VALDOR ENGINEERING INC.
Municipal • Land Development • Water Resources
Site Development • Project Management • Contract Administration
Consulting Engineers – est. 1992

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20 December 2024
File: **23142**

Briarwood (Dundalk) Ltd.
636 Edward Avenue
Unit 14
Richmond Hill, ON
L4C 0V4

Attention: **Enzo Di Giovanni**
President

Dear Mr. Di Giovanni:

Re: **Floodplain Analysis for Proposed Development (Condominium Apartments)**
Ida Street, Village of Dundalk
Township of Southgate, Ontario

Background

Valdor Engineering Inc. was retained by Briarwood (Dundalk) Ltd. to complete a hydrology/hydraulic analysis and floodplain mapping assignment using Visual OTTHYMO and HEC-RAS regarding a parcel of land of which a portion is proposed to be developed as residential condominium apartments. The full property (*i.e.* subject site) is located on the east side of Ida Street and North of Eco Parkway in Dundalk and within the Township of Southgate as shown on the Site Location Plan provided in Figure **1**. While the full property (*i.e.* subject site) extends between Ida Street to east of the Rail Trail, the proposed development site is limited to a smaller portion of the subject site immediately northeast of Ida Street.

As shown in **Figure 2**, the proposed development site is located immediately to the southwest of Tributary 1 and Tributary 1-A. The remainder of the subject site is traversed by Tributary 1, Tributary 1-A, Tributary 2 and Tributary 2-A. It is proposed that a portion of Tributary 1 adjacent the proposed development will be realigned to the northeast to ensure an appropriate and naturalized buffer zone and the development site is to be filled to ensure it is protected from flooding. The tributaries generally flow from the northwest to the southeast connecting with the Grand River and ultimately draining to Lake Erie. The floodplain associated with Tributaries 1, 1-A, 2 and 2-A is not currently mapped based on regulation mapping available from GRCA. As such, the development of a hydraulic model and delineation of the floodplain is required to confirm that any encroachment within the existing floodplain will not have any significant hydraulic impacts or result in any loss in floodplain storage and that the proposed development is located outside the flood hazard.

Figure 1: Site Location Plan (Dundalk, Ontario)

Methodology

Hydrology

A hydrologic model using Visual OTTHYMO (VO) was prepared to determine the peak flows to be used in the hydraulic model.

The contributing drainage areas to the ditch/watercourse within the subject site and other identified flow node locations are illustrated in **Figure 2**. The catchment areas were delineated based on contour mapping prepared using the Ontario Digital Surface Model (LiDAR-derived) Land Information Ontario (LIO) Dataset. The Ontario Digital Surface Model is a compilation of raster digital elevation data from multiple acquisition projects completed within Ontario. The hydrologic soil groups for each catchment were determined based on the soils mapping provided in *Soil Map of Dufferin County, Ontario* (Soil Survey Report No.38, 1964). Land uses for each catchment were determined based on satellite imagery. The supporting calculations (**Tables A.1** through **A.3**) and hydrology model schematic (**Figure A.1**) and model output for the hydrologic model are provided in **Attachment 'A'**. The identified Catchments 101 (29.73 ha), 102 (44.83 ha), and 103

(40.97 ha) drain to Tributary 1 and 201 (24.18 ha), 202 (36.26 ha), and 203 (301.0 ha) drain to Tributary 2. These two tributaries both drain into the Grand River. Flow Node #1 corresponds to the combined flows from Catchments 101 through 103 (115.53 ha). Flow Node #2 corresponds to the combined flows from Catchments 201 through 203 (361.44 ha).

To determine the Regulatory flow (the greater flow of the 100-year storm or the Regional storm), the 100-year storms for the 1-hour, 6-hour, 12-hour, and 24-hour AES and Regional storm (Hurricane Hazel) were analysed. It was determined that the Hazel storm distribution is the critical storm, resulting in a Regional storm flow of 13.303 m^3/s at Flow Node #1 and 17.087 m^3/s at Flow Node #2 (see **Table A.4**).

Hydraulics

Hydraulic modelling of the existing conditions was completed by Valdor using the HEC-RAS 4.1.0 hydraulic model (Hydrologic Engineering Center, U.S. Army Corps of Engineers, January 2010). Cross-section data was entered into the model based on the Classified Point Cloud bare earth LiDAR from the Ontario Digital Surface Model (LiDAR-derived) Land Information Ontario (LIO) Dataset. Refer to **Figure 3** for the locations of the HEC-RAS cross-sections.

Appropriate Manning's roughness "n" values were selected for each land cover type in the hydraulic model based on a review of satellite imagery and using standard values as per the *HEC-RAS Hydraulic Reference Manual, Version 4.1* (U.S. Army Corps of Engineers, January 2010). For the main channel between bank stations, a value of n = 0.035 was selected, appropriate for "clean, straight, full, with stones and weeds but no rifts or deep pools". For the meadow and treed areas, a composite value of n = 0.080 was chosen, and a value of n = 0.013 was chosen for pavement and roads.

Field measurements of existing culverts and channel widths were completed at four locations. Culvert GR_001 is located at the railroad trail off Hagan Street East. Culvert GR_002 is located at the intersection of Eco Parkway northeast of Ida Street. Culvert GR_003 is located on Eco Parkway to the southwest of the Lystek Sewage Treatment Plant. Culvert GR_004 is located on a trail northeast of Ida Street and northwest of Eco Parkway upstream of culvert GR_002. Hydraulic structure inventory sheets were prepared and are provided in **Attachment 'B'**.

It is noted that a discrepancy between the topographic survey and the LiDAR was observed in completing the project design work. Upon further review, it was confirmed that the topographic survey was completed using the CGVD28 vertical datum while the LiDAR uses the CGVD2013 vertical datum. The difference between CGVD2013 and CGVD28 at the site location near Dundalk was obtained from MNR's COSINE Station Report for Station 00820048005 (see COSINE report provided in **Attachment 'A'**). *To address this discrepancy, and based on discussions with the Township of Southgate, the Regional water surface elevations from HEC-RAS prepared using the LiDAR surface data were adjusted by +0.414 m to use with the topographic survey and design drawings to reflect the CGVD28 vertical datum*. As such, the floodlines and

contours presented in this report in **Figure 3** and **Figure 4** are based on CGVD2013 while the floodlines provided on the design drawings associated with this project have been transformed to CGVD28 to be compliant with the Township of Southgate's vertical datum convention.

Comparison Between the LiDAR Data Set and Available Topographic Survey

A comparison was made between the 2017 LiDAR data set and the available topographic survey. Based on a comparison of elevations, it was determined that the LiDAR data set matched well with the topographic survey (transformed to CGVD2013) at most locations where reliable comparisons could be achieved. Typically, the elevations on open hard surfaces were found to be within 12 cm with an average difference of – 4 cm. The LiDAR data set for all surfaces including those areas with dense vegetation were found to be within 32 cm with an average difference of - 15 cm. A copy of the results of the comparison of elevations completed in and around the subject property is provided in **Table A.5** in **Attachment 'A'**.

Results

Existing Conditions Hydraulics

The results of the HEC-RAS model for existing conditions are summarized for the Hazel storm in **Table 1**. The full set of hydraulic results is provided in **Table B.1** in **Attachment 'B'**. The location of the HEC-RAS cross sections including the extent of the Regulatory floodplain through the subject site and upstream and downstream of the site for existing conditions is included in **Figure 3** and the set of cross-section graphical output for the Regulatory storm is provided in **Figure B.1** in **Attachment 'B'**.

Proposed Conditions Hydraulics

The proposed development will extend within the existing floodplain to the northeast of Ida Street and a portion of the existing watercourse will be realigned to ensure an appropriate naturalized buffer. As per GRCA policy, any fill within the floodplain shall be balanced by a corresponding amount of cut to ensure no net loss in floodplain storage. In addition, any significant hydraulic impacts resulting from the proposed development are not permitted.

Based on preliminary calculations, the approximate volume of fill within the existing floodplain associated with the proposed development is 5,900 m^3. As such, it is proposed that a corresponding volume of cut will be achieved within the area identified in **Figure 4** within the east portion of the subject property to ensure no net loss in floodplain storage.

The results of the HEC-RAS model for proposed conditions are summarized for the Hazel storm in **Table 1**. The full set of hydraulic results is provided in **Table B.2** in **Attachment 'B'**. The location of the HEC-RAS cross sections including the extent of the Regulatory floodplain through the subject site and upstream and downstream of the site for proposed conditions is included in **Figure 4** and the set of cross-section graphical output for the Regulatory storm is provided in **Figure B.2** in **Attachment 'B'**.

As noted in **Table 1**, the maximum increase in calculated water surface elevation (WSEL) external to the subject site is 2 cm which is considered insignificant. As such, the proposed development will not have any significant hydraulic impacts to the existing floodplain or flood risk.

Table 1: Water Surface Elevations (WSEL) for Existing and Proposed Conditions (CGVD2013)

River Sta	Profile	Q Total (m/s)	W.S Elev - Existing (m) CGVD2013	W.S Elev - Proposed (m) CGVD2013	Difference	Notes
34	Hazel	5.71	512.8	512.80	0.00	
33	Hazel	5.31	513.92	513.92	0.00	
32	Hazel	5.31	513.35	513.35	0.00	
31	Hazel	5.71	512.4	512.40	0.00	
30	Hazel	11.03	510.82	510.82	0.00	
29	Hazel	11.03	510.62	510.63	0.01	
28	Hazel	11.03	510.62	510.63	0.01	
27	Hazel	11.03	510.57	510.59	0.02	
26	**Hazel**	**11.03**	**510.52**	**510.56**	**0.04**	Within Site Development
25	**Hazel**	**11.03**	**510.49**	**510.54**	**0.05**	
24	**Hazel**	**11.03**	**510.48**	**510.53**	**0.05**	
23	**Hazel**	**11.03**	**510.48**	**510.52**	**0.04**	
22	**Hazel**	**11.03**	**510.47**	**510.52**	**0.05**	
21	**Hazel**	**13.3**	**510.46**	**510.51**	**0.05**	
20	**Hazel**	**13.3**	**510.43**	**510.46**	**0.03**	
19	**Hazel**	**13.3**	**510.37**	**510.37**	**0.00**	
18	**Hazel**	**13.3**	**510.18**	**510.18**	**0.00**	
17	Hazel	13.3	510.11	510.11	0.00	
16	Hazel	13.3	509.97	509.97	0.00	
15	Hazel	13.3	509.79	509.79	0.00	
14	Hazel	13.3	509.44	509.44	0.00	
13	Hazel	13.3	509.26	509.26	0.00	
12	Hazel	13.3	509.2	509.20	0.00	
11	Hazel	13.3	509.18	509.18	0.00	
10	Hazel	13.3	509.11	509.11	0.00	
9	Hazel	13.3	508.64	508.64	0.00	
8	Hazel	13.3	508.15	508.15	0.00	
7	Hazel	13.3	507.86	507.86	0.00	
6	Hazel	13.3	507.27	507.27	0.00	
5	Hazel	13.3	507.27	507.27	0.00	
4	Hazel	13.3	507.26	507.26	0.00	
3	Hazel	13.3	506.81	506.81	0.00	
2	Hazel	13.3	506.63	506.63	0.00	
1	Hazel	13.3	506.37	506.37	0.00	

River Sta	Profile	Q Total (m/s)	W.S Elev - Existing (m) CGVD2013	W.S Elev - Proposed (m) CGVD2013	Difference	Notes
232	Hazel	15.99	513.06	513.06	0.00	
231	Hazel	15.99	513.06	513.06	0.00	
230	Hazel	15.99	513.05	513.05	0.00	
229	Hazel	15.99	513.05	513.05	0.00	
228	Hazel	15.99	512.54	512.54	0.00	
227	Hazel	15.99	512.48	512.48	0.00	
226	Hazel	15.99	512.23	512.23	0.00	
225	Hazel	15.99	512.17	512.17	0.00	
224	Hazel	15.99	512.08	512.08	0.00	
329	Hazel	4.71	514.48	514.48	0.00	
328	Hazel	4.71	513.98	513.98	0.00	
327	Hazel	4.71	513.29	513.29	0.00	
326	Hazel	4.71	512.77	512.77	0.00	
325	Hazel	4.71	512.5	512.50	0.00	
324	Hazel	4.71	512.08	512.08	0.00	
123	Hazel	16.03	512.06	512.06	0.00	
122	Hazel	16.03	512.05	512.05	0.00	
121	Hazel	17.09	512.03	512.03	0.00	
120	Hazel	17.09	512.01	512.01	0.00	
119	Hazel	17.09	511.98	511.98	0.00	
118	Hazel	17.09	511.8	511.80	0.00	
117	**Hazel**	**17.09**	**511.44**	**511.44**	**0.00**	Within Site Development
116	**Hazel**	**17.09**	**511.2**	**511.20**	**0.00**	
115	**Hazel**	**17.09**	**510.92**	**510.92**	**0.00**	
114	**Hazel**	**17.09**	**510.84**	**510.84**	**0.00**	
113	**Hazel**	**17.09**	**510.63**	**510.63**	**0.00**	
112	**Hazel**	**17.09**	**510.45**	**510.45**	**0.00**	
111	Hazel	17.09	510.17	510.17	0.00	
110	Hazel	17.09	509.99	509.99	0.00	
109	Hazel	17.09	509.85	509.85	0.00	
108	Hazel	17.09	509.6	509.60	0.00	
107	Hazel	17.09	509.26	509.26	0.00	
106	Hazel	17.09	508.3	508.30	0.00	
105	Hazel	17.09	508.21	508.21	0.00	
104	Hazel	17.09	508.2	508.20	0.00	
103	Hazel	17.09	508.07	508.07	0.00	
102	Hazel	17.09	507.07	507.07	0.00	
101	Hazel	17.09	507.01	507.01	0.00	

WSEL Results Transformed to CGVD28

As noted earlier and based on discussions with the Township of Southgate, the Township's convention is to present elevation data using CGVD28. As such, the Regional WSEL's from the HEC-RAS model prepared using LiDAR surface data were adjusted by +0.414 m to use with the topographic survey and design drawings to reflect the CGVD28 vertical datum. A summary of the transformed WSEL's for the existing and proposed conditions floodplains is provided in **Table 2**.

Table 2: Transformed Water Surface Elevations (WSEL) for Existing and Proposed Conditions (CGVD28)

River Sta	Transformed WSEL - Existing (m) CGVD28	Transformed WSEL - Proposed (m) CGVD28	Difference	Notes
34	513.21	513.21	0.00	
33	514.33	514.33	0.00	
32	513.76	513.76	0.00	
31	512.81	512.81	0.00	
30	511.23	511.23	0.00	
29	511.03	511.04	0.01	
28	511.03	511.04	0.01	
27	510.98	511.00	0.02	
26	510.93	510.97	**0.04**	Within Site Development
25	510.90	510.95	**0.05**	
24	510.89	510.94	**0.05**	
23	510.89	510.93	**0.04**	
22	510.88	510.93	**0.05**	
21	510.87	510.92	**0.05**	
20	510.84	510.87	**0.03**	
19	510.78	510.78	**0.00**	
18	510.59	510.59	**0.00**	
17	510.52	510.52	0.00	
16	510.38	510.38	0.00	
15	510.20	510.20	0.00	
14	509.85	509.85	0.00	
13	509.67	509.67	0.00	
12	509.61	509.61	0.00	
11	509.59	509.59	0.00	
10	509.52	509.52	0.00	
9	509.05	509.05	0.00	
8	508.56	508.56	0.00	
7	508.27	508.27	0.00	
6	507.68	507.68	0.00	
5	507.68	507.68	0.00	
4	507.67	507.67	0.00	
3	507.22	507.22	0.00	
2	507.04	507.04	0.00	
1	506.78	506.78	0.00	

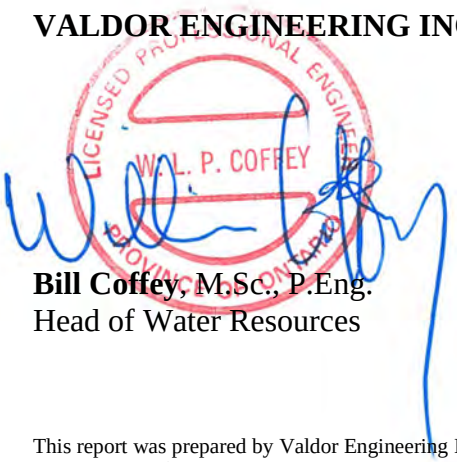
River Sta	Transformed WSEL - Existing (m) CGVD28	Transformed WSEL - Proposed (m) CGVD28	Difference	Notes
232	513.47	513.47	0.00	
231	513.47	513.47	0.00	
230	513.46	513.46	0.00	
229	513.46	513.46	0.00	
228	512.95	512.95	0.00	
227	512.89	512.89	0.00	
226	512.64	512.64	0.00	
225	512.58	512.58	0.00	
224	512.49	512.49	0.00	
329	514.89	514.89	0.00	
328	514.39	514.39	0.00	
327	513.70	513.70	0.00	
326	513.18	513.18	0.00	
325	512.91	512.91	0.00	
324	512.49	512.49	0.00	
123	512.47	512.47	0.00	
122	512.46	512.46	0.00	
121	512.44	512.44	0.00	
120	512.42	512.42	0.00	
119	512.39	512.39	0.00	
118	512.21	512.21	0.00	
117	511.85	511.85	**0.00**	Within Site Development
116	511.61	511.61	**0.00**	
115	511.33	511.33	**0.00**	
114	511.25	511.25	**0.00**	
113	511.04	511.04	**0.00**	
112	510.86	510.86	**0.00**	
111	510.58	510.58	0.00	
110	510.40	510.40	0.00	
109	510.26	510.26	0.00	
108	510.01	510.01	0.00	
107	509.67	509.67	0.00	
106	508.71	508.71	0.00	
105	508.62	508.62	0.00	
104	508.61	508.61	0.00	
103	508.48	508.48	0.00	
102	507.48	507.48	0.00	
101	507.42	507.42	0.00	

Summary and Recommendations

Based on the results of the hydrologic and hydraulic investigations completed for existing and proposed conditions, the proposed development will not contribute to any significant increase in WSEL's or flood risk. In addition, a quantity of cut within the subject property is proposed to ensure no net loss in floodplain storage. As such, it is recommended the proposed development be approved.

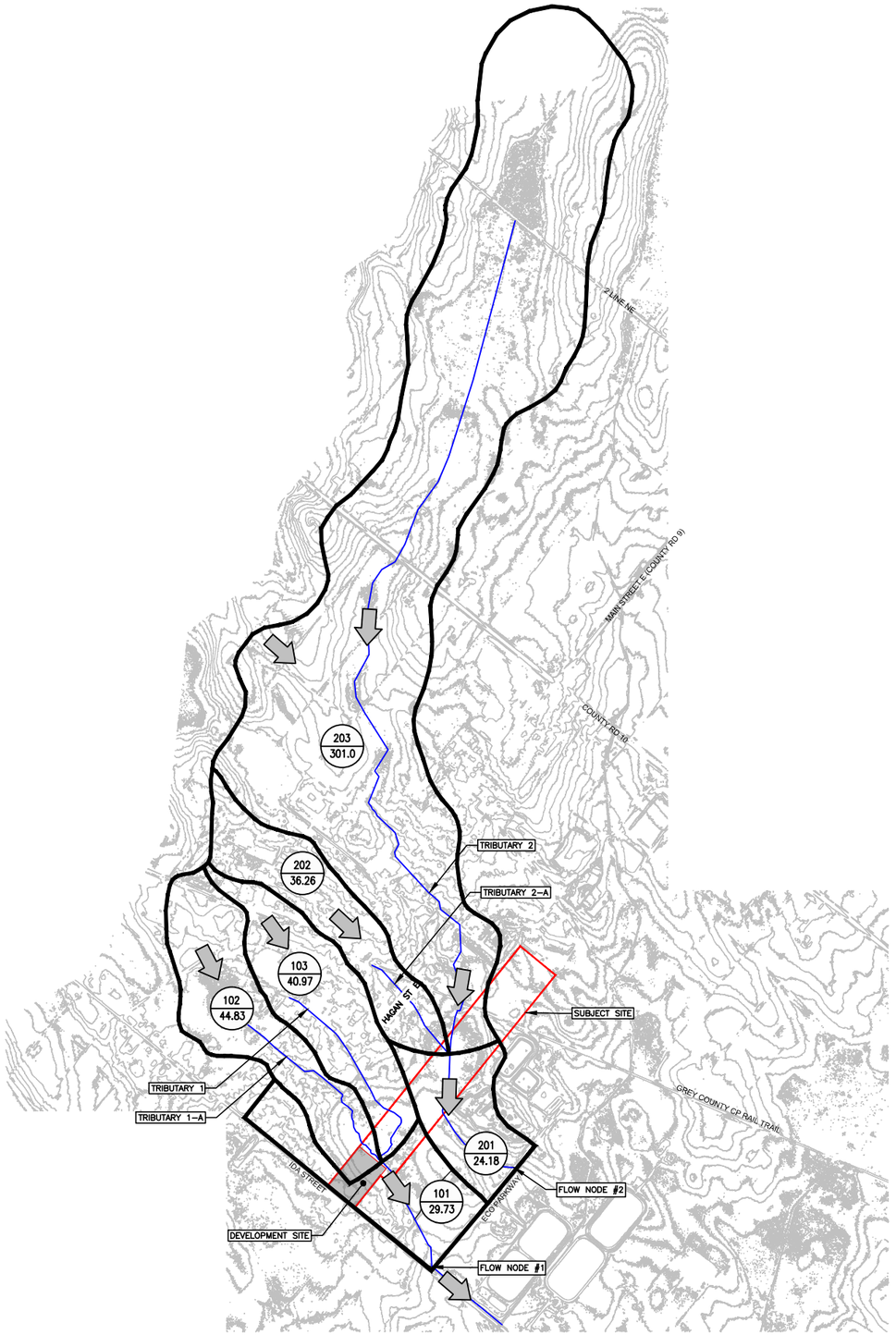
Respectfully submitted,

VALDOR ENGINEERING INC.



Bill Coffey, M.Sc., P.Eng.
Head of Water Resources

Phoebe Yung, B.Eng.
Water Resource Analyst



LEGEND

101 — CATCHMENT ID
10.00 — AREA (HA)

DRAINAGE BOUNDARY

DRAINAGE BOUNDARY

OVERLAND FLOW

PROJECT
BRIARWOOD DUNDALK SUBDIVISION
GRAND RIVER CONSERVATION AREA

TITLE
DRAINAGE PLAN

VALDOR ENGINEERING INC.
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PREPARED BY	CHECKED BY
P.Y.	B.C.
SCALE: 1:25000	DATE: JAN. 2024
PROJECT: 23142	**FIGURE 2**

ACAD File: S:\Projects\2023\23142\Hydrotechnical\Hydrology\23142_SWM Drainage Plan.dwg Layout: Existing Printed: Dec. 19, 2024

HANBURY ST.
GOLD ST.
YOUNG ST.
HAGEN ST.
ELM ST.
IDA STREET
ECO PARKWAY
GREY COUNTY CP RAIL TRAIL

SITE BOUNDARY
REGIONAL FLOODLINE
SPILL AREA
REGIONAL FLOODLINE

34 513.21
31 512.81
30 511.23
29 511.03
28 511.03
27 510.98
26 510.93
25 510.90
24 510.89
23 510.89
22 510.88
21 510.87
20 510.84
19 510.78
18 510.59
17 510.52
16 510.38
15 510.20
14 509.85
13 509.67
12 509.61
11 509.59
10 509.52
9 509.05
8 508.56
7 508.27
6 507.68
5 507.68
4 507.67
3 507.22
2 507.04
1 506.78
33 514.33
32 513.76
326 513.18
325 512.91
324 512.49
116 511.61
115 511.33
114 511.25
113 511.04
329 514.89
328 514.39
327 513.70
232 513.47
231 513.47
230 513.46
229 513.46
228 512.95
227 512.89
226 512.64
225 512.58
224 512.49
123 512.47
122 512.46
121 512.44
120 512.42
119 512.39
118 512.21
117 511.85
24/112 510.89
111 510.58
110 510.40
109 510.26
108 510.01
107 509.67
106 508.71
105 508.62
104 508.61
103 508.48
102 507.48
101 507.42

BEARING NOTES

POINT ID	NORTHING	EASTING

LEGEND

- EXISTING REGIONAL FLOODLINE
- HEC–RAS CROSS SECTION
- 510.00 ELEVATION
- WATERCOURSE
- 1 / 510.48 HEC–RAS CROSS–SECTION / REGIONAL WATER SURFACE ELEVATION (m)

No.	Revision	Date	By	Appr'd
3				
2				
1				

BENCHMARK:

No.	Elevation:	Description:

CONSULTANT:

REVIEWED BY

C.E.T./C.Tech ( ) OTHER ( ) P. Eng ( )

ENGINEERING AND CORPORATE ASSETS DEPARTMENT

DATE:

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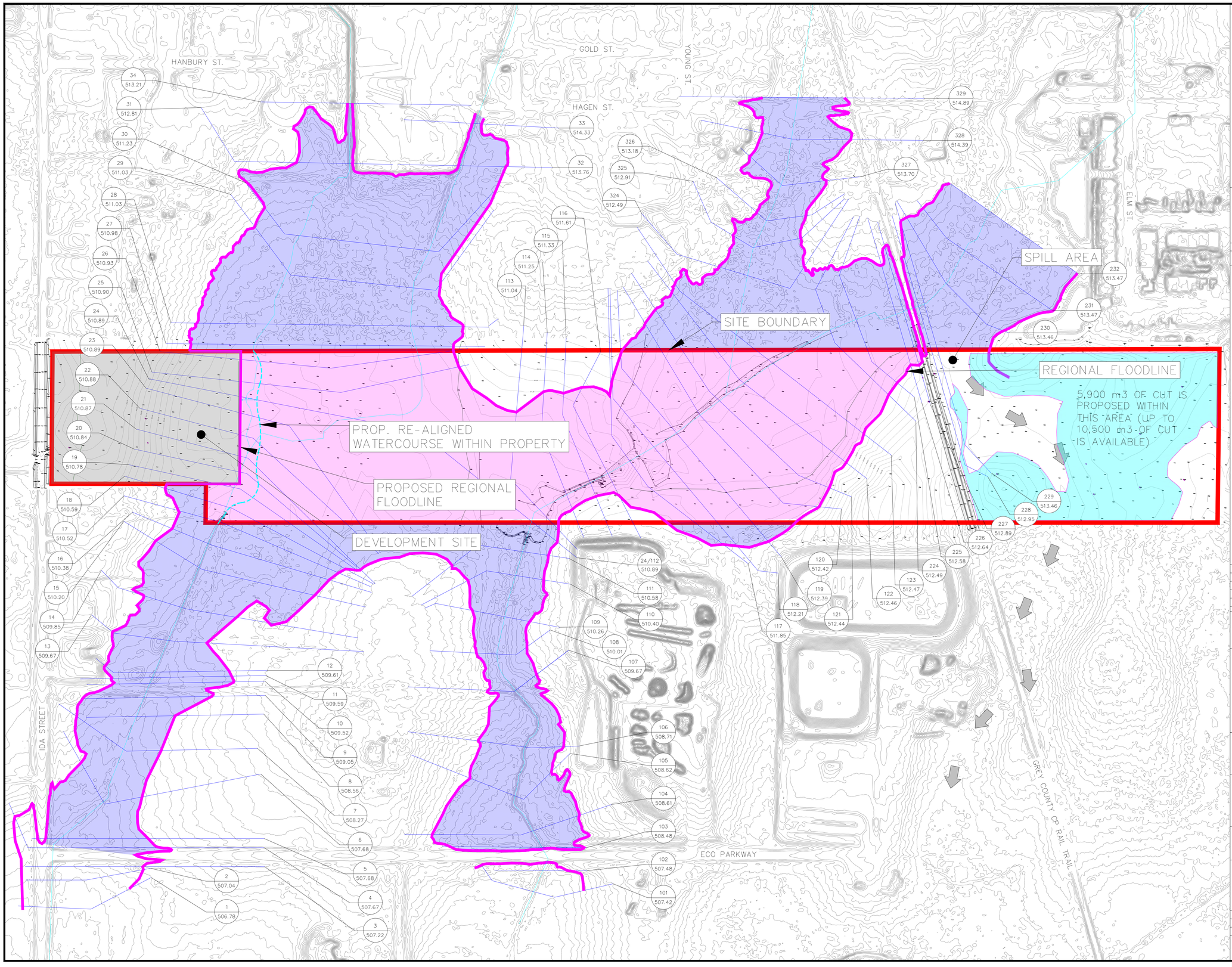
DUNDALK SUBDIVISION

FLOODPLAIN MAPPING EXISTING

Scale:	1:2000	Checked by:	B.C.
Drawn by:	P.Y.	Approved by:	B.C.
Designed by:	P.Y.	Date:	DEC. 2024

Project No. 23142
Drawing No.
Sheet No.

FIGURE 3



BEARING NOTES

POINT ID	NORTHING	EASTING

LEGEND

- EXISTING REGIONAL FLOODLINE
- HEC-RAS CROSS SECTION
- 510.00 — ELEVATION
- WATERCOURSE
- 1 / 510.48 — HEC-RAS CROSS-SECTION / REGIONAL WATER SURFACE ELEVATION (m)

No.	Revision	Date	By	Appr'd
3				
2				
1				

BENCHMARK:

No.	Elevation:	Description:

CONSULTANT:

REVIEWED BY

P. Eng ( )
C.E.T./C.Tech ( ) OTHER ( )

ENGINEERING AND CORPORATE ASSETS DEPARTMENT

DATE:

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www.valdor-engineering.com

DUNDALK SUBDIVISION

FLOODPLAIN MAPPING PROPOSED

Scale:	1:2000	Checked by:	B.C.
Drawn by:	P.Y.	Approved by:	B.C.
Designed by:	P.Y.	Date:	DEC. 2024

Project No. 23142

Drawing No.

Sheet No.

FIGURE 4

ATTACHMENT ‘A’

Hydrology Model (VO)

Supporting Documentation and Calculations

VALDOR

VALDOR ENGINEERING INC.
File: 23142
Date: January 2024

Table A.1: Summary of VO Model Parameters
Pre-Development Conditions

Catchment ID	Area (ha)	VO Routine	TIMP	XIMP	CN II	IA (mm)	Tpeak (hr)
101	29.73	NasHyd	-	-	71	6.4	0.73
102	44.83	StandHyd	0.3	0.2	75	5.5	-
103	40.97	StandHyd	0.3	0.2	77	4.7	-
201	24.18	NasHyd	-	-	68	7.3	0.67
202	36.26	StandHyd	0.3	0.2	77	4.7	-
203	301.00	NasHyd	-	-	79	6.9	3.42
Total	**476.97**						

VALDOR ENGINEERING INC.
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Table A.2: Calculation of CN Values, Initial Abstractions and Runoff Coefficients

Subcatchment	Area (ha)	Land Use and Land Cover		CN II	Area Weighted CN II	IA (mm)	Area Weighted IA (mm)	C-Value	Area Weighted C-Value
		Type	Area (ha)						
101	29.73	Row Crops (HSG 'BC')	0.00	85	**71**	7	**6.4**	0.35	**0.34**
		Forest (HSG 'BC')	2.28	63		10		0.25	
		Lawn (HSG 'BC')	6.41	68		5		0.11	
		Meadow (HSG 'BC')	15.45	65		8		0.28	
		Industrial (HSG 'BC')	3.46	90		2		0.70	
		Other Impervious	2.14	100		2		0.95	
102	44.83	Row Crops (HSG 'BC')	0.00	85	**75**	7	**5.5**	0.35	**0.40**
		Forest (HSG 'BC')	1.29	63		10		0.25	
		Lawn (HSG 'BC')	13.33	68		5		0.11	
		Meadow (HSG 'BC')	17.94	65		8		0.28	
		Industrial (HSG 'BC')	1.92	90		2		0.70	
		Other Impervious	10.35	100		2		0.95	
103	40.97	Row Crops (HSG 'BC')	0.00	85	**77**	7	**4.7**	0.35	**0.39**
		Forest (HSG 'BC')	0.00	63		10		0.25	
		Lawn (HSG 'BC')	19.44	68		5		0.11	
		Meadow (HSG 'BC')	8.73	65		8		0.28	
		Industrial (HSG 'BC')	3.05	90		2		0.70	
		Other Impervious	9.75	100		2		0.95	
201	24.18	Row Crops (HSG 'BC')	0.00	85	**68**	7	**7.3**	0.35	**0.32**
		Forest (HSG 'BC')	0.00	63		10		0.25	
		Lawn (HSG 'BC')	1.11	68		5		0.11	
		Meadow (HSG 'BC')	20.88	65		8		0.28	
		Industrial (HSG 'BC')	1.08	90		2		0.70	
		Other Impervious	1.11	100		2		0.95	
202	36.26	Row Crops (HSG 'BC')	0.00	85	**77**	7	**4.7**	0.35	**0.40**
		Forest (HSG 'BC')	0.00	63		10		0.25	
		Lawn (HSG 'BC')	16.34	68		5		0.11	
		Meadow (HSG 'BC')	8.41	65		8		0.28	
		Industrial (HSG 'BC')	2.71	90		2		0.70	
		Other Impervious	8.80	100		2		0.95	
203	301.00	Row Crops (HSG 'BC')	167.98	85	**79**	7	**6.9**	0.35	**0.35**
		Forest (HSG 'BC')	13.38	63		10		0.25	
		Lawn (HSG 'BC')	23.65	68		5		0.11	
		Meadow (HSG 'BC')	74.84	65		8		0.28	
		Industrial (HSG 'BC')	0.00	90		2		0.70	
		Other Impervious	21.15	100		2		0.95	

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Table A.3: SWM Analysis - Calculation of Time to Peak

Subcatchment	A Area (ha)	L (m) Catchment Length	Highest Elevation (m)	Lowest Elevation (m)	Slope (m/m)	$^{1,2}T_c$ Method	C_u (Uplands Coefficient)	Velocity (m/s)	^{1,2}Tc (s)	^{1,2}Tp (s)	^{1,2}Tp (hr)
101	29.73	265.00	516.50	512.75	0.01	Uplands (Short Grass Pasture and Lawns)	2.3	0.3	968.56	648.93	0.18
		1085.0	513.00	506.00	0.01	Uplands (Grassed Waterway Ditch)	4.6	0.4	2936.55	1967.49	0.55
201	24.18	290.0	515.25	511.75	0.01	Uplands (Short Grass Pasture and Lawns)	2.3	0.3	1147.72	768.97	0.21
		725.0	511.75	508.75	0.00414	Uplands (Grassed Waterway Ditch)	4.6	0.3	2450.13	1641.58	0.46
203	301.00	970.0	536.00	528.00	0.01	Uplands (Short Grass Pasture and Lawns)	2.3	0.2	4643.92	3111.43	0.86
		4250.0	528.00	508.75	0.00453	Uplands (Grassed Waterway Ditch)	4.6	0.3	13728.09	9197.82	2.55

Uplands Method

The Uplands Method is appropriate when the flow path consists of a number of different land covers. The average overland flow velocity is determined for a catchment based on the catchment slope and land cover type. The individual travel time for each land cover is summed to obtain the total travel time. The velocity used in the Uplands Method is calculated as follows:

$$V = (C_u)(S)^{0.5}$$

where,

V = average overland flow velocity (m/s)
C_u = $V/S^{0.5}$ (Uplands coefficient)
S = average slope (m/m)

And the Uplands coefficient for different land covers is defined in the following table:

Table 7.3: Uplands Coefficients for Different Land Covers

Land Cover	Cu (V/S^0.5)
Forest with heavy ground litter, meadow (overland flow)	0.6
Fallow or minimum tillage cultivation (overland flow)	1.5
Short grass pasture and lawns (overland flow)	2.3
Cultivated, straight row (overland flow)	2.7
Nearly bare ground (overland flow)	3.0
Grassed waterway (ditch)	4.6
Paved areas (sheet flow) and shallow gutter flow	6.1

Source: modified from Figure 3.11, American Iron and Steel Institute, "Modern Sewer Design: Canadian Edition," Corrugated Steel Pipe Institute, 1996 and Stormwater Conveyance Modeling and Design, Haestad Methods, First Edition, 2003.

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Table A.4: Critical Storm

Storm	Flow (Flow Node #1) (m3/s)	Flow (Flow Node #2) (m3/s)
100-YEAR 1-HR AES	10.608	4.774
100-YEAR 6-HR AES	12.626	6.676
100-YEAR 12-HR AES	9.101	6.929
100-YEAR 24-HR AES	6.057	6.876
HAZEL	13.303	17.087

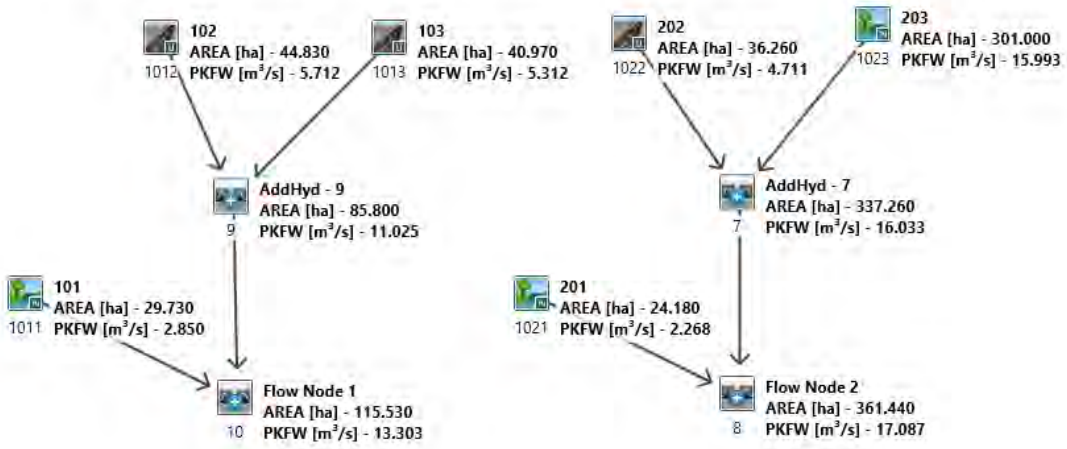

Figure A.1: VO Model Schematic

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================================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0849c88f-221a-4209-a887-6ab4a966a5a0\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0849c88f-221a-4209-a887-6ab4a966a5a0\scenar


DATE: 11-23-2023                          TIME: 01:37:29

USER:


COMMENTS: _____________________________________________________


-------------------------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : AES_24hr_100yr                **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              3c114613-d427-41cb-bbe0-52817044461c\c0795392
| Ptotal=117.08 mm |    Comments: AES_24hr_100yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  6.25    9.95 | 12.50    4.10 | 18.75    0.59
                0.25    0.59 |  6.50    9.95 | 12.75    4.10 | 19.00    0.59
                0.50    0.59 |  6.75    9.95 | 13.00    4.10 | 19.25    0.59
                0.75    0.59 |  7.00    9.95 | 13.25    4.10 | 19.50    0.59
                1.00    0.59 |  7.25    9.95 | 13.50    4.10 | 19.75    0.59
                1.25    0.59 |  7.50    9.95 | 13.75    4.10 | 20.00    0.59
                1.50    0.59 |  7.75    9.95 | 14.00    4.10 | 20.25    0.59
                1.75    0.59 |  8.00    9.95 | 14.25    2.34 | 20.50    0.59
                2.00    0.59 |  8.25   26.91 | 14.50    2.34 | 20.75    0.59
                2.25    0.59 |  8.50   26.91 | 14.75    2.34 | 21.00    0.59
                2.50    0.59 |  8.75   26.91 | 15.00    2.34 | 21.25    0.59
                2.75    0.59 |  9.00   26.91 | 15.25    2.34 | 21.50    0.59
                3.00    0.59 |  9.25   26.91 | 15.50    2.34 | 21.75    0.59
                3.25    0.59 |  9.50   26.91 | 15.75    2.34 | 22.00    0.59
                3.50    0.59 |  9.75   26.91 | 16.00    2.34 | 22.25    0.59
                3.75    0.59 | 10.00   26.91 | 16.25    1.17 | 22.50    0.59
                4.00    0.59 | 10.25    7.61 | 16.50    1.17 | 22.75    0.59
                4.25    3.51 | 10.50    7.61 | 16.75    1.17 | 23.00    0.59
                4.50    3.51 | 10.75    7.61 | 17.00    1.17 | 23.25    0.59
                4.75    3.51 | 11.00    7.61 | 17.25    1.17 | 23.50    0.59
                5.00    3.51 | 11.25    7.61 | 17.50    1.17 | 23.75    0.59
                5.25    3.51 | 11.50    7.61 | 17.75    1.17 | 24.00    0.59
                5.50    3.51 | 11.75    7.61 | 18.00    1.17 |
                5.75    3.51 | 12.00    7.61 | 18.25    0.59 |
                6.00    3.51 | 12.25    4.10 | 18.50    0.59 |

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| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.67

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.083    0.00 | 6.167    3.51 |12.250    7.61 | 18.33    0.59
0.167    0.00 | 6.250    3.51 |12.333    4.10 | 18.42    0.59
0.250    0.00 | 6.333    9.95 |12.417    4.10 | 18.50    0.59
0.333    0.59 | 6.417    9.95 |12.500    4.10 | 18.58    0.59
0.417    0.59 | 6.500    9.95 |12.583    4.10 | 18.67    0.59
0.500    0.59 | 6.583    9.95 |12.667    4.10 | 18.75    0.59
0.583    0.59 | 6.667    9.95 |12.750    4.10 | 18.83    0.59
0.667    0.59 | 6.750    9.95 |12.833    4.10 | 18.92    0.59
0.750    0.59 | 6.833    9.95 |12.917    4.10 | 19.00    0.59
0.833    0.59 | 6.917    9.95 |13.000    4.10 | 19.08    0.59
0.917    0.59 | 7.000    9.95 |13.083    4.10 | 19.17    0.59
1.000    0.59 | 7.083    9.95 |13.167    4.10 | 19.25    0.59
1.083    0.59 | 7.167    9.95 |13.250    4.10 | 19.33    0.59
1.167    0.59 | 7.250    9.95 |13.333    4.10 | 19.42    0.59
1.250    0.59 | 7.333    9.95 |13.417    4.10 | 19.50    0.59
1.333    0.59 | 7.417    9.95 |13.500    4.10 | 19.58    0.59
1.417    0.59 | 7.500    9.95 |13.583    4.10 | 19.67    0.59
1.500    0.59 | 7.583    9.95 |13.667    4.10 | 19.75    0.59
1.583    0.59 | 7.667    9.95 |13.750    4.10 | 19.83    0.59
1.667    0.59 | 7.750    9.95 |13.833    4.10 | 19.92    0.59
1.750    0.59 | 7.833    9.95 |13.917    4.10 | 20.00    0.59
1.833    0.59 | 7.917    9.95 |14.000    4.10 | 20.08    0.59
1.917    0.59 | 8.000    9.95 |14.083    4.10 | 20.17    0.59
2.000    0.59 | 8.083    9.95 |14.167    4.10 | 20.25    0.59
2.083    0.59 | 8.167    9.95 |14.250    4.10 | 20.33    0.59
2.167    0.59 | 8.250    9.95 |14.333    2.34 | 20.42    0.59
2.250    0.59 | 8.333   26.91 |14.417    2.34 | 20.50    0.59
2.333    0.59 | 8.417   26.91 |14.500    2.34 | 20.58    0.59
2.417    0.59 | 8.500   26.91 |14.583    2.34 | 20.67    0.59
2.500    0.59 | 8.583   26.91 |14.667    2.34 | 20.75    0.59
2.583    0.59 | 8.667   26.91 |14.750    2.34 | 20.83    0.59
2.667    0.59 | 8.750   26.91 |14.833    2.34 | 20.92    0.59
2.750    0.59 | 8.833   26.91 |14.917    2.34 | 21.00    0.59
2.833    0.59 | 8.917   26.91 |15.000    2.34 | 21.08    0.59
2.917    0.59 | 9.000   26.91 |15.083    2.34 | 21.17    0.59
3.000    0.59 | 9.083   26.91 |15.167    2.34 | 21.25    0.59
3.083    0.59 | 9.167   26.91 |15.250    2.34 | 21.33    0.59
3.167    0.59 | 9.250   26.91 |15.333    2.34 | 21.42    0.59
3.250    0.59 | 9.333   26.91 |15.417    2.34 | 21.50    0.59
3.333    0.59 | 9.417   26.91 |15.500    2.34 | 21.58    0.59
3.417    0.59 | 9.500   26.91 |15.583    2.34 | 21.67    0.59
3.500    0.59 | 9.583   26.91 |15.667    2.34 | 21.75    0.59
3.583    0.59 | 9.667   26.91 |15.750    2.34 | 21.83    0.59
3.667    0.59 | 9.750   26.91 |15.833    2.34 | 21.92    0.59
3.750    0.59 | 9.833   26.91 |15.917    2.34 | 22.00    0.59
3.833    0.59 | 9.917   26.91 |16.000    2.34 | 22.08    0.59
```

3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 1.378

PEAK FLOW (cms)= 0.905 (i)
TIME TO PEAK (hrs)= 10.417
RUNOFF VOLUME (mm)= 52.555
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.449

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (1023)	Area (ha)= 301.00	Curve Number (CN)= 79.0	
ID= 1 DT= 5.0 min	Ia (mm)= 6.90	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 3.42		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 3.362

PEAK FLOW (cms)= 6.276 (i)
TIME TO PEAK (hrs)= 13.667
RUNOFF VOLUME (mm)= 68.315
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.583

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (1022)	Area (ha)= 36.26	
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00	Dir. Conn.(%)= 20.00

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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     10.88         25.38
     Dep. Storage     (mm)=      1.00          4.70
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    491.66         40.00
     Mannings n           =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    0.00 | 6.167    3.51 |12.250    7.61 | 18.33    0.59
     0.167    0.00 | 6.250    3.51 |12.333    4.10 | 18.42    0.59
     0.250    0.00 | 6.333    9.95 |12.417    4.10 | 18.50    0.59
     0.333    0.59 | 6.417    9.95 |12.500    4.10 | 18.58    0.59
     0.417    0.59 | 6.500    9.95 |12.583    4.10 | 18.67    0.59
     0.500    0.59 | 6.583    9.95 |12.667    4.10 | 18.75    0.59
     0.583    0.59 | 6.667    9.95 |12.750    4.10 | 18.83    0.59
     0.667    0.59 | 6.750    9.95 |12.833    4.10 | 18.92    0.59
     0.750    0.59 | 6.833    9.95 |12.917    4.10 | 19.00    0.59
     0.833    0.59 | 6.917    9.95 |13.000    4.10 | 19.08    0.59
     0.917    0.59 | 7.000    9.95 |13.083    4.10 | 19.17    0.59
     1.000    0.59 | 7.083    9.95 |13.167    4.10 | 19.25    0.59
     1.083    0.59 | 7.167    9.95 |13.250    4.10 | 19.33    0.59
     1.167    0.59 | 7.250    9.95 |13.333    4.10 | 19.42    0.59
     1.250    0.59 | 7.333    9.95 |13.417    4.10 | 19.50    0.59
     1.333    0.59 | 7.417    9.95 |13.500    4.10 | 19.58    0.59
     1.417    0.59 | 7.500    9.95 |13.583    4.10 | 19.67    0.59
     1.500    0.59 | 7.583    9.95 |13.667    4.10 | 19.75    0.59
     1.583    0.59 | 7.667    9.95 |13.750    4.10 | 19.83    0.59
     1.667    0.59 | 7.750    9.95 |13.833    4.10 | 19.92    0.59
     1.750    0.59 | 7.833    9.95 |13.917    4.10 | 20.00    0.59
     1.833    0.59 | 7.917    9.95 |14.000    4.10 | 20.08    0.59
     1.917    0.59 | 8.000    9.95 |14.083    4.10 | 20.17    0.59
     2.000    0.59 | 8.083    9.95 |14.167    4.10 | 20.25    0.59
     2.083    0.59 | 8.167    9.95 |14.250    4.10 | 20.33    0.59
     2.167    0.59 | 8.250    9.95 |14.333    2.34 | 20.42    0.59
     2.250    0.59 | 8.333   26.91 |14.417    2.34 | 20.50    0.59
     2.333    0.59 | 8.417   26.91 |14.500    2.34 | 20.58    0.59
     2.417    0.59 | 8.500   26.91 |14.583    2.34 | 20.67    0.59
     2.500    0.59 | 8.583   26.91 |14.667    2.34 | 20.75    0.59
     2.583    0.59 | 8.667   26.91 |14.750    2.34 | 20.83    0.59
     2.667    0.59 | 8.750   26.91 |14.833    2.34 | 20.92    0.59
     2.750    0.59 | 8.833   26.91 |14.917    2.34 | 21.00    0.59
     2.833    0.59 | 8.917   26.91 |15.000    2.34 | 21.08    0.59
     2.917    0.59 | 9.000   26.91 |15.083    2.34 | 21.17    0.59
     3.000    0.59 | 9.083   26.91 |15.167    2.34 | 21.25    0.59
     3.083    0.59 | 9.167   26.91 |15.250    2.34 | 21.33    0.59
     3.167    0.59 | 9.250   26.91 |15.333    2.34 | 21.42    0.59
     3.250    0.59 | 9.333   26.91 |15.417    2.34 | 21.50    0.59
     3.333    0.59 | 9.417   26.91 |15.500    2.34 | 21.58    0.59
     3.417    0.59 | 9.500   26.91 |15.583    2.34 | 21.67    0.59
     3.500    0.59 | 9.583   26.91 |15.667    2.34 | 21.75    0.59
     3.583    0.59 | 9.667   26.91 |15.750    2.34 | 21.83    0.59
     3.667    0.59 | 9.750   26.91 |15.833    2.34 | 21.92    0.59
     3.750    0.59 | 9.833   26.91 |15.917    2.34 | 22.00    0.59
     3.833    0.59 | 9.917   26.91 |16.000    2.34 | 22.08    0.59
     3.917    0.59 |10.000   26.91 |16.083    2.34 | 22.17    0.59
     4.000    0.59 |10.083   26.91 |16.167    2.34 | 22.25    0.59
     4.083    0.59 |10.167   26.91 |16.250    2.34 | 22.33    0.59
     4.167    0.59 |10.250   26.91 |16.333    1.17 | 22.42    0.59
     4.250    0.59 |10.333    7.61 |16.417    1.17 | 22.50    0.59
     4.333    3.51 |10.417    7.61 |16.500    1.17 | 22.58    0.59
     4.417    3.51 |10.500    7.61 |16.583    1.17 | 22.67    0.59
     4.500    3.51 |10.583    7.61 |16.667    1.17 | 22.75    0.59
     4.583    3.51 |10.667    7.61 |16.750    1.17 | 22.83    0.59
     4.667    3.51 |10.750    7.61 |16.833    1.17 | 22.92    0.59
     4.750    3.51 |10.833    7.61 |16.917    1.17 | 23.00    0.59
     4.833    3.51 |10.917    7.61 |17.000    1.17 | 23.08    0.59
     4.917    3.51 |11.000    7.61 |17.083    1.17 | 23.17    0.59
     5.000    3.51 |11.083    7.61 |17.167    1.17 | 23.25    0.59
     5.083    3.51 |11.167    7.61 |17.250    1.17 | 23.33    0.59
     5.167    3.51 |11.250    7.61 |17.333    1.17 | 23.42    0.59
     5.250    3.51 |11.333    7.61 |17.417    1.17 | 23.50    0.59
     5.333    3.51 |11.417    7.61 |17.500    1.17 | 23.58    0.59
     5.417    3.51 |11.500    7.61 |17.583    1.17 | 23.67    0.59
     5.500    3.51 |11.583    7.61 |17.667    1.17 | 23.75    0.59
     5.583    3.51 |11.667    7.61 |17.750    1.17 | 23.83    0.59
     5.667    3.51 |11.750    7.61 |17.833    1.17 | 23.92    0.59
     5.750    3.51 |11.833    7.61 |17.917    1.17 | 24.00    0.59
     5.833    3.51 |11.917    7.61 |18.000    1.17 | 24.08    0.59
     5.917    3.51 |12.000    7.61 |18.083    1.17 | 24.17    0.59
     6.000    3.51 |12.083    7.61 |18.167    1.17 | 24.25    0.59
     6.083    3.51 |12.167    7.61 |18.250    1.17 |

     Max.Eff.Inten.(mm/hr)=      26.91         24.03
               over (min)        10.00         25.00
     Storage Coeff.  (min)=      11.23 (ii)    23.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00         25.00
     Unit Hyd. peak  (cms)=       0.10          0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.54          1.58          2.121 (iii)
     TIME TO PEAK    (hrs)=      10.25         10.25          10.25
     RUNOFF VOLUME    (mm)=     116.08         71.15          80.14
     TOTAL RAINFALL   (mm)=     117.08        117.08         117.08
     RUNOFF COEFFICIENT   =       0.99          0.61           0.68

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1022):    36.26   2.121    10.25    80.14
     + ID2= 2 (  1023):   301.00   6.276    13.67    68.32
       ================================================
       ID = 3 (  0007):   337.26   6.647    13.58    69.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1021):    24.18   0.905    10.42    52.56
     + ID2= 2 (  0007):   337.26   6.647    13.58    69.59
       ================================================
       ID = 3 (  0008):   361.44   6.876    13.42    68.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------
| CALIB            |
| NASHYD   (  1011)|   Area    (ha)=  29.73   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.40   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.73
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NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 1.556

PEAK FLOW (cms)= 1.177 (i)
TIME TO PEAK (hrs)= 10.500
RUNOFF VOLUME (mm)= 57.129
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.488

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (1012)
ID= 1 DT= 5.0 min

Area (ha)= 44.83
Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.45	31.38
Dep. Storage	(mm)=	1.00	5.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	546.69	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59

2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Max.Eff.Inten.(mm/hr)=		26.91	23.15	
over (min)		10.00	25.00	
Storage Coeff. (min)=		11.97 (ii)	24.64 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.10	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.67	1.86	2.531 (iii)
TIME TO PEAK	(hrs)=	10.25	10.25	10.25
RUNOFF VOLUME	(mm)=	116.08	67.63	77.32
TOTAL RAINFALL	(mm)=	117.08	117.08	117.08
RUNOFF COEFFICIENT	=	0.99	0.58	0.66

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (1013)	Area (ha)=	40.97	
ID= 1 DT= 5.0 min	Total Imp(%)=	30.00	Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.29	28.68
Dep. Storage	(mm)=	1.00	4.70
Average Slope	(%)=	1.00	2.00
Length	(m)=	522.62	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59

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              4.833    3.51 |10.917    7.61 |17.000    1.17 | 23.08    0.59
              4.917    3.51 |11.000    7.61 |17.083    1.17 | 23.17    0.59
              5.000    3.51 |11.083    7.61 |17.167    1.17 | 23.25    0.59
              5.083    3.51 |11.167    7.61 |17.250    1.17 | 23.33    0.59
              5.167    3.51 |11.250    7.61 |17.333    1.17 | 23.42    0.59
              5.250    3.51 |11.333    7.61 |17.417    1.17 | 23.50    0.59
              5.333    3.51 |11.417    7.61 |17.500    1.17 | 23.58    0.59
              5.417    3.51 |11.500    7.61 |17.583    1.17 | 23.67    0.59
              5.500    3.51 |11.583    7.61 |17.667    1.17 | 23.75    0.59
              5.583    3.51 |11.667    7.61 |17.750    1.17 | 23.83    0.59
              5.667    3.51 |11.750    7.61 |17.833    1.17 | 23.92    0.59
              5.750    3.51 |11.833    7.61 |17.917    1.17 | 24.00    0.59
              5.833    3.51 |11.917    7.61 |18.000    1.17 | 24.08    0.59
              5.917    3.51 |12.000    7.61 |18.083    1.17 | 24.17    0.59
              6.000    3.51 |12.083    7.61 |18.167    1.17 | 24.25    0.59
              6.083    3.51 |12.167    7.61 |18.250    1.17 |

    Max.Eff.Inten.(mm/hr)=      26.91        24.03
                over (min)      10.00        25.00
    Storage Coeff.  (min)=      11.65 (ii)   24.13 (ii)
    Unit Hyd. Tpeak (min)=      10.00        25.00
    Unit Hyd. peak  (cms)=       0.10         0.05
                                                    *TOTALS*
    PEAK FLOW       (cms)=       0.61         1.78          2.394 (iii)
    TIME TO PEAK    (hrs)=      10.25        10.25          10.25
    RUNOFF VOLUME    (mm)=     116.08        71.15          80.14
    TOTAL RAINFALL   (mm)=     117.08       117.08         117.08
    RUNOFF COEFFICIENT   =       0.99         0.61           0.68

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  77.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1012):    44.83    2.531    10.25    77.32
     + ID2= 2 (  1013):    40.97    2.394    10.25    80.14
       ========================================================
       ID = 3 (  0009):    85.80    4.925    10.25    78.67

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73    1.177    10.50    57.13
     + ID2= 2 (  0009):    85.80    4.925    10.25    78.67
       ========================================================
       ID = 3 (  0010):   115.53    6.057    10.25    73.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
===============

      V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
        V V    I      SS   U   U  A   A  L

       VV     I    SSSSS  UUUUU  A   A  LLLLL

      OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
     O   O    T      T    H   H   Y Y   MM MM  O   O
     O   O    T      T    H   H    Y    M   M  O   O
      OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\dc639c61-26b2-4cef-8074-a85f66fe64bd\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\dc639c61-26b2-4cef-8074-a85f66fe64bd\scenar

DATE: 11-23-2023                          TIME: 01:37:29

USER:

COMMENTS: _____________________________________________________

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  ***********************************************
  ** SIMULATION : HAZEL                        **
  ***********************************************

--------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              3c114613-d427-41cb-bbe0-52817044461c\c71a5a96
| Ptotal=212.00 mm |    Comments: HAZEL
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                0.20    6.00 |  3.20   13.00 |  6.20   23.00 |  9.20   53.00
                0.40    6.00 |  3.40   13.00 |  6.40   23.00 |  9.40   53.00
                0.60    6.00 |  3.60   13.00 |  6.60   23.00 |  9.60   53.00
                0.80    6.00 |  3.80   13.00 |  6.80   23.00 |  9.80   53.00
                1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                1.20    4.00 |  4.20   17.00 |  7.20   13.00 | 10.20   38.00
                1.40    4.00 |  4.40   17.00 |  7.40   13.00 | 10.40   38.00
                1.60    4.00 |  4.60   17.00 |  7.60   13.00 | 10.60   38.00
                1.80    4.00 |  4.80   17.00 |  7.80   13.00 | 10.80   38.00
                2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00
                2.20    6.00 |  5.20   13.00 |  8.20   13.00 | 11.20   13.00
                2.40    6.00 |  5.40   13.00 |  8.40   13.00 | 11.40   13.00
                2.60    6.00 |  5.60   13.00 |  8.60   13.00 | 11.60   13.00
                2.80    6.00 |  5.80   13.00 |  8.80   13.00 | 11.80   13.00

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| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.67

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 1.378

PEAK FLOW (cms)= 2.268 (i)
TIME TO PEAK (hrs)= 10.667
RUNOFF VOLUME (mm)= 129.234
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.610

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (1023)	Area (ha)= 301.00 Curve Number (CN)= 79.0
ID= 1 DT= 5.0 min	Ia (mm)= 6.90 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 3.42

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 3.362

PEAK FLOW (cms)= 15.993 (i)
TIME TO PEAK (hrs)= 13.167
RUNOFF VOLUME (mm)= 154.303
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.728

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1022)	Area (ha)= 36.26
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.88	25.38
Dep. Storage	(mm)=	1.00	4.70
Average Slope	(%)=	1.00	2.00
Length	(m)=	491.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00

0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	55.00	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.56 (ii)	17.53 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	1.07	3.65	4.711 (iii)
TIME TO PEAK (hrs)=	10.00	10.08	10.00
RUNOFF VOLUME (mm)=	211.00	157.57	168.26
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.74	0.79

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 77.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0007)|	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1022):	36.26	4.711	10.00	168.26
+ ID2= 2 (1023):	301.00	15.993	13.17	154.30
ID = 3 (0007):	337.26	16.033	13.08	155.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0008)|	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1021):	24.18	2.268	10.67	129.23
+ ID2= 2 (0007):	337.26	16.033	13.08	155.80
ID = 3 (0008):	361.44	17.087	12.08	154.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (1011)\| Area (ha)= 29.73 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min \| Ia (mm)= 6.40 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.73

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 1.556

PEAK FLOW (cms)= 2.850 (i)
TIME TO PEAK (hrs)= 10.833
RUNOFF VOLUME (mm)= 136.646
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.645

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (1012)\| Area (ha)= 44.83
ID= 1 DT= 5.0 min \| Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

IMPERVIOUS PERVIOUS (i)

Surface Area	(ha)=	13.45	31.38
Dep. Storage	(mm)=	1.00	5.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	546.69	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=		53.00	54.05	
over (min)		10.00	20.00	
Storage Coeff. (min)=		9.13 (ii)	18.15 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.32	4.41	5.712 (iii)
TIME TO PEAK	(hrs)=	10.00	10.08	10.00
RUNOFF VOLUME	(mm)=	211.00	152.62	164.29
TOTAL RAINFALL	(mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT	=	1.00	0.72	0.77

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (1013) | Area (ha)= 40.97
ID= 1 DT= 5.0 min | Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.29	28.68
Dep. Storage	(mm)=	1.00	4.70
Average Slope	(%)=	1.00	2.00
Length	(m)=	522.62	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=		53.00	55.00	
over (min)		10.00	20.00	
Storage Coeff. (min)=		8.88 (ii)	17.85 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.20	4.12	5.312 (iii)
TIME TO PEAK	(hrs)=	10.00	10.08	10.00
RUNOFF VOLUME	(mm)=	211.00	157.57	168.26
TOTAL RAINFALL	(mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT	=	1.00	0.74	0.79

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1012):    44.83   5.712    10.00   164.29
      + ID2= 2 (  1013):    40.97   5.312    10.00   168.26
        ================================================
        ID = 3 (  0009):    85.80  11.025    10.00   166.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1011):    29.73   2.850    10.83   136.65
      + ID2= 2 (  0009):    85.80  11.025    10.00   166.19
        ================================================
        ID = 3 (  0010):   115.53  13.303    10.08   158.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0324e0e1-517c-4114-bc23-bc46990f439e\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0324e0e1-517c-4114-bc23-bc46990f439e\scenar


DATE: 01-12-2024                          TIME: 03:30:16

USER:


COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : AES_01hr_100yr                 **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              f2c8c8ca-da0f-47d8-9fa2-022ac01bdcfd\f85b1451
| Ptotal= 56.00 mm |    Comments: AES_01hr_100yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  0.33  100.80 |  0.67   53.76 |  1.00    6.72
                0.08    6.72 |  0.42  188.16 |  0.75   33.60 |
                0.17   20.16 |  0.50  100.80 |  0.83   20.16 |
                0.25   53.76 |  0.58   80.64 |  0.92    6.72 |

--------------------------------------------------------------------------------


--------------------
| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.67

     Unit Hyd Qpeak  (cms)=   1.378

     PEAK FLOW       (cms)=   0.724 (i)
     TIME TO PEAK    (hrs)=   1.250
     RUNOFF VOLUME    (mm)=  14.098
     TOTAL RAINFALL   (mm)=  56.000
     RUNOFF COEFFICIENT   =   0.252

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  1023)|   Area    (ha)= 301.00   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   3.42

     Unit Hyd Qpeak  (cms)=   3.362

     PEAK FLOW       (cms)=   2.731 (i)
     TIME TO PEAK    (hrs)=   4.000
     RUNOFF VOLUME    (mm)=  20.673
     TOTAL RAINFALL   (mm)=  56.000
     RUNOFF COEFFICIENT   =   0.369

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1022)|   Area    (ha)=  36.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.88         25.38
     Dep. Storage     (mm)=       1.00          4.70
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     491.66         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     188.16         72.46
                  over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.16 (ii)    13.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.21          0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=       2.94          3.02          4.568 (iii)
     TIME TO PEAK    (hrs)=       0.50          0.75           0.67
     RUNOFF VOLUME    (mm)=      55.00         22.76          29.21
     TOTAL RAINFALL   (mm)=      56.00         56.00          56.00
     RUNOFF COEFFICIENT   =       0.98          0.41           0.52

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1022):    36.26   4.568     0.67    29.21
     + ID2= 2 (  1023):   301.00   2.731     4.00    20.67
       ==========================================
       ID = 3 (  0007):   337.26   4.610     0.67    21.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1021):    24.18   0.724     1.25    14.10
     + ID2= 2 (  0007):   337.26   4.610     0.67    21.59
       ====================================================
       ID = 3 (  0008):   361.44   4.774     0.67    21.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  1011)|   Area    (ha)=  29.73   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.73

    Unit Hyd Qpeak  (cms)=   1.556

    PEAK FLOW       (cms)=   0.938 (i)
    TIME TO PEAK    (hrs)=   1.333
    RUNOFF VOLUME    (mm)=  16.043
    TOTAL RAINFALL   (mm)=  56.000
    RUNOFF COEFFICIENT   =   0.286

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1012)|   Area    (ha)=  44.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     13.45        31.38
    Dep. Storage     (mm)=      1.00         5.50
    Average Slope     (%)=      1.00         2.00
    Length            (m)=    546.69        40.00
    Mannings n           =     0.013        0.250

    Max.Eff.Inten.(mm/hr)=    188.16        66.12
              over (min)        5.00        15.00
    Storage Coeff.  (min)=      5.50 (ii)   13.83 (ii)
    Unit Hyd. Tpeak (min)=      5.00        15.00
    Unit Hyd. peak  (cms)=      0.20         0.08
                                                      *TOTALS*
    PEAK FLOW       (cms)=      3.55         3.38          5.268 (iii)
    TIME TO PEAK    (hrs)=      0.50         0.83           0.67
    RUNOFF VOLUME    (mm)=     55.00        20.92          27.73
    TOTAL RAINFALL   (mm)=     56.00        56.00          56.00
    RUNOFF COEFFICIENT   =      0.98         0.37           0.50

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1013)|   Area    (ha)=  40.97
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     12.29        28.68
    Dep. Storage     (mm)=      1.00         4.70
    Average Slope     (%)=      1.00         2.00
    Length            (m)=    522.62        40.00
    Mannings n           =     0.013        0.250

    Max.Eff.Inten.(mm/hr)=    188.16        72.46
              over (min)        5.00        15.00
    Storage Coeff.  (min)=      5.35 (ii)   13.38 (ii)
    Unit Hyd. Tpeak (min)=      5.00        15.00
    Unit Hyd. peak  (cms)=      0.21         0.08
                                                      *TOTALS*
    PEAK FLOW       (cms)=      3.27         3.38          5.146 (iii)
    TIME TO PEAK    (hrs)=      0.50         0.75           0.67
    RUNOFF VOLUME    (mm)=     55.00        22.76          29.21
    TOTAL RAINFALL   (mm)=     56.00        56.00          56.00
    RUNOFF COEFFICIENT   =      0.98         0.41           0.52

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1012):    44.83   5.268     0.67    27.73
     + ID2= 2 (  1013):    40.97   5.146     0.67    29.21
       ====================================================
       ID = 3 (  0009):    85.80  10.414     0.67    28.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73   0.938     1.33    16.04
     + ID2= 2 (  0009):    85.80  10.414     0.67    28.44
       ====================================================
       ID = 3 (  0010):   115.53  10.608     0.67    25.25

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================================================
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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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```

