

MDOT Bridge Update

BRAD WAGNER CHIEF STRUCTURE DESIGN ENGINEER

RICK LIPTAK CHIEF BRIDGE CONSTRUCTION ENGINEER

MARCIA YOCKEY BRIDGE SUPPORT SPECIALIST

JOHN BELCHER BRIDGE CONSTRUCTION ENGINEER

SCOTT FERNALD GRANITE CONSTRUCTION CO. UTAH

The Road to Model Delivery

MDOT's 3D Bridge Model Delivery Pilot

October 2016

Phase I
Review of National
Bridge Modeling
Practices

May 2017

Phase II
Create
Implementation
Framework

October 2017

Phase III
Sample MDOT
Models

May 2018

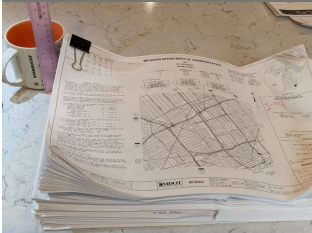
Phase IV
Workspace &
Workflows for
Bridge Modeling

January 2020

I-94 BIM
Bridge Plans
from Model

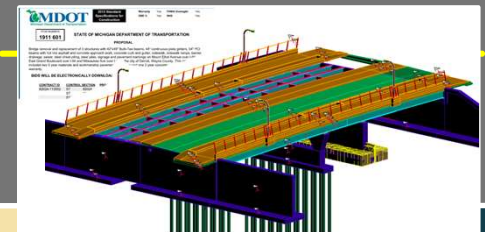
November 2021

3D Bridge Model
Delivery Pilot



2D Paper Plans
<Static>

2D Digital Plans
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3D Digital Model
<Dynamic>

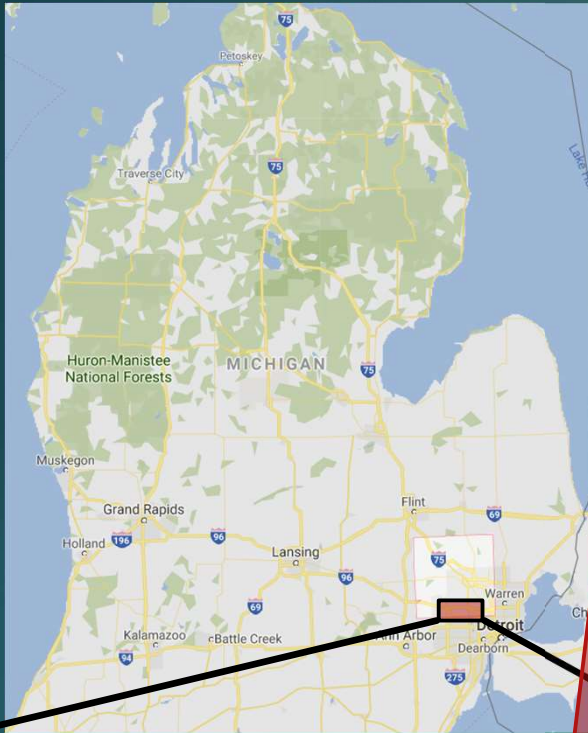
MITA Engagement

- ▶ I-696 over Rouge River Pilot
 - ▶ DDWG BIM for Bridges Group
 - ▶ Training
 - ▶ MITA Meeting Updates
- ▶ 2022 and Beyond
 - ▶ Continuation of DDWG BIM for Bridges Group

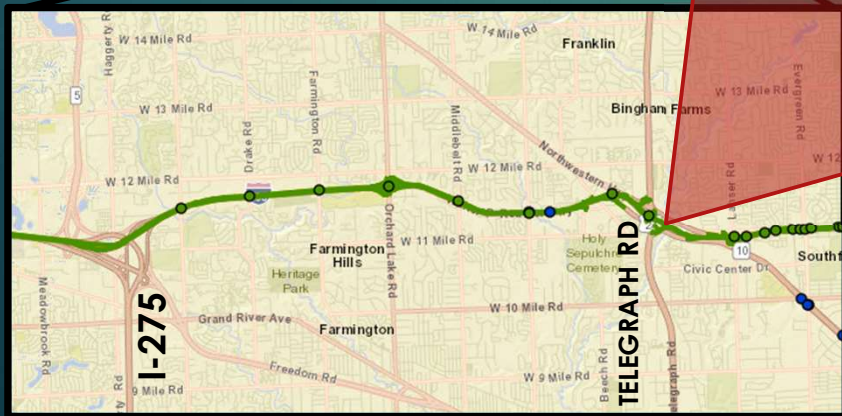


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I-696 EB & WB OVER ROUGE RIVER



JN 201222PES
I-696 EB & WB over Rouge River



- ▶ B01-3 & B01-4 of 63102
- ▶ Structure Replacement
- ▶ I-696 Reconstruct - I-275 to Lahser
- ▶ November 2021 Letting

Key People

MDOT | Bureau of Bridges & Structures

- Brad Wagner, PE – Chief Structure Design Engineer
- Talia Belill, PE – Project Manager/Bridge Engineer

MDOT | Design Services

- John Wilkerson, PE – Manager Engineering Support Unit
- Marcia Yockey, PE – Bridge Support Engineer. Pilot PM

MDOT | Oakland TSC

- David Harrison, PE - I-696 Reconstruction Road PM
- Brian Travis, PE – Construction Engineer

Baker & Associates

- Parker Thomson, PE, SE - Project Manager
- Cathy Cassar, PE
- Steve Gravlin, PE, PS
- Daniel Jensen, PE
- Alex Svilar, PE



