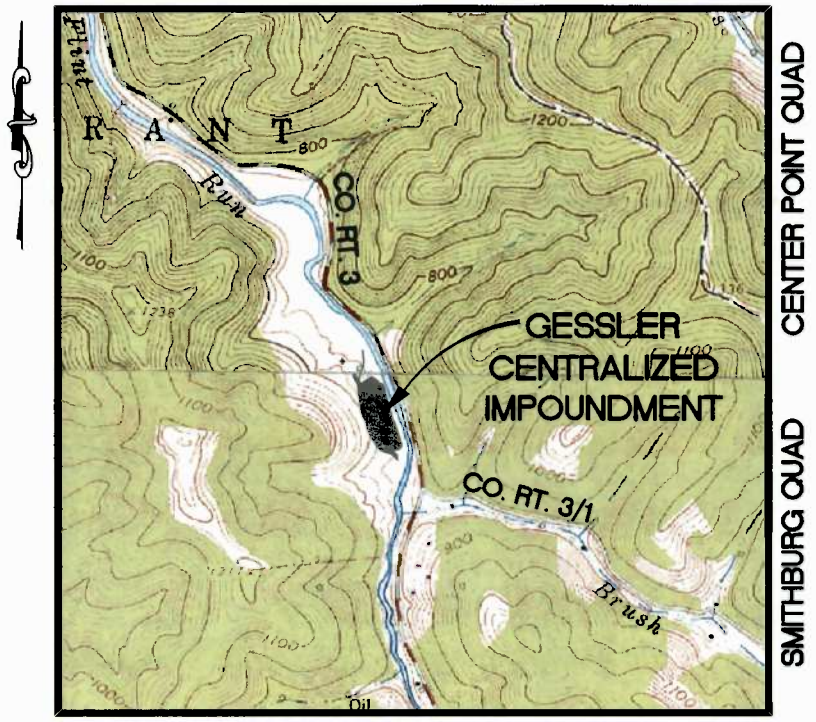
FLOODPLAIN ANAYLSIS OF
FLINT RUN
GESSLER CENTRALIZED IMPOUNDMENT



VICINITY MAP
1" = 2,000'

NAVITUS
ENGINEERING INC.

151 Windy Hill Lane
Winchester, VA 22602
Telephone: (888) 662-4185
www.navituseng.com

Engineering • Survey • Environmental • GIS

Prepared For:
EQT Production Company
115 Professional Place
P.O. Box 280
Bridgeport, WV 26330

Contact:
Victoria J. Roark
Permitting Supervisor
(304) 848-0076

Designed By:
Navitus Engineering Inc.

Project Manager:
Cyrus Kump, PE
ckump@navituseng.com

CYRUS S. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

Surface Owner (s)
Eric S. & Shirley Gessler
HC 67 Box 81
West Union, WV 26456

Tax Parcel:
Map 2 Parcel 11
Deed Book 282 Page 406

Location:
Grant District, Doddridge County
West Virginia

Revised: February 1, 2013
Date: November 20, 2012

FN# 7838

NAVITUS
ENGINEERING INC.

151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185

November 20, 2012 - Revised February 1, 2013

Smith Land Surveying
226 West Main Street
Glenville, WV 26351

Attn: Thomas Meeks

Re: Gessler Centralized Impoundment Floodplain Analysis

Dear Mr. Meeks:

Navitus Engineering has completed a floodplain analysis of the proposed Gessler Centralized Impoundment site adjacent to Flint Run and located south of Little Pittsburgh, along County Route 3 in Doddridge County, West Virginia. This site is located within a FEMA Flood Zone A, as shown on the Flood Insurance Rate Maps (FIRM) from the National Flood Insurance Program (NFIP), Map Numbers 54017C0040C and 54017C0130C, dated October 4, 2011. Being that the site is located in a Flood Zone A, base flood elevations for this area have not been established and no detailed study information was found in the Flood Insurance Study for Doddridge County, dated October 4, 2011.

In order to establish base flood elevations for this site, a hydrologic and hydraulic analysis was preformed as outlined in the current Doddridge County Floodplain Ordinance, enacted September 21, 2011. Using field shot data, 5' County topo, and information taken from USGS 7.5 Minute Series Topographic Maps, a drainage analysis was performed for the Flint Run drainage shed. Upon establishing the peak flow drainage calculations for the 100-year storm event, a HEC-RAS river analysis was conducted for a section of Flint Run adjacent to the proposed Gessler Centralized Impoundment development area and Base Flood Elevations (BFE) were established. The resulting BFEs were used to establish adjusted floodplain boundaries for the segment of Flint Run being studied. These boundaries are shown on the attached Floodplain Exhibit of this development site. In addition to establishing BFEs, a proposed conditions analysis was performed to determine the impacts of the proposed impoundment grading. The proposed impoundment grading was added into the cross sections and the manning's "n" values were adjusted. The model was run with these changes to determine the impacts of the proposed impoundment. The results of this analysis indicate that the proposed impoundment will cause a maximum increase of 0.21' in the BFEs in this area and no upstream or downstream properties will be impacted.

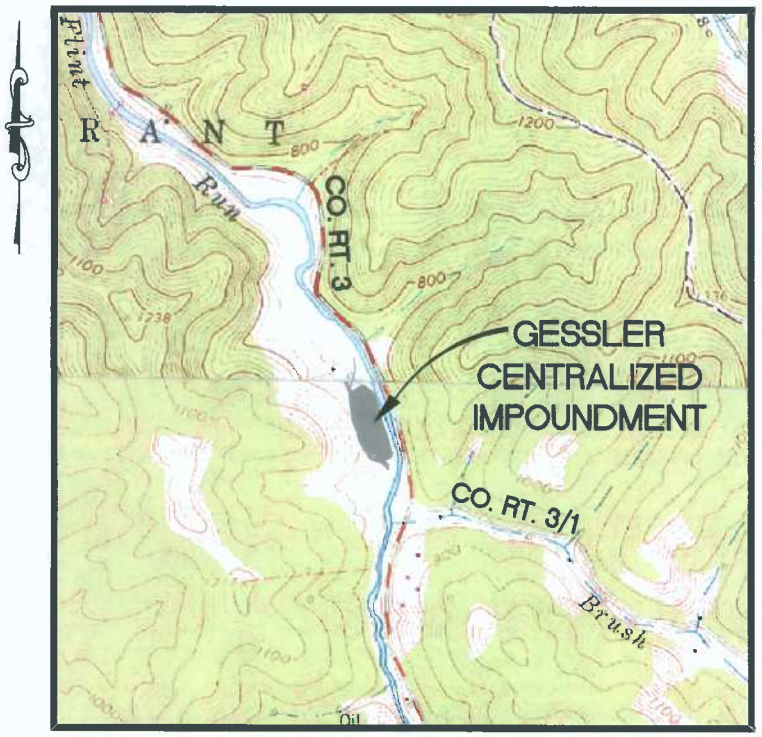
Attached is a report documenting the methods used for the Floodplain Analysis. The report contains drainage computations, cross sections, and a narrative to describe the analysis. Also attached are exhibits that identify the existing and proposed 100-year floodplain. The Gessler Centralized Impoundment site plan, prepared by Navitus Engineering, Inc., includes additional site design and construction specifications. Please let me know if you should need additional information. You can reach me by phone (888) 662-4185 or email: ckump@navituseng.com.

Sincerely,
Navitus Engineering, Inc.

Cyrus S. Kump, PE

FLOODPLAIN ANAYLSIS OF
FLINT RUN

GESSLER CENTRALIZED IMPOUNDMENT



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Tax Parcel:
Map 2 Parcel 11
Deed Book 282 Page 406

Location:
Grant District, Doddridge County
West Virginia

Revised: February 1, 2013
Date: November 20, 2012

FN# 7838

1. Objective

The objective of this floodplain analysis was to establish boundaries for the existing and proposed conditions of the 100 year base flood elevations within the proposed centralized impoundment. A 100 year floodplain boundary will be established from these base flood elevations for both conditions.

2. Existing Conditions

2.1. Property Description

This site is located in Doddridge County, West Virginia along Flint Run and County Route 3 just south of Little Pittsburgh. The proposed access road entrance is located along County Route 3.

2.2. Floodplain Delineation

The approximate limit of the 100-year floodplain (a flood event that has a 1% chance of being equaled or exceeded in any given year) is shown on FEMA Flood Insurance Rate Map (FIRM) for Doddridge County on panels 54017C0040C and 54017C0130C effective October 4, 2011. This floodplain is located in zone designation "A" and no base flood elevations have been established.

2.3. Floodplain Ordinance

This site is administered under the Doddridge County Floodplain Ordinance. Per Section 4.4 of the ordinance, when a site is located in FEMA Zone designation "A" the applicant is required to determine the elevation above which the development will be reasonably safe from flooding using hydrologic and hydraulic analyses or other techniques. Per Section 6.1.H a flood protection setback equal to twice the width of the watercourse channel measuring from the top of one bank to the top of the opposite bank or 50 feet, whichever is less, shall be maintained from the top of the banks of all watercourses.

2.4. Flint Run Characteristics

Flint Run is located in the Grant District of Doddridge County and flows in a northern direction. The drainage area flowing to Flint Run is approximately 12,284 acres of forested and agricultural land with an average basin slope of 24.7%.

3. Analysis Information

3.1. HEC-RAS

A HEC-RAS hydraulic analysis was performed for the portion of the Flint Run that has an impact on the BFE's across the property. A portion of Brush Run was also modeled to

properly determine the BFEs on site, due to the proximity of the site and the confluence of Flint Run and Brush Run. HEC-RAS is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. The steady flow system is designed for applications in floodplain management and flood insurance studies.

3.2. Analysis Limits

The analysis information is based upon a combination of two foot interval field shot and five foot interval GIS topography. The upstream analysis limit for Flint Run is located approximately 2,886 feet upstream from the proposed impoundment site and represents the 53+48.412 section. The downstream analysis limit for Flint Run is located approximately 1,460 feet downstream of the proposed impoundment site and represents the 10+00.000 section. The upstream analysis limit for Brush Run is located approximately 1,011 feet upstream from the confluence of Brush Run and Flint Run and represents the 20+11.333 section. The downstream analysis limit for Brush Run is located at the confluence of Brush Run and Flint Run and represents the 40+52.349 section. These limits were selected so that the HEC-RAS model would accurately determine the base flood elevations on site and off site.

3.3. Flow Data

The TR-55 SCS method was used to formulate 100-year peak flow data for Flint Run and Brush Run. The drainage areas were determined using 5-foot interval topography for the drainage shed. Soils types of the drainage area were found using USDA soil maps. The majority of the drainage areas were determined to have soils mostly in hydrologic soils group C. The time of concentration for the drainage areas were calculated using the SCS lag method. See the table below for a summary of the flow conditions, and see Supplement 1 for the complete Drainage Computations.

Stream	**Drainage Area**	**Flow**	**Note**
Flint Run	11,287.5 Ac.	7,165.3	Upper Reach
Brush Run	996.5 Ac.	1,553.5	
Flint Run	12,284.0 Ac.	7,411.7	Lower Reach

3.4. Cross Section Data

The cross sections were employed at significant changes in site features. This includes major bends in the stream channel, areas of major contraction and expansion of the floodplain area, upstream and downstream of existing culverts, and at building obstructions. Field run 2-foot interval topography was used within the project area to help refine the cross sectional information through the site.

3.5. Manning's n-value

The channel and overbank areas were assigned manning's n-values based on photographs and close inspection of existing aerial photography. The chart below describes the manning's n values used in this study.

Manning's n value	Description	Portion Used
.1	Heavy stand of timber, few down trees, little undergrowth, flow below branches	Floodplains
.035	Clean, straight, full, no rifts or deep pools with more stones and weeds	Main Channel
.035	High grass	Floodplains
.02	Gravel	Gravel Road
.05	Scattered brush, heavy weeds	Floodplains
.04	Mature Field Crops	Floodplains
.03	Short Grass	Impoundment Site Grading

1. Results

1.1. Existing Conditions

Since the site is in Zone "A" floodplain area as shown on the FIRM, the existing condition model was based on existing topography and drainage computations. This information was processed in HEC-RAS to determine the existing conditions of the Base Flood Elevations.

1.2. Proposed Conditions

The proposed conditions model was based on the proposed topography for the centralized impoundment. This information was added into the existing conditions cross sections, and then was processed in HEC-RAS to determine the proposed conditions of the Base Flood Elevations. Below is a table showing the existing and proposed BFEs at the various cross sections. As shown in the table, the proposed development will decrease the existing BFEs at multiple cross sections through the project area.

SUMMARY OF COMPUTED ELEVATIONS				
CROSS SECTION STATION	RIVER NAME	100 YEAR BASE FLOOD ELEVATION		
		EXISTING CONDITIONS MODEL	PROPOSED CONDITIONS MODEL	DIFFERENCE
5348.412	FLINT RUN	767.24	767.24	0.00
4587.709	FLINT RUN	766.04	766.04	0.00
4327.913	FLINT RUN	764.07	764.07	0.00
4052.349	FLINT RUN	764.76	764.76	0.00
3910.912	FLINT RUN	764.81	764.81	0.00
3710.271	FLINT RUN	762.00	762.01	+ 0.01
3270.325	FLINT RUN	761.95	761.96	+ 0.01
3218.798	FLINT RUN	761.89	761.89	0.00
3143.198	FLINT RUN	760.82	760.77	- 0.05
2861.250	FLINT RUN	760.03	760.19	+ 0.16
2579.076	FLINT RUN	759.94	759.87	- 0.07
2476.907	FLINT RUN	759.89	759.88	- 0.01
2422.446	FLINT RUN	758.15	758.10	- 0.05
2355.763	FLINT RUN	756.94	756.94	0.00
2314.880	FLINT RUN	756.95	756.92	- 0.03
2223.643	FLINT RUN	756.81	756.82	+ 0.01
2185.764	FLINT RUN	756.75	756.81	+ 0.06
2075.488	FLINT RUN	756.47	756.47	0.00
2035.918	FLINT RUN	756.63	756.63	0.00
1996.533	FLINT RUN	756.24	756.24	0.00
1720.640	FLINT RUN	754.92	754.92	0.00
1407.321	FLINT RUN	753.75	753.75	0.00
1000.000	FLINT RUN	752.41	752.41	0.00
2011.333	BRUSH RUN	777.24	777.24	0.00
1507.212	BRUSH RUN	768.38	768.38	0.00

2. Conclusion

The results of this floodplain analysis indicate that there will be minimal changes in the 100 year base flood elevation and no impacts to upstream and downstream properties along Flint Run. The largest increase in base flood elevation is 0.16' and is located on site.

APPENDIX

Exhibit A	FIRM Panel 54017C0040C
Exhibit B	FIRM Panel 54017C0130C
Exhibit C	Overall Plan
Exhibit D	Existing Conditions Plan
Exhibit E	Proposed Conditions Plan
Supplement 1	Drainage Computations
Supplement 2	HEC-RAS Analysis –Existing Conditions Summary w/ Cross Sections
Supplement 3	HEC-RAS Analysis –Proposed Conditions Summary w/ Cross Sections

Exhibit A

FIRM Panel 54017C0040C

JOINS PANEL 0130

MAP SCALE 1" = 1000'

500 0 1000 2000

FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0040C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 40 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0040	C

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.

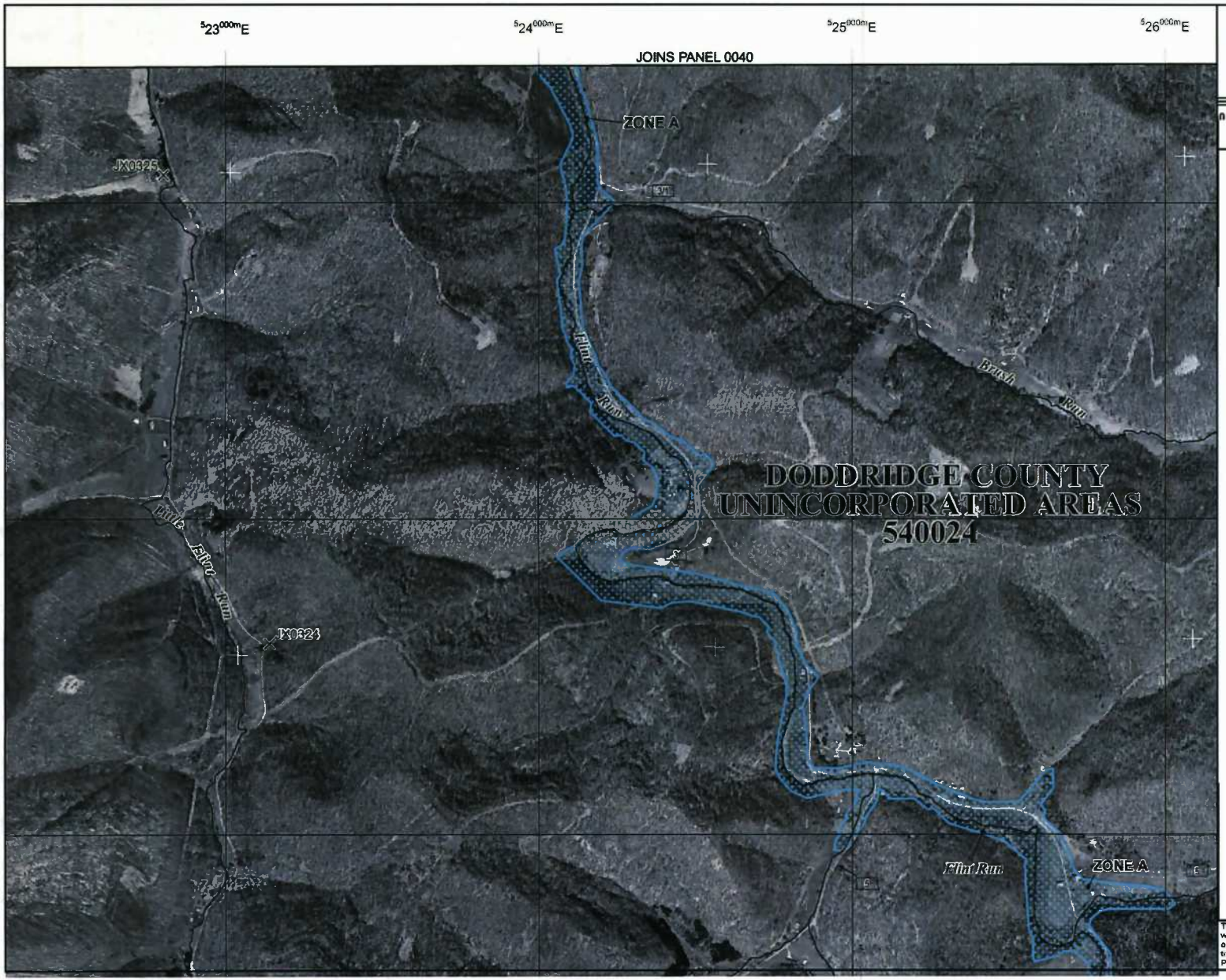
MAP NUMBER
54017C0040C

MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

Exhibit B

FIRM Panel 54017C0130C



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

0 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0130C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 130 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0130	C

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.

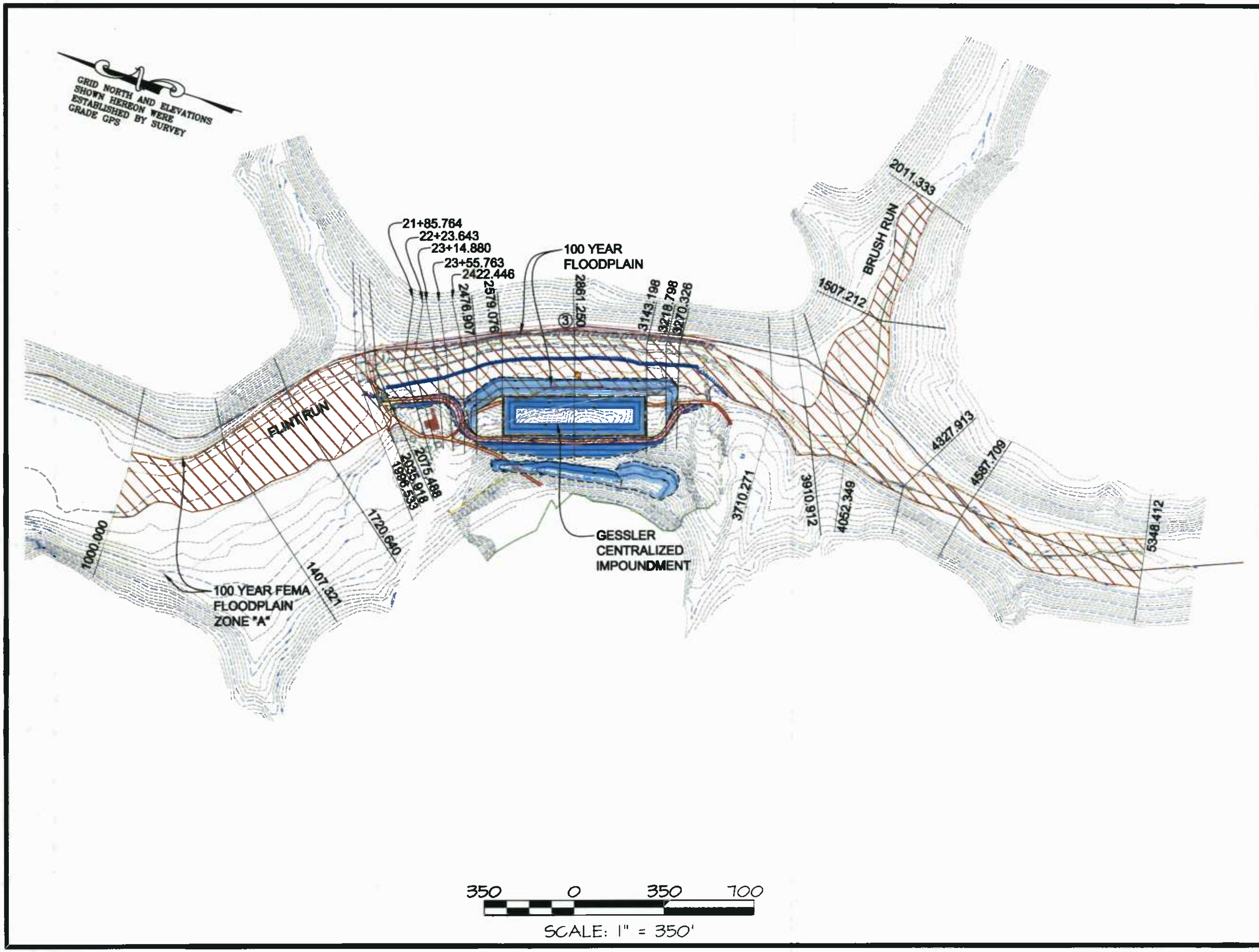
MAP NUMBER
54017C0130C

MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

Exhibit C

Overall Plan



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PROFESSIONAL SURVEYING AND ENVIRONMENTAL SERVICES
P.O. Box 150
226 W. Main Street
Glenville, WV 26351

CYRUS S. KUMP
REGISTERED
19576
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
02/01/2013

THIS DOCUMENT WAS PREPARED BY: NAVITUS ENGINEERING INC FOR: EQT PRODUCTION COMPANY

OVERALL PLAN

GESSLER CENTRALIZED IMPOUNDMENT

GRANT DISTRICT
DODDRIDGE COUNTY, WV

SHEET 1 OF 3

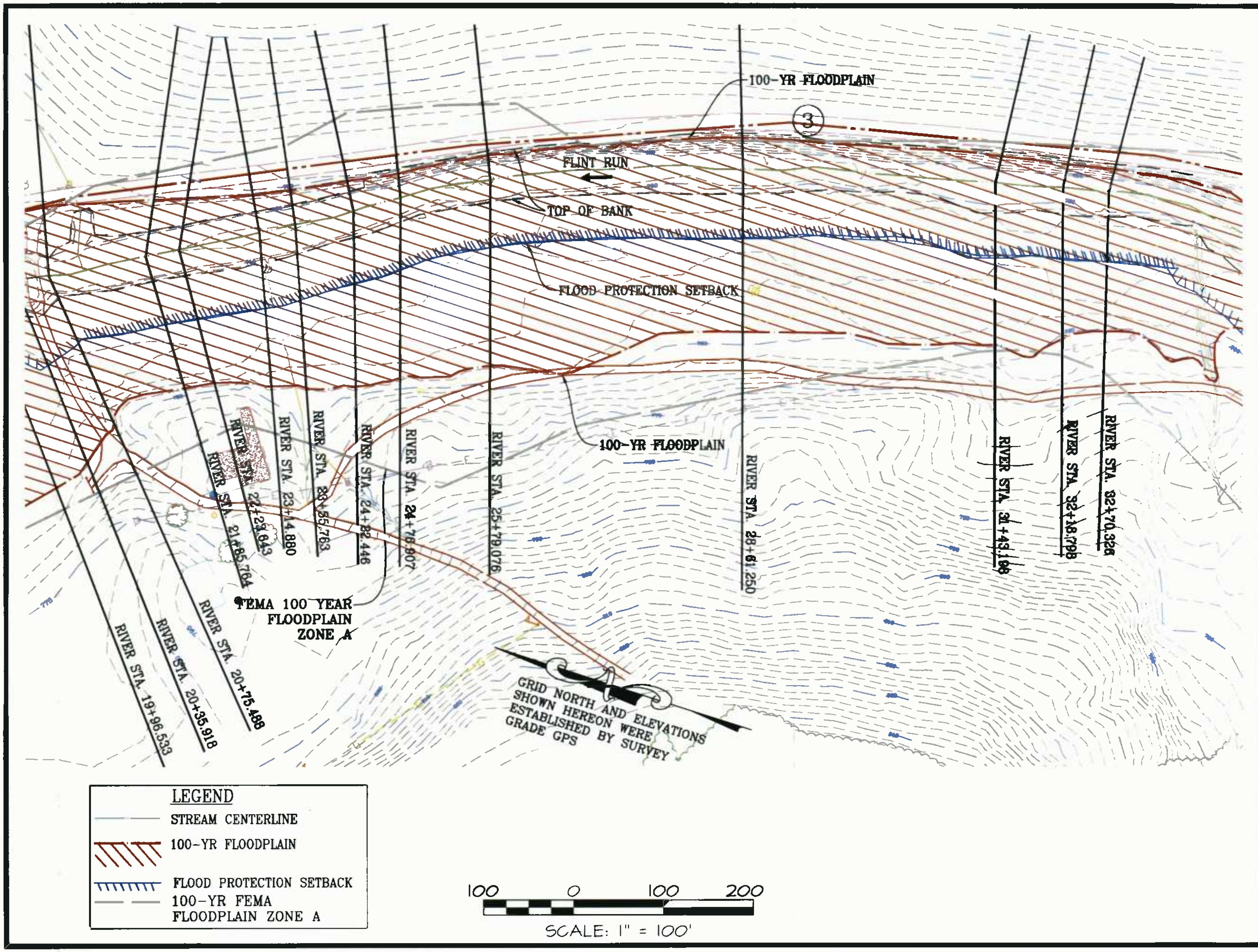
GESSLER
JOB NO. 7838

DATE: 02/01/13

SCALE: 1" = 350'

Exhibit D

Existing Conditions Plan



NAVITUS ENGINEERING INC.

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SLS SMITH LAND SURVEYING INC
PROFESSIONAL SURVEYING AND ENVIRONMENTAL SERVICES

CYRUS S. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
02/01/2013

THIS DOCUMENT WAS PREPARED BY: NAVITUS ENGINEERING INC FOR: EQT PRODUCTION COMPANY

EXISTING CONDITIONS PLAN

GESSLER
CENTRALIZED IMPOUNDMENT
GRANT DISTRICT
DODDRIDGE COUNTY, WV

SHEET 2 OF 3

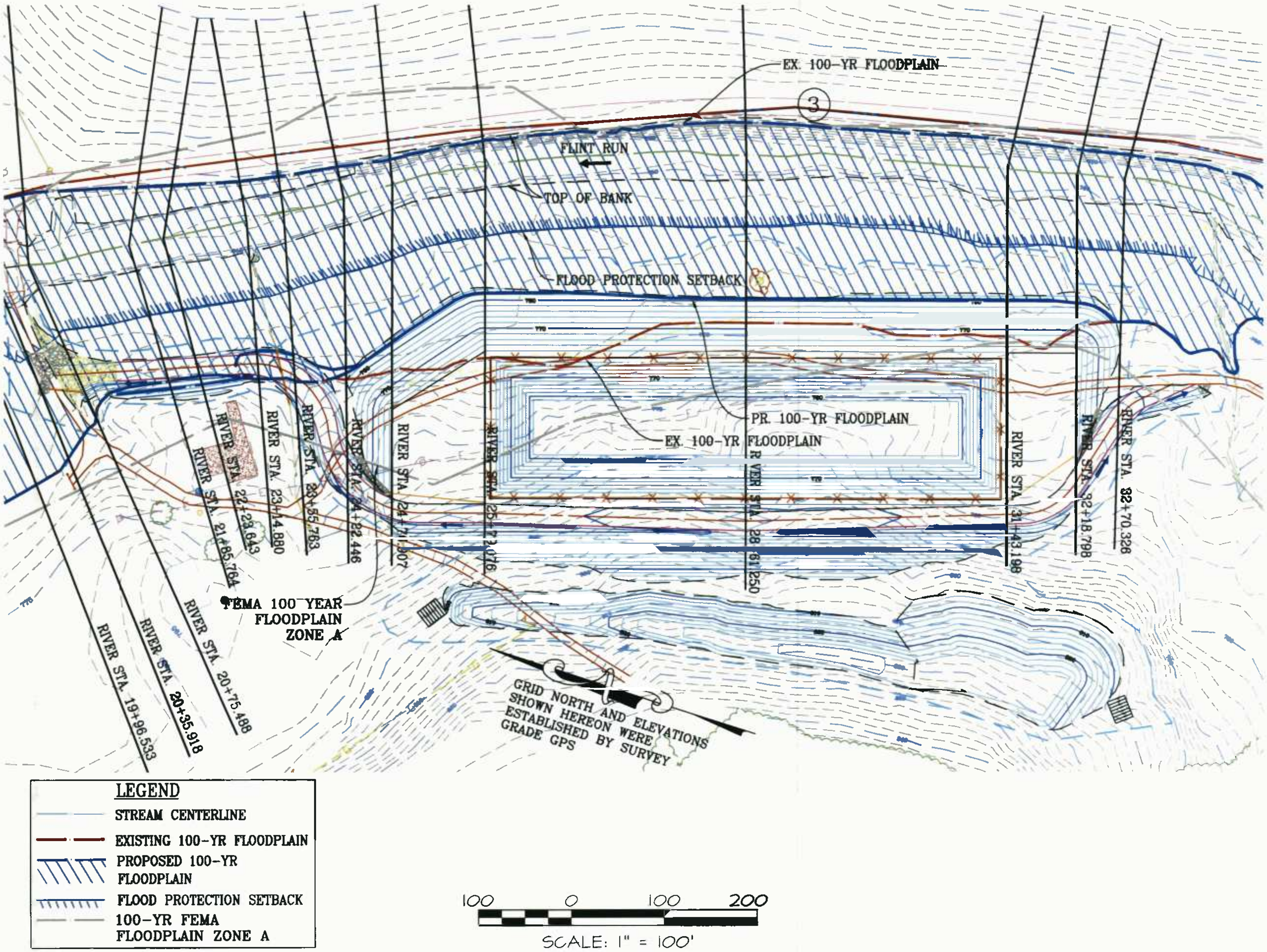
GESSLER
JOB NO. 7838

DATE: 02/01/13

SCALE: 1" = 100'

Exhibit E

Proposed Conditions Plan



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PROFESSIONAL ENGINEER
02/01/2013

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PROPOSED CONDITIONS PLAN

GESSLER CENTRALIZED IMPOUNDMENT

GRANT DISTRICT
DODDRIDGE COUNTY, WV

SHEET 3 OF 3

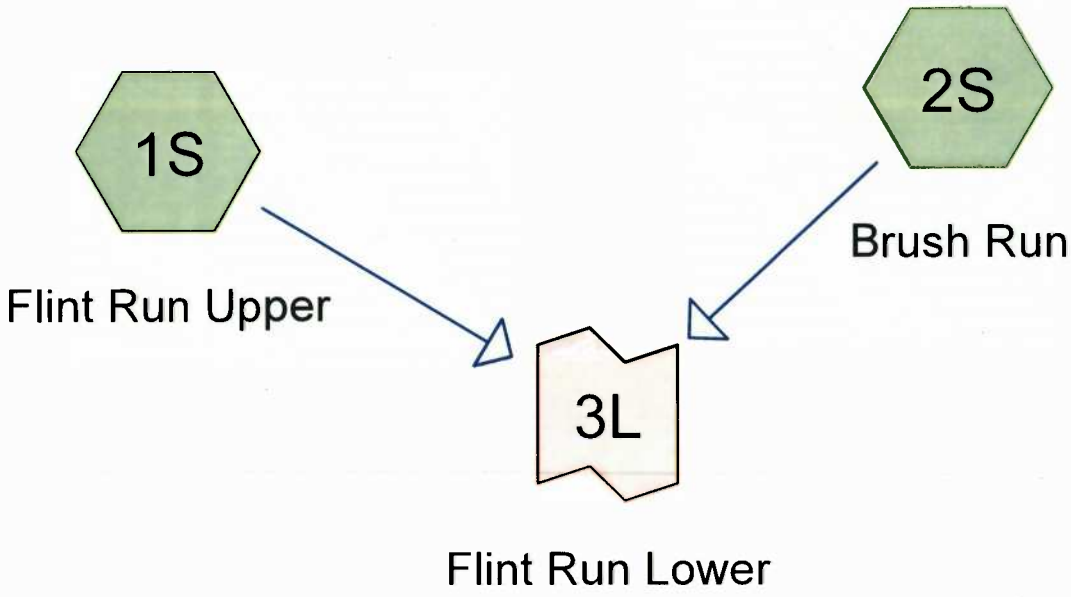
GESSLER
JOB NO. 7838

DATE: 02/01/13

SCALE: 1" = 100'

Supplement 1

Drainage Computations



Subcat Reach Pond Link

Routing Diagram for Gessler
Prepared by Windows User, Printed 10/8/2012
HydroCAD® 10.00 s/n M28119 © 2012 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12,284.020	73	(1S, 2S)
12,284.020	**73**	**TOTAL AREA**

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Flint Run Upper Runoff Area=11,287.500 ac 0.00% Impervious Runoff Depth=2.59"
Flow Length=56,749' Slope=0.3640 '/' Tc=163.8 min CN=73 Runoff=7,165.30 cfs 2,436.375 af

Subcatchment2S: Brush Run Runoff Area=996.520 ac 0.00% Impervious Runoff Depth=2.59"
Flow Length=12,758' Slope=0.3620 '/' Tc=49.8 min CN=73 Runoff=1,553.54 cfs 215.096 af

Link 3L: Flint Run Lower Inflow=7,411.70 cfs 2,651.471 af
Primary=7,411.70 cfs 2,651.471 af

Total Runoff Area = 12,284.020 ac Runoff Volume = 2,651.471 af Average Runoff Depth = 2.59"
100.00% Pervious = 12,284.020 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Flint Run Upper

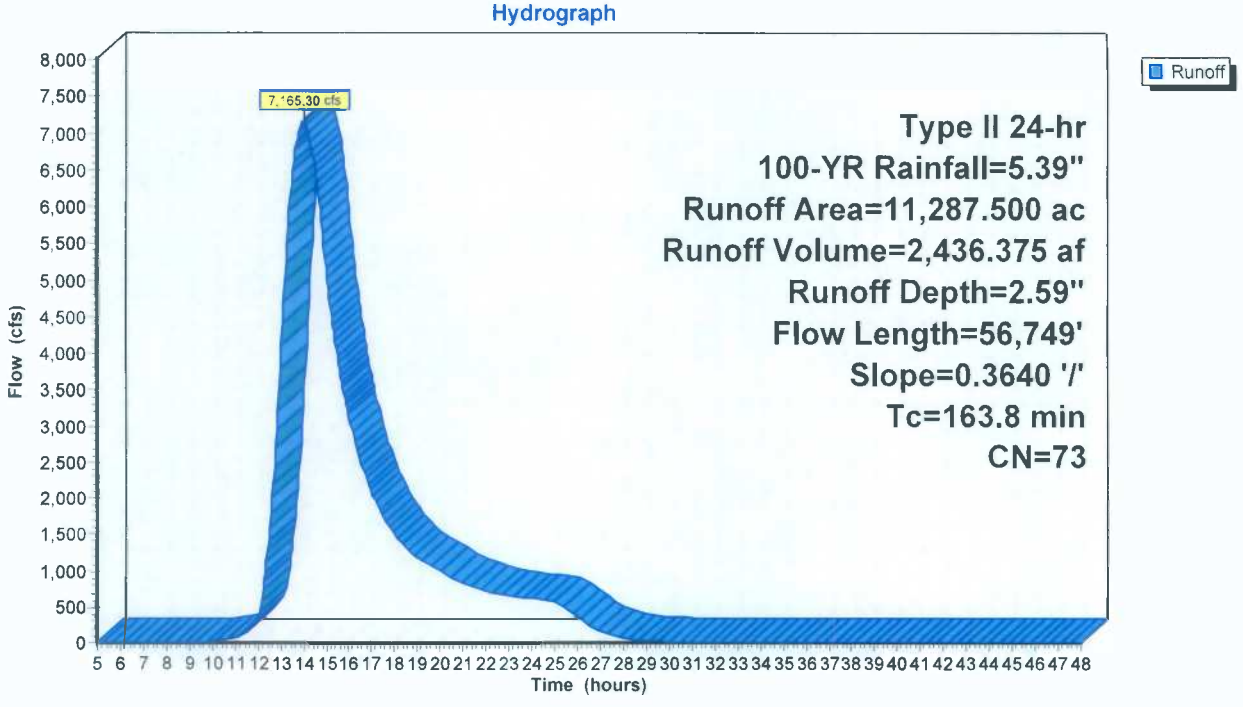
Runoff = 7,165.30 cfs @ 14.01 hrs, Volume= 2,436.375 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.39"

Area (ac)	CN	Description
* 11,287.500	73	
11,287.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
163.8	56,749	0.3640	5.78		**Lag/CN Method, DA1**

Subcatchment 1S: Flint Run Upper



Summary for Subcatchment 2S: Brush Run

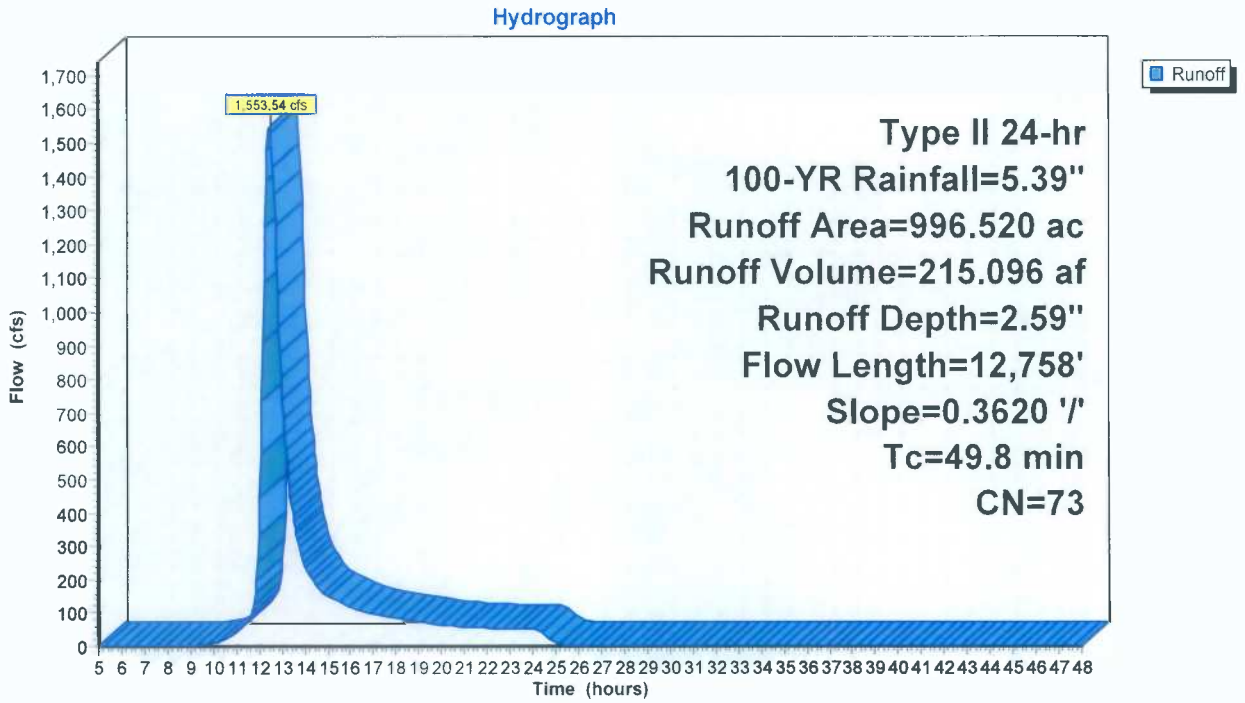
Runoff = 1,553.54 cfs @ 12.50 hrs, Volume= 215.096 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=5.39"

	Area (ac)	CN	Description
*	996.520	73	
	996.520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.8	12,758	0.3620	4.27		**Lag/CN Method, DA 2**

Subcatchment 2S: Brush Run

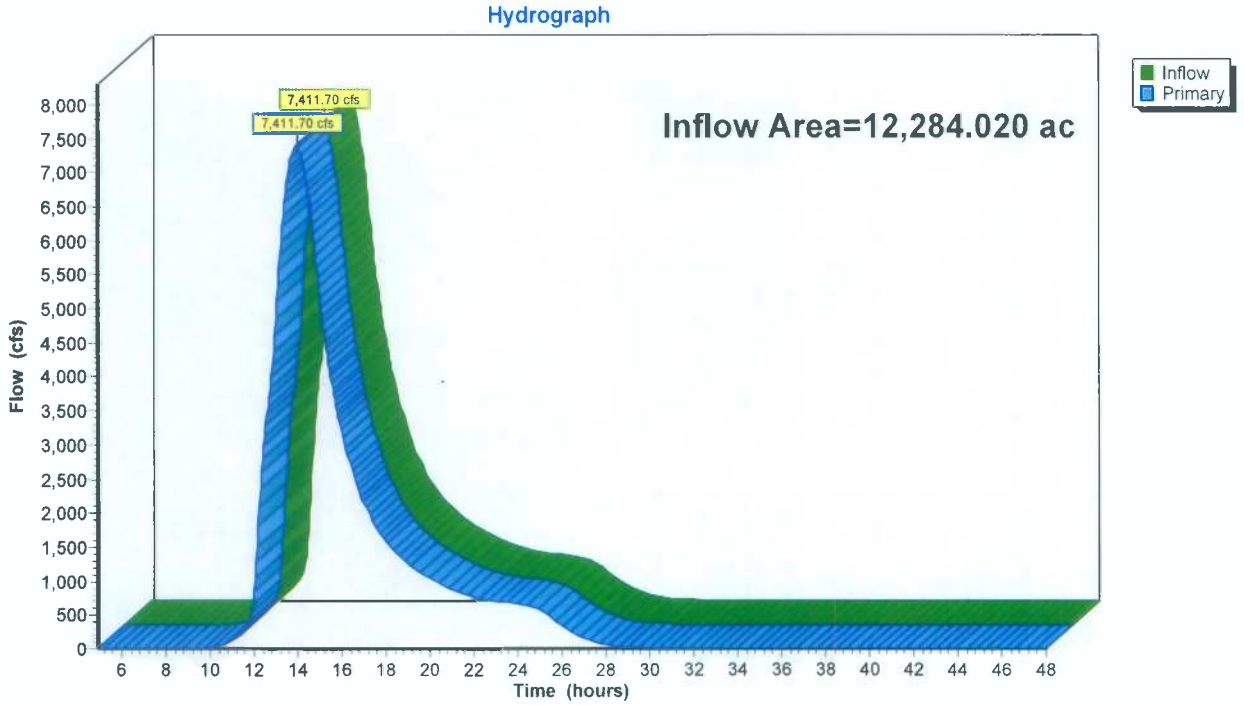


Summary for Link 3L: Flint Run Lower

Inflow Area = 12,284.020 ac, 0.00% Impervious, Inflow Depth = 2.59" for 100-YR event
Inflow = 7,411.70 cfs @ 14.00 hrs, Volume= 2,651.471 af
Primary = 7,411.70 cfs @ 14.00 hrs, Volume= 2,651.471 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Flint Run Lower



Supplement 2

HEC-RAS Analysis –Existing Conditions Summary w/ Cross Sections

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

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

PROJECT DATA
Project Title: Gessler Final
Project File : GesslerFinal.prj
Run Date and Time: 2/1/2013 7:47:44 AM

Project in English units

Project Description:
Flint Run Existing Drainage - 100yr

PLAN DATA

Plan Title: Existing
Plan File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.p05

Geometry Title: Flint Run Existing
Geometry File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.g01

Flow Title : Flint Run
Flow File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.f01

Plan Summary Information:

Number of: Cross Sections	=	25	Multiple Openings	=	0
Culverts	=	1	Inline Structures	=	0
Bridges	=	1	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: Subcritical Flow

FLOW DATA

Flow Title: Flint Run
Flow File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.f01

Flow Data (cfs)

River	Reach	RS	100-yr
Brush Run	Reach 1	2011.333	1554
Flint Run	Lower	4052.349	7412
Flint Run	Upper	5348.411	7165

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Brush Run	Reach 1	100-yr	Normal S = 0.02	
Flint Run	Upper	100-yr	Normal S = 0.0028	
Flint Run	Lower	100-yr		Normal S = 0.0028

GEOMETRY DATA

Geometry Title: Flint Run Existing
Geometry File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Brush Run	Reach 1		Flint/Brush
Flint Run	Upper		Flint/Brush

Flint Run Lower Flint/Brush

JUNCTION INFORMATION

Name: Flint/Brush
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Flint Run	Upper	to Flint Run	Lower	271.11	0
Brush Run	Reach 1	to Flint Run	Lower	0	0

CROSS SECTION

RIVER: Brush Run
REACH: Reach 1 RS: 2011.333

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.15	820	25.84	815	38.21	810	50.42	805
62.38	800	73.77	795	85.55	790	98.37	785	112.22	780
152.85	775	164.2	774.43	192.7	774.25	196.77	772.8	200.7	774.25
214.97	775	231.99	780	232.62	780.27	243.56	785	254.04	790
264.52	795	274.85	800	286.88	805	300.37	810	314.46	815
328.19	820	342.09	825						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	192.7	.035	200.7	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
192.7	200.7	530.52	498.55	409.24	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	778.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.18	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	777.24	Reach Len. (ft)	530.52	498.55	409.24
Crit W.S. (ft)	777.24	Flow Area (sq ft)	131.86	29.74	45.92
E.G. Slope (ft/ft)	0.012925	Area (sq ft)	131.86	29.74	45.92
Q Total (cfs)	1554.00	Flow (cfs)	1097.60	330.65	125.76
Top Width (ft)	87.98	Top Width (ft)	58.08	8.00	21.90
Vel Total (ft/s)	7.49	Avg. Vel. (ft/s)	8.32	11.12	2.74
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)	2.27	3.72	2.10
Conv. Total (cfs)	13668.7	Conv. (cfs)	9654.3	2908.3	1106.1
Length Wtd. (ft)	507.85	Wetted Per. (ft)	58.23	8.51	22.25
Min Ch El (ft)	772.80	Shear (lb/sq ft)	1.83	2.82	1.67

Alpha	1.35	Stream Power (lb/ft s)	342.09	0.00	0.00
Frctn Loss (ft)	6.25	Cum Volume (acre-ft)	1.45	0.42	0.57
C & E Loss (ft)	0.01	Cum SA (acres)	0.66	0.10	0.23

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: Brush Run
REACH: Reach 1 RS: 1507.212

INPUT
Description:
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.46	820	26.15	815	38.91	810	52.5	805
66.14	800	79.79	795	93.18	790	106.62	785	121.37	780
147.73	775	200	770	220.39	768.22	257.2	765	268.2	764.5
273.24	763.58	278.2	764.5	292.38	765	312.6	770	325.34	774.15
327.95	775	342.48	780	357.11	785	375.04	790	394.75	795
416.88	800	439.08	805	460.07	810	481.91	815	502.95	820
524.75	825								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	268.2	.035	278.2	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
268.2	278.2	101.38	496.45	893.29	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	769.63	Element			
Vel Head (ft)	1.25	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	768.38	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	768.38	Flow Area (sq ft)	105.48	43.45	74.71
E.G. Slope (ft/ft)	0.011714	Area (sq ft)	105.48	43.45	74.71
Q Total (cfs)	1554.00	Flow (cfs)	798.70	525.74	229.57
Top Width (ft)	87.57	Top Width (ft)	49.70	10.00	27.87
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)	7.57	12.10	3.07

Max Chl Dpth (ft)	4.80	Hydr. Depth (ft)	2.12	4.34	2.68
Conv. Total (cfs)	14358.1	Conv. (cfs)	7379.5	4857.5	2121.1
Length Wtd. (ft)	0.00	Wetted Per. (ft)	49.86	10.17	28.29
Min Ch El (ft)	763.58	Shear (lb/sq ft)	1.55	3.13	1.93
Alpha	1.67	Stream Power (lb/ft s)	524.75	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)			
C & E Loss (ft)	0.24	Cum SA (acres)			

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: Flint Run
REACH: Upper RS: 5348.411

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	840	1.72	839.54	20.54	835	24.75	833.8	36.88	830
51.38	825.46	55.35	824.2	67.57	820	73.13	817.69	79.16	815
84.47	812.57	90.58	810	97.49	806.98	101.8	805	106.69	802.5
110.69	800	115.05	796.83	117.97	795	122.72	791.65	125.34	790
130.32	786.47	132.65	785	135.2	783.3	146.28	775.4	147.14	775
158.66	770.79	160.42	770	174.03	765.42	174.99	765	180.62	763.23
181.36	763	192.5	760	222.27	755.17	223.26	755	230.93	753.25
235.85	755	269.45	758.27	280.96	759.23	290.29	760	326.78	762.1
365.08	765	372.98	766.67	386.11	770	396.48	774.04	398.32	775
406.94	779.55	407.8	780	416.8	784.76	417.27	785	426.65	789.96
426.73	790	428.71	791.05	436.09	795	444.41	799.48	445.39	800
446.08	800.36	454.72	805	455.78	805.56	464.06	810	465.51	810.76
473.44	815	475.26	815.96	482.89	820	485.06	821.16	492.3	825
494.85	826.36	501.72	830						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	192.5	.035	290.29	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
192.5	290.29	580.67	714.22 806.06	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	767.86	Element			
Vel Head (ft)	0.62	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	767.24	Reach Len. (ft)	580.67	714.22	806.06
Crit W.S. (ft)		Flow Area (sq ft)	91.45	989.74	378.91
E.G. Slope (ft/ft)	0.001126	Area (sq ft)	91.45	989.74	378.91
Q Total (cfs)	7165.00	Flow (cfs)	108.35	6546.35	510.30
Top Width (ft)	206.60	Top Width (ft)	23.88	97.79	84.94
Vel Total (ft/s)	4.91	Avg. Vel. (ft/s)	1.18	6.61	1.35
Max Chl Dpth (ft)	13.99	Hydr. Depth (ft)	3.83	10.12	4.46
Conv. Total (cfs)	213540.1	Conv. (cfs)	3229.1	195102.5	15208.6
Length Wtd. (ft)	718.22	Wetted Per. (ft)	24.97	98.92	85.35
Min Ch El (ft)	753.25	Shear (lb/sq ft)	0.26	0.70	0.31
Alpha	1.67	Stream Power (lb/ft s)	501.72	0.00	0.00
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	4.85	23.53	7.54
C & E Loss (ft)	0.03	Cum SA (acres)	0.45	1.90	1.55

CROSS SECTION

RIVER: Flint Run
REACH: Upper RS: 4587.709

INPUT
Description:
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	840	16.28	837.87	44.55	835	50.03	834.1	70.49	830
71.13	829.87	74.8	828.94	89.92	825	92.85	824.16	107.23	820
117.17	816.98	122.54	815	133.88	811.31	137.46	810	141.29	808.34
149.13	805	155.07	802.08	159.98	800	166.69	796.65	170.66	795
180.52	790	183.16	788.77	190.93	785	201.31	780.39	202.06	780
212.06	775.62	213.49	775	213.71	774.92	226.49	770	234.57	767.82
245	765	252.1	763.08	253.44	762.72	257.73	761.49	262.92	760
300	751.5	307.31	751.12	310	751.6	339.98	758.49	350.45	759.54
355.56	760	359.38	760.46	365.09	761.16	399.99	765	402.3	765.98
415.29	770	427.45	774.34	428.94	775	430.68	775.78	438.45	780
442.51	782.05	447.95	785	452.55	787.32	457.52	790	462.66	792.58
467.15	795	472.85	797.85	476.81	800	483.08	803.12	486.55	805
493.4	808.4	496.37	810	503.81	813.67	506.28	815	514.29	818.95
516.32	820	524.84	824.23	526.34	825	535.44	829.51	536.39	830

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.92	.035	339.98	.1

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

262.92 339.98 165.19 259.78 200.58 .1 .3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	766.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	766.04	Reach Len. (ft)	165.19	259.78	200.58
Crit W.S. (ft)		Flow Area (sq ft)	64.85	858.62	262.45
E.G. Slope (ft/ft)	0.001406	Area (sq ft)	64.85	858.62	262.45
Q Total (cfs)	7165.00	Flow (cfs)	72.94	6713.88	378.19
Top Width (ft)	161.36	Top Width (ft)	21.78	77.06	62.53
Vel Total (ft/s)	6.04	Avg. Vel. (ft/s)	1.12	7.82	1.44
Max Chl Dpth (ft)	14.92	Hydr. Depth (ft)	2.98	11.14	4.20
Conv. Total (cfs)	191110.0	Conv. (cfs)	1945.5	179077.3	10087.3
Length Wtd. (ft)	255.72	Wetted Per. (ft)	22.60	78.86	63.09
Min Ch El (ft)	751.12	Shear (lb/sq ft)	0.25	0.96	0.37
Alpha	1.57	Stream Power (lb/ft s)	536.39	0.00	0.00
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	3.80	8.38	1.61
C & E Loss (ft)	0.12	Cum SA (acres)	0.14	0.47	0.19

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.

