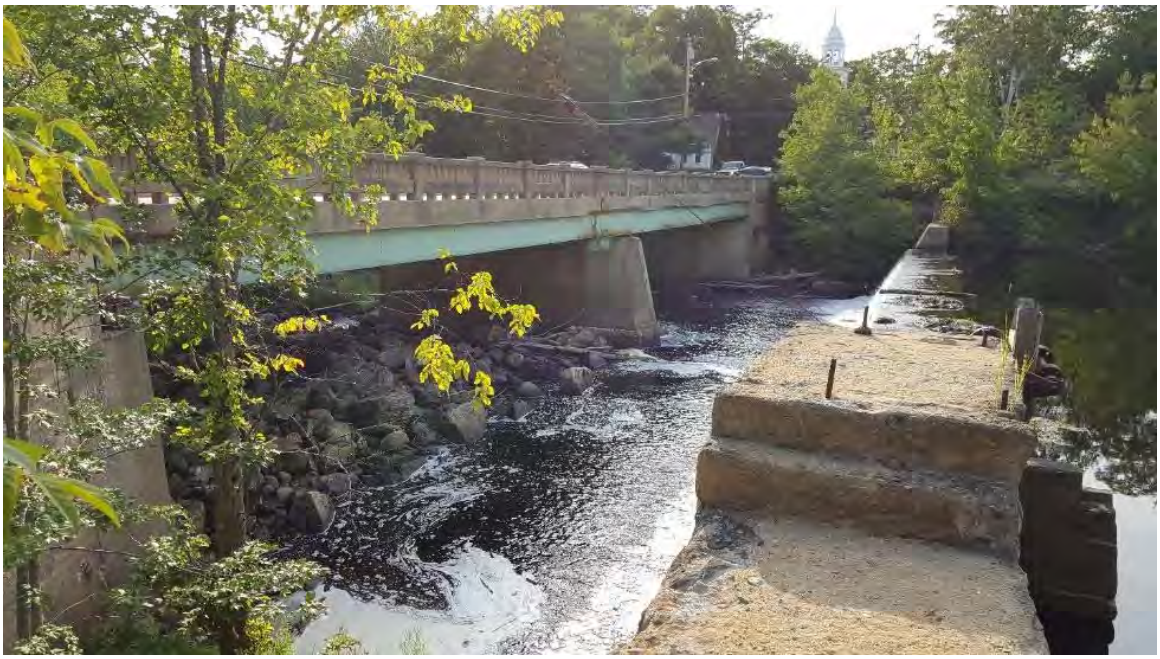
Preliminary Design Report, Hydrology and Hydraulics

MaineDOT Bridge # 2979, Billings Bridge,

Route 117 over Little Androscoggin River in Paris



For VHB and Maine Department of Transportation

March 22, 2017

NORTHSTAR
HYDRO

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3/22/17

STATE OF MAINE
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NORTHSTAR HYDRO

Preliminary Design Report, Hydrology and Hydraulics
MaineDOT Bridge # 2979, Billings Bridge
Route 117 over Little Androscoggin River in Paris

3-20-17

This report details preliminary design phase hydrologic and hydraulic analysis for the East Main Street/Route 117 crossing of the Little Androscoggin River in South Paris, Maine. The bridge location is shown in a Google Map air photo in Figure 1.

Figure 1 Billings Bridge # 2979 Paris, Maine

1.0 Introduction:

Billings Bridge crosses the Little Androscoggin River just downstream of a dam that has reportedly been in place since the late 1700's. The existing bridge is comprised of two spans set on abutments and a single pier, with a total length of 165' according to MaineDOT's bridge inventory. The site includes a number of structures and features that affect flow through the bridge including an old tailrace and rubble in the channel. Effective flow areas are limited by some of the structures and/or rubble.

The bridge and dam are close together with a concrete apron at base of dam and rubble in the bridge channel areas.

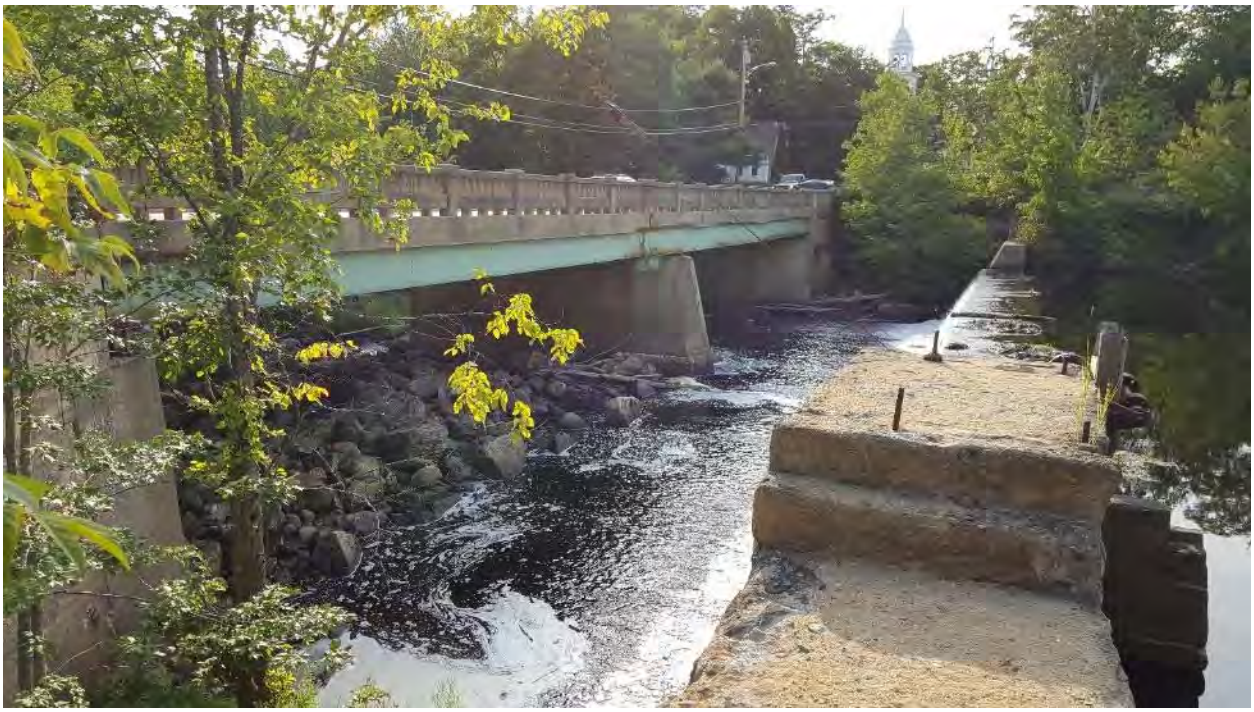

Figure 2 Looking across Dam at upstream face of Bridge.

Figure 3 Billings Bridge, Paris. Looking downstream

Figure 4 Looking at dam just upstream of bridge

Figure 5 Looking upstream at downstream face of bridge and dam face

Options considered in this modeling effort include:

- Single span bridge, 100’, 110’ or 120’ inside width
- Twin span, total span 220’

- Maintaining the existing substructure and replacing the super structure while removing excess rubble below the left side of the bridge

2.0 Existing Data Review:

- FEMA Flood Insurance Study and mapping. 100-year flood elevation downstream of the site is listed as 342' NAVD. Above the bridge, water surface elevation changes rapidly to the elevation listed above the dam as 350' NAVD.

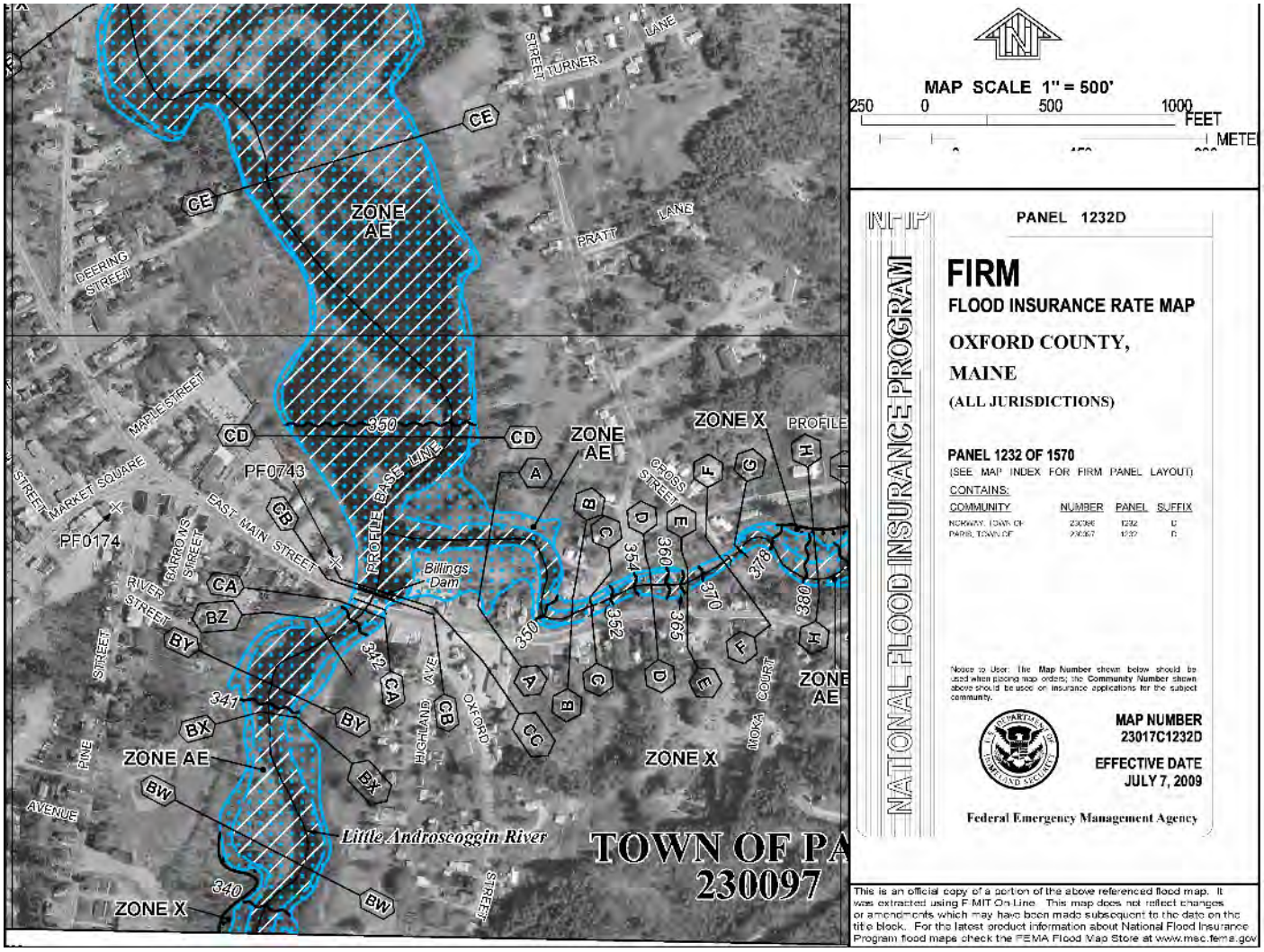

Figure 6. FEMA FIRM for project site.

- Aerial photos, including Google Earth and ESRI databases
- MEGIS data including elevation data, and NHD database
- Data from MaineDOT's Bridge Inventory including 1938 bridge plans and annual database of inspections.
- USGS data related to river flows and flooding, including gage number 01057000 and U.S. G.S. historic flood reports for the 1936 and 1987 floods.

- Data related to the Billings dam from Maine's dam safety database
- Town of Paris, Flood Plain Ordinance related to construction in floodways, with the following wording:

In Zones A1-30 and AE encroachments, including fill, new construction, substantial improvement, and other development shall not be permitted in riverine areas, for which a regulatory floodway is designated on the community's "Flood Boundary and Floodway Map," unless a technical evaluation certified by a registered professional engineer is provided demonstrating that such encroachments will not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

3.0 Hydrologic Analysis:

MaineDOT provided hydrologic analysis. Northstar Hydro Inc. reviewed calculated flows and found that the percent wetlands was too high in the first round of calculations. NHI reviewed calculations using StreamStats, the USGS Regression Formulas for Maine, and Bulletin 17B/HEC SSP. MaineDOT revised projected flows to reflect revised wetland area with the following table of flows for comparison. Flows listed in column three were adopted for use in this study.

Method	Historic Flows AT Paris Gage	MaineDOT, USGS Regression (Estimated historic)	FEMA Flood Insurance Study
Drainage Area, sq. mi.	73.9	108.5	110
Percent Wetlands		5.85	
1.1 year flow, cfs		1610	
2-year flow, cfs	2142	3116	
10-year flow, cfs	4305	5878	5050
25-year flow, cfs	5505	7409	
50-year flow, cfs (Design Discharge)	6458	8604	7930
100-year flow, cfs (Check Discharge)	7446	9852	9370
500-year flow, cfs (Scour Check Discharge)	9881	12948	13300
1936 flood, cfs, approx. 50-year +/-	6890	8946	
1953 flood, cfs, approx. 100-year +/-	7810		
1987 flood, cfs approx. 500-year +/- (Flood of Record)	9340	11342	

Table 1. Summary of hydrologic data

4.0 Hydraulic Analysis:

Existing and proposed bridges were analyzed to evaluate characteristics of flow under existing and proposed conditions. Key factors addressed in the hydraulic evaluation include:

- Water surface elevations
- Velocity of flow

4.1 Survey and Model compilation

Site survey was used to build the portion of the geometric model for flow analysis close to the bridge. Figure 7 shows the site model with cross sections overlying the digital terrain model of the site.

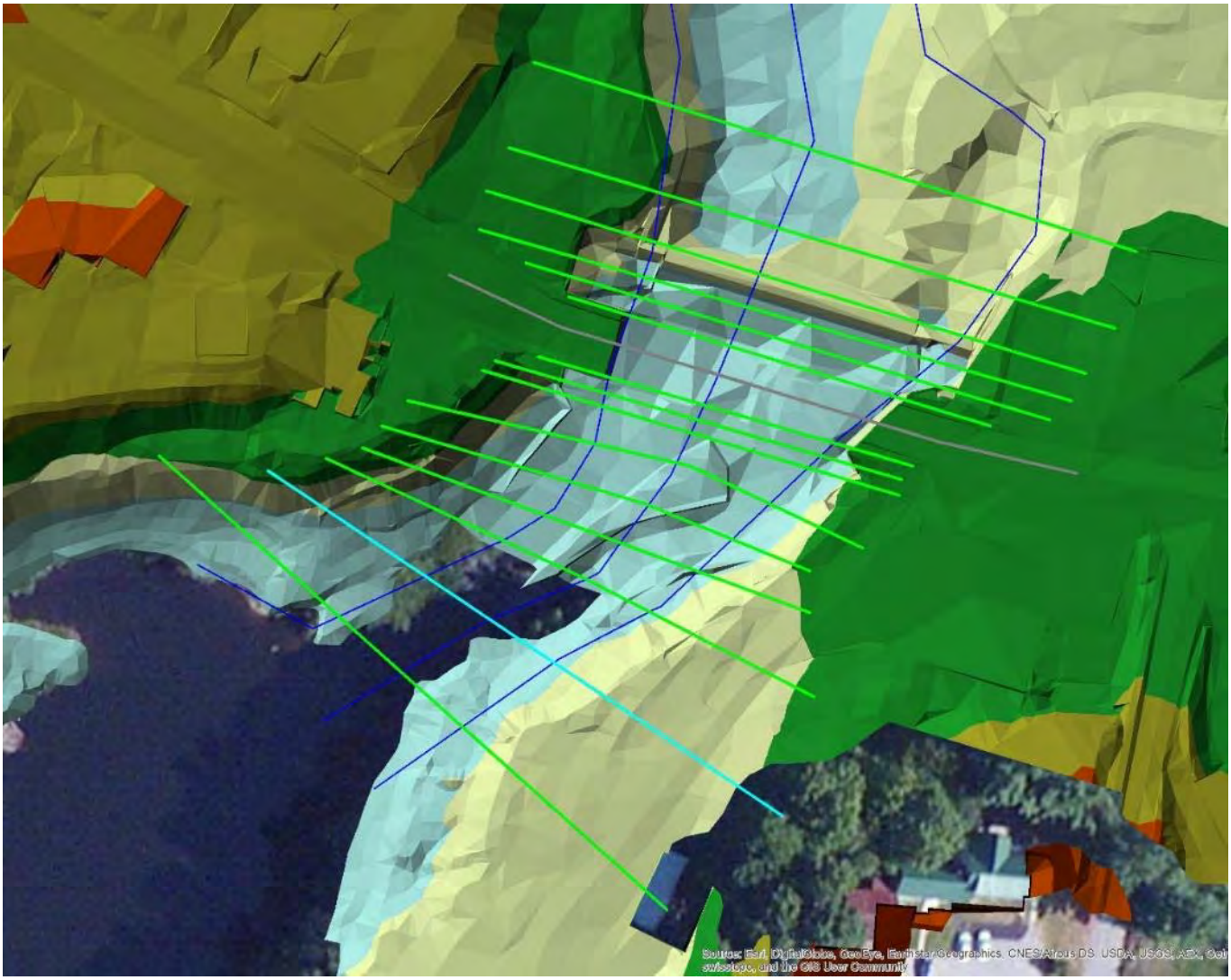

Figure 7 Billings Bridge HECRAS cross sections based on site survey and digital terrain model.

FEMA compiled a river hydraulic model for their September, 1991 Flood Insurance Study. The data was furnished by FEMA to NHI in paper format, based on microfiche archives of an older version of the WSP2 hydraulic model. Several cross sections were extracted from the data for the most downstream segment of the river. The FEMA map is shown above in figure 6.

Sections downstream of the site survey were added to the HECRAS model including sections BW, BX and BY.

Model cross sections were developed based on project survey, local DEM (Digital Elevation Model from Maine Office of GIS), FEMA hydraulic model and site characteristics. Project survey in landxml format was provided by VHB and imported by NHI to a GIS database for import to GeoRAS and HECRAS.

4.1 Model

Hydraulic analysis was conducted using U.S. Army Corps of Engineers model HECRAS, version 5.0.1. The model was run in steady 1-dimensional flow mode.

The hydraulic model was used to simulate existing and proposed bridge conditions including three single span and one twin span option. Key hydraulic parameters including water elevation and flow velocity were derived for design storms via modeling.

4.2 Clearance:

Excerpts from the MaineDOT Bridge Design Guide, Chapter 2, Preliminary Design, Section 2.3.10.2 Hydraulic Analysis give guidance for required clearance as follows:

"Major riverine bridges - A freeboard depth of 4 feet minimum between the bottom of the superstructure and the backwater elevation should be provided on major river crossings. As much as 10 feet of freeboard depth should be provided when practical.

"Other riverine bridges – A depth of 2 feet minimum is recommended on smaller streams where there has been no history of ice jams.

"If providing the desired freeboard depth results in significant environmental and/or property impacts, a reduced freeboard depth should be investigated with the approval of the Engineer of Design.

"All bridge-type structures should also be capable of passing the Q100, or the flood of record, whichever is greater, without any serious harm to the structure, roadway, or adjacent property. This may be accomplished by allowing an overtopping of the approaches if the structure cannot be reasonable sized to accommodate the flow, with the approval of the Engineer of Design. When possible, there should be 1 foot of freeboard at Q100.

"Occasionally, freeboard depths may need to be increased for high waters caused by some occurrence other than design flow, such as an ice jam, a collapse of a dam, or some construction that may increase the depth of flowage."

MaineDOT generally requires 2-4' of freeboard for the 50-year design storm, depending on characterization of the bridge. This standard should be reviewed by the project team for final design.

4.3 Calibration: The hydraulic model was calibrated using historic flood marks recorded by the USGS during several storm events. Table 2 summarizes recorded flood marks near the project site.

April, 1987 Flood	Flow Rate at gage, cfs	Approximate Frequency	HECRAS model, w/est flow rates	FEMA Flood levels
S. Paris Gage, 73.9 sq mi	9340	close to 500-year		
Auburn Gage, 328 sq. mi.	10300	approx 100-year		
Location	Elevation, ft NGVD elev	Elevation, ft NAVD		
Headwater, billings dam	350	349.4	350.1	351.0
50' DS of route 117 bridge	344.6	344	344.0	344.0
US of RR	334.5	333.9		331.0
DS of RR	333.6	333		333.7
September, 1936 Flood	Flow Rate, cfs	Approx Frequency		
S. Paris Gage	6980	approx 75 year		
Auburn Gage	9280	approx 50 year		
Location	Elevation, ft. NGVD elev	Elevation, ft NAVD approx		
Headwater, Billings Dam	349.6	348.9	349.1	349.5
275' DS of dam	342.5	341.8	341.3	341.0
DS of RR (4800’ DS of dam)	342.3	341.6		332.0

Table 2. Summary of Historic Flood Marks. HECRAS hydraulic model calibration data results are shown in the column 4 and FEMA flood elevations are included in column 5 for the existing bridge model.

4.4 Modeled structures:

The existing bridge was modeled with the old tailrace channel assumed to be ineffective flow and a center pier. Figure 8 shows the model representation of the upstream face section of the bridge.

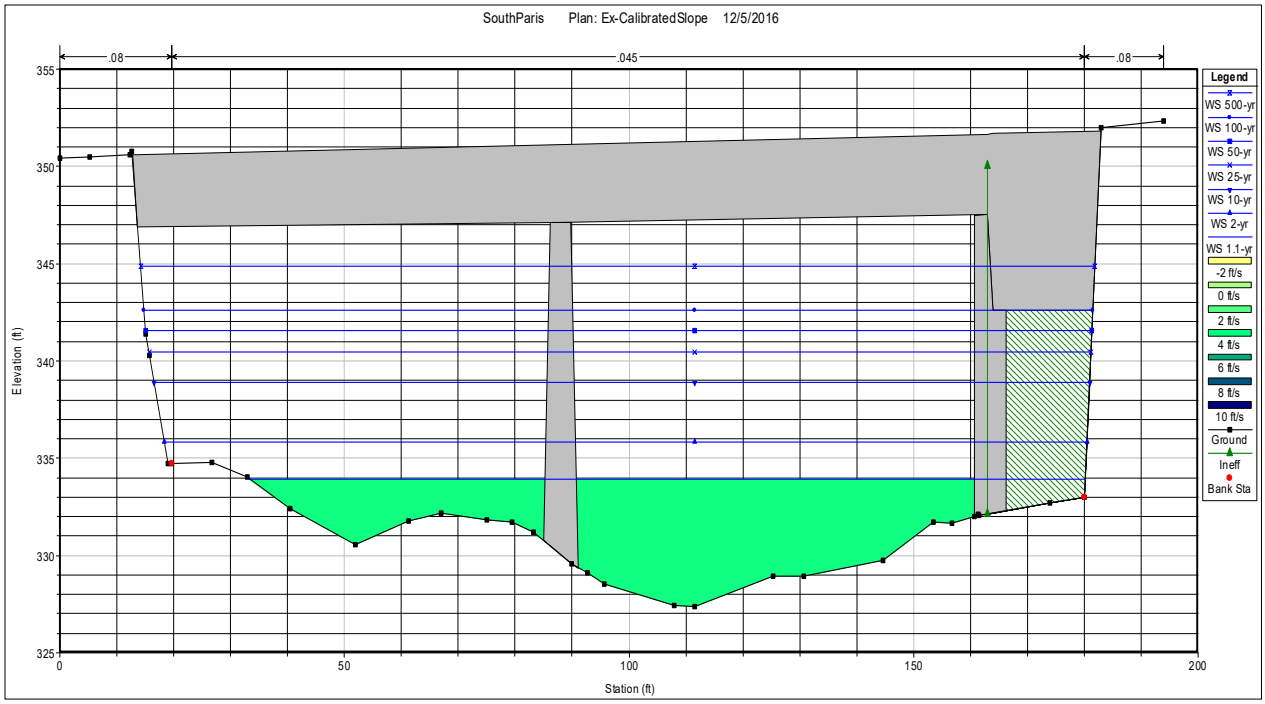

Figure 8. Existing bridge, upstream face section. Section is plotted facing downstream. The left channel shows impact of rubble.

The model representation of the upstream face of the proposed single span bridge with a 120' span is shown in figure 9 and the model representation of the twin span bridge is shown in figure 10. Figure 11 shows the model representation where the existing foundation components are maintained, the bridge is widened upstream and rubble is cleared from the channel on the easterly side of the bridge.

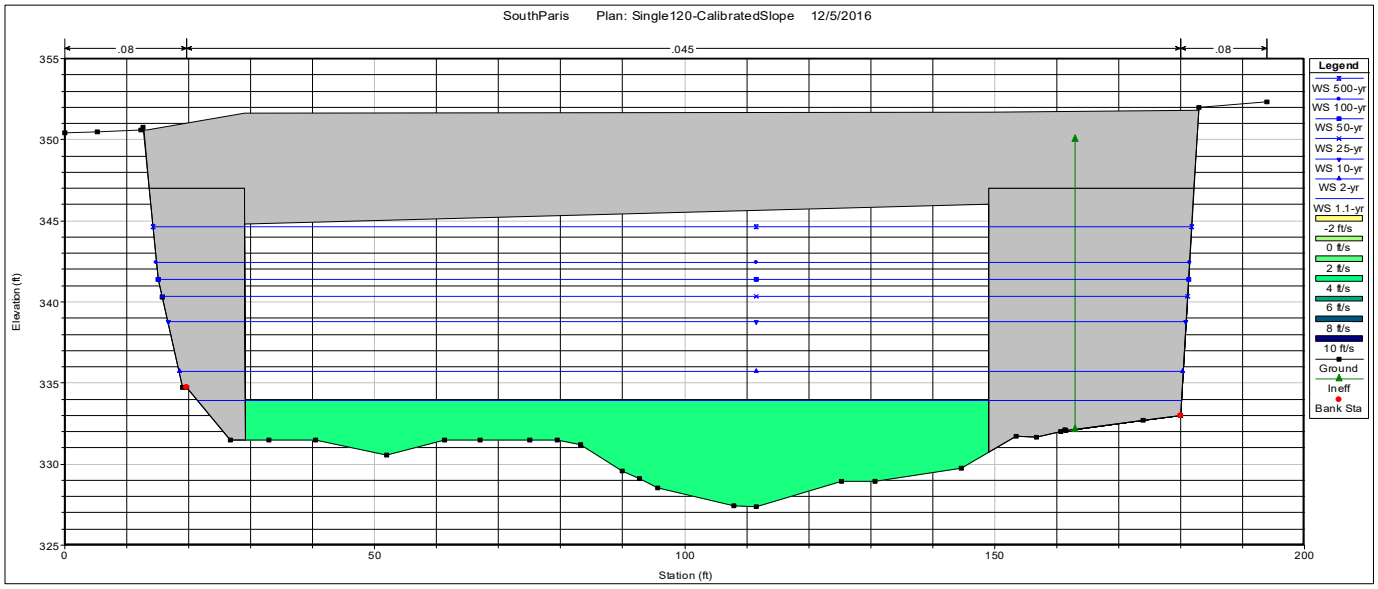

Figure 9. 120' single span. Section is plotted facing downstream.