Model Delivery Process

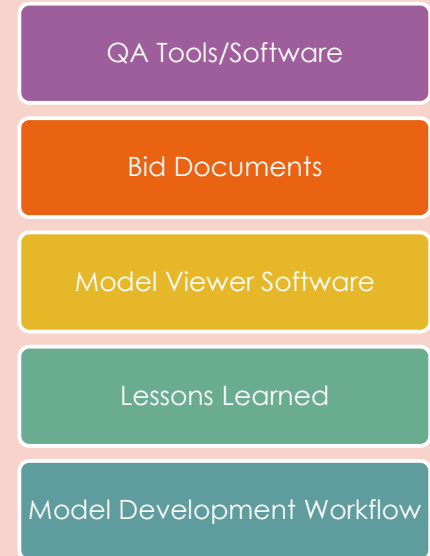
Stakeholder Engagement



Pilot Contract Model



Training

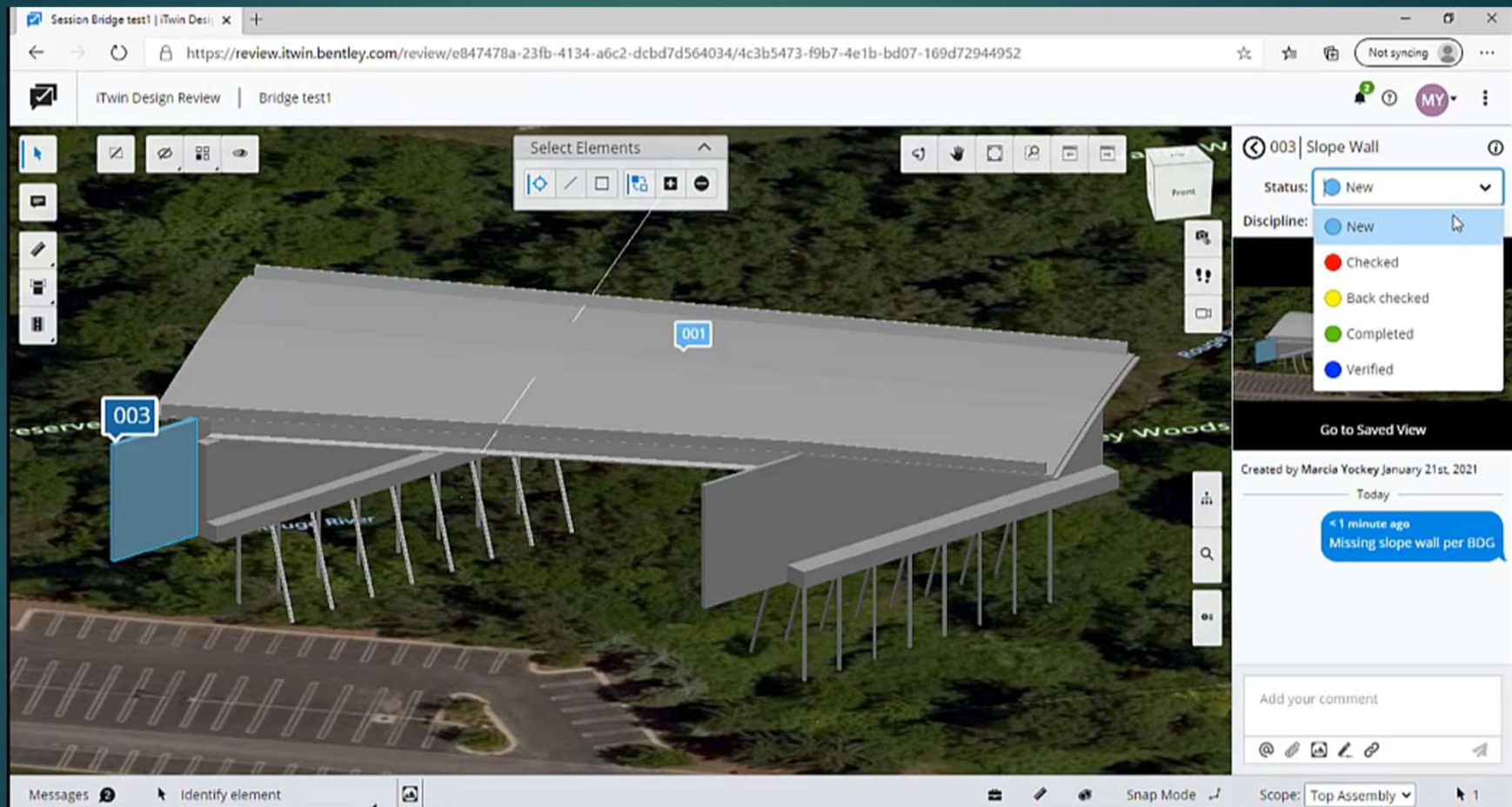


DDWG

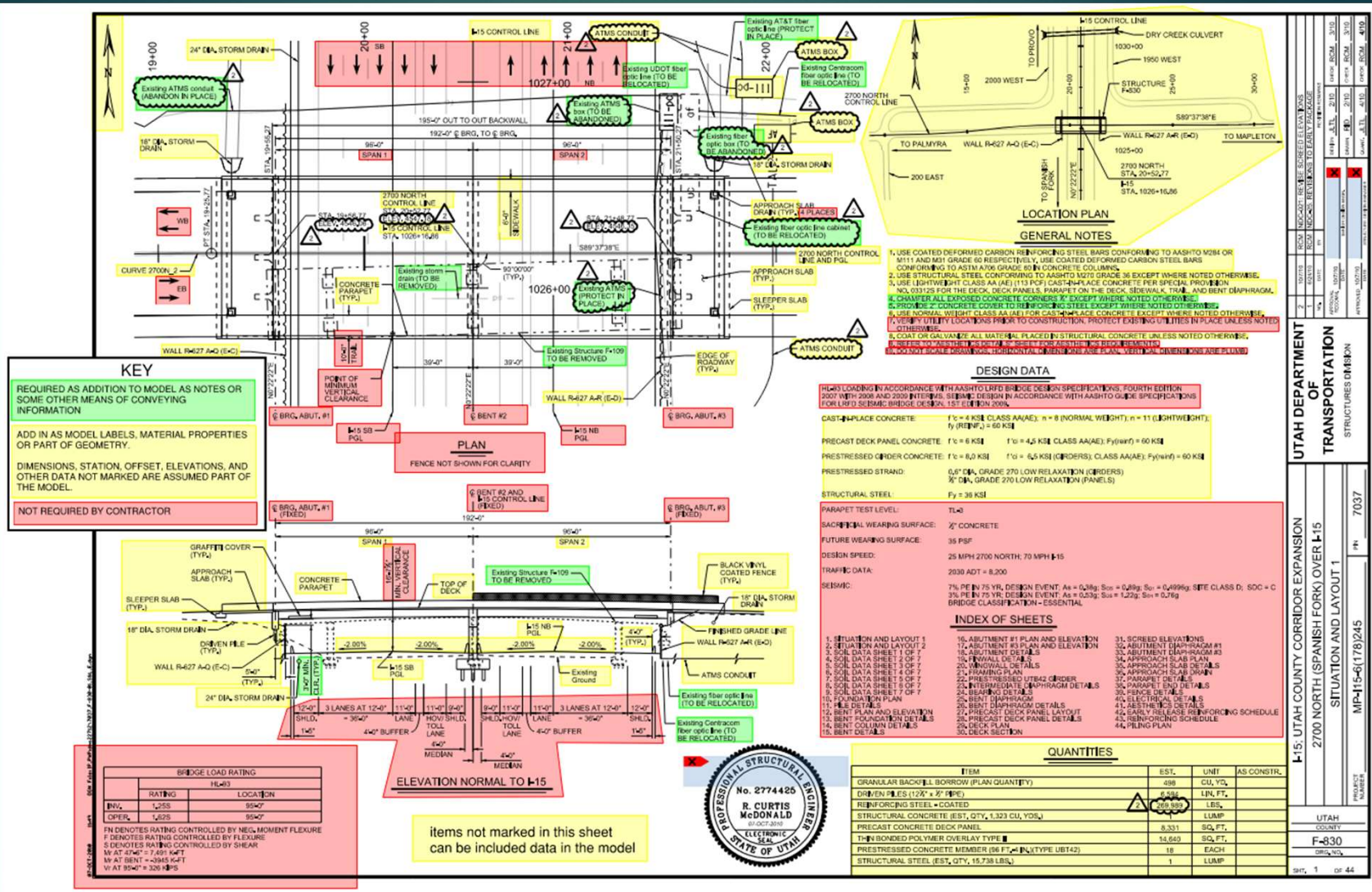
BLM for Bridges Group

- 1) Pilot Introduction
- 2) Sample Utah Model in Bentley View
- 3) iTwin Design Review Model (MDOT Pilot Model)
- 4) MDOT Plan Set Essentials
- 5) Attribution / Pay Items / Specifications
- 6) As-Built Model & Tracking Daily Activities
- 7) Feedback on Final Model

iTwin Design Review



Essential Details



MDOT BIM Research

Development of 3D/4D Bridge Models & Plans

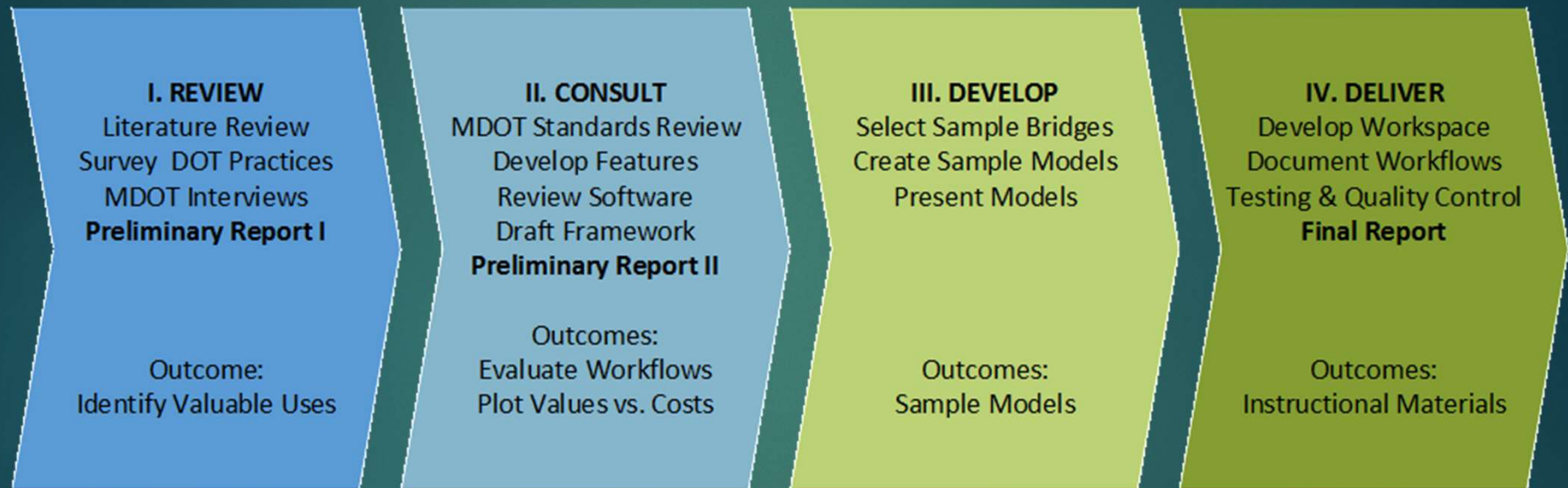
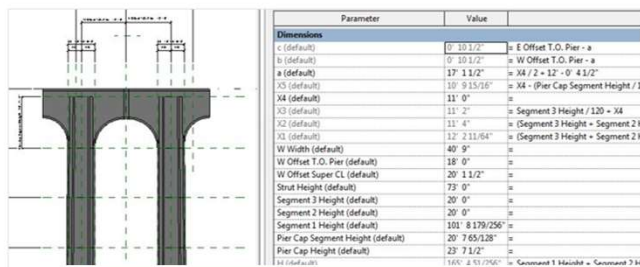