CROSS SECTION

RIVER: Flint Run
REACH: Upper RS: 4327.913

INPUT
Description:
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	833.82	19.57	830.26	21.04	830	21.99	829.86	47.76	825
48.22	824.91	50.72	824.4	68.17	820.98	73.18	820	78.14	818.92
96.27	815	114.35	810.94	116.96	810	126.97	806.39	127.89	805.99
130.7	805	140.29	801.4	144.1	800	147.74	798.78	158.49	795
160.48	794.34	171.07	790	179.16	786.84	183.7	785	188.85	782.97
196.53	780	209.11	775.55	210.65	775	218.43	773.03	231.45	770
262.46	765.7	268.7	765	290.32	762.84	326.29	760	330.65	759.71
335.69	759.38	359.73	757.01	380.75	755	394.73	755	410.28	758.76
414.93	760	418.46	760.97	432.73	765	446.67	772.66	468.61	784.7
469.11	785	469.23	785.07	477.23	790	477.75	790.22	485.38	795
485.72	795.15	501.33	804.99	501.35	805	501.39	805.02	502.19	805.53
509.35	810	527.85	814.53	529.88	815	551.4	819.56	552.97	820
553.92	820.47	564.75	825	565.92	825.57	576.46	830	577.84	830.68
580.09	831.63								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	330.65	.035	410.28	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
330.65	410.28	783.59	271.11	224.1	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.17	Element			
Vel Head (ft)	2.10	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	764.07	Reach Len. (ft)	271.11	271.11	271.11
Crit W.S. (ft)	763.25	Flow Area (sq ft)	121.06	571.85	51.40
E.G. Slope (ft/ft)	0.005757	Area (sq ft)	121.06	571.85	51.40
Q Total (cfs)	7165.00	Flow (cfs)	237.36	6818.41	109.23
Top Width (ft)	151.37	Top Width (ft)	52.60	79.63	19.14
Vel Total (ft/s)	9.63	Avg. Vel. (ft/s)	1.96	11.92	2.12
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	2.30	7.18	2.69
Conv. Total (cfs)	94431.1	Conv. (cfs)	3128.3	89863.2	1439.5
Length Wtd. (ft)	271.11	Wetted Per. (ft)	52.78	80.30	19.86
Min Ch El (ft)	755.00	Shear (lb/sq ft)	0.82	2.56	0.93
Alpha	1.46	Stream Power (lb/ft s)	580.09	0.00	0.00
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	3.45	4.11	0.89
C & E Loss (ft)	0.50	Cum SA (acres)			

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: Flint Run
REACH: Lower RS: 4052.349

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	12.51	820	27.22	815	41.83	810	53.13	805
64.15	800	76.03	795	88.87	790	100.79	785	113.96	780
127.03	775	147.55	770	263.25	765	408.02	760	445.55	757.94
499.06	755	535.56	749.62	559.34	755	588.18	760	598.81	765
609.68	770	620.27	774.99	620.29	775	633.72	780	648.98	785
662.08	790	694.14	795	731.89	800	766.48	805	796.9	810
828.16	815	854.05	820	873.62	825				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	499.06	.035	559.34	.1

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

499.06	559.34		46.88	141.39	54.28	

.1	.3		

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	765.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.	0.050	0.035	0.100
W.S. Elev (ft)	764.76	Reach Len. (ft)	46.88	141.39	54.28
Crit W.S. (ft)		Flow Area (sq ft)	988.05	750.26	233.32
E.G. Slope (ft/ft)	0.000824	Area (sq ft)	988.05	750.26	233.32
Q Total (cfs)	7412.00	Flow (cfs)	2234.26	4857.60	320.13
Top Width (ft)	327.98	Top Width (ft)	228.75	60.28	38.95
Vel Total (ft/s)	3.76	Avg. Vel. (ft/s)	2.26	6.47	1.37
Max Chl Dpth (ft)	15.14	Hydr. Depth (ft)	4.32	12.45	5.99
Conv. Total (cfs)	258187.4	Conv. (cfs)	77827.7	169208.3	11151.4
Length Wtd. (ft)	102.66	Wetted Per. (ft)	228.97	61.28	40.44
Min Ch El (ft)	749.62	Shear (lb/sq ft)	0.22	0.63	0.30
Alpha	2.06	Stream Power (lb/ft s)	873.62	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	15.51	81.07	57.98
C & E Loss (ft)	0.05	Cum SA (acres)	3.95	9.02	15.48

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3910.912

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.06	820	25.72	815	38.09	810	49.94	805
60.85	800	72.27	795	84.38	790	96.36	785	110.18	780
125.5	775	144.56	770	183.92	765	270.21	760	395.63	756.36
442.34	755	475.81	749.22	497.6	755	521.35	760	547	765
563.98	767.12	587.08	770	605.74	775	624.3	780	639.31	785
655.35	790	672.44	795	692.16	800	714.94	805	748.48	810
778.02	815	814.83	820	841.76	825				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	442.34	.035	497.6	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
442.34	497.6	545.19	736.56	773.43	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	765.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.050	0.035	0.100
W.S. Elev (ft)	764.81	Reach Len. (ft)	545.19	736.56	773.43
Crit W.S. (ft)		Flow Area (sq ft)	1456.72	701.60	232.78

E.G. Slope (ft/ft)	0.000580	Area (sq ft)	1456.72	701.60	232.78
Q Total (cfs)	7412.00	Flow (cfs)	3330.24	3847.53	234.24
Top Width (ft)	358.75	Top Width (ft)	255.08	55.26	48.41
Vel Total (ft/s)	3.10	Avg. Vel. (ft/s)	2.29	5.48	1.01
Max Chl Dpth (ft)	15.59	Hydr. Depth (ft)	5.71	12.70	4.81
Conv. Total (cfs)	307672.8	Conv. (cfs)	138238.5	159711.1	9723.2
Length Wtd. (ft)	692.00	Wetted Per. (ft)	255.29	56.51	49.39
Min Ch El (ft)	749.22	Shear (lb/sq ft)	0.21	0.45	0.17
Alpha	1.87	Stream Power (lb/ft s)	841.76	0.00	0.00
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)	14.19	78.72	57.69
C & E Loss (ft)	0.17	Cum SA (acres)	3.69	8.83	15.42

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: Flint Run
REACH: Lower RS: 3710.271

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.59	1.19	830	5.17	828.26	11.78	825	18.55	822.06
22.62	820	25.86	818.34	32.69	815	39.5	811.75	42.95	810
50.85	806.25	53.33	805	62.32	800.74	63.72	800	72.83	795.28
73.35	795	79.16	792	82.94	790	83.33	789.82	92.54	785
93.94	784.35	102.34	780	105.35	778.85	116.54	775	124.62	773
134.24	770	154.69	766.67	163.72	765	173.17	764.14	192.66	762.77
216.3	761.04	228.82	760.42	238.05	760	259.77	758.83	268.66	758.35
295.6	756.85	310.89	755.83	327.74	755	361.63	755	363.07	755.53
373.76	760	381.2	763.3	385.82	765	392.04	767.49	397.71	770
404.57	772.41	414.53	775	422.13	776.81	427.28	778.04	434.83	780
453.33	782.48	457.94	782.86	479.51	784.62	482.04	784.84	484.65	785
529.85	787.44	553.59	790	583.03	792.13	626.64	795	635.74	795
646.71	796.76	672.12	800	684.01	800	736.87	804.08	745.03	805
804.17	805	811.79	807.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	259.77	.035	373.76	.04

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

259.77 373.76 310.33 428.51 382.56 .1 .3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.94	Element			
Vel Head (ft)	1.94	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	762.00	Reach Len. (ft)	310.33	428.51	382.56
Crit W.S. (ft)	761.55	Flow Area (sq ft)	94.82	638.47	4.51
E.G. Slope (ft/ft)	0.007244	Area (sq ft)	94.82	638.47	4.51
Q Total (cfs)	7412.00	Flow (cfs)	169.02	7229.57	13.41
Top Width (ft)	175.08	Top Width (ft)	56.58	113.99	4.51
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)	1.78	11.32	2.98
Max Chl Dpth (ft)	7.00	Hydr. Depth (ft)	1.68	5.60	1.00
Conv. Total (cfs)	87087.3	Conv. (cfs)	1985.9	84943.8	157.6
Length Wtd. (ft)	417.13	Wetted Per. (ft)	56.67	115.09	4.93
Min Ch El (ft)	755.00	Shear (lb/sq ft)	0.76	2.51	0.41
Alpha	1.24	Stream Power (lb/ft s)	811.79	0.00	0.00
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)	4.48	67.39	55.58
C & E Loss (ft)	0.40	Cum SA (acres)	1.74	7.40	14.95

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

RIVER: Flint Run
REACH: Lower RS: 3270.326

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.35	.62	830	3.7	828.37	9.03	825	12.01	823.42
22.94	816.51	25.77	815	31.37	811.45	34.09	810	39.88	806.4
42.62	805	48.76	801.34	51.43	800	57.66	796.28	60.21	795
66.52	791.22	68.96	790	73.81	787.17	77.42	785	82.26	782.7
88.32	780	93.41	774.58	98.85	769.7	102.41	766.52	104.59	766.29
107.58	766	118.66	764.89	120.09	764.73	120.28	764.75	122.12	764.46
122.76	764.37	123.27	764	124.63	762.92	125.88	762	127.98	760.08
128.11	760	128.42	759.77	130.52	758.09	130.64	758	130.71	757.94
132.7	756.36	133.11	756	133.45	755.76	135.68	754	137.04	753.03
138.23	752	140.01	750.41	140.52	750	140.78	749.92	140.81	749.9
147.08	748.66	153.81	747.64	168.81	749.47	175.26	750	176.2	750
176.55	750.02	176.81	750.22	178.14	750.98	179.61	752	179.72	752.07

181.25	753.12	183.58	753.34	191.25	754	197.69	754.21	208.69	754.48
269.6	756	276.77	756	283.82	757.14	289.37	758	304.52	759.95
304.89	760	305.51	760.06	305.73	760.08	331.42	762	347.28	763.38
355.61	764	358.49	764.68	360.23	765.08	364.95	766	373.96	766.93
374.88	766.98	376.44	767.11	378.24	767.6	381.59	768.57	384.29	768.76
395.07	770	407.01	771.12	416.76	772	430.89	773.27	434.87	773.61
439.3	774	457.68	775.47	464.31	776	466.4	776.16	467.01	776.21
474.6	776.76	487.8	777.73	488.28	777.75	491.33	778	502.32	779.12
510.97	780	513.33	780.24	514.22	780.33	527.07	782	537.73	783.53
541.14	784	549.19	785.15						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	135.68	.035	181.25	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
135.68	181.25	56.8	51.5	42.19	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	762.55	Element			
Vel Head (ft)	0.60	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	761.95	Reach Len. (ft)	56.80	51.50	42.19
Crit W.S. (ft)		Flow Area (sq ft)	39.60	567.50	801.81
E.G. Slope (ft/ft)	0.001168	Area (sq ft)	39.60	567.50	801.81
Q Total (cfs)	7412.00	Flow (cfs)	43.19	4255.24	3113.58
Top Width (ft)	204.76	Top Width (ft)	9.74	45.57	149.45
Vel Total (ft/s)	5.26	Avg. Vel. (ft/s)	1.09	7.50	3.88
Max Chl Dpth (ft)	14.31	Hydr. Depth (ft)	4.07	12.45	5.37
Conv. Total (cfs)	216895.1	Conv. (cfs)	1263.8	124519.7	91111.6
Length Wtd. (ft)	47.85	Wetted Per. (ft)	12.58	48.30	149.87
Min Ch El (ft)	747.64	Shear (lb/sq ft)	0.23	0.86	0.39
Alpha	1.40	Stream Power (lb/ft s)	549.19	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	4.00	61.46	52.04
C & E Loss (ft)	0.00	Cum SA (acres)	1.50	6.61	14.28

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3218.798

INPUT
Description:
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	828.88	.23	828.76	7.55	825	10.07	823.65	17.17	820
19.89	818.54	26.77	815	32.42	812	36.36	810	40.08	808.16
46.43	805	50.01	803.2	56.47	800	60.28	798.08	66.51	795
73.67	791.4	76.37	790	78.73	788.7	85.9	785	90.73	782.74
95.72	780	102.21	773.16	107.4	767.69	108.76	766.03	109.03	766

124.19	764.57	126.34	764.36	127.28	764.21	128.59	764	129.66	763.84
130.15	763.76	132.48	762.13	132.67	762	135.22	760.24	135.52	760
137.74	758.3	138.14	758	138.39	757.79	140.64	756	142.61	754.47
143.22	754	143.71	753.59	145.71	752	146.32	751.52	148.24	749.99
148.33	749.92	160.99	747.7	161.66	747.59	162.51	747.69	176.31	749.61
176.94	749.78	177.66	750	182.2	751.26	185	752	188.38	752.92
197.84	754	199.96	754.09	202.2	754	205.09	754	215.77	754.44
239.26	755.41	271.98	756	284.51	756	286.21	756.18	303.45	758
313.9	759.23	321.91	759.89	323.33	760	360.52	761.55	367.94	762
374.22	763.26	377.74	764	379.82	764.43	382.44	764.63	390.01	765.44
392.55	765.65	394.18	766	403.15	766	404.96	766.66	409.02	768
412.18	768.21	428.2	770	432.93	770.41	437.4	770.74	444.67	771.26
449.13	771.39	453.48	771.56	455.91	771.61	469.9	772	475.86	772.35
488.67	773.25	491.72	773.51	495.64	774	503.56	775.09	510.04	776
516.62	776.93	524.07	778	535.75	779.66	538.08	780	538.71	780.09
547.74	782	548.26	782.11	556.72	784	560.99	784.91	565.9	786
567.81	786.42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	142.61	.035	197.84	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
142.61	197.84	785.25	753.13	556.83	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	762.49	Element			
Vel Head (ft)	0.59	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	761.89	Reach Len. (ft)	785.25	753.13	556.83
Crit W.S. (ft)		Flow Area (sq ft)	35.47	633.43	770.06
E.G. Slope (ft/ft)	0.001214	Area (sq ft)	35.47	633.43	770.06
Q Total (cfs)	7412.00	Flow (cfs)	37.23	4630.93	2743.84
Top Width (ft)	233.37	Top Width (ft)	9.79	55.23	168.35
Vel Total (ft/s)	5.15	Avg. Vel. (ft/s)	1.05	7.31	3.56
Max Chl Dpth (ft)	14.30	Hydr. Depth (ft)	3.62	11.47	4.57
Conv. Total (cfs)	212686.6	Conv. (cfs)	1068.4	132884.0	78734.2
Length Wtd. (ft)	686.94	Wetted Per. (ft)	12.29	57.67	168.64
Min Ch El (ft)	747.59	Shear (lb/sq ft)	0.22	0.83	0.35
Alpha	1.44	Stream Power (lb/ft s)	567.81	0.00	0.00
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	3.95	60.75	51.28
C & E Loss (ft)	0.01	Cum SA (acres)	1.49	6.55	14.12

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3143.198

INPUT
Description:

Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	828.29	5.49	825.77	17.29	820	21.67	817.85	27.1	815
31.65	812.49	36.19	810	40.9	807.4	45.28	805	50.15	802.31
54.36	800	61.91	795.84	63.43	795	65.19	794.1	73.74	790
79.87	787.01	84.09	785	90.43	781.91	94.44	780	101.15	774.46
112.15	765.76	112.42	765.73	119.43	765.02	129.18	764.27	129.79	764.13
130.32	764	132.1	763.58	133.01	763.41	135.21	762.41	136.06	762
138.41	760.54	139.21	760	141.56	758.35	142.12	758	145.16	756.12
145.35	756	148.1	754.16	148.34	754	150.93	752.42	151.55	752
153.96	750.49	154.71	750	155.08	749.77	167.46	747.7	168.72	747.5
187.93	749	189.3	749.12	189.53	749.18	191.27	749.48	193.74	750
195.64	750.7	199.13	752	200.09	752.36	201.56	752.92	205.05	753.72
206.24	753.96	206.63	754	216.1	754	230.76	754.74	249.31	755.67
250.8	755.73	251.03	755.74	258.12	756	263.65	756	291.86	756.82
294.98	756.91	303.54	757.23	324.68	758	344.71	759.6	348.66	760
358.45	760.94	370.21	762	370.48	762.04	375.06	762.58	391.13	764
391.29	764.02	392.26	764.14	393.38	764.18	393.95	764.24	395.83	764.29
406.48	764.83	411.3	765.18	411.46	765.19	411.59	765.22	411.94	765.24
413.32	765.29	424.45	766	433.25	766.6	434.73	766.75	436.11	766.8
439.14	767.17	454.05	767.61	458.45	768	469.74	769.12	478.67	770
486.18	771.01	493.92	772	503.23	773.37	507.19	774	508.93	774.31
518.98	776	523.62	776.92	529.14	778	535.92	779.37	539.06	780
546.31	781.43	547.5	781.64	549.84	782	560.6	783.76	561.79	784
569.1	785.8	569.95	786	573.86	786.99	576.84	788	578.8	788.64
582.89	790	586.6	791.28	588.7	792	591.68	793		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	148.1	.035	206.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
148.1	206.63	328.74	281.33	282.2	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	761.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	760.82	Reach Len. (ft)	328.74	281.33	282.20
Crit W.S. (ft)		Flow Area (sq ft)	33.96	645.97	618.31
E.G. Slope (ft/ft)	0.001484	Area (sq ft)	33.96	645.97	618.31
Q Total (cfs)	7412.00	Flow (cfs)	38.61	5106.53	2266.86
Top Width (ft)	219.23	Top Width (ft)	10.14	58.53	150.56
Vel Total (ft/s)	5.71	Avg. Vel. (ft/s)	1.14	7.91	3.67
Max Chl Dpth (ft)	13.32	Hydr. Depth (ft)	3.35	11.04	4.11
Conv. Total (cfs)	192423.2	Conv. (cfs)	1002.2	132570.9	58850.1
Length Wtd. (ft)	281.91	Wetted Per. (ft)	12.13	60.78	150.77
Min Ch El (ft)	747.50	Shear (lb/sq ft)	0.26	0.98	0.38
Alpha	1.45	Stream Power (lb/ft s)	591.68	0.00	0.00
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)	3.33	49.69	42.41
C & E Loss (ft)	0.03	Cum SA (acres)	1.31	5.57	12.08

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2861.250

INPUT
Description:
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	826.9	4.8	825	12.94	822.7	19.82	820	26.57	817.43
32.71	815	41.14	811.83	45.78	810	56.33	806.06	58.94	805
61.05	804.15	70.89	800	72.52	799.34	85.51	793.83	94.91	790
95.97	789.57	107.51	785	109.72	784	119.83	780	132.77	771.02
138.06	767.36	139.79	765.92	157.05	764.29	157.48	764.26	157.54	764.24
158.64	764	159.11	763.92	161.15	763.5	162.46	762.59	163.32	762
165.46	760.51	166.16	760	167.02	759.42	169.07	758	171.9	756.02
172.06	755.91	175.03	754	177.68	752.32	178.16	752	178.63	751.72
181.49	750	183.57	748.54	184.21	748	196.25	747.21	201.32	746.88
206.45	747.15	217.53	747.66	217.74	747.77	218.35	748	221	749.34
222.22	750	225.36	751.49	226.27	752	226.62	752.19	227.52	752.66
234.32	753.23	244.21	754	265.55	754.91	267.37	754.99	291.93	756
315.7	757.29	318.46	757.39	320.44	757.45	335.42	758	340.68	758
377.78	759.4	389.73	759.83	391.14	759.88	394.14	760	397.17	760.33
403.31	761.12	409.98	762	410.6	762	413.04	762.16	422.07	762.91
424.12	763.65	425.18	764	428.69	765.29	430.57	766	434.45	767.4
436.16	768	440.53	769.55	443	770.45	447.67	772	453.46	773.81
454.01	774	454.69	774.2	460.77	776	462.73	776.6	468.13	778
471.6	778.77	479.33	780	490.91	781.42	493.11	781.67	496.23	782
497.33	782.12	505.38	782.44	507.73	782.51	517.78	782.77	525.43	782.87
540.41	783.11	544.19	783.21	545.17	783.27	549.44	783.41	554.58	784
556.42	784	559.92	784.61	568.01	786	575.1	787.47	577.64	788
577.75	788.02	589	790	593.37	791	598.91	791.74	600.71	792
602.13	792.31	609.17	794	616.6	795.78	617.49	796	618.4	796.22
626.33	798	631.12	799.1	635.13	800	641.57	801.47	644.2	802
651.56	803.29	656.3	804	663.87	805.07				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	177.68	.035	227.52	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
177.68	227.52	296.63	281.27	281.46	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	761.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	760.03	Reach Len. (ft)	296.63	281.27	281.46
Crit W.S. (ft)		Flow Area (sq ft)	45.46	584.88	544.28
E.G. Slope (ft/ft)	0.001902	Area (sq ft)	45.46	584.88	544.28

Q Total (cfs)	7412.00	Flow (cfs)	64.90	5409.29	1937.80
Top Width (ft)	228.30	Top Width (ft)	11.56	49.84	166.89
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)	1.43	9.25	3.56
Max Chl Dpth (ft)	13.15	Hydr. Depth (ft)	3.93	11.74	3.26
Conv. Total (cfs)	169947.9	Conv. (cfs)	1488.2	124028.3	44431.4
Length Wtd. (ft)	281.41	Wetted Per. (ft)	13.90	52.39	167.08
Min Ch El (ft)	746.88	Shear (lb/sq ft)	0.39	1.33	0.39
Alpha	1.65	Stream Power (lb/ft s)	663.87	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	3.03	45.71	38.64
C & E Loss (ft)	0.14	Cum SA (acres)	1.23	5.22	11.06

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2579.076

INPUT
Description:
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	15.21	820	27.97	815.49	29.43	815	37.74	812.05
42.99	810	47.62	808.16	56	805	64.64	801.42	68.65	800
69.31	799.77	82.89	795	85.84	793.93	97.04	790	102.08	788.12
110.79	785	118.7	782.03	123.55	780	132.63	774.42	140.89	769.34
145.19	766.68	152.14	766.05	152.65	766	154.5	765.81	162.84	765.05
163.2	764.88	164.87	764	165.21	763.85	166.44	763.24	167.48	762
168.46	760.7	168.99	760	170.28	758.29	170.48	758	171.42	756.82
172.31	756	174.02	754.3	174.35	754	174.61	753.75	176.64	752
178.01	750.57	178.62	750	180.09	748.58	180.72	748	181.02	747.68
182.28	746.5	191.79	746.04	192.63	746	193.42	746	197.24	745.85
201.26	745.98	201.68	746	202.75	746.05	204.91	746.19	217	746.9
217.34	747.42	217.74	748	218.23	748.97	218.99	750	219.7	751.04
220.27	752	220.52	752.38	221.26	752.97	248.71	753.86	254.02	753.92
258.94	753.98	261.16	754	267.96	754	274.07	754.26	288.53	754.54
293.17	754.64	301.91	754.88	361.59	756	372.94	756	392	757.2
403.75	758	410.88	758.87	412.88	759.04	417.87	759.45	427.04	759.8
427.31	759.82	427.38	759.84	427.86	760	428.39	760.16	437.5	762
438.49	762.17	441.16	762.4	443.31	762.52	453.12	764	461.52	765.42
465.12	766	471.29	767.03	477.09	768	482.32	768.78	491.75	770
503.41	771.52	507.03	772	511.6	772.59	522.55	774	526.04	774.45
533.69	775.51	537.17	776	541.47	776.69	542.97	776.92	545.09	777.3
548.46	778	551.98	778.73	557.92	780	560.77	780.57	563.7	781.28
566.65	782	572.62	783.7	573.81	784	575.37	784.47	580.71	786
582.49	786.52	587.67	788	593.13	789.61	594.5	790	599.64	791.47
601.54	792	602.39	792.22	609.77	794	615.62	795.16	619.95	796
626.28	797.25	630.42	798	631.55	798				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	174.02	.035	221.26	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
174.02	221.26	100.63	101.9	100.41	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	760.49	Element			
Vel Head (ft)	0.55	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	759.94	Reach Len. (ft)	100.63	101.90	100.41
Crit W.S. (ft)		Flow Area (sq ft)	15.12	595.36	904.43
E.G. Slope (ft/ft)	0.001177	Area (sq ft)	15.12	595.36	904.43
Q Total (cfs)	7412.00	Flow (cfs)	12.24	4316.10	3083.67
Top Width (ft)	258.66	Top Width (ft)	4.99	47.24	206.43
Vel Total (ft/s)	4.89	Avg. Vel. (ft/s)	0.81	7.25	3.41
Max Chl Dpth (ft)	14.09	Hydr. Depth (ft)	3.03	12.60	4.38
Conv. Total (cfs)	216083.3	Conv. (cfs)	356.7	125827.9	89898.6
Length Wtd. (ft)	101.23	Wetted Per. (ft)	7.55	53.60	206.64
Min Ch El (ft)	745.85	Shear (lb/sq ft)	0.15	0.82	0.32
Alpha	1.48	Stream Power (lb/ft s)	631.55	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	2.82	41.90	33.96
C & E Loss (ft)	0.02	Cum SA (acres)	1.17	4.91	9.85

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2476.907

INPUT
Description:
Station Elevation Data num= 129

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	831.38	3.33	830	5.72	829.01	15.43	825	22.82	822.34
28.58	820	40.8	815.67	42.71	815	44.21	814.47	55.18	810
59.63	808.2	67.59	805	67.84	804.9	79.93	800	89.78	795.99
92.37	795	97.27	793.01	104.66	790	109.47	788.03	116.91	785
123.41	782.33	129.15	780	142.55	770.74	146.96	767.78	150.66	765.3
160.01	764.7	168.22	764	172.06	763.29	173.79	762.87	174.04	762.64
174.91	762	176.73	760.21	176.95	760	177.56	759.41	179.34	758
179.44	757.9	182.16	756	183.28	755.08	184.78	754	185.95	753.02
187.32	752	190.07	750.11	190.22	750	192.21	748.44	192.82	748
193.24	747.76	193.53	747.54	206.22	745.61	206.72	745.53	208.65	745.76
223.7	747.61	223.76	747.64	224.43	748	225.55	748.48	228.72	750
231.91	751.57	232.75	752	233	752.13	235.44	752.14	259.47	753.16
261.54	753.16	269.43	753.21	277.15	753.26	326.57	754	327.55	754
334.78	754.24	340.44	754.41	342.94	754.49	387.79	756	396.64	757.07
407.05	758	409.16	758.33	417.04	760	420.6	761.4	422.33	762
424.54	762.58	428.22	764	436.28	765.55	438.62	766	442.96	766.83
444.87	767.11	457.41	767.36	458.84	767.82	459.4	768	461.3	768.59
462.91	768.58	474.99	769.14	480.26	769.43	482.57	769.58	488.41	769.73
490.03	769.75	501.14	770	504.2	770.05	504.3	770.05	505.61	770.12

510.36	770.3	513.51	770.47	518.62	771.06	522.03	771.47	526.56	772
542.42	773.8	544.05	774	553.06	775.33	557.39	776	558.6	776.2
561.37	776.65	565.64	777.31	566.92	777.08	570.1	776.53	570.42	776.52
572.46	776	573.26	776	574.02	775.88	574.13	776	574.32	776.12
574.39	776.16	576.51	778	578.08	779.19	580.23	779.54	581.06	779.78
585.6	779.93	586.2	779.93	589.77	779.97	589.93	780	598.78	781.61
598.82	781.61	603.87	782	607.81	782.36	612.35	783.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	187.32	.035	233	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
187.32	233	1155.6	1093.26	853.34	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	760.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.47	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	759.89	Reach Len. (ft)	1155.60	1093.26	853.34
Crit W.S. (ft)		Flow Area (sq ft)	40.88	558.45	984.72
E.G. Slope (ft/ft)	0.001001	Area (sq ft)	40.88	558.45	984.72
Q Total (cfs)	7412.00	Flow (cfs)	41.35	3827.94	3542.71
Top Width (ft)	239.45	Top Width (ft)	10.25	45.68	183.51
Vel Total (ft/s)	4.68	Avg. Vel. (ft/s)	1.01	6.85	3.60
Max Chl Dpth (ft)	14.36	Hydr. Depth (ft)	3.99	12.23	5.37
Conv. Total (cfs)	234268.2	Conv. (cfs)	1307.0	120988.1	111973.2
Length Wtd. (ft)	996.77	Wetted Per. (ft)	12.95	48.44	183.87
Min Ch El (ft)	745.53	Shear (lb/sq ft)	0.20	0.72	0.33
Alpha	1.39	Stream Power (lb/ft s)	612.35	0.00	0.00
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	2.76	40.55	31.78
C & E Loss (ft)	0.04	Cum SA (acres)	1.15	4.80	9.40

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: Flint Run
REACH: Lower RS: 2422.446

INPUT
Description:
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	827.33	2.04	826.52	8.7	823.9	18.49	820	26.59	816.78
31.02	815	43.42	810.03	43.71	809.91	54.78	805	60.08	802.88
66.69	800	74.34	796.99	78.98	795	89.14	791.07	91.95	790
103.33	785.18	103.8	785	106.19	783.96	113.68	780.68	115.31	780

118.54	777.88	140.62	764.19	142.29	764.11	144.58	764	144.84	764
152.26	763.62	158.03	763.3	160.92	762.67	164.22	762	164.71	761.59
166.7	760	168.44	758.49	168.99	758	170.24	757.01	171.81	756
172.19	755.78	175.1	754	175.49	753.72	175.98	753.38	178.43	752.83
181.13	752.77	181.48	752.3	181.65	752	182.61	750.49	182.87	750
183.38	749.35	184.29	748	184.5	747.68	184.78	747.3	193.16	746.66
203.98	745.48	217.18	746.81	225.14	747.51	225.66	747.78	226.09	748
228.92	749.5	229.87	750	230.61	750.38	232.45	752	232.85	752.31
232.95	752.4	260.86	752.89	294.85	753.48	318.12	754	357.87	755.53
367.67	755.91	370.06	756	371.96	756.14	377.39	756.48	400.27	758
405.99	759.54	407.35	760	409.43	760.56	415.23	761.51	418.4	762
422.13	762.26	427.49	762.69	438.54	763.45	445.89	764	445.98	764.01
450.72	764.31	457.31	764.66	468.97	765.18	473.41	764.92	476.44	764.98
481.45	765.78	482.02	765.87	482.98	766	486.54	766.53	496.79	768
498.55	768.27	500.18	768	501.55	767.77	506.62	766.99	506.95	767.01
510.16	767.11	511.72	767.16	512.3	767.17	513.92	768	516.15	769.06
516.78	769.47	517.17	769.52	521.86	770	522.39	770	522.56	770.07
538.9	771.76	541.52	772	546.77	772.53	547.5	772.61	547.85	772.66
548.46	772.68	556.6	774.61	557.51	774.57	557.96	774.56	585.55	778.67
590.53	779.65	591.47	780	592.65	780	592.87	780.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	178.43	.035	232.45	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
178.43	232.45	335.76 346.43	218.7	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	758.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	758.15	Reach Len. (ft)	335.76	346.43	218.70
Crit W.S. (ft)		Flow Area (sq ft)	30.04	577.66	626.54
E.G. Slope (ft/ft)	0.001909	Area (sq ft)	30.04	577.66	626.54
Q Total (cfs)	7412.00	Flow (cfs)	37.82	4934.71	2439.47
Top Width (ft)	232.01	Top Width (ft)	9.61	54.02	168.38
Vel Total (ft/s)	6.01	Avg. Vel. (ft/s)	1.26	8.54	3.89
Max Chl Dpth (ft)	12.67	Hydr. Depth (ft)	3.13	10.69	3.72
Conv. Total (cfs)	169621.4	Conv. (cfs)	865.6	112929.3	55826.5
Length Wtd. (ft)	309.49	Wetted Per. (ft)	11.13	58.46	168.66
Min Ch El (ft)	745.48	Shear (lb/sq ft)	0.32	1.18	0.44
Alpha	1.49	Stream Power (lb/ft s)	592.87	0.00	0.00
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	1.82	26.29	16.00
C & E Loss (ft)	0.04	Cum SA (acres)	0.89	3.55	5.95

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2355.763

INPUT
Description:
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	10.21	821.05	13.07	820	23.71	816.28	26.8	815
32.1	812.7	38.29	810	46.89	806.31	49.93	805	57.14	802.05
61.49	800	64.14	798.95	74.21	795	78.78	793.14	86.71	790
95.42	786.48	99.06	785	104.68	782.71	110.72	780	118.05	775.07
137.58	762.78	146.88	762.44	149.01	762.36	150.64	762.29	155.97	762
158.29	761.64	163.32	760.9	163.35	760.9	164.36	760.26	164.71	760
167.42	758.19	167.69	758	167.89	757.86	170.3	756	171.54	755.19
173.13	754	173.64	753.64	174.15	753.27	178.85	753.19	184.22	752.73
184.82	752.06	184.85	752	186.64	750.14	186.74	750	187.23	749.51
188.17	748	188.32	747.77	188.37	747.71	198.18	746.71	205.27	746
206.99	745.42	210.92	746	230.13	746.85	232.78	746.97	234.03	747.03
234.51	747.47	234.99	748	235.3	748.24	237.05	750	237.56	750.51
239.26	752.07	263.63	752.63	263.67	752.63	272.98	752.86	301.5	753.37
303.52	753.43	315.09	753.69	323.85	754	330	754	330.07	754
330.82	754.05	363.37	756	366.07	756.18	389.18	758	390.95	758.16
397.67	758.5	421.92	760	426.05	759.69	431.14	759.92	431.67	760
432.1	760	437.22	760.93	444.16	762	444.81	762.16	445.26	762.2
445.37	762.17	446.19	762	446.29	761.97	450.55	761.16	453.37	761.84
454.42	762	456.96	762.09	467.93	762.44	468.26	762.46	468.6	762.49
481.15	763.4	490.57	764	491.33	764.07	494	764.25	495.49	764.41
507.57	765.77	508.22	765.78	509.7	766	518.27	767.27	519.09	767.4
519.73	767.47	519.97	767.54	520.51	767.59	524.68	768	524.9	768
529.76	768.49	537.93	768	538.2	767.92	539.72	766.59	543.27	767.24
543.98	767.22	547.94	767.31	556.22	767.03	558.31	766.68	558.95	766.74
561.68	766.28	563.3	766.28	568.4	767.22	570.83	768	573.12	768.85

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	184.22	.035	239.26	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
184.22	239.26	48.16	40.88	38.52	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	758.20	Element			
Vel Head (ft)	1.26	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.94	Reach Len. (ft)	48.16	40.88	38.52
Crit W.S. (ft)		Flow Area (sq ft)	48.20	540.75	422.80
E.G. Slope (ft/ft)	0.003034	Area (sq ft)	48.20	540.75	422.80
Q Total (cfs)	7412.00	Flow (cfs)	81.09	5493.68	1837.23
Top Width (ft)	206.69	Top Width (ft)	15.14	55.04	136.51
Vel Total (ft/s)	7.33	Avg. Vel. (ft/s)	1.68	10.16	4.35
Max Chl Dpth (ft)	11.52	Hydr. Depth (ft)	3.18	9.82	3.10
Conv. Total (cfs)	134557.6	Conv. (cfs)	1472.2	99732.3	33353.1
Length Wtd. (ft)	40.44	Wetted Per. (ft)	16.36	59.72	136.62
Min Ch El (ft)	745.42	Shear (lb/sq ft)	0.56	1.72	0.59

Alpha	1.51	Stream Power (lb/ft s)	573.12	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	1.52	21.85	13.37
C & E Loss (ft)	0.05	Cum SA (acres)	0.79	3.11	5.19

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2314.880

INPUT
Description:
Station Elevation Data num= 118

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	19.5	818	28.11	815	36.25	812.18	42.53	810
56.39	805.1	56.63	805	66.61	801.16	69.63	800	72.03	799.07
82.59	795	90.29	792.01	94.69	790	97.61	788.63	105.64	785
113.46	781.64	117.02	780	121.01	778.24	138.82	766.27	145.02	761.77
160.34	761.2	162.74	761.1	164.48	760.89	167.6	760.5	170	760.19
170.29	760.17	171	760.07	171.21	760.03	171.48	759.87	173.71	758.37
174.27	758	175.29	757.38	177.31	756	178.41	755.28	180.25	754
180.93	753.59	181.27	753.36	193.53	752.27	194.51	752.23	194.54	752.18
194.63	752	194.7	751.84	195.49	750	195.56	749.77	196.1	748.95
196.6	748	196.68	747.23	196.69	747.22	205.08	746.58	212.71	746
218.94	745.38	227.24	746	232.48	746.29	244.35	746.97	245.59	747.78
245.92	748	247.75	749.2	248.1	749.47	248.85	750	249.62	750.56
249.88	750.64	250.85	751.24	261.15	752.56	261.33	752.58	262.14	752.68
277.92	752.69	279.68	752.69	292.5	752.92	298.82	752.9	322.81	753.54
327.56	753.77	332.01	753.89	334.12	754	336.21	754	340.62	754.22
352.2	754.51	371.05	755.96	371.69	756	373.41	756	385.15	757.36
387.78	757.64	391.43	758	394.31	758.21	406.45	760	413.23	761.12
418.5	762	423.18	762.75	424.39	762.88	443.25	763.96	443.67	763.98
443.74	763.99	445.42	764	457.65	764.13	457.77	764.13	467.5	764.06
469.11	764.11	476.62	764.36	487.38	764.57	488.62	764.5	489.9	764.2
502.7	765.85	503.7	766	505.57	766.24	505.97	766.3	507.46	766.45
516.98	767.35	520.13	767.72	521.12	767.9	523.92	767.95	529.43	767.98
531.43	767.98	531.7	768	540.12	768.65	542.23	768.78	547.7	769.16
562.92	769.85	563.68	769.88	567.18	770				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	193.53	.035	261.15	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
193.53	261.15	14.36	91.23	28.15	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	758.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.09	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.95	Reach Len. (ft)	14.36	91.23	28.15

Crit W.S. (ft)		Flow Area (sq ft)	60.37	631.20	370.21
E.G. Slope (ft/ft)	0.002633	Area (sq ft)	60.37	631.20	370.21
Q Total (cfs)	7412.00	Flow (cfs)	100.36	5821.18	1490.46
Top Width (ft)	205.69	Top Width (ft)	17.61	67.62	120.46
Vel Total (ft/s)	6.98	Avg. Vel. (ft/s)	1.66	9.22	4.03
Max Chl Dpth (ft)	11.57	Hydr. Depth (ft)	3.43	9.33	3.07
Conv. Total (cfs)	144449.8	Conv. (cfs)	1955.9	113446.9	29047.0
Length Wtd. (ft)	74.72	Wetted Per. (ft)	18.75	72.46	120.61
Min Ch El (ft)	745.38	Shear (lb/sq ft)	0.53	1.43	0.50
Alpha	1.44	Stream Power (lb/ft s)	567.18	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	1.46	21.30	13.02
C & E Loss (ft)	0.02	Cum SA (acres)	0.78	3.06	5.07

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2223.643

INPUT
Description:
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	27.73	815	34.41	812.57	41.67	810	51.05	806.58
55.42	805	58.57	803.87	69.2	800	73.81	798.35	81.51	795
87.77	791.97	92.08	790	96.21	788.14	102.73	785	107.36	782.93
113.45	780	119.05	777.7	125.77	775	133.03	772.43	139.3	770
149.59	763.59	152.1	760.27	157.45	760.05	158.38	760	166.7	759.51
172.23	759.11	177.72	758.38	178.27	758	179.88	757.02	181.33	756.14
181.54	756	181.73	755.88	184.62	754	185.04	753.73	185.31	753.56
207.65	752.72	208.62	752.7	209.08	752.08	209.12	752	209.17	751.94
210.3	750	211.6	748.18	211.72	748	212.03	747.69	212.53	746.94
233.11	746.13	235.95	746	236.34	745.96	236.97	745.3	237.41	745.96
237.66	746	239.35	746.12	257.68	746.72	259.4	747.73	259.84	748
262.98	749.98	263.04	750.02	265.2	752	265.46	752.34	266.25	753.09
295.92	752.68	305.73	752.54	343.2	752.45	346.57	752.53	347.78	752.57
351.69	752.72	352.4	752.71	356.77	752.96	374.51	754	379.83	754.73
385.32	756	388.92	757.13	391.58	758	396.79	759.74	397.6	760
398.41	760.3	403.72	762	404.88	762.33	405.21	762.4	408.43	762.97
410.23	763.19	422.43	764	426.15	764.29	430.67	764.85	434.41	764.95
437.51	766	437.82	766.1	439.15	766.55	442.1	766.65	450.77	766.33
452.23	766.31	464.94	766.36	465.78	766.36	467.12	766.4	469.77	766
477.19	766	505.78	766.37	509.94	766.55	510.53	766.34	510.66	766.34
518.58	767.43	519.03	767.5	519.68	767.58	520.34	767.64	524.71	767.85
526.06	767.89	532.55	768	532.81	768.01	535.5	768.02	553.12	769.97
553.44	770	554.15	770.07	574.46	771.76	575.95	771.96	576.48	772
578.16	772	580.24	778.23						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	207.65	.035	266.25	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
207.65 266.25 39.89 37.88 44.06 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
494.07	507.39	800

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	757.82	Element			
Vel Head (ft)	1.01	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.81	Reach Len. (ft)	39.89	37.88	44.06
Crit W.S. (ft)		Flow Area (sq ft)	90.20	563.55	456.80
E.G. Slope (ft/ft)	0.002603	Area (sq ft)	90.20	563.55	456.80
Q Total (cfs)	7412.00	Flow (cfs)	147.77	5177.03	2087.19
Top Width (ft)	207.68	Top Width (ft)	27.43	58.60	121.65
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)	1.64	9.19	4.57
Max Chl Dpth (ft)	11.51	Hydr. Depth (ft)	3.29	9.62	3.75
Conv. Total (cfs)	145289.9	Conv. (cfs)	2896.6	101480.1	40913.1
Length Wtd. (ft)	39.66	Wetted Per. (ft)	28.39	64.51	122.02
Min Ch El (ft)	745.30	Shear (lb/sq ft)	0.52	1.42	0.61
Alpha	1.46	Stream Power (lb/ft s)	580.24	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	1.43	20.05	12.75
C & E Loss (ft)	0.02	Cum SA (acres)	0.77	2.92	5.00

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2185.764

INPUT
Description:
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	14.44	820	15.39	819.67	28.89	815	30.77	814.35
43.61	810	46.43	809.02	58.5	805	62.27	803.68	73.29	800
77.15	798.36	86.5	795	90.52	793.08	98.84	790	103.37	787.81
111.03	785	116.77	782.18	121.84	780	128.58	777.28	134.01	775
141.49	772	146.27	770	157.97	765.3	159.15	765	159.53	764.6
167.95	759.3	178.98	758.72	188.57	758	189.07	757.92	190.8	757.66
191.91	757.49	193.04	756.84	194.34	756	196.29	754.86	198.33	754
198.65	753.77	198.84	753.68	206	753.46	226.2	752.66	226.5	752.28
226.65	752	227.4	751.05	228.28	750	229.58	748.42	229.85	748
230.79	746.94	230.85	746.86	232.6	746.79	232.91	746.78	255.43	745.34
255.45	745.27	255.48	745.34	258.85	745.41	277.09	746.39	278.3	747.61
278.68	748	279.12	748.39	280.84	750	281.49	750.58	282.74	752
283.6	752.82	283.82	753.02	304.14	752.7	318	752.51	354.53	752
362.74	752	375.72	752.96	394.2	754	397.51	754.93	401.3	756
406.93	757.6	408.32	758	410.59	758.65	414.78	760	417.64	760.89
422.97	762	424.18	762.23	435.45	764	439.18	764.59	440.45	764.79

443.8	765.18	446.37	765.34	456.87	766	457.13	766.03	458.2	766.08
462.99	766.32	464.54	766.38	469.6	766.32	477.45	766.2	483.79	766
489.89	765.82	497.17	765.85	501.81	765.93	504.34	766	506.22	766
525.5	766.08	530.79	766.58	531.62	766.6	539.2	766.99	545.12	767.08
549.74	767.47	550.66	767.48	556.32	767.65	562.96	768	569.41	768
573.65	768.37	576.32	768.74	584.99	770	586.31	770.14	600.11	771.39
605.92	772	609.78	772	614.47	772.31	616.42	772.49	627.88	774
630.43	774	631.19	780.48	631.25	780.39	635.99	780.55		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	226.2	.035	283.6	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
226.2	283.6	190.76	109.94	157.38	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
515.49	528.8	800

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	757.71	Element			
Vel Head (ft)	0.95	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.75	Reach Len. (ft)	190.76	109.94	157.38
Crit W.S. (ft)		Flow Area (sq ft)	106.58	577.58	469.96
E.G. Slope (ft/ft)	0.002318	Area (sq ft)	106.58	577.58	469.96
Q Total (cfs)	7412.00	Flow (cfs)	163.81	5170.10	2078.09
Top Width (ft)	210.77	Top Width (ft)	33.02	57.40	120.34
Vel Total (ft/s)	6.42	Avg. Vel. (ft/s)	1.54	8.95	4.42
Max Chl Dpth (ft)	11.48	Hydr. Depth (ft)	3.23	10.06	3.91
Conv. Total (cfs)	153964.5	Conv. (cfs)	3402.8	107395.0	43166.7
Length Wtd. (ft)	126.63	Wetted Per. (ft)	33.84	63.02	120.87
Min Ch El (ft)	745.27	Shear (lb/sq ft)	0.46	1.33	0.56
Alpha	1.49	Stream Power (lb/ft s)	635.99	0.00	0.00
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	1.34	19.55	12.28
C & E Loss (ft)	0.02	Cum SA (acres)	0.74	2.87	4.87

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2075.488

INPUT
Description:
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	802.23	3.51	801.49	11.2	800	23.28	797.48	37.66	795
45.98	793.51	66.38	790	66.75	789.93	77.42	788.18	92.16	785.7
95.67	785	110.22	782.46	121.42	780	132.63	777.62	144.52	775
153.17	773.15	167.17	770	172.97	769.53	182.57	766.54	189.19	765

226.92	765	255.29	758.47	258.94	758.29	262.94	757.39	265.94	756.71
269.59	756.41	275.43	756	278.33	755.79	287.28	755.2	289.64	755.02
292.29	754.77	292.59	754.74	296.35	754.35	298.4	754.14	298.98	754
299.33	753.9	304.32	752.88	313.3	752.57	319.57	752	320.16	752
331.52	750.76	336.84	750.08	337.14	750.03	337.6	750	338.5	749.96
340.85	749.47	346.27	748	347.01	747.8	351.42	747.26	357.61	745.69
358.12	745.17	375.72	748	378.17	749.67	378.68	750	380.07	750.9
382.5	751.57	384.12	752	384.28	752.05	385.43	752.36	390.12	752.43
411.87	752.53	434.09	752.12	444.28	752.05	451.3	752	499.75	752
508.05	753.84	508.95	754	511.38	754.44	512.07	754.53	517.05	755.31
517.68	755.36	522.76	755.38	530.91	755.38	538.94	755.37	542.82	755.68
547.05	756	550	756	561.76	757.77	563.24	757.99	563.34	758
564.55	758	566.62	758.29	569.75	758.52	572.04	758.67	576.08	758.9
581.86	759.45	583.67	759.61	584.97	759.72	585.93	759.78	592.84	760
592.86	760	594.56	760.05	602.27	761.74	603.46	762	603.73	762.06
611.35	763.55	612.46	763.7	612.68	763.73	613.11	763.81	614.13	764
616.28	764.4	617.45	764.62	626.9	765.99	626.97	766	642	768
646.62	768.63	648.2	768.84	655.6	770	668.42	772.24	669.35	773.12
700.03	781.17	722.83	783.03	742.99	787.88	757.66	786.67	763.96	787.49
764.04	787.51	795.36	791.59	802.24	795	808.51	795	830.36	792.84
856.2	792.6	904.14	792.39	906.69	792.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	313.3	.035	384.12	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
313.3	384.12	41.03	39.47	55.96	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
714	766	810

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	757.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.87	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.47	Reach Len. (ft)	41.03	39.47	55.96
Crit W.S. (ft)	754.92	Flow Area (sq ft)	82.89	525.37	574.67
E.G. Slope (ft/ft)	0.003094	Area (sq ft)	82.89	525.37	574.67
Q Total (cfs)	7412.00	Flow (cfs)	103.48	4627.76	2680.76
Top Width (ft)	284.25	Top Width (ft)	44.43	70.82	169.00
Vel Total (ft/s)	6.27	Avg. Vel. (ft/s)	1.25	8.81	4.66
Max Chl Dpth (ft)	11.30	Hydr. Depth (ft)	1.87	7.42	3.40
Conv. Total (cfs)	133242.3	Conv. (cfs)	1860.2	83191.3	48190.8
Length Wtd. (ft)	39.47	Wetted Per. (ft)	44.66	72.93	169.43
Min Ch El (ft)	745.17	Shear (lb/sq ft)	0.36	1.39	0.66
Alpha	1.43	Stream Power (lb/ft s)	906.69	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.93	18.16	10.39
C & E Loss (ft)		Cum SA (acres)	0.57	2.71	4.35

CULVERT

RIVER: Flint Run
REACH: Lower RS: 2057.86

INPUT
Description:
Distance from Upstream XS = 10
Deck/Roadway Width = 15
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
338.5	749.96	0	378.68	750	0

Upstream Bridge Cross Section Data
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	802.23	3.51	801.49	11.2	800	23.28	797.48	37.66	795
45.98	793.51	66.38	790	66.75	789.93	77.42	788.18	92.16	785.7
95.67	785	110.22	782.46	121.42	780	132.63	777.62	144.52	775
153.17	773.15	167.17	770	172.97	769.53	182.57	766.54	189.19	765
226.92	765	255.29	758.47	258.94	758.29	262.94	757.39	265.94	756.71
269.59	756.41	275.43	756	278.33	755.79	287.28	755.2	289.64	755.02
292.29	754.77	292.59	754.74	296.35	754.35	298.4	754.14	298.98	754
299.33	753.9	304.32	752.88	313.3	752.57	319.57	752	320.16	752
331.52	750.76	336.84	750.08	337.14	750.03	337.6	750	338.5	749.96
340.85	749.47	346.27	748	347.01	747.8	351.42	747.26	357.61	745.69
358.12	745.17	375.72	748	378.17	749.67	378.68	750	380.07	750.9
382.5	751.57	384.12	752	384.28	752.05	385.43	752.36	390.12	752.43
411.87	752.53	434.09	752.12	444.28	752.05	451.3	752	499.75	752
508.05	753.84	508.95	754	511.38	754.44	512.07	754.53	517.05	755.31
517.68	755.36	522.76	755.38	530.91	755.38	538.94	755.37	542.82	755.68
547.05	756	550	756	561.76	757.77	563.24	757.99	563.34	758
564.55	758	566.62	758.29	569.75	758.52	572.04	758.67	576.08	758.9
581.86	759.45	583.67	759.61	584.97	759.72	585.93	759.78	592.84	760
592.86	760	594.56	760.05	602.27	761.74	603.46	762	603.73	762.06
611.35	763.55	612.46	763.7	612.68	763.73	613.11	763.81	614.13	764
616.28	764.4	617.45	764.62	626.9	765.99	626.97	766	642	768
646.62	768.63	648.2	768.84	655.6	770	668.42	772.24	669.35	773.12
700.03	781.17	722.83	783.03	742.99	787.88	757.66	786.67	763.96	787.49
764.04	787.51	795.36	791.59	802.24	795	808.51	795	830.36	792.84
856.2	792.6	904.14	792.39	906.69	792.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	313.3	.035	384.12	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
313.3	384.12	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev

714 766 810

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
343.84	750	0	417.5	750	0

Downstream Bridge Cross Section Data
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790
43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49
343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760
634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	337.61	.035	422.03	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
337.61	422.03	.1	.3

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 Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.5	

FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 2 - Mitered to conform to slope
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
6	20	.024	.024	0	.7	1

Number of Barrels = 11
Upstream Elevation = 747.14
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
350.5	352	353.5	355	356.5	358	359.5	361	362.5	364
365.5									

Downstream Elevation = 746
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
372.5	374	375.5	377	378.5	380	381.5	383	384.5	386
387.5									

CULVERT OUTPUT Profile #100-yr Culv Group: Culvert #1

Q Culv Group (cfs)	54.79	Culv Full Len (ft)	20.00
# Barrels	11	Culv Vel US (ft/s)	2.82
Q Barrel (cfs)	4.98	Culv Vel DS (ft/s)	2.82
E.G. US. (ft)	757.35	Culv Inv El Up (ft)	747.14
W.S. US. (ft)	756.47	Culv Inv El Dn (ft)	746.00
E.G. DS (ft)	757.11	Culv Frctn Ls (ft)	0.15
W.S. DS (ft)	756.63	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.24	Culv Entr Loss (ft)	0.09
Delta WS (ft)	0.16	Q Weir (cfs)	7357.21
E.G. IC (ft)	757.31	Weir Sta Lft (ft)	263.17
E.G. OC (ft)	757.35	Weir Sta Rgt (ft)	558.88
Culvert Control	Outlet	Weir Submerg	0.87
Culv WS Inlet (ft)	748.64	Weir Max Depth (ft)	7.38
Culv WS Outlet (ft)	747.50	Weir Avg Depth (ft)	4.49
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	1328.83
Culv Crt Depth (ft)	0.86	Min El Weir Flow (ft)	750.01

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2035.918

INPUT
Description:
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790

43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49
343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760
634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	337.61	.035	422.03	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
337.61	422.03	50.28	39.38	62.3	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	757.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.63	Reach Len. (ft)	16.00	16.00	16.00
Crit W.S. (ft)	753.24	Flow Area (sq ft)	111.05	880.30	646.51
E.G. Slope (ft/ft)	0.001044	Area (sq ft)	111.05	880.30	646.51
Q Total (cfs)	7412.00	Flow (cfs)	92.40	5523.40	1796.20
Top Width (ft)	316.21	Top Width (ft)	48.41	84.42	183.38
Vel Total (ft/s)	4.53	Avg. Vel. (ft/s)	0.83	6.27	2.78
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)	2.29	10.43	3.53
Conv. Total (cfs)	229372.3	Conv. (cfs)	2859.4	170927.5	55585.4
Length Wtd. (ft)	16.00	Wetted Per. (ft)	48.68	90.00	183.61
Min Ch El (ft)	744.25	Shear (lb/sq ft)	0.15	0.64	0.23
Alpha	1.52	Stream Power (lb/ft s)	940.17	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.93	17.20	10.39
C & E Loss (ft)	0.03	Cum SA (acres)	0.53	2.64	4.12

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.

