

Michigan Department of Transportation

Infrastructure Protection and Rehabilitation Response to High Lake Levels

MDOT OR21-013

Appendix E: M-22 Elberta/Frankfort Expanded Documentation

March 2022 (Final)

Infrastructure Protection and Rehabilitation Response to High Lake Levels

MDOT OR21-031

Appendix E: M-22 Elberta/Frankfort Expanded Documentation

March 2022 (Final)

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As Arcadis does not have a complete control over the accuracy of the data used in the conceptual engineering and design completed in this report, it is recommended that the results shown not be used without first obtaining additional information and confirming all results. This includes, but is not limited to, the roadway survey data, the recommended bridge structures, the soils and geotechnical data, the erosion control calculations, the wave calculations, future high water and wave forecasts, and all other engineering design. The statements provided herein shall not be relied upon for any specific application without independent verification and assessment of suitability by the project’s engineer of record, architect, or another party acting in similar capacity, as stipulated by the authority having jurisdiction or other applicable contractual regulations.

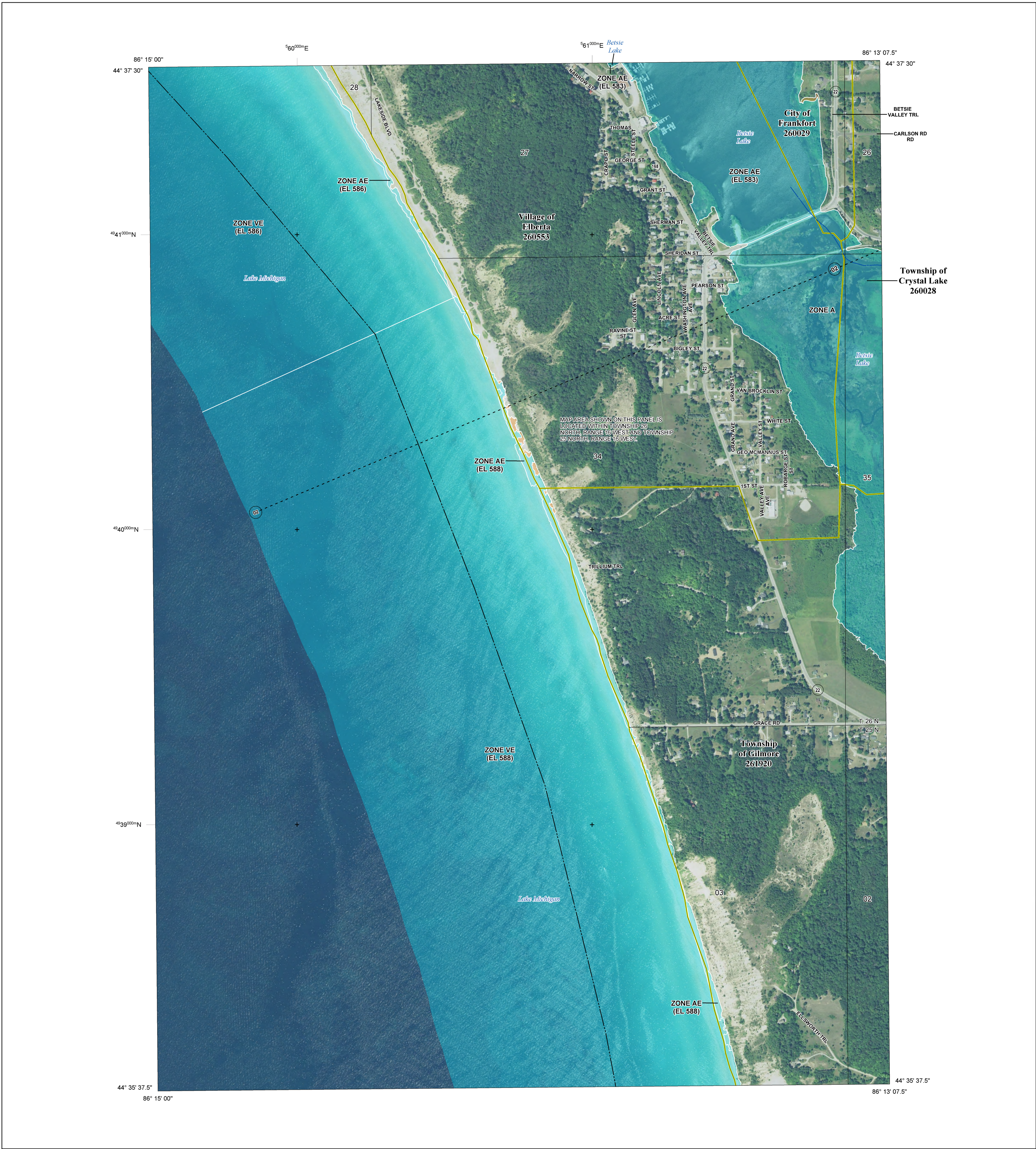
Therefore, while preliminary recommendations, calculations, and engineering design are based on sound and established principles, they shall not be deemed as instruction for any specific application or project without subsequent independent analysis, evaluation, verification and assessment of appropriateness for such an application by the engineer and/or architect of the project.

Based on the preceding, Arcadis hereby denies any liability whatsoever for losses and/or damages of whatever kind (and sustained by whomever) that might result from the above.

FEMA FIRM Map

26019C0201C

Effective Date March 23, 2021



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS OF FLOOD HAZARD		Area with Reduced Flood Risk due to Levee See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at <https://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

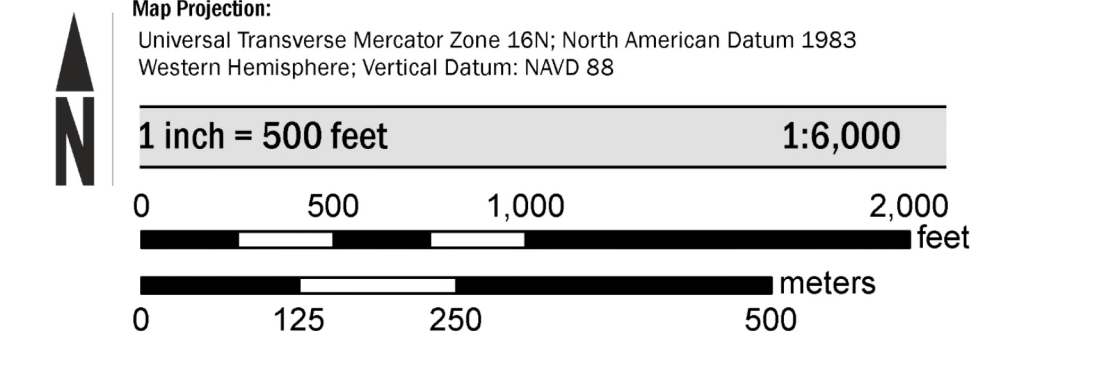
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

