No Rise Certificate

For

Arch of Nature

City of La Crosse

Wisconsin

December, 2021

Prepared by

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MAKEPEACE
ENGINEERING

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1.0 Conclusions

HEC-RAS modeling indicates the Arch of Nature artistic monument will result in no rise to the Base Flood Elevation (BFE).

2.0 Purpose

The City of La Crosse is in the planning phase for a multi-use development near the confluence of the La Crosse and Mississippi Rivers. As part of the development, public artwork is to be installed. One of these public art displays is the Arch of Nature, a walkway made of natural materials that would link the commercial and residential areas of the development to the existing parks along the City of La Crosse waterfront.

This constitutes placement of fill and development in the regulatory floodway.

City of La Crosse Municipal Code requires that projects constructed in the floodway have no impact on the base flood elevation (BFE). For such projects, the project's consulting Professional Engineer creates a No Rise Certificate which is provided, along with supporting technical data, to the local floodway regulator, who saves it in their permit files.

3.0 Methodology

HEC-RAS 6.0.0 was used to investigate the impact of the project on the BFE and Flood Fringe. HEC-RAS was developed by the Army Corps of Engineers for modeling stream and river flow and is the accepted standard for flood modeling.

The current HEC-RAS model for this stretch of the Mississippi River was downloaded from Wisconsin DNR's Surface Water Data Viewer, and verified by comparing a baseline run to established BFE data from the Federal Emergency Management Agency.

In the current HEC-RAS model, the project lies between river stations 697.521 to 698.373. The nearest adjacent upstream cross-section was duplicated at the river station corresponding most closely to the project location to create a new, interpolated cross-section, which is river station 698.221*. Since the channel cross section was duplicated, and the baseline profile of the reach turned between the interpolated section and its parent, a skew angle was assigned to the new cross section to ensure it ran parallel to the parent section. Once this skew angle was assigned, La Crosse County LiDAR data was used to update the overbank elevation data and Manning's values in the interpolated section. See Exhibits A through D.

This section was then modified using the preliminary measurements of the proposed archway to determine the effect of the project on the floodway and BFE. See Exhibit E.

The current HEC-RAS model for the La Crosse River was also downloaded from the Surface Water Data Viewer. Since this model had existing sections immediately upstream and downstream of the existing pedestrian bridge the arch will be installed adjacent to, no interpolated sections were needed. The existing sections were also modified using the same preliminary measurements of the archway, but were taken perpendicular to the measurements used for the modeling along the Mississippi River. These sections are included in Exhibits F through H.