BRIDGE

RIVER: Flint Run
REACH: Lower RS: 2017.29

INPUT
Description:
Distance from Upstream XS = 16
Deck/Roadway Width = 8
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
321.62	754.05	753.55	457.89	752.74	752.24

Upstream Bridge Cross Section Data
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790
43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49
343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760
634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0      .1  337.61    .035  422.03     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
        337.61  422.03             .1       .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
  386.49  754.62  754.12  496.28  752.33  751.83

Downstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  800.66    2.87     800   20.54  796.34   26.59     795   36.01  792.98
   49.32     790    59.3  787.88   73.33     785   83.96  782.91   98.17     780
  110.22  777.43  123.36     775  146.01  770.34  147.65     770  148.86     770
  161.56  768.45  187.96  765.59  190.53     765  212.74     765  253.18  767.96
  264.25     770  321.36     770  321.59     770  321.74  769.95  334.48     765
  338.22   757.6  339.53  756.12  340.34  756.05  340.99     756  343.03  755.84
   344.1  755.84  358.64  754.61  365.02  754.27  367.69  754.14  371.47  754.14
   372.1  754.12  378.35  754.22  381.77  754.24  386.49  754.12  386.64     754
  390.39     754  390.53  752.89  390.68     752  390.77  751.51  391.24  750.56
  391.36  750.46  392.18   749.9  399.43   745.4  412.84  745.49  429.87   745.1
  430.68  746.25  431.49  745.59  456.87  746.69  457.47  747.11  458.75     748
  460.62  749.36   461.5     750  464.07  751.86   464.2  751.97  468.76  752.05
  479.07  752.08  496.28  751.83  496.46  751.84  527.54  754.42  528.69  754.44
  552.71  754.82  561.91  754.99     562  754.99  562.21     755  562.32     755
  595.37  753.58  612.25   754.6  623.27  754.45  645.53  758.04  658.09  758.71
  693.09     760  709.49  763.47  710.27  763.68  715.07     765  717.82  765.77
  733.15     770  749.73  774.64  751.01     775  761.67  776.19  762.32  776.22
  794.97  778.22  813.46  779.54  813.52  779.55  826.69     780  850.66  781.41
  865.24  781.54  890.26  781.22  898.37     780   947.8     780  968.82   782.8
  977.23     785 1019.29  789.33 1027.08     790 1035.86  791.47 1036.64  791.59

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  264.25      .2  321.36     .04  378.35    .035  528.69     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
        378.35  528.69             .1       .3

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
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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 #100-yr

			Inside BR US	Inside BR DS
E.G. US. (ft)	757.11	Element		
W.S. US. (ft)	756.63	E.G. Elev (ft)	757.05	756.99
Q Total (cfs)	7412.00	W.S. Elev (ft)	756.67	756.38
Q Bridge (cfs)	2992.01	Crit W.S. (ft)	753.40	753.52
Q Weir (cfs)		Max Chl Dpth (ft)	12.42	11.28
Weir Sta Lft (ft)		Vel Total (ft/s)	4.68	6.12
Weir Sta Rgt (ft)		Flow Area (sq ft)	1582.53	1211.05
Weir Submerg		Froude # Chl	0.25	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	7230.79	5800.81
Min El Weir Flow (ft)	752.00	Hydr Depth (ft)	4.99	4.09
Min El Prs (ft)	753.55	W.P. Total (ft)	596.50	523.93
Delta EG (ft)	0.18	Conv. Total (cfs)	127513.6	89063.7
Delta WS (ft)	0.39	Top Width (ft)	316.84	295.95
BR Open Area (sq ft)	513.33	Frctn Loss (ft)	0.04	0.06
BR Open Vel (ft/s)	5.83	C & E Loss (ft)	0.02	0.01
Coef of Q		Shear Total (lb/sq ft)	0.56	1.00
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
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: Flint Run
REACH: Lower RS: 1996.533

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	800.66	2.87	800	20.54	796.34	26.59	795	36.01	792.98
49.32	790	59.3	787.88	73.33	785	83.96	782.91	98.17	780
110.22	777.43	123.36	775	146.01	770.34	147.65	770	148.86	770
161.56	768.45	187.96	765.59	190.53	765	212.74	765	253.18	767.96
264.25	770	321.36	770	321.59	770	321.74	769.95	334.48	765
338.22	757.6	339.53	756.12	340.34	756.05	340.99	756	343.03	755.84
344.1	755.84	358.64	754.61	365.02	754.27	367.69	754.14	371.47	754.14
372.1	754.12	378.35	754.22	381.77	754.24	386.49	754.12	386.64	754
390.39	754	390.53	752.89	390.68	752	390.77	751.51	391.24	750.56
391.36	750.46	392.18	749.9	399.43	745.4	412.84	745.49	429.87	745.1
430.68	746.25	431.49	745.59	456.87	746.69	457.47	747.11	458.75	748
460.62	749.36	461.5	750	464.07	751.86	464.2	751.97	468.76	752.05
479.07	752.08	496.28	751.83	496.46	751.84	527.54	754.42	528.69	754.44
552.71	754.82	561.91	754.99	562	754.99	562.21	755	562.32	755
595.37	753.58	612.25	754.6	623.27	754.45	645.53	758.04	658.09	758.71
693.09	760	709.49	763.47	710.27	763.68	715.07	765	717.82	765.77
733.15	770	749.73	774.64	751.01	775	761.67	776.19	762.32	776.22
794.97	778.22	813.46	779.54	813.52	779.55	826.69	780	850.66	781.41
865.24	781.54	890.26	781.22	898.37	780	947.8	780	968.82	782.8
977.23	785	1019.29	789.33	1027.08	790	1035.86	791.47	1036.64	791.59

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	264.25	.2	321.36	.04	378.35	.035	528.69	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
378.35	528.69	477.61	274.2	175.6	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	756.93	Element			
Vel Head (ft)	0.69	Wt. n-Val.	0.040	0.035	0.040
W.S. Elev (ft)	756.24	Reach Len. (ft)	477.61	274.20	175.60
Crit W.S. (ft)		Flow Area (sq ft)	55.08	987.34	180.62
E.G. Slope (ft/ft)	0.002293	Area (sq ft)	55.08	987.34	180.62
Q Total (cfs)	7412.00	Flow (cfs)	123.22	6830.05	458.73
Top Width (ft)	294.92	Top Width (ft)	38.92	150.34	105.65
Vel Total (ft/s)	6.06	Avg. Vel. (ft/s)	2.24	6.92	2.54
Max Chl Dpth (ft)	11.14	Hydr. Depth (ft)	1.42	6.57	1.71
Conv. Total (cfs)	154798.8	Conv. (cfs)	2573.4	142644.9	9580.5
Length Wtd. (ft)	261.19	Wetted Per. (ft)	39.05	157.28	105.87
Min Ch El (ft)	745.10	Shear (lb/sq ft)	0.20	0.90	0.24
Alpha	1.21	Stream Power (lb/ft s)	1036.64	0.00	0.00
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	0.85	16.38	10.02
C & E Loss (ft)	0.05	Cum SA (acres)	0.49	2.54	3.99

CROSS SECTION

RIVER: Flint Run

REACH: Lower RS: 1720.640

INPUT
Description:
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	837.16	1.23	836.49	13.1	830	17.08	827.77	21.76	825
25.63	822.75	42.44	812.26	46.07	810	50.32	807.36	54.09	805
59.39	801.78	62.27	800	64.45	798.71	70.4	795	74.16	792.68
78.56	790	85.62	785.73	86.73	785	98.37	777.91	102.25	775.54
103.14	775	108.56	772.08	112.09	770	130.34	760.38	131.04	760
131.6	759.8	144.88	755	149.32	753.92	165.23	750	170.74	749.21
195.91	744.85	230.75	749.58	234.55	750	240.54	750	288.17	751.29
311.57	751.92	430.38	755	453.79	755	457.16	755.23	515.06	760
519.16	760	552.44	764.22	557.98	765	559.45	765	574.29	767.43
593.86	770	608.06	771.67	629.58	774.61	631.13	775	633.42	775.21
648.79	776.49	690.41	780	712.88	782.89	739.28	785	753.82	785
786.54	788.08	809.67	790	829.53	792.2	850.76	793.74	863.78	795
886.65	799.16	891.24	800	910.57	803.96	914.92	805	925.56	807.51
929.58	808.43								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	165.23	.035	240.54	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
165.23	240.54	277.27	313.32	323.91	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	756.11	Element			
Vel Head (ft)	1.19	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	754.92	Reach Len. (ft)	277.27	313.32	323.91
Crit W.S. (ft)		Flow Area (sq ft)	49.14	545.23	454.65
E.G. Slope (ft/ft)	0.003952	Area (sq ft)	49.14	545.23	454.65
Q Total (cfs)	7412.00	Flow (cfs)	81.90	5408.93	1921.17
Top Width (ft)	282.06	Top Width (ft)	20.02	75.31	186.73
Vel Total (ft/s)	7.07	Avg. Vel. (ft/s)	1.67	9.92	4.23
Max Chl Dpth (ft)	10.07	Hydr. Depth (ft)	2.45	7.24	2.43
Conv. Total (cfs)	117903.1	Conv. (cfs)	1302.8	86040.1	30560.2
Length Wtd. (ft)	314.90	Wetted Per. (ft)	20.61	76.08	186.79
Min Ch El (ft)	744.85	Shear (lb/sq ft)	0.59	1.77	0.60
Alpha	1.53	Stream Power (lb/ft s)	929.58	0.00	0.00
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.28	11.55	8.74
C & E Loss (ft)	0.02	Cum SA (acres)	0.17	1.83	3.40

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: Flint Run
REACH: Lower RS: 1407.321

INPUT
Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835	15.3	830	29.71	825	43.91	820	52.91	815
60.66	810	68.42	805	76.06	800	82.66	795	88.88	790
95.11	785	99.61	781.84	102.24	780	111.32	775	125.54	770
139.85	765	149.46	760	158.8	755	173.41	750	203.62	744.57
291.54	750	298.84	750.31	407.75	755	524.57	760	588.52	765
640.93	770	692.34	775	744.25	780	795.32	785	843.16	790
863.99	795	879.83	800	894.48	805	908.83	810	922.47	815
937.27	820	952.18	825	967.2	830	981.3	835	996.14	840

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	139.85	.035	291.54	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
139.85	291.54	277.15	391.34	964.75	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	754.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.		0.035	0.040
W.S. Elev (ft)	753.75	Reach Len. (ft)	277.15	391.34	964.75
Crit W.S. (ft)	752.37	Flow Area (sq ft)		783.74	163.29
E.G. Slope (ft/ft)	0.003864	Area (sq ft)		783.74	163.29
Q Total (cfs)	7412.00	Flow (cfs)		6839.00	573.00
Top Width (ft)	216.17	Top Width (ft)		129.08	87.09
Vel Total (ft/s)	7.83	Avg. Vel. (ft/s)		8.73	3.51
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)		6.07	1.87
Conv. Total (cfs)	119236.8	Conv. (cfs)		110018.9	9217.8
Length Wtd. (ft)	483.09	Wetted Per. (ft)		130.35	87.17
Min Ch El (ft)	744.57	Shear (lb/sq ft)		1.45	0.45
Alpha	1.16	Stream Power (lb/ft s)	996.14	0.00	0.00
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)	0.12	6.77	6.44
C & E Loss (ft)	0.10	Cum SA (acres)	0.10	1.09	2.39

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: Flint Run

REACH: Lower RS: 1000.000

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835	11.33	830	22.75	825	34.21	820	45.56	815
56.88	810	68.24	805	79.67	800	91.34	795	103.05	790
114.79	785	127.21	780	140.15	775	152.91	770	170.26	765
190.86	760	221.82	755	250.19	752.85	287.95	750	327.56	744.2
401.82	746.77	495.35	750	567.57	755	605.23	760	621.13	765
637.13	770	652.43	775	667.45	780	682.71	785	691.45	790
700.18	795	708.92	800	717.65	805	726.09	810	734.13	815
742.18	820	750.22	825	758.16	830				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	287.95	.035	401.82	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
287.95	401.82	1	1	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	753.17	Element			
Vel Head (ft)	0.76	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	752.41	Reach Len. (ft)			
Crit W.S. (ft)	750.74	Flow Area (sq ft)	38.41	724.33	418.13
E.G. Slope (ft/ft)	0.002801	Area (sq ft)	38.41	724.33	418.13
Q Total (cfs)	7412.00	Flow (cfs)	34.12	5572.26	1805.63
Top Width (ft)	274.08	Top Width (ft)	31.90	113.87	128.31
Vel Total (ft/s)	6.28	Avg. Vel. (ft/s)	0.89	7.69	4.32
Max Chl Dpth (ft)	8.21	Hydr. Depth (ft)	1.20	6.36	3.26
Conv. Total (cfs)	140045.8	Conv. (cfs)	644.6	105284.8	34116.3
Length Wtd. (ft)		Wetted Per. (ft)	31.99	114.34	128.45
Min Ch El (ft)	744.20	Shear (lb/sq ft)	0.21	1.11	0.57
Alpha	1.24	Stream Power (lb/ft s)	758.16	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Brush Run

Reach	River Sta.	n1	n2	n3
Reach 1	2011.333	.035	.035	.1
Reach 1	1507.212	.035	.035	.1

River:Flint Run

Reach	River Sta.	n1	n2	n3	n4	n5
Upper	5348.411	.1	.035	.1		
Upper	4587.709	.1	.035	.1		
Upper	4327.913	.1	.035	.1		
Lower	4052.349	.05	.035	.1		
Lower	3910.912	.05	.035	.1		
Lower	3710.271	.1	.035	.04		
Lower	3270.326	.1	.035	.04		
Lower	3218.798	.1	.035	.04		
Lower	3143.198	.1	.035	.04		
Lower	2861.250	.1	.035	.04		
Lower	2579.076	.1	.035	.04		
Lower	2476.907	.1	.035	.04		
Lower	2422.446	.1	.035	.04		
Lower	2355.763	.1	.035	.04		
Lower	2314.880	.1	.035	.04		
Lower	2223.643	.1	.035	.04		
Lower	2185.764	.1	.035	.04		
Lower	2075.488	.1	.035	.04		
Lower	2057.86	Culvert				
Lower	2035.918	.1	.035	.04		
Lower	2017.29	Bridge				
Lower	1996.533	.1	.2	.04	.035	.04
Lower	1720.640	.1	.035	.04		
Lower	1407.321	.1	.035	.04		
Lower	1000.000	.1	.035	.04		

SUMMARY OF REACH LENGTHS

River: Brush Run

Reach	River Sta.	Left	Channel	Right
Reach 1	2011.333	530.52	498.55	409.24
Reach 1	1507.212	101.38	496.45	893.29

River: Flint Run

Reach	River Sta.	Left	Channel	Right
Upper	5348.411	580.67	714.22	806.06
Upper	4587.709	165.19	259.78	200.58
Upper	4327.913	783.59	271.11	224.1
Lower	4052.349	46.88	141.39	54.28

Lower	3910.912	545.19	736.56	773.43
Lower	3710.271	310.33	428.51	382.56
Lower	3270.326	56.8	51.5	42.19
Lower	3218.798	785.25	753.13	556.83
Lower	3143.198	328.74	281.33	282.2
Lower	2861.250	296.63	281.27	281.46
Lower	2579.076	100.63	101.9	100.41
Lower	2476.907	1155.6	1093.26	853.34
Lower	2422.446	335.76	346.43	218.7
Lower	2355.763	48.16	40.88	38.52
Lower	2314.880	14.36	91.23	28.15
Lower	2223.643	39.89	37.88	44.06
Lower	2185.764	190.76	109.94	157.38
Lower	2075.488	41.03	39.47	55.96
Lower	2057.86	Culvert		
Lower	2035.918	50.28	39.38	62.3
Lower	2017.29	Bridge		
Lower	1996.533	477.61	274.2	175.6
Lower	1720.640	277.27	313.32	323.91
Lower	1407.321	277.15	391.34	964.75
Lower	1000.000	1	1	1

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Brush Run

Reach	River Sta.	Contr.	Expan.
Reach 1	2011.333	.1	.3
Reach 1	1507.212	.1	.3

River: Flint Run

Reach	River Sta.	Contr.	Expan.
Upper	5348.411	.1	.3
Upper	4587.709	.1	.3
Upper	4327.913	.1	.3
Lower	4052.349	.1	.3
Lower	3910.912	.1	.3
Lower	3710.271	.1	.3
Lower	3270.326	.1	.3
Lower	3218.798	.1	.3
Lower	3143.198	.1	.3
Lower	2861.250	.1	.3
Lower	2579.076	.1	.3
Lower	2476.907	.1	.3
Lower	2422.446	.1	.3

Lower	2355.763		.1	.3
Lower	2314.880		.1	.3
Lower	2223.643		.1	.3
Lower	2185.764		.1	.3
Lower	2075.488		.1	.3
Lower	2057.86	Culvert		
Lower	2035.918		.1	.3
Lower	2017.29	Bridge		
Lower	1996.533		.1	.3
Lower	1720.640		.1	.3
Lower	1407.321		.1	.3
Lower	1000.000		.1	.3

Profile Output Table - Standard Table 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Flint Run	Upper	5348.411	7165.00	753.25	767.24		767.86	0.001126	6.61	1460.11	206.60	0.37
Flint Run	Upper	4587.709	7165.00	751.12	766.04		766.94	0.001406	7.82	1185.92	161.36	0.41
Flint Run	Upper	4327.913	7165.00	755.00	764.07	763.25	766.17	0.005757	11.92	744.31	151.37	0.78
Flint Run	Lower	4052.349	7412.00	749.62	764.76		765.21	0.000824	6.47	1971.62	327.98	0.32
Flint Run	Lower	3910.912	7412.00	749.22	764.81		765.09	0.000580	5.48	2391.11	358.75	0.27
Flint Run	Lower	3710.271	7412.00	755.00	762.00	761.55	763.94	0.007244	11.32	737.80	175.08	0.84
Flint Run	Lower	3270.326	7412.00	747.64	761.95		762.55	0.001168	7.50	1408.91	204.76	0.37
Flint Run	Lower	3218.798	7412.00	747.59	761.89		762.49	0.001214	7.31	1438.96	233.37	0.38
Flint Run	Lower	3143.198	7412.00	747.50	760.82		761.55	0.001484	7.91	1298.25	219.23	0.42
Flint Run	Lower	2861.250	7412.00	746.88	760.03		761.05	0.001902	9.25	1174.61	228.30	0.48
Flint Run	Lower	2579.076	7412.00	745.85	759.94		760.49	0.001177	7.25	1514.91	258.66	0.36
Flint Run	Lower	2476.907	7412.00	745.53	759.89		760.36	0.001001	6.85	1584.04	239.45	0.35
Flint Run	Lower	2422.446	7412.00	745.48	758.15		758.98	0.001909	8.54	1234.24	232.01	0.46
Flint Run	Lower	2355.763	7412.00	745.42	756.94		758.20	0.003034	10.16	1011.74	206.69	0.57
Flint Run	Lower	2314.880	7412.00	745.38	756.95		758.04	0.002633				

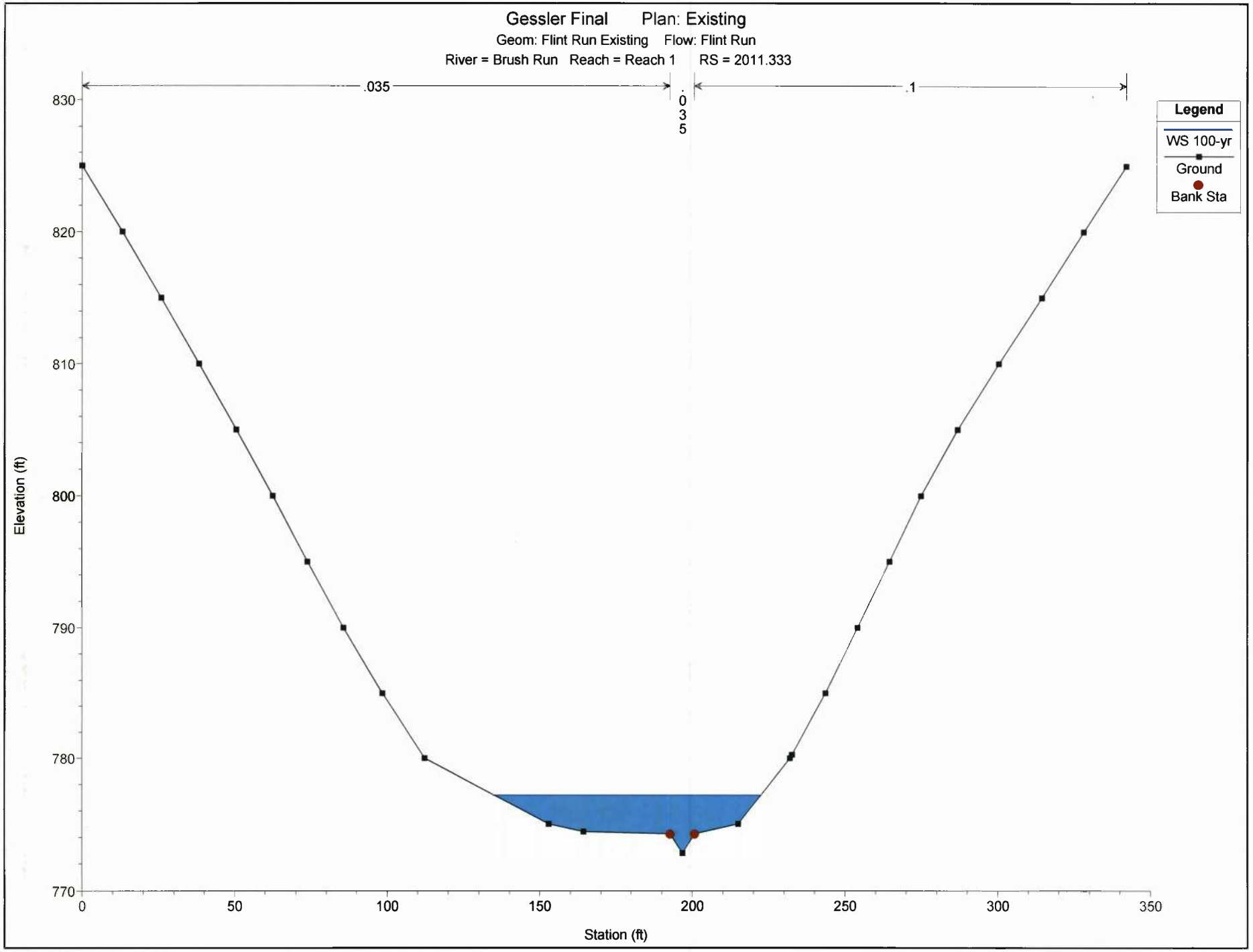
9.22	1061.79	205.69		0.53					
Flint Run	Lower		2223.643	7412.00	745.30	756.81		757.82	0.002603
9.19	1110.56	207.68		0.52					
Flint Run	Lower		2185.764	7412.00	745.27	756.75		757.71	0.002318
8.95	1154.12	210.77		0.50					
Flint Run	Lower		2075.488	7412.00	745.17	756.47	754.92	757.34	0.003094
8.81	1182.93	284.25		0.57					
Flint Run	Lower		2057.86	Culvert					
Flint Run	Lower		2035.918	7412.00	744.25	756.63	753.24	757.11	0.001044
6.27	1637.86	316.21		0.34					
Flint Run	Lower		2017.29	Bridge					
Flint Run	Lower		1996.533	7412.00	745.10	756.24		756.93	0.002293
6.92	1223.04	294.92		0.48					
Flint Run	Lower		1720.640	7412.00	744.85	754.92		756.11	0.003952
9.92	1049.02	282.06		0.65					
Flint Run	Lower		1407.321	7412.00	744.57	753.75	752.37	754.85	0.003864
8.73	947.03	216.17		0.62					
Flint Run	Lower		1000.000	7412.00	744.20	752.41	750.74	753.17	0.002801
7.69	1180.87	274.08		0.54					
Brush Run	Reach 1		2011.333	1554.00	772.80	777.24	777.24	778.42	0.012925
11.12	207.53	87.98		1.02					
Brush Run	Reach 1		1507.212	1554.00	763.58	768.38	768.38	769.63	0.011714
12.10	223.64	87.57		1.02					

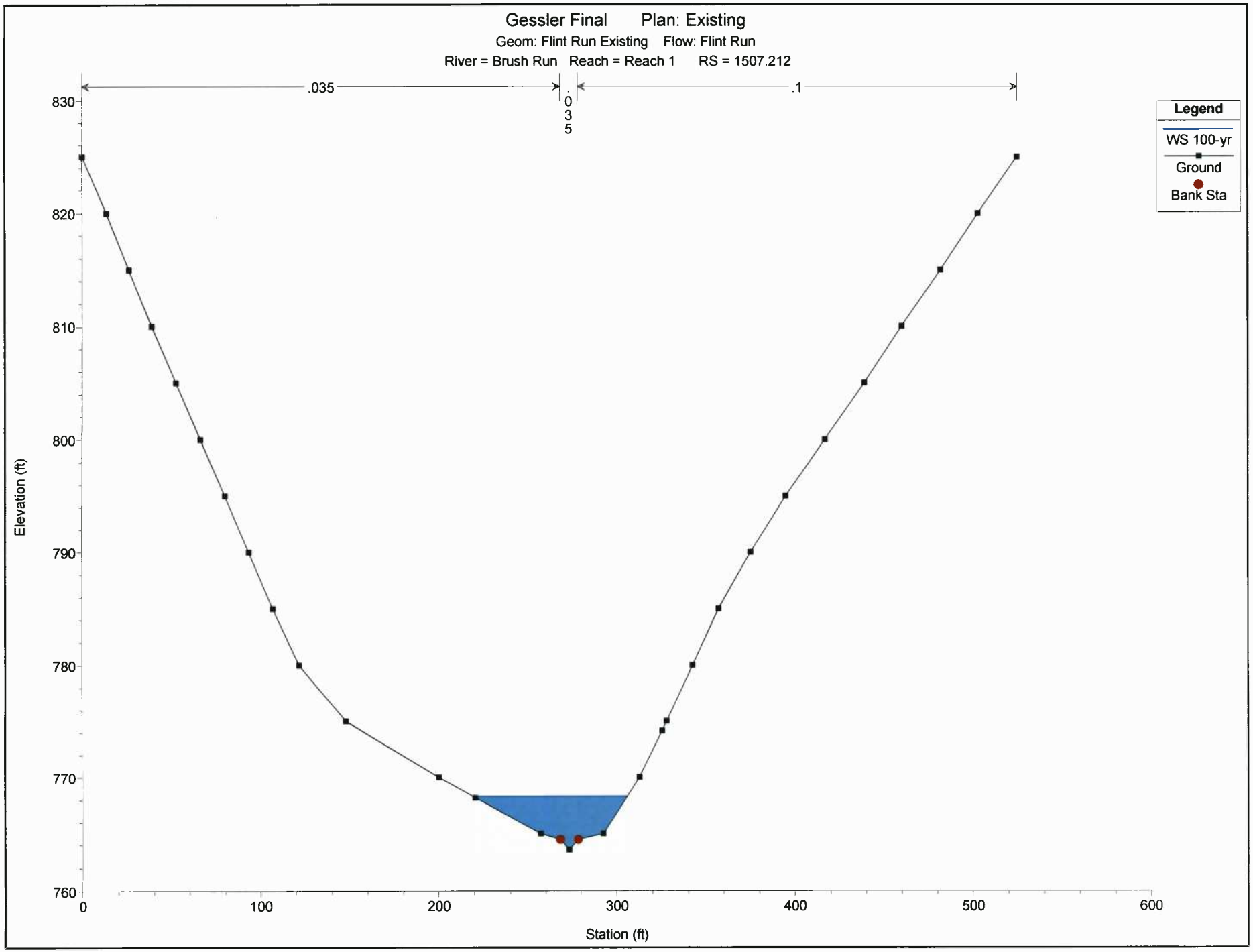
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Ex

River: Brush Run Reach: Reach 1 RS: 2011.333 Profile: 100-yr
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.
River: Brush Run Reach: Reach 1 RS: 1507.212 Profile: 100-yr
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.
River: Flint Run Reach: Upper RS: 4587.709 Profile: 100-yr
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.
River: Flint Run Reach: Upper RS: 4327.913 Profile: 100-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Flint Run Reach: Lower RS: 3910.912 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 3710.271 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2476.907 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2035.918 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2017.29 Profile: 100-yr Upstream
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.
River: Flint Run Reach: Lower RS: 2017.29 Profile: 100-yr Downstream
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.
River: Flint Run Reach: Lower RS: 1720.640 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 1407.321 Profile: 100-yr
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.


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Brush Run Reach = Reach 1 RS = 2011.333
.035
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
830
820
810
800
790
780
770
0
50
100
150
200
250
300
350
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Brush Run Reach = Reach 1 RS = 1507.212
.035
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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820
810
800
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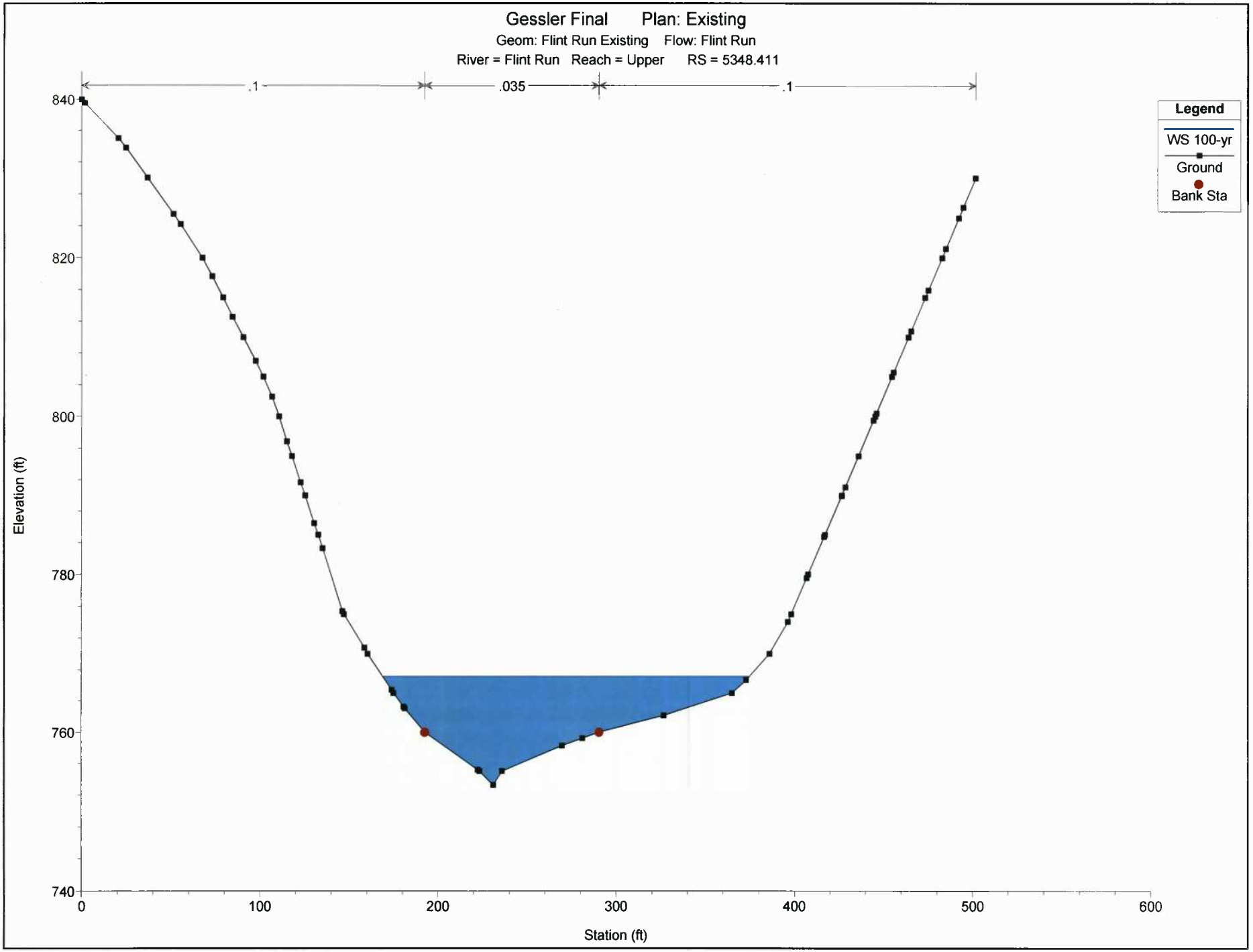
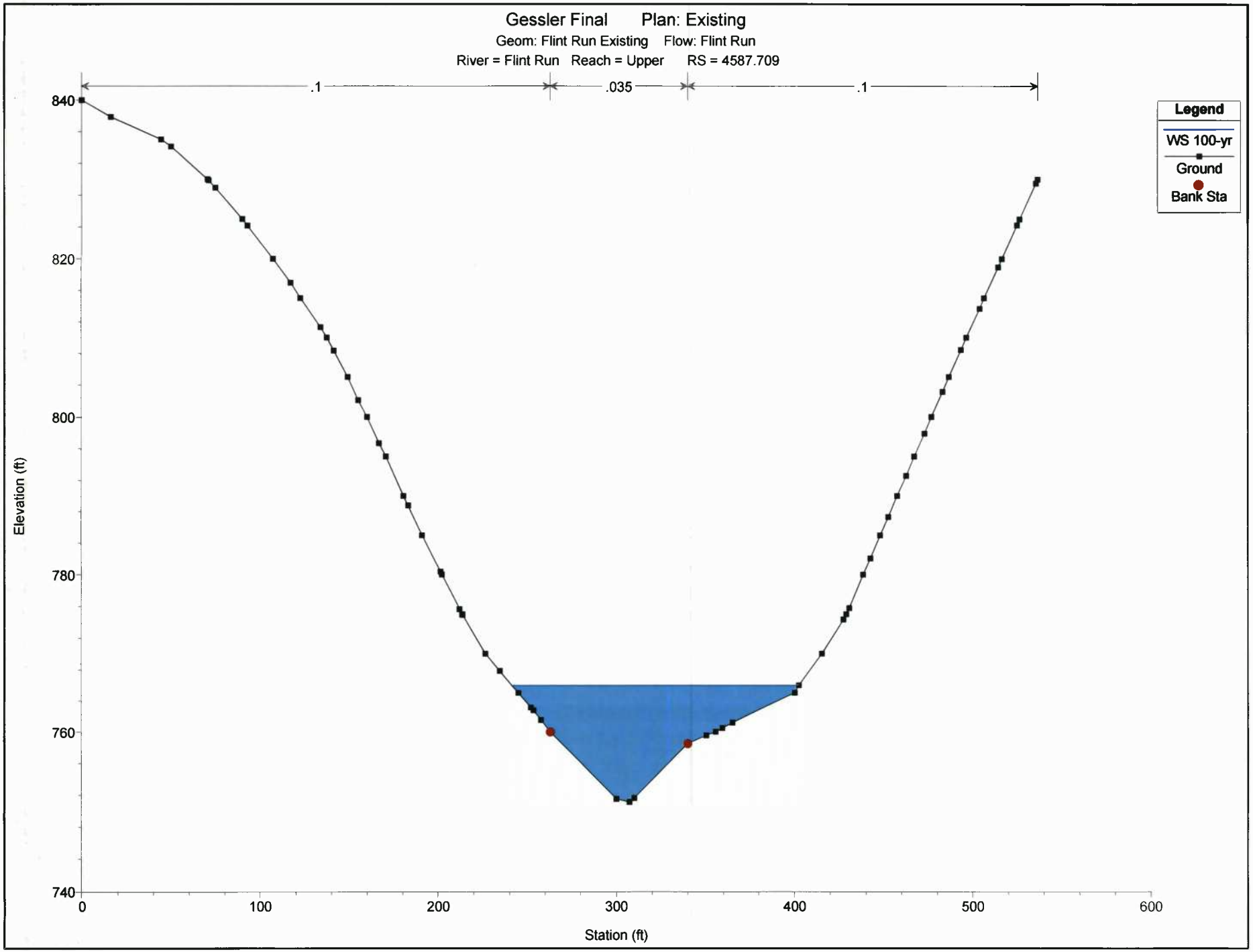
760
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Upper RS = 5348.411
.1
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Upper RS = 4587.709
.1
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
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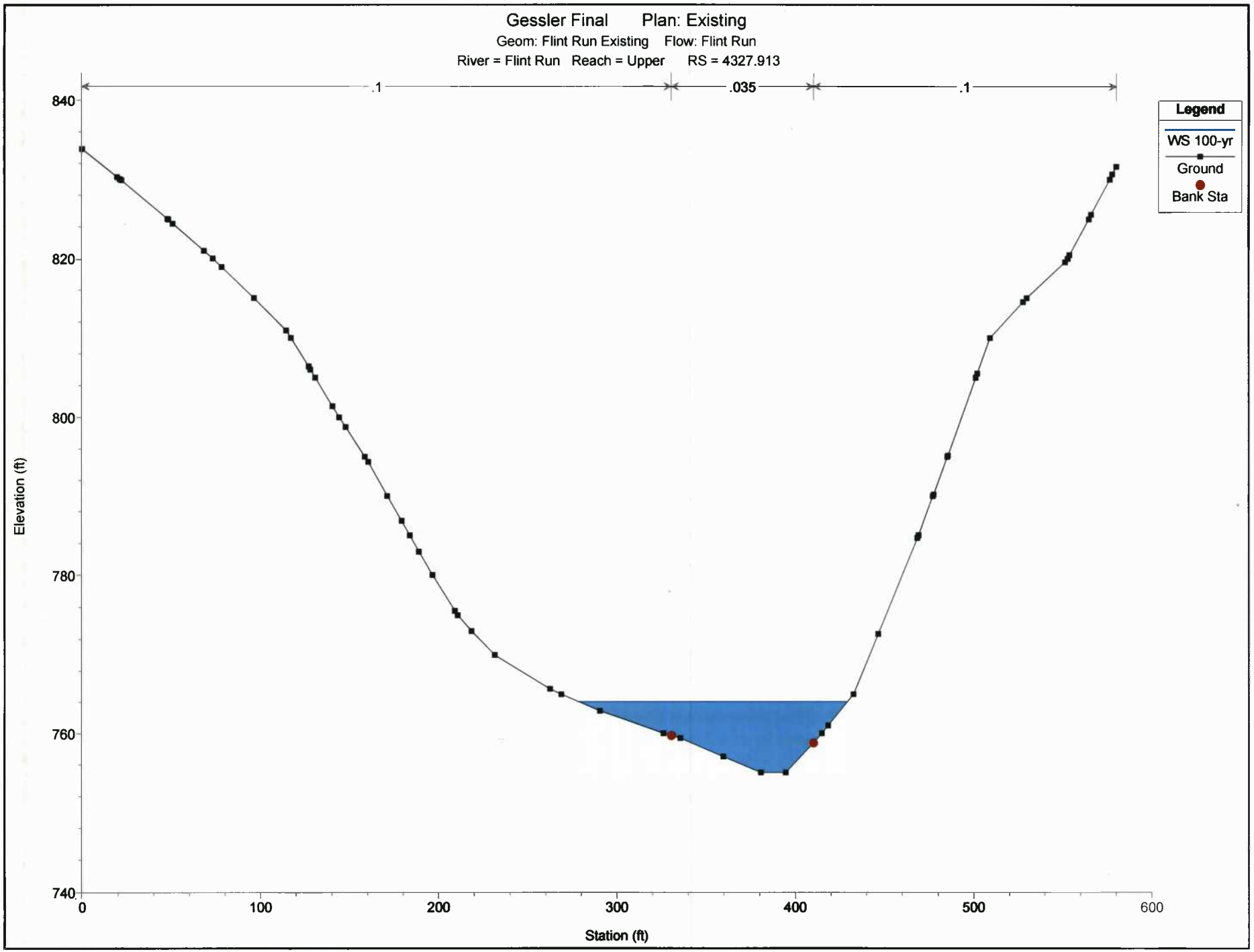
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Upper RS = 4327.913
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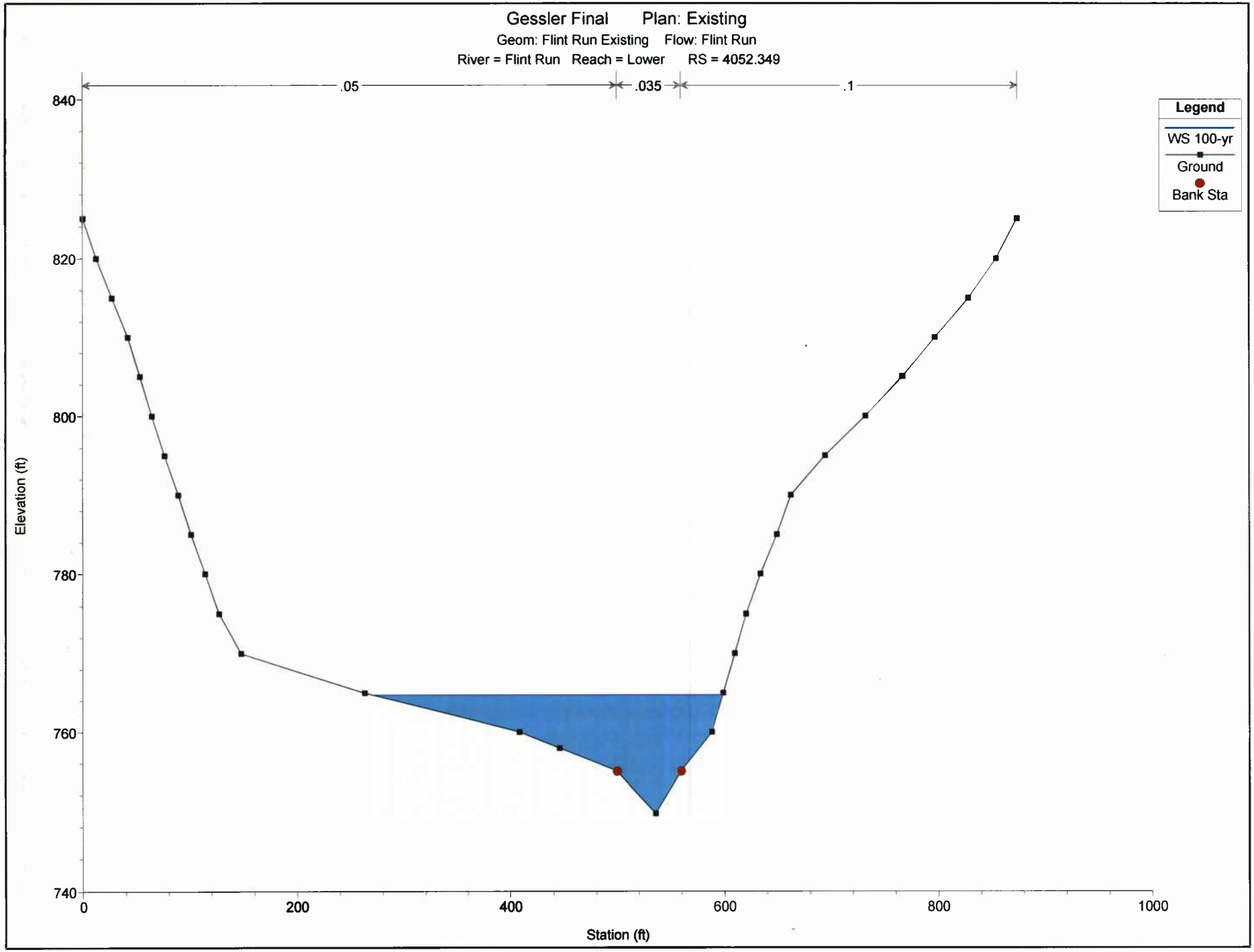
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 4052.349
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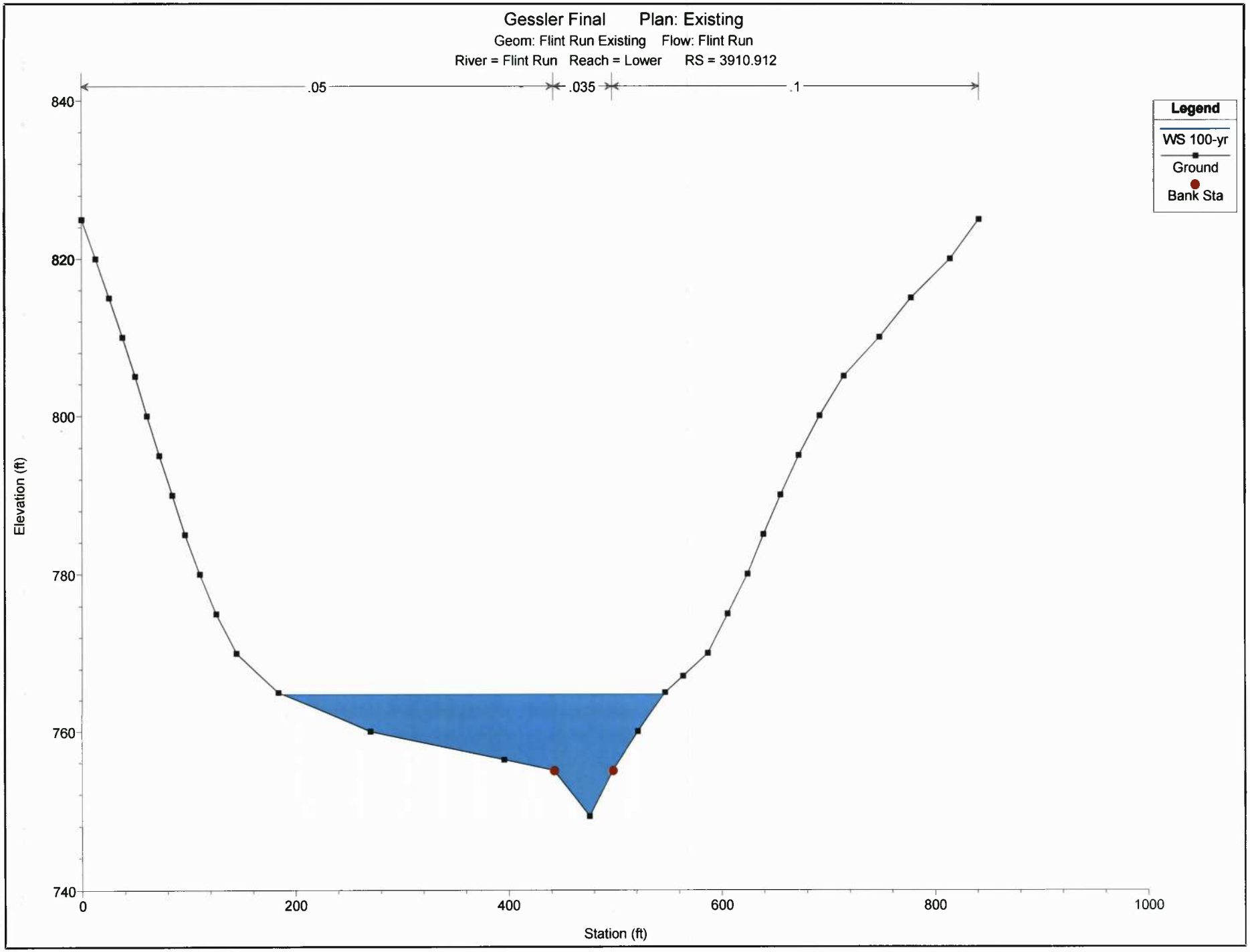
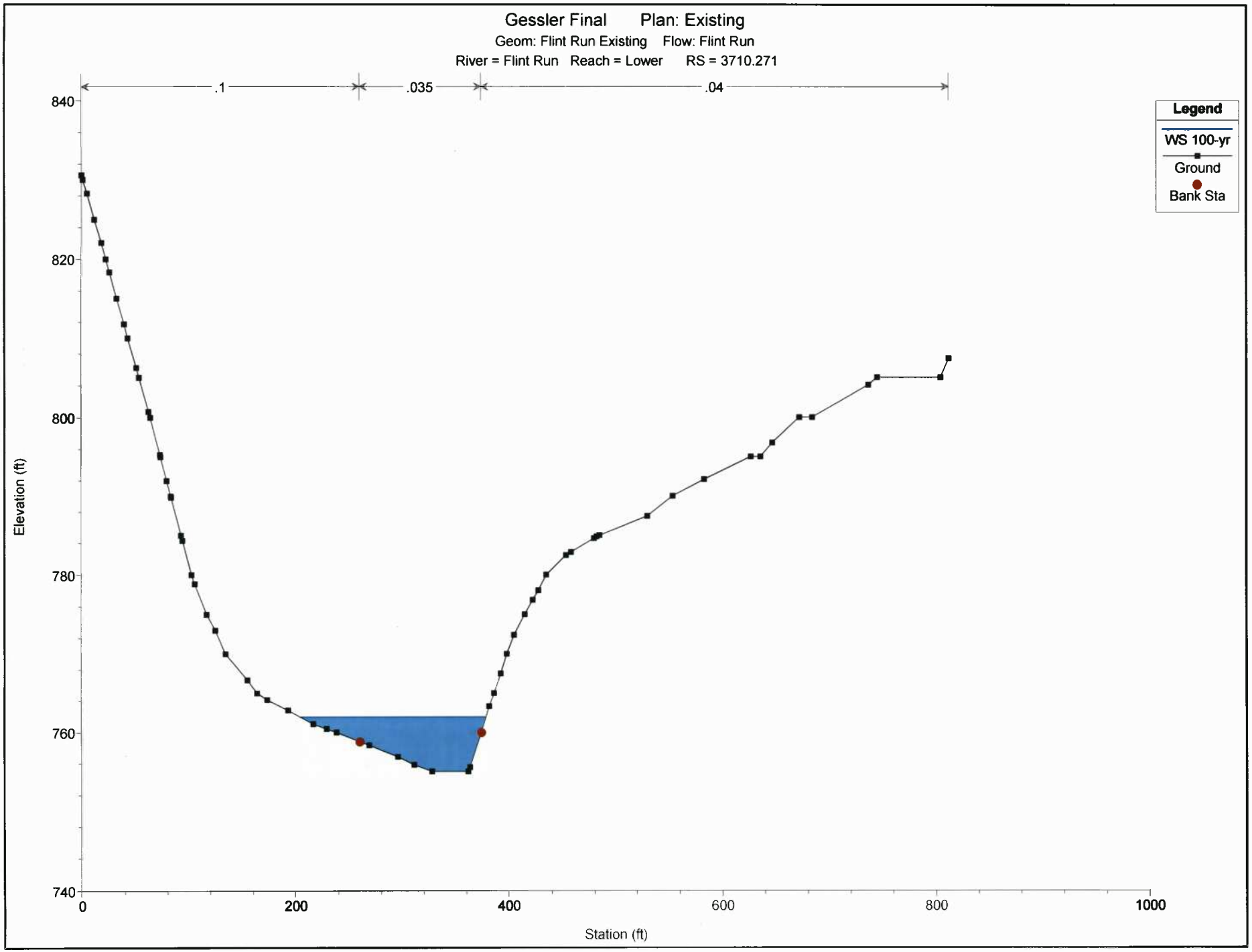
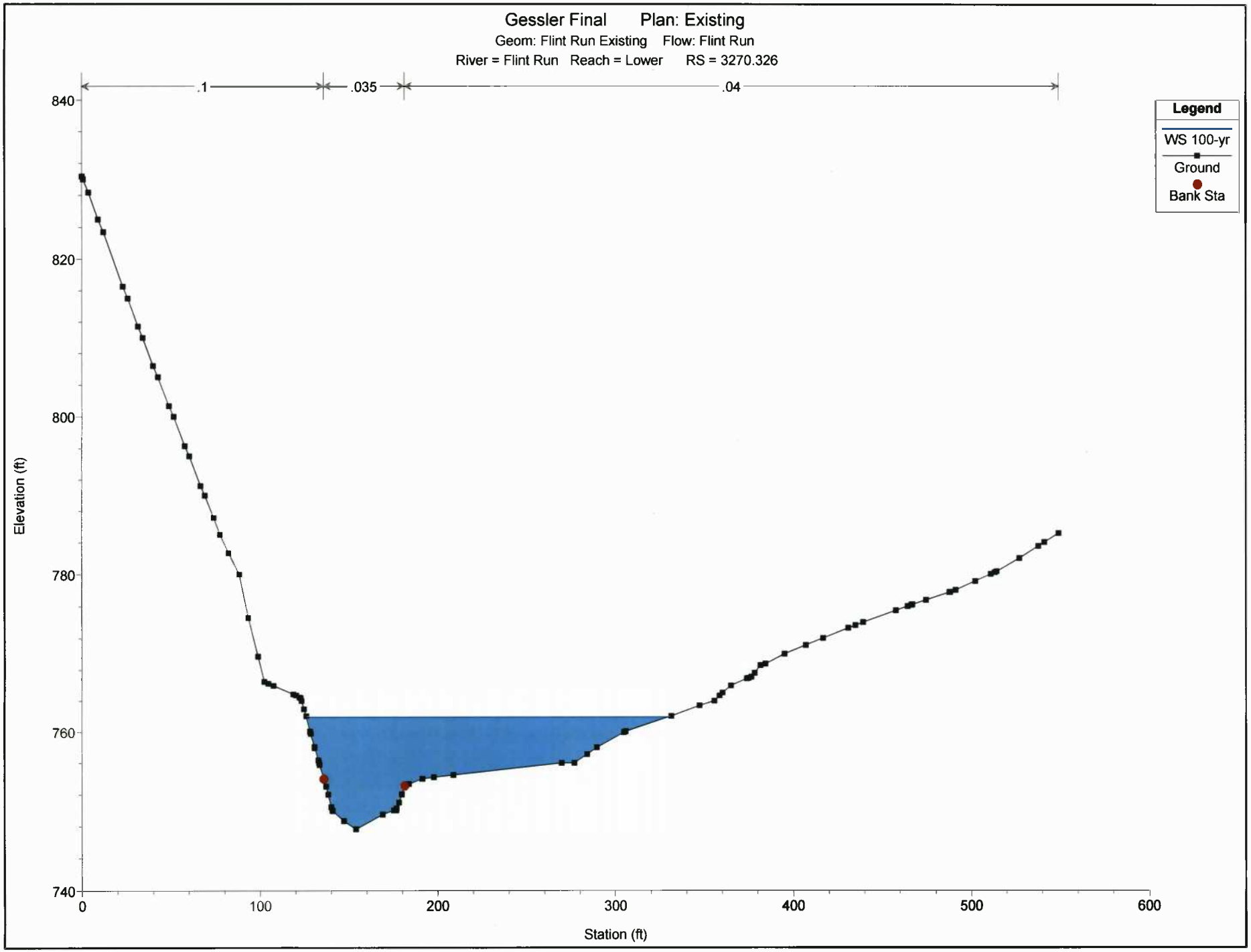
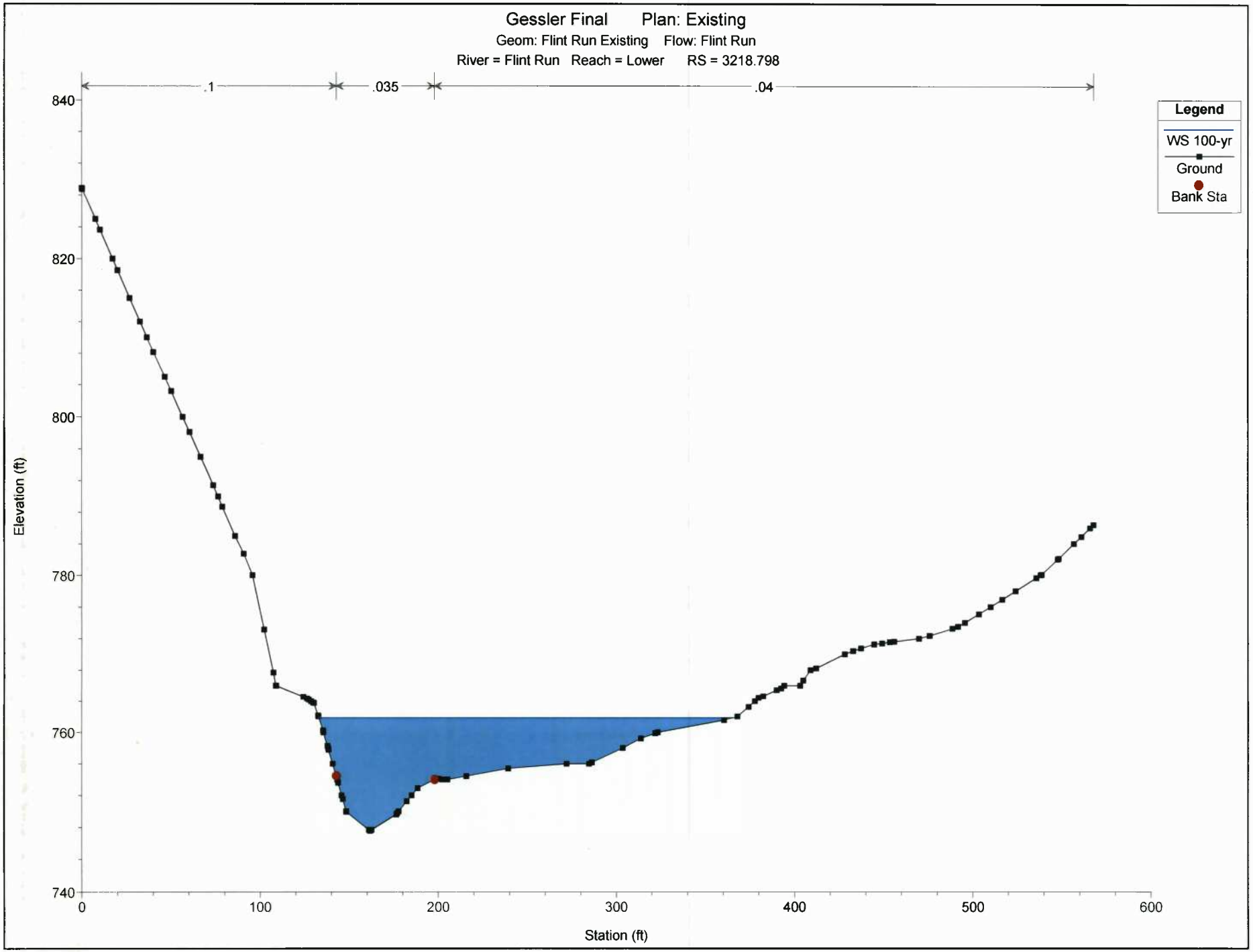
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 3910.912
.05
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 3710.271
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 3270.326
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 3218.798
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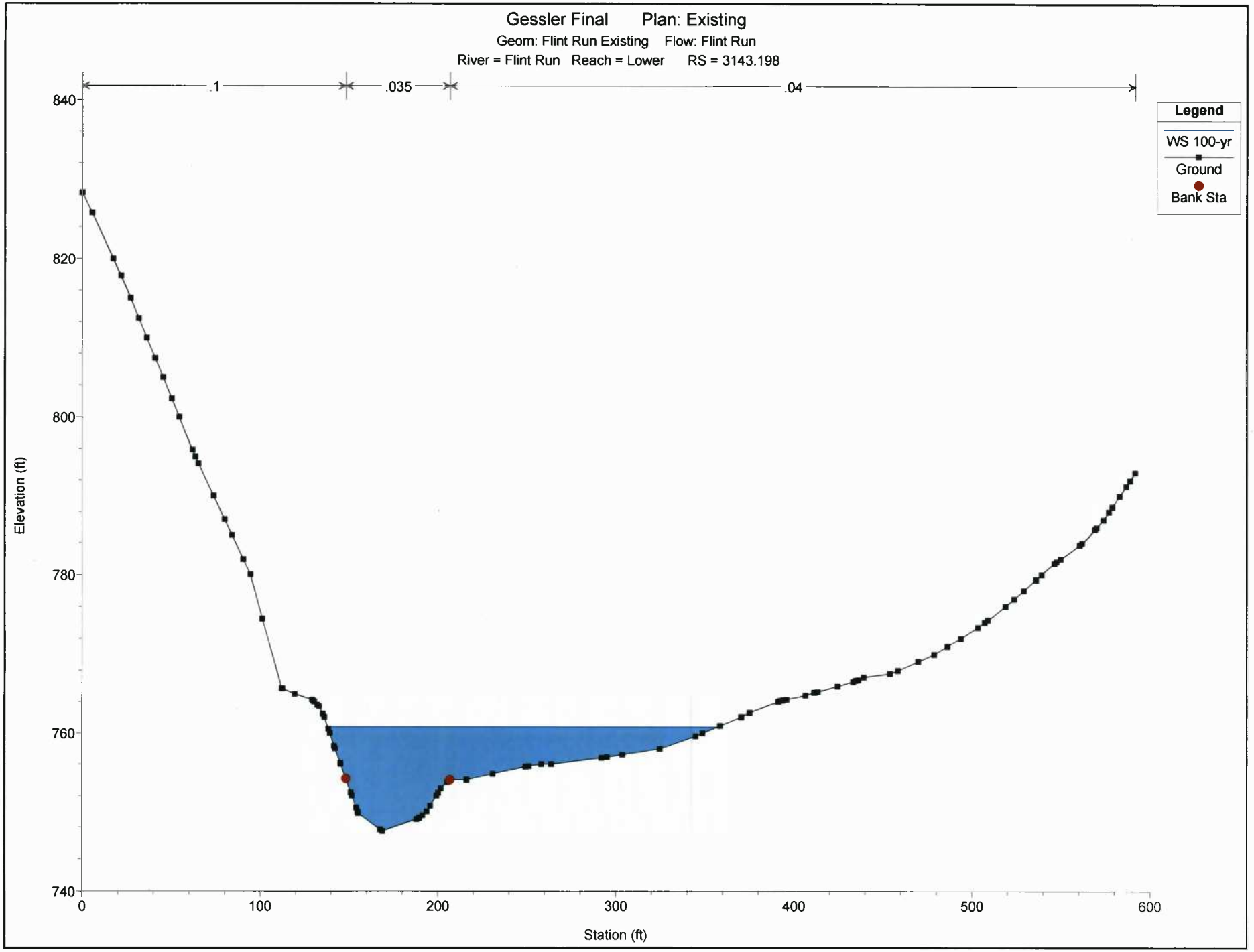
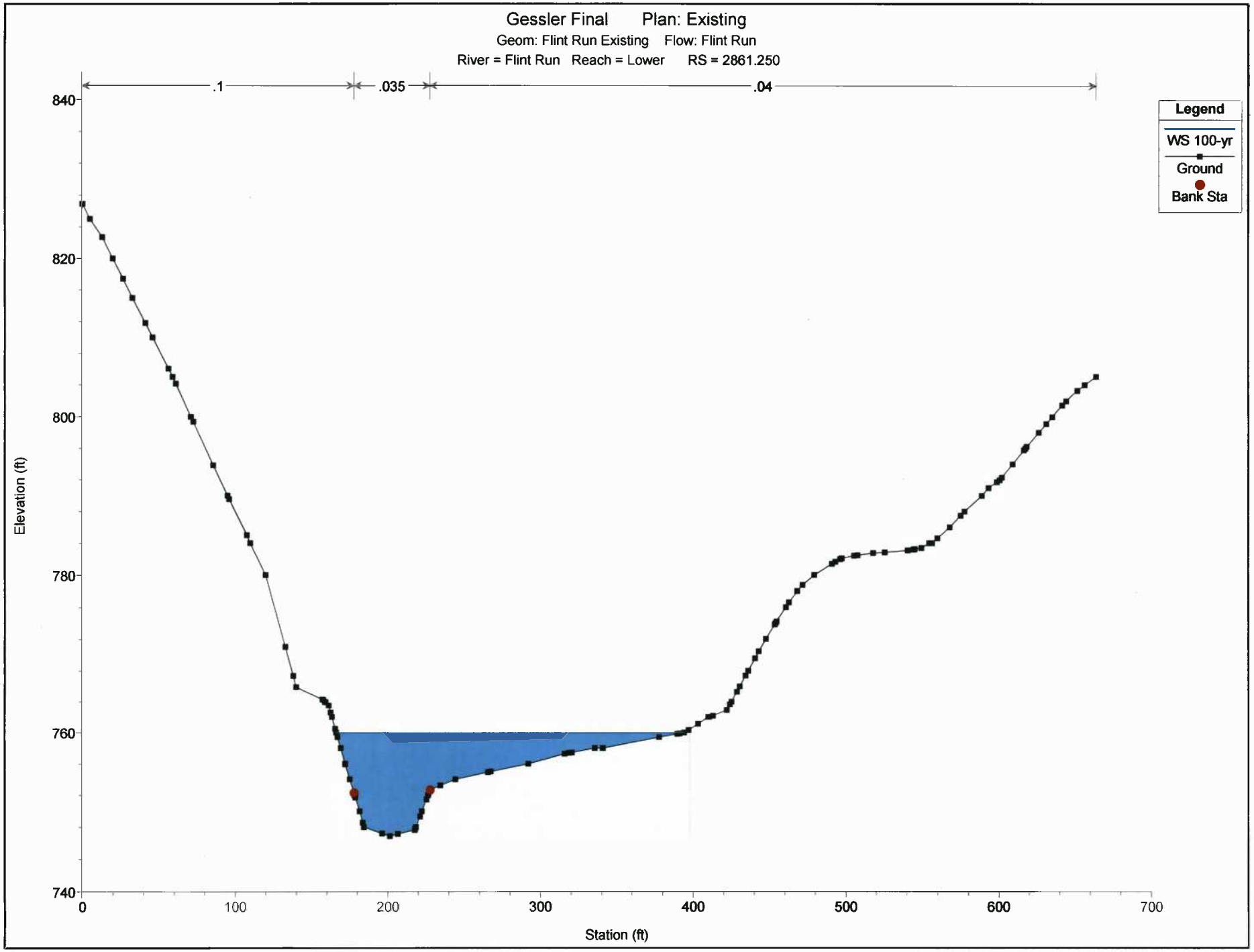
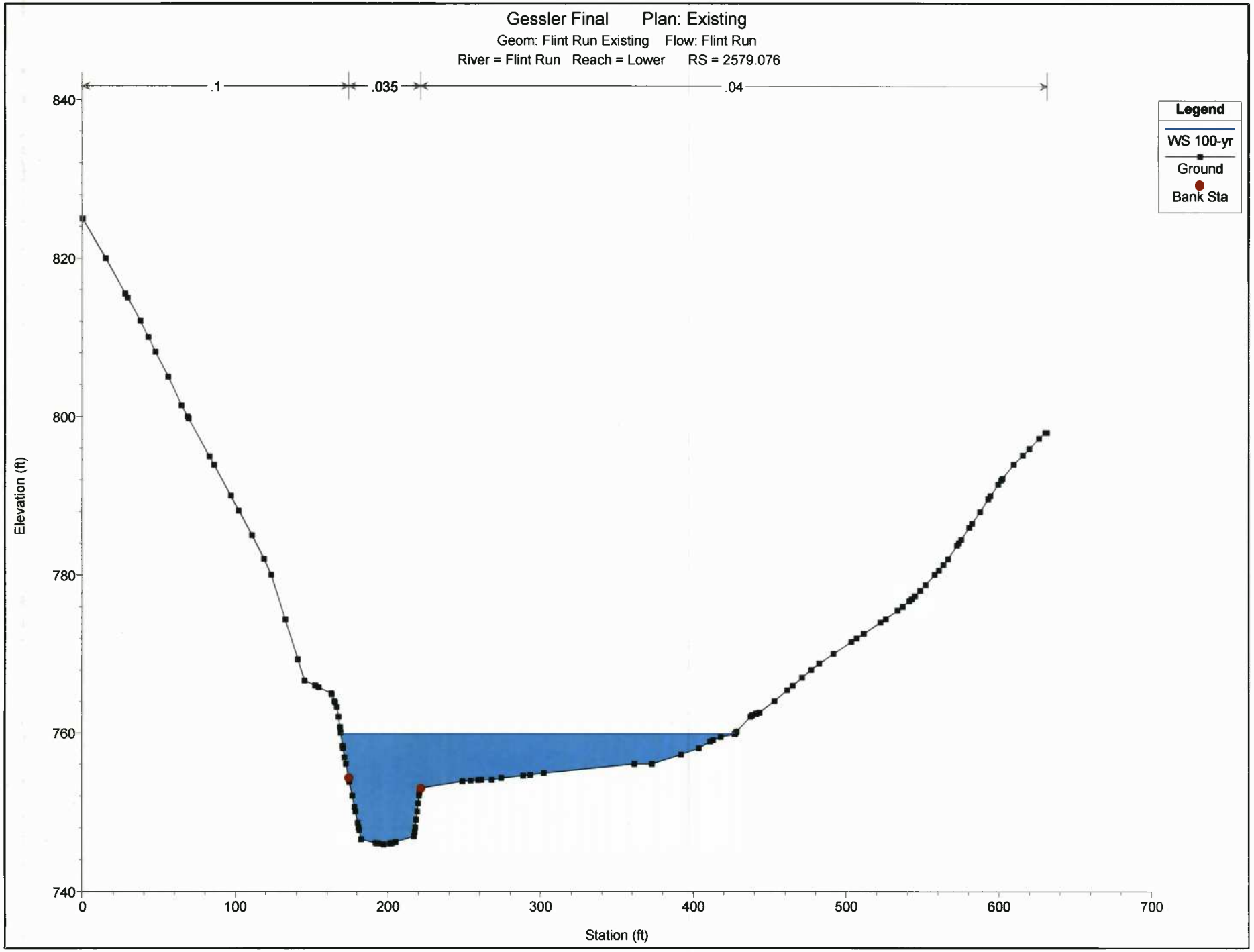
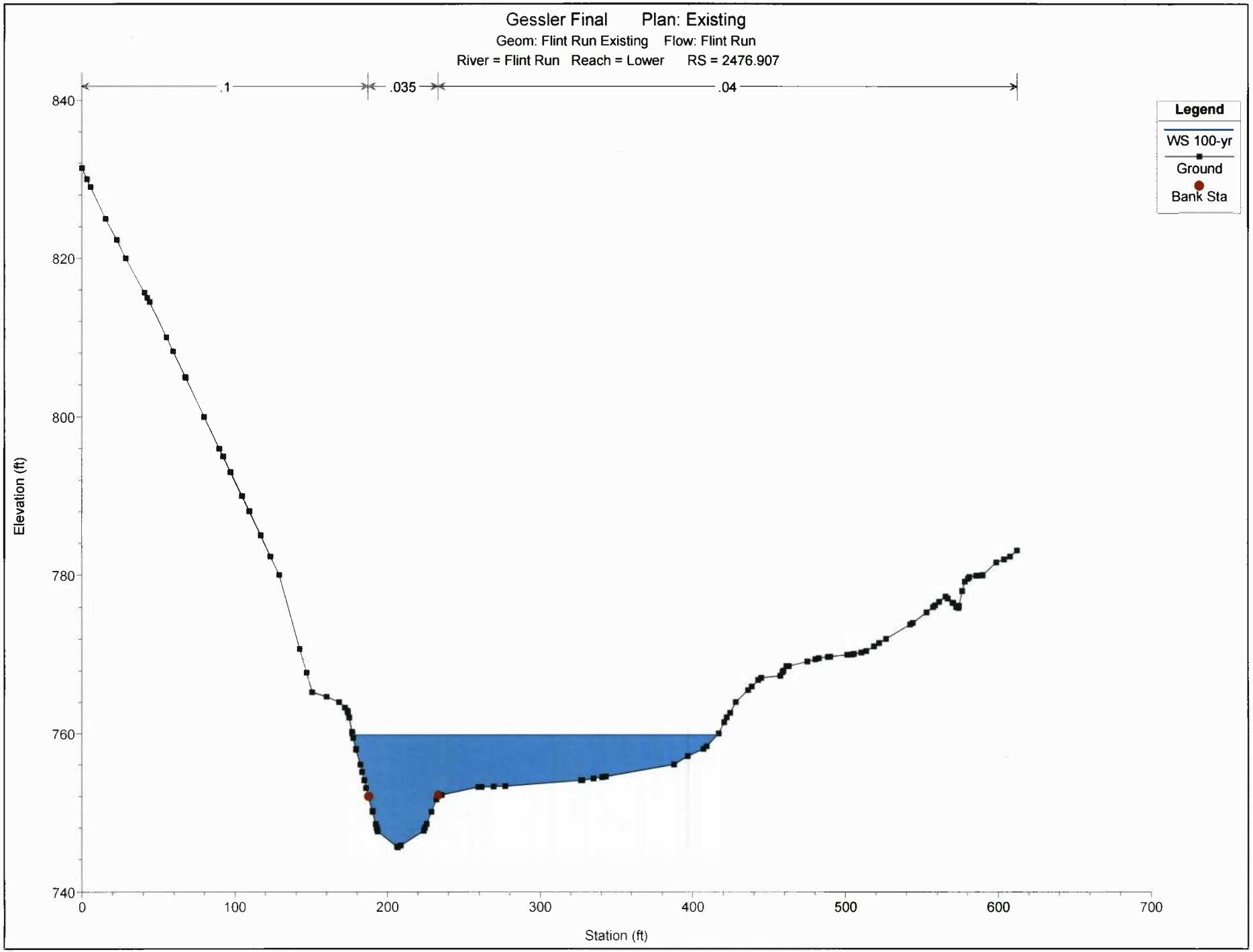
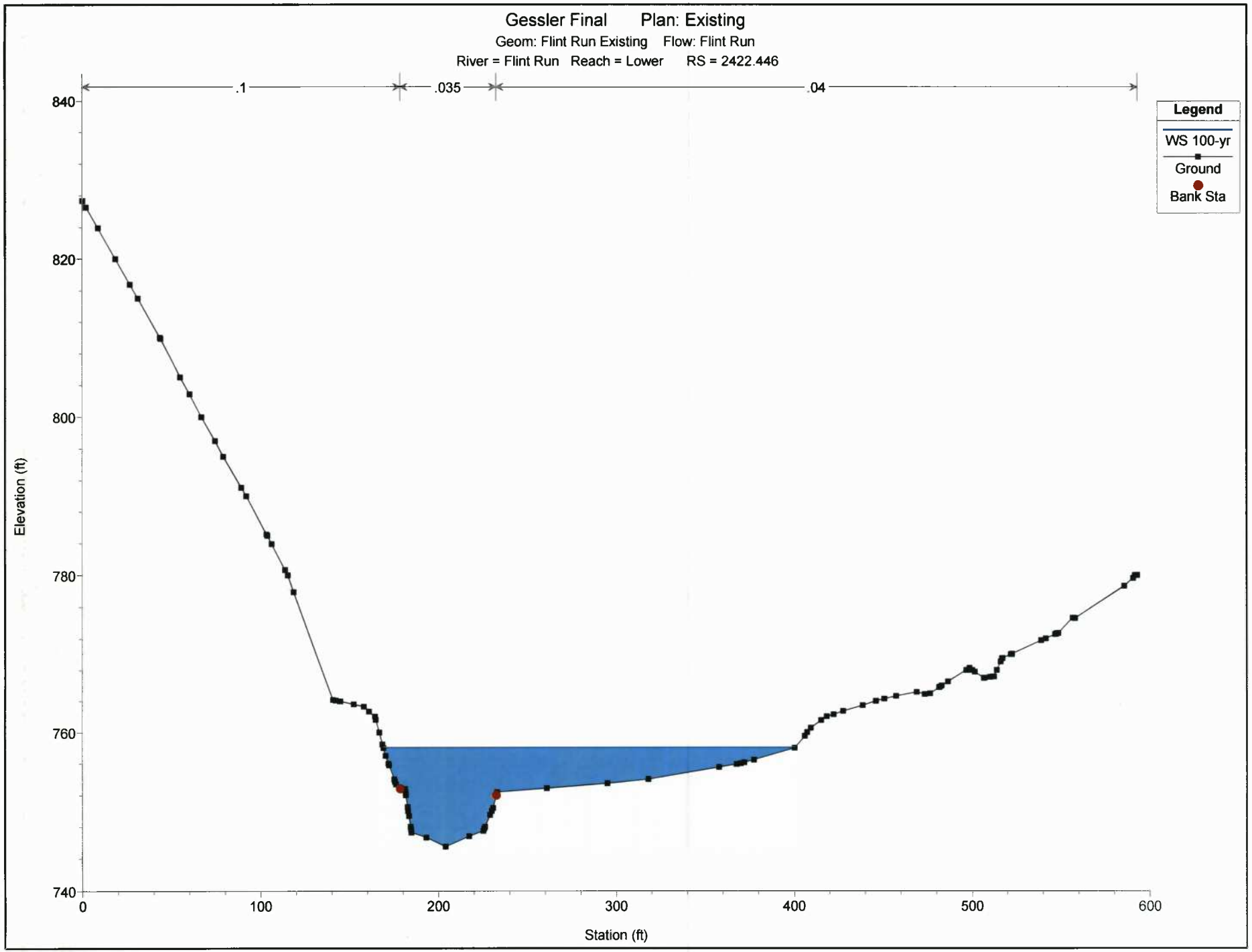
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
Station (ft)