Image courtesy of WSP

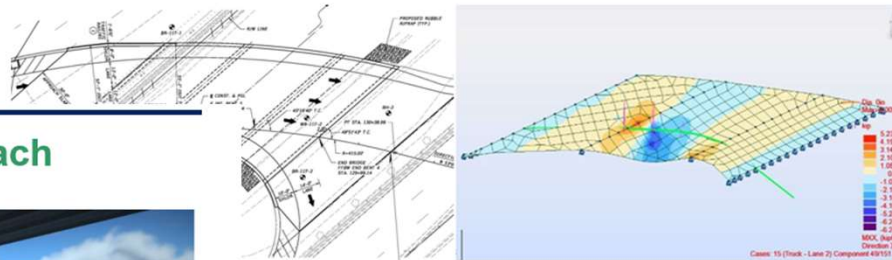
MDOT BIM Research

Phase III & IV

Model-based Plans Production



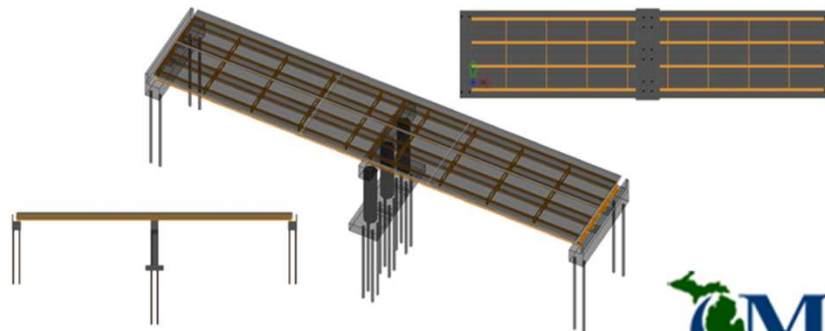
Structural Analysis and Design



Visualization and Public Outreach



Visual design, sizing, and placing of components



MDOT BIM Pilots

I-94 Modernization BIM

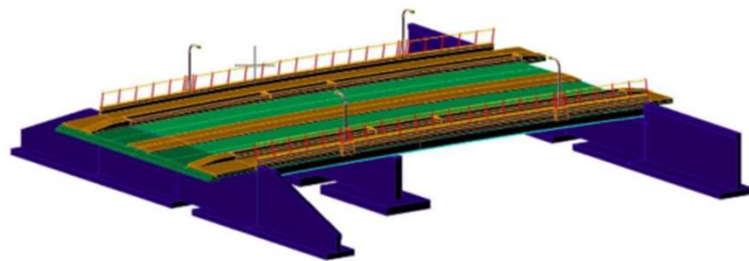


Figure 1: OpenBridge model of East Grand Boulevard bridge

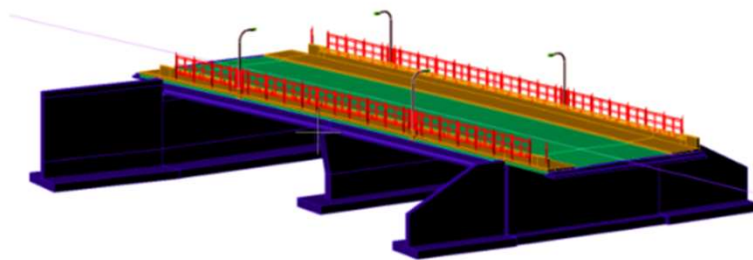


Figure 2: OpenBridge model of Milwaukee Avenue bridge

I-94 Advanced Bridges – Phase II

- Test Workspace & Effort
- Visualization
- Plan Sheet Creation
- Analysis
- Quantities
- Link Proposal Documentation

The General Plan of Structure sheet created for the East Grand Boulevard bridge is shown in Figure 6, while the General Plan of Structure sheet created for the Milwaukee Avenue bridge is shown in Figure 7.

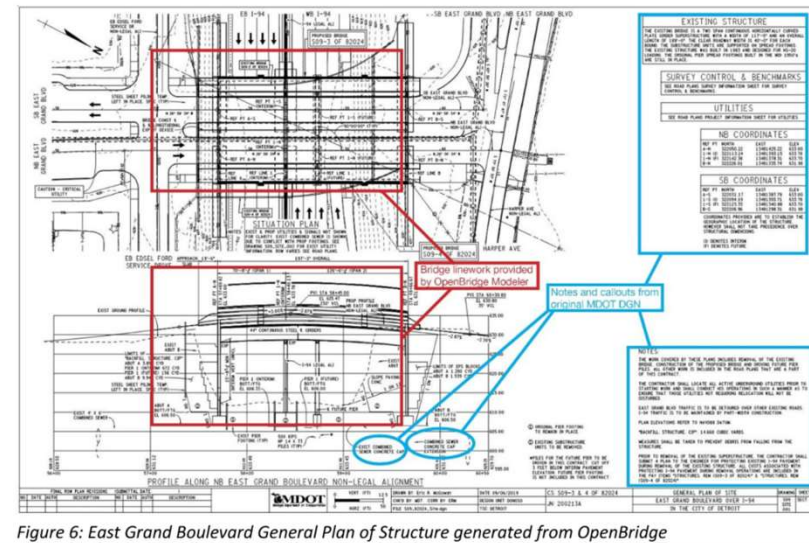


Figure 6: East Grand Boulevard General Plan of Structure generated from OpenBridge

Challenges/Solutions for Both Bridges

A number of challenges were identified, and solutions/workarounds developed, for the bridge models at the East Grand Boulevard and Milwaukee Avenue bridge sites including:

- Bentley OpenBridge doesn't have specific approach slab or sleeper slab elements. OpenBridge uses deck and abutment elements to model the approach slab and sleeper slab. The top of the abutment element follows the cross slope of the deck. The pavement step in the backwall of the abutment for the approach slab does not follow the cross slope. The approach slab seat in the abutment backwall begins at the face of the parapet. The abutment template in OpenBridge doesn't provide an option to start or stop the pavement step part way along the length of the abutment. The Solid Modeling tool was used to form the pavement step in the abutment backwall for the approach slab.

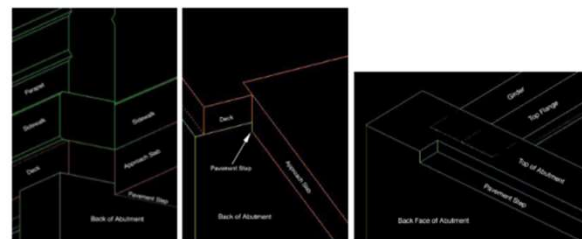


Figure 8: Pavement step modeling



**2012 Standard
Specifications for
Construction**

Warranty	Yes	FHWA Oversight	Yes
DBE %	Yes	NHS	Yes

ITEM NUMBER
1911 601

STATE OF MICHIGAN DEPARTMENT OF TRANSPORTATION

PROPOSAL

Bridge removal and replacement of 3 structures with 42"x49" Bulb-Tee beams, 44" continuous plate girders, 54" PCI beams with hot mix asphalt and concrete approach work, concrete curb and gutter, sidewalk, sidewalk ramps, barrier, drainage, sewer, steel sheet piling, steel piles, signage and pavement markings on Mount Elliot Avenue over I-94, East Grand Boulevard over I-94 and Milwaukee Ave over I-75 in the city of Detroit, Wayne County. This project includes two 5 year materials and workmanship pavement warranties and one 2 year concrete surface coating warranty.

BIDS WILL BE ELECTRONICALLY DOWNLOADED AT 10:30 AM LOCAL TIME, ON 11/22/19

CONTRACT ID	CONTROL SECTION	PROJECT	FEDERAL NUMBER
82024-113552	ST 82024	200213A	1901245
	ST 82252	200222A	1901246
	STI 82024	113552A	1901233

The bidder has downloaded and examined the plans, specifications, special provisions, and related materials in the proposal, as well as the location of the work described in the proposal for this project, and has obtained all addenda issued for this project, and is fully informed as to the nature of the work and the conditions relating to its performance and understands that the quantities shown are approximate only and are subject to either increase or decrease.

The bidder hereby proposes to furnish all necessary machinery, tools, apparatus, and other means of construction, do all the work, furnish all the materials except as otherwise specified and, for each unit price, lump sum, or one each named in the itemized bid, to complete the work in strict conformity with the plans therefore and the entire proposal which is incorporated by reference in these pages, and in strict conformity with the requirements of the 2012 Standard Specifications for Construction, Michigan Department of Transportation and such other special provisions and supplemental specifications as may be a part of the proposal for this project.

The bidder further proposes to do such extra work as may be authorized by the Department, prices for which are not included in the itemized bid. Compensation shall be made on the basis agreed upon before such extra work is begun.

The bidder hereby certifies that if it is not prequalified in all classifications required by the advertisement for this project, it has taken such preparatory steps as may be necessary and will within the time specified in Subsection 102.15 of the 2012 Standard Specifications for Construction, designate subcontractor(s) that are fully prequalified in the classification(s) to perform the work.

THE BIDDER UNDERSTANDS AND AGREES THAT THE DEPARTMENT RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS AND NO CONTRACTUAL RELATIONSHIP SHALL EXIST BETWEEN THE BIDDER AND THE DEPARTMENT FOR THE WORK DESCRIBED HEREIN UNTIL SUCH TIME AS THE CONTRACT HAS BEEN FORMALLY EXECUTED BY BOTH THE BIDDER AND THE DEPARTMENT.

The bidder agrees upon submitting this bid that its agents, officers or employees have not directly or indirectly entered into any agreements, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal for the above project.

