

HYDROLOGY REPORT

The Hodgdon Mills Bridge carries Hodgdon Mills Road over the South Branch of the Meduxnekeag River, in the town of Hodgdon, Maine. The South Branch of the Meduxnekeag River generally begins in Linneus, Maine at the confluence of the South and North Branches of the Meduxnekeag Stream, and ends roughly 3.5 miles downstream of the subject bridge at the confluence with the Meduxnekeag River. The South Branch of the Meduxnekeag River generally flows north within the project limits and has a bankfull width of approximately 67 feet at Hodgdon Mills Bridge.

The project site is located within a 64.5 square mile hilly drainage basin that consists of a combination of forested and open grassed areas, small ponds, large wetlands, and the 156-acre Hodgdon Mill Pond. The outlet for this impoundment, a 10-ft high by 80-ft long concrete dam, is located approximately 140 feet upstream of the project site.

The drainage basin flow characteristics for the bridge were provided by the Maine Department of Transportation (MaineDOT) Environmental Office – Hydrology Section. The peak flows were computed using the 1999 U.S.G.S full regression equation. A summary of these peak flows are shown in the Hydrologic Summary table below, and supporting calculations are found in Appendix F.

Feedback received from attendees of the March 22, 2016 public meeting indicate that the bridge has not experienced overtopping during significant past storm events. This information is supported by hydraulic modeling of the existing bridge using the peak flows below, providing validation of the HEC-RAS model developed for this project and the calculated peak flows.

HYDROLOGIC SUMMARY		
Drainage Area:	64.5	mi ²
Q1.1	461.2	ft ³ /s
Q10	1,372	ft ³ /s
Q25	1,668	ft ³ /s
Q50	1,890	ft ³ /s
Q100	2,129	ft ³ /s
Q500	2,683	ft ³ /s

HYDRAULIC REPORT

The existing bridge and proposed replacement structure were analyzed using HEC-RAS, version 5.0.3, the river analysis software developed by the U.S. Army Corps of Engineers. The HEC-RAS model for this project represents a 658 foot long segment of the South Branch Meduxnekeag River including the Hodgdon Mills Bridge and the Hodgdon Pond Dam located approximately 140-ft upstream of the subject bridge. The hydraulic models were developed using a combination of as-built plans, topographic survey, LiDAR and other available information. Seven cross-sections downstream of the bridge and six cross-sections upstream comprise the geometric model of the river.

The parameters used in the final analysis as well as other assumptions made for both the existing and proposed models are summarized herein.

Model Development

Numerical Modeling Computations

The crossing was analyzed using one-dimensional steady state flow computational procedures.

Main Channel Manning's 'n'

Based on field observations and photographs of the river, the channel appears to be straight with some pools and shoals at the bridge crossing, and there is a sharp bend approximately 150 feet downstream of the bridge. Manning's 'n' values were selected using Table 3-1 of the HEC-RAS *Hydraulic Reference Manual* (see Figure H.1, below). A value of 0.037 was used for sections within the straight portion of the main channel, and a value of 0.04 was used for sections within the sharp bend. A Manning's 'n' value of 0.05 was used for the main channel cross sections (106+50, 106+05.83, 105+83.45) within the vicinity of the dam because of the deep pools in these sections.

Type of Channel and Description	Minimum	Normal	Maximum
<i>A. Natural Streams</i>			
1. Main Channels			
a. Clean, straight, full, no rifts or deep pools	0.025	0.030	0.033
b. Same as above, but more stones and weeds	0.030	0.035	0.040
c. Clean, winding, some pools and shoals	0.033	0.040	0.045
d. Same as above, but some weeds and stones	0.035	0.045	0.050
e. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. Same as "d" but more stones	0.045	0.050	0.060
g. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. Very weedy reaches, deep pools, or floodways with heavy stands of timber and brush	0.070	0.100	0.150

Figure H.1

Overbanks/Floodplain Manning's 'n'

Based on field observations and photographs of the overbank area, the right overbank (ROB) areas upstream of the bridge have dense brush and trees and the left overbank (LOB) areas have dense trees with undergrowth. Downstream of the crossing, ROB areas have dense trees with undergrowth and LOB areas have short grass or dense trees. Manning's 'n' values from Table 3-1 of the HEC-RAS *Hydraulic Reference Manual* (see Figure H.2, below) were considered. A value of 0.1 was used for all downstream ROB areas and some LOB areas. A value of 0.05 was used for the LOB that have grassed areas.

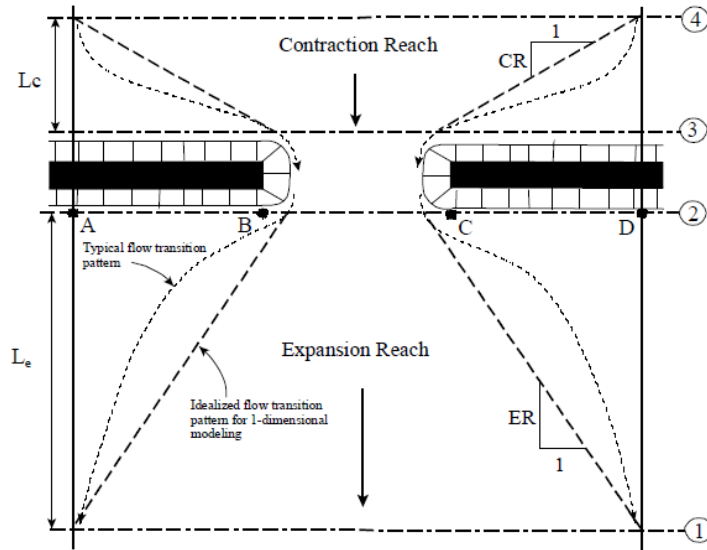
2. Flood Plains				
a.	Pasture no brush			
1.	Short grass	0.025	0.030	0.035
2.	High grass	0.030	0.035	0.050
b.	Cultivated areas			
1.	No crop	0.020	0.030	0.040
2.	Mature row crops	0.025	0.035	0.045
3.	Mature field crops	0.030	0.040	0.050
c.	Brush			
1.	Scattered brush, heavy weeds	0.035	0.050	0.070
2.	Light brush and trees, in winter	0.035	0.050	0.060
3.	Light brush and trees, in summer	0.040	0.060	0.080
4.	Medium to dense brush, in winter	0.045	0.070	0.110
5.	Medium to dense brush, in summer	0.070	0.100	0.160
d.	Trees			
1.	Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
2.	Same as above, but heavy sprouts	0.050	0.060	0.080
3.	Heavy stand of timber, few down trees, little undergrowth, flow below branches	0.080	0.100	0.120
4.	Same as above, but with flow into branches	0.100	0.120	0.160
5.	Dense willows, summer, straight	0.110	0.150	0.200

Figure H.2

Contraction and Expansion Coefficients

Typical values for Contraction and Expansion Coefficients were selected from Table 5-2 of the HEC-RAS *Hydraulic Reference Manual* (see Figure H.3 below). For bridge cross section 4 in the Proposed Condition models, a typical value of 0.3 was used for the contraction coefficient and a value of 0.5 was used for the expansion coefficients. For bridge cross section 1, and intermediate cross sections, values of 0.1 and 0.3 were used for the contraction and expansion coefficients, respectively, to model the gradual transitions in these sections.

In locations with abrupt transitions, such as immediately up- and downstream of the existing bridge opening, such as at river station 104+67.92 (bridge cross section 3) and river station 104+00 (bridge cross section 2), values of 0.6 and 0.8 were used for the contraction and expansion coefficients, respectively.



	Contraction	Expansion
No transition loss computed	0.0	0.0
Gradual transitions	0.1	0.3
Typical Bridge sections	0.3	0.5
Abrupt transitions	0.6	0.8

Figure H.3

Losses at Bend

A conservative value of 0.5 was used for the loss coefficient, K_b , at the bend in the river immediately downstream of the bridge. Refer to Table 5.1 of HDS-5, *Hydraulic Design of Culverts* (see Figure H.4, below) for typical values of K_b .

$$H_b = K_b \left(\frac{V^2}{2g} \right)$$

Table 5.1. Loss Coefficients for Bends.			
Radius of Bend / Pipe Diameter	Angle of Bend in Degrees)		
	90°	45°	22.5°
1	0.50	0.37	0.25
2	0.30	0.22	0.15
4	0.25	0.19	0.12
6	0.15	0.11	0.08
8	0.15	0.11	0.08

Figure H.4

Ineffective Flow Areas

Ineffective Flow Areas are defined at bridge cross sections 2 and 3. Per HEC-RAS's *Hydraulic Reference Manual*, ineffective flow areas are recommended to be located using these guidelines:

- For upstream ineffective flow area, assume a 1:1 contraction rate. For example, if Cross Section 3 is located 10' upstream from the upstream bridge face, the ineffective flow areas should be placed 10' outside each side of the bridge opening.
- For the downstream flow area, the active flow area is equal to or less than the width of the bridge opening. In general, the flow area locations should be equal to or slightly wider than the bridge opening depending on the abruptness of the contraction at the bridge.
- Generally, set the ineffective flow area elevations equal to the low point of the road. The elevations should correspond to elevations where significant weir flow passes over the bridge.
- It is expected that ineffective flow areas or "pooling" will be encountered in the cross sections located at 103+57.98 and 103+11.23, between the left outer bank and floodplain, because these sections are immediately upstream of the sharp 90-degree bend in the river and immediately downstream of the bridge.

Existing Bridge Geometry

The existing bridge geometry was developed using the topographic survey data available for the project. The following parameters were used:

- Clear Span: 24.8ft with sloping abutments
- Average Low Chord Elevation: 419.1ft

Bridge Modeling Approach

Bridge Routines were selected instead of Culvert Routines as the bridge modeling approach for this crossing for the following reasons:

- The crossing length is relatively short.
- There is open stream bottom with an irregular channel bottom through crossing.

For low flow computations, the Energy and Momentum equations were chosen to model/calculate hydraulic properties at the crossing. The highest energy solution was selected if Class A (or completely subcritical) flow through the bridge was present. The highest energy solution typically outputs a higher water surface elevation upstream of the bridge. Flows exceeding the low chord elevation are not anticipated for the storm events considered at this crossing. However, if high flows were present, high flow computations would be carried out with the Standard Step/Energy equation as the default.

Dam Modeling Approach

The Hodgdon Pond Dam, located immediately upstream of the subject bridge, is maintained by the Maine Department of Inland Fish & Wildlife and was constructed as part of a highway mitigation project which ultimately created the 156-acre Hodgdon Mill Pond. The dam is a cast-

in-place concrete structure with an ogee shape that is approximately 10.6' tall by 80' long. The dam has a 6' wide by 9' tall sluice gate and fixtures to allow for the installation of flashboards; however, there is no evidence or information to suggest that they have been recently used and/or installed. A fish ladder is not present and based on email correspondence information from the Department's Environmental Office, there are no plans to accommodate fish passage at this dam in the future.

To model the flow characteristics of an ogee shaped dam correctly, the design head needs to be known. Design calculations for the dam are not readily available and the construction drawings titled "Proposed Hodgdon Marsh Dam" dated December 26, 1962 do not indicate a design head. The reference manual titled "Design of Small Dams", Third Edition, released by the United States Bureau of Reclamation, was utilized to determine a design head for this structure. Typically, for ogee shaped dams/spillways, the design head is used in conjunction with a design equation to define the shape (or x-coordinate and y-coordinate) of the spillway. Based on design equation (2) of section 9.10 of the reference manual, a relative design head was determined (by balancing the equation) for each selected point/coordinate on the existing dam. After the relative heads were determined, the average relative head was calculated and was used as the design head for this structure.

To validate the calculated design head, the selected x-coordinates on the dam were fixed and equation (2) was utilized to calculate the y-coordinates of theoretical ogee shape which compares well to the existing ogee shape. As a result, the following parameters were used to model the dam:

- Weir Crest Shape: Ogee
- Design Head: 2.22'
- Dam Height: 10.63'
- Dam Width: 80'

The dam has the potential to attenuate streamflow by impounding water in the upstream storage area of Hodgdon Pond. However, the upstream water surface elevation would have to be actively and specifically managed for the purpose of flood control for the dam to perform in this capacity. Regulating the elevation of the impoundment area, and drawing the elevation down prior to the storm event, would provide some capacity for flow attenuation. No information was made available or discovered during a site visit to indicate the dam is actively used for flood control purposes. Therefore, storage capacity of the dam has been conservatively neglected, and the hydraulic modeling assumes the water surface elevation of the impoundment area to be equal to that of the crest of the weir at the start of the storm event. In other words, streamflow immediately upstream of the dam is assumed to be equal to streamflow immediately downstream, or Q_{in} is equal to Q_{out} .

According to the Department's Environmental Office, there are no plans to remove this dam. However, if the dam were to be removed, the hydraulic performance of this section of the river is not anticipated to change significantly because the dam is located far enough upstream of the bridge to not directly impact the hydraulic performance of the crossing.

Flow Regime

Due to the presence of the upstream dam, it is possible that supercritical and subcritical flow will occur between the bridge and dam. Likewise, rapidly varied flow may occur within the vicinity of the existing/proposed bridge during certain flow events. Therefore, the **mixed flow** regime was used for all HEC-RAS models.

Downstream Boundary Condition

Downstream flows do not appear to be inundated by a dam, lake, bridge or other constriction or restriction to flow. Therefore, the downstream reach will experience free discharge conditions and a **normal depth** boundary condition assumption is appropriate. The normal depth was estimated using LiDAR information to have a slope of 0.0076 ft/ft.

Existing Conditions Model Validity

To check the validity of the existing condition HEC-RAS model, including boundary conditions and calculated flows, results of the existing condition modeling were compared to public accounts presented during the Public Meeting. There was general discussion at the meeting of the historic performance of the bridge during past storm events, and several residents commented that they have never observed overtopping of the roadway at this crossing. It was also stated that a significant early-summer storm event, approximately 3 to 4 years ago (2012-2013 timeframe), produced a total rainfall of 6 or 7 inches over a 3-day period. As an independent check, data was retrieved from NOAA for the nearby weather monitoring station, Houlton International Airport (COOP:173892), to validate this claim. Upon inspection, the following rainfall depths were observed between the dates of June 22, 2012 and June 28, 2012:

Date	Rainfall Depth (inches)
6/22/12	1.33
6/23/12	2.91
6/24/12	2.52
6/25/12	0.05
6/26/12	2.30
6/27/12	1.80
6/28/12	0.07

Table H.1

Based on the data presented in Table H.1, the total rainfall depth between 6/22/12 and 6/24/12 was 6.76". The Extreme Precipitation Tables generated from the Extreme Precipitation in New York & New England website for the 1-Day, 2-Day and 4-Day events are summarized below in Table H.2 for selected return intervals. The precipitation depth of the event in question exceeds that of the 100-year event, but is less than the 200-year event.

Event Return	1 Day (in)	2 Day (in)	4 Day (in)
50 Year	4.17	5.18	5.68
100 Year	4.79	6.00	6.48
200 Year	5.52	6.95	7.41

Table H.2

Residents reported that the dam was fully submerged during this event, and the flood waters downstream of the bridge were quite elevated, but peak flood stage of the river never reached the house located at 221 Hodgdon Mills Road (located near the left floodplain).

For model comparison and validation, it was assumed that the storm event recalled by the public was equivalent to the 100-year peak flow calculated for the project. The results of the existing conditions HEC-RAS model for the 100-year event show the upstream dam to be fully submerged without overtopping of the roadway or bridge. The 100-year water surface elevation downstream of the bridge is calculated by the HEC-RAS model to be approximately elevation 409.7 ft. The edge of water at this elevation would reach to within approximately 40' of the house located at 221 Hodgdon Mills Road, correlating well with reports that the river widens substantially during high-flow events but has never reached the structure.

Based on information from the Public Meeting, there appears to be good correlation between results of the existing conditions HEC-RAS model and public accounts of the real world behavior of the river. Therefore, the existing conditions model is considered to be adequate for determining velocities and water surface elevations for the different flows, and will be used in development of the proposed conditions models.

Proposed Structure and Conditions Model

The proposed structure has the following characteristics:

- 55'-0" clear span from face of abutment to face of abutment
- 1.75:1 riprap slopes around abutments
 - o Bottom of slope elevation of 405 feet
 - o Top of slope elevation at face of abutments of 412 feet

- Proposed structure generally centered in the east-west direction on the footprint of the existing structure
- Low chord elevation of 418.03 feet

The peak flows that were provided by MaineDOT were used to analyze and determine the flow characteristics of the proposed structure. The proposed structure lowered the water surface elevations upstream of the bridge during the Q2 thru Q500 flow events. The proposed conditions model also revealed that there is potential for a hydraulic jump to occur within the vicinity of the proposed bridge structure which causes high velocities during the Q5 thru Q500 flow events. The hydraulic jump is believed to be caused by the transition from the steep slope upstream of and through the bridge crossing to the mild slope just downstream of the bridge. If a hydraulic jump is not desired, major upstream river regrading would have to occur to remove the steep transition. This regrading would potentially decrease velocities within the vicinity of the bridge.

Scour and Scour Countermeasures

The existing cast-in-place concrete bridge abutments are founded on bedrock at the approximate elevation of the existing streambed. The proposed replacement structure will utilize full-height cantilever abutments and u-back wingwalls with spread footings also founded on bedrock. Scour is not typically a consideration for foundations founded on rock. However, rock mass quality information contained in the boring logs indicates there is a possibility that the bedrock at the streambed elevation is erodible and therefore potentially susceptible to scour attack.

The depth of bedrock scour was not calculated for either the existing or proposed structures, as this concern was discussed with the design team and the potential for scour of this nature is considered to be unlikely. The Contractor will be required to remove any loose, unsound concrete before placing the foundation.

HYDRAULIC SUMMARY TABLE

		Existing Structure	Proposed Structure
		24.8' Span w/Sloping Abutments	55' clear span w/ rip-rap embankments
Total Area of Waterway Opening	ft ²	351	716
¹ Headwater elevation @ Q ₅₀	ft	415.04	410.42
¹ Headwater elevation @ Q ₁₀₀	ft	415.85	410.88
¹ Freeboard @ Q ₅₀	ft	4.06	7.61
¹ Freeboard @ Q ₁₀₀	ft	3.25	7.15
² Velocity @ Q ₅₀	ft/s	19.05	15.59
² Velocity @ Q ₁₀₀	ft/s	20.01	16.32

1. Measured at immediate upstream cross-section (104+67.92)
2. Max velocity encountered within the vicinity of the bridge

Note: All elevations based on North American Vertical Datum (NAVD) of 1988.

Reported by: Jeffrey A. De Graff, Jr., PE
Date: January 5, 2017

Appendix F

Hydrology and Hydraulics Documentation

Project Name:
 Stream Name: Hogdon Mills Br
 Bridge Name: S Br Meduxnekeag Rvr
 Route No. Hogdon Mills Rd
 Analysis by: CSH

PIN: 22638
 Town: Hogdon
 Bridge No. 3103
 USGS Quad:
 Date: 2/11/2016

Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999 & Lombard/Hodgkins, 2015)

Enter data in blue cells only!

	km ²	mi ²	ac
A	167.31	64.60	41344.0
W	35.14	13.57	8682.2
P _c	585703	5093434	
County	Aroostook S		
pptA	39.0		
SG	0.04		
A (km ²)	167.31		
W (%)	21.00		

Enter data in [mi²]

Watershed Area
 Wetlands area (by NWI)

watershed centroid (E, N; UTM 19N; meters)
 choose county from drop-down menu
 mean annual precipitation (inches; by look-up)
 sand & gravel aquifer as decimal fraction of watershed A

Worksheet prepared by:

Charles S. Hebson, PE
 Environmental Office
 Maine Dept. Transportation
 Augusta, ME 04333-0016
 207-557-1052

Charles.Hebson@maine.gov

Conf Lvl 0.67

Ret Pd	Peak Flow Estimate		
T (yr)	Lower	Q _T (m ³ /s)	Upper
1.1		13.06	
2		22.82	
5		32.28	
10		38.84	
25		47.23	
50		53.53	
100		60.28	
500		75.99	

Q_T (ft³/s)

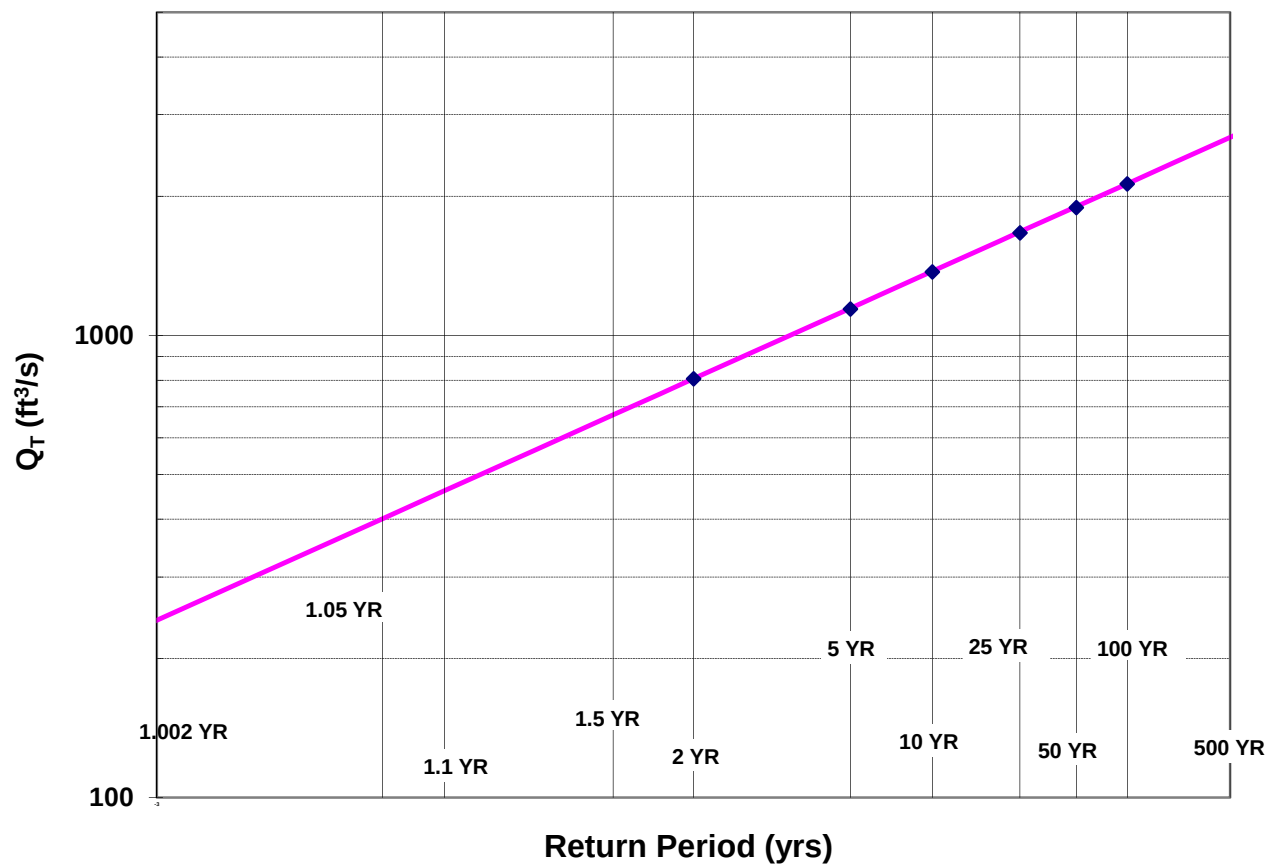
461.2
805.9
1139.9
1371.6
1667.9
1890.1
2128.5
2683.0