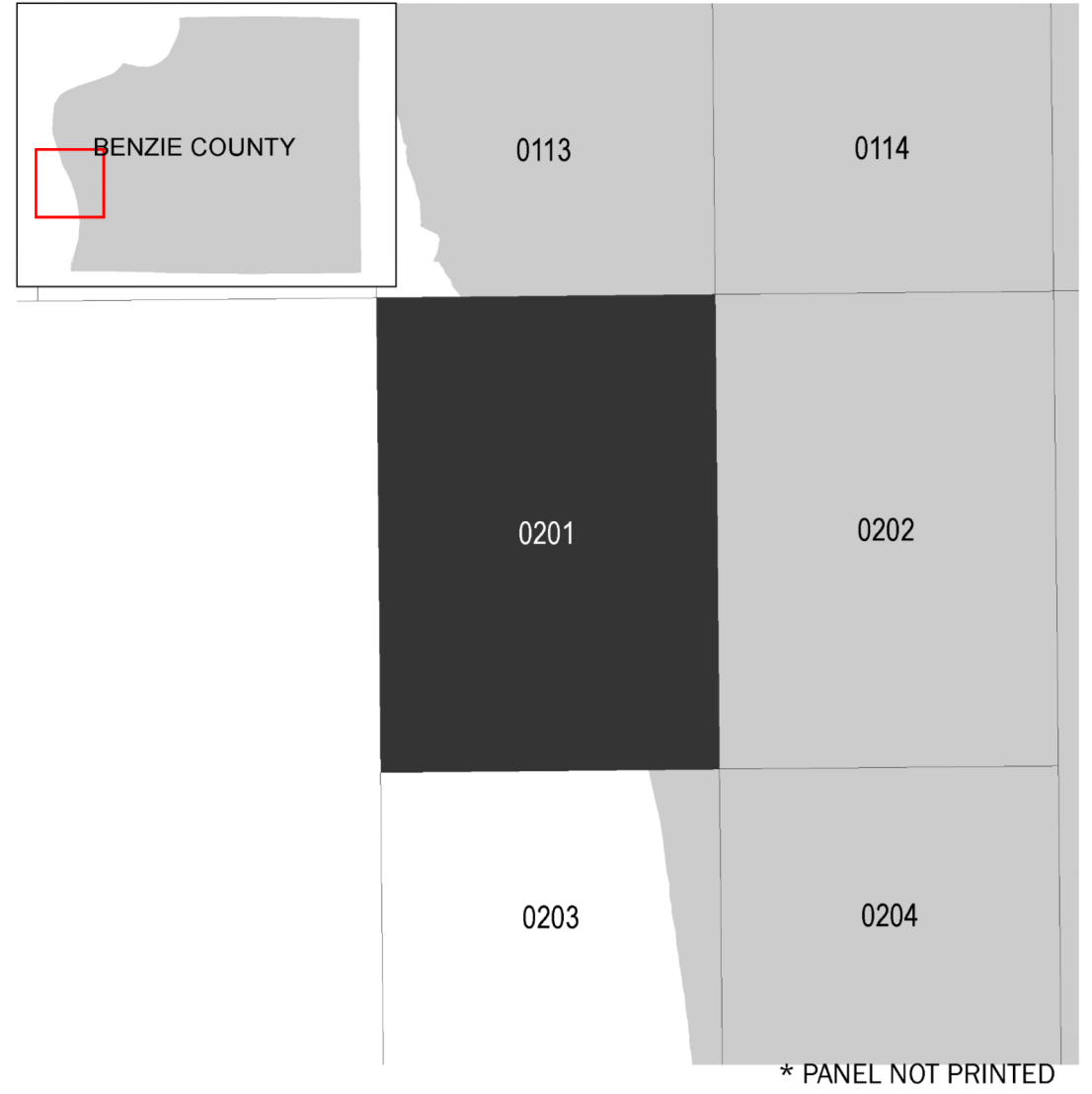
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the United States Department of Agriculture Farm Service Agency (USDA-FSA). This information was derived from digital orthophotography at a 1-meter resolution from photography dated 2016.

SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP

BENZIE COUNTY, MICHIGAN
 (All Jurisdictions)

PANEL 201 of 300

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
CRYSTAL LAKE,	260028	0201	C
TOWNSHIP OF ELBERTA, VILLAGE OF	260553	0201	C
FRANKFORT, CITY OF	260029	0201	C
GILMORE, TOWNSHIP OF	261920	0201	C

VERSION NUMBER
2.4.3.5

MAP NUMBER
26019C0201C

EFFECTIVE DATE
MARCH 23, 2021

Detour Route for M-22 Elberta/Frankfort Expanded Documentation

DETOUR M4-8 24"x12"
NORTH M3-1 24"x12"
DETOUR M1-6 24"x24"
DETOUR M6-3 24"x15"
 7 EACH 24"x63"

DETOUR M4-8
NORTH M3-1
DETOUR M1-6
DETOUR M6-1L
 2 EACH

DETOUR M4-8
NORTH M3-1
DETOUR M1-6
DETOUR M5-1L
DETOUR M6-1R
 2 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M6-1R
 1 EACH

DETOUR M4-8d 24"x18"
 2 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M6-3
 6 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M6-1L
 2 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M5-1L
 1 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M6-1R
DETOUR M5-1R
 4 EACH

DETOUR M4-8
SOUTH M3-3
DETOUR M1-6
DETOUR M5-1R
 2 EACH

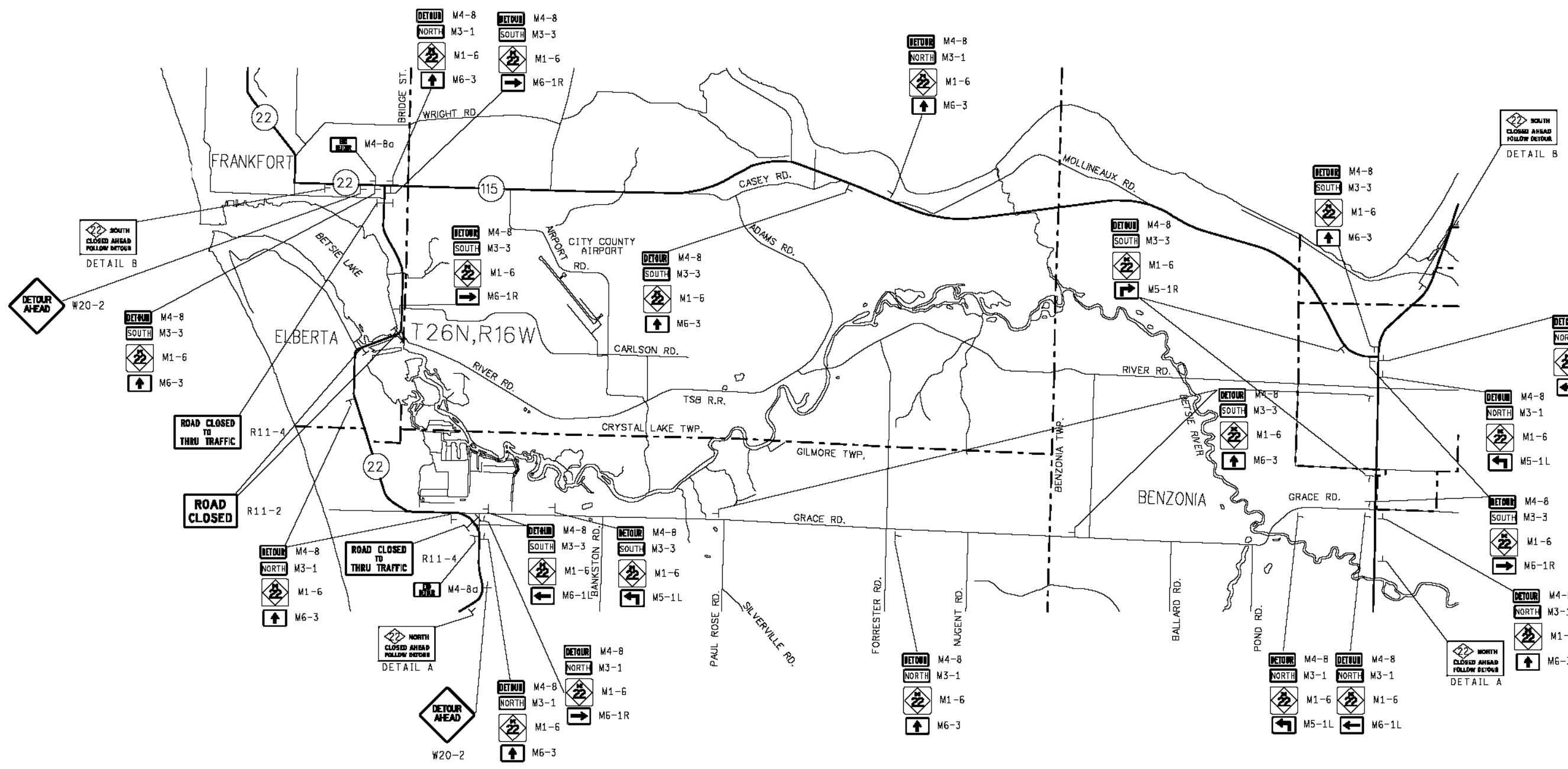
ROAD CLOSED TO THRU TRAFFIC R11-4 2 EACH 60"x30"
ROAD CLOSED R11-2 2 EACH 48"x30"
DETOUR AHEAD W20-2 2 EACH 48"x 48"
DETOUR NORTH CLOSED AHEAD FOLLOW DETOUR 2 EACH 78" X 48"
DETOUR SOUTH CLOSED AHEAD FOLLOW DETOUR 2 EACH 78" X 48"