Unless the bidder gives MDOT advance written notice, MDOT may correspond directly with the insurance agencies concerning questions and problems with the insurance certificates, bonds and related materials. It is the obligation of the bidder to monitor the filing of the insurance certificates, bond, and related materials with MDOT and the bidder is responsible for any failure to provide MDOT with the required materials, on a timely basis and in proper form.

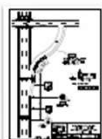
Subject to Subsection 102.17 of the 2012 Standard Specifications for Construction, the bidder agrees to pay to the Michigan Department of Transportation the bid guaranty sum of **\$50,000.00** if the bidder fails to provide the required materials and/or execute the contract in accordance with Subsection 102.15 of the 2012 Standard Specifications for Construction.

Detroit TSC

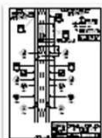
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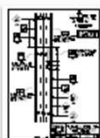


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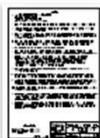
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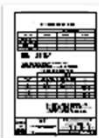
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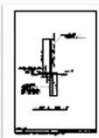
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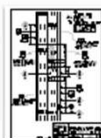


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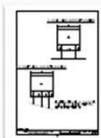
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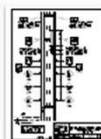


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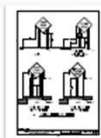
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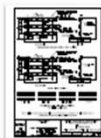
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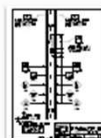


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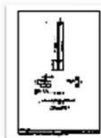
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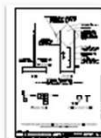
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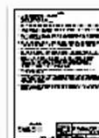


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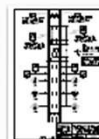


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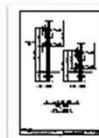
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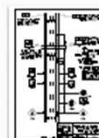


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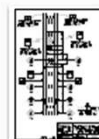


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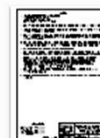


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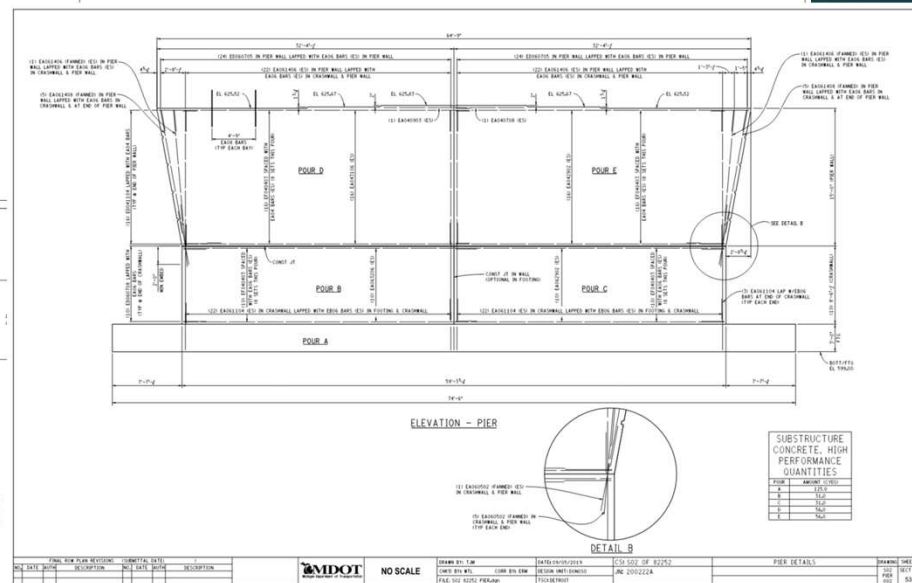
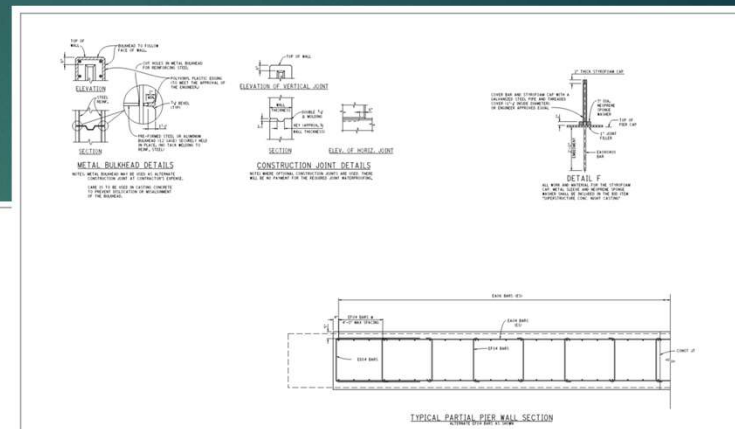
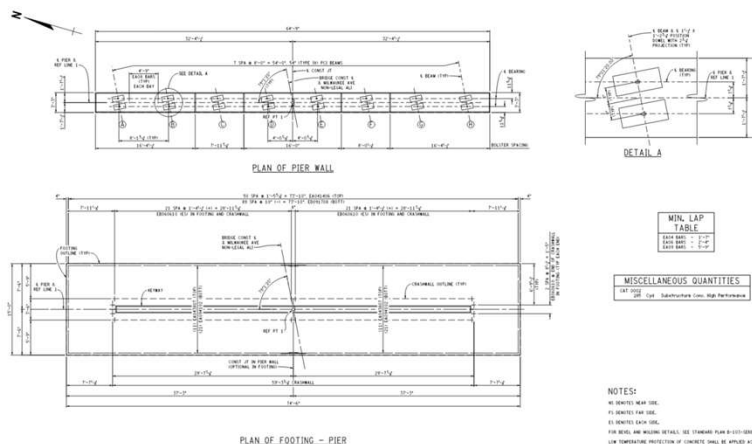
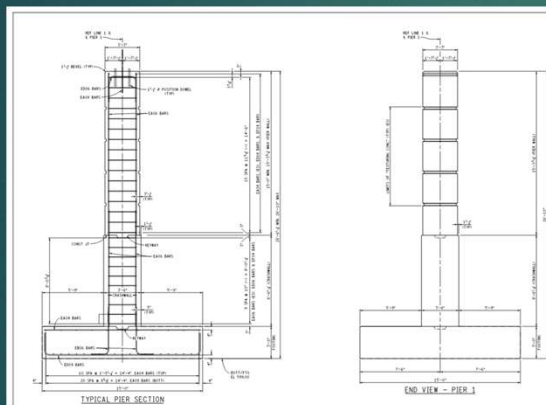
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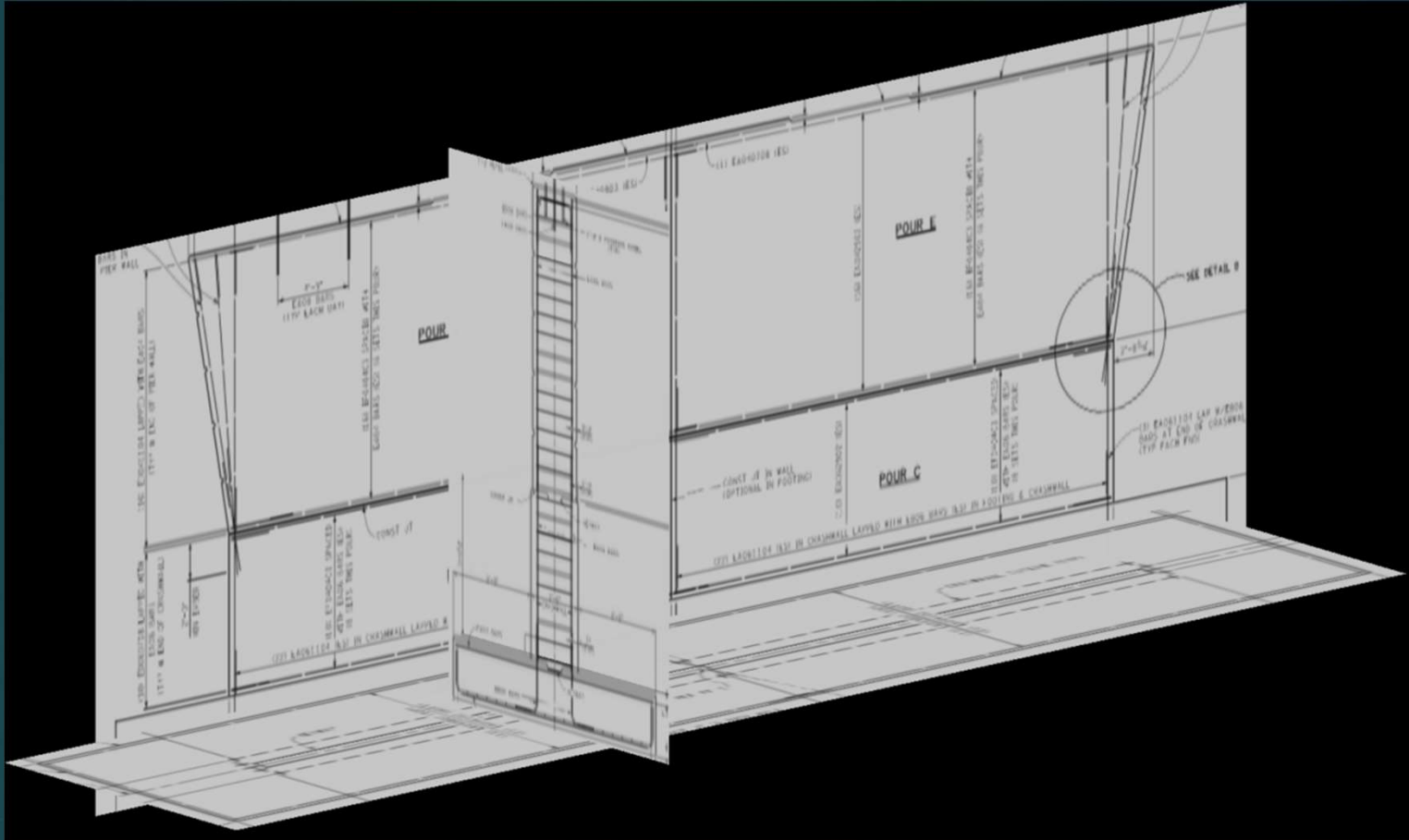
Translating 2D to 3D