Reference:

Hodgkins, G., 1999.
 Estimating the magnitude of peak flows for streams
 in Maine for selected recurrence intervals
Water-Resources Investigations Report 99-4008
 US Geological Survey, Augusta, Maine

$$Q_T = b \times A^a \times 10^{-WW}$$

Log-Normal Probability Plot



Project Name: 0
 Stream Name: Hogdon Mills Br
 Bridge Name: S Br Meduxnekeag Rvr
 Route No. Hogdon Mills Rd
 Analysis by: CSH

PIN: 22638
 Town: Hogdon
 Bridge No. 3103
 USGS Quad: 0
 Date: 2/11/2016

DO NOT ENTER ANY DATA ON THIS PAGE; EVERYTHING IS CALCULATED

MAINE MONTHLY MEDIAN FLOWS BY USGS REGRESSION EQUATIONS (2004)

Worksheet prepared by:

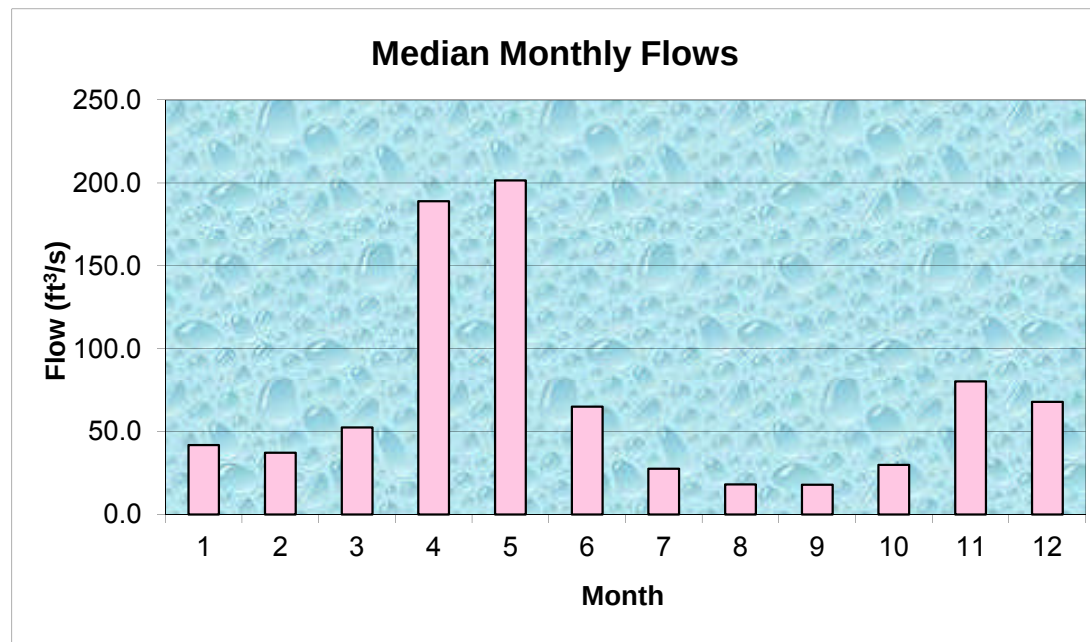
Charles S. Hebson, PE
 Chief Hydrologist
 Maine Dept. Transportation
 Augusta, ME 04333-0016
 207-624-3073
Charles.Hebson@maine.gov

Value	Variable	Explanation
64.600	A	Area (mi ²)
585703	P _c	Watershed centroid (E,N; UTM; Zone 19; meters)
114.58	DIST	Distance from Coastal reference line (mi)
39.0	pptA	Mean Annual Precipitation (inches)
0.04	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	41.93	1.1883
Feb	37.25	1.0557
Mar	52.60	1.4907
Apr	188.96	5.3547
May	201.61	5.7132
Jun	65.09	1.8445
Jul	27.73	0.7859
Aug	18.27	0.5177
Sep	18.05	0.5115
Oct	29.90	0.8474
Nov	80.27	2.2747
Dec	68.09	1.9296

Q _{bf}	413.0
ann avg	120.0
ann med	56.9
Q _{1.002}	241.8
Q _{1.01}	304.1
Q _{1.05}	401.0

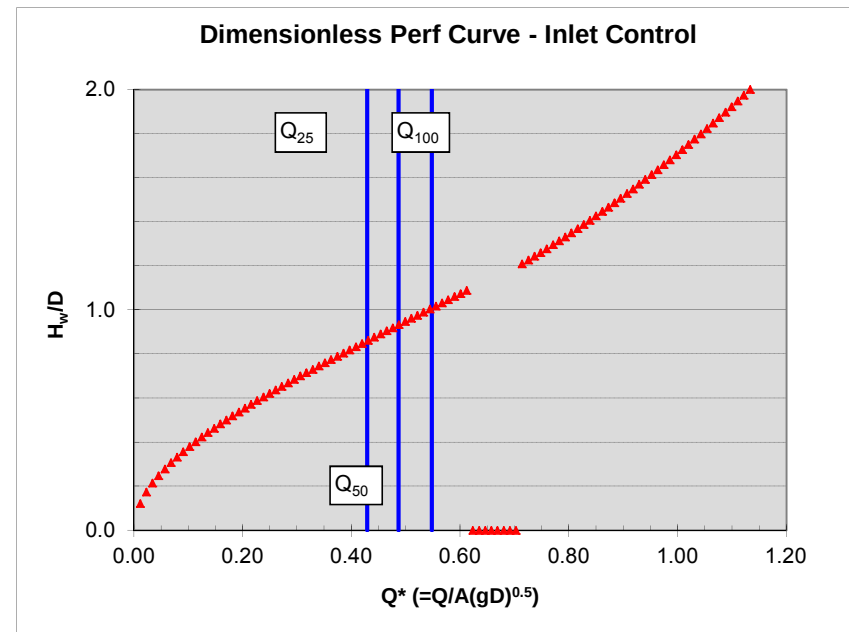
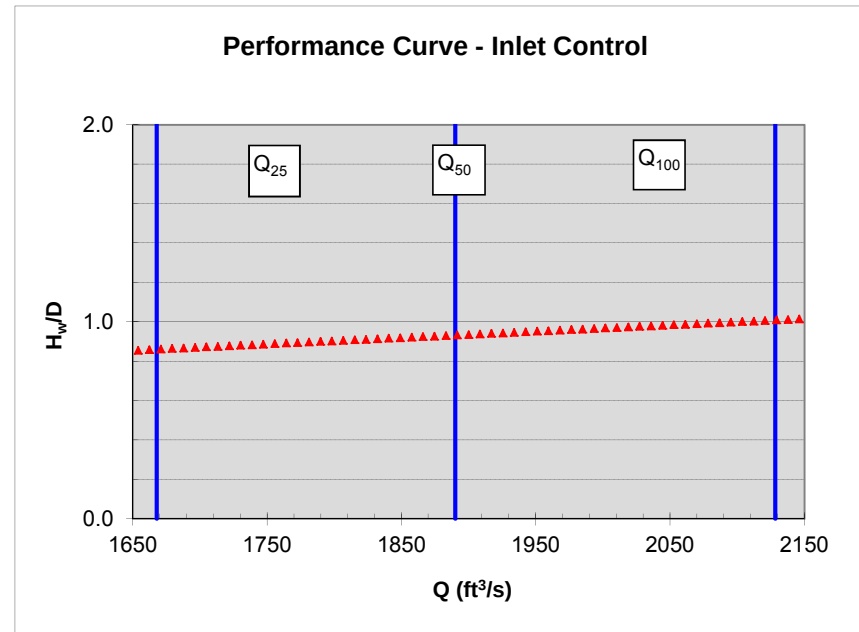
W _{bf}	67.0	estimated bankfull width
d _{bf}	5.2	
Q _{bf}	1390.9	assume v = 4ft/s

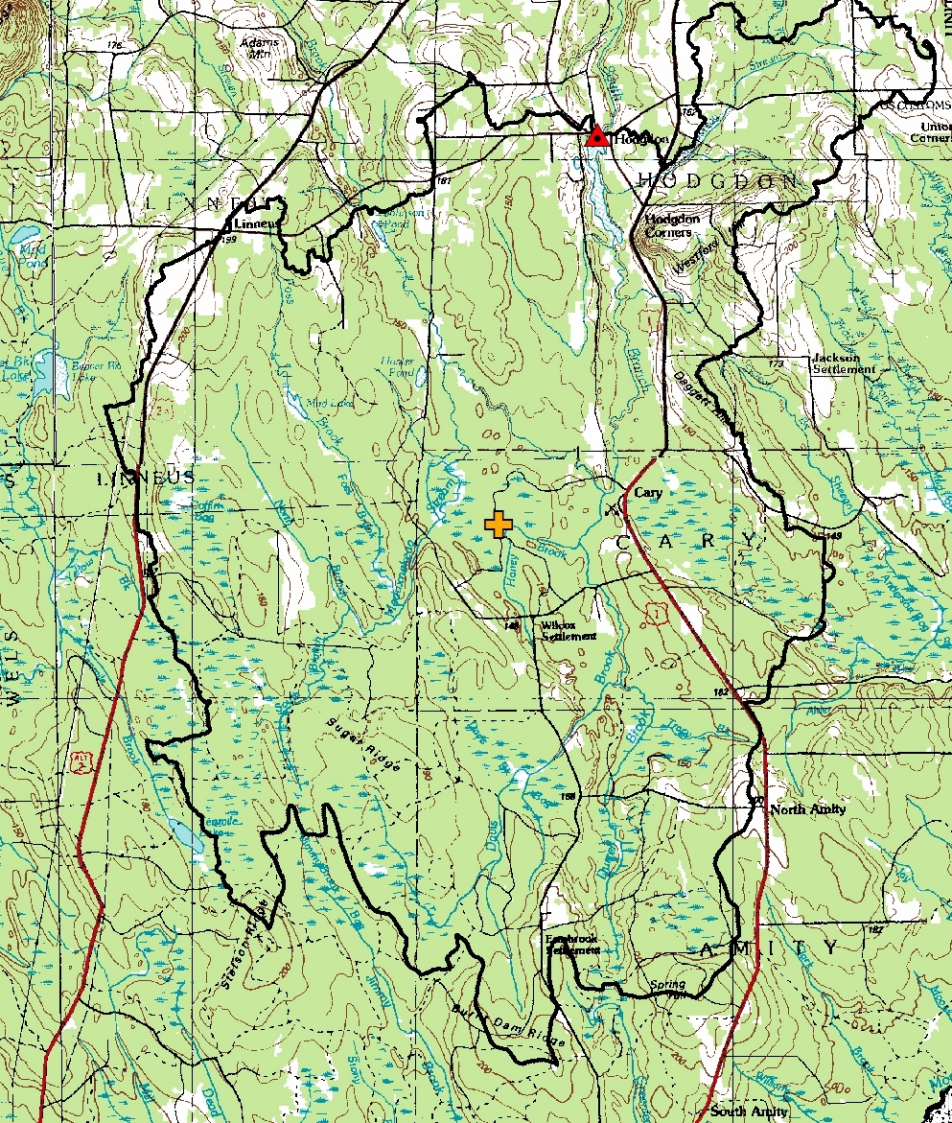


NOTE: This page is for preliminary sizing only.
Final design should be done with HY8 or HDS-5

Preliminary Culvert Sizing - Round Pipes

Type:	Circ RCP Proj	Q_{25}	1667.9	trial D = 15.42
D (ft)	15	Q_{50}	1890.1	
w (ft)	9 box width	Q_{100}	2128.5	
Slope (ft/ft)	0.02			
A (ft ²)	176.71			
g	32.2			





StreamStats Version 3.0

Basin Characteristics Ungaged Site Report

Date: Thurs Feb 11, 2016 10:53:38 AM GMT-5

Study Area: Maine

NAD 1983 Latitude: 46.054 (46 03 15)

NAD 1983 Longitude: -67.8683 (-67 52 06)

Label	Value	Units	Definition
DRNAREA	64.6	square miles	Area that drains to a point on a stream
STORNWI	21.02	percent	Percentage of storage (combined water bodies and wetlands) from the National Wetlands Inventory
ELEV	546.5	feet	Mean Basin Elevation
PRECIP	39.8	inches	Mean Annual Precipitation
PRDEC FEB90	8.72	inches	Basin average mean precipitation for December to February from PRISM 1961-1990
SANDGRAVAP	3.72	percent	Percentage of land surface underlain by sand and gravel aquifers
COASTDIST	116	miles	Shortest distance from the coastline to the basin centroid
CENTROIDX	585702.54	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	5093434.39	State plane coordinates	Basin centroid vertical (y) location in state plane units
SANDGRAVAF	0.04	dimensionless	Fraction of land surface underlain by sand and gravel aquifers
LC11IMP	0.32	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	2.75	percent	Percentage of land-use from NLCD 2011 classes 21-24

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U.S. Department of the Interior | U.S. Geological Survey

URL: http://streamstatsags.cr.usgs.gov/v3_beta/BCreport.htm

Page Contact Information: [StreamStats Help](#)

Page Last Modified: 01/26/2016 11:44:09 (Web2)

[Streamstats Status](#) [News](#)



StreamStats Version 3.0

Flow Statistics Ungaged Site Report

Date: Thurs Feb 11, 2016 10:56:56 AM GMT-5

Study Area: Maine

NAD 1983 Latitude: 46.054 (46 03 14)

NAD 1983 Longitude: -67.8683 (-67 52 06)

Drainage Area: 64.6 mi²

Regional Hydraulic Geometry Basin Characteristics

100% Unnamed Region (64.6 mi²)

The selected watershed is entirely in an area for which flow equations were not defined.

Regional Median Flows Basin Characteristics

100% East Aroostook 2 Variable WRI 03 4225 (64.6 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	64.6 (above max value 43.06)	0.38	43.06
Mean Basin Elevation (feet)	546.5	437	1024

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Monthly Mean Flows Basin Characteristics

100% Statewide Mean Monthly SIR 2004 5026 (64.6 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	64.6	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.04	0	0.455
Mean Annual Precipitation (inches)	39.8	37.8	47.9
Distance From Coast To Basin Centroid (miles)	116	42.7	193

Monthly Median Flows Basin Characteristics

100% Statewide Median Monthly SIR 2004 5026 (64.6 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max

Drainage Area (square miles)	64.6	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.04	0	0.455
Mean Annual Precipitation (inches)	39.8	37.8	47.9
Distance From Coast To Basin Centroid (miles)	116	42.7	193

Peak Flow Basin Characteristics			
100% Statewide Peak Flow Full WRI 99 4008 (64.6 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	64.6	0.93	1653
Percentage of Storage from NWI (percent)	21.02	0.7	26.7

Annual Flows Basin Characteristics			
100% Statewide Annual SIR 2004 5026 (64.6 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	64.6	9.79	1418
Fraction of Sand and Gravel Aquifers (dimensionless)	0.04	0	0.455
Basin Ave Precip Dec Feb PRISM 1990 (inches)	8.72	7.71	12.6

Regional Median Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
AUGD50	26.6	ft3/s				

<http://water.usgs.gov/pubs/wri/wri034225/pdf/wrir03-4225.pdf> (<http://water.usgs.gov/pubs/wri/wri034225/pdf/wrir03-4225.pdf>)

Lombard_ P. J._ Tasker_ G. D._ and Nielsen_ M. G._ 2003_ August Median Streamflow on Ungaged Streams in Eastern Aroostook County_ Maine: U.S. Geological Survey Water-Resources Investigations Report 03-4225_ 20 p.

Monthly Mean Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
Q1	61.9	ft3/s	11	30		
Q2	56.6	ft3/s	10	41		
Q3	111	ft3/s	24	7.3		

Q4	297	ft3/s	17	4.9		
Q5	264	ft3/s	17	7		
Q6	100	ft3/s	16	13		
Q7	47.1	ft3/s	22	8.4		
Q8	33.6	ft3/s	25	8.6		
Q9	37.1	ft3/s	23	14		
Q10	69.4	ft3/s	22	17		
Q11	130	ft3/s	21	12		
Q12	104	ft3/s	13	29		

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)

Dudley_ R.W._ 2004_ Estimating Monthly_ Annual_ and Low 7-Day_ 10-Year Streamflows for Ungaged Rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2004-5026_ 22 p.

Monthly Median Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
JAND50	41.5	ft3/s	18	8.9		
FEBD50	36.8	ft3/s	16	18		
MARD50	51.9	ft3/s	19	13		
APRD50	199	ft3/s	24	3.8		
MAYD50	203	ft3/s	23	3.9		
JUND50	65.1	ft3/s	26	4.3		
JULD50	27.7	ft3/s	31	3.6		
AUGD50	18.3	ft3/s	35	3.9		
SEPD50	18	ft3/s	32	5.4		
OCTD50	29.9	ft3/s	31	8.3		
NOVD50	80.3	ft3/s	35	4.4		
DECD50	67.7	ft3/s	14	22		

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)

Dudley_ R.W._ 2004_ Estimating Monthly_ Annual_ and Low 7-Day_ 10-Year Streamflows for Ungaged Rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2004-5026_ 22 p.

Peak Flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	805	ft3/s	35	1.8	450	1440

PK5	1140	ft3/s	36	2.5	631	2060
PK10	1370	ft3/s	37	3.2	748	2510
PK25	1670	ft3/s	39	4.1	887	3130
PK50	1890	ft3/s	40	4.8	985	3620
PK100	2130	ft3/s	41	5.4	1090	4160
PK500	2680	ft3/s	45	6.4	1290	5540

<http://me.water.usgs.gov/99-4008.pdf> (<http://me.water.usgs.gov/99-4008.pdf>)

Hodgkins_ G. A._ 1999_ Estimating the Magnitude of Peak Flows for Streams in Maine for Selected Recurrence Intervals: U.S. Geological Survey Water-Resources Investigations Report 99-4008_ 45 p.

Annual Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
QA	114	ft3/s	7.6	9.9		
MEDAN	49.7	ft3/s	14	6.9		
M7D10Y	3.86	ft3/s	44	2.9		

<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf> (<http://water.usgs.gov/pubs/sir/2004/5026/pdf/sir2004-5026.pdf>)

Dudley_ R.W._ 2004_ Estimating Monthly_ Annual_ and Low 7-Day_ 10-Year Streamflows for Ungaged Rivers in Maine: U.S. Geological Survey Scientific Investigations Report 2004-5026_ 22 p.

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URL: http://streamstatsags.cr.usgs.gov/v3_beta/FTreport.htm

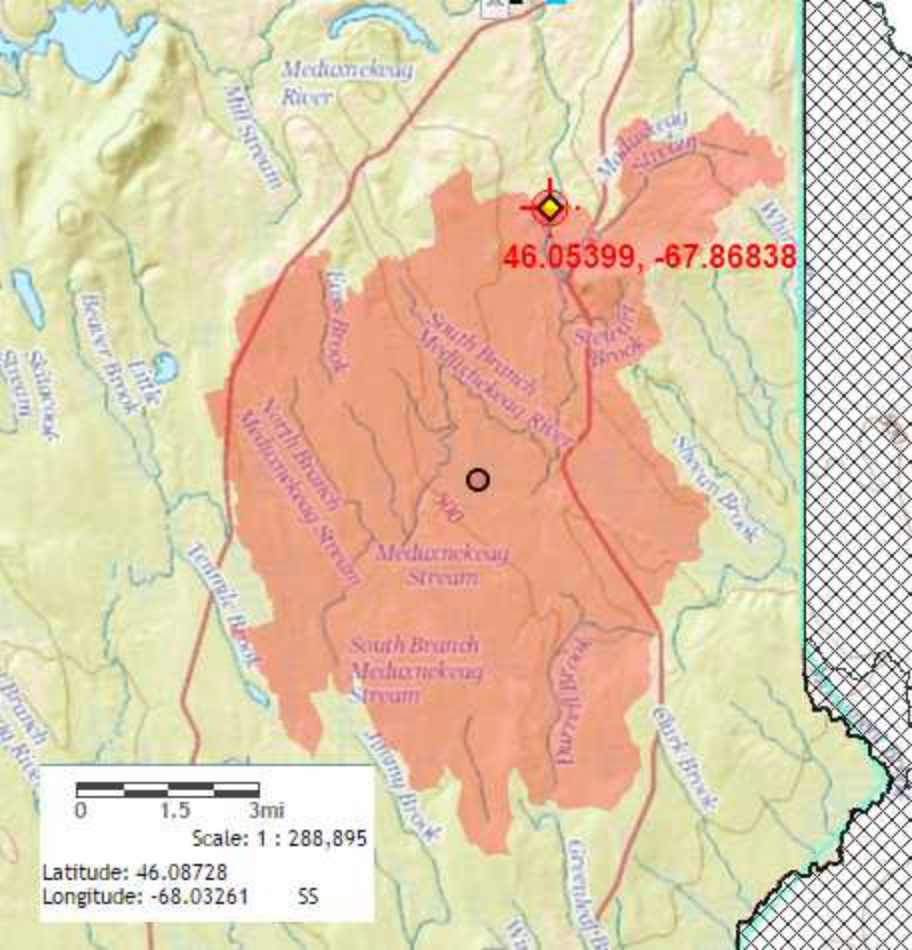
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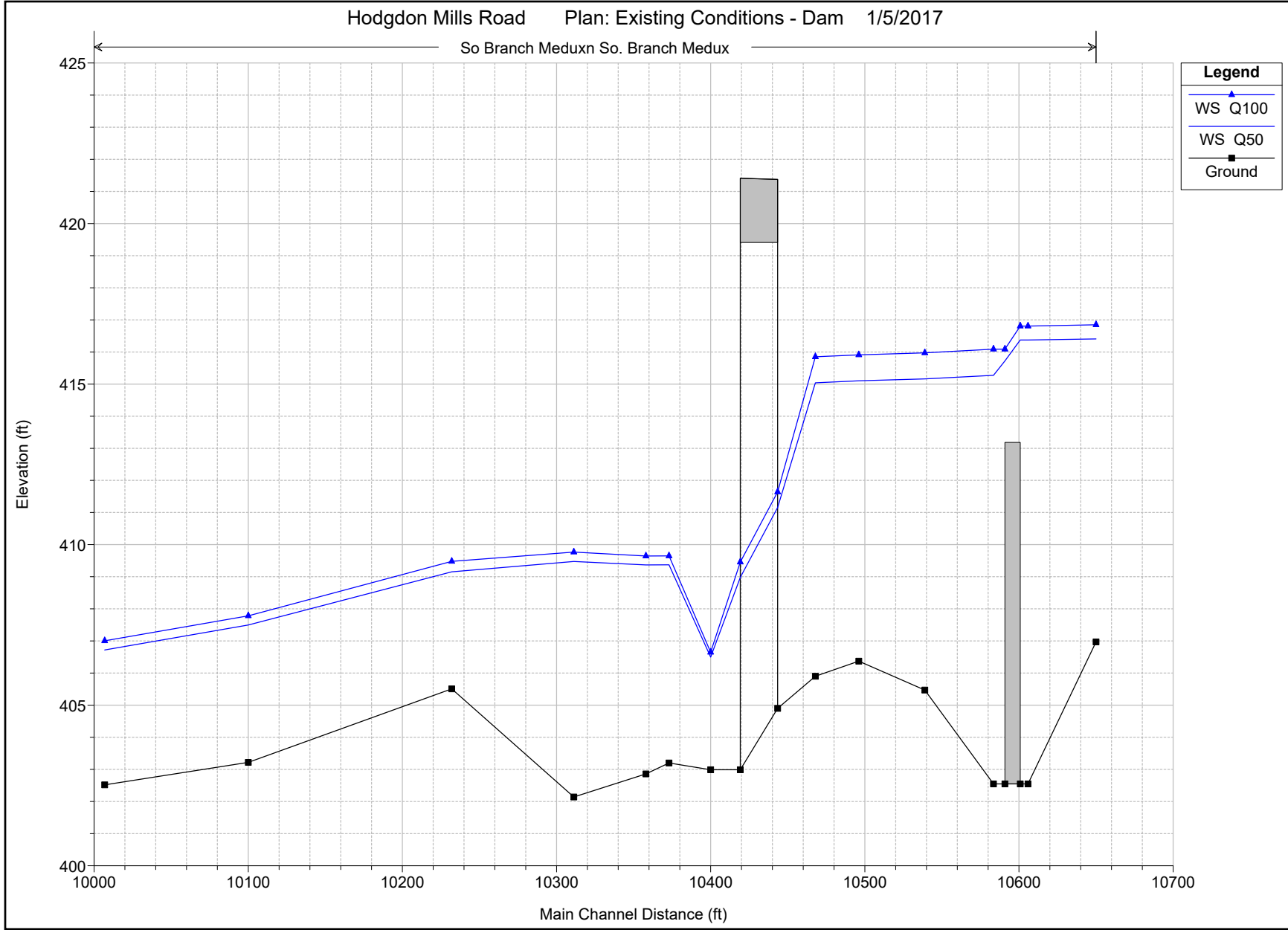
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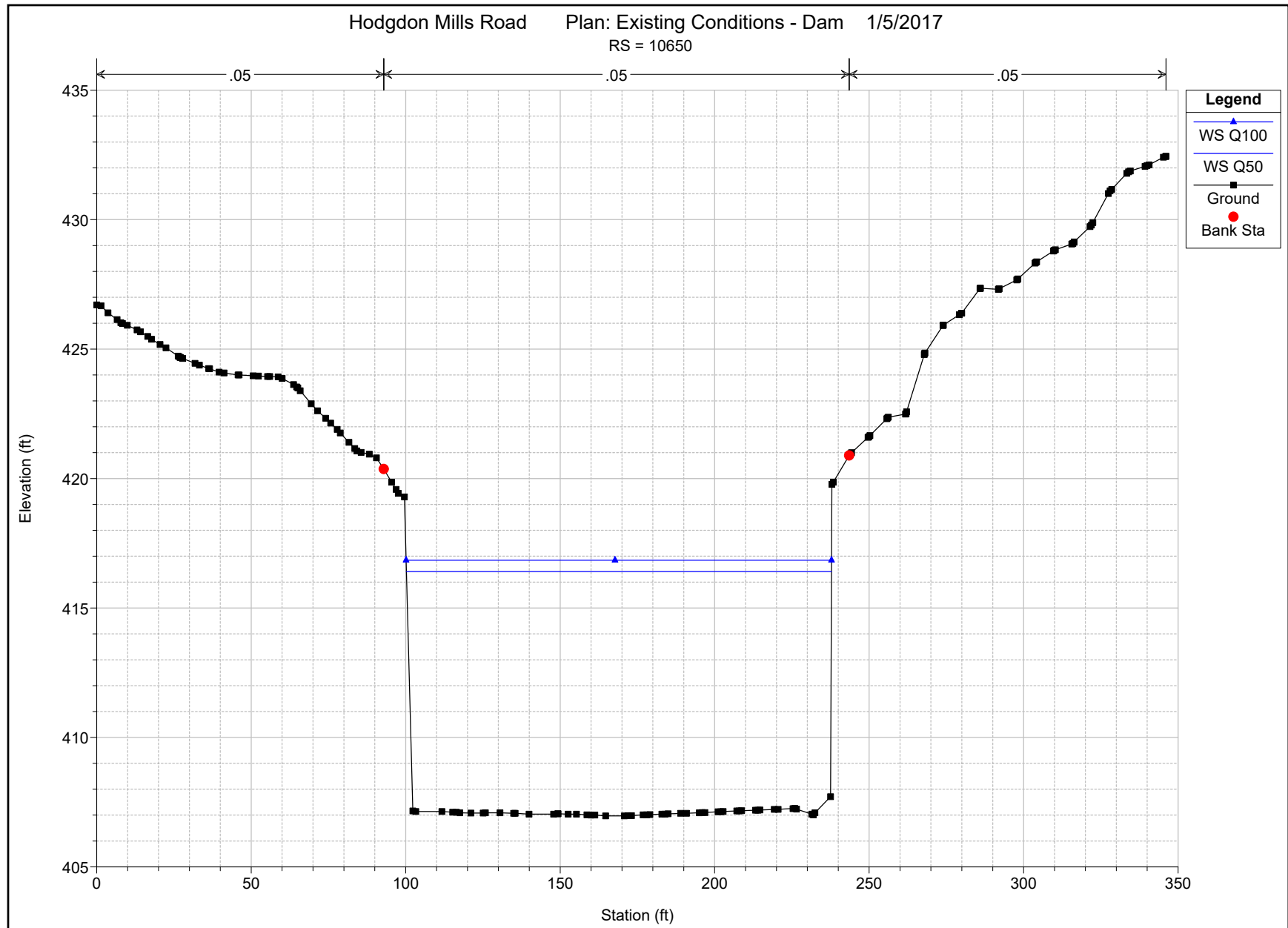
Stream Alignment and Cross-Section Location Map