```
                *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\4f420cbb-8a79-4737-9562-ff847908e246\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\4f420cbb-8a79-4737-9562-ff847908e246\scenar


DATE: 01-12-2024                          TIME: 03:30:16

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : AES_06hr_100yr                **
  ************************************************


-------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              f2c8c8ca-da0f-47d8-9fa2-022ac01bdcfd\c5c40387
| Ptotal= 97.09 mm |    Comments: AES_06hr_100yr
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.75   33.01 |  3.50   13.59 |  5.25    1.94
                0.25    1.94 |  2.00   33.01 |  3.75    7.77 |  5.50    1.94
                0.50    1.94 |  2.25   89.33 |  4.00    7.77 |  5.75    1.94
                0.75    1.94 |  2.50   89.33 |  4.25    3.88 |  6.00    1.94
                1.00    1.94 |  2.75   25.25 |  4.50    3.88 |
                1.25   11.65 |  3.00   25.25 |  4.75    1.94 |
                1.50   11.65 |  3.25   13.59 |  5.00    1.94 |

--------------------------------------------------------------------------------


-------------------
| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.67

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
               0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
               0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
               0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
               0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
               0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
               0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
               0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
               0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
               0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
               0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
               1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
               1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
               1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
               1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
               1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
               1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
               1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
               1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Unit Hyd Qpeak  (cms)=   1.378

     PEAK FLOW       (cms)=   1.298 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  38.516
     TOTAL RAINFALL   (mm)=  97.090
     RUNOFF COEFFICIENT   =   0.397

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  1023)|   Area    (ha)= 301.00   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   3.42

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
               0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
               0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
               0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
               0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
               0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
               0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
               0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
               0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
               0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
               0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
               1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
               1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
               1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
               1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
               1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
               1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
               1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
               1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Unit Hyd Qpeak  (cms)=   3.362

     PEAK FLOW       (cms)=   6.407 (i)
     TIME TO PEAK    (hrs)=   6.417
     RUNOFF VOLUME    (mm)=  51.578
     TOTAL RAINFALL   (mm)=  97.090
     RUNOFF COEFFICIENT   =   0.531

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  1022)|   Area    (ha)=  36.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
-------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       10.88         25.38
     Dep. Storage     (mm)=        1.00          4.70
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      491.66         40.00
```

```
     Mannings n          =      0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
               0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
               0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
               0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
               0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
               0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
               0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
               0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
               0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
               0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
               0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
               1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
               1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
               1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
               1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
               1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
               1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
               1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
               1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Max.Eff.Inten.(mm/hr)=      89.33       72.61
                 over (min)        5.00       15.00
     Storage Coeff.  (min)=       6.95 (ii)  14.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00       15.00
     Unit Hyd. peak  (cms)=       0.17        0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.78        3.84        5.488 (iii)
     TIME TO PEAK    (hrs)=       2.75        2.83         2.75
     RUNOFF VOLUME    (mm)=      96.09       54.25        62.61
     TOTAL RAINFALL   (mm)=      97.09       97.09        97.09
     RUNOFF COEFFICIENT   =       0.99        0.56         0.64

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1022):    36.26   5.488     2.75    62.61
     + ID2= 2 (  1023):   301.00   6.407     6.42    51.58
       ====================================================
       ID = 3 (  0007):   337.26   6.556     6.25    52.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1021):    24.18   1.298     3.42    38.52
     + ID2= 2 (  0007):   337.26   6.556     6.25    52.76
       ====================================================
       ID = 3 (  0008):   361.44   6.676     6.25    51.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| CALIB            |
| NASHYD   (  1011)|   Area    (ha)=  29.73   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.40   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.73

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
               0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
               0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
               0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
               0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
               0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
               0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
               0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
               0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
               0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
               0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
               1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
               1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
               1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
               1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
               1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
               1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
               1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
               1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Unit Hyd Qpeak  (cms)=   1.556

     PEAK FLOW       (cms)=   1.669 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  42.300
     TOTAL RAINFALL   (mm)=  97.090
     RUNOFF COEFFICIENT   =   0.436

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| STANDHYD (  1012)|   Area    (ha)=  44.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
-------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      13.45        31.38
     Dep. Storage     (mm)=       1.00         5.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     546.69        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
               0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
               0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
               0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
               0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
```

```
               0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
               0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
               0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
               0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
               0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
               0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
               1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
               1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
               1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
               1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
               1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
               1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
               1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
               1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Max.Eff.Inten.(mm/hr)=      89.33        69.22
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      7.41 (ii)   15.58 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.17         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=      2.20         4.24          6.068 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.92           2.75
     RUNOFF VOLUME    (mm)=     96.09        51.18          60.17
     TOTAL RAINFALL   (mm)=     97.09        97.09          97.09
     RUNOFF COEFFICIENT   =      0.99         0.53           0.62

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB           |
| STANDHYD (  1013)|   Area    (ha)=  40.97
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     12.29        28.68
     Dep. Storage     (mm)=      1.00         4.70
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    522.62        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    0.00 | 1.667   11.65 | 3.250   25.25 |  4.83    1.94
     0.167    0.00 | 1.750   11.65 | 3.333   13.59 |  4.92    1.94
     0.250    0.00 | 1.833   33.01 | 3.417   13.59 |  5.00    1.94
     0.333    1.94 | 1.917   33.01 | 3.500   13.59 |  5.08    1.94
     0.417    1.94 | 2.000   33.01 | 3.583   13.59 |  5.17    1.94
     0.500    1.94 | 2.083   33.01 | 3.667   13.59 |  5.25    1.94
     0.583    1.94 | 2.167   33.01 | 3.750   13.59 |  5.33    1.94
     0.667    1.94 | 2.250   33.01 | 3.833    7.77 |  5.42    1.94
     0.750    1.94 | 2.333   89.33 | 3.917    7.77 |  5.50    1.94
     0.833    1.94 | 2.417   89.33 | 4.000    7.77 |  5.58    1.94
     0.917    1.94 | 2.500   89.33 | 4.083    7.77 |  5.67    1.94
     1.000    1.94 | 2.583   89.33 | 4.167    7.77 |  5.75    1.94
     1.083    1.94 | 2.667   89.33 | 4.250    7.77 |  5.83    1.94
     1.167    1.94 | 2.750   89.33 | 4.333    3.88 |  5.92    1.94
     1.250    1.94 | 2.833   25.25 | 4.417    3.88 |  6.00    1.94
     1.333   11.65 | 2.917   25.25 | 4.500    3.88 |  6.08    1.94
     1.417   11.65 | 3.000   25.25 | 4.583    3.88 |  6.17    1.94
     1.500   11.65 | 3.083   25.25 | 4.667    3.88 |  6.25    1.94
     1.583   11.65 | 3.167   25.25 | 4.750    3.88 |

     Max.Eff.Inten.(mm/hr)=      89.33        72.61
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      7.21 (ii)   15.23 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.17         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=      2.01         4.13          5.828 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.92           2.75
     RUNOFF VOLUME    (mm)=     96.09        54.25          62.61
     TOTAL RAINFALL   (mm)=     97.09        97.09          97.09
     RUNOFF COEFFICIENT   =      0.99         0.56           0.64

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1012):    44.83   6.068     2.75    60.17
     + ID2= 2 (  1013):    40.97   5.828     2.75    62.61
       ================================================
       ID = 3 (  0009):    85.80  11.897     2.75    61.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73   1.669     3.42    42.30
     + ID2= 2 (  0009):    85.80  11.897     2.75    61.33
       ================================================
       ID = 3 (  0010):   115.53  12.626     2.75    56.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                ***** D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\c3e1b4a9-7990-476e-aa57-b30409995f04\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\c3e1b4a9-7990-476e-aa57-b30409995f04\scenar


DATE: 01-12-2024                          TIME: 03:30:16

USER:


COMMENTS: _____________________________________________________________


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  ************************************************
  ** SIMULATION : AES_12hr_100yr                **
  ************************************************


-------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              f2c8c8ca-da0f-47d8-9fa2-022ac01bdcfd\cd66fe4c
| Ptotal=105.29 mm |    Comments: AES_12hr_100yr
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  3.25   17.90 |  6.50    7.37 |  9.75    1.05
                0.25    1.05 |  3.50   17.90 |  6.75    7.37 | 10.00    1.05
                0.50    1.05 |  3.75   17.90 |  7.00    7.37 | 10.25    1.05
                0.75    1.05 |  4.00   17.90 |  7.25    4.21 | 10.50    1.05
                1.00    1.05 |  4.25   48.44 |  7.50    4.21 | 10.75    1.05
                1.25    1.05 |  4.50   48.44 |  7.75    4.21 | 11.00    1.05
                1.50    1.05 |  4.75   48.44 |  8.00    4.21 | 11.25    1.05
                1.75    1.05 |  5.00   48.44 |  8.25    2.11 | 11.50    1.05
                2.00    1.05 |  5.25   13.69 |  8.50    2.11 | 11.75    1.05
                2.25    6.32 |  5.50   13.69 |  8.75    2.11 | 12.00    1.05
                2.50    6.32 |  5.75   13.69 |  9.00    2.11 |
                2.75    6.32 |  6.00   13.69 |  9.25    1.05 |
                3.00    6.32 |  6.25    7.37 |  9.50    1.05 |

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-------------------
| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.67

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    6.32 | 6.250   13.69 |  9.33    1.05
               0.167    0.00 | 3.250    6.32 | 6.333    7.37 |  9.42    1.05
               0.250    0.00 | 3.333   17.90 | 6.417    7.37 |  9.50    1.05
               0.333    1.05 | 3.417   17.90 | 6.500    7.37 |  9.58    1.05
               0.417    1.05 | 3.500   17.90 | 6.583    7.37 |  9.67    1.05
               0.500    1.05 | 3.583   17.90 | 6.667    7.37 |  9.75    1.05
               0.583    1.05 | 3.667   17.90 | 6.750    7.37 |  9.83    1.05
               0.667    1.05 | 3.750   17.90 | 6.833    7.37 |  9.92    1.05
               0.750    1.05 | 3.833   17.90 | 6.917    7.37 | 10.00    1.05
               0.833    1.05 | 3.917   17.90 | 7.000    7.37 | 10.08    1.05
               0.917    1.05 | 4.000   17.90 | 7.083    7.37 | 10.17    1.05
               1.000    1.05 | 4.083   17.90 | 7.167    7.37 | 10.25    1.05
               1.083    1.05 | 4.167   17.90 | 7.250    7.37 | 10.33    1.05
               1.167    1.05 | 4.250   17.90 | 7.333    4.21 | 10.42    1.05
               1.250    1.05 | 4.333   48.44 | 7.417    4.21 | 10.50    1.05
               1.333    1.05 | 4.417   48.44 | 7.500    4.21 | 10.58    1.05
               1.417    1.05 | 4.500   48.44 | 7.583    4.21 | 10.67    1.05
               1.500    1.05 | 4.583   48.44 | 7.667    4.21 | 10.75    1.05
               1.583    1.05 | 4.667   48.44 | 7.750    4.21 | 10.83    1.05
               1.667    1.05 | 4.750   48.44 | 7.833    4.21 | 10.92    1.05
               1.750    1.05 | 4.833   48.44 | 7.917    4.21 | 11.00    1.05
               1.833    1.05 | 4.917   48.44 | 8.000    4.21 | 11.08    1.05
               1.917    1.05 | 5.000   48.44 | 8.083    4.21 | 11.17    1.05
               2.000    1.05 | 5.083   48.44 | 8.167    4.21 | 11.25    1.05
               2.083    1.05 | 5.167   48.44 | 8.250    4.21 | 11.33    1.05
               2.167    1.05 | 5.250   48.44 | 8.333    2.11 | 11.42    1.05
               2.250    1.05 | 5.333   13.69 | 8.417    2.11 | 11.50    1.05
               2.333    6.32 | 5.417   13.69 | 8.500    2.11 | 11.58    1.05
               2.417    6.32 | 5.500   13.69 | 8.583    2.11 | 11.67    1.05
               2.500    6.32 | 5.583   13.69 | 8.667    2.11 | 11.75    1.05
               2.583    6.32 | 5.667   13.69 | 8.750    2.11 | 11.83    1.05
               2.667    6.32 | 5.750   13.69 | 8.833    2.11 | 11.92    1.05
               2.750    6.32 | 5.833   13.69 | 8.917    2.11 | 12.00    1.05
               2.833    6.32 | 5.917   13.69 | 9.000    2.11 | 12.08    1.05
               2.917    6.32 | 6.000   13.69 | 9.083    2.11 | 12.17    1.05
               3.000    6.32 | 6.083   13.69 | 9.167    2.11 | 12.25    1.05
               3.083    6.32 | 6.167   13.69 | 9.250    2.11 |

     Unit Hyd Qpeak  (cms)=   1.378

     PEAK FLOW       (cms)=   1.116 (i)
     TIME TO PEAK    (hrs)=   5.667
     RUNOFF VOLUME    (mm)=  44.142
     TOTAL RAINFALL   (mm)= 105.290
     RUNOFF COEFFICIENT   =   0.419

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB            |
| NASHYD   (  1023)|   Area    (ha)= 301.00   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   3.42

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    6.32 | 6.250   13.69 |  9.33    1.05
               0.167    0.00 | 3.250    6.32 | 6.333    7.37 |  9.42    1.05
               0.250    0.00 | 3.333   17.90 | 6.417    7.37 |  9.50    1.05
               0.333    1.05 | 3.417   17.90 | 6.500    7.37 |  9.58    1.05
               0.417    1.05 | 3.500   17.90 | 6.583    7.37 |  9.67    1.05
               0.500    1.05 | 3.583   17.90 | 6.667    7.37 |  9.75    1.05
               0.583    1.05 | 3.667   17.90 | 6.750    7.37 |  9.83    1.05
               0.667    1.05 | 3.750   17.90 | 6.833    7.37 |  9.92    1.05
               0.750    1.05 | 3.833   17.90 | 6.917    7.37 | 10.00    1.05
               0.833    1.05 | 3.917   17.90 | 7.000    7.37 | 10.08    1.05
               0.917    1.05 | 4.000   17.90 | 7.083    7.37 | 10.17    1.05
               1.000    1.05 | 4.083   17.90 | 7.167    7.37 | 10.25    1.05
               1.083    1.05 | 4.167   17.90 | 7.250    7.37 | 10.33    1.05
               1.167    1.05 | 4.250   17.90 | 7.333    4.21 | 10.42    1.05
               1.250    1.05 | 4.333   48.44 | 7.417    4.21 | 10.50    1.05
               1.333    1.05 | 4.417   48.44 | 7.500    4.21 | 10.58    1.05
               1.417    1.05 | 4.500   48.44 | 7.583    4.21 | 10.67    1.05
```

1.500	1.05	4.583	48.44	7.667	4.21	10.75	1.05
1.583	1.05	4.667	48.44	7.750	4.21	10.83	1.05
1.667	1.05	4.750	48.44	7.833	4.21	10.92	1.05
1.750	1.05	4.833	48.44	7.917	4.21	11.00	1.05
1.833	1.05	4.917	48.44	8.000	4.21	11.08	1.05
1.917	1.05	5.000	48.44	8.083	4.21	11.17	1.05
2.000	1.05	5.083	48.44	8.167	4.21	11.25	1.05
2.083	1.05	5.167	48.44	8.250	4.21	11.33	1.05
2.167	1.05	5.250	48.44	8.333	2.11	11.42	1.05
2.250	1.05	5.333	13.69	8.417	2.11	11.50	1.05
2.333	6.32	5.417	13.69	8.500	2.11	11.58	1.05
2.417	6.32	5.500	13.69	8.583	2.11	11.67	1.05
2.500	6.32	5.583	13.69	8.667	2.11	11.75	1.05
2.583	6.32	5.667	13.69	8.750	2.11	11.83	1.05
2.667	6.32	5.750	13.69	8.833	2.11	11.92	1.05
2.750	6.32	5.833	13.69	8.917	2.11	12.00	1.05
2.833	6.32	5.917	13.69	9.000	2.11	12.08	1.05
2.917	6.32	6.000	13.69	9.083	2.11	12.17	1.05
3.000	6.32	6.083	13.69	9.167	2.11	12.25	1.05
3.083	6.32	6.167	13.69	9.250	2.11		

Unit Hyd Qpeak (cms)= 3.362

PEAK FLOW (cms)= 6.494 (i)
TIME TO PEAK (hrs)= 9.000
RUNOFF VOLUME (mm)= 58.349
TOTAL RAINFALL (mm)= 105.290
RUNOFF COEFFICIENT = 0.554

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (1022)	Area (ha)= 36.26		
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00	Dir. Conn.(%)= 20.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.88	25.38
Dep. Storage	(mm)=	1.00	4.70
Average Slope	(%)=	1.00	2.00
Length	(m)=	491.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	6.32	6.250	13.69	9.33	1.05
0.167	0.00	3.250	6.32	6.333	7.37	9.42	1.05
0.250	0.00	3.333	17.90	6.417	7.37	9.50	1.05
0.333	1.05	3.417	17.90	6.500	7.37	9.58	1.05
0.417	1.05	3.500	17.90	6.583	7.37	9.67	1.05
0.500	1.05	3.583	17.90	6.667	7.37	9.75	1.05
0.583	1.05	3.667	17.90	6.750	7.37	9.83	1.05
0.667	1.05	3.750	17.90	6.833	7.37	9.92	1.05
0.750	1.05	3.833	17.90	6.917	7.37	10.00	1.05
0.833	1.05	3.917	17.90	7.000	7.37	10.08	1.05
0.917	1.05	4.000	17.90	7.083	7.37	10.17	1.05
1.000	1.05	4.083	17.90	7.167	7.37	10.25	1.05
1.083	1.05	4.167	17.90	7.250	7.37	10.33	1.05
1.167	1.05	4.250	17.90	7.333	4.21	10.42	1.05
1.250	1.05	4.333	48.44	7.417	4.21	10.50	1.05
1.333	1.05	4.417	48.44	7.500	4.21	10.58	1.05
1.417	1.05	4.500	48.44	7.583	4.21	10.67	1.05
1.500	1.05	4.583	48.44	7.667	4.21	10.75	1.05
1.583	1.05	4.667	48.44	7.750	4.21	10.83	1.05
1.667	1.05	4.750	48.44	7.833	4.21	10.92	1.05
1.750	1.05	4.833	48.44	7.917	4.21	11.00	1.05
1.833	1.05	4.917	48.44	8.000	4.21	11.08	1.05
1.917	1.05	5.000	48.44	8.083	4.21	11.17	1.05
2.000	1.05	5.083	48.44	8.167	4.21	11.25	1.05
2.083	1.05	5.167	48.44	8.250	4.21	11.33	1.05
2.167	1.05	5.250	48.44	8.333	2.11	11.42	1.05
2.250	1.05	5.333	13.69	8.417	2.11	11.50	1.05
2.333	6.32	5.417	13.69	8.500	2.11	11.58	1.05
2.417	6.32	5.500	13.69	8.583	2.11	11.67	1.05
2.500	6.32	5.583	13.69	8.667	2.11	11.75	1.05
2.583	6.32	5.667	13.69	8.750	2.11	11.83	1.05
2.667	6.32	5.750	13.69	8.833	2.11	11.92	1.05
2.750	6.32	5.833	13.69	8.917	2.11	12.00	1.05
2.833	6.32	5.917	13.69	9.000	2.11	12.08	1.05
2.917	6.32	6.000	13.69	9.083	2.11	12.17	1.05
3.000	6.32	6.083	13.69	9.167	2.11	12.25	1.05
3.083	6.32	6.167	13.69	9.250	2.11		

			TOTALS
Max.Eff.Inten.(mm/hr)=	48.44	41.11	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.88 (ii)	18.95 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
PEAK FLOW (cms)=	0.97	2.49	3.457 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	104.29	61.09	69.73
TOTAL RAINFALL (mm)=	105.29	105.29	105.29
RUNOFF COEFFICIENT =	0.99	0.58	0.66

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 77.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0007)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1022):	36.26	3.457	5.25	69.73
+ ID2= 2 (1023):	301.00	6.494	9.00	58.35
ID = 3 (0007):	337.26	6.707	8.83	59.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0008)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1021):	24.18	1.116	5.67	44.14
+ ID2= 2 (0007):	337.26	6.707	8.83	59.57
ID = 3 (0008):	361.44	6.929	8.42	58.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (1011)	Area (ha)= 29.73	Curve Number (CN)= 71.0	
ID= 1 DT= 5.0 min	Ia (mm)= 6.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.73		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	6.32	6.250	13.69	9.33	1.05
0.167	0.00	3.250	6.32	6.333	7.37	9.42	1.05
0.250	0.00	3.333	17.90	6.417	7.37	9.50	1.05
0.333	1.05	3.417	17.90	6.500	7.37	9.58	1.05
0.417	1.05	3.500	17.90	6.583	7.37	9.67	1.05
0.500	1.05	3.583	17.90	6.667	7.37	9.75	1.05
0.583	1.05	3.667	17.90	6.750	7.37	9.83	1.05
0.667	1.05	3.750	17.90	6.833	7.37	9.92	1.05
0.750	1.05	3.833	17.90	6.917	7.37	10.00	1.05
0.833	1.05	3.917	17.90	7.000	7.37	10.08	1.05
0.917	1.05	4.000	17.90	7.083	7.37	10.17	1.05
1.000	1.05	4.083	17.90	7.167	7.37	10.25	1.05
1.083	1.05	4.167	17.90	7.250	7.37	10.33	1.05
1.167	1.05	4.250	17.90	7.333	4.21	10.42	1.05
1.250	1.05	4.333	48.44	7.417	4.21	10.50	1.05
1.333	1.05	4.417	48.44	7.500	4.21	10.58	1.05
1.417	1.05	4.500	48.44	7.583	4.21	10.67	1.05
1.500	1.05	4.583	48.44	7.667	4.21	10.75	1.05
1.583	1.05	4.667	48.44	7.750	4.21	10.83	1.05
1.667	1.05	4.750	48.44	7.833	4.21	10.92	1.05
1.750	1.05	4.833	48.44	7.917	4.21	11.00	1.05
1.833	1.05	4.917	48.44	8.000	4.21	11.08	1.05
1.917	1.05	5.000	48.44	8.083	4.21	11.17	1.05
2.000	1.05	5.083	48.44	8.167	4.21	11.25	1.05
2.083	1.05	5.167	48.44	8.250	4.21	11.33	1.05
2.167	1.05	5.250	48.44	8.333	2.11	11.42	1.05
2.250	1.05	5.333	13.69	8.417	2.11	11.50	1.05
2.333	6.32	5.417	13.69	8.500	2.11	11.58	1.05
2.417	6.32	5.500	13.69	8.583	2.11	11.67	1.05
2.500	6.32	5.583	13.69	8.667	2.11	11.75	1.05
2.583	6.32	5.667	13.69	8.750	2.11	11.83	1.05
2.667	6.32	5.750	13.69	8.833	2.11	11.92	1.05
2.750	6.32	5.833	13.69	8.917	2.11	12.00	1.05
2.833	6.32	5.917	13.69	9.000	2.11	12.08	1.05
2.917	6.32	6.000	13.69	9.083	2.11	12.17	1.05
3.000	6.32	6.083	13.69	9.167	2.11	12.25	1.05
3.083	6.32	6.167	13.69	9.250	2.11		

Unit Hyd Qpeak (cms)= 1.556

PEAK FLOW (cms)= 1.439 (i)
TIME TO PEAK (hrs)= 5.667
RUNOFF VOLUME (mm)= 48.259
TOTAL RAINFALL (mm)= 105.290
RUNOFF COEFFICIENT = 0.458

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1012)	Area (ha)= 44.83
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.45	31.38
Dep. Storage	(mm)=	1.00	5.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	546.69	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	6.32	6.250	13.69	9.33	1.05
0.167	0.00	3.250	6.32	6.333	7.37	9.42	1.05
0.250	0.00	3.333	17.90	6.417	7.37	9.50	1.05
0.333	1.05	3.417	17.90	6.500	7.37	9.58	1.05
0.417	1.05	3.500	17.90	6.583	7.37	9.67	1.05
0.500	1.05	3.583	17.90	6.667	7.37	9.75	1.05
0.583	1.05	3.667	17.90	6.750	7.37	9.83	1.05
0.667	1.05	3.750	17.90	6.833	7.37	9.92	1.05
0.750	1.05	3.833	17.90	6.917	7.37	10.00	1.05
0.833	1.05	3.917	17.90	7.000	7.37	10.08	1.05
0.917	1.05	4.000	17.90	7.083	7.37	10.17	1.05
1.000	1.05	4.083	17.90	7.167	7.37	10.25	1.05
1.083	1.05	4.167	17.90	7.250	7.37	10.33	1.05
1.167	1.05	4.250	17.90	7.333	4.21	10.42	1.05
1.250	1.05	4.333	48.44	7.417	4.21	10.50	1.05
1.333	1.05	4.417	48.44	7.500	4.21	10.58	1.05
1.417	1.05	4.500	48.44	7.583	4.21	10.67	1.05
1.500	1.05	4.583	48.44	7.667	4.21	10.75	1.05
1.583	1.05	4.667	48.44	7.750	4.21	10.83	1.05
1.667	1.05	4.750	48.44	7.833	4.21	10.92	1.05
1.750	1.05	4.833	48.44	7.917	4.21	11.00	1.05
1.833	1.05	4.917	48.44	8.000	4.21	11.08	1.05
1.917	1.05	5.000	48.44	8.083	4.21	11.17	1.05
2.000	1.05	5.083	48.44	8.167	4.21	11.25	1.05
2.083	1.05	5.167	48.44	8.250	4.21	11.33	1.05
2.167	1.05	5.250	48.44	8.333	2.11	11.42	1.05
2.250	1.05	5.333	13.69	8.417	2.11	11.50	1.05
2.333	6.32	5.417	13.69	8.500	2.11	11.58	1.05
2.417	6.32	5.500	13.69	8.583	2.11	11.67	1.05
2.500	6.32	5.583	13.69	8.667	2.11	11.75	1.05
2.583	6.32	5.667	13.69	8.750	2.11	11.83	1.05
2.667	6.32	5.750	13.69	8.833	2.11	11.92	1.05
2.750	6.32	5.833	13.69	8.917	2.11	12.00	1.05
2.833	6.32	5.917	13.69	9.000	2.11	12.08	1.05
2.917	6.32	6.000	13.69	9.083	2.11	12.17	1.05
3.000	6.32	6.083	13.69	9.167	2.11	12.25	1.05
3.083	6.32	6.167	13.69	9.250	2.11		

Max.Eff.Inten.(mm/hr)=	48.44	39.37		
over (min)	10.00	20.00		
Storage Coeff. (min)=	9.46 (ii)	19.71 (ii)		
Unit Hyd. Tpeak (min)=	10.00	20.00		
Unit Hyd. peak (cms)=	0.12	0.06		
			TOTALS	
PEAK FLOW (cms)=	1.20	2.90	4.087 (iii)	
TIME TO PEAK (hrs)=	5.25	5.33	5.25	
RUNOFF VOLUME (mm)=	104.29	57.83	67.13	
TOTAL RAINFALL (mm)=	105.29	105.29	105.29	
RUNOFF COEFFICIENT =	0.99	0.55	0.64	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1013)	Area (ha)= 40.97
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.29	28.68

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Dep. Storage     (mm)=       1.00         4.70
Average Slope     (%)=       1.00         2.00
Length            (m)=     522.62        40.00
Mannings n           =      0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.083    0.00 | 3.167    6.32 | 6.250   13.69 |  9.33    1.05
0.167    0.00 | 3.250    6.32 | 6.333    7.37 |  9.42    1.05
0.250    0.00 | 3.333   17.90 | 6.417    7.37 |  9.50    1.05
0.333    1.05 | 3.417   17.90 | 6.500    7.37 |  9.58    1.05
0.417    1.05 | 3.500   17.90 | 6.583    7.37 |  9.67    1.05
0.500    1.05 | 3.583   17.90 | 6.667    7.37 |  9.75    1.05
0.583    1.05 | 3.667   17.90 | 6.750    7.37 |  9.83    1.05
0.667    1.05 | 3.750   17.90 | 6.833    7.37 |  9.92    1.05
0.750    1.05 | 3.833   17.90 | 6.917    7.37 | 10.00    1.05
0.833    1.05 | 3.917   17.90 | 7.000    7.37 | 10.08    1.05
0.917    1.05 | 4.000   17.90 | 7.083    7.37 | 10.17    1.05
1.000    1.05 | 4.083   17.90 | 7.167    7.37 | 10.25    1.05
1.083    1.05 | 4.167   17.90 | 7.250    7.37 | 10.33    1.05
1.167    1.05 | 4.250   17.90 | 7.333    4.21 | 10.42    1.05
1.250    1.05 | 4.333   48.44 | 7.417    4.21 | 10.50    1.05
1.333    1.05 | 4.417   48.44 | 7.500    4.21 | 10.58    1.05
1.417    1.05 | 4.500   48.44 | 7.583    4.21 | 10.67    1.05
1.500    1.05 | 4.583   48.44 | 7.667    4.21 | 10.75    1.05
1.583    1.05 | 4.667   48.44 | 7.750    4.21 | 10.83    1.05
1.667    1.05 | 4.750   48.44 | 7.833    4.21 | 10.92    1.05
1.750    1.05 | 4.833   48.44 | 7.917    4.21 | 11.00    1.05
1.833    1.05 | 4.917   48.44 | 8.000    4.21 | 11.08    1.05
1.917    1.05 | 5.000   48.44 | 8.083    4.21 | 11.17    1.05
2.000    1.05 | 5.083   48.44 | 8.167    4.21 | 11.25    1.05
2.083    1.05 | 5.167   48.44 | 8.250    4.21 | 11.33    1.05
2.167    1.05 | 5.250   48.44 | 8.333    2.11 | 11.42    1.05
2.250    1.05 | 5.333   13.69 | 8.417    2.11 | 11.50    1.05
2.333    6.32 | 5.417   13.69 | 8.500    2.11 | 11.58    1.05
2.417    6.32 | 5.500   13.69 | 8.583    2.11 | 11.67    1.05
2.500    6.32 | 5.583   13.69 | 8.667    2.11 | 11.75    1.05
2.583    6.32 | 5.667   13.69 | 8.750    2.11 | 11.83    1.05
2.667    6.32 | 5.750   13.69 | 8.833    2.11 | 11.92    1.05
2.750    6.32 | 5.833   13.69 | 8.917    2.11 | 12.00    1.05
2.833    6.32 | 5.917   13.69 | 9.000    2.11 | 12.08    1.05
2.917    6.32 | 6.000   13.69 | 9.083    2.11 | 12.17    1.05
3.000    6.32 | 6.083   13.69 | 9.167    2.11 | 12.25    1.05
3.083    6.32 | 6.167   13.69 | 9.250    2.11 |

Max.Eff.Inten.(mm/hr)=      48.44        41.11
          over (min)        10.00        20.00
Storage Coeff.  (min)=       9.21 (ii)   19.28 (ii)
Unit Hyd. Tpeak (min)=      10.00        20.00
Unit Hyd. peak  (cms)=       0.12         0.06
                                          *TOTALS*
PEAK FLOW       (cms)=       1.10         2.80          3.895 (iii)
TIME TO PEAK    (hrs)=       5.25         5.33           5.25
RUNOFF VOLUME    (mm)=     104.29        61.09          69.73
TOTAL RAINFALL   (mm)=     105.29       105.29         105.29
RUNOFF COEFFICIENT   =       0.99         0.58           0.66

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  77.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1012):    44.83   4.087     5.25    67.13
     + ID2= 2 (  1013):    40.97   3.895     5.25    69.73
       ================================================
       ID = 3 (  0009):    85.80   7.982     5.25    68.37

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73   1.439     5.67    48.26
     + ID2= 2 (  0009):    85.80   7.982     5.25    68.37
       ================================================
       ID = 3 (  0010):   115.53   9.101     5.25    63.19

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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==========================================================================================
==============

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                 *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0849c88f-221a-4209-a887-6ab4a966a5a0\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\0849c88f-221a-4209-a887-6ab4a966a5a0\scenar


DATE: 01-12-2024                          TIME: 03:30:16

USER:



COMMENTS: _____________________________________________________

------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : AES_24hr_100yr                **
  ***********************************************


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```

READ STORM	Filename: C:\Users\pyung\AppD ata\Local\Temp\ f2c8c8ca-da0f-47d8-9fa2-022ac01bdcfd\c0795392
Ptotal=117.08 mm	Comments: AES_24hr_100yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	9.95	12.50	4.10	18.75	0.59
0.25	0.59	6.50	9.95	12.75	4.10	19.00	0.59
0.50	0.59	6.75	9.95	13.00	4.10	19.25	0.59
0.75	0.59	7.00	9.95	13.25	4.10	19.50	0.59
1.00	0.59	7.25	9.95	13.50	4.10	19.75	0.59
1.25	0.59	7.50	9.95	13.75	4.10	20.00	0.59
1.50	0.59	7.75	9.95	14.00	4.10	20.25	0.59
1.75	0.59	8.00	9.95	14.25	2.34	20.50	0.59
2.00	0.59	8.25	26.91	14.50	2.34	20.75	0.59
2.25	0.59	8.50	26.91	14.75	2.34	21.00	0.59
2.50	0.59	8.75	26.91	15.00	2.34	21.25	0.59
2.75	0.59	9.00	26.91	15.25	2.34	21.50	0.59
3.00	0.59	9.25	26.91	15.50	2.34	21.75	0.59
3.25	0.59	9.50	26.91	15.75	2.34	22.00	0.59
3.50	0.59	9.75	26.91	16.00	2.34	22.25	0.59
3.75	0.59	10.00	26.91	16.25	1.17	22.50	0.59
4.00	0.59	10.25	7.61	16.50	1.17	22.75	0.59
4.25	3.51	10.50	7.61	16.75	1.17	23.00	0.59
4.50	3.51	10.75	7.61	17.00	1.17	23.25	0.59
4.75	3.51	11.00	7.61	17.25	1.17	23.50	0.59
5.00	3.51	11.25	7.61	17.50	1.17	23.75	0.59
5.25	3.51	11.50	7.61	17.75	1.17	24.00	0.59
5.50	3.51	11.75	7.61	18.00	1.17		
5.75	3.51	12.00	7.61	18.25	0.59		
6.00	3.51	12.25	4.10	18.50	0.59		

CALIB	
NASHYD (1021)	Area (ha)= 24.18 Curve Number (CN)= 68.0
ID= 1 DT= 5.0 min	Ia (mm)= 7.30 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.67

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 1.378

PEAK FLOW (cms)= 0.905 (i)
TIME TO PEAK (hrs)= 10.417
RUNOFF VOLUME (mm)= 52.555
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.449

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (1023)	Area (ha)= 301.00 Curve Number (CN)= 79.0
ID= 1 DT= 5.0 min	Ia (mm)= 6.90 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 3.42

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 3.362

PEAK FLOW (cms)= 6.276 (i)
TIME TO PEAK (hrs)= 13.667
RUNOFF VOLUME (mm)= 68.315
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.583

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (1022)
ID= 1 DT= 5.0 min

Area (ha)= 36.26
Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.88	25.38
Dep. Storage	(mm)=	1.00	4.70
Average Slope	(%)=	1.00	2.00
Length	(m)=	491.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59

2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

			TOTALS
Max.Eff.Inten.(mm/hr)=	26.91	24.03	
over (min)	10.00	25.00	
Storage Coeff. (min)=	11.23 (ii)	23.71 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.10	0.05	
PEAK FLOW (cms)=	0.54	1.58	2.121 (iii)
TIME TO PEAK (hrs)=	10.25	10.25	10.25
RUNOFF VOLUME (mm)=	116.08	71.15	80.14
TOTAL RAINFALL (mm)=	117.08	117.08	117.08
RUNOFF COEFFICIENT =	0.99	0.61	0.68

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 77.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0007)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1022):	36.26	2.121	10.25	80.14
+ ID2= 2 (1023):	301.00	6.276	13.67	68.32
ID = 3 (0007):	337.26	6.647	13.58	69.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0008)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1021):	24.18	0.905	10.42	52.56
+ ID2= 2 (0007):	337.26	6.647	13.58	69.59
ID = 3 (0008):	361.44	6.876	13.42	68.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (1011) | Area (ha)= 29.73 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min | Ia (mm)= 6.40 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.73

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59

3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Unit Hyd Qpeak (cms)= 1.556

PEAK FLOW (cms)= 1.177 (i)
TIME TO PEAK (hrs)= 10.500
RUNOFF VOLUME (mm)= 57.129
TOTAL RAINFALL (mm)= 117.080
RUNOFF COEFFICIENT = 0.488

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1012)	Area (ha)= 44.83
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.45	31.38
Dep. Storage	(mm)=	1.00	5.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	546.69	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	3.51	12.250	7.61	18.33	0.59
0.167	0.00	6.250	3.51	12.333	4.10	18.42	0.59
0.250	0.00	6.333	9.95	12.417	4.10	18.50	0.59
0.333	0.59	6.417	9.95	12.500	4.10	18.58	0.59
0.417	0.59	6.500	9.95	12.583	4.10	18.67	0.59
0.500	0.59	6.583	9.95	12.667	4.10	18.75	0.59
0.583	0.59	6.667	9.95	12.750	4.10	18.83	0.59
0.667	0.59	6.750	9.95	12.833	4.10	18.92	0.59
0.750	0.59	6.833	9.95	12.917	4.10	19.00	0.59
0.833	0.59	6.917	9.95	13.000	4.10	19.08	0.59
0.917	0.59	7.000	9.95	13.083	4.10	19.17	0.59
1.000	0.59	7.083	9.95	13.167	4.10	19.25	0.59
1.083	0.59	7.167	9.95	13.250	4.10	19.33	0.59
1.167	0.59	7.250	9.95	13.333	4.10	19.42	0.59
1.250	0.59	7.333	9.95	13.417	4.10	19.50	0.59
1.333	0.59	7.417	9.95	13.500	4.10	19.58	0.59
1.417	0.59	7.500	9.95	13.583	4.10	19.67	0.59
1.500	0.59	7.583	9.95	13.667	4.10	19.75	0.59
1.583	0.59	7.667	9.95	13.750	4.10	19.83	0.59
1.667	0.59	7.750	9.95	13.833	4.10	19.92	0.59
1.750	0.59	7.833	9.95	13.917	4.10	20.00	0.59
1.833	0.59	7.917	9.95	14.000	4.10	20.08	0.59
1.917	0.59	8.000	9.95	14.083	4.10	20.17	0.59
2.000	0.59	8.083	9.95	14.167	4.10	20.25	0.59
2.083	0.59	8.167	9.95	14.250	4.10	20.33	0.59
2.167	0.59	8.250	9.95	14.333	2.34	20.42	0.59
2.250	0.59	8.333	26.91	14.417	2.34	20.50	0.59
2.333	0.59	8.417	26.91	14.500	2.34	20.58	0.59
2.417	0.59	8.500	26.91	14.583	2.34	20.67	0.59
2.500	0.59	8.583	26.91	14.667	2.34	20.75	0.59
2.583	0.59	8.667	26.91	14.750	2.34	20.83	0.59
2.667	0.59	8.750	26.91	14.833	2.34	20.92	0.59
2.750	0.59	8.833	26.91	14.917	2.34	21.00	0.59
2.833	0.59	8.917	26.91	15.000	2.34	21.08	0.59
2.917	0.59	9.000	26.91	15.083	2.34	21.17	0.59
3.000	0.59	9.083	26.91	15.167	2.34	21.25	0.59
3.083	0.59	9.167	26.91	15.250	2.34	21.33	0.59
3.167	0.59	9.250	26.91	15.333	2.34	21.42	0.59
3.250	0.59	9.333	26.91	15.417	2.34	21.50	0.59
3.333	0.59	9.417	26.91	15.500	2.34	21.58	0.59
3.417	0.59	9.500	26.91	15.583	2.34	21.67	0.59
3.500	0.59	9.583	26.91	15.667	2.34	21.75	0.59
3.583	0.59	9.667	26.91	15.750	2.34	21.83	0.59
3.667	0.59	9.750	26.91	15.833	2.34	21.92	0.59
3.750	0.59	9.833	26.91	15.917	2.34	22.00	0.59
3.833	0.59	9.917	26.91	16.000	2.34	22.08	0.59
3.917	0.59	10.000	26.91	16.083	2.34	22.17	0.59
4.000	0.59	10.083	26.91	16.167	2.34	22.25	0.59
4.083	0.59	10.167	26.91	16.250	2.34	22.33	0.59
4.167	0.59	10.250	26.91	16.333	1.17	22.42	0.59
4.250	0.59	10.333	7.61	16.417	1.17	22.50	0.59
4.333	3.51	10.417	7.61	16.500	1.17	22.58	0.59
4.417	3.51	10.500	7.61	16.583	1.17	22.67	0.59
4.500	3.51	10.583	7.61	16.667	1.17	22.75	0.59
4.583	3.51	10.667	7.61	16.750	1.17	22.83	0.59
4.667	3.51	10.750	7.61	16.833	1.17	22.92	0.59
4.750	3.51	10.833	7.61	16.917	1.17	23.00	0.59
4.833	3.51	10.917	7.61	17.000	1.17	23.08	0.59
4.917	3.51	11.000	7.61	17.083	1.17	23.17	0.59
5.000	3.51	11.083	7.61	17.167	1.17	23.25	0.59
5.083	3.51	11.167	7.61	17.250	1.17	23.33	0.59
5.167	3.51	11.250	7.61	17.333	1.17	23.42	0.59
5.250	3.51	11.333	7.61	17.417	1.17	23.50	0.59
5.333	3.51	11.417	7.61	17.500	1.17	23.58	0.59
5.417	3.51	11.500	7.61	17.583	1.17	23.67	0.59
5.500	3.51	11.583	7.61	17.667	1.17	23.75	0.59
5.583	3.51	11.667	7.61	17.750	1.17	23.83	0.59
5.667	3.51	11.750	7.61	17.833	1.17	23.92	0.59
5.750	3.51	11.833	7.61	17.917	1.17	24.00	0.59
5.833	3.51	11.917	7.61	18.000	1.17	24.08	0.59
5.917	3.51	12.000	7.61	18.083	1.17	24.17	0.59
6.000	3.51	12.083	7.61	18.167	1.17	24.25	0.59
6.083	3.51	12.167	7.61	18.250	1.17		

Max.Eff.Inten.(mm/hr)=	26.91	23.15
over (min)	10.00	25.00
Storage Coeff. (min)=	11.97 (ii)	24.64 (ii)
Unit Hyd. Tpeak (min)=	10.00	25.00

```
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.67         1.86          2.531 (iii)
     TIME TO PEAK    (hrs)=      10.25        10.25         10.25
     RUNOFF VOLUME    (mm)=     116.08        67.63         77.32
     TOTAL RAINFALL   (mm)=     117.08       117.08        117.08
     RUNOFF COEFFICIENT   =       0.99         0.58          0.66

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD (  1013)|   Area    (ha)=  40.97
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     12.29        28.68
     Dep. Storage     (mm)=      1.00         4.70
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    522.62        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 6.167    3.51 |12.250    7.61 | 18.33    0.59
               0.167    0.00 | 6.250    3.51 |12.333    4.10 | 18.42    0.59
               0.250    0.00 | 6.333    9.95 |12.417    4.10 | 18.50    0.59
               0.333    0.59 | 6.417    9.95 |12.500    4.10 | 18.58    0.59
               0.417    0.59 | 6.500    9.95 |12.583    4.10 | 18.67    0.59
               0.500    0.59 | 6.583    9.95 |12.667    4.10 | 18.75    0.59
               0.583    0.59 | 6.667    9.95 |12.750    4.10 | 18.83    0.59
               0.667    0.59 | 6.750    9.95 |12.833    4.10 | 18.92    0.59
               0.750    0.59 | 6.833    9.95 |12.917    4.10 | 19.00    0.59
               0.833    0.59 | 6.917    9.95 |13.000    4.10 | 19.08    0.59
               0.917    0.59 | 7.000    9.95 |13.083    4.10 | 19.17    0.59
               1.000    0.59 | 7.083    9.95 |13.167    4.10 | 19.25    0.59
               1.083    0.59 | 7.167    9.95 |13.250    4.10 | 19.33    0.59
               1.167    0.59 | 7.250    9.95 |13.333    4.10 | 19.42    0.59
               1.250    0.59 | 7.333    9.95 |13.417    4.10 | 19.50    0.59
               1.333    0.59 | 7.417    9.95 |13.500    4.10 | 19.58    0.59
               1.417    0.59 | 7.500    9.95 |13.583    4.10 | 19.67    0.59
               1.500    0.59 | 7.583    9.95 |13.667    4.10 | 19.75    0.59
               1.583    0.59 | 7.667    9.95 |13.750    4.10 | 19.83    0.59
               1.667    0.59 | 7.750    9.95 |13.833    4.10 | 19.92    0.59
               1.750    0.59 | 7.833    9.95 |13.917    4.10 | 20.00    0.59
               1.833    0.59 | 7.917    9.95 |14.000    4.10 | 20.08    0.59
               1.917    0.59 | 8.000    9.95 |14.083    4.10 | 20.17    0.59
               2.000    0.59 | 8.083    9.95 |14.167    4.10 | 20.25    0.59
               2.083    0.59 | 8.167    9.95 |14.250    4.10 | 20.33    0.59
               2.167    0.59 | 8.250    9.95 |14.333    2.34 | 20.42    0.59
               2.250    0.59 | 8.333   26.91 |14.417    2.34 | 20.50    0.59
               2.333    0.59 | 8.417   26.91 |14.500    2.34 | 20.58    0.59
               2.417    0.59 | 8.500   26.91 |14.583    2.34 | 20.67    0.59
               2.500    0.59 | 8.583   26.91 |14.667    2.34 | 20.75    0.59
               2.583    0.59 | 8.667   26.91 |14.750    2.34 | 20.83    0.59
               2.667    0.59 | 8.750   26.91 |14.833    2.34 | 20.92    0.59
               2.750    0.59 | 8.833   26.91 |14.917    2.34 | 21.00    0.59
               2.833    0.59 | 8.917   26.91 |15.000    2.34 | 21.08    0.59
               2.917    0.59 | 9.000   26.91 |15.083    2.34 | 21.17    0.59
               3.000    0.59 | 9.083   26.91 |15.167    2.34 | 21.25    0.59
               3.083    0.59 | 9.167   26.91 |15.250    2.34 | 21.33    0.59
               3.167    0.59 | 9.250   26.91 |15.333    2.34 | 21.42    0.59
               3.250    0.59 | 9.333   26.91 |15.417    2.34 | 21.50    0.59
               3.333    0.59 | 9.417   26.91 |15.500    2.34 | 21.58    0.59
               3.417    0.59 | 9.500   26.91 |15.583    2.34 | 21.67    0.59
               3.500    0.59 | 9.583   26.91 |15.667    2.34 | 21.75    0.59
               3.583    0.59 | 9.667   26.91 |15.750    2.34 | 21.83    0.59
               3.667    0.59 | 9.750   26.91 |15.833    2.34 | 21.92    0.59
               3.750    0.59 | 9.833   26.91 |15.917    2.34 | 22.00    0.59
               3.833    0.59 | 9.917   26.91 |16.000    2.34 | 22.08    0.59
               3.917    0.59 |10.000   26.91 |16.083    2.34 | 22.17    0.59
               4.000    0.59 |10.083   26.91 |16.167    2.34 | 22.25    0.59
               4.083    0.59 |10.167   26.91 |16.250    2.34 | 22.33    0.59
               4.167    0.59 |10.250   26.91 |16.333    1.17 | 22.42    0.59
               4.250    0.59 |10.333    7.61 |16.417    1.17 | 22.50    0.59
               4.333    3.51 |10.417    7.61 |16.500    1.17 | 22.58    0.59
               4.417    3.51 |10.500    7.61 |16.583    1.17 | 22.67    0.59
               4.500    3.51 |10.583    7.61 |16.667    1.17 | 22.75    0.59
               4.583    3.51 |10.667    7.61 |16.750    1.17 | 22.83    0.59
               4.667    3.51 |10.750    7.61 |16.833    1.17 | 22.92    0.59
               4.750    3.51 |10.833    7.61 |16.917    1.17 | 23.00    0.59
               4.833    3.51 |10.917    7.61 |17.000    1.17 | 23.08    0.59
               4.917    3.51 |11.000    7.61 |17.083    1.17 | 23.17    0.59
               5.000    3.51 |11.083    7.61 |17.167    1.17 | 23.25    0.59
               5.083    3.51 |11.167    7.61 |17.250    1.17 | 23.33    0.59
               5.167    3.51 |11.250    7.61 |17.333    1.17 | 23.42    0.59
               5.250    3.51 |11.333    7.61 |17.417    1.17 | 23.50    0.59
               5.333    3.51 |11.417    7.61 |17.500    1.17 | 23.58    0.59
               5.417    3.51 |11.500    7.61 |17.583    1.17 | 23.67    0.59
               5.500    3.51 |11.583    7.61 |17.667    1.17 | 23.75    0.59
               5.583    3.51 |11.667    7.61 |17.750    1.17 | 23.83    0.59
               5.667    3.51 |11.750    7.61 |17.833    1.17 | 23.92    0.59
               5.750    3.51 |11.833    7.61 |17.917    1.17 | 24.00    0.59
               5.833    3.51 |11.917    7.61 |18.000    1.17 | 24.08    0.59
               5.917    3.51 |12.000    7.61 |18.083    1.17 | 24.17    0.59
               6.000    3.51 |12.083    7.61 |18.167    1.17 | 24.25    0.59
               6.083    3.51 |12.167    7.61 |18.250    1.17 |

     Max.Eff.Inten.(mm/hr)=      26.91        24.03
               over (min)        10.00        25.00
     Storage Coeff.  (min)=      11.65 (ii)   24.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.61         1.78          2.394 (iii)
     TIME TO PEAK    (hrs)=      10.25        10.25         10.25
     RUNOFF VOLUME    (mm)=     116.08        71.15         80.14
     TOTAL RAINFALL   (mm)=     117.08       117.08        117.08
     RUNOFF COEFFICIENT   =       0.99         0.61          0.68

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1012):    44.83   2.531    10.25    77.32
      + ID2= 2 (  1013):    40.97   2.394    10.25    80.14
        ================================================
```

```
       ID = 3 (  0009):    85.80   4.925    10.25    78.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73   1.177    10.50    57.13
     + ID2= 2 (  0009):    85.80   4.925    10.25    78.67
       ================================================
       ID = 3 (  0010):   115.53   6.057    10.25    73.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\dc639c61-26b2-4cef-8074-a85f66fe64bd\scenar
  Summary filename: C:\Users\pyung\AppData\Local\Civica\VH5\59240a7b-1b4a-45f6-9044-
605764144db8\dc639c61-26b2-4cef-8074-a85f66fe64bd\scenar


DATE: 01-12-2024                          TIME: 03:30:16

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : HAZEL                        **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\pyung\AppD
|                  |              ata\Local\Temp\
|                  |              f2c8c8ca-da0f-47d8-9fa2-022ac01bdcfd\c71a5a96
| Ptotal=212.00 mm |    Comments: HAZEL
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                0.20    6.00 |  3.20   13.00 |  6.20   23.00 |  9.20   53.00
                0.40    6.00 |  3.40   13.00 |  6.40   23.00 |  9.40   53.00
                0.60    6.00 |  3.60   13.00 |  6.60   23.00 |  9.60   53.00
                0.80    6.00 |  3.80   13.00 |  6.80   23.00 |  9.80   53.00
                1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                1.20    4.00 |  4.20   17.00 |  7.20   13.00 | 10.20   38.00
                1.40    4.00 |  4.40   17.00 |  7.40   13.00 | 10.40   38.00
                1.60    4.00 |  4.60   17.00 |  7.60   13.00 | 10.60   38.00
                1.80    4.00 |  4.80   17.00 |  7.80   13.00 | 10.80   38.00
                2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00
                2.20    6.00 |  5.20   13.00 |  8.20   13.00 | 11.20   13.00
                2.40    6.00 |  5.40   13.00 |  8.40   13.00 | 11.40   13.00
                2.60    6.00 |  5.60   13.00 |  8.60   13.00 | 11.60   13.00
                2.80    6.00 |  5.80   13.00 |  8.80   13.00 | 11.80   13.00

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| CALIB            |
| NASHYD   (  1021)|   Area    (ha)=  24.18   Curve Number   (CN)= 68.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.30   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.67

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   1.378

     PEAK FLOW       (cms)=   2.268 (i)
     TIME TO PEAK    (hrs)=  10.667
     RUNOFF VOLUME    (mm)= 129.234
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TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.610

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB									
NASHYD (1023)	Area (ha)= 301.00	Curve Number (CN)= 79.0							
ID= 1 DT= 5.0 min	Ia (mm)= 6.90	# of Linear Res.(N)= 3.00							
	U.H. Tp(hrs)= 3.42								

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 3.362

PEAK FLOW (cms)= 15.993 (i)
TIME TO PEAK (hrs)= 13.167
RUNOFF VOLUME (mm)= 154.303
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.728

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB									
STANDHYD (1022)	Area (ha)= 36.26								
ID= 1 DT= 5.0 min	Total Imp(%)= 30.00	Dir. Conn.(%)= 20.00							

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.88	25.38
Dep. Storage (mm)=	1.00	4.70
Average Slope (%)=	1.00	2.00
Length (m)=	491.66	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

			TOTALS
Max.Eff.Inten.(mm/hr)=	53.00	55.00	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.56 (ii)	17.53 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
PEAK FLOW (cms)=	1.07	3.65	4.711 (iii)
TIME TO PEAK (hrs)=	10.00	10.08	10.00
RUNOFF VOLUME (mm)=	211.00	157.57	168.26
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.74	0.79

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 77.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0007)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1022):		36.26	4.711	10.00	168.26
+ ID2= 2 (1023):		301.00	15.993	13.17	154.30
ID = 3 (0007):		337.26	16.033	13.08	155.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0008)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1021):		24.18	2.268	10.67	129.23
+ ID2= 2 (0007):		337.26	16.033	13.08	155.80
ID = 3 (0008):		361.44	17.087	12.08	154.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (1011)		Area	(ha)=	29.73	Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min		Ia	(mm)=	6.40	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)=		0.73	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Unit Hyd Qpeak (cms)= 1.556

PEAK FLOW (cms)= 2.850 (i)
TIME TO PEAK (hrs)= 10.833
RUNOFF VOLUME (mm)= 136.646
TOTAL RAINFALL (mm)= 212.000
RUNOFF COEFFICIENT = 0.645

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (1012)		Area	(ha)=	44.83	
ID= 1 DT= 5.0 min		Total Imp(%)=	30.00	Dir. Conn.(%)=	20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.45	31.38
Dep. Storage	(mm)=	1.00	5.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	546.69	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00

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              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        54.05
                 over (min)      10.00        20.00
     Storage Coeff.  (min)=       9.13 (ii)   18.15 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.32         4.41          5.712 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.08         10.00
     RUNOFF VOLUME    (mm)=     211.00       152.62        164.29
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.00
     RUNOFF COEFFICIENT   =       1.00         0.72          0.77

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (   1013)|   Area    (ha)=  40.97
|ID= 1 DT= 5.0 min |   Total Imp(%)=  30.00   Dir. Conn.(%)=  20.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.29        28.68
     Dep. Storage     (mm)=       1.00         4.70
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     522.62        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        55.00
                 over (min)      10.00        20.00
     Storage Coeff.  (min)=       8.88 (ii)   17.85 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.20         4.12          5.312 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.08         10.00
     RUNOFF VOLUME    (mm)=     211.00       157.57        168.26
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.00
     RUNOFF COEFFICIENT   =       1.00         0.74          0.79

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  77.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1012):    44.83   5.712    10.00   164.29
     + ID2= 2 (  1013):    40.97   5.312    10.00   168.26
       ================================================
       ID = 3 (  0009):    85.80  11.025    10.00   166.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1011):    29.73   2.850    10.83   136.65
     + ID2= 2 (  0009):    85.80  11.025    10.00   166.19
       ================================================
       ID = 3 (  0010):   115.53  13.303    10.08   158.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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Table A.5: Comparison of LiDAR Surface with Topo Survey Elevations

File: 23142 *07 Nov 2023*

	Location	Survey (CGVD28) Elevation, m	LiDAR (2017) Elevation, m	Difference, m	Survey - 0.414 (CGVD2013) m	LiDAR - (Survey - 0.414) m
1	IDA Street along Center, Near South West Corner of Site	512.72	512.31	0.41	512.31	0.00
2	IDA Street along Center, Near South West Corner of Site	512.97	512.53	0.44	512.56	0.03
3	IDA Street along Center, Near Middle Section of Road	513.12	512.71	0.41	512.71	0.00
4	IDA Street along Center, Near North West Corner of Site	513.15	512.75	0.40	512.74	-0.01
5	IDA Street along Center, Near North West Corner of Site	513.17	512.78	0.39	512.76	-0.02
6	IDA Street along Edge, Near South West Corner of Site	512.64	512.29	0.35	512.23	-0.06
7	IDA Street along Edge, Near South West Corner of Site	512.93	512.58	0.35	512.52	-0.06
8	IDA Street along Edge, Near Middle Section of Road	513.06	512.73	0.33	512.65	-0.08
9	IDA Street along Edge, Near North West Corner of Site	513.13	512.78	0.35	512.72	-0.06
10	IDA Street along Edge, Near North West Corner of Site	513.17	512.81	0.36	512.76	-0.05
11	Along South Border of Site, West Side Open Land with Low Vegetation Shrubs	512.22	512.00	0.22	511.81	-0.19
12	Along South Border of Site, West Side Open Land with Low Vegetation Shrubs	511.94	511.70	0.24	511.53	-0.17
13	Along South Border of Site, Middle Vegetated Area	511.44	511.22	0.22	511.03	-0.19
14	Along South Border of Site, East Side Open Land with Low Vegetation Shrubs	513.15	512.90	0.25	512.74	-0.16
15	Along South Border of Site, East Side Open Land with Low Vegetation Shrubs	512.55	512.37	0.18	512.14	-0.23
16	Along North Border of Site, West Side Open Land with Low Vegetation Shrubs	513.47	513.25	0.22	513.06	-0.19
17	Along North Border of Site, West Side Open Land with Low Vegetation Shrubs	511.45	511.23	0.22	511.04	-0.19
18	Along North Border of Site, Middle Open Land with Low Vegetation Shrubs	511.46	511.27	0.19	511.05	-0.22
19	Along North Border of Site, East Side Open Land with Low Vegetation Shrubs	512.78	512.59	0.19	512.37	-0.22
20	Along North Border of Site, East Side Open Land with Low Vegetation Shrubs	513.32	513.19	0.13	512.91	-0.28
21	Along East Border of Site, South Side Open Land with Low Vegetation Shrubs	512.25	511.93	0.32	511.84	-0.09
22	Along East Border of Site, South Side Open Land with Low Vegetation Shrubs	512.41	512.32	0.09	512.00	-0.32
23	Along East Border of Site, Middle Vegetated Area	512.72	512.51	0.21	512.31	-0.20
24	Along East Border of Site, North Side Vegetated Area	513.08	512.83	0.25	512.67	-0.16
25	Along East Border of Site, North Side Corner Vegetated Area	513.24	513.07	0.17	512.83	-0.24
26	Along Railway, South Corner of Site	512.02	511.73	0.29	511.61	-0.12
27	Along Railway, South of Site	512.31	511.93	0.38	511.90	-0.03
28	Along Railway, Middle of Site	512.43	512.08	0.35	512.02	-0.06
29	Along Railway, North of Site	512.90	512.45	0.45	512.49	0.04
30	Along Railway, North Corner of Site	513.31	512.99	0.32	512.90	-0.09
31	Along Swamp Area, South within Site	510.49	510.12	0.37	510.08	-0.04
32	Along Swamp Area, South near Site Boundary	510.16	510.03	0.13	509.75	-0.28
36	Inside Area, West Side Open Land Low Vegetation with Shrubs	512.91	512.81	0.10	512.50	-0.31
37	Inside Area, West Side Open Land Low Vegetation with Shrubs	511.90	511.74	0.16	511.49	-0.25
38	Inside Area, West Side Open Land Low Vegetation with Shrubs	513.23	513.08	0.15	512.82	-0.26
39	Inside Area, West Side Open Land Low Vegetation with Shrubs	511.08	510.97	0.11	510.67	-0.30
40	Inside Area, West Side Open Land Low Vegetation with Shrubs	512.86	512.75	0.11	512.45	-0.30
41	Along Trail, Open Land Low Vegetation with Shrubs	510.53	510.21	0.32	510.12	-0.09
42	Along Trail, Open Land Low Vegetation with Shrubs	510.57	510.27	0.30	510.16	-0.11
43	Along Trail, Open Land Low Vegetation with Shrubs	511.06	510.70	0.36	510.65	-0.05
44	Along Trail, Open Land Low Vegetation with Shrubs	512.10	511.90	0.20	511.69	-0.21
45	Along Trail, Open Land Low Vegetation with Shrubs	511.16	510.91	0.25	510.75	-0.16
51	Inside Area, East of Railway Vegetated Area	512.72	512.50	0.22	512.31	-0.19
52	Inside Area, East of Railway Vegetated Area	512.61	512.35	0.26	512.20	-0.15
53	Inside Area, East of Railway Vegetated Area	512.39	512.15	0.24	511.98	-0.17
54	Inside Area, East of Railway Vegetated Area	512.50	512.21	0.29	512.09	-0.12
55	Inside Area, East of Railway Vegetated Area	512.56	512.35	0.21	512.15	-0.20
56	Inside Area, East of Railway along Trail	513.13	512.96	0.17	512.72	-0.24
57	Inside Area, East of Railway along Trail	513.67	513.37	0.30	513.26	-0.11
58	Inside Area, East of Railway Open Land Low Vegetation with Shrubs	513.05	512.87	0.18	512.64	-0.23
59	Inside Area, East of Railway Open Land Low Vegetation with Shrubs	512.78	512.60	0.18	512.37	-0.23
60	Inside Area, East of Railway Open Land Low Vegetation with Shrubs	513.01	512.80	0.21	512.60	-0.20
			Average Difference	0.260		-0.154

Hard Open Surfaces

Ontario Ministry of Natural Resources and Forestry

Control Survey Information Exchange

COSINE Station Report

Retrieval Date: 2023-Nov-21

Station: 00820048005

AKA Names:

Number of Ref Sketches: 1

Networks [usage]: 3262 [FREE], 3262V [FREE], 3262V13 [FREE], C2ANDD2 [FREE], CBN31D [FREE]

Known Status: Existing

Last Reported Visit:

Monument Type: CAP

Station Type: GPS

Location Description:

Dundalk - 6' RIB & brass cap, 30 cm below ground. - Station is located on southeast side of Hwy 10 jkust northerly of County Road 9.