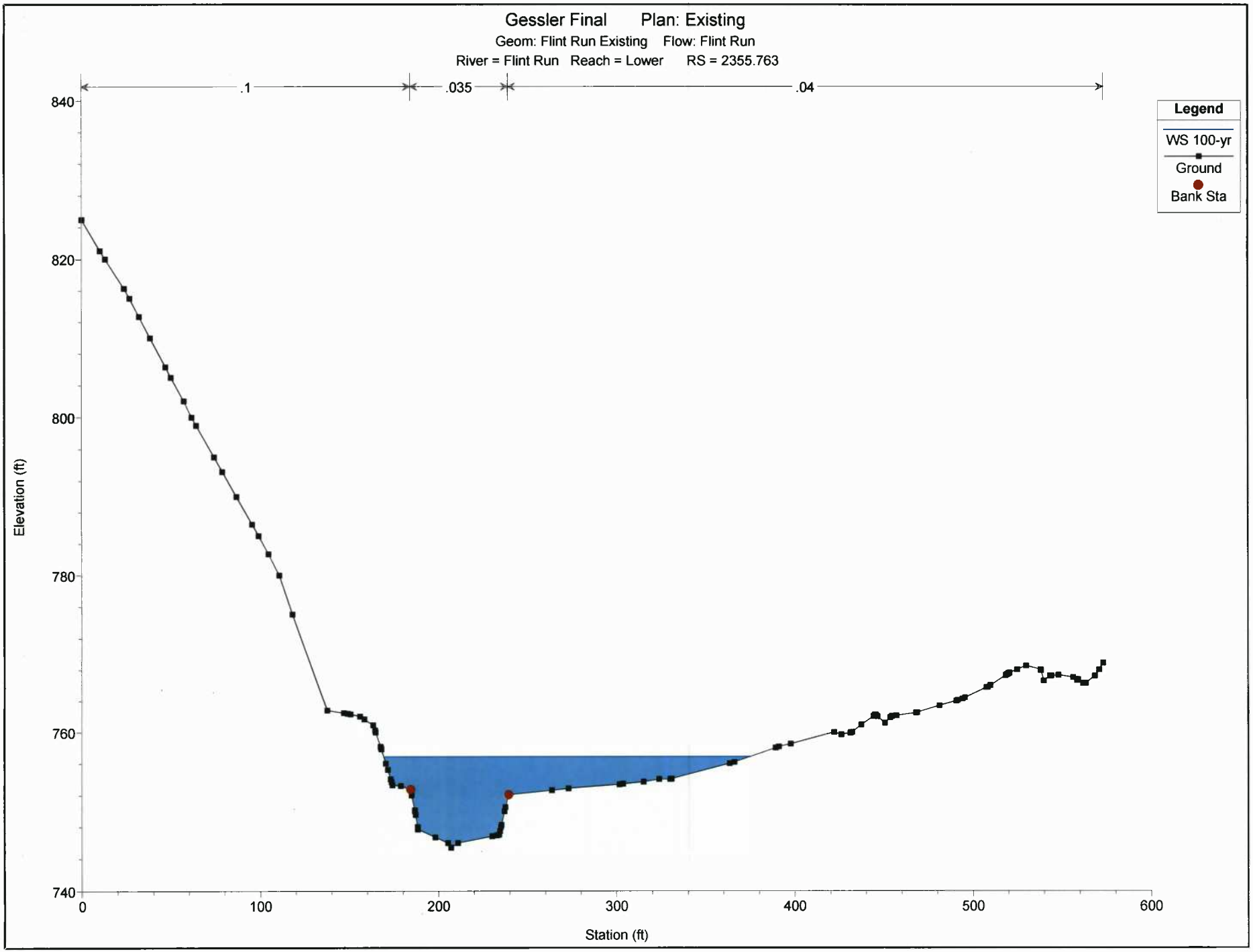

Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 3143.198
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
Station (ft)

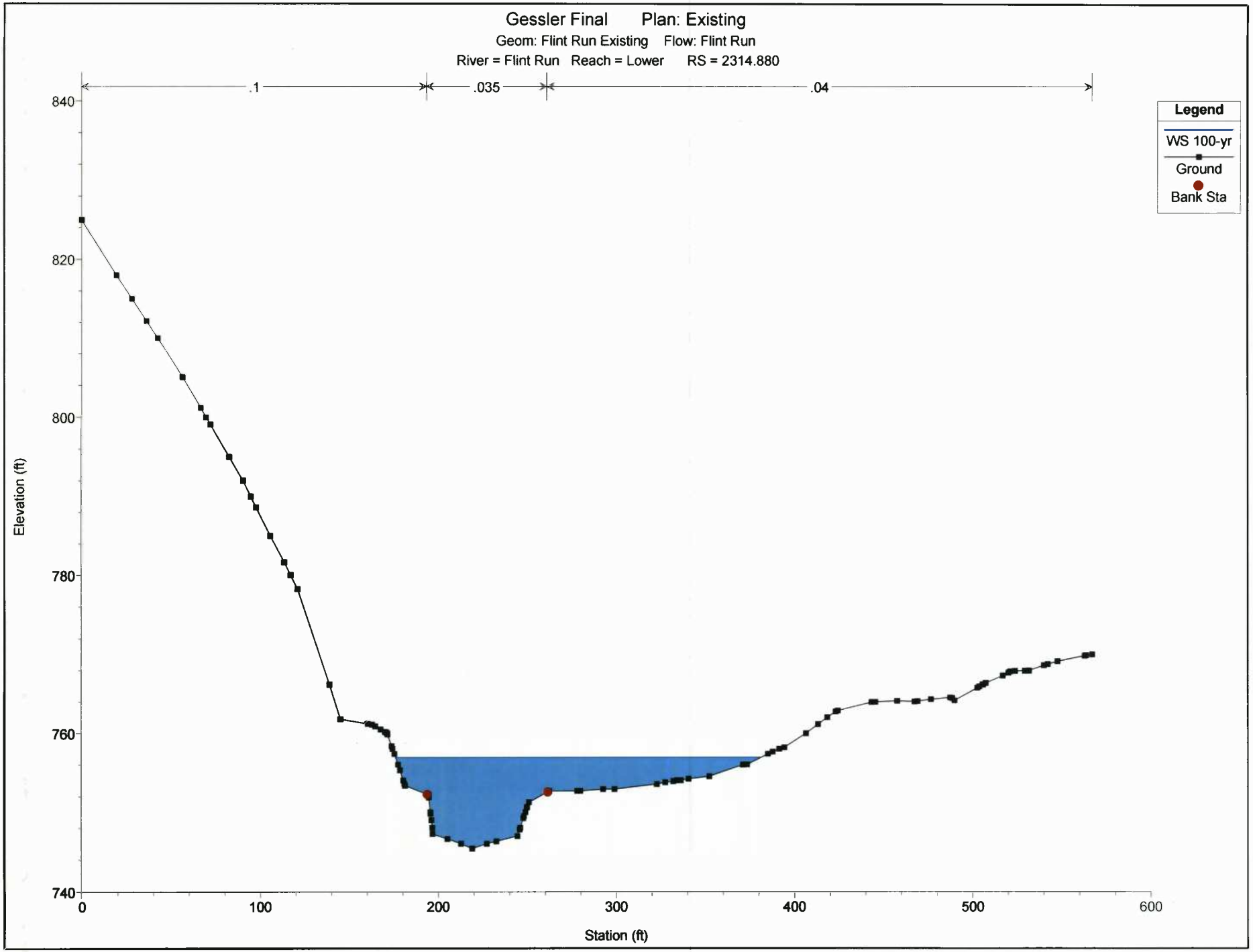

Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2861.250
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2579.076
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2476.907
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2422.446
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2355.763
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2314.880
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.035
.04
Legend
WS 100-yr
Ground
Bank Sta
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820
800
780
760
740
Elevation (ft)
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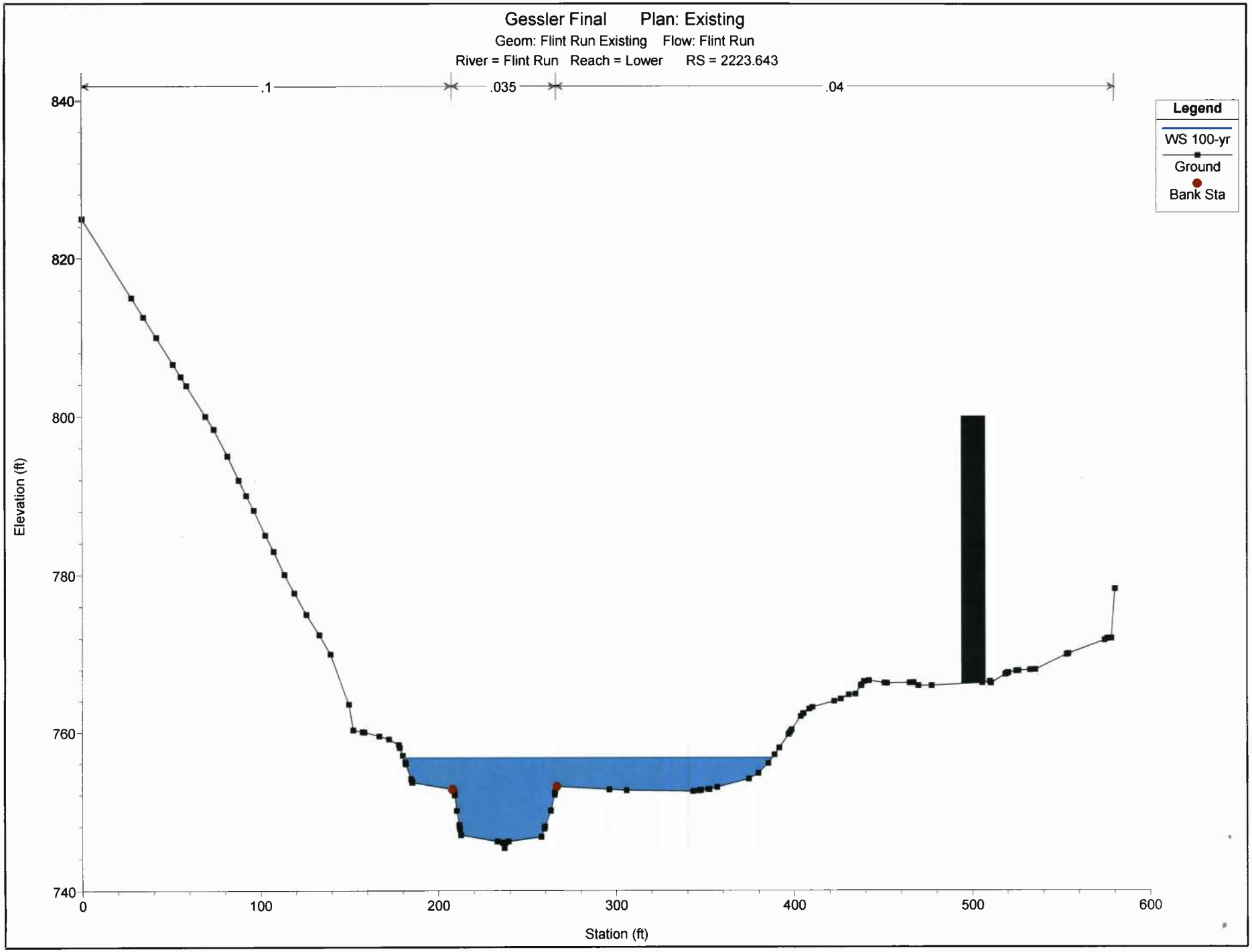
100
200
300
400
500
600
Station (ft)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River = Flint Run Reach = Lower RS = 2223.643
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.035
.04
Legend
WS 100-yr
Ground
Bank Sta
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820
800
780
760
740
Elevation (ft)
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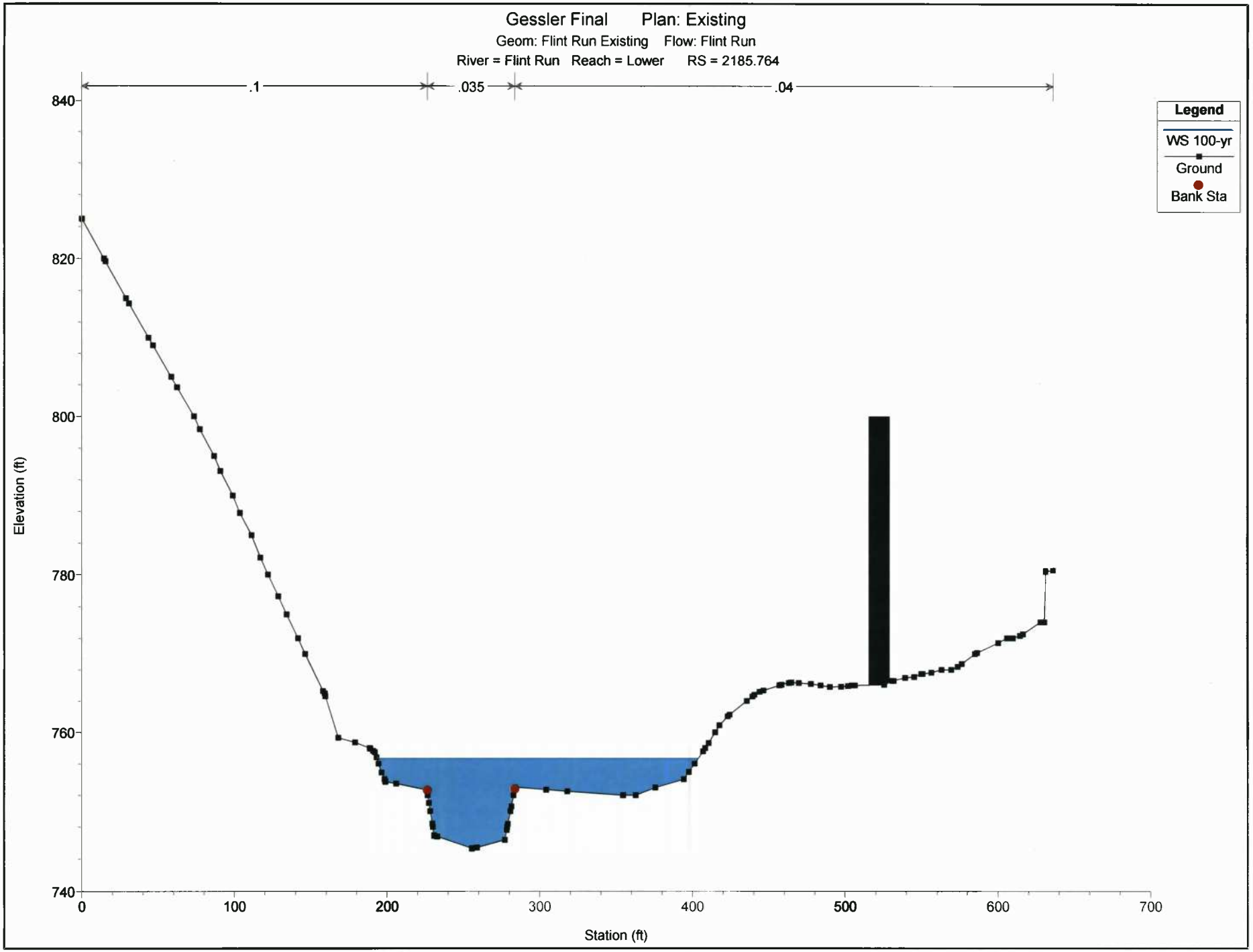
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2185.764
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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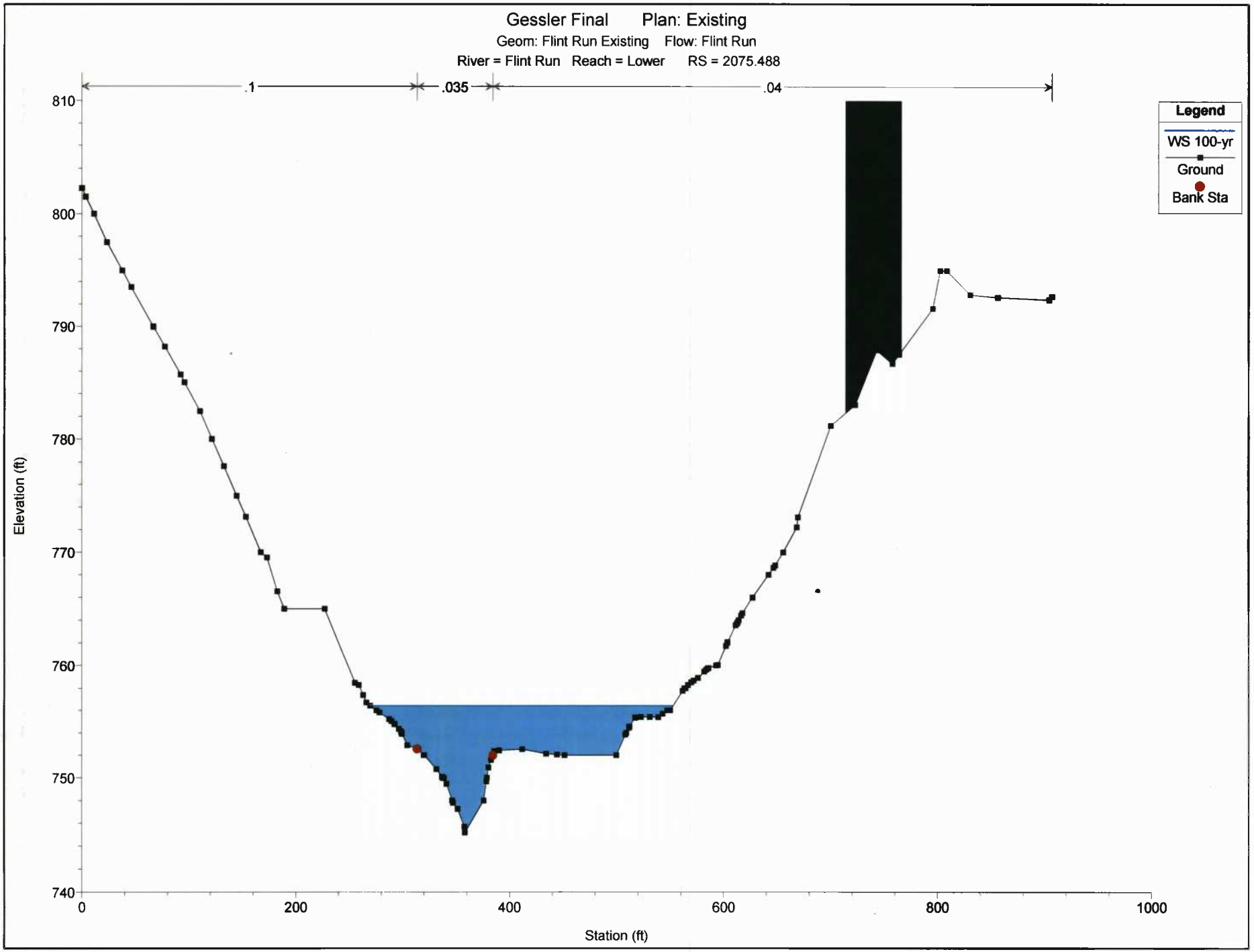
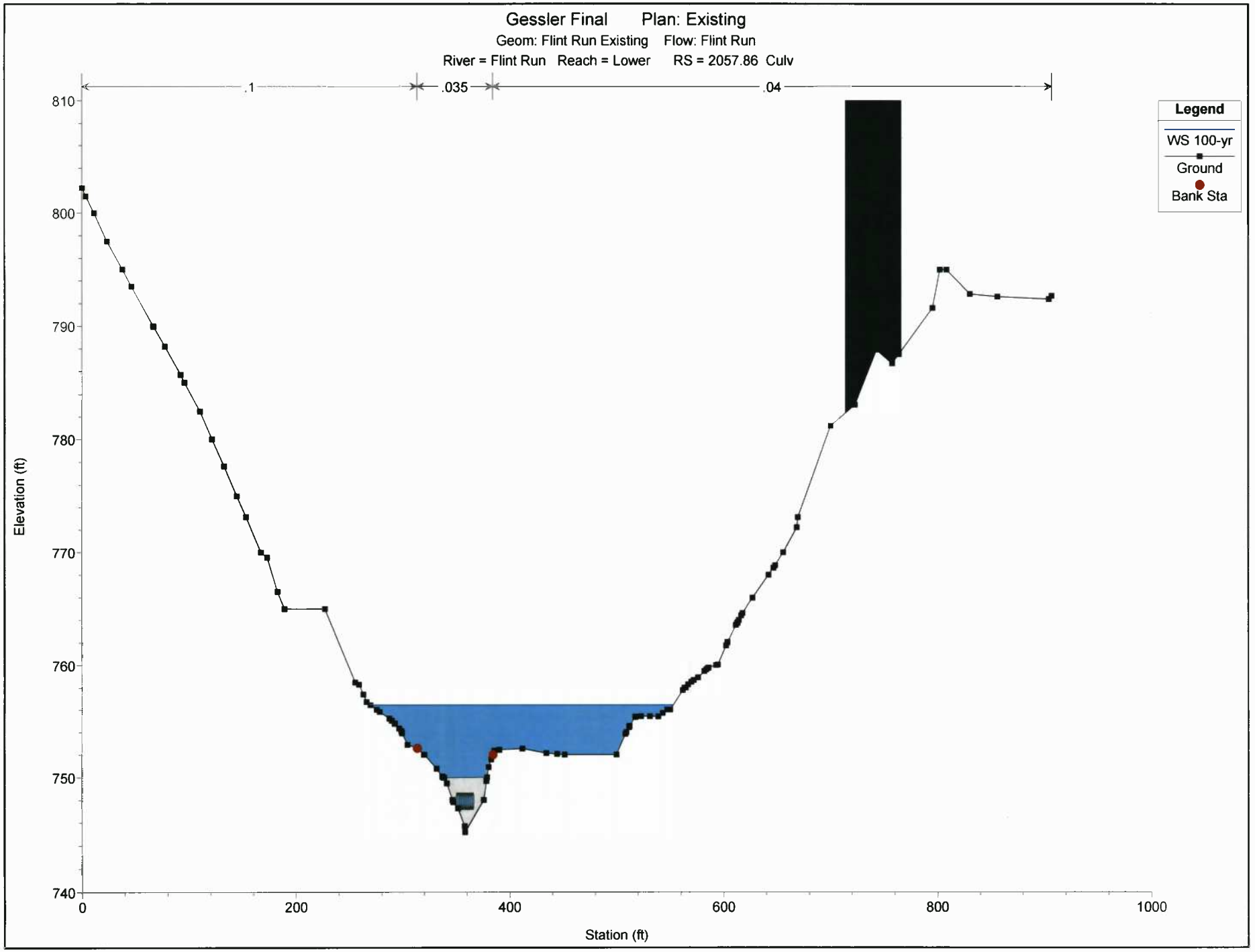
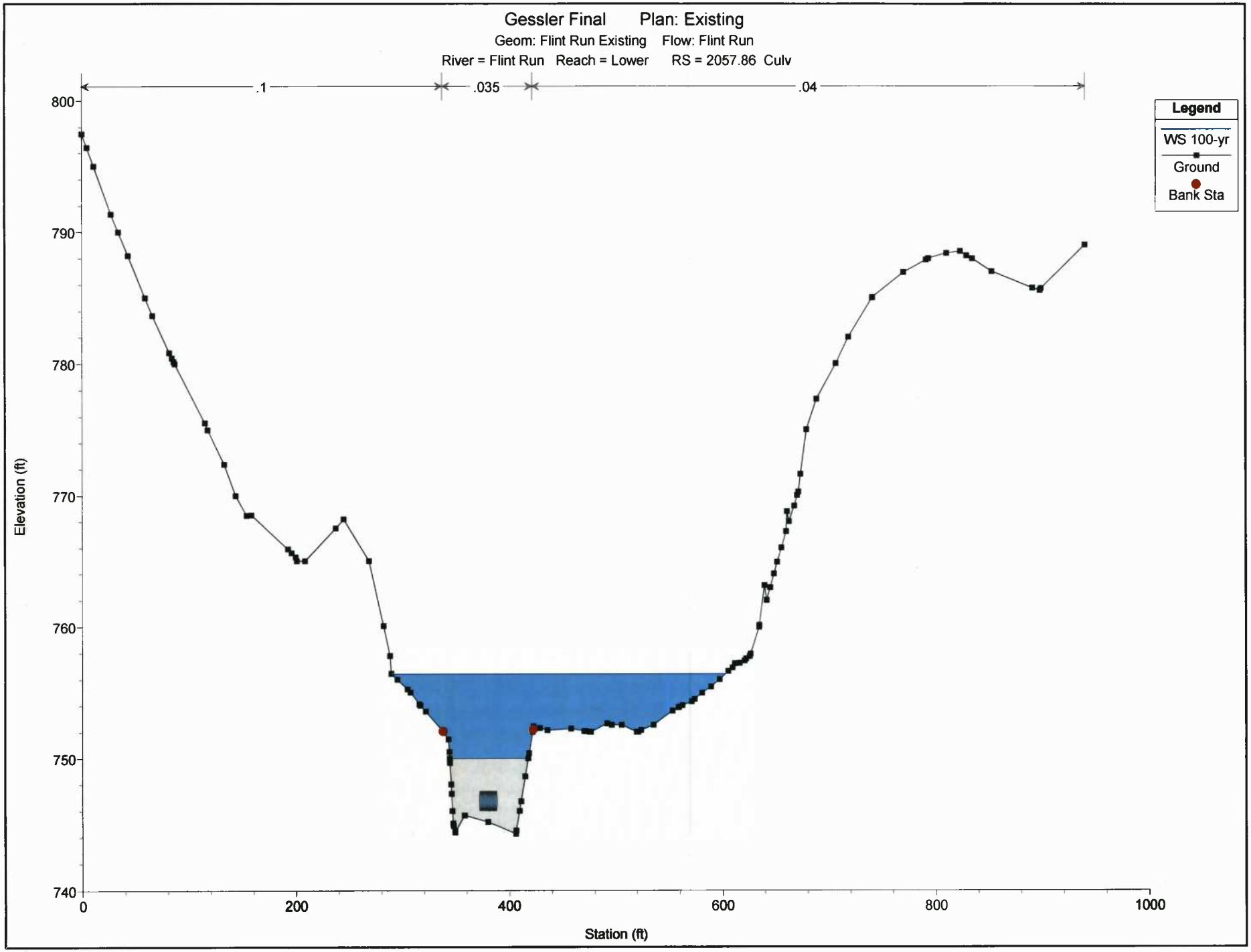
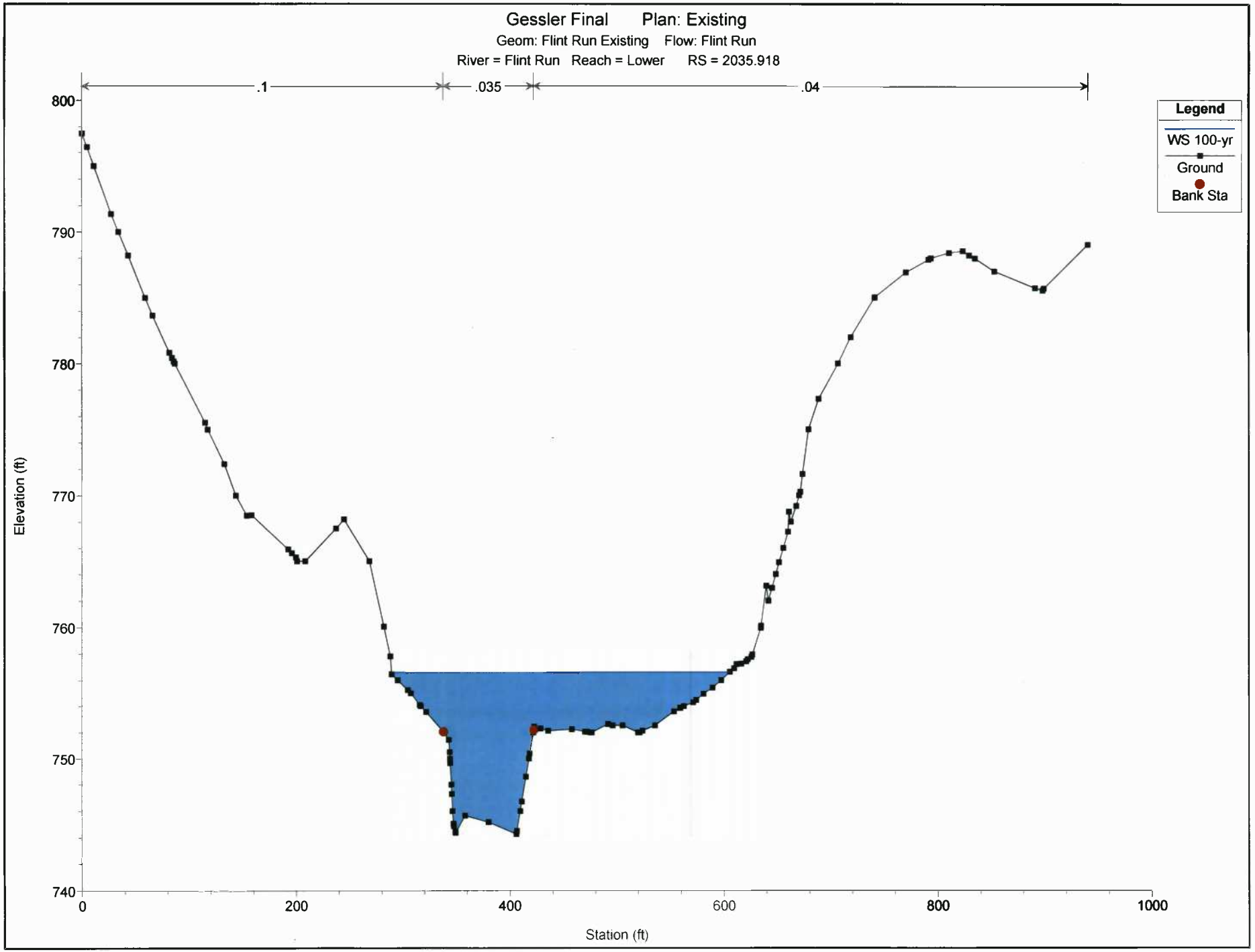
820
800
780
760
740
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2075.488
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
1000


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2057.86 Culv
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
1000