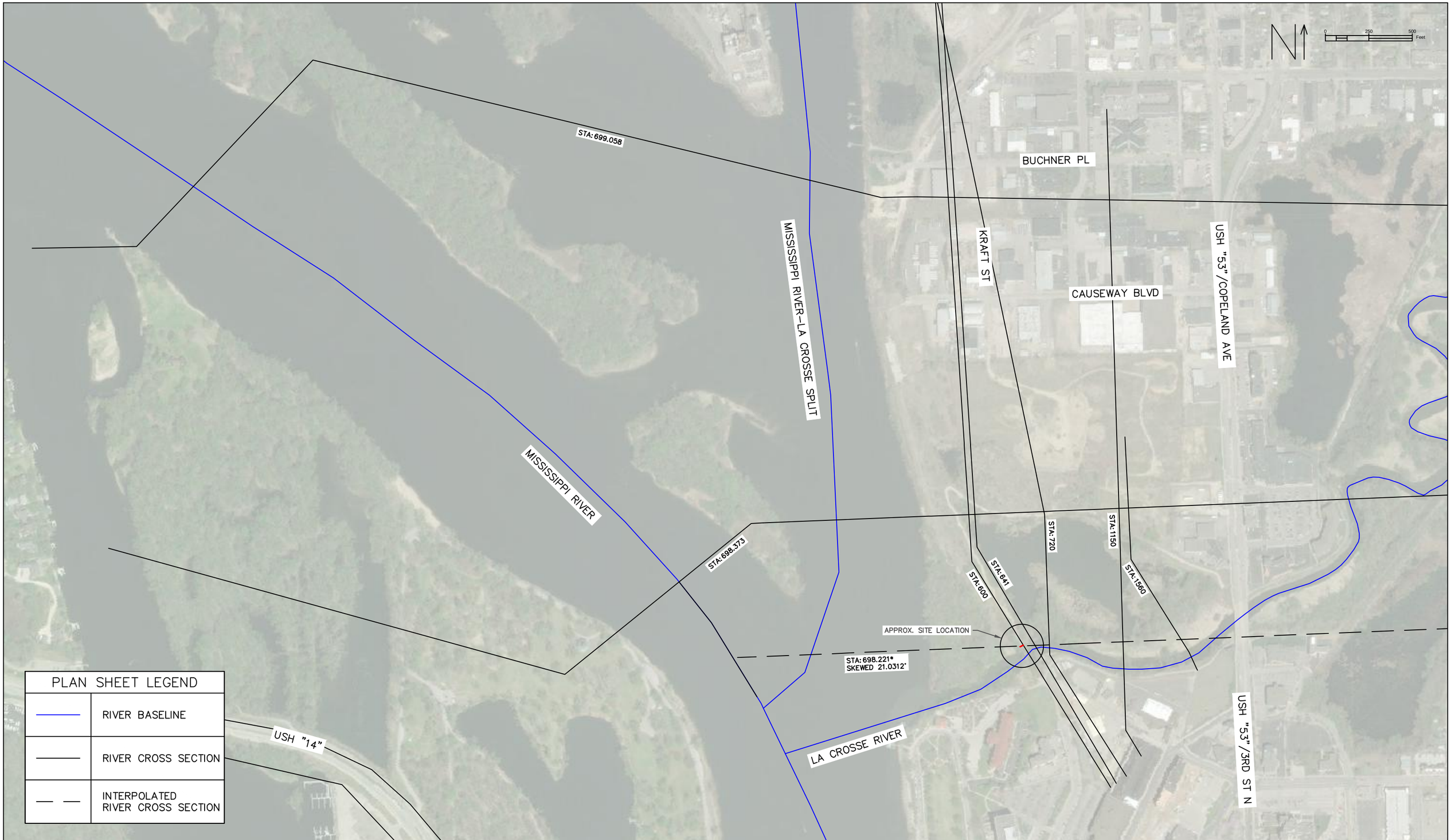
4.0 Results

Exhibit I includes the modeling results, with "Ex Site" indicating results of the existing model, "Ex Site INT" indicating results after adding the interpolated section, and "Pro Site" showing results of proposed changes at the site. The results for the Mississippi indicate a pre-construction BFE of 643.41 feet at River Station 698.221*. The model run of the proposed conditions indicates a post-construction BFE of 643.41.

The modeling for the La Crosse River indicated a pre-construction BFE of 642.19 at station 600 (immediately downstream of the bridge), as well as 642.53 at station 641 (immediately upstream of the bridge). Post-construction BFE for the same stations were unchanged. As such, the project has no impact on the BFE for either fluvial system.

5.0 List of Exhibits

A: Location Overview
B: Project Location
C: Upstream & Downstream Mississippi Sections
D: Mississippi Interpolated Section
E: Mississippi Proposed Section
F: Upstream & Downstream La Crosse River Sections
G: La Crosse River Existing Section
H: La Crosse River Proposed Section
I: HEC-RAS Combined Results