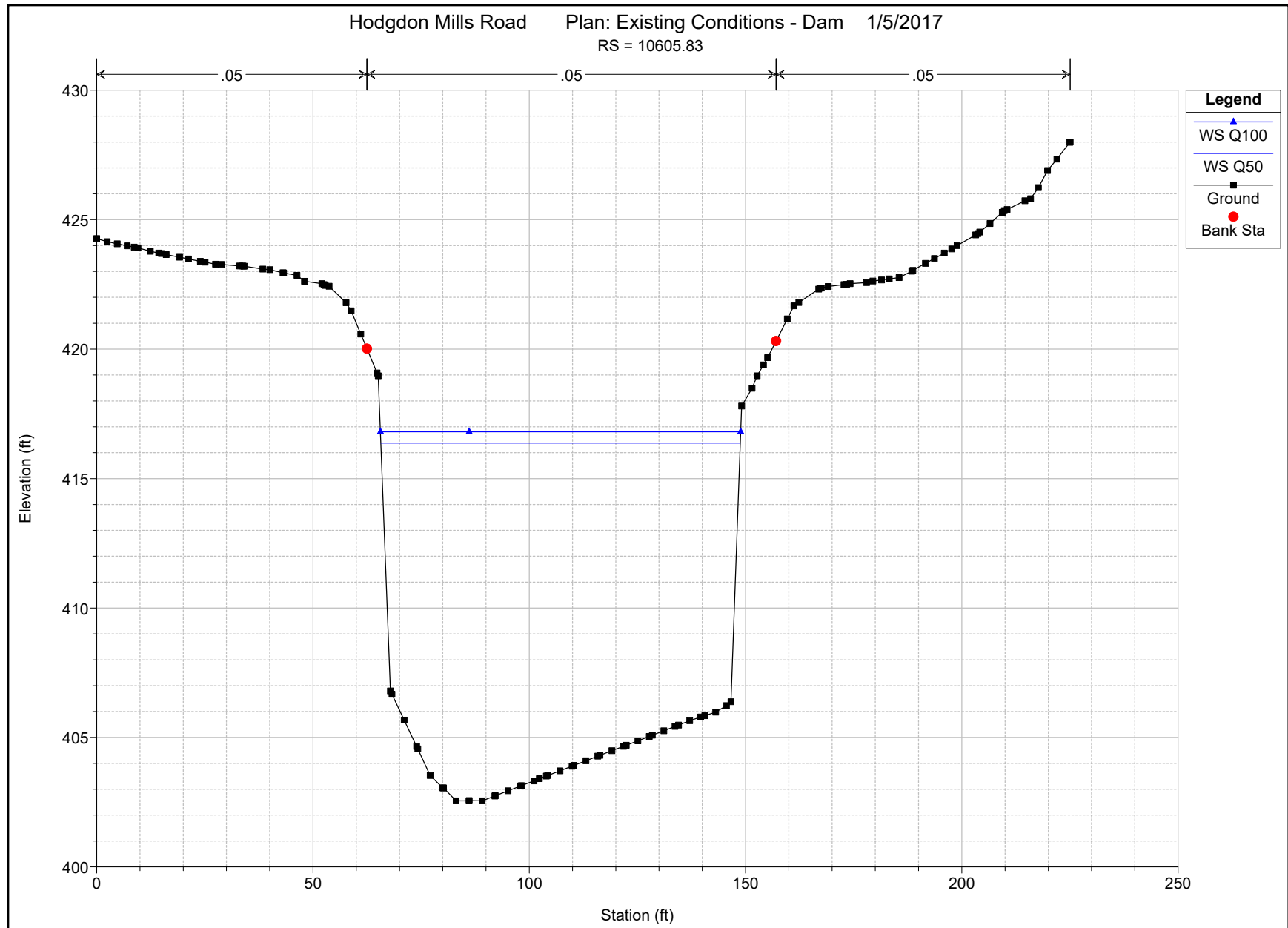
Existing Condition Water Surface Profile