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2057.86 Culv
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
790
780
770
760
750
740
0
200
400
600
800
1000
Station (ft)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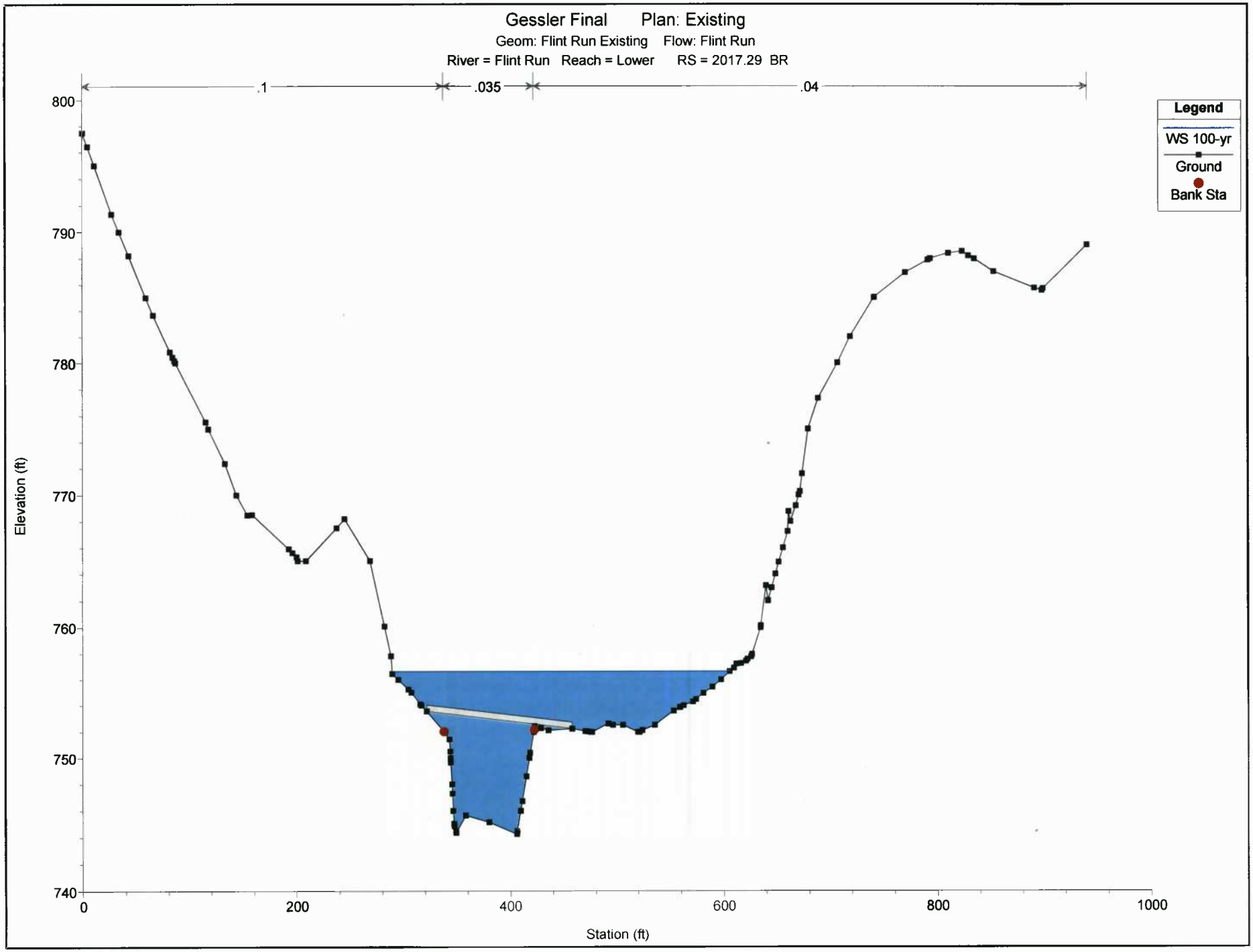
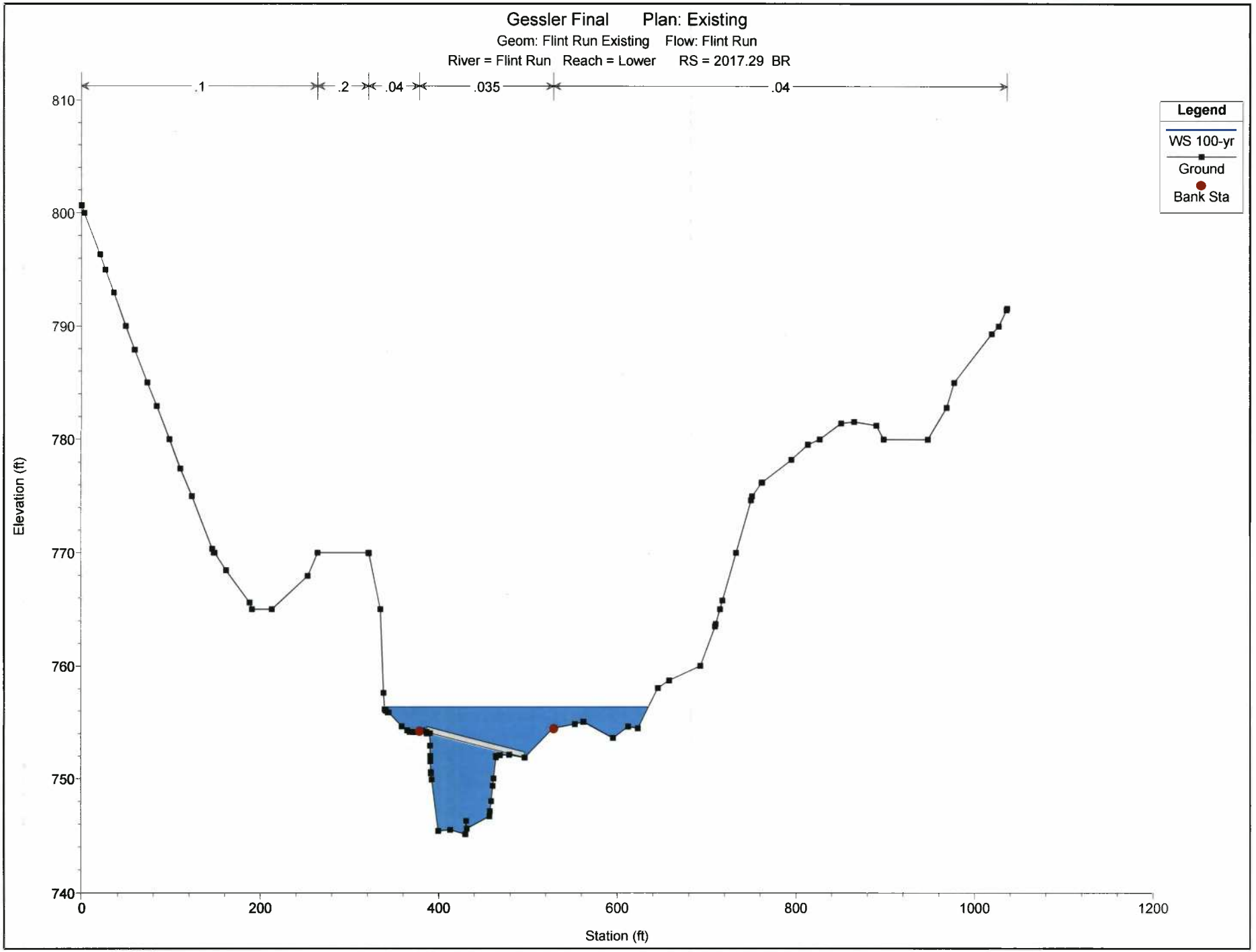
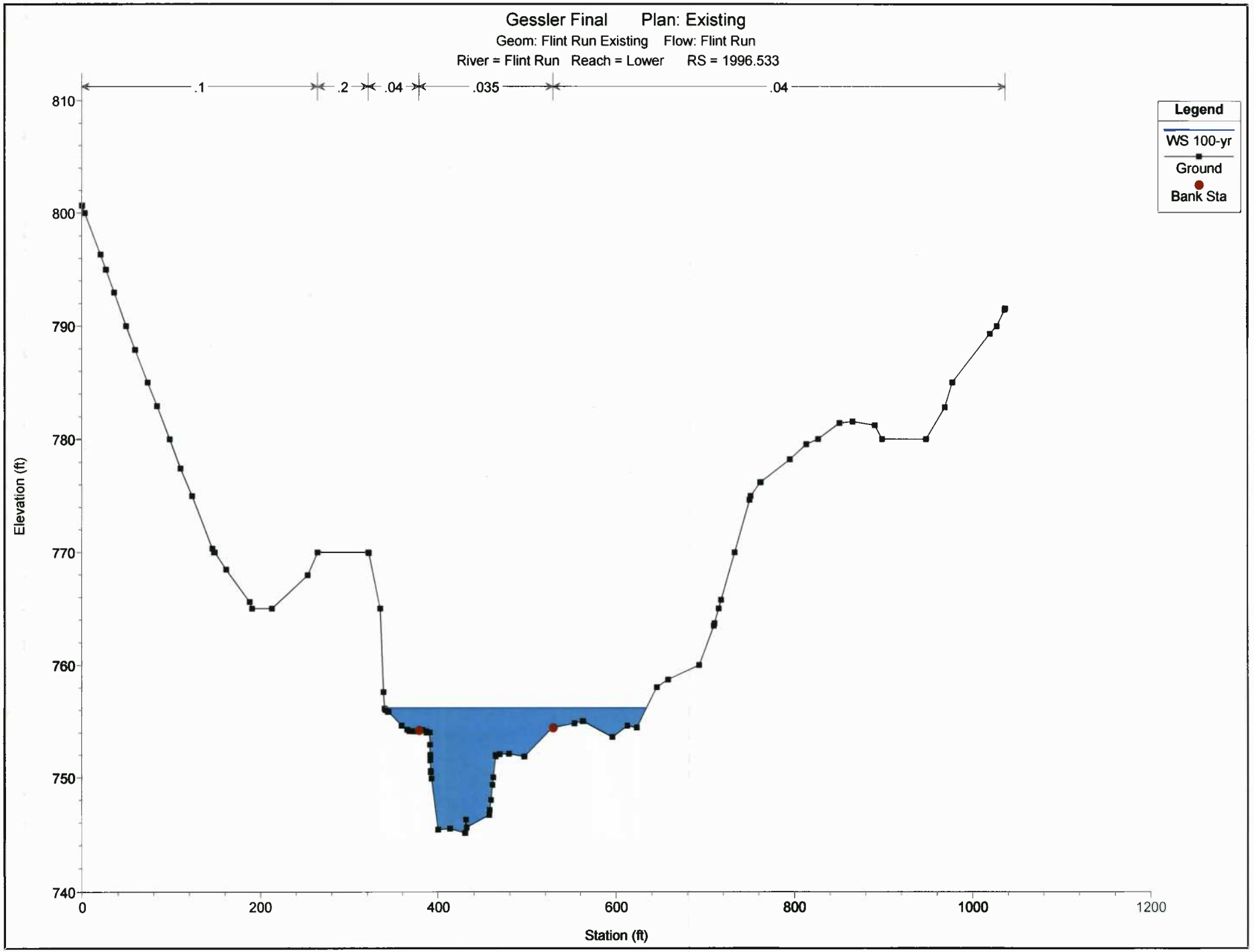
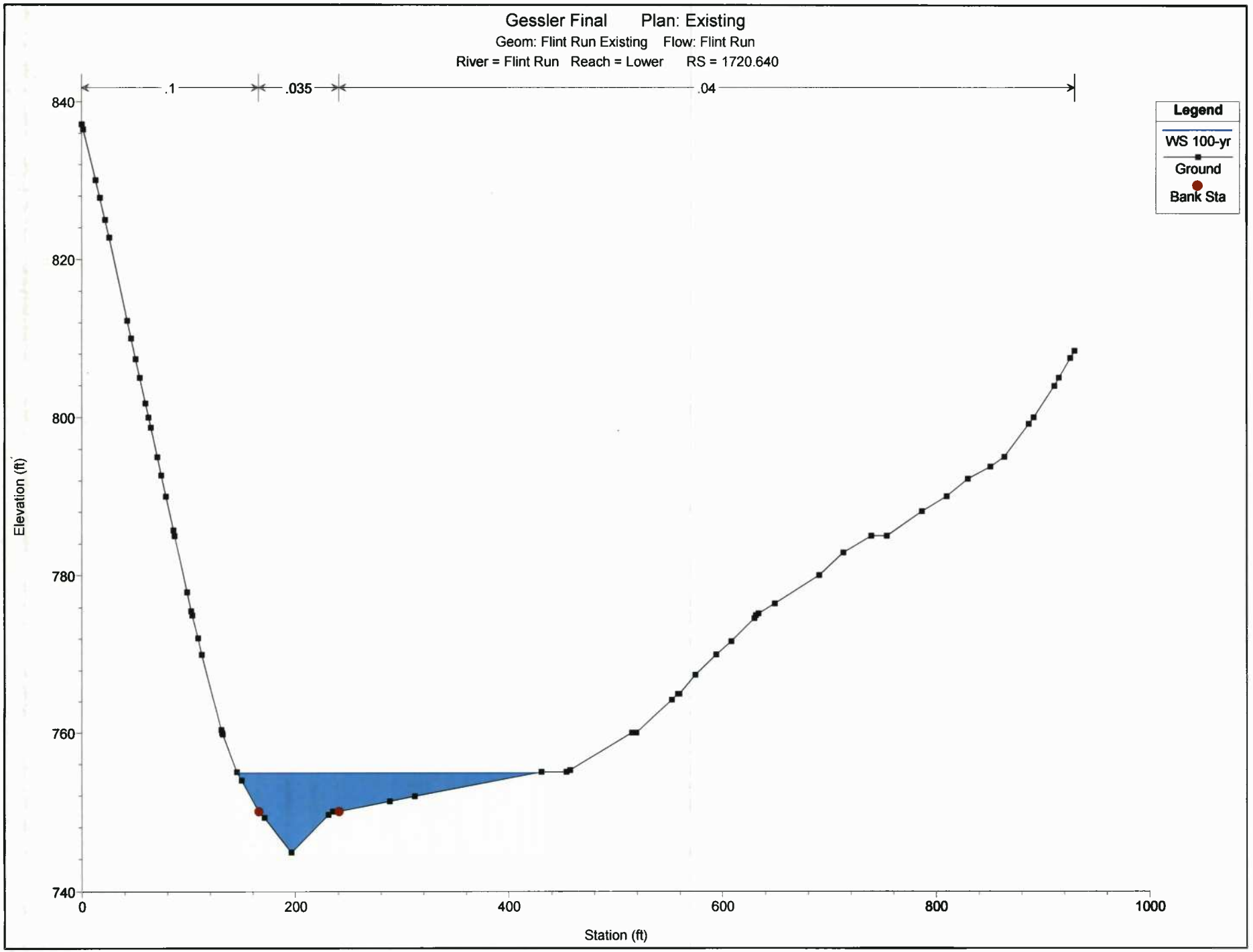
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2035.918
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
790
780
770
760
750
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2017.29 BR
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
790
780
770
760
750
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 2017.29 BR
.1
.2
.04
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
1000
1200
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 1996.533
.1
.2
.04
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
1000
1200
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 1720.640
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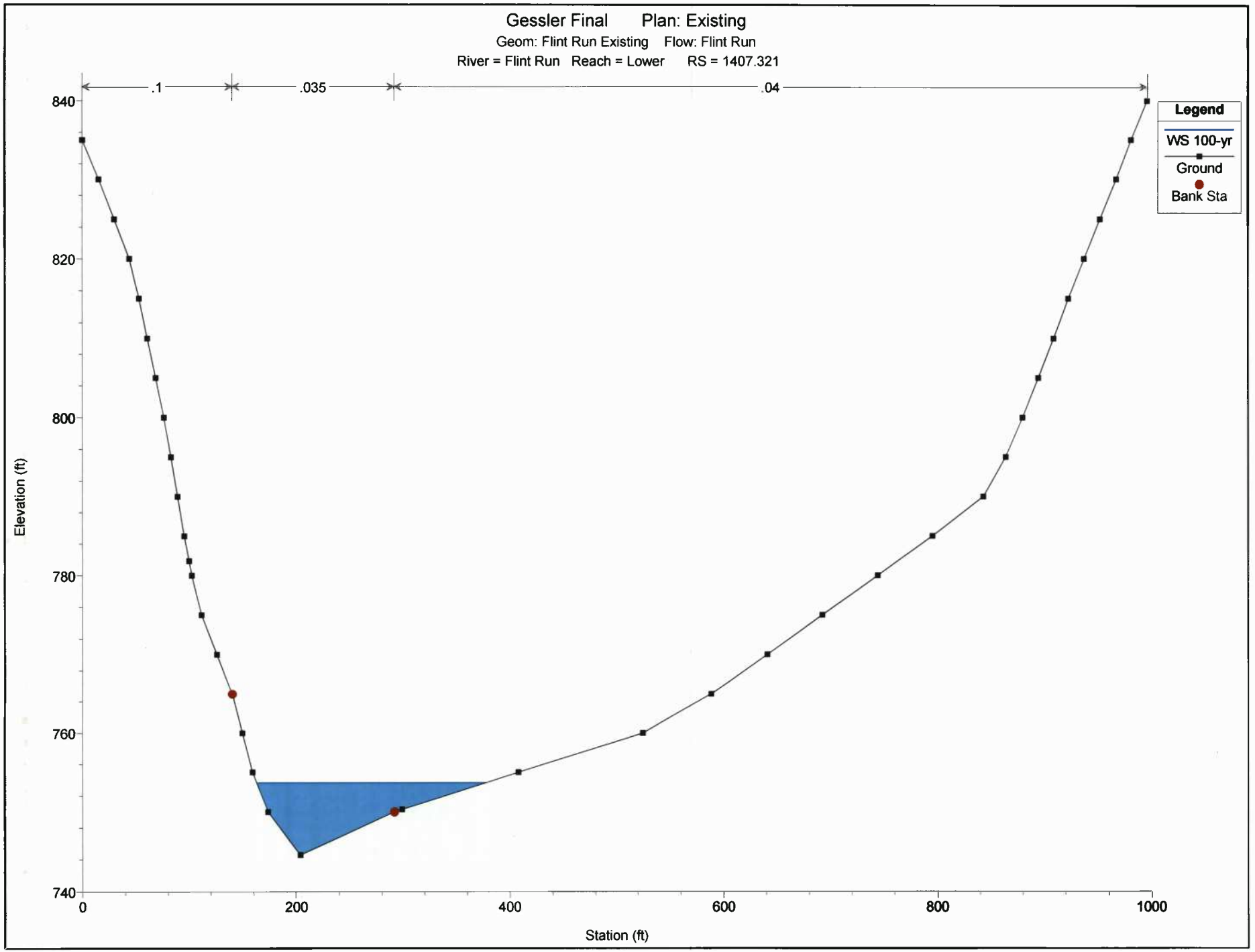
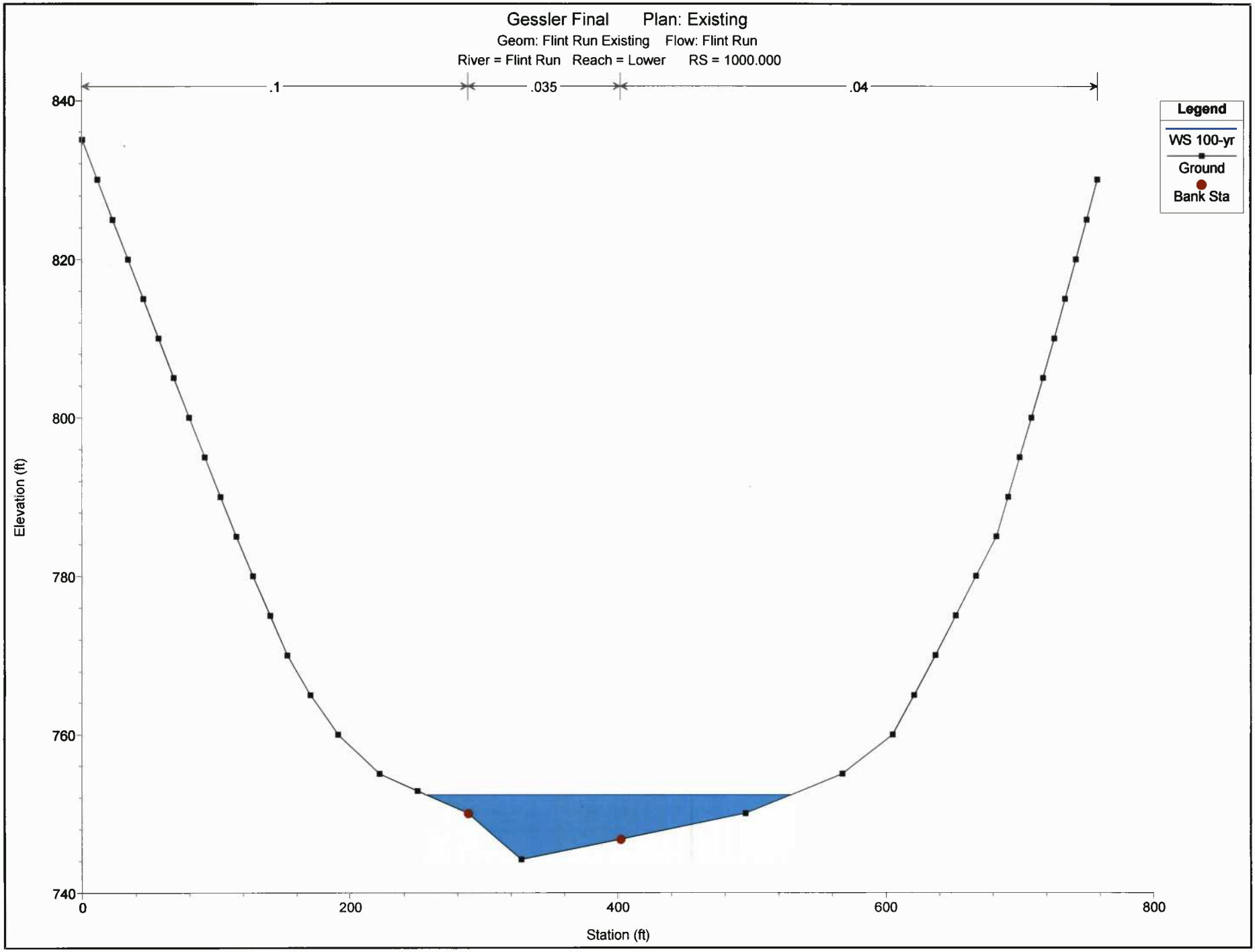
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 1407.321
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Existing
Geom: Flint Run Existing Flow: Flint Run
River = Flint Run Reach = Lower RS = 1000.000
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
Station (ft)

Supplement 3

HEC-RAS Analysis –Proposed Conditions Summary w/ Cross Sections

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
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PROJECT DATA
Project Title: Gessler Final
Project File : GesslerFinal.prj
Run Date and Time: 2/1/2013 7:51:46 AM

Project in English units

Project Description:
Flint Run Existing Drainage - 100yr

PLAN DATA

Plan Title: Proposed
Plan File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.p03

Geometry Title: Flint Run Proposed
Geometry File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.g02

Flow Title : Flint Run
Flow File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.f01

Plan Summary Information:

Number of:	Cross Sections	= 25	Multiple Openings	=	0
	Culverts	= 1	Inline Structures	=	0
	Bridges	= 1	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: Subcritical Flow

FLOW DATA

Flow Title: Flint Run
Flow File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.f01

Flow Data (cfs)

River	Reach	RS	100-yr
Brush Run	Reach 1	2011.333	1554
Flint Run	Lower	4052.349	7412
Flint Run	Upper	5348.411	7165

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Brush Run	Reach 1	100-yr	Normal S = 0.02	
Flint Run	Upper	100-yr	Normal S = 0.0028	
Flint Run	Lower	100-yr		Normal S = 0.0028

GEOMETRY DATA

Geometry Title: Flint Run Proposed
Geometry File : X:\Navitus Jobfiles\SLS\7838-Gessler Centralized Impoundment\Engineering\Drainage Comp\Floodplain - Final\GesslerFinal.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Brush Run	Reach 1		Flint/Brush
Flint Run	Upper		Flint/Brush

Flint Run Lower Flint/Brush

JUNCTION INFORMATION

Name: Flint/Brush
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Flint Run	Upper	to Flint Run	Lower	271.11	0
Brush Run	Reach 1	to Flint Run	Lower	0	0

CROSS SECTION

RIVER: Brush Run
REACH: Reach 1 RS: 2011.333

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.15	820	25.84	815	38.21	810	50.42	805
62.38	800	73.77	795	85.55	790	98.37	785	112.22	780
152.85	775	164.2	774.43	192.7	774.25	196.77	772.8	200.7	774.25
214.97	775	231.99	780	232.62	780.27	243.56	785	254.04	790
264.52	795	274.85	800	286.88	805	300.37	810	314.46	815
328.19	820	342.09	825						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	192.7	.035	200.7	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
192.7	200.7	530.52	498.55	409.24	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	778.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.18	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	777.24	Reach Len. (ft)	530.52	498.55	409.24
Crit W.S. (ft)	777.24	Flow Area (sq ft)	131.86	29.74	45.92
E.G. Slope (ft/ft)	0.012925	Area (sq ft)	131.86	29.74	45.92
Q Total (cfs)	1554.00	Flow (cfs)	1097.60	330.65	125.76
Top Width (ft)	87.98	Top Width (ft)	58.08	8.00	21.90
Vel Total (ft/s)	7.49	Avg. Vel. (ft/s)	8.32	11.12	2.74
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)	2.27	3.72	2.10
Conv. Total (cfs)	13668.7	Conv. (cfs)	9654.3	2908.3	1106.1
Length Wtd. (ft)	507.85	Wetted Per. (ft)	58.23	8.51	22.25
Min Ch El (ft)	772.80	Shear (lb/sq ft)	1.83	2.82	1.67

Alpha	1.35	Stream Power (lb/ft s)	342.09	0.00	0.00
Frctn Loss (ft)	6.25	Cum Volume (acre-ft)	1.45	0.42	0.57
C & E Loss (ft)	0.01	Cum SA (acres)	0.66	0.10	0.23

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: Brush Run
REACH: Reach 1 RS: 1507.212

INPUT
Description:
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.46	820	26.15	815	38.91	810	52.5	805
66.14	800	79.79	795	93.18	790	106.62	785	121.37	780
147.73	775	200	770	220.39	768.22	257.2	765	268.2	764.5
273.24	763.58	278.2	764.5	292.38	765	312.6	770	325.34	774.15
327.95	775	342.48	780	357.11	785	375.04	790	394.75	795
416.88	800	439.08	805	460.07	810	481.91	815	502.95	820
524.75	825								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	268.2	.035	278.2	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
268.2	278.2	101.38	496.45	893.29	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	769.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.25	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	768.38	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	768.38	Flow Area (sq ft)	105.48	43.45	74.71
E.G. Slope (ft/ft)	0.011714	Area (sq ft)	105.48	43.45	74.71
Q Total (cfs)	1554.00	Flow (cfs)	798.70	525.74	229.57
Top Width (ft)	87.57	Top Width (ft)	49.70	10.00	27.87
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)	7.57	12.10	3.07

Max Chl Dpth (ft)	4.80	Hydr. Depth (ft)	2.12	4.34	2.68
Conv. Total (cfs)	14358.1	Conv. (cfs)	7379.5	4857.5	2121.1
Length Wtd. (ft)	0.00	Wetted Per. (ft)	49.86	10.17	28.29
Min Ch El (ft)	763.58	Shear (lb/sq ft)	1.55	3.13	1.93
Alpha	1.67	Stream Power (lb/ft s)	524.75	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)			
C & E Loss (ft)	0.24	Cum SA (acres)			

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: Flint Run
REACH: Upper RS: 5348.411

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	840	1.72	839.54	20.54	835	24.75	833.8	36.88	830
51.38	825.46	55.35	824.2	67.57	820	73.13	817.69	79.16	815
84.47	812.57	90.58	810	97.49	806.98	101.8	805	106.69	802.5
110.69	800	115.05	796.83	117.97	795	122.72	791.65	125.34	790
130.32	786.47	132.65	785	135.2	783.3	146.28	775.4	147.14	775
158.66	770.79	160.42	770	174.03	765.42	174.99	765	180.62	763.23
181.36	763	192.5	760	222.27	755.17	223.26	755	230.93	753.25
235.85	755	269.45	758.27	280.96	759.23	290.29	760	326.78	762.1
365.08	765	372.98	766.67	386.11	770	396.48	774.04	398.32	775
406.94	779.55	407.8	780	416.8	784.76	417.27	785	426.65	789.96
426.73	790	428.71	791.05	436.09	795	444.41	799.48	445.39	800
446.08	800.36	454.72	805	455.78	805.56	464.06	810	465.51	810.76
473.44	815	475.26	815.96	482.89	820	485.06	821.16	492.3	825
494.85	826.36	501.72	830						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	192.5	.035	290.29	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
192.5	290.29	580.67	714.22 806.06	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	767.86	Element			
Vel Head (ft)	0.62	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	767.24	Reach Len. (ft)	580.67	714.22	806.06
Crit W.S. (ft)		Flow Area (sq ft)	91.45	989.75	378.92
E.G. Slope (ft/ft)	0.001126	Area (sq ft)	91.45	989.75	378.92
Q Total (cfs)	7165.00	Flow (cfs)	108.35	6546.35	510.30
Top Width (ft)	206.60	Top Width (ft)	23.88	97.79	84.94
Vel Total (ft/s)	4.91	Avg. Vel. (ft/s)	1.18	6.61	1.35
Max Chl Dpth (ft)	13.99	Hydr. Depth (ft)	3.83	10.12	4.46
Conv. Total (cfs)	213542.4	Conv. (cfs)	3229.2	195104.4	15208.9
Length Wtd. (ft)	718.22	Wetted Per. (ft)	24.97	98.92	85.35
Min Ch El (ft)	753.25	Shear (lb/sq ft)	0.26	0.70	0.31
Alpha	1.67	Stream Power (lb/ft s)	501.72	0.00	0.00
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	4.85	23.53	7.54
C & E Loss (ft)	0.03	Cum SA (acres)	0.45	1.90	1.55

CROSS SECTION

RIVER: Flint Run
REACH: Upper RS: 4587.709

INPUT
Description:
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	840	16.28	837.87	44.55	835	50.03	834.1	70.49	830
71.13	829.87	74.8	828.94	89.92	825	92.85	824.16	107.23	820
117.17	816.98	122.54	815	133.88	811.31	137.46	810	141.29	808.34
149.13	805	155.07	802.08	159.98	800	166.69	796.65	170.66	795
180.52	790	183.16	788.77	190.93	785	201.31	780.39	202.06	780
212.06	775.62	213.49	775	213.71	774.92	226.49	770	234.57	767.82
245	765	252.1	763.08	253.44	762.72	257.73	761.49	262.92	760
300	751.5	307.31	751.12	310	751.6	339.98	758.49	350.45	759.54
355.56	760	359.38	760.46	365.09	761.16	399.99	765	402.3	765.98
415.29	770	427.45	774.34	428.94	775	430.68	775.78	438.45	780
442.51	782.05	447.95	785	452.55	787.32	457.52	790	462.66	792.58
467.15	795	472.85	797.85	476.81	800	483.08	803.12	486.55	805
493.4	808.4	496.37	810	503.81	813.67	506.28	815	514.29	818.95
516.32	820	524.84	824.23	526.34	825	535.44	829.51	536.39	830

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.92	.035	339.98	.1

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

262.92 339.98 165.19 259.78 200.58 .1 .3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	766.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	766.04	Reach Len. (ft)	165.19	259.78	200.58
Crit W.S. (ft)		Flow Area (sq ft)	64.85	858.63	262.46
E.G. Slope (ft/ft)	0.001406	Area (sq ft)	64.85	858.63	262.46
Q Total (cfs)	7165.00	Flow (cfs)	72.94	6713.86	378.20
Top Width (ft)	161.37	Top Width (ft)	21.78	77.06	62.53
Vel Total (ft/s)	6.04	Avg. Vel. (ft/s)	1.12	7.82	1.44
Max Chl Dpth (ft)	14.92	Hydr. Depth (ft)	2.98	11.14	4.20
Conv. Total (cfs)	191113.9	Conv. (cfs)	1945.6	179080.6	10087.7
Length Wtd. (ft)	255.72	Wetted Per. (ft)	22.60	78.86	63.09
Min Ch El (ft)	751.12	Shear (lb/sq ft)	0.25	0.96	0.37
Alpha	1.57	Stream Power (lb/ft s)	536.39	0.00	0.00
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	3.80	8.38	1.61
C & E Loss (ft)	0.12	Cum SA (acres)	0.14	0.47	0.19

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.

CROSS SECTION

RIVER: Flint Run
REACH: Upper RS: 4327.913

INPUT
Description:
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	833.82	19.57	830.26	21.04	830	21.99	829.86	47.76	825
48.22	824.91	50.72	824.4	68.17	820.98	73.18	820	78.14	818.92
96.27	815	114.35	810.94	116.96	810	126.97	806.39	127.89	805.99
130.7	805	140.29	801.4	144.1	800	147.74	798.78	158.49	795
160.48	794.34	171.07	790	179.16	786.84	183.7	785	188.85	782.97
196.53	780	209.11	775.55	210.65	775	218.43	773.03	231.45	770
262.46	765.7	268.7	765	290.32	762.84	326.29	760	330.65	759.71
335.69	759.38	359.73	757.01	380.75	755	394.73	755	410.28	758.76
414.93	760	418.46	760.97	432.73	765	446.67	772.66	468.61	784.7
469.11	785	469.23	785.07	477.23	790	477.75	790.22	485.38	795
485.72	795.15	501.33	804.99	501.35	805	501.39	805.02	502.19	805.53
509.35	810	527.85	814.53	529.88	815	551.4	819.56	552.97	820
553.92	820.47	564.75	825	565.92	825.57	576.46	830	577.84	830.68
580.09	831.63								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	330.65	.035	410.28	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
330.65	410.28	783.59	271.11	224.1	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.17	Element			
Vel Head (ft)	2.10	Wt. n-Val.	0.100	0.035	0.100
W.S. Elev (ft)	764.07	Reach Len. (ft)	271.11	271.11	271.11
Crit W.S. (ft)	763.25	Flow Area (sq ft)	121.07	571.87	51.41
E.G. Slope (ft/ft)	0.005756	Area (sq ft)	121.07	571.87	51.41
Q Total (cfs)	7165.00	Flow (cfs)	237.39	6818.38	109.23
Top Width (ft)	151.38	Top Width (ft)	52.60	79.63	19.14
Vel Total (ft/s)	9.63	Avg. Vel. (ft/s)	1.96	11.92	2.12
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	2.30	7.18	2.69
Conv. Total (cfs)	94438.2	Conv. (cfs)	3128.9	89869.6	1439.8
Length Wtd. (ft)	271.11	Wetted Per. (ft)	52.79	80.30	19.87
Min Ch El (ft)	755.00	Shear (lb/sq ft)	0.82	2.56	0.93
Alpha	1.46	Stream Power (lb/ft s)	580.09	0.00	0.00
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	3.45	4.11	0.89
C & E Loss (ft)	0.50	Cum SA (acres)			

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: Flint Run
REACH: Lower RS: 4052.349

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	12.51	820	27.22	815	41.83	810	53.13	805
64.15	800	76.03	795	88.87	790	100.79	785	113.96	780
127.03	775	147.55	770	263.25	765	408.02	760	445.55	757.94
499.06	755	535.56	749.62	559.34	755	588.18	760	598.81	765
609.68	770	620.27	774.99	620.29	775	633.72	780	648.98	785
662.08	790	694.14	795	731.89	800	766.48	805	796.9	810
828.16	815	854.05	820	873.62	825				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	499.06	.035	559.34	.1

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

499.06	559.34	46.88	141.39	54.28	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	765.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.	0.050	0.035	0.100
W.S. Elev (ft)	764.76	Reach Len. (ft)	46.88	141.39	54.28
Crit W.S. (ft)		Flow Area (sq ft)	988.09	750.27	233.32
E.G. Slope (ft/ft)	0.000824	Area (sq ft)	988.09	750.27	233.32
Q Total (cfs)	7412.00	Flow (cfs)	2234.31	4857.56	320.14
Top Width (ft)	327.99	Top Width (ft)	228.76	60.28	38.95
Vel Total (ft/s)	3.76	Avg. Vel. (ft/s)	2.26	6.47	1.37
Max Chl Dpth (ft)	15.14	Hydr. Depth (ft)	4.32	12.45	5.99
Conv. Total (cfs)	258196.3	Conv. (cfs)	77832.0	169212.5	11151.9
Length Wtd. (ft)	102.66	Wetted Per. (ft)	228.98	61.28	40.45
Min Ch El (ft)	749.62	Shear (lb/sq ft)	0.22	0.63	0.30
Alpha	2.06	Stream Power (lb/ft s)	873.62	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	15.52	81.06	53.98
C & E Loss (ft)	0.05	Cum SA (acres)	3.95	9.02	14.05

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3910.912

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	13.06	820	25.72	815	38.09	810	49.94	805
60.85	800	72.27	795	84.38	790	96.36	785	110.18	780
125.5	775	144.56	770	183.92	765	270.21	760	395.63	756.36
442.34	755	475.81	749.22	497.6	755	521.35	760	547	765
563.98	767.12	587.08	770	605.74	775	624.3	780	639.31	785
655.35	790	672.44	795	692.16	800	714.94	805	748.48	810
778.02	815	814.83	820	841.76	825				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	442.34	.035	497.6	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
442.34	497.6	545.19	736.56	773.43	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	765.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.050	0.035	0.100
W.S. Elev (ft)	764.81	Reach Len. (ft)	545.19	736.56	773.43
Crit W.S. (ft)		Flow Area (sq ft)	1456.77	701.61	232.79

E.G. Slope (ft/ft)	0.000580	Area (sq ft)	1456.77	701.61	232.79
Q Total (cfs)	7412.00	Flow (cfs)	3330.27	3847.49	234.24
Top Width (ft)	358.75	Top Width (ft)	255.08	55.26	48.41
Vel Total (ft/s)	3.10	Avg. Vel. (ft/s)	2.29	5.48	1.01
Max Chl Dpth (ft)	15.59	Hydr. Depth (ft)	5.71	12.70	4.81
Conv. Total (cfs)	307683.4	Conv. (cfs)	138244.7	159715.0	9723.7
Length Wtd. (ft)	691.98	Wetted Per. (ft)	255.29	56.51	49.39
Min Ch El (ft)	749.22	Shear (lb/sq ft)	0.21	0.45	0.17
Alpha	1.87	Stream Power (lb/ft s)	841.76	0.00	0.00
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)	14.20	78.70	53.69
C & E Loss (ft)	0.17	Cum SA (acres)	3.69	8.83	13.99

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.

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3710.271

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.59	1.19	830	5.17	828.26	11.78	825	18.55	822.06
22.62	820	25.86	818.34	32.69	815	39.5	811.75	42.95	810
50.85	806.25	53.33	805	62.32	800.74	63.72	800	72.83	795.28
73.35	795	79.16	792	82.94	790	83.33	789.82	92.54	785
93.94	784.35	102.34	780	105.35	778.85	116.54	775	124.62	773
134.24	770	154.69	766.67	163.72	765	173.17	764.14	192.66	762.77
216.3	761.04	228.82	760.42	238.05	760	259.77	758.83	268.66	758.35
295.6	756.85	310.89	755.83	327.74	755	361.63	755	363.07	755.53
373.76	760	381.2	763.3	385.82	765	392.04	767.49	397.71	770
404.57	772.41	414.53	775	422.13	776.81	427.28	778.04	434.83	780
453.33	782.48	457.94	782.86	479.51	784.62	482.04	784.84	484.65	785
529.85	787.44	553.59	790	583.03	792.13	626.64	795	635.74	795
646.71	796.76	672.12	800	684.01	800	736.87	804.08	745.03	805
804.17	805	811.79	807.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	259.77	.035	373.76	.04

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

259.77 373.76 310.33 428.51 382.56 .1 .3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	763.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	762.01	Reach Len. (ft)	310.33	428.51	382.56
Crit W.S. (ft)	761.55	Flow Area (sq ft)	95.70	640.23	4.58
E.G. Slope (ft/ft)	0.007174	Area (sq ft)	95.70	640.23	4.58
Q Total (cfs)	7412.00	Flow (cfs)	170.39	7227.98	13.63
Top Width (ft)	175.32	Top Width (ft)	56.79	113.99	4.54
Vel Total (ft/s)	10.01	Avg. Vel. (ft/s)	1.78	11.29	2.98
Max Chl Dpth (ft)	7.01	Hydr. Depth (ft)	1.69	5.62	1.01
Conv. Total (cfs)	87508.6	Conv. (cfs)	2011.6	85336.0	160.9
Length Wtd. (ft)	417.10	Wetted Per. (ft)	56.88	115.09	4.97
Min Ch El (ft)	755.00	Shear (lb/sq ft)	0.75	2.49	0.41
Alpha	1.24	Stream Power (lb/ft s)	811.79	0.00	0.00
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)	4.49	67.35	51.58
C & E Loss (ft)	0.40	Cum SA (acres)	1.74	7.40	13.52

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: Flint Run
REACH: Lower RS: 3270.326

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.35	.62	830	3.7	828.37	9.03	825	12.01	823.42
22.94	816.51	25.77	815	31.37	811.45	34.09	810	39.88	806.4
42.62	805	48.76	801.34	51.43	800	57.66	796.28	60.21	795
66.52	791.22	68.96	790	73.81	787.17	77.42	785	82.26	782.7
88.32	780	93.41	774.58	98.85	769.7	102.41	766.52	104.59	766.29
107.58	766	118.66	764.89	120.09	764.73	120.28	764.75	122.12	764.46
122.76	764.37	123.27	764	124.63	762.92	125.88	762	127.98	760.08
128.11	760	128.42	759.77	130.52	758.09	130.64	758	130.71	757.94
132.7	756.36	133.11	756	133.45	755.76	135.68	754	137.04	753.03
138.23	752	140.01	750.41	140.52	750	140.78	749.92	140.81	749.9
147.08	748.66	153.81	747.64	168.81	749.47	175.26	750	176.2	750
176.55	750.02	176.81	750.22	178.14	750.98	179.61	752	179.72	752.07

181.25	753.12	183.58	753.34	191.25	754	197.69	754.21	208.69	754.48
269.6	756	276.77	756	283.82	757.14	289.37	758	304.52	759.95
304.89	760	305.51	760.06	305.73	760.08	331.42	762	347.28	763.38
355.61	764	358.49	764.68	360.23	765.08	364.95	766	373.96	766.93
374.88	766.98	376.44	767.11	378.24	767.6	381.59	768.57	384.29	768.76
395.07	770	407.01	771.12	416.76	772	430.89	773.27	434.87	773.61
439.3	774	457.68	775.47	464.31	776	466.4	776.16	467.01	776.21
474.6	776.76	487.8	777.73	488.28	777.75	491.33	778	502.32	779.12
510.97	780	513.33	780.24	514.22	780.33	527.07	782	537.73	783.53
541.14	784	549.19	785.15						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	135.68	.035	181.25	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
135.68	181.25	56.8	51.5	42.19	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	762.56	Element			
Vel Head (ft)	0.60	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	761.96	Reach Len. (ft)	56.80	51.50	42.19
Crit W.S. (ft)		Flow Area (sq ft)	39.76	568.24	804.23
E.G. Slope (ft/ft)	0.001161	Area (sq ft)	39.76	568.24	804.23
Q Total (cfs)	7412.00	Flow (cfs)	43.29	4251.77	3116.94
Top Width (ft)	204.99	Top Width (ft)	9.76	45.57	149.66
Vel Total (ft/s)	5.25	Avg. Vel. (ft/s)	1.09	7.48	3.88
Max Chl Dpth (ft)	14.32	Hydr. Depth (ft)	4.07	12.47	5.37
Conv. Total (cfs)	217541.8	Conv. (cfs)	1270.6	124789.3	91481.9
Length Wtd. (ft)	47.80	Wetted Per. (ft)	12.60	48.30	150.09
Min Ch El (ft)	747.64	Shear (lb/sq ft)	0.23	0.85	0.39
Alpha	1.40	Stream Power (lb/ft s)	549.19	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	4.00	61.41	48.03
C & E Loss (ft)	0.00	Cum SA (acres)	1.50	6.61	12.85

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3218.798

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	828.88	.23	828.76	7.55	825	10.07	823.65	17.17	820
19.89	818.54	26.77	815	32.42	812	36.36	810	40.08	808.16
46.43	805	50.01	803.2	56.47	800	60.28	798.08	66.51	795
73.67	791.4	76.37	790	78.73	788.7	85.9	785	90.73	782.74
95.72	780	102.21	773.16	107.4	767.69	108.76	766.03	109.03	766

124.19	764.57	126.34	764.36	127.28	764.21	128.59	764	129.66	763.84
130.15	763.76	132.48	762.13	132.67	762	135.22	760.24	135.52	760
137.74	758.3	138.14	758	138.39	757.79	140.64	756	142.61	754.47
143.22	754	143.71	753.59	145.71	752	146.32	751.52	148.24	749.99
148.33	749.92	160.99	747.7	161.66	747.59	162.51	747.69	176.31	749.61
176.94	749.78	177.66	750	182.2	751.26	185	752	188.38	752.92
197.84	754	199.96	754.09	202.2	754	205.09	754	215.77	754.44
239.26	755.41	271.98	756	284.51	756	286.21	756.18	292.49	758
292.58	758.03	298.84	760	302.28	761.15	304.82	762	308.46	763.22
310.79	764	314.66	765.3	316.89	766	322.48	767.88	322.82	768
328.76	770	334.42	771.98	334.6	772.04	340.63	774	345.3	775.6
346.57	776	346.84	776	351.61	776.15	464.32	776.05	468.6	776.05
469.67	776.08	482.13	776	509.7	776	512.02	775.5	512.54	775.35
514.94	775.91	515.28	776	519.76	777.12	521.48	777.65	532.74	779.69
536.06	780.56	544.14	782.62	567.81	788.23				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	142.61	.035	197.84	.04	292.49	.03	351.61	.02
509.7	.03	544.14	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
142.61	197.84	785.25	753.13	556.83	.1 .3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	762.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	761.89	Reach Len. (ft)	785.25	753.13	556.83
Crit W.S. (ft)		Flow Area (sq ft)	35.46	633.41	642.78
E.G. Slope (ft/ft)	0.001178	Area (sq ft)	35.46	633.41	642.78
Q Total (cfs)	7412.00	Flow (cfs)	36.66	4559.89	2815.45
Top Width (ft)	171.68	Top Width (ft)	9.79	55.23	106.66
Vel Total (ft/s)	5.65	Avg. Vel. (ft/s)	1.03	7.20	4.38
Max Chl Dpth (ft)	14.30	Hydr. Depth (ft)	3.62	11.47	6.03
Conv. Total (cfs)	215986.4	Conv. (cfs)	1068.3	132875.7	82042.4
Length Wtd. (ft)	686.95	Wetted Per. (ft)	12.29	57.67	107.58
Min Ch El (ft)	747.59	Shear (lb/sq ft)	0.21	0.81	0.44
Alpha	1.23	Stream Power (lb/ft s)	567.81	0.00	0.00
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	3.95	60.70	47.33
C & E Loss (ft)	0.02	Cum SA (acres)	1.49	6.55	12.72

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 3143.198

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	828.29	5.49	825.77	17.29	820	21.67	817.85	27.1	815
31.65	812.49	36.19	810	40.9	807.4	45.28	805	50.15	802.31
54.36	800	61.91	795.84	63.43	795	65.19	794.1	73.74	790
79.87	787.01	84.09	785	90.43	781.91	94.44	780	101.15	774.46
112.15	765.76	112.42	765.73	119.43	765.02	129.18	764.27	129.79	764.13
130.32	764	132.1	763.58	133.01	763.41	135.21	762.41	136.06	762
138.41	760.54	139.21	760	141.56	758.35	142.12	758	145.16	756.12
145.35	756	148.1	754.16	148.34	754	150.93	752.42	151.55	752
153.96	750.49	154.71	750	155.08	749.77	167.46	747.7	168.72	747.5
187.93	749	189.3	749.12	189.53	749.18	191.27	749.48	193.74	750
195.64	750.7	199.13	752	200.09	752.36	201.56	752.92	205.05	753.72
206.24	753.96	206.63	754	216.1	754	230.76	754.74	249.31	755.67
250.8	755.73	251.03	755.74	258.12	756	263.65	756	291.86	756.82
294.98	756.91	303.54	757.23	304.26	758	346.26	772	352.48	774
358.26	776	364.26	778	546.27	778	549.27	776.51	556.14	780
560.06	781.91	567.2	785.48	591.68	792.89				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	148.1	.035	206.63	.04	304.26	.03	364.26	.02
546.27	.03	567.2	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
148.1	206.63	328.74	281.33	282.2	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	761.56	Element			
Vel Head (ft)	0.79	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	760.77	Reach Len. (ft)	328.74	281.33	282.20
Crit W.S. (ft)		Flow Area (sq ft)	33.50	643.30	511.99
E.G. Slope (ft/ft)	0.001547	Area (sq ft)	33.50	643.30	511.99
Q Total (cfs)	7412.00	Flow (cfs)	38.72	5178.35	2194.94
Top Width (ft)	174.55	Top Width (ft)	10.07	58.53	105.95
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	1.16	8.05	4.29
Max Chl Dpth (ft)	13.27	Hydr. Depth (ft)	3.33	10.99	4.83
Conv. Total (cfs)	188446.6	Conv. (cfs)	984.3	131657.0	55805.3
Length Wtd. (ft)	281.92	Wetted Per. (ft)	12.05	60.78	106.80
Min Ch El (ft)	747.50	Shear (lb/sq ft)	0.27	1.02	0.46
Alpha	1.30	Stream Power (lb/ft s)	591.68	0.00	0.00
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	3.33	49.66	39.95
C & E Loss (ft)	0.01	Cum SA (acres)	1.31	5.57	11.36

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2861.250

INPUT

Description:

Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	826.9	4.8	825	12.94	822.7	19.82	820	26.57	817.43
32.71	815	41.14	811.83	45.78	810	56.33	806.06	58.94	805
61.05	804.15	70.89	800	72.52	799.34	85.51	793.83	94.91	790
95.97	789.57	107.51	785	109.72	784	119.83	780	132.77	771.02
138.06	767.36	139.79	765.92	157.05	764.29	157.48	764.26	157.54	764.24
158.64	764	159.11	763.92	161.15	763.5	162.46	762.59	163.32	762
165.46	760.51	166.16	760	167.02	759.42	169.07	758	171.9	756.02
172.06	755.91	175.03	754	177.68	752.32	178.16	752	178.63	751.72
181.49	750	183.57	748.54	184.21	748	196.25	747.21	201.32	746.88
206.45	747.15	217.53	747.66	217.74	747.77	218.35	748	221	749.34
222.22	750	225.36	751.49	226.27	752	226.62	752.19	227.52	752.66
234.32	753.23	244.21	754	265.55	754.91	267.37	754.99	291.93	756
315.7	757.29	318.46	757.39	320.44	757.45	335.42	758	340.68	758
348.67	757.41	395.78	773.11	398.54	774	401.11	774.89	410.43	778
422.43	778	462.43	758	520.43	758	560.43	778	572.43	778
576.44	780	580.43	782	600.32	782	601.74	781.34	603.43	780.5
606.46	782	608.51	783.02	612.52	785.03	614.42	786	616.47	787.02
618.38	788	620.48	789.05	622.5	790	624.34	790.96	628.56	793.07
630.36	794	632.73	795.18	634.41	796	647.48	802.53	655.28	803.77
663.87	805.36								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	177.68	.035	227.52	.04	348.67	.03	580.43	.02
600.32	.03	647.48	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
177.68	227.52	296.63	281.27	281.46	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
422.43	663.87	785	T

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	761.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	760.19	Reach Len. (ft)	296.63	281.27	281.46
Crit W.S. (ft)		Flow Area (sq ft)	47.36	593.03	539.46
E.G. Slope (ft/ft)	0.001669	Area (sq ft)	47.36	593.03	676.29
Q Total (cfs)	7412.00	Flow (cfs)	64.25	5184.68	2163.07
Top Width (ft)	257.90	Top Width (ft)	11.79	49.84	196.27
Vel Total (ft/s)	6.28	Avg. Vel. (ft/s)	1.36	8.74	4.01
Max Chl Dpth (ft)	13.31	Hydr. Depth (ft)	4.02	11.90	4.17
Conv. Total (cfs)	181445.6	Conv. (cfs)	1572.9	126920.8	52951.9
Length Wtd. (ft)	281.41	Wetted Per. (ft)	14.18	52.39	130.12
Min Ch El (ft)	746.88	Shear (lb/sq ft)	0.35	1.18	0.43
Alpha	1.47	Stream Power (lb/ft s)	663.87	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	3.03	45.67	36.10
C & E Loss (ft)	0.05	Cum SA (acres)	1.23	5.22	10.38

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2579.076

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	15.21	820	27.97	815.49	29.43	815	37.74	812.05
42.99	810	47.62	808.16	56	805	64.64	801.42	68.65	800
69.31	799.77	82.89	795	85.84	793.93	97.04	790	102.08	788.12
110.79	785	118.7	782.03	123.55	780	132.63	774.42	140.89	769.34
145.19	766.68	152.14	766.05	152.65	766	154.5	765.81	162.84	765.05
163.2	764.88	164.87	764	165.21	763.85	166.44	763.24	167.48	762
168.46	760.7	168.99	760	170.28	758.29	170.48	758	171.42	756.82
172.31	756	174.02	754.3	174.35	754	174.61	753.75	176.64	752
178.01	750.57	178.62	750	180.09	748.58	180.72	748	181.02	747.68
182.28	746.5	191.79	746.04	192.63	746	193.42	746	197.24	745.85
201.26	745.98	201.68	746	202.75	746.05	204.91	746.19	217	746.9
217.34	747.42	217.74	748	218.23	748.97	218.99	750	219.7	751.04
220.27	752	220.52	752.38	221.26	752.97	248.71	753.86	254.02	753.92
258.94	753.98	261.16	754	267.96	754	274.07	754.26	288.53	754.54
293.17	754.64	301.91	754.88	328.08	756	376.08	772	382.31	774
387.99	775.97	394.08	778	576.08	778	579.08	776.51	581.94	777.92
582.91	778.4	585.93	779.85	586.24	780	590.1	781.98	594.19	784.02
596.09	784.99	598.14	786	598.52	786.19	601.73	787.87	601.99	788
606.23	790	608.23	791.04	610.17	792	611.89	792.87	613.7	793.88
613.94	794	614.13	794.09	631.55	796.79				

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	174.02	.035	221.26	.04	328.08	.03	394.08	.02
576.08	.03	613.94	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
174.02	221.26	100.63	101.9	100.41	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	760.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	759.87	Reach Len. (ft)	100.63	101.90	100.41
Crit W.S. (ft)		Flow Area (sq ft)	14.76	591.96	613.04
E.G. Slope (ft/ft)	0.001442	Area (sq ft)	14.76	591.96	613.04
Q Total (cfs)	7412.00	Flow (cfs)	13.12	4732.07	2666.81
Top Width (ft)	170.61	Top Width (ft)	4.93	47.24	118.44

Vel Total (ft/s)	6.08	Avg. Vel. (ft/s)	0.89	7.99	4.35
Max Chl Dpth (ft)	14.02	Hydr. Depth (ft)	2.99	12.53	5.18
Conv. Total (cfs)	195217.8	Conv. (cfs)	345.6	124633.7	70238.6
Length Wtd. (ft)	101.29	Wetted Per. (ft)	7.46	53.60	119.12
Min Ch El (ft)	745.85	Shear (lb/sq ft)	0.18	0.99	0.46
Alpha	1.29	Stream Power (lb/ft s)	631.55	0.00	0.00
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.82	41.84	31.93
C & E Loss (ft)	0.06	Cum SA (acres)	1.17	4.91	9.37