22 NORTH
CLOSED AHEAD
FOLLOW DETOUR

13.69	18	6	26.62	13.69
8.22	30.14		26.85	8.22
8.83	28.83	4.57	27.35	8.83
		4.16		
		78		

DETAIL A:
 1.63" Radius, 0.76" Border, Black on, Orange,
 State Highway 22 M1-6a,
 "NORTH", ClearviewHwy-3-W,
 "CLOSED AHEAD", ClearviewHwy-3-W,
 "FOLLOW DETOUR", ClearviewHwy-3-W 40% spacing.
 Table of letter and object lefts

	N	O	R	T	H	
13.69	37.69	43.66	60.20	66.16	60.20	
C	L	O	S	E	D	
8.22	13.81	17.92	24.02	29.31	34.05	
	A	H	E	A	D	
	42.93	49.17	55.03	59.24	65.47	
F	O	L	L	O	W	
8.83	12.48	18.09	21.88	25.13	30.61	
	D	E	T	O	U	R
	41.82	46.74	60.41	64.63	60.26	65.14



22 SOUTH
CLOSED AHEAD
FOLLOW DETOUR

13.69	18	6	26.62	13.69
8.22	30.14		26.85	8.22
8.83	28.83	4.57	27.35	8.83
		4.16		
		78		

DETAIL B:
 1.63" Radius, 0.76" Border, Black on, Orange,
 State Highway 22 M1-6a,
 "SOUTH", ClearviewHwy-3-W,
 "CLOSED AHEAD", ClearviewHwy-3-W,
 "FOLLOW DETOUR", ClearviewHwy-3-W 40% spacing.
 Table of letter and object lefts

	S	O	U	T	H	
13.69	37.69	43.66	60.20	66.16	60.20	
C	L	O	S	E	D	
8.22	13.81	17.92	24.02	29.31	34.05	
	A	H	E	A	D	
	42.93	49.17	55.03	59.24	65.47	
F	O	L	L	O	W	
8.83	12.48	18.09	21.88	25.13	30.61	
	D	E	T	O	U	R
	41.82	46.74	60.41	64.63	60.26	65.14

FINAL ROW PLAN REVISIONS (SUBMITTAL DATE:)

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION



NO SCALE

DATE: 04/08/2020
 DESIGN UNIT:
 TSC:
 CS:
 JN:

ELBERTA CAUSEWAY DETOUR
 DRAWING SHEET
 SECT

Historic Flooding Photographs for M-22 Elberta/Frankfort Expanded Documentation









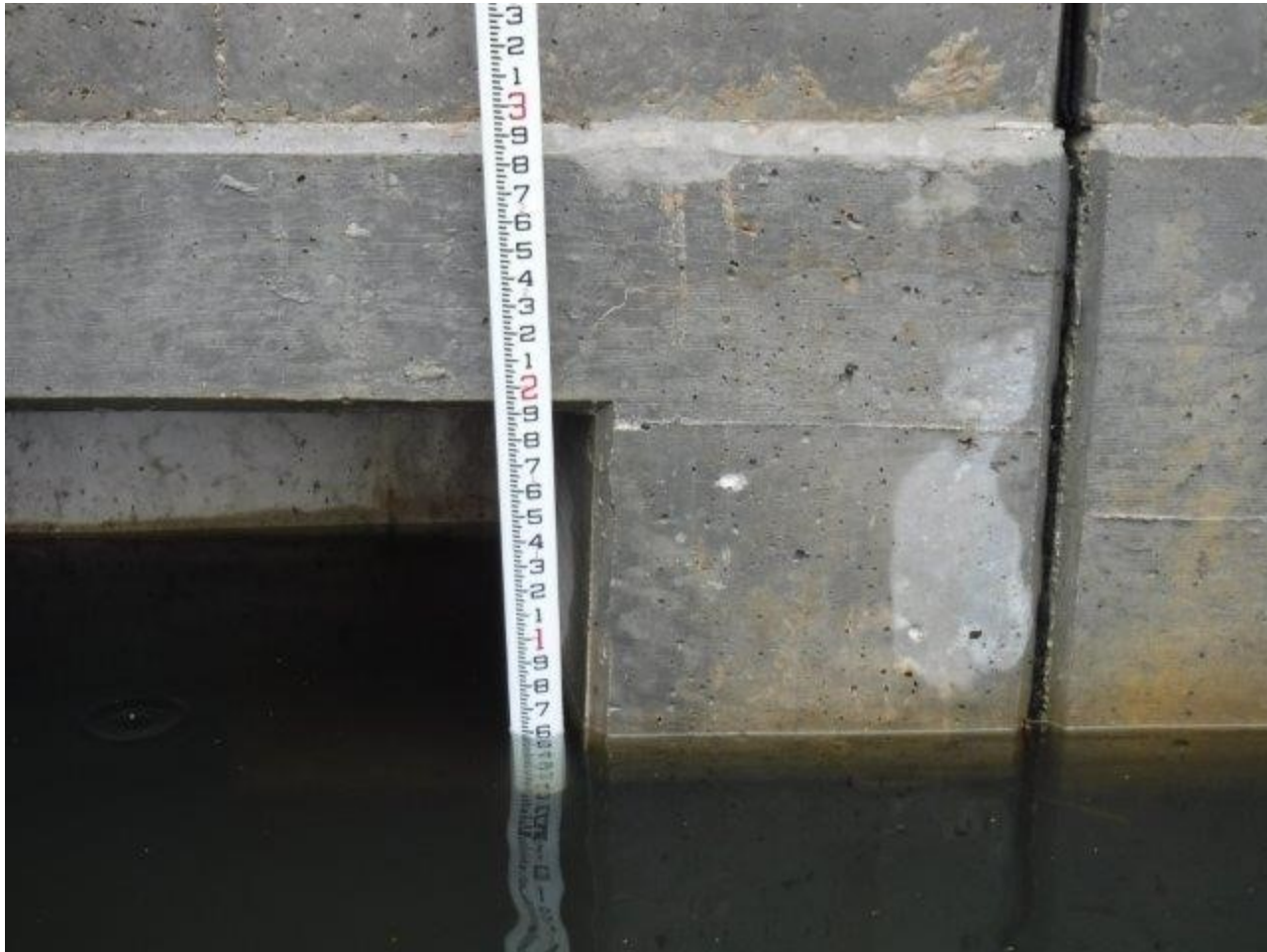












McClendon, Jade

From: Hunt, Jeff (MDOT) <Huntj2@michigan.gov>
Sent: Tuesday, May 4, 2021 12:17 PM
To: Kirkpatrick, Emily; Brettschneider, Michael (MDOT); Niemi, Gary (MDOT); Mathieu, Jacob (MDOT); Affholder, Paul (MDOT)
Cc: Hebebrand, Craig
Subject: RE: MDOT OR21-013: North Region Connect (pre site visit) - RFI and Scheduling
Attachments: 1-2-20elbertawet.pdf; 7-8-20wetelberta.pdf; 6-15-20 waterdown.pdf; 9-21-20dry.pdf; elbertapave.pdf; bridge6-15-20.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: MDOT

Will this work or do you need more? Paving done by Elmers \$21,399. 261 tons. Detour

From: Kirkpatrick, Emily <Emily.Kirkpatrick@arcadis.com>
Sent: Tuesday, May 4, 2021 8:43 AM
To: Brettschneider, Michael (MDOT) <Brettschneiderm@michigan.gov>; Niemi, Gary (MDOT) <NiemiG@michigan.gov>; Mathieu, Jacob (MDOT) <MathieuJ@michigan.gov>; Hunt, Jeff (MDOT) <Huntj2@michigan.gov>; Affholder, Paul (MDOT) <AffholderP@michigan.gov>
Cc: Hebebrand, Craig <craig.hebebrand@arcadis.com>
Subject: RE: MDOT OR21-013: North Region Connect (pre site visit) - RFI and Scheduling

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

Perfect, thank you Michael,

-Emily

From: Brettschneider, Michael (MDOT) <Brettschneiderm@michigan.gov>
Sent: Tuesday, May 4, 2021 7:19 AM
To: Niemi, Gary (MDOT) <NiemiG@michigan.gov>; Mathieu, Jacob (MDOT) <MathieuJ@michigan.gov>; Hunt, Jeff (MDOT) <Huntj2@michigan.gov>; Affholder, Paul (MDOT) <AffholderP@michigan.gov>
Cc: Kirkpatrick, Emily <Emily.Kirkpatrick@arcadis.com>
Subject: RE: MDOT OR21-013: North Region Connect (pre site visit) - RFI and Scheduling

Here you go.