PLAN SHEET LEGEND	
———	RIVER BASELINE
———	RIVER CROSS SECTION
— —	INTERPOLATED RIVER CROSS SECTION

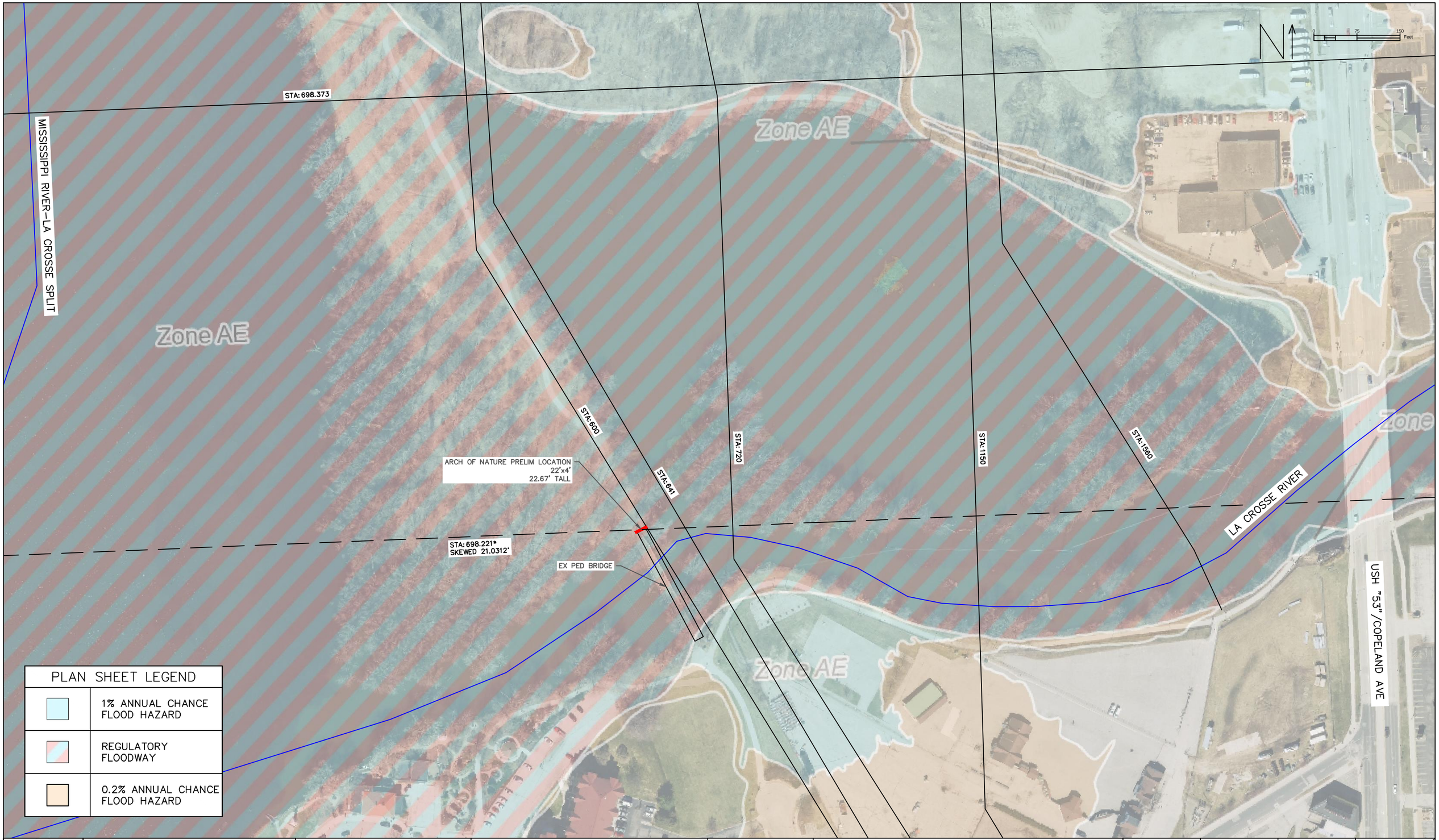
MAKEPEACE ENGINEERING
200 MASON STREET #3
ONALASKA, WI 54650
608.881.6030

ARCH OF NATURE H&H
CITY OF LA CROSSE
LA CROSSE COUNTY, WI

12/14/2021

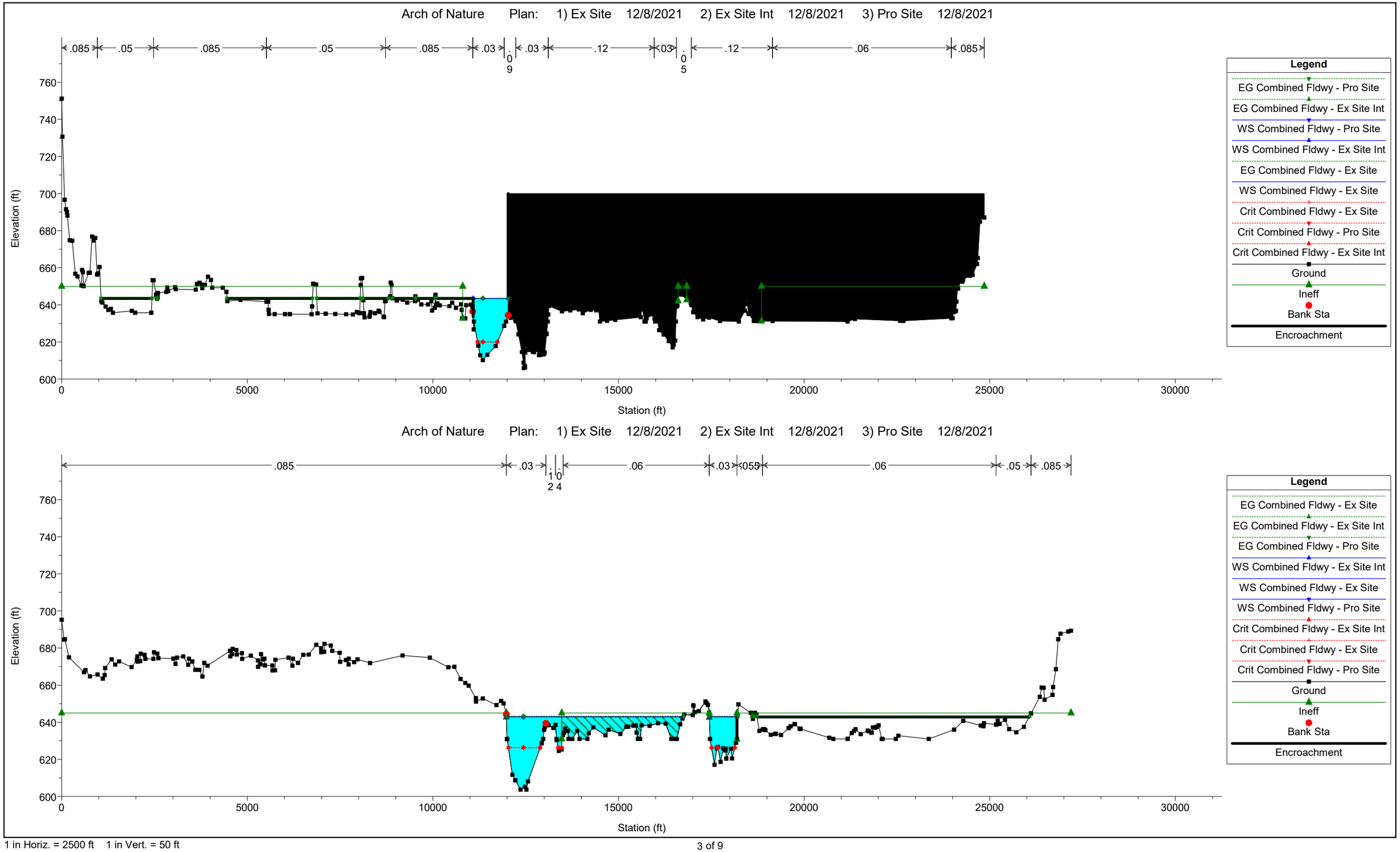
EXHIBIT A
LOCATION OVERVIEW

DATE	REVISION	DESCR.