Constructing a Pier

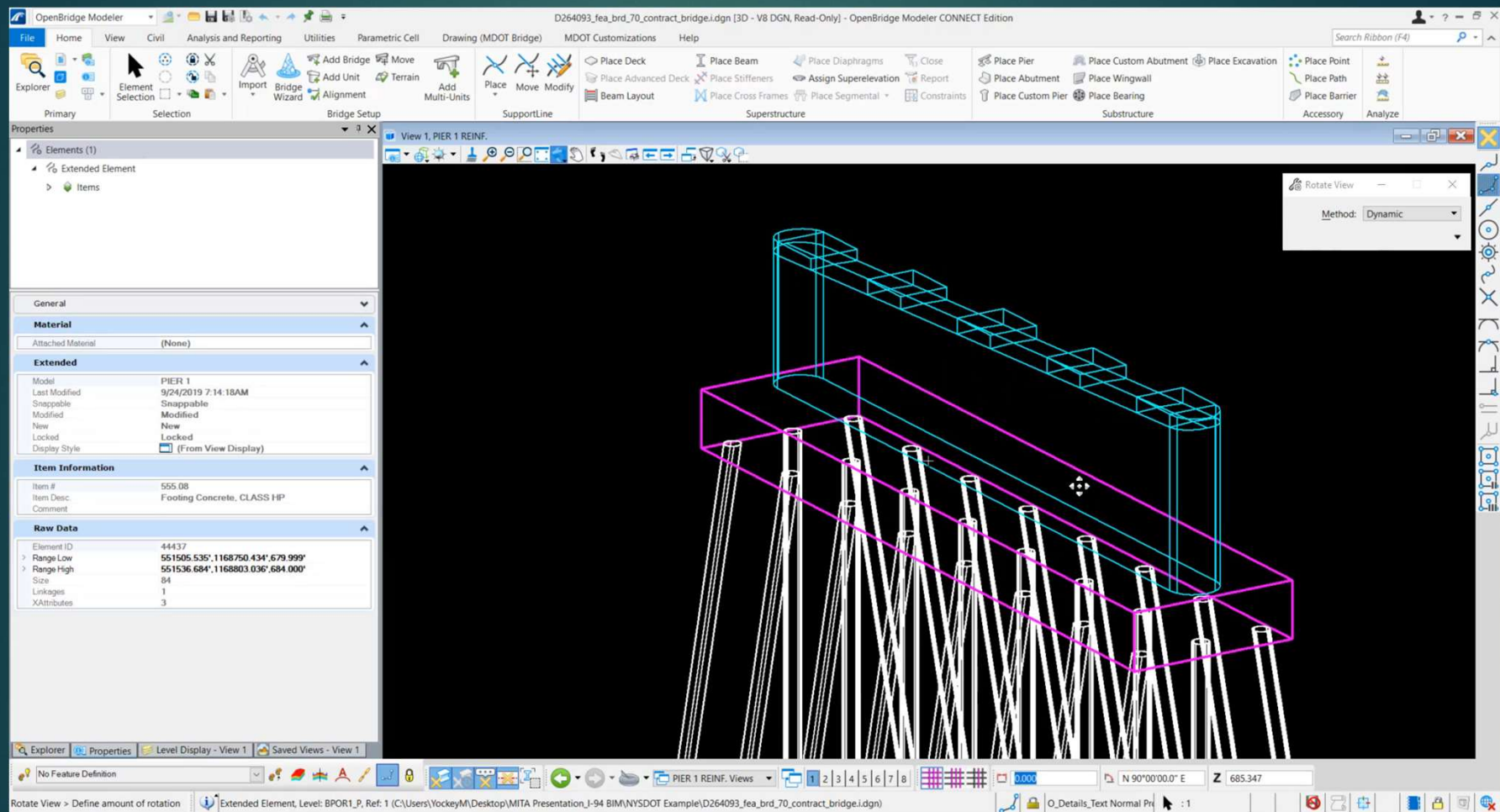


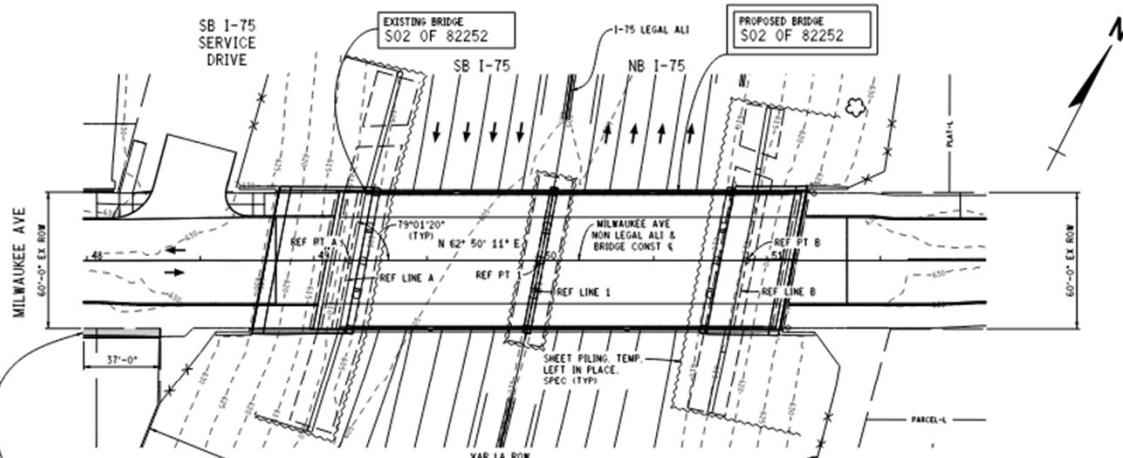
Translating 2D to 3D

Constructing a Pier



3D to 3D





EXISTING STRUCTURE

THE EXISTING STRUCTURE IS A FOUR SPAN MULTI STRINGER ROLLED BEAMS WITH PIN AND HANGERS SUPERSTRUCTURE WITH A WIDTH OF 42'-5" AND OVERALL LENGTH OF 237'-0". THE CLEAR ROADWAY WIDTH IS 40'-0". EXISTING SUBSTRUCTURE UNITS ARE SUPPORTED ON SPREAD FOOTINGS. THE EXISTING STRUCTURE WAS BUILT IN 1965 FOR HS20 LOADING. THE EXISTING DECK WAS OVERLAID IN 2001.

SURVEY CONTROL & BENCHMARKS

SEE ROAD PLANS SURVEY INFORMATION SHEET FOR SURVEY CONTROL & BENCHMARKS

UTILITIES

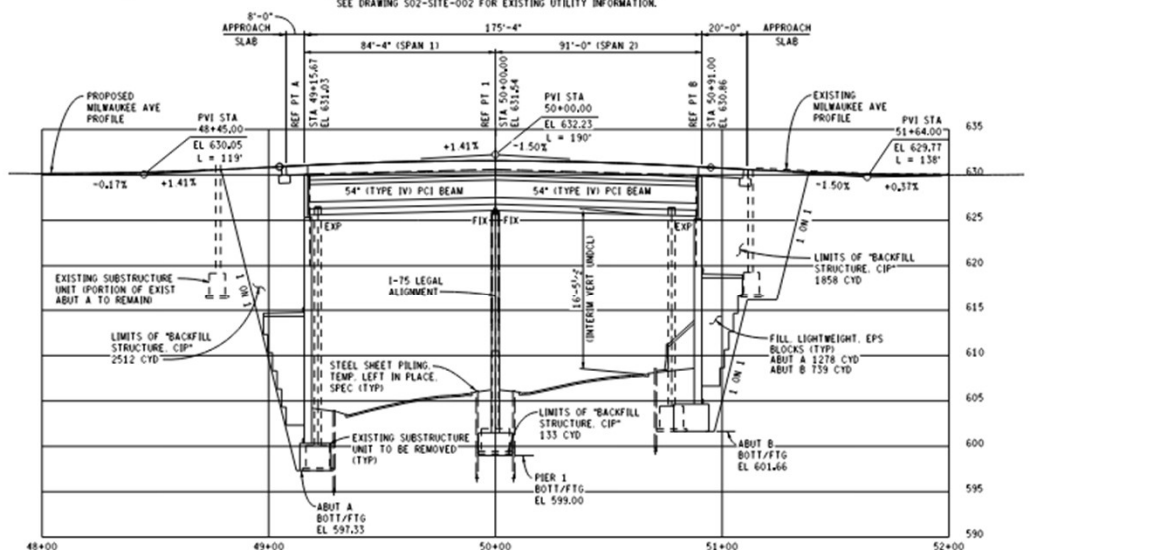
SEE ROAD PLANS PROJECT INFORMATION SHEET FOR UTILITIES

COORDINATES

REF PT	NORTH	EAST	ELEV
A	321137.12	13476392.61	631.03
I	321175.61	13476487.64	631.54
B	321217.16	13476548.60	630.86

COORDINATES PROVIDED ARE TO ESTABLISH THE GEOGRAPHIC LOCATION OF THE STRUCTURE. HOWEVER SHALL NOT TAKE PRECEDENCE OVER STRUCTURAL DIMENSIONS.