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2476.907

INPUT
Description:
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	831.38	3.33	830	5.72	829.01	15.43	825	22.82	822.34
28.58	820	40.8	815.67	42.71	815	44.21	814.47	55.18	810
59.63	808.2	67.59	805	67.84	804.9	79.93	800	89.78	795.99
92.37	795	97.27	793.01	104.66	790	109.47	788.03	116.91	785
123.41	782.33	129.15	780	142.55	770.74	146.96	767.78	150.66	765.3
160.01	764.7	168.22	764	172.06	763.29	173.79	762.87	174.04	762.64
174.91	762	176.73	760.21	176.95	760	177.56	759.41	179.34	758
179.44	757.9	182.16	756	183.28	755.08	184.78	754	185.95	753.02
187.32	752	190.07	750.11	190.22	750	192.21	748.44	192.82	748
193.24	747.76	193.53	747.54	206.22	745.61	206.72	745.53	208.65	745.76
223.7	747.61	223.76	747.64	224.43	748	225.55	748.48	228.72	750
231.91	751.57	232.75	752	233	752.13	235.44	752.14	259.47	753.16
261.54	753.16	269.43	753.21	277.15	753.26	326.57	754	327.55	754
331.28	755.23	331.3	755.23	331.4	755.24	333.08	755.32	337.42	755.42
341.93	755.32	344.62	755.62	370.65	756	372.86	756.61	377.93	758
380.12	758.61	385.24	760	390.46	761.49	392.29	762	397.91	763.57
405.4	765.64	406.71	766	407.95	766.35	413.69	768	420.85	770
428.05	772	428.61	772.15	435.3	774	436.02	774.21	442.64	776
444.41	776	447.37	776.06	542.96	776.06	544.8	776.09	545.6	776
567.96	776	568.38	775.79	569.97	774.64	573.06	775.28	574.08	776
574.48	776.2	578.63	778	586.5	780.84	609.97	784.69	612.35	785.19

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	187.32	.035	233	.04	370.65	.03	447.37	.02
567.96	.03	578.63	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
187.32	233	1155.6 1093.26	853.34	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	760.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	759.88	Reach Len. (ft)	1155.60	1093.26	853.34
Crit W.S. (ft)		Flow Area (sq ft)	40.74	557.86	837.67
E.G. Slope (ft/ft)	0.001113	Area (sq ft)	40.74	557.86	837.67
Q Total (cfs)	7412.00	Flow (cfs)	43.41	4029.59	3339.00
Top Width (ft)	207.70	Top Width (ft)	10.24	45.68	151.78
Vel Total (ft/s)	5.16	Avg. Vel. (ft/s)	1.07	7.22	3.99
Max Chl Dpth (ft)	14.35	Hydr. Depth (ft)	3.98	12.21	5.52
Conv. Total (cfs)	222154.0	Conv. (cfs)	1301.2	120775.7	100077.1
Length Wtd. (ft)	1000.47	Wetted Per. (ft)	12.93	48.44	152.55
Min Ch El (ft)	745.53	Shear (lb/sq ft)	0.22	0.80	0.38
Alpha	1.33	Stream Power (lb/ft s)	612.35	0.00	0.00
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	2.75	40.50	30.26
C & E Loss (ft)	0.03	Cum SA (acres)	1.15	4.80	9.06

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: Flint Run
REACH: Lower RS: 2422.446

INPUT
Description:
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	827.33	2.04	826.52	8.7	823.9	18.49	820	26.59	816.78
31.02	815	43.42	810.03	43.71	809.91	54.78	805	60.08	802.88
66.69	800	74.34	796.99	78.98	795	89.14	791.07	91.95	790
103.33	785.18	103.8	785	106.19	783.96	113.68	780.68	115.31	780
118.54	777.88	140.62	764.19	142.29	764.11	144.58	764	144.84	764
152.26	763.62	158.03	763.3	160.92	762.67	164.22	762	164.71	761.59
166.7	760	168.44	758.49	168.99	758	170.24	757.01	171.81	756
172.19	755.78	175.1	754	175.49	753.72	175.98	753.38	178.43	752.83
181.13	752.77	181.48	752.3	181.65	752	182.61	750.49	182.87	750
183.38	749.35	184.29	748	184.5	747.68	184.78	747.3	193.16	746.66
203.98	745.48	217.18	746.81	225.14	747.51	225.66	747.78	226.09	748
228.92	749.5	229.87	750	230.61	750.38	232.45	752	232.85	752.31
232.95	752.4	260.86	752.89	294.85	753.48	318.12	754	357.87	755.53
367.67	755.91	370.06	756	371.96	756.14	377.39	756.48	400.27	758
405.99	759.54	407.35	760	409.43	760.56	415.23	761.51	418.4	762
422.13	762.26	427.49	762.69	438.54	763.45	445.89	764	445.98	764.01
450.72	764.31	457.31	764.66	458.95	764.67	480.98	770.6	499.66	772.3
515.1	772.8	523.56	770.1	538.9	771.76	541.52	772	546.77	772.53
547.5	772.61	547.85	772.66	548.46	772.68	556.6	774.61	557.51	774.57
557.96	774.56	585.55	778.67	590.53	779.65	591.47	780	592.65	780
592.87	780.06								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	178.43	.035	232.45	.04	457.31	.03	480.98	.02
515.1	.03	523.56	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
178.43	232.45	335.76	346.43	218.7	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	758.95	Element			
Vel Head (ft)	0.85	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	758.10	Reach Len. (ft)	335.76	346.43	218.70
Crit W.S. (ft)		Flow Area (sq ft)	29.53	574.79	617.61
E.G. Slope (ft/ft)	0.001961	Area (sq ft)	29.53	574.79	617.61
Q Total (cfs)	7412.00	Flow (cfs)	37.43	4959.10	2415.47
Top Width (ft)	231.75	Top Width (ft)	9.55	54.02	168.18
Vel Total (ft/s)	6.07	Avg. Vel. (ft/s)	1.27	8.63	3.91
Max Chl Dpth (ft)	12.62	Hydr. Depth (ft)	3.09	10.64	3.67
Conv. Total (cfs)	167394.0	Conv. (cfs)	845.3	111997.3	54551.3
Length Wtd. (ft)	309.14	Wetted Per. (ft)	11.05	58.46	168.46
Min Ch El (ft)	745.48	Shear (lb/sq ft)	0.33	1.20	0.45
Alpha	1.49	Stream Power (lb/ft s)	592.87	0.00	0.00
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	1.82	26.29	16.00
C & E Loss (ft)	0.04	Cum SA (acres)	0.89	3.55	5.92

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2355.763

INPUT
Description:
Station Elevation Data num= 125

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	10.21	821.05	13.07	820	23.71	816.28	26.8	815
32.1	812.7	38.29	810	46.89	806.31	49.93	805	57.14	802.05
61.49	800	64.14	798.95	74.21	795	78.78	793.14	86.71	790
95.42	786.48	99.06	785	104.68	782.71	110.72	780	118.05	775.07
137.58	762.78	146.88	762.44	149.01	762.36	150.64	762.29	155.97	762
158.29	761.64	163.32	760.9	163.35	760.9	164.36	760.26	164.71	760
167.42	758.19	167.69	758	167.89	757.86	170.3	756	171.54	755.19
173.13	754	173.64	753.64	174.15	753.27	178.85	753.19	184.22	752.73
184.82	752.06	184.85	752	186.64	750.14	186.74	750	187.23	749.51
188.17	748	188.32	747.77	188.37	747.71	198.18	746.71	205.27	746
206.99	745.42	210.92	746	230.13	746.85	232.78	746.97	234.03	747.03
234.51	747.47	234.99	748	235.3	748.24	237.05	750	237.56	750.51
239.26	752.07	263.63	752.63	263.67	752.63	272.98	752.86	301.5	753.37
303.52	753.43	315.09	753.69	323.85	754	330	754	330.07	754

330.82	754.05	356.8	755.6	369.54	761.5	381.48	762.4	401.6	763
416.2	759.7	421.92	760	426.05	759.69	431.14	759.92	431.67	760
432.1	760	437.22	760.93	444.16	762	444.81	762.16	445.26	762.2
445.37	762.17	446.19	762	446.29	761.97	450.55	761.16	453.37	761.84
454.42	762	456.96	762.09	467.93	762.44	468.26	762.46	468.6	762.49
481.15	763.4	490.57	764	491.33	764.07	494	764.25	495.49	764.41
507.57	765.77	508.22	765.78	509.7	766	518.27	767.27	519.09	767.4
519.73	767.47	519.97	767.54	520.51	767.59	524.68	768	524.9	768
529.76	768.49	537.93	768	538.2	767.92	539.72	766.59	543.27	767.24
543.98	767.22	547.94	767.31	556.22	767.03	558.31	766.68	558.95	766.74
561.68	766.28	563.3	766.28	568.4	767.22	570.83	768	573.12	768.85

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	184.22	.035	239.26	.04	356.8	.03	369.54	.02
401.6	.03	416.2	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
184.22	239.26	48.16	40.88	38.52	.1 .3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	758.17	Element			
Vel Head (ft)	1.23	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.94	Reach Len. (ft)	48.16	40.88	38.52
Crit W.S. (ft)		Flow Area (sq ft)	48.11	540.43	410.64
E.G. Slope (ft/ft)	0.002970	Area (sq ft)	48.11	540.43	410.64
Q Total (cfs)	7412.00	Flow (cfs)	80.02	5429.91	1902.07
Top Width (ft)	190.60	Top Width (ft)	15.14	55.04	120.43
Vel Total (ft/s)	7.42	Avg. Vel. (ft/s)	1.66	10.05	4.63
Max Chl Dpth (ft)	11.52	Hydr. Depth (ft)	3.18	9.82	3.41
Conv. Total (cfs)	136005.3	Conv. (cfs)	1468.3	99635.3	34901.7
Length Wtd. (ft)	40.42	Wetted Per. (ft)	16.35	59.72	120.79
Min Ch El (ft)	745.42	Shear (lb/sq ft)	0.55	1.68	0.63
Alpha	1.44	Stream Power (lb/ft s)	573.12	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	1.52	21.85	13.42
C & E Loss (ft)	0.04	Cum SA (acres)	0.79	3.11	5.20

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2314.880

INPUT
Description:
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	19.5	818	28.11	815	36.25	812.18	42.53	810
56.39	805.1	56.63	805	66.61	801.16	69.63	800	72.03	799.07
82.59	795	90.29	792.01	94.69	790	97.61	788.63	105.64	785

113.46	781.64	117.02	780	121.01	778.24	138.82	766.27	145.02	761.77
160.34	761.2	162.74	761.1	164.48	760.89	167.6	760.5	170	760.19
170.29	760.17	171	760.07	171.21	760.03	171.48	759.87	173.71	758.37
174.27	758	175.29	757.38	177.31	756	178.41	755.28	180.25	754
180.93	753.59	181.27	753.36	193.53	752.27	194.51	752.23	194.54	752.18
194.63	752	194.7	751.84	195.49	750	195.56	749.77	196.1	748.95
196.6	748	196.68	747.23	196.69	747.22	205.08	746.58	212.71	746
218.94	745.38	227.24	746	232.48	746.29	244.35	746.97	245.59	747.78
245.92	748	247.75	749.2	248.1	749.47	248.85	750	249.62	750.56
249.88	750.64	250.85	751.24	261.15	752.56	261.33	752.58	262.14	752.68
277.92	752.69	279.68	752.69	292.5	752.92	298.82	752.9	322.81	753.54
327.56	753.77	332.01	753.89	334.12	754	336.21	754	340.62	754.22
352.2	754.51	353.78	754.6	361.68	758.6	371.75	759	383.72	758.7
386.37	757.5	387.78	757.64	391.43	758	394.31	758.21	406.45	760
413.23	761.12	418.5	762	423.18	762.75	424.39	762.88	443.25	763.96
443.67	763.98	443.74	763.99	445.42	764	457.65	764.13	457.77	764.13
467.5	764.06	469.11	764.11	476.62	764.36	487.38	764.57	488.62	764.5
489.9	764.2	502.7	765.85	503.7	766	505.57	766.24	505.97	766.3
507.46	766.45	516.98	767.35	520.13	767.72	521.12	767.9	523.92	767.95
529.43	767.98	531.43	767.98	531.7	768	540.12	768.65	542.23	768.78
547.7	769.16	562.92	769.85	563.68	769.88	567.18	770		

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	193.53	.035	261.15	.04	352.2	.03	353.78	.02
383.72	.03	386.37	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
193.53	261.15	14.36	91.23	28.15	.1 .3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	758.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.09	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.92	Reach Len. (ft)	14.36	91.23	28.15
Crit W.S. (ft)		Flow Area (sq ft)	59.89	629.36	338.33
E.G. Slope (ft/ft)	0.002636	Area (sq ft)	59.89	629.36	338.33
Q Total (cfs)	7412.00	Flow (cfs)	99.26	5796.02	1516.72
Top Width (ft)	182.41	Top Width (ft)	17.57	67.62	97.22
Vel Total (ft/s)	7.21	Avg. Vel. (ft/s)	1.66	9.21	4.48
Max Chl Dpth (ft)	11.54	Hydr. Depth (ft)	3.41	9.31	3.48
Conv. Total (cfs)	144372.5	Conv. (cfs)	1933.5	112896.1	29543.0
Length Wtd. (ft)	74.19	Wetted Per. (ft)	18.70	72.46	97.81
Min Ch El (ft)	745.38	Shear (lb/sq ft)	0.53	1.43	0.57
Alpha	1.35	Stream Power (lb/ft s)	567.18	0.00	0.00
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1.46	21.30	13.09
C & E Loss (ft)	0.04	Cum SA (acres)	0.78	3.06	5.10

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2223.643

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	27.73	815	34.41	812.57	41.67	810	51.05	806.58
55.42	805	58.57	803.87	69.2	800	73.81	798.35	81.51	795
87.77	791.97	92.08	790	96.21	788.14	102.73	785	107.36	782.93
113.45	780	119.05	777.7	125.77	775	133.03	772.43	139.3	770
149.59	763.59	152.1	760.27	157.45	760.05	158.38	760	166.7	759.51
172.23	759.11	177.72	758.38	178.27	758	179.88	757.02	181.33	756.14
181.54	756	181.73	755.88	184.62	754	185.04	753.73	185.31	753.56
207.65	752.72	208.62	752.7	209.08	752.08	209.12	752	209.17	751.94
210.3	750	211.6	748.18	211.72	748	212.03	747.69	212.53	746.94
233.11	746.13	235.95	746	236.34	745.96	236.97	745.3	237.41	745.96
237.66	746	239.35	746.12	257.68	746.72	259.4	747.73	259.84	748
262.98	749.98	263.04	750.02	265.2	752	265.46	752.34	266.25	753.09
295.92	752.68	305.73	752.54	343.2	752.45	346.57	752.53	347.78	752.57
351.69	752.72	352.4	752.71	356.77	752.96	365.45	753.47	368.6	755.03
378.83	755.5	389.05	755.2	392.11	753.71	411.25	763.2	422.43	764
426.15	764.29	430.67	764.85	434.41	764.95	437.51	766	437.82	766.1
439.15	766.55	442.1	766.65	450.77	766.33	452.23	766.31	464.94	766.36
465.78	766.36	467.12	766.4	469.77	766	477.19	766	505.78	766.37
509.94	766.55	510.53	766.34	510.66	766.34	518.58	767.43	519.03	767.5
519.68	767.58	520.34	767.64	524.71	767.85	526.06	767.89	532.55	768
532.81	768.01	535.5	768.02	553.12	769.97	553.44	770	554.15	770.07
574.46	771.76	575.95	771.96	576.48	772	578.16	772	580.24	778.23

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	207.65	.035	266.25	.04	365.45	.03	368.6	.02
389.05	.03	411.25	.04						

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
207.65	266.25	39.89	37.88	44.06	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
494.07	507.39	800

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	757.79	Element	0.100	0.035	0.038
Vel Head (ft)	0.96	Wt. n-Val.	39.89	37.88	44.06
W.S. Elev (ft)	756.82	Reach Len. (ft)	90.55	564.29	464.31
Crit W.S. (ft)		Flow Area (sq ft)	90.55	564.29	464.31
E.G. Slope (ft/ft)	0.002493	Area (sq ft)	145.47	5077.82	2188.71
Q Total (cfs)	7412.00	Flow (cfs)	27.45	58.60	132.14
Top Width (ft)	218.19	Top Width (ft)	1.61	9.00	4.71
Vel Total (ft/s)	6.62	Avg. Vel. (ft/s)	3.30	9.63	3.51
Max Chl Dpth (ft)	11.52	Hydr. Depth (ft)			

Conv. Total (cfs)	148453.0	Conv. (cfs)	2913.6	101702.4	43837.0
Length Wtd. (ft)	39.80	Wetted Per. (ft)	28.42	64.51	133.62
Min Ch El (ft)	745.30	Shear (lb/sq ft)	0.50	1.36	0.54
Alpha	1.42	Stream Power (lb/ft s)	580.24	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	1.44	20.05	12.83
C & E Loss (ft)	0.03	Cum SA (acres)	0.77	2.92	5.03

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2185.764

INPUT
Description:
Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	14.44	820	15.39	819.67	28.89	815	30.77	814.35
43.61	810	46.43	809.02	58.5	805	62.27	803.68	73.29	800
77.15	798.36	86.5	795	90.52	793.08	98.84	790	103.37	787.81
111.03	785	116.77	782.18	121.84	780	128.58	777.28	134.01	775
141.49	772	146.27	770	157.97	765.3	159.15	765	159.53	764.6
167.95	759.3	178.98	758.72	188.57	758	189.07	757.92	190.8	757.66
191.91	757.49	193.04	756.84	194.34	756	196.29	754.86	198.33	754
198.65	753.77	198.84	753.68	206	753.46	226.2	752.66	226.5	752.28
226.65	752	227.4	751.05	228.28	750	229.58	748.42	229.85	748
230.79	746.94	230.85	746.86	232.6	746.79	232.91	746.78	255.43	745.34
255.45	745.27	255.48	745.34	258.85	745.41	277.09	746.39	278.3	747.61
278.68	748	279.12	748.39	280.84	750	281.49	750.58	282.74	752
283.6	752.82	283.82	753.02	304.14	752.7	318	752.51	354.53	752
362.74	752	375.72	752.96	380.78	753.25	382.63	754.15	392.91	754.6
403.18	754.25	406.27	752.76	426.18	762.15	435.45	764	439.18	764.59
440.45	764.79	443.8	765.18	446.37	765.34	456.87	766	457.13	766.03
458.2	766.08	462.99	766.32	464.54	766.38	469.6	766.32	477.45	766.2
483.79	766	489.89	765.82	497.17	765.85	501.81	765.93	504.34	766
506.22	766	525.5	766.08	530.79	766.58	531.62	766.6	539.2	766.99
545.12	767.08	549.74	767.47	550.66	767.48	556.32	767.65	562.96	768
569.41	768	573.65	768.37	576.32	768.74	584.99	770	586.31	770.14
600.11	771.39	605.92	772	609.78	772	614.47	772.31	616.42	772.49
627.88	774	630.43	774	631.19	780.48	631.25	780.39	635.99	780.55

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	226.2	.035	283.6	.04	380.78	.03	382.63	.02
403.18	.03	426.18	.04						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
226.2	283.6	190.76	109.94	157.38	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
515.5	528.8	800

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	757.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.85	Wt. n-Val.	0.100	0.035	0.037
W.S. Elev (ft)	756.81	Reach Len. (ft)	190.76	109.94	157.38
Crit W.S. (ft)		Flow Area (sq ft)	108.65	581.17	503.61
E.G. Slope (ft/ft)	0.002069	Area (sq ft)	108.65	581.17	503.61
Q Total (cfs)	7412.00	Flow (cfs)	159.47	4935.97	2316.57
Top Width (ft)	221.78	Top Width (ft)	33.12	57.40	131.27
Vel Total (ft/s)	6.21	Avg. Vel. (ft/s)	1.47	8.49	4.60
Max Chl Dpth (ft)	11.54	Hydr. Depth (ft)	3.28	10.12	3.84
Conv. Total (cfs)	162942.2	Conv. (cfs)	3505.6	108510.1	50926.4
Length Wtd. (ft)	127.37	Wetted Per. (ft)	33.96	63.02	132.87
Min Ch El (ft)	745.27	Shear (lb/sq ft)	0.41	1.19	0.49
Alpha	1.42	Stream Power (lb/ft s)	635.99	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	1.34	19.55	12.34
C & E Loss (ft)	0.00	Cum SA (acres)	0.74	2.87	4.89

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2075.488

INPUT
Description:
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	802.23	3.51	801.49	11.2	800	23.28	797.48	37.66	795
45.98	793.51	66.38	790	66.75	789.93	77.42	788.18	92.16	785.7
95.67	785	110.22	782.46	121.42	780	132.63	777.62	144.52	775
153.17	773.15	167.17	770	172.97	769.53	182.57	766.54	189.19	765
226.92	765	255.29	758.47	258.94	758.29	262.94	757.39	265.94	756.71
269.59	756.41	275.43	756	278.33	755.79	287.28	755.2	289.64	755.02
292.29	754.77	292.59	754.74	296.35	754.35	298.4	754.14	298.98	754
299.33	753.9	304.32	752.88	313.3	752.57	319.57	752	320.16	752
331.52	750.76	336.84	750.08	337.14	750.03	337.6	750	338.5	749.96
340.85	749.47	346.27	748	347.01	747.8	351.42	747.26	357.61	745.69
358.12	745.17	375.72	748	378.17	749.67	378.68	750	380.07	750.9
382.5	751.57	384.12	752	384.28	752.05	385.43	752.36	390.12	752.43
411.87	752.53	434.09	752.12	444.28	752.05	451.3	752	499.75	752
508.05	753.84	508.95	754	511.38	754.44	512.07	754.53	517.05	755.31
517.68	755.36	522.76	755.38	530.91	755.38	538.94	755.37	542.82	755.68
547.05	756	550	756	561.76	757.77	563.24	757.99	563.34	758
564.55	758	566.62	758.29	569.75	758.52	572.04	758.67	576.08	758.9
581.86	759.45	583.67	759.61	584.97	759.72	585.93	759.78	592.84	760
592.86	760	594.56	760.05	602.27	761.74	603.46	762	603.73	762.06
611.35	763.55	612.46	763.7	612.68	763.73	613.11	763.81	614.13	764
616.28	764.4	617.45	764.62	626.9	765.99	626.97	766	642	768
646.62	768.63	648.2	768.84	655.6	770	668.42	772.24	669.35	773.12

700.03	781.17	722.83	783.03	742.99	787.88	757.66	786.67	763.96	787.49
764.04	787.51	795.36	791.59	802.24	795	808.51	795	830.36	792.84
856.2	792.6	904.14	792.39	906.69	792.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	313.3	.035	384.12	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
313.3	384.12	41.03	39.47	55.96	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
714	766	810

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	757.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.87	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.47	Reach Len. (ft)	41.03	39.47	55.96
Crit W.S. (ft)	754.92	Flow Area (sq ft)	82.89	525.37	574.67
E.G. Slope (ft/ft)	0.003094	Area (sq ft)	82.89	525.37	574.67
Q Total (cfs)	7412.00	Flow (cfs)	103.48	4627.76	2680.76
Top Width (ft)	284.25	Top Width (ft)	44.43	70.82	169.00
Vel Total (ft/s)	6.27	Avg. Vel. (ft/s)	1.25	8.81	4.66
Max Chl Dpth (ft)	11.30	Hydr. Depth (ft)	1.87	7.42	3.40
Conv. Total (cfs)	133242.3	Conv. (cfs)	1860.2	83191.3	48190.8
Length Wtd. (ft)	39.47	Wetted Per. (ft)	44.66	72.93	169.43
Min Ch El (ft)	745.17	Shear (lb/sq ft)	0.36	1.39	0.66
Alpha	1.43	Stream Power (lb/ft s)	906.69	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.93	18.16	10.39
C & E Loss (ft)		Cum SA (acres)	0.57	2.71	4.35

CULVERT

RIVER: Flint Run
REACH: Lower RS: 2057.86

INPUT
Description:
Distance from Upstream XS = 10
Deck/Roadway Width = 15
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
338.5 749.96	0	378.68 750	0

Upstream Bridge Cross Section Data
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	802.23	3.51	801.49	11.2	800	23.28	797.48	37.66	795
45.98	793.51	66.38	790	66.75	789.93	77.42	788.18	92.16	785.7
95.67	785	110.22	782.46	121.42	780	132.63	777.62	144.52	775
153.17	773.15	167.17	770	172.97	769.53	182.57	766.54	189.19	765
226.92	765	255.29	758.47	258.94	758.29	262.94	757.39	265.94	756.71
269.59	756.41	275.43	756	278.33	755.79	287.28	755.2	289.64	755.02
292.29	754.77	292.59	754.74	296.35	754.35	298.4	754.14	298.98	754
299.33	753.9	304.32	752.88	313.3	752.57	319.57	752	320.16	752
331.52	750.76	336.84	750.08	337.14	750.03	337.6	750	338.5	749.96
340.85	749.47	346.27	748	347.01	747.8	351.42	747.26	357.61	745.69
358.12	745.17	375.72	748	378.17	749.67	378.68	750	380.07	750.9
382.5	751.57	384.12	752	384.28	752.05	385.43	752.36	390.12	752.43
411.87	752.53	434.09	752.12	444.28	752.05	451.3	752	499.75	752
508.05	753.84	508.95	754	511.38	754.44	512.07	754.53	517.05	755.31
517.68	755.36	522.76	755.38	530.91	755.38	538.94	755.37	542.82	755.68
547.05	756	550	756	561.76	757.77	563.24	757.99	563.34	758
564.55	758	566.62	758.29	569.75	758.52	572.04	758.67	576.08	758.9
581.86	759.45	583.67	759.61	584.97	759.72	585.93	759.78	592.84	760
592.86	760	594.56	760.05	602.27	761.74	603.46	762	603.73	762.06
611.35	763.55	612.46	763.7	612.68	763.73	613.11	763.81	614.13	764
616.28	764.4	617.45	764.62	626.9	765.99	626.97	766	642	768
646.62	768.63	648.2	768.84	655.6	770	668.42	772.24	669.35	773.12
700.03	781.17	722.83	783.03	742.99	787.88	757.66	786.67	763.96	787.49
764.04	787.51	795.36	791.59	802.24	795	808.51	795	830.36	792.84
856.2	792.6	904.14	792.39	906.69	792.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	313.3	.035	384.12	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
313.3	384.12	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
714	766	810

Downstream Deck/Roadway Coordinates num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
343.84	750	0	417.5	750	0

Downstream Bridge Cross Section Data

Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790
43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49

343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760
634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	337.61	.035	422.03	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
337.61	422.03	.1	.3

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 Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.5	

FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 2 - Mitered to conform to slope
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
6	20	.024	.024	0	.7	1

Number of Barrels = 11
Upstream Elevation = 747.14
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
350.5	352	353.5	355	356.5	358	359.5	361	362.5	364
365.5									

Downstream Elevation = 746
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.	Sta.

372.5 374 375.5 377 378.5 380 381.5 383 384.5 386
387.5

CULVERT OUTPUT Profile #100-yr Culv Group: Culvert #1

Q Culv Group (cfs)	54.79	Culv Full Len (ft)	20.00
# Barrels	11	Culv Vel US (ft/s)	2.82
Q Barrel (cfs)	4.98	Culv Vel DS (ft/s)	2.82
E.G. US. (ft)	757.35	Culv Inv El Up (ft)	747.14
W.S. US. (ft)	756.47	Culv Inv El Dn (ft)	746.00
E.G. DS (ft)	757.11	Culv Frctn Ls (ft)	0.15
W.S. DS (ft)	756.63	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.24	Culv Entr Loss (ft)	0.09
Delta WS (ft)	0.16	Q Weir (cfs)	7357.21
E.G. IC (ft)	757.31	Weir Sta Lft (ft)	263.17
E.G. OC (ft)	757.35	Weir Sta Rgt (ft)	558.88
Culvert Control	Outlet	Weir Submerg	0.87
Culv WS Inlet (ft)	748.64	Weir Max Depth (ft)	7.38
Culv WS Outlet (ft)	747.50	Weir Avg Depth (ft)	4.49
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	1328.83
Culv Crt Depth (ft)	0.86	Min El Weir Flow (ft)	750.01

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 2035.918

INPUT
Description:
Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790
43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49
343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760

634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	337.61	.035	422.03	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
337.61	422.03	50.28	39.38	62.3	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	757.11	Element			
Vel Head (ft)	0.48	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	756.63	Reach Len. (ft)	16.00	16.00	16.00
Crit W.S. (ft)	753.24	Flow Area (sq ft)	111.05	880.30	646.51
E.G. Slope (ft/ft)	0.001044	Area (sq ft)	111.05	880.30	646.51
Q Total (cfs)	7412.00	Flow (cfs)	92.40	5523.40	1796.20
Top Width (ft)	316.21	Top Width (ft)	48.41	84.42	183.38
Vel Total (ft/s)	4.53	Avg. Vel. (ft/s)	0.83	6.27	2.78
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)	2.29	10.43	3.53
Conv. Total (cfs)	229372.3	Conv. (cfs)	2859.4	170927.5	55585.4
Length Wtd. (ft)	16.00	Wetted Per. (ft)	48.68	90.00	183.61
Min Ch El (ft)	744.25	Shear (lb/sq ft)	0.15	0.64	0.23
Alpha	1.52	Stream Power (lb/ft s)	940.17	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.93	17.20	10.39
C & E Loss (ft)	0.03	Cum SA (acres)	0.53	2.64	4.12

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.

BRIDGE

RIVER: Flint Run
REACH: Lower RS: 2017.29

INPUT
Description:
Distance from Upstream XS = 16
Deck/Roadway Width = 8
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord

321.62	754.05	753.55	457.89	752.74	752.24

Upstream Bridge Cross Section Data

Station Elevation Data num= 128

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	797.48	4.66	796.43	11.04	795	27.23	791.35	33.9	790
43.01	788.21	59.06	785	65.87	783.66	81.55	780.84	83.94	780.44
85.52	780.18	86.62	780	114.79	775.53	117.33	775	132.81	772.38
143.55	770	153.89	768.47	158.37	768.52	192.54	765.91	196.06	765.62
199.75	765.31	200.76	765	208.51	765	237.42	767.51	244.73	768.19
268.64	765	282.05	760.05	288.17	757.8	289.35	756.46	289.4	756.45
295.03	756	304.43	755.26	307.38	755.01	315.56	754.1	316.61	754
321.62	753.55	337.61	752.06	338.07	752	342.74	751.44	343.57	750.49
343.84	750	343.89	749.93	344.12	749.66	345.11	748	345.55	747.3
346.34	746	346.96	745.04	347.45	744.85	348.87	744.46	349.02	744.36
357.9	745.65	379.86	745.14	405.91	744.25	406.39	744.49	409.49	746
410.95	746.72	414.72	748.61	417.5	750	418.28	750.39	421.68	752
422.03	752.18	422.48	752.42	428.58	752.3	435.53	752.14	457.89	752.24
470.09	752.07	472.1	752.05	475.35	752	476.3	751.99	491.47	752.63
495.94	752.53	505.27	752.53	519.73	752	521.1	752	523.71	752.13
535.47	752.53	553.07	753.59	558.81	753.85	559.28	753.88	562.41	754
571.09	754.29	574.06	754.48	580.8	754.97	589.35	755.44	597.42	756
605.47	756.63	609.52	756.9	611.59	757.21	616.07	757.25	620.82	757.42
622.16	757.57	625.72	757.76	626.44	757.93	634.36	759.95	634.54	760
634.58	760.11	639.58	763.14	641.45	762	644.86	762.97	648.36	764
651.47	764.9	655.48	766	659.92	767.24	660.69	768.76	662.5	768
667.51	769.19	670.21	770	671.27	770.26	673.42	771.6	679.03	775
688.59	777.32	706.8	780	718.51	782.01	740.86	785	740.95	785.01
741.09	785.03	770.29	786.92	791.45	787.88	793.6	787.99	810.56	788.39
823.46	788.52	829.23	788.2	834.73	787.97	853.01	786.99	891.13	785.73
898.11	785.56	899.14	785.7	940.17	789.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	337.61	.035	422.03	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
337.61	422.03	.1	.3

Downstream Deck/Roadway Coordinates

num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
386.49	754.62	754.12	496.28	752.33	751.83

Downstream Bridge Cross Section Data

Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	800.66	2.87	800	20.54	796.34	26.59	795	36.01	792.98
49.32	790	59.3	787.88	73.33	785	83.96	782.91	98.17	780
110.22	777.43	123.36	775	146.01	770.34	147.65	770	148.86	770
161.56	768.45	187.96	765.59	190.53	765	212.74	765	253.18	767.96
264.25	770	321.36	770	321.59	770	321.74	769.95	334.48	765

338.22	757.6	339.53	756.12	340.34	756.05	340.99	756	343.03	755.84
344.1	755.84	358.64	754.61	365.02	754.27	367.69	754.14	371.47	754.14
372.1	754.12	378.35	754.22	381.77	754.24	386.49	754.12	386.64	754
390.39	754	390.53	752.89	390.68	752	390.77	751.51	391.24	750.56
391.36	750.46	392.18	749.9	399.43	745.4	412.84	745.49	429.87	745.1
430.68	746.25	431.49	745.59	456.87	746.69	457.47	747.11	458.75	748
460.62	749.36	461.5	750	464.07	751.86	464.2	751.97	468.76	752.05
479.07	752.08	496.28	751.83	496.46	751.84	527.54	754.42	528.69	754.44
552.71	754.82	561.91	754.99	562	754.99	562.21	755	562.32	755
595.37	753.58	612.25	754.6	623.27	754.45	645.53	758.04	658.09	758.71
693.09	760	709.49	763.47	710.27	763.68	715.07	765	717.82	765.77
733.15	770	749.73	774.64	751.01	775	761.67	776.19	762.32	776.22
794.97	778.22	813.46	779.54	813.52	779.55	826.69	780	850.66	781.41
865.24	781.54	890.26	781.22	898.37	780	947.8	780	968.82	782.8
977.23	785	1019.29	789.33	1027.08	790	1035.86	791.47	1036.64	791.59

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	264.25	.2	321.36	.04	378.35	.035	528.69	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
378.35	528.69	.1	.3

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 #100-yr

			Inside BR US	Inside BR DS
E.G. US. (ft)	757.11	Element		
W.S. US. (ft)	756.63	E.G. Elev (ft)	757.05	756.99
Q Total (cfs)	7412.00	W.S. Elev (ft)	756.67	756.38

Q Bridge (cfs)	2992.01	Crit W.S. (ft)	753.40	753.52
Q Weir (cfs)		Max Chl Dpth (ft)	12.42	11.28
Weir Sta Lft (ft)		Vel Total (ft/s)	4.68	6.12
Weir Sta Rgt (ft)		Flow Area (sq ft)	1582.53	1211.05
Weir Submerg		Froude # Chl	0.25	0.33
Weir Max Depth (ft)		Specif Force (cu ft)	7230.79	5800.81
Min El Weir Flow (ft)	752.00	Hydr Depth (ft)	4.99	4.09
Min El Prs (ft)	753.55	W.P. Total (ft)	596.50	523.93
Delta EG (ft)	0.18	Conv. Total (cfs)	127513.6	89063.7
Delta WS (ft)	0.39	Top Width (ft)	316.84	295.95
BR Open Area (sq ft)	513.33	Frctn Loss (ft)	0.04	0.06
BR Open Vel (ft/s)	5.83	C & E Loss (ft)	0.02	0.01
Coef of Q		Shear Total (lb/sq ft)	0.56	1.00
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
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: Flint Run
REACH: Lower RS: 1996.533

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	800.66	2.87	800	20.54	796.34	26.59	795	36.01	792.98
49.32	790	59.3	787.88	73.33	785	83.96	782.91	98.17	780
110.22	777.43	123.36	775	146.01	770.34	147.65	770	148.86	770
161.56	768.45	187.96	765.59	190.53	765	212.74	765	253.18	767.96
264.25	770	321.36	770	321.59	770	321.74	769.95	334.48	765
338.22	757.6	339.53	756.12	340.34	756.05	340.99	756	343.03	755.84
344.1	755.84	358.64	754.61	365.02	754.27	367.69	754.14	371.47	754.14
372.1	754.12	378.35	754.22	381.77	754.24	386.49	754.12	386.64	754
390.39	754	390.53	752.89	390.68	752	390.77	751.51	391.24	750.56
391.36	750.46	392.18	749.9	399.43	745.4	412.84	745.49	429.87	745.1
430.68	746.25	431.49	745.59	456.87	746.69	457.47	747.11	458.75	748
460.62	749.36	461.5	750	464.07	751.86	464.2	751.97	468.76	752.05
479.07	752.08	496.28	751.83	496.46	751.84	527.54	754.42	528.69	754.44
552.71	754.82	561.91	754.99	562	754.99	562.21	755	562.32	755
595.37	753.58	612.25	754.6	623.27	754.45	645.53	758.04	658.09	758.71
693.09	760	709.49	763.47	710.27	763.68	715.07	765	717.82	765.77
733.15	770	749.73	774.64	751.01	775	761.67	776.19	762.32	776.22

794.97	778.22	813.46	779.54	813.52	779.55	826.69	780	850.66	781.41
865.24	781.54	890.26	781.22	898.37	780	947.8	780	968.82	782.8
977.23	785	1019.29	789.33	1027.08	790	1035.86	791.47	1036.64	791.59

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	264.25	.2	321.36	.04	378.35	.035	528.69	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
378.35	528.69	477.61	274.2	175.6	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	756.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.	0.040	0.035	0.040
W.S. Elev (ft)	756.24	Reach Len. (ft)	477.61	274.20	175.60
Crit W.S. (ft)		Flow Area (sq ft)	55.08	987.34	180.62
E.G. Slope (ft/ft)	0.002293	Area (sq ft)	55.08	987.34	180.62
Q Total (cfs)	7412.00	Flow (cfs)	123.22	6830.05	458.73
Top Width (ft)	294.92	Top Width (ft)	38.92	150.34	105.65
Vel Total (ft/s)	6.06	Avg. Vel. (ft/s)	2.24	6.92	2.54
Max Chl Dpth (ft)	11.14	Hydr. Depth (ft)	1.42	6.57	1.71
Conv. Total (cfs)	154798.8	Conv. (cfs)	2573.4	142644.9	9580.5
Length Wtd. (ft)	261.19	Wetted Per. (ft)	39.05	157.28	105.87
Min Ch El (ft)	745.10	Shear (lb/sq ft)	0.20	0.90	0.24
Alpha	1.21	Stream Power (lb/ft s)	1036.64	0.00	0.00
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	0.85	16.38	10.02
C & E Loss (ft)	0.05	Cum SA (acres)	0.49	2.54	3.99

CROSS SECTION

RIVER: Flint Run
REACH: Lower RS: 1720.640

INPUT
Description:
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	837.16	1.23	836.49	13.1	830	17.08	827.77	21.76	825
25.63	822.75	42.44	812.26	46.07	810	50.32	807.36	54.09	805
59.39	801.78	62.27	800	64.45	798.71	70.4	795	74.16	792.68
78.56	790	85.62	785.73	86.73	785	98.37	777.91	102.25	775.54
103.14	775	108.56	772.08	112.09	770	130.34	760.38	131.04	760
131.6	759.8	144.88	755	149.32	753.92	165.23	750	170.74	749.21
195.91	744.85	230.75	749.58	234.55	750	240.54	750	288.17	751.29
311.57	751.92	430.38	755	453.79	755	457.16	755.23	515.06	760
519.16	760	552.44	764.22	557.98	765	559.45	765	574.29	767.43
593.86	770	608.06	771.67	629.58	774.61	631.13	775	633.42	775.21
648.79	776.49	690.41	780	712.88	782.89	739.28	785	753.82	785
786.54	788.08	809.67	790	829.53	792.2	850.76	793.74	863.78	795

886.65	799.16	891.24	800	910.57	803.96	914.92	805	925.56	807.51
929.58	808.43								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	165.23	.035	240.54	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
165.23	240.54	277.27	313.32	323.91	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	756.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.19	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	754.92	Reach Len. (ft)	277.27	313.32	323.91
Crit W.S. (ft)		Flow Area (sq ft)	49.14	545.23	454.65
E.G. Slope (ft/ft)	0.003952	Area (sq ft)	49.14	545.23	454.65
Q Total (cfs)	7412.00	Flow (cfs)	81.90	5408.93	1921.17
Top Width (ft)	282.06	Top Width (ft)	20.02	75.31	186.73
Vel Total (ft/s)	7.07	Avg. Vel. (ft/s)	1.67	9.92	4.23
Max Chl Dpth (ft)	10.07	Hydr. Depth (ft)	2.45	7.24	2.43
Conv. Total (cfs)	117903.1	Conv. (cfs)	1302.8	86040.1	30560.2
Length Wtd. (ft)	314.90	Wetted Per. (ft)	20.61	76.08	186.79
Min Ch El (ft)	744.85	Shear (lb/sq ft)	0.59	1.77	0.60
Alpha	1.53	Stream Power (lb/ft s)	929.58	0.00	0.00
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.28	11.55	8.74
C & E Loss (ft)	0.02	Cum SA (acres)	0.17	1.83	3.40

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: Flint Run
REACH: Lower RS: 1407.321

INPUT
Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835	15.3	830	29.71	825	43.91	820	52.91	815
60.66	810	68.42	805	76.06	800	82.66	795	88.88	790
95.11	785	99.61	781.84	102.24	780	111.32	775	125.54	770
139.85	765	149.46	760	158.8	755	173.41	750	203.62	744.57
291.54	750	298.84	750.31	407.75	755	524.57	760	588.52	765
640.93	770	692.34	775	744.25	780	795.32	785	843.16	790
863.99	795	879.83	800	894.48	805	908.83	810	922.47	815
937.27	820	952.18	825	967.2	830	981.3	835	996.14	840

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	139.85	.035	291.54	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
139.85	291.54	277.15	391.34	964.75	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	754.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.		0.035	0.040
W.S. Elev (ft)	753.75	Reach Len. (ft)	277.15	391.34	964.75
Crit W.S. (ft)	752.37	Flow Area (sq ft)		783.74	163.29
E.G. Slope (ft/ft)	0.003864	Area (sq ft)		783.74	163.29
Q Total (cfs)	7412.00	Flow (cfs)		6839.00	573.00
Top Width (ft)	216.17	Top Width (ft)		129.08	87.09
Vel Total (ft/s)	7.83	Avg. Vel. (ft/s)		8.73	3.51
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)		6.07	1.87
Conv. Total (cfs)	119236.8	Conv. (cfs)		110018.9	9217.8
Length Wtd. (ft)	483.09	Wetted Per. (ft)		130.35	87.17
Min Ch El (ft)	744.57	Shear (lb/sq ft)		1.45	0.45
Alpha	1.16	Stream Power (lb/ft s)	996.14	0.00	0.00
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)	0.12	6.77	6.44
C & E Loss (ft)	0.10	Cum SA (acres)	0.10	1.09	2.39

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: Flint Run
REACH: Lower RS: 1000.000

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835	11.33	830	22.75	825	34.21	820	45.56	815
56.88	810	68.24	805	79.67	800	91.34	795	103.05	790
114.79	785	127.21	780	140.15	775	152.91	770	170.26	765
190.86	760	221.82	755	250.19	752.85	287.95	750	327.56	744.2
401.82	746.77	495.35	750	567.57	755	605.23	760	621.13	765
637.13	770	652.43	775	667.45	780	682.71	785	691.45	790
700.18	795	708.92	800	717.65	805	726.09	810	734.13	815
742.18	820	750.22	825	758.16	830				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	287.95	.035	401.82	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.95	401.82		1	1	.1	.3

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	753.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.	0.100	0.035	0.040
W.S. Elev (ft)	752.41	Reach Len. (ft)			
Crit W.S. (ft)	750.74	Flow Area (sq ft)	38.41	724.33	418.13
E.G. Slope (ft/ft)	0.002801	Area (sq ft)	38.41	724.33	418.13
Q Total (cfs)	7412.00	Flow (cfs)	34.12	5572.26	1805.63
Top Width (ft)	274.08	Top Width (ft)	31.90	113.87	128.31
Vel Total (ft/s)	6.28	Avg. Vel. (ft/s)	0.89	7.69	4.32
Max Chl Dpth (ft)	8.21	Hydr. Depth (ft)	1.20	6.36	3.26
Conv. Total (cfs)	140045.8	Conv. (cfs)	644.6	105284.8	34116.3
Length Wtd. (ft)		Wetted Per. (ft)	31.99	114.34	128.45
Min Ch El (ft)	744.20	Shear (lb/sq ft)	0.21	1.11	0.57
Alpha	1.24	Stream Power (lb/ft s)	758.16	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Brush Run

Reach	River Sta.	n1	n2	n3
Reach 1	2011.333	.035	.035	.1
Reach 1	1507.212	.035	.035	.1

River:Flint Run

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7
Upper	5348.411	.1	.035	.1				
Upper	4587.709	.1	.035	.1				
Upper	4327.913	.1	.035	.1				
Lower	4052.349	.05	.035	.1				
Lower	3910.912	.05	.035	.1				
Lower	3710.271	.1	.035	.04				
Lower	3270.326	.1	.035	.04				
Lower	3218.798	.1	.035	.04	.03	.02	.03	.04
Lower	3143.198	.1	.035	.04	.03	.02	.03	.04
Lower	2861.250	.1	.035	.04	.03	.02	.03	.04
Lower	2579.076	.1	.035	.04	.03	.02	.03	.04
Lower	2476.907	.1	.035	.04	.03	.02	.03	.04
Lower	2422.446	.1	.035	.04	.03	.02	.03	.04

Lower	2355.763		.1	.035	.04	.03	.02	.03	.04
Lower	2314.880		.1	.035	.04	.03	.02	.03	.04
Lower	2223.643		.1	.035	.04	.03	.02	.03	.04
Lower	2185.764		.1	.035	.04	.03	.02	.03	.04
Lower	2075.488		.1	.035	.04				
Lower	2057.86	Culvert							
Lower	2035.918		.1	.035	.04				
Lower	2017.29	Bridge							
Lower	1996.533		.1	.2	.04	.035	.04		
Lower	1720.640		.1	.035	.04				
Lower	1407.321		.1	.035	.04				
Lower	1000.000		.1	.035	.04				

SUMMARY OF REACH LENGTHS

River: Brush Run

Reach	River Sta.	Left	Channel	Right
Reach 1	2011.333	530.52	498.55	409.24
Reach 1	1507.212	101.38	496.45	893.29

River: Flint Run

Reach	River Sta.	Left	Channel	Right
Upper	5348.411	580.67	714.22	806.06
Upper	4587.709	165.19	259.78	200.58
Upper	4327.913	783.59	271.11	224.1
Lower	4052.349	46.88	141.39	54.28
Lower	3910.912	545.19	736.56	773.43
Lower	3710.271	310.33	428.51	382.56
Lower	3270.326	56.8	51.5	42.19
Lower	3218.798	785.25	753.13	556.83
Lower	3143.198	328.74	281.33	282.2
Lower	2861.250	296.63	281.27	281.46
Lower	2579.076	100.63	101.9	100.41
Lower	2476.907	1155.6	1093.26	853.34
Lower	2422.446	335.76	346.43	218.7
Lower	2355.763	48.16	40.88	38.52
Lower	2314.880	14.36	91.23	28.15
Lower	2223.643	39.89	37.88	44.06
Lower	2185.764	190.76	109.94	157.38
Lower	2075.488	41.03	39.47	55.96
Lower	2057.86	Culvert		
Lower	2035.918	50.28	39.38	62.3
Lower	2017.29	Bridge		
Lower	1996.533	477.61	274.2	175.6

Lower	1720.640	277.27	313.32	323.91
Lower	1407.321	277.15	391.34	964.75
Lower	1000.000	1	1	1

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Brush Run

Reach	River Sta.	Contr.	Expan.
Reach 1	2011.333	.1	.3
Reach 1	1507.212	.1	.3

River: Flint Run

Reach	River Sta.	Contr.	Expan.
Upper	5348.411	.1	.3
Upper	4587.709	.1	.3
Upper	4327.913	.1	.3
Lower	4052.349	.1	.3
Lower	3910.912	.1	.3
Lower	3710.271	.1	.3
Lower	3270.326	.1	.3
Lower	3218.798	.1	.3
Lower	3143.198	.1	.3
Lower	2861.250	.1	.3
Lower	2579.076	.1	.3
Lower	2476.907	.1	.3
Lower	2422.446	.1	.3
Lower	2355.763	.1	.3
Lower	2314.880	.1	.3
Lower	2223.643	.1	.3
Lower	2185.764	.1	.3
Lower	2075.488	.1	.3
Lower	2057.86	Culvert	
Lower	2035.918	.1	.3
Lower	2017.29	Bridge	
Lower	1996.533	.1	.3
Lower	1720.640	.1	.3
Lower	1407.321	.1	.3
Lower	1000.000	.1	.3

Profile Output Table - Standard Table 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel

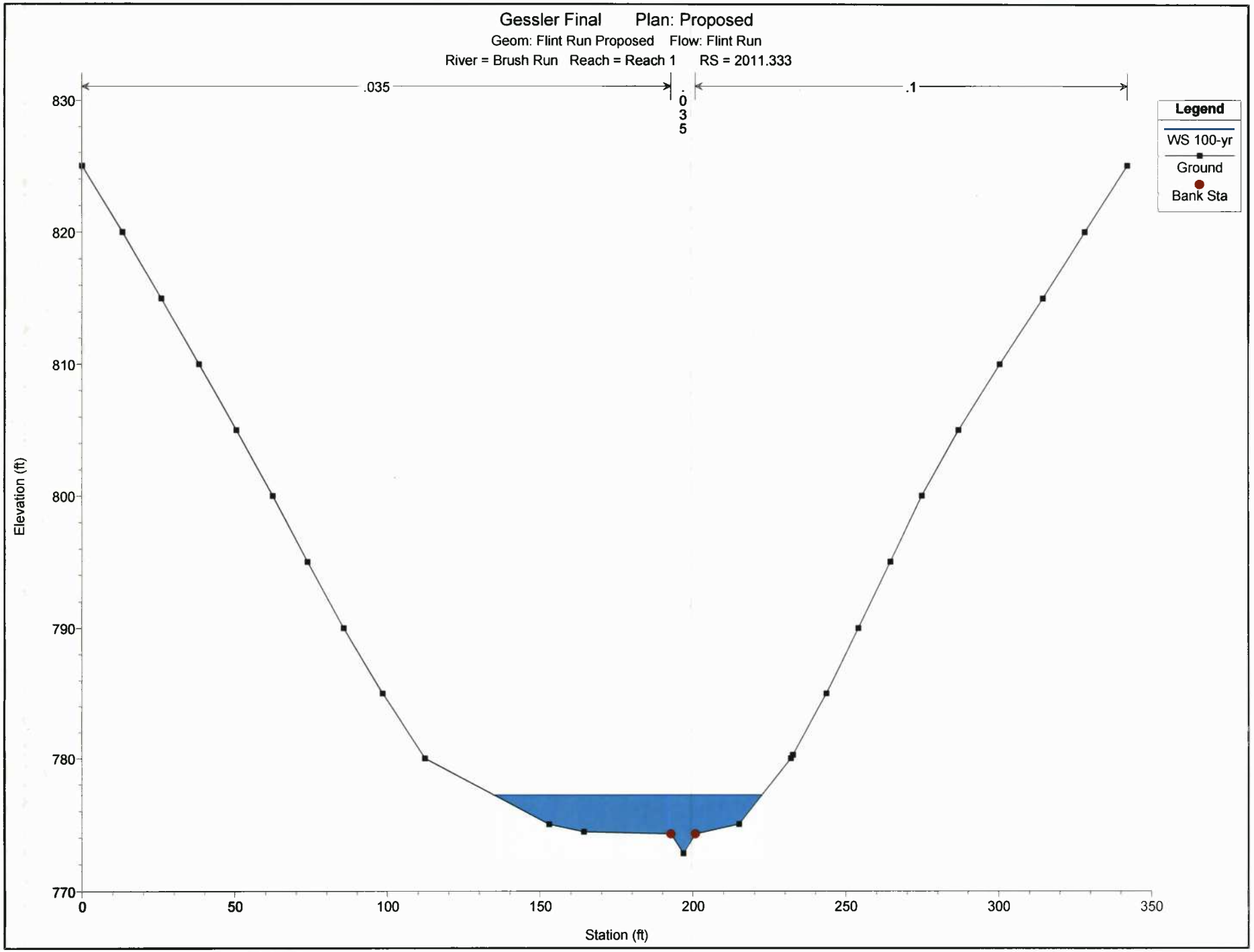
Chnl	Flow Area	Top Width	Froude # Chl	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
Flint Run	Upper		5348.411	7165.00	753.25	767.24		767.86	0.001126	6.61	1460.12	206.60
			0.37									
Flint Run	Upper		4587.709	7165.00	751.12	766.04		766.94	0.001406	7.82	1185.94	161.37
			0.41									
Flint Run	Upper		4327.913	7165.00	755.00	764.07	763.25	766.17	0.005756	11.92	744.35	151.38
			0.78									
Flint Run	Lower		4052.349	7412.00	749.62	764.76		765.21	0.000824	6.47	1971.68	327.99
			0.32									
Flint Run	Lower		3910.912	7412.00	749.22	764.81		765.09	0.000580	5.48	2391.17	358.75
			0.27									
Flint Run	Lower		3710.271	7412.00	755.00	762.01	761.55	763.95	0.007174	11.29	740.51	175.32
			0.84									
Flint Run	Lower		3270.326	7412.00	747.64	761.96		762.56	0.001161	7.48	1412.22	204.99
			0.37									
Flint Run	Lower		3218.798	7412.00	747.59	761.89		762.50	0.001178	7.20	1311.65	171.68
			0.37									
Flint Run	Lower		3143.198	7412.00	747.50	760.77		761.56	0.001547	8.05	1188.79	174.55
			0.43									
Flint Run	Lower		2861.250	7412.00	746.88	760.19		761.10	0.001669	8.74	1179.85	257.90
			0.45									
Flint Run	Lower		2579.076	7412.00	745.85	759.87		760.61	0.001442	7.99	1219.76	170.61
			0.40									
Flint Run	Lower		2476.907	7412.00	745.53	759.88		760.43	0.001113	7.22	1436.27	207.70
			0.36									
Flint Run	Lower		2422.446	7412.00	745.48	758.10		758.95	0.001961	8.63	1221.94	231.75
			0.47									
Flint Run	Lower		2355.763	7412.00	745.42	756.94		758.17	0.002970	10.05	999.18	190.60
			0.57									
Flint Run	Lower		2314.880	7412.00	745.38	756.92		758.02	0.002636	9.21	1027.59	182.41
			0.53									
Flint Run	Lower		2223.643	7412.00	745.30	756.82		757.79	0.002493	9.00	1119.16	218.19
			0.51									
Flint Run	Lower		2185.764	7412.00	745.27	756.81		757.66	0.002069	8.49	1193.44	221.78
			0.47									
Flint Run	Lower		2075.488	7412.00	745.17	756.47	754.92	757.34	0.003094	8.81	1182.93	284.25
			0.57									
Flint Run	Lower		2057.86	Culvert								
Flint Run	Lower		2035.918	7412.00	744.25	756.63	753.24	757.11	0.001044	6.27	1637.86	316.21
			0.34									
Flint Run	Lower		2017.29	Bridge								
Flint Run	Lower		1996.533	7412.00	745.10	756.24		756.93	0.002293	6.92	1223.04	294.92
			0.48									
Flint Run	Lower		1720.640	7412.00	744.85	754.92		756.11	0.003952	9.92	1049.02	282.06
			0.65									
Flint Run	Lower		1407.321	7412.00	744.57	753.75	752.37	754.85	0.003864			

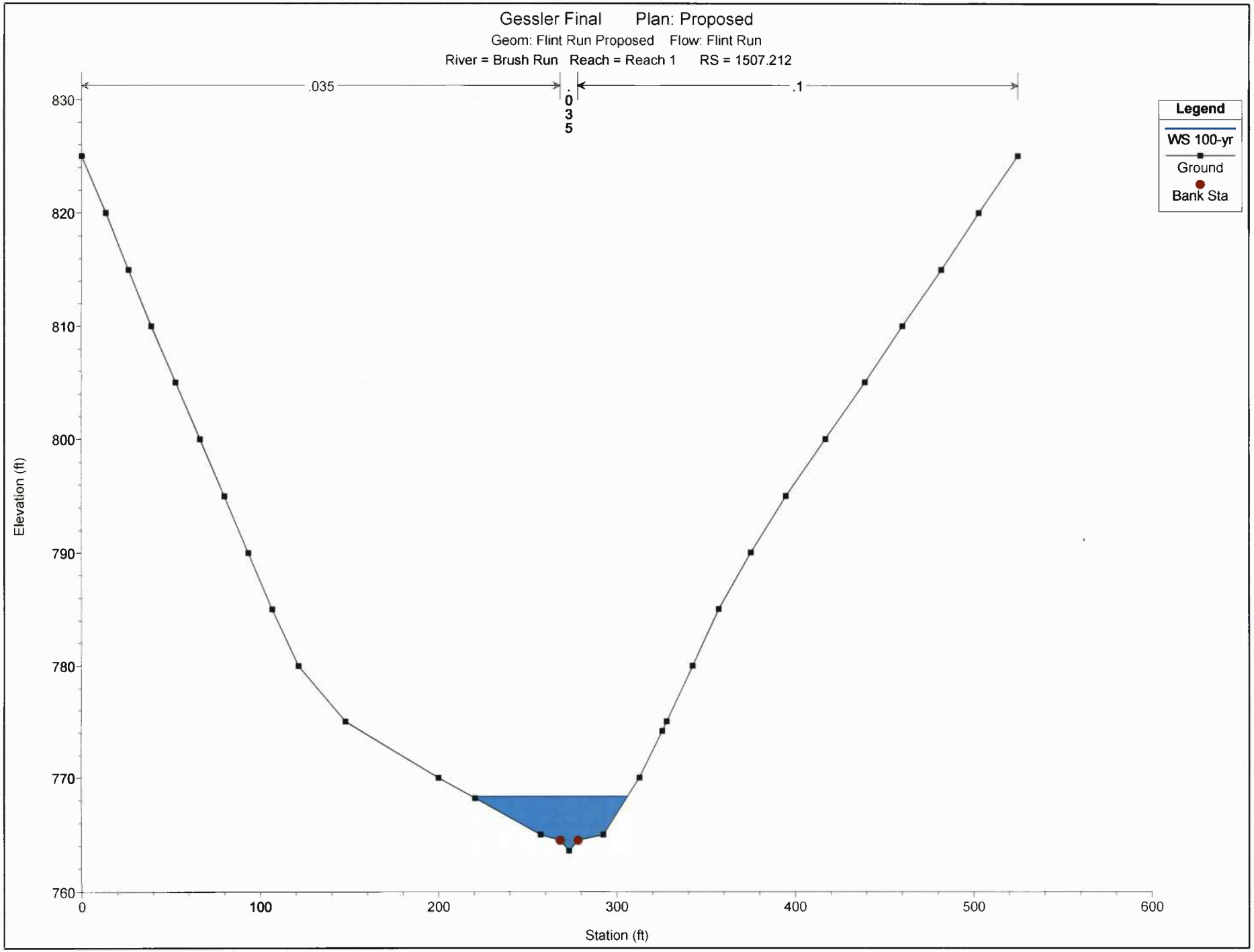
8.73	947.03	216.17		0.62					
Flint Run	Lower		1000.000	7412.00	744.20	752.41	750.74	753.17	0.002801
7.69	1180.87	274.08		0.54					
Brush Run	Reach 1		2011.333	1554.00	772.80	777.24	777.24	778.42	0.012925
11.12	207.53	87.98		1.02					
Brush Run	Reach 1		1507.212	1554.00	763.58	768.38	768.38	769.63	0.011714
12.10	223.64	87.57		1.02					

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Prop

River: Brush Run Reach: Reach 1 RS: 2011.333 Profile: 100-yr
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.
River: Brush Run Reach: Reach 1 RS: 1507.212 Profile: 100-yr
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.
River: Flint Run Reach: Upper RS: 4587.709 Profile: 100-yr
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.
River: Flint Run Reach: Upper RS: 4327.913 Profile: 100-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Flint Run Reach: Lower RS: 3910.912 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 3710.271 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2861.250 Profile: 100-yr
Warning:Divided flow computed for this cross-section.
River: Flint Run Reach: Lower RS: 2476.907 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2035.918 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 2017.29 Profile: 100-yr Upstream
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.
River: Flint Run Reach: Lower RS: 2017.29 Profile: 100-yr Downstream
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.
River: Flint Run Reach: Lower RS: 1720.640 Profile: 100-yr
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.
River: Flint Run Reach: Lower RS: 1407.321 Profile: 100-yr
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.