No Photo

Horizontal (Ellipsoidal) Control Data

Datum: NAD-1983:CSRS:CBNV6-2010.0	**Horiz Order:** CSRS Class D			**Ellipsoidal Order:** Fourth Order
Latitude: N44° 10′ 45.472483″	**Longitude:** W80° 22′ 54.257316″			**Ellipsoidal elev:** 490.266
***UTM Zone:** 17	**E:** E549419.106	**N:** N4891973.201	**C. S. F.:** 0.99955319	**Mrdl Convg:** 0° 25′ 51.2″
***MTM Zone:** 10	**E:** E234299.427	**N:** N4893633.571	**C. S. F.:** 0.99988424	**Mrdl Convg:** -0° 36′ 52.2″

Datum: NAD-1983:CSRS:CBNv3-1997.0	**Horiz Order:** CSRS Class D			**Ellipsoidal Order:** Fourth Order
Latitude: N44° 10′ 45.473050″	**Longitude:** W80° 22′ 54.258407″			**Ellipsoidal elev:** 490.303
***UTM Zone:** 17	**E:** E549419.081	**N:** N4891973.218	**C. S. F.:** 0.99955318	**Mrdl Convg:** 0° 25′ 51.2″
***MTM Zone:** 10	**E:** E234299.403	**N:** N4893633.588	**C. S. F.:** 0.99988423	**Mrdl Convg:** -0° 36′ 52.3″

Datum: NAD-1983:ORIG	**Horiz Order:** Second Order			**Ellipsoidal Order:** Unclassified
Latitude: N44° 10′ 45.476730″	**Longitude:** W80° 22′ 54.252670″			**Ellipsoidal elev:** 490.xxx
***UTM Zone:** 17	**E:** E549419.208	**N:** N4891973.332	**C. S. F.:** 0.99955314	**Mrdl Convg:** 0° 25′ 51.2″
***MTM Zone:** 10	**E:** E234299.532	**N:** N4893633.701	**C. S. F.:** 0.99988419	**Mrdl Convg:** -0° 36′ 52.2″

Vertical (Geoidal) Control Data

Datum: CGVD2013	Vert Order: Second Order	Elevation: 525.163	
Geoid:	Meridional defl:	Prime vert defl:	Undulation:

Datum: CGVD28:78	Vert Order: Second Order	Elevation: 525.577	
Geoid:	Meridional defl:	Prime vert defl:	Undulation:

Maintenance / History

Date	Description
2019-Mar-20	Established by MTO Aug 2004.

Reference Sketches

Sketch 1 of 1

Ministry of Transportation
Ontario

MONUMENT POSITION SKETCH

DATE: AUG 2004
TIES UPDATED

Job File:
Map Sheet:
Order:
MTM - Zone:

Mon: 00820048005
Elev.:
C.M.:

TYPE OF MONUMENT: 6" R.I.B & BRASS CAP
RELATIONSHIP TO GROUND: - 30 cm

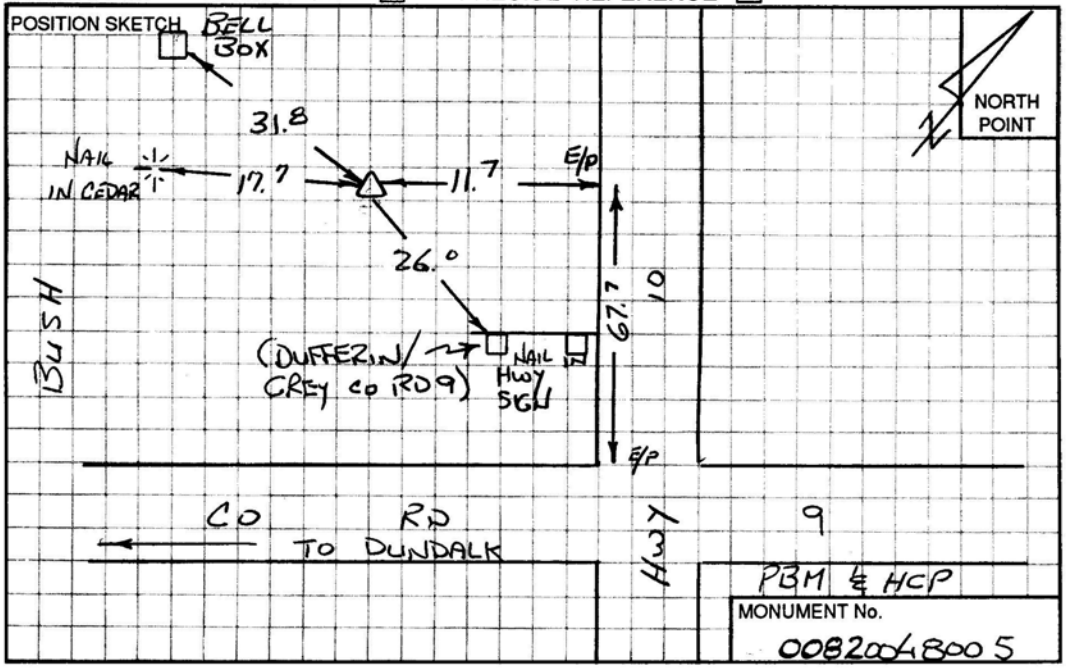
INTERVISIBLE WITH: 20040077

LOCATION: DUNDALK

STATION IS LOCATED ON SOUTHEAST SIDE OF HWY 10 JUST NORTHERLY OF CO RD 9

PURPOSE: LOCATE POINT ☑ PRECISE REFERENCE ☐

POSITION SKETCH



MONUMENT No. 00820048005

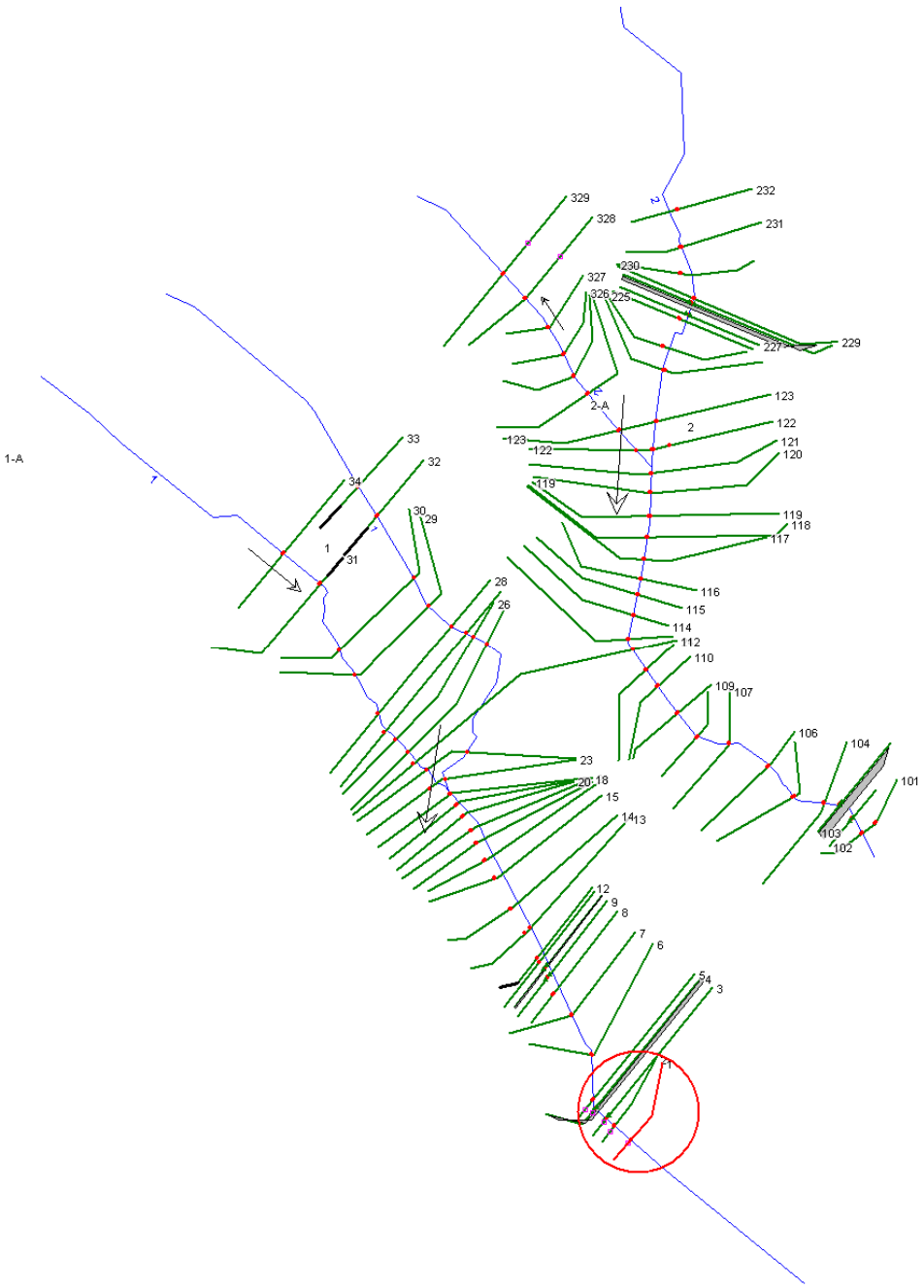
PH-D-808 88-08

ATTACHMENT ‘B’

Hydraulic Model (HEC-RAS)

Supporting Documentation and Calculations

VALDOR



HEC-RAS Model Schematic

Table B.1 Existing HEC-RAS Output

HEC-RAS Plan: 012 River: 1 Reach: 1

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	33	100-YR	2.39	512.95	513.62	513.62	513.81	0.015499	2.09	1.38	3.88	0.85
1	33	HAZEL	5.31	512.95	513.92	513.92	514.14	0.012790	2.46	2.90	6.84	0.82
1	32	100-YR	2.39	512.45	513.18	513.18	513.29	0.007517	1.76	2.09	9.99	0.68
1	32	HAZEL	5.31	512.45	513.35	513.35	513.48	0.007939	2.10	4.37	16.70	0.73
1	30	100-YR	4.92	510.30	510.75		510.77	0.008502	0.46	8.77	91.12	0.56
1	30	HAZEL	11.03	510.30	510.82		510.85	0.012510	0.54	15.13	102.68	0.48
1	29	100-YR	4.92	510.05	510.46		510.51	0.016841	1.12	5.00	36.05	0.83
1	29	HAZEL	11.03	510.05	510.61		510.65	0.006880	0.55	13.46	66.67	0.43
1	28	100-YR	4.92	509.80	510.47		510.48	0.000355	0.13	31.57	115.36	0.08
1	28	HAZEL	11.03	509.80	510.62		510.62	0.000497	0.13	61.97	240.30	0.09
1	27	100-YR	4.92	509.80	510.43		510.44	0.001088	0.26	15.55	89.82	0.22
1	27	HAZEL	11.03	509.80	510.57		510.58	0.000910	0.31	33.25	159.28	0.21
1	26	100-YR	4.92	509.70	510.39		510.39	0.000400	0.17	28.86	111.41	0.10
1	26	HAZEL	11.03	509.70	510.52		510.52	0.000755	0.25	45.42	211.07	0.16
1	25	100-YR	4.92	509.80	510.38		510.38	0.000307	0.18	28.63	149.91	0.13
1	25	HAZEL	11.03	509.80	510.49		510.50	0.000395	0.25	49.42	199.10	0.15
1	24	100-YR	4.92	509.70	510.37		510.37	0.000504	0.15	34.20	248.61	0.13
1	24	HAZEL	11.03	509.70	510.48		510.49	0.000490	0.18	65.22	274.44	0.11
1	23	100-YR	4.92	509.70	510.36		510.36	0.000943	0.21	32.09	198.89	0.17
1	23	HAZEL	11.03	509.70	510.48		510.48	0.001014	0.24	57.85	235.93	0.15
1	22	100-YR	4.92	509.80	510.35		510.35	0.000342	0.09	49.20	179.92	0.06
1	22	HAZEL	11.03	509.80	510.47		510.47	0.000557	0.13	71.02	197.09	0.08
1	21	100-YR	6.06	509.95	510.35		510.35	0.000916	0.39	42.92	226.44	0.21
1	21	HAZEL	13.30	509.95	510.46		510.46	0.001057	0.51	70.07	249.76	0.24
1	20	100-YR	6.06	509.70	510.32		510.32	0.000413	0.37	46.58	229.41	0.16
1	20	HAZEL	13.30	509.70	510.43		510.43	0.000527	0.47	71.97	240.10	0.18

HEC-RAS Plan: 012 River: 1 Reach: 1 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	19	100-YR	6.06	509.45	510.27		510.29	0.002077	1.01	24.75	156.69	0.37
1	19	HAZEL	13.30	509.45	510.37		510.39	0.002571	1.22	41.34	176.51	0.42
1	18	100-YR	6.06	509.45	510.05	510.04	510.09	0.008501	1.62	13.05	133.27	0.70
1	18	HAZEL	13.30	509.45	510.18		510.20	0.005334	1.48	30.69	147.63	0.57
1	17	100-YR	6.06	509.15	509.99		510.00	0.001394	0.73	20.67	119.58	0.26
1	17	HAZEL	13.30	509.15	510.11		510.12	0.001483	0.82	36.70	143.06	0.27
1	16	100-YR	6.06	508.65	509.83	509.83	509.91	0.007917	1.97	9.42	59.40	0.59
1	16	HAZEL	13.30	508.65	509.97	509.94	510.03	0.007593	2.09	21.08	100.69	0.59
1	15	100-YR	6.06	508.65	509.65	509.65	509.73	0.007939	1.96	6.70	34.77	0.64
1	15	HAZEL	13.30	508.65	509.79	509.79	509.86	0.008484	2.22	15.59	134.33	0.67
1	14	100-YR	6.06	508.15	509.30	509.30	509.36	0.003896	1.51	6.39	48.24	0.46
1	14	HAZEL	13.30	508.15	509.44	509.38	509.50	0.003852	1.63	14.09	56.79	0.46
1	13	100-YR	6.06	508.75	509.14	509.14	509.22	0.017351	0.33	5.29	36.75	0.34
1	13	HAZEL	13.30	508.75	509.26	509.26	509.36	0.029672	0.58	10.51	55.67	0.49
1	12	100-YR	6.06	507.90	509.03		509.04	0.000521	0.55	19.11	61.31	0.17
1	12	HAZEL	13.30	507.90	509.20		509.21	0.000852	0.77	30.56	78.91	0.22
1	11	100-YR	6.06	507.90	509.02		509.03	0.000538	0.55	20.81	69.40	0.17
1	11	HAZEL	13.30	507.90	509.18		509.19	0.000856	0.76	34.27	101.50	0.22
1	10	100-YR	6.06	507.65	508.98	508.76	508.99	0.000876	0.79	27.58	80.50	0.22
1	10	HAZEL	13.30	507.65	509.11	508.87	509.13	0.001625	1.15	39.09	97.67	0.31
1	9.5		Culvert									
1	9	100-YR	6.06	507.40	508.46	508.46	508.66	0.013499	2.66	4.17	78.05	0.84
1	9	HAZEL	13.30	507.40	508.64	508.58	508.66	0.002165	1.19	37.25	100.10	0.34
1	8	100-YR	6.06	507.40	508.03		508.07	0.007768	1.42	8.68	49.78	0.58
1	8	HAZEL	13.30	507.40	508.15		508.20	0.007786	1.60	15.67	68.47	0.60

HEC-RAS Plan: 012 River: 1 Reach: 1 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	7	100-YR	6.06	507.15	507.76	507.76	507.83	0.014200	1.86	6.21	42.19	0.78
1	7	HAZEL	13.30	507.15	507.86	507.86	507.96	0.014907	2.13	11.25	56.70	0.82
1	6	100-YR	6.06	506.15	507.12		507.21	0.006937	1.80	6.00	23.14	0.59
1	6	HAZEL	13.30	506.15	507.27	507.27	507.43	0.012147	2.63	10.32	35.09	0.80
1	5	100-YR	6.06	505.65	507.17	506.60	507.17	0.000237	0.45	41.47	84.30	0.12
1	5	HAZEL	13.30	505.65	507.27	506.79	507.27	0.000680	0.80	50.43	91.49	0.20
1	4	100-YR	6.06	505.29	507.16	506.20	507.16	0.000089	0.30	42.47	90.94	0.07
1	4	HAZEL	13.30	505.29	507.26	506.63	507.26	0.000193	0.45	62.71	140.80	0.10
1	3.5		Culvert									
1	3	100-YR	6.06	505.28	506.60	506.17	506.67	0.000545	0.58	6.51	34.94	0.16
1	3	HAZEL	13.30	505.28	506.80	506.55	506.83	0.000678	0.72	20.05	50.70	0.19
1	2	100-YR	6.06	505.40	506.49	506.42	506.53	0.003569	1.40	11.05	57.29	0.43
1	2	HAZEL	13.30	505.40	506.63	506.57	506.67	0.004215	1.65	19.96	68.90	0.48
1	1	100-YR	6.06	505.15	506.30	506.30	506.35	0.003301	1.40	7.14	69.97	0.42
1	1	HAZEL	13.30	505.15	506.37	506.37	506.44	0.004503	1.70	12.17	74.60	0.50

HEC-RAS Plan: 012 River: 1 Reach: 1-A

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	34	100-YR	2.53	511.80	512.61		512.73	0.004972	1.66	1.85	3.75	0.60
1-A	34	HAZEL	5.71	511.80	512.80	512.80	513.11	0.010083	2.73	2.64	4.46	0.89
1-A	31	100-YR	2.53	511.30	511.95	511.95	512.18	0.012495	2.25	1.29	2.99	0.91
1-A	31	HAZEL	5.71	511.30	512.40	512.40	512.50	0.003431	1.71	5.09	23.93	0.53
1-A	30	100-YR	4.92	510.30	510.75		510.77	0.008502	0.46	8.77	91.12	0.56
1-A	30	HAZEL	11.03	510.30	510.82		510.85	0.012510	0.54	15.13	102.68	0.48
1-A	29	100-YR	4.92	510.05	510.46		510.51	0.016841	1.12	5.00	36.05	0.83
1-A	29	HAZEL	11.03	510.05	510.61		510.65	0.006880	0.55	13.46	66.67	0.43
1-A	28	100-YR	4.92	509.80	510.47		510.48	0.000355	0.13	31.57	115.36	0.08
1-A	28	HAZEL	11.03	509.80	510.62		510.62	0.000497	0.13	61.97	240.30	0.09
1-A	27	100-YR	4.92	509.80	510.43		510.44	0.001088	0.26	15.55	89.82	0.22
1-A	27	HAZEL	11.03	509.80	510.57		510.58	0.000910	0.31	33.25	159.28	0.21
1-A	26	100-YR	4.92	509.70	510.39		510.39	0.000400	0.17	28.86	111.41	0.10
1-A	26	HAZEL	11.03	509.70	510.52		510.52	0.000755	0.25	45.42	211.07	0.16
1-A	25	100-YR	4.92	509.80	510.38		510.38	0.000307	0.18	28.63	149.91	0.13
1-A	25	HAZEL	11.03	509.80	510.49		510.50	0.000395	0.25	49.42	199.10	0.15
1-A	24	100-YR	4.92	509.70	510.37		510.37	0.000504	0.15	34.20	248.61	0.13
1-A	24	HAZEL	11.03	509.70	510.48		510.49	0.000490	0.18	65.22	274.44	0.11
1-A	23	100-YR	4.92	509.70	510.36		510.36	0.000943	0.21	32.09	198.89	0.17
1-A	23	HAZEL	11.03	509.70	510.48		510.48	0.001014	0.24	57.85	235.93	0.15
1-A	22	100-YR	4.92	509.80	510.35		510.35	0.000342	0.09	49.20	179.92	0.06
1-A	22	HAZEL	11.03	509.80	510.47		510.47	0.000557	0.13	71.02	197.09	0.08
1-A	21	100-YR	6.06	509.95	510.35		510.35	0.000916	0.39	42.92	226.44	0.21
1-A	21	HAZEL	13.30	509.95	510.46		510.46	0.001057	0.51	70.07	249.76	0.24
1-A	20	100-YR	6.06	509.70	510.32		510.32	0.000413	0.37	46.58	229.41	0.16
1-A	20	HAZEL	13.30	509.70	510.43		510.43	0.000527	0.47	71.97	240.10	0.18

HEC-RAS Plan: 012 River: 1 Reach: 1-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	19	100-YR	6.06	509.45	510.27		510.29	0.002077	1.01	24.75	156.69	0.37
1-A	19	HAZEL	13.30	509.45	510.37		510.39	0.002571	1.22	41.34	176.51	0.42
1-A	18	100-YR	6.06	509.45	510.05	510.04	510.09	0.008501	1.62	13.05	133.27	0.70
1-A	18	HAZEL	13.30	509.45	510.18		510.20	0.005334	1.48	30.69	147.63	0.57
1-A	17	100-YR	6.06	509.15	509.99		510.00	0.001394	0.73	20.67	119.58	0.26
1-A	17	HAZEL	13.30	509.15	510.11		510.12	0.001483	0.82	36.70	143.06	0.27
1-A	16	100-YR	6.06	508.65	509.83	509.83	509.91	0.007917	1.97	9.42	59.40	0.59
1-A	16	HAZEL	13.30	508.65	509.97	509.94	510.03	0.007593	2.09	21.08	100.69	0.59
1-A	15	100-YR	6.06	508.65	509.65	509.65	509.73	0.007939	1.96	6.70	34.77	0.64
1-A	15	HAZEL	13.30	508.65	509.79	509.79	509.86	0.008484	2.22	15.59	134.33	0.67
1-A	14	100-YR	6.06	508.15	509.30	509.30	509.36	0.003896	1.51	6.39	48.24	0.46
1-A	14	HAZEL	13.30	508.15	509.44	509.38	509.50	0.003852	1.63	14.09	56.79	0.46
1-A	13	100-YR	6.06	508.75	509.14	509.14	509.22	0.017351	0.33	5.29	36.75	0.34
1-A	13	HAZEL	13.30	508.75	509.26	509.26	509.36	0.029672	0.58	10.51	55.67	0.49
1-A	12	100-YR	6.06	507.90	509.03		509.04	0.000521	0.55	19.11	61.31	0.17
1-A	12	HAZEL	13.30	507.90	509.20		509.21	0.000852	0.77	30.56	78.91	0.22
1-A	11	100-YR	6.06	507.90	509.02		509.03	0.000538	0.55	20.81	69.40	0.17
1-A	11	HAZEL	13.30	507.90	509.18		509.19	0.000856	0.76	34.27	101.50	0.22
1-A	10	100-YR	6.06	507.65	508.98	508.76	508.99	0.000876	0.79	27.58	80.50	0.22
1-A	10	HAZEL	13.30	507.65	509.11	508.87	509.13	0.001625	1.15	39.09	97.67	0.31
1-A	9.5		Culvert									
1-A	9	100-YR	6.06	507.40	508.46	508.46	508.66	0.013499	2.66	4.17	78.05	0.84
1-A	9	HAZEL	13.30	507.40	508.64	508.58	508.66	0.002165	1.19	37.25	100.10	0.34
1-A	8	100-YR	6.06	507.40	508.03		508.07	0.007834	1.42	8.65	49.70	0.58
1-A	8	HAZEL	13.30	507.40	508.15		508.20	0.007786	1.60	15.67	68.47	0.60

HEC-RAS Plan: 012 River: 1 Reach: 1-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	7	100-YR	6.06	507.15	507.76	507.76	507.83	0.014200	1.86	6.21	42.19	0.78
1-A	7	HAZEL	13.30	507.15	507.86	507.86	507.96	0.014907	2.13	11.25	56.70	0.82
1-A	6	100-YR	6.06	506.15	507.02	507.02	507.19	0.014349	2.40	4.02	14.62	0.83
1-A	6	HAZEL	13.30	506.15	507.27	507.27	507.43	0.012147	2.63	10.32	35.09	0.80
1-A	5	100-YR	6.06	505.65	507.10	506.60	507.11	0.000338	0.52	36.22	80.02	0.14
1-A	5	HAZEL	13.30	505.65	507.27	506.79	507.28	0.000669	0.79	50.74	91.78	0.20
1-A	4	100-YR	6.06	505.29	507.10	506.20	507.10	0.000083	0.28	43.73	109.97	0.07
1-A	4	HAZEL	13.30	505.29	507.26	506.63	507.26	0.000189	0.45	63.31	141.31	0.10
1-A	3.5		Culvert									
1-A	3	100-YR	6.06	505.28	506.60	506.16	506.70	0.000637	0.63	6.06	35.35	0.18
1-A	3	HAZEL	13.30	505.28	506.81	506.60	506.83	0.000667	0.71	20.23	51.13	0.18
1-A	2	100-YR	6.06	505.40	506.49	506.43	506.53	0.003659	1.45	10.93	56.96	0.46
1-A	2	HAZEL	13.30	505.40	506.63	506.57	506.68	0.004329	1.72	19.79	68.80	0.51
1-A	1	100-YR	6.06	505.15	506.30	506.30	506.35	0.003301	1.40	7.14	69.97	0.42
1-A	1	HAZEL	13.30	505.15	506.37	506.37	506.44	0.004503	1.70	12.17	74.60	0.50

HEC-RAS Plan: 012 River: 2 Reach: 2

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	232	100-YR	6.28	511.80	512.84	512.84	512.90	0.003717	1.52	15.14	117.05	0.50
2	232	HAZEL	15.99	511.80	513.06		513.08	0.002216	1.35	45.23	181.52	0.40
2	231	100-YR	6.28	511.80	512.76		512.76	0.000158	0.30	57.56	168.68	0.10
2	231	HAZEL	15.99	511.80	513.06		513.06	0.000118	0.31	109.04	180.67	0.09
2	230	100-YR	6.28	511.55	512.76		512.76	0.000094	0.27	59.15	122.16	0.08
2	230	HAZEL	15.99	511.55	513.05		513.05	0.000114	0.35	100.09	153.17	0.09
2	229	100-YR	6.28	511.55	512.75		512.75	0.000043	0.18	101.63	272.95	0.05
2	229	HAZEL	15.99	511.55	513.05		513.05	0.000042	0.21	185.83	297.87	0.06
2	228	100-YR	6.28	511.30	512.75	512.17	512.75	0.000067	0.26	78.59	274.10	0.07
2	228	HAZEL	15.99	511.30	512.54	512.54	512.93	0.013524	3.27	6.79	150.63	0.96
2	227.5		Culvert									
2	227	100-YR	6.28	511.17	512.21	512.21	512.26	0.004720	1.82	11.21	42.25	0.59
2	227	HAZEL	15.99	511.17	512.48	512.34	512.50	0.002511	1.56	34.07	103.43	0.44
2	226	100-YR	6.28	511.30	512.07	512.07	512.18	0.010124	2.01	6.10	27.98	0.77
2	226	HAZEL	15.99	511.30	512.23	512.23	512.40	0.014509	2.76	11.53	39.39	0.96
2	225	100-YR	6.28	511.05	512.02		512.03	0.000748	0.65	27.30	131.73	0.22
2	225	HAZEL	15.99	511.05	512.17		512.18	0.001032	0.84	47.96	144.65	0.26
2	224	100-YR	6.28	511.05	511.90	511.90	511.97	0.005946	1.66	9.19	63.28	0.60
2	224	HAZEL	15.99	511.05	512.08		512.12	0.003808	1.52	28.20	157.24	0.50
2	123	100-YR	6.65	511.05	511.91		511.91	0.000102	0.17	55.22	197.54	0.08
2	123	HAZEL	16.03	511.05	512.06		512.07	0.000184	0.28	93.36	275.42	0.11
2	122	100-YR	6.65	511.05	511.90		511.90	0.000254	0.28	46.03	203.57	0.13
2	122	HAZEL	16.03	511.05	512.05		512.06	0.000364	0.40	83.20	278.41	0.16
2	121	100-YR	6.88	511.05	511.88		511.89	0.000541	0.49	39.96	198.98	0.18
2	121	HAZEL	17.09	511.05	512.03		512.04	0.000745	0.65	75.94	288.63	0.22

HEC-RAS Plan: 012 River: 2 Reach: 2 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	120	100-YR	6.88	511.05	511.87		511.87	0.000555	0.49	39.33	204.05	0.18
2	120	HAZEL	17.09	511.05	512.01		512.02	0.000639	0.60	75.84	290.91	0.20
2	119	100-YR	6.88	511.05	511.84		511.84	0.001150	0.69	29.58	156.66	0.26
2	119	HAZEL	17.09	511.05	511.98		511.99	0.001354	0.84	55.34	213.46	0.29
2	118	100-YR	6.88	511.05	511.70	511.70	511.76	0.010125	1.77	10.73	79.22	0.75
2	118	HAZEL	17.09	511.05	511.80	511.80	511.88	0.013575	2.27	20.27	120.20	0.89
2	117	100-YR	6.88	510.30	511.27	511.27	511.34	0.005092	1.69	10.71	62.58	0.57
2	117	HAZEL	17.09	510.30	511.44		511.50	0.004813	1.85	22.08	73.20	0.57
2	116	100-YR	6.88	510.30	511.09	511.09	511.15	0.007736	1.78	9.53	63.00	0.68
2	116	HAZEL	17.09	510.30	511.20	511.20	511.29	0.011420	2.39	19.02	105.71	0.85
2	115	100-YR	6.88	509.80	510.74		510.78	0.002479	1.15	9.06	27.04	0.40
2	115	HAZEL	17.09	509.80	510.92		510.98	0.004012	1.67	19.27	88.82	0.52
2	114	100-YR	6.88	509.80	510.69		510.70	0.001975	0.99	16.27	91.39	0.35
2	114	HAZEL	17.09	509.80	510.84		510.86	0.002851	1.33	33.08	122.58	0.43
2	113	100-YR	6.88	509.55	510.44	510.44	510.56	0.008913	2.10	7.67	27.78	0.75
2	113	HAZEL	17.09	509.55	510.63	510.63	510.70	0.007171	2.17	28.54	153.63	0.69
2	112	100-YR	6.88	509.70	510.28	510.27	510.29	0.006151	0.55	12.86	229.16	0.74
2	112	HAZEL	17.09	509.70	510.45		510.46	0.001702	0.31	56.77	267.65	0.21
2	111	100-YR	6.88	508.80	509.92	509.92	510.05	0.006076	2.05	8.15	35.96	0.64
2	111	HAZEL	17.09	508.80	510.17	510.17	510.32	0.007919	2.70	21.37	76.27	0.76
2	110	100-YR	6.88	508.80	509.62		509.68	0.005504	1.55	8.21	31.10	0.58
2	110	HAZEL	17.09	508.80	509.99		510.04	0.002288	1.32	23.89	55.38	0.40
2	109	100-YR	6.88	508.30	509.43		509.48	0.002952	1.44	10.79	26.58	0.45
2	109	HAZEL	17.09	508.30	509.85		509.91	0.002748	1.74	25.34	44.07	0.46
2	108	100-YR	6.88	508.05	509.21		509.31	0.004578	1.83	8.74	20.53	0.56
2	108	HAZEL	17.09	508.05	509.60		509.73	0.005301	2.41	18.56	30.72	0.64

HEC-RAS Plan: 012 River: 2 Reach: 2 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	107	100-YR	6.88	507.30	508.50	508.50	508.93	0.011842	3.00	2.77	4.28	0.91
2	107	HAZEL	17.09	507.30	509.26	509.26	509.47	0.004783	2.70	19.71	48.87	0.63
2	106	100-YR	6.88	506.80	508.10	508.10	508.22	0.004200	1.90	11.62	54.75	0.55
2	106	HAZEL	17.09	506.80	508.30	508.30	508.45	0.006468	2.60	23.50	65.10	0.70
2	105	100-YR	6.88	505.80	507.52	507.00	507.60	0.001655	1.45	14.45	56.54	0.36
2	105	HAZEL	17.09	505.80	507.92		507.96	0.001290	1.48	42.85	84.35	0.33
2	104	100-YR	6.88	505.80	506.97	506.97	507.38	0.015915	2.99	3.18	5.80	0.92
2	104	HAZEL	17.09	505.80	507.92		507.92	0.000315	0.64	91.75	150.66	0.14
2	103	100-YR	6.88	505.30	507.03	506.09	507.09	0.001258	1.08	6.98	12.24	0.27
2	103	HAZEL	17.09	505.30	507.72	506.73	507.87	0.002118	1.78	11.09	46.84	0.38
2	102.5		Culvert									
2	102	100-YR	6.88	505.23	506.94	506.04	507.00	0.002917	1.18	6.56	20.77	0.29
2	102	HAZEL	17.09	505.23	507.07	506.82	507.39	0.013090	2.64	7.36	29.36	0.62
2	101	100-YR	6.88	505.55	506.81	506.81	506.90	0.003733	1.75	14.66	95.24	0.51
2	101	HAZEL	17.09	505.55	507.01	506.96	507.08	0.004001	2.01	35.21	113.55	0.55

HEC-RAS Plan: 012 River: 2 Reach: 2-A

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	329	100-YR	2.12	513.80	514.39	514.39	514.45	0.007036	1.36	3.75	29.86	0.61
2-A	329	HAZEL	4.71	513.80	514.48	514.48	514.56	0.009288	1.76	7.12	41.14	0.72
2-A	328	100-YR	2.12	513.30	513.88	513.88	513.94	0.007169	1.36	3.53	30.38	0.62
2-A	328	HAZEL	4.71	513.30	513.98	513.98	514.05	0.008750	1.69	7.10	45.21	0.70
2-A	327	100-YR	2.12	512.55	513.16	513.16	513.24	0.008077	1.50	3.35	24.80	0.66
2-A	327	HAZEL	4.71	512.55	513.29	513.29	513.37	0.008662	1.80	7.72	43.02	0.71
2-A	326	100-YR	2.12	512.05	512.65	512.65	512.72	0.007182	1.41	3.61	29.66	0.62
2-A	326	HAZEL	4.71	512.05	512.77	512.76	512.84	0.007355	1.63	8.09	46.07	0.65
2-A	325	100-YR	2.12	511.80	512.40	512.40	512.46	0.006981	1.37	4.07	34.52	0.61
2-A	325	HAZEL	4.71	511.80	512.50	512.50	512.57	0.007833	1.65	8.86	69.26	0.67
2-A	324	100-YR	2.12	511.30	511.92	511.92	512.02	0.008971	1.59	2.53	16.04	0.70
2-A	324	HAZEL	4.71	511.30	512.08	512.08	512.15	0.007016	1.68	8.47	62.31	0.65
2-A	123	100-YR	6.65	511.05	511.91		511.91	0.000102	0.17	55.22	197.54	0.08
2-A	123	HAZEL	16.03	511.05	512.06		512.07	0.000184	0.28	93.36	275.42	0.11
2-A	122	100-YR	6.65	511.05	511.90		511.90	0.000254	0.28	46.03	203.57	0.13
2-A	122	HAZEL	16.03	511.05	512.05		512.06	0.000364	0.40	83.20	278.41	0.16
2-A	121	100-YR	6.88	511.05	511.88		511.89	0.000541	0.49	39.96	198.98	0.18
2-A	121	HAZEL	17.09	511.05	512.03		512.04	0.000745	0.65	75.94	288.63	0.22
2-A	120	100-YR	6.88	511.05	511.87		511.87	0.000555	0.49	39.33	204.05	0.18
2-A	120	HAZEL	17.09	511.05	512.01		512.02	0.000639	0.60	75.84	290.91	0.20
2-A	119	100-YR	6.88	511.05	511.84		511.84	0.001150	0.69	29.58	156.66	0.26
2-A	119	HAZEL	17.09	511.05	511.98		511.99	0.001354	0.84	55.34	213.46	0.29
2-A	118	100-YR	6.88	511.05	511.70	511.70	511.76	0.010125	1.77	10.73	79.22	0.75
2-A	118	HAZEL	17.09	511.05	511.80	511.80	511.88	0.013575	2.27	20.27	120.20	0.89
2-A	117	100-YR	6.88	510.30	511.27	511.27	511.34	0.005092	1.69	10.71	62.58	0.57
2-A	117	HAZEL	17.09	510.30	511.44		511.50	0.004813	1.85	22.08	73.20	0.57

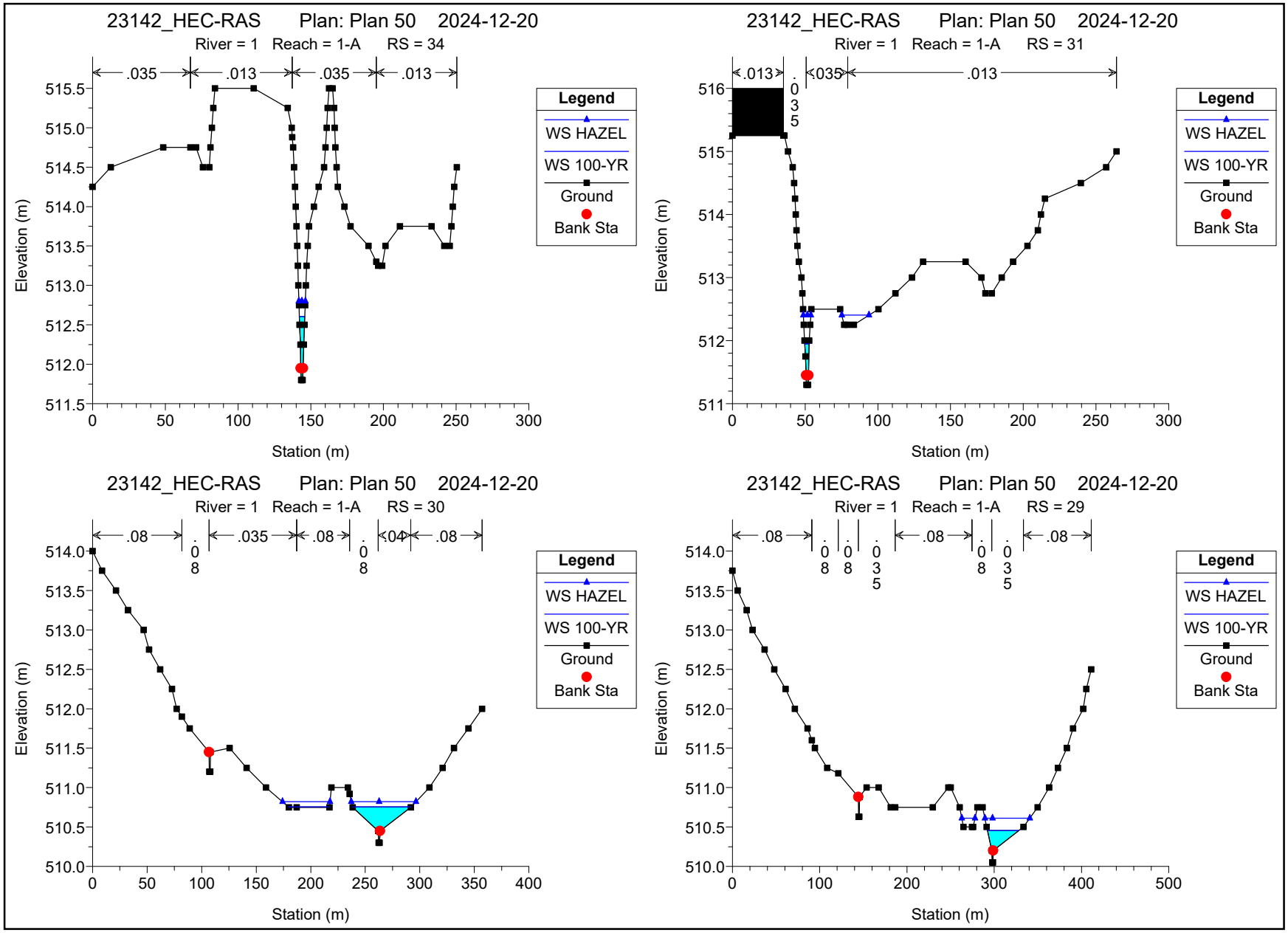
HEC-RAS Plan: 012 River: 2 Reach: 2-A (Continued)

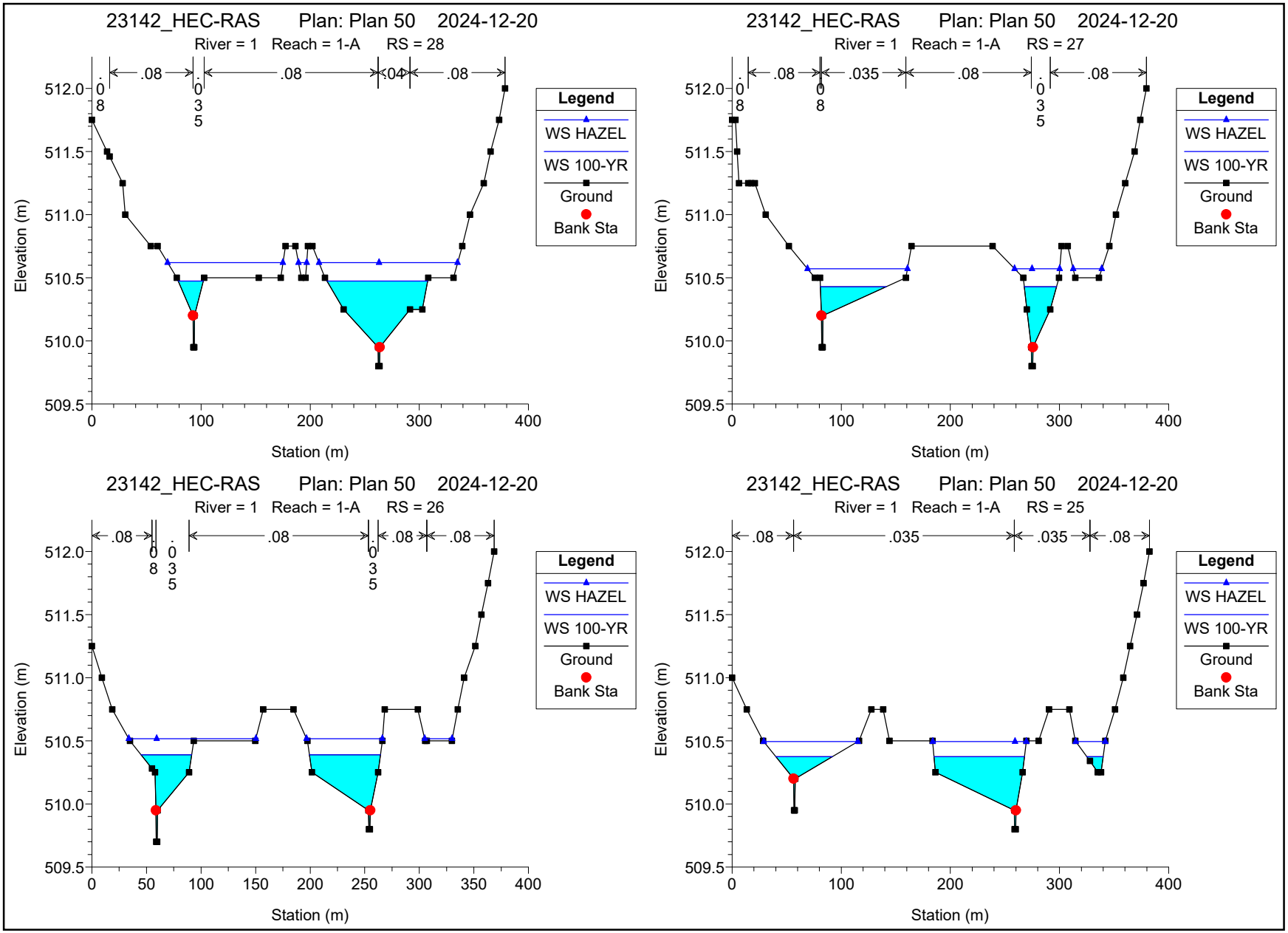
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	116	100-YR	6.88	510.30	511.09	511.09	511.15	0.007736	1.78	9.53	63.00	0.68
2-A	116	HAZEL	17.09	510.30	511.20	511.20	511.29	0.011420	2.39	19.02	105.71	0.85
2-A	115	100-YR	6.88	509.80	510.74		510.78	0.002479	1.15	9.06	27.04	0.40
2-A	115	HAZEL	17.09	509.80	510.92		510.98	0.004012	1.67	19.27	88.82	0.52
2-A	114	100-YR	6.88	509.80	510.69		510.70	0.001975	0.99	16.27	91.39	0.35
2-A	114	HAZEL	17.09	509.80	510.84		510.86	0.002851	1.33	33.08	122.58	0.43
2-A	113	100-YR	6.88	509.55	510.44	510.44	510.56	0.008913	2.10	7.67	27.78	0.75
2-A	113	HAZEL	17.09	509.55	510.63	510.63	510.70	0.007171	2.17	28.54	153.63	0.69
2-A	112	100-YR	6.88	509.70	510.28	510.27	510.29	0.006151	0.55	12.86	229.16	0.74
2-A	112	HAZEL	17.09	509.70	510.45		510.46	0.001702	0.31	56.77	267.65	0.21
2-A	111	100-YR	6.88	508.80	509.92	509.92	510.05	0.006076	2.05	8.15	35.96	0.64
2-A	111	HAZEL	17.09	508.80	510.17	510.17	510.32	0.007919	2.70	21.37	76.27	0.76
2-A	110	100-YR	6.88	508.80	509.62		509.68	0.005504	1.55	8.21	31.10	0.58
2-A	110	HAZEL	17.09	508.80	509.99		510.04	0.002288	1.32	23.89	55.38	0.40
2-A	109	100-YR	6.88	508.30	509.43		509.48	0.002952	1.44	10.79	26.58	0.45
2-A	109	HAZEL	17.09	508.30	509.85		509.91	0.002748	1.74	25.34	44.07	0.46
2-A	108	100-YR	6.88	508.05	509.21		509.31	0.004578	1.83	8.74	20.53	0.56
2-A	108	HAZEL	17.09	508.05	509.60		509.73	0.005301	2.41	18.56	30.72	0.64
2-A	107	100-YR	6.88	507.30	508.50	508.50	508.93	0.011842	3.00	2.77	4.28	0.91
2-A	107	HAZEL	17.09	507.30	509.26	509.26	509.47	0.004783	2.70	19.71	48.87	0.63
2-A	106	100-YR	6.88	506.80	508.10	508.10	508.22	0.004200	1.90	11.62	54.75	0.55
2-A	106	HAZEL	17.09	506.80	508.30	508.30	508.45	0.006468	2.60	23.50	65.10	0.70
2-A	105	100-YR	6.88	505.80	507.52	507.00	507.60	0.001657	1.45	14.44	56.53	0.36
2-A	105	HAZEL	17.09	505.80	508.21		508.22	0.000360	0.85	69.21	102.24	0.18
2-A	104	100-YR	6.88	505.80	506.97	506.97	507.38	0.015915	2.99	3.18	5.80	0.92

HEC-RAS Plan: 012 River: 2 Reach: 2-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	104	HAZEL	17.09	505.80	508.20		508.21	0.000084	0.36	138.83	174.52	0.08
2-A	103	100-YR	6.88	505.30	507.11	506.09	507.16	0.001048	1.02	7.48	15.31	0.25
2-A	103	HAZEL	17.09	505.30	508.06	506.73	508.17	0.001269	1.52	13.17	153.05	0.30
2-A	102.5		Culvert									
2-A	102	100-YR	6.88	505.23	506.94	506.04	507.00	0.002917	1.18	6.56	20.77	0.29
2-A	102	HAZEL	17.09	505.23	507.07	506.82	507.39	0.013088	2.64	7.36	29.36	0.62
2-A	101	100-YR	6.88	505.55	506.81	506.81	506.90	0.003733	1.75	14.66	95.24	0.51
2-A	101	HAZEL	17.09	505.55	507.01	506.95	507.08	0.004001	2.01	35.21	113.55	0.55