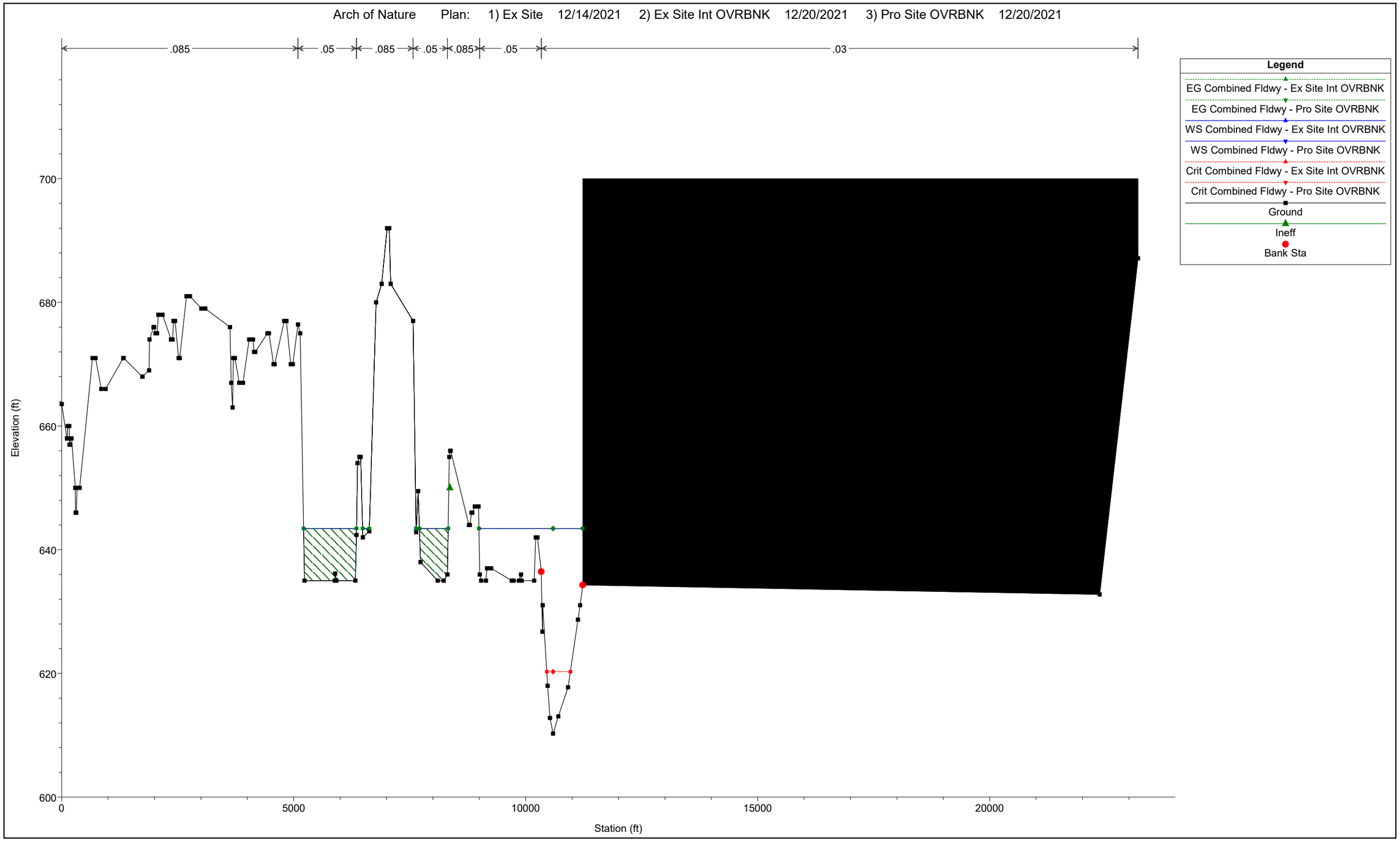
MAKEPEACE ENGINEERING	200 MASON STREET #3 ONALASKA, WI 54650 608.881.6030	ARCH OF NATURE H&H CITY OF LA CROSSE LA CROSSE COUNTY, WI	12/14/2021	EXHIBIT B PROJECT LOCATION	DATE	REVISION	DESCR.	2 9