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Brush Run Reach = Reach 1 RS = 2011.333
.035
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
830
820
810
800
790
780
770
0
50
100
150
200
250
300
350
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Brush Run Reach = Reach 1 RS = 1507.212
.035
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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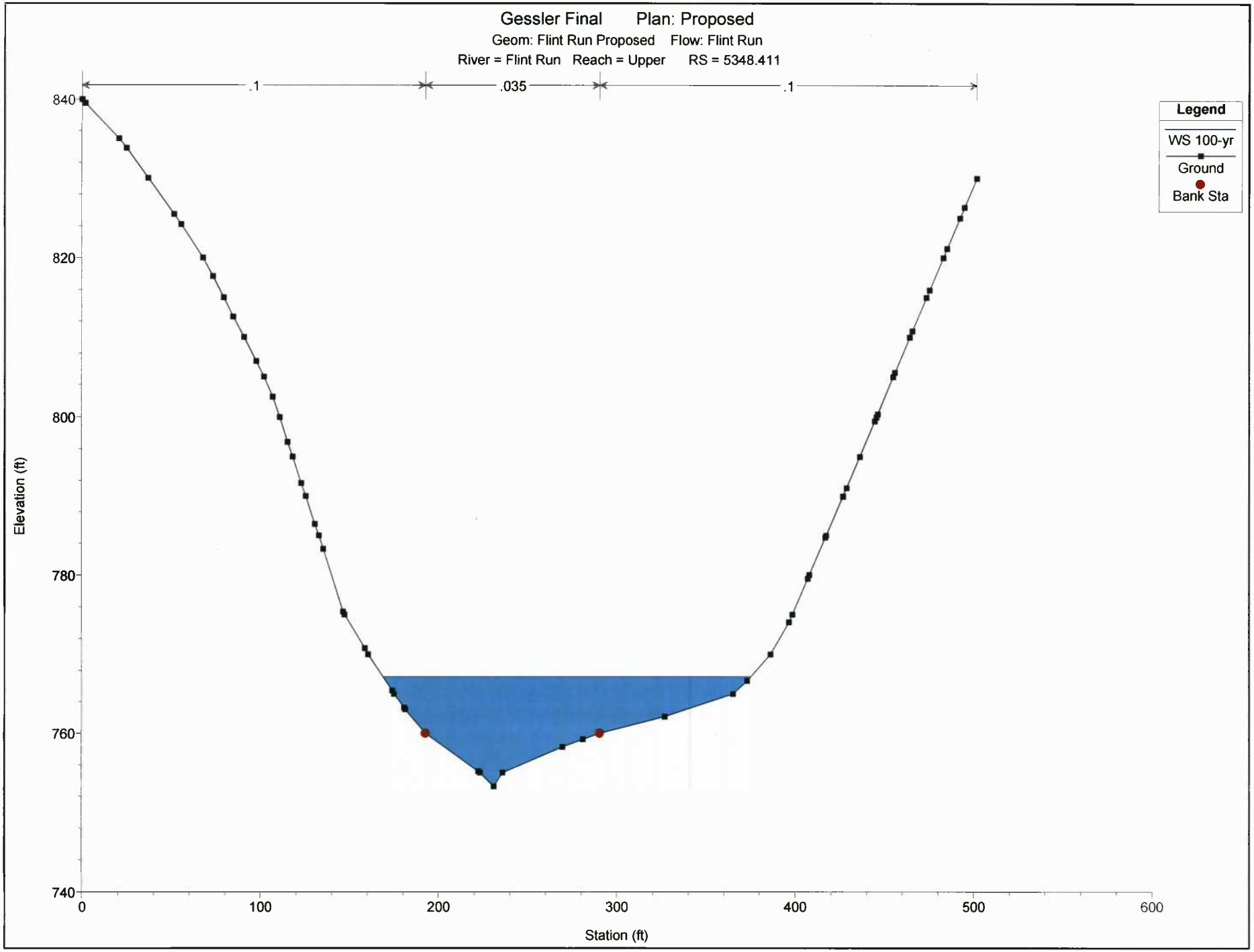
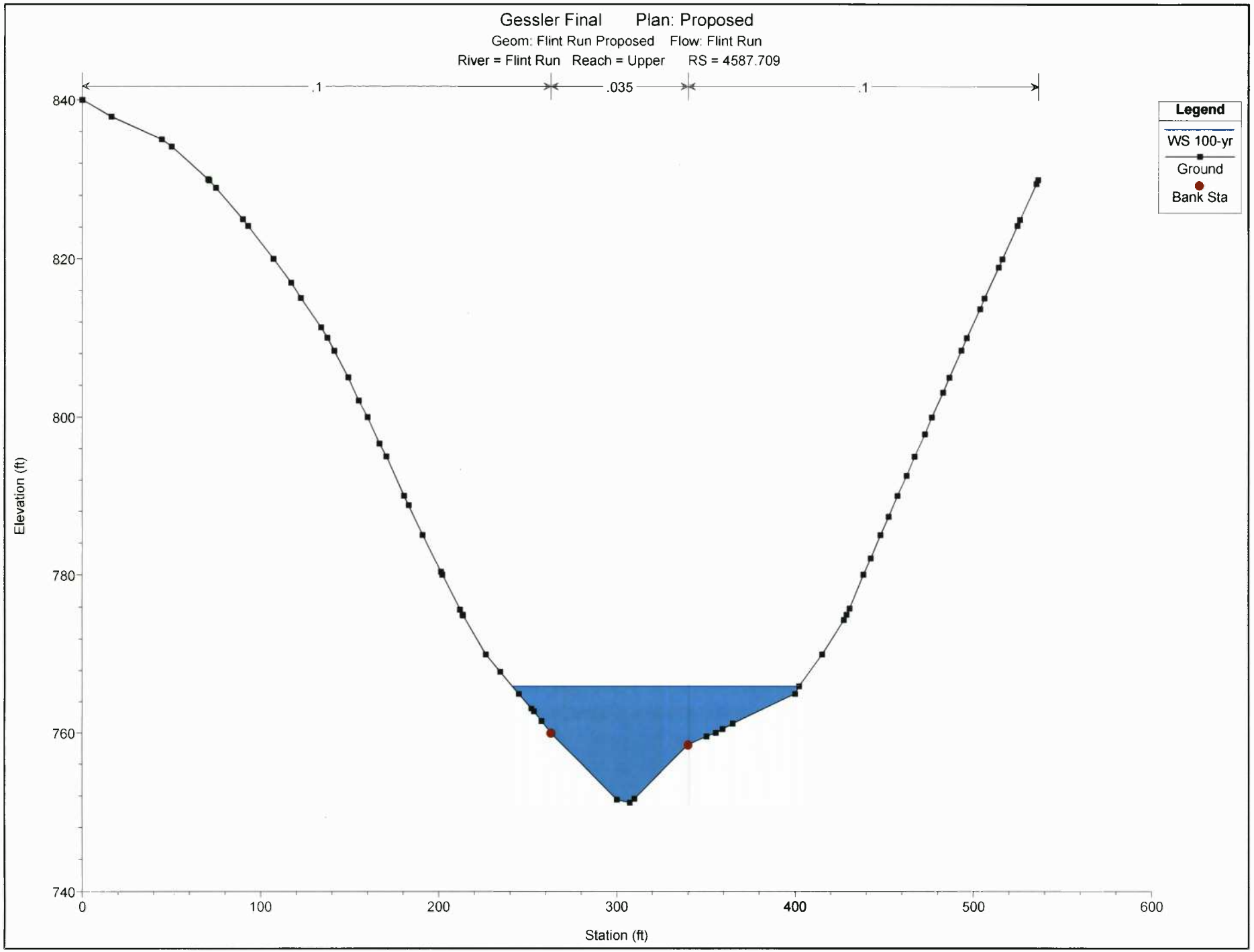
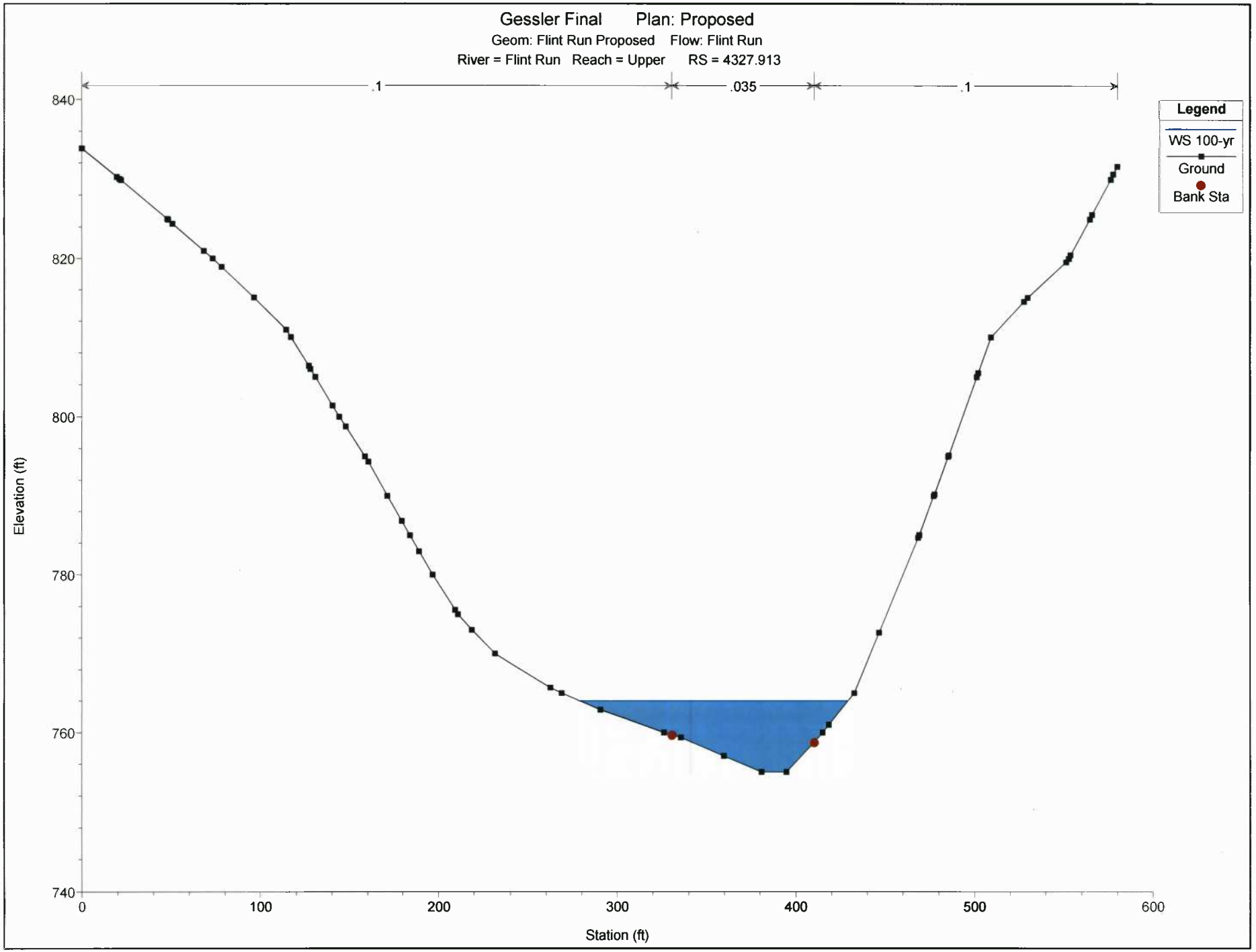
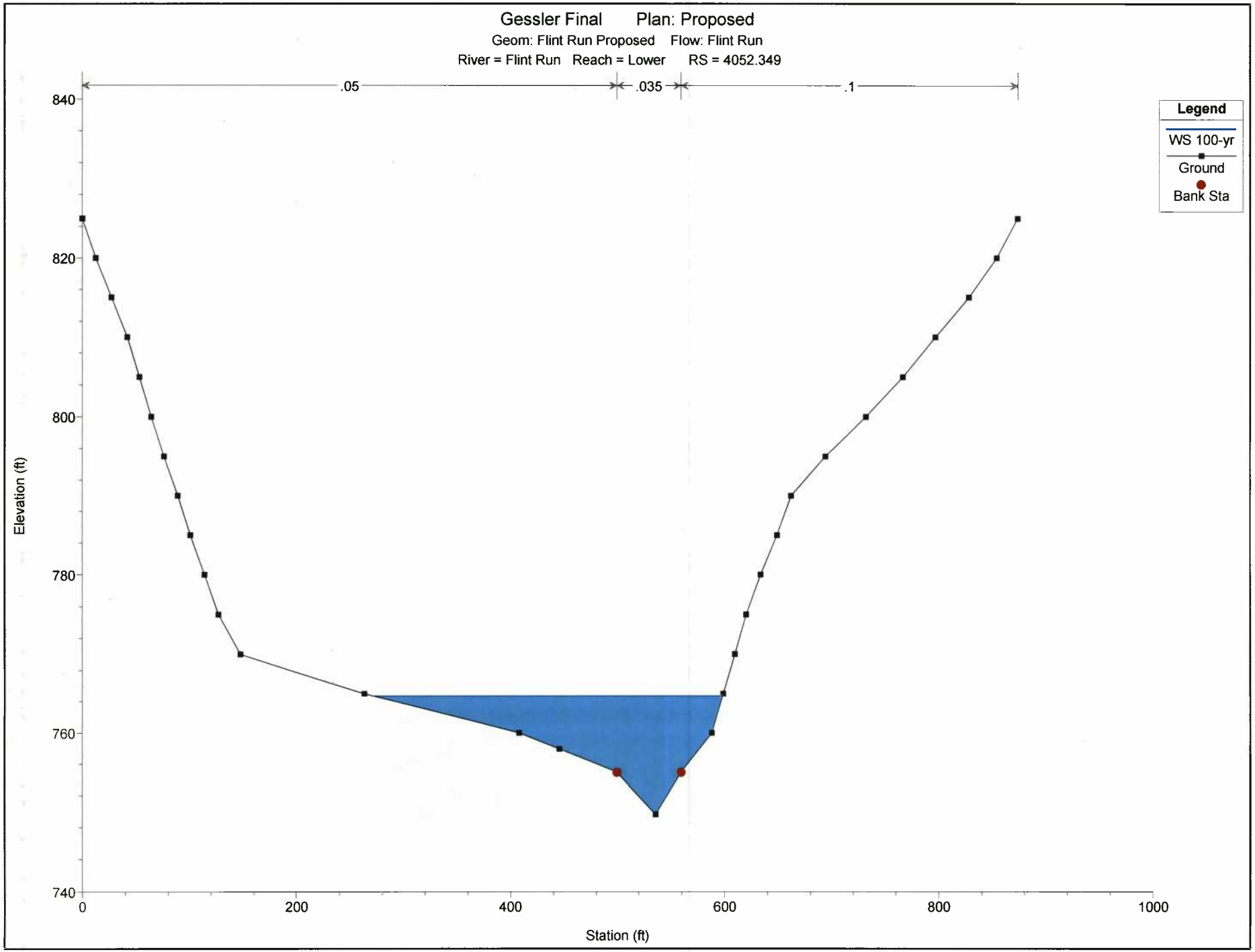
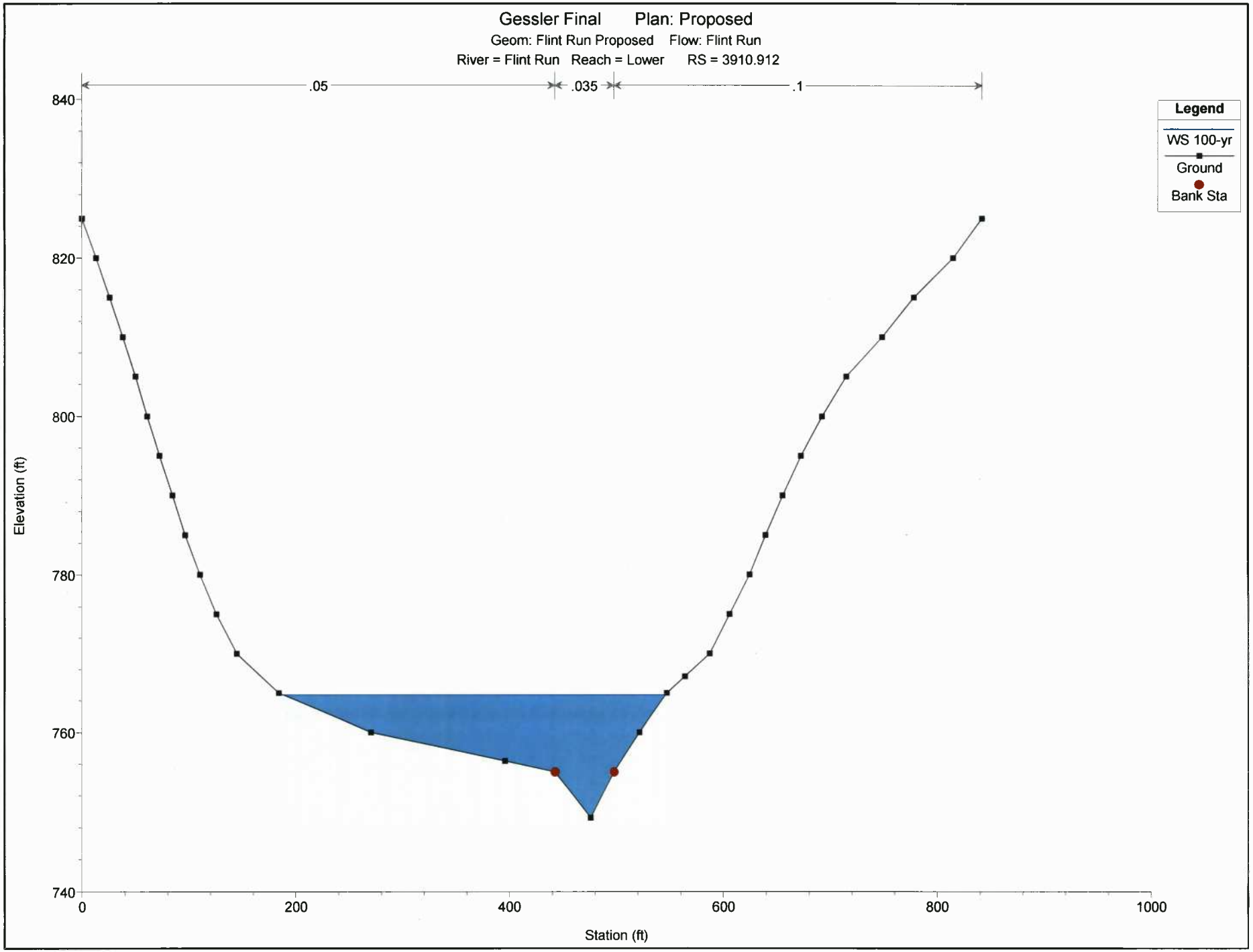
820
810
800
790
780
770
760
0
100
200
300
400
500
600
Station (ft)

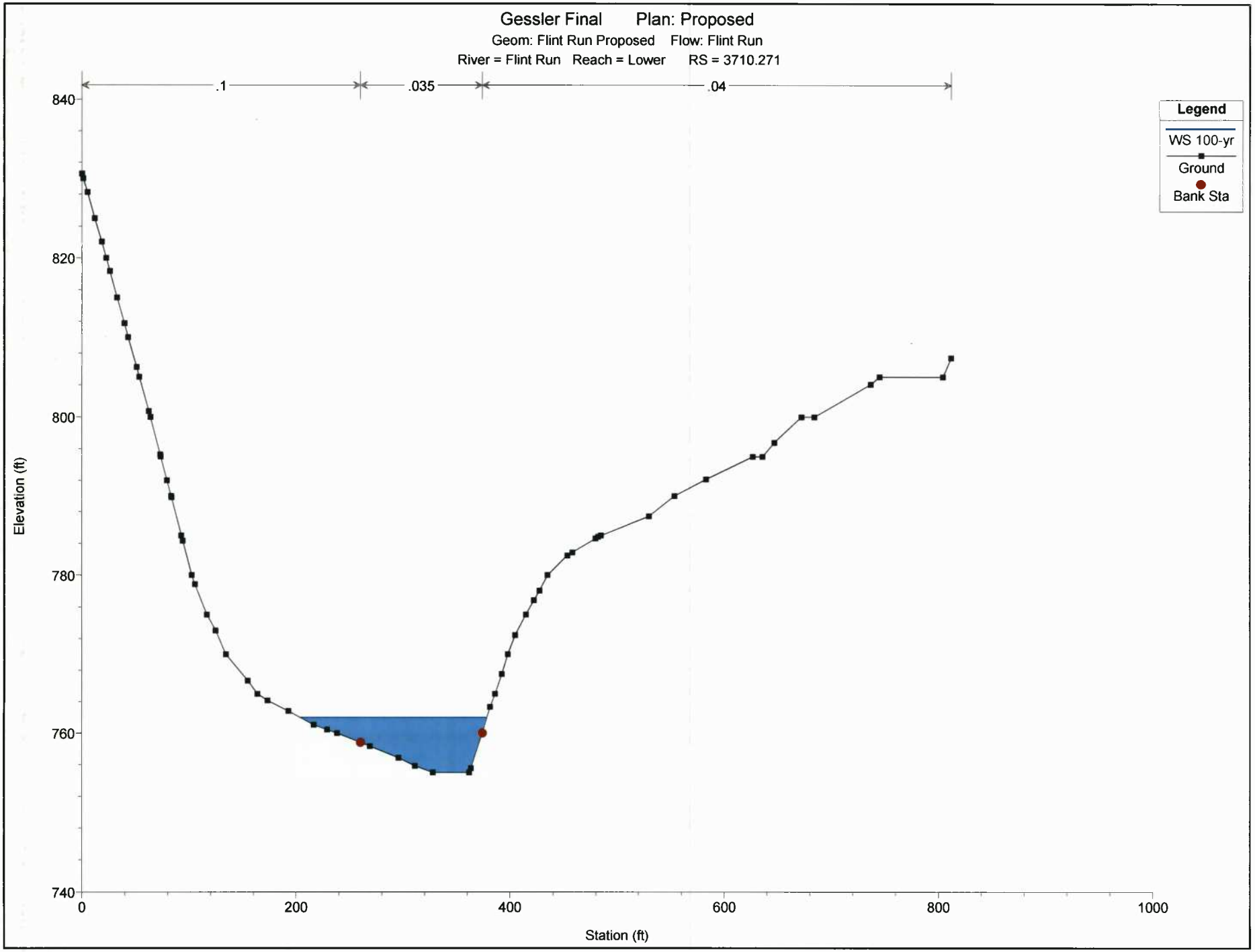

Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Upper RS = 5348.411
.1
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)