Figure B.1 Existing Cross Sections

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River = 1 Reach = 1-A RS = 28
.08
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.04
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 27
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 26
.08
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 25
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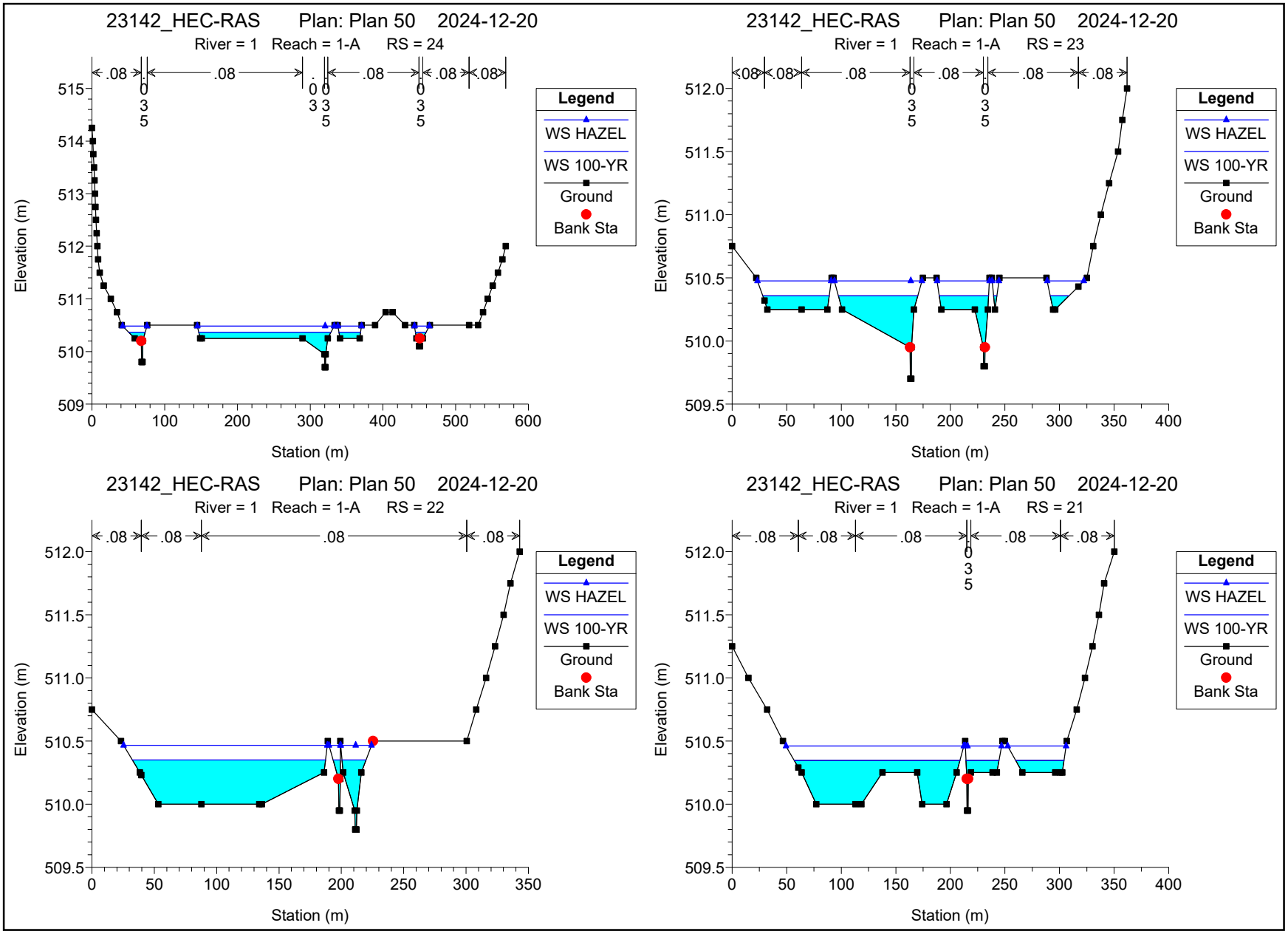
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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0 3 5
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WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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River = 1 Reach = 1-A RS = 21
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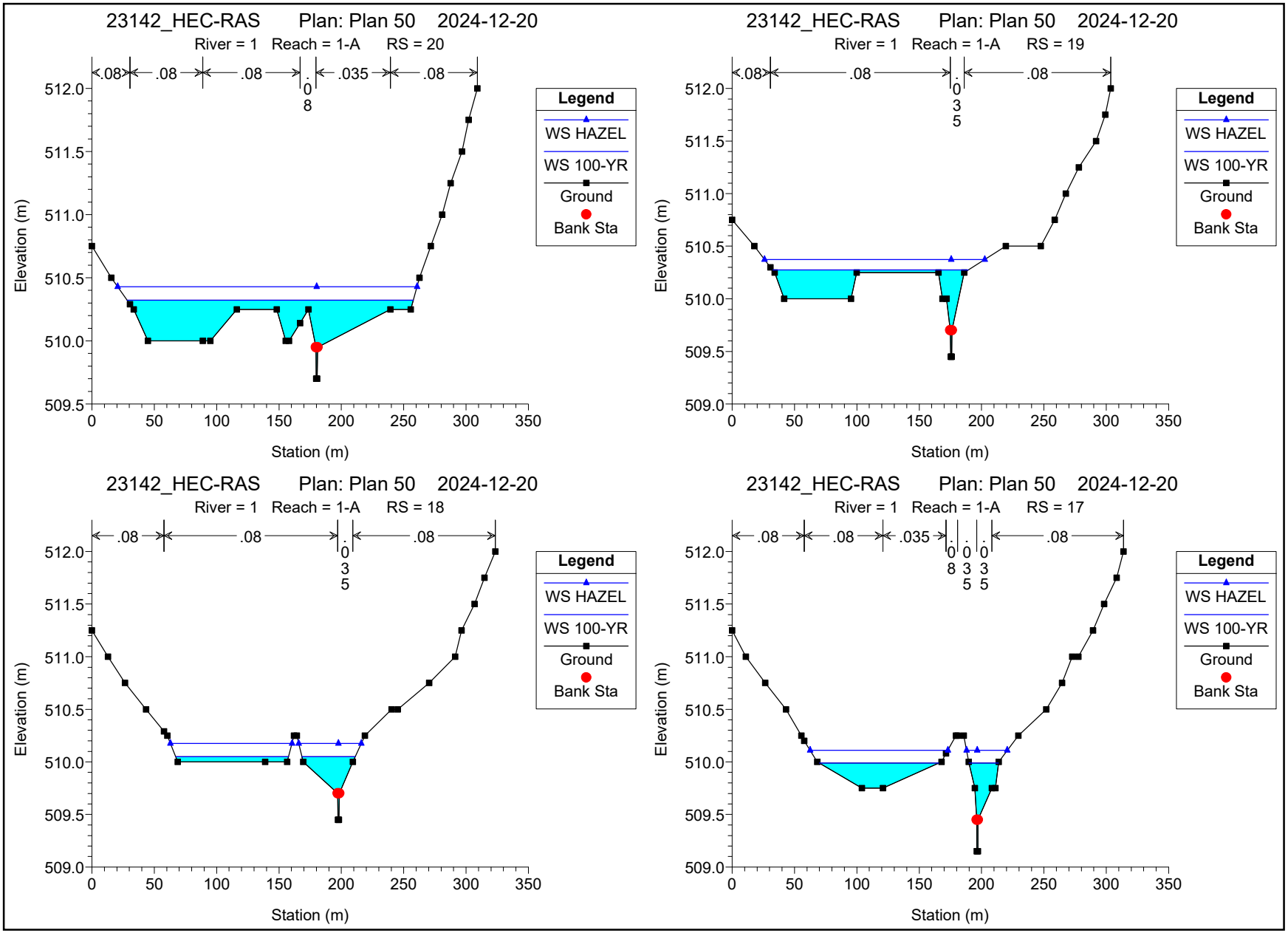
0 3 5
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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River = 1 Reach = 1-A RS = 19
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 18
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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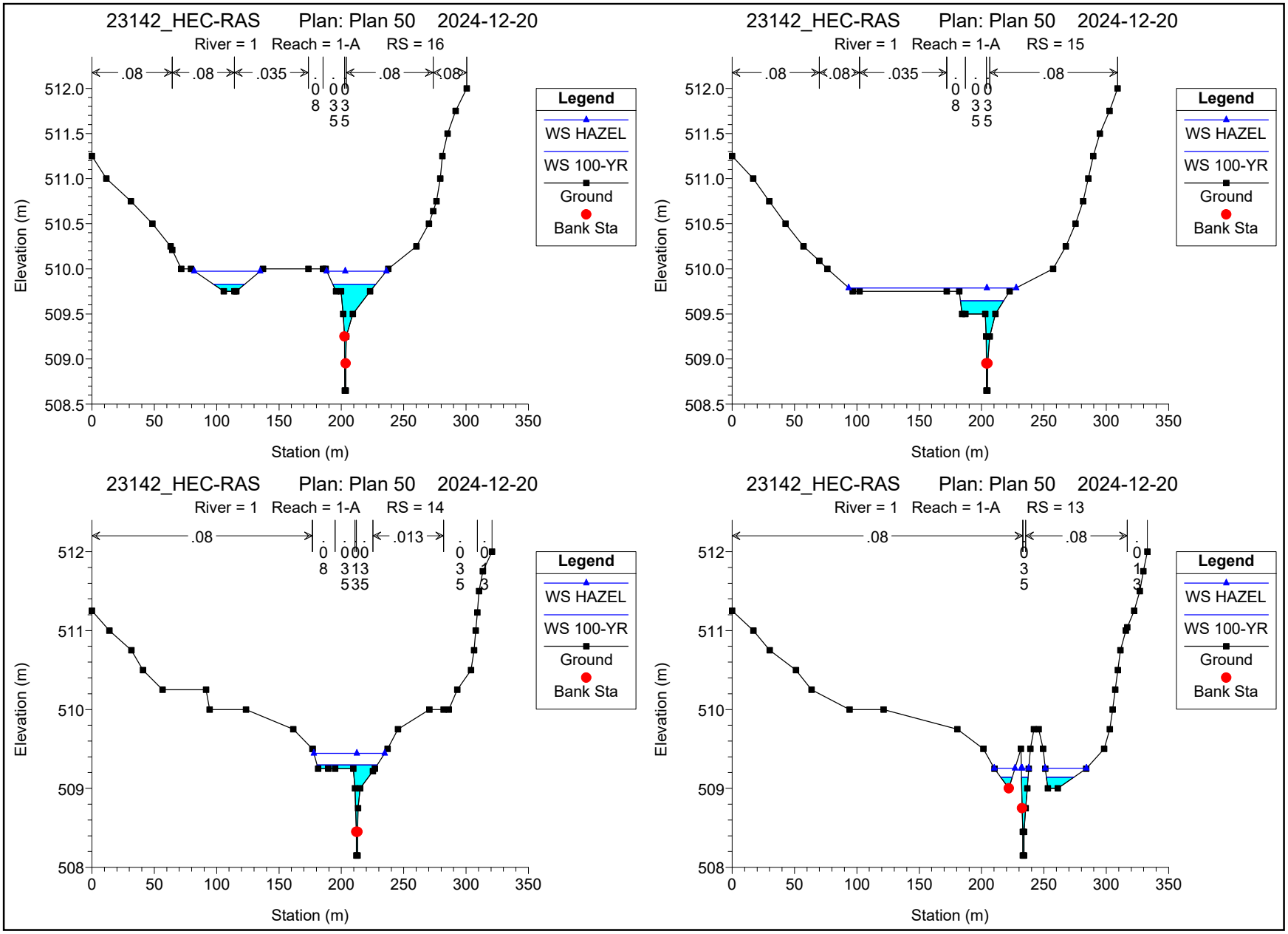
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta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.08 .08 .035 .08 .08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 15
.08 .08 .035 .08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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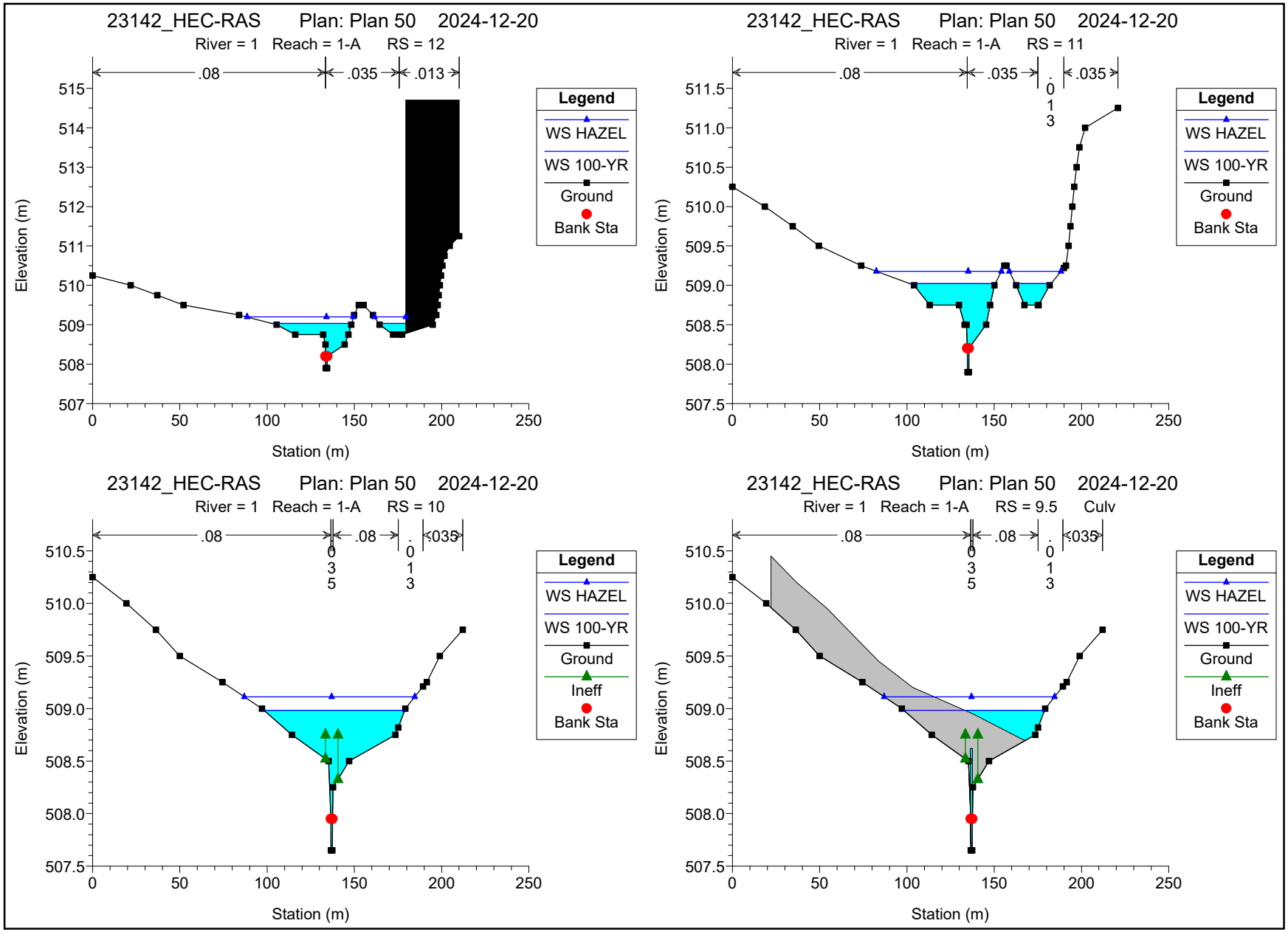
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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.08
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.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 11
.08
.035
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 10
.08
.035
.08
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 9.5 Culv
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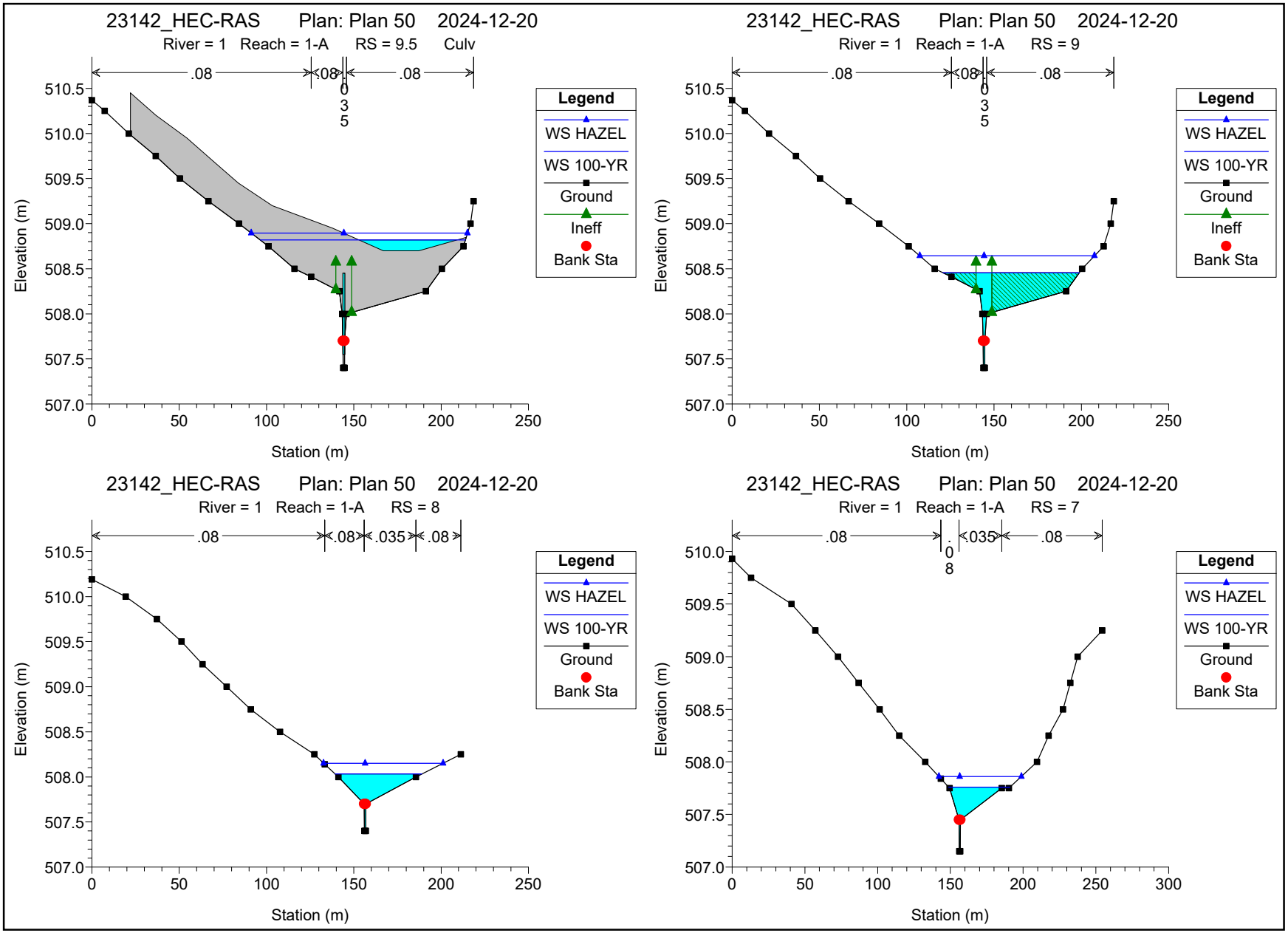
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta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.08
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
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23142_HEC-RAS Plan: Plan 50 2024-12-20
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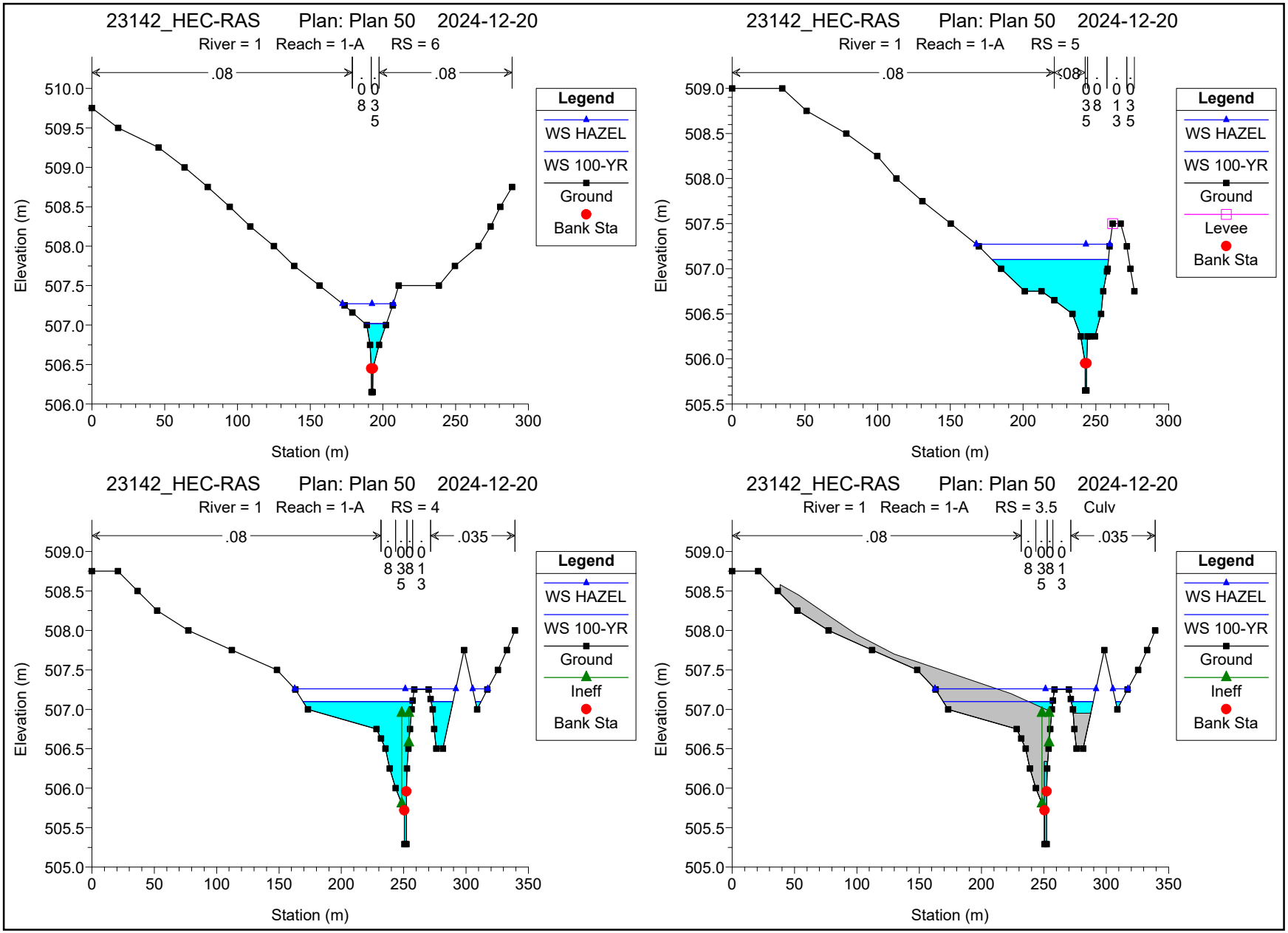
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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River = 1 Reach = 1-A RS = 5
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
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.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 3.5 Culv
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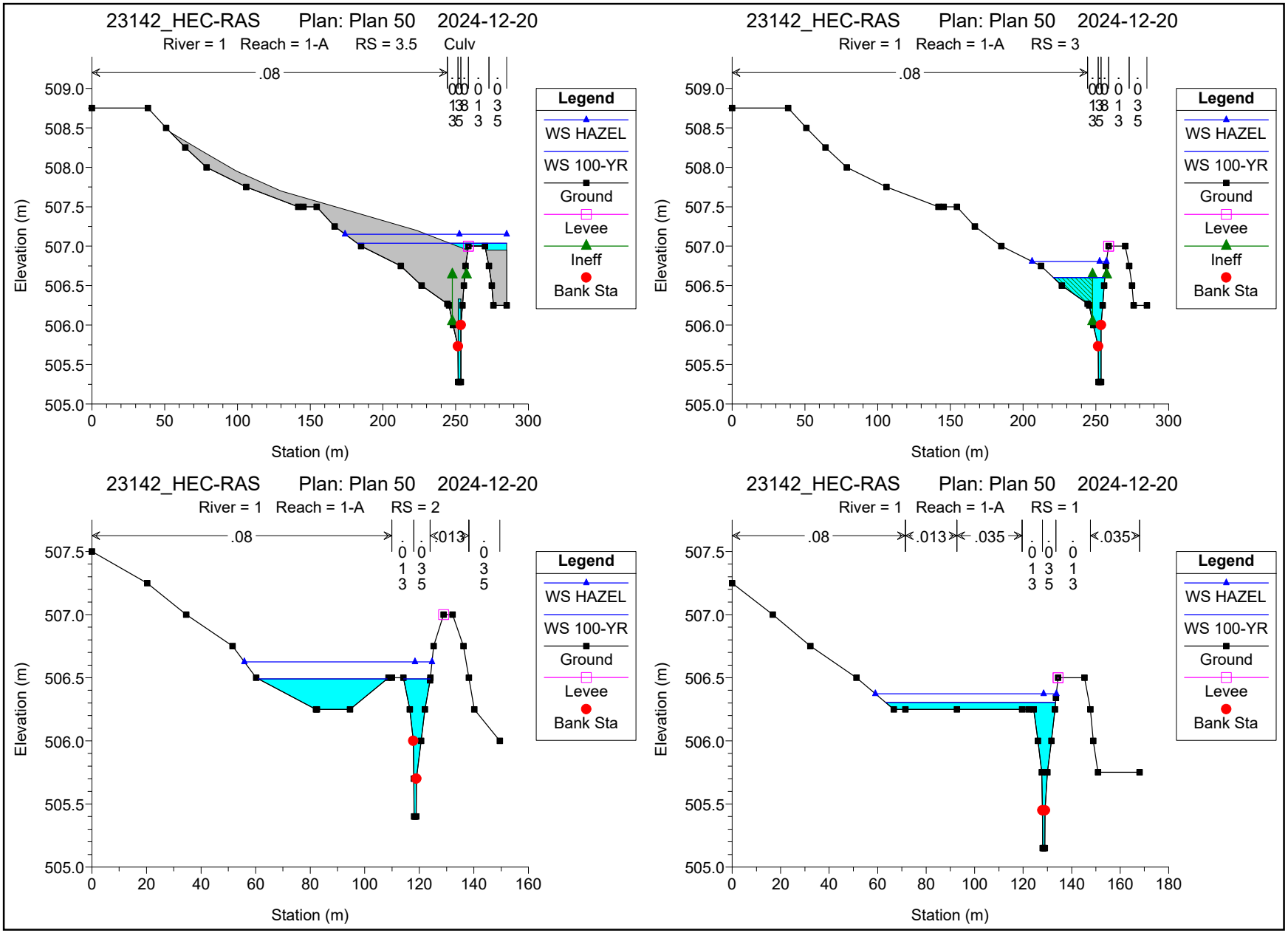
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)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Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
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WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
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.08
.013
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1-A RS = 1
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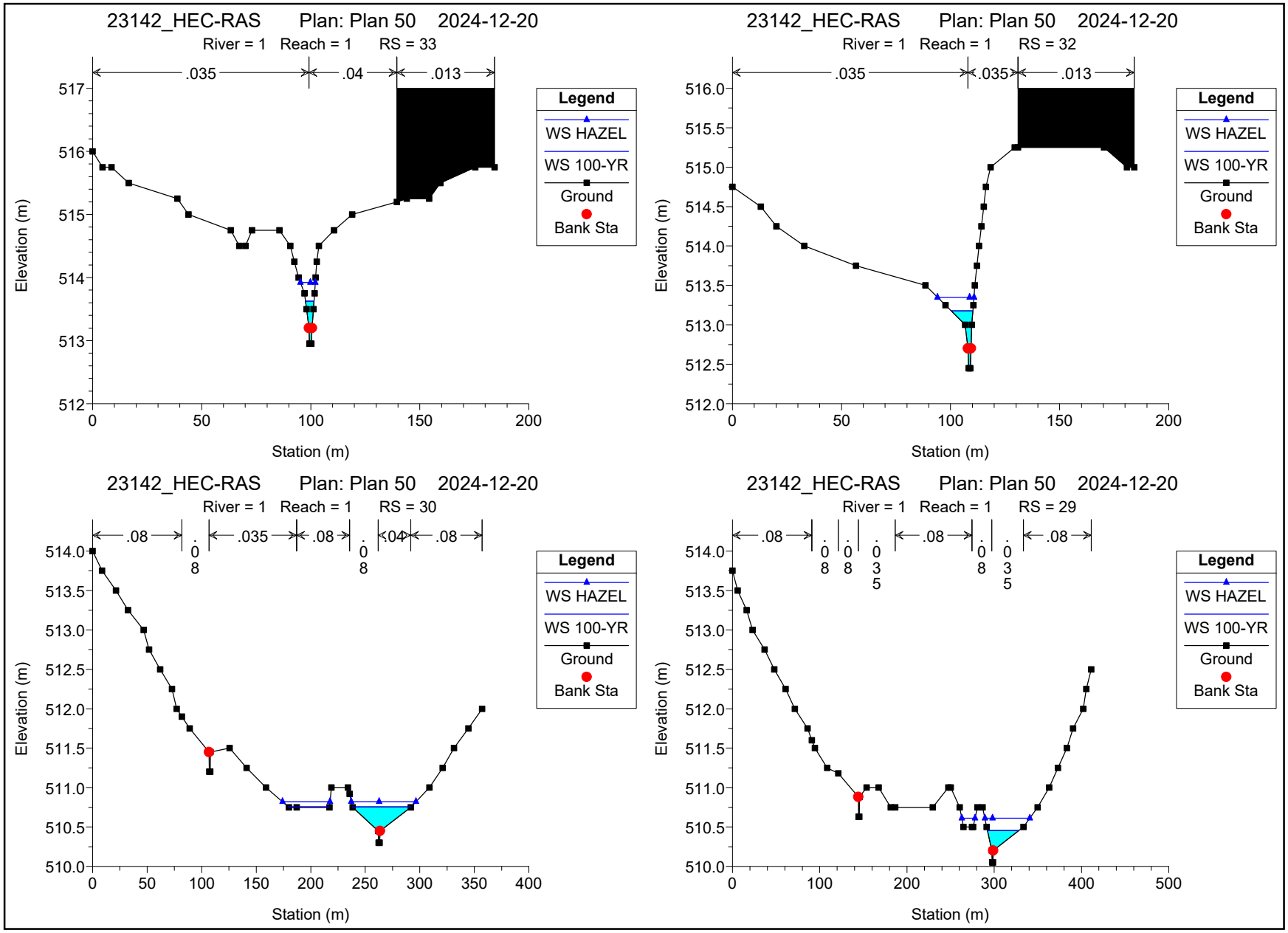
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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.08
.08
.04
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 29
.08
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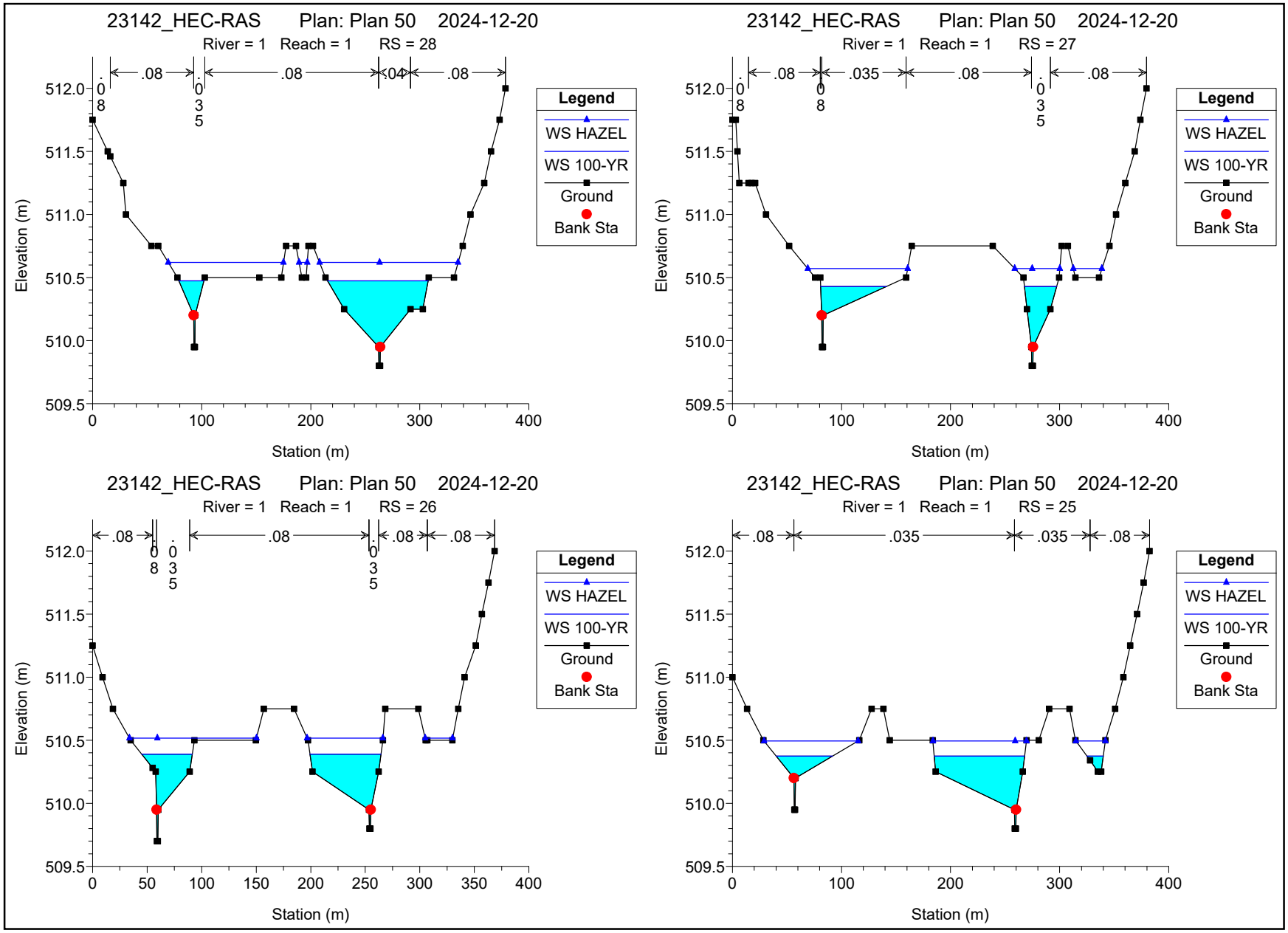
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 27
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.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 26
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.08
.035
.08
.035
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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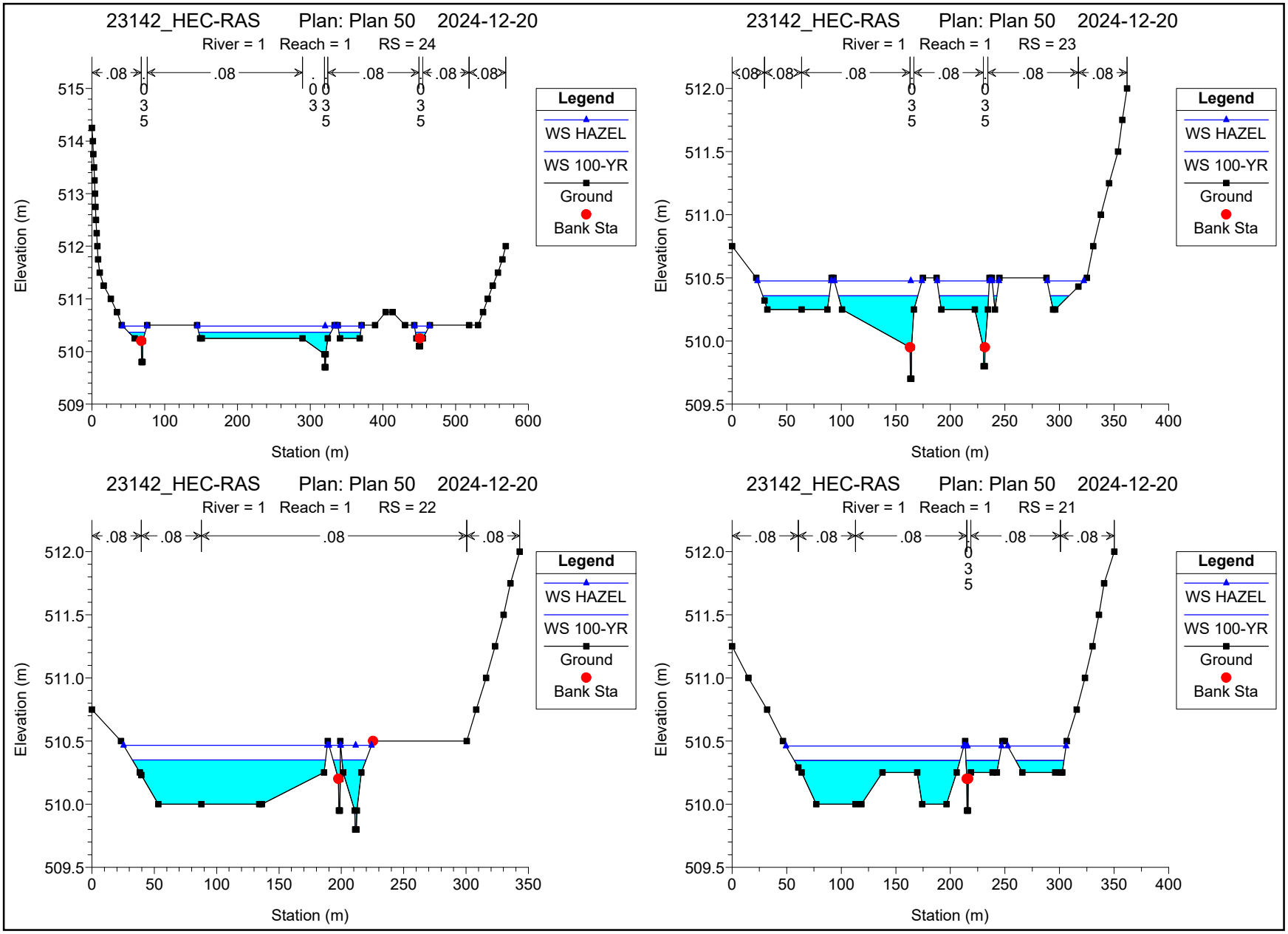
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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0 3 5
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 21
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Legend
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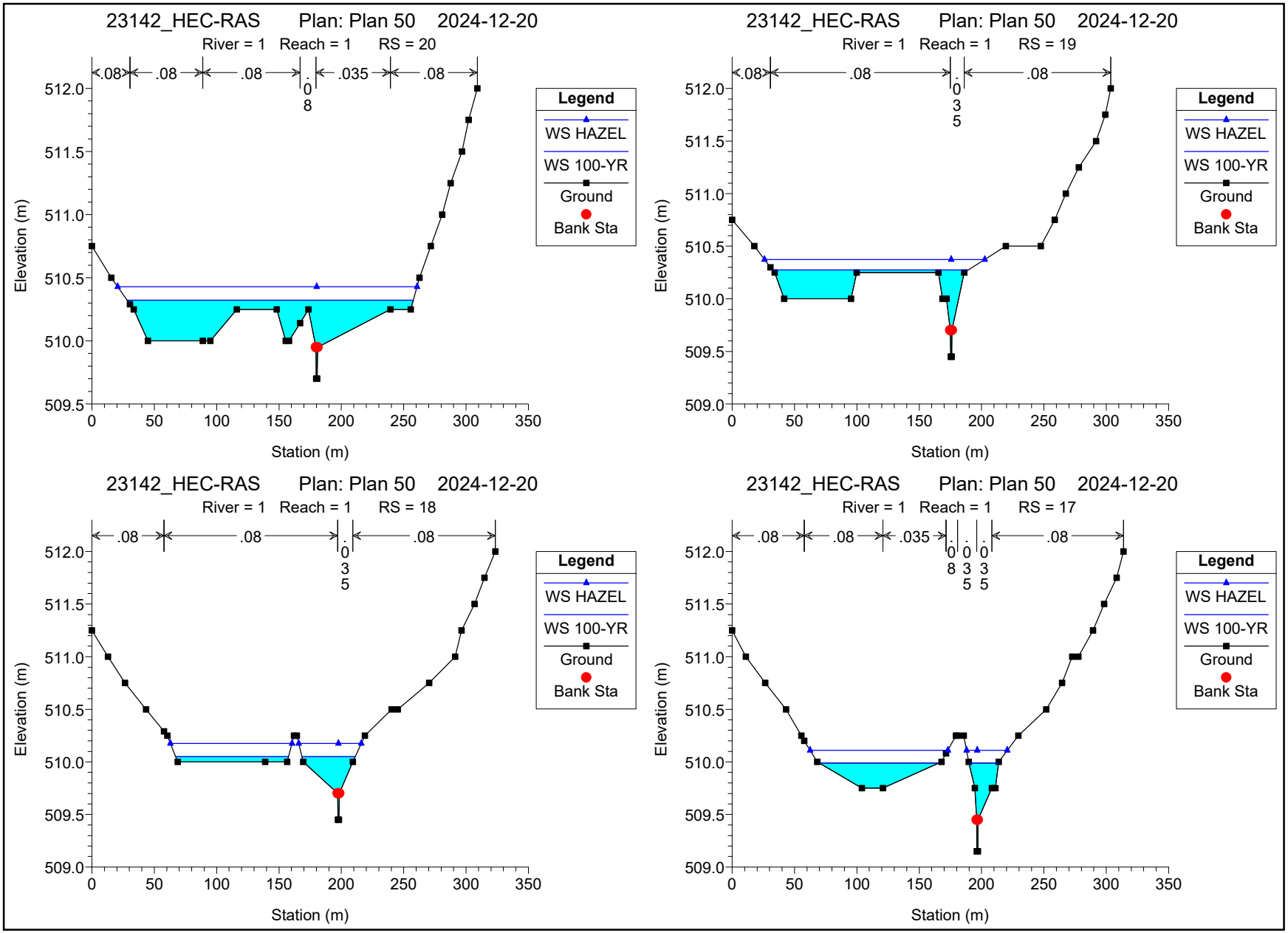
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
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.08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 18
.08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
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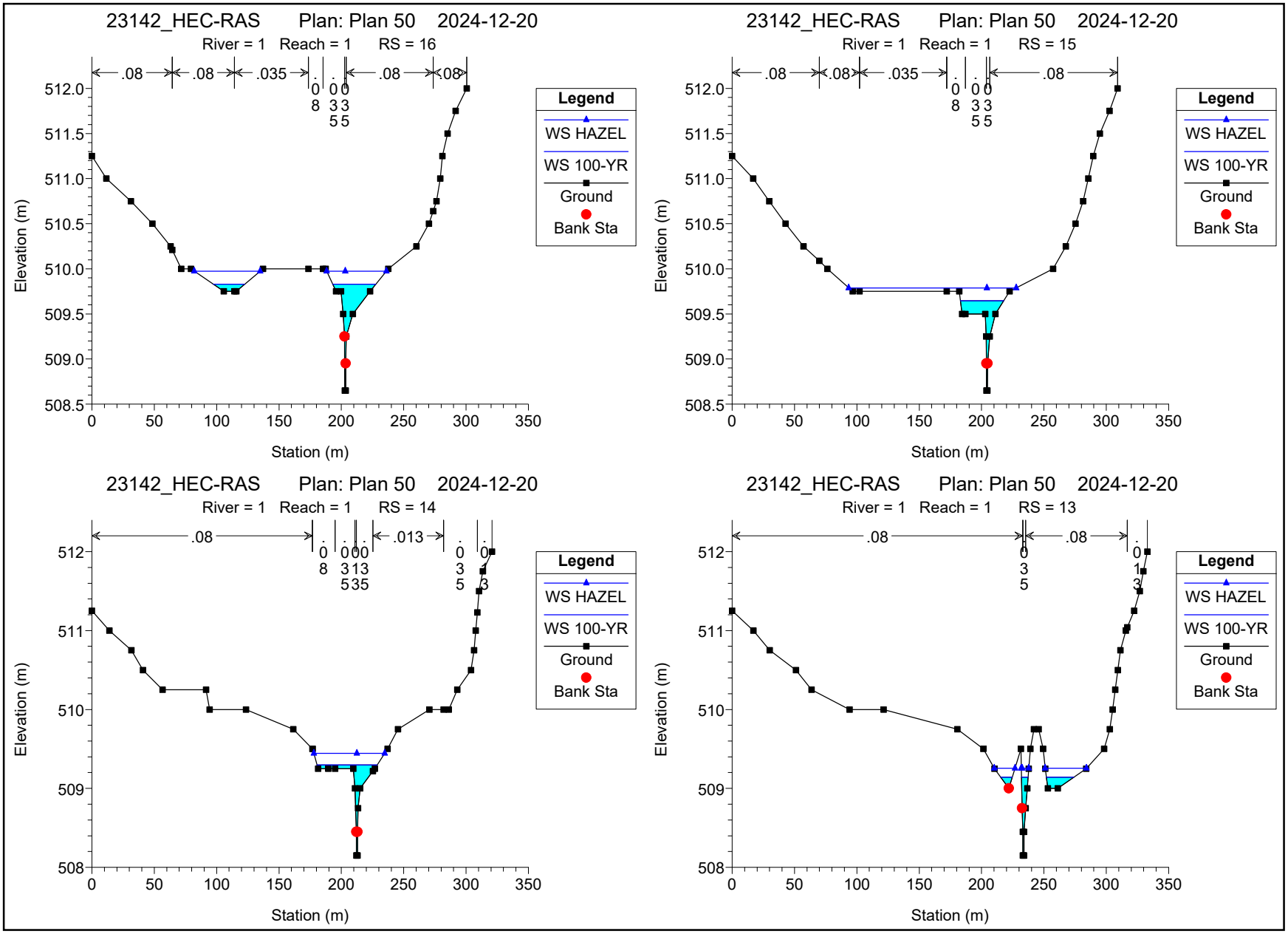
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 14
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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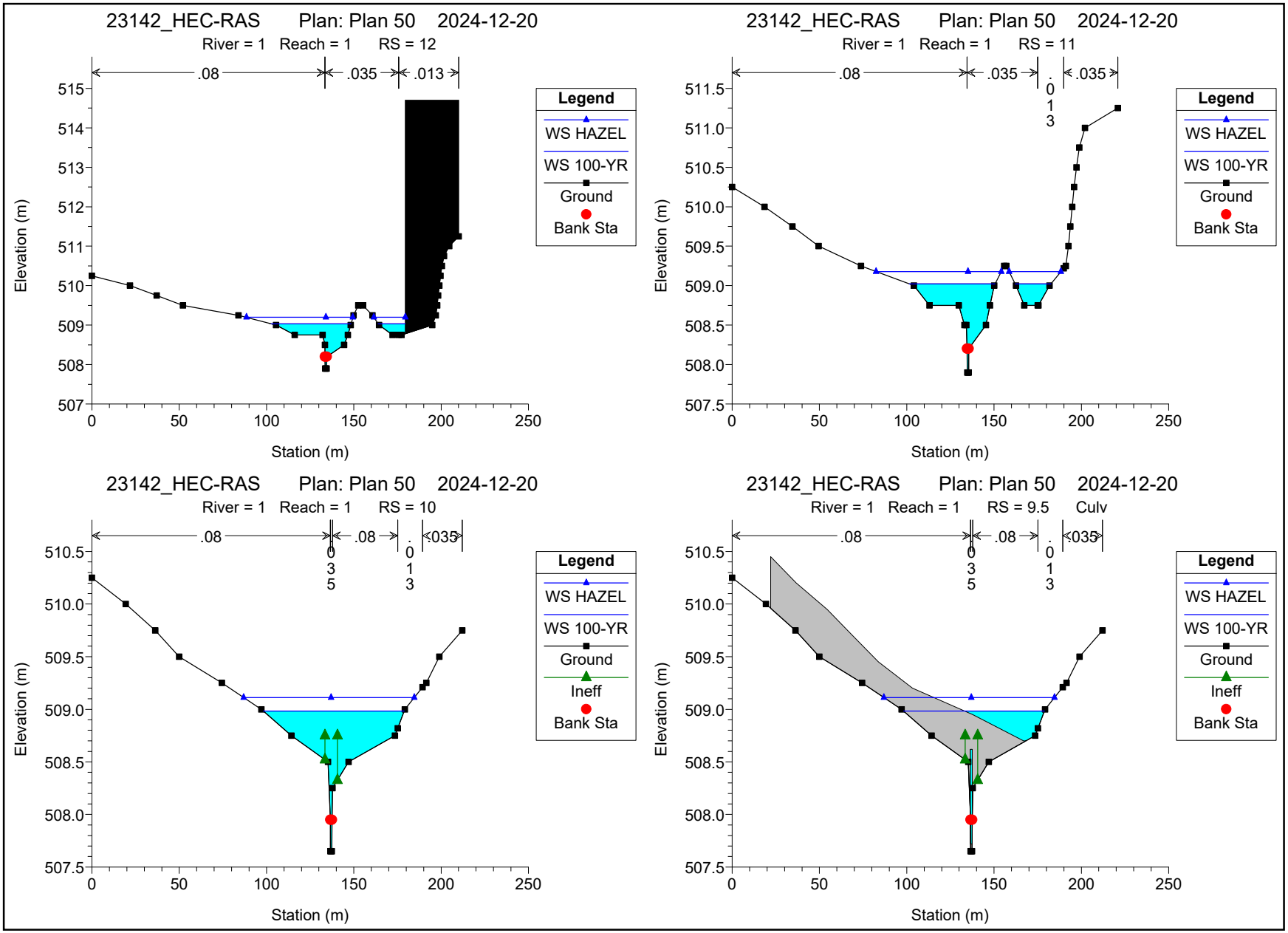
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 10
.08
.035
.08
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 9.5 Culv
.08
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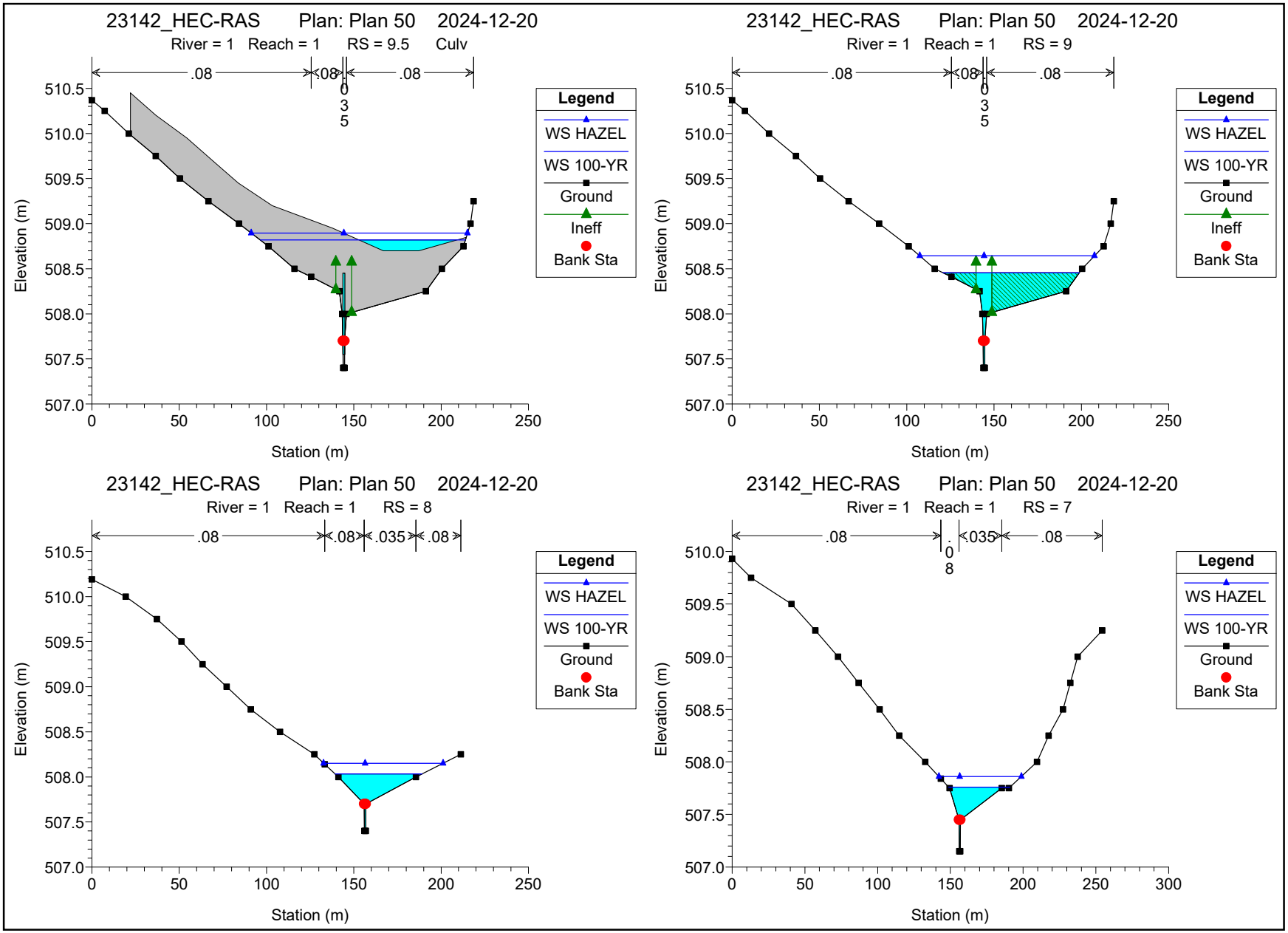
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta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.08
.08
.08
0
3
5
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
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.08
.08
.08
0
3
5
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 8
.08
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 7
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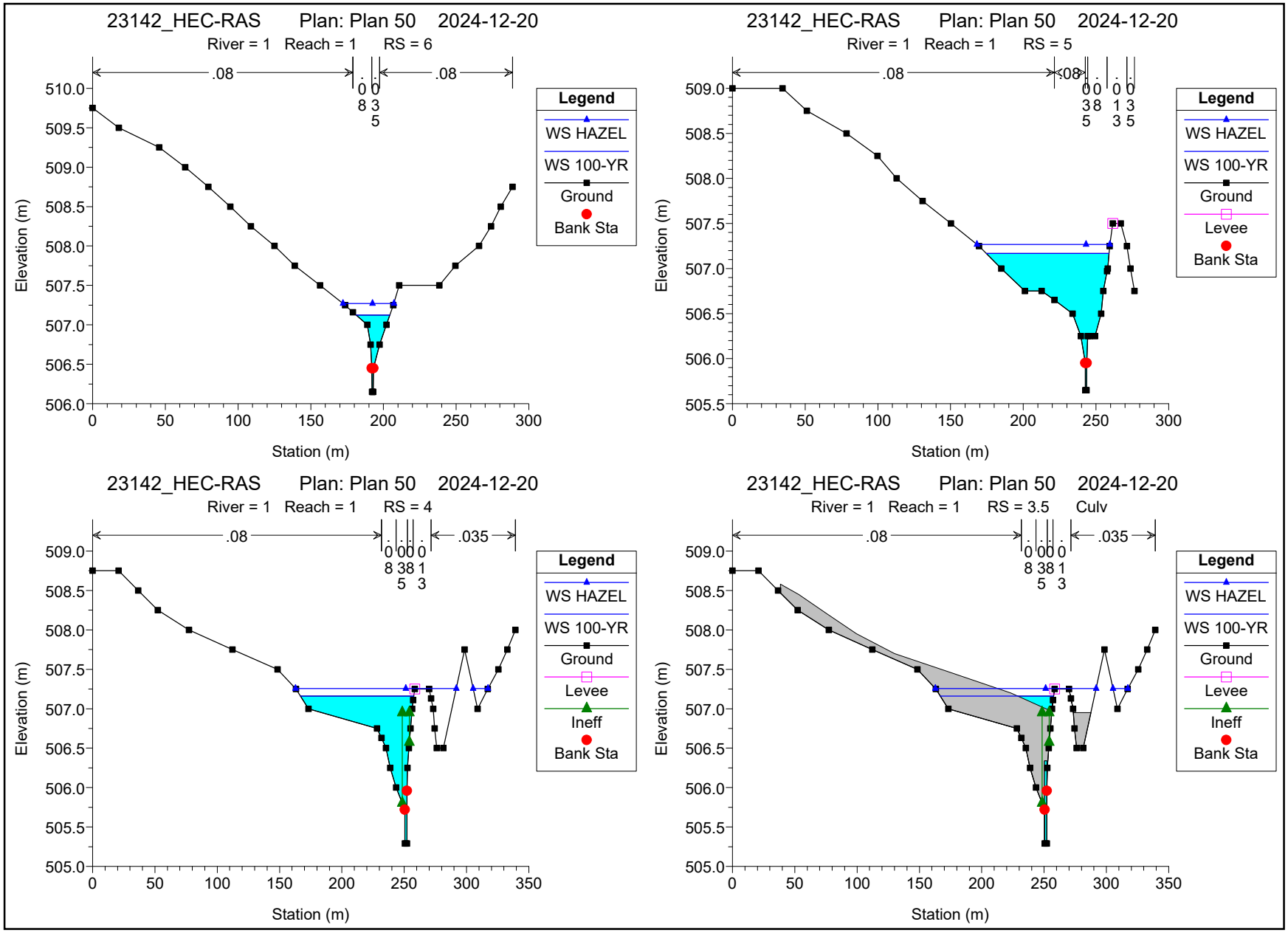
8
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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River = 1 Reach = 1 RS = 6
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 5
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 4
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 3.5 Culv
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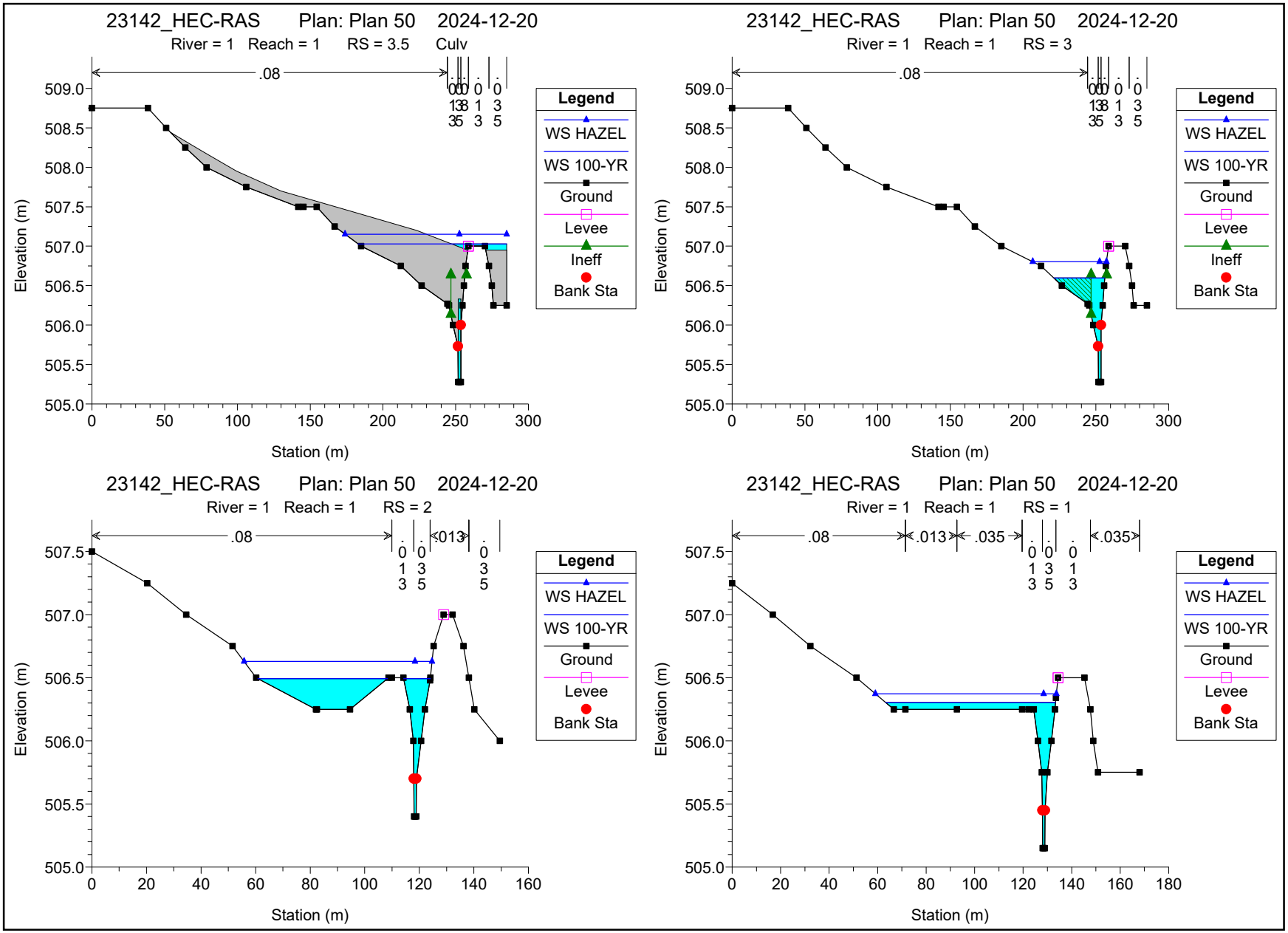
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)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River = 1 Reach = 1 RS = 3.5 Culv
.08
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 3
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Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 2
.08
.013
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 1 Reach = 1 RS = 1
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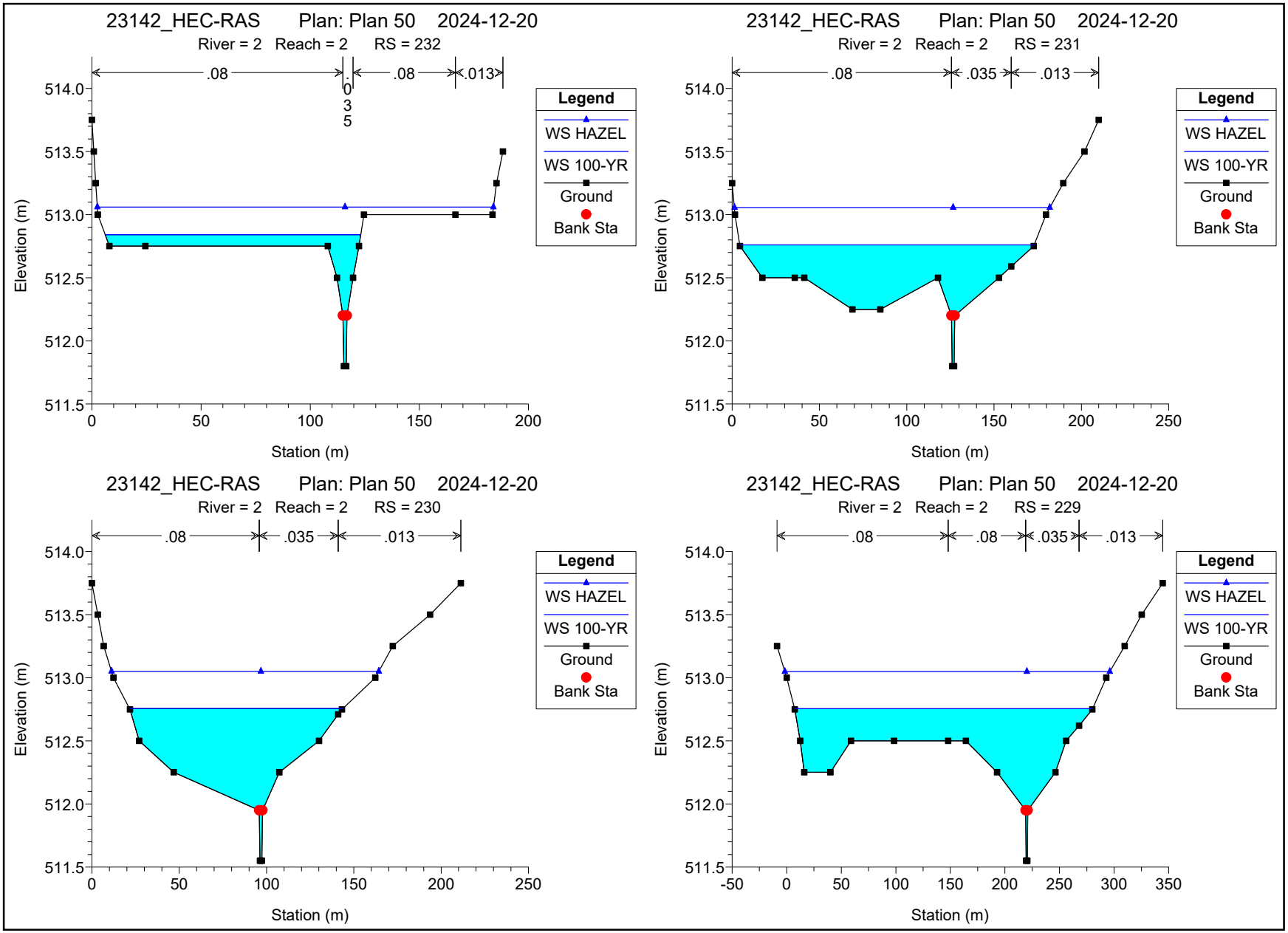
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)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River = 2 Reach = 2 RS = 232
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 231
.08
.035
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 230
.08
.035
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 229
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.08
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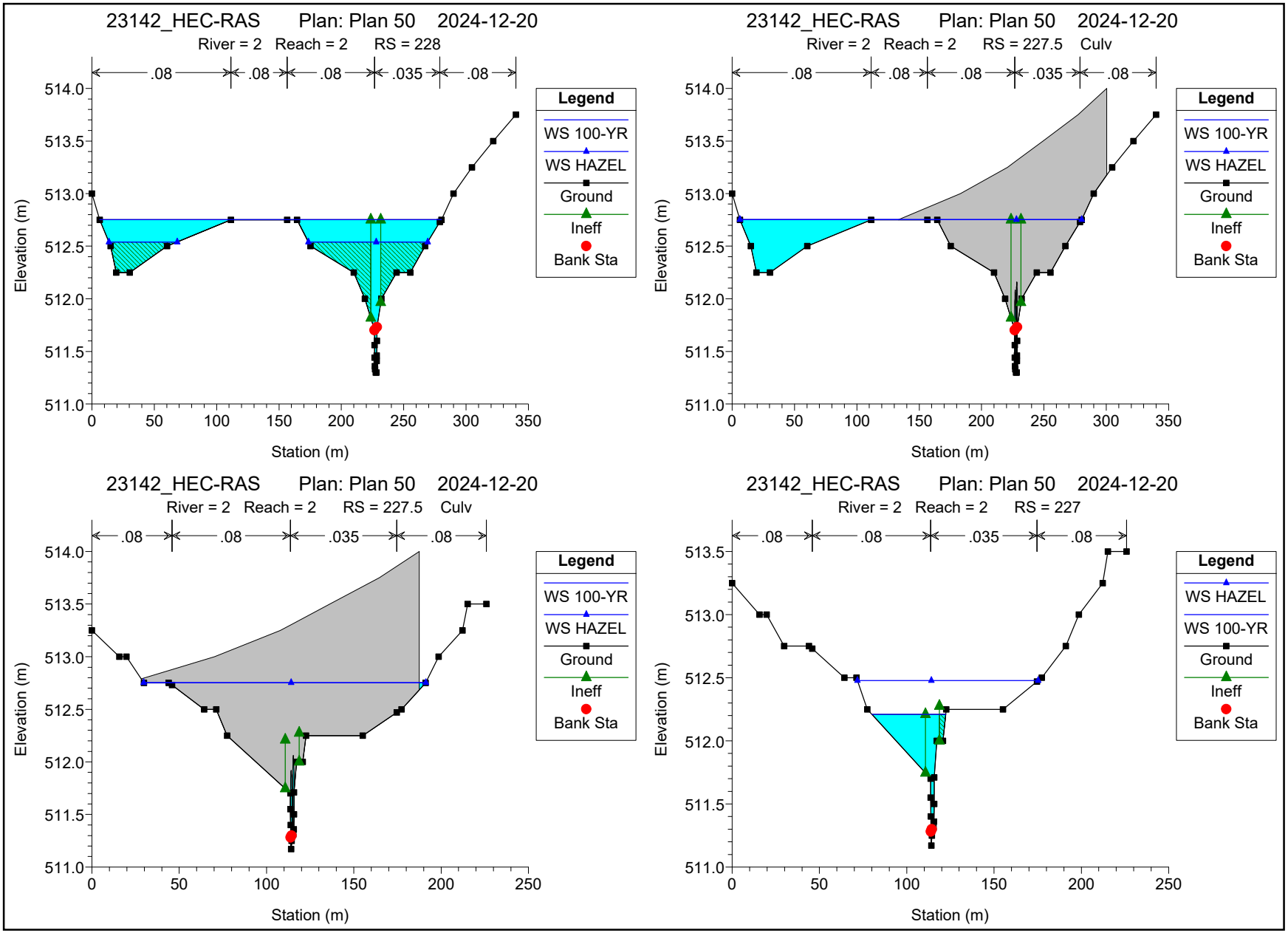
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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River = 2 Reach = 2 RS = 228
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Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 227.5 Culv
.08 .08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 227.5 Culv
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 227
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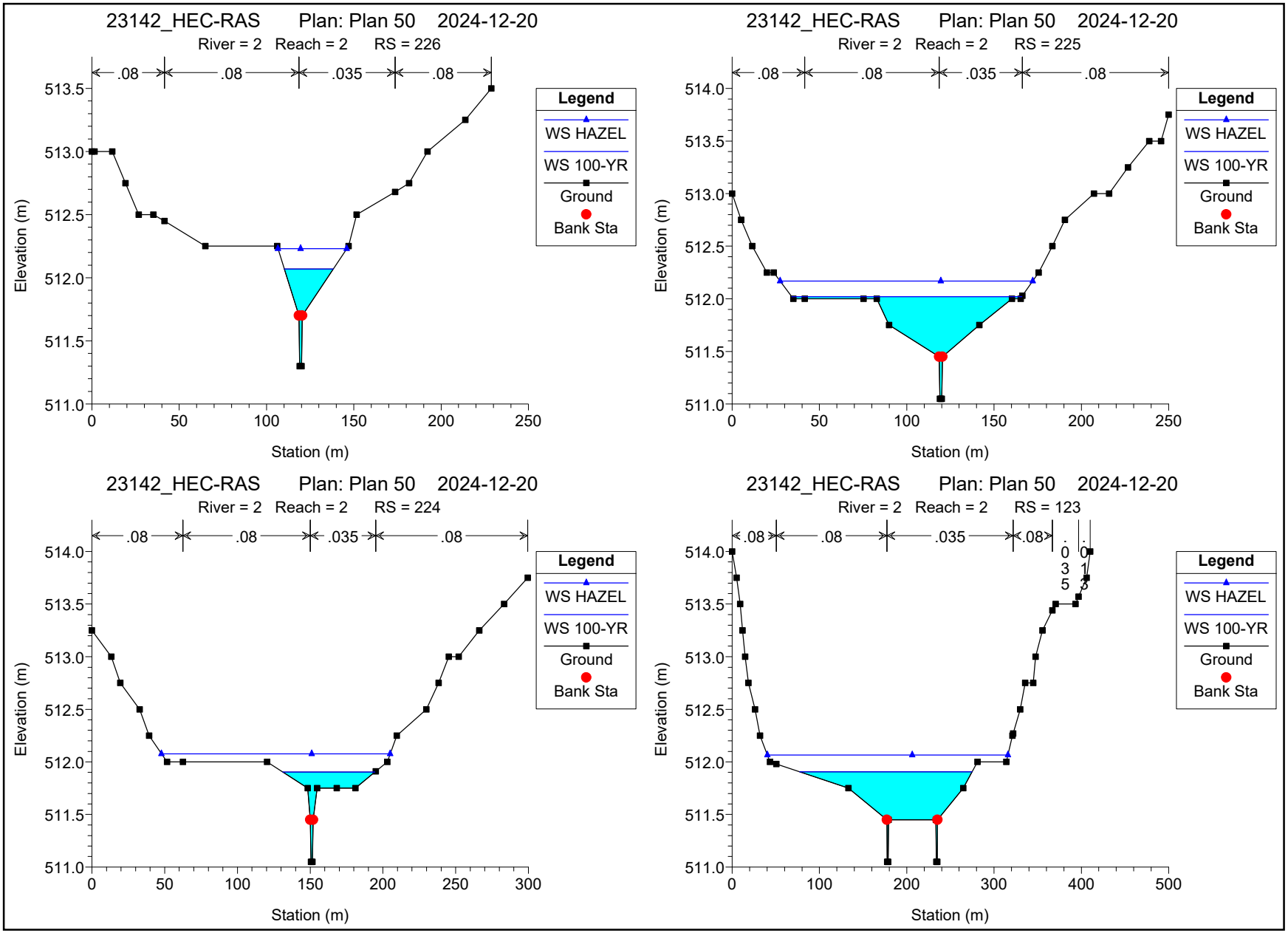
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta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River = 2 Reach = 2 RS = 226
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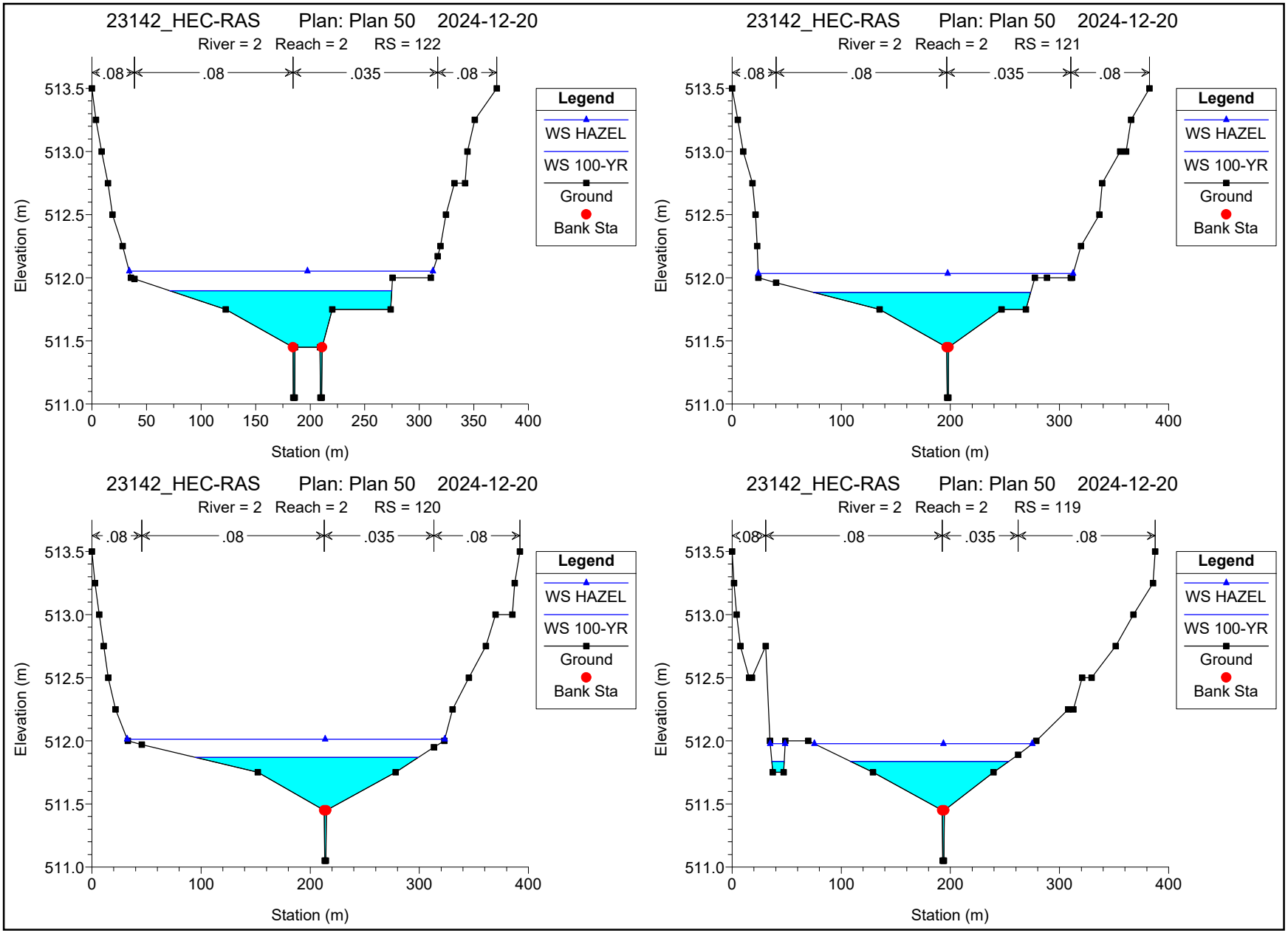
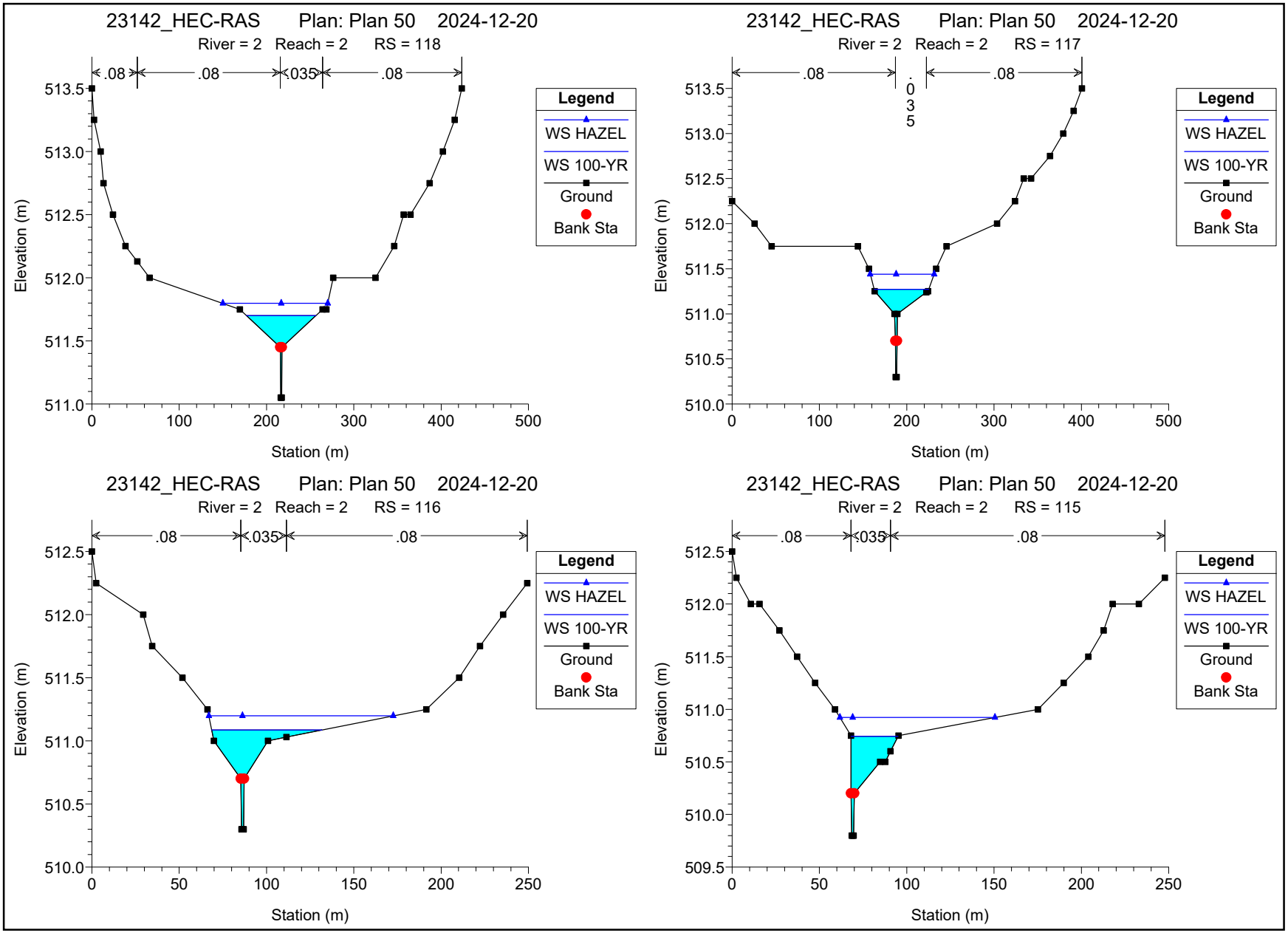
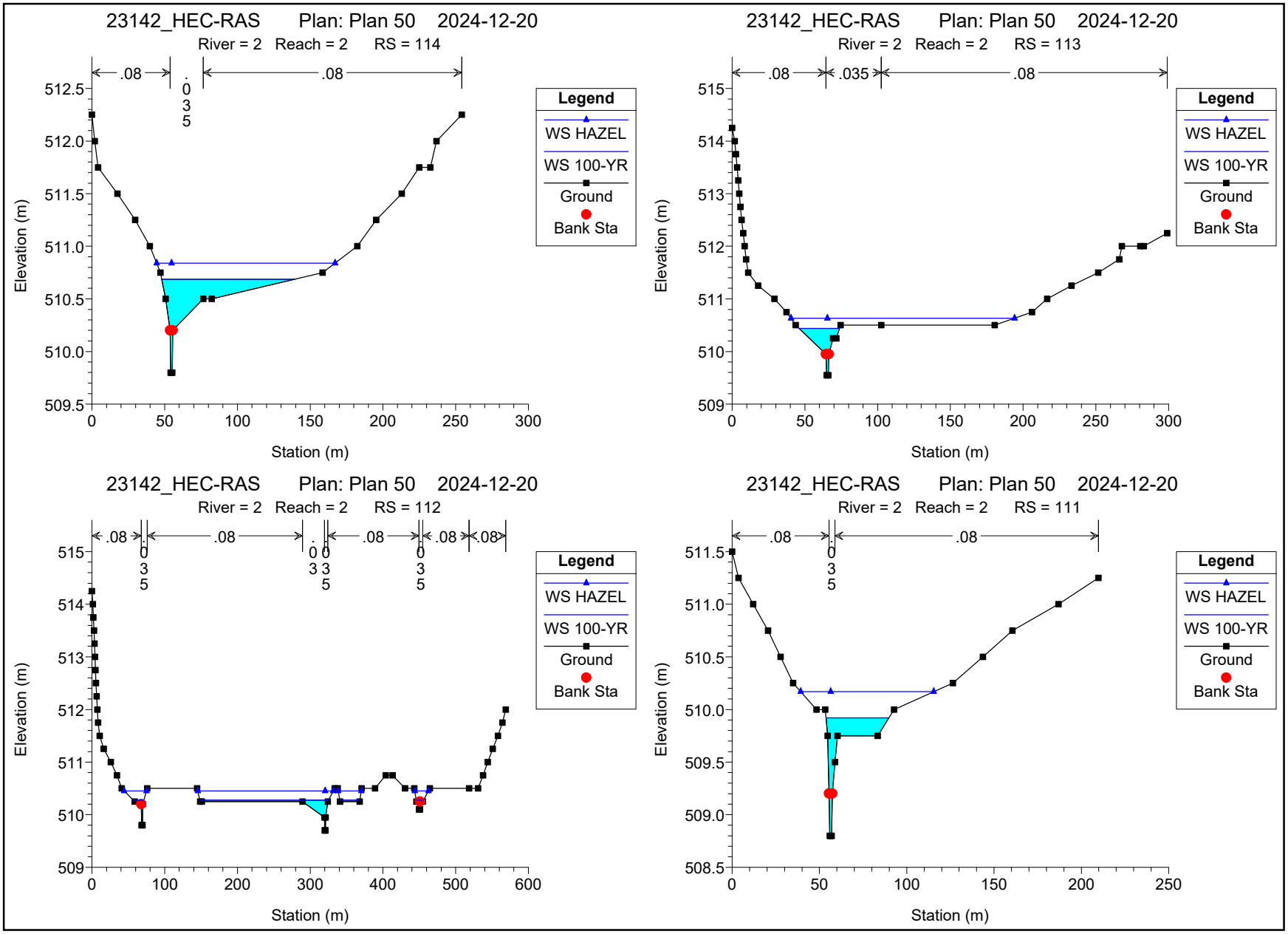
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 225
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 224
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 123
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 122
.08
.08
.035
.08
513.5
513.0
512.5
512.0
511.5
511.0
Elevation (m)
0
50
100
150
200
250
300
350
400
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 121
.08
.08
.035
.08
513.5
513.0
512.5
512.0
511.5
511.0
Elevation (m)
0
100
200
300
400
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 120
.08
.08
.035
.08
513.5
513.0
512.5
512.0
511.5
511.0
Elevation (m)
0
100
200
300
400
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 119
.08
.08
.035
.08
513.5
513.0
512.5
512.0
511.5
511.0
Elevation (m)
0
100
200
300
400
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 118
.08
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 117
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 116
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 115
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 114
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 113
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 112
.08
.035
.08
.035
.08
.035
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 111
.08
.035
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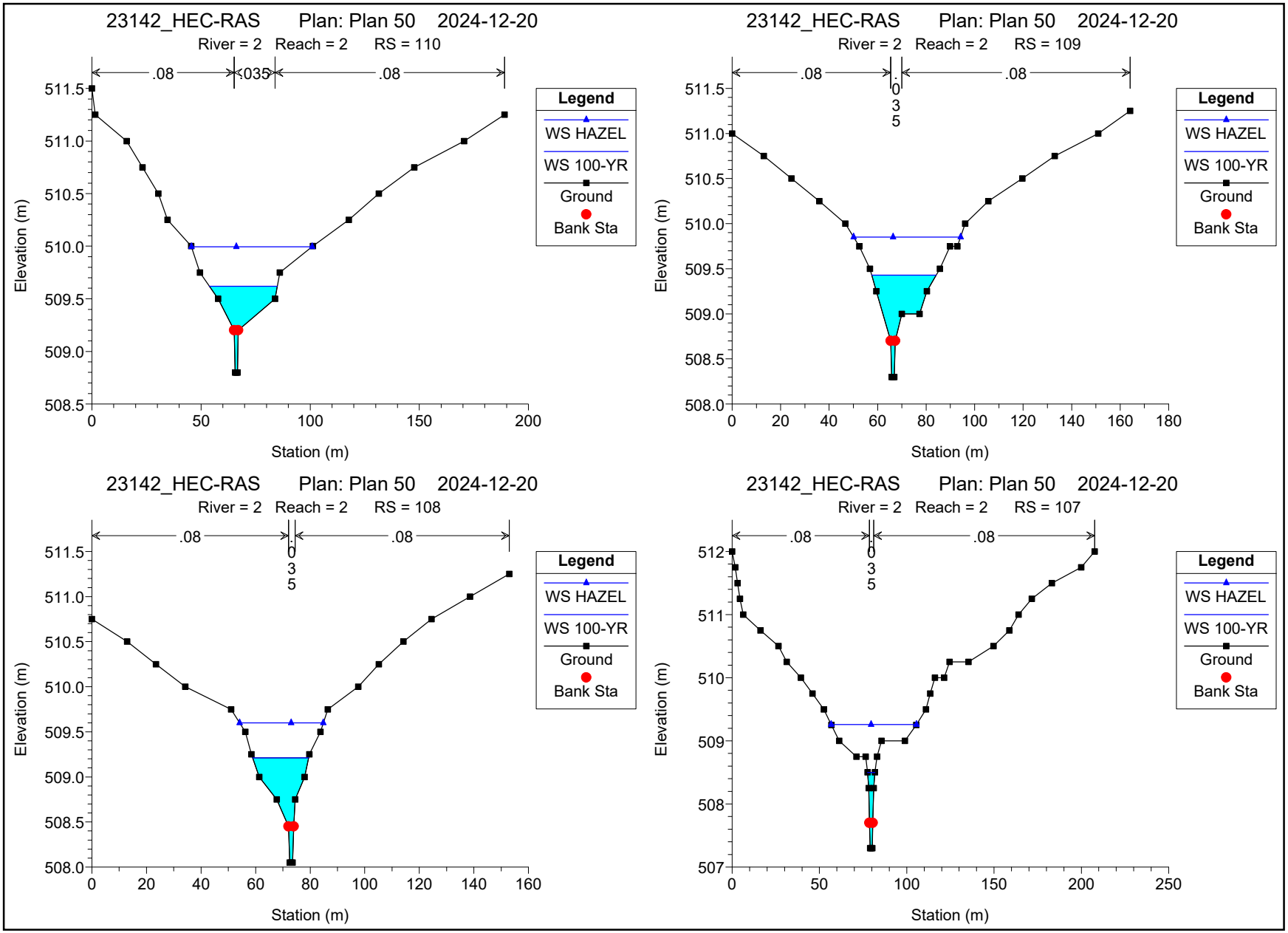
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 110
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 109
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 108
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 107
.08
.035
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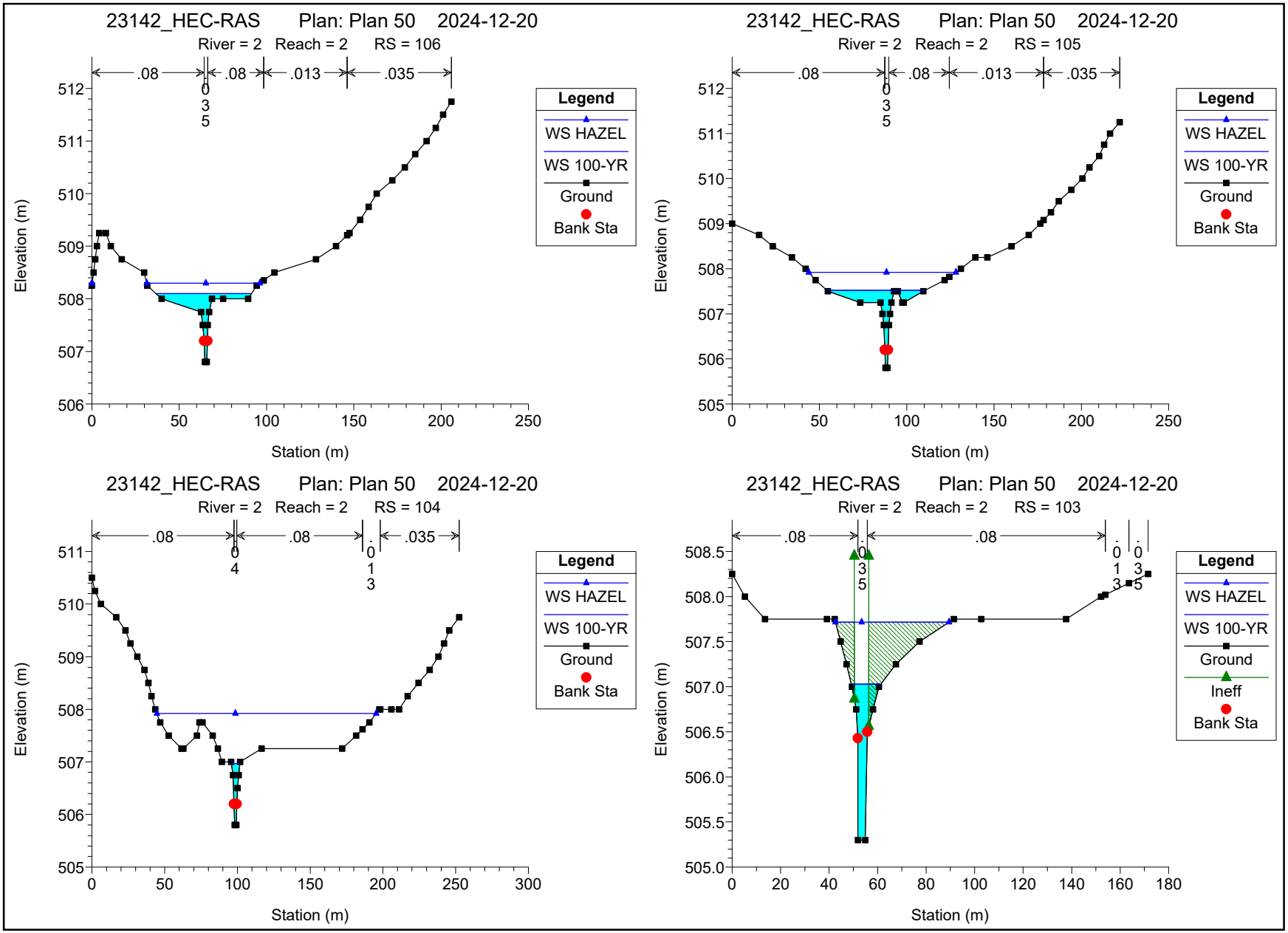
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta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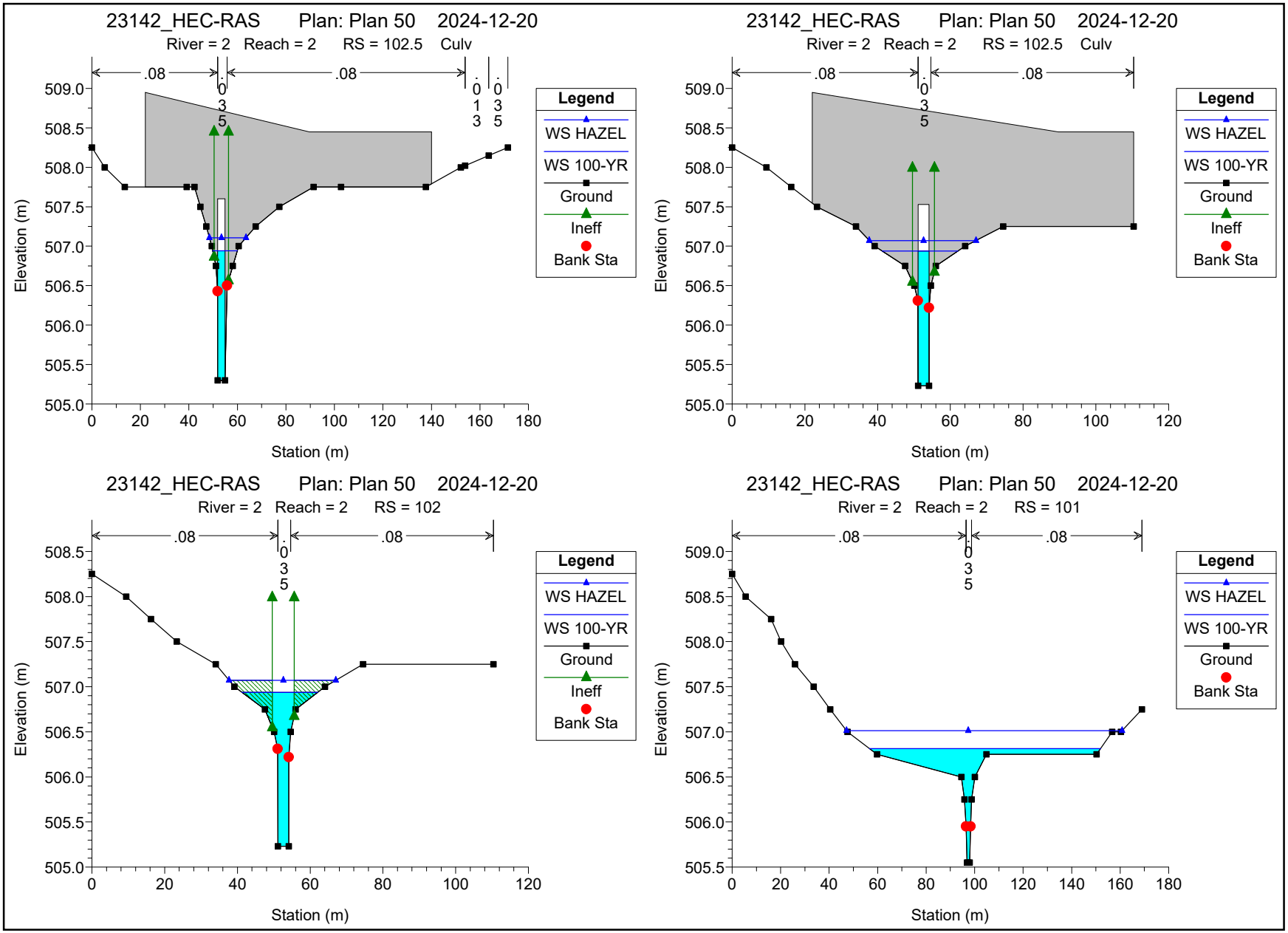
River = 2 Reach = 2 RS = 106
.08 .08 .013 .035
0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 105
.08 .08 .013 .035
0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 104
.08 .08 .035
0 4
. 0 1 3
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 103
.08 .08
. 0 3 5
. 0 1 3
. 0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 102.5 Culv
.08
.08
.035
.013
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 102.5 Culv
.08
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 102
.08
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2 RS = 101
.08
.08
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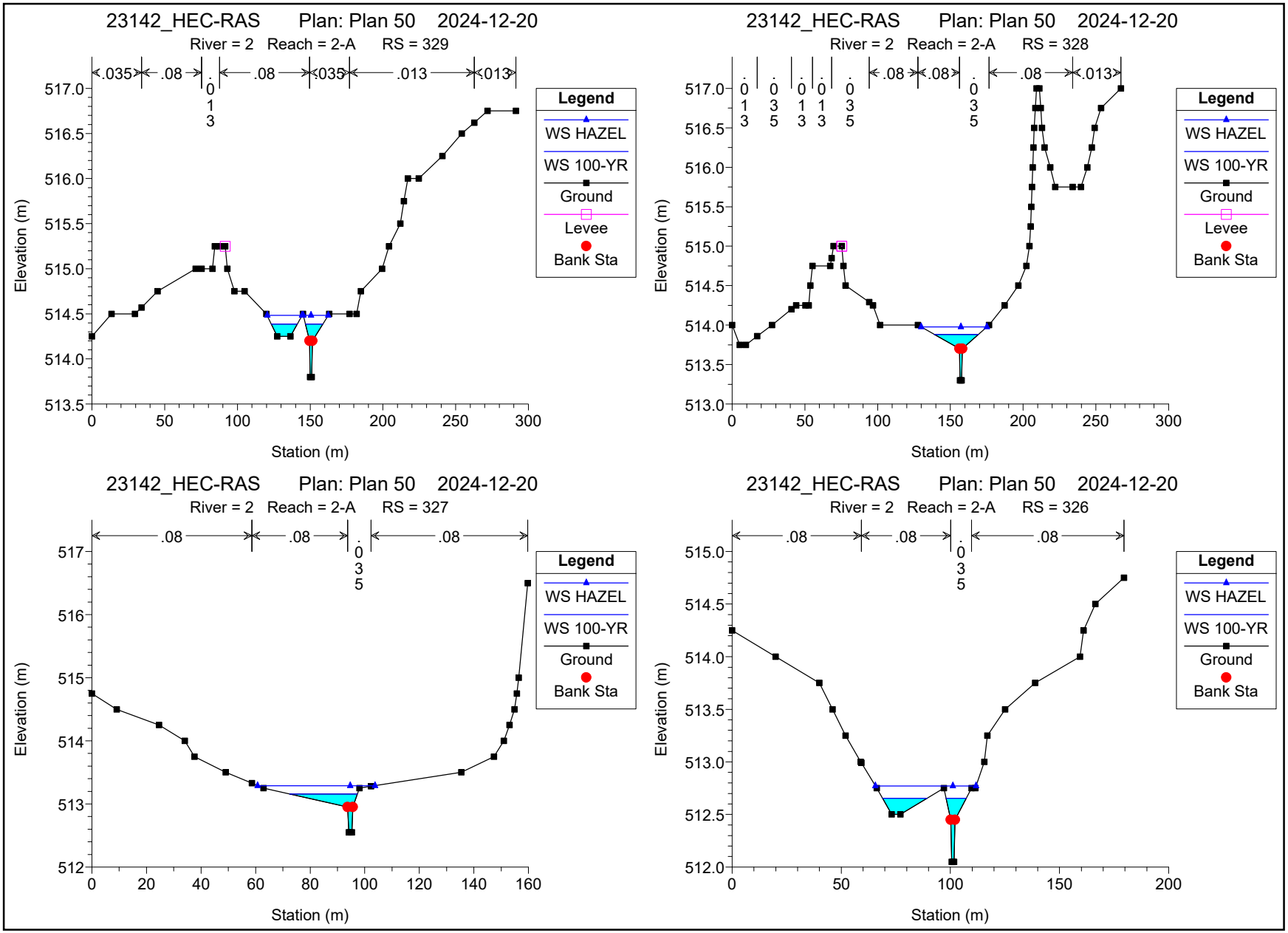
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 329
.035
.08
.013
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 328
.08
.08
.08
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 327
.08
.08
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 326
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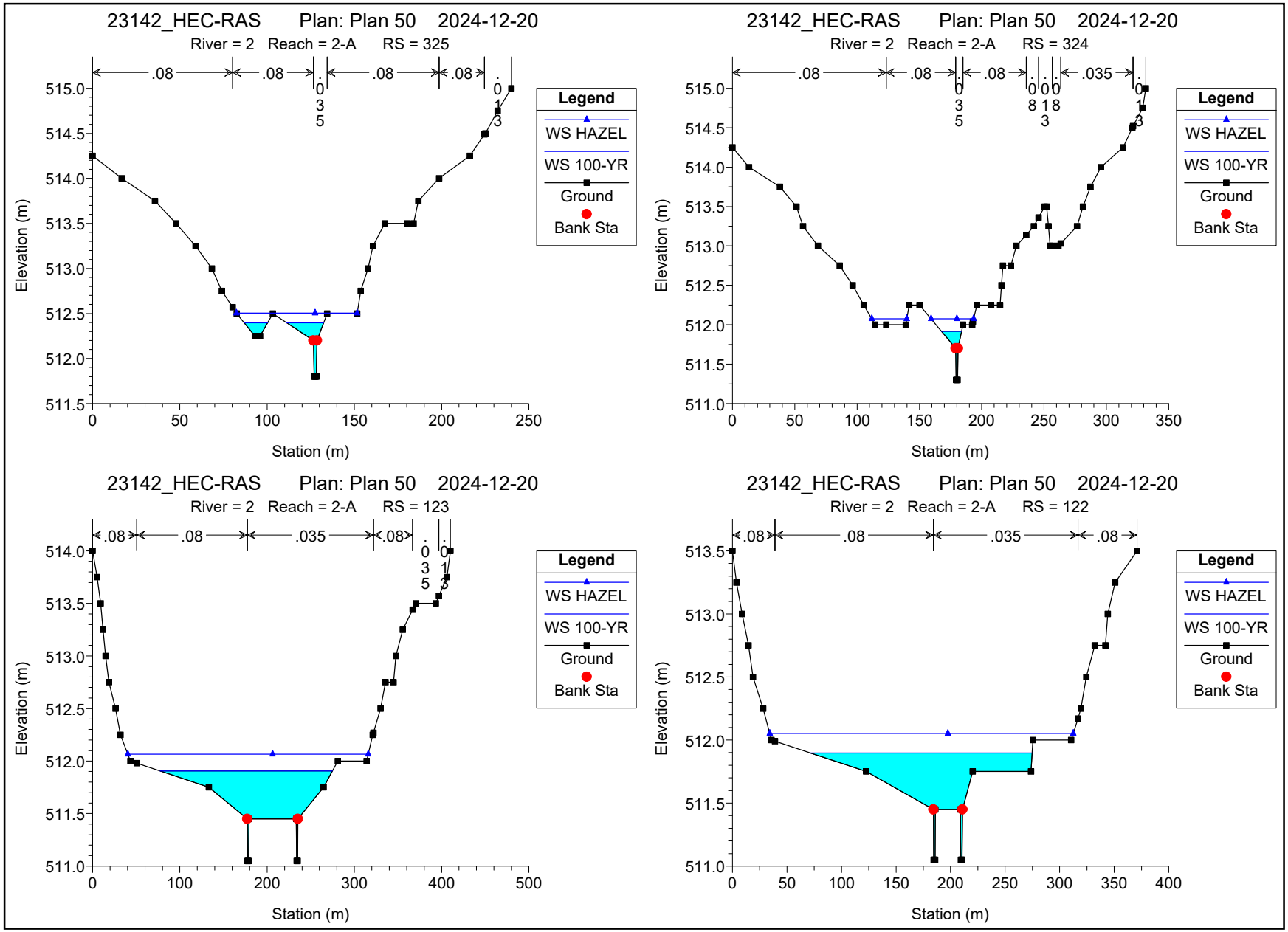
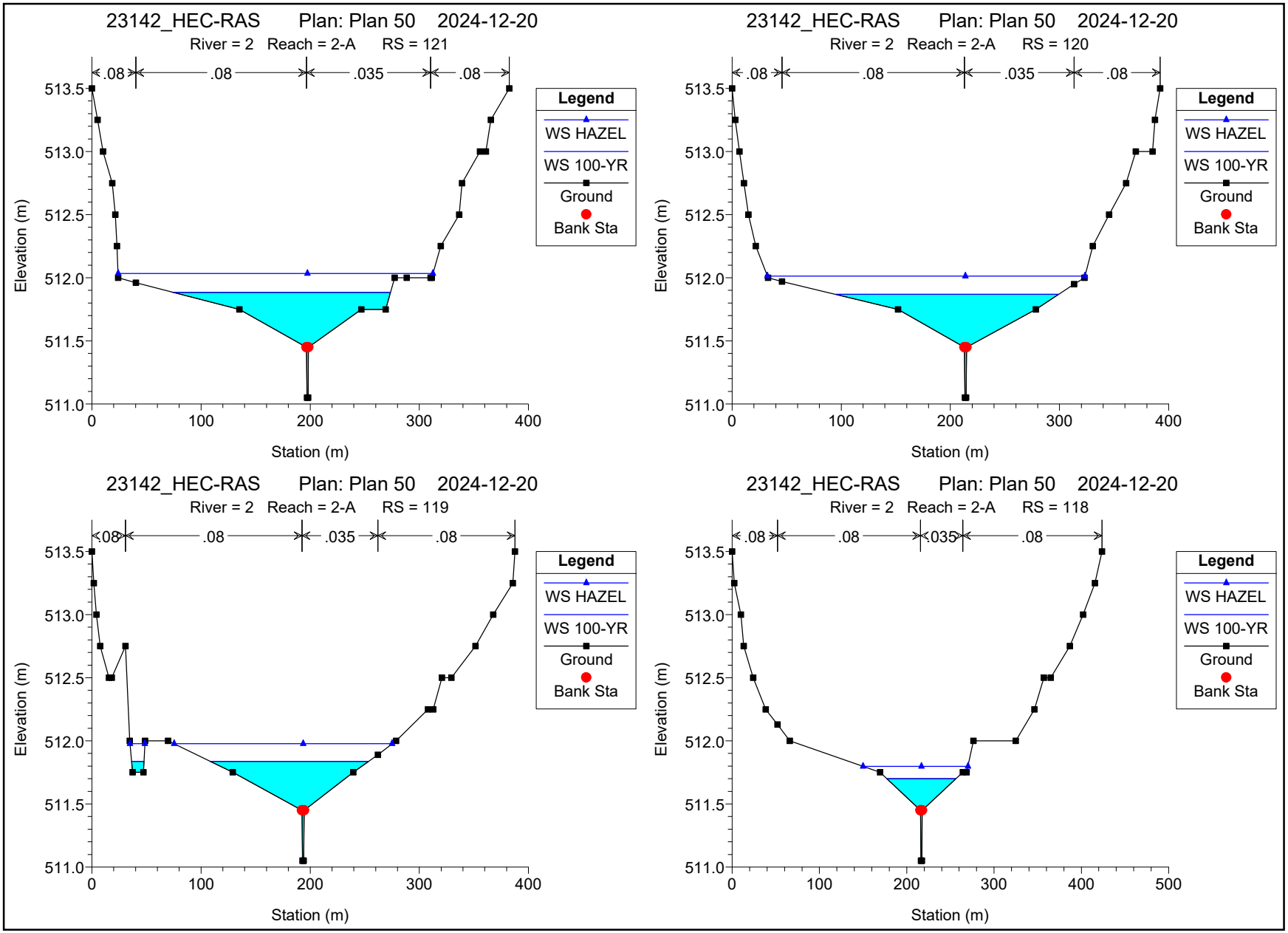
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 325
.08 .08 .08 .08
.035
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 324
.08 .08 .08 .035
.035 .008 .018 .013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 123
.08 .08 .035 .08
.035 .013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 122
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 121
.08
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 120
23142_HEC-RAS Plan: Plan 50 2024-12-20
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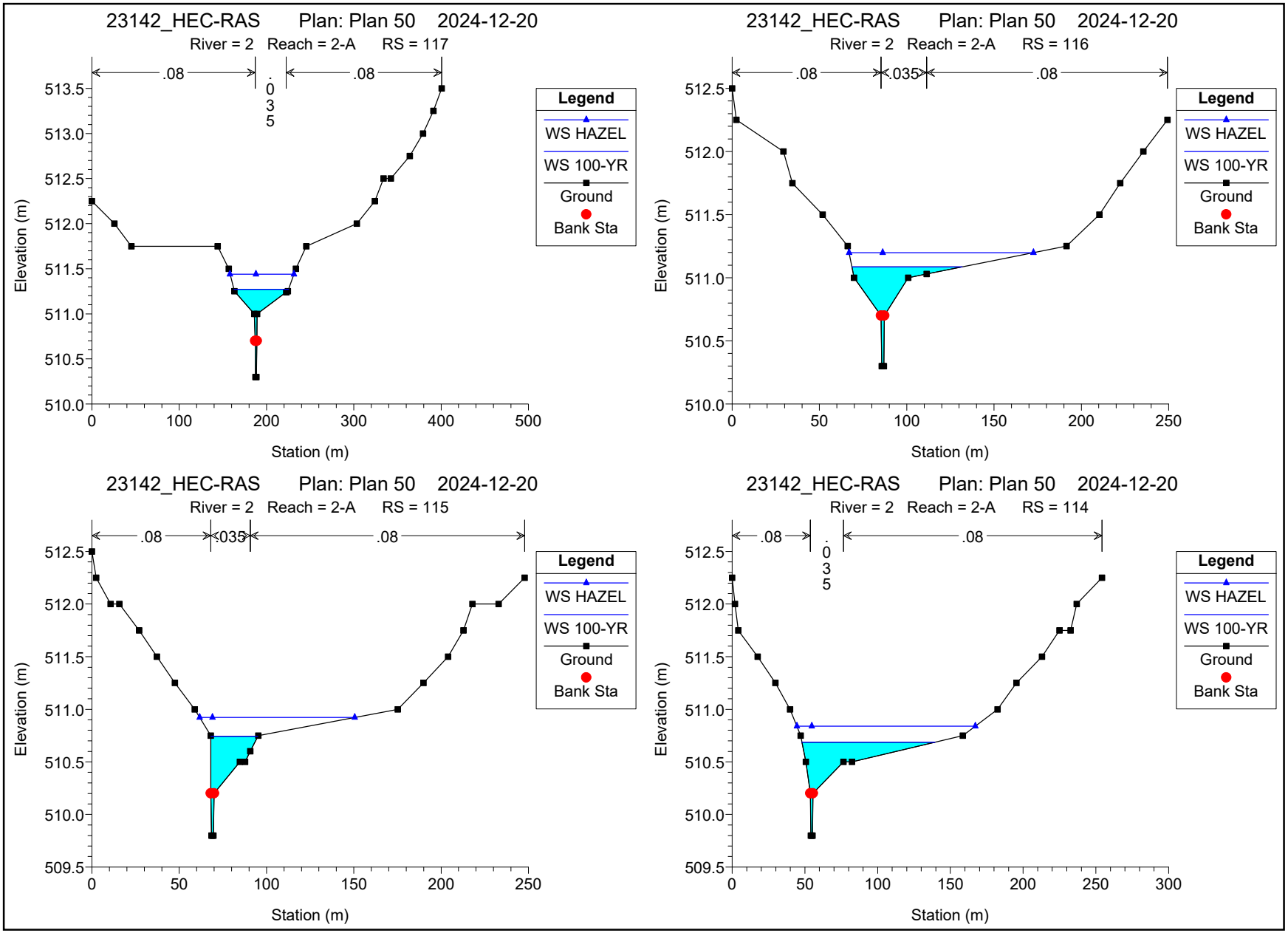
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 118