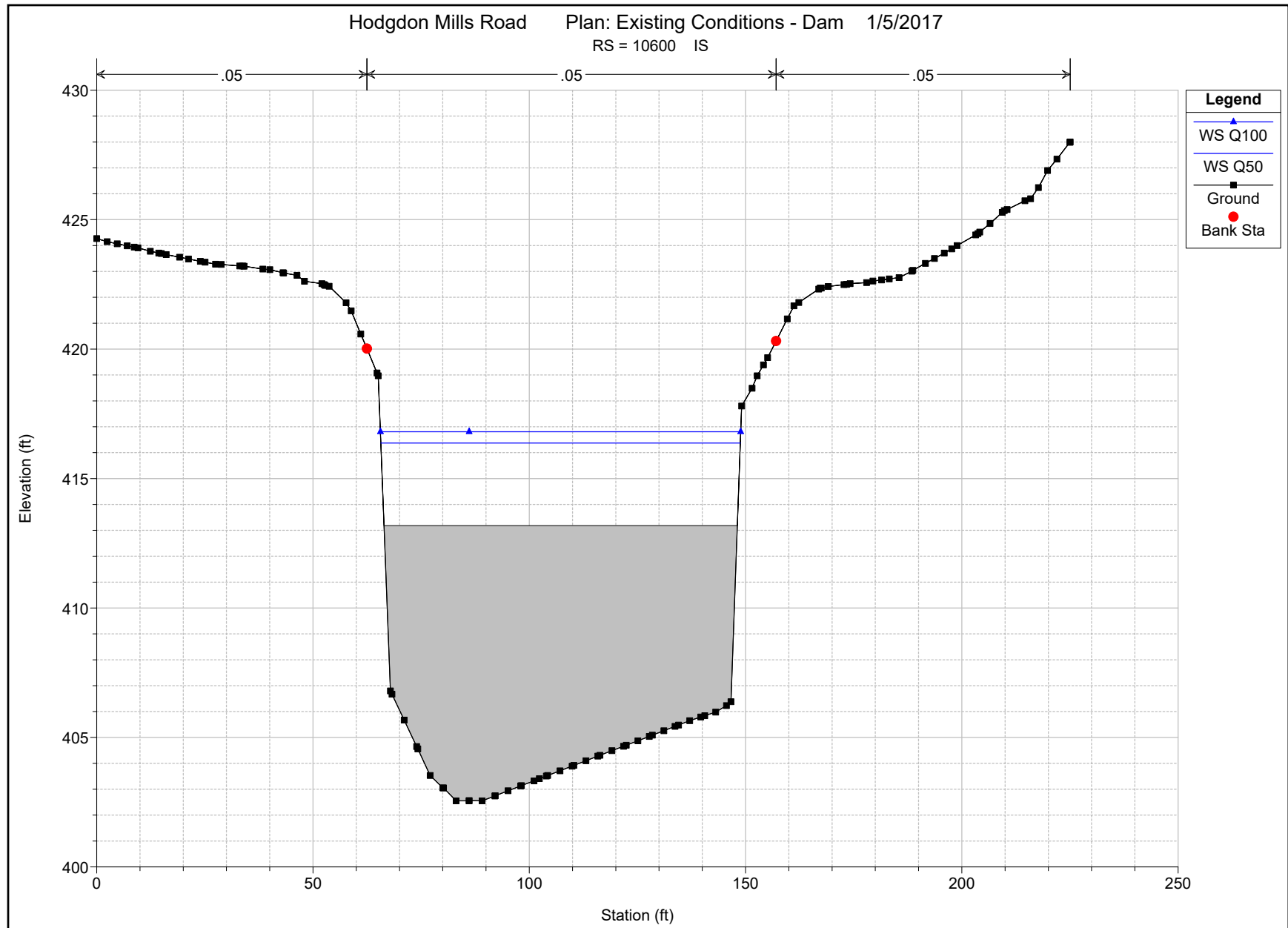
Existing Condition Cross-Sections



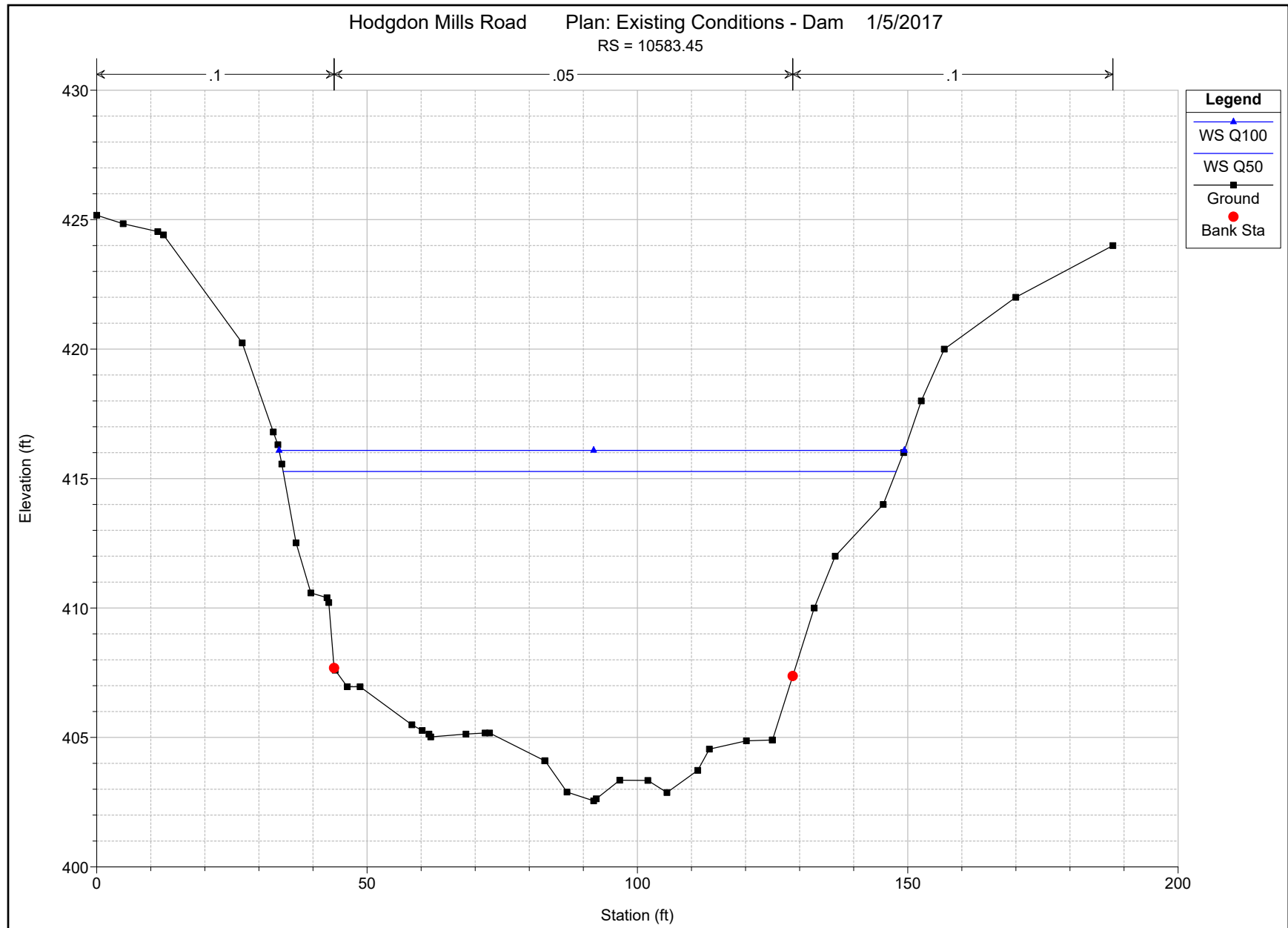
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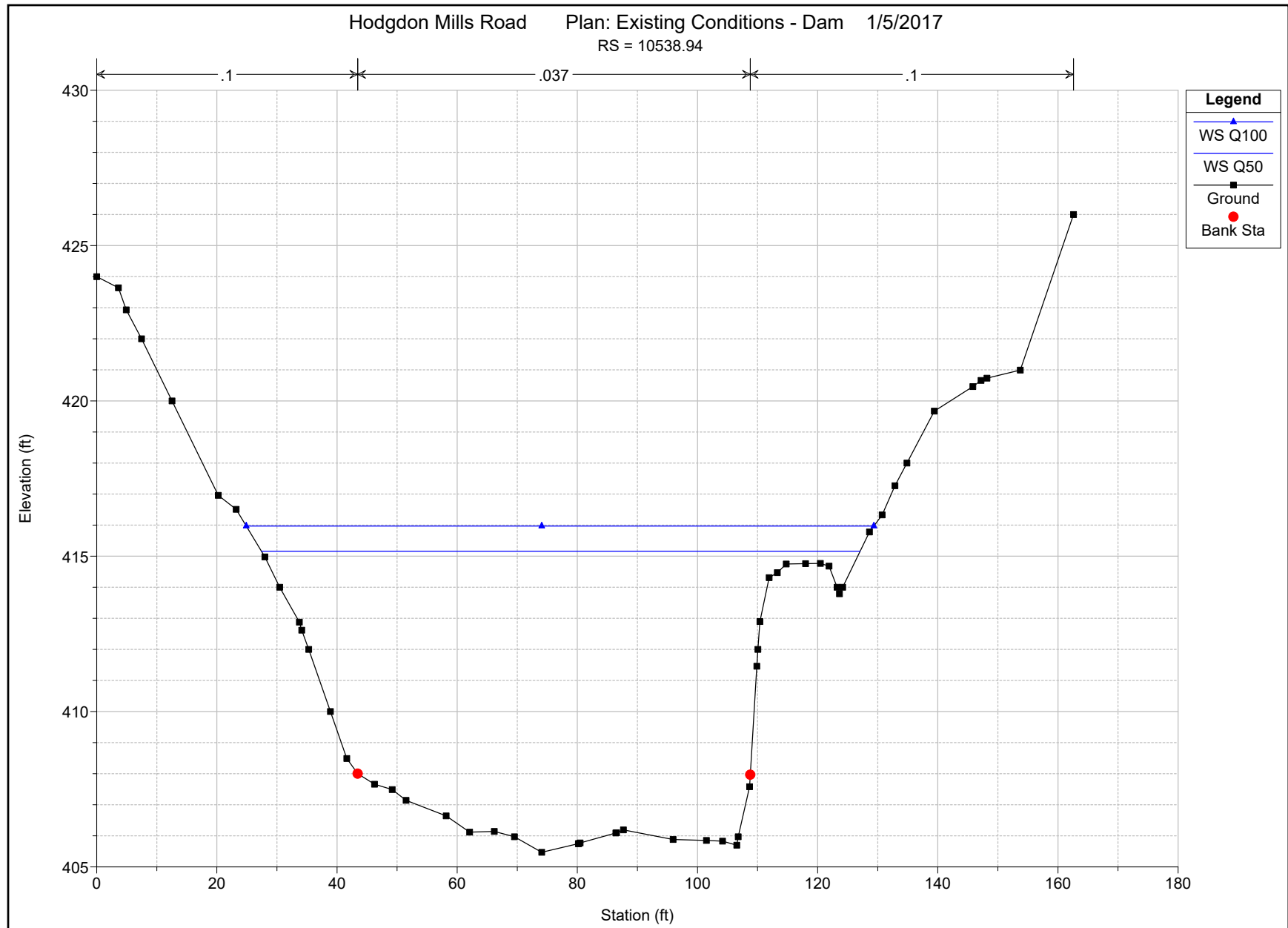
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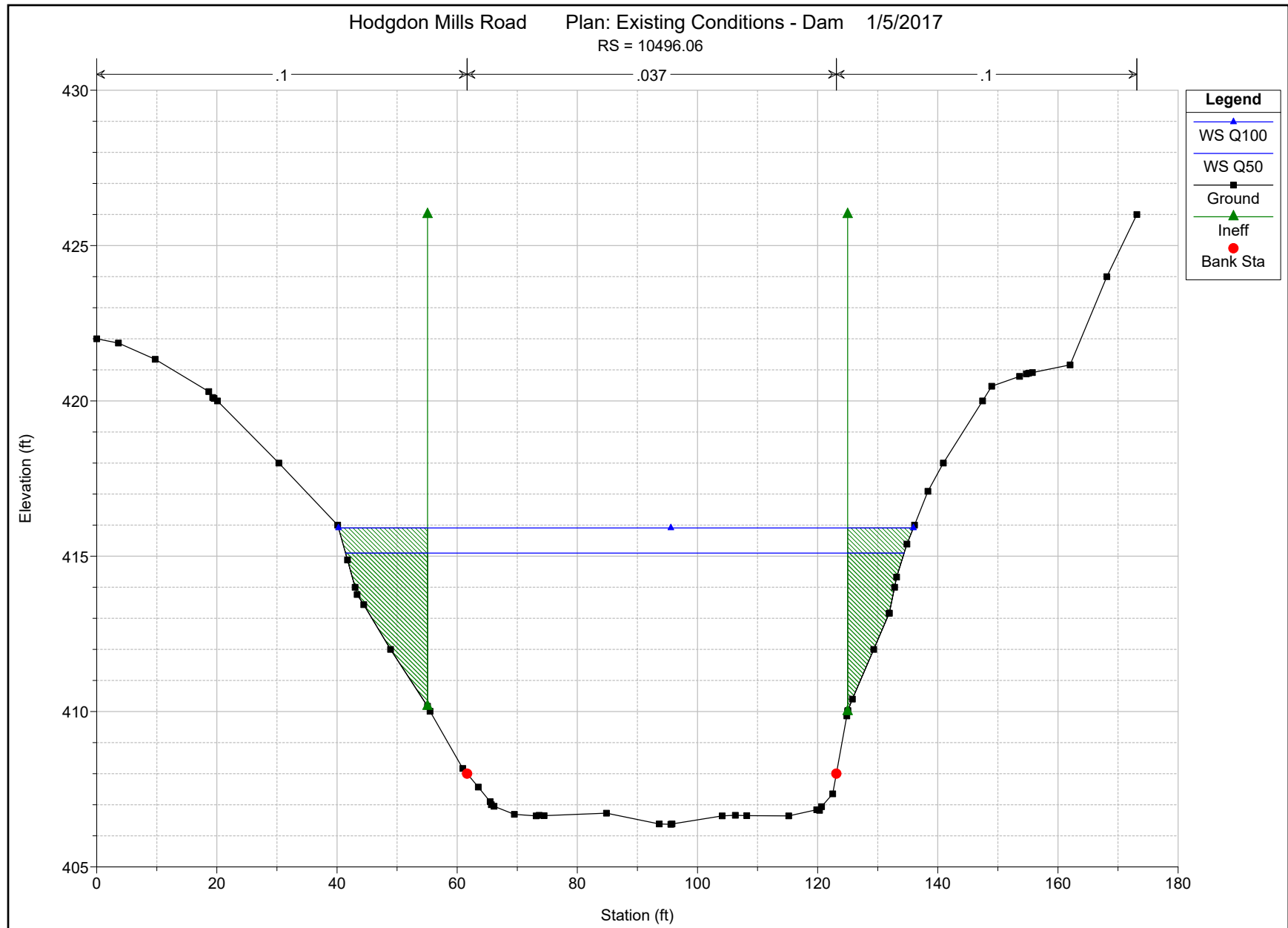
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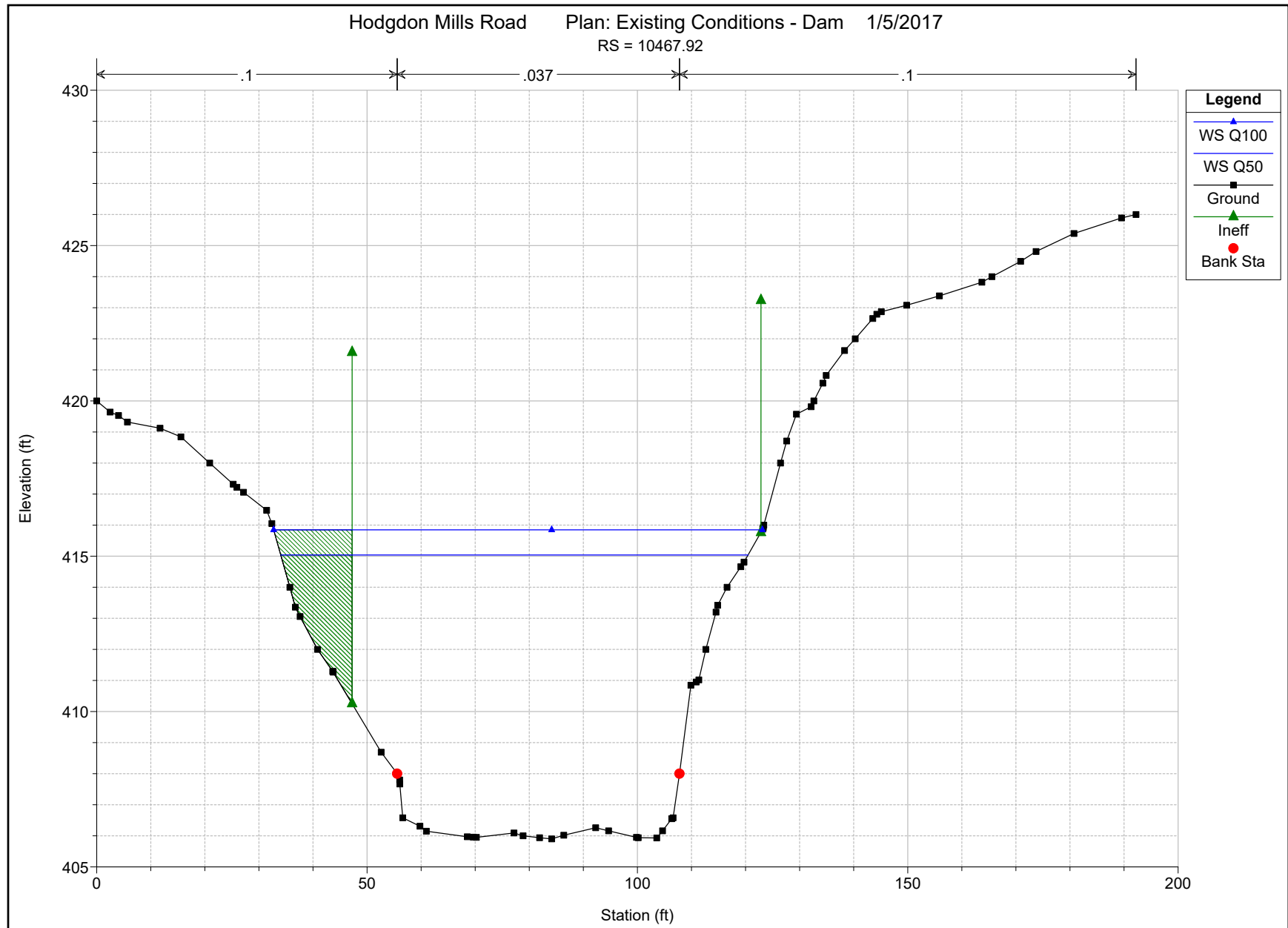
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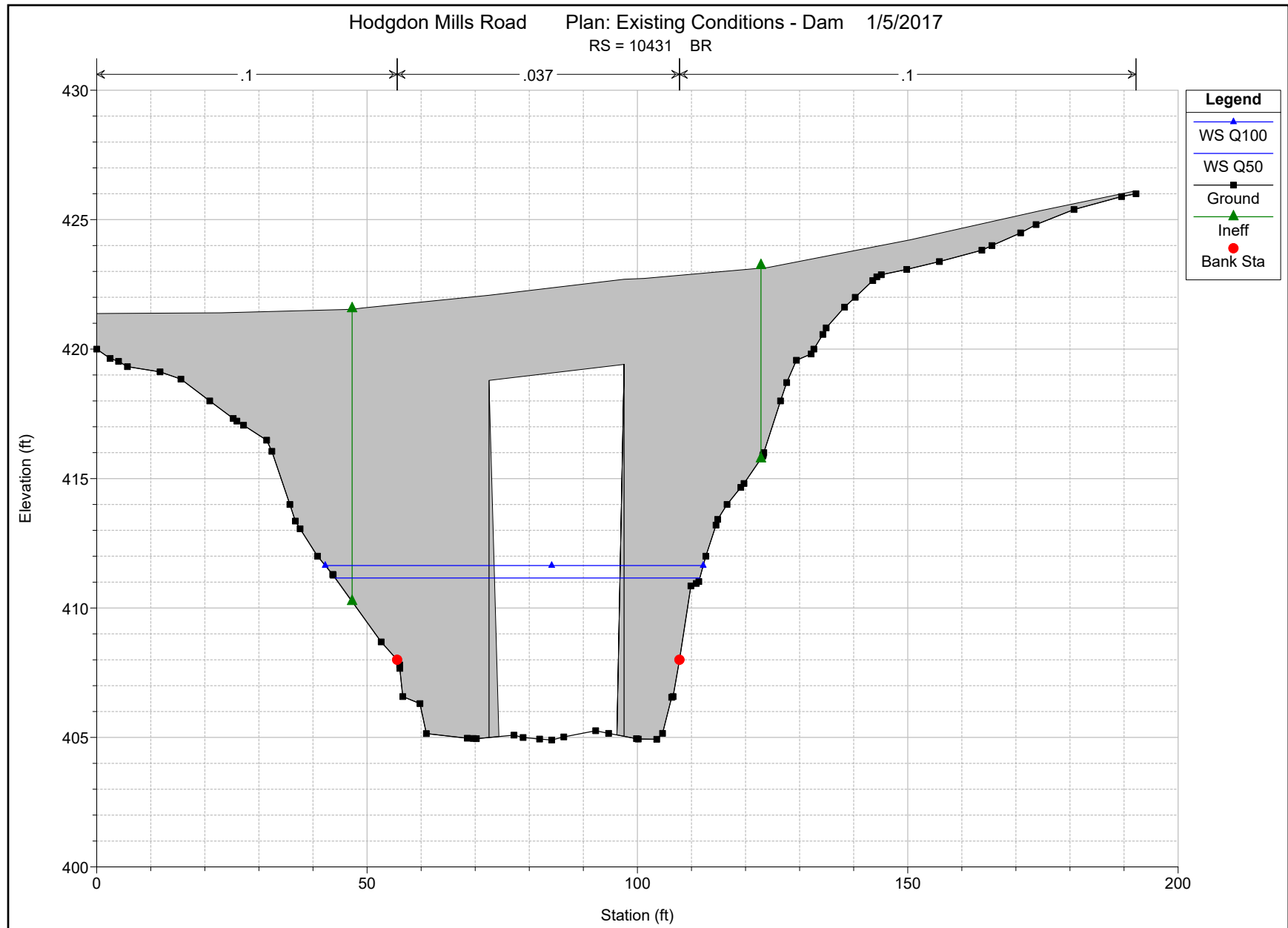
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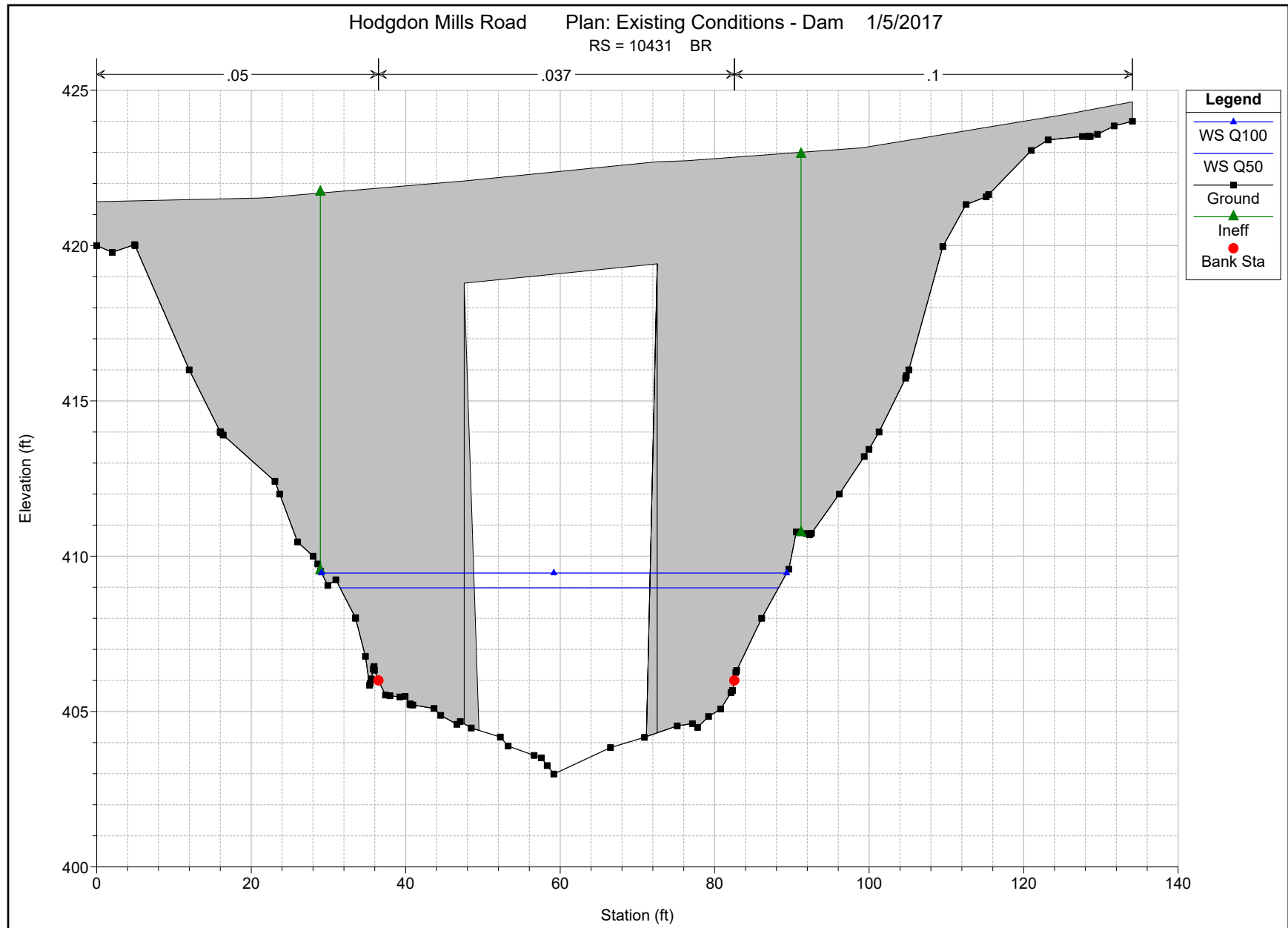
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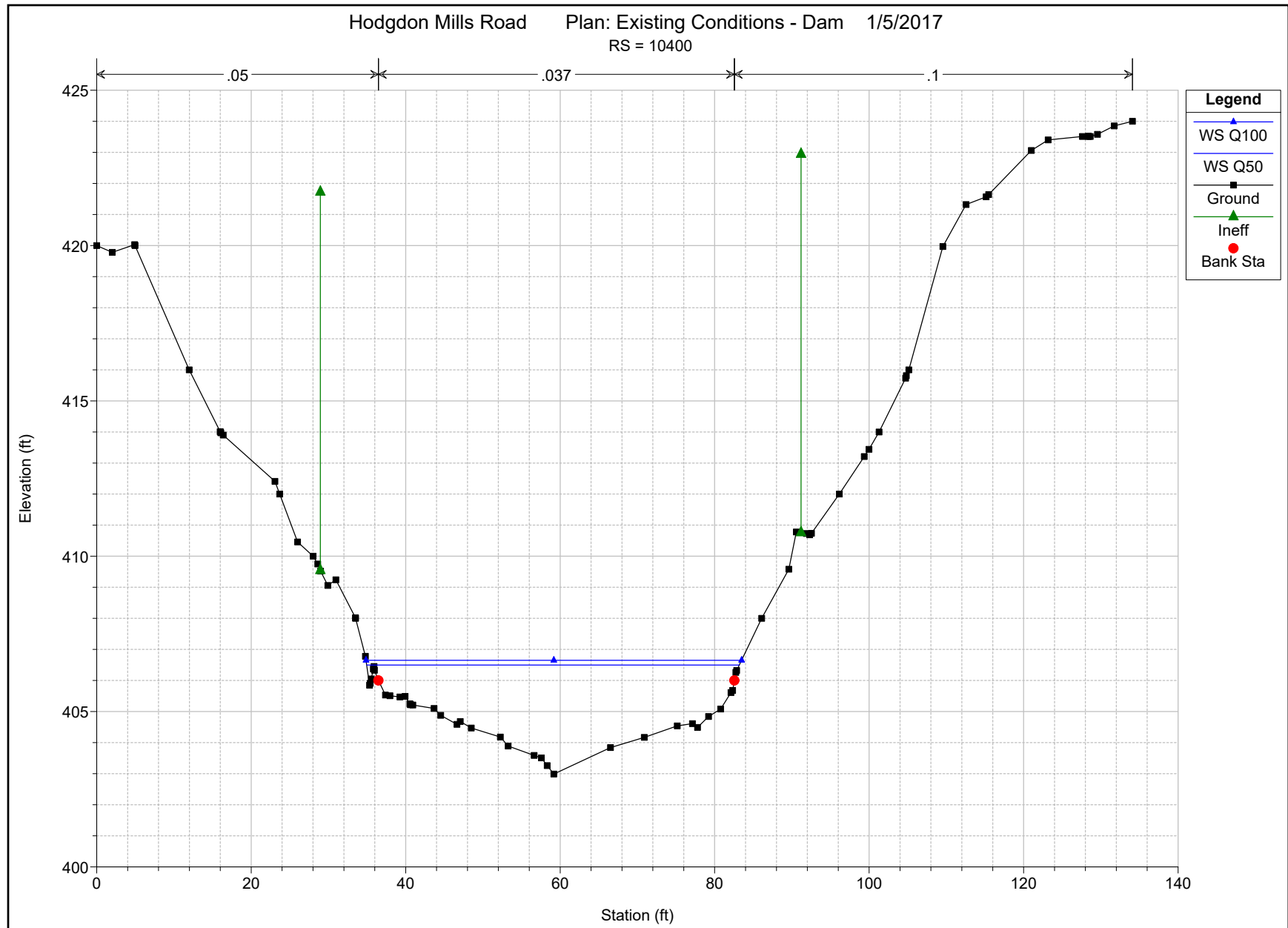
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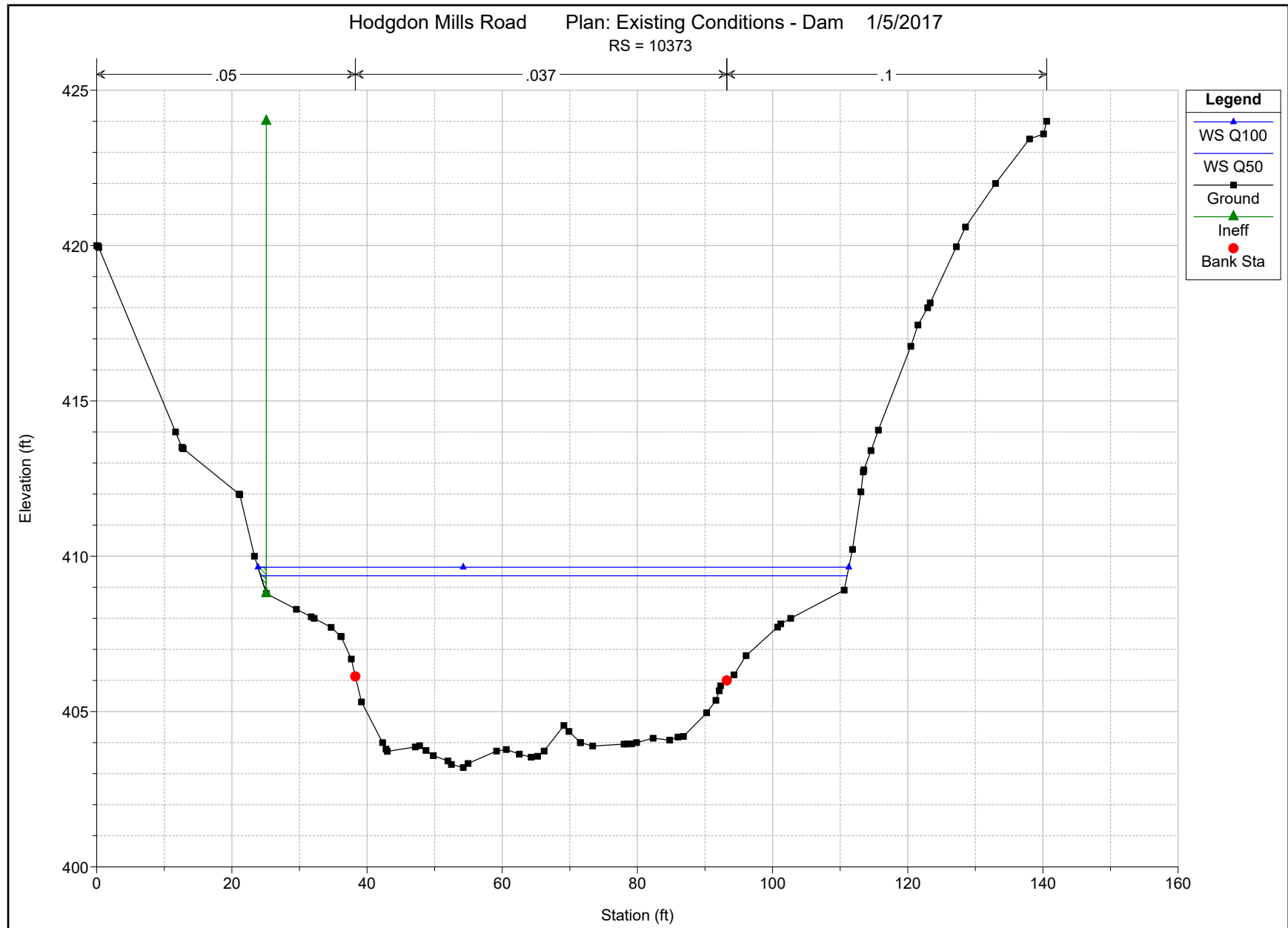
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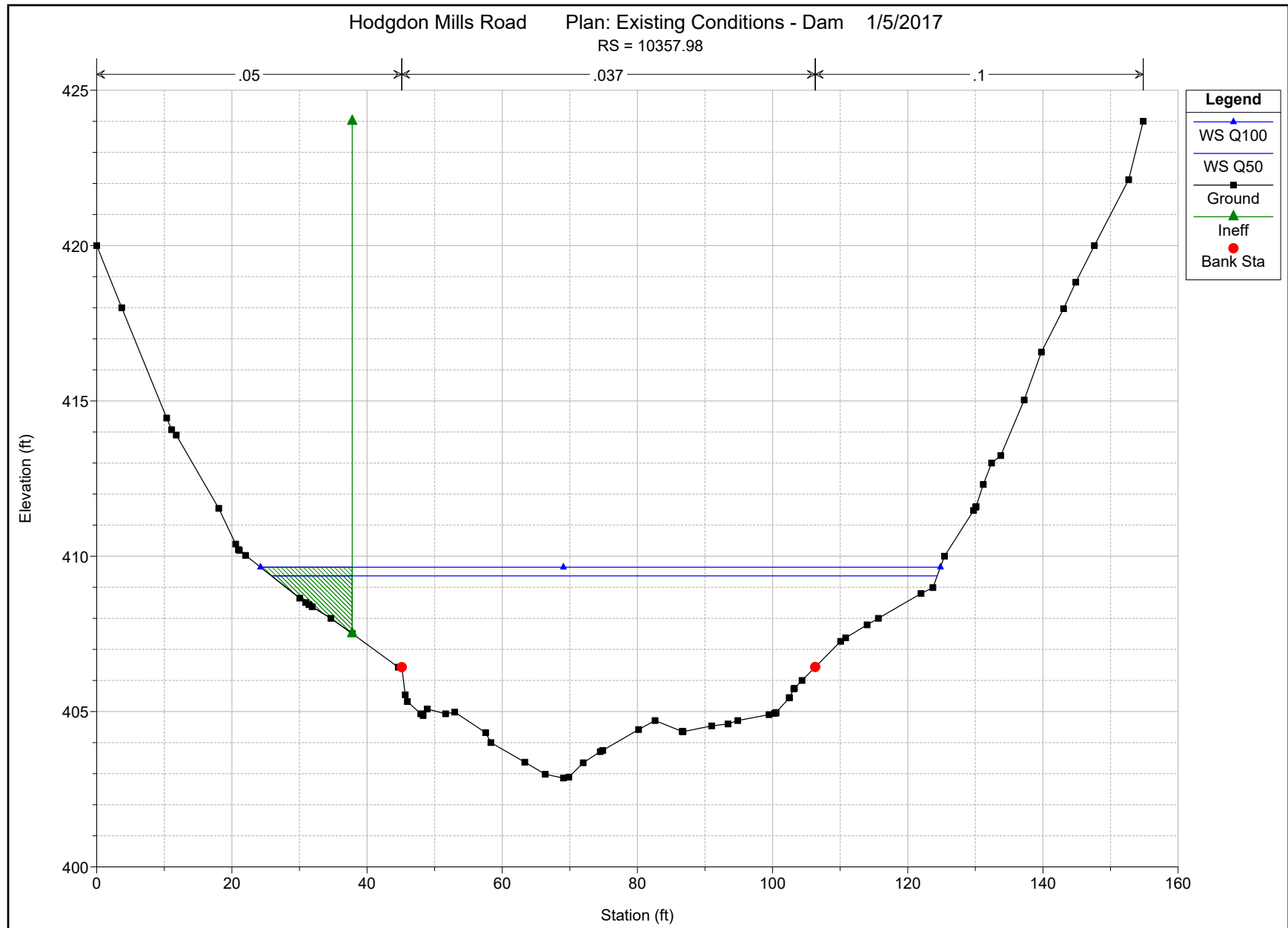
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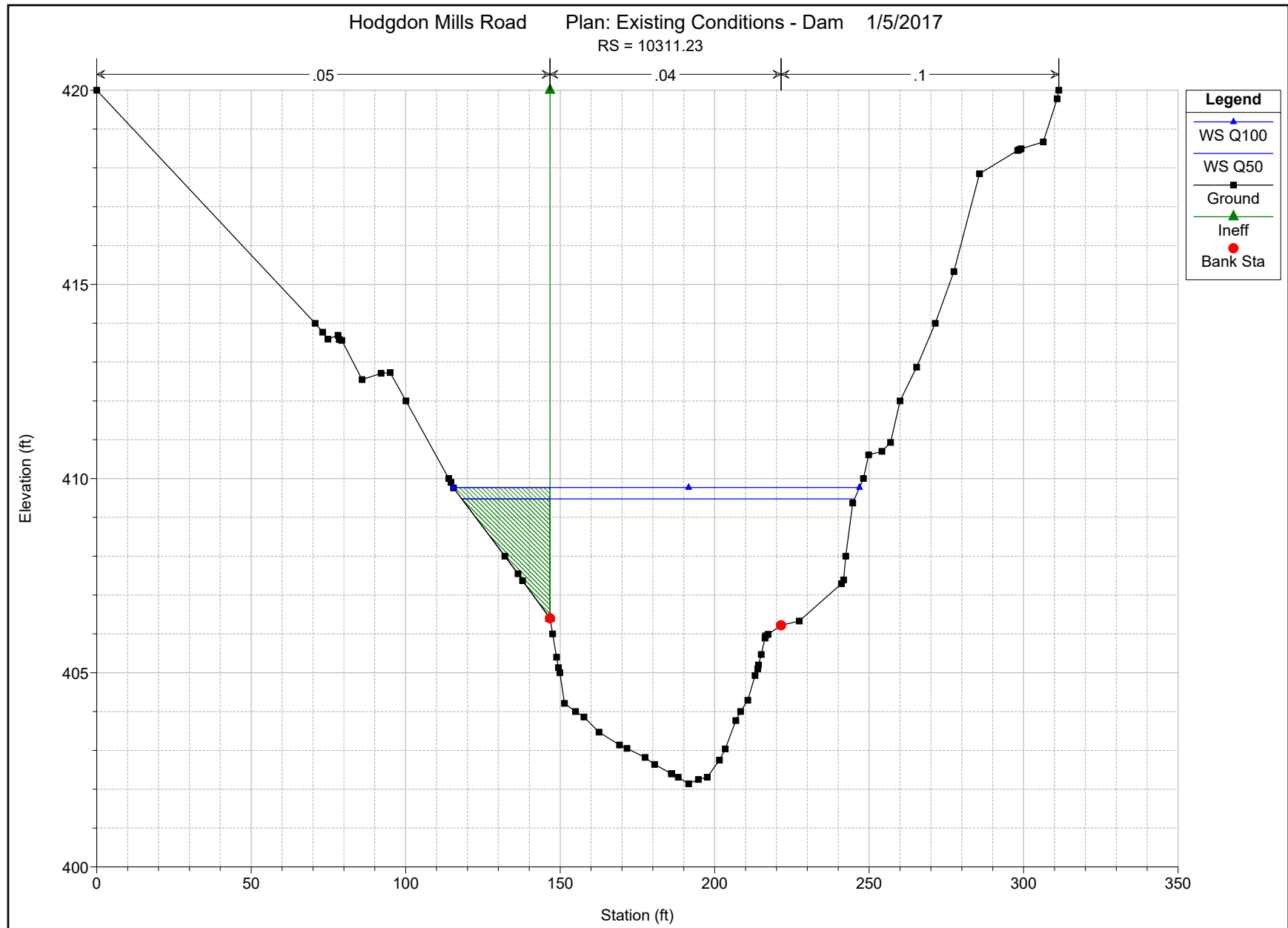
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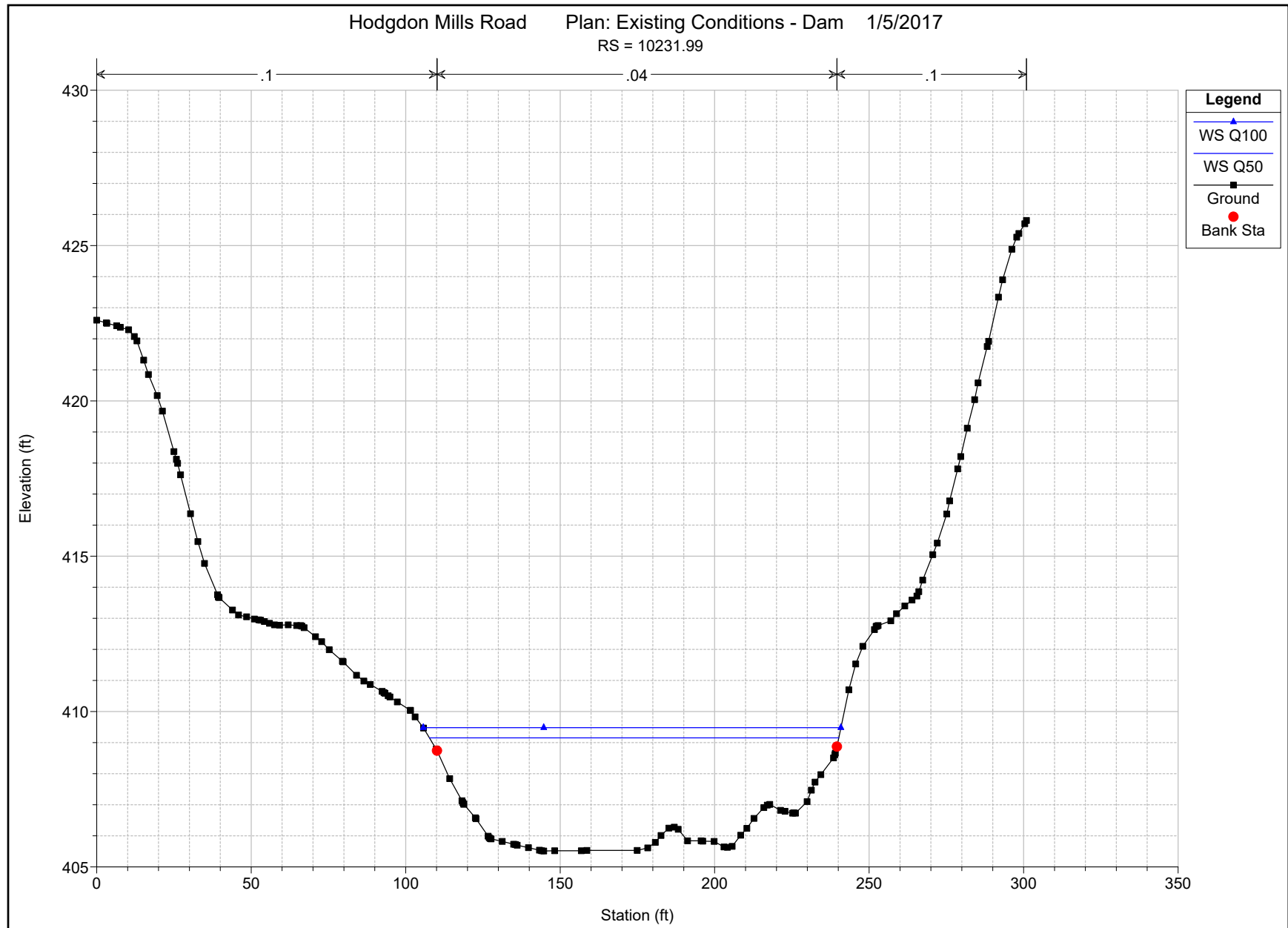
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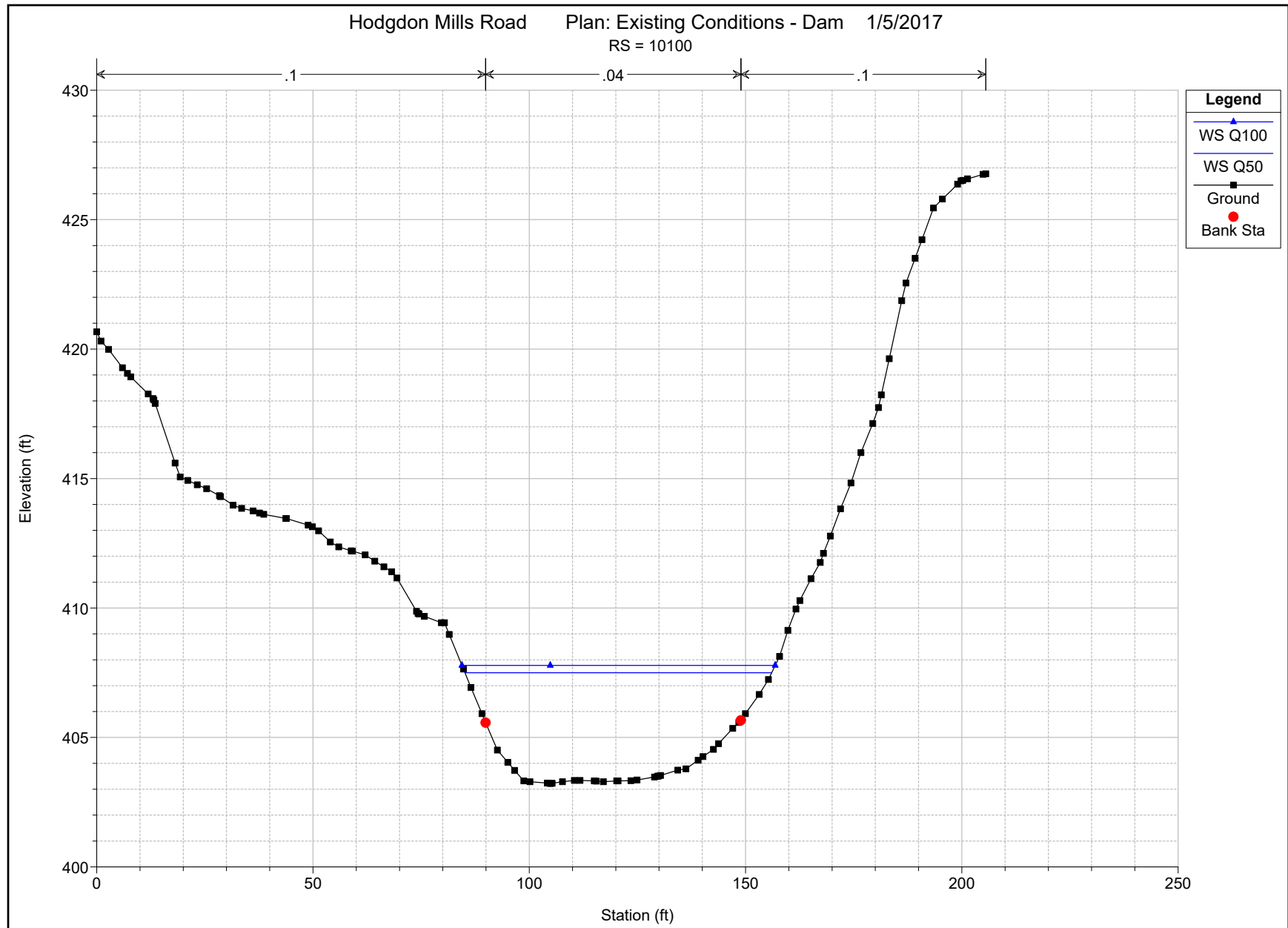
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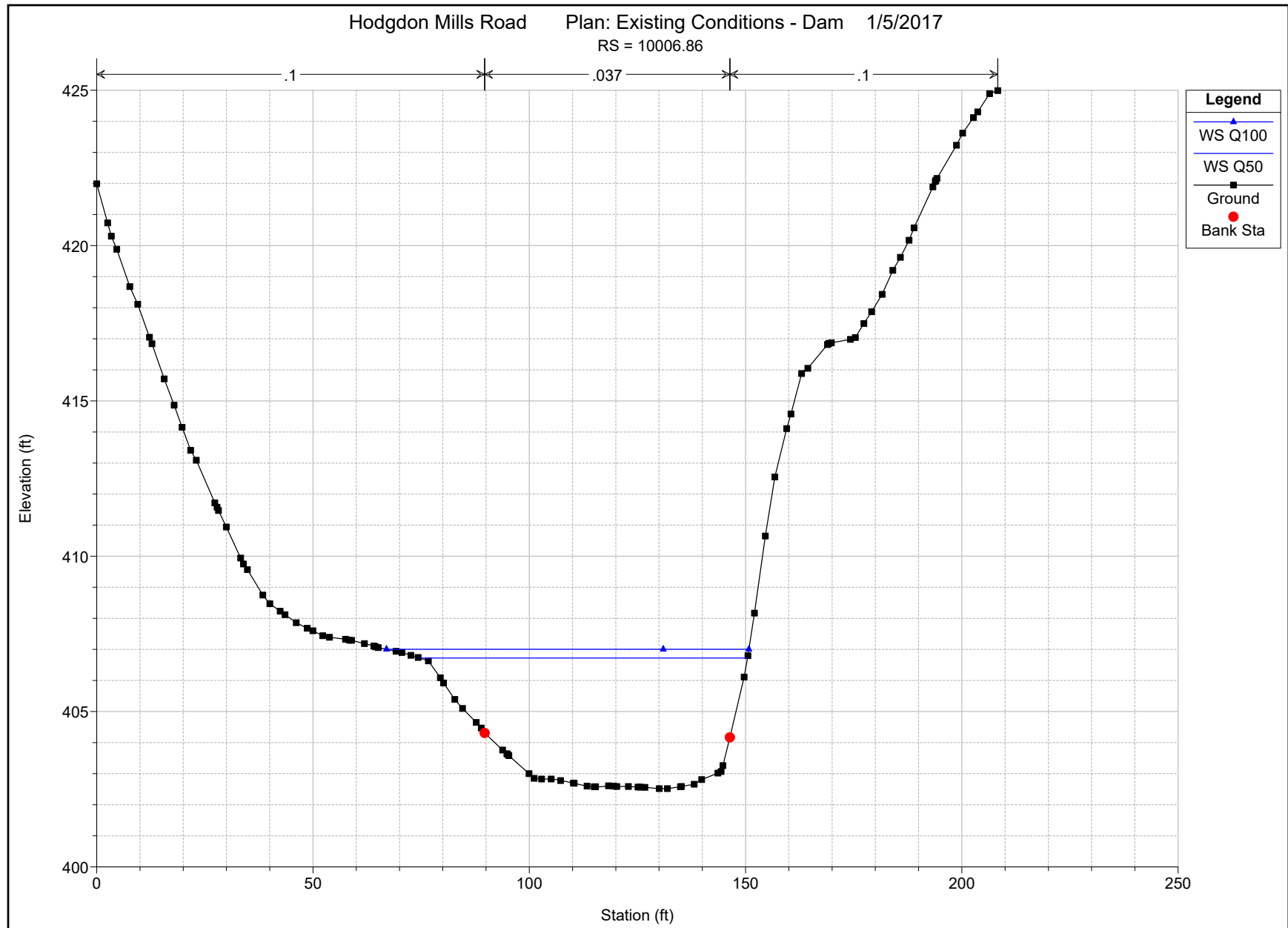
Existing Condition Cross-Sections