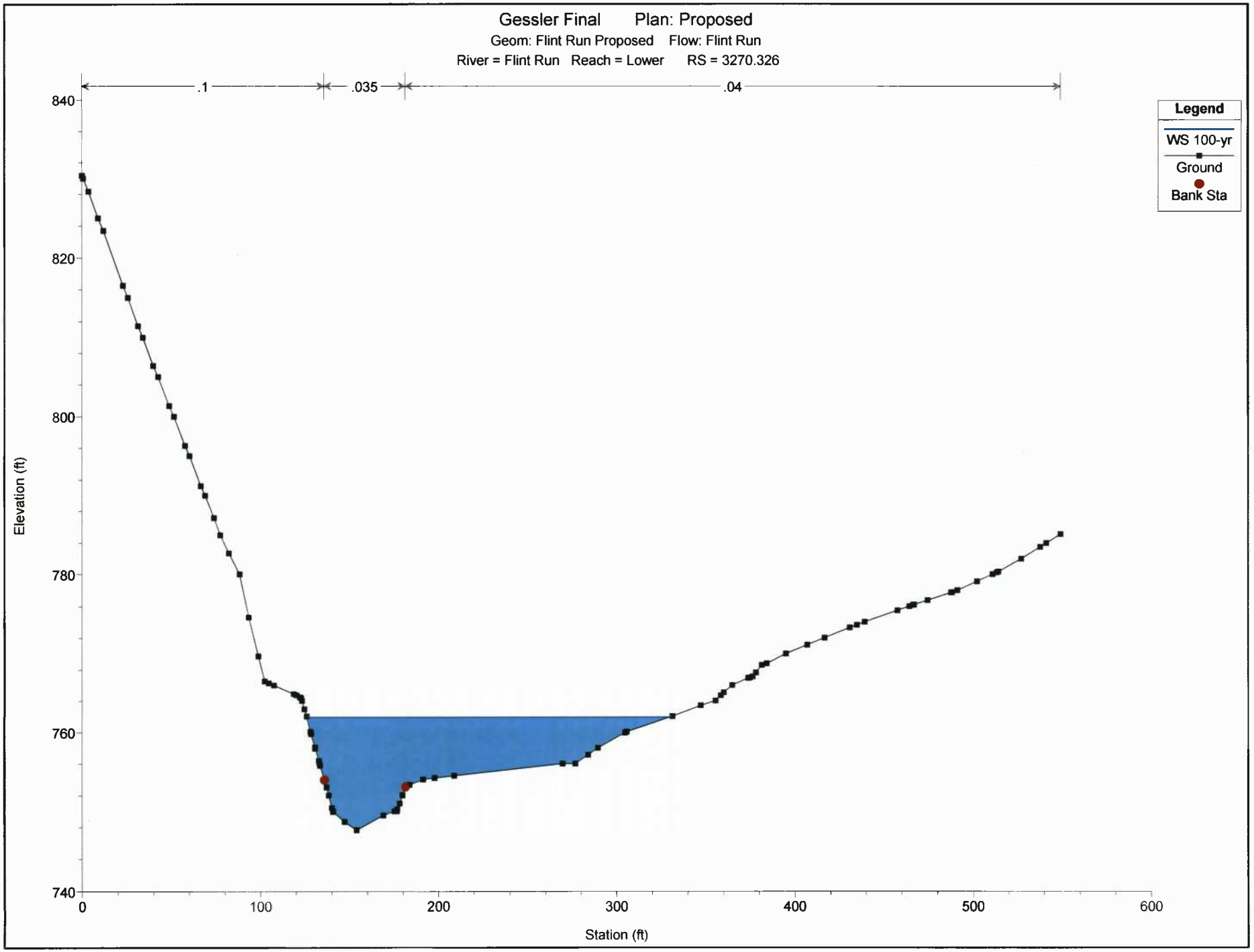

Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Upper RS = 4587.709
.1
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Upper RS = 4327.913
.1
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 4052.349
.05
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 3910.912
.05
.035
.1
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 3710.271
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 3270.326
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
100
200
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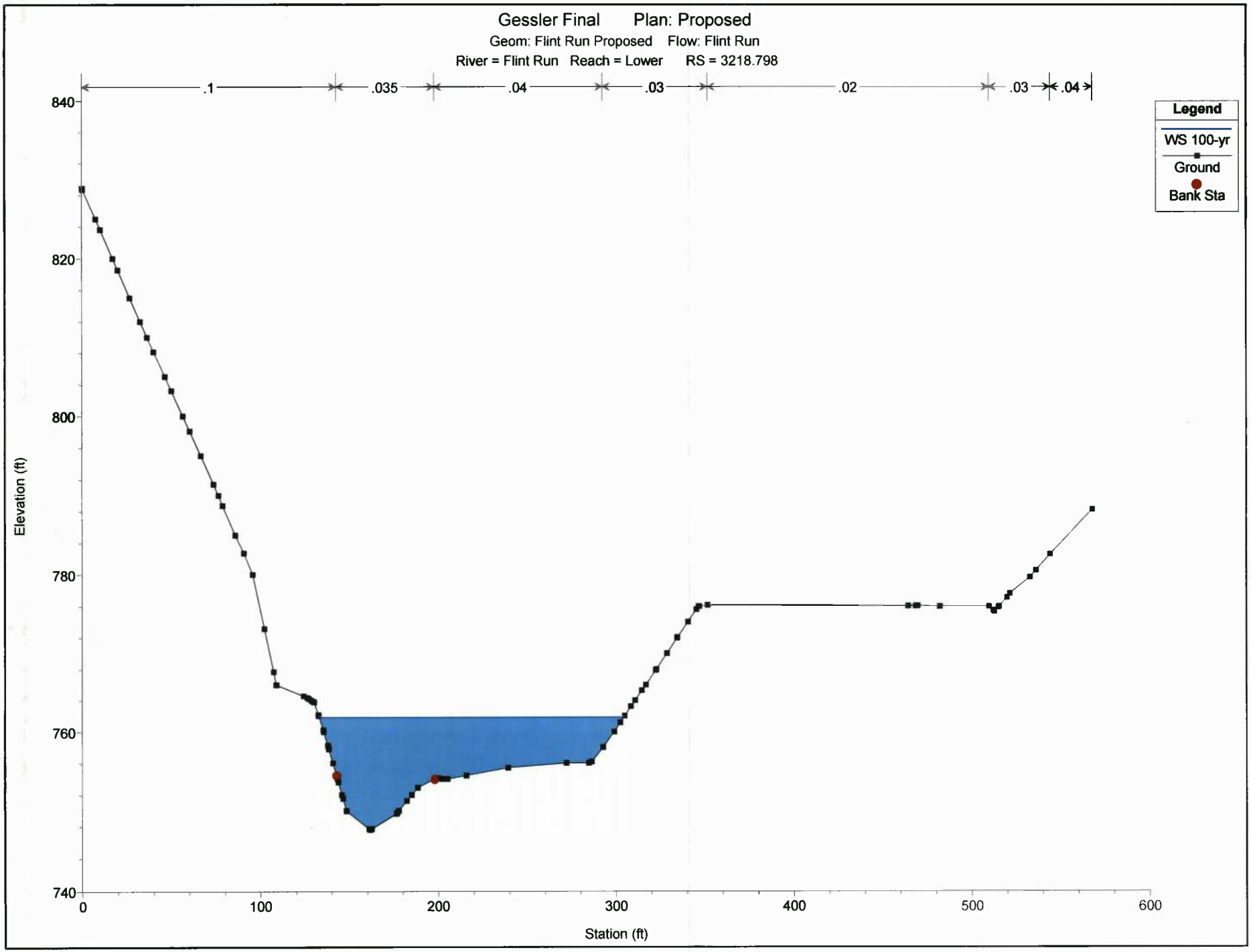
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 3218.798
.1
.035
.04
.03
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
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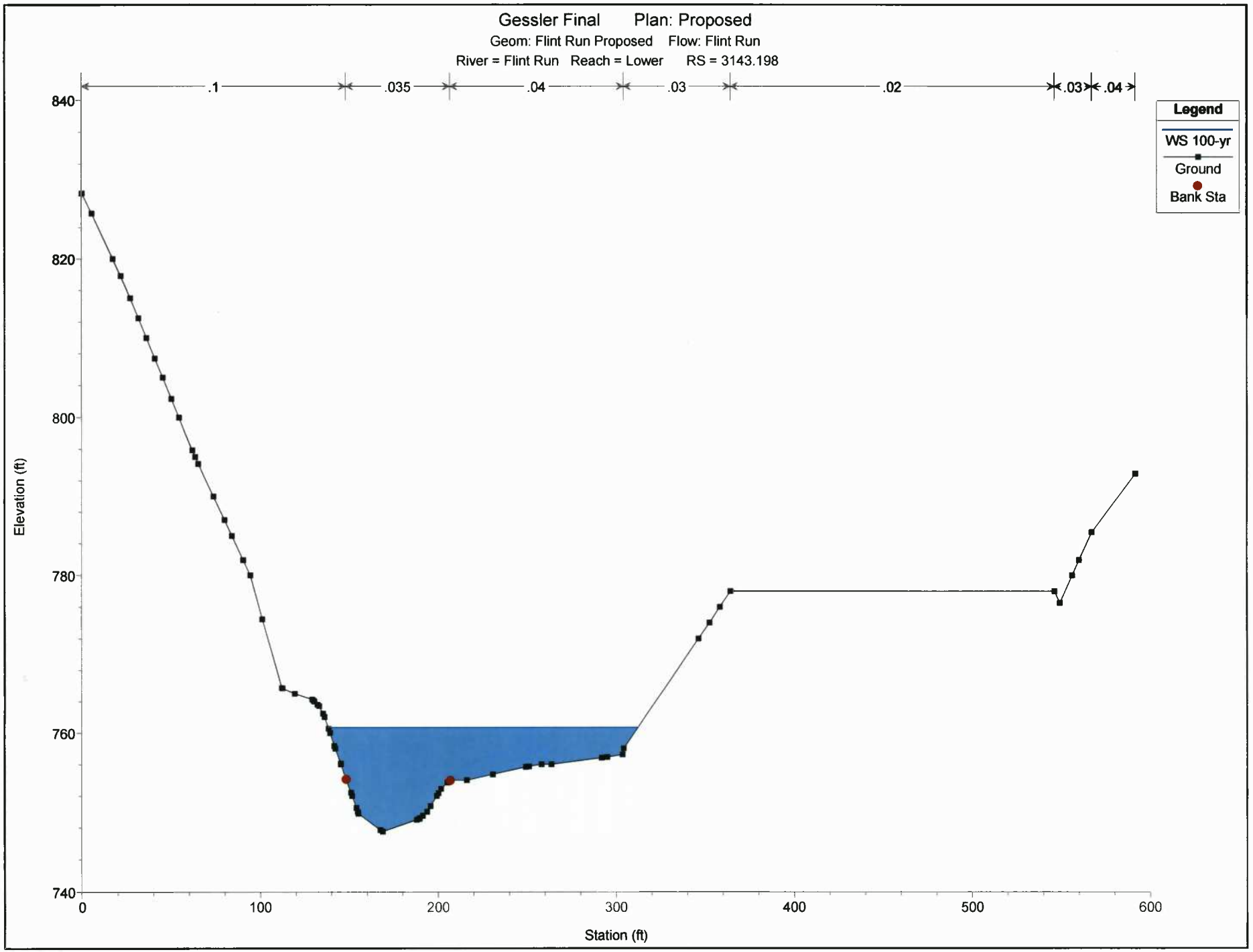
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 3143.198
.1
.035
.04
.03
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
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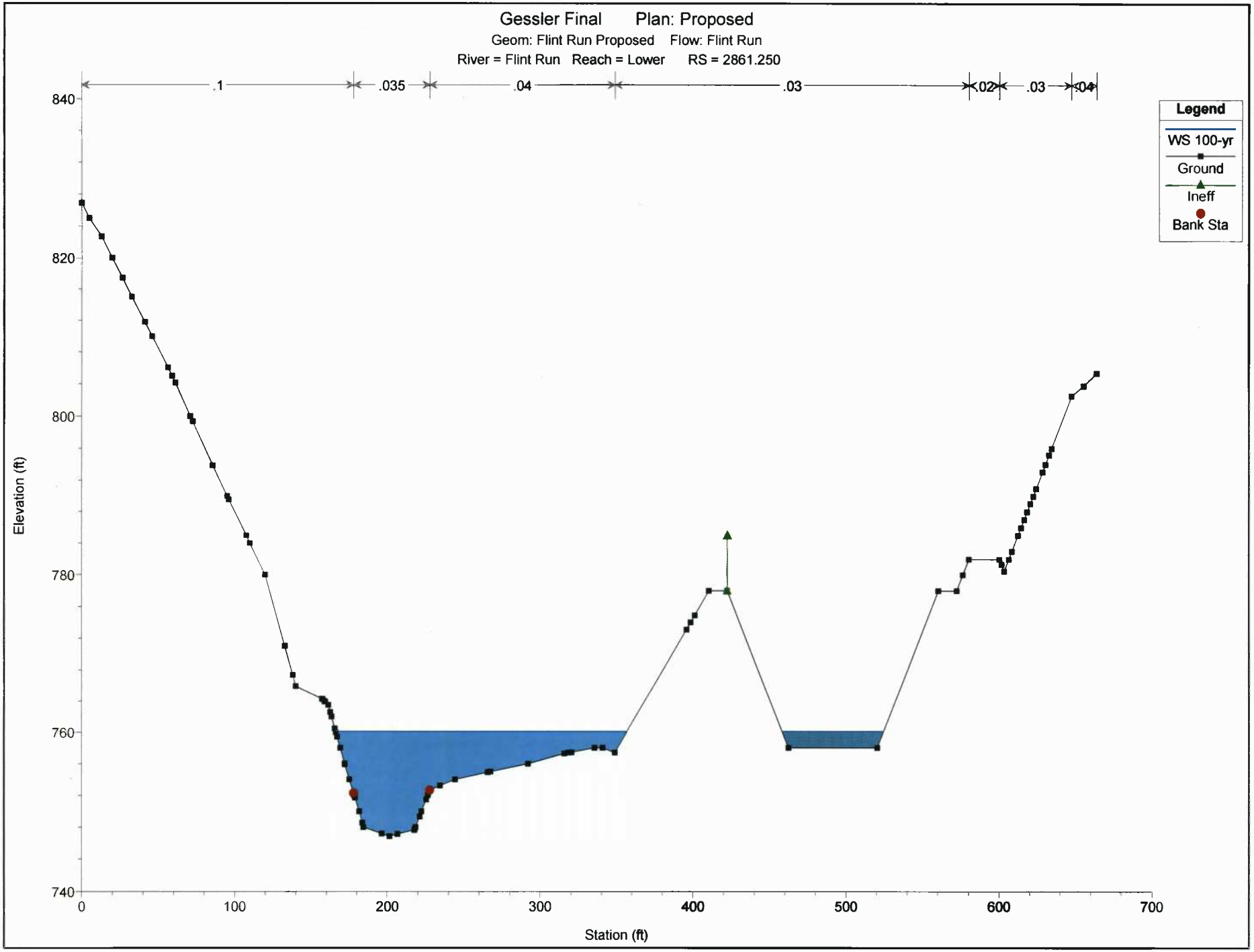
820
800
780
760
740
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2861.250
.1
.035
.04
.03
.02
.03
.04
Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
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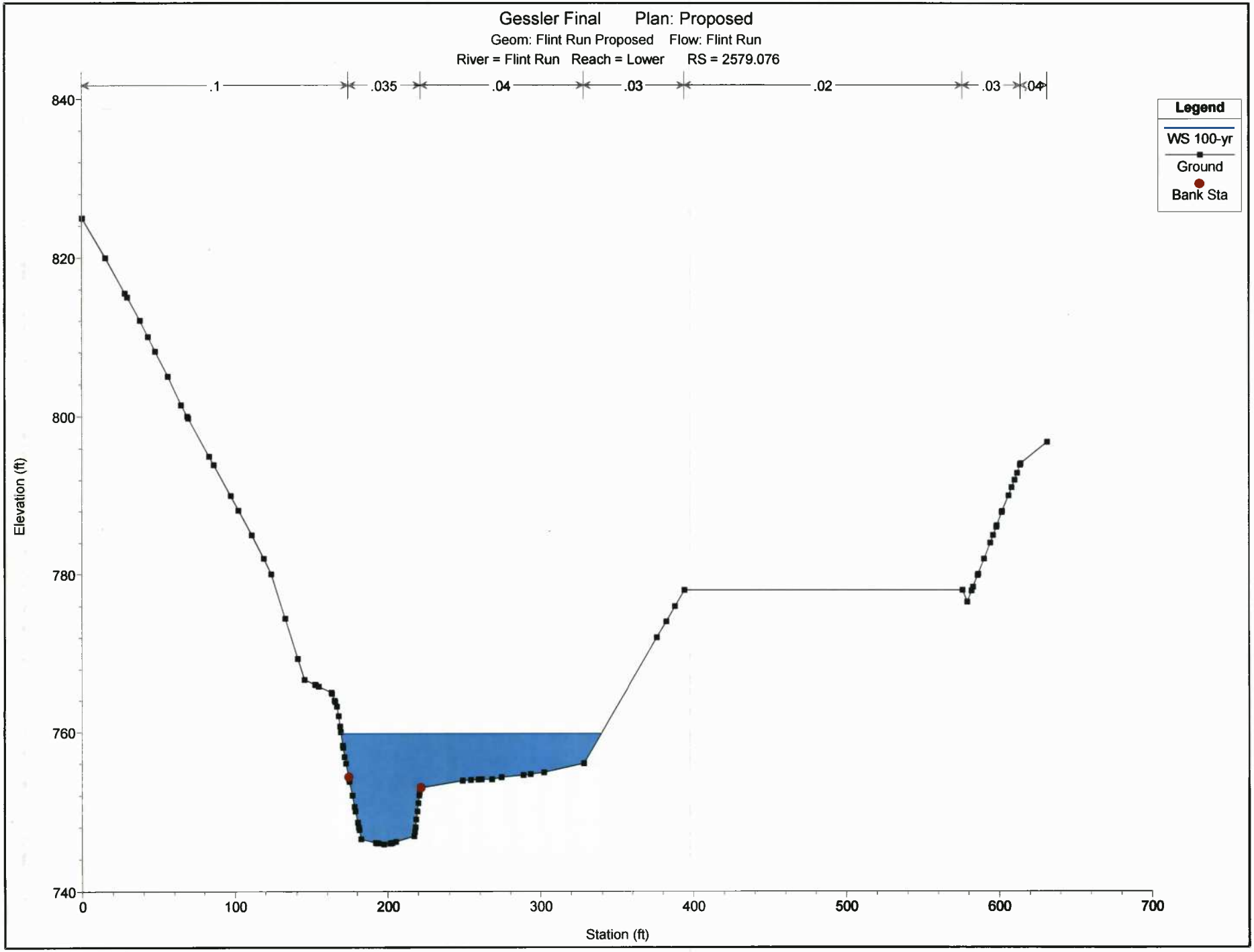
820
800
780
760
740
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2579.076
.1
.035
.04
.03
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
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800
780
760
740
Elevation (ft)
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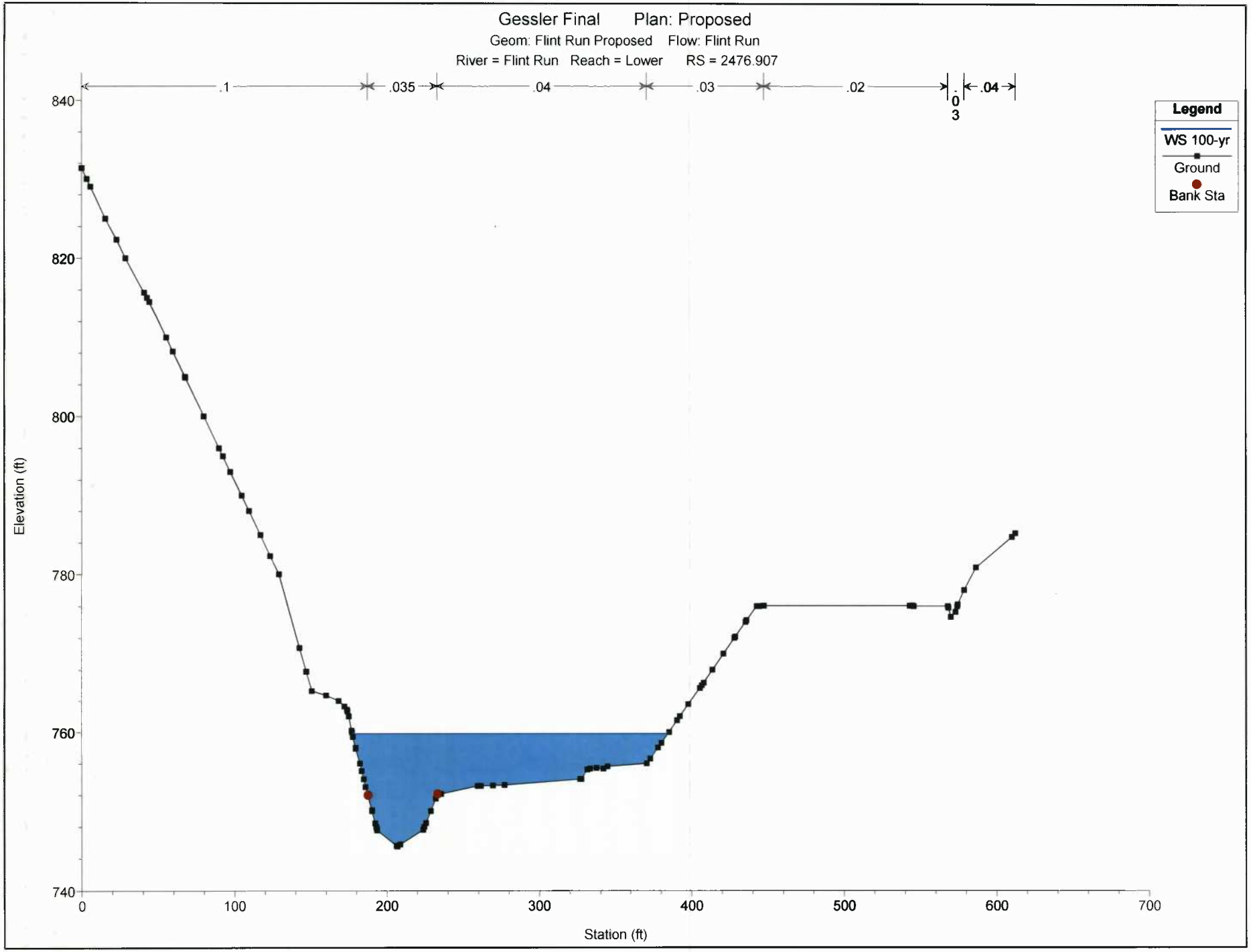
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2476.907
.1
.035
.04
.03
.02
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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820
800
780
760
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200
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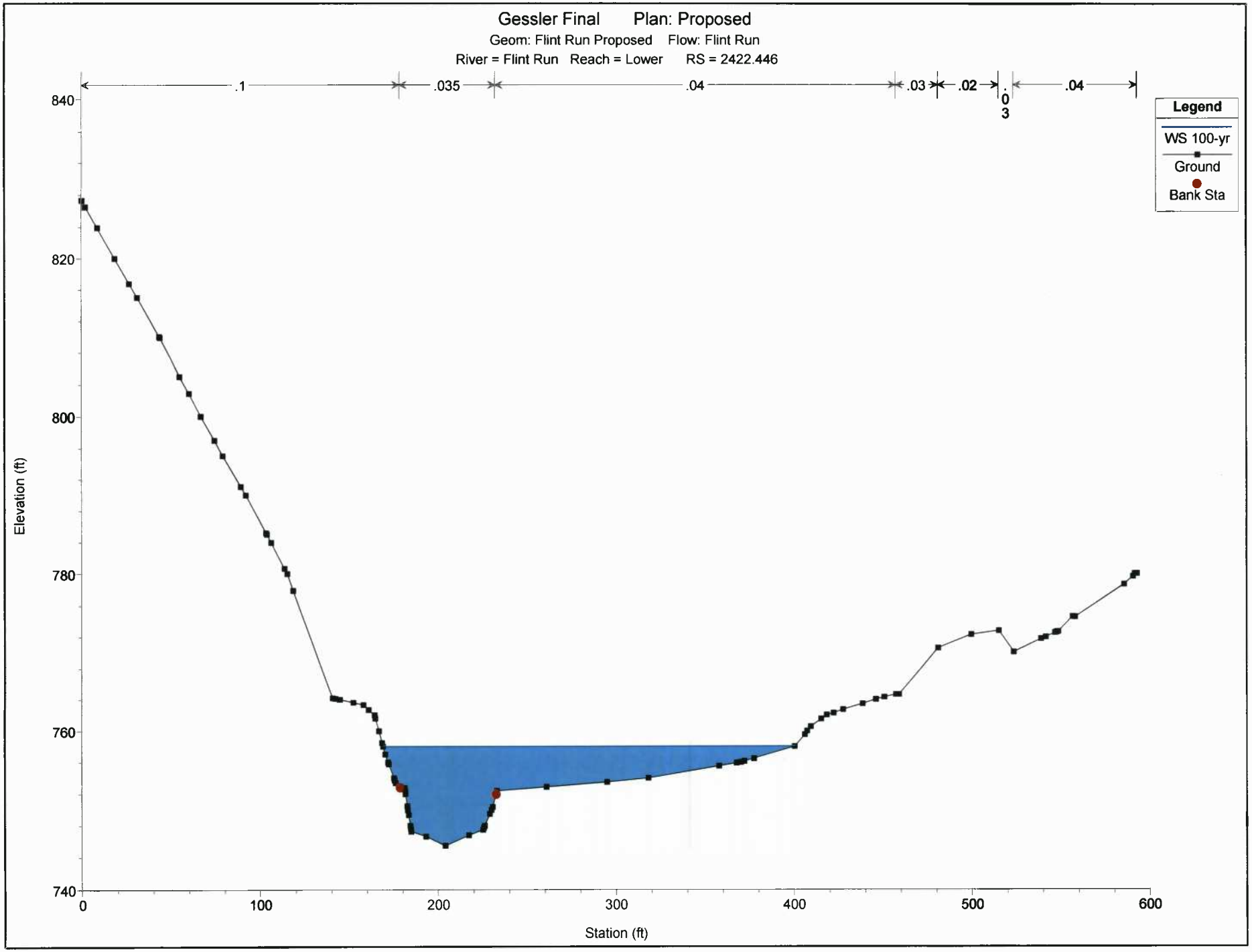
600
700
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2422.446
.1
.035
.04
.03
.02
.04
Legend
WS 100-yr
Ground
Bank Sta
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740
Elevation (ft)
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100
200
300
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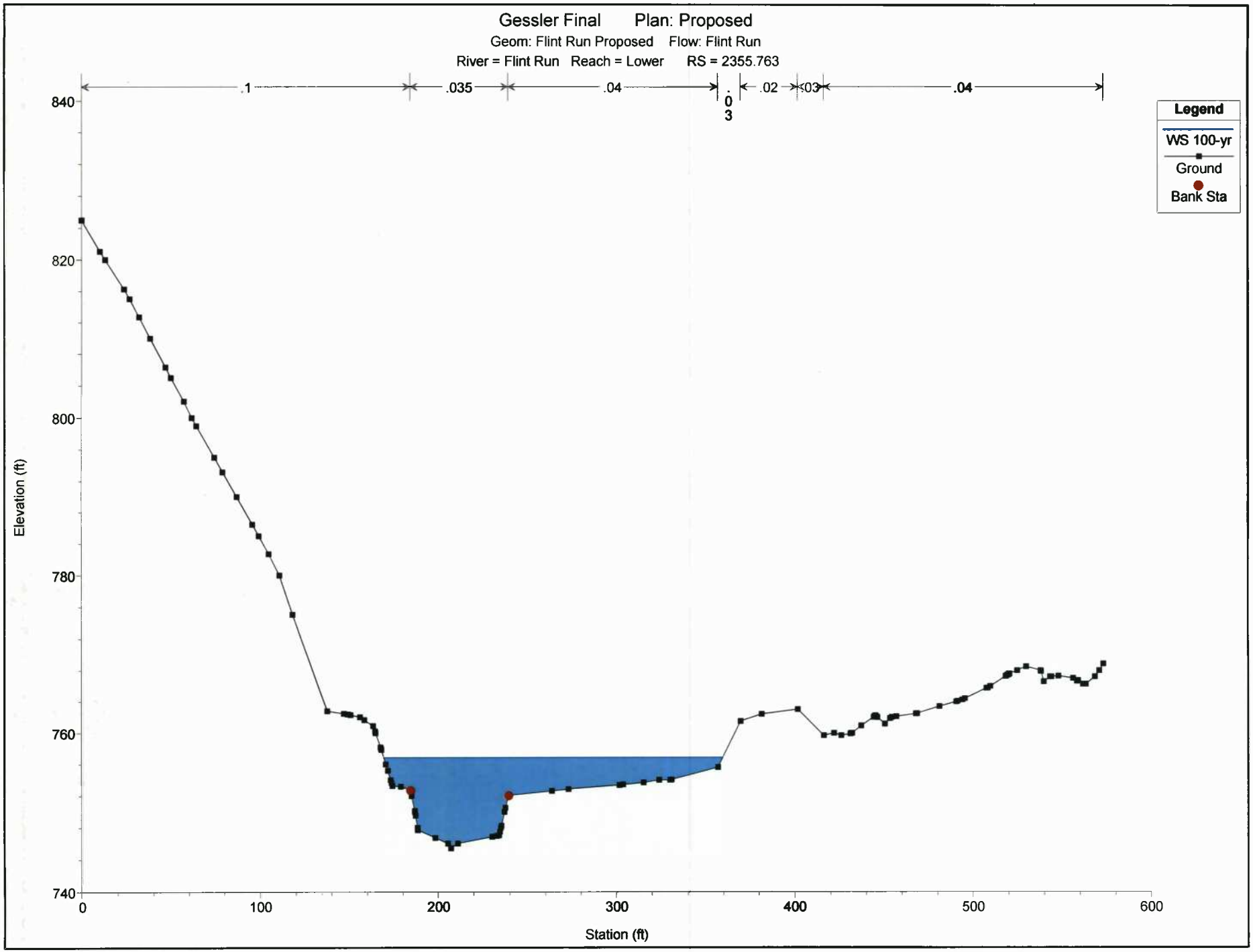
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2355.763
.1
.035
.04
.03
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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100
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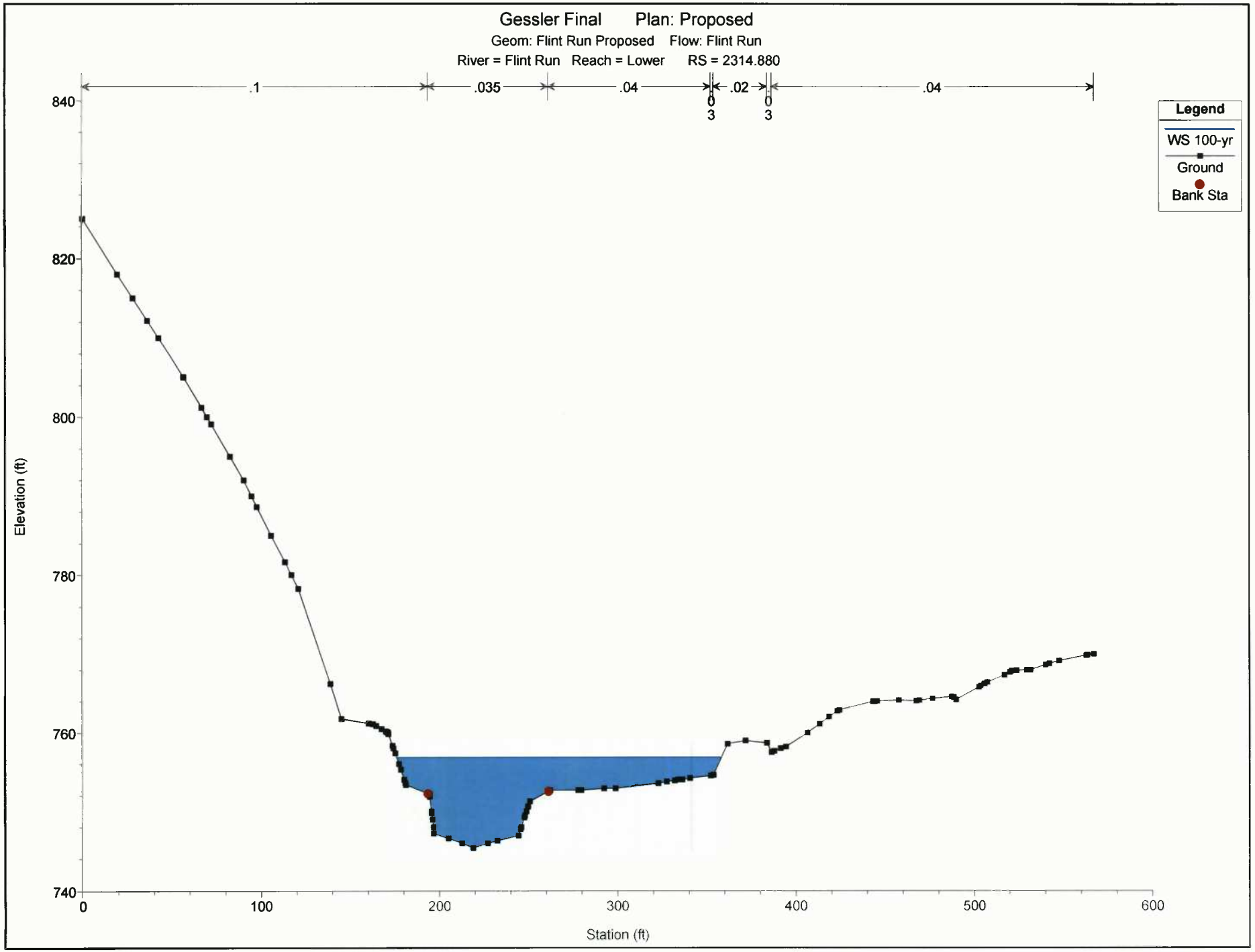
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2314.880
.1
.035
.04
.02
.04
0
3
0
3
Legend
WS 100-yr
Ground
Bank Sta
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780
760
740
Elevation (ft)
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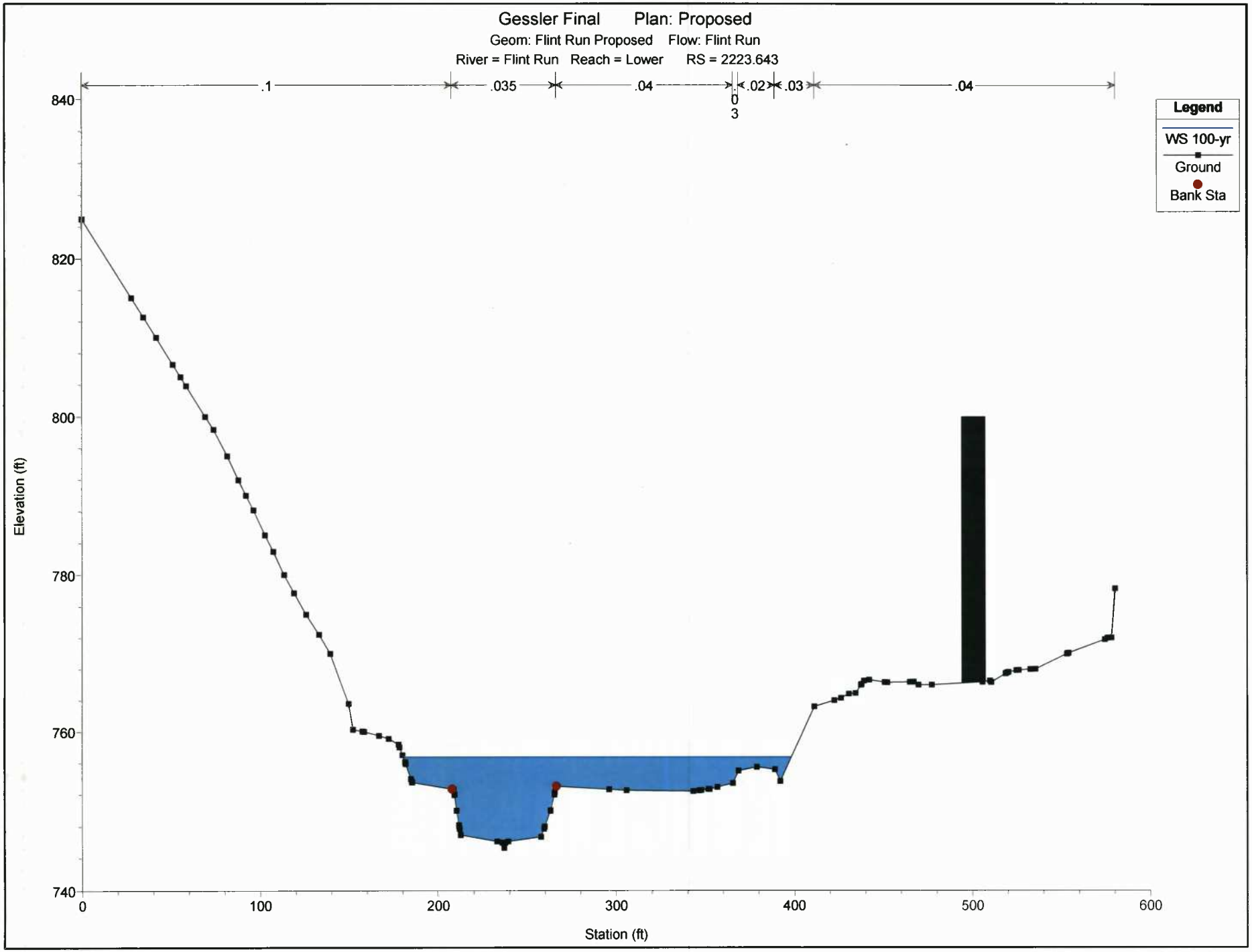
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2223.643
.1
.035
.04
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
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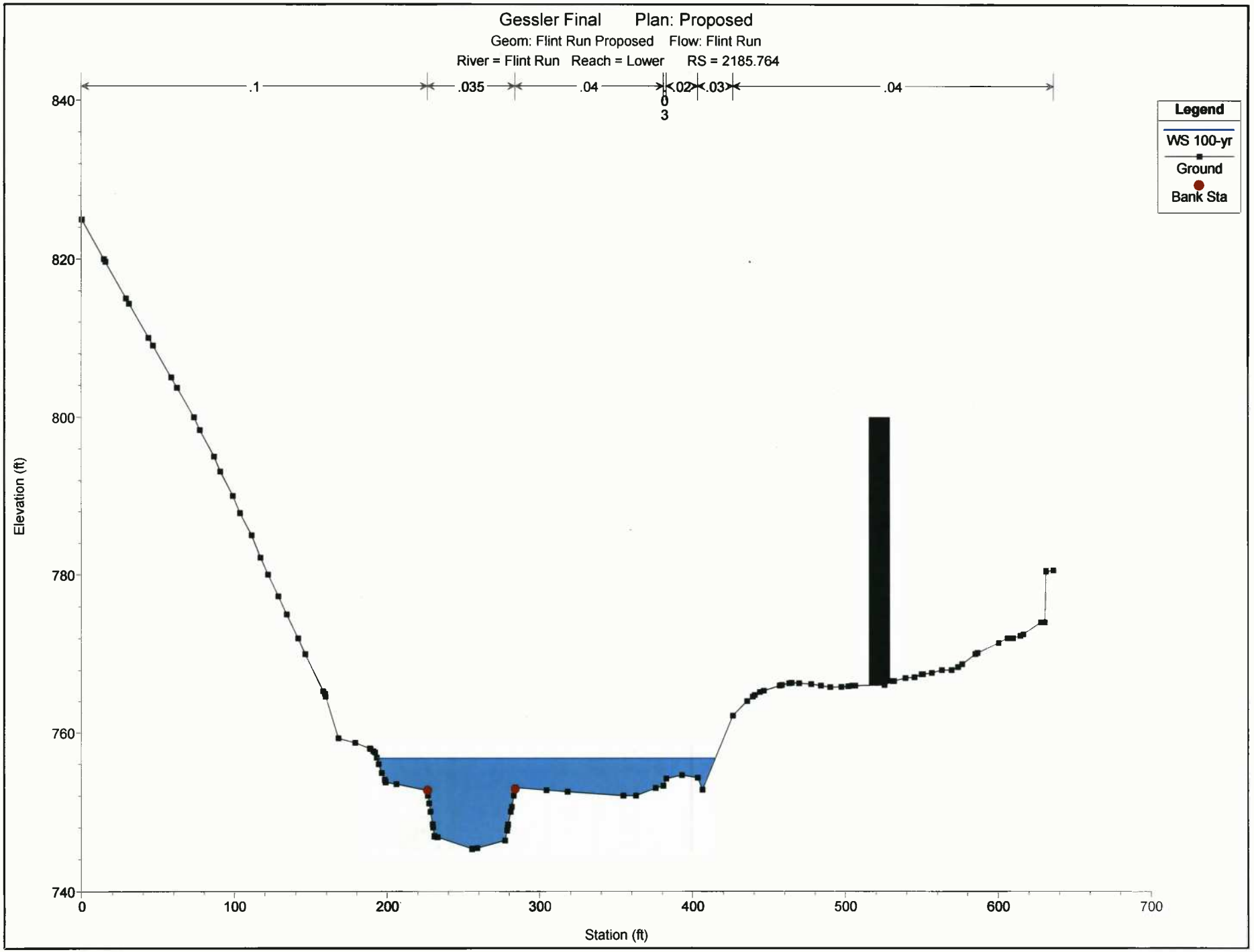
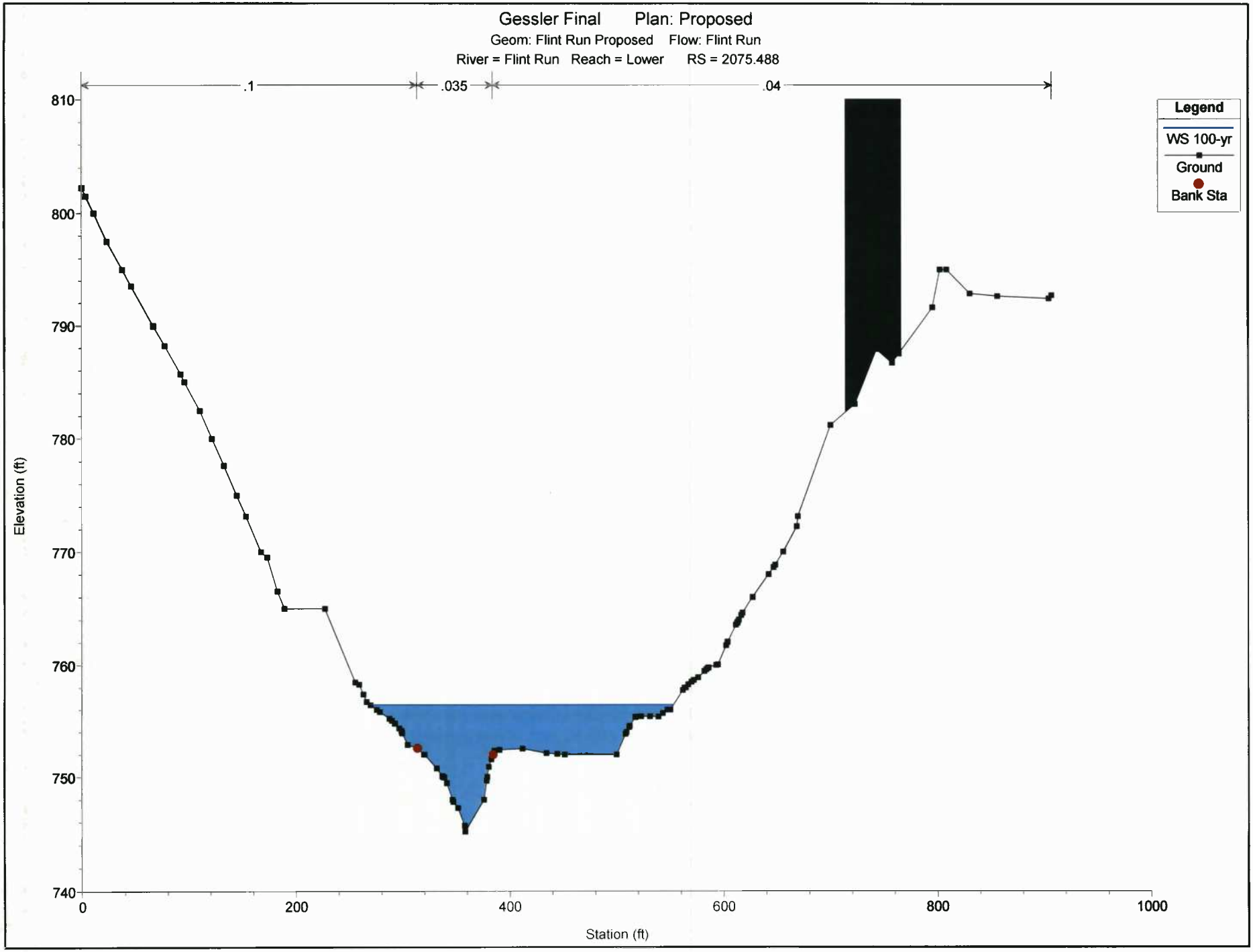
820
800
780
760
740
0
100
200
300
400
500
600
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2185.764
.1
.035
.04
.02
.03
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
840
820
800
780
760
740
0
100
200
300
400
500
600
700
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2075.488
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
810
800
790
780
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750
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400
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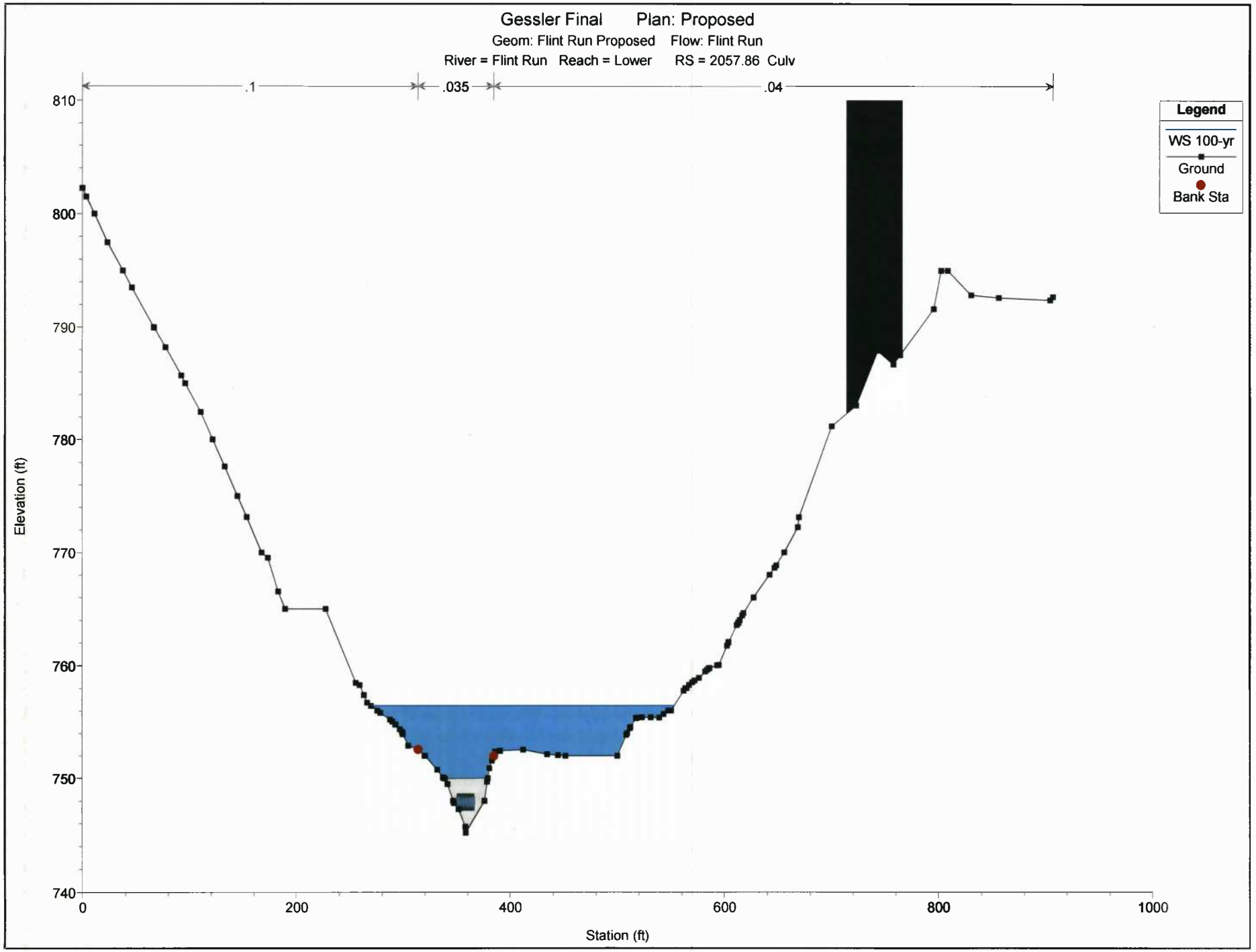
800
1000


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2057.86 Culv
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
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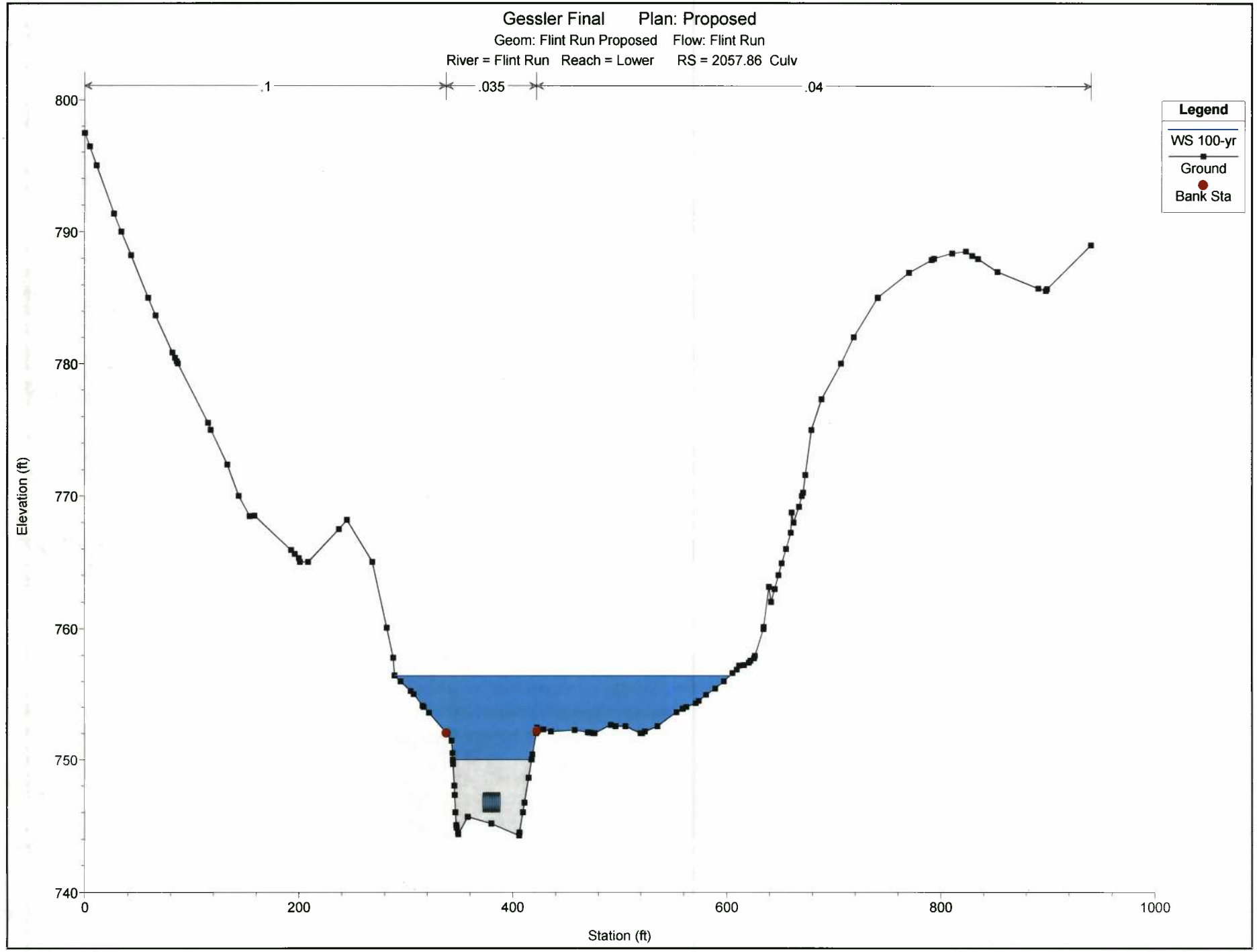
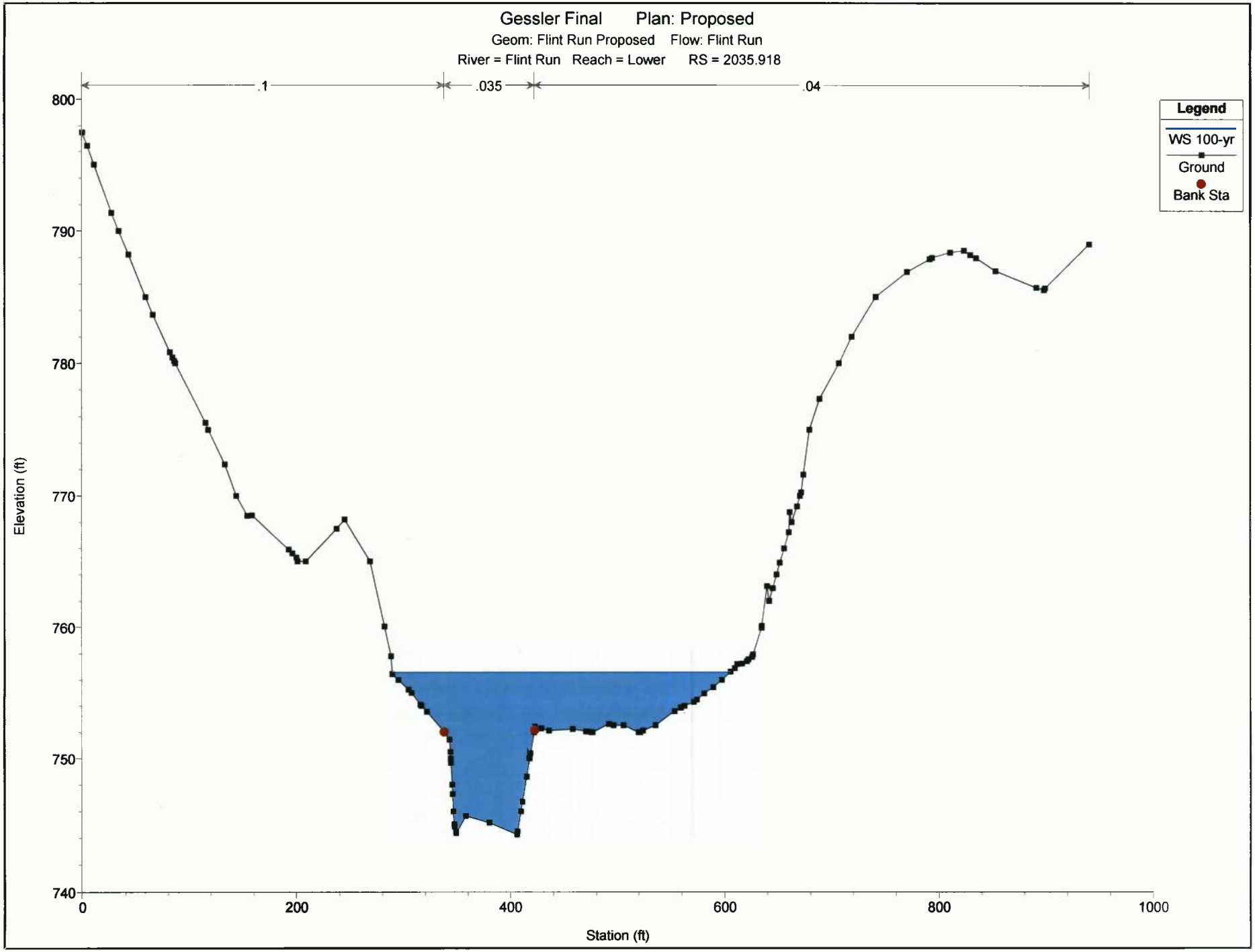

Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2057.86 Culv
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
790
780
770
760
750
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2035.918
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
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780
770
760
750
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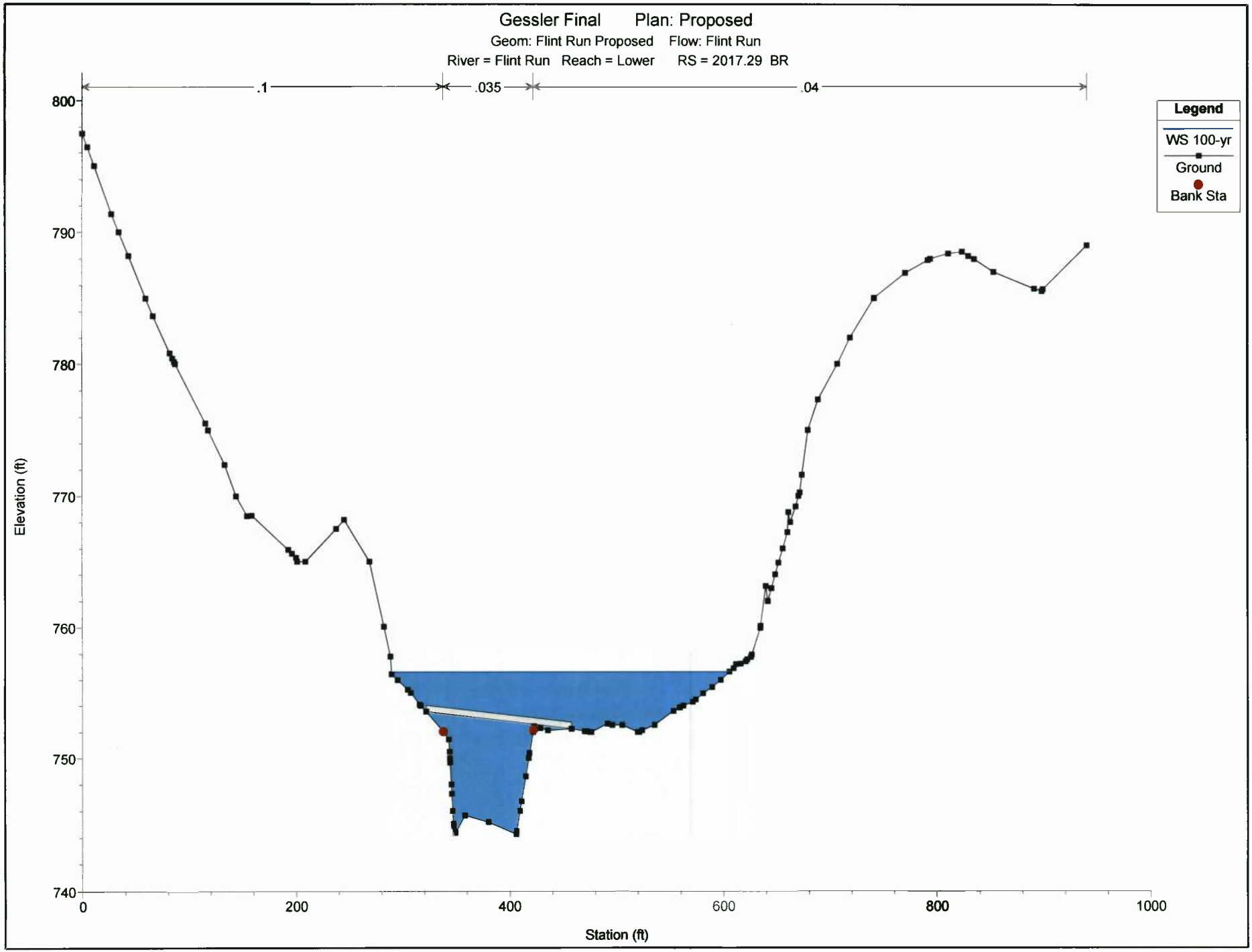
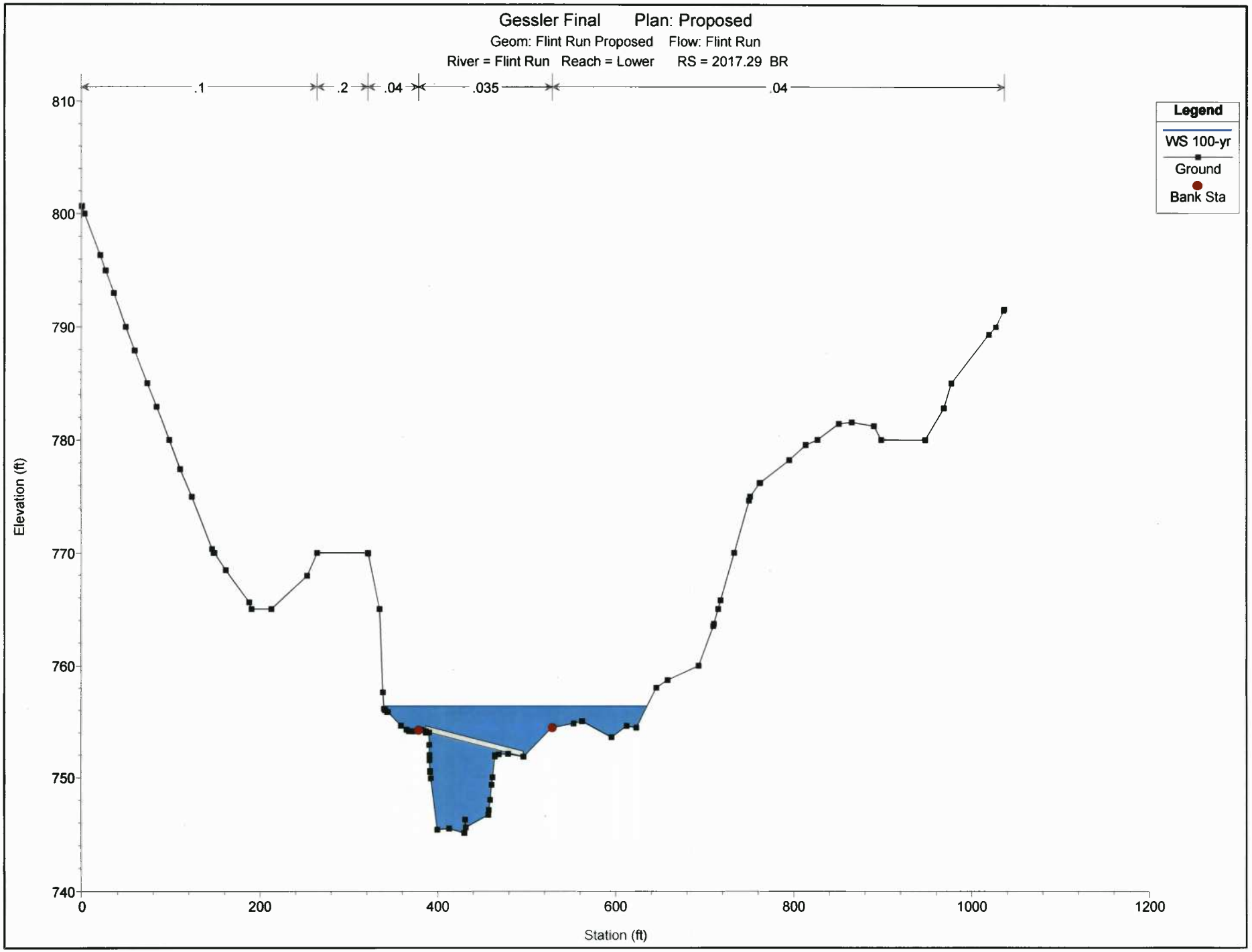
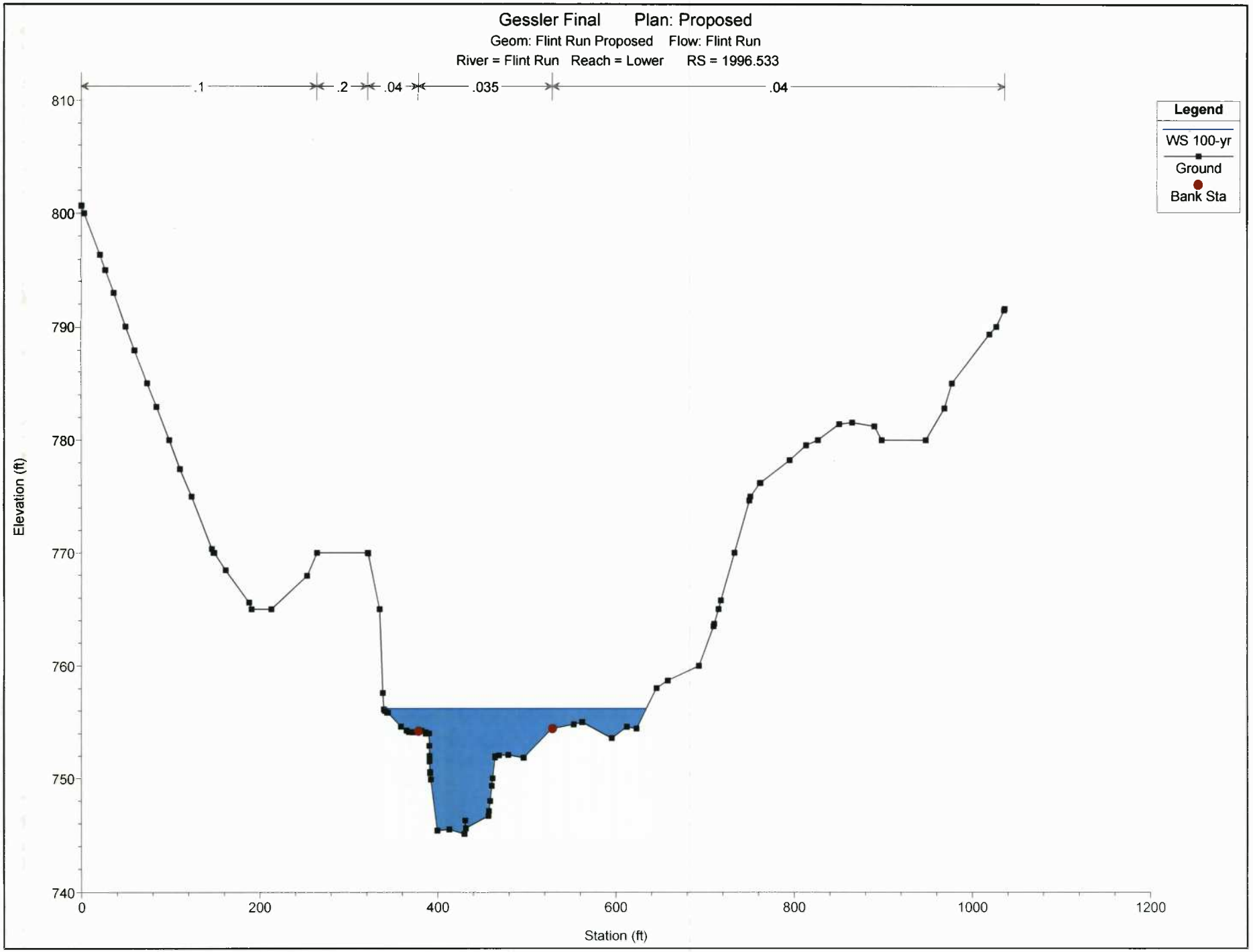
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2017.29 BR
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
800
790
780
770
760
750
740
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 2017.29 BR
.1
.2
.04
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
810
800
790
780
770
760
750
740
0
200
400
600
800
1000
1200
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 1996.533
.1
.2
.04
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
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800
790
780
770
760
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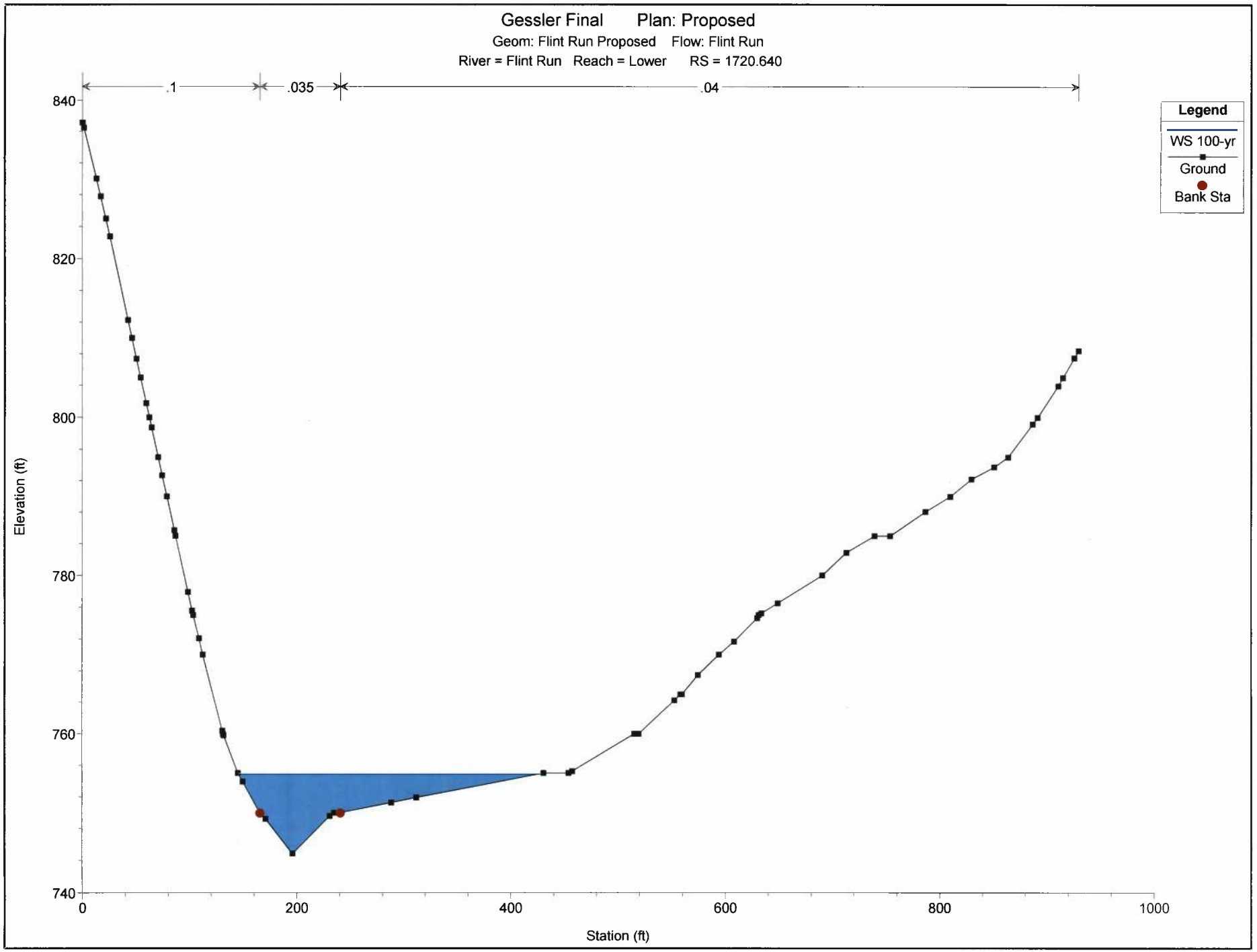
740
0
200
400
600
800
1000
1200


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 1720.640
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
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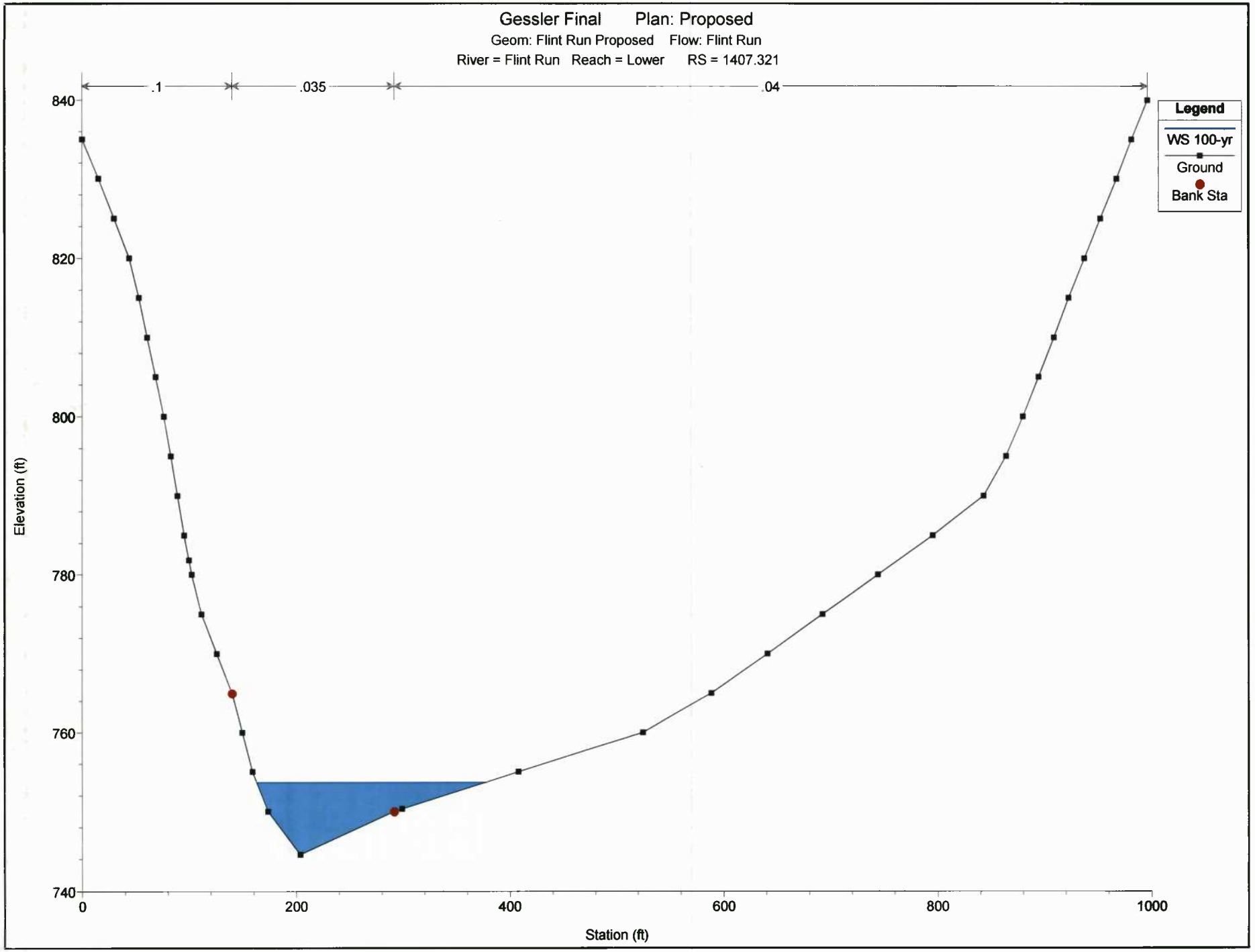
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 1407.321
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
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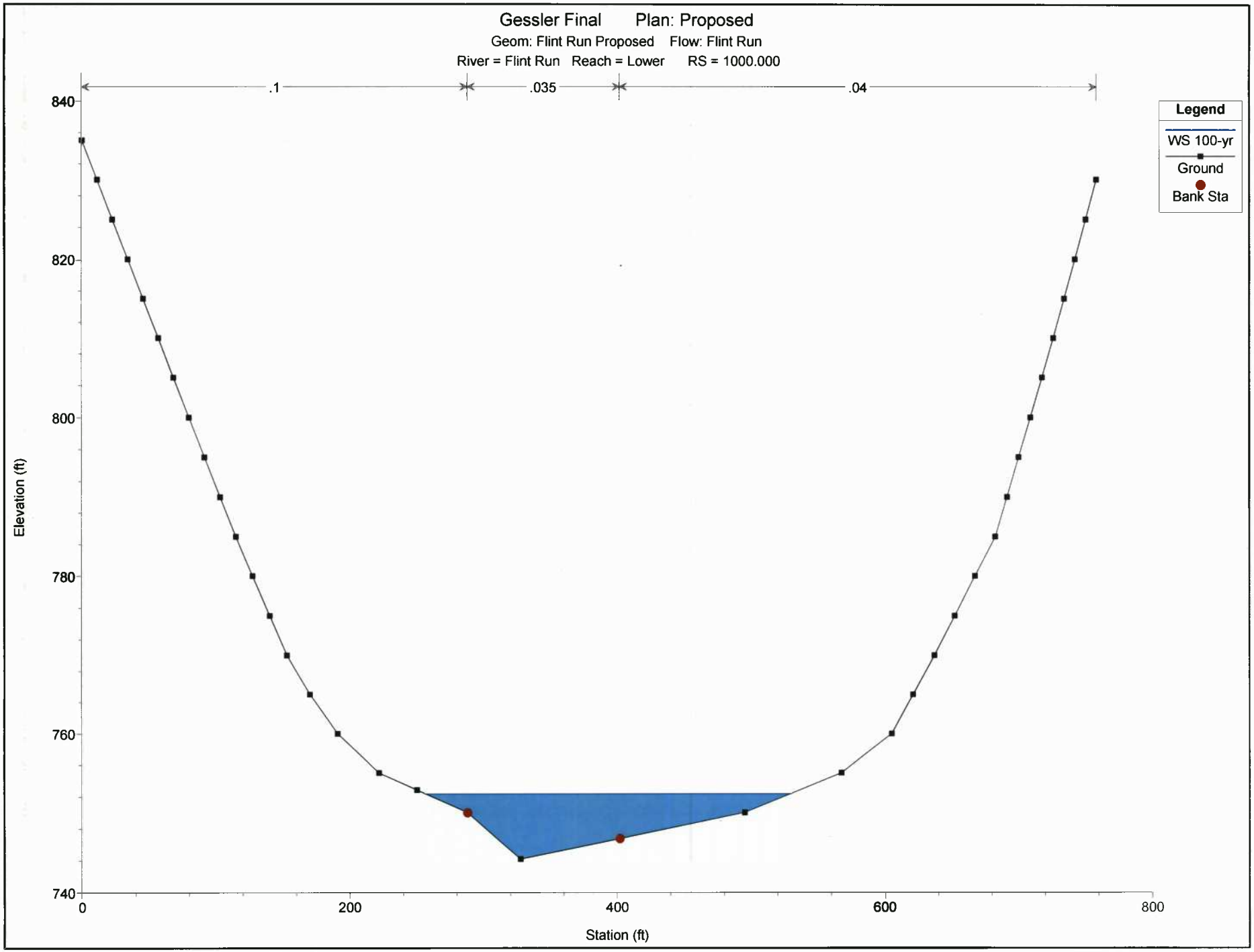
800
780
760
740
Elevation (ft)
0
200
400
600
800
1000
Station (ft)


Gessler Final Plan: Proposed
Geom: Flint Run Proposed Flow: Flint Run
River = Flint Run Reach = Lower RS = 1000.000
.1
.035
.04
Legend
WS 100-yr
Ground
Bank Sta
840
820
800
780
760
740
Elevation (ft)
0
200
400
600
800
Station (ft)