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 117
.08
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.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 116
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 115
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 114
.08
.035
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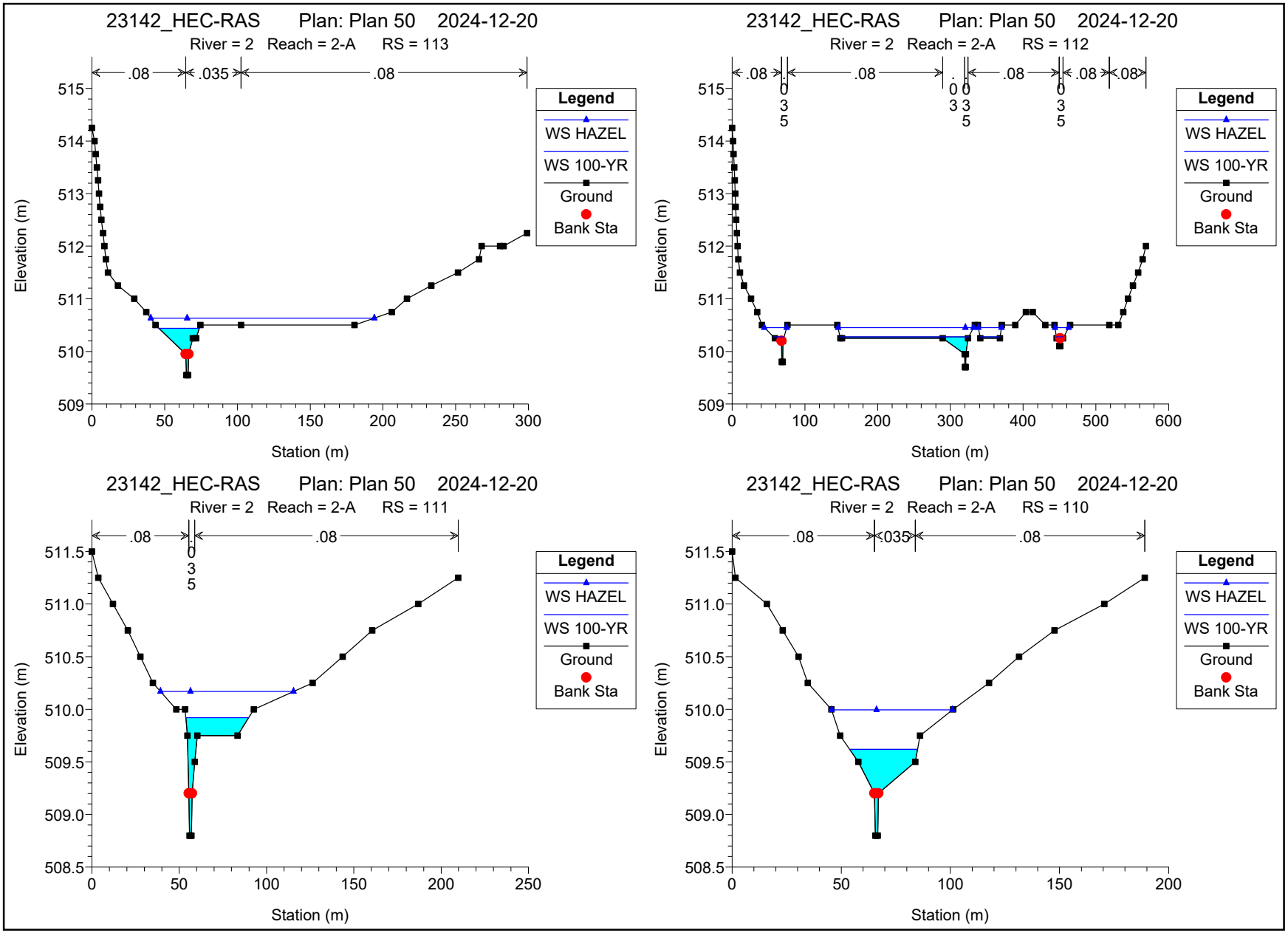
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 113
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 112
.08
.08
.08
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 111
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 110
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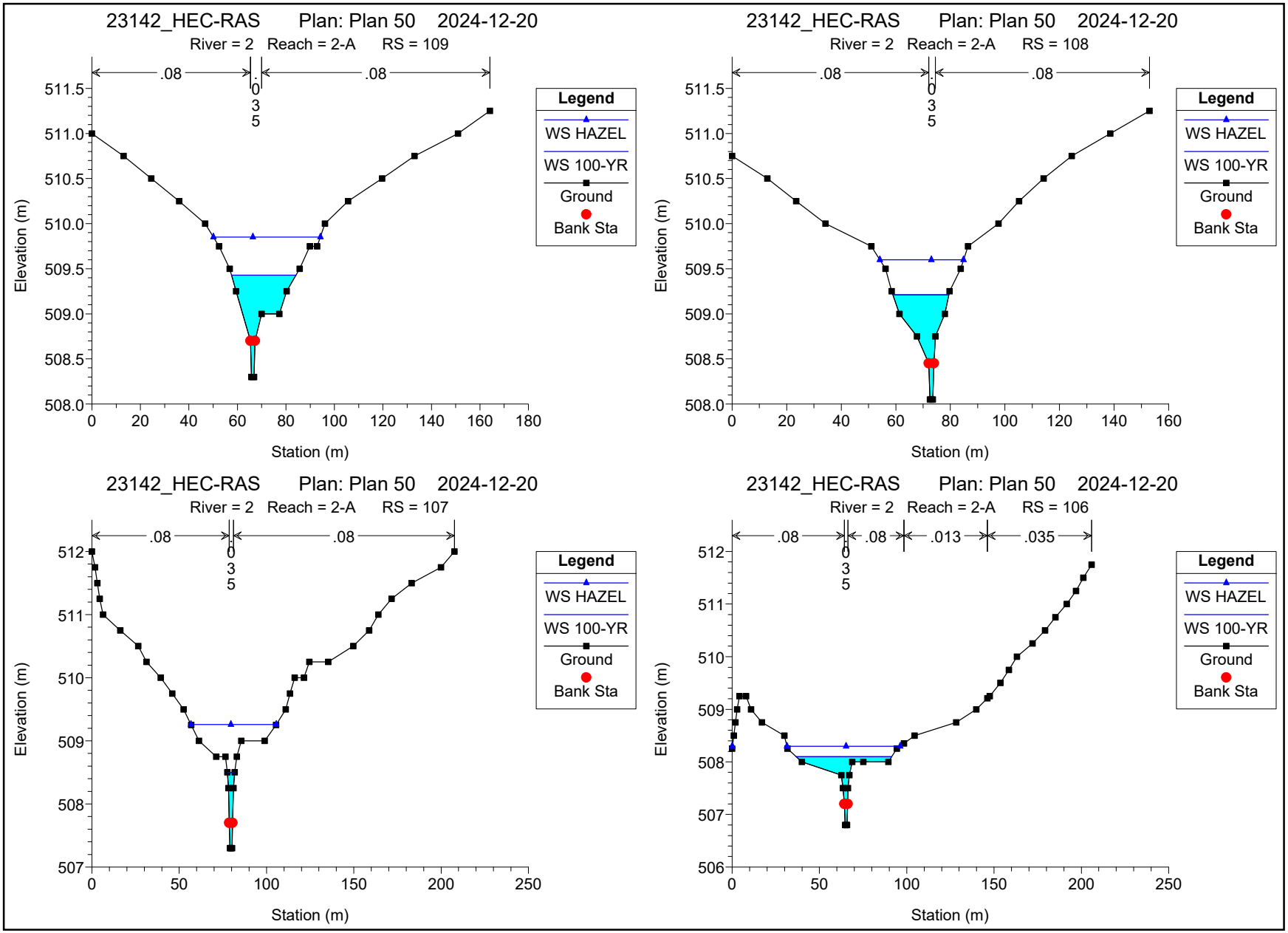
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 109
.08
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 108
.08
.08
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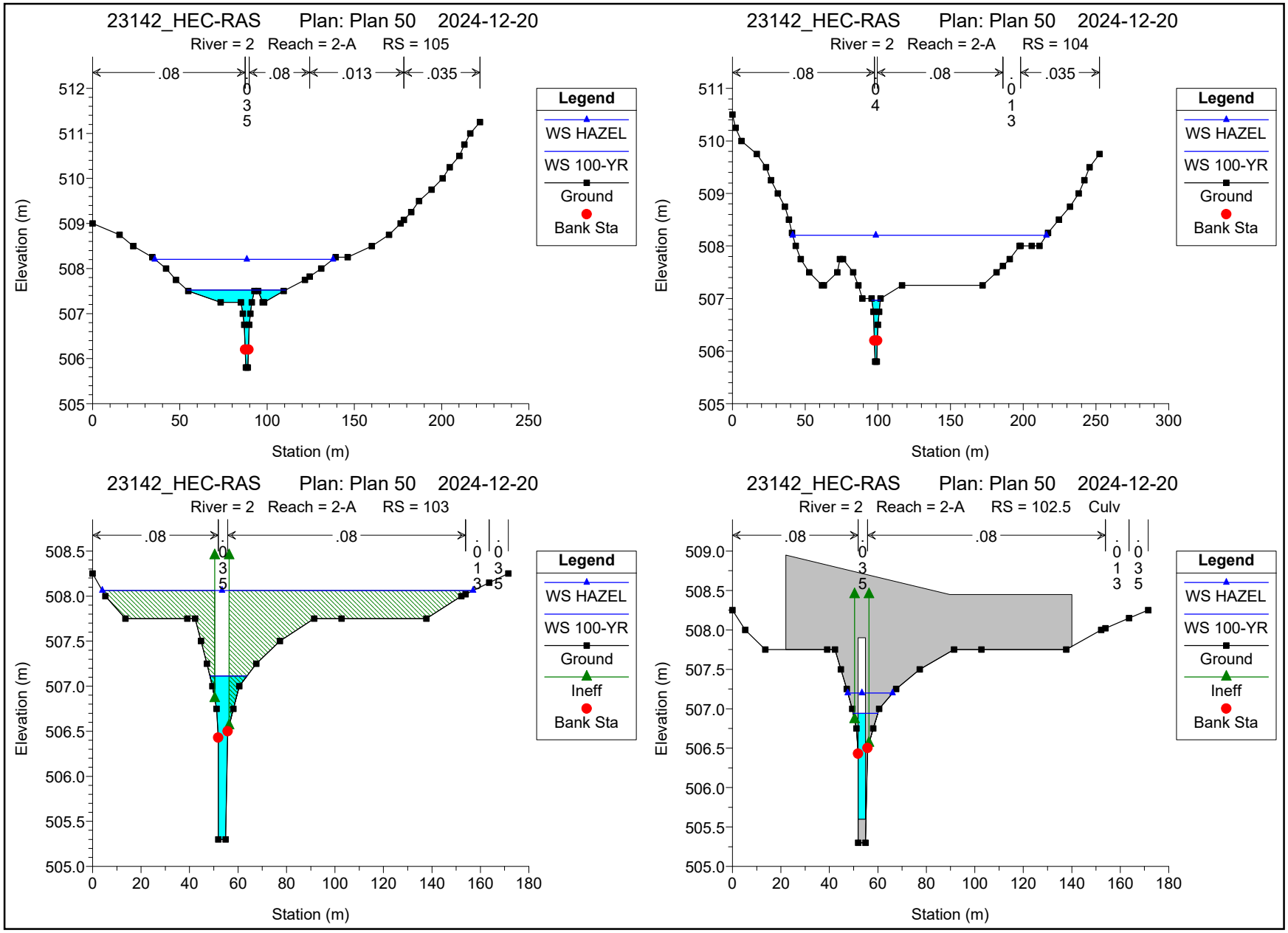
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 107
.08
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 106
.08
.08
.013
.035
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 105
.08 .08 .013 .035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 104
.08 .08 .035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 103
.08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 102.5 Culv
.08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta

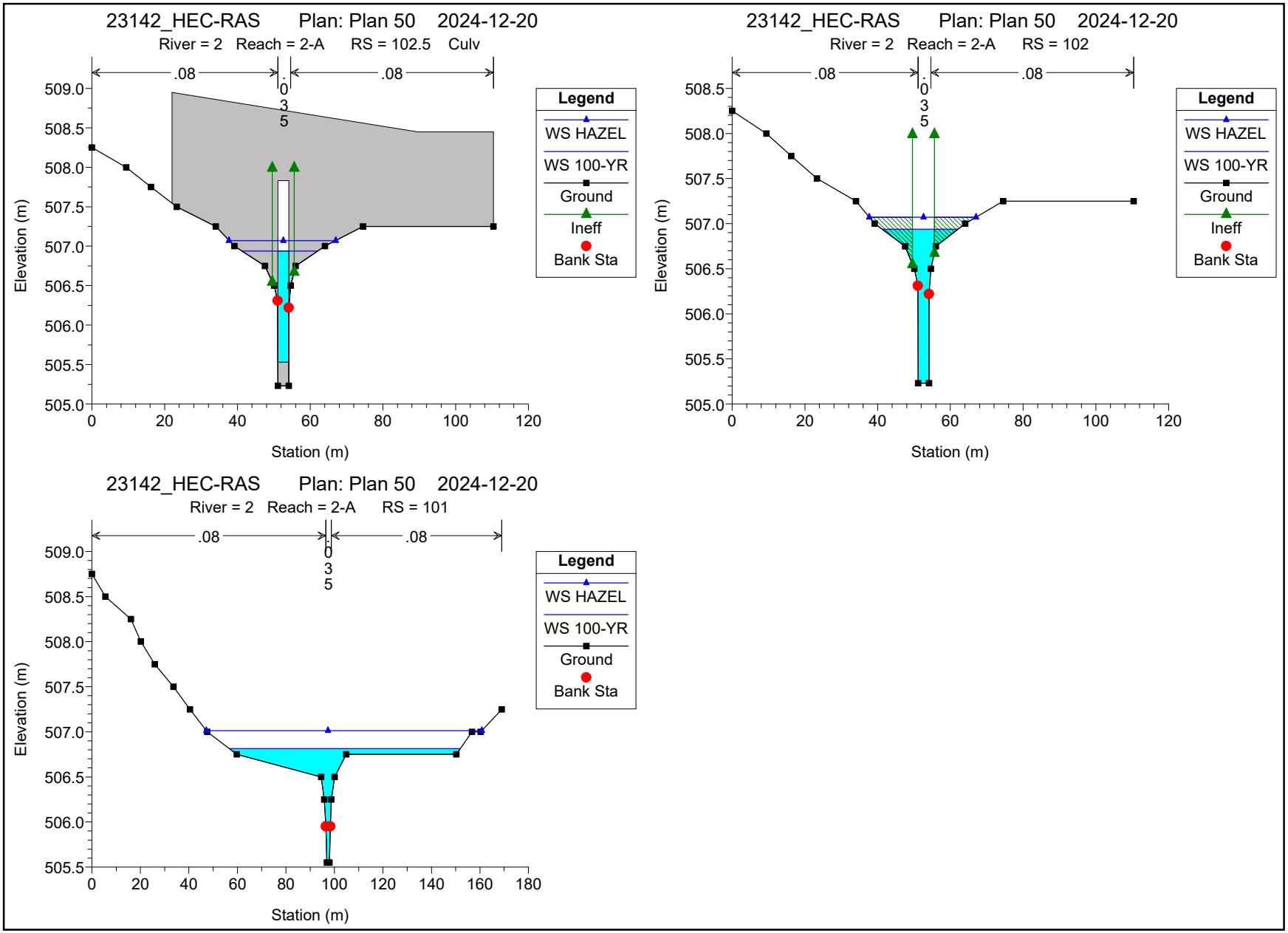

23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 102.5 Culv
.08
.035
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 102
23142_HEC-RAS Plan: Plan 50 2024-12-20
River = 2 Reach = 2-A RS = 101

Table B.2 Proposed HEC-RAS Output

HEC-RAS Plan: 012 River: 1 Reach: 1-A

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	34	100-YR	2.53	511.80	512.61		512.73	0.004952	1.65	1.85	3.75	0.60
1-A	34	HAZEL	5.71	511.80	512.80	512.80	513.11	0.010083	2.73	2.64	4.46	0.89
1-A	31	100-YR	2.53	511.30	511.95	511.95	512.18	0.012495	2.25	1.29	2.99	0.91
1-A	31	HAZEL	5.71	511.30	512.40	512.40	512.50	0.003431	1.71	5.09	23.93	0.53
1-A	30	100-YR	4.92	510.30	510.75		510.77	0.009609	0.50	8.26	52.74	0.40
1-A	30	HAZEL	11.03	510.30	510.81		510.85	0.013887	0.56	14.50	101.60	0.51
1-A	29	100-YR	4.92	510.05	510.47		510.51	0.013329	1.00	5.49	37.82	0.73
1-A	29	HAZEL	11.03	510.05	510.63		510.66	0.005686	0.49	14.50	68.50	0.38
1-A	28	100-YR	4.92	509.80	510.48		510.48	0.000326	0.12	32.60	116.86	0.07
1-A	28	HAZEL	11.03	509.80	510.63		510.64	0.000432	0.13	65.53	243.18	0.08
1-A	27	100-YR	4.92	509.80	510.44		510.45	0.000890	0.24	16.92	94.31	0.20
1-A	27	HAZEL	11.03	509.80	510.59		510.60	0.000699	0.29	37.08	166.43	0.19
1-A	26	100-YR	4.92	509.70	510.41		510.41	0.000312	0.16	31.48	114.69	0.09
1-A	26	HAZEL	11.03	509.70	510.56		510.56	0.000522	0.21	52.33	191.88	0.13
1-A	25	100-YR	4.92	509.80	510.40		510.40	0.000225	0.17	31.20	143.08	0.11
1-A	25	HAZEL	11.03	509.80	510.54		510.54	0.000335	0.22	55.16	224.59	0.13
1-A	24	100-YR	4.92	509.70	510.40		510.40	0.000311	0.12	41.67	252.15	0.09
1-A	24	HAZEL	11.03	509.70	510.53		510.53	0.000348	0.14	80.38	379.89	0.10
1-A	23	100-YR	4.92	509.70	510.39		510.39	0.000603	0.17	37.16	187.47	0.13
1-A	23	HAZEL	11.03	509.70	510.52		510.53	0.000720	0.20	64.12	225.83	0.13
1-A	22	100-YR	4.92	509.80	510.39		510.39	0.000233	0.08	55.59	183.52	0.05
1-A	22	HAZEL	11.03	509.80	510.52		510.52	0.000374	0.13	80.68	197.74	0.06
1-A	21	100-YR	6.06	509.95	510.38		510.38	0.000672	0.36	42.98	164.23	0.19
1-A	21	HAZEL	13.30	509.95	510.51		510.51	0.000896	0.50	65.10	176.99	0.22
1-A	20	100-YR	6.06	509.70	510.35		510.35	0.001031	0.63	36.22	154.29	0.26
1-A	20	HAZEL	13.30	509.70	510.46		510.47	0.001392	0.82	54.78	162.58	0.31

HEC-RAS Plan: 012 River: 1 Reach: 1-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	19	100-YR	6.06	509.45	510.27		510.29	0.002077	1.01	24.75	156.71	0.37
1-A	19	HAZEL	13.30	509.45	510.37		510.39	0.002574	1.22	41.15	169.99	0.42
1-A	18	100-YR	6.06	509.45	510.05	510.04	510.09	0.008501	1.62	13.05	133.27	0.70
1-A	18	HAZEL	13.30	509.45	510.18		510.20	0.005334	1.48	30.69	147.63	0.57
1-A	17	100-YR	6.06	509.15	509.99		510.00	0.001394	0.73	20.67	119.58	0.26
1-A	17	HAZEL	13.30	509.15	510.11		510.12	0.001483	0.82	36.70	143.06	0.27
1-A	16	100-YR	6.06	508.65	509.83	509.83	509.91	0.007917	1.97	9.42	59.40	0.59
1-A	16	HAZEL	13.30	508.65	509.97	509.94	510.03	0.007593	2.09	21.08	100.69	0.59
1-A	15	100-YR	6.06	508.65	509.65	509.65	509.73	0.007939	1.96	6.70	34.77	0.64
1-A	15	HAZEL	13.30	508.65	509.79	509.79	509.86	0.008484	2.22	15.59	134.33	0.67
1-A	14	100-YR	6.06	508.15	509.30	509.30	509.36	0.003896	1.51	6.39	48.24	0.46
1-A	14	HAZEL	13.30	508.15	509.44	509.38	509.50	0.003852	1.63	14.09	56.79	0.46
1-A	13	100-YR	6.06	508.75	509.14	509.14	509.22	0.017351	0.33	5.29	36.75	0.34
1-A	13	HAZEL	13.30	508.75	509.26	509.26	509.36	0.029672	0.58	10.51	55.67	0.49
1-A	12	100-YR	6.06	507.90	509.03		509.04	0.000521	0.55	19.11	61.31	0.17
1-A	12	HAZEL	13.30	507.90	509.20		509.21	0.000852	0.77	30.56	78.91	0.22
1-A	11	100-YR	6.06	507.90	509.02		509.03	0.000538	0.55	20.81	69.40	0.17
1-A	11	HAZEL	13.30	507.90	509.18		509.19	0.000856	0.76	34.27	101.50	0.22
1-A	10	100-YR	6.06	507.65	508.98	508.76	508.99	0.000876	0.79	27.58	80.50	0.22
1-A	10	HAZEL	13.30	507.65	509.11	508.87	509.13	0.001625	1.15	39.09	97.67	0.31
1-A	9.5		Culvert									
1-A	9	100-YR	6.06	507.40	508.46	508.46	508.66	0.013499	2.66	4.17	78.05	0.84
1-A	9	HAZEL	13.30	507.40	508.64	508.58	508.66	0.002165	1.19	37.25	100.10	0.34
1-A	8	100-YR	6.06	507.40	508.03		508.07	0.007829	1.42	8.65	49.70	0.58
1-A	8	HAZEL	13.30	507.40	508.15		508.20	0.007786	1.60	15.67	68.47	0.60

HEC-RAS Plan: 012 River: 1 Reach: 1-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1-A	7	100-YR	6.06	507.15	507.76	507.76	507.83	0.014200	1.86	6.21	42.19	0.78
1-A	7	HAZEL	13.30	507.15	507.86	507.86	507.96	0.014907	2.13	11.25	56.70	0.82
1-A	6	100-YR	6.06	506.15	507.02	507.02	507.19	0.014510	2.41	4.00	14.48	0.84
1-A	6	HAZEL	13.30	506.15	507.27	507.27	507.43	0.012147	2.63	10.32	35.09	0.80
1-A	5	100-YR	6.06	505.65	507.10	506.60	507.10	0.000344	0.53	35.95	79.79	0.14
1-A	5	HAZEL	13.30	505.65	507.27	506.79	507.28	0.000669	0.79	50.74	91.78	0.20
1-A	4	100-YR	6.06	505.29	507.09	506.20	507.09	0.000084	0.28	43.34	109.54	0.07
1-A	4	HAZEL	13.30	505.29	507.26	506.63	507.26	0.000189	0.45	63.31	141.31	0.10
1-A	3.5		Culvert									
1-A	3	100-YR	6.06	505.28	506.60	506.16	506.70	0.000638	0.63	6.06	35.33	0.18
1-A	3	HAZEL	13.30	505.28	506.81	506.60	506.83	0.000667	0.71	20.23	51.13	0.18
1-A	2	100-YR	6.06	505.40	506.49	506.43	506.53	0.003689	1.46	10.89	56.84	0.46
1-A	2	HAZEL	13.30	505.40	506.63	506.57	506.68	0.004324	1.71	19.80	68.81	0.51
1-A	1	100-YR	6.06	505.15	506.30	506.30	506.35	0.003301	1.40	7.14	69.97	0.42
1-A	1	HAZEL	13.30	505.15	506.37	506.37	506.44	0.004503	1.70	12.17	74.60	0.50

HEC-RAS Plan: 012 River: 1 Reach: 1

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	33	100-YR	2.39	512.95	513.62	513.62	513.81	0.015499	2.09	1.38	3.88	0.85
1	33	HAZEL	5.31	512.95	513.92	513.92	514.14	0.012790	2.46	2.90	6.84	0.82
1	32	100-YR	2.39	512.45	513.18	513.18	513.29	0.007517	1.76	2.09	9.99	0.68
1	32	HAZEL	5.31	512.45	513.35	513.35	513.48	0.007939	2.10	4.37	16.70	0.73
1	30	100-YR	4.92	510.30	510.75		510.77	0.008502	0.46	8.77	91.12	0.56
1	30	HAZEL	11.03	510.30	510.82		510.85	0.012510	0.54	15.13	102.68	0.48
1	29	100-YR	4.92	510.05	510.46		510.51	0.016841	1.12	5.00	36.05	0.83
1	29	HAZEL	11.03	510.05	510.61		510.65	0.006880	0.55	13.46	66.67	0.43
1	28	100-YR	4.92	509.80	510.47		510.48	0.000355	0.13	31.57	115.36	0.08
1	28	HAZEL	11.03	509.80	510.62		510.62	0.000497	0.13	61.97	240.30	0.09
1	27	100-YR	4.92	509.80	510.43		510.44	0.001088	0.26	15.55	89.82	0.22
1	27	HAZEL	11.03	509.80	510.57		510.58	0.000910	0.31	33.25	159.28	0.21
1	26	100-YR	4.92	509.70	510.39		510.39	0.000400	0.17	28.86	111.41	0.10
1	26	HAZEL	11.03	509.70	510.52		510.52	0.000755	0.25	45.42	211.07	0.16
1	25	100-YR	4.92	509.80	510.38		510.38	0.000307	0.18	28.63	149.91	0.13
1	25	HAZEL	11.03	509.80	510.49		510.50	0.000395	0.25	49.42	199.10	0.15
1	24	100-YR	4.92	509.70	510.37		510.37	0.000504	0.15	34.20	248.61	0.13
1	24	HAZEL	11.03	509.70	510.48		510.49	0.000490	0.18	65.22	274.44	0.11
1	23	100-YR	4.92	509.70	510.36		510.36	0.000943	0.21	32.09	198.89	0.17
1	23	HAZEL	11.03	509.70	510.48		510.48	0.001014	0.24	57.85	235.93	0.15
1	22	100-YR	4.92	509.80	510.35		510.35	0.000342	0.09	49.20	179.92	0.06
1	22	HAZEL	11.03	509.80	510.47		510.47	0.000557	0.13	71.02	197.09	0.08
1	21	100-YR	6.06	509.95	510.35		510.35	0.000916	0.39	42.92	226.44	0.21
1	21	HAZEL	13.30	509.95	510.46		510.46	0.001057	0.51	70.07	249.76	0.24
1	20	100-YR	6.06	509.70	510.32		510.32	0.000413	0.37	46.58	229.41	0.16
1	20	HAZEL	13.30	509.70	510.43		510.43	0.000527	0.47	71.97	240.10	0.18

HEC-RAS Plan: 012 River: 1 Reach: 1 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	19	100-YR	6.06	509.45	510.27		510.29	0.002077	1.01	24.75	156.69	0.37
1	19	HAZEL	13.30	509.45	510.37		510.39	0.002571	1.22	41.34	176.51	0.42
1	18	100-YR	6.06	509.45	510.05	510.04	510.09	0.008501	1.62	13.05	133.27	0.70
1	18	HAZEL	13.30	509.45	510.18		510.20	0.005334	1.48	30.69	147.63	0.57
1	17	100-YR	6.06	509.15	509.99		510.00	0.001394	0.73	20.67	119.58	0.26
1	17	HAZEL	13.30	509.15	510.11		510.12	0.001483	0.82	36.70	143.06	0.27
1	16	100-YR	6.06	508.65	509.83	509.83	509.91	0.007917	1.97	9.42	59.40	0.59
1	16	HAZEL	13.30	508.65	509.97	509.94	510.03	0.007593	2.09	21.08	100.69	0.59
1	15	100-YR	6.06	508.65	509.65	509.65	509.73	0.007939	1.96	6.70	34.77	0.64
1	15	HAZEL	13.30	508.65	509.79	509.79	509.86	0.008484	2.22	15.59	134.33	0.67
1	14	100-YR	6.06	508.15	509.30	509.30	509.36	0.003896	1.51	6.39	48.24	0.46
1	14	HAZEL	13.30	508.15	509.44	509.38	509.50	0.003852	1.63	14.09	56.79	0.46
1	13	100-YR	6.06	508.75	509.14	509.14	509.22	0.017351	0.33	5.29	36.75	0.34
1	13	HAZEL	13.30	508.75	509.26	509.26	509.36	0.029672	0.58	10.51	55.67	0.49
1	12	100-YR	6.06	507.90	509.03		509.04	0.000521	0.55	19.11	61.31	0.17
1	12	HAZEL	13.30	507.90	509.20		509.21	0.000852	0.77	30.56	78.91	0.22
1	11	100-YR	6.06	507.90	509.02		509.03	0.000538	0.55	20.81	69.40	0.17
1	11	HAZEL	13.30	507.90	509.18		509.19	0.000856	0.76	34.27	101.50	0.22
1	10	100-YR	6.06	507.65	508.98	508.76	508.99	0.000876	0.79	27.58	80.50	0.22
1	10	HAZEL	13.30	507.65	509.11	508.87	509.13	0.001625	1.15	39.09	97.67	0.31
1	9.5		Culvert									
1	9	100-YR	6.06	507.40	508.46	508.46	508.66	0.013499	2.66	4.17	78.05	0.84
1	9	HAZEL	13.30	507.40	508.64	508.58	508.66	0.002165	1.19	37.25	100.10	0.34
1	8	100-YR	6.06	507.40	508.03		508.07	0.007768	1.42	8.68	49.78	0.58
1	8	HAZEL	13.30	507.40	508.15		508.20	0.007786	1.60	15.67	68.47	0.60

HEC-RAS Plan: 012 River: 1 Reach: 1 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	7	100-YR	6.06	507.15	507.76	507.76	507.83	0.014200	1.86	6.21	42.19	0.78
1	7	HAZEL	13.30	507.15	507.86	507.86	507.96	0.014907	2.13	11.25	56.70	0.82
1	6	100-YR	6.06	506.15	507.12		507.21	0.007069	1.81	5.94	22.92	0.60
1	6	HAZEL	13.30	506.15	507.27	507.27	507.43	0.012147	2.63	10.32	35.09	0.80
1	5	100-YR	6.06	505.65	507.16	506.60	507.17	0.000239	0.45	41.31	84.18	0.12
1	5	HAZEL	13.30	505.65	507.27	506.79	507.28	0.000663	0.79	50.92	91.94	0.20
1	4	100-YR	6.06	505.29	507.16	506.20	507.16	0.000090	0.30	42.30	90.85	0.07
1	4	HAZEL	13.30	505.29	507.26	506.63	507.26	0.000188	0.45	63.51	141.48	0.10
1	3.5		Culvert									
1	3	100-YR	6.06	505.28	506.60	506.17	506.67	0.000544	0.58	6.51	34.95	0.16
1	3	HAZEL	13.30	505.28	506.80	506.55	506.83	0.000678	0.72	20.04	50.69	0.19
1	2	100-YR	6.06	505.40	506.49	506.42	506.53	0.003549	1.40	11.08	57.38	0.43
1	2	HAZEL	13.30	505.40	506.63	506.57	506.67	0.004252	1.65	19.90	68.87	0.48
1	1	100-YR	6.06	505.15	506.30	506.30	506.35	0.003301	1.40	7.14	69.97	0.42
1	1	HAZEL	13.30	505.15	506.37	506.37	506.44	0.004503	1.70	12.17	74.60	0.50

HEC-RAS Plan: 012 River: 2 Reach: 2

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	232	100-YR	6.28	511.80	512.84	512.84	512.90	0.003717	1.52	15.14	117.05	0.50
2	232	HAZEL	15.99	511.80	513.06		513.08	0.002216	1.35	45.23	181.52	0.40
2	231	100-YR	6.28	511.80	512.76		512.76	0.000158	0.30	57.56	168.68	0.10
2	231	HAZEL	15.99	511.80	513.06		513.06	0.000118	0.31	109.04	180.67	0.09
2	230	100-YR	6.28	511.55	512.76		512.76	0.000094	0.27	59.15	122.16	0.08
2	230	HAZEL	15.99	511.55	513.05		513.05	0.000114	0.35	100.09	153.17	0.09
2	229	100-YR	6.28	511.55	512.75		512.75	0.000043	0.18	101.63	272.95	0.05
2	229	HAZEL	15.99	511.55	513.05		513.05	0.000042	0.21	185.83	297.87	0.06
2	228	100-YR	6.28	511.30	512.75	512.17	512.75	0.000067	0.26	78.59	274.10	0.07
2	228	HAZEL	15.99	511.30	512.54	512.54	512.93	0.013524	3.27	6.79	150.63	0.96
2	227.5		Culvert									
2	227	100-YR	6.28	511.17	512.21	512.21	512.26	0.004720	1.82	11.21	42.25	0.59
2	227	HAZEL	15.99	511.17	512.48	512.34	512.50	0.002511	1.56	34.07	103.43	0.44
2	226	100-YR	6.28	511.30	512.07	512.07	512.18	0.010124	2.01	6.10	27.98	0.77
2	226	HAZEL	15.99	511.30	512.23	512.23	512.40	0.014509	2.76	11.53	39.39	0.96
2	225	100-YR	6.28	511.05	512.02		512.03	0.000748	0.65	27.30	131.73	0.22
2	225	HAZEL	15.99	511.05	512.17		512.18	0.001032	0.84	47.96	144.65	0.26
2	224	100-YR	6.28	511.05	511.90	511.90	511.97	0.005946	1.66	9.19	63.28	0.60
2	224	HAZEL	15.99	511.05	512.08		512.12	0.003808	1.52	28.20	157.24	0.50
2	123	100-YR	6.65	511.05	511.91		511.91	0.000102	0.17	55.22	197.54	0.08
2	123	HAZEL	16.03	511.05	512.06		512.07	0.000184	0.28	93.36	275.42	0.11
2	122	100-YR	6.65	511.05	511.90		511.90	0.000254	0.28	46.03	203.57	0.13
2	122	HAZEL	16.03	511.05	512.05		512.06	0.000364	0.40	83.20	278.41	0.16
2	121	100-YR	6.88	511.05	511.88		511.89	0.000541	0.49	39.96	198.98	0.18
2	121	HAZEL	17.09	511.05	512.03		512.04	0.000745	0.65	75.94	288.63	0.22

HEC-RAS Plan: 012 River: 2 Reach: 2 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	120	100-YR	6.88	511.05	511.87		511.87	0.000555	0.49	39.33	204.05	0.18
2	120	HAZEL	17.09	511.05	512.01		512.02	0.000639	0.60	75.84	290.91	0.20
2	119	100-YR	6.88	511.05	511.84		511.84	0.001150	0.69	29.58	156.66	0.26
2	119	HAZEL	17.09	511.05	511.98		511.99	0.001354	0.84	55.34	213.46	0.29
2	118	100-YR	6.88	511.05	511.70	511.70	511.76	0.010125	1.77	10.73	79.22	0.75
2	118	HAZEL	17.09	511.05	511.80	511.80	511.88	0.013575	2.27	20.27	120.20	0.89
2	117	100-YR	6.88	510.30	511.27	511.27	511.34	0.005092	1.69	10.71	62.58	0.57
2	117	HAZEL	17.09	510.30	511.44		511.50	0.004813	1.85	22.08	73.20	0.57
2	116	100-YR	6.88	510.30	511.09	511.09	511.15	0.007736	1.78	9.53	63.00	0.68
2	116	HAZEL	17.09	510.30	511.20	511.20	511.29	0.011420	2.39	19.02	105.71	0.85
2	115	100-YR	6.88	509.80	510.74		510.78	0.002479	1.15	9.06	27.04	0.40
2	115	HAZEL	17.09	509.80	510.92		510.98	0.004012	1.67	19.27	88.82	0.52
2	114	100-YR	6.88	509.80	510.69		510.70	0.001975	0.99	16.27	91.39	0.35
2	114	HAZEL	17.09	509.80	510.84		510.86	0.002851	1.33	33.08	122.58	0.43
2	113	100-YR	6.88	509.55	510.44	510.44	510.56	0.008913	2.10	7.67	27.78	0.75
2	113	HAZEL	17.09	509.55	510.63	510.63	510.70	0.007171	2.17	28.54	153.63	0.69
2	112	100-YR	6.88	509.70	510.28	510.27	510.29	0.006151	0.55	12.86	229.16	0.74
2	112	HAZEL	17.09	509.70	510.45		510.46	0.001702	0.31	56.77	267.65	0.21
2	111	100-YR	6.88	508.80	509.92	509.92	510.05	0.006076	2.05	8.15	35.96	0.64
2	111	HAZEL	17.09	508.80	510.17	510.17	510.32	0.007919	2.70	21.37	76.27	0.76
2	110	100-YR	6.88	508.80	509.62		509.68	0.005504	1.55	8.21	31.10	0.58
2	110	HAZEL	17.09	508.80	509.99		510.04	0.002288	1.32	23.89	55.38	0.40
2	109	100-YR	6.88	508.30	509.43		509.48	0.002952	1.44	10.79	26.58	0.45
2	109	HAZEL	17.09	508.30	509.85		509.91	0.002748	1.74	25.34	44.07	0.46
2	108	100-YR	6.88	508.05	509.21		509.31	0.004578	1.83	8.74	20.53	0.56
2	108	HAZEL	17.09	508.05	509.60		509.73	0.005301	2.41	18.56	30.72	0.64

HEC-RAS Plan: 012 River: 2 Reach: 2 (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2	107	100-YR	6.88	507.30	508.50	508.50	508.93	0.011842	3.00	2.77	4.28	0.91
2	107	HAZEL	17.09	507.30	509.26	509.26	509.47	0.004783	2.70	19.71	48.87	0.63
2	106	100-YR	6.88	506.80	508.10	508.10	508.22	0.004200	1.90	11.62	54.75	0.55
2	106	HAZEL	17.09	506.80	508.30	508.30	508.45	0.006468	2.60	23.50	65.10	0.70
2	105	100-YR	6.88	505.80	507.52	507.00	507.60	0.001655	1.45	14.45	56.55	0.36
2	105	HAZEL	17.09	505.80	507.92		507.96	0.001290	1.48	42.85	84.35	0.33
2	104	100-YR	6.88	505.80	506.97	506.97	507.38	0.015915	2.99	3.18	5.80	0.92
2	104	HAZEL	17.09	505.80	507.92		507.92	0.000315	0.64	91.76	150.66	0.14
2	103	100-YR	6.88	505.30	507.03	506.09	507.09	0.001258	1.08	6.98	12.24	0.27
2	103	HAZEL	17.09	505.30	507.72	506.73	507.87	0.002117	1.78	11.09	46.84	0.38
2	102.5		Culvert									
2	102	100-YR	6.88	505.23	506.94	506.04	507.00	0.002918	1.18	6.56	20.77	0.29
2	102	HAZEL	17.09	505.23	507.07	506.82	507.39	0.013081	2.64	7.37	29.37	0.62
2	101	100-YR	6.88	505.55	506.81	506.81	506.90	0.003733	1.75	14.66	95.24	0.51
2	101	HAZEL	17.09	505.55	507.01	506.96	507.08	0.004001	2.01	35.21	113.55	0.55

HEC-RAS Plan: 012 River: 2 Reach: 2-A

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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	329	100-YR	2.12	513.80	514.39	514.39	514.45	0.007036	1.36	3.75	29.86	0.61
2-A	329	HAZEL	4.71	513.80	514.48	514.48	514.56	0.009288	1.76	7.12	41.14	0.72
2-A	328	100-YR	2.12	513.30	513.88	513.88	513.94	0.007169	1.36	3.53	30.38	0.62
2-A	328	HAZEL	4.71	513.30	513.98	513.98	514.05	0.008750	1.69	7.10	45.21	0.70
2-A	327	100-YR	2.12	512.55	513.16	513.16	513.24	0.008077	1.50	3.35	24.80	0.66
2-A	327	HAZEL	4.71	512.55	513.29	513.29	513.37	0.008662	1.80	7.72	43.02	0.71
2-A	326	100-YR	2.12	512.05	512.65	512.65	512.72	0.007182	1.41	3.61	29.66	0.62
2-A	326	HAZEL	4.71	512.05	512.77	512.76	512.84	0.007355	1.63	8.09	46.07	0.65
2-A	325	100-YR	2.12	511.80	512.40	512.40	512.46	0.006981	1.37	4.07	34.52	0.61
2-A	325	HAZEL	4.71	511.80	512.50	512.50	512.57	0.007833	1.65	8.86	69.26	0.67
2-A	324	100-YR	2.12	511.30	511.92	511.92	512.02	0.008971	1.59	2.53	16.04	0.70
2-A	324	HAZEL	4.71	511.30	512.08	512.08	512.15	0.007016	1.68	8.47	62.31	0.65
2-A	123	100-YR	6.65	511.05	511.91		511.91	0.000102	0.17	55.22	197.54	0.08
2-A	123	HAZEL	16.03	511.05	512.06		512.07	0.000184	0.28	93.36	275.42	0.11
2-A	122	100-YR	6.65	511.05	511.90		511.90	0.000254	0.28	46.03	203.57	0.13
2-A	122	HAZEL	16.03	511.05	512.05		512.06	0.000364	0.40	83.20	278.41	0.16
2-A	121	100-YR	6.88	511.05	511.88		511.89	0.000541	0.49	39.96	198.98	0.18
2-A	121	HAZEL	17.09	511.05	512.03		512.04	0.000745	0.65	75.94	288.63	0.22
2-A	120	100-YR	6.88	511.05	511.87		511.87	0.000555	0.49	39.33	204.05	0.18
2-A	120	HAZEL	17.09	511.05	512.01		512.02	0.000639	0.60	75.84	290.91	0.20
2-A	119	100-YR	6.88	511.05	511.84		511.84	0.001150	0.69	29.58	156.66	0.26
2-A	119	HAZEL	17.09	511.05	511.98		511.99	0.001354	0.84	55.34	213.46	0.29
2-A	118	100-YR	6.88	511.05	511.70	511.70	511.76	0.010125	1.77	10.73	79.22	0.75
2-A	118	HAZEL	17.09	511.05	511.80	511.80	511.88	0.013575	2.27	20.27	120.20	0.89
2-A	117	100-YR	6.88	510.30	511.27	511.27	511.34	0.005092	1.69	10.71	62.58	0.57
2-A	117	HAZEL	17.09	510.30	511.44		511.50	0.004813	1.85	22.08	73.20	0.57

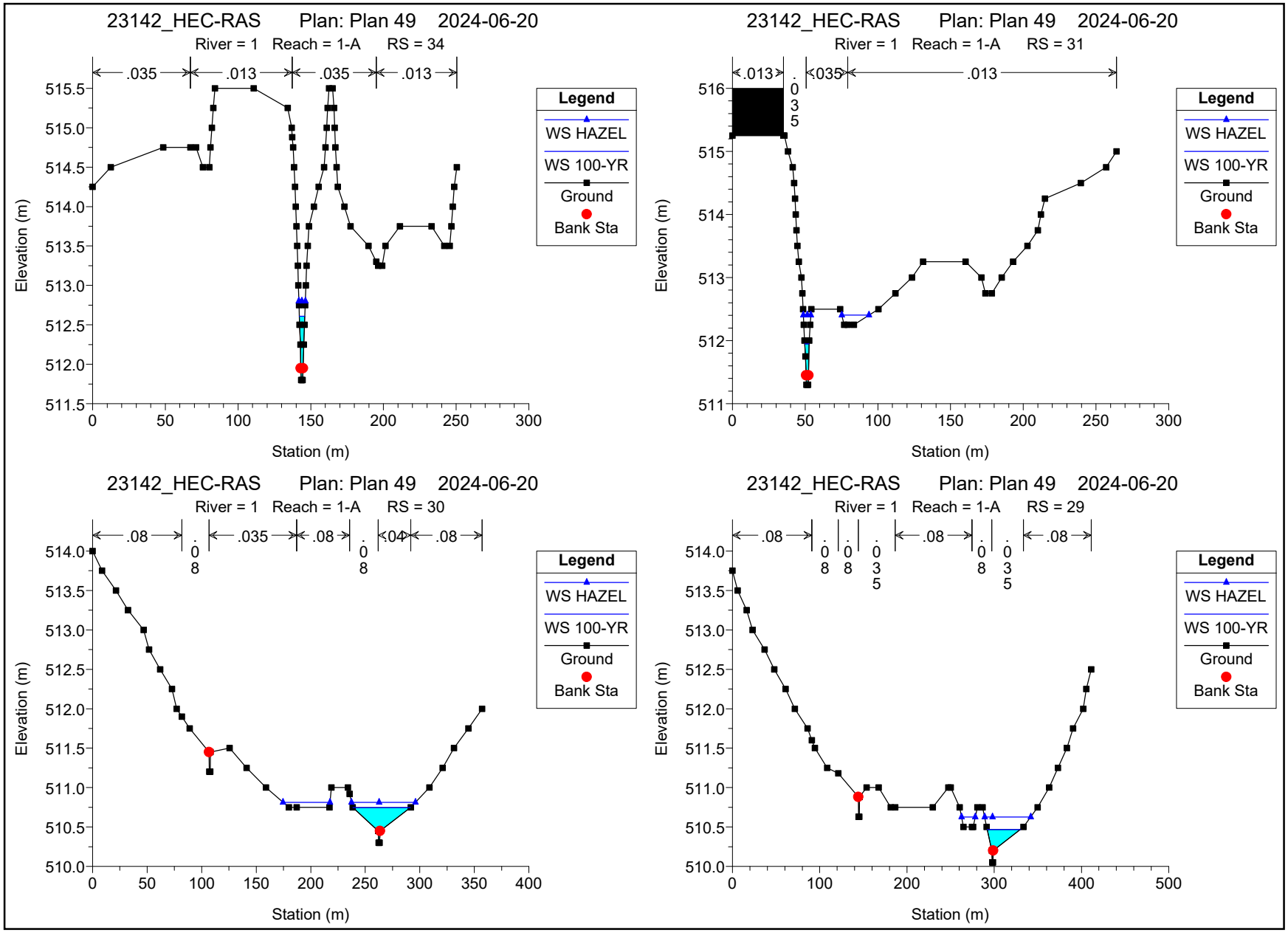
HEC-RAS Plan: 012 River: 2 Reach: 2-A (Continued)

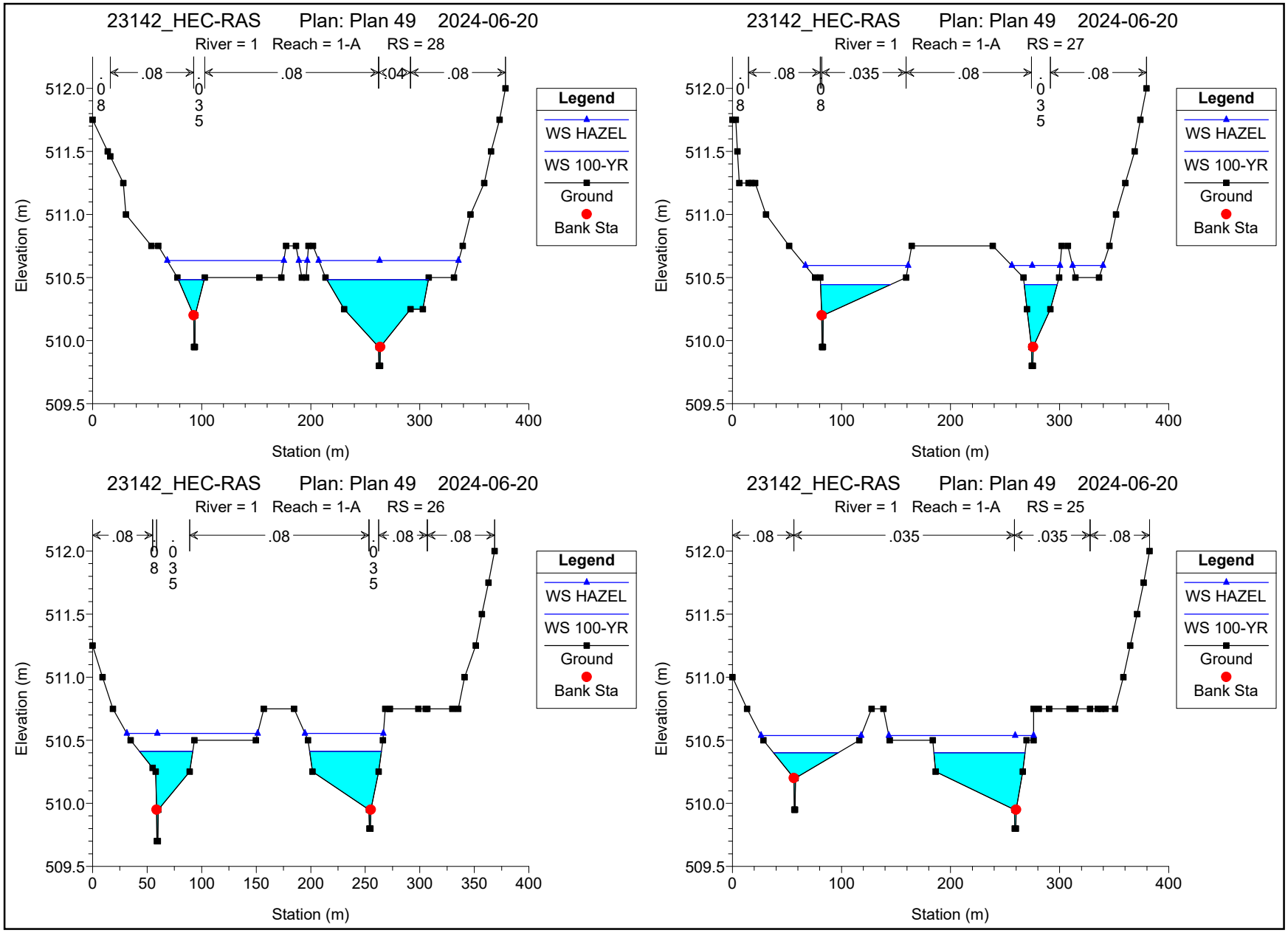
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	116	100-YR	6.88	510.30	511.09	511.09	511.15	0.007736	1.78	9.53	63.00	0.68
2-A	116	HAZEL	17.09	510.30	511.20	511.20	511.29	0.011420	2.39	19.02	105.71	0.85
2-A	115	100-YR	6.88	509.80	510.74		510.78	0.002483	1.16	9.06	27.03	0.40
2-A	115	HAZEL	17.09	509.80	510.92		510.98	0.004012	1.67	19.27	88.82	0.52
2-A	114	100-YR	6.88	509.80	510.69		510.70	0.001983	0.99	16.23	91.27	0.35
2-A	114	HAZEL	17.09	509.80	510.84		510.86	0.002851	1.33	33.08	122.58	0.43
2-A	113	100-YR	6.88	509.55	510.44	510.44	510.56	0.008913	2.10	7.67	27.78	0.75
2-A	113	HAZEL	17.09	509.55	510.63	510.63	510.70	0.007171	2.17	28.54	153.63	0.69
2-A	112	100-YR	6.88	509.70	510.27	510.27	510.29	0.007800	0.68	10.58	229.00	0.99
2-A	112	HAZEL	17.09	509.70	510.40		510.40	0.003778	0.43	41.53	252.05	0.33
2-A	111	100-YR	6.88	508.80	509.92	509.92	510.05	0.006076	2.05	8.15	35.96	0.64
2-A	111	HAZEL	17.09	508.80	510.17	510.17	510.32	0.007919	2.70	21.37	76.27	0.76
2-A	110	100-YR	6.88	508.80	509.62		509.68	0.005504	1.55	8.21	31.10	0.58
2-A	110	HAZEL	17.09	508.80	509.99		510.04	0.002288	1.32	23.89	55.38	0.40
2-A	109	100-YR	6.88	508.30	509.43		509.48	0.002952	1.44	10.79	26.58	0.45
2-A	109	HAZEL	17.09	508.30	509.85		509.91	0.002748	1.74	25.34	44.07	0.46
2-A	108	100-YR	6.88	508.05	509.21		509.31	0.004578	1.83	8.74	20.53	0.56
2-A	108	HAZEL	17.09	508.05	509.60		509.73	0.005301	2.41	18.56	30.72	0.64
2-A	107	100-YR	6.88	507.30	508.50	508.50	508.93	0.011842	3.00	2.77	4.28	0.91
2-A	107	HAZEL	17.09	507.30	509.26	509.26	509.47	0.004783	2.70	19.71	48.87	0.63
2-A	106	100-YR	6.88	506.80	508.10	508.10	508.22	0.004200	1.90	11.62	54.75	0.55
2-A	106	HAZEL	17.09	506.80	508.30	508.30	508.45	0.006468	2.60	23.50	65.10	0.70
2-A	105	100-YR	6.88	505.80	507.52	507.00	507.60	0.001657	1.45	14.44	56.53	0.36
2-A	105	HAZEL	17.09	505.80	508.21		508.22	0.000360	0.85	69.21	102.24	0.18
2-A	104	100-YR	6.88	505.80	506.97	506.97	507.38	0.015915	2.99	3.18	5.80	0.92

HEC-RAS Plan: 012 River: 2 Reach: 2-A (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
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
2-A	104	HAZEL	17.09	505.80	508.20		508.21	0.000084	0.36	138.83	174.52	0.08
2-A	103	100-YR	6.88	505.30	507.11	506.09	507.16	0.001048	1.02	7.48	15.31	0.25
2-A	103	HAZEL	17.09	505.30	508.06	506.73	508.17	0.001269	1.52	13.17	153.05	0.30
2-A	102.5		Culvert									
2-A	102	100-YR	6.88	505.23	506.94	506.04	507.00	0.002918	1.18	6.56	20.77	0.29
2-A	102	HAZEL	17.09	505.23	507.07	506.82	507.39	0.013086	2.64	7.36	29.36	0.62
2-A	101	100-YR	6.88	505.55	506.81	506.81	506.90	0.003733	1.75	14.66	95.24	0.51
2-A	101	HAZEL	17.09	505.55	507.01	506.96	507.08	0.004001	2.01	35.21	113.55	0.55

Figure B.2 Proposed Cross Sections

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.08
.04
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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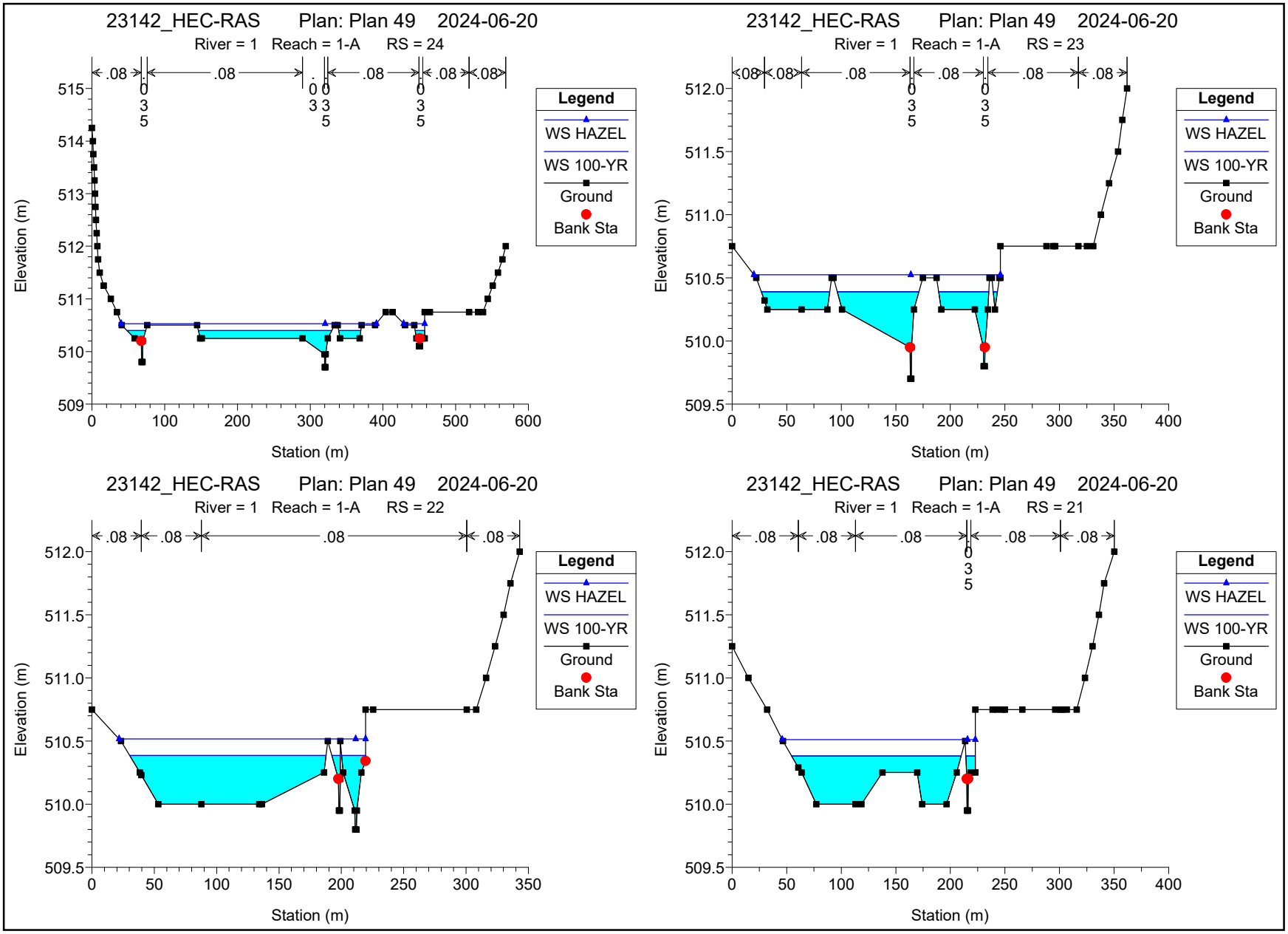
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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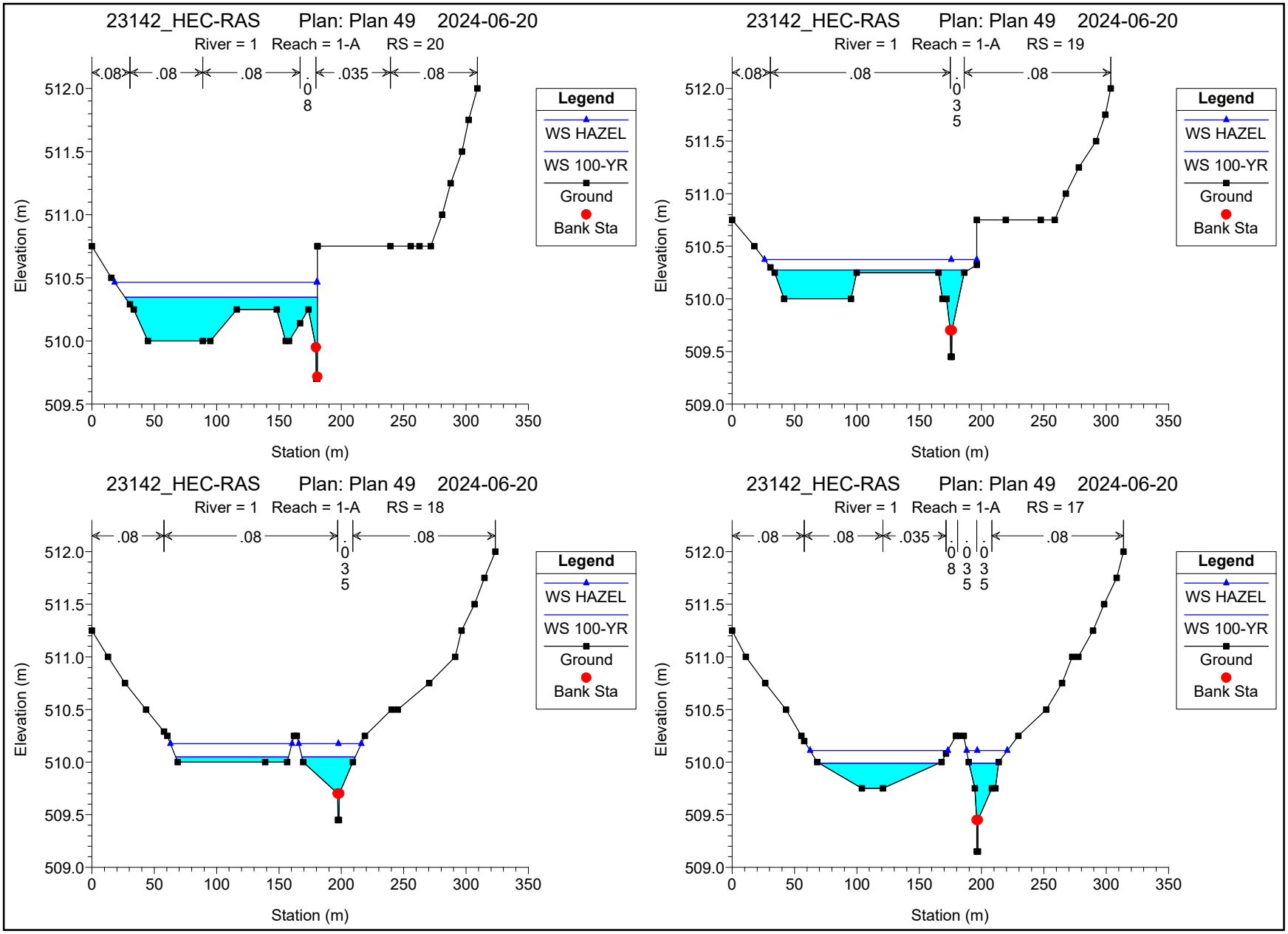
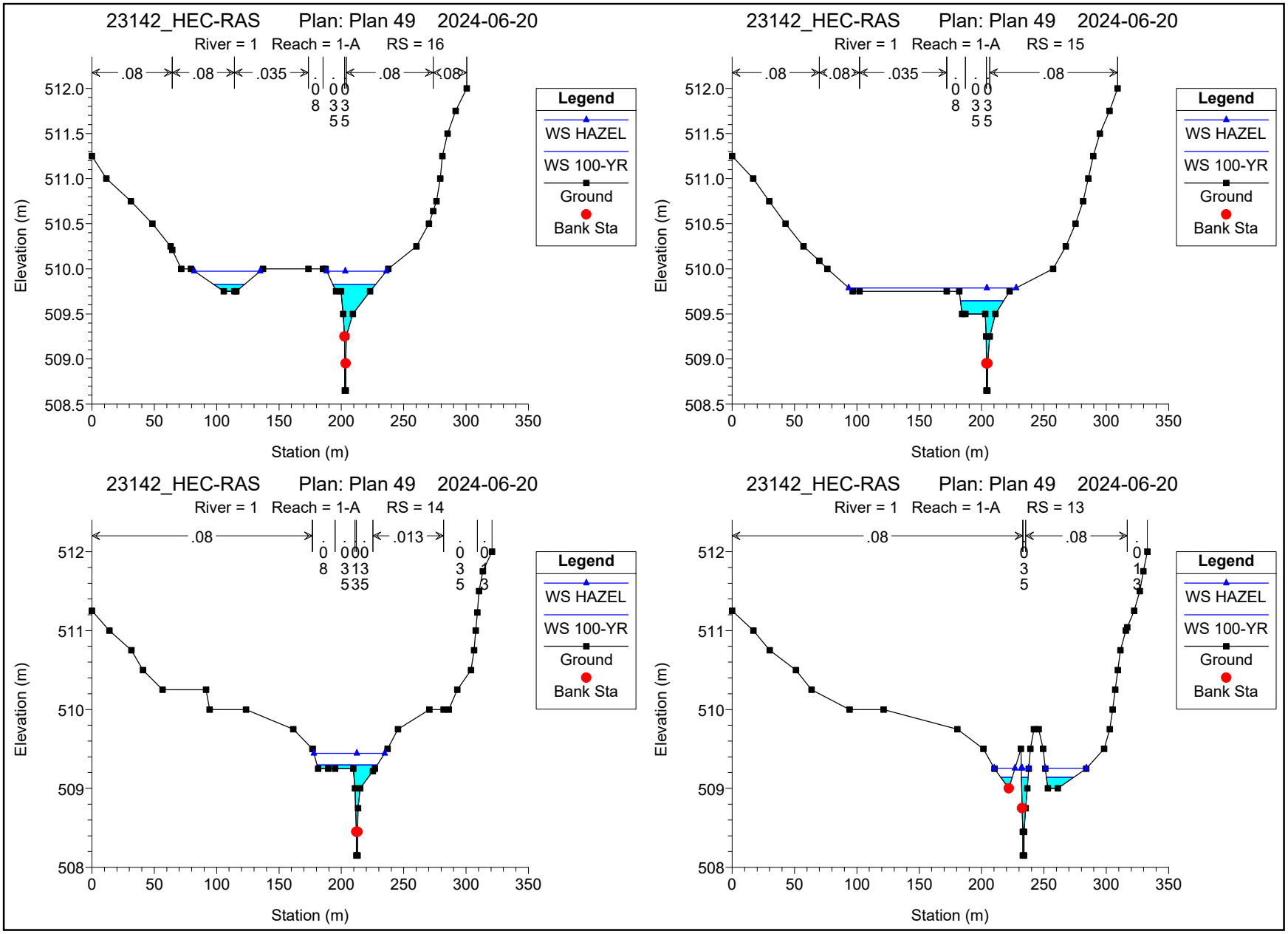
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 21
.08 .08 .08 .08 .08
0 3 5
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 20
.08 .08 .08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 19
.08 .08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 18
.08 .08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 17
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 16
.08 .08 .035 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 15
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 14
.08 .013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 13
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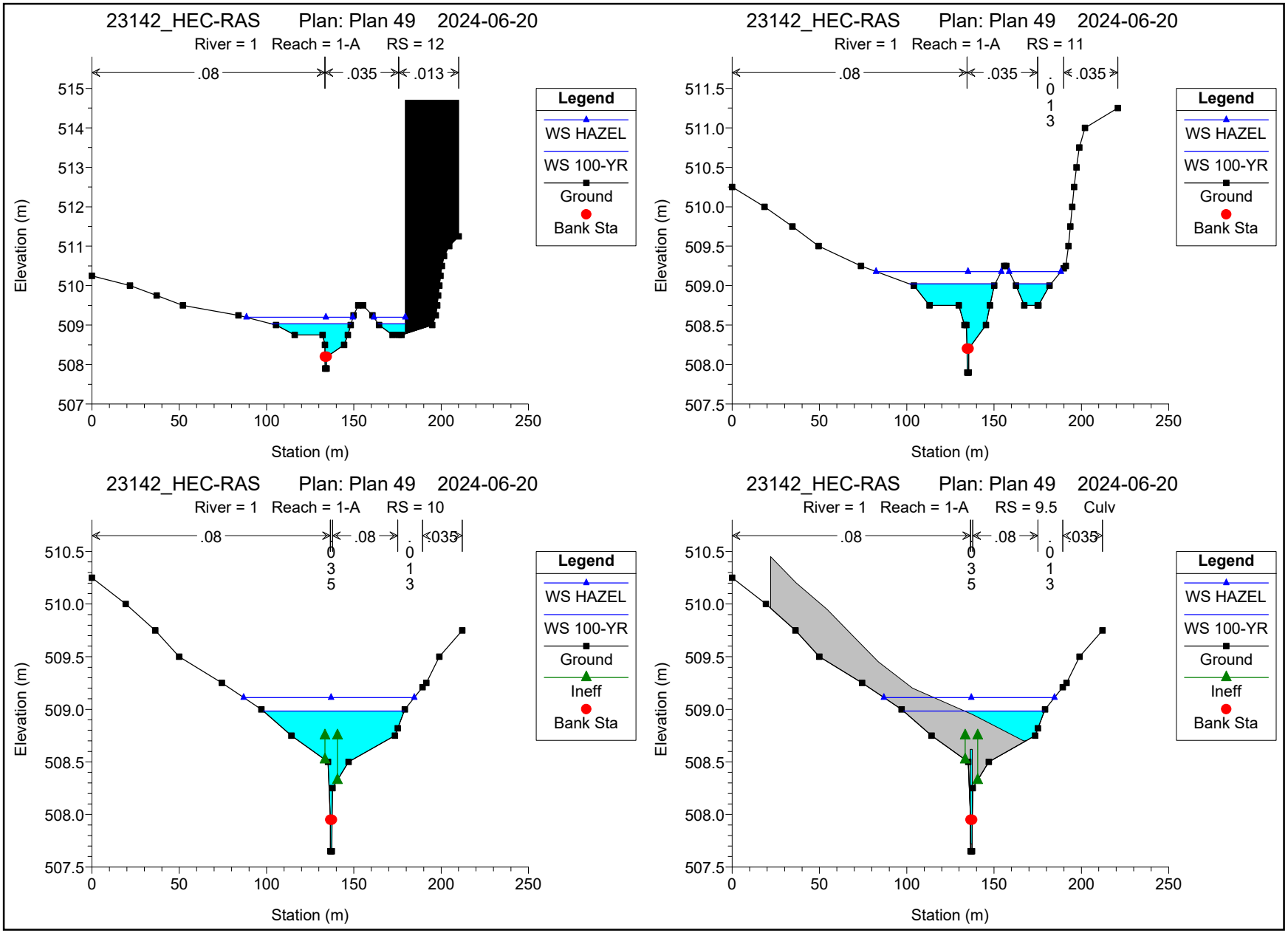
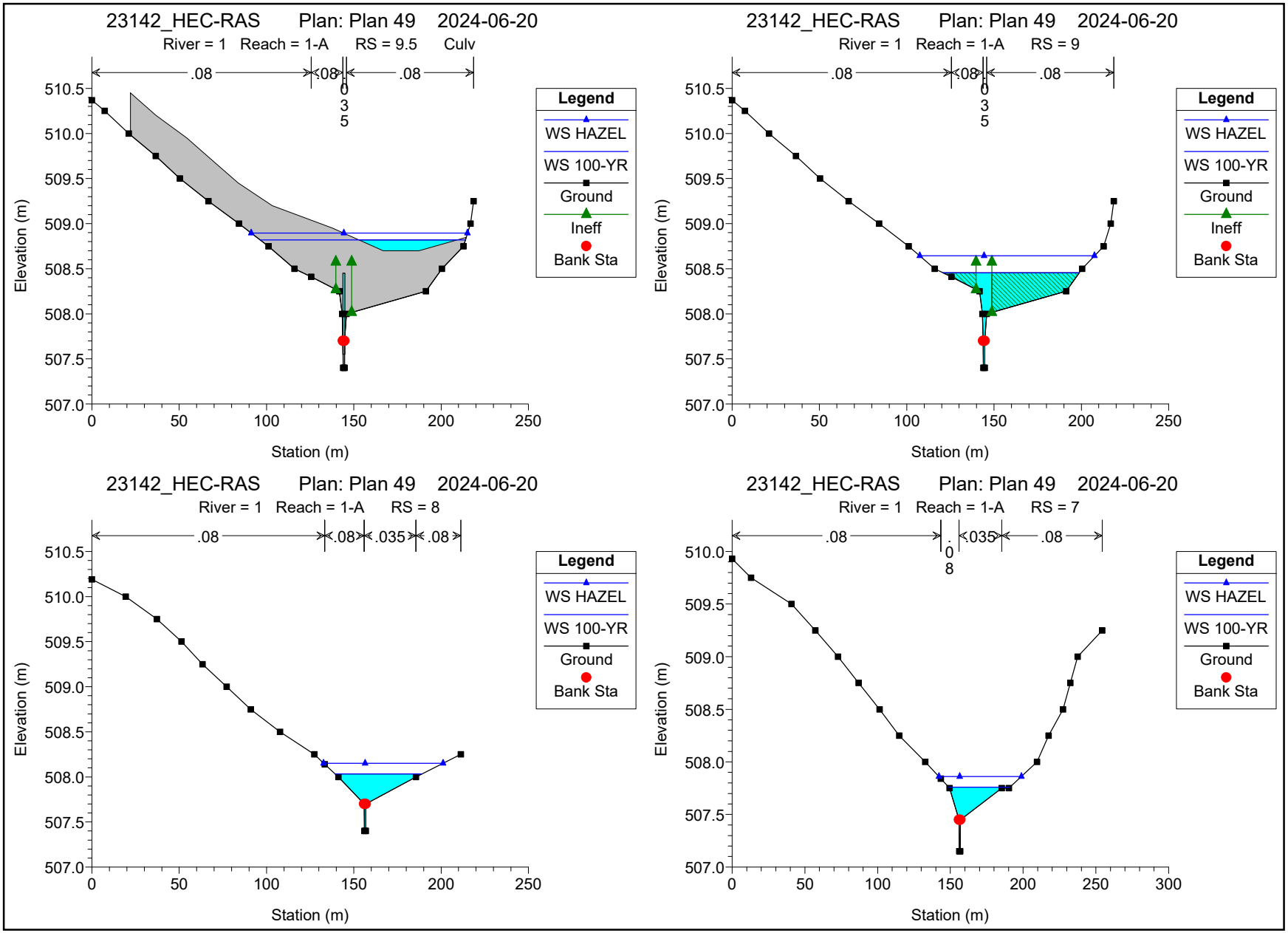
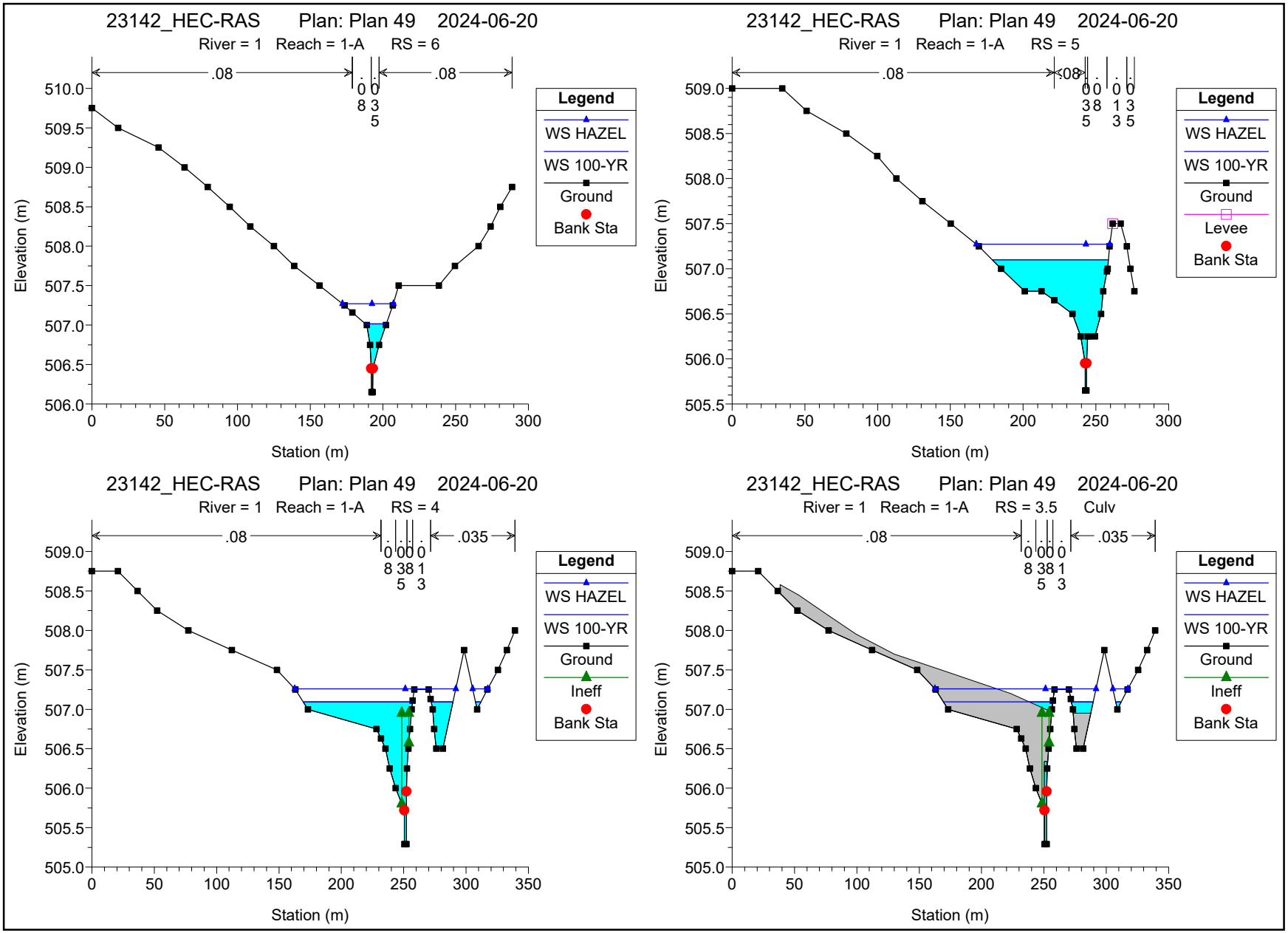
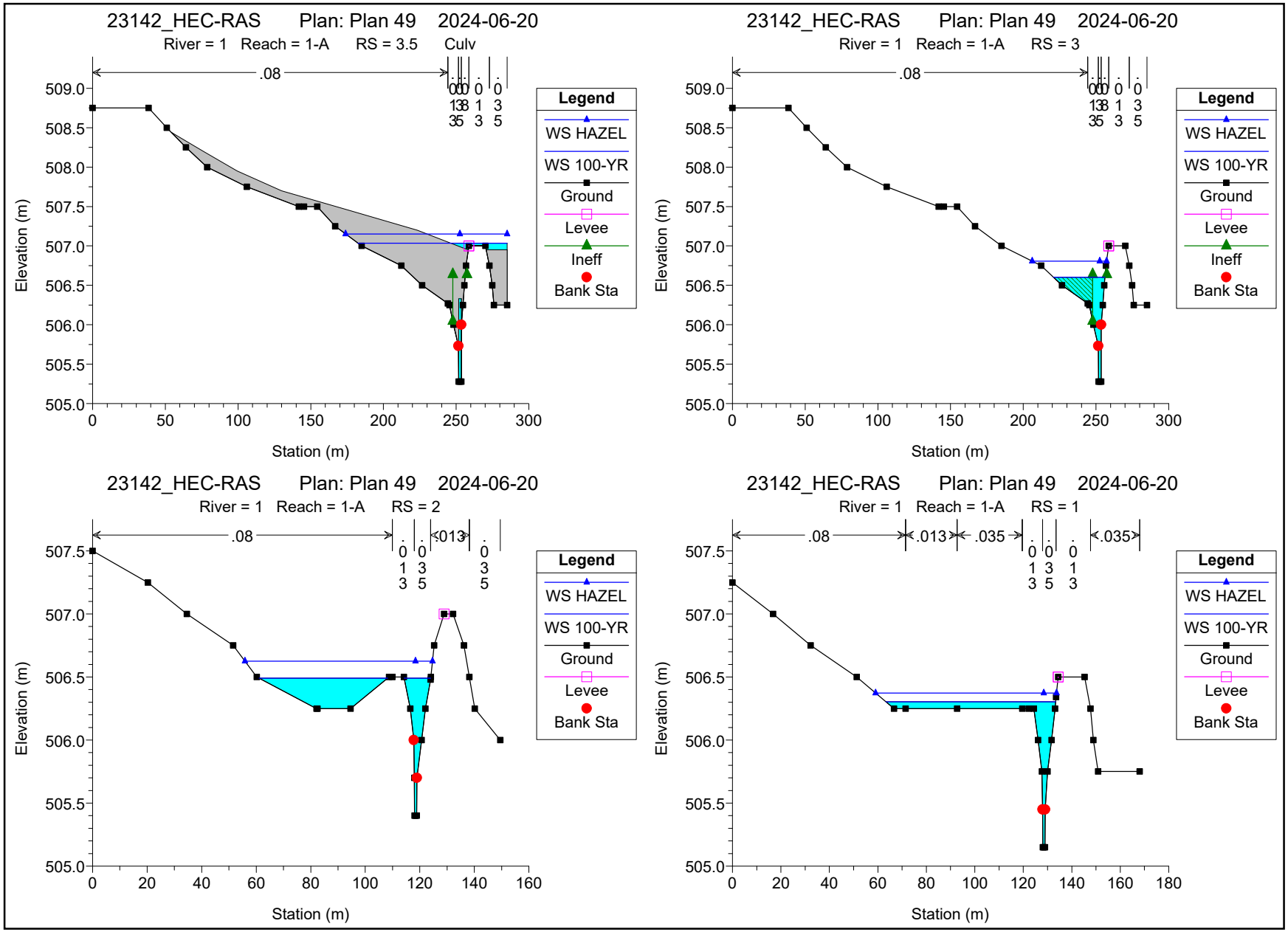
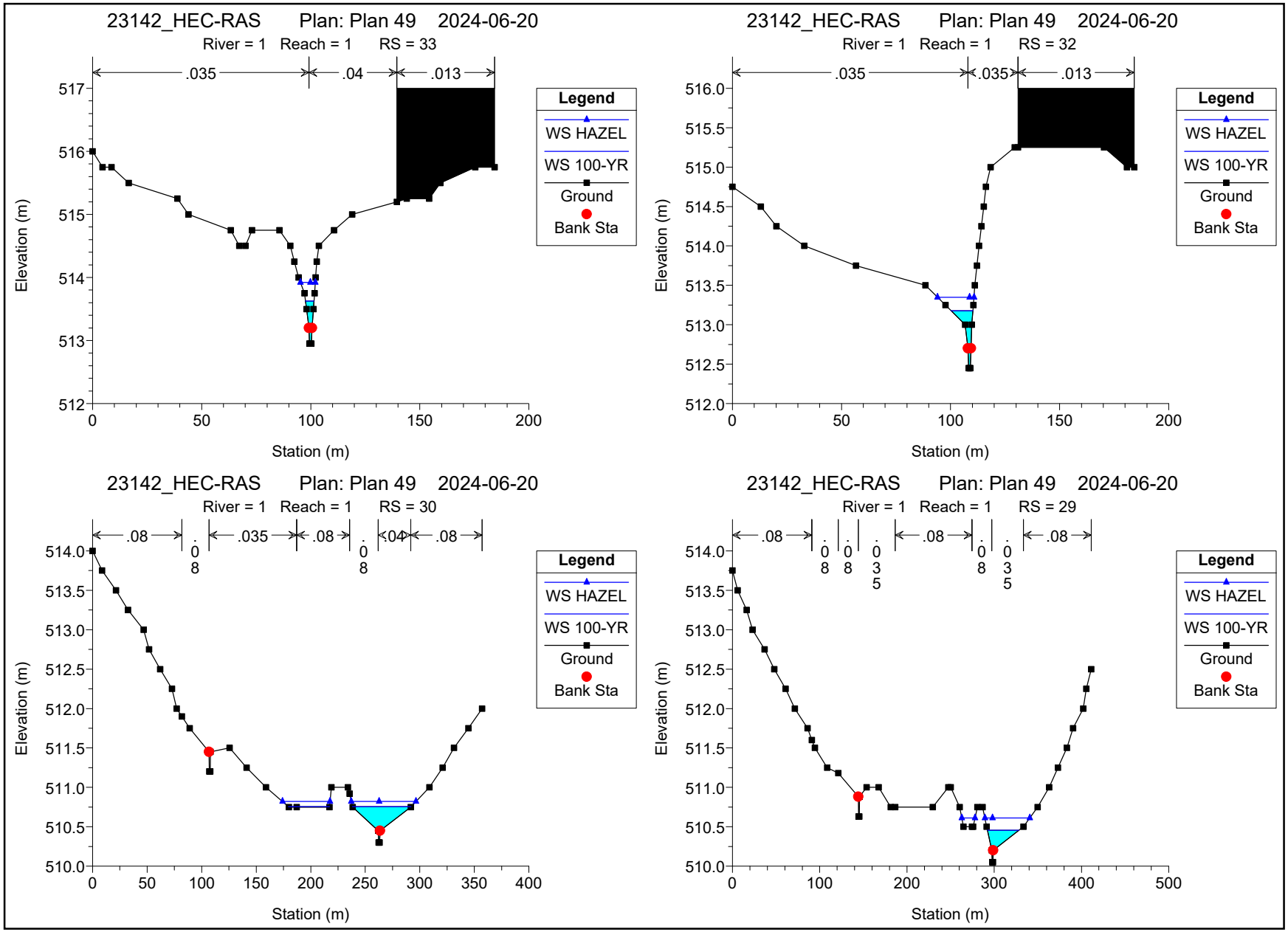
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta

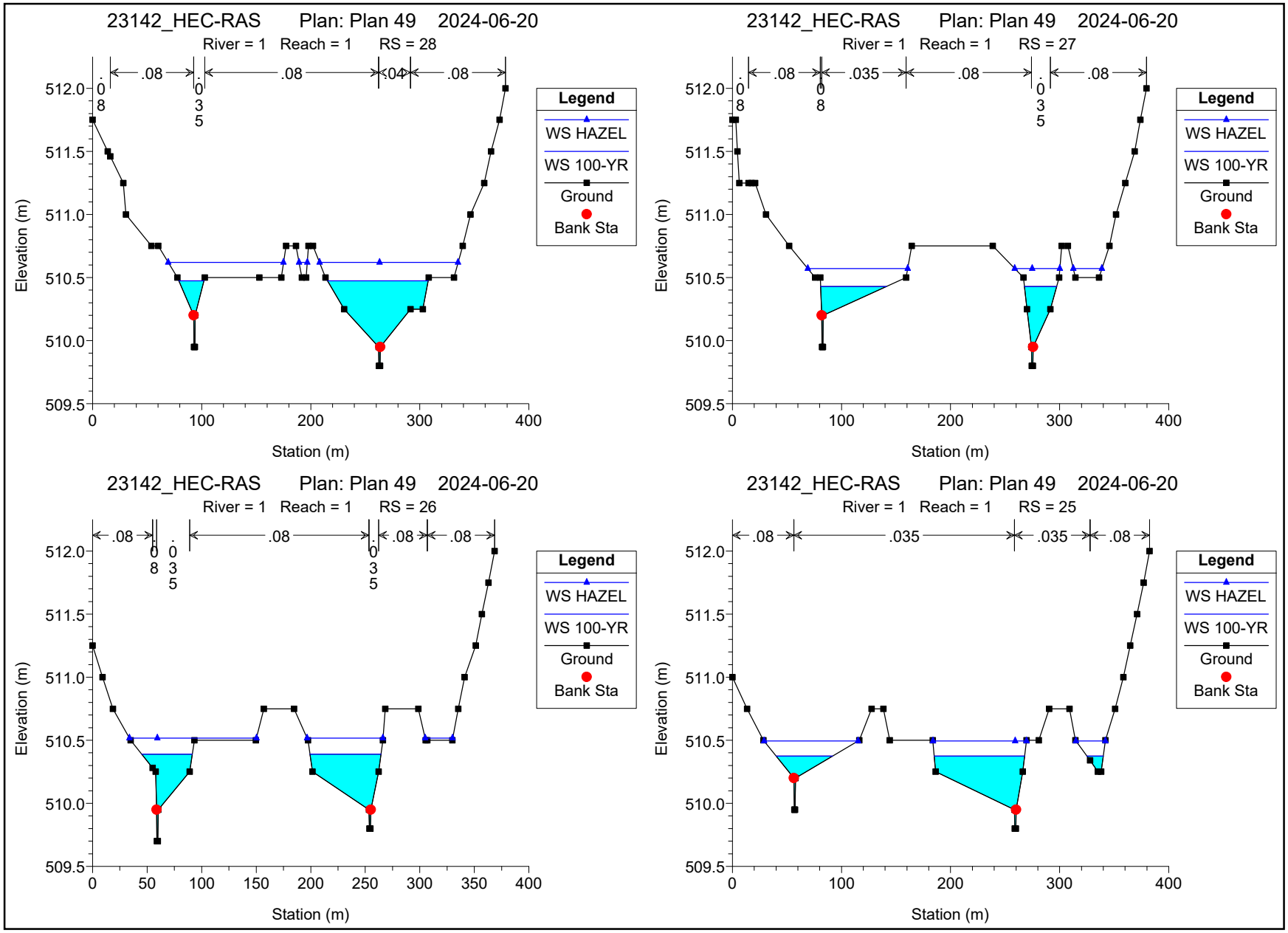

23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 12
.08
.035
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 11
.08
.035
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 10
.08
.035
.08
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 9.5 Culv
.08
.035
.08
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta

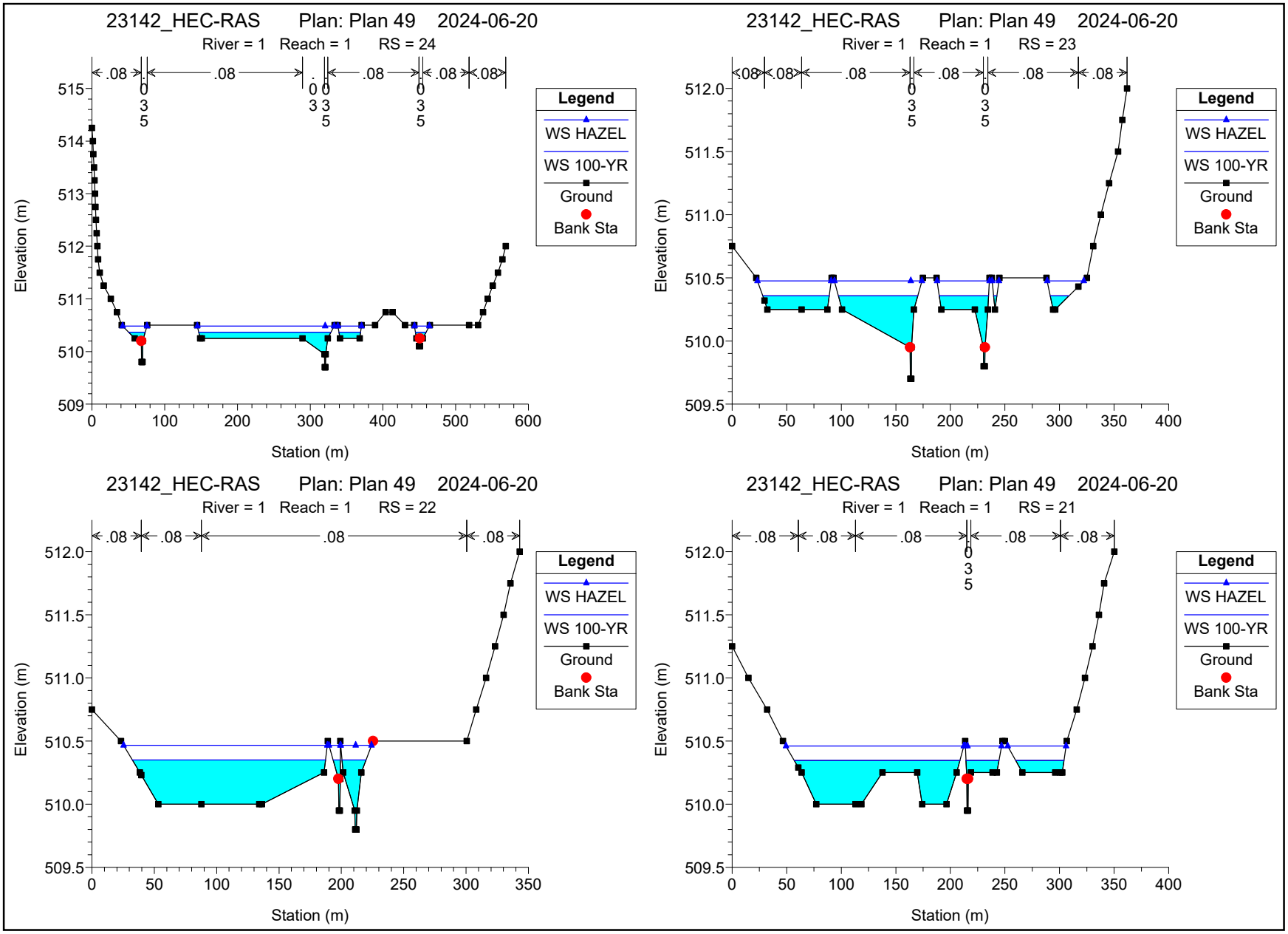

23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 9.5 Culv
.08
.08
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 9
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 8
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 7


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 6
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 5
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 4
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 3.5 Culv
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 3.5 Culv
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 3
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 2
.08
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1-A RS = 1
.08
.013
.035
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 33
.035
.04
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 32
.035
.035
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 30
.08
.08
.035
.08
.08
.04
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 29
.08
.08
.08
.08
.08
.035
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 28
.08
.035
.08
.04
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 27
.08
.08
.035
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 26
.08
.08
.035
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 25
.08
.035
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 24
.08 .08 .08 .08 .08 .08
0 3 5
0 3 5
0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 23
.08 .08 .08 .08 .08 .08
0 3 5
0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 22
.08 .08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 21
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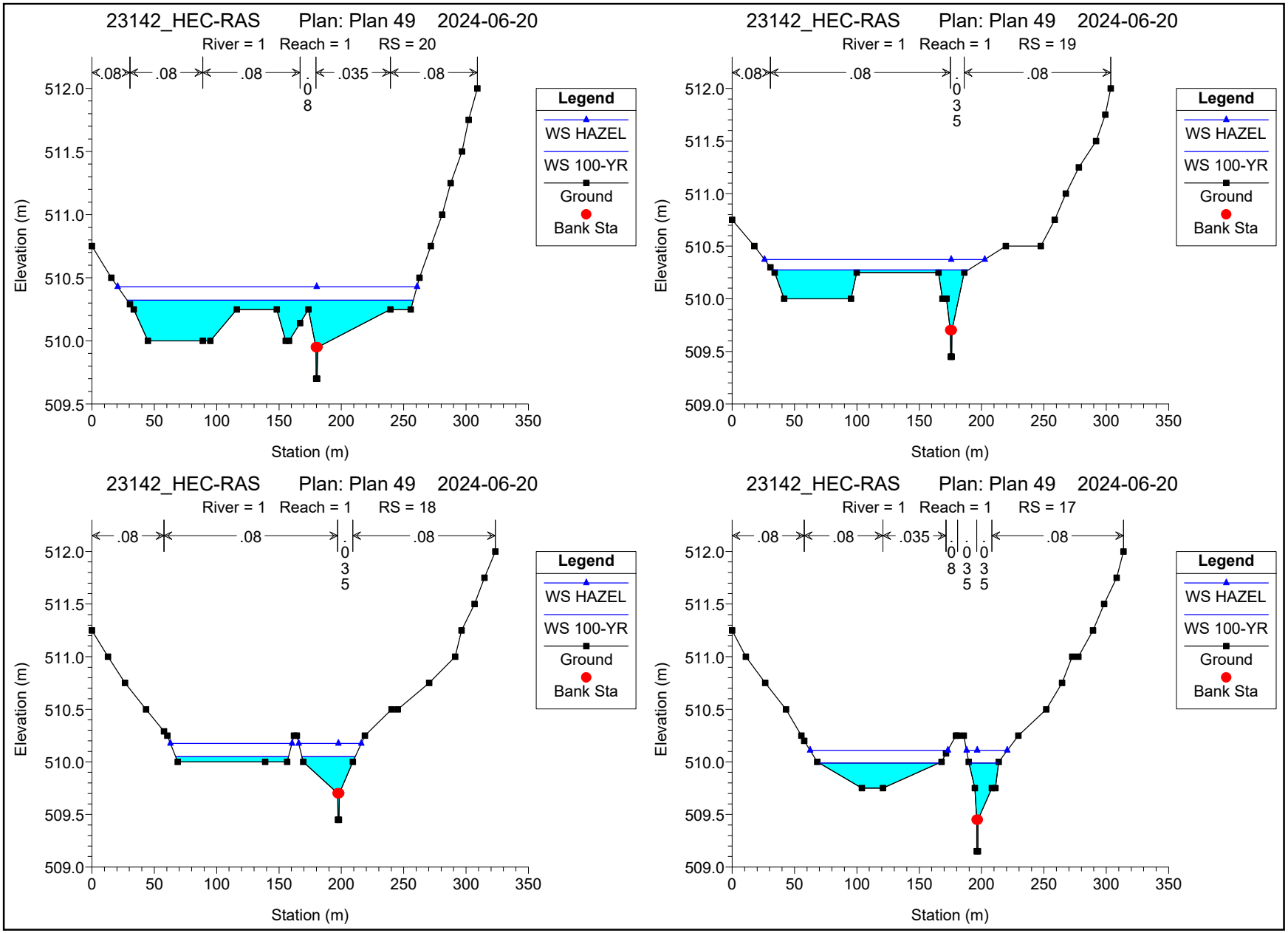
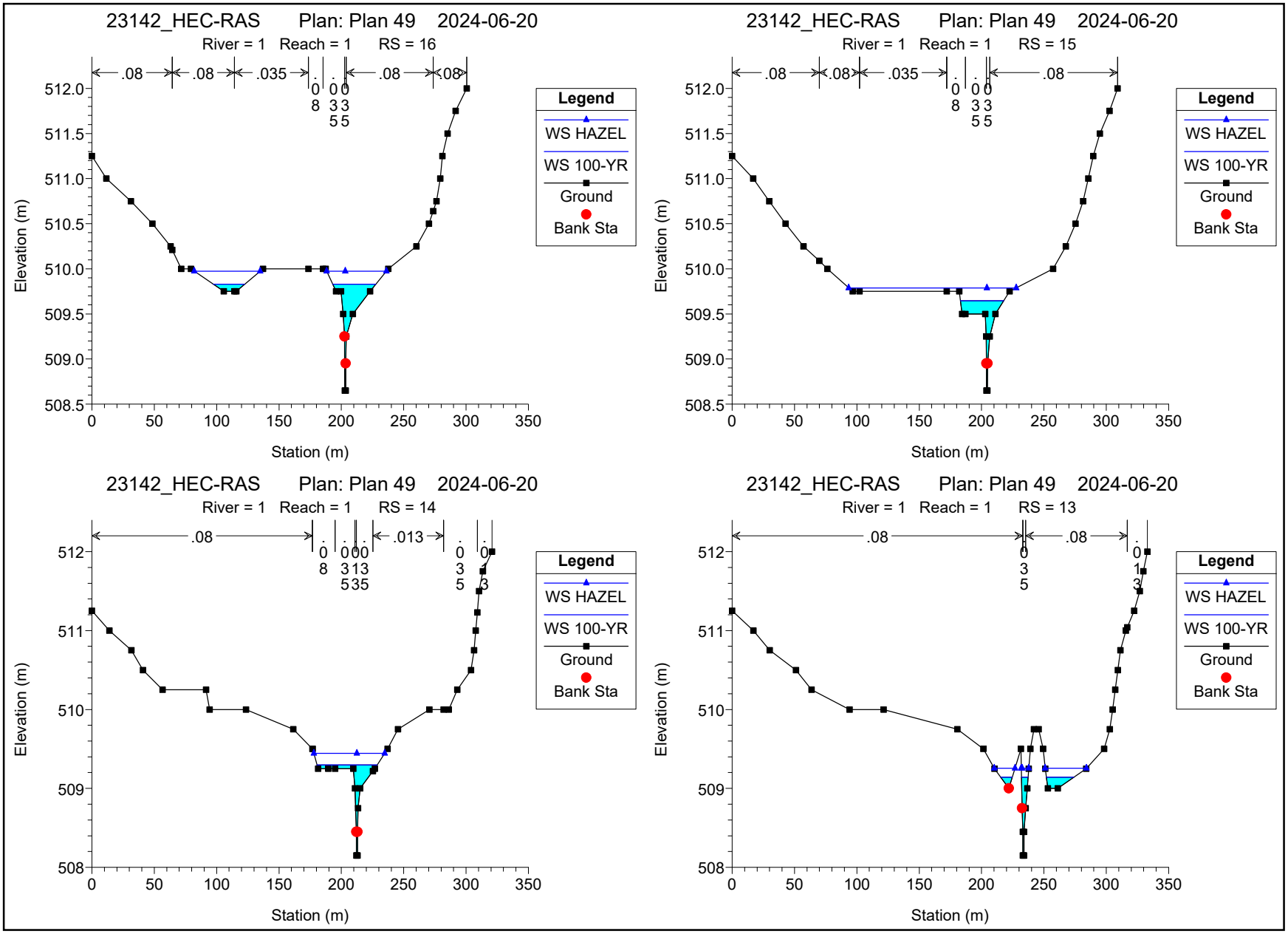
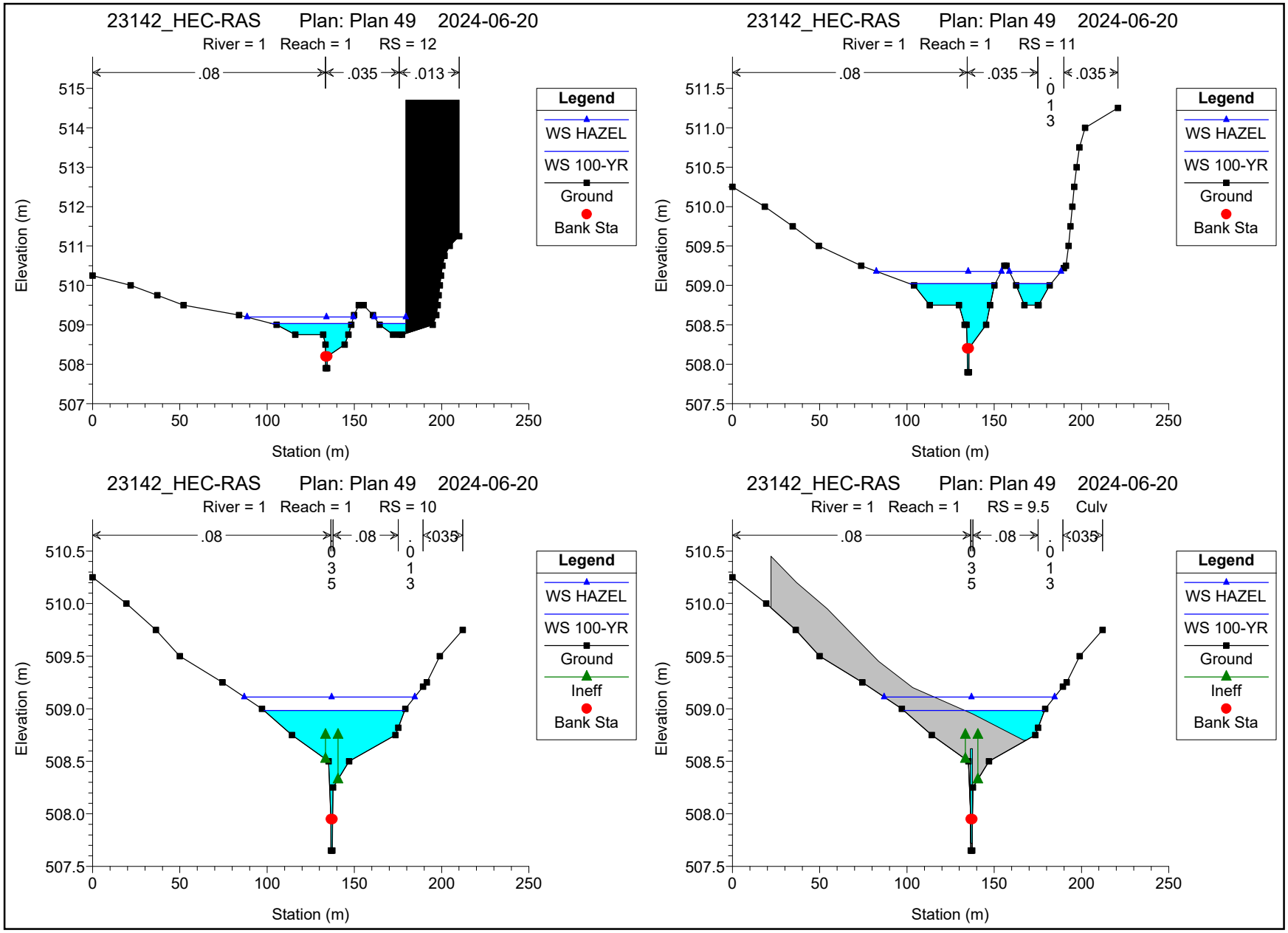
0 3 5
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 20
.08 .08 .08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 19
.08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 18
.08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 17
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 16
.08 .08 .035 .08 .08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 15
.08 .08 .035 .08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 14
.08 .013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 13
.08 .08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 12
.08
.035
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 11
.08
.035
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 10
.08
.035
.08
.013
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 9.5 Culv
.08
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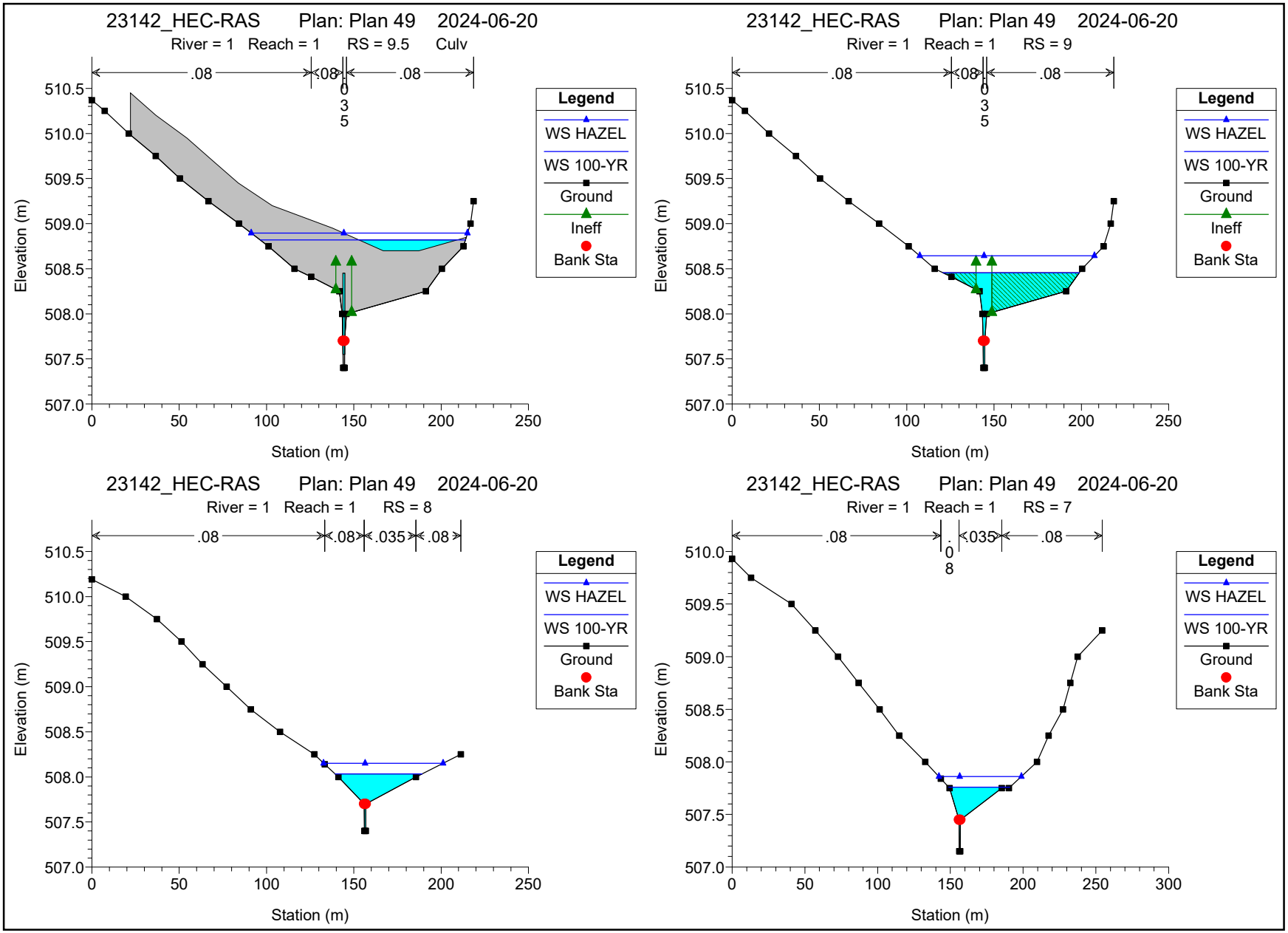
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 9.5 Culv
.08
.08
.08
0
3
5
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 9
.08
.08
.08
0
3
5
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 8
.08
.08
.035
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 7
.08
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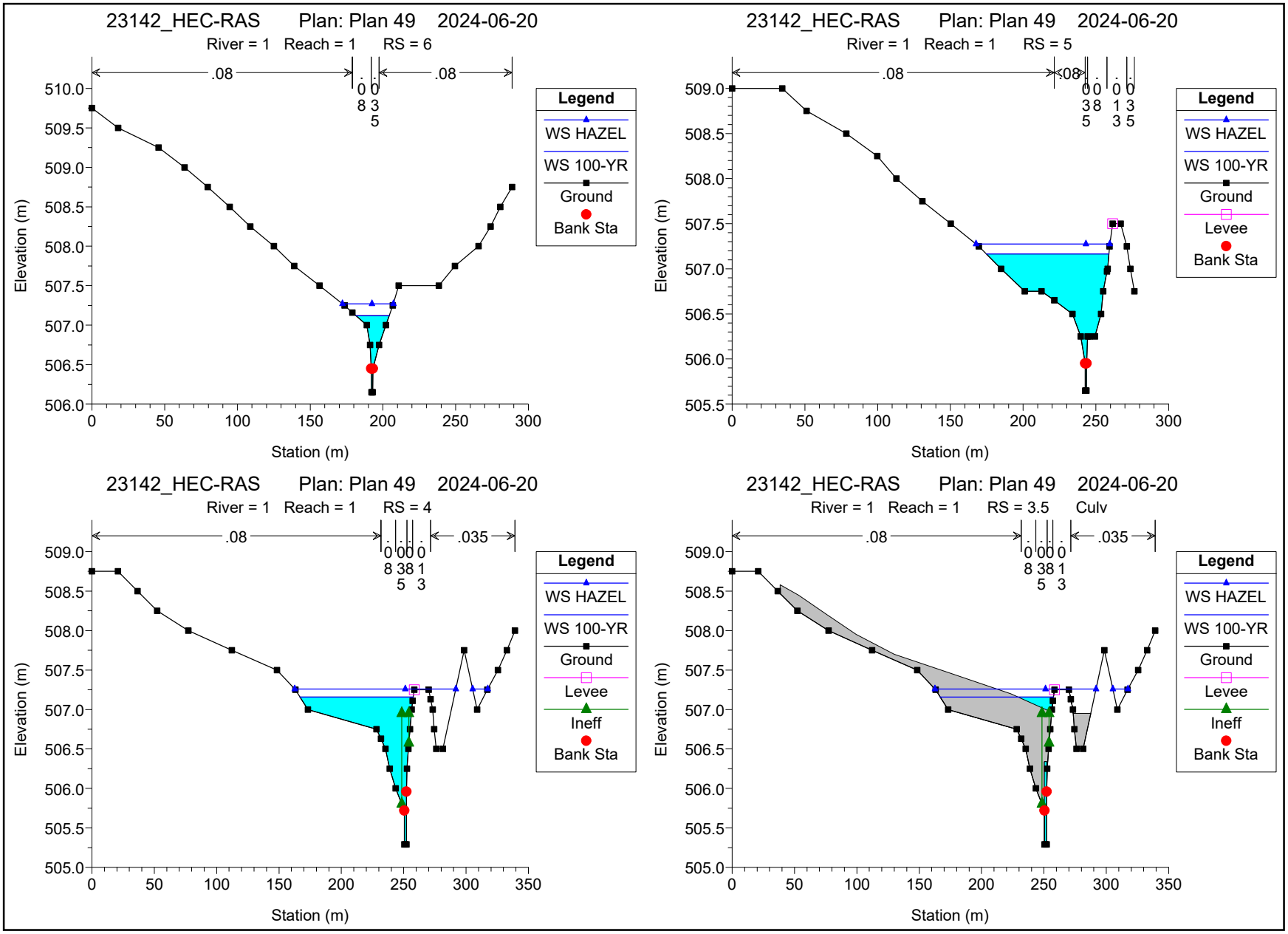
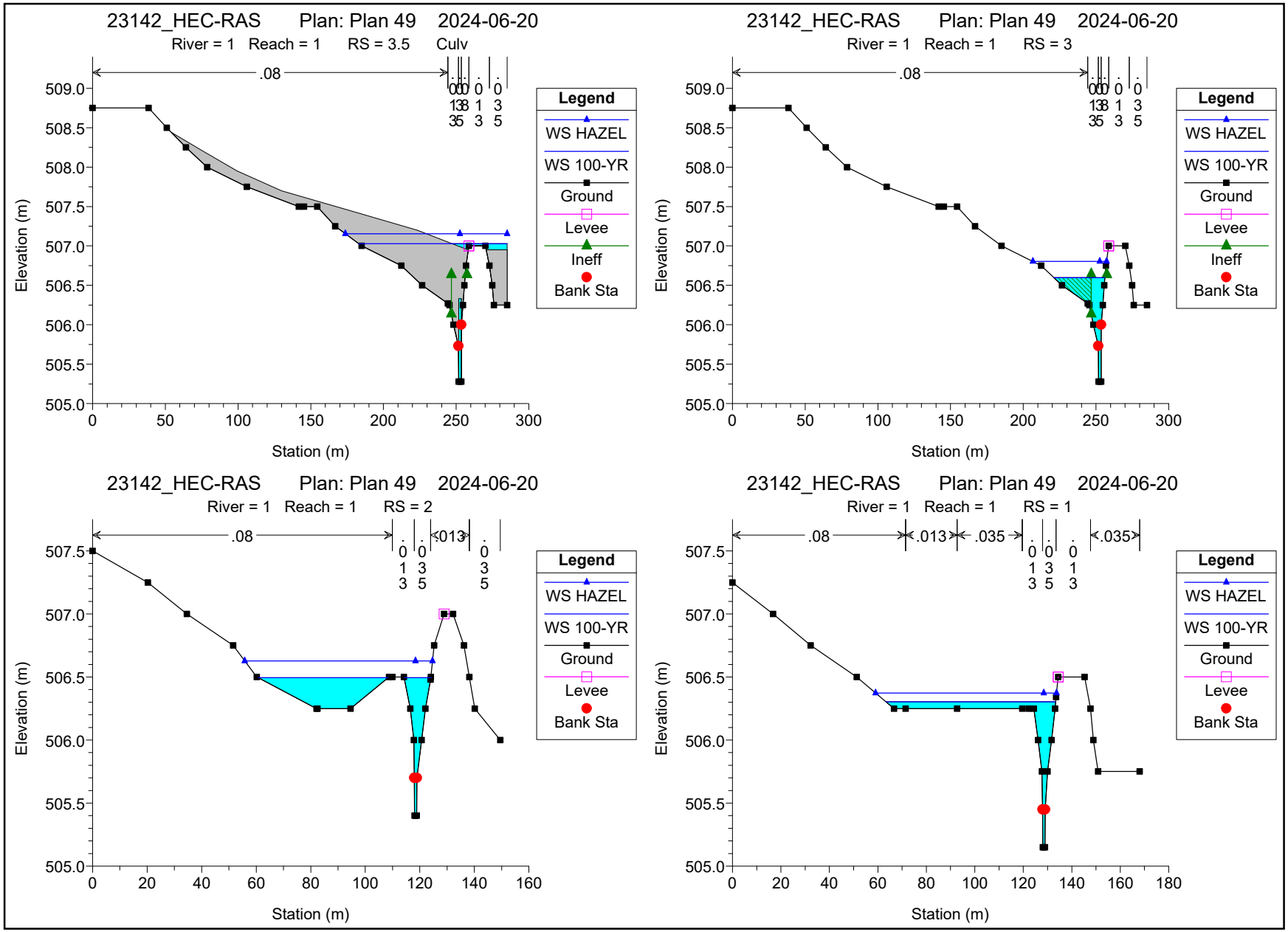
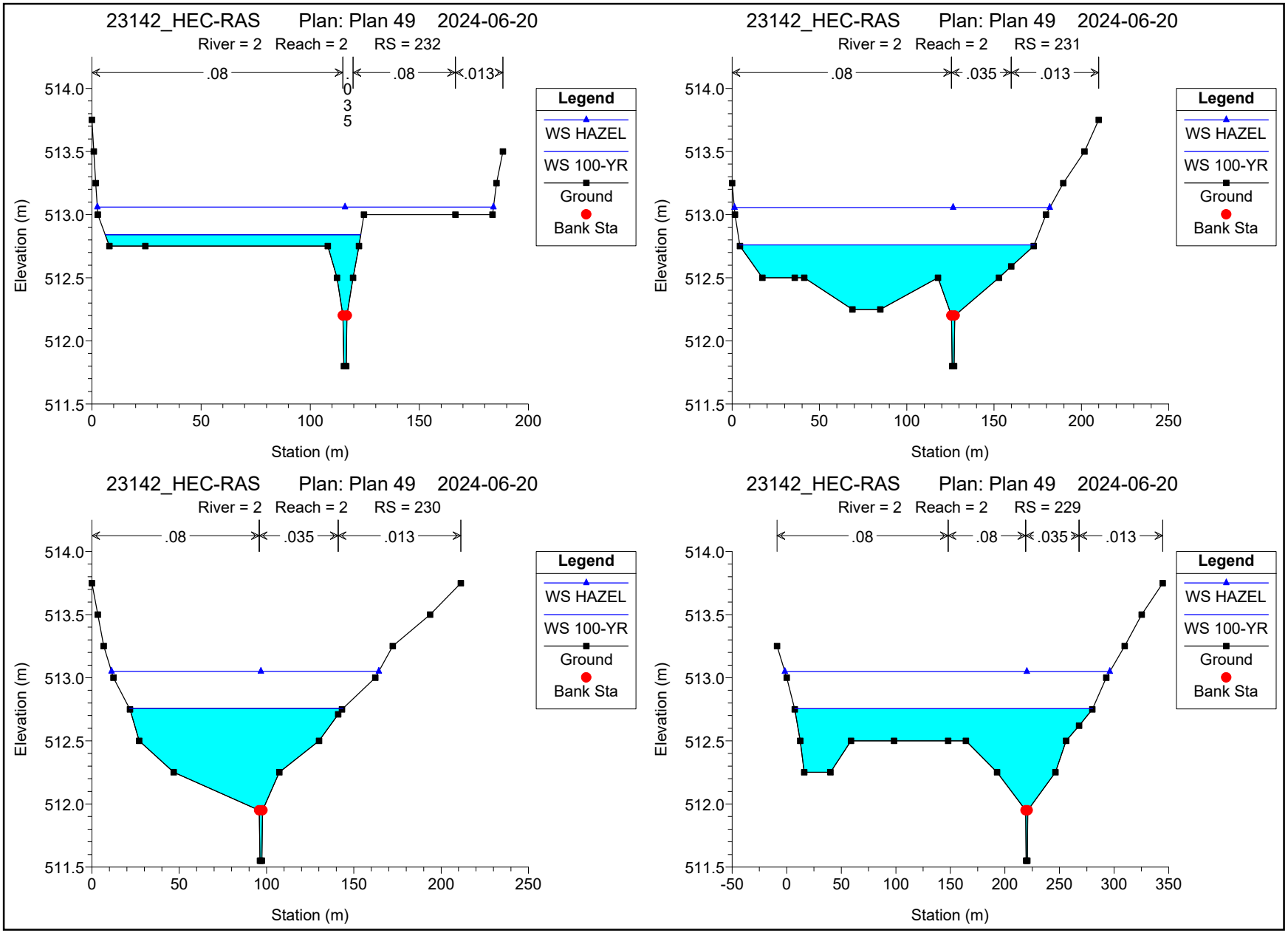
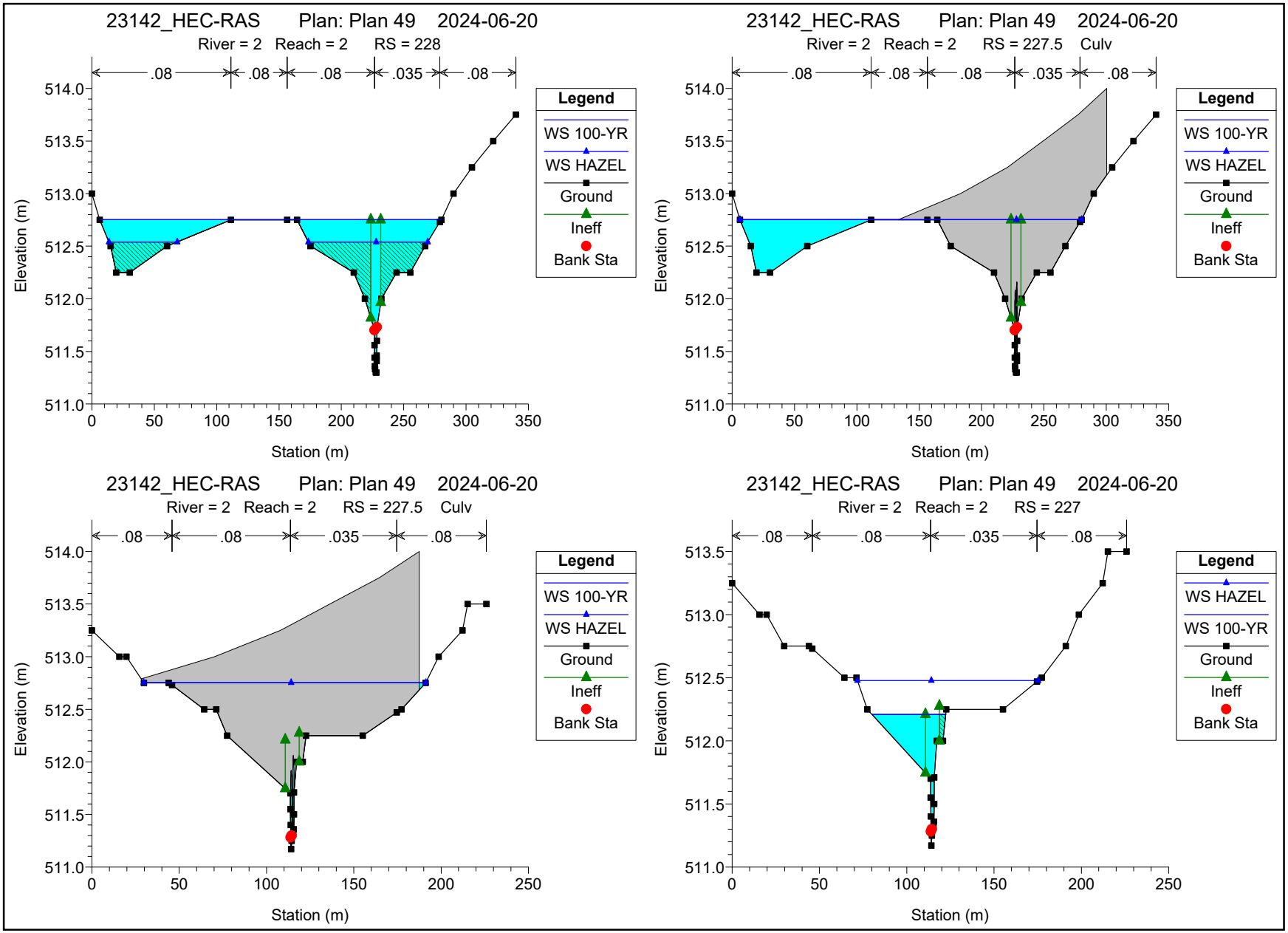
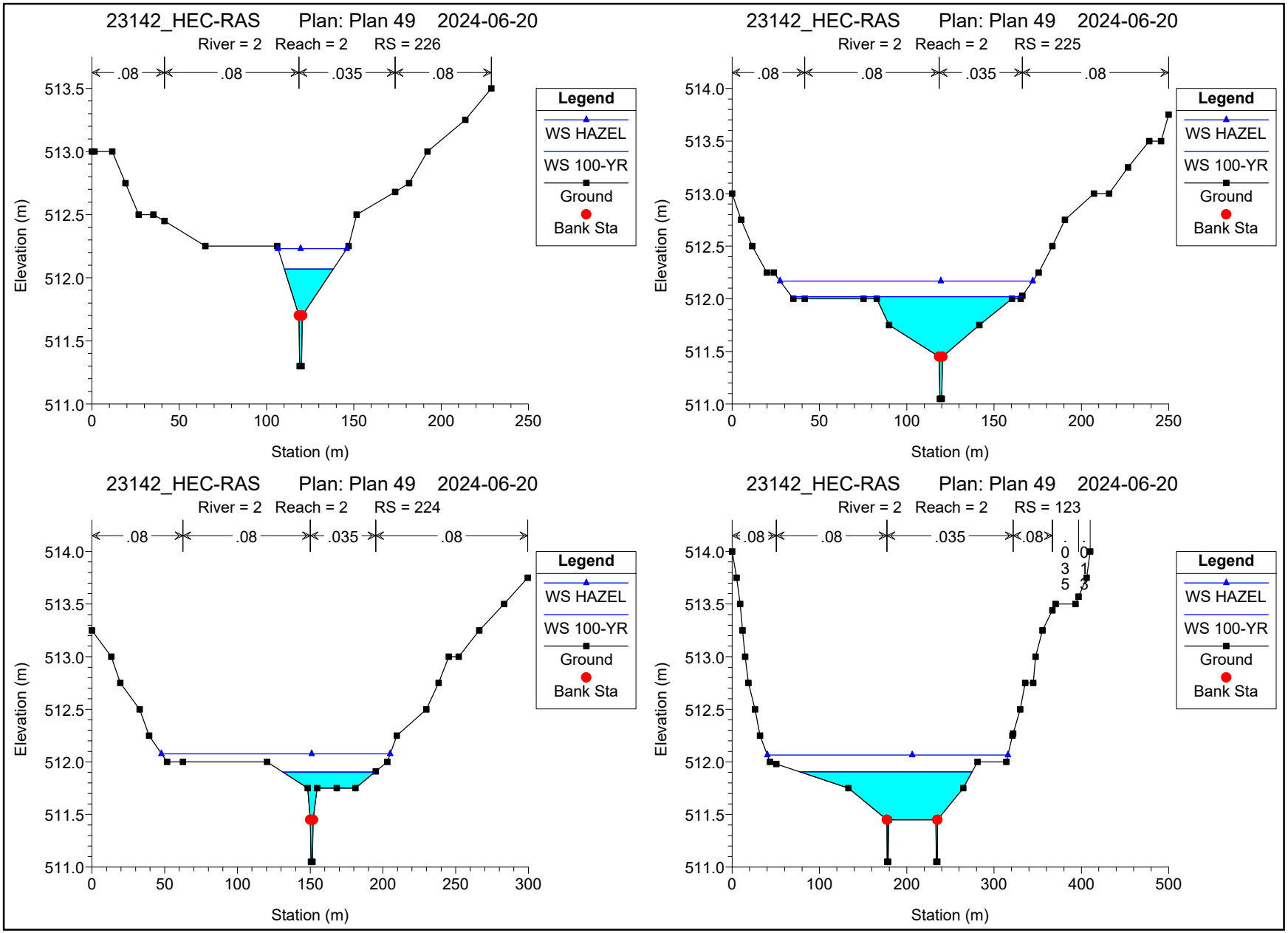
.08
0
8
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 6
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 5
.08
.08
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 4
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 3.5 Culv
.08
.035
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 3.5 Culv
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 3
.08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 2
.08
.013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 1 Reach = 1 RS = 1
.08
.013
.035
.035
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 232
.08
.035
.08
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 231
.08
.035
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 230
.08
.035
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 229
.08
.08
.035
.013
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 228
.08 .08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 227.5 Culv
.08 .08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 227.5 Culv
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS 100-YR
WS HAZEL
Ground
Ineff
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 227
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta


23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 226
.08 .08 .035 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Elevation (m)
Station (m)
Legend
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WS 100-YR
Ground
Bank Sta
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Station (m)
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Bank Sta
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Station (m)
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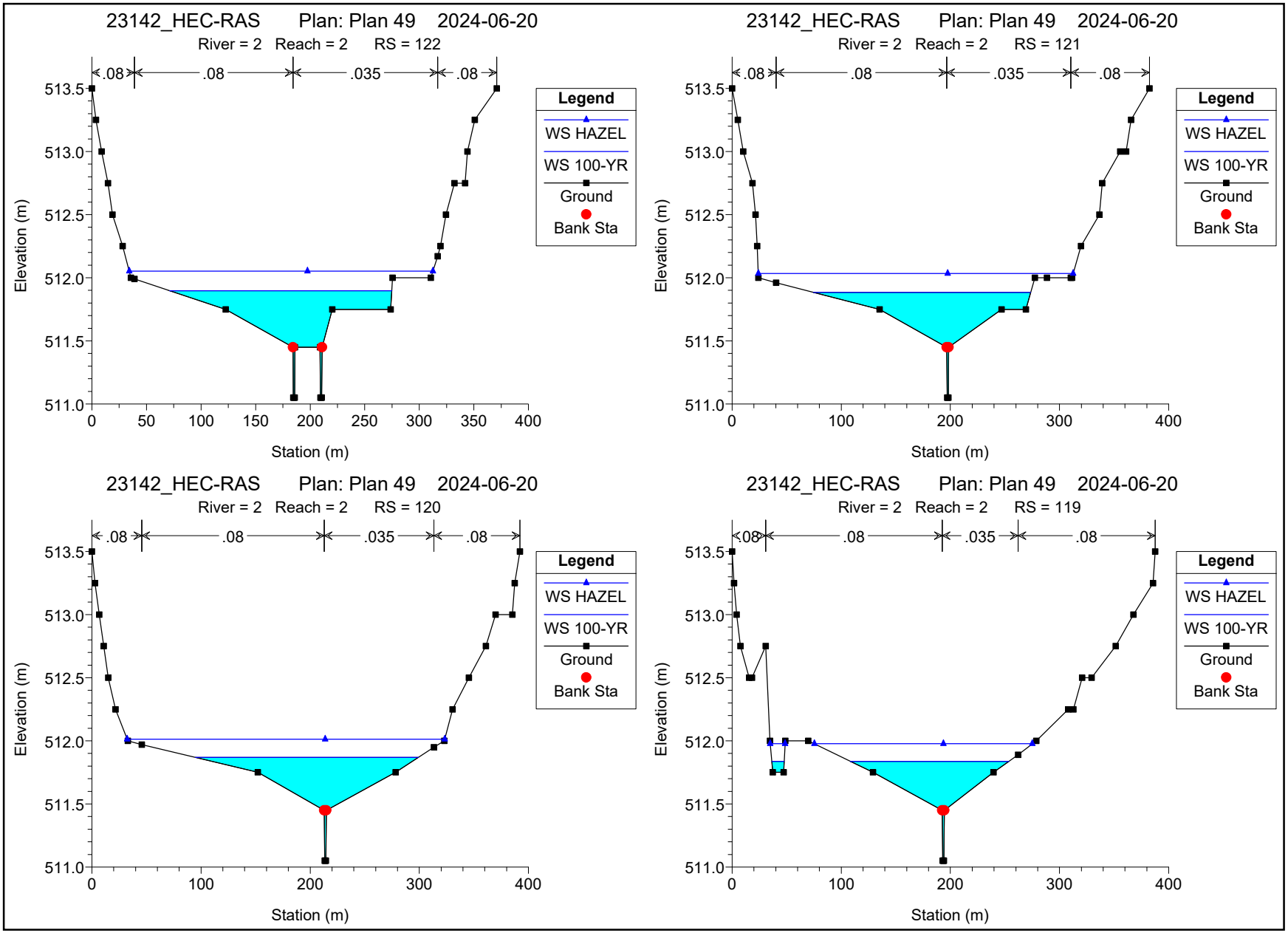
Ground
Bank Sta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Station (m)
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Bank Sta
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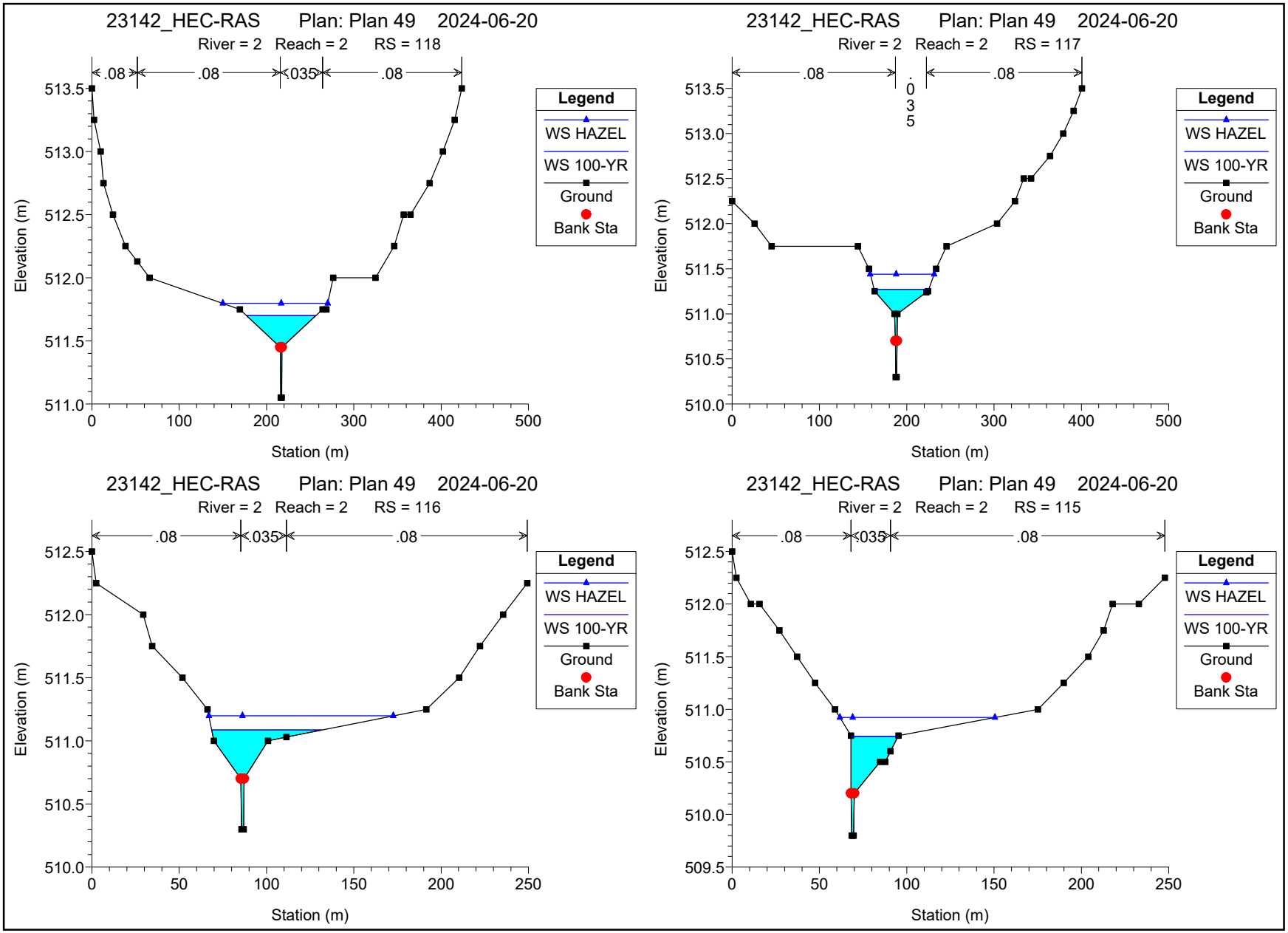
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Station (m)
Legend
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WS 100-YR
Ground
Bank Sta
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Station (m)
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WS 100-YR
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Bank Sta
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Station (m)
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WS 100-YR
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Bank Sta
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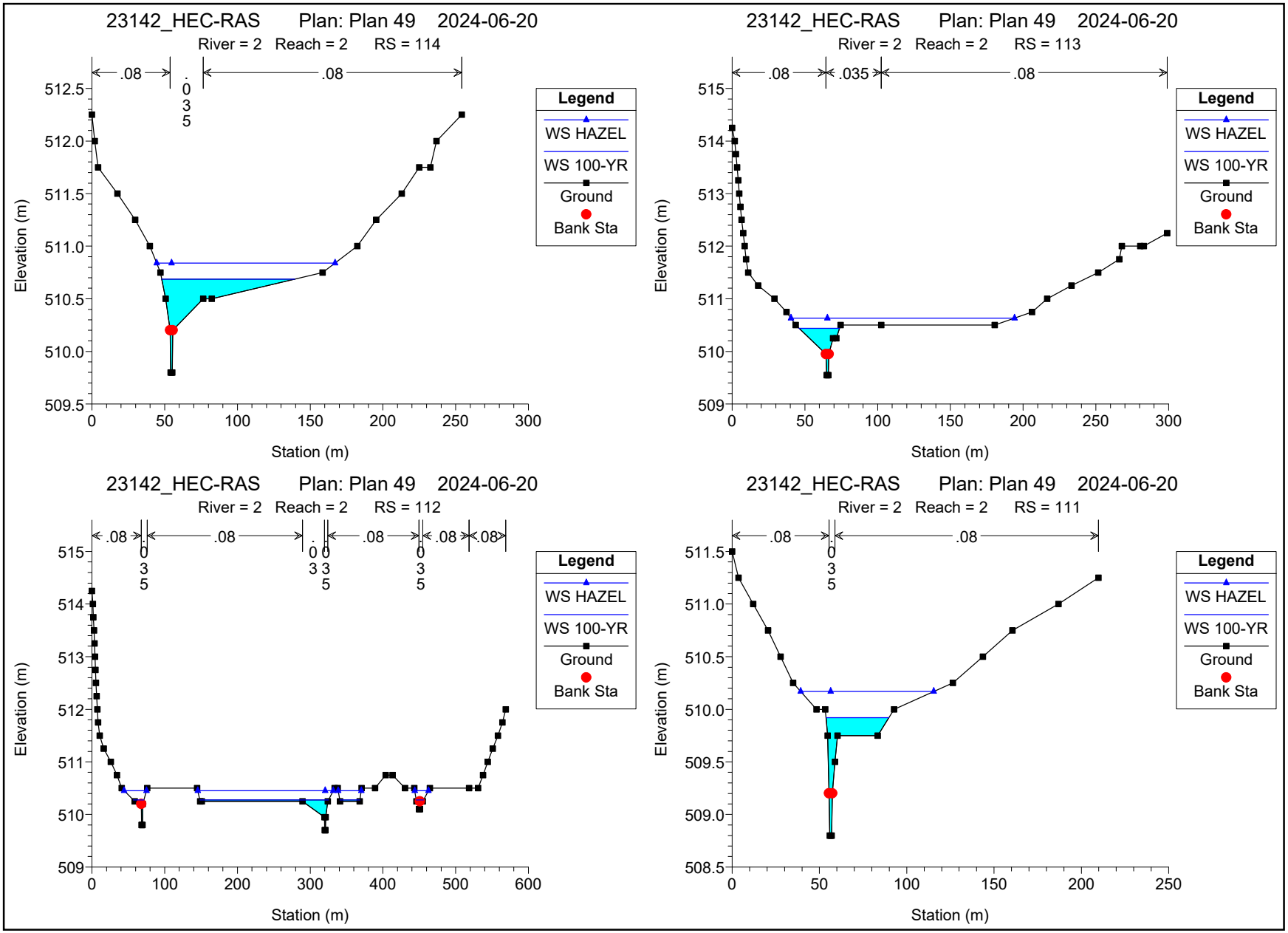
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Ground
Bank Sta
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Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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River = 2 Reach = 2 RS = 112
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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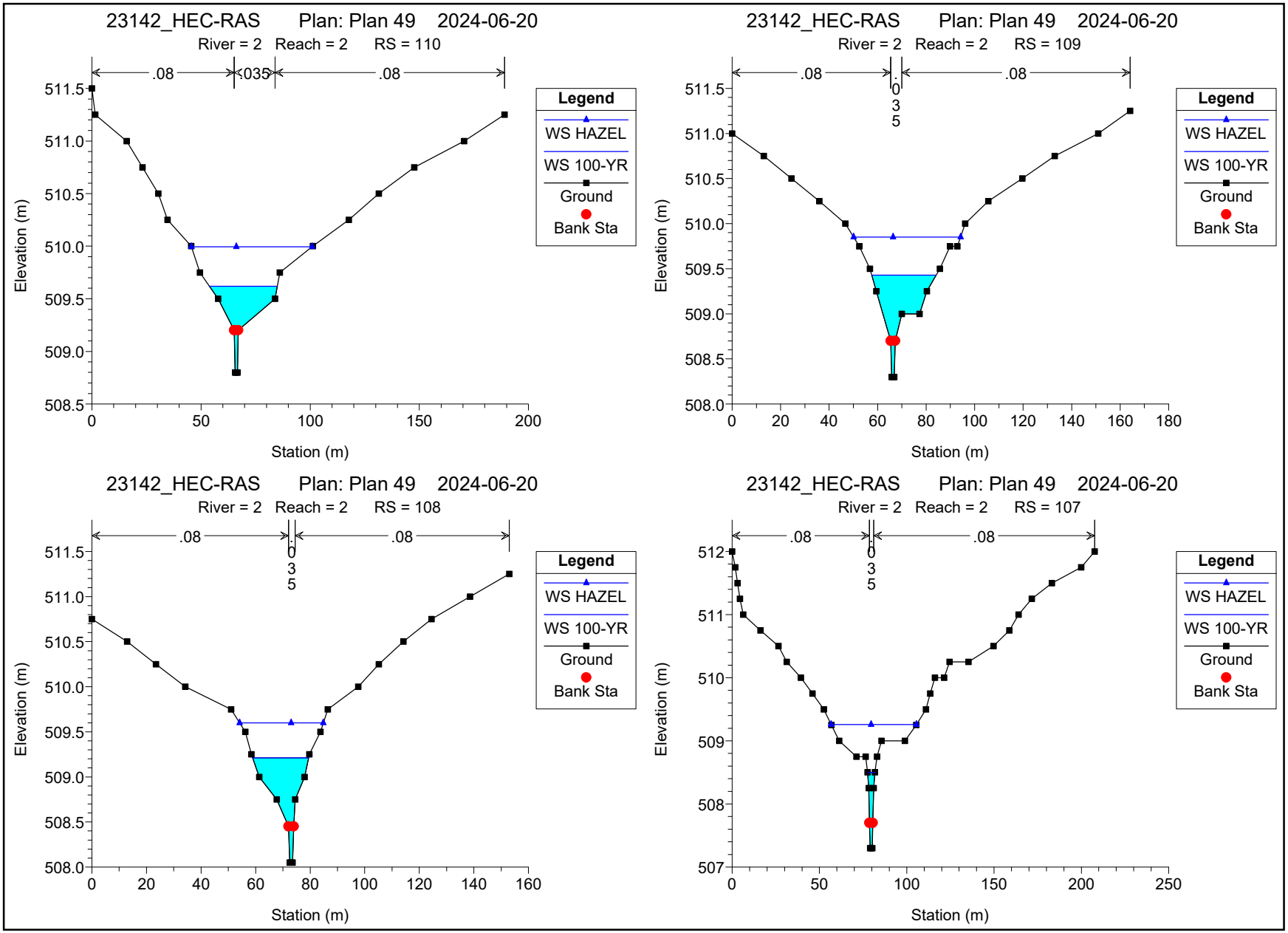
Station (m)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Station (m)
Legend
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WS 100-YR
Ground
Bank Sta
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Elevation (m)
Station (m)
Legend
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WS 100-YR
Ground
Bank Sta
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River = 2 Reach = 2 RS = 108
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Station (m)
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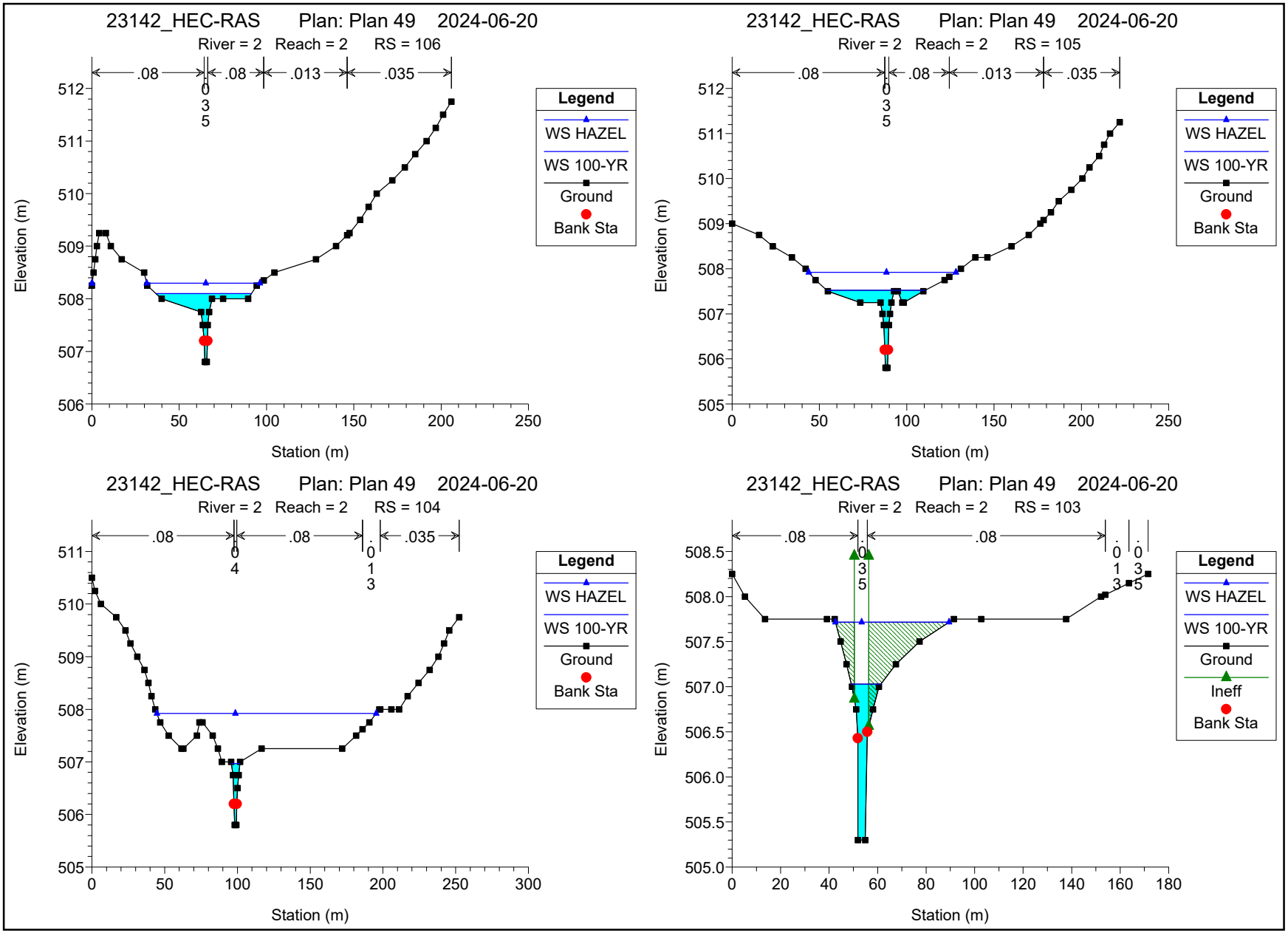
Ground
Bank Sta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Station (m)
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WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
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Elevation (m)
Station (m)
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WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 104
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0 1 3
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 103
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Elevation (m)
Station (m)
Legend
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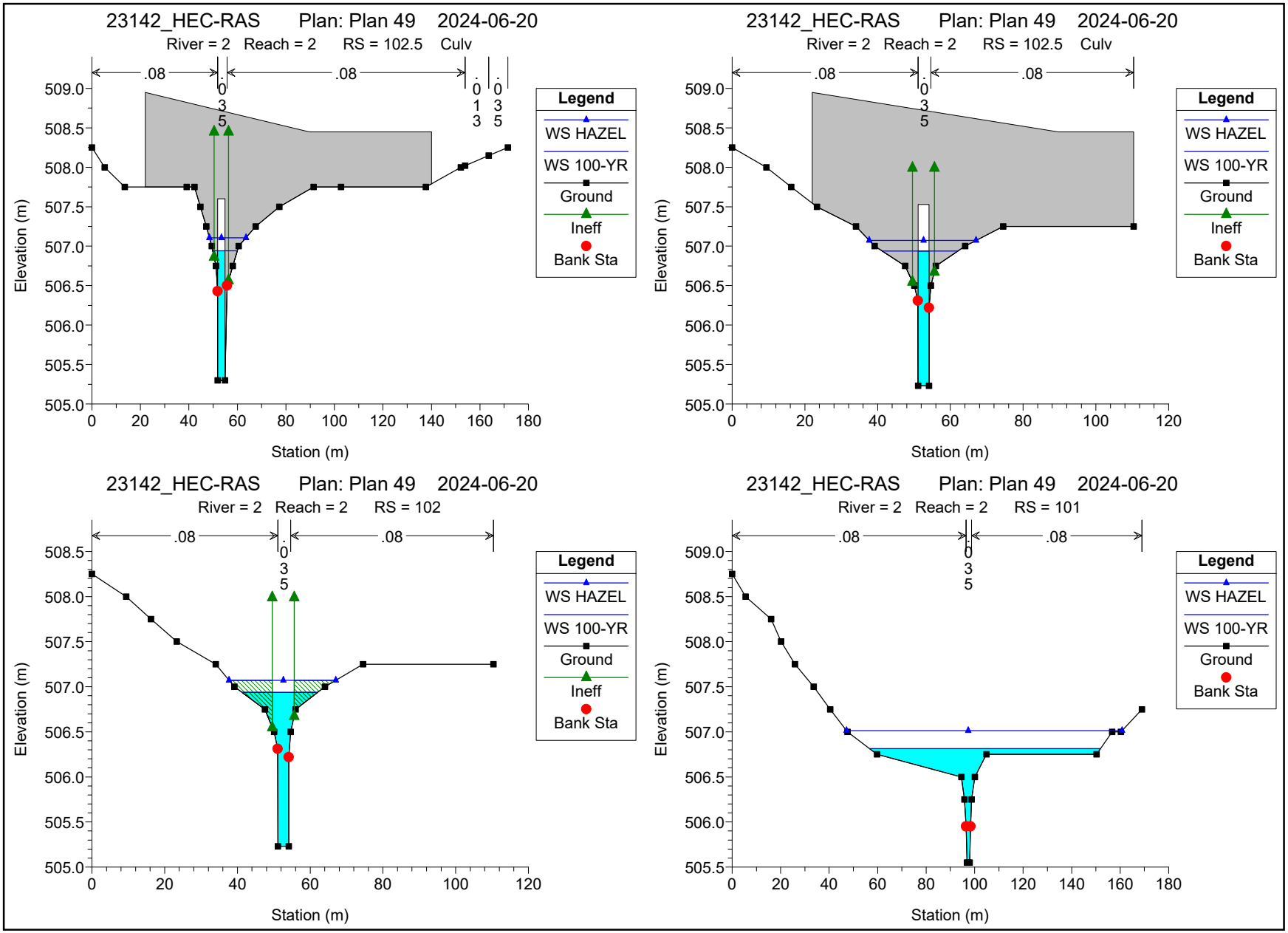
WS 100-YR
Ground
Ineff
Bank Sta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WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 102.5 Culv
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Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2 RS = 102
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Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
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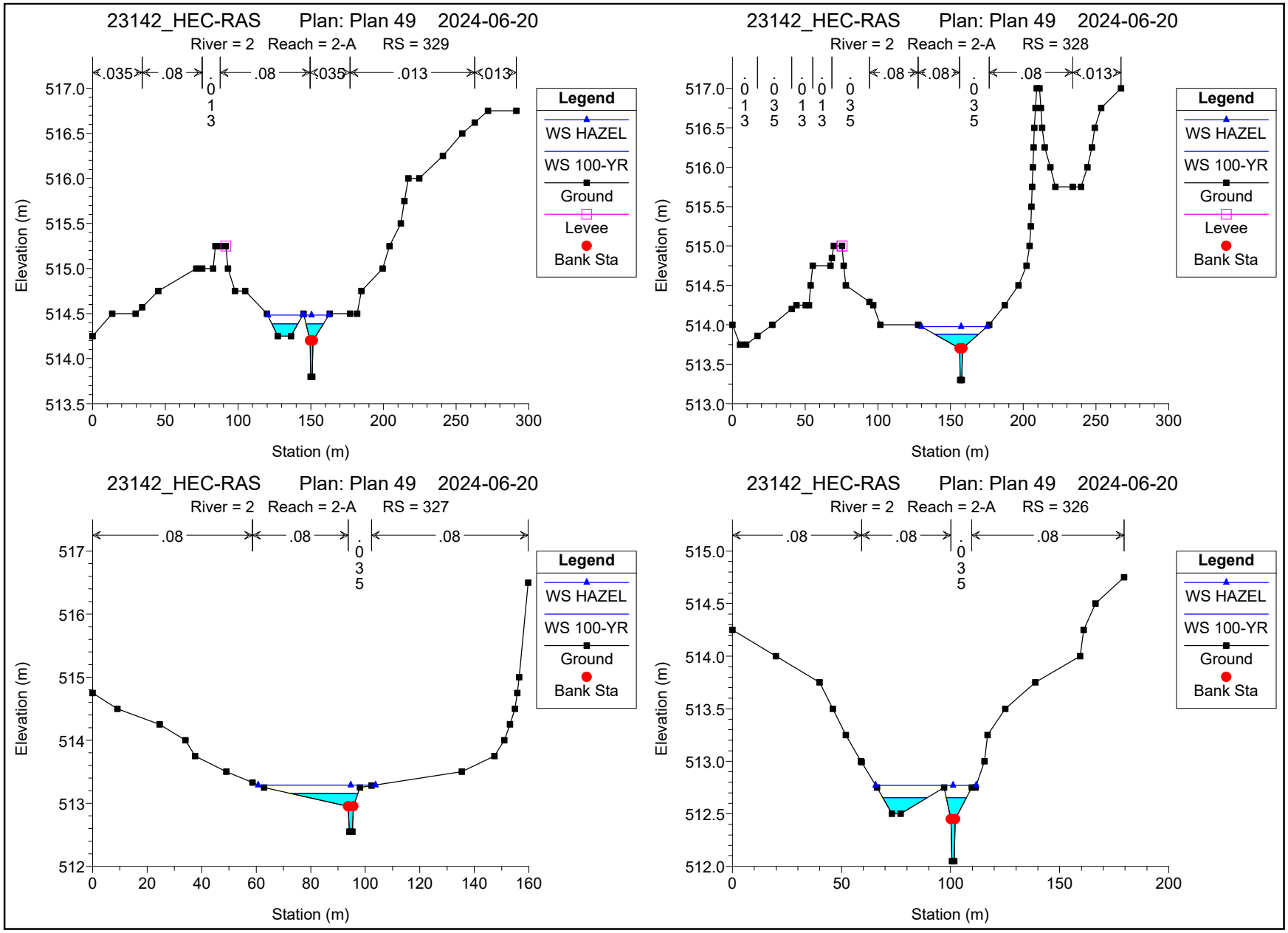
Ground
Bank Sta
Elevation (m)
Station (m)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Elevation (m)
Station (m)
Legend
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WS 100-YR
Ground
Levee
Bank Sta
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Levee
Bank Sta
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.08 .08 .08 .08
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Station (m)
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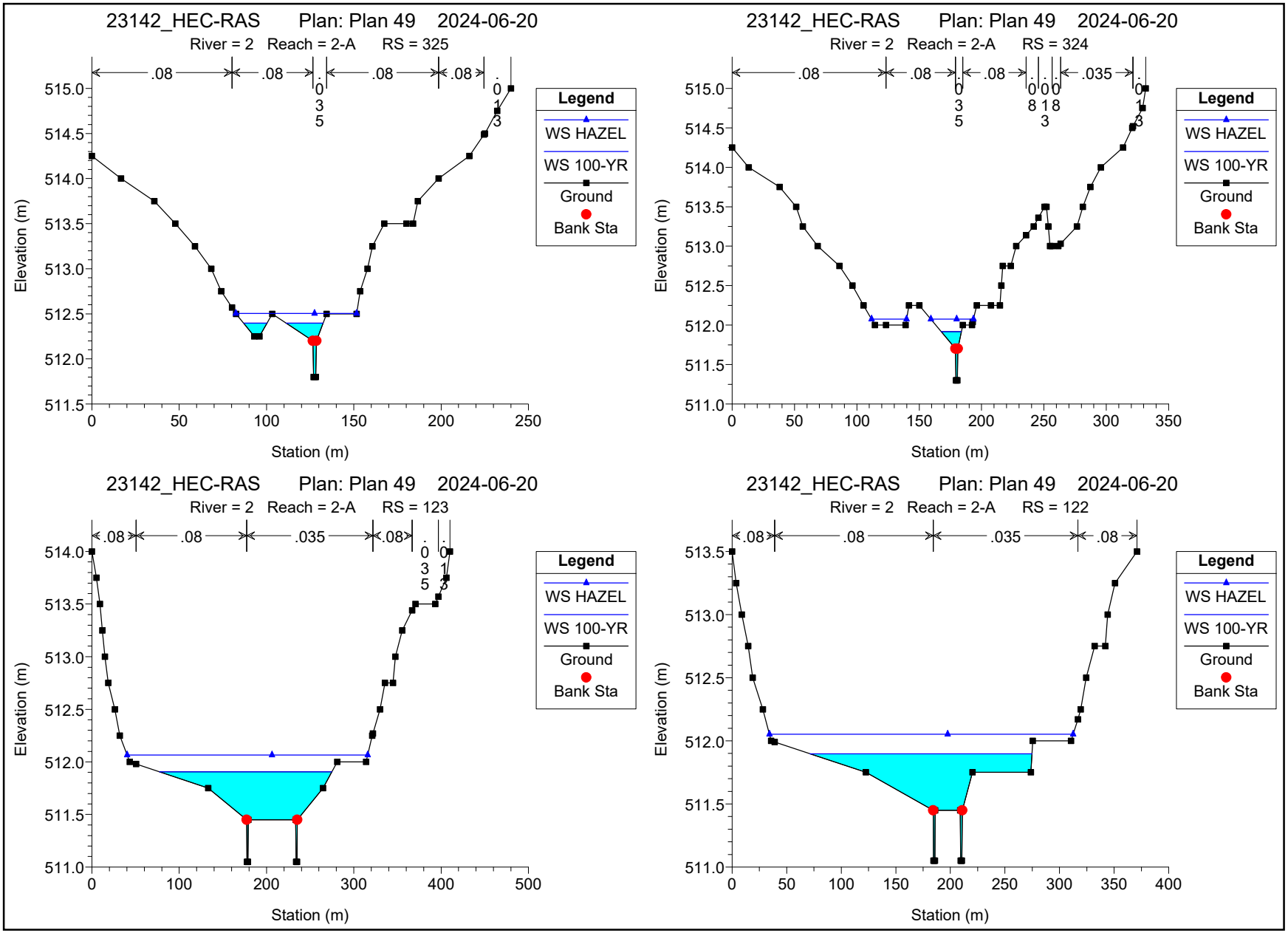
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Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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.08 .08 .08 .035
.035 .008 .018 .013
Elevation (m)
Station (m)
Legend
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WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
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.08 .08 .035 .08
.035 .013
Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
23142_HEC-RAS Plan: Plan 49 2024-06-20
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Station (m)
Legend
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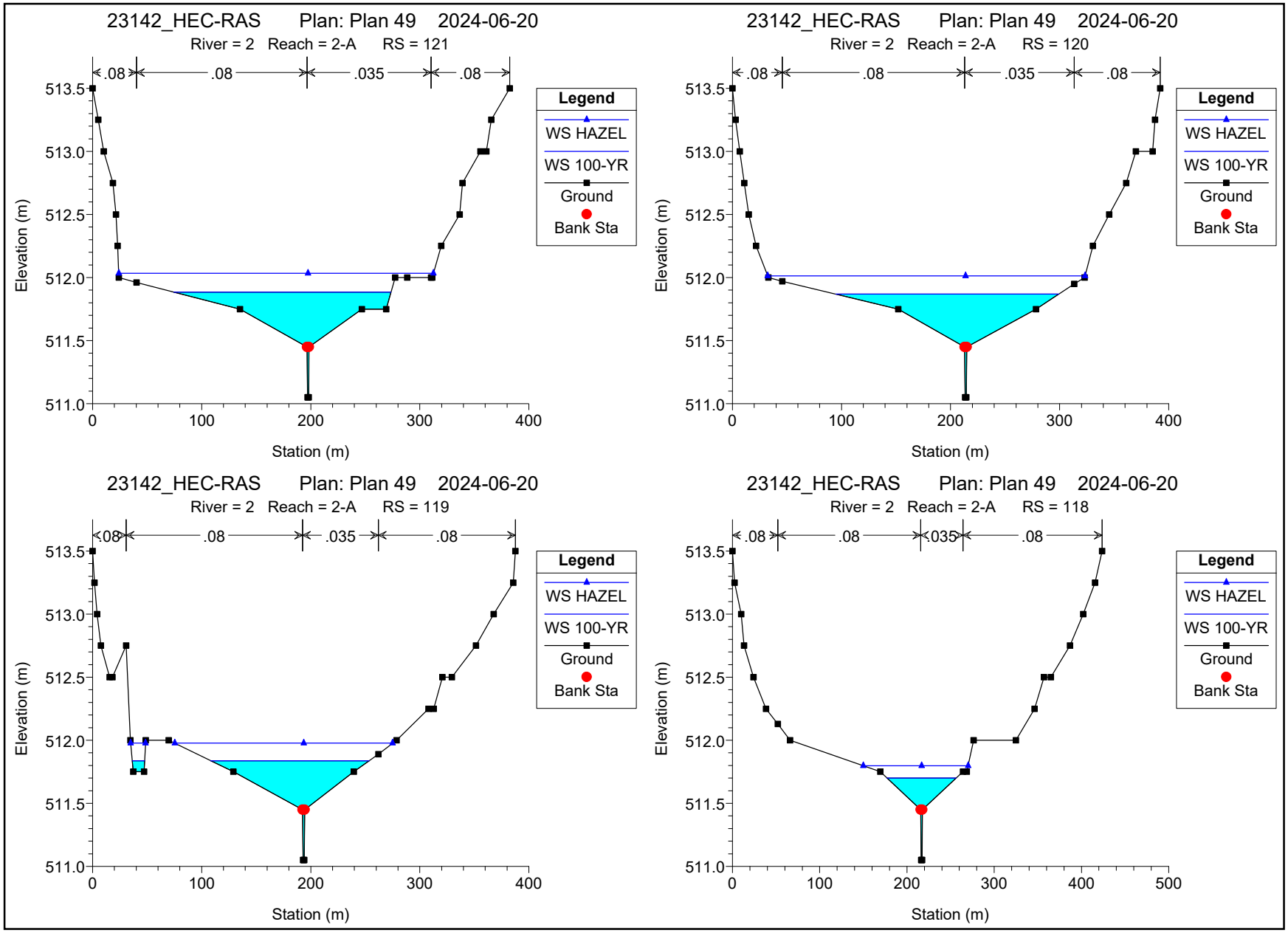
WS 100-YR
Ground
Bank Sta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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 119
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 118
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WS 100-YR
Ground
Bank Sta
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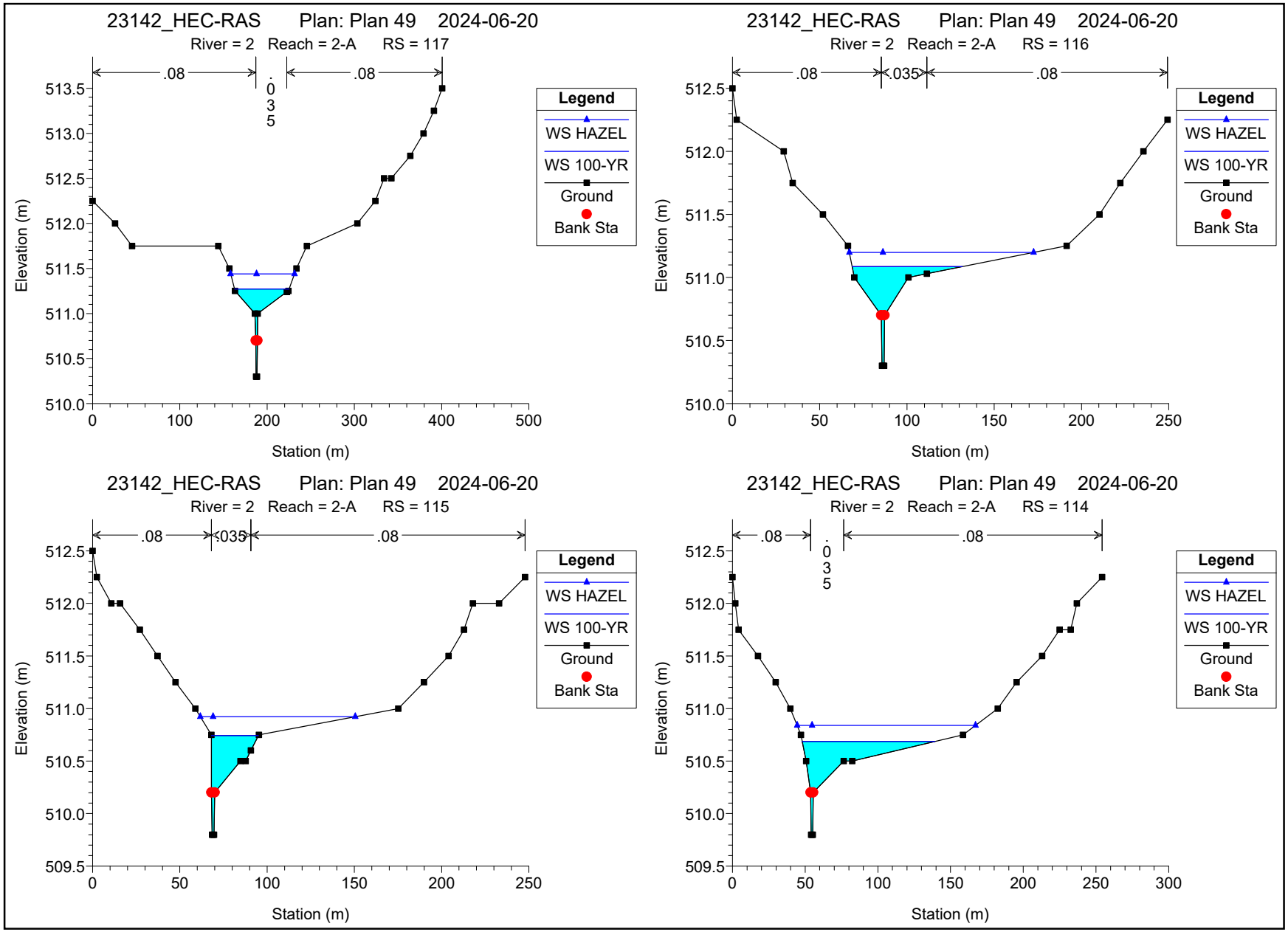
Station (m)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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 116
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 115
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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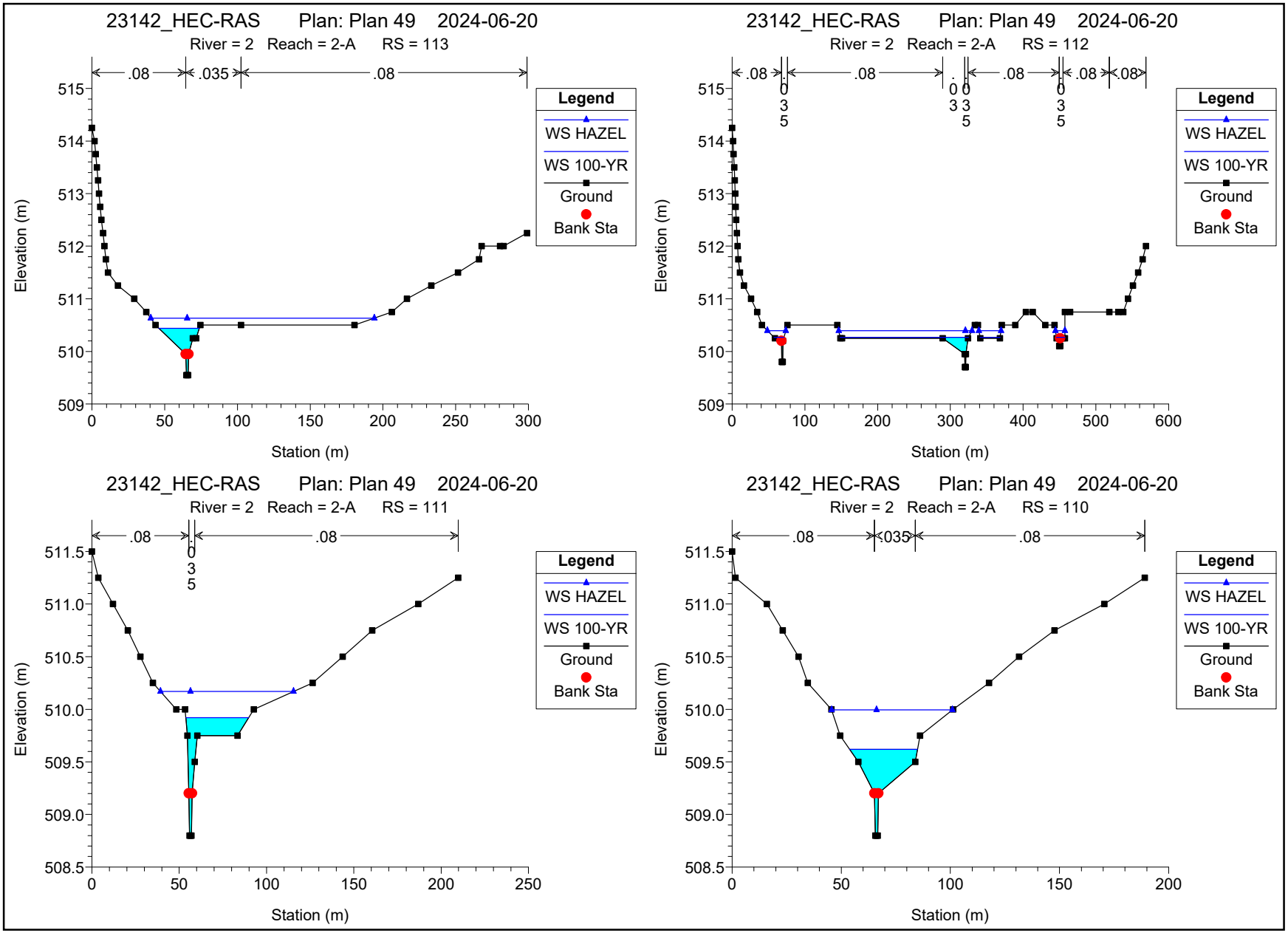
Elevation (m)
Station (m)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WS 100-YR
Ground
Bank Sta
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Station (m)
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 111
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Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
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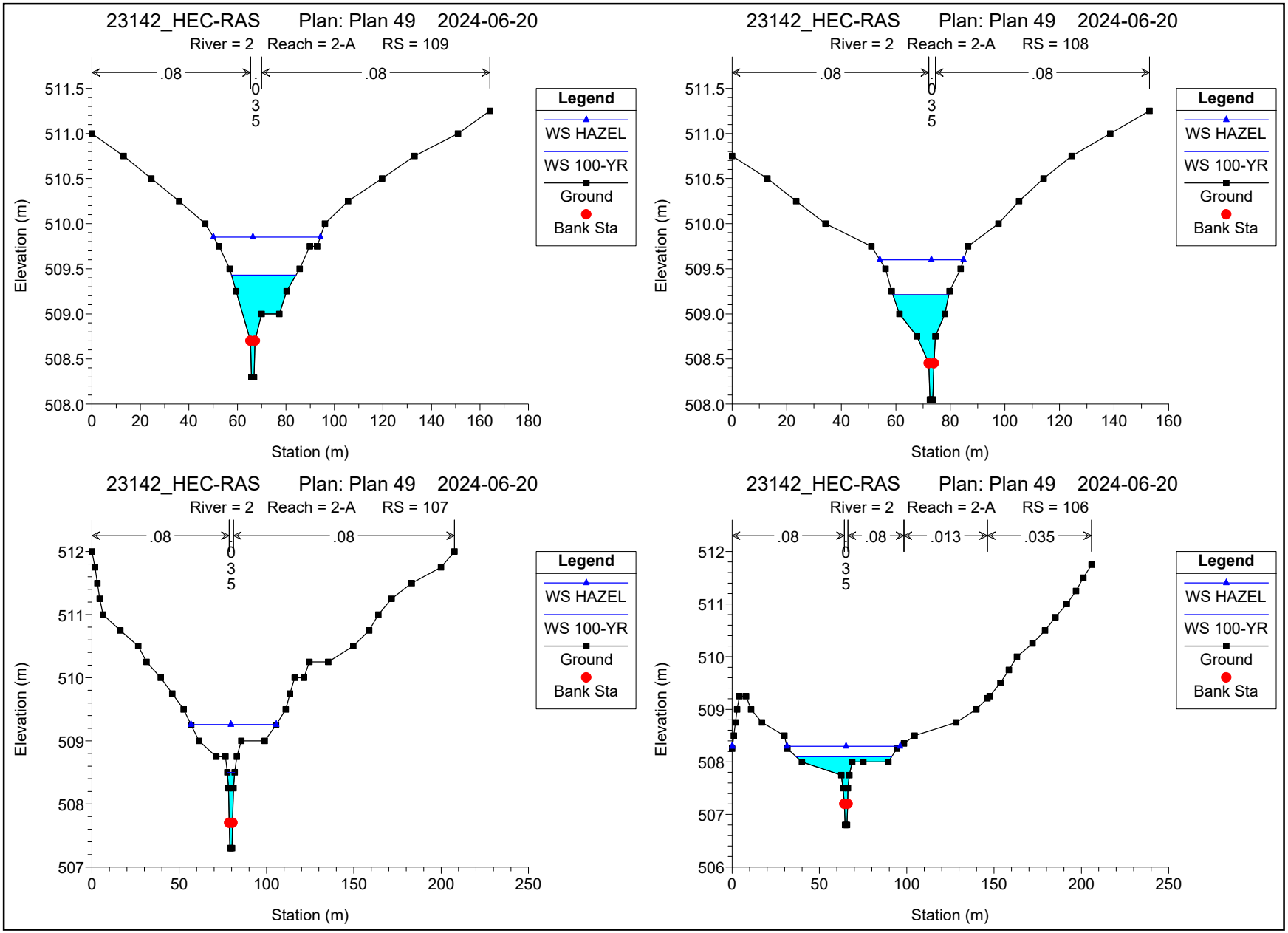
Station (m)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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 108
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 107
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Legend
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WS 100-YR
Ground
Bank Sta
Elevation (m)
Station (m)
23142_HEC-RAS Plan: Plan 49 2024-06-20
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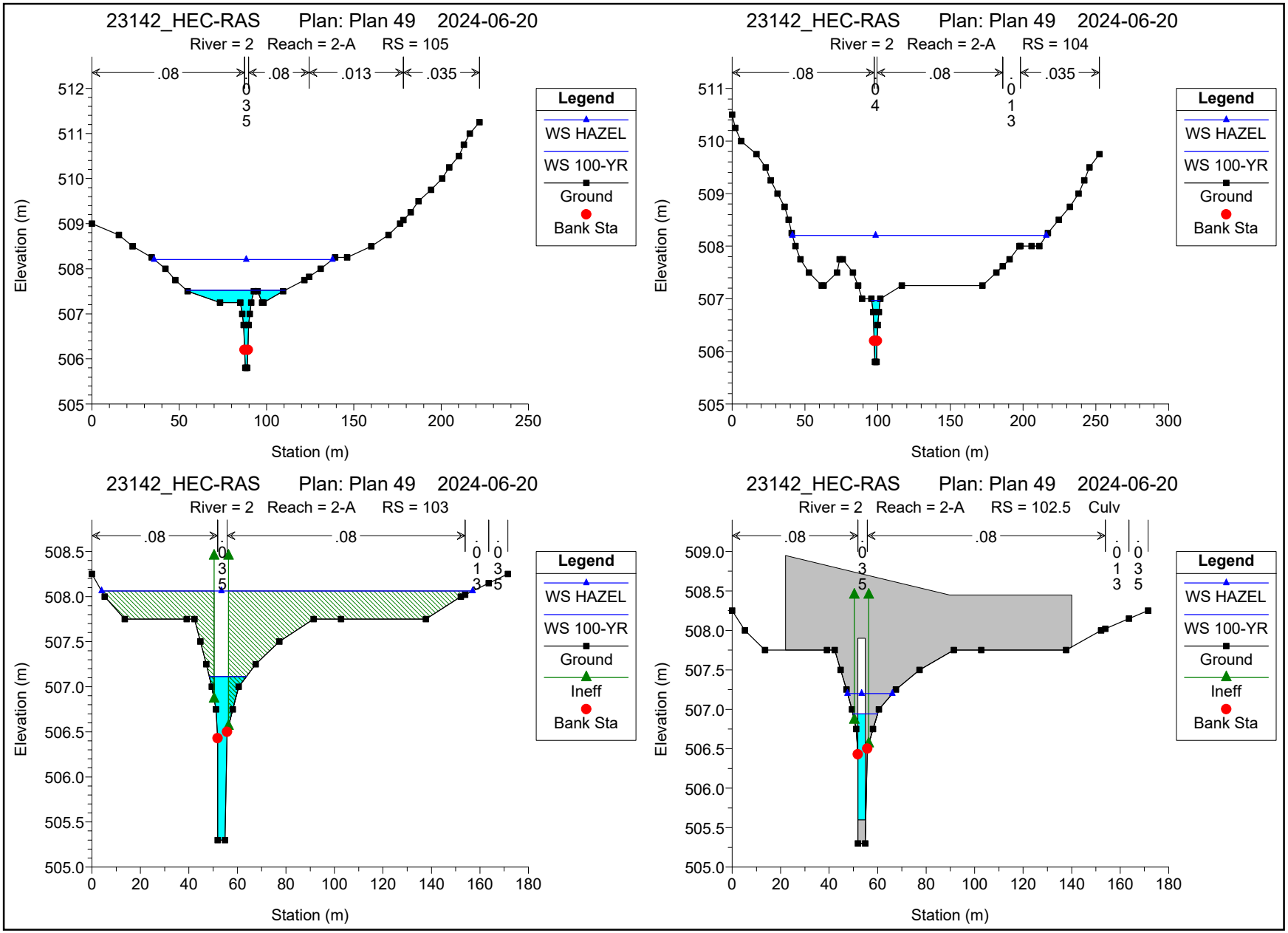
Station (m)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Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Bank Sta
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Station (m)
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WS 100-YR
Ground
Bank Sta
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River = 2 Reach = 2-A RS = 103
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Elevation (m)
Station (m)
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Ineff
Bank Sta
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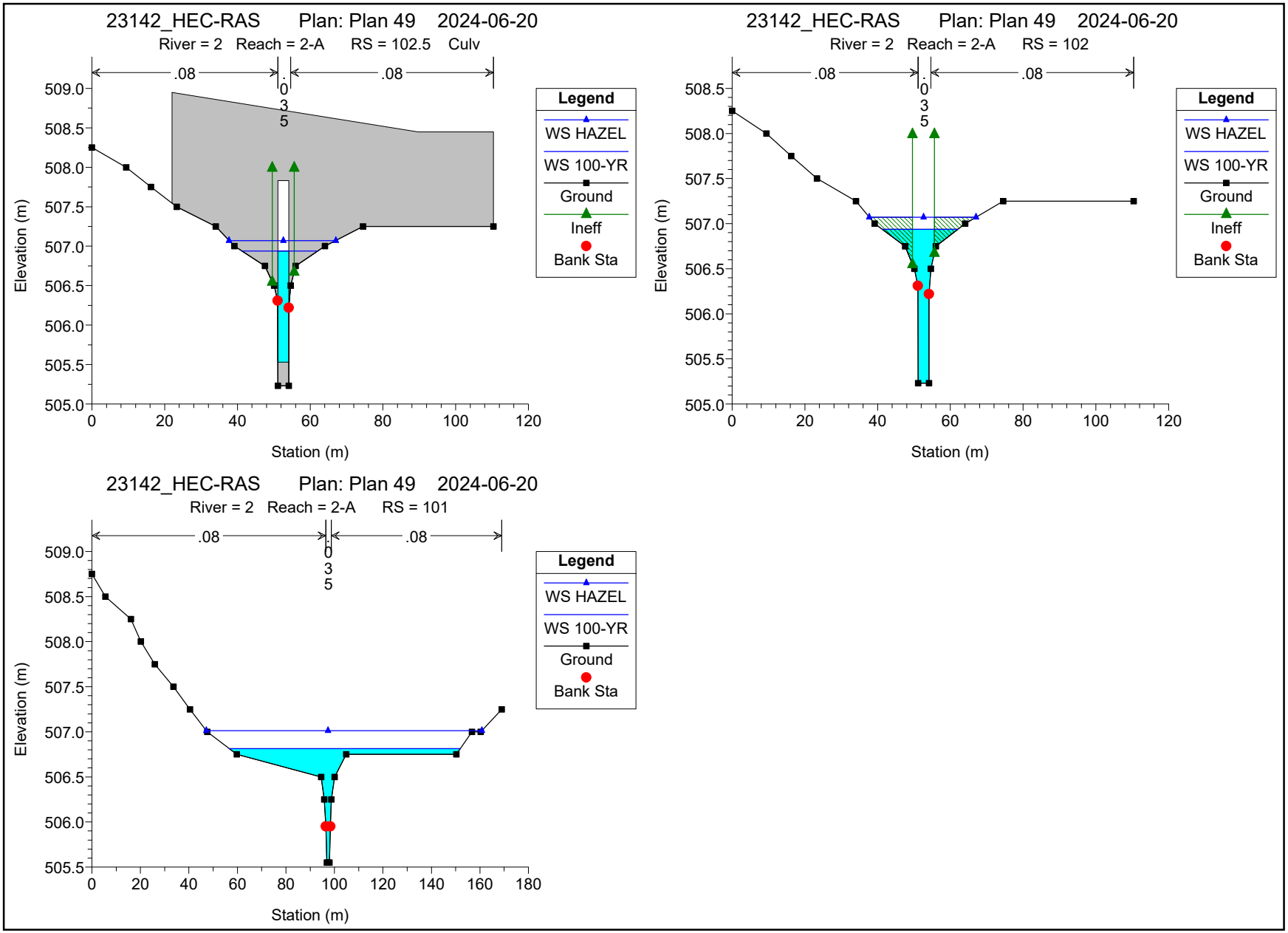
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Elevation (m)
Station (m)
Legend
WS HAZEL
WS 100-YR
Ground
Ineff
Bank Sta
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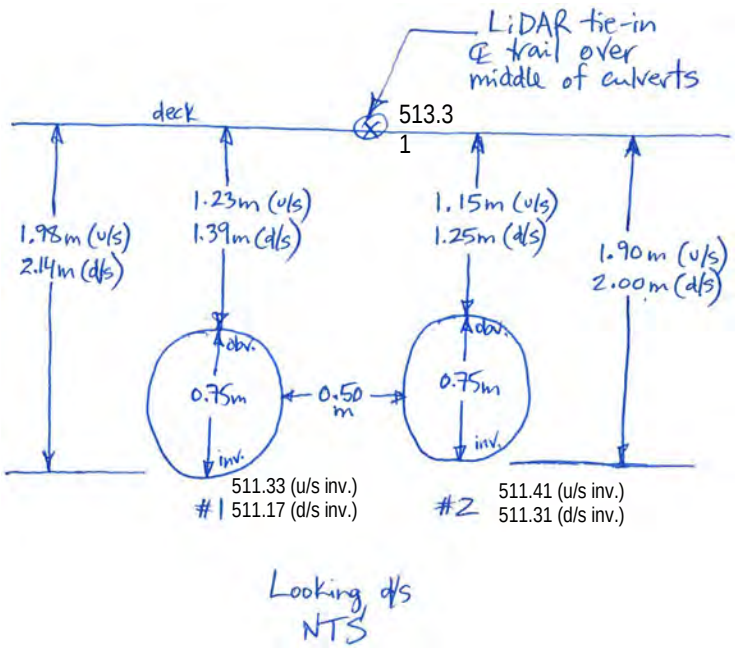
23142_HEC-RAS Plan: Plan 49 2024-06-20
River = 2 Reach = 2-A RS = 101

GR_001 - HYDRAULIC STRUCTURE INVENTORY SHEET

Watershed and Location Information	Structure Configuration and Dimensions		Current Flow Information
Date (mm/dd/yy): 11/14/23	Structure Type (Culvert/Bridge): Culvert		Flow Present (Y/N): N
Field Crew: BC/MC	Number of Openings: 2	Open Footing (Yes/No): No	Approx. Depth (mm): 720
Watershed Name: Grand River Watershed	Opening Shape: Circular	Material (Conc/Steel): HDPE (smooth int)	Approx. Velocity (m/s): n/a
River Name: Grand River	Opening Height(m): C1: 0.75 C2: 0.75	Opening Width/Span(m): C1: 0.75 C2: 0.75	Upstream Erosion (Y/N): N
Reach ID: Tributary 2	Opening Length in direction of flow (m): C1: 12.1 C2: 12.1		Downstream Erosion (Y/N): N
Municipality: Township of Southgate (Dundalk)	Inlet Type (Projecting/Mitered/Headwall): Projecting		Additional Flow Information / Field Notes:
Location (Road Name/Intersection): Rail Trail off Hagan St E	Skew Angle of Crossing (Degrees): n/a		
Latitude: 44.165992	Height from Obvert to Top of Road (m): C1: 1.23 C2: 1.15		
Longitude: -80.386271	Railing height (m): n/a	Depth of Siltation (mm): n/a	

Site Photograph and Additional Field Notes



Sketch of Structure

Upstream Structure Face

Downstream Structure Face

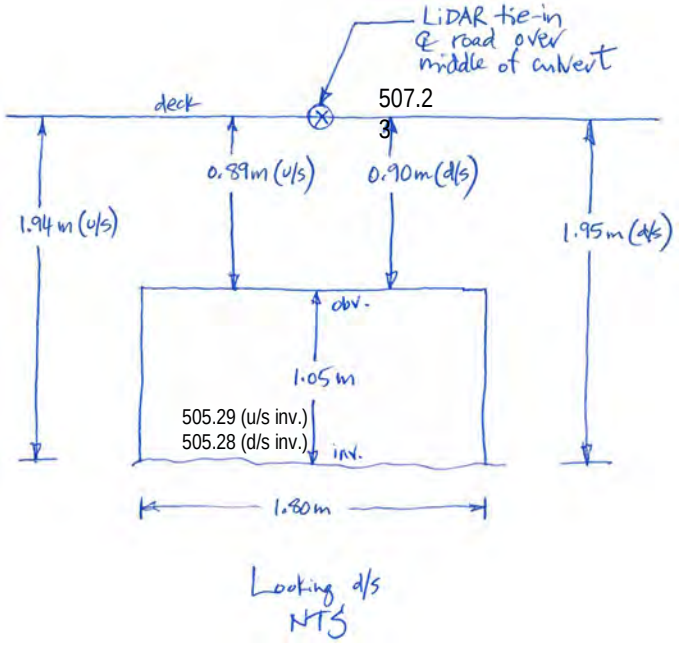
Watercourse Looking Upstream

Watercourse Looking Downstream

GR_002 - HYDRAULIC STRUCTURE INVENTORY SHEET

Watershed and Location Information	Structure Configuration and Dimensions		Current Flow Information
Date (mm/dd/yy): 11/14/23	Structure Type (Culvert/Bridge): Culvert		Flow Present (Y/N): Y
Field Crew: BC/MC	Number of Openings: 1	Open Footing (Yes/No): No (imbedded)	Approx. Depth (mm): 250
Watershed Name: Grand River Watershed	Opening Shape: Rectangular	Material (Conc/Steel): Concrete	Approx. Velocity (m/s): n/a
River Name: Grand River	Opening Height(m): 1.050	Opening Width/Span(m): 1.800	Upstream Erosion (Y/N): N
Reach ID: Tributary 1	Opening Length in direction of flow (m): 14.5		Downstream Erosion (Y/N): N
Municipality: Township of Southgate (Dundalk)	Inlet Type (Projecting/Mitered/Headwall): Gabion Headwall		Additional Flow Information / Field Notes:
Location (Road Name/Intersection): Eco Parkway E of Ida St	Skew Angle of Crossing (Degrees): n/a		
Latitude: 44.155185	Height from Obvert to Top of Road (m): 0.89		
Longitude: -80.388024	Railing height (m): n/a	Depth of Siltation (mm): n/a	

Site Photograph and Additional Field Notes



Sketch of Structure

Upstream Structure Face

Downstream Structure Face

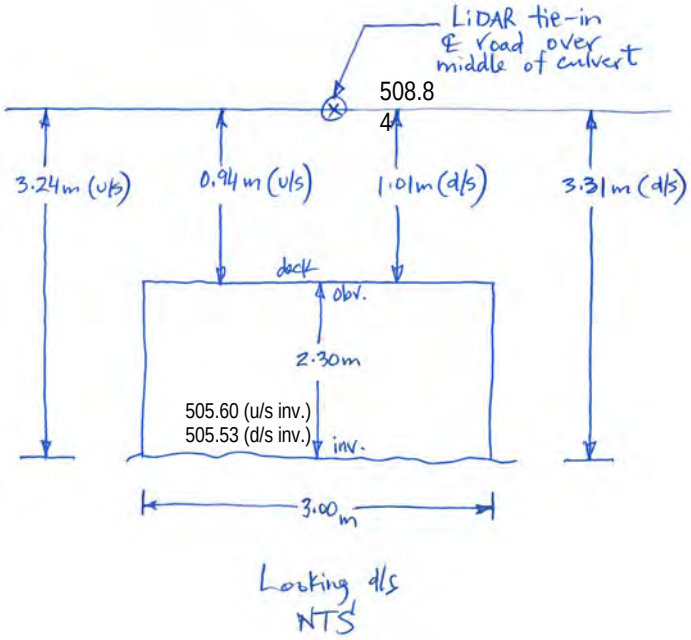
Watercourse Looking Upstream

Watercourse Looking Downstream

GR_003 - HYDRAULIC STRUCTURE INVENTORY SHEET

Watershed and Location Information	Structure Configuration and Dimensions		Current Flow Information
Date (mm/dd/yy): 11/14/23	Structure Type (Culvert/Bridge): Culvert		Flow Present (Y/N): Y
Field Crew: BC/MC	Number of Openings: 1	Open Footing (Yes/No): No (imbedded)	Approx. Depth (mm): 300
Watershed Name: Grand River Watershed	Opening Shape: Rectangular	Material (Conc/Steel): Concrete	Approx. Velocity (m/s): n/a
River Name: Grand River	Opening Height(m): 2.30	Opening Width/Span(m): 3.00	Upstream Erosion (Y/N): N
Reach ID: Tributary 2	Opening Length in direction of flow (m): 17.0		Downstream Erosion (Y/N): N
Municipality: Township of Southgate (Dundalk)	Inlet Type (Projecting/Mitered/Headwall): Concrete Block Headwall		Additional Flow Information / Field Notes:
Location (Road Name/Intersection): Eco Parkway E of Ida St	Skew Angle of Crossing (Degrees): n/a		
Latitude: 44.159234	Height from Obvert to Top of Road (m): 0.94		
Longitude: -80.383408	Railing height (m): n/a	Depth of Siltation (mm): n/a	

Site Photograph and Additional Field Notes



Sketch of Structure

Upstream Structure Face

Downstream Structure Face

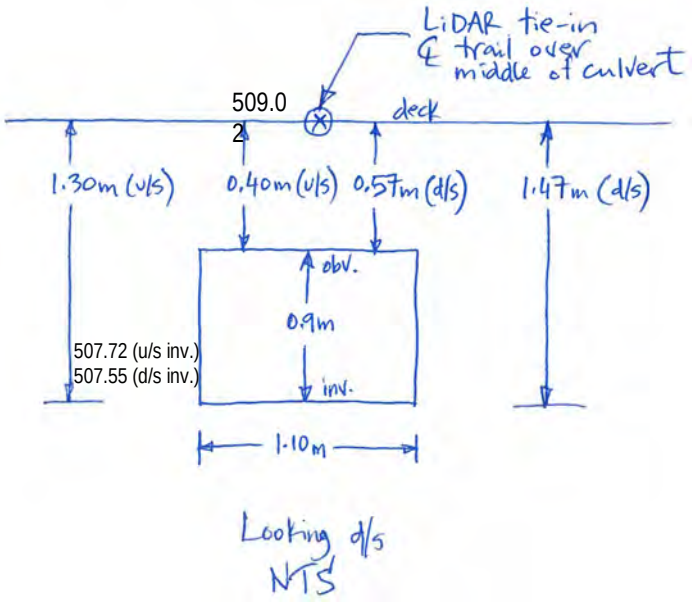
Watercourse Looking Upstream

Watercourse Looking Downstream

GR_004 - HYDRAULIC STRUCTURE INVENTORY SHEET

Watershed and Location Information	Structure Configuration and Dimensions		Current Flow Information
Date (mm/dd/yy): 11/14/23	Structure Type (Culvert/Bridge): Culvert		Flow Present (Y/N): Y
Field Crew: BC/MC	Number of Openings: 1	Open Footing (Yes/No): No	Approx. Depth (mm): 200
Watershed Name: Grand River Watershed	Opening Shape: Rectangular	Material (Conc/Steel): Concrete	Approx. Velocity (m/s): n/a
River Name: Grand River	Opening Height(m): 0.90	Opening Width/Span(m): 1.10	Upstream Erosion (Y/N): N
Reach ID: Tributary 1	Opening Length in direction of flow (m): 4.1		Downstream Erosion (Y/N): N
Municipality: Township of Southgate (Dundalk)	Inlet Type (Projecting/Mitered/Headwall): Concrete Headwall w Wingwalls (u/s face)		Additional Flow Information / Field Notes:
Location (Road Name/Intersection): Trail E of Ida St N of EcoPky	Skew Angle of Crossing (Degrees): n/a		
Latitude: 44.157065	Height from Obvert to Top of Road (m): 0.40		
Longitude: -80.389051	Railing height (m): n/a	Depth of Siltation (mm): n/a	

Site Photograph and Additional Field Notes



Sketch of Structure

Upstream Structure Face

Downstream Structure Face

Watercourse Looking Upstream

Watercourse Looking Downstream