Existing Condition Cross-Sections



Existing Condition Cross-Sections



Existing Condition Standard Table

HEC-RAS Plan: Existing Con River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
So. Branch Medux	10650	Q50	1890.10	406.97	416.41	408.92	416.44	0.000150	1.49	1269.46	137.60	0.09
So. Branch Medux	10650	Q100	2128.50	406.97	416.85	409.06	416.89	0.000164	1.60	1330.03	137.72	0.09
So. Branch Medux	10605.83	Q50	1890.10	402.55	416.37	406.86	416.43	0.000202	1.94	975.84	83.10	0.10
So. Branch Medux	10605.83	Q100	2128.50	402.55	416.81	407.08	416.88	0.000230	2.10	1011.90	83.29	0.11
So. Branch Medux	10600		Inl Struct									
So. Branch Medux	10583.45	Q50	1890.10	402.55	415.27	407.08	415.34	0.000207	2.04	1003.43	113.38	0.11
So. Branch Medux	10583.45	Q100	2128.50	402.55	416.09	407.30	416.16	0.000203	2.13	1096.64	115.66	0.11
So. Branch Medux	10538.94	Q50	1890.10	405.47	415.16	409.22	415.32	0.000350	3.19	655.31	99.65	0.19
So. Branch Medux	10538.94	Q100	2128.50	405.47	415.97	409.47	416.13	0.000328	3.27	738.09	104.47	0.19
So. Branch Medux	10496.06	Q50	1890.10	406.37	415.10	409.80	415.29	0.000469	3.57	566.50	92.97	0.22
So. Branch Medux	10496.06	Q100	2128.50	406.37	415.91	410.07	416.11	0.000436	3.66	623.18	95.70	0.21
So. Branch Medux	10467.92	Q50	1890.10	405.90	415.04	409.59	415.27	0.000535	3.91	546.48	86.44	0.23
So. Branch Medux	10467.92	Q100	2128.50	405.90	415.85	409.88	416.09	0.000503	4.02	606.78	90.39	0.23
So. Branch Medux	10431		Bridge									
So. Branch Medux	10400	Q50	1890.10	402.99	406.50	408.09	412.13	0.082935	19.05	99.76	48.24	2.29
So. Branch Medux	10400	Q100	2128.50	402.99	406.65	408.40	412.86	0.083470	20.01	107.20	48.63	2.32
So. Branch Medux	10373	Q50	1890.10	403.20	409.37	407.39	409.96	0.002655	6.22	340.62	86.77	0.48
So. Branch Medux	10373	Q100	2128.50	403.20	409.65	407.67	410.30	0.002805	6.62	364.35	87.43	0.49
So. Branch Medux	10357.98	Q50	1890.10	402.86	409.37	407.53	409.90	0.002654	5.96	348.87	98.51	0.47
So. Branch Medux	10357.98	Q100	2128.50	402.86	409.65	407.79	410.24	0.002778	6.32	373.08	100.61	0.49
So. Branch Medux	10311.23	Q50	1890.10	402.14	409.48	406.26	409.74	0.001178	4.14	503.05	127.14	0.30
So. Branch Medux	10311.23	Q100	2128.50	402.14	409.77	406.50	410.07	0.001267	4.43	532.12	131.47	0.31
So. Branch Medux	10231.99	Q50	1890.10	405.51	409.15	408.05	409.54	0.004392	5.01	377.91	132.48	0.52
So. Branch Medux	10231.99	Q100	2128.50	405.51	409.48	408.22	409.88	0.003903	5.07	421.74	135.16	0.50
So. Branch Medux	10100	Q50	1890.10	403.22	407.50	406.96	408.62	0.009302	8.55	230.78	70.92	0.78
So. Branch Medux	10100	Q100	2128.50	403.22	407.78	407.23	409.01	0.009179	8.92	251.20	72.43	0.79

Existing Condition Standard Table

HEC-RAS Plan: Existing Con River: So Branch Meduxn Reach: So. Branch Medux (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
So. Branch Medux	10006.86	Q50	1890.10	402.52	406.72	406.16	407.84	0.007614	8.55	240.10	75.74	0.77
So. Branch Medux	10006.86	Q100	2128.50	402.52	407.00	406.43	408.23	0.007601	8.95	262.50	83.76	0.78

Existing Condition Four Inline Structure Table

HEC-RAS Plan: Existing Con River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
So. Branch Medux	10650	Q50	416.44	416.41	0.03	0.01	0.00		1890.10		137.60
So. Branch Medux	10650	Q100	416.89	416.85	0.04	0.01	0.00		2128.50		137.72
So. Branch Medux	10605.83	Q50	416.43	416.37	0.06				1890.10		83.10
So. Branch Medux	10605.83	Q100	416.88	416.81	0.07				2128.50		83.29
So. Branch Medux	10600		Inl Struct								
So. Branch Medux	10583.45	Q50	415.34	415.27	0.06	0.01	0.01	14.90	1846.05	29.16	113.38
So. Branch Medux	10583.45	Q100	416.16	416.09	0.07	0.01	0.01	19.57	2069.08	39.85	115.66
So. Branch Medux	10538.94	Q50	415.32	415.16	0.15	0.02	0.00	32.99	1852.63	4.48	99.65
So. Branch Medux	10538.94	Q100	416.13	415.97	0.16	0.02	0.00	42.39	2074.86	11.26	104.47