From: Niemi, Gary (MDOT) <NiemiG@michigan.gov>
Sent: Monday, May 3, 2021 10:17 AM
To: Brettschneider, Michael (MDOT) <Brettschneiderm@michigan.gov>; Mathieu, Jacob (MDOT) <MathieuJ@michigan.gov>; Hunt, Jeff (MDOT) <Huntj2@michigan.gov>; Affholder, Paul (MDOT) <AffholderP@michigan.gov>
Subject: FW: MDOT OR21-013: North Region Connect (pre site visit) - RFI and Scheduling

Mike, Jake, Jeff and Paul:

Please see email below:

Mike can you send Emily the Road plans for Elbert

Jake can you send Emily any AADT info

Jeff and Paul can you send Emily any photos and costs associated with the flooding issues.

Thanks,

Gary

From: Kirkpatrick, Emily <Emily.Kirkpatrick@arcadis.com>

Sent: Friday, April 30, 2021 5:38 PM

To: Wahl, Bill (MDOT) <wahlb@michigan.gov>

Cc: Reddick, Kelli <Kelli.Reddick@arcadis.com>; Zweng, Harold (MDOT) <ZwengH@michigan.gov>; Niemi, Gary (MDOT) <NiemiG@michigan.gov>; Wagner, Dan (MDOT) <WagnerD2@michigan.gov>; Hebebrand, Craig <craig.hebebrand@arcadis.com>; Berdis, Philip <philip.berdis@arcadis.com>; Wildman, Charlie <Charlie.Wildman@arcadis.com>; Gerdeman, David <David.Gerdeman@arcadis.com>

Subject: RE: MDOT OR21-013: North Region Connect (pre site visit) - RFI and Scheduling

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

Hi Bill,

I wanted to follow up on both scheduling and our site-specific RFIs before we connect next week.

In terms of scheduling, what is your region's availability for site visits the week of May 10th? In terms of a time commitment, David, our drone pilot, is thinking he will likely be 2-3 hours at each site. We were hoping to get your staff's availability generally (morning / afternoon) from Monday May 10 through Friday May 14th so we can finalize the route. We can then share our target date, as well as a "rain" date once we coordinate with all the regions.

Also, below you will find our list of requested information, based on our understanding of what is available for the sites of interest based on our last call and our call with Chris. We don't need all the information at once, but we were hoping to get any plans prior to the site visits. Sending via email is fine – let me know if we need to coordinate on transferring any larger files.

Thank you!
Emily + team

North Region RFI

Petoskey

- Any photos during the past high-water events, any additional slope monitoring photos since the Baird report
- Roadway construction documents (2014); trail construction documents, if available.
- Any local roadway maintenance logs
- Digital version of the topographic contours extracted by Baird (if available)
- Any high-resolution imagery captured by Baird (for comparison)

- *Received to date:*
 - *Baird Study – includes historic soil borings*

Elberta/ Frankfort

- Existing roadway plans
- Any photographs of the bridge showing type of construction (as plans are unavailable)
- Any local maintenance logs
- Any photos during the past high-water events (photos during historic lows would also be useful for comparison)
- Historic road closures (full and partial) from high water (logs, or a narrative)
- Detour routes
- Any bridge inspection reports
- Seasonal AADT, if available
- Any cost data associated with past high-water events (installing signage, traffic light, etc)

Our understanding is that no geotechnical reports are available for this site.

Reference Site - US-23 Beach and Dune Erosion North of Rogers City

- Available cost data for implemented riprap fixes
- Plans/photos of fixes, as necessary to interpret cost data

-----Original Appointment-----

From: Kirkpatrick, Emily

Sent: Wednesday, April 28, 2021 10:42 AM

To: Kirkpatrick, Emily; Wahl, Bill (MDOT); Johnecheck, Christopher (MDOT); Hebebrand, Craig; Berdis, Philip; Wildman, Charlie; Gerdeman, David

Cc: Reddick, Kelli; Zweng, Harold (MDOT); Niemi, Gary (MDOT); Wagner, Dan (MDOT)

Subject: MDOT OR21-013: North Region Connect (pre site visit)

When: Thursday, May 6, 2021 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).

Where: Microsoft Teams Meeting

Grabbing an hour, but may use less. Bill, feel free to forward to others on your team,

Elberta/Frankfort & Petoskey

Call Purpose:

- Review the specific site of interest in more detail, identify key elements that should be captured, talk through any site-specific logistics (access, key start/stop points for capture, etc.).

Tentative Schedule – TBC – Weather and Regional Schedule Dependent

5/10 Benton Harbor

5/11 Ludington State Park and **Elbert/Frankfort (about 1.5hr drive between sites)**

5/12 **Petoskey**

TBD Algonac & St. Johns Marsh

- Friday - overflow day for weather or if we aren't able to do both sites on Tuesday.
- Week of 5/17-5/21 as fall back dates.
- If the weather the week of 5/10 is not optimal, either Benton Harbor or Algonac may be done as a "one-off" visit.

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

[+1 213-379-9608,,843950636#](#) United States, Los Angeles

Phone Conference ID: 843 950 636#

[Find a local number](#) | [Reset PIN](#)