SITUATION PLAN
NOTE: EXISTING AND PROPOSED UTILITIES NOT SHOWN FOR CLARITY.
SEE DRAWING S02-SITE-002 FOR EXISTING UTILITY INFORMATION.



PROFILE ALONG MILWAUKEE AVE NON-LEGAL ALIGNMENT
VERTICAL SCALE 1" = 10'

NOTES:

THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF EXISTING BRIDGE AND CONSTRUCTION OF THE PROPOSED BRIDGE. ALL OTHER WORK IS INCLUDED IN THE ROAD PLANS THAT ARE PART OF THIS CONTRACT.
MILWAUKEE AVE TRAFFIC IS TO BE DETOURED OVER OTHER EXISTING ROADS. I-75 TRAFFIC IS TO BE MAINTAINED BY PART-WIDTH CONSTRUCTION.
THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.
MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE.
PLAN ELEVATIONS REFER TO NAVD83 DATUM.
"BACKFILL STRUCTURE, CIP": 5098 CUBIC YARDS.
PRIOR TO REMOVAL OF THE EXISTING SUPERSTRUCTURE, THE CONTRACTOR SHALL SUBMIT A PLAN TO THE ENGINEER FOR PROTECTING I-75 PAVEMENT DURING REMOVAL OF THE EXISTING STRUCTURE. ALL COSTS ASSOCIATED WITH PROTECTING I-75 PAVEMENT DURING REMOVAL OPERATIONS ARE INCLUDED IN THE PAY ITEM "STRUCTURES, REM PORTIONS (S02 OF 82252)".

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



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CHK'D BY: WTL
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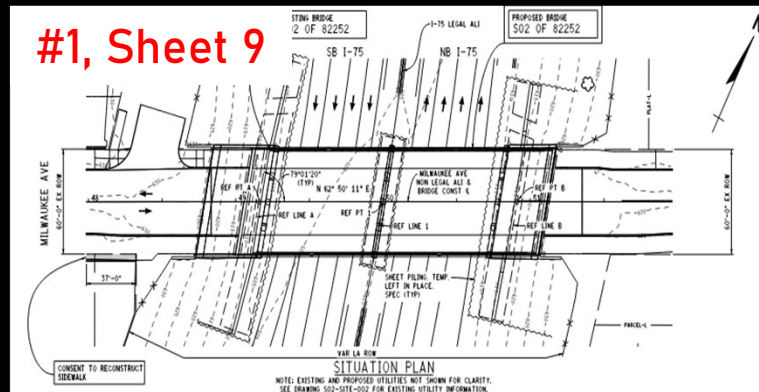
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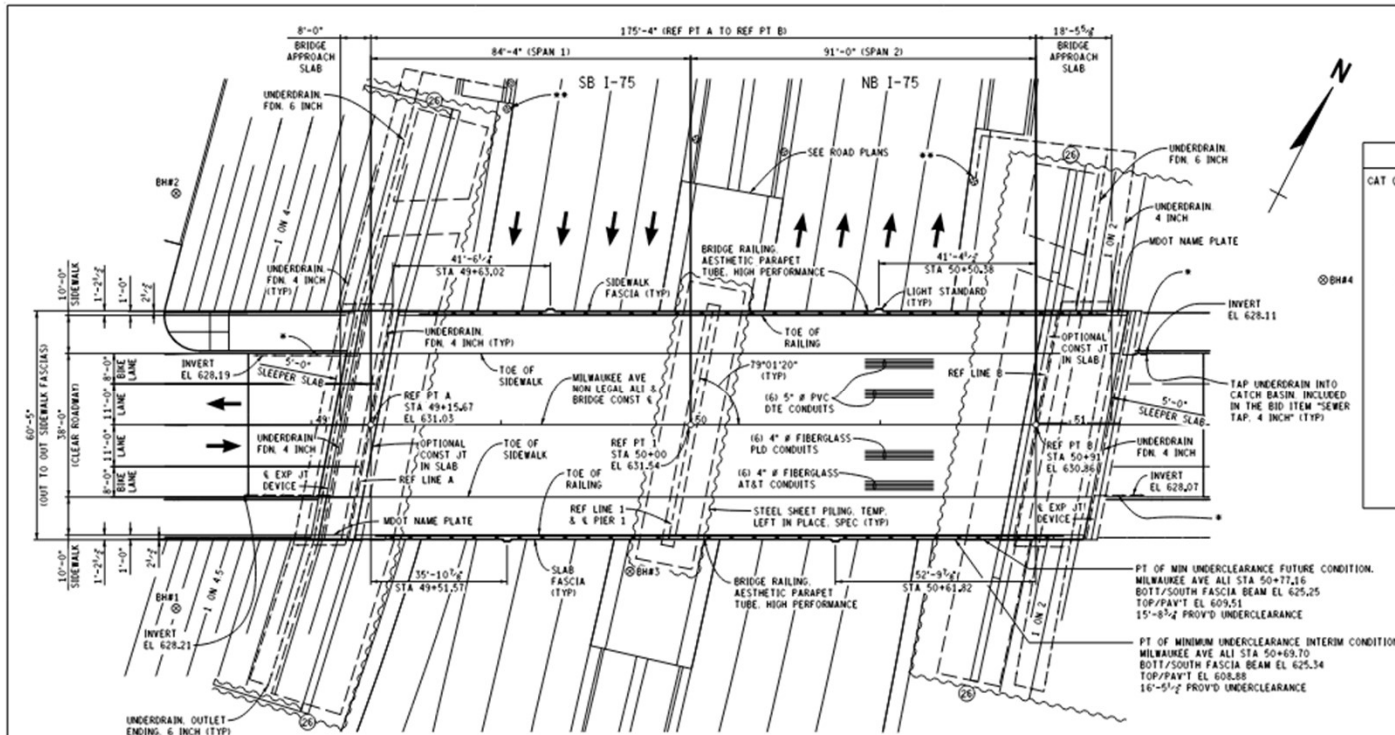
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GENERAL PLAN OF SITE
MILWAUKEE AVE OVER I-75
IN THE CITY OF DETROIT

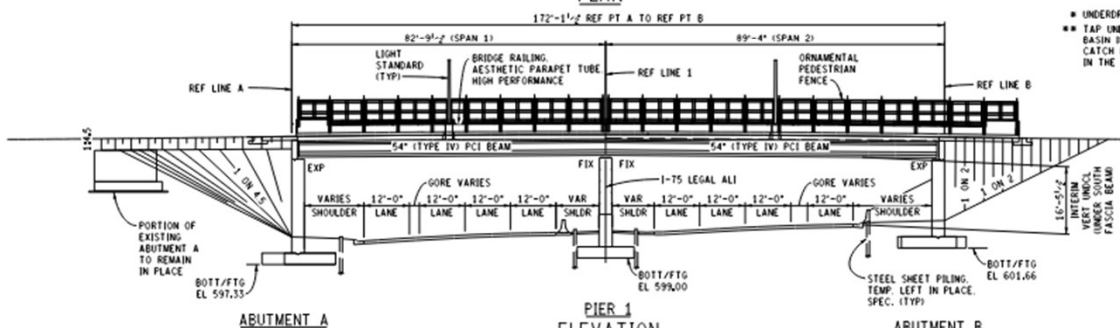
DRAWING SHEET
S02
001
SECT 2
9

#1, Sheet 9





PLAN



ELEVATION

(NORMAL TO REFERENCE LINES)
(SHOWING CURRENT 1-75 CONDITION)

SOIL EROSION AND SEDIMENTATION CONTROL QUANTITIES

KEY NO.	ITEM	UNIT	QUANTITY
20	Erosion Control Silt Fence	Ft	300
	Erosion Control Inlet Protection Fabric Drop	Ea	6
	Erosion Control Maintenance Sediment Removal	Cyd	5