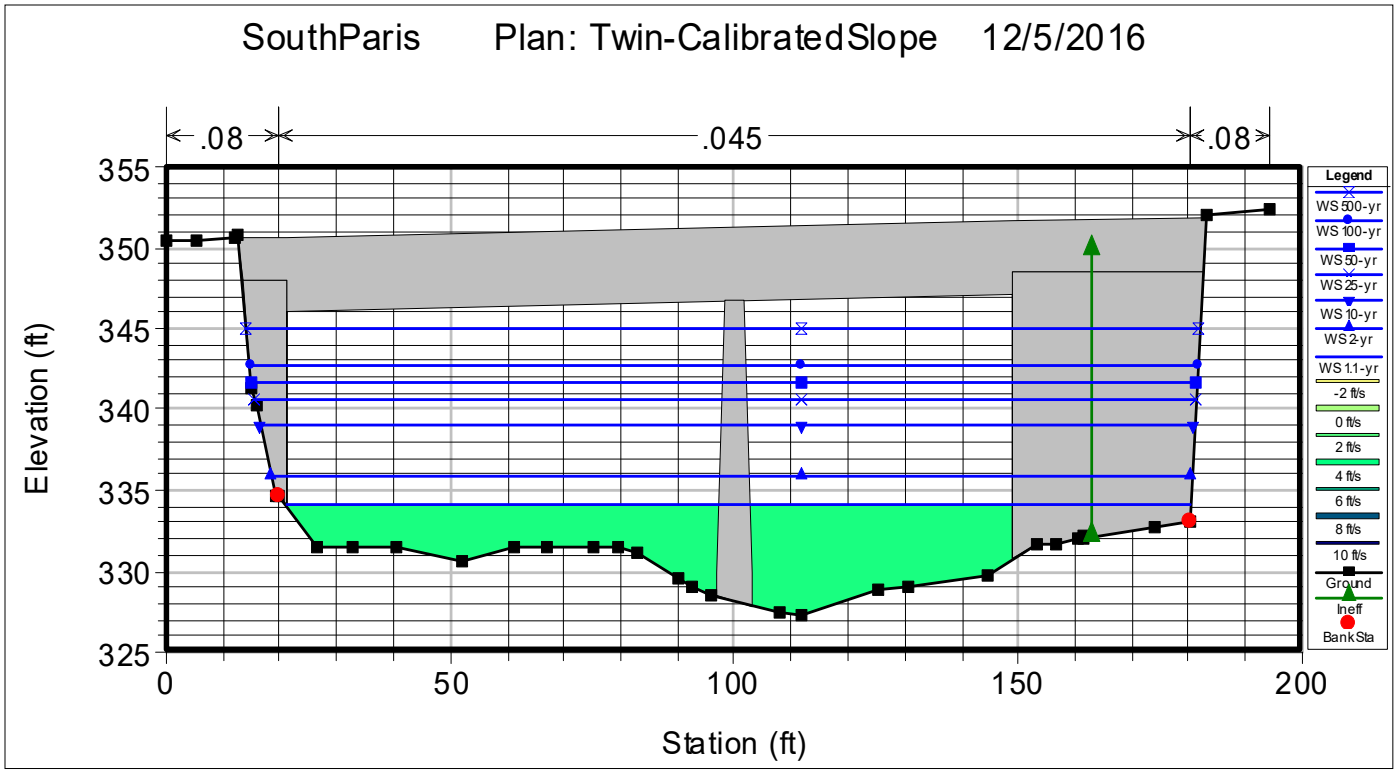

Figure 10. Proposed Twin Span Bridge section, upstream face, plotted facing downstream.

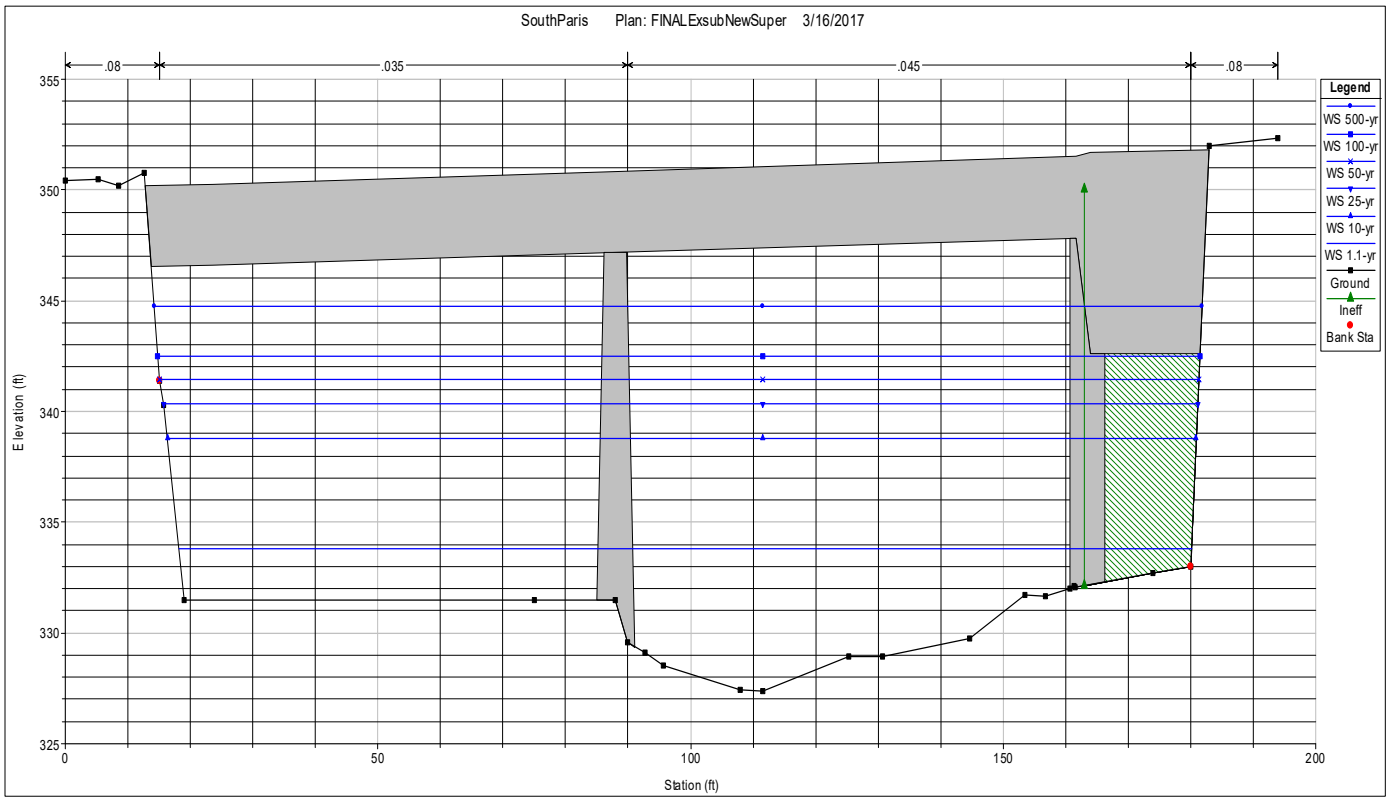

Figure 11: Proposed Bridge section maintaining existing substructures and removing excess rubble, upstream face, plotted facing downstream.

Model results are summarized in table 3 below.

Summary of Hydraulic Data Billings Bridge, Paris	Existing Bridge	Proposed Bridge 100' span	110' single span	120' single span	Twin span	EX with restored channel, new deck
Low Chord, ft NAVD	346.9-347.5	345.3-346.5	345.3-346.5	344.8-346.0	346.1-347.1	346.5-347.8
Width at Q100, ft	139 DS – 157 US	100	110	120	98-122	139 DS – 157 US
Flood of Record, 1987, approx. 100-year, at stillwater location (EGL)	344.7/ 344.8					344.6/ 344.7
Headwater at Q25, ft,	340.7	340.8	340.7	340.7	340.9	340.6
Headwater at Q50, ft,	341.8	342.0	341.8	341.8	342.0	341.7
Headwater at Q100, ft,	342.9	343.0	342.9	342.9	343.1	342.7
Discharge Velocity at Q25, fps- average channel	7.5	8.3	7.5	7.3	8.7	6.7
Discharge Velocity at Q50, fps – average channel	7.7	8.7	7.8	7.5	9.0	6.9
Discharge Velocity at Q100, fps – average channel	8.0	9.0	8.1	7.8	9.3	7.2
Ordinary High Water Elevation (Q1.1)	334.1	334.2	334.1	334.1	334.3	333.9
Discharge Velocity at Q1.1, fps	6.6	7.0	6.4	6.2	7.8	4.8
Clearance @ Q25, ft	6.2	4.5	4.6	4.1	5.2	5.9
Clearance @ Q50, ft	5.1	3.3	3.5	3.0	4.1	4.8
Clearance @ Q100, ft	4.0	2.3	2.4	1.9	3.0	3.8
Bridge Opening Area, ft^2	1834	1502	1645	1644	1545	1983
Flow Area at Q100, ft^2	1236	1096	1215	1258	1058	1367

Table 3. Summary of Hydraulic Data

5.0 Scour Analysis:

Scour is not expected to be a major issue due to the presence of bedrock at all bridge foundations. However, rock competence related to stream power should be reviewed as recommended in MaineDOT's hydraulic manual and HEC 18 for final design. It is recommended that scour inspection and field data related to scour be reviewed for final design in relation to re-using the existing substructure.

For a replacement substructure, rock scour would be considered. If the existing substructure is to be re-used, field and file data related to scour would be reviewed as part of the final design process to assure that scour is not occurring at the existing pier. The following discussion applies to new structures or if field inspection finds reason to suspect rock scour. The data is obtained via rock cores overseen by a geotechnical engineer.

Rock scour primarily applies at piers. If no pier is to be used, rock scour is not likely. The following rock quality data will assist in evaluating the potential for scour of rock during storms and in the event of dam failure:

- RQD or drill core quality
- Unconfined Compressive Strength, MPa or Mass Strength Number of rock
- Number of joint sets in rock
- Information on joint roughness and alteration
- Joint orientation (estimated from surface outcrops)

An estimated index of erodibility would be developed based on these parameters. The Erodibility Index is then compared to Stream Power in the reach of river just upstream of the bridge.

The dam is listed as Low Hazard by MEMA and was last inspected in 1981 according to the MEMA dam database. Dam failure could cause different hydraulic conditions just below the dam with much higher flows than normal storm flows. Scour evaluation related to potential failure should be discussed as part of the final design process.

6.0 Summary:

- The existing 139'-157' channel opening at the bridge includes a center pier. Preliminary design options evaluated included single span, a twin span, and a deck only replacement option. The existing span is listed as 165' total with the tailrace.
- The project site has complex flow dynamics with a bridge, old tailrace channel, old stone channel walls, split flow below the bridge and a dam above the bridge. Dam remnants including the old tailrace channel and rubble in the channel within the bridge section. In addition, the abutment walls are skewed to flow such that upstream and downstream bridge sections are not the same width.
- The Town of Paris Flood Plain Ordinance does not allow for any increase in flood elevations with channel encroachment
- Hydrologic analysis for the site was provided by MaineDOT using the USGS Regression formula with gage weighting for the drainage area of 108.5 square miles. FEMA FIS flows are similar to flows used for this study.
- The HECRAS model was used for hydraulic analysis and was built using a combination of site survey and downstream data extracted from the original FEMA model built with software predating model WSP2.
- The HECRAS model at the site was calibrated using flood marks from the floods of 1987 and 1936. These flood marks indicate that the site is affected by backwater from downstream structures.
- Preliminary design evaluated the following options. Potential upstream change in 100-year flood level is shown for each option.
    - Existing N/A
    - 100' single span 0.1' rise
    - 110' single span 0.0' rise

  - 120’ single span 0.0’ rise
  - Twin span 0.2’ rise
  - Existing Substructure, Cleared channel and New Superstructure. -0.2’ rise.
- Scour is not expected to be a design issue at the site due to shallow to surface bedrock. For final design, it is recommended to obtain bedrock quality information, and that scour inspection data and field data related to scour be reviewed for the existing foundations.

7.0 References

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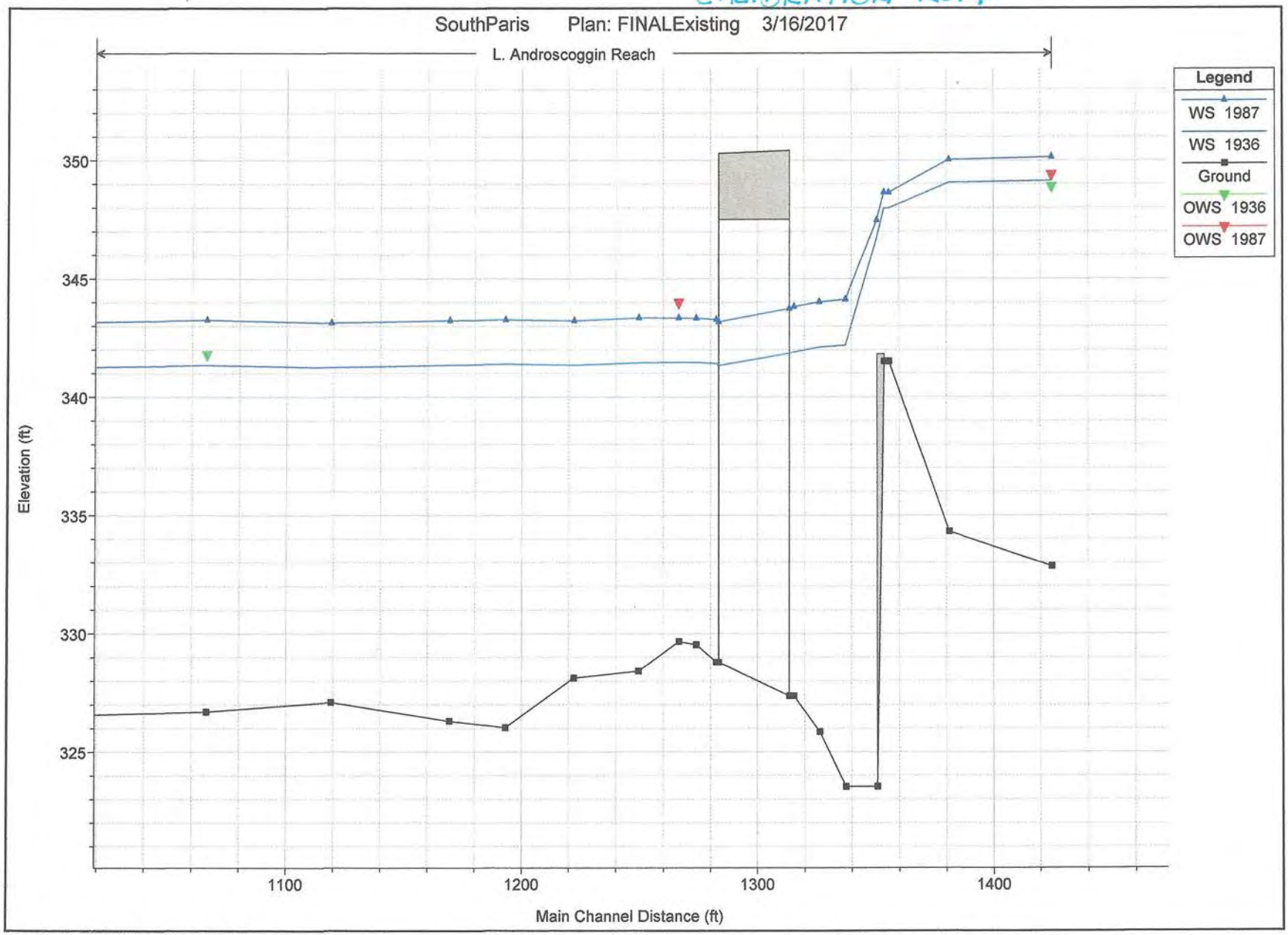
Appendix:

CALIBRATION RUN



1 in Horiz. = 60 ft 1 in Vert. = 6 ft

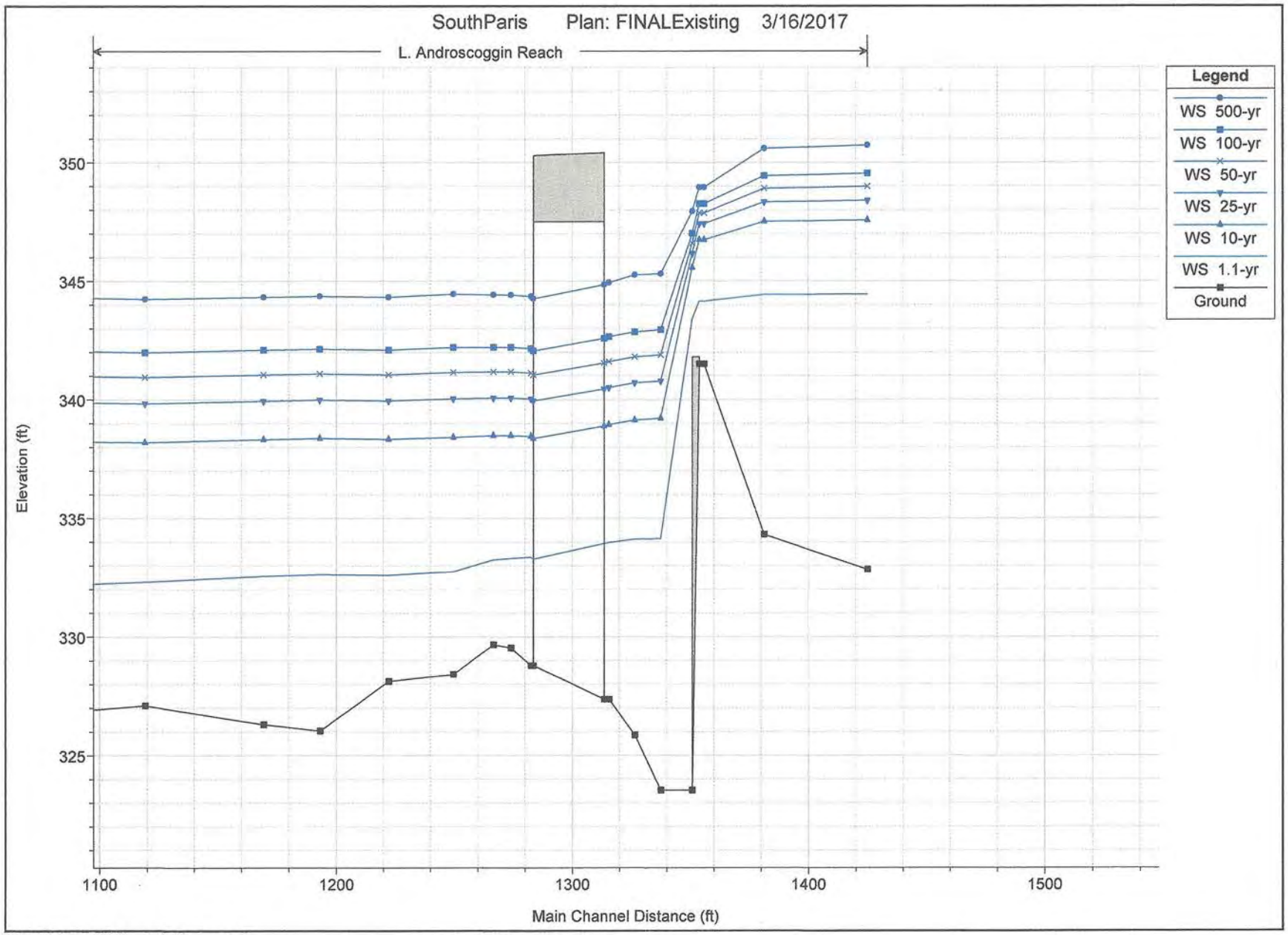
Calibration - Existing Bridge Model
1936/1987 Floods.

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	376.8629	1936	8946.00	332.84	349.14	341.78	349.39	0.000367	3.95	2341.79	262.99	0.21
Reach	376.8629	1987	11342.00	332.84	350.14	342.56	350.46	0.000437	4.57	2605.22	265.21	0.23
Reach	333.2086	1936	8946.00	334.31	349.06		349.36	0.000468	4.42	2073.42	244.44	0.23
Reach	333.2086	1987	11342.00	334.31	350.03		350.43	0.000564	5.13	2316.52	254.87	0.26
Reach	307.6648	1936	8946.00	341.50	347.98	346.49	349.24	0.003994	9.16	1090.05	203.40	0.64
Reach	307.6648	1987	11342.00	341.50	348.64	347.28	350.28	0.004578	10.47	1228.08	221.12	0.70
Reach	306		Inl Struct									
Reach	289.4348	1936	8946.00	323.53	342.19	331.45	342.43	0.000374	3.90	2299.76	208.09	0.18
Reach	289.4348	1987	11342.00	323.53	344.12	332.33	344.42	0.000406	4.39	2588.82	208.21	0.19
Reach	278.3602	1936	8946.00	325.85	342.11	333.15	342.41	0.000550	4.45	2010.84	196.36	0.21
Reach	278.3602	1987	11342.00	325.85	344.02	333.99	344.40	0.000575	4.96	2288.50	196.60	0.22
Reach	267.4976	1936	8946.00	327.36	341.91	335.66	342.39	0.001143	5.56	1625.55	166.46	0.29
Reach	267.4976	1987	11342.00	327.36	343.82	336.50	344.38	0.001086	6.02	1908.20	167.25	0.29
Reach	251.5954		Bridge									
Reach	234.4498	1936	8946.00	328.79	341.42	336.82	342.23	0.002216	7.22	1239.46	148.37	0.40
Reach	234.4498	1987	11342.00	328.79	343.28	337.76	344.21	0.002023	7.72	1468.74	149.05	0.39
Reach	225.9996	1936	8946.00	329.53	341.46	336.42	342.15	0.001809	6.63	1349.35	155.68	0.36
Reach	225.9996	1987	11342.00	329.53	343.33	337.32	344.12	0.001667	7.11	1594.65	156.38	0.36
Reach	218.6182	1936	8946.00	329.66	341.46	336.27	342.12	0.001715	6.50	1376.12	169.79	0.35
Reach	218.6182	1987	11342.00	329.66	343.34	337.15	344.09	0.001589	6.99	1623.51	172.31	0.35
Reach	201.5596	1936	8946.00	328.41	341.45	336.50	342.08	0.001856	6.52	1513.62	170.41	0.36
Reach	201.5596	1987	11342.00	328.41	343.35	337.42	344.05	0.001669	6.91	1828.98	175.03	0.35
Reach	174.1587	1936	8946.00	328.12	341.35		342.02	0.001901	6.76	1481.10	158.59	0.36
Reach	174.1587	1987	11342.00	328.12	343.23		344.00	0.001768	7.23	1785.77	164.69	0.35
Reach	145.0395	1936	8946.00	326.03	341.39		341.94	0.001342	6.05	1591.99	156.16	0.31
Reach	145.0395	1987	11342.00	326.03	343.27		343.92	0.001293	6.56	1891.51	161.68	0.31
Reach	121.3383	1936	8946.00	326.30	341.35		341.91	0.001344	6.13	1593.36	161.98	0.31
Reach	121.3383	1987	11342.00	326.30	343.24		343.89	0.001291	6.63	1906.42	168.51	0.31
Reach	71.10767	1936	8946.00	327.09	341.25		341.84	0.001347	6.35	1610.75	170.74	0.32
Reach	71.10767	1987	11342.00	327.09	343.14		343.82	0.001287	6.83	1943.18	180.02	0.32
Reach	18.21174	1936	8946.00	326.69	341.34		341.72	0.000943	5.38	2129.90	214.37	0.27
Reach	18.21174	1987	11342.00	326.69	343.26		343.69	0.000907	5.81	2551.67	243.43	0.27
Reach	-285	1936	8946.00	325.92	341.00		341.40	0.000987	5.15	1932.77	213.43	0.25
Reach	-285	1987	11342.00	325.92	342.92		343.37	0.000967	5.58	2393.08	266.21	0.25
Reach	-400	1936	8946.00	323.22	341.09		341.25	0.000359	3.62	3567.43	355.52	0.17
Reach	-400	1987	11342.00	323.22	343.04		343.21	0.000345	3.86	4261.33	355.90	0.17
Reach	-1048	1936	8946.00	321.72	340.45	330.29	340.74	0.001000	4.39	2263.18	265.95	0.21
Reach	-1048	1987	11342.00	321.72	342.38	331.32	342.72	0.001001	4.78	2842.77	318.85	0.21

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1936	342.41	342.11	333.15	0.01	0.02	196.36		8946.00		4.45
Reach	278.3602	1987	344.40	344.02	333.99	0.01	0.02	196.60		11342.00		4.96
Reach	267.4976	1936	342.39	341.91	335.66	0.00	0.01	166.46	20.44	8925.56		5.56
Reach	267.4976	1987	344.38	343.82	336.50	0.00	0.01	167.25	33.67	11308.33		6.02
Reach	251.5954BR U	1936	342.38	341.84	335.87	0.07	0.04	156.50	24.55	8921.45		5.90
Reach	251.5954BR U	1987	344.37	343.74	336.75	0.07	0.04	157.40	41.42	11300.58		6.38
Reach	251.5954BR D	1936	342.27	341.33	337.10	0.00	0.04	138.33		8946.00		7.78
Reach	251.5954BR D	1987	344.25	343.18	338.09	0.00	0.04	139.28		11342.00		8.30
Reach	234.4498	1936	342.23	341.42	336.82	0.02	0.06	148.37		8946.00		7.22
Reach	234.4498	1987	344.21	343.28	337.76	0.02	0.07	149.05		11342.00		7.72
Reach	225.9996	1936	342.15	341.46	336.42	0.01	0.01	155.68		8946.00		6.63
Reach	225.9996	1987	344.12	343.33	337.32	0.01	0.01	156.38		11342.00		7.11