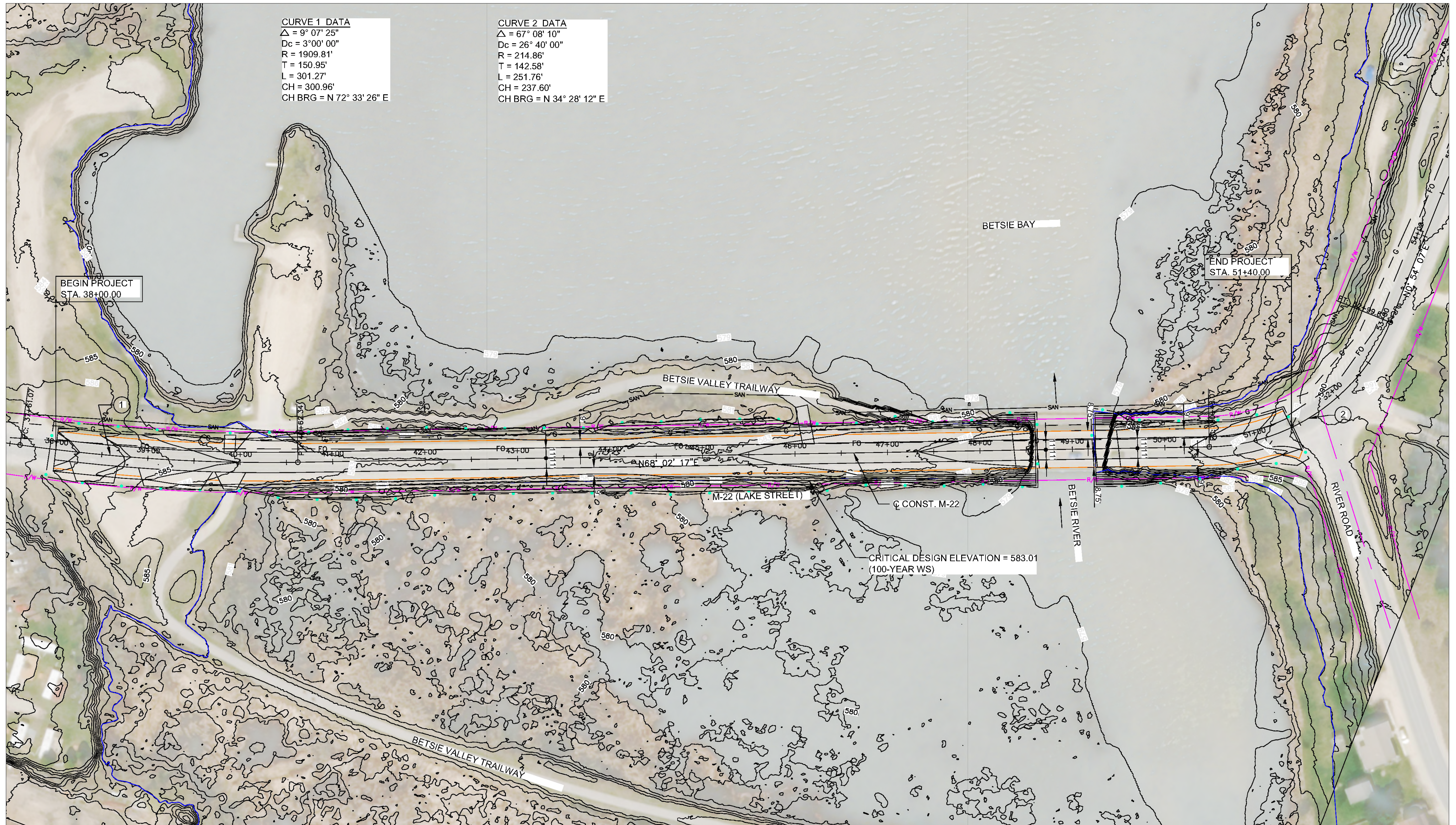


[Learn More](#) | [Help](#) | [Meeting options](#)

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Engineering Drawings for Preferred Mitigation Alternative for M-22 Elberta/Frankfort Expanded Documentation

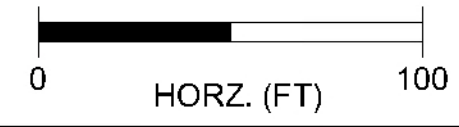


CURVE 1 DATA
 $\Delta = 9^\circ 07' 25''$
 $Dc = 3^\circ 00' 00''$
 $R = 1909.81'$
 $T = 150.95'$
 $L = 301.27'$
 $CH = 300.96'$
 $CH BRG = N 72^\circ 33' 26'' E$

CURVE 2 DATA
 $\Delta = 67^\circ 08' 10''$
 $Dc = 26^\circ 40' 00''$
 $R = 214.86'$
 $T = 142.58'$
 $L = 251.76'$
 $CH = 237.60'$
 $CH BRG = N 34^\circ 28' 12'' E$

CRITICAL DESIGN ELEVATION = 583.01
 (100-YEAR WS)

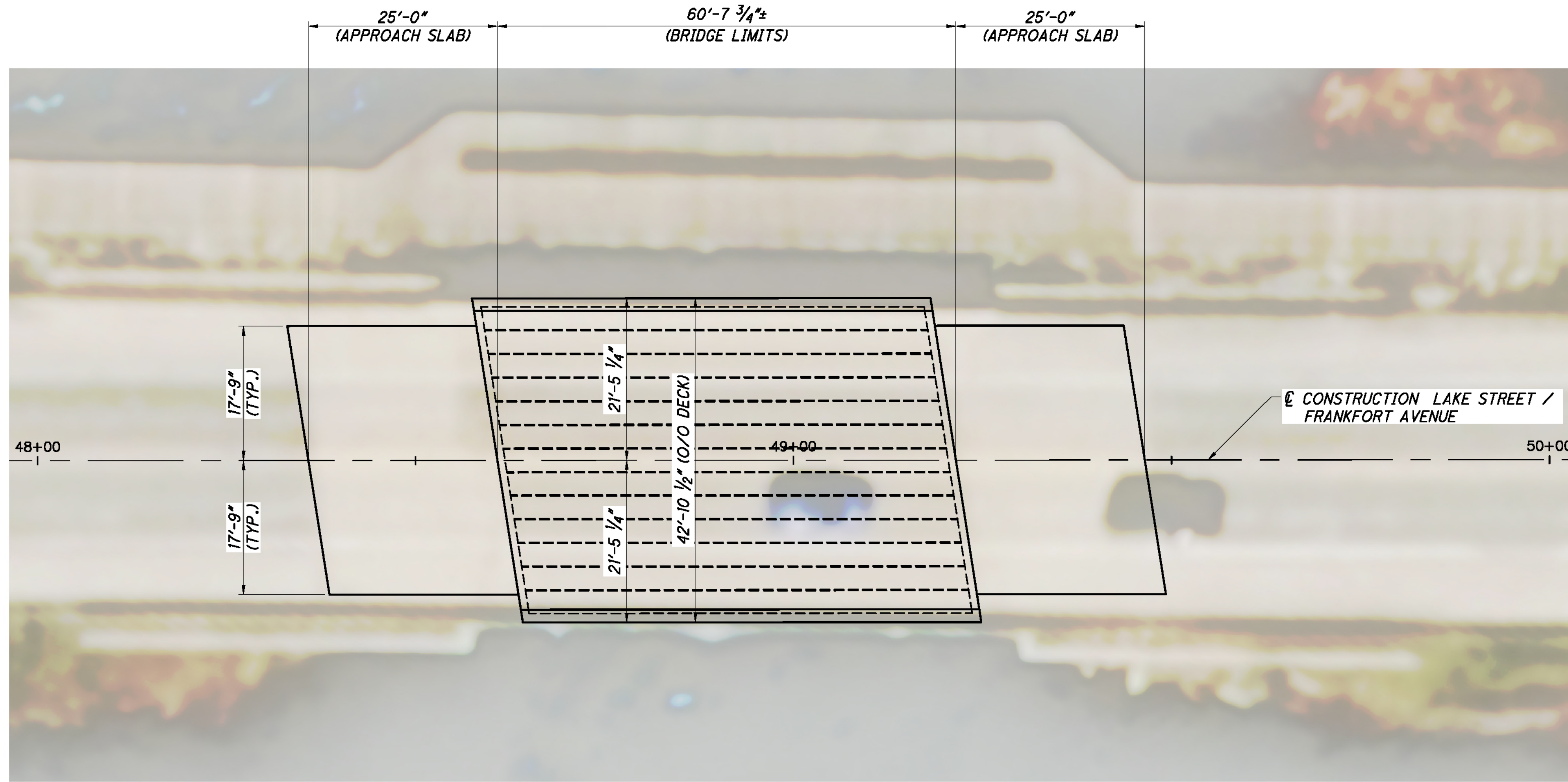
FINAL ROW PLAN REVISIONS SUBMITTAL DATE:							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION



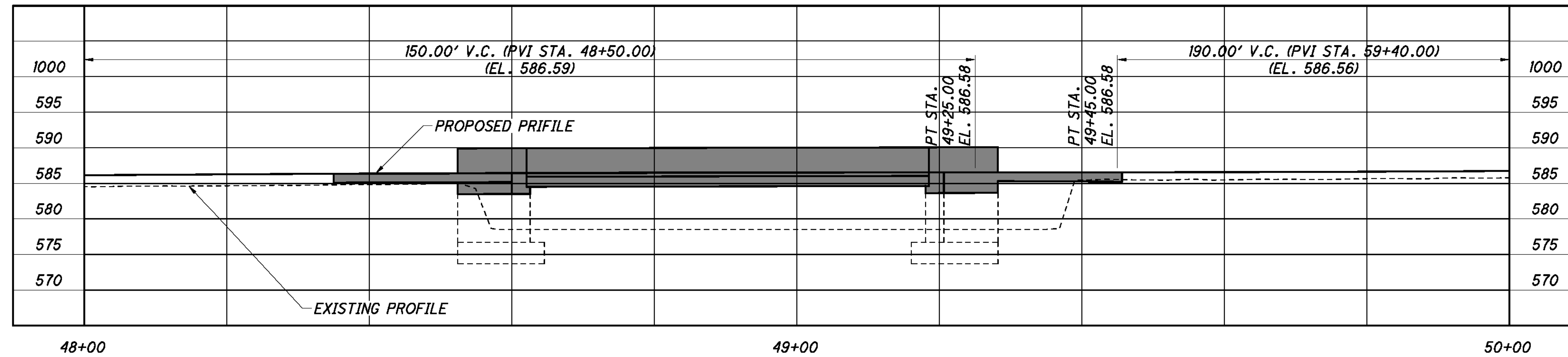
DATE: _____ CS: _____
 DESIGN UNIT: _____ JN: _____
 TSC: _____