EXHIBIT C:
UPSTREAM & DOWNSTREAM MISSISSIPPI LA CROSSE RIVER SPLIT SECTIONS



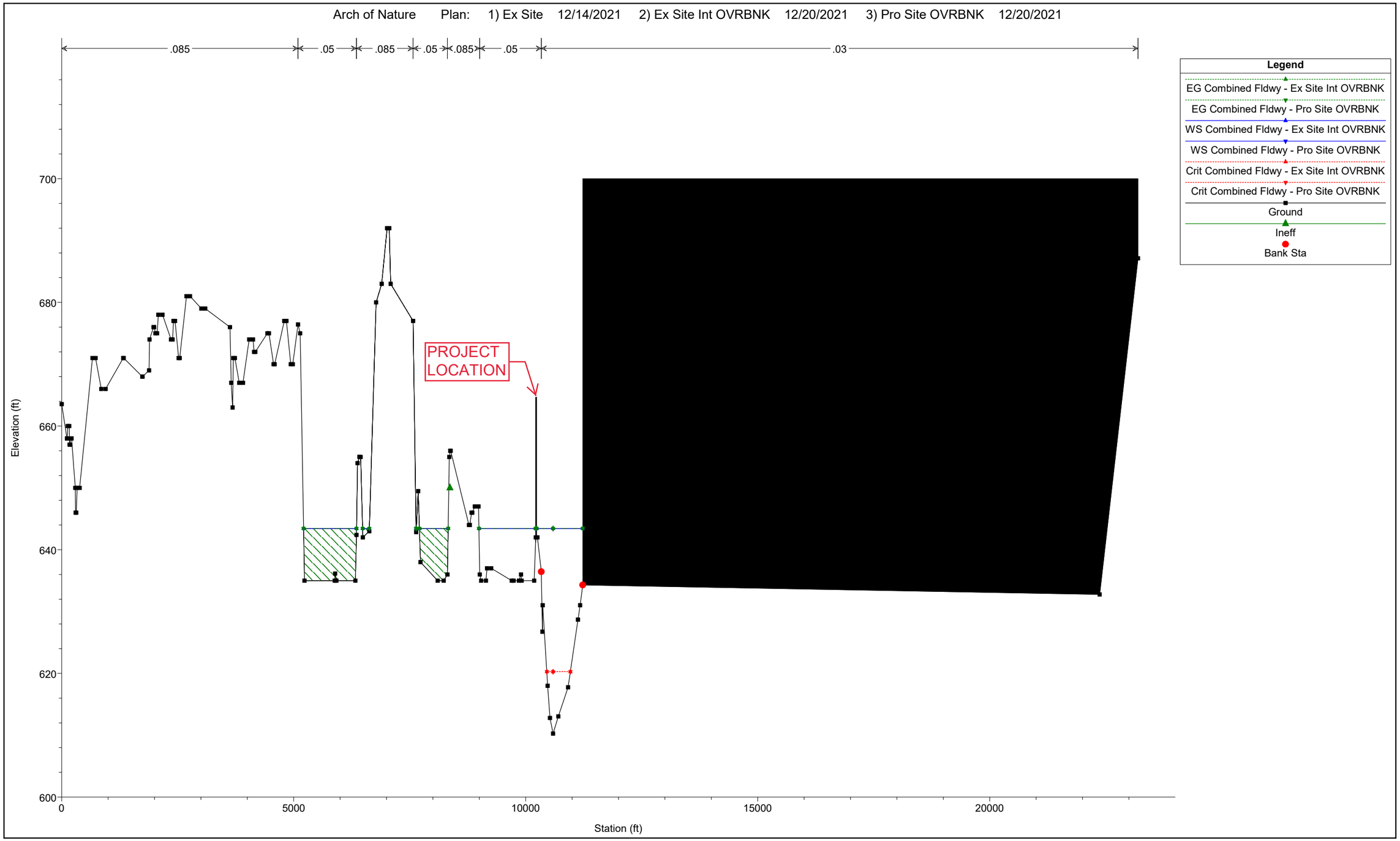
1 in Horiz. = 2500 ft 1 in Vert. = 50 ft

EXHIBIT D:
MISSISSIPPI LA CROSSE SPLIT INTERPOLATED SECTION



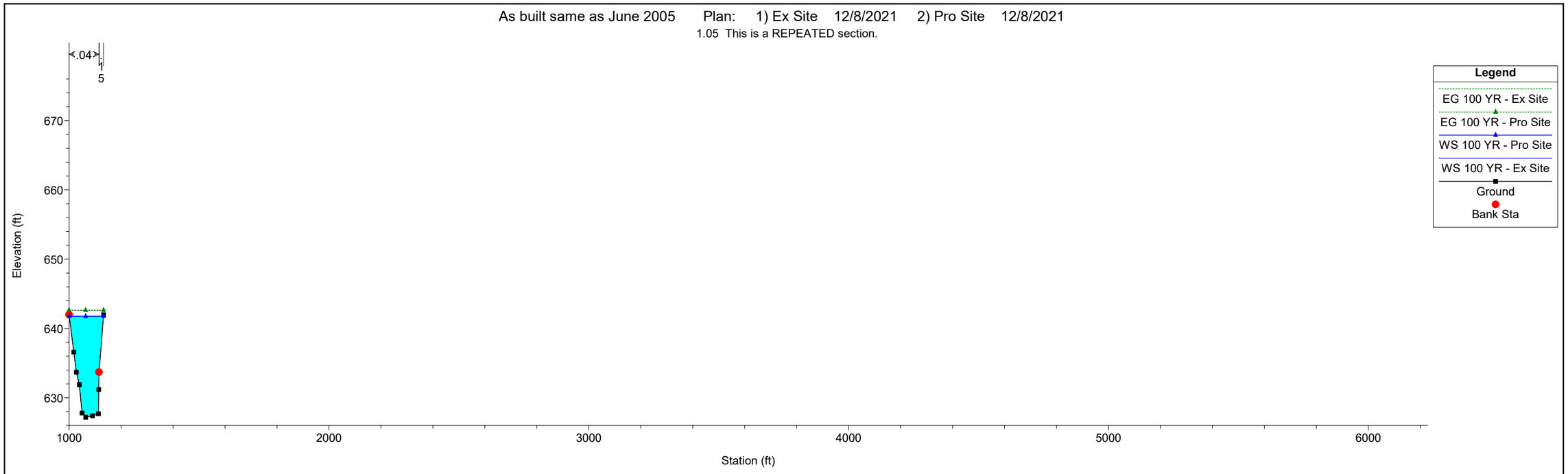
1 in Horiz. = 2000 ft 1 in Vert. = 15 ft