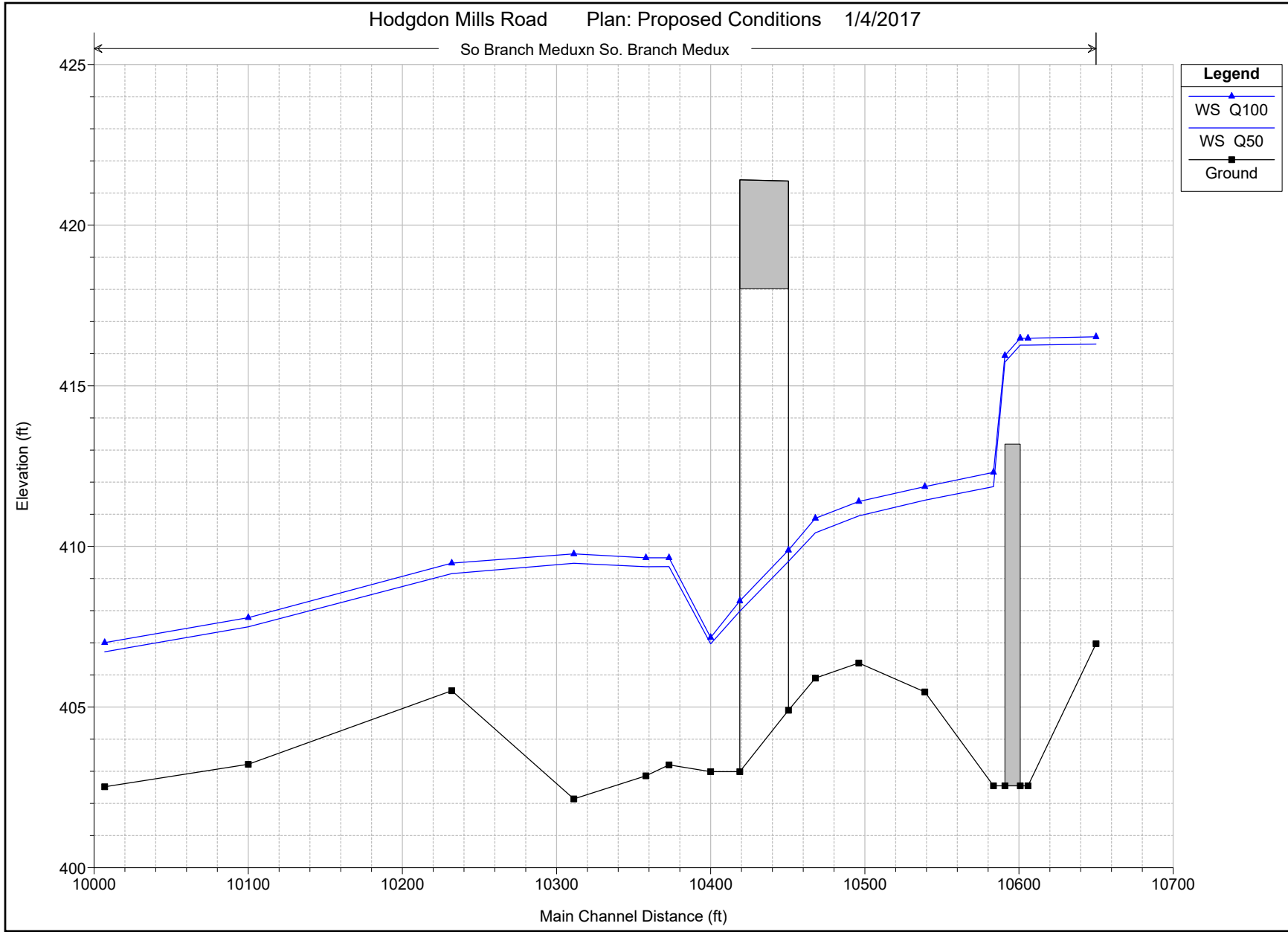
Existing Condition

Six Bridge Cross-Section Table

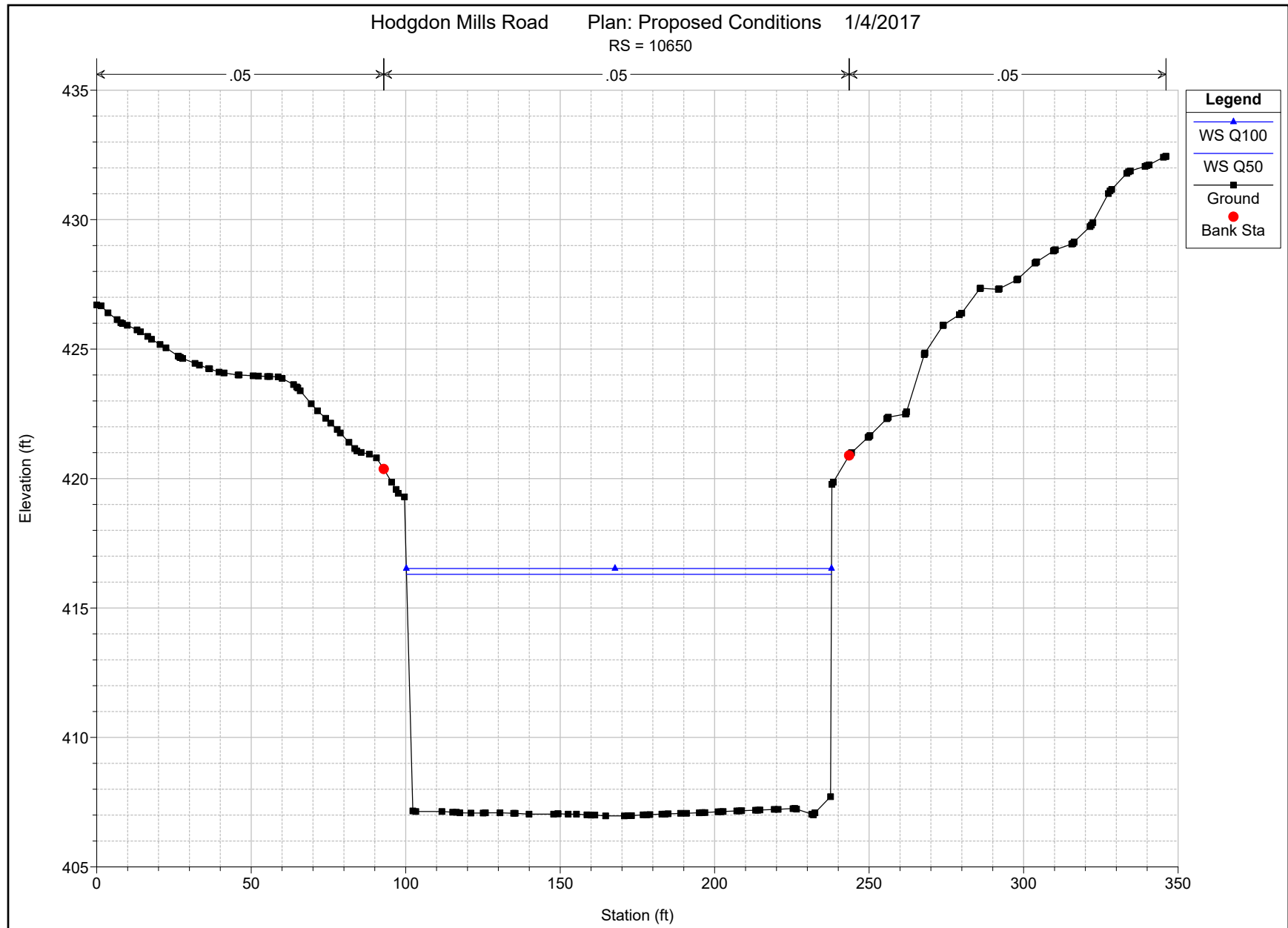
HEC-RAS Plan: Existing Con River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
So. Branch Medux	10496.06	Q50	415.29	415.10	409.80	0.01	0.01	92.97	41.26	1839.22	9.62	3.57
So. Branch Medux	10496.06	Q100	416.11	415.91	410.07	0.01	0.01	95.70	49.04	2068.04	11.42	3.66
So. Branch Medux	10467.92	Q50	415.27	415.04	409.59	0.08	1.09	86.44	54.96	1817.06	18.08	3.91
So. Branch Medux	10467.92	Q100	416.09	415.85	409.88	0.07	1.18	90.39	65.86	2036.38	26.27	4.02
So. Branch Medux	10431 BR U	Q50	414.11	411.16	411.16	0.44	0.02	23.21		1890.10		13.77
So. Branch Medux	10431 BR U	Q100	414.83	411.64	411.64	0.44	0.01	23.32		2128.50		14.33
So. Branch Medux	10431 BR D	Q50	413.09	408.98	409.86	0.93	0.02	22.72		1890.10		16.25
So. Branch Medux	10431 BR D	Q100	413.81	409.46	410.37	0.93	0.02	22.83		2128.50		16.74
So. Branch Medux	10400	Q50	412.13	406.50	408.09	0.17	0.02	48.24	1.55	1888.40	0.15	19.05
So. Branch Medux	10400	Q100	412.86	406.65	408.40	0.19	0.02	48.63	2.85	2125.28	0.37	20.01
So. Branch Medux	10373	Q50	409.96	409.37	407.39	0.04	0.01	86.77	35.21	1825.13	29.76	6.22
So. Branch Medux	10373	Q100	410.30	409.65	407.67	0.04	0.02	87.43	48.69	2040.50	39.31	6.62

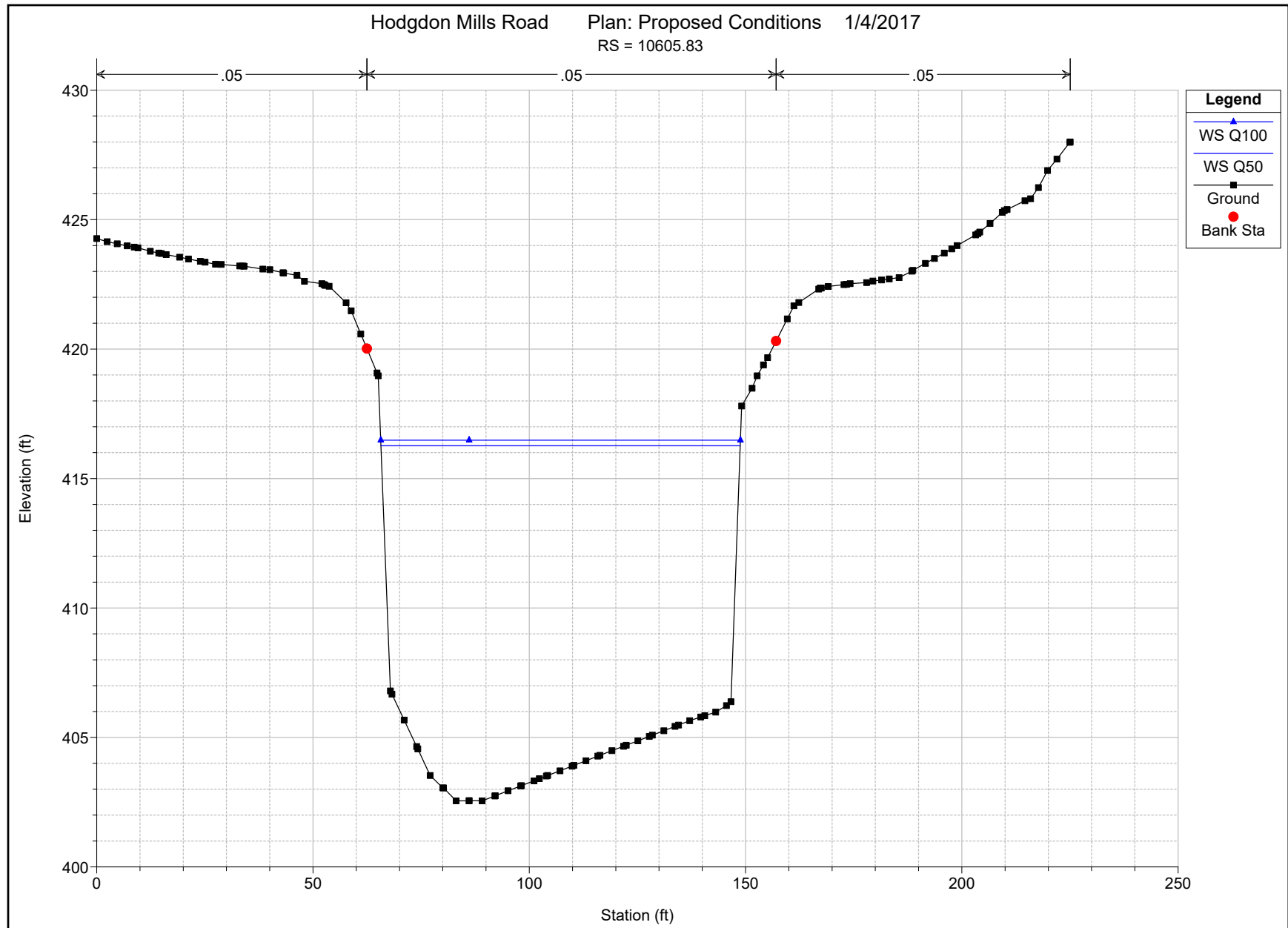
Proposed Condition Water Surface Profile