PLAN SHEET
 M-22 (LAKE STREET)
 STA. 37+50 TO STA. 52+50

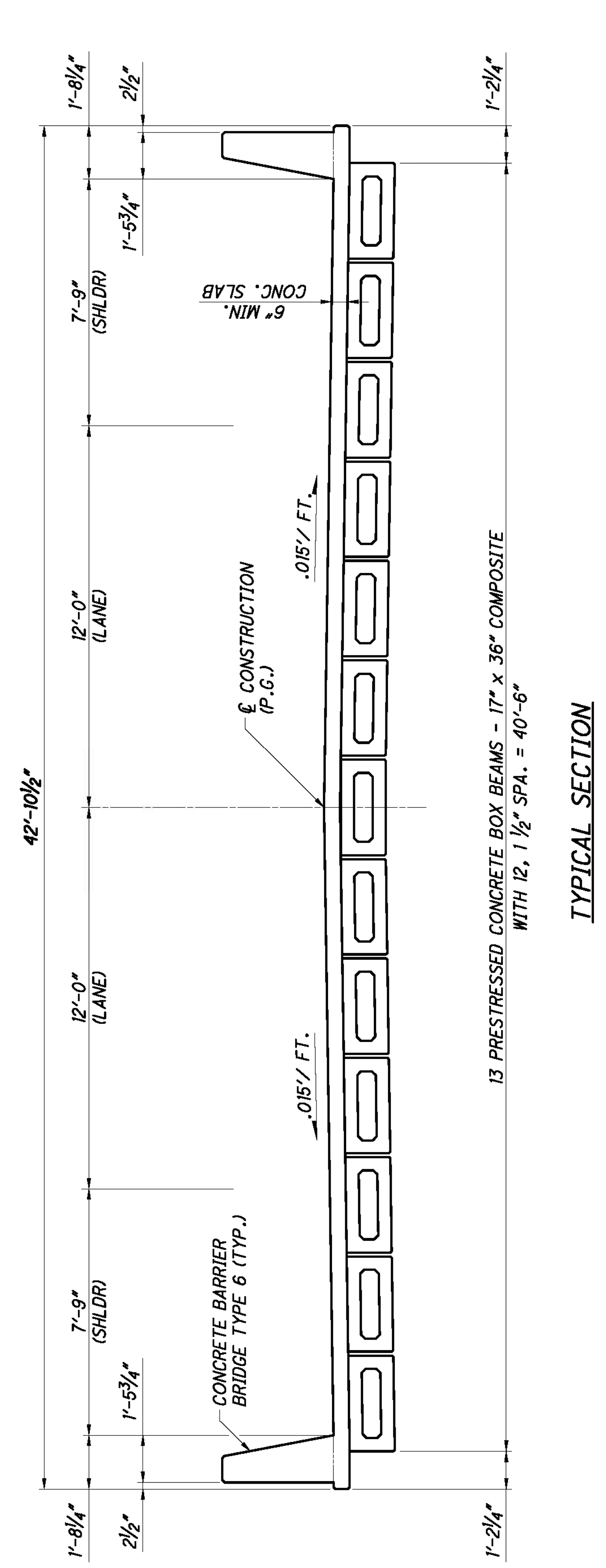
DRAWING SHEET
 SECT



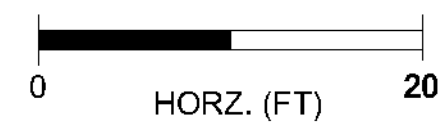
PLAN



ELEVATION

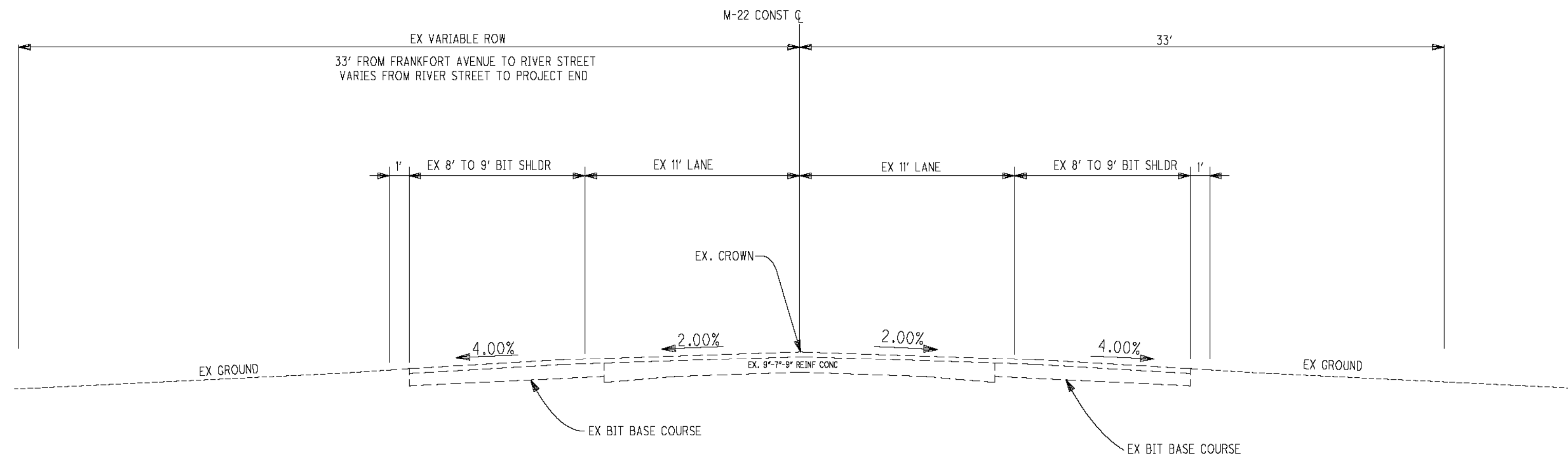


FINAL ROW PLAN REVISIONS		SUBMITTAL DATE:	
NO.	DATE	AUTH	DESCRIPTION



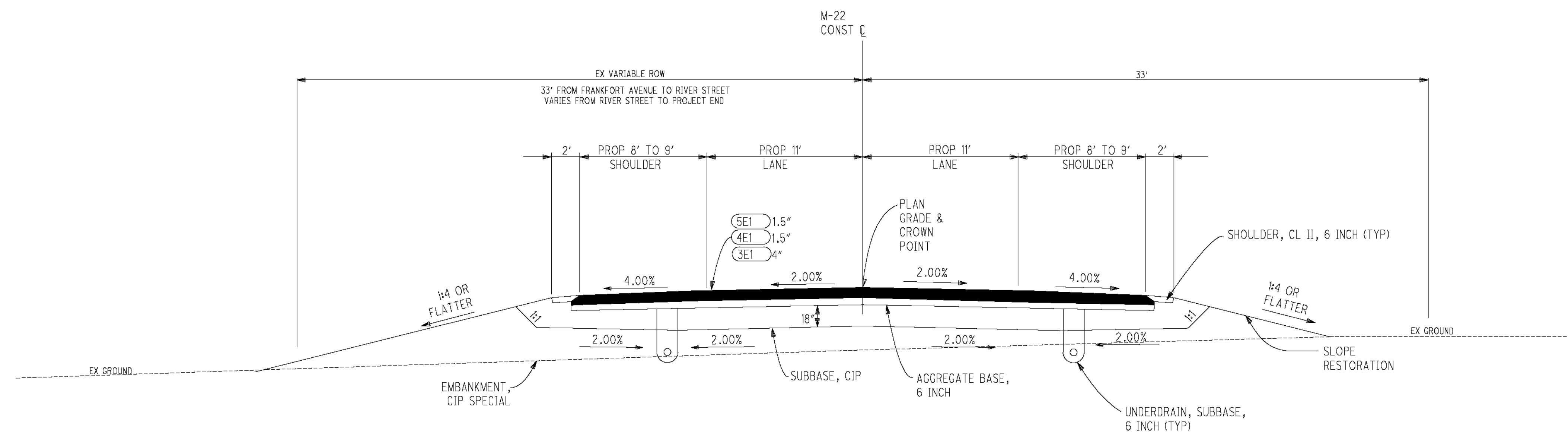
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DESIGN UNIT:	JN:
TSC:	