MISCELLANEOUS QUANTITIES

CAT 0011	CAT 0002	CAT 0001	ITEM	QUANTITY
--	2	Ea	Dr Structure, Abandon	
--	1	--	LSUM Structure, Rem Portions (502 of 82252)	
--	5098	Cyd	Backfill Structure, CIP	
--	5720	Cyd	Excavation, Fdn	
163	--	Cyd	Backfill Ultra-Lightweight, Foamed Glass Aggregate	
--	1965	Cyd	Fill, Lightweight, EPS Block	
--	935	Syd	Linear, PVC, 20 mil	
--	330	Cyd	Aggregate Base, LM	
190	--	Syd	Geotextile, Separator, Non-Woven	
--	4	Ea	Sewer Tap, 4 inch	
--	2	Td	Sewer Tap, 6 inch	
--	564	Ft	Underdrain, Fdn, 4 inch	
--	311	Ft	Underdrain, Fdn, 6 inch	
--	207	Ft	Underdrain, Outlet, 4 inch	
--	75	Ft	Underdrain, Outlet, 6 inch	
--	151	Cyd	Conc Base Cse, Refin, Modified	
5047	--	SFF	Steel Sheet Piling, Temp. Left in Place, Spec	
--	24904	SFF	False Decking	
--	563	Syd	Texturing Conc	
--	2940	Lb	Structural Steel Plate, Erect	
--	2940	Lb	Structural Steel Plate, Furn and Fab	
--	1	LSUM	Conc Surface Coating, Warranty (502 of 82252)	
--	1	LSUM	Vibration Monitoring (502 of 82252)	
1	--	LSUM	Geotextile Instrumentation Hardware (502 of 82252)	
--	76	Ft	Slope Paving Header	
--	48	Syd	Slope Paving, Conc	
--	16	Cyd	Flowable Fill, Non-Structural	

NOTES:

THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEN PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL-93 MOD. LINE LOAD PLUS DYNAMIC LOAD ALLOWANCE REFLECTION DOES NOT EXCEED 1/1000 OF SPAN LENGTH.

THE ABUTMENT AND PIER MAXIMUM AVERAGE FOUNDATION PRESSURE IS CALCULATED TO BE 3500 PSF FOR SERVICE LIMIT STATE, AND 4800 PSF FOR STRENGTH LIMIT STATE AND ARE BASED ON A GROSS FOOTING WIDTH OF:

- 13'-6" (ABUT A)
- 19'-0" (PIER) A1
- 15'-0" (PIER) B1
- 15'-6" (ABUT B)
- 16'-9" (PIER) B1

CONCRETE SURFACE COATING SHALL BE APPLIED TO THE ENTIRE CONCRETE PORTION OF BRIDGE RAILING INCLUDING SLAB FASCIA, SIDEWALK FASCIA, UNDERSIDE OF DECK FROM SLAB FASCIA TO FASCIA BEAM FLANGE AND EXTERIOR FACE AND BOTTOM OF FASCIA BEAMS AND ALL SUBSTRUCTURE UNITS. SEE ABUTMENT, PIER AND SUPERSTRUCTURE DETAILS FOR COATING LIMITS AND COATING COLORS. THE ESTIMATED AREA OF COATING IS 1750 SYD.

FOR DETAILS OF SLOPE PROTECTION, SEE STANDARD PLAN B-102-SERIES.

THE DESIGN OF THE DECK SLAB IS BASED UPON THE STRIP METHOD AS DEFINED IN THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION.

FALSE DECKING SHALL INCLUDE THE AREA BOUNDED BY REFERENCE LINES A & B AND OUTSIDE FLANGE FASCIA OF BEAMS A & B. THE ESTIMATED AREA IS 14795 SQUARE FEET DURING REMOVAL AND 10265 SQUARE FEET DURING PROPOSED CONSTRUCTION.

DO NOT USE WHEELED, ROLLER BASED OR MACHINE MOUNTED COMPACTOR EQUIPMENT TO COMPACT THE SUBGRADE, SUBBASE, AND BASE WITHIN 10' OF THE SLEEPER SLAB AFTER IT IS BUILT. USE ONLY HAND/PLATE COMPACTORS. CONTACT PRESSURE OF COMPACTOR EQUIPMENT SHALL NOT EXCEED 10 PSI.

STEEL SHEET PILING, TEMP. LEFT IN PLACE, SPEC TO BE CUT OFF 3 FEET BELOW FINAL GRADE OR 3 FEET BELOW 1-75 TOP OF EXISTING PAVEMENT.

REMOVAL OF UTILITY CONDUITS FOUND TO CONTAIN ASBESTOS MATERIAL IS INCLUDED IN THE BID ITEM "ASBESTOS MATERIALS, REM AND DISPOSAL". THIS ITEM IS LISTED ON THE MISCELLANEOUS QUANTITIES SHEET IN THE ROAD PLANS. SAW CUTS REQUIRED FOR REMOVAL OF THE CONDUITS ARE INCLUDED IN THE BID ITEM "STRUCTURES, REM PORTIONS (502 OF 82252)".

CONTACT THE REGION SOILS ENGINEER A MINIMUM OF 48 HOURS PRIOR TO THE FOOTING INSPECTION.

FINAL ROW PLAN REVISIONS		SUBMITTAL DATES	
NO.	DATE	AUTH	DESCRIPTION



NO SCALE

DRAWN BY: TJM
CHKD BY: WTL
FILE: S02 82252 gpcstr.dgn

DATE: 09/23/2019
DESIGN UNIT: D0050
TSC: DETROIT

CS: S02 OF 82252
JN: 200222A

GENERAL PLAN OF STRUCTURE
MILWAUKEE AVE OVER I-75
IN THE CITY OF DETROIT

DRAWING SHEET
S02 OFSTR
001 13

#1, Sheet 9

STENO BORING
2 OF 82252

PROPOSED BORING
502 OF 82252

SB I-75

NB I-75

MILWAUKEE AVE
NEW LEGAL ALL &
BRIDGE CONDUIT 6

REF PT A

REF PT B

REF LINE A

REF LINE B

REF LINE C

REF LINE D

SHEET PILING TEMP
LEFT IN PLACE
SPEC 17.01

VAR LA ROW

VAR RA ROW

37'-0"

60'-0" E.A. ROW

60'-0" E.A. ROW

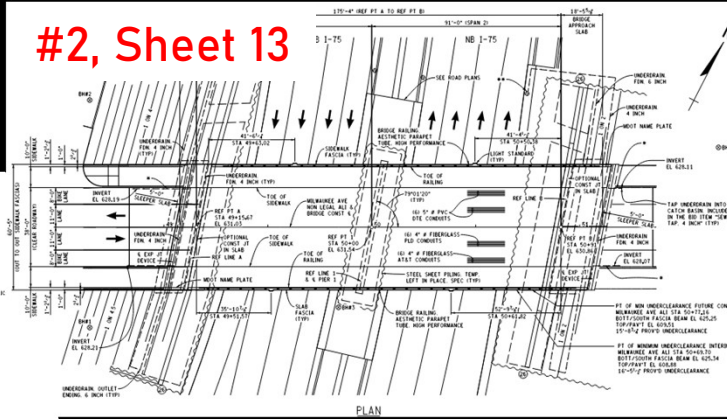
1" = 40'

CONSENT TO RECONSTRUCT UTILITIES

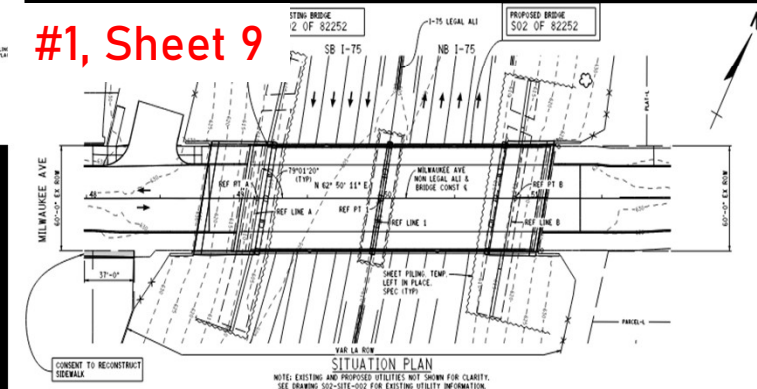
SITUATION PLAN

NOTE: EXISTING AND PROPOSED UTILITIES ARE NOT SHOWN FOR CLARITY.
SEE DRAWING 502-SITE-002 FOR EXISTING UTILITY INFORMATION.