1 in Horiz. = 60 ft 1 in Vert. = 6 ft

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	-285	500-yr	12948.00	325.92	344.05		344.54	0.000962	5.84	2709.79	291.79	0.25
Reach	-400	1.1-yr	1610.00	323.22	330.98		331.11	0.001024	2.97	542.03	113.49	0.24
Reach	-400	10-yr	5878.00	323.22	337.92		338.07	0.000440	3.38	2442.52	354.89	0.18
Reach	-400	25-yr	7409.00	323.22	339.62		339.77	0.000384	3.48	3047.03	355.23	0.17
Reach	-400	50-yr	8604.00	323.22	340.78		340.94	0.000363	3.58	3457.69	355.46	0.17
Reach	-400	100-yr	9852.00	323.22	341.87		342.03	0.000351	3.71	3844.50	355.67	0.17
Reach	-400	500-yr	12948.00	323.22	344.19		344.37	0.000343	4.03	4669.84	357.05	0.17
Reach	-1048	1.1-yr	1610.00	321.72	330.30	325.99	330.39	0.001000	2.47	652.69	111.68	0.18
Reach	-1048	10-yr	5878.00	321.72	337.30	328.83	337.52	0.001002	3.77	1618.01	173.75	0.20
Reach	-1048	25-yr	7409.00	321.72	339.00	329.59	339.25	0.001000	4.10	1929.54	193.34	0.20
Reach	-1048	50-yr	8604.00	321.72	340.14	330.12	340.43	0.001000	4.33	2183.79	252.32	0.20
Reach	-1048	100-yr	9852.00	321.72	341.22	330.67	341.53	0.001000	4.55	2482.09	300.36	0.21
Reach	-1048	500-yr	12948.00	321.72	343.52	331.98	343.88	0.001001	5.01	3212.38	330.43	0.21

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	174.1587	25-yr	7409.00	328.12	339.95		340.57	0.002085	6.48	1262.31	153.92	0.36
Reach	174.1587	50-yr	8604.00	328.12	341.05		341.72	0.001932	6.70	1434.30	157.60	0.36
Reach	174.1587	100-yr	9852.00	328.12	342.10		342.81	0.001836	6.94	1600.95	161.09	0.35
Reach	174.1587	500-yr	12948.00	328.12	344.33		345.16	0.001733	7.56	1967.59	166.50	0.35
Reach	145.0395	1.1-yr	1610.00	326.03	332.63		332.90	0.003160	4.18	384.98	107.35	0.39
Reach	145.0395	10-yr	5878.00	326.03	338.38		338.83	0.001589	5.41	1137.99	145.71	0.32
Reach	145.0395	25-yr	7409.00	326.03	339.99		340.49	0.001421	5.72	1376.82	151.27	0.31
Reach	145.0395	50-yr	8604.00	326.03	341.09		341.63	0.001355	5.98	1545.91	155.12	0.31
Reach	145.0395	100-yr	9852.00	326.03	342.14		342.73	0.001316	6.24	1709.96	158.39	0.31
Reach	145.0395	500-yr	12948.00	326.03	344.37		345.08	0.001291	6.90	2070.70	165.20	0.32
Reach	121.3383	1.1-yr	1610.00	326.30	332.56		332.82	0.002849	4.12	390.85	104.55	0.38
Reach	121.3383	10-yr	5878.00	326.30	338.33		338.79	0.001596	5.50	1123.93	147.73	0.32
Reach	121.3383	25-yr	7409.00	326.30	339.94		340.45	0.001426	5.81	1369.52	156.62	0.32
Reach	121.3383	50-yr	8604.00	326.30	341.05		341.60	0.001357	6.06	1545.56	160.71	0.31
Reach	121.3383	100-yr	9852.00	326.30	342.10		342.69	0.001317	6.32	1716.44	165.22	0.31
Reach	121.3383	500-yr	12948.00	326.30	344.33		345.05	0.001294	6.98	2092.77	175.89	0.32
Reach	71.10767	1.1-yr	1610.00	327.09	332.32		332.65	0.004092	4.60	349.70	107.49	0.45
Reach	71.10767	10-yr	5878.00	327.09	338.21		338.71	0.001611	5.73	1116.63	151.96	0.33
Reach	71.10767	25-yr	7409.00	327.09	339.84		340.38	0.001438	6.04	1374.29	164.33	0.33
Reach	71.10767	50-yr	8604.00	327.09	340.95		341.53	0.001362	6.28	1560.03	169.33	0.32
Reach	71.10767	100-yr	9852.00	327.09	342.00		342.63	0.001316	6.53	1741.01	174.29	0.32
Reach	71.10767	500-yr	12948.00	327.09	344.25		344.98	0.001280	7.17	2145.04	202.90	0.32
Reach	18.21174	1.1-yr	1610.00	326.69	332.12		332.43	0.003965	4.53	384.10	146.77	0.44
Reach	18.21174	10-yr	5878.00	326.69	338.26		338.59	0.001146	4.91	1490.40	201.25	0.28
Reach	18.21174	25-yr	7409.00	326.69	339.91		340.26	0.001008	5.13	1827.87	208.20	0.27
Reach	18.21174	50-yr	8604.00	326.69	341.04		341.41	0.000954	5.33	2065.36	213.07	0.27
Reach	18.21174	100-yr	9852.00	326.69	342.10		342.50	0.000922	5.54	2295.04	217.67	0.27
Reach	18.21174	500-yr	12948.00	326.69	344.36		344.85	0.000929	6.18	2882.31	320.16	0.28
Reach	-285	1.1-yr	1610.00	325.92	331.11		331.32	0.002706	3.71	433.57	115.07	0.34
Reach	-285	10-yr	5878.00	325.92	337.90		338.21	0.001081	4.51	1378.26	160.48	0.25
Reach	-285	25-yr	7409.00	325.92	339.56		339.92	0.001013	4.84	1654.66	173.94	0.25
Reach	-285	50-yr	8604.00	325.92	340.70		341.08	0.000992	5.08	1869.34	205.09	0.25
Reach	-285	100-yr	9852.00	325.92	341.77		342.18	0.000977	5.32	2104.28	234.49	0.25

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	267.4976	10-yr	5878.00	327.36	338.95	334.32	339.33	0.001376	4.97	1189.20	164.38	0.31
Reach	267.4976	25-yr	7409.00	327.36	340.51	335.07	340.94	0.001223	5.26	1419.17	165.55	0.30
Reach	267.4976	50-yr	8604.00	327.36	341.61	335.52	342.08	0.001156	5.49	1581.58	166.33	0.29
Reach	267.4976	100-yr	9852.00	327.36	342.66	335.99	343.17	0.001114	5.73	1737.43	166.77	0.29
Reach	267.4976	500-yr	12948.00	327.36	344.94	337.04	345.56	0.001076	6.33	2074.91	167.72	0.30
Reach	251.5954		Bridge									
Reach	234.4498	1.1-yr	1610.00	328.79	333.36	332.55	333.91	0.008565	5.95	270.81	119.02	0.63
Reach	234.4498	10-yr	5878.00	328.79	338.46	335.49	339.16	0.003050	6.71	875.41	147.27	0.44
Reach	234.4498	25-yr	7409.00	328.79	340.03	336.17	340.78	0.002487	6.93	1069.29	147.85	0.41
Reach	234.4498	50-yr	8604.00	328.79	341.12	336.68	341.92	0.002262	7.15	1203.45	148.26	0.40
Reach	234.4498	100-yr	9852.00	328.79	342.16	337.19	343.01	0.002122	7.40	1330.67	148.64	0.40
Reach	234.4498	500-yr	12948.00	328.79	344.36	338.34	345.38	0.001974	8.08	1602.01	149.46	0.39
Reach	225.9996	1.1-yr	1610.00	329.53	333.31	332.67	333.81	0.009949	5.70	282.22	138.90	0.66
Reach	225.9996	10-yr	5878.00	329.53	338.49	335.13	339.07	0.002427	6.12	960.30	155.21	0.40
Reach	225.9996	25-yr	7409.00	329.53	340.07	335.80	340.70	0.002011	6.35	1167.44	155.46	0.37
Reach	225.9996	50-yr	8604.00	329.53	341.17	336.28	341.84	0.001843	6.56	1310.85	155.63	0.37
Reach	225.9996	100-yr	9852.00	329.53	342.21	336.77	342.93	0.001739	6.81	1446.89	156.23	0.36
Reach	225.9996	500-yr	12948.00	329.53	344.42	337.89	345.29	0.001632	7.45	1737.38	156.52	0.36
Reach	218.6182	1.1-yr	1610.00	329.66	333.25	332.68	333.72	0.009718	5.51	292.28	141.32	0.65
Reach	218.6182	10-yr	5878.00	329.66	338.49	334.99	339.04	0.002268	5.98	983.58	164.10	0.39
Reach	218.6182	25-yr	7409.00	329.66	340.07	335.65	340.67	0.001896	6.21	1192.62	167.15	0.36
Reach	218.6182	50-yr	8604.00	329.66	341.17	336.14	341.81	0.001745	6.43	1337.29	169.40	0.36
Reach	218.6182	100-yr	9852.00	329.66	342.21	336.60	342.90	0.001652	6.68	1474.50	170.79	0.35
Reach	218.6182	500-yr	12948.00	329.66	344.43	337.73	345.26	0.001560	7.33	1767.45	173.78	0.35
Reach	201.5596	1.1-yr	1610.00	328.41	332.75	332.29	333.50	0.013697	6.92	232.52	91.04	0.76
Reach	201.5596	10-yr	5878.00	328.41	338.42	335.12	339.00	0.002649	6.21	1019.48	161.59	0.40
Reach	201.5596	25-yr	7409.00	328.41	340.04	335.84	340.63	0.002110	6.32	1282.33	166.31	0.37
Reach	201.5596	50-yr	8604.00	328.41	341.15	336.36	341.77	0.001899	6.47	1464.49	169.54	0.36
Reach	201.5596	100-yr	9852.00	328.41	342.21	336.86	342.86	0.001765	6.67	1638.57	172.60	0.35
Reach	201.5596	500-yr	12948.00	328.41	344.46	338.05	345.21	0.001615	7.20	2014.90	176.76	0.35
Reach	174.1587	1.1-yr	1610.00	328.12	332.60		333.12	0.009482	5.82	276.64	106.58	0.64
Reach	174.1587	10-yr	5878.00	328.12	338.34		338.93	0.002463	6.25	1018.71	148.56	0.38

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	376.8629	1.1-yr	1610.00	332.84	344.45	337.16	344.47	0.000076	1.25	1287.61	202.72	0.09
Reach	376.8629	10-yr	5878.00	332.84	347.57	340.47	347.72	0.000268	3.04	1945.71	220.16	0.18
Reach	376.8629	25-yr	7409.00	332.84	348.40	341.21	348.59	0.000320	3.52	2147.44	260.92	0.19
Reach	376.8629	50-yr	8604.00	332.84	348.99	341.68	349.22	0.000357	3.85	2301.29	262.57	0.21
Reach	376.8629	100-yr	9852.00	332.84	349.54	342.08	349.81	0.000394	4.19	2445.83	263.87	0.22
Reach	376.8629	500-yr	12948.00	332.84	350.73	343.01	351.11	0.000483	4.96	2762.70	270.73	0.25
Reach	333.2086	1.1-yr	1610.00	334.31	344.44		344.47	0.000085	1.36	1185.06	176.75	0.09
Reach	333.2086	10-yr	5878.00	334.31	347.52		347.70	0.000334	3.38	1741.72	188.09	0.19
Reach	333.2086	25-yr	7409.00	334.31	348.34		348.57	0.000404	3.92	1903.95	226.33	0.22
Reach	333.2086	50-yr	8604.00	334.31	348.91		349.20	0.000454	4.31	2037.19	238.85	0.23
Reach	333.2086	100-yr	9852.00	334.31	349.44		349.78	0.000505	4.69	2169.04	250.55	0.24
Reach	333.2086	500-yr	12948.00	334.31	350.60		351.07	0.000626	5.57	2463.86	262.73	0.28
Reach	307.6648	1.1-yr	1610.00	341.50	344.15	343.15	344.44	0.002998	4.30	375.22	152.47	0.48
Reach	307.6648	10-yr	5878.00	341.50	346.74	345.33	347.61	0.003629	7.56	845.44	194.48	0.59
Reach	307.6648	25-yr	7409.00	341.50	347.42	345.95	348.47	0.003771	8.36	976.81	197.77	0.61
Reach	307.6648	50-yr	8604.00	341.50	347.87	346.37	349.08	0.003921	8.97	1067.82	201.95	0.63
Reach	307.6648	100-yr	9852.00	341.50	348.26	346.81	349.65	0.004192	9.65	1146.45	207.40	0.66
Reach	307.6648	500-yr	12948.00	341.50	348.95	347.71	350.89	0.005129	11.41	1302.05	252.56	0.74
Reach	306		Inl Struct									
Reach	289.4348	1.1-yr	1610.00	323.53	334.14	327.46	334.18	0.000139	1.47	1095.08	148.08	0.09
Reach	289.4348	10-yr	5878.00	323.53	339.21	330.17	339.37	0.000332	3.18	1852.74	201.49	0.16
Reach	289.4348	25-yr	7409.00	323.53	340.78	330.83	340.98	0.000354	3.55	2088.65	207.41	0.17
Reach	289.4348	50-yr	8604.00	323.53	341.89	331.31	342.12	0.000370	3.82	2254.81	208.08	0.17
Reach	289.4348	100-yr	9852.00	323.53	342.95	331.79	343.21	0.000386	4.09	2414.16	208.13	0.18
Reach	289.4348	500-yr	12948.00	323.53	345.31	332.87	345.60	0.000405	4.42	3129.34	208.36	0.18
Reach	278.3602	1.1-yr	1610.00	325.85	334.12	329.48	334.17	0.000312	1.89	852.40	164.12	0.14
Reach	278.3602	10-yr	5878.00	325.85	339.14	331.89	339.36	0.000530	3.72	1580.98	190.89	0.20
Reach	278.3602	25-yr	7409.00	325.85	340.71	332.56	340.97	0.000538	4.10	1807.90	196.18	0.20
Reach	278.3602	50-yr	8604.00	325.85	341.81	333.02	342.11	0.000547	4.37	1967.65	196.32	0.21
Reach	278.3602	100-yr	9852.00	325.85	342.86	333.48	343.20	0.000559	4.65	2120.77	196.45	0.21
Reach	278.3602	500-yr	12948.00	325.85	345.26	334.52	345.59	0.000490	4.68	2873.47	196.78	0.20
Reach	267.4976	1.1-yr	1610.00	327.36	333.98	331.60	334.15	0.001870	3.38	476.67	147.03	0.31

HEC-RAS Plan: FINAL_EX River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	334.17	334.12	329.48	0.01	0.01	164.12		1610.00		1.89
Reach	278.3602	10-yr	339.36	339.14	331.89	0.01	0.02	190.89		5878.00		3.72
Reach	278.3602	25-yr	340.97	340.71	332.56	0.01	0.02	196.18		7409.00		4.10
Reach	278.3602	50-yr	342.11	341.81	333.02	0.01	0.02	196.32		8604.00		4.37
Reach	278.3602	100-yr	343.20	342.86	333.48	0.01	0.02	196.45		9852.00		4.65
Reach	278.3602	500-yr	345.59	345.26	334.52	0.01	0.03	196.78		12742.87	205.13	4.68
Reach	267.4976	1.1-yr	334.15	333.98	331.60	0.00	0.00	147.03		1610.00		3.38
Reach	267.4976	10-yr	339.33	338.95	334.32	0.00	0.01	164.38	6.67	5871.33		4.97
Reach	267.4976	25-yr	340.94	340.51	335.07	0.00	0.01	165.55	12.76	7396.24		5.26
Reach	267.4976	50-yr	342.08	341.61	335.52	0.00	0.01	166.33	18.61	8585.39		5.49
Reach	267.4976	100-yr	343.17	342.66	335.99	0.00	0.01	166.77	25.35	9826.65		5.73
Reach	267.4976	500-yr	345.56	344.94	337.04	0.00	0.01	167.72	42.86	12905.14		6.33
Reach	251.5954BR U	1.1-yr	334.15	333.94	331.74	0.14	0.05	135.76		1610.00		3.62
Reach	251.5954BR U	10-yr	339.32	338.89	334.50	0.09	0.04	153.97	7.70	5870.30		5.30
Reach	251.5954BR U	25-yr	340.93	340.45	335.25	0.08	0.04	155.37	15.07	7393.93		5.60
Reach	251.5954BR U	50-yr	342.07	341.54	335.73	0.07	0.04	156.34	22.27	8581.73		5.83
Reach	251.5954BR U	100-yr	343.16	342.59	336.20	0.07	0.04	156.93	30.76	9821.23		6.08
Reach	251.5954BR U	500-yr	345.55	344.85	337.30	0.07	0.05	157.85	53.39	12894.61		6.70
Reach	251.5954BR D	1.1-yr	333.96	333.28	332.64	0.01	0.04	106.66		1610.00		6.61
Reach	251.5954BR D	10-yr	339.20	338.37	335.71	0.00	0.04	136.80		5878.00		7.26
Reach	251.5954BR D	25-yr	340.82	339.95	336.43	0.00	0.04	137.61		7409.00		7.48
Reach	251.5954BR D	50-yr	341.96	341.04	336.95	0.00	0.04	138.18		8604.00		7.71
Reach	251.5954BR D	100-yr	343.05	342.06	337.48	0.00	0.04	138.72		9852.00		7.97
Reach	251.5954BR D	500-yr	345.43	344.26	338.70	0.00	0.05	139.81		12948.00		8.68
Reach	234.4498	1.1-yr	333.91	333.36	332.55	0.08	0.02	119.02		1610.00		5.95
Reach	234.4498	10-yr	339.16	338.46	335.49	0.02	0.06	147.27		5878.00		6.71
Reach	234.4498	25-yr	340.78	340.03	336.17	0.02	0.06	147.85		7409.00		6.93
Reach	234.4498	50-yr	341.92	341.12	336.68	0.02	0.06	148.26		8604.00		7.15
Reach	234.4498	100-yr	343.01	342.16	337.19	0.02	0.07	148.64		9852.00		7.40
Reach	234.4498	500-yr	345.38	344.36	338.34	0.02	0.08	149.46		12948.00		8.08
Reach	225.9996	1.1-yr	333.81	333.31	332.67	0.07	0.02	138.90		1610.00		5.70
Reach	225.9996	10-yr	339.07	338.49	335.13	0.02	0.01	155.21		5878.00		6.12
Reach	225.9996	25-yr	340.70	340.07	335.80	0.01	0.01	155.46		7409.00		6.35
Reach	225.9996	50-yr	341.84	341.17	336.28	0.01	0.01	155.63		8604.00		6.56
Reach	225.9996	100-yr	342.93	342.21	336.77	0.01	0.01	156.23		9852.00		6.81
Reach	225.9996	500-yr	345.29	344.42	337.89	0.01	0.01	156.52		12948.00		7.45

Plan: FINAL_EX L. Androscoggin Reach RS: 251.5954 Profile: 100-yr

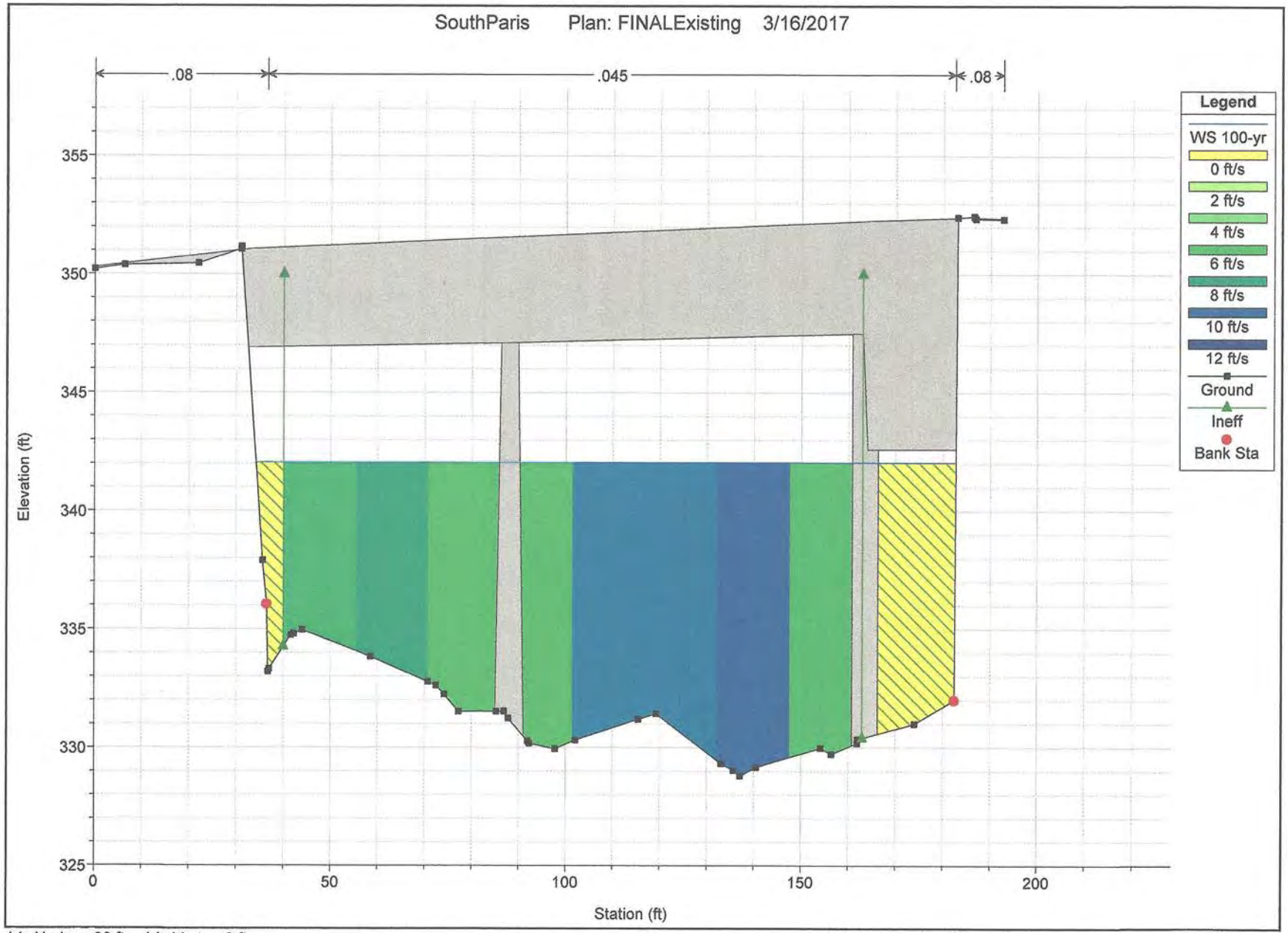
E.G. US. (ft)	343.17	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	342.66	E.G. Elev (ft)	343.16	343.05
Q Total (cfs)	9852.00	W.S. Elev (ft)	342.59	342.06
Q Bridge (cfs)	9852.00	Crit W.S. (ft)	336.20	337.48
Q Weir (cfs)		Max Chl Dpth (ft)	15.23	13.27
Weir Sta Lft (ft)		Vel Total (ft/s)	6.02	7.97
Weir Sta Rgt (ft)		Flow Area (sq ft)	1636.90	1235.88
Weir Submerg		Froude # Chl	0.31	0.43
Weir Max Depth (ft)		Specif Force (cu ft)	11781.37	9222.02
Min El Weir Flow (ft)	350.42	Hydr Depth (ft)	11.55	10.62
Min El Prs (ft)	347.50	W.P. Total (ft)	181.25	149.54
Delta EG (ft)	0.17	Conv. Total (cfs)	238230.0	166817.1
Delta WS (ft)	0.51	Top Width (ft)	156.93	138.72
BR Open Area (sq ft)	1833.58	Frctn Loss (ft)	0.07	0.00
BR Open Vel (ft/s)	7.97	C & E Loss (ft)	0.04	0.04
BR Sluice Coef		Shear Total (lb/sq ft)	0.96	1.80
BR Sel Method	Energy only	Power Total (lb/ft s)	5.80	14.35

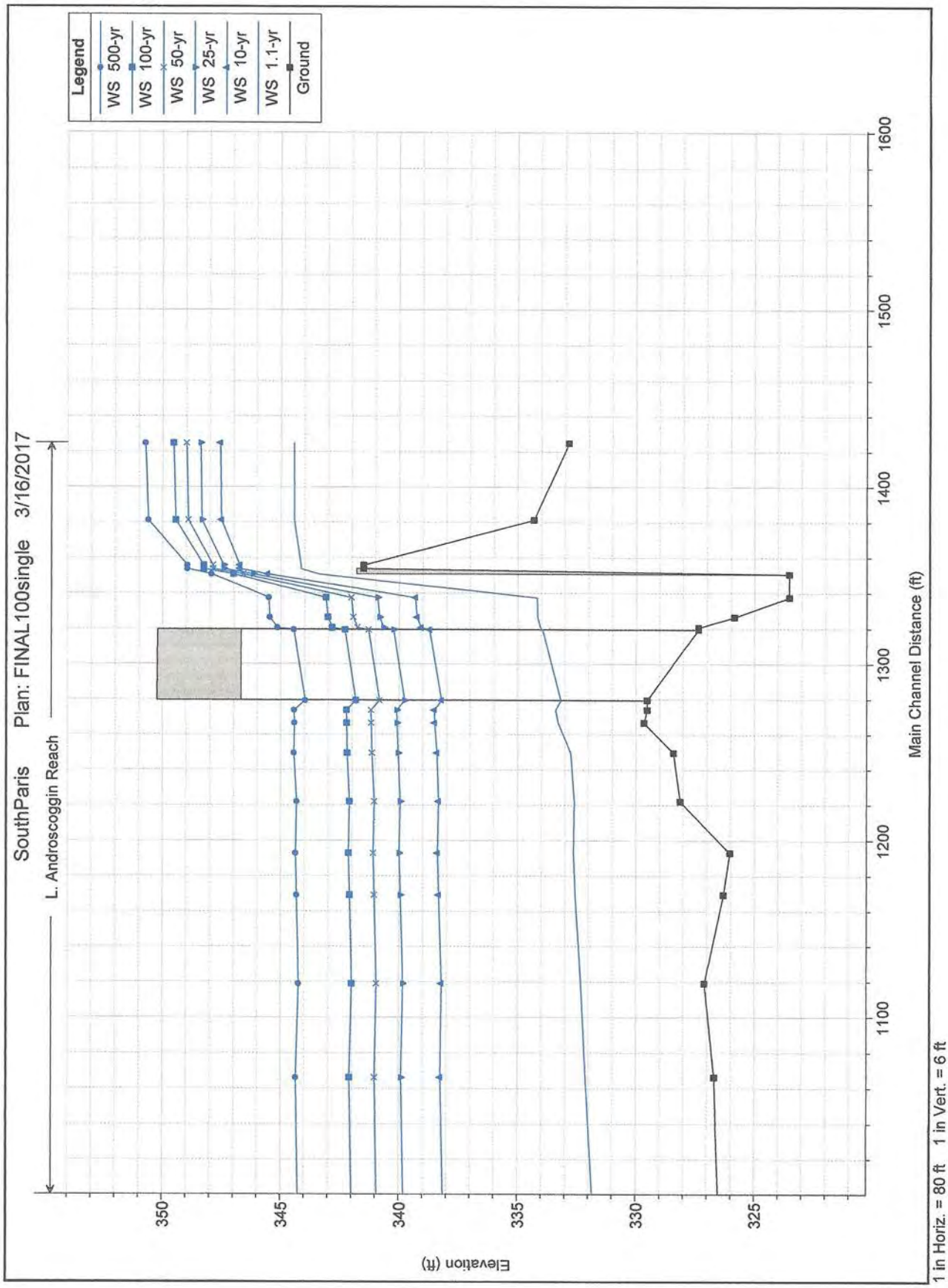
Plan: FINAL_EX L. Androscoggin Reach RS: 251.5954BR U Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	11.77	15.70	0.53	1.22	2.40	0.01	1.32	0.44	0.05	0.02
2	LOB	15.70	19.62	30.23	21.38	7.19	0.31	5.45	1.41	0.32	0.45
3	Chan	19.62	35.55	657.60	129.89	16.03	6.67	8.15	5.06	0.86	4.38
4	Chan	35.55	51.48	1017.00	169.35	16.18	10.32	10.63	6.01	1.12	6.71
5	Chan	51.48	67.41	1103.64	177.19	16.03	11.20	11.12	6.23	1.18	7.35
6	Chan	67.41	83.34	1050.03	171.77	15.98	10.66	10.78	6.11	1.15	7.02
7	Chan	83.34	99.28	460.73	143.39	35.01	4.68	12.34	3.21	0.44	1.41
8	Chan	99.28	115.21	1803.77	237.71	15.99	18.31	14.92	7.59	1.59	12.04
9	Chan	115.21	131.14	1624.41	223.27	16.00	16.49	14.01	7.28	1.49	10.84
10	Chan	131.14	147.07	1452.63	208.87	16.01	14.74	13.11	6.95	1.39	9.69
11	Chan	147.07	163.00	651.42	152.83	24.42	6.61	11.17	4.26	0.67	2.85
12	Chan	163.00	180.00	0.00	136.64	24.05	0.00	9.94	0.00	0.61	0.00
13	ROB	180.00	182.80	0.00	7.26	9.71	0.00	4.80	0.00	0.08	0.00