DRAWING SHEET
SECT



EXISTING M-22 NORMAL CROWN SECTION

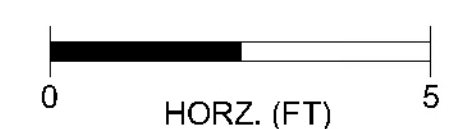
TO APPLY:
STA 38+00 TO STA 51+40



PROPOSED M-22 NORMAL CROWN SECTION

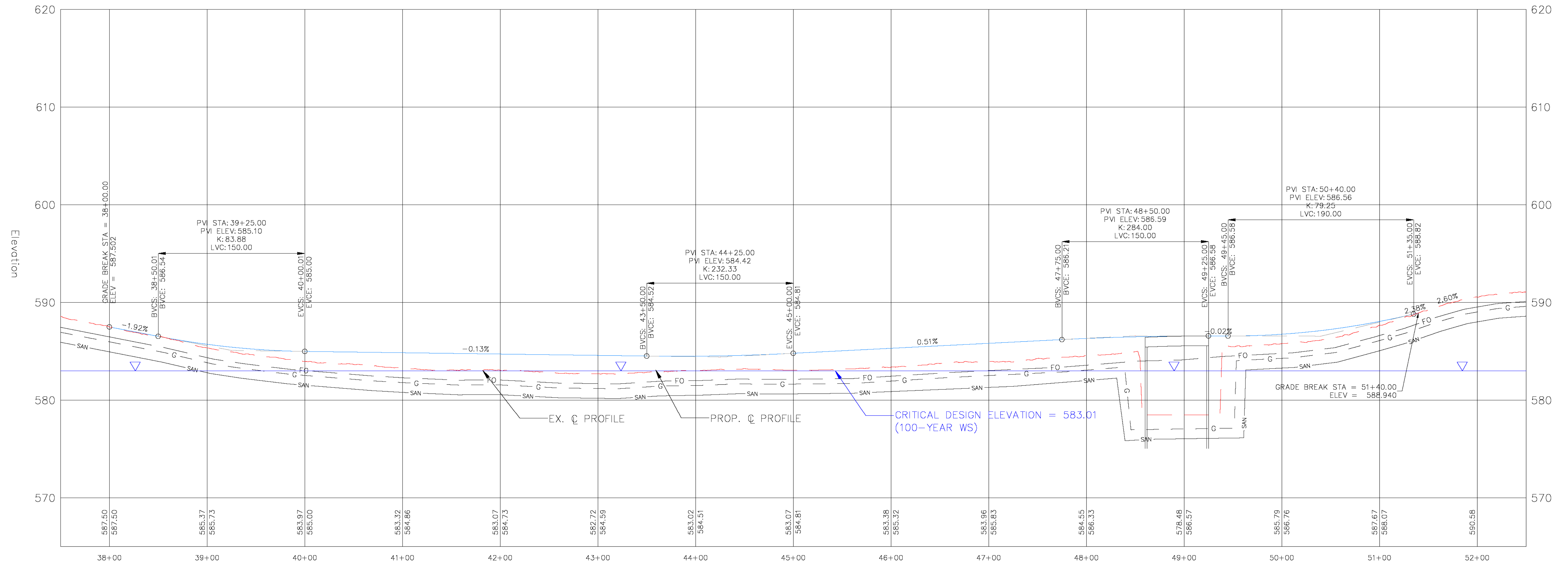
TO APPLY:
STA 38+00 TO STA 51+40

FINAL ROW PLAN REVISIONS				SUBMITTAL DATE:			
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

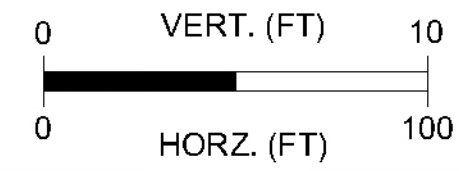


DATE:	CS:
DESIGN UNIT:	JN:
TSC:	
FILE:	

TYPICAL CROSS SECTION	DRAWING	SHEET
M-22 (LAKE STREET)		



FINAL ROW PLAN REVISIONS			SUBMITTAL DATE:		
NO.	DATE	AUTH	NO.	DATE	AUTH



DATE: _____
 DESIGN UNIT: _____
 TSC: _____
 FILE: _____

CS: _____
 JN: _____

PROFILE SHEET
M-22 (LAKE STREET)
STA. 37+50 TO STA. 52+50

DRAWING SHEET
 SECT

Cost Estimate for Preferred Mitigation Alternative for M-22 Elberta/Frankfort Expanded Documentation

Elberta-Frankfort
M-22 Design Criteria Matrix

Preparation Date: 6-30-2021
Consultant: ARCADIS

Item	Engineering Design Feature	Criteria 45 MPH	Reference
Design Controls			
1	Highway Functional Classification	Arterial	TDMS
2	Design Functional Classification	Urban Minor Arterial	TDMS
3	AADT (2019)	3,862	TDMS
4	CAADT (2019)	62	TDMS
5	Terrain Type	Level	Topo Maps
6	Legal Speed Limit	40	Google Street Viewer
7	Design Speed	45	MDOT RDM, Sec. 3.06
8	Route on the National Highway System (NHS)?	No	NHS Michigan Map
Horizontal Alignment Design			
1	Stopping Sight Distance	360'	MDOT RDM, Sec. 3.03.01
2	Horizontal Sight Distance	360'	MDOT RDM, Sec. 3.03.01D
3	Passing Sight Distance	700 (K=175)	AASHTO Green Book
4	Intersection Sight Distance (Left Turn)	500 (K=89)	AASHTO Green Book
5	Intersection Sight Distance (Right turn)	430 (K=66)	AASHTO Green Book
6	Decision Sight Distance (DSD)	675'	AASHTO Green Book
7	Max. Centerline deflection w/o horiz. curve	1° 40'	AASHTO Green Book
8	Max. Degree of Curve w/ superelevation (Min. Radius)	9°45' (588)	AASHTO Green Book
9	Max. Degree of Curve w/o superelevation (Min. Radius)	5°40' (1011)	AASHTO Green Book
10	Design Superelevation Rate	0.070	Appendix 3A-4
11	Superelevation Transitions (equivalent max. relative slope)	185:1	AASHTO Green Book
12	Max. Curve w/o Spiral (Min. Radius)	N/A	AASHTO Green Book
Vertical Alignment Design			
1	Max. Grades - Roadway (Rolling Terrain)	6.00%	MDOT RDM, Sec. 3.03.02 and Appendix 3A-4
2	Critical Length of Grade	N/A	
3	Min. Grades- Roadway	0.00%	AASHTO Green Book
4	Max. Change in Vertical algnmt. w/o vert. curve	0.55%	AASHTO Green Book
5	Vertical Curve design SSD (crest)	360 (K=61)	AASHTO Green Book
6	Vertical Curve design SSD (sag)	360 (K=79)	AASHTO Green Book