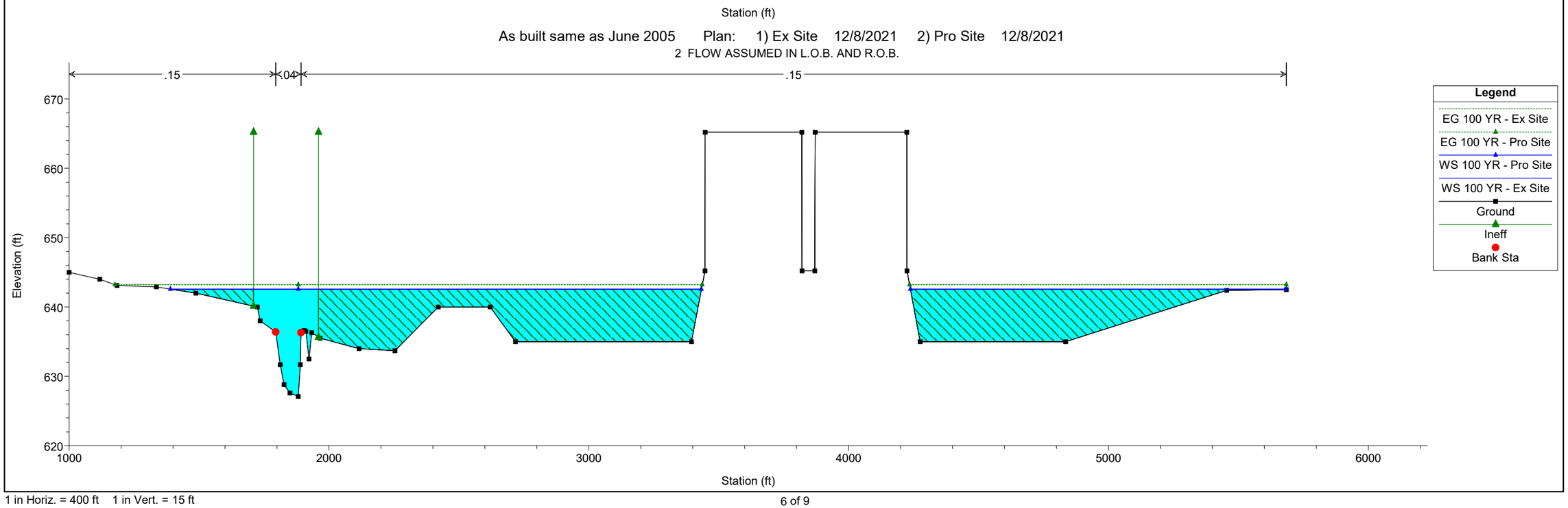
EXHIBIT E:
MISSISSIPPI RIVER LA CROSSE SPLIT PROPOSED SECTION



1 in Horiz. = 2000 ft 1 in Vert. = 15 ft

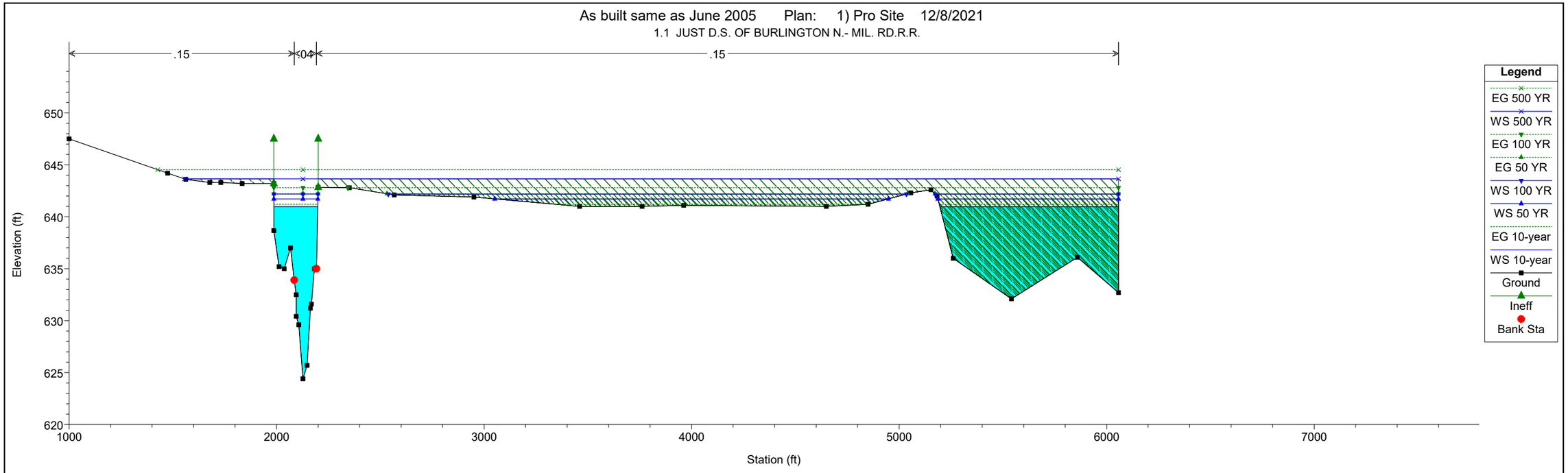
EXHIBIT F:
UPSTREAM & DOWNSTREAM LA CROSSE RIVER SECTIONS

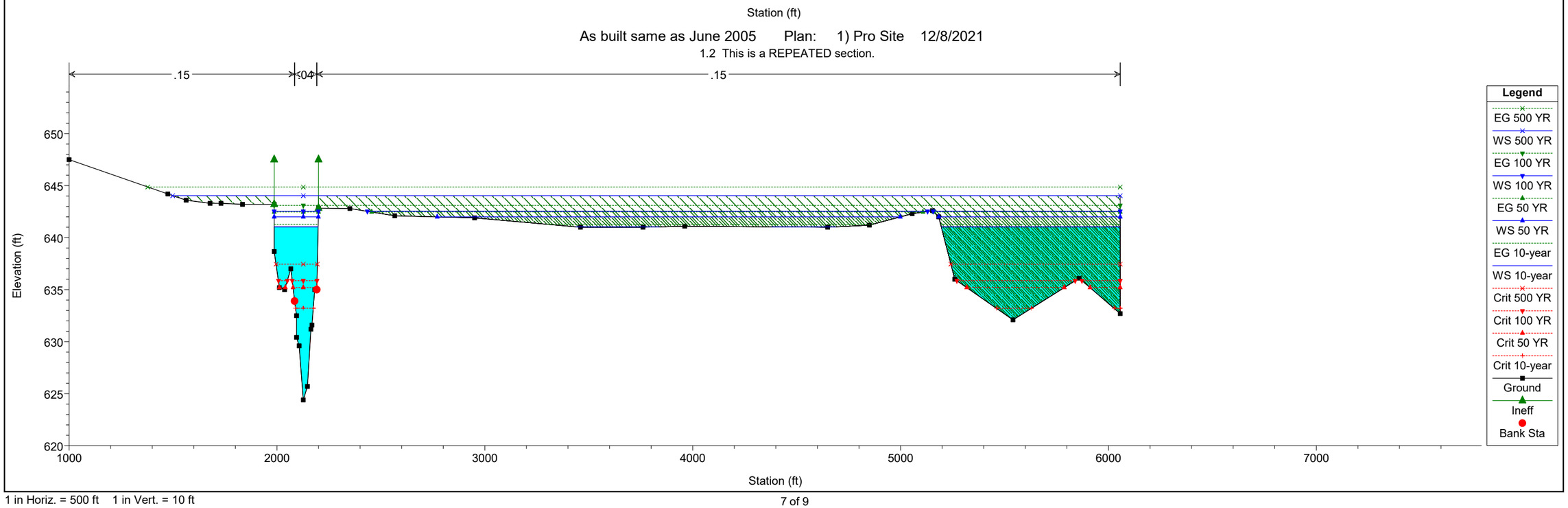




1 in Horiz. = 400 ft 1 in Vert. = 15 ft

EXHIBIT G:
LA CROSSE RIVER EXISTING SECTION



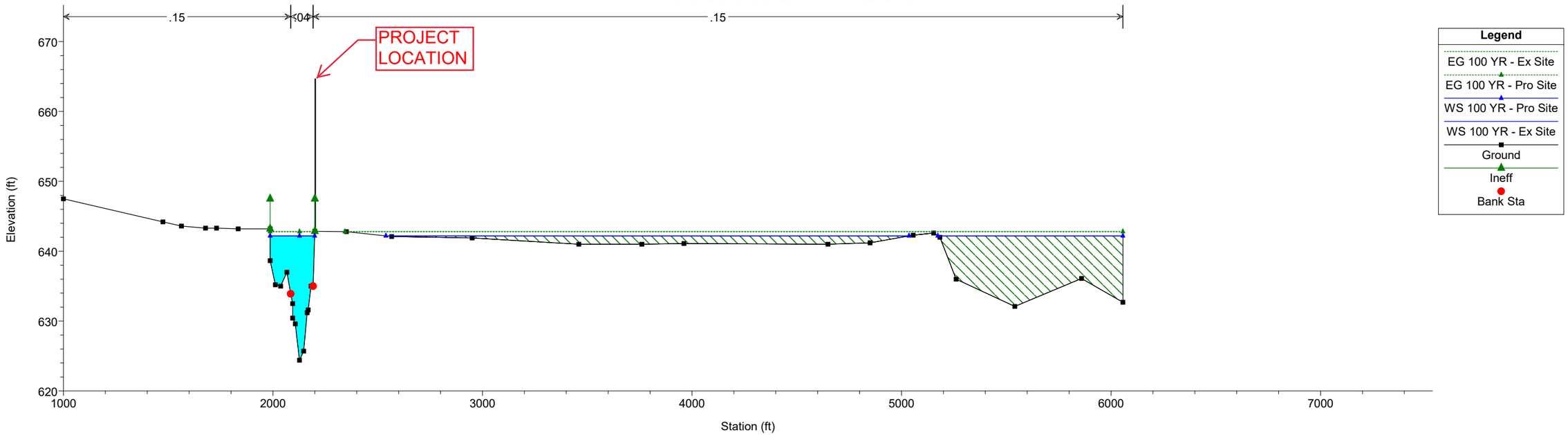


1 in Horiz. = 500 ft 1 in Vert. = 10 ft

EXHIBIT H:
LA CROSSE RIVER PROPOSED SECTION

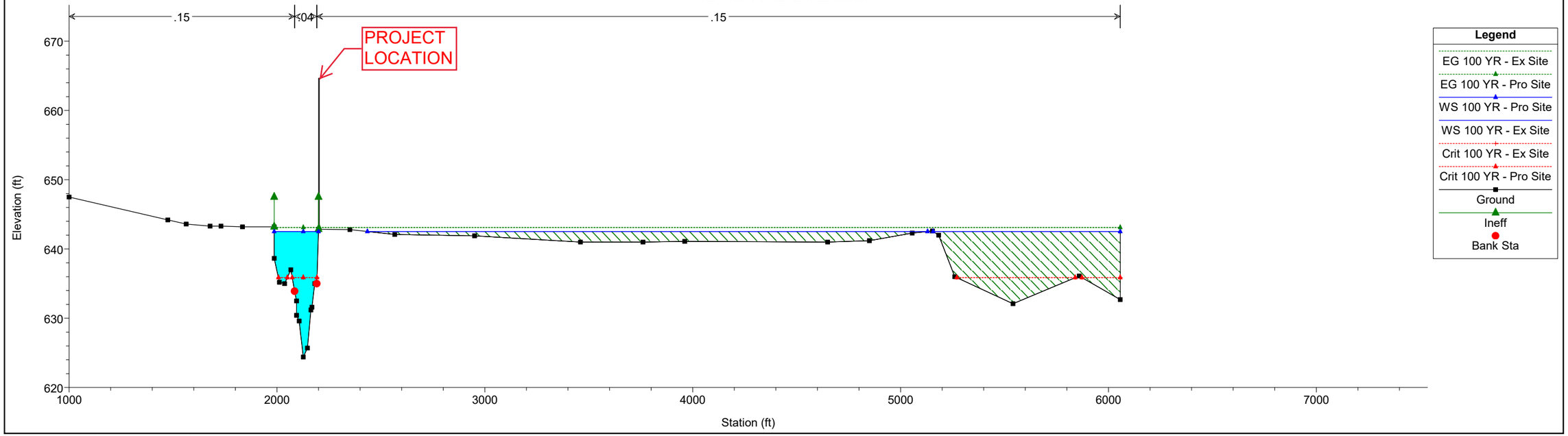
As built same as June 2005 Plan: 1) Ex Site 12/8/2021 2) Pro Site 12/8/2021

1.1 JUST D.S. OF BURLINGTON N.- MIL. RD.R.R.



As built same as June 2005 Plan: 1) Ex Site 12/8/2021 2) Pro Site 12/8/2021

1.2 This is a REPEATED section.



1 in Horiz. = 500 ft 1 in Vert. = 15 ft

EXHIBIT I: HEC-RAS COMBINED RESULTS

Project: Arch of Nature
Location: River Point Development
Municipality/Town: City of La Crosse