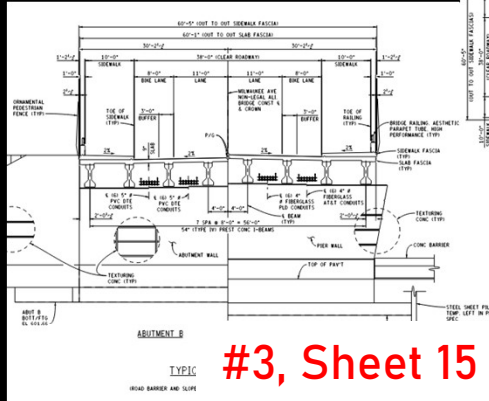
#2, Sheet 13

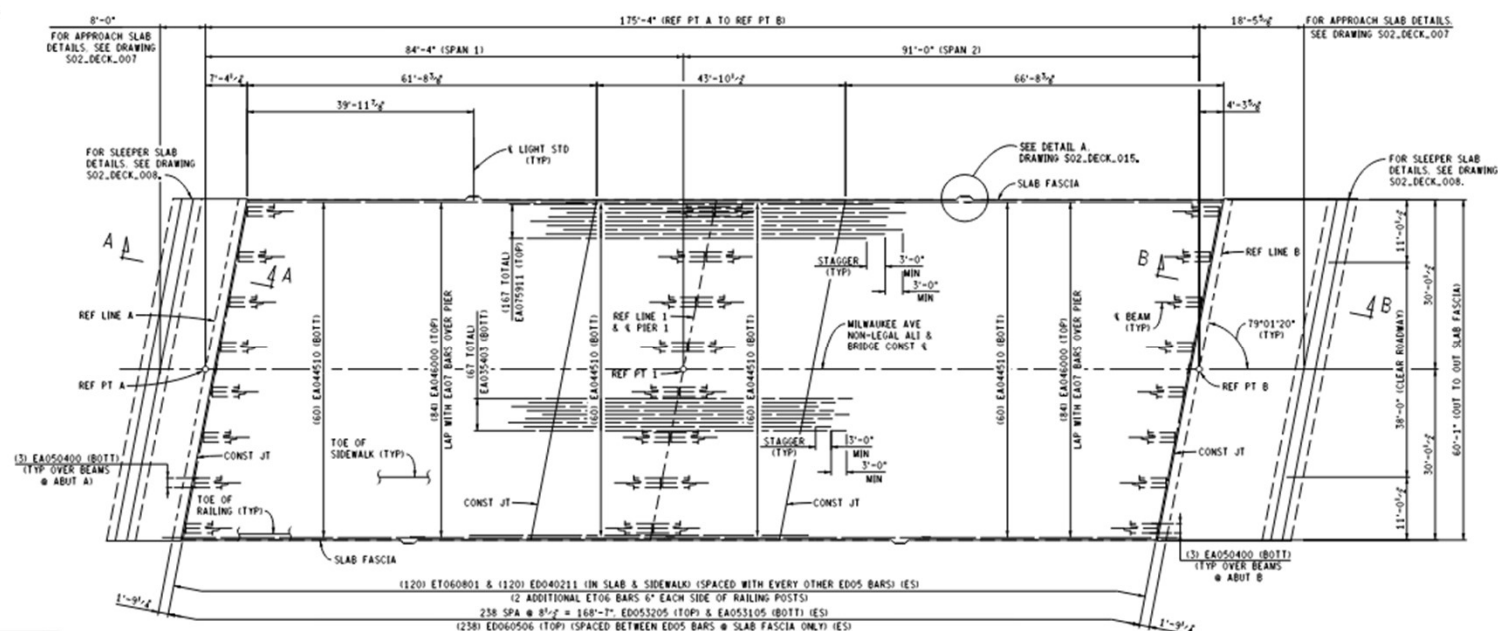


#1, Sheet 9

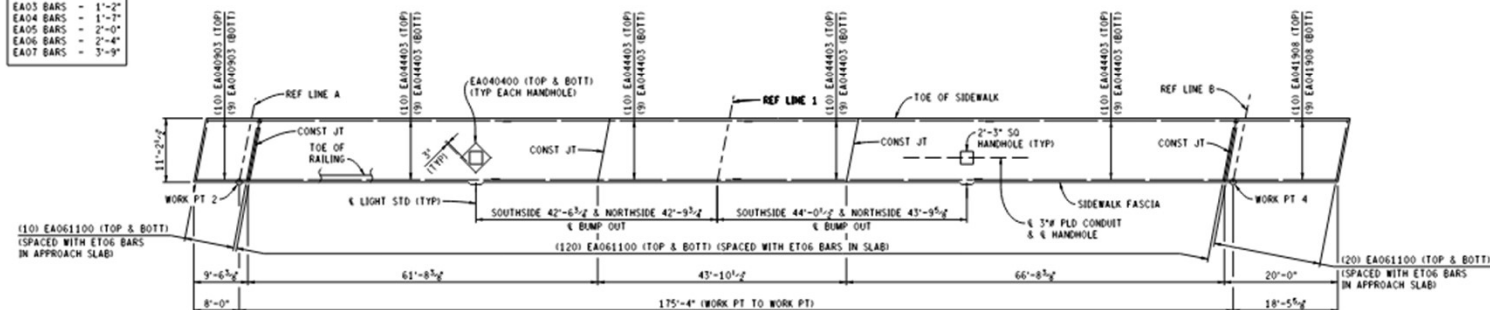


#3, Sheet 15





MIN. LAP TABLE	
E0403 BARS	1'-2"
E0404 BARS	1'-2"
E0405 BARS	2'-0"
E0406 BARS	2'-4"
E0407 BARS	3'-9"



PLAN OF SIDEWALK
(SOUTH SIDE SHOWN, NORTH SIDE IS SIMILAR)
(E0404 & E0406 BARS CAST IN SIDEWALK NOT SHOWN SEE DRAWING S02.DECK.003)

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



NO SCALE

DRAWN BY: TJM
CHKD BY: WTL
FILE: S02 82252 deck.dgn

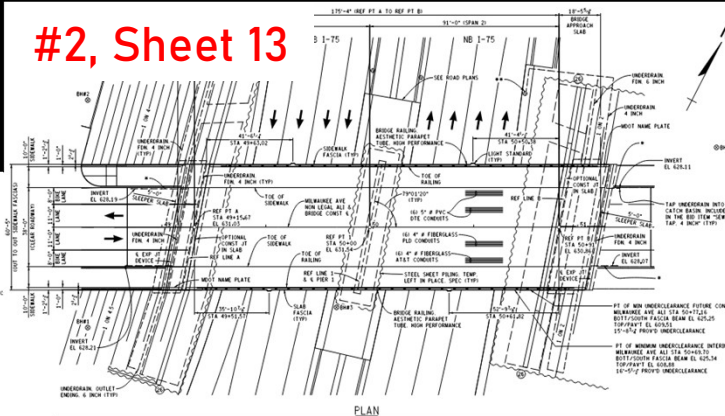
DATE: 09/03/2019
DESIGN UNIT: DOWNS
TSC: DETROIT

CS: S02 OF 82252
JN: 200222A

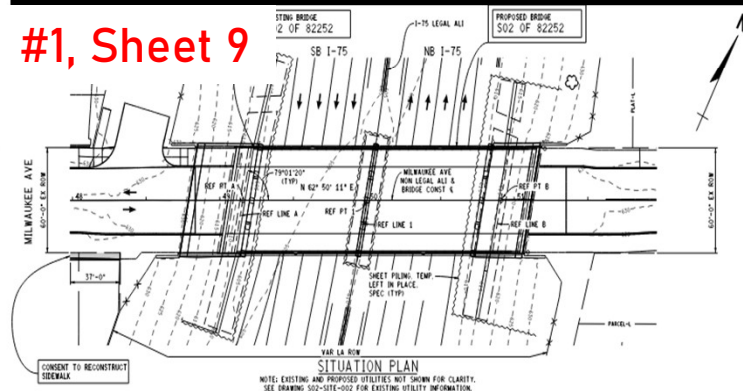
SUPERSTRUCTURE DETAILS

DRAWING SHEET
S02 DECK
001 62

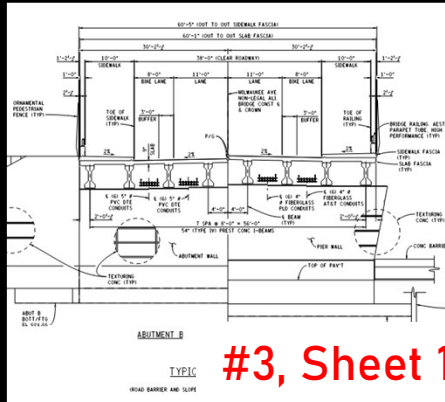
#2, Sheet 13



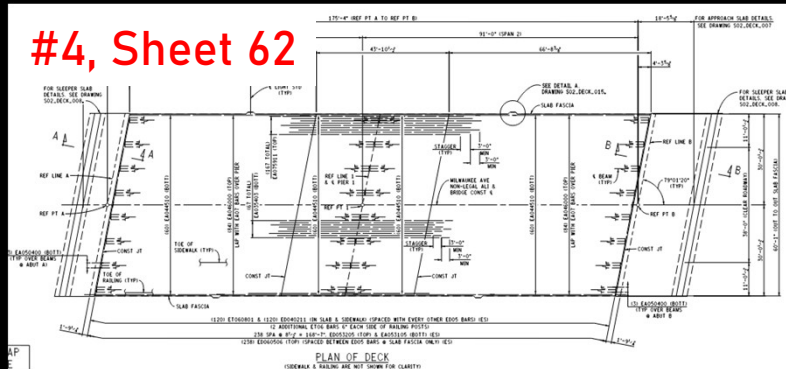
#1, Sheet 9