Item	Engineering Design Feature	Criteria 45 MPH	Reference
Cross Section Design			
1	Travel Lane Width	11	MDOT RDM, Sec. 3.09.02
2	Cross Slopes (Roadway lanes)	2.00%	MDOT RDM, Sec. 3.09.02
3	Graded Shoulder Width (w/ barrier / w/o barrier)	6'+4' = 10'	MDOT RDM, Sec. 6.05.04D Shoulder Width Details
4	Treated Shoulder Width	6'	MDOT RDM, Sec. 3.09.02 and Appendix 3A-2
5	Treated Shoulder Composition	Paved	MDOT RDM, Sec. 3.09.02 and Appendix 3A-2
6	Cross Slopes (shoulders)	4.00%	MDOT RDM, Sec. 6.05.05
7	Guardrail offset from traveled way	8'	MDOT RDM, Sec. 6.05.04D Shoulder Width Details & 7.01.30B
8	Rounding	4'	
Roadside Design			
1	Clear Zone Width	Varies 12' to 26'	MDOT RDM, Sec. 7.01.11
2	Safety Grading in Clear Zone	N/A	
3	Safety Grading outside of Clear Zone	N/A	
4	Barrier Grading	Yes, If Required	MDOT RDM, Sec. 7.01.30
5	Clear Zone Grading	Fill Slopes 1:4 Max Foreslopes.; Cut Slopes 1:3 Max. Backslopes	MDOT RDM, Sec. 2.03.01 and Sec. 7.01.11
6	Common Grading	N/A	
7	Roadside Barrier Warrants	Yes	MDOT RDM, Sec. 7.01.30
8	Median Barrier Warrants	N/A	
9	Lateral Clearence for bridge	Shoulder width + GR Offset = 8'	
10	Curve Widening	N/A	

**OPINION OF PROBABLE CONSTRUCTION COST
VILLAGES OF FRANKFORT AND ELBERTA, MICHIGAN**

**M-22 RECONSTRUCTION
(FROM FRANKFORT STREET TO RIVER STREET)**

REF NO.	ITEM NO.	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT COST	ITEM TOTAL
1	1500001	Mobilization, Max \$50,000.00	LSUM	1	\$50,000.00	\$50,000.00
2	201001	Clearing	Acre	1	\$5,000.00	\$2,681.70
3	2040035	Guardrail, Rem	Ft	1,473	\$3.00	\$4,419.00
4	2040050	Pavt, Rem	Syd	4,940	\$8.00	\$39,521.78
5	2040055	Sidewalk, Rem	Syd	132	\$15.00	\$1,973.33
6	2040060	Structures, Rem	LSUM	1	\$40,000.00	\$40,000.00
7	2050010	Embankment, CIP	Cyd	2,306	\$12.00	\$27,672.00
8	2050016	Excavation, Earth	Cyd	464	\$12.00	\$5,568.00
9	2080001	Sediment and Erosion Control	LSUM	1	\$10,000.00	\$10,000.00
10	3010002	Subbase, CIP	Cyd	5,389	\$25.00	\$134,724.07
11	3020001	Aggregate Base	Ton	1,640	\$40.00	\$65,605.93
12	3070001	Shoulder, CL II	Ton	170	\$6.00	\$1,022.22
13	4040063	Underdrain, Subbase, 6 inch	Ft	2,300	\$45.00	\$103,500.00
14	4040093	Underdrain Outlet, 6 inch	Ft	100	\$25.00	\$2,500.00
15	4040113	Underdrain Outlet Ending, 6 inch	Ea	4	\$200.00	\$800.00
16	5010046	HMA, 3E1	Ton	406	\$95.00	\$38,563.98
17	5010052	HMA, 4E1	Ton	395	\$90.00	\$35,585.55
18	5010058	HMA, 5E1	Ton	395	\$90.00	\$35,585.55
19	708001	Prestressed Box Beam Bridge on Full Height Abutments	Sf	2,600	\$160.00	\$416,000.00
20	8070004	Guardrail, Type MGS-8	Ft	1,298	\$20.00	\$25,960.00
21	8070022	Guardrail Anch, Bridge, Det T1	Ea	4	\$2,000.00	\$8,000.00
22	8070044	Guardrail Approach Terminal, Type 2M	Ea	3	\$3,000.00	\$9,000.00
23	8097043	Field Office, CL 3	Mo	12	\$2,000.00	\$24,000.00
24	8100001	Traffic Signs	LSUM	1	\$5,000.00	\$5,000.00

**M-22 RECONSTRUCTION
(FROM FRANKFORT STREET TO RIVER STREET)**

REF NO.	ITEM NO.	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT COST	ITEM TOTAL
25	8110091	Pavt Mrkg, Polyurea, 4 inch, White	Ft	3,030	\$1.00	\$3,030.00
26	8110092	Pavt Mrkg, Polyurea, 4 inch, Yellow	Ft	1,515	\$1.00	\$1,515.00
27	8120001	Maintenance of Traffic (Assume 2% of Construction Cost)	LSUM	1	\$60,000.00	\$60,000.00
28	8160027	Mulch Blanket	Syd	1,298	\$1.50	\$1,946.92
29	8160062	Topsoil Subsurface, Furn, 4 inch	Syd	2,596	\$5.00	\$12,979.44
30	8167011	Turf Establishment - Seed	Syd	2,596	\$4.00	\$10,383.56
31	8240001	Contractor Staking	LSUM	1	\$15,000.00	\$15,000.00
		CONSTRUCTION SUBTOTAL				\$1,192,538.04
		30% CONTINGENCY				\$357,761.41
		CONSTRUCTION TOTAL				\$1,550,299.45
		RIGHT-OF-WAY	Sf	0	\$1.00	\$0.00
		UTILITY RELOCATIONS	Ea	3	\$25,000.00	\$75,000.00
		ESTIMATED PROJECT TOTAL				\$1,625,299.45

**OPINION OF PROBABLE CONSTRUCTION COST
VILLAGES OF FRANKFORT AND ELBERTA, MICHIGAN**

**M-22 RECONSTRUCTION
(FROM FRANKFORT STREET TO RIVER STREET)**

REF NO.	ITEM NO.	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT COST	INFLATION ADJUSTED UNIT COST	ITEM TOTAL
1	1500001	Mobilization, Max \$100,000.00	LSUM	1	\$100,000.00	\$115,000.00	\$115,000.00
2	2040050	Cold Milling HMA Surface	Syd	5,008	\$1.50	\$1.73	\$8,639.38
3	3070001	Shoulder, CL II	Ton	170	\$30.00	\$34.50	\$5,877.78
4	5010058	HMA, 5E1	Ton	413	\$90.00	\$103.50	\$42,764.91
5	8240001	Contractor Staking	LSUM	1	\$10,000.00	\$11,500.00	\$11,500.00
		CONSTRUCTION TOTAL					\$183,782.06

PID NO.: From Sum

JOB NO.: 30045997

STRUCTURE: Trail Bridge

ITEM/EXT.	PARTICIPATION		ESTIMATED QUANTITIES				DESCRIPTION	CALC. BY: RJB		DATE: 11/17		AS PER PLAN	
	REHAB I	TRAC II	ITEM	ITEM EXT	TOTAL	UNIT		CHK'D BY:	DATE:	SUPER	ABUT'S		PIERS
202E11004			202	11004	75,000	\$	STRUCTURE REMOVED						
509E10000			509	10000	15,277	\$	EPOXY COATED REINFORCING STEEL						
511E34444			511	34444	36,114	\$	CLASS QC2 CONCRETE, BRIDGE DECK						
515E12020			515	12020	146,417	\$	PRESTRESSED CONCRETE COMPOSITE BOX BEAM BRIDGE MEMBERS, LEVEL 1, CB17-36						
526E25000			526	25000	63,122	\$	REINFORCED CONCRETE APPROACH SLABS (T=15")						
622E10060			622	10060	24,259	\$	CONCRETE BARRIER, SINGLE SLOPE, TYPE B						

Subtotal = 360,189

15 % Contingency = 54,028

Total = 414,217

Deck Area = 2,600 SF

Unit Cost = 159 /SF Superstructure Replacement & Raising

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