Date: 12/20/2021

River	Reach	River Sta	Profile	Q Total (cfs)	Flow Area (sq ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	W.S. Elev Ex Site (ft)	W.S. Elev Ex Site INT(ft)	Δ Ex Site (ft)	W.S. Elev Pro Site (ft)	Δ Ex Site INT (ft)
Miss_LaCrosse	LaCrosseSplit	699.058	Combined Fldwy	39340.49	15782.34	643.53	0.000035	643.44	643.44	0.00	643.44	0.00
Miss_LaCrosse	LaCrosseSplit	698.373	Combined Fldwy	39340.49	22355.86	643.47	0.000019	643.42	643.42	0.00	643.42	0.00
Miss_LaCrosse	LaCrosseSplit	698.221*	Combined Fldwy	39310.71	22378.34	643.48	0.000022	N/A	643.41	N/A	643.41	0.00
Mississippi	LaCrosseToLD1	697.521	Combined Fldwy	244866	46211.36	643.27	0.000185	642.79	642.79	0.00	642.79	0.00
Mississippi	LaCrosseToLD1	697.497	Bridge							N/A		N/A
Mississippi	LaCrosseToLD1	697.471	Combined Fldwy	244866	51895.16	643.15	0.00015	642.75	642.75	0.00	642.75	0.00
Mississippi	LaCrosseToLD1	697.422	Combined Fldwy	244866	66142.63	643.03	0.000127	642.72	642.72	0.00	642.72	0.00

River	Reach	River Sta	Profile	Q Total (cfs)	Flow Area (sq ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	W.S. Elev Ex Site (ft)	W.S. Elev Pro Site (ft)	Δ Ex Site (ft)
Main Channel (La Crosse River)	Reach 7	0	100 YR	9500	1160.55	641.52	0.002566	640.40	640.40	0.00
Main Channel (La Crosse River)	Reach 7	500	100 YR	9500	1334.11	642.62	0.00176	641.76	641.76	0.00
Main Channel (La Crosse River)	Reach 7	600	100 YR	9500	1998.43	642.8	0.001092	642.19	642.19	0.00
Main Channel (La Crosse River)	Reach 7	621	Bridge							N/A
Main Channel (La Crosse River)	Reach 7	641	100 YR	9500	2070.15	643.1	0.000994	642.53	642.53	0.00
Main Channel (La Crosse River)	Reach 7	720	100 YR	9500	2141.09	643.21	0.001134	642.58	642.58	0.00
Main Channel (La Crosse River)	Reach 7	1150	100 YR	9500	3163.17	643.67	0.000846	643.26	643.26	0.00
Main Channel (La Crosse River)	Reach 7	1560	100 YR	9500	2865.93	644.06	0.000864	643.62	643.62	0.00

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