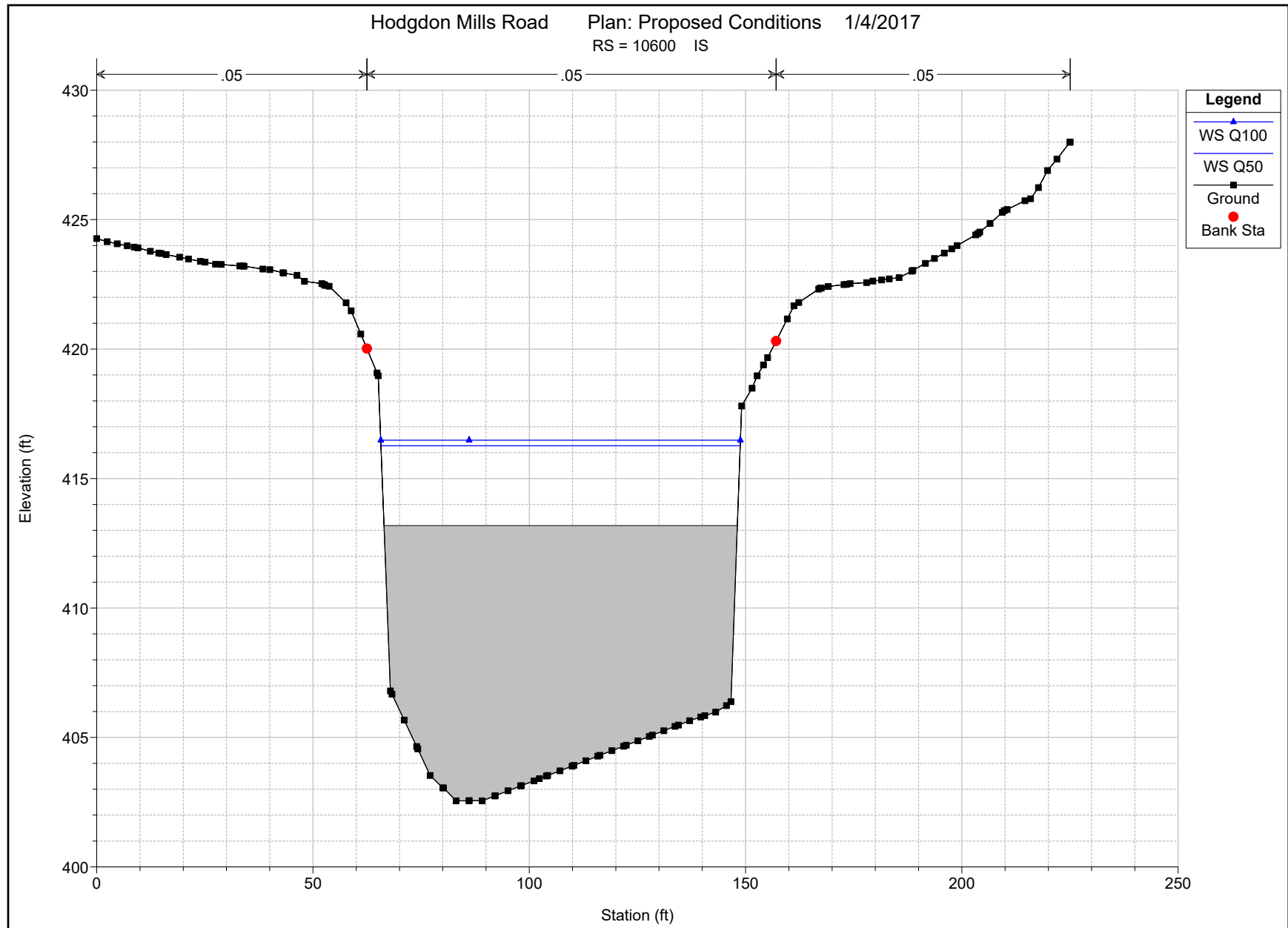
Proposed Condition Cross-Sections



Proposed Condition Cross-Sections



Proposed Condition Cross-Sections

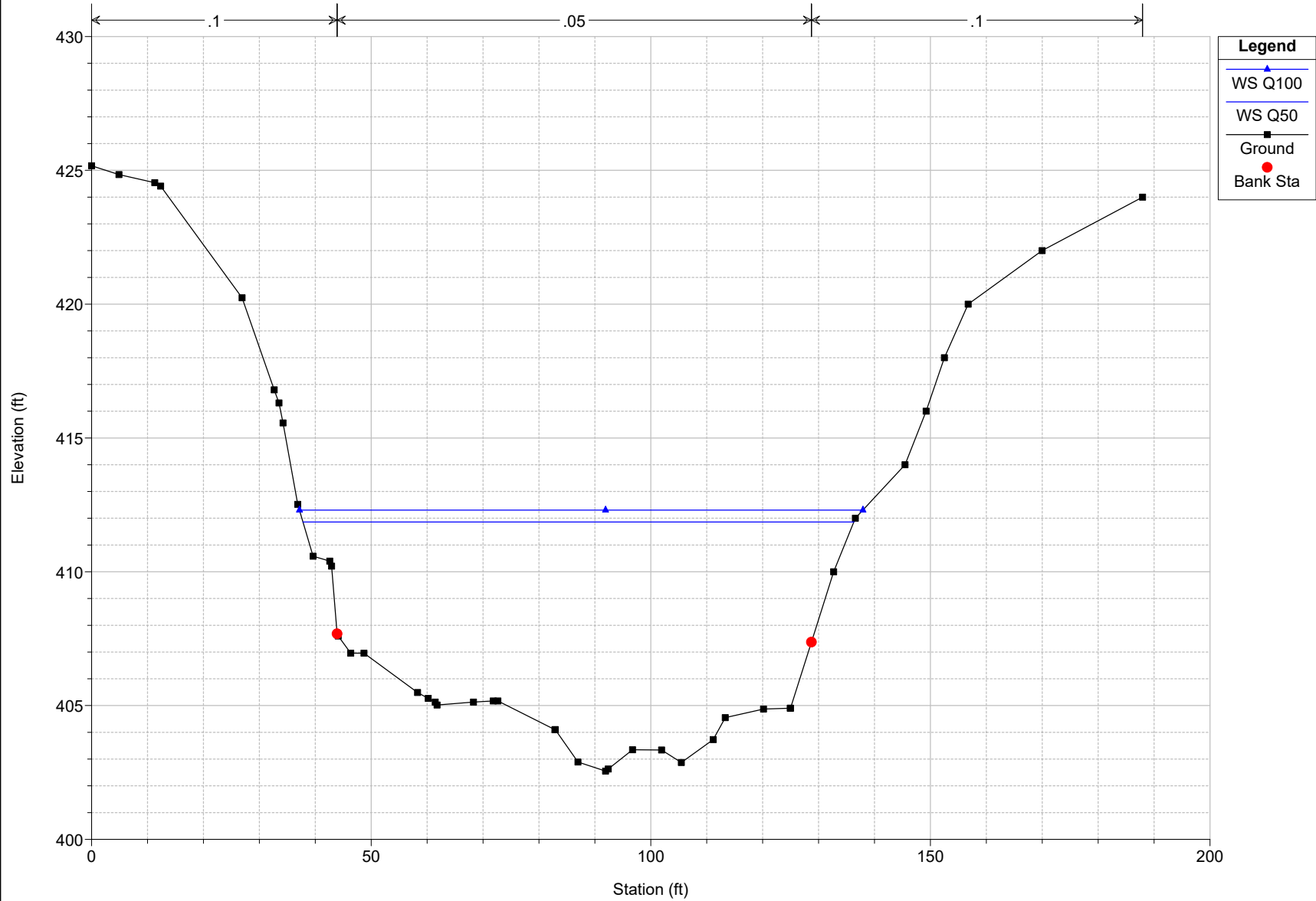


Proposed Condition Cross-Sections

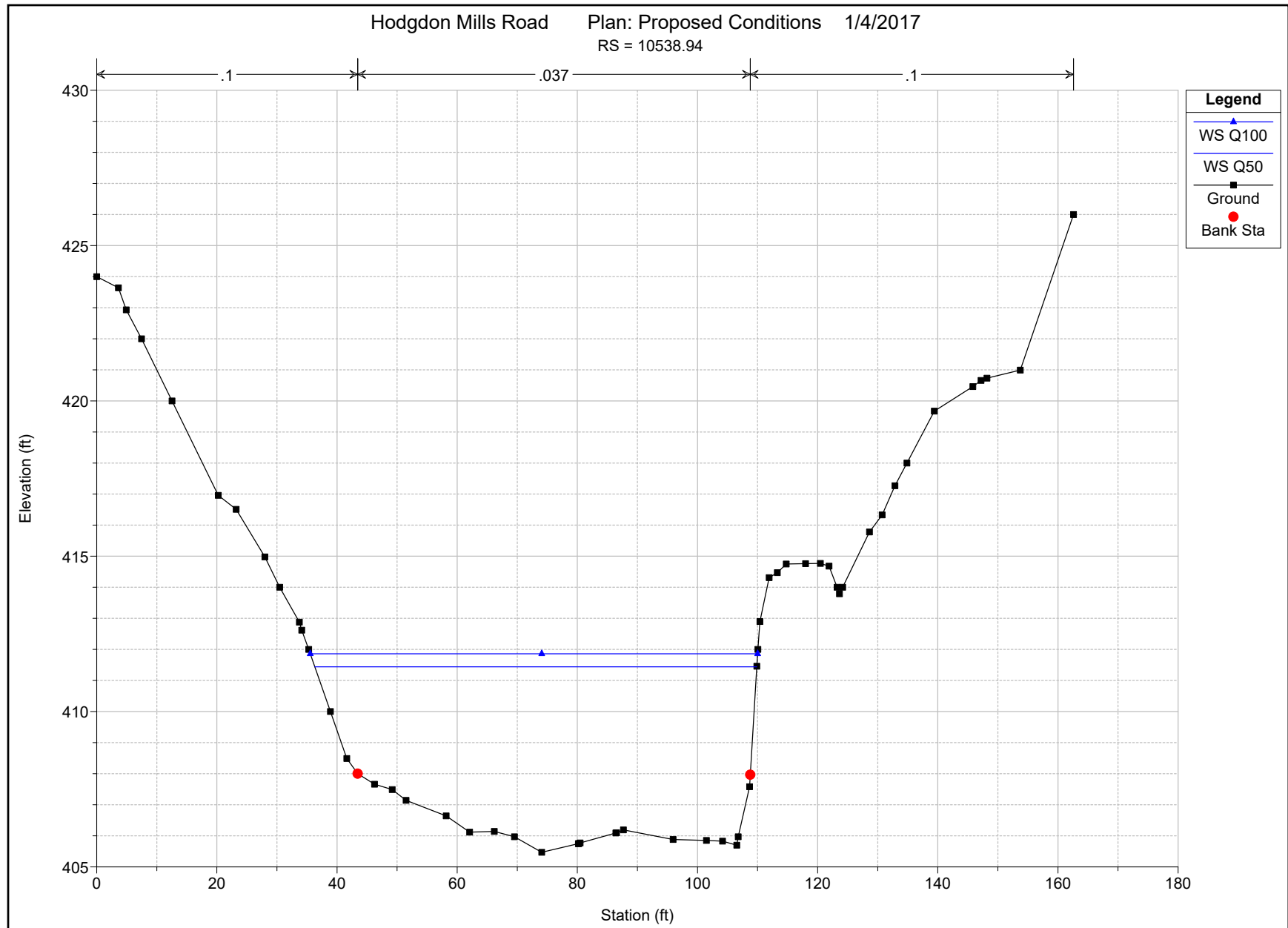
Hodgdon Mills Road

Plan: Proposed Conditions 1/4/2017

RS = 10583.45



Proposed Condition Cross-Sections

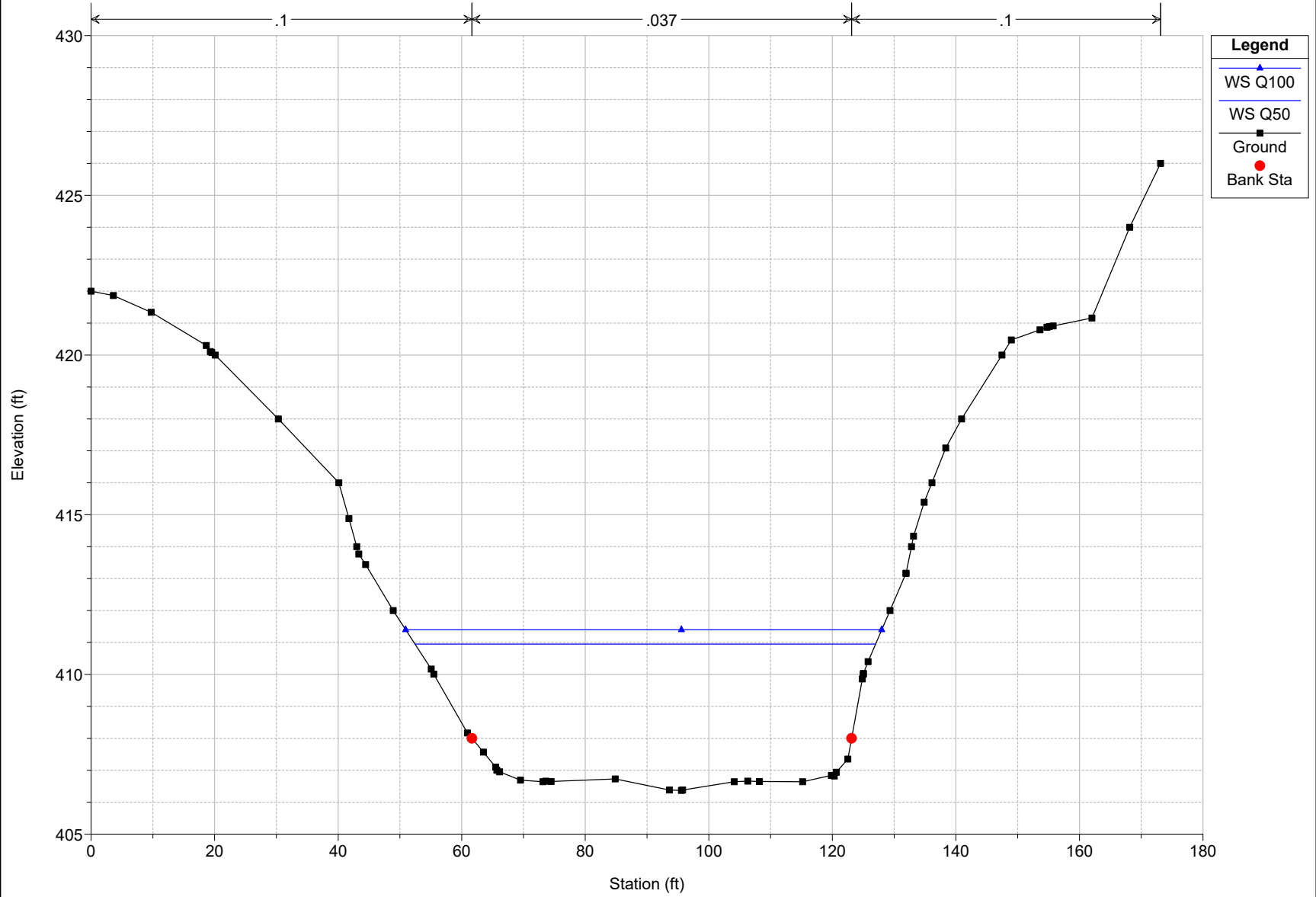


Proposed Condition Cross-Sections

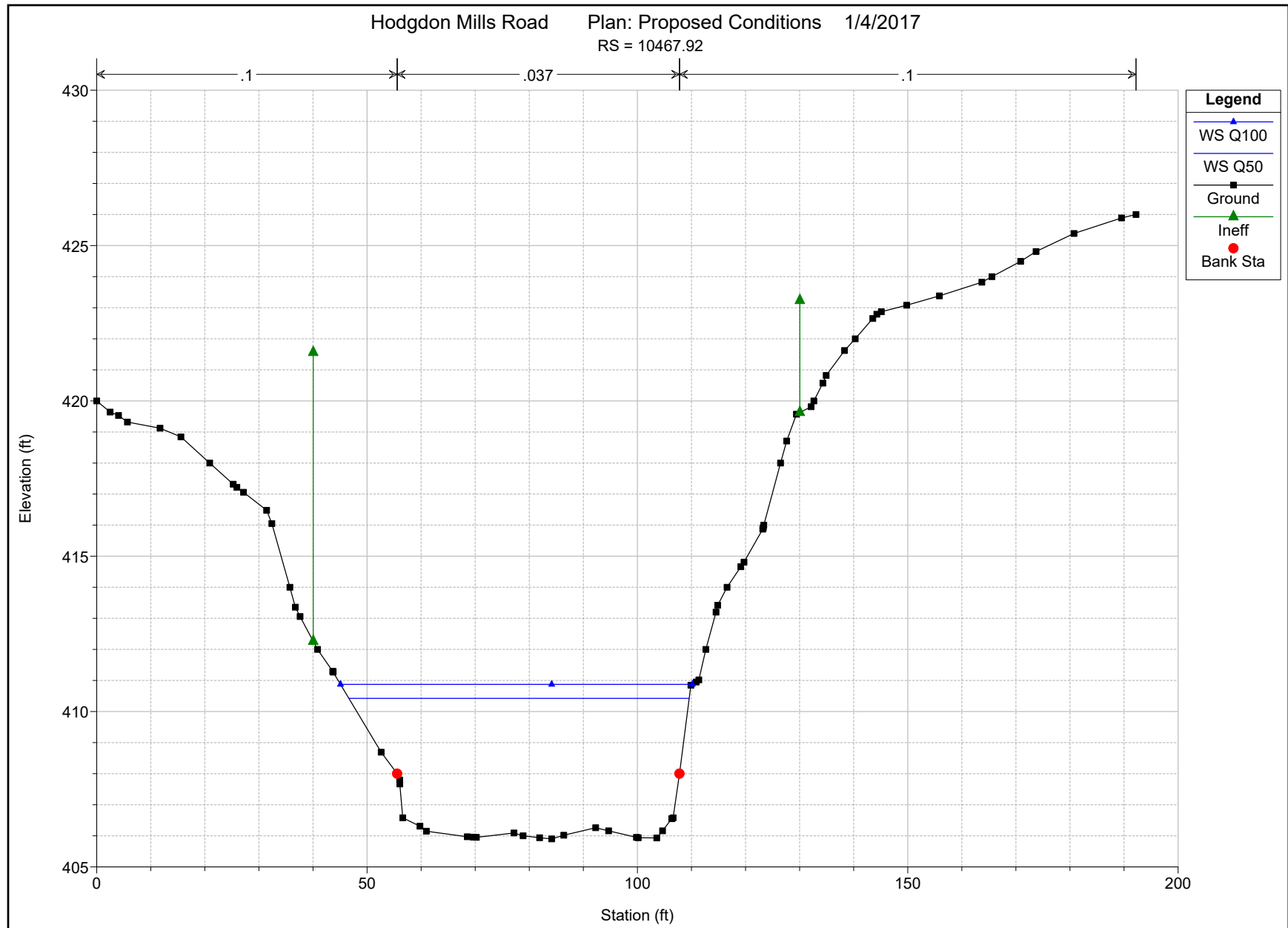
Hodgdon Mills Road

Plan: Proposed Conditions 1/4/2017

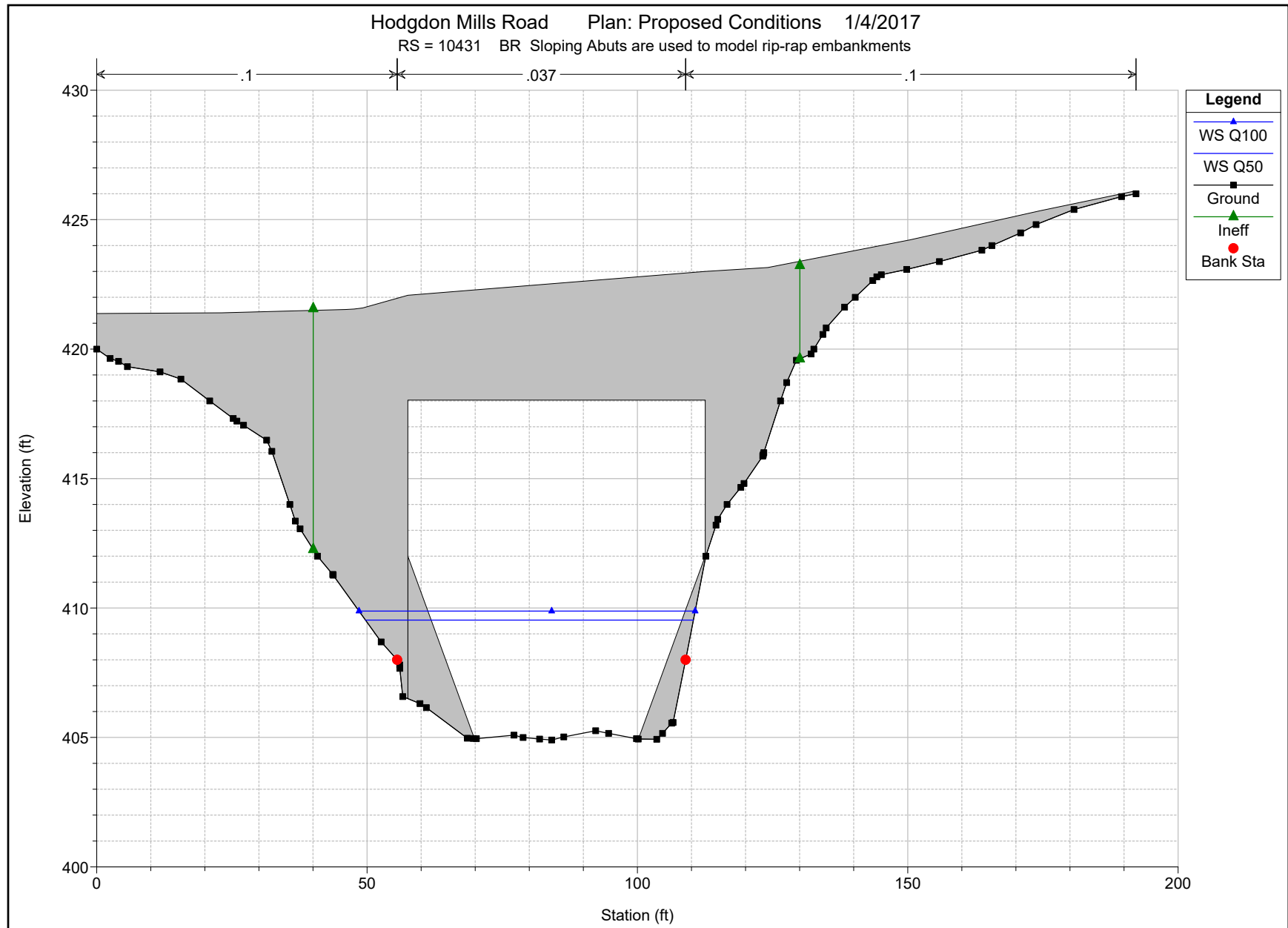
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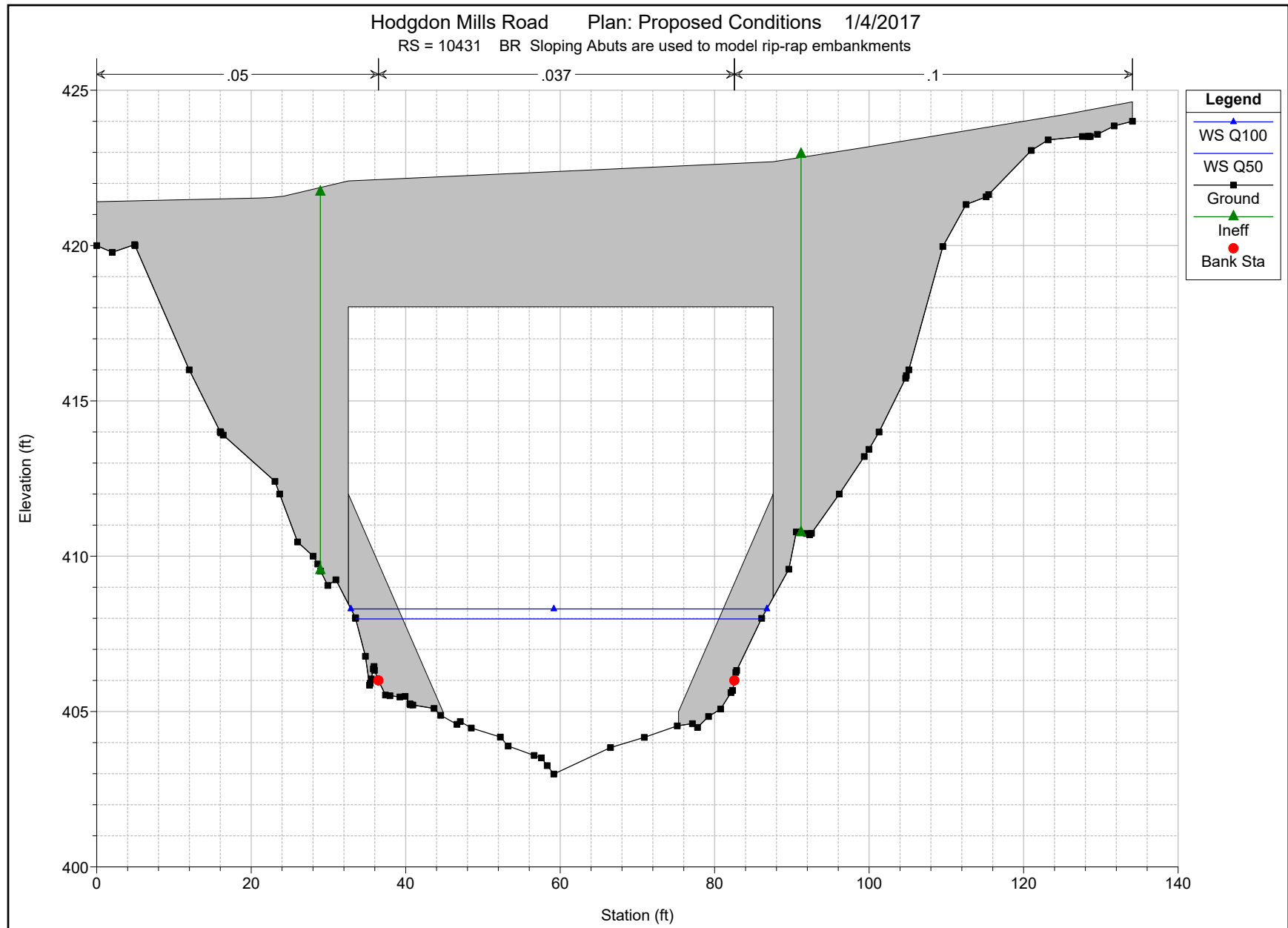
Proposed Condition Cross-Sections



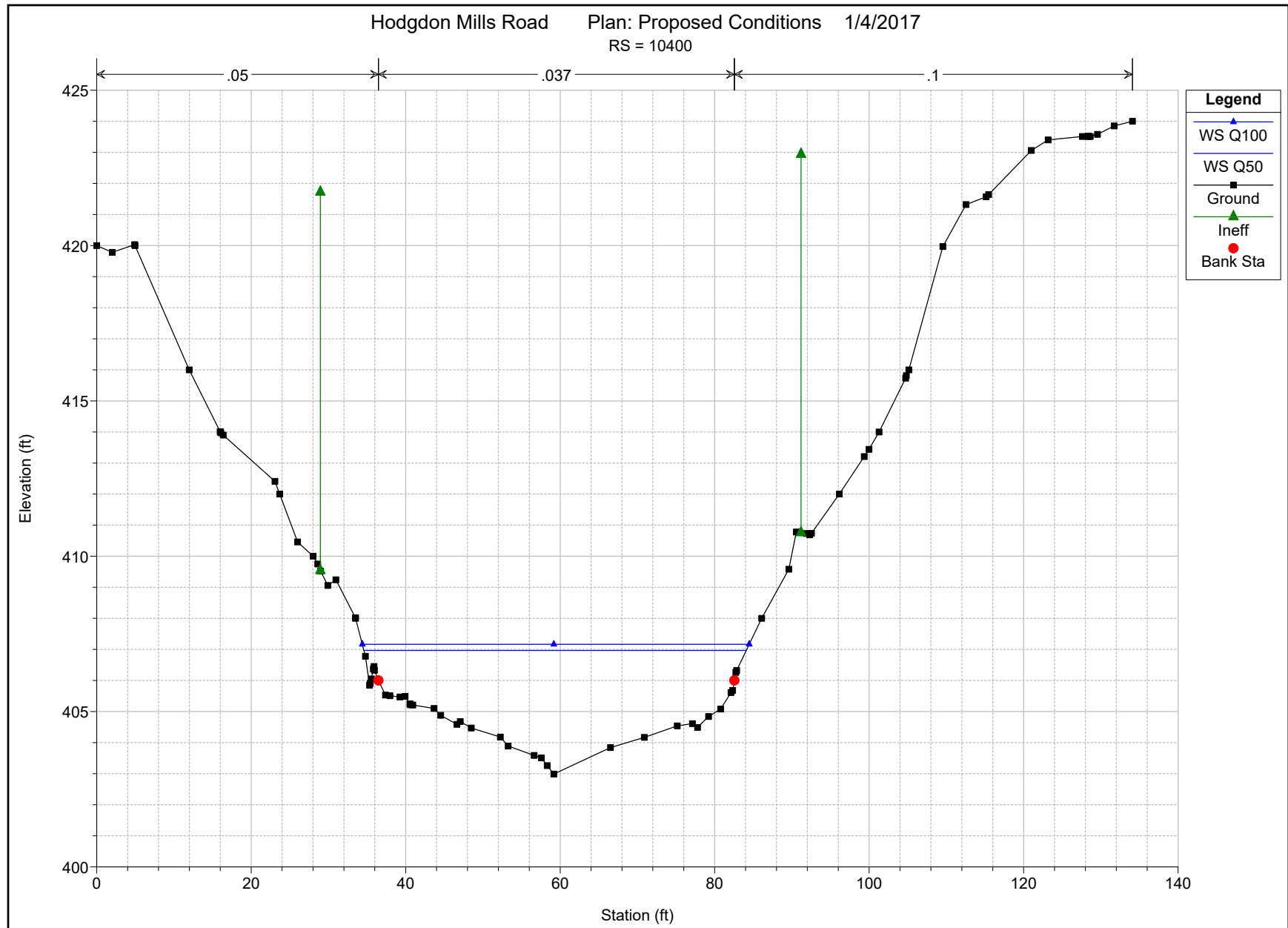
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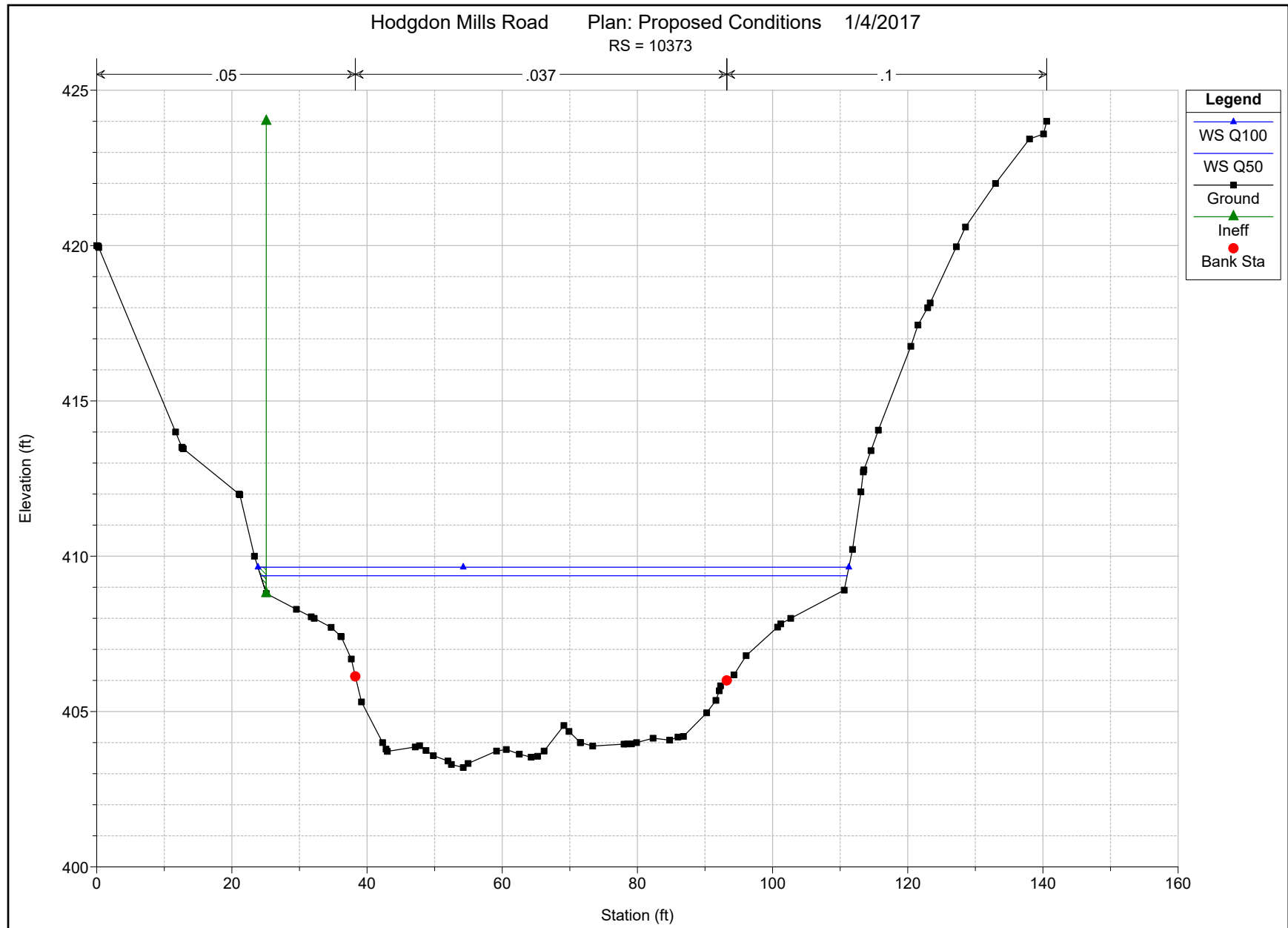
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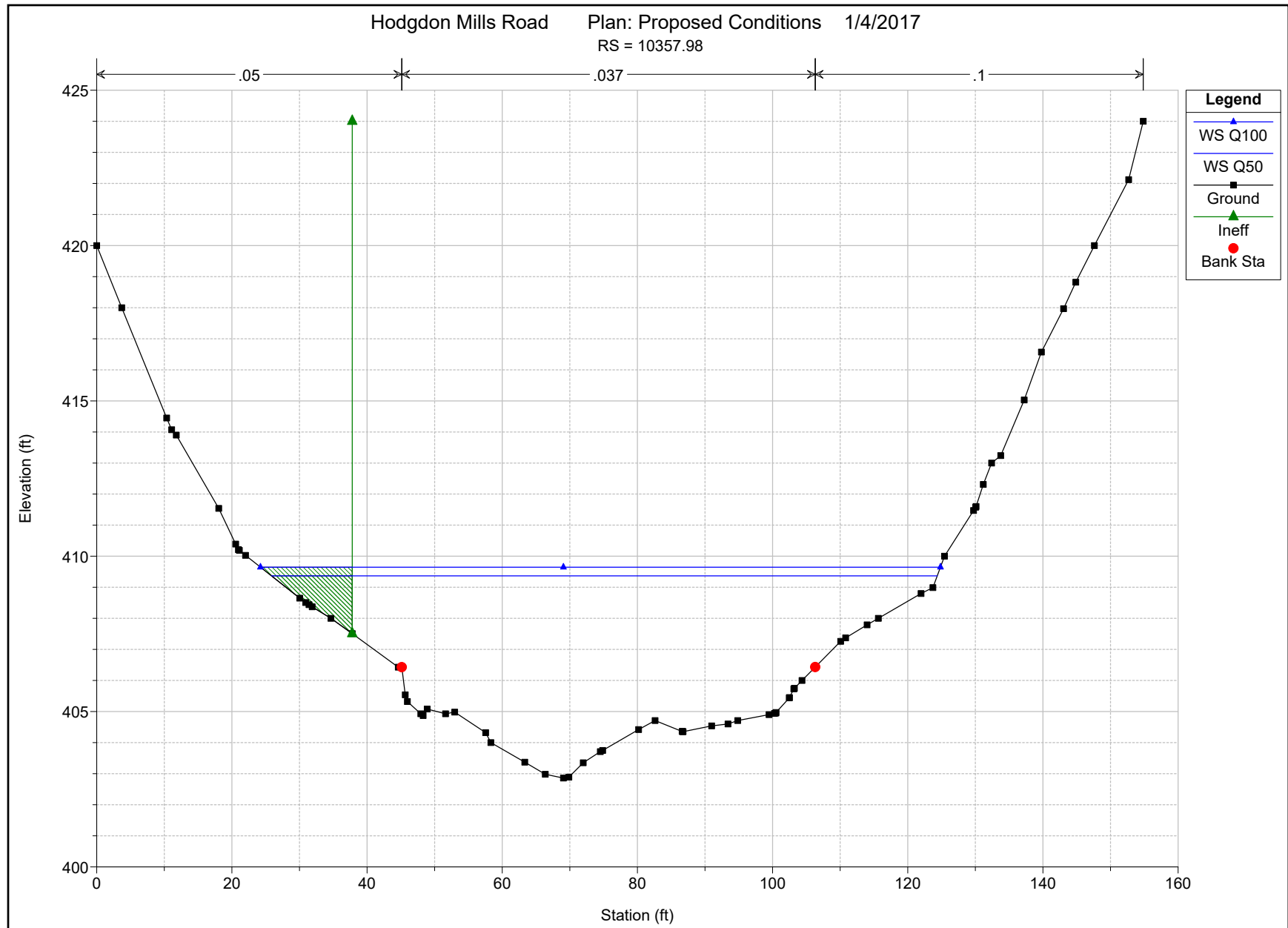
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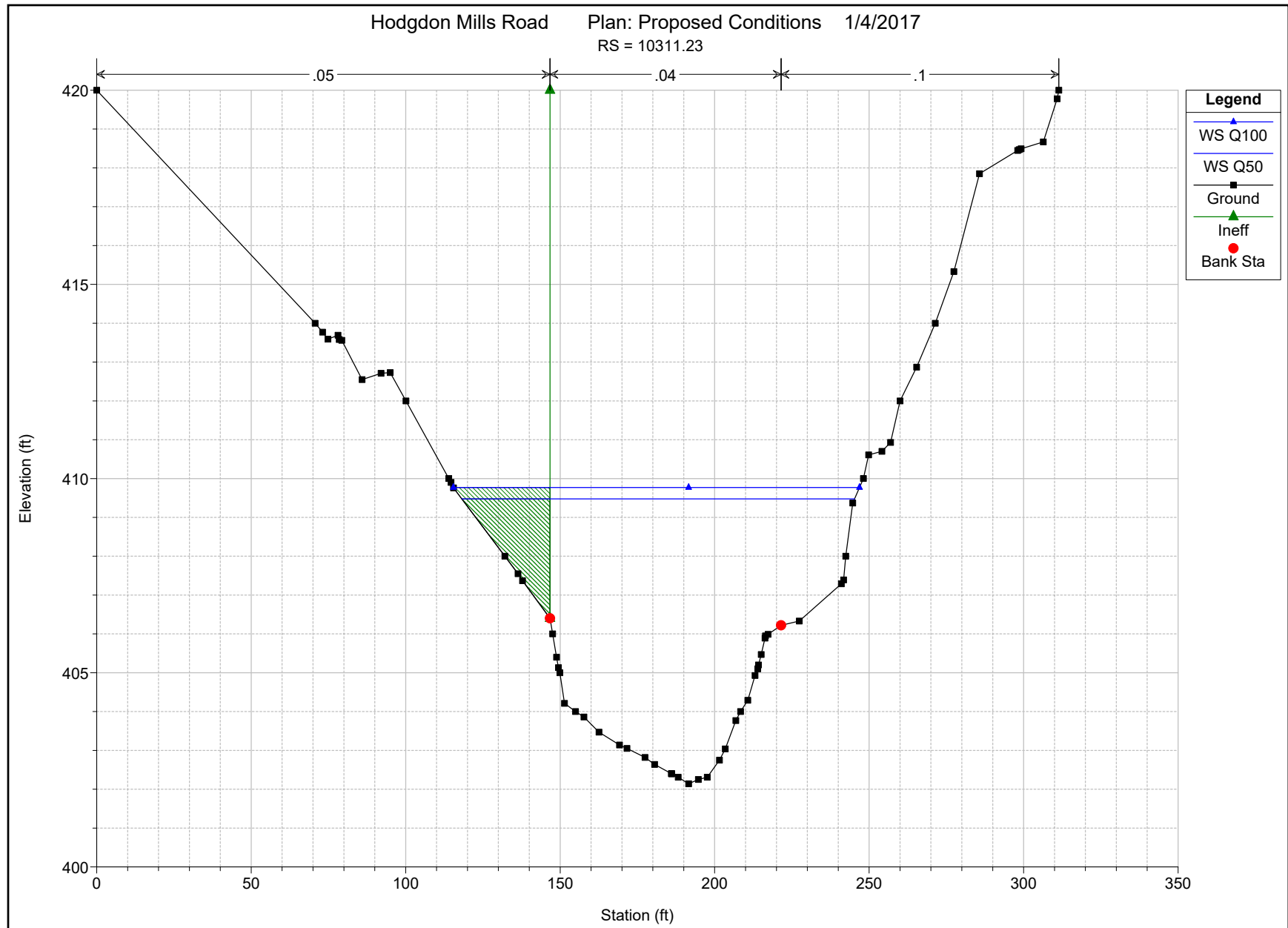
Proposed Condition Cross-Sections