Plan: FINAL_EX L. Androscoggin Reach RS: 251.5954BR D Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	29.19	36.49	0.00	7.63	6.48	0.00	3.25	0.00	0.26	0.00
2	Chan	36.49	40.00	0.00	28.98	6.29	0.00	8.26	0.00	1.00	0.00
3	Chan	40.00	55.38	814.46	115.23	15.49	8.27	7.49	7.07	1.62	11.45
4	Chan	55.38	70.75	1032.49	132.64	15.43	10.48	8.63	7.78	1.87	14.57
5	Chan	70.75	86.13	918.79	149.94	24.97	9.33	9.96	6.13	1.31	8.01
6	Chan	86.13	101.50	784.02	129.84	22.11	7.96	11.49	6.04	1.28	7.72
7	Chan	101.50	116.88	1617.43	173.54	15.41	16.42	11.29	9.32	2.45	22.86
8	Chan	116.88	132.25	1655.57	176.54	15.53	16.80	11.48	9.38	2.48	23.21
9	Chan	132.25	147.63	2004.57	197.62	15.45	20.35	12.85	10.14	2.78	28.24
10	Chan	147.63	163.00	1024.68	160.51	25.14	10.40	12.23	6.38	1.39	8.88
11	Chan	163.00	182.50	0.00	177.18	27.81	0.00	10.90	0.00	1.39	0.00
12	ROB	182.50	184.53	0.00	1.24	10.07	0.00	5.03	0.00	0.03	0.00


SouthParis Plan: FINALExisting 3/16/2017
.08
.045
.08
Legend
WS 100-yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft


SouthParis Plan: FINAL100single 3/16/2017
L. Androscoggin Reach
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 1.1-yr
Ground
Elevation (ft)
350
345
340
335
330
325
1100
1200
1300
1400
1500
1600
Main Channel Distance (ft)
1 in Horiz. = 80 ft 1 in Vert. = 6 ft

HEC-RAS Plan: FINAL_100single River: L Androscoggin Reach: Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	376.8629	1.1-yr	1610.00	332.84	344.45	337.16	344.47	0.000076	1.25	1287.61	202.72	0.09
Reach	376.8629	10-yr	5878.00	332.84	347.57	340.47	347.72	0.000268	3.04	1945.71	220.16	0.18
Reach	376.8629	25-yr	7409.00	332.84	348.40	341.21	348.59	0.000320	3.52	2147.44	260.92	0.19
Reach	376.8629	50-yr	8604.00	332.84	348.99	341.68	349.22	0.000357	3.85	2301.29	262.57	0.21
Reach	376.8629	100-yr	9852.00	332.84	349.54	342.08	349.81	0.000394	4.19	2445.83	263.87	0.22
Reach	376.8629	500-yr	12948.00	332.84	350.73	343.01	351.11	0.000483	4.96	2762.70	270.73	0.25
Reach	333.2086	1.1-yr	1610.00	334.31	344.44		344.47	0.000085	1.36	1185.06	176.75	0.09
Reach	333.2086	10-yr	5878.00	334.31	347.52		347.70	0.000334	3.38	1741.72	188.09	0.19
Reach	333.2086	25-yr	7409.00	334.31	348.34		348.57	0.000404	3.92	1903.95	226.33	0.22
Reach	333.2086	50-yr	8604.00	334.31	348.91		349.20	0.000454	4.31	2037.20	238.85	0.23
Reach	333.2086	100-yr	9852.00	334.31	349.44		349.78	0.000505	4.69	2169.04	250.55	0.24
Reach	333.2086	500-yr	12948.00	334.31	350.60		351.07	0.000626	5.57	2463.86	262.73	0.28
Reach	307.6648	1.1-yr	1610.00	341.50	344.15	343.15	344.44	0.002998	4.30	375.22	152.47	0.48
Reach	307.6648	10-yr	5878.00	341.50	346.74	345.33	347.61	0.003629	7.56	845.44	194.48	0.59
Reach	307.6648	25-yr	7409.00	341.50	347.42	345.95	348.47	0.003771	8.36	976.81	197.77	0.61
Reach	307.6648	50-yr	8604.00	341.50	347.87	346.37	349.08	0.003921	8.97	1067.82	201.95	0.63
Reach	307.6648	100-yr	9852.00	341.50	348.26	346.81	349.65	0.004192	9.65	1148.45	207.40	0.66
Reach	307.6648	500-yr	12948.00	341.50	348.95	347.71	350.89	0.005129	11.41	1302.05	252.56	0.74
Reach	306		Inl Struct									
Reach	289.4348	1.1-yr	1610.00	323.53	334.18	327.46	334.22	0.000137	1.46	1100.80	148.11	0.09
Reach	289.4348	10-yr	5878.00	323.53	339.32	330.17	339.47	0.000322	3.15	1868.88	201.89	0.16
Reach	289.4348	25-yr	7409.00	323.53	340.91	330.83	341.10	0.000343	3.52	2107.44	207.88	0.17
Reach	289.4348	50-yr	8604.00	323.53	342.03	331.31	342.25	0.000359	3.79	2275.15	208.09	0.17
Reach	289.4348	100-yr	9852.00	323.53	343.10	331.79	343.36	0.000375	4.05	2436.60	208.14	0.18
Reach	289.4348	500-yr	12948.00	323.53	345.51	332.87	345.80	0.000390	4.36	3169.52	208.38	0.16
Reach	278.3602	1.1-yr	1610.00	325.85	334.16	329.48	334.21	0.000305	1.88	858.12	164.47	0.14
Reach	278.3602	10-yr	5878.00	325.85	339.25	331.89	339.46	0.000512	3.68	1596.85	191.31	0.20
Reach	278.3602	25-yr	7409.00	325.85	340.83	332.56	341.09	0.000520	4.06	1826.36	196.20	0.20
Reach	278.3602	50-yr	8604.00	325.85	341.95	333.02	342.24	0.000529	4.33	1987.63	196.34	0.21
Reach	278.3602	100-yr	9852.00	325.85	343.02	333.48	343.35	0.000540	4.60	2142.82	196.47	0.21
Reach	278.3602	500-yr	12948.00	325.85	345.47	334.52	345.79	0.000470	4.62	2912.47	196.82	0.20
Reach	272.5	1.1-yr	1610.00	327.36	334.04	331.77	334.18	0.001424	3.00	536.06	159.05	0.27
Reach	272.5	10-yr	5878.00	327.36	339.08	334.03	339.42	0.001119	4.67	1266.18	164.48	0.28
Reach	272.5	25-yr	7409.00	327.36	340.66	334.67	341.05	0.001023	4.98	1498.51	165.67	0.27
Reach	272.5	50-yr	8604.00	327.36	341.77	335.13	342.19	0.000982	5.22	1662.38	166.40	0.27
Reach	272.5	100-yr	9852.00	327.36	342.84	335.59	343.30	0.000956	5.47	1820.28	166.84	0.27
Reach	272.5	500-yr	12948.00	327.36	345.15	336.64	345.72	0.000938	6.07	2163.65	167.80	0.28
Reach	251.5954		Bridge									
Reach	225.9996	1.1-yr	1610.00	329.53	333.40	332.53	333.77	0.006484	4.89	328.95	147.10	0.54
Reach	225.9996	10-yr	5878.00	329.53	338.52	334.86	339.05	0.002121	5.88	1000.42	155.21	0.37
Reach	225.9996	25-yr	7409.00	329.53	340.10	335.53	340.68	0.001802	6.14	1206.99	155.46	0.36
Reach	225.9996	50-yr	8604.00	329.53	341.19	336.00	341.82	0.001674	6.37	1349.72	155.64	0.35
Reach	225.9996	100-yr	9852.00	329.53	342.23	336.49	342.91	0.001594	6.63	1485.65	156.23	0.35
Reach	225.9996	500-yr	12948.00	329.53	344.44	337.61	345.27	0.001518	7.29	1776.20	156.52	0.35
Reach	218.6182	1.1-yr	1610.00	329.66	333.29	332.58	333.71	0.007806	5.16	312.25	141.49	0.59
Reach	218.6182	10-yr	5878.00	329.66	338.51	334.88	339.04	0.002146	5.88	1000.36	164.12	0.38
Reach	218.6182	25-yr	7409.00	329.66	340.09	335.52	340.67	0.001814	6.13	1208.99	167.18	0.36
Reach	218.6182	50-yr	8604.00	329.66	341.18	336.02	341.81	0.001681	6.36	1353.00	169.41	0.35
Reach	218.6182	100-yr	9852.00	329.66	342.22	336.50	342.89	0.001597	6.61	1490.12	170.81	0.35
Reach	218.6182	500-yr	12948.00	329.66	344.43	337.62	345.25	0.001517	7.26	1783.10	173.79	0.35
Reach	201.5596	1.1-yr	1610.00	328.41	332.75	332.29	333.50	0.013704	6.93	232.47	91.03	0.76
Reach	201.5596	10-yr	5878.00	328.41	338.41	335.12	339.00	0.002652	6.21	1019.07	161.59	0.40
Reach	201.5596	25-yr	7409.00	328.41	340.04	335.84	340.63	0.002111	6.32	1262.06	166.30	0.37
Reach	201.5596	50-yr	8604.00	328.41	341.15	336.36	341.77	0.001899	6.47	1464.26	169.53	0.36
Reach	201.5596	100-yr	9852.00	328.41	342.20	336.86	342.86	0.001766	6.67	1638.24	172.59	0.35
Reach	201.5596	500-yr	12948.00	328.41	344.45	338.05	345.21	0.001616	7.20	2014.51	176.76	0.35
Reach	174.1587	1.1-yr	1610.00	328.12	332.60		333.12	0.009490	5.82	276.56	106.57	0.64
Reach	174.1587	10-yr	5878.00	328.12	338.34		338.93	0.002466	6.25	1018.33	148.55	0.38
Reach	174.1587	25-yr	7409.00	328.12	339.95		340.57	0.002086	6.48	1262.05	153.92	0.36
Reach	174.1587	50-yr	8604.00	328.12	341.05		341.71	0.001933	6.70	1434.07	157.60	0.36
Reach	174.1587	100-yr	9852.00	328.12	342.10		342.80	0.001837	6.94	1600.62	161.08	0.35
Reach	174.1587	500-yr	12948.00	328.12	344.33		345.15	0.001734	7.56	1967.20	166.50	0.35
Reach	145.0395	1.1-yr	1610.00	326.03	332.63		332.90	0.003162	4.18	384.90	107.34	0.39
Reach	145.0395	10-yr	5878.00	326.03	338.38		338.83	0.001591	5.42	1137.62	145.70	0.32

HEC-RAS Plan: FINAL_100single River: L. Androscoggin Reach: Reach (Continued)

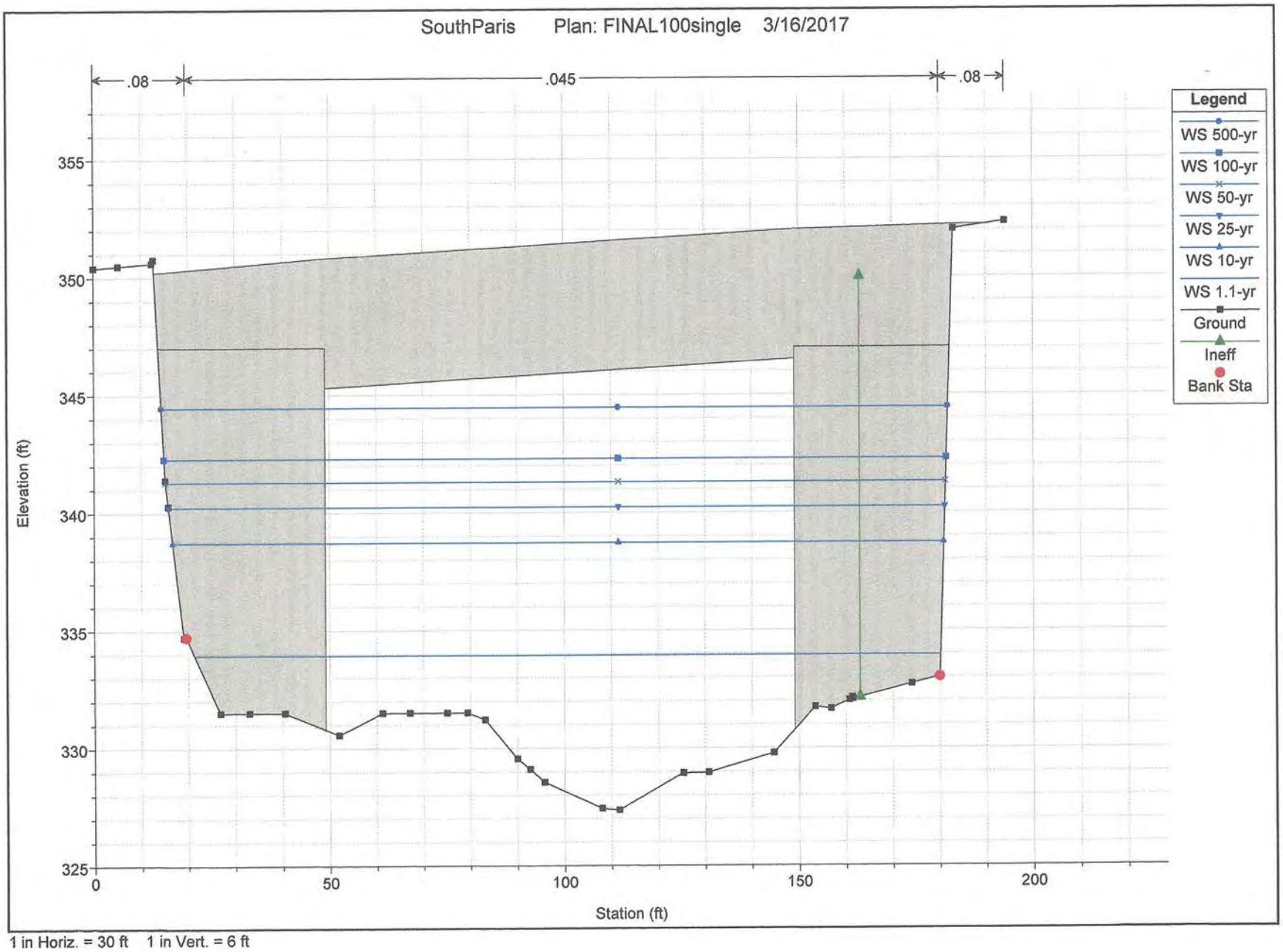
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	145.0395	25-yr	7409.00	326.03	339.99		340.49	0.001421	5.72	1376.57	151.26	0.31
Reach	145.0395	50-yr	8604.00	326.03	341.09		341.63	0.001356	5.98	1545.69	155.12	0.31
Reach	145.0395	100-yr	9852.00	326.03	342.14		342.72	0.001317	6.24	1709.64	158.38	0.31
Reach	145.0395	500-yr	12948.00	326.03	344.37		345.08	0.001292	6.90	2070.31	165.19	0.32
Reach	121.3383	1.1-yr	1610.00	326.30	332.56		332.82	0.002851	4.12	390.76	104.55	0.38
Reach	121.3383	10-yr	5878.00	326.30	338.33		338.79	0.001597	5.50	1123.55	147.72	0.32
Reach	121.3383	25-yr	7409.00	326.30	339.94		340.45	0.001427	5.81	1369.26	156.61	0.32
Reach	121.3383	50-yr	8604.00	326.30	341.05		341.60	0.001357	6.06	1545.33	160.70	0.31
Reach	121.3383	100-yr	9852.00	326.30	342.09		342.69	0.001318	6.32	1716.10	165.21	0.31
Reach	121.3383	500-yr	12948.00	326.30	344.33		345.05	0.001294	6.98	2092.37	175.84	0.32
Reach	71.10767	1.1-yr	1610.00	327.09	332.32		332.65	0.004096	4.61	349.59	107.47	0.45
Reach	71.10767	10-yr	5878.00	327.09	338.21		338.70	0.001613	5.73	1116.21	151.95	0.34
Reach	71.10767	25-yr	7409.00	327.09	339.83		340.38	0.001439	6.04	1373.99	164.32	0.33
Reach	71.10767	50-yr	8604.00	327.09	340.95		341.53	0.001363	6.28	1559.78	169.33	0.32
Reach	71.10767	100-yr	9852.00	327.09	342.00		342.62	0.001317	6.53	1740.64	174.28	0.32
Reach	71.10767	500-yr	12948.00	327.09	344.24		344.96	0.001280	7.17	2144.55	201.87	0.33
Reach	18.21174	1.1-yr	1610.00	326.69	332.12		332.43	0.003970	4.53	383.91	146.75	0.44
Reach	18.21174	10-yr	5878.00	326.69	338.26		338.58	0.001148	4.91	1489.85	201.24	0.28
Reach	18.21174	25-yr	7409.00	326.69	339.91		340.26	0.001009	5.13	1827.49	208.19	0.27
Reach	18.21174	50-yr	8604.00	326.69	341.03		341.41	0.000954	5.33	2085.05	213.06	0.27
Reach	18.21174	100-yr	9852.00	326.69	342.10		342.50	0.000922	5.54	2294.59	217.66	0.27
Reach	18.21174	500-yr	12948.00	326.69	344.36		344.85	0.000930	6.18	2881.52	320.16	0.28
Reach	-285	1.1-yr	1610.00	325.92	331.11		331.32	0.002713	3.72	433.19	115.02	0.34
Reach	-285	10-yr	5878.00	325.92	337.89		338.20	0.001083	4.52	1377.76	160.46	0.25
Reach	-285	25-yr	7409.00	325.92	339.56		339.91	0.001014	4.84	1654.32	173.89	0.25
Reach	-285	50-yr	8604.00	325.92	340.69		341.08	0.000992	5.09	1869.02	205.05	0.25
Reach	-285	100-yr	9852.00	325.92	341.76		342.18	0.000978	5.32	2103.76	234.43	0.25
Reach	-285	500-yr	12948.00	325.92	344.05		344.54	0.000962	5.84	2709.02	291.74	0.25
Reach	-400	1.1-yr	1610.00	323.22	330.98		331.11	0.001024	2.97	542.03	113.49	0.24
Reach	-400	10-yr	5878.00	323.22	337.92		338.07	0.000440	3.38	2442.52	354.89	0.18
Reach	-400	25-yr	7409.00	323.22	339.62		339.77	0.000384	3.48	3047.03	355.23	0.17
Reach	-400	50-yr	8604.00	323.22	340.78		340.94	0.000363	3.58	3457.69	355.46	0.17
Reach	-400	100-yr	9852.00	323.22	341.87		342.03	0.000351	3.71	3844.50	355.67	0.17
Reach	-400	500-yr	12948.00	323.22	344.19		344.37	0.000343	4.03	4669.84	357.05	0.17
Reach	-1045	1.1-yr	1610.00	321.72	330.30	325.99	330.39	0.001000	2.47	652.69	111.68	0.18
Reach	-1048	10-yr	5878.00	321.72	337.30	328.83	337.52	0.001002	3.77	1618.01	173.75	0.20
Reach	-1048	25-yr	7409.00	321.72	339.00	329.59	339.25	0.001000	4.10	1929.54	193.34	0.20
Reach	-1048	50-yr	8604.00	321.72	340.14	330.12	340.43	0.001000	4.33	2183.79	252.32	0.20
Reach	-1048	100-yr	9852.00	321.72	341.22	330.67	341.53	0.001000	4.55	2482.09	300.36	0.21
Reach	-1048	500-yr	12948.00	321.72	343.52	331.96	343.88	0.001001	5.01	3212.38	330.43	0.21

HEC-RAS Plan: FINAL_100single River: L. Androscoggin Reach: Reach

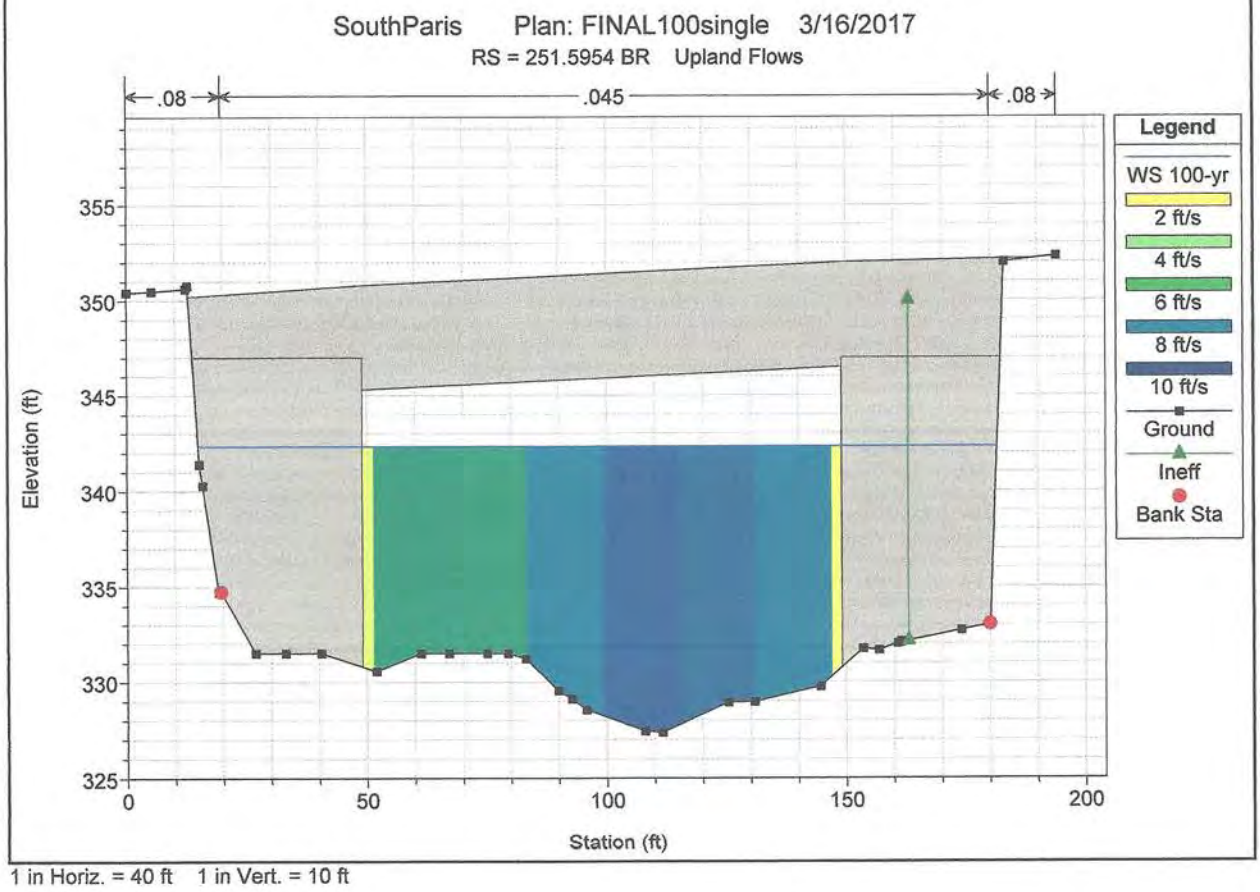
Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	334.21	334.16	329.48	0.00	0.03	164.47		1610.00		1.88
Reach	278.3602	10-yr	339.46	339.25	331.89	0.00	0.04	191.31		5878.00		3.68
Reach	278.3602	25-yr	341.09	340.83	332.56	0.00	0.04	196.20		7409.00		4.06
Reach	278.3602	50-yr	342.24	341.95	333.02	0.00	0.04	196.34		8604.00		4.33
Reach	278.3602	100-yr	343.35	343.02	333.48	0.00	0.04	196.47		9852.00		4.60
Reach	278.3602	500-yr	345.79	345.47	334.52	0.00	0.07	196.82		12738.85	209.15	4.62
Reach	272.5	1.1-yr	334.18	334.04	331.77	0.00	0.01	159.05		1610.00		3.00
Reach	272.5	10-yr	339.42	339.08	334.03	0.00	0.03	164.48	6.44	5871.56		4.67
Reach	272.5	25-yr	341.05	340.66	334.67	0.00	0.04	165.67	12.37	7396.63		4.98
Reach	272.5	50-yr	342.19	341.77	335.13	0.00	0.04	166.40	18.09	8585.90		5.22
Reach	272.5	100-yr	343.30	342.84	335.59	0.00	0.05	166.84	24.63	9827.37		5.47
Reach	272.5	500-yr	345.72	345.15	336.64	0.00	0.06	167.80	41.75	12906.25		6.07
Reach	251.5954BR U	1.1-yr	334.17	333.95	331.69	0.18	0.05	99.95		1610.00		3.77
Reach	251.5954BR U	10-yr	339.39	338.73	334.42	0.14	0.03	100.00		5878.00		6.50
Reach	251.5954BR U	25-yr	341.01	340.24	335.23	0.13	0.03	100.02		7409.00		7.02
Reach	251.5954BR U	50-yr	342.15	341.30	335.81	0.13	0.03	100.03		8604.00		7.41
Reach	251.5954BR U	100-yr	343.25	342.30	336.39	0.13	0.03	100.04		9852.00		7.81
Reach	251.5954BR U	500-yr	345.65	344.46	337.71	0.13	0.03	100.07		12948.00		8.76
Reach	251.5954BR D	1.1-yr	333.94	333.18	332.89	0.05	0.12	99.94		1610.00		6.99
Reach	251.5954BR D	10-yr	339.21	338.22	335.63	0.02	0.14	100.00		5878.00		8.01
Reach	251.5954BR D	25-yr	340.85	339.77	336.43	0.01	0.15	100.01		7409.00		8.34
Reach	251.5954BR D	50-yr	341.99	340.83	337.01	0.01	0.16	100.03		8604.00		8.65
Reach	251.5954BR D	100-yr	343.09	341.84	337.58	0.01	0.17	100.04		9852.00		8.99
Reach	251.5954BR D	500-yr	345.49	343.97	338.93	0.01	0.21	100.06		12948.00		9.89
Reach	225.9996	1.1-yr	333.77	333.40	332.53	0.05	0.01	147.10		1610.00		4.89
Reach	225.9996	10-yr	339.06	338.52	334.86	0.02	0.00	155.21		5878.00		5.88
Reach	225.9996	25-yr	340.68	340.10	335.53	0.01	0.00	155.46		7409.00		6.14
Reach	225.9996	50-yr	341.82	341.19	336.00	0.01	0.00	155.64		8604.00		6.37
Reach	225.9996	100-yr	342.91	342.23	336.49	0.01	0.00	156.23		9852.00		6.63
Reach	225.9996	500-yr	345.27	344.44	337.61	0.01	0.00	156.52		12948.00		7.29
Reach	218.6182	1.1-yr	333.71	333.29	332.58	0.17	0.03	141.49		1610.00		5.16
Reach	218.6182	10-yr	339.04	338.51	334.88	0.04	0.00	164.12		5878.00		5.88
Reach	218.6182	25-yr	340.67	340.09	335.52	0.03	0.00	167.18		7409.00		6.13
Reach	218.6182	50-yr	341.81	341.18	336.02	0.03	0.00	169.41		8604.00		6.36

HEC-RAS Plan: FINAL_100single River: L. Androscoggin Reach: Reach (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	218.6182	100-yr	342.89	342.22	336.50	0.03	0.01	170.81		9852.00		6.61
Reach	218.6182	500-yr	345.25	344.43	337.62	0.03	0.02	173.79		12948.00		7.26


SouthParis Plan: FINAL100single 3/16/2017
.08
.045
.08
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 1.1-yr
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

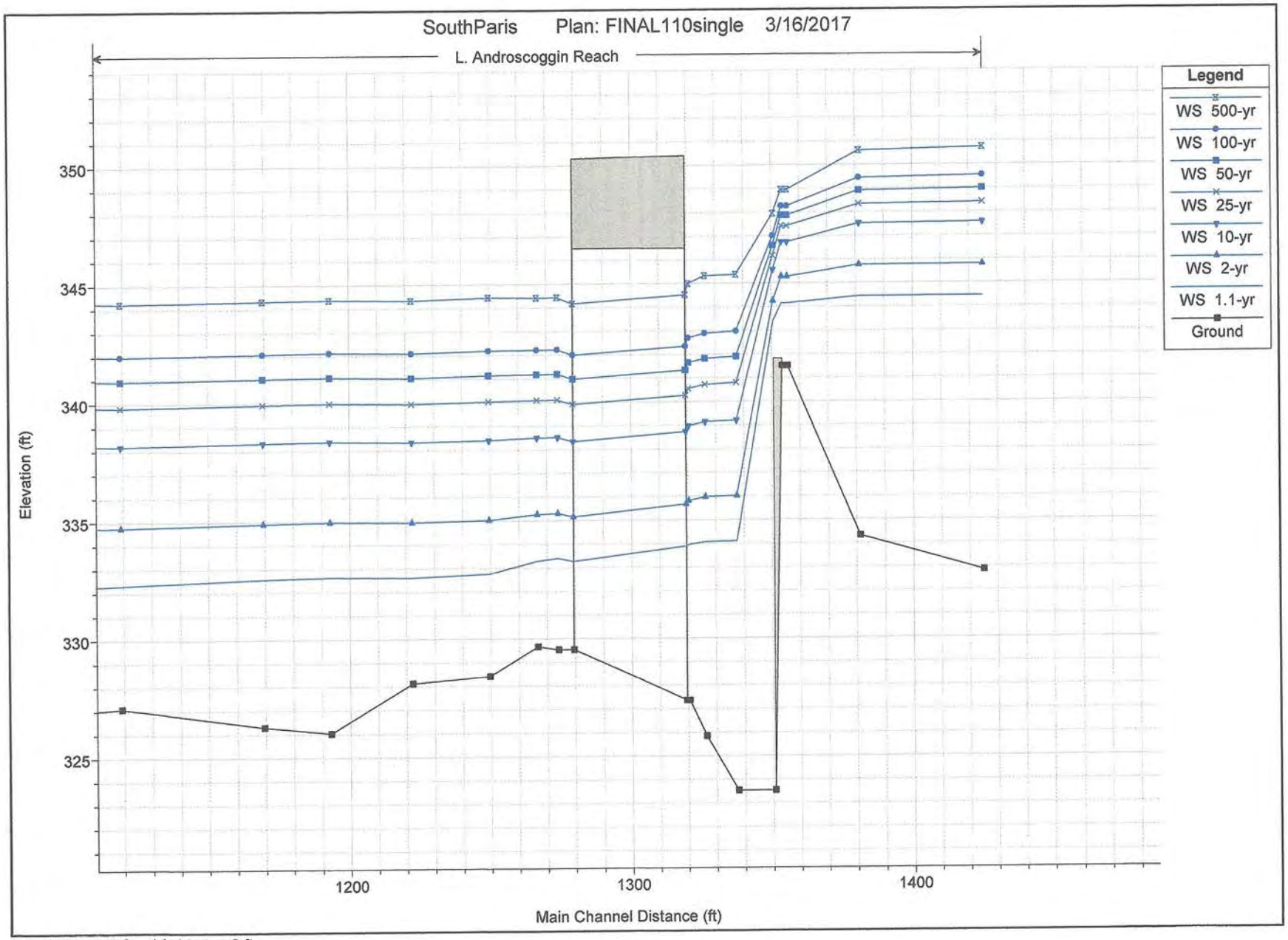
No Data for Plot



1 in Horiz. = 40 ft 1 in Vert. = 10 ft

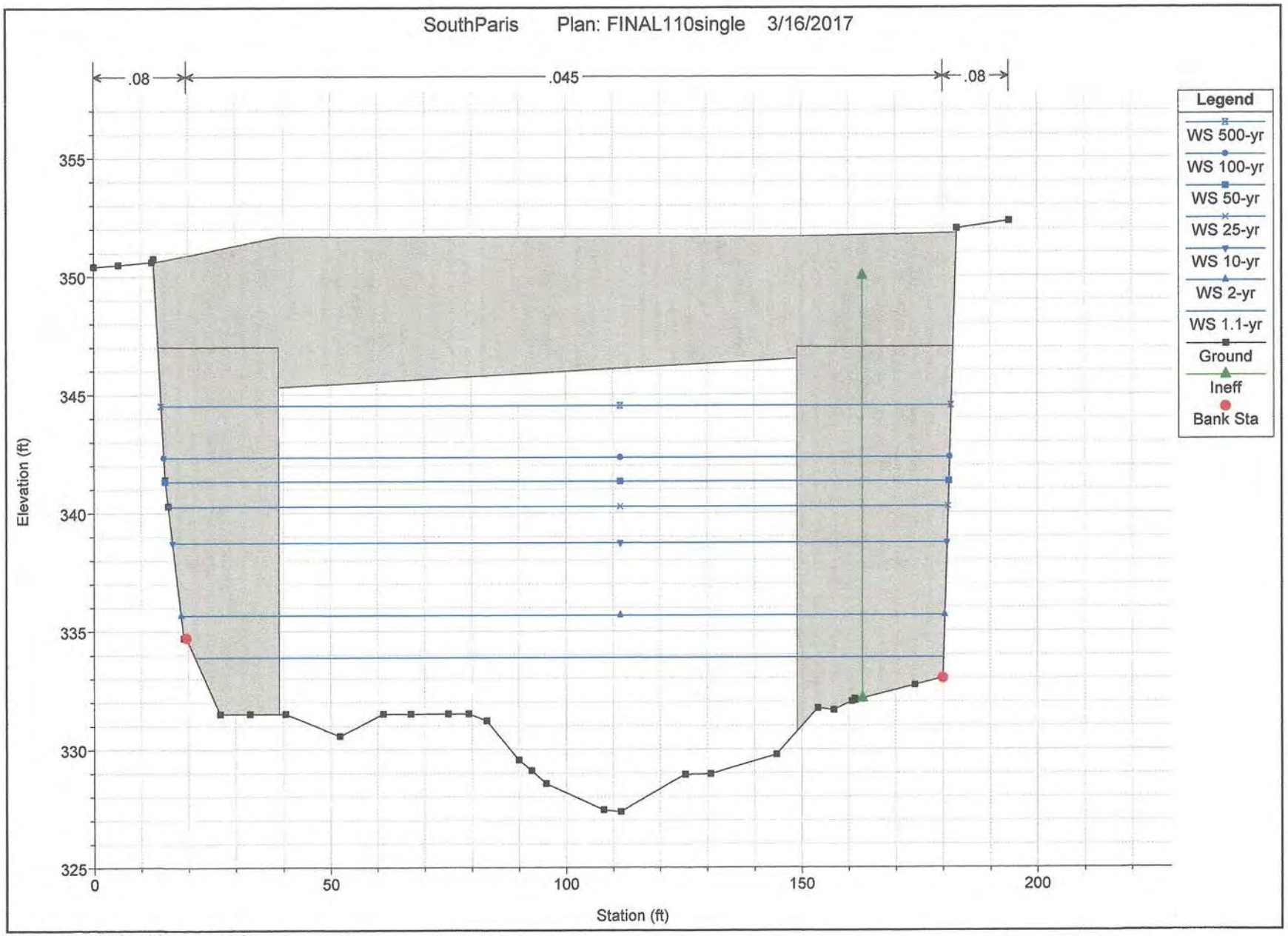
Plan: FINAL_100single L Androscoggin Reach RS: 251.5954BR D Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	Chan	35.00	49.56	6.00	5.12	10.80	0.06	9.74	1.17	0.12	0.14
2	Chan	49.56	64.11	1379.01	150.47	14.56	14.00	10.34	9.16	2.58	23.68
3	Chan	64.11	78.67	1384.49	150.83	14.56	14.05	10.36	9.18	2.59	23.77
4	Chan	78.67	93.22	1534.02	160.68	14.62	15.57	11.04	9.55	2.75	26.23
5	Chan	93.22	107.78	1601.85	164.74	14.58	16.26	11.32	9.72	2.82	27.46
6	Chan	107.78	122.33	1444.98	154.80	14.57	14.67	10.64	9.33	2.66	24.79
7	Chan	122.33	136.89	1586.77	164.96	14.84	16.11	11.33	9.62	2.78	26.72
8	Chan	136.89	151.44	914.88	144.30	24.26	9.29	11.85	6.34	1.49	9.43


SouthParis Plan: FINAL110single 3/16/2017
L. Androscoggin Reach
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Elevation (ft)
350
345
340
335
330
325
1200
1300
1400
Main Channel Distance (ft)
1 in Horiz. = 50 ft 1 in Vert. = 6 ft

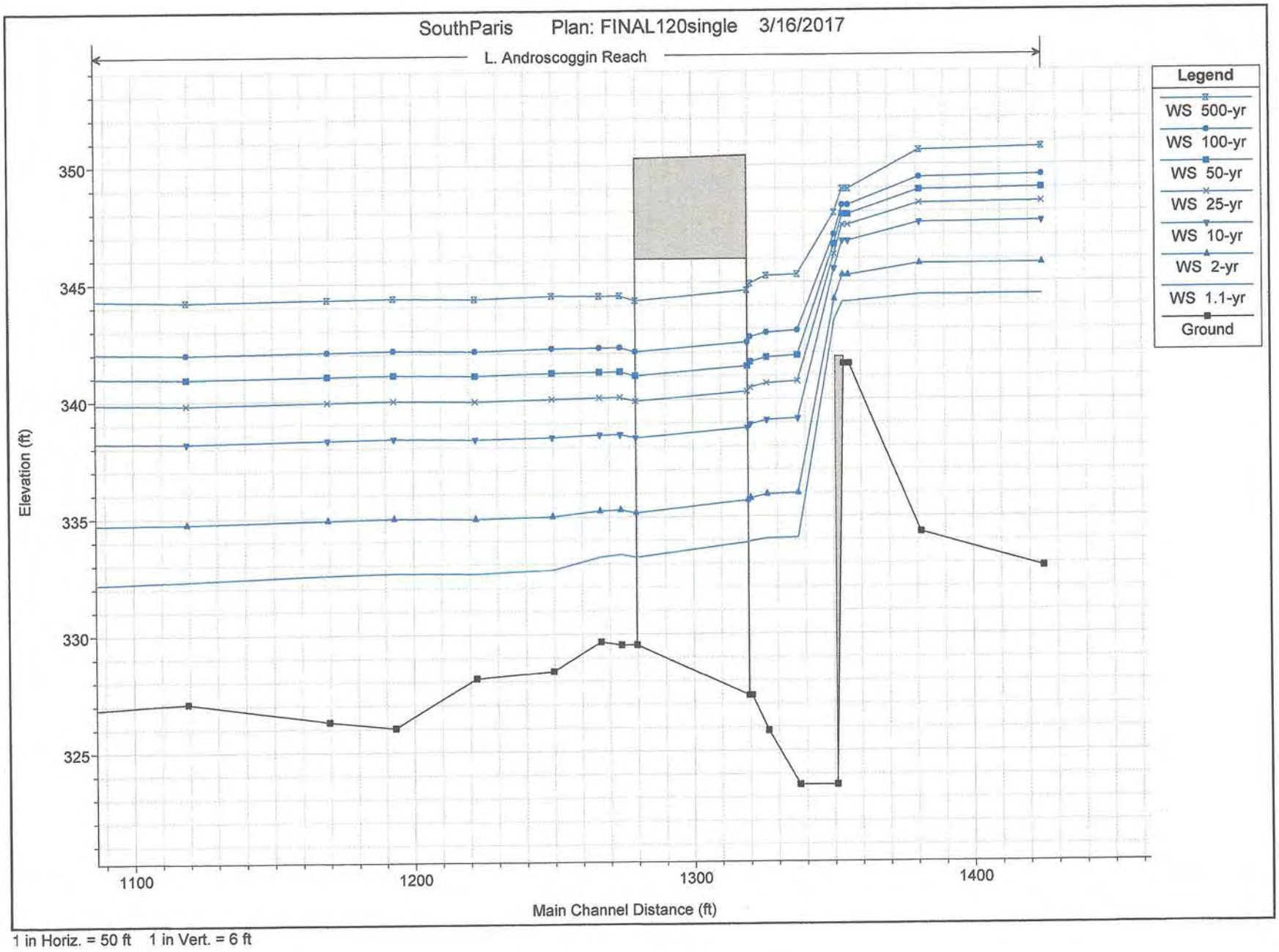
HEC-RAS Plan: FINAL_110single River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	334.13	334.07	329.48	0.00	0.03	163.72		1610.00		1.90
Reach	278.3602	2-yr	336.09	335.97	330.47	0.00	0.04	177.85		3116.00		2.78
Reach	278.3602	10-yr	339.36	339.15	331.89	0.00	0.04	190.90		5878.00		3.72
Reach	278.3602	25-yr	340.98	340.72	332.56	0.00	0.04	196.18		7409.00		4.09
Reach	278.3602	50-yr	342.13	341.83	333.02	0.00	0.04	196.32		8604.00		4.37
Reach	278.3602	100-yr	343.22	342.89	333.48	0.00	0.04	196.46		9852.00		4.64
Reach	278.3602	500-yr	345.65	345.32	334.52	0.00	0.07	196.79		12741.69	206.31	4.67
Reach	272.5	1.1-yr	334.10	333.95	331.77	0.00	0.01	158.83		1610.00		3.08
Reach	272.5	2-yr	336.05	335.81	332.70	0.00	0.01	162.05	0.47	3115.53		3.95
Reach	272.5	10-yr	339.32	338.97	334.03	0.00	0.02	164.40	6.22	5871.78		4.73
Reach	272.5	25-yr	340.94	340.55	334.67	0.00	0.03	165.58	12.05	7396.95		5.04
Reach	272.5	50-yr	342.08	341.65	335.13	0.00	0.03	166.35	17.67	8586.33		5.28
Reach	272.5	100-yr	343.18	342.70	335.59	0.00	0.03	166.79	24.18	9827.82		5.53
Reach	272.5	500-yr	345.57	344.99	336.64	0.00	0.04	167.74	41.18	12906.82		6.13
Reach	251.5954BR U	1.1-yr	334.09	333.89	331.70	0.16	0.04	109.95		1610.00		3.60
Reach	251.5954BR U	2-yr	336.04	335.67	332.74	0.15	0.03	109.97		3116.00		4.84
Reach	251.5954BR U	10-yr	339.29	338.74	334.28	0.11	0.03	110.00		5878.00		6.00
Reach	251.5954BR U	25-yr	340.91	340.27	335.03	0.10	0.02	110.02		7409.00		6.45
Reach	251.5954BR U	50-yr	342.05	341.33	335.58	0.10	0.02	110.03		8604.00		6.80
Reach	251.5954BR U	100-yr	343.15	342.35	336.12	0.10	0.02	110.05		9852.00		7.15
Reach	251.5954BR U	500-yr	345.53	344.53	337.37	0.10	0.02	110.07		12948.00		8.00
Reach	251.5954BR D	1.1-yr	333.89	333.27	332.83	0.05	0.07	109.94		1610.00		6.29
Reach	251.5954BR D	2-yr	335.86	335.15	333.88	0.03	0.08	109.96		3116.00		6.74
Reach	251.5954BR D	10-yr	339.16	338.34	335.41	0.02	0.08	110.00		5878.00		7.23
Reach	251.5954BR D	25-yr	340.79	339.91	336.16	0.01	0.09	110.02		7409.00		7.52
Reach	251.5954BR D	50-yr	341.93	340.98	336.70	0.01	0.09	110.03		8604.00		7.80
Reach	251.5954BR D	100-yr	343.02	342.00	337.25	0.01	0.10	110.04		9852.00		8.10
Reach	251.5954BR D	500-yr	345.40	344.17	338.50	0.01	0.12	110.07		12948.00		8.90
Reach	225.9996	1.1-yr	333.77	333.40	332.53	0.05	0.01	147.10		1610.00		4.89
Reach	225.9996	2-yr	335.75	335.30	333.49	0.03	0.00	151.77		3116.00		5.38
Reach	225.9996	10-yr	339.06	338.52	334.86	0.02	0.00	155.21		5878.00		5.88
Reach	225.9996	25-yr	340.68	340.10	335.53	0.01	0.00	155.46		7409.00		6.14
Reach	225.9996	50-yr	341.82	341.19	336.00	0.01	0.00	155.64		8604.00		6.37
Reach	225.9996	100-yr	342.91	342.23	336.49	0.01	0.00	156.23		9852.00		6.63
Reach	225.9996	500-yr	345.27	344.44	337.61	0.01	0.00	156.52		12948.00		7.29
Reach	218.6182	1.1-yr	333.71	333.29	332.58	0.17	0.03	141.49		1610.00		5.16
Reach	218.6182	2-yr	335.72	335.26	333.51	0.08	0.01	149.06		3116.00		5.44
Reach	218.6182	10-yr	339.04	338.51	334.86	0.04	0.00	164.12		5878.00		5.88
Reach	218.6182	25-yr	340.67	340.09	335.52	0.03	0.00	167.18		7409.00		6.13
Reach	218.6182	50-yr	341.81	341.18	336.02	0.03	0.00	169.41		8604.00		6.35
Reach	218.6182	100-yr	342.89	342.22	336.50	0.03	0.01	170.81		9852.00		6.61
Reach	218.6182	500-yr	345.25	344.43	337.62	0.03	0.02	173.79		12948.00		7.26


SouthParis Plan: FINAL110single 3/16/2017
.08
.045
.08
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

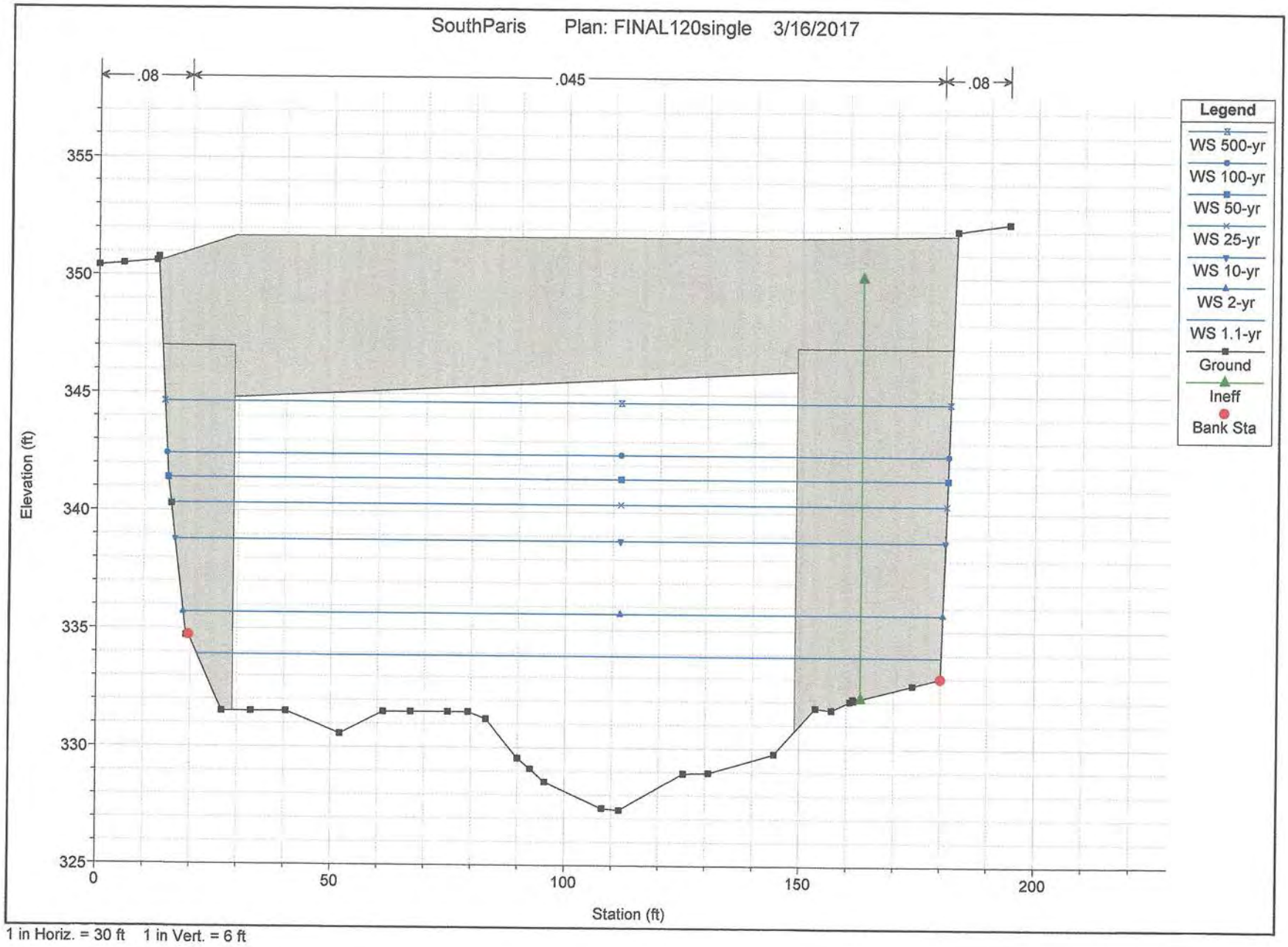
Plan: FINAL_110single L. Androscoggin Reach RS: 251.5954BR D Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	Chan	35.00	49.56	592.77	108.78	20.18	6.02	10.33	5.45	1.05	5.74
2	Chan	49.56	64.11	1299.19	152.85	14.56	13.19	10.50	8.50	2.05	17.43
3	Chan	64.11	78.67	1304.28	153.21	14.56	13.24	10.53	8.51	2.06	17.50
4	Chan	78.67	93.22	1442.85	163.06	14.62	14.65	11.20	8.85	2.18	19.28
5	Chan	93.22	107.78	1505.75	167.12	14.58	15.28	11.48	9.01	2.24	20.17
6	Chan	107.78	122.33	1360.37	157.18	14.57	13.81	10.80	8.65	2.11	18.24
7	Chan	122.33	136.89	1491.52	167.34	14.84	15.14	11.50	8.91	2.20	19.63
8	Chan	136.89	151.44	855.27	146.29	24.42	8.68	12.01	5.85	1.17	6.84


SouthParis Plan: FINAL120single 3/16/2017
L. Androscoggin Reach
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Elevation (ft)
350
345
340
335
330
325
1100
1200
1300
1400
Main Channel Distance (ft)
1 in Horiz. = 50 ft 1 in Vert. = 6 ft

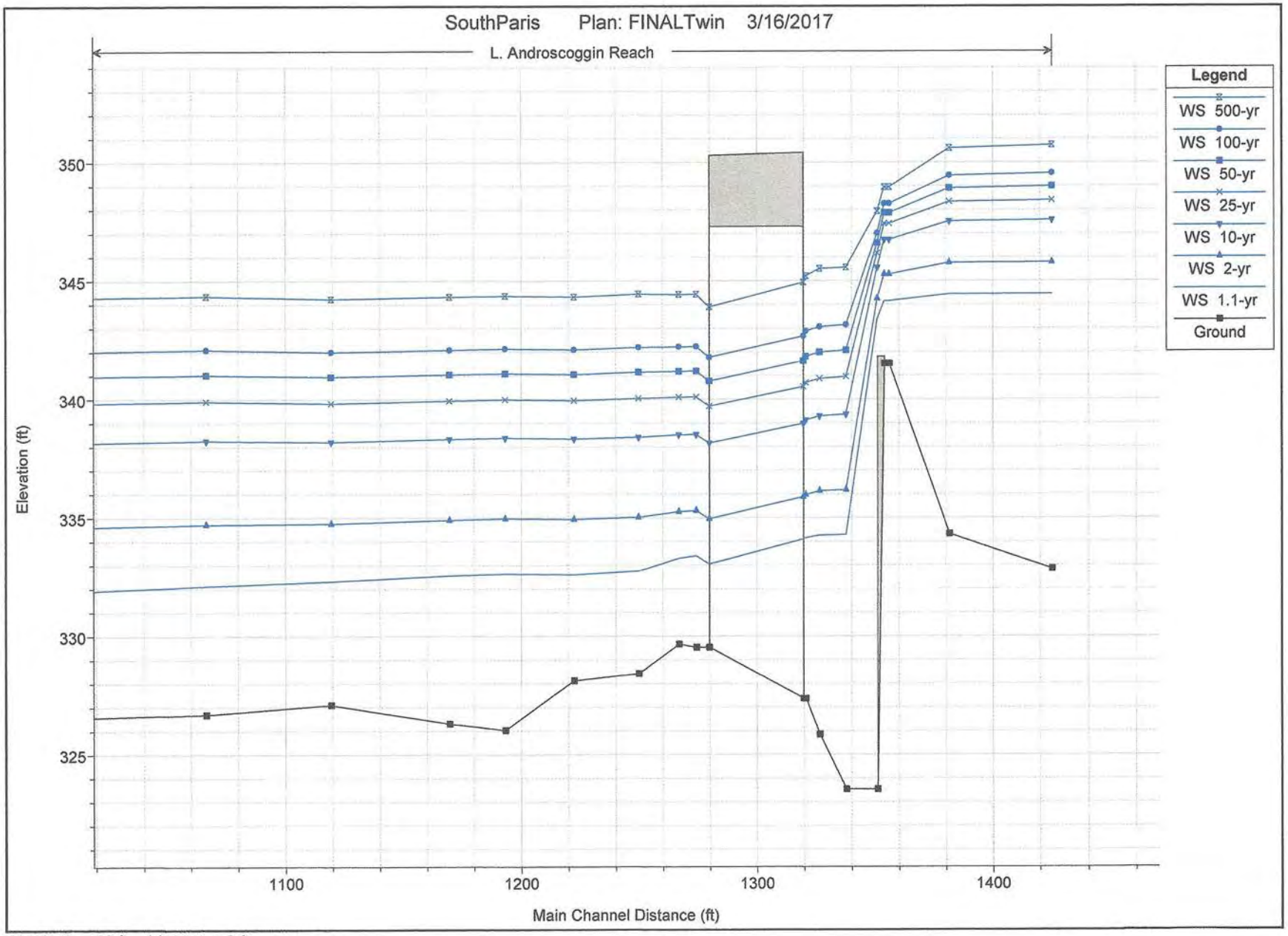
HEC-RAS Plan: FINAL_120single River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	334.12	334.06	329.48	0.00	0.03	163.61		1610.00		1.91
Reach	278.3602	2-yr	336.06	335.94	330.47	0.00	0.04	177.65		3116.00		2.79
Reach	278.3602	10-yr	339.33	339.11	331.89	0.00	0.04	190.76		5878.00		3.73
Reach	278.3602	25-yr	340.95	340.68	332.56	0.00	0.04	196.18		7409.00		4.11
Reach	278.3602	50-yr	342.08	341.79	333.02	0.00	0.04	196.32		8604.00		4.38
Reach	278.3602	100-yr	343.18	342.85	333.48	0.00	0.04	196.45		9852.00		4.65
Reach	278.3602	500-yr	345.60	345.26	334.52	0.00	0.08	196.79		12742.74	205.26	4.68
Reach	272.5	1.1-yr	334.09	333.94	331.77	0.00	0.00	158.80		1610.00		3.09
Reach	272.5	2-yr	336.02	335.78	332.70	0.00	0.01	162.02	0.45	3115.55		3.97
Reach	272.5	10-yr	339.28	338.93	334.03	0.00	0.01	164.37	6.14	5871.86		4.75
Reach	272.5	25-yr	340.90	340.50	334.67	0.00	0.02	165.55	11.93	7397.07		5.06
Reach	272.5	50-yr	342.04	341.60	335.13	0.00	0.02	166.33	17.52	8586.48		5.30
Reach	272.5	100-yr	343.13	342.66	335.59	0.00	0.02	166.77	24.01	9827.99		5.55
Reach	272.5	500-yr	345.52	344.93	336.64	0.00	0.03	167.71	40.97	12907.03		6.15
Reach	251.5954BR U	1.1-yr	334.08	333.90	331.74	0.15	0.04	119.95		1610.00		3.41
Reach	251.5954BR U	2-yr	336.01	335.69	332.72	0.13	0.04	119.97		3116.00		4.53
Reach	251.5954BR U	10-yr	339.27	338.79	334.17	0.10	0.03	120.00		5878.00		5.55
Reach	251.5954BR U	25-yr	340.88	340.33	334.88	0.09	0.03	120.02		7409.00		5.95
Reach	251.5954BR U	50-yr	342.02	341.41	335.39	0.09	0.03	120.03		8604.00		6.26
Reach	251.5954BR U	100-yr	343.11	342.44	335.90	0.08	0.03	120.05		9852.00		6.58
Reach	251.5954BR U	500-yr	345.49	344.65	337.09	0.09	0.03	120.07		12948.00		7.34
Reach	251.5954BR D	1.1-yr	333.89	333.28	332.84	0.05	0.07	113.74		1610.00		6.24
Reach	251.5954BR D	2-yr	335.85	335.17	333.88	0.03	0.07	118.82		3116.00		6.58
Reach	251.5954BR D	10-yr	339.14	338.38	335.36	0.01	0.07	120.00		5878.00		7.00
Reach	251.5954BR D	25-yr	340.77	339.94	336.10	0.01	0.07	120.02		7409.00		7.28
Reach	251.5954BR D	50-yr	341.91	341.02	336.64	0.01	0.08	120.03		8604.00		7.54
Reach	251.5954BR D	100-yr	343.00	342.05	337.16	0.01	0.08	120.04		9852.00		7.83
Reach	251.5954BR D	500-yr	345.38	344.23	338.39	0.01	0.10	120.07		12948.00		8.59
Reach	225.9996	1.1-yr	333.77	333.40	332.53	0.05	0.01	147.10		1610.00		4.89
Reach	225.9996	2-yr	335.75	335.30	333.49	0.03	0.00	151.77		3116.00		5.38
Reach	225.9996	10-yr	339.06	338.52	334.66	0.02	0.00	155.21		5878.00		5.88
Reach	225.9996	25-yr	340.68	340.10	335.53	0.01	0.00	155.46		7409.00		6.14
Reach	225.9996	50-yr	341.82	341.19	336.00	0.01	0.00	155.64		8604.00		6.37
Reach	225.9996	100-yr	342.91	342.23	336.49	0.01	0.00	156.23		9852.00		6.63
Reach	225.9996	500-yr	345.27	344.44	337.61	0.01	0.00	156.52		12948.00		7.29
Reach	218.6182	1.1-yr	333.71	333.29	332.58	0.17	0.03	141.49		1610.00		5.16
Reach	218.6182	2-yr	335.72	335.26	333.51	0.08	0.01	149.06		3116.00		5.44
Reach	218.6182	10-yr	339.04	338.51	334.88	0.04	0.00	164.12		5878.00		5.88
Reach	218.6182	25-yr	340.67	340.09	335.52	0.03	0.00	167.18		7409.00		6.13
Reach	218.6182	50-yr	341.81	341.18	336.02	0.03	0.00	169.41		8604.00		6.36
Reach	218.6182	100-yr	342.89	342.22	336.50	0.03	0.01	170.81		9852.00		6.61
Reach	218.6182	500-yr	345.25	344.43	337.62	0.03	0.02	173.79		12948.00		7.26


SouthParis Plan: FINAL120single 3/16/2017
.08
.045
.08
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

Plan: FINAL_120single L. Androscoggin Reach RS: 251.5954BR D Profile: 100-yr

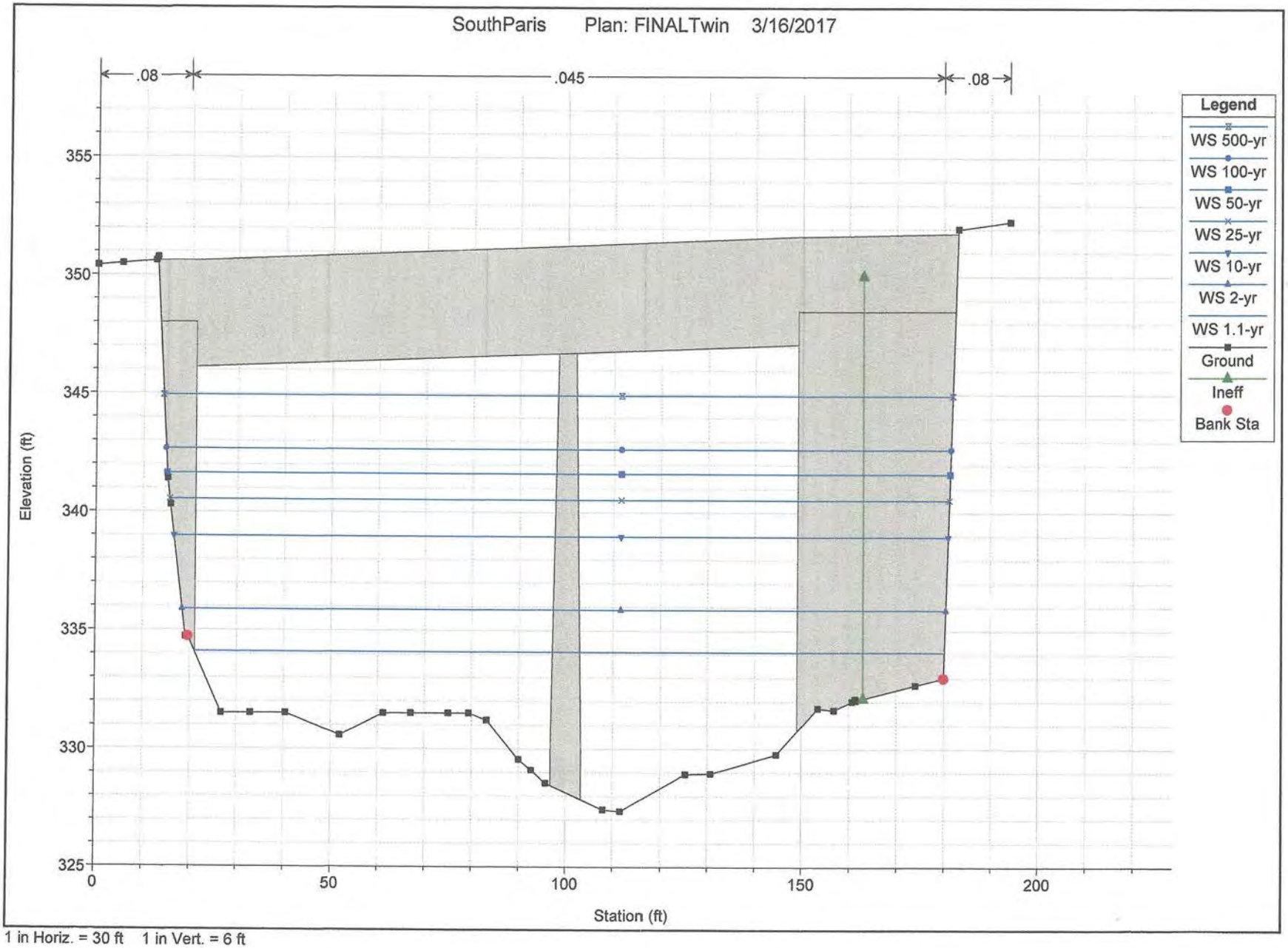
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	0.00	32.32	0.00	23.41	10.01	0.00	7.11	0.00	0.39	0.00
2	Chan	32.32	35.00	0.00	22.58	2.76	0.00	8.43	0.00	1.35	0.00
3	Chan	35.00	49.56	1116.17	146.08	14.80	11.33	10.04	7.64	1.63	12.45
4	Chan	49.56	64.11	1226.38	153.52	14.56	12.45	10.55	7.99	1.74	13.92
5	Chan	64.11	78.67	1231.16	153.88	14.56	12.50	10.57	8.00	1.75	13.97
6	Chan	78.67	93.22	1361.37	163.72	14.62	13.82	11.25	8.32	1.85	15.38
7	Chan	93.22	107.78	1420.47	167.79	14.58	14.42	11.53	8.47	1.90	16.09
8	Chan	107.78	122.33	1283.86	157.85	14.57	13.03	10.84	8.13	1.79	14.56
9	Chan	122.33	136.89	1407.04	168.01	14.84	14.28	11.54	8.37	1.87	15.66
10	Chan	136.89	151.44	805.56	146.85	24.47	8.18	12.05	5.49	0.99	5.44



1 in Horiz. = 60 ft 1 in Vert. = 6 ft

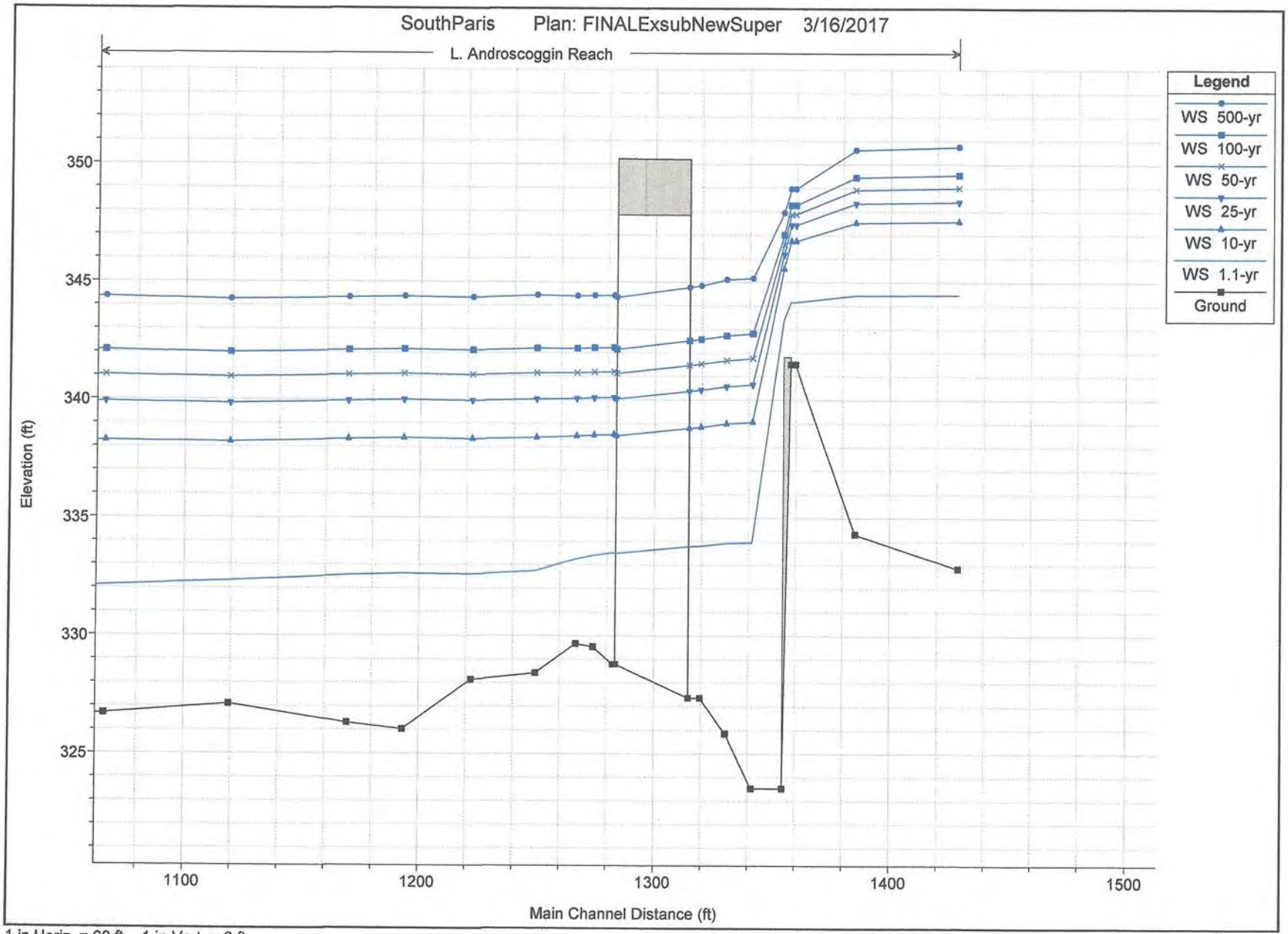
HEC-RAS Plan: FINALTwin River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	334.31	334.26	329.48	0.00	0.02	165.40		1610.00		1.84
Reach	278.3602	2-yr	336.24	336.13	330.47	0.00	0.03	178.91		3116.00		2.72
Reach	278.3602	10-yr	339.50	339.29	331.89	0.00	0.04	191.46		5878.00		3.67
Reach	278.3602	25-yr	341.13	340.87	332.56	0.00	0.04	196.20		7409.00		4.04
Reach	278.3602	50-yr	342.28	341.99	333.02	0.00	0.04	196.34		8604.00		4.32
Reach	278.3602	100-yr	343.39	343.06	333.48	0.00	0.04	196.48		9852.00		4.58
Reach	278.3602	500-yr	345.84	345.51	334.52	0.00	0.07	196.83		12737.99	210.01	4.61
Reach	272.5	1.1-yr	334.28	334.15	331.77	0.00	0.00	159.31		1610.00		2.92
Reach	272.5	2-yr	336.20	335.97	332.70	0.00	0.01	162.17	0.57	3115.43		3.83
Reach	272.5	10-yr	339.46	339.12	334.03	0.00	0.01	164.51	6.53	5871.47		4.64
Reach	272.5	25-yr	341.09	340.70	334.67	0.00	0.02	165.70	12.49	7396.51		4.96
Reach	272.5	50-yr	342.23	341.81	335.13	0.00	0.02	166.42	18.24	8585.76		5.20
Reach	272.5	100-yr	343.34	342.88	335.59	0.00	0.02	166.86	24.79	9827.21		5.45
Reach	272.5	500-yr	345.76	345.20	336.64	0.00	0.02	167.82	41.93	12906.07		6.05
Reach	251.5954BR U	1.1-yr	334.28	334.10	331.91	0.20	0.08	122.13		1610.00		3.41
Reach	251.5954BR U	2-yr	336.19	335.88	332.92	0.18	0.07	122.44		3116.00		4.52
Reach	251.5954BR U	10-yr	339.44	338.98	334.40	0.14	0.06	122.99		5878.00		5.49
Reach	251.5954BR U	25-yr	341.07	340.53	335.09	0.13	0.06	123.27		7409.00		5.87
Reach	251.5954BR U	50-yr	342.21	341.63	335.59	0.13	0.07	123.46		8604.00		6.16
Reach	251.5954BR U	100-yr	343.32	342.67	336.09	0.13	0.07	123.65		9852.00		6.45
Reach	251.5954BR U	500-yr	345.74	344.94	337.28	0.13	0.08	124.05		12948.00		7.17
Reach	251.5954BR D	1.1-yr	334.00	333.05	332.98	0.06	0.17	96.94		1610.00		7.82
Reach	251.5954BR D	2-yr	335.95	334.96	334.11	0.03	0.16	97.28		3116.00		7.96
Reach	251.5954BR D	10-yr	339.24	338.16	335.79	0.02	0.17	97.85		5878.00		8.36
Reach	251.5954BR D	25-yr	340.88	339.71	336.60	0.02	0.17	98.12		7409.00		8.67
Reach	251.5954BR D	50-yr	342.02	340.77	337.18	0.02	0.19	98.31		8604.00		8.97
Reach	251.5954BR D	100-yr	343.12	341.78	337.78	0.01	0.20	98.49		9852.00		9.31
Reach	251.5954BR D	500-yr	345.52	343.90	339.14	0.01	0.24	98.87		12948.00		10.21
Reach	225.9996	1.1-yr	333.77	333.40	332.53	0.05	0.01	147.10		1610.00		4.89
Reach	225.9996	2-yr	335.75	335.30	333.49	0.03	0.00	151.77		3116.00		5.38
Reach	225.9996	10-yr	339.06	338.52	334.86	0.02	0.00	155.21		5878.00		5.88
Reach	225.9996	25-yr	340.68	340.10	335.53	0.01	0.00	155.46		7409.00		6.14
Reach	225.9996	50-yr	341.82	341.19	336.00	0.01	0.00	155.64		8604.00		6.37
Reach	225.9996	100-yr	342.91	342.23	336.49	0.01	0.00	156.23		9852.00		6.63
Reach	225.9996	500-yr	345.27	344.44	337.61	0.01	0.00	156.52		12948.00		7.29
Reach	218.6182	1.1-yr	333.71	333.29	332.58	0.17	0.03	141.49		1610.00		5.16
Reach	218.6182	2-yr	335.72	335.26	333.51	0.08	0.01	149.06		3116.00		5.44
Reach	218.6182	10-yr	339.04	338.51	334.88	0.04	0.00	164.12		5878.00		5.88
Reach	218.6182	25-yr	340.67	340.09	335.52	0.03	0.00	167.18		7409.00		6.13
Reach	218.6182	50-yr	341.81	341.18	336.02	0.03	0.00	169.41		8604.00		6.36
Reach	218.6182	100-yr	342.89	342.22	336.50	0.03	0.01	170.81		9852.00		6.61
Reach	218.6182	500-yr	345.25	344.44	337.62	0.03	0.02	173.79		12948.00		7.26


SouthParis Plan: FINALTwin 3/16/2017
.08
.045
.08
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

Plan: FINALTwin L. Androscoggin Reach RS: 251.5954BR D Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	Chan	35.00	49.56	148.29	35.89	13.74	1.51	10.19	4.13	0.89	3.68
2	Chan	49.56	64.11	1540.27	149.57	14.56	15.63	10.28	10.30	3.50	36.05
3	Chan	64.11	78.67	1546.43	149.93	14.56	15.70	10.30	10.31	3.51	36.19
4	Chan	78.67	93.22	1714.50	159.78	14.62	17.40	10.98	10.73	3.72	39.96
5	Chan	93.22	107.78	489.62	101.55	30.84	4.97	10.14	4.82	1.12	5.41
6	Chan	107.78	122.33	1614.42	153.90	14.57	16.39	10.57	10.49	3.60	37.76
7	Chan	122.33	136.89	1773.89	164.06	14.84	18.01	11.27	10.81	3.77	40.73
8	Chan	136.89	151.44	1024.58	143.51	24.19	10.40	11.79	7.14	2.02	14.43


SouthParis Plan: FINALExsubNewSuper 3/16/2017
L. Androscoggin Reach
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 1.1-yr
Ground
Elevation (ft)
350
345
340
335
330
325
1100
1200
1300
1400
1500
Main Channel Distance (ft)
1 in Horiz. = 60 ft 1 in Vert. = 6 ft

HEC-RAS Plan: FINALExsubnewsuper River: L. Androscoggin Reach: Reach

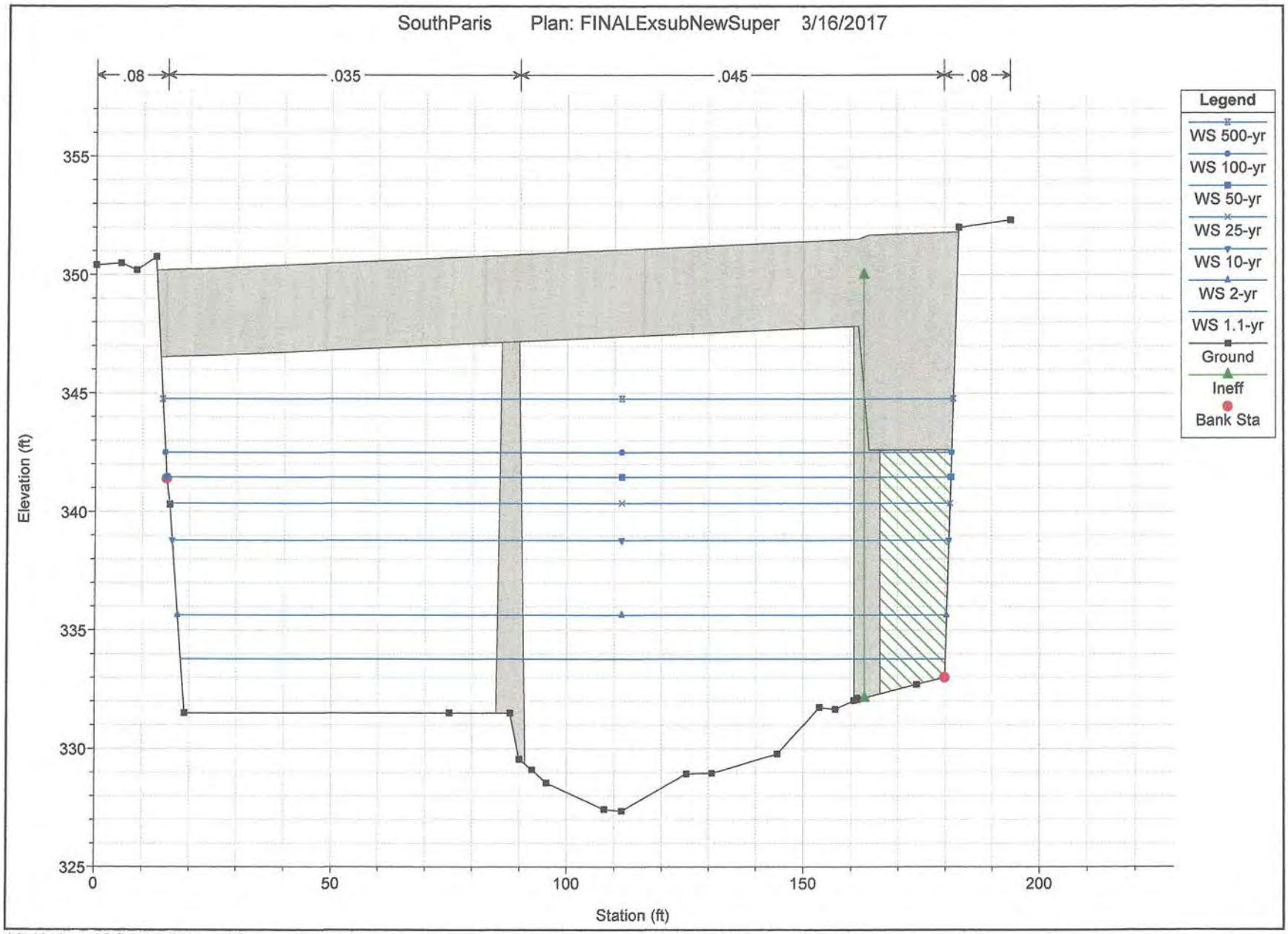
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	376.8629	1.1-yr	1610.00	332.84	344.45	337.16	344.47	0.000076	1.25	1287.61	202.72	0.09
Reach	376.8629	10-yr	5878.00	332.84	347.57	340.47	347.72	0.000268	3.04	1945.71	220.16	0.18
Reach	376.8629	25-yr	7409.00	332.84	348.40	341.21	348.59	0.000320	3.52	2147.44	260.92	0.19
Reach	376.8629	50-yr	8604.00	332.84	348.99	341.68	349.22	0.000357	3.85	2301.29	262.57	0.21
Reach	376.8629	100-yr	9852.00	332.84	349.54	342.08	349.81	0.000394	4.19	2445.83	263.87	0.22
Reach	376.8629	500-yr	12948.00	332.84	350.73	343.01	351.11	0.000483	4.96	2762.70	270.73	0.25
Reach	333.2086	1.1-yr	1610.00	334.31	344.44		344.47	0.000085	1.36	1185.06	176.75	0.09
Reach	333.2086	10-yr	5878.00	334.31	347.52		347.70	0.000334	3.38	1741.72	188.09	0.19
Reach	333.2086	25-yr	7409.00	334.31	348.34		348.57	0.000404	3.92	1903.95	226.33	0.22
Reach	333.2086	50-yr	8604.00	334.31	348.91		349.20	0.000454	4.31	2037.19	238.85	0.23
Reach	333.2086	100-yr	9852.00	334.31	349.44		349.78	0.000505	4.69	2169.04	250.55	0.24
Reach	333.2086	500-yr	12948.00	334.31	350.60		351.07	0.000626	5.57	2463.86	262.73	0.28
Reach	307.6648	1.1-yr	1610.00	341.50	344.15	343.15	344.44	0.002998	4.30	375.22	152.47	0.48
Reach	307.6648	10-yr	5878.00	341.50	346.74	345.33	347.61	0.003629	7.56	845.44	194.48	0.59
Reach	307.6648	25-yr	7409.00	341.50	347.42	345.95	348.47	0.003771	8.36	976.81	197.77	0.61
Reach	307.6648	50-yr	8604.00	341.50	347.87	346.37	349.08	0.003921	8.97	1067.82	201.95	0.63
Reach	307.6648	100-yr	9852.00	341.50	348.26	346.81	349.65	0.004192	9.65	1146.45	207.40	0.66
Reach	307.6648	500-yr	12948.00	341.50	348.95	347.71	350.89	0.005129	11.41	1302.05	252.56	0.74
Reach	306		Inl Struct									
Reach	289.4348	1.1-yr	1610.00	323.53	333.96	327.46	333.99	0.000151	1.51	1068.14	147.81	0.10
Reach	289.4348	10-yr	5878.00	323.53	339.07	330.17	339.23	0.000344	3.21	1832.12	200.97	0.16
Reach	289.4348	25-yr	7409.00	323.53	340.65	330.83	340.85	0.000365	3.59	2068.54	206.90	0.17
Reach	289.4348	50-yr	8604.00	323.53	341.76	331.31	341.99	0.000381	3.86	2234.86	208.07	0.18
Reach	289.4348	100-yr	9852.00	323.53	342.82	331.79	343.08	0.000397	4.12	2393.93	208.12	0.18
Reach	289.4348	500-yr	12948.00	323.53	345.16	332.87	345.46	0.000417	4.45	3101.49	208.34	0.18
Reach	278.3602	1.1-yr	1610.00	325.85	333.93	329.48	333.99	0.000347	1.95	825.38	162.42	0.14
Reach	278.3602	10-yr	5878.00	325.85	339.00	331.89	339.22	0.000553	3.77	1560.69	190.35	0.20
Reach	278.3602	25-yr	7409.00	325.85	340.57	332.56	340.84	0.000558	4.14	1788.11	196.16	0.21
Reach	278.3602	50-yr	8604.00	325.85	341.67	333.02	341.98	0.000566	4.42	1948.02	196.30	0.21
Reach	278.3602	100-yr	9852.00	325.85	342.73	333.46	343.07	0.000577	4.69	2100.87	196.43	0.22
Reach	278.3602	500-yr	12948.00	325.85	345.11	334.52	345.45	0.000505	4.73	2846.44	196.76	0.21
Reach	271.5	1.1-yr	1610.00	327.36	333.81	331.90	333.97	0.001446	3.22	500.50	161.98	0.31
Reach	271.5	10-yr	5878.00	327.36	338.85	334.06	339.20	0.001014	4.76	1234.74	164.62	0.29
Reach	271.5	25-yr	7409.00	327.36	340.42	334.69	340.82	0.000920	5.08	1465.55	165.48	0.28
Reach	271.5	50-yr	8604.00	327.36	341.52	335.15	341.96	0.000880	5.28	1628.35	166.30	0.28
Reach	271.5	100-yr	9852.00	327.36	342.57	335.60	343.05	0.000851	5.52	1784.22	166.73	0.28
Reach	271.5	500-yr	12948.00	327.36	344.84	336.64	345.42	0.000826	5.11	2121.11	167.68	0.28
Reach	251.5954		Bridge									
Reach	234.4498	1.1-yr	1610.00	328.79	333.53	332.41	333.84	0.003900	4.50	357.66	147.10	0.47
Reach	234.4498	10-yr	5878.00	328.79	338.54	334.76	339.09	0.001733	5.92	992.80	148.41	0.37
Reach	234.4498	25-yr	7409.00	328.79	340.10	335.44	340.70	0.001504	6.22	1190.27	148.82	0.36
Reach	234.4498	50-yr	8604.00	328.79	341.19	335.94	341.84	0.001408	6.48	1327.94	149.11	0.35
Reach	234.4498	100-yr	9852.00	328.79	342.22	336.42	342.93	0.001350	6.75	1458.74	149.38	0.35
Reach	234.4498	500-yr	12948.00	328.79	344.43	337.57	345.29	0.001299	7.45	1738.40	150.25	0.35
Reach	225.9996	1.1-yr	1610.00	329.53	333.41	332.53	333.79	0.005598	4.91	329.71	144.17	0.54
Reach	225.9996	10-yr	5878.00	329.53	338.51	334.88	339.07	0.001944	6.01	995.49	151.15	0.36
Reach	225.9996	25-yr	7409.00	329.53	340.08	335.57	340.69	0.001656	6.28	1201.04	153.30	0.36
Reach	225.9996	50-yr	8604.00	329.53	341.17	336.06	341.83	0.001536	6.52	1344.05	154.80	0.36
Reach	225.9996	100-yr	9852.00	329.53	342.21	336.55	342.92	0.001463	6.78	1479.74	156.21	0.35
Reach	225.9996	500-yr	12948.00	329.53	344.42	337.68	345.27	0.001394	7.46	1769.42	159.24	0.36
Reach	218.6182	1.1-yr	1610.00	329.66	333.26	332.60	333.71	0.008393	5.38	300.90	136.30	0.61
Reach	218.6182	10-yr	5878.00	329.66	338.47	334.97	339.05	0.002308	6.11	983.25	158.30	0.39
Reach	218.6182	25-yr	7409.00	329.66	340.05	335.65	340.67	0.001948	6.36	1191.25	163.72	0.37
Reach	218.6182	50-yr	8604.00	329.66	341.14	336.15	341.81	0.001800	6.59	1335.73	167.65	0.36
Reach	218.6182	100-yr	9852.00	329.66	342.18	336.64	342.90	0.001709	6.85	1472.73	170.62	0.36
Reach	218.6182	500-yr	12948.00	329.66	344.40	337.77	345.26	0.001621	7.52	1765.12	176.96	0.36
Reach	201.5596	1.1-yr	1610.00	328.41	332.75	332.29	333.50	0.013588	6.98	232.22	91.46	0.77
Reach	201.5596	10-yr	5878.00	328.41	338.40	335.15	339.00	0.002719	6.30	1005.26	158.10	0.41
Reach	201.5596	25-yr	7409.00	328.41	340.02	335.86	340.63	0.002182	6.44	1264.11	162.70	0.38
Reach	201.5596	50-yr	8604.00	328.41	341.13	336.37	341.77	0.001961	6.59	1446.22	165.88	0.36
Reach	201.5596	100-yr	9852.00	328.41	342.18	336.86	342.86	0.001821	6.78	1620.24	168.88	0.36
Reach	201.5596	500-yr	12948.00	328.41	344.43	338.06	345.21	0.001663	7.32	1996.26	175.29	0.35
Reach	174.1587	1.1-yr	1610.00	328.12	332.60		333.12	0.009482	5.82	276.64	106.58	0.64
Reach	174.1587	10-yr	5878.00	328.12	338.34		338.93	0.002463	6.25	1018.71	148.56	0.38

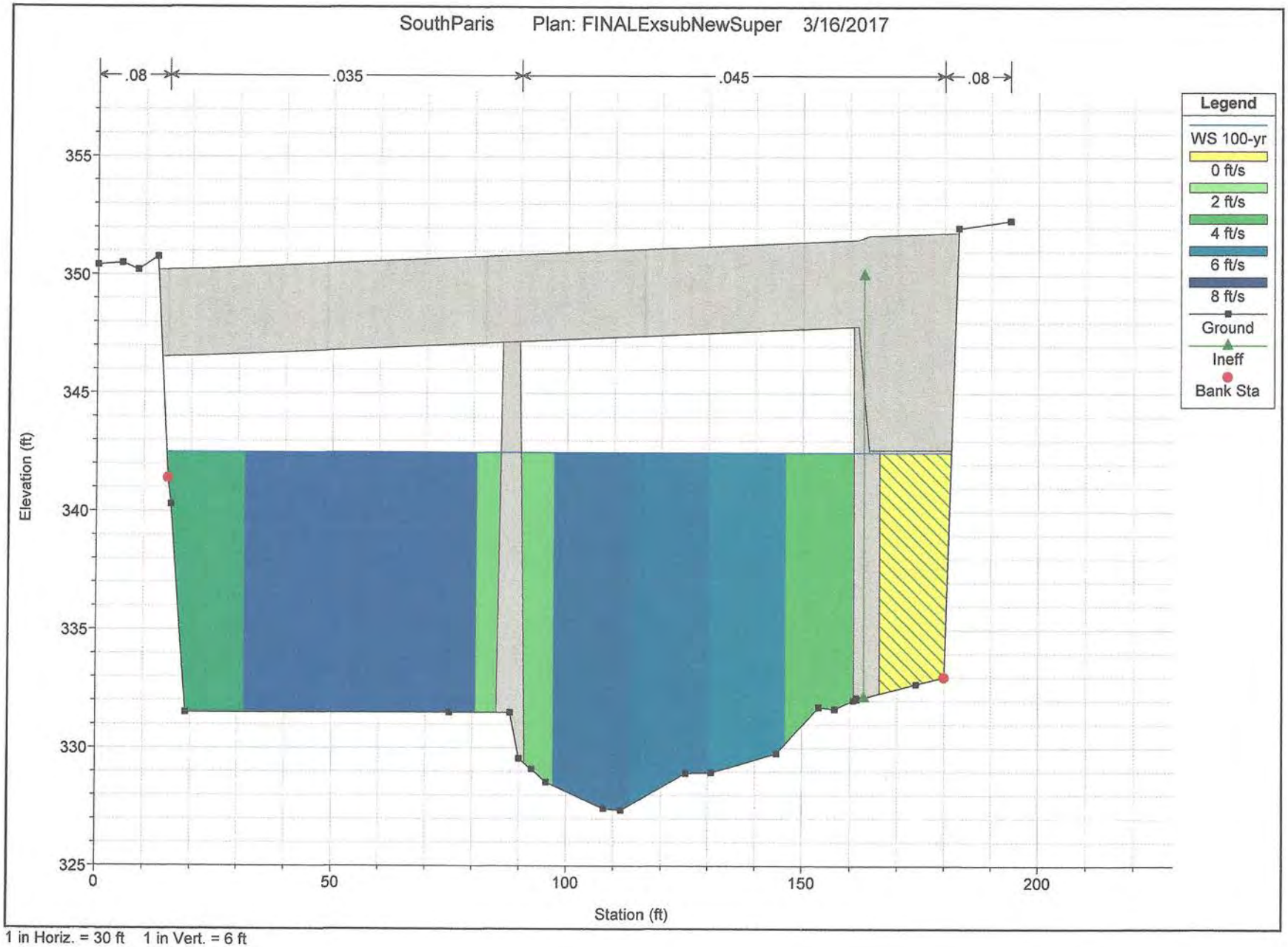
HEC-RAS Plan: FINALExsubnewsuper River: L. Androscoggin Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	174.1587	25-yr	7409.00	328.12	339.95		340.57	0.002085	6.48	1262.31	153.92	0.36
Reach	174.1587	50-yr	8604.00	328.12	341.05		341.72	0.001932	6.70	1434.30	157.60	0.36
Reach	174.1587	100-yr	9852.00	328.12	342.10		342.81	0.001836	6.94	1600.95	161.09	0.35
Reach	174.1587	500-yr	12948.00	328.12	344.33		345.16	0.001733	7.56	1967.59	166.50	0.35
Reach	145.0395	1.1-yr	1610.00	326.03	332.63		332.90	0.003160	4.18	384.98	107.35	0.39
Reach	145.0395	10-yr	5878.00	326.03	338.38		338.83	0.001589	5.41	1137.99	145.71	0.32
Reach	145.0395	25-yr	7409.00	326.03	339.99		340.49	0.001421	5.72	1376.82	151.27	0.31
Reach	145.0395	50-yr	8604.00	326.03	341.09		341.63	0.001355	5.98	1545.91	155.12	0.31
Reach	145.0395	100-yr	9852.00	326.03	342.14		342.73	0.001316	6.24	1709.96	158.39	0.31
Reach	145.0395	500-yr	12948.00	326.03	344.37		345.08	0.001291	6.90	2070.70	165.20	0.32
Reach	121.3383	1.1-yr	1610.00	326.30	332.56		332.82	0.002849	4.12	390.85	104.55	0.38
Reach	121.3383	10-yr	5878.00	326.30	338.33		338.79	0.001596	5.50	1123.93	147.73	0.32
Reach	121.3383	25-yr	7409.00	326.30	339.94		340.45	0.001426	5.81	1369.52	156.62	0.32
Reach	121.3383	50-yr	8604.00	326.30	341.05		341.60	0.001357	6.06	1545.56	160.71	0.31
Reach	121.3383	100-yr	9852.00	326.30	342.10		342.69	0.001317	6.32	1716.44	165.22	0.31
Reach	121.3383	500-yr	12948.00	326.30	344.33		345.05	0.001294	6.98	2092.77	175.89	0.32
Reach	71.10767	1.1-yr	1610.00	327.09	332.32		332.65	0.004092	4.60	349.70	107.49	0.45
Reach	71.10767	10-yr	5878.00	327.09	338.21		338.71	0.001611	5.73	1116.63	151.96	0.33
Reach	71.10767	25-yr	7409.00	327.09	339.84		340.38	0.001438	6.04	1374.29	164.33	0.33
Reach	71.10767	50-yr	8604.00	327.09	340.95		341.53	0.001362	6.28	1560.03	169.33	0.32
Reach	71.10767	100-yr	9852.00	327.09	342.00		342.63	0.001316	6.53	1741.01	174.29	0.32
Reach	71.10767	500-yr	12948.00	327.09	344.25		344.98	0.001280	7.17	2145.04	202.90	0.32
Reach	18.21174	1.1-yr	1610.00	326.69	332.12		332.43	0.003965	4.53	384.10	146.77	0.44
Reach	18.21174	10-yr	5878.00	326.69	338.26		338.59	0.001146	4.91	1490.40	201.25	0.28
Reach	18.21174	25-yr	7409.00	326.69	339.91		340.26	0.001008	5.13	1827.87	208.20	0.27
Reach	18.21174	50-yr	8604.00	326.69	341.04		341.41	0.000954	5.33	2085.36	213.07	0.27
Reach	18.21174	100-yr	9852.00	326.69	342.10		342.50	0.000922	5.54	2295.04	217.67	0.27
Reach	18.21174	500-yr	12948.00	326.69	344.36		344.85	0.000929	6.18	2882.31	320.16	0.28
Reach	-285	1.1-yr	1610.00	325.92	331.11		331.32	0.002706	3.71	433.57	115.07	0.34
Reach	-285	10-yr	5878.00	325.92	337.90		338.21	0.001081	4.51	1378.26	160.48	0.25
Reach	-285	25-yr	7409.00	325.92	339.56		339.92	0.001013	4.84	1654.66	173.94	0.25
Reach	-285	50-yr	8604.00	325.92	340.70		341.08	0.000992	5.08	1869.34	205.09	0.25
Reach	-285	100-yr	9852.00	325.92	341.77		342.18	0.000977	5.32	2104.26	234.49	0.25
Reach	-285	500-yr	12948.00	325.92	344.05		344.54	0.000962	5.84	2709.79	291.79	0.25
Reach	-400	1.1-yr	1610.00	323.22	330.98		331.11	0.001024	2.97	542.03	113.49	0.24
Reach	-400	10-yr	5878.00	323.22	337.92		338.07	0.000440	3.38	2442.52	354.89	0.18
Reach	-400	25-yr	7409.00	323.22	339.62		339.77	0.000384	3.48	3047.03	355.23	0.17
Reach	-400	50-yr	8604.00	323.22	340.78		340.94	0.000363	3.58	3457.69	355.46	0.17
Reach	-400	100-yr	9852.00	323.22	341.87		342.03	0.000351	3.71	3844.50	355.67	0.17
Reach	-400	500-yr	12948.00	323.22	344.19		344.37	0.000343	4.03	4669.84	357.05	0.17
Reach	-1048	1.1-yr	1610.00	321.72	330.30	325.99	330.39	0.001000	2.47	652.69	111.68	0.18
Reach	-1048	10-yr	5878.00	321.72	337.30	328.83	337.52	0.001002	3.77	1618.01	173.75	0.20
Reach	-1048	25-yr	7409.00	321.72	339.00	329.59	339.25	0.001000	4.10	1929.54	193.34	0.20
Reach	-1048	50-yr	8604.00	321.72	340.14	330.12	340.43	0.001000	4.33	2183.79	252.32	0.20
Reach	-1048	100-yr	9852.00	321.72	341.22	330.67	341.53	0.001000	4.55	2482.09	300.36	0.21
Reach	-1048	500-yr	12948.00	321.72	343.52	331.98	343.88	0.001001	5.01	3212.38	330.43	0.21

HEC-RAS Plan: FINALExsubnewsuper River: L. Androscoggin Reach: Reach

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
Reach	278.3602	1.1-yr	333.99	333.93	329.48	0.01	0.01	162.42		1610.00		1.95
Reach	278.3602	10-yr	339.22	339.00	331.89	0.01	0.01	190.35		5878.00		3.77
Reach	278.3602	25-yr	340.64	340.57	332.56	0.01	0.01	196.16		7409.00		4.14
Reach	278.3602	50-yr	341.98	341.67	333.02	0.01	0.01	196.30		8604.00		4.42
Reach	278.3602	100-yr	343.07	342.73	333.48	0.01	0.01	196.43		9852.00		4.69
Reach	278.3602	500-yr	345.45	345.11	334.52	0.01	0.02	196.76		12745.72	202.28	4.73
Reach	271.5	1.1-yr	333.97	333.81	331.90	0.01	0.00	161.98		1610.00		3.22
Reach	271.5	10-yr	339.20	338.85	334.06	0.01	0.00	164.62		5878.00		4.76
Reach	271.5	25-yr	340.82	340.42	334.69	0.01	0.00	165.48		7409.00		5.06
Reach	271.5	50-yr	341.96	341.52	335.15	0.01	0.00	166.30	0.00	8604.00		5.28
Reach	271.5	100-yr	343.05	342.57	335.60	0.01	0.01	166.73	0.03	9851.97		5.52
Reach	271.5	500-yr	345.42	344.84	336.64	0.01	0.01	167.68	0.46	12947.54		6.11
Reach	251.5954BR U	1.1-yr	333.96	333.79	331.92	0.08	0.02	150.83		1610.00		3.39
Reach	251.5954BR U	10-yr	339.19	338.80	334.17	0.06	0.02	154.22		5878.00		5.03
Reach	251.5954BR U	25-yr	340.81	340.36	334.82	0.05	0.02	155.29		7409.00		5.34
Reach	251.5954BR U	50-yr	341.95	341.46	335.30	0.05	0.03	156.29	0.00	8604.00		5.58
Reach	251.5954BR U	100-yr	343.04	342.51	335.76	0.05	0.03	156.88	0.03	9851.97		5.83
Reach	251.5954BR U	500-yr	345.41	344.77	336.84	0.05	0.03	157.82	0.54	12947.46		6.44
Reach	251.5954BR D	1.1-yr	333.86	333.50	332.47	0.00	0.01	135.92		1610.00		4.82
Reach	251.5954BR D	10-yr	339.11	338.49	334.93	0.00	0.02	137.97		5878.00		6.33
Reach	251.5954BR D	25-yr	340.73	340.04	335.63	0.00	0.03	138.61		7409.00		6.65
Reach	251.5954BR D	50-yr	341.87	341.12	336.15	0.00	0.03	139.06		8604.00		6.92
Reach	251.5954BR D	100-yr	342.96	342.15	336.68	0.00	0.03	139.48		9852.00		7.21
Reach	251.5954BR D	500-yr	345.33	344.35	337.86	0.00	0.04	140.60		12948.00		7.94
Reach	234.4498	1.1-yr	333.84	333.53	332.41	0.04	0.02	147.10		1610.00		4.50
Reach	234.4498	10-yr	339.09	338.54	334.76	0.02	0.00	148.41		5878.00		5.92
Reach	234.4498	25-yr	340.70	340.10	335.44	0.01	0.00	148.82		7409.00		6.22
Reach	234.4498	50-yr	341.84	341.19	335.94	0.01	0.00	149.11		8604.00		6.48
Reach	234.4498	100-yr	342.93	342.22	336.42	0.01	0.00	149.38		9852.00		6.75
Reach	234.4498	500-yr	345.29	344.43	337.57	0.01	0.00	150.25		12948.00		7.45
Reach	225.9996	1.1-yr	333.79	333.41	332.53	0.05	0.02	144.17	2.78	1607.22		4.91
Reach	225.9996	10-yr	339.07	338.51	334.88	0.02	0.01	151.15	53.35	5824.65		6.01
Reach	225.9996	25-yr	340.69	340.08	335.57	0.01	0.00	153.30	76.92	7332.08		6.28
Reach	225.9996	50-yr	341.83	341.17	336.06	0.01	0.00	154.80	95.36	8508.64		6.52
Reach	225.9996	100-yr	342.92	342.21	336.55	0.01	0.00	156.21	114.62	9737.38		6.78
Reach	225.9996	500-yr	345.27	344.42	337.68	0.01	0.00	159.24	162.52	12785.48		7.46


SouthParis Plan: FINALExsubNewSuper 3/16/2017
.08
.035
.045
.08
Legend
WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
WS 2-yr
WS 1.1-yr
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

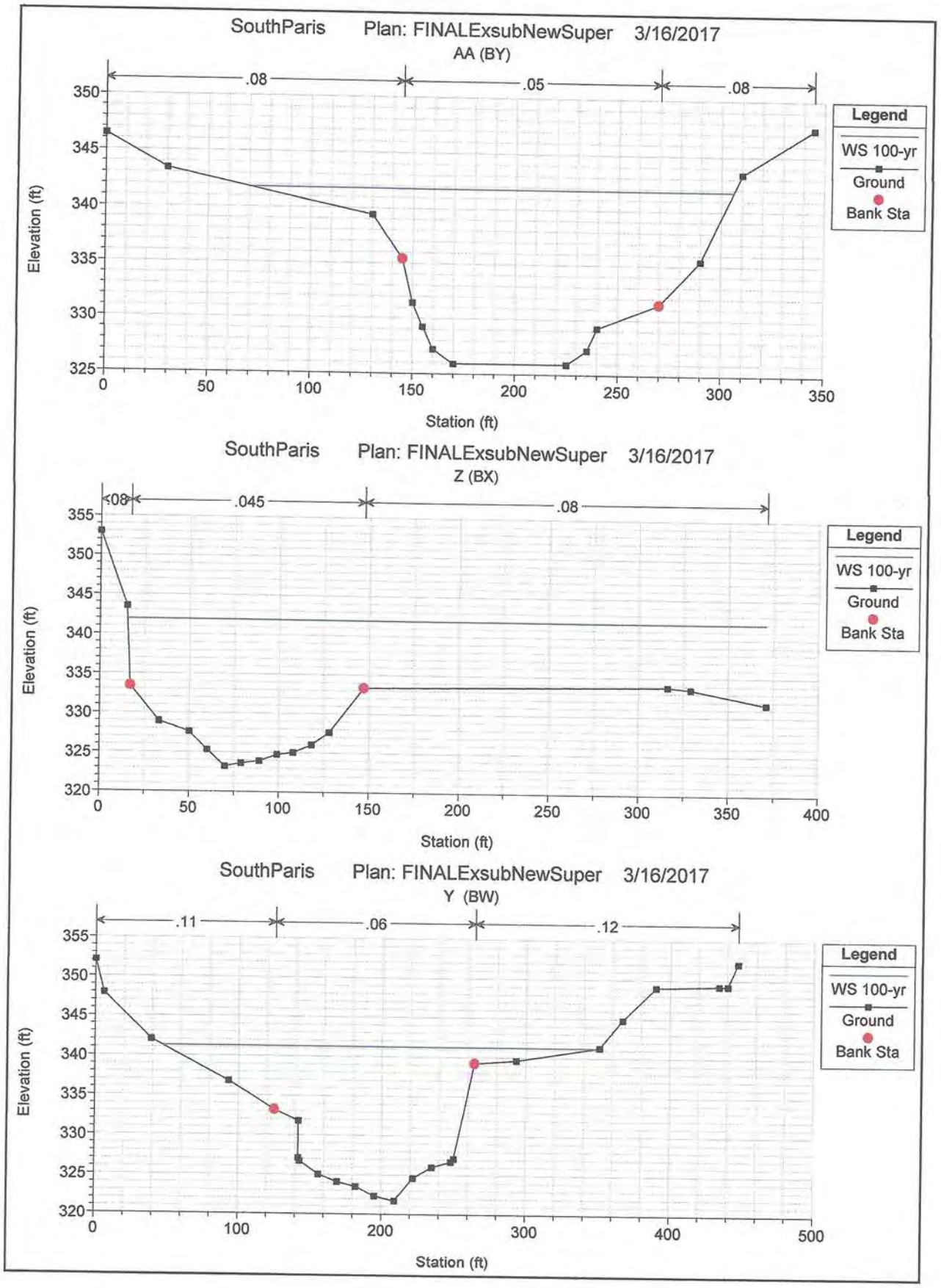

SouthParis Plan: FINALExsubNewSuper 3/16/2017
.08
.035
.045
.08
Legend
WS 100-yr
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
355
350
345
340
335
330
325
0
50
100
150
200
Station (ft)
1 in Horiz. = 30 ft 1 in Vert. = 6 ft

Plan: FINALExsubnewsuper L. Androscoggin Reach RS: 376.8629 Profile: 100-yr

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	0.00	8.60	4.60	11.45	9.83	0.05	1.33	0.40	0.03	0.01
2	LOB	8.60	17.20	6.75	13.67	8.61	0.07	1.59	0.49	0.04	0.02
3	LOB	17.20	25.81	8.09	15.23	8.61	0.08	1.77	0.53	0.04	0.02
4	LOB	25.81	34.41	7.70	14.79	8.61	0.08	1.72	0.52	0.04	0.02
5	LOB	34.41	43.01	10.06	17.60	8.90	0.10	2.05	0.57	0.05	0.03
6	Chan	43.01	63.71	392.55	139.63	21.63	3.98	6.74	2.81	0.16	0.45
7	Chan	63.71	84.41	739.44	201.08	20.82	7.51	9.71	3.68	0.24	0.87
8	Chan	84.41	105.12	777.35	207.17	20.81	7.89	10.01	3.75	0.25	0.92
9	Chan	105.12	125.82	588.05	175.43	20.87	5.97	8.47	3.35	0.21	0.69
10	Chan	125.82	146.52	848.54	218.57	20.86	8.61	10.56	3.88	0.26	1.00
11	Chan	146.52	167.22	1197.72	268.59	20.82	12.16	12.97	4.46	0.32	1.42
12	Chan	167.22	187.92	1466.07	302.80	20.75	14.88	14.63	4.84	0.36	1.74
13	Chan	187.92	208.63	1580.79	316.66	20.73	16.05	15.30	4.99	0.38	1.88
14	Chan	208.63	229.33	1573.58	320.46	21.50	15.97	15.48	4.91	0.37	1.80
15	Chan	229.33	250.03	627.35	187.36	22.32	6.37	9.05	3.35	0.21	0.69
16	ROB	250.03	265.00	23.36	35.34	14.73	0.24	2.55	0.66	0.06	0.04

Plan: FINALExsubnewsuper L. Androscoggin Reach RS: 251.5954 Profile: 100-yr

E.G. US. (ft)	343.05	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	342.57	E.G. Elev (ft)	343.04	342.96
Q Total (cfs)	9852.00	W.S. Elev (ft)	342.51	342.15
Q Bridge (cfs)	9852.00	Crit W.S. (ft)	335.76	336.68
Q Weir (cfs)		Max Chl Dpth (ft)	15.15	13.36
Weir Sta Lft (ft)		Vel Total (ft/s)	5.83	7.21
Weir Sta Rgt (ft)		Flow Area (sq ft)	1690.30	1366.92
Weir Submerg		Froude # Chl	0.30	0.38
Weir Max Depth (ft)		Specif Force (cu ft)	12185.30	10071.10
Min El Weir Flow (ft)	350.37	Hydr Depth (ft)	11.93	11.39
Min El Prs (ft)	347.83	W.P. Total (ft)	182.62	153.12
Delta EG (ft)	0.12	Conv. Total (cfs)	277653.5	211793.2
Delta WS (ft)	0.36	Top Width (ft)	156.88	139.48
BR Open Area (sq ft)	1982.55	Frctn Loss (ft)	0.05	0.00
BR Open Vel (ft/s)	7.21	C & E Loss (ft)	0.03	0.03
BR Sluice Coef		Shear Total (lb/sq ft)	0.73	1.21
BR Sel Method	Energy only	Power Total (lb/ft s)	4.24	8.69


SouthParis Plan: FINALExsubNewSuper 3/16/2017
AA (BY)
.08
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Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Z (BX)
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Y (BW)
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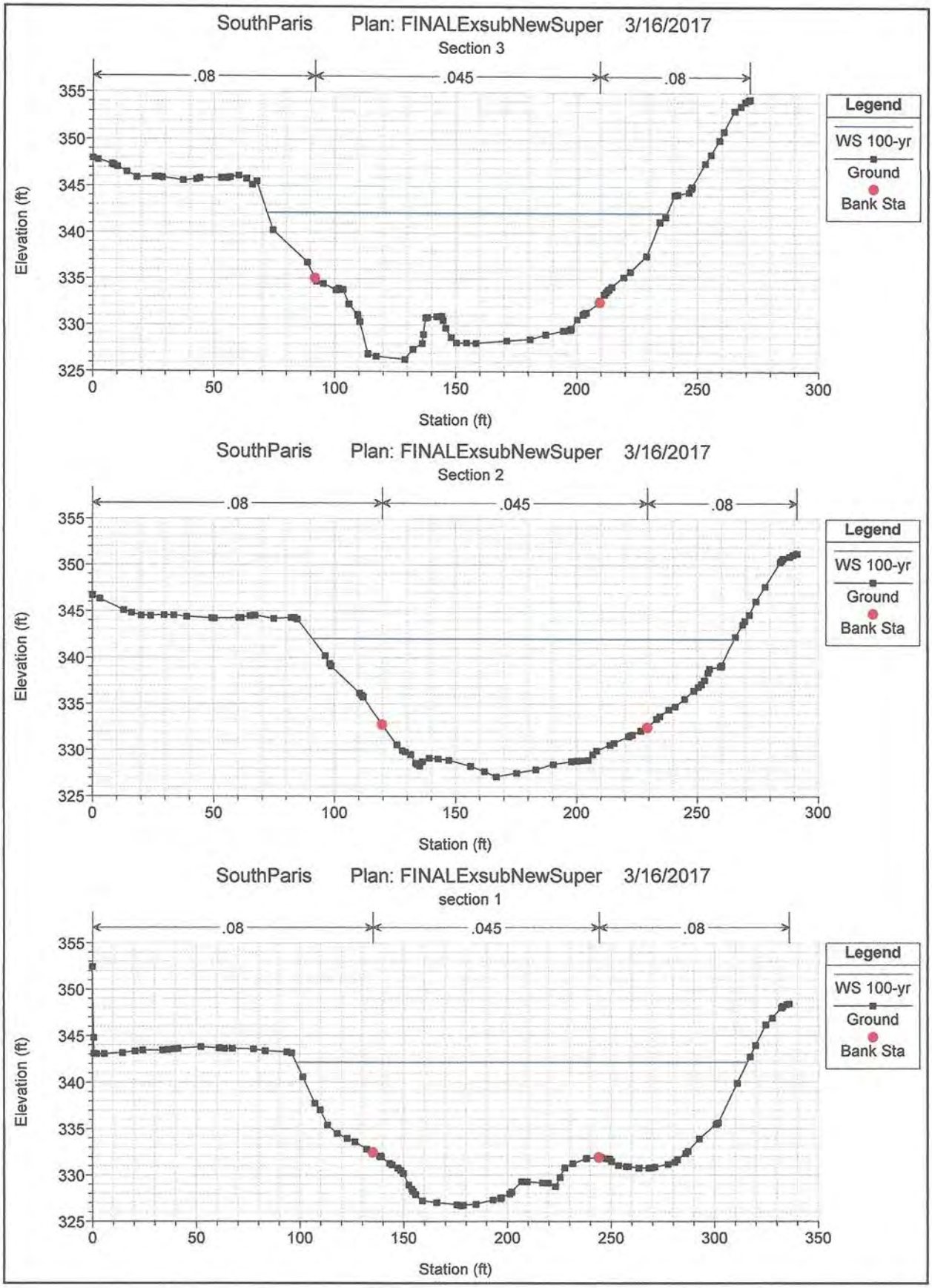
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta


SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 3
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.045
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Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 2
.08
.045
.08
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
SouthParis Plan: FINALExsubNewSuper 3/16/2017
section 1
.08
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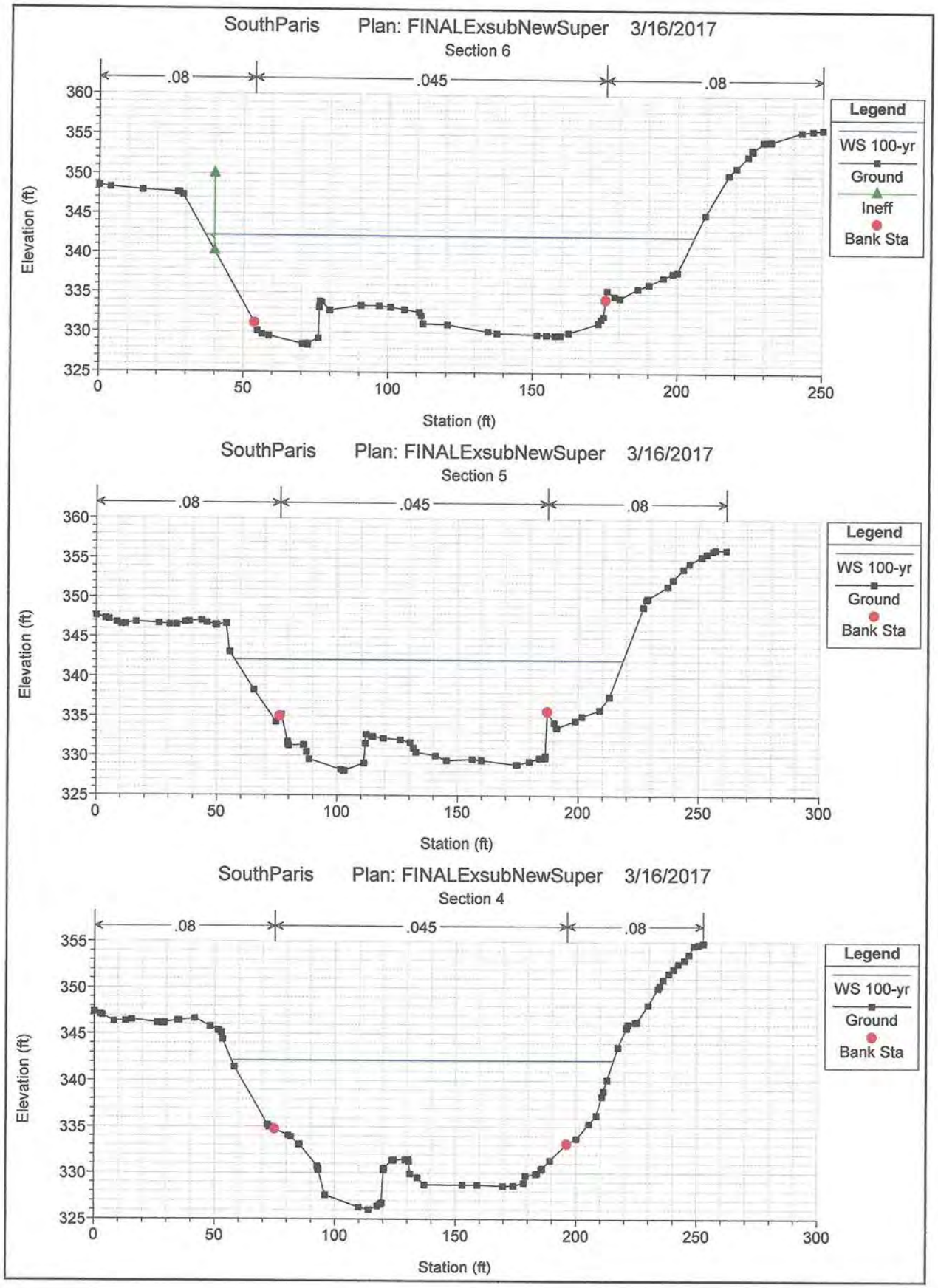
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 6
.08
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Legend
WS 100-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 5
.08
.045
.08
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 4
.08
.045
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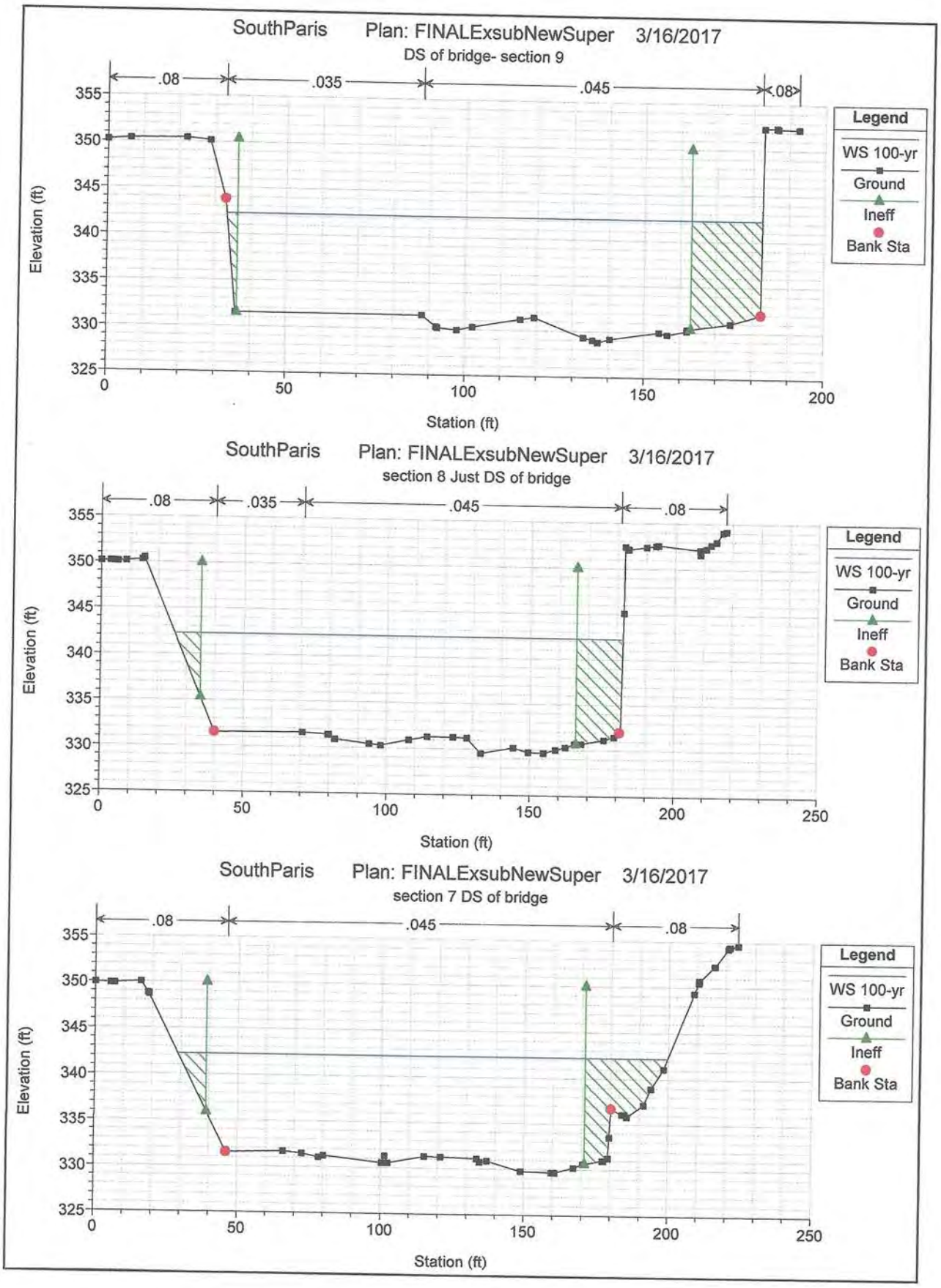
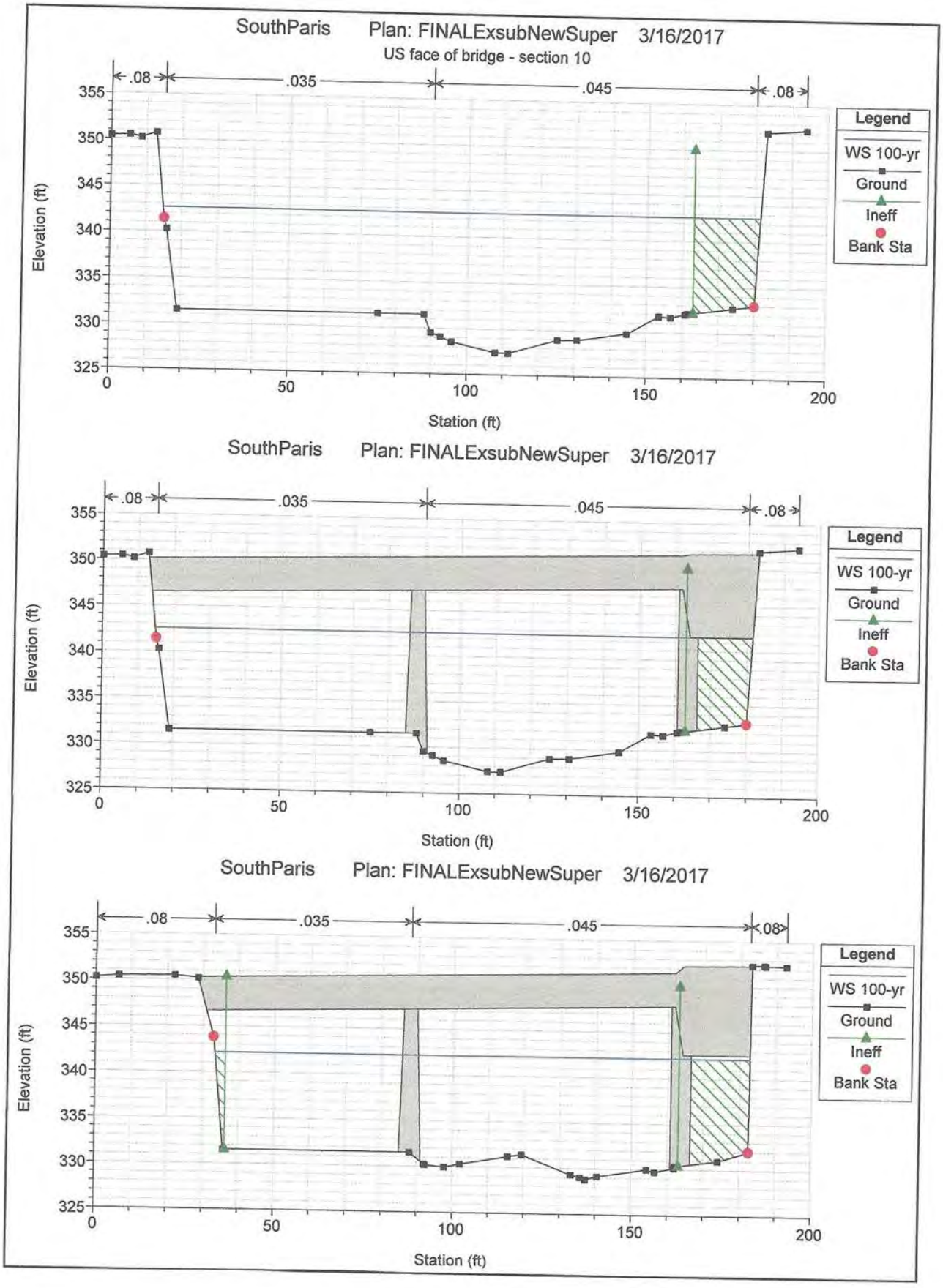
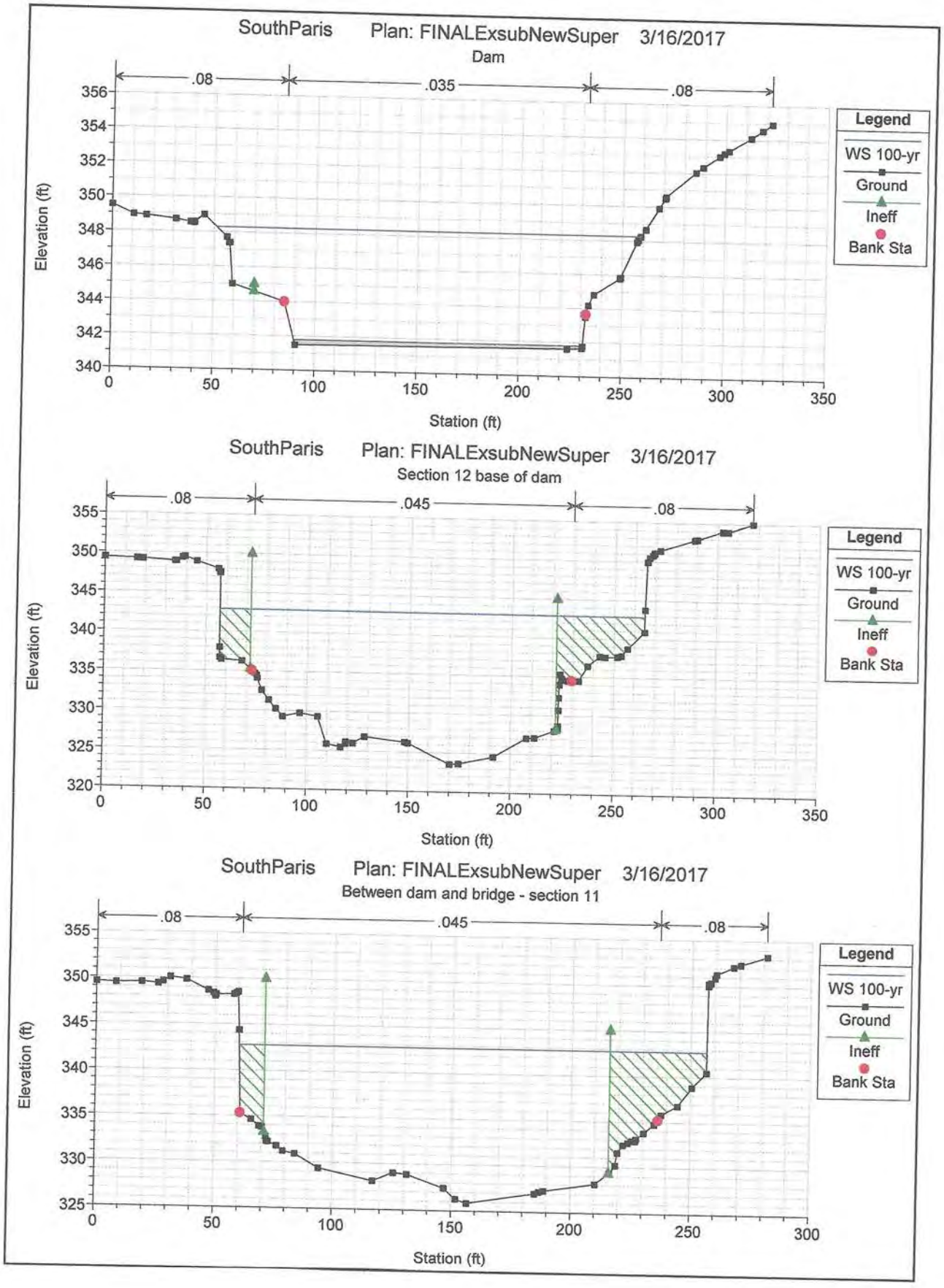
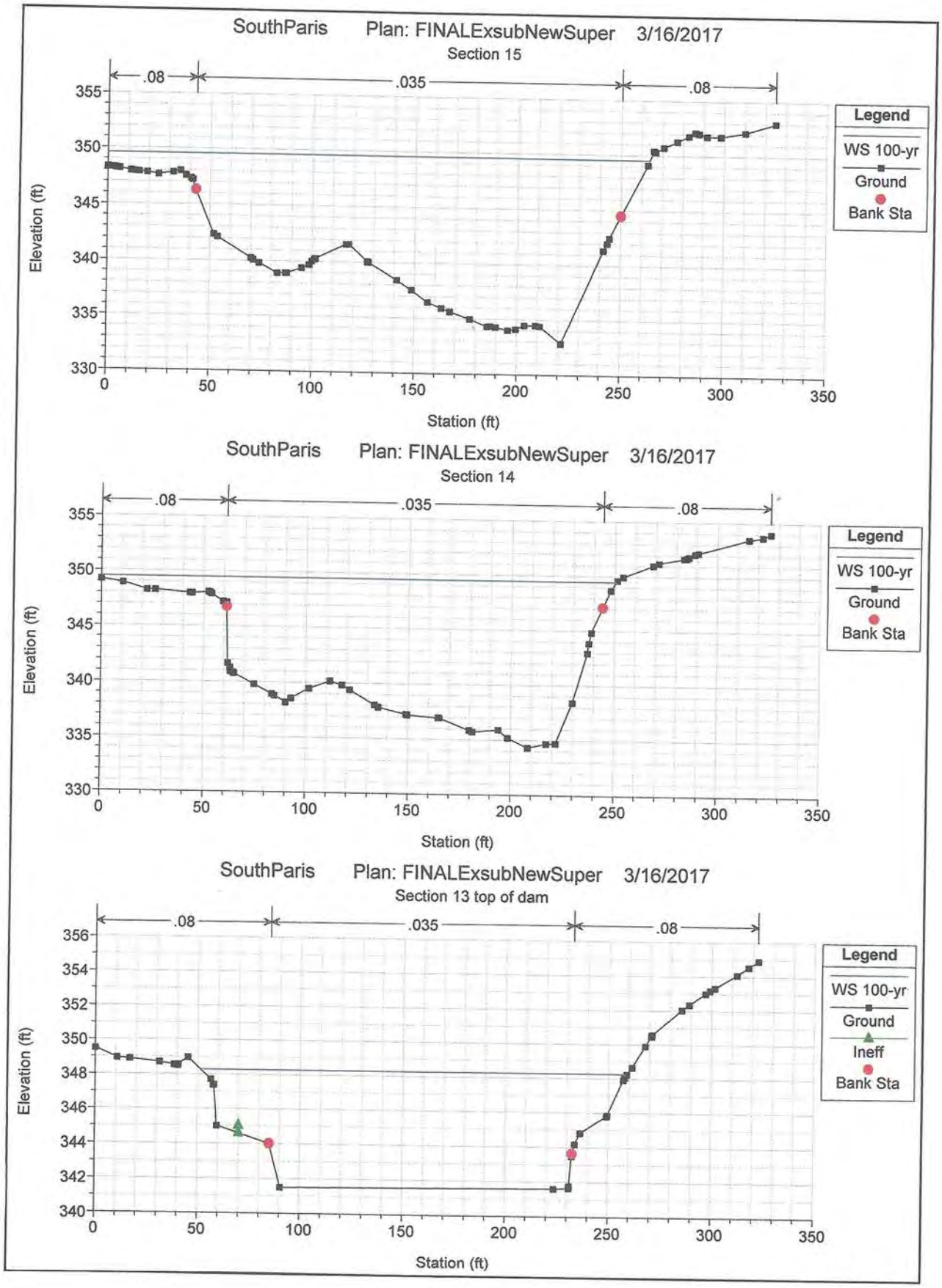
Legend
WS 100-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


SouthParis Plan: FINALExsubNewSuper 3/16/2017
DS of bridge- section 9
.08
.035
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
section 8 Just DS of bridge
.08
.035
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
section 7 DS of bridge
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


SouthParis Plan: FINALExsubNewSuper 3/16/2017
US face of bridge - section 10
.08
.035
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


SouthParis Plan: FINALExsubNewSuper 3/16/2017
Dam
.08
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 12 base of dam
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Between dam and bridge - section 11
.08
.045
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta


SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 15
.08
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 14
.08
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Bank Sta
SouthParis Plan: FINALExsubNewSuper 3/16/2017
Section 13 top of dam
.08
.035
.08
Elevation (ft)
Station (ft)
Legend
WS 100-yr
Ground
Ineff
Bank Sta