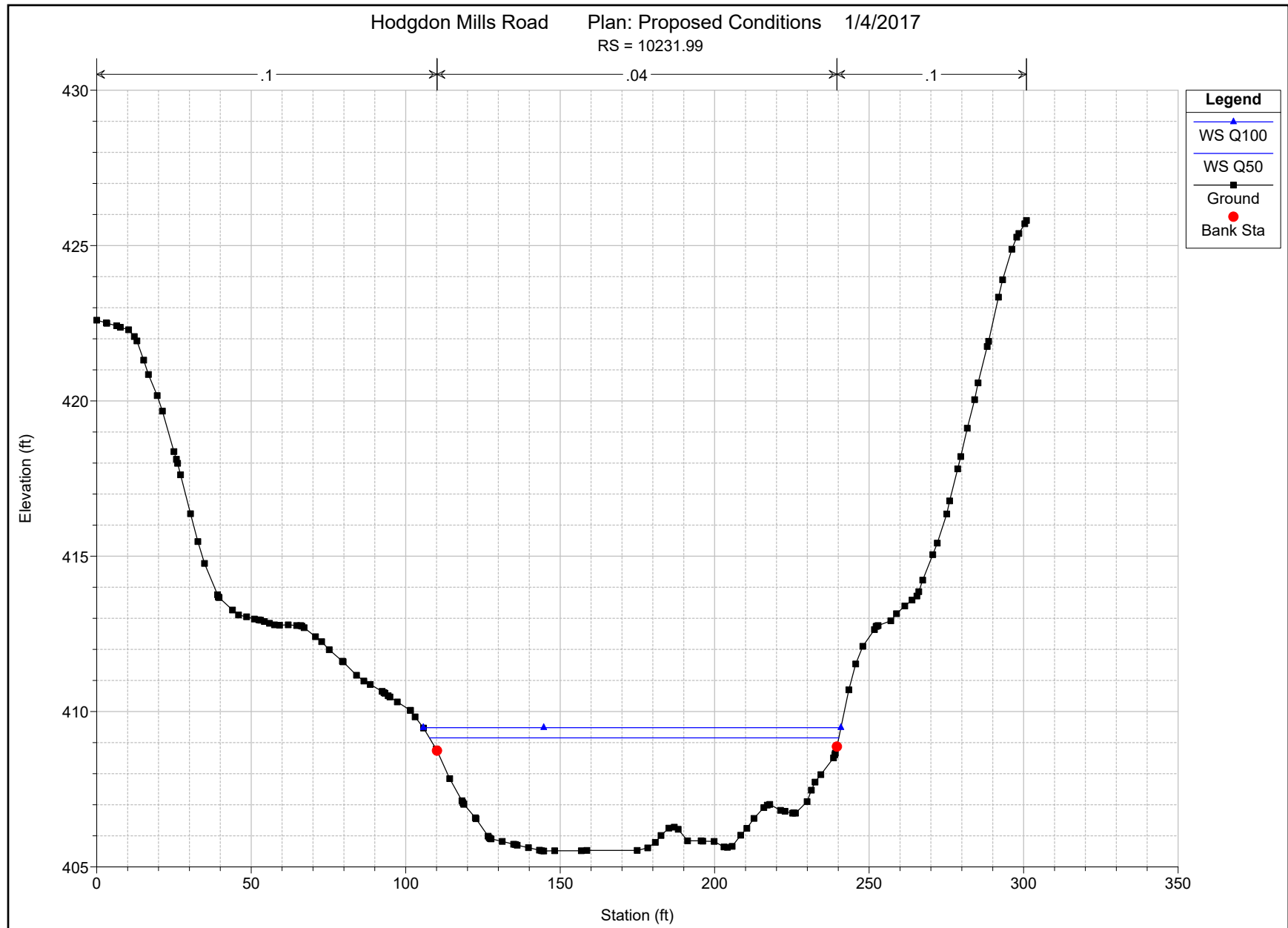
Proposed Condition Cross-Sections



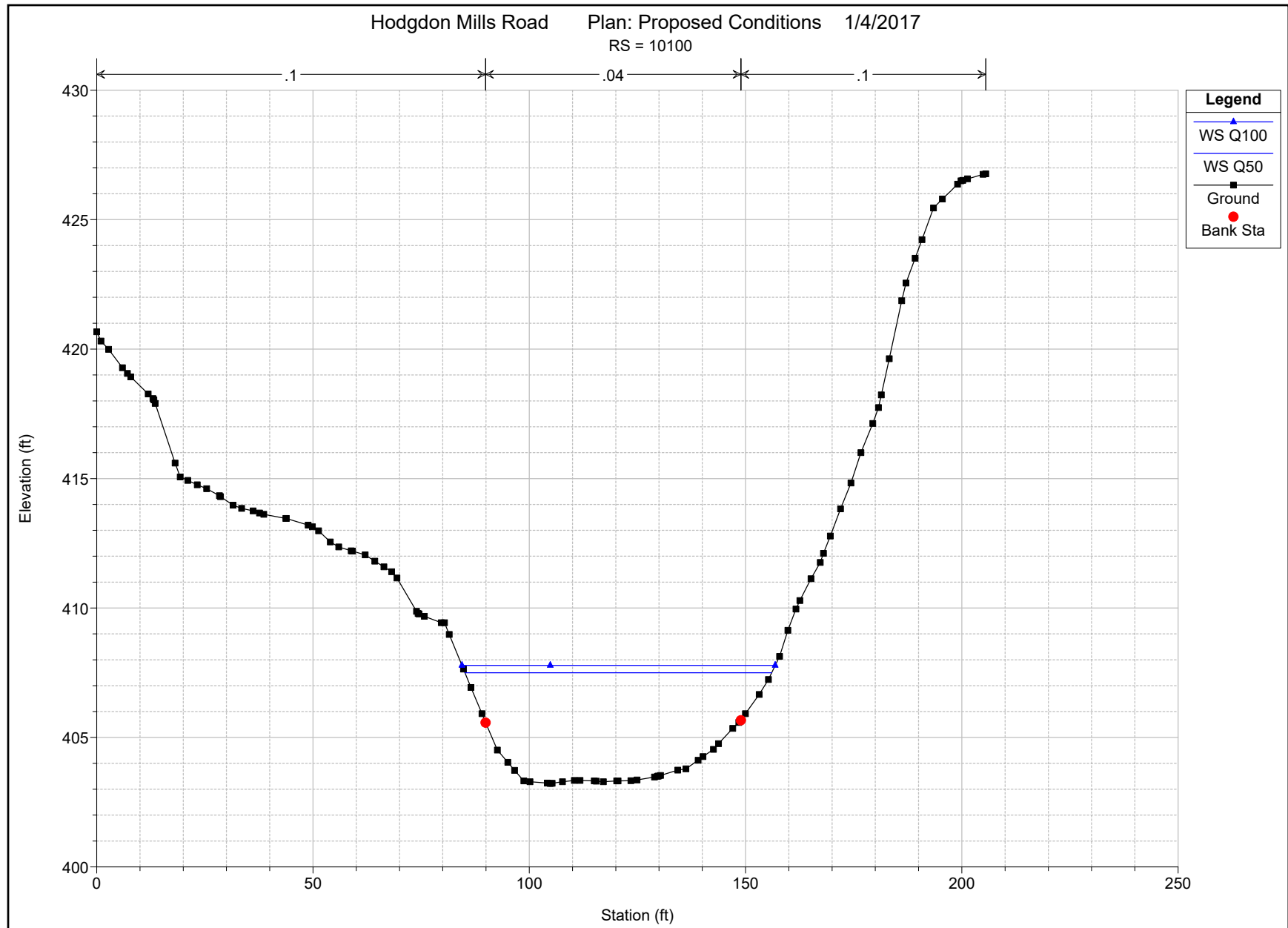
Proposed Condition Cross-Sections



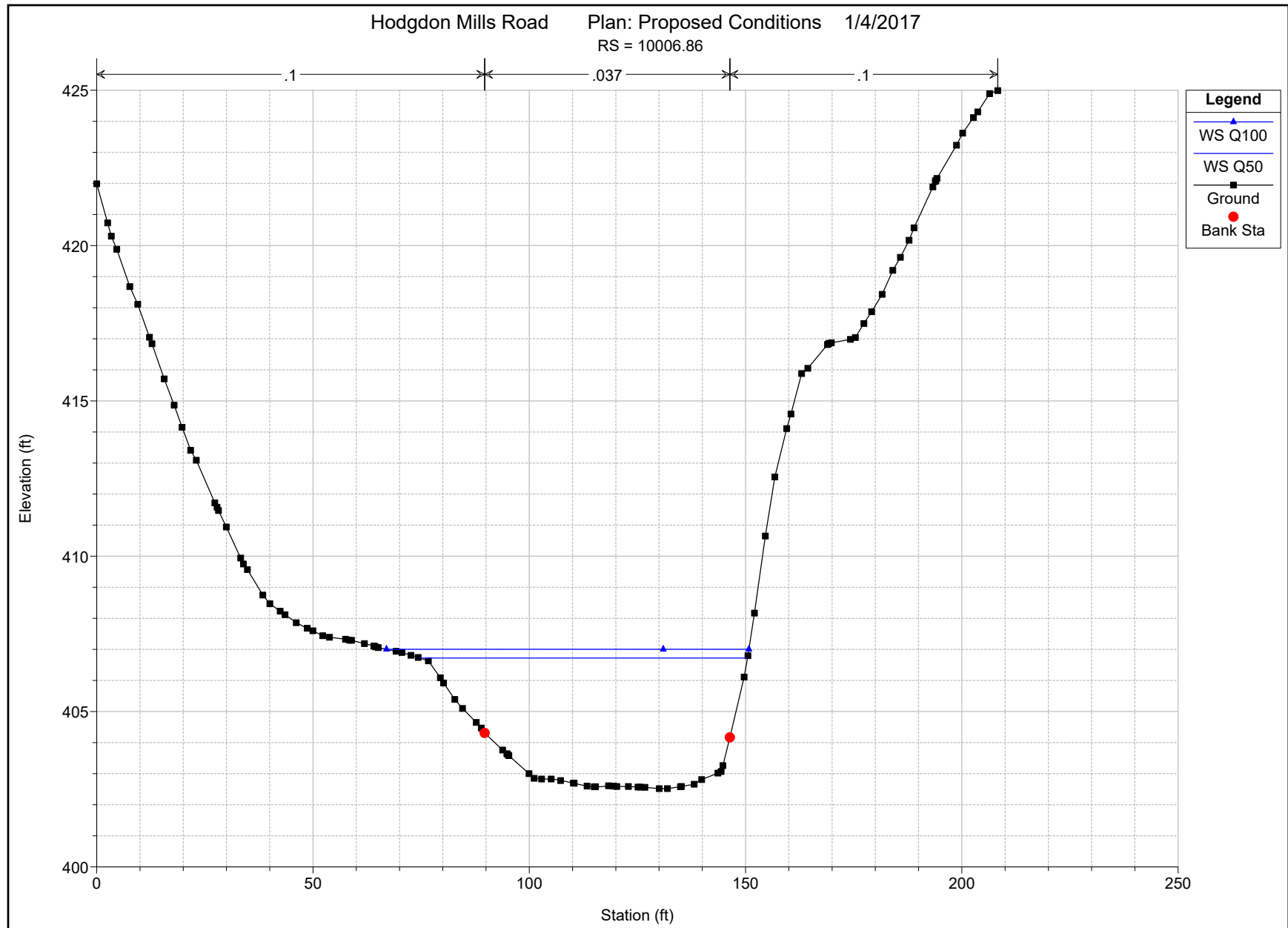
Proposed Condition Cross-Sections



Proposed Condition Cross-Sections



Proposed Condition Cross-Sections



Proposed Condition Standard Table

HEC-RAS Plan: Prop Cond River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
So. Branch Medux	10650	Q50	1890.10	406.97	416.30	408.93	416.33	0.000156	1.51	1254.53	137.57	0.09
So. Branch Medux	10650	Q100	2128.50	406.97	416.52	409.07	416.57	0.000183	1.66	1285.49	137.63	0.10
So. Branch Medux	10605.83	Q50	1890.10	402.55	416.26	406.85	416.32	0.000208	1.96	966.78	83.05	0.10
So. Branch Medux	10605.83	Q100	2128.50	402.55	416.48	407.09	416.55	0.000250	2.16	984.81	83.15	0.11
So. Branch Medux	10600		Inl Struct									
So. Branch Medux	10583.45	Q50	1890.10	402.55	411.86	407.09	412.00	0.000775	3.06	638.46	98.52	0.20
So. Branch Medux	10583.45	Q100	2128.50	402.55	412.31	407.29	412.47	0.000803	3.24	682.79	100.77	0.21
So. Branch Medux	10538.94	Q50	1890.10	405.47	411.44	409.25	411.91	0.002180	5.55	353.79	73.57	0.43
So. Branch Medux	10538.94	Q100	2128.50	405.47	411.86	409.48	412.37	0.002123	5.77	385.06	74.47	0.43
So. Branch Medux	10496.06	Q50	1890.10	406.37	410.95	409.80	411.74	0.004728	7.19	278.20	74.56	0.62
So. Branch Medux	10496.06	Q100	2128.50	406.37	411.40	410.08	412.21	0.004260	7.29	312.22	77.07	0.59
So. Branch Medux	10467.92	Q50	1890.10	405.90	410.42	409.59	411.50	0.006487	8.37	237.31	62.93	0.71
So. Branch Medux	10467.92	Q100	2128.50	405.90	410.88	409.88	411.99	0.005855	8.50	266.21	65.06	0.69
So. Branch Medux	10431		Bridge									
So. Branch Medux	10400	Q50	1890.10	402.99	406.97	408.10	410.73	0.042643	15.59	122.82	49.52	1.70
So. Branch Medux	10400	Q100	2128.50	402.99	407.16	408.39	411.29	0.042434	16.32	132.59	50.10	1.71
So. Branch Medux	10373	Q50	1890.10	403.20	409.37	407.37	409.95	0.002656	6.23	340.57	86.77	0.48
So. Branch Medux	10373	Q100	2128.50	403.20	409.65	407.67	410.30	0.002806	6.62	364.31	87.43	0.49
So. Branch Medux	10357.98	Q50	1890.10	402.86	409.37	407.53	409.90	0.002655	5.96	348.83	98.51	0.47
So. Branch Medux	10357.98	Q100	2128.50	402.86	409.65	407.77	410.24	0.002779	6.32	373.04	100.60	0.49
So. Branch Medux	10311.23	Q50	1890.10	402.14	409.48	406.25	409.74	0.001178	4.14	503.02	127.14	0.30
So. Branch Medux	10311.23	Q100	2128.50	402.14	409.77	406.50	410.07	0.001267	4.43	532.10	131.47	0.31
So. Branch Medux	10231.99	Q50	1890.10	405.51	409.15	408.04	409.54	0.004391	5.01	377.94	132.48	0.52
So. Branch Medux	10231.99	Q100	2128.50	405.51	409.48	408.21	409.88	0.003902	5.07	421.77	135.16	0.50
So. Branch Medux	10100	Q50	1890.10	403.22	407.50	406.97	408.62	0.009308	8.55	230.73	70.91	0.78
So. Branch Medux	10100	Q100	2128.50	403.22	407.78	407.24	409.01	0.009195	8.93	251.04	72.42	0.79

Proposed Condition Standard Table

HEC-RAS Plan: Prop Cond River: So Branch Meduxn Reach: So. Branch Medux (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
So. Branch Medux	10006.86	Q50	1890.10	402.52	406.72	406.16	407.84	0.007614	8.55	240.10	75.74	0.77
So. Branch Medux	10006.86	Q100	2128.50	402.52	407.00	406.44	408.23	0.007601	8.95	262.50	83.76	0.78

Proposed Conditions Four Inline Structure Table

HEC-RAS Plan: Prop Cond River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
So. Branch Medux	10650	Q50	416.33	416.30	0.04	0.01	0.00		1890.10		137.57
So. Branch Medux	10650	Q100	416.57	416.52	0.04	0.01	0.00		2128.50		137.63
So. Branch Medux	10605.83	Q50	416.32	416.26	0.06				1890.10		83.05
So. Branch Medux	10605.83	Q100	416.55	416.48	0.07				2128.50		83.15
So. Branch Medux	10600		Inl Struct								
So. Branch Medux	10583.45	Q50	412.00	411.86	0.14	0.06	0.03	3.69	1876.59	9.83	98.52
So. Branch Medux	10583.45	Q100	412.47	412.31	0.16	0.06	0.04	5.70	2110.23	12.58	100.77
So. Branch Medux	10538.94	Q50	411.91	411.44	0.47	0.14	0.03	13.60	1875.66	0.84	73.57
So. Branch Medux	10538.94	Q100	412.37	411.86	0.51	0.13	0.03	17.75	2109.62	1.13	74.47

Proposed Conditions

Six Bridge Cross-Section Table

HEC-RAS Plan: Prop Cond River: So Branch Meduxn Reach: So. Branch Medux

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
So. Branch Medux	10496.06	Q50	411.74	410.95	409.80	0.16	0.09	74.56	17.42	1868.24	4.44	7.19
So. Branch Medux	10496.06	Q100	412.21	411.40	410.08	0.14	0.09	77.07	24.03	2097.77	6.70	7.29
So. Branch Medux	10467.92	Q50	411.50	410.42	409.59			62.93	15.52	1872.49	2.09	8.37
So. Branch Medux	10467.92	Q100	411.99	410.88	409.88			65.06	22.86	2102.63	3.02	8.50
So. Branch Medux	10431 BR U	Q50	411.39	409.53	409.53			46.37		1890.10		10.94
So. Branch Medux	10431 BR U	Q100	411.85	409.88	409.88			47.59		2128.50		11.25
So. Branch Medux	10431 BR D	Q50	410.87	407.98	408.71			40.94		1890.10		13.64
So. Branch Medux	10431 BR D	Q100	411.36	408.30	409.04			42.06		2128.50		14.02
So. Branch Medux	10400	Q50	410.73	406.97	408.10	0.17	0.02	49.52	4.62	1884.52	0.96	15.59
So. Branch Medux	10400	Q100	411.29	407.16	408.39	0.19	0.02	50.10	6.72	2120.07	1.71	16.32
So. Branch Medux	10373	Q50	409.95	409.37	407.37	0.04	0.01	86.77	35.20	1825.15	29.75	6.23
So. Branch Medux	10373	Q100	410.30	409.65	407.67	0.04	0.02	87.43	48.67	2040.53	39.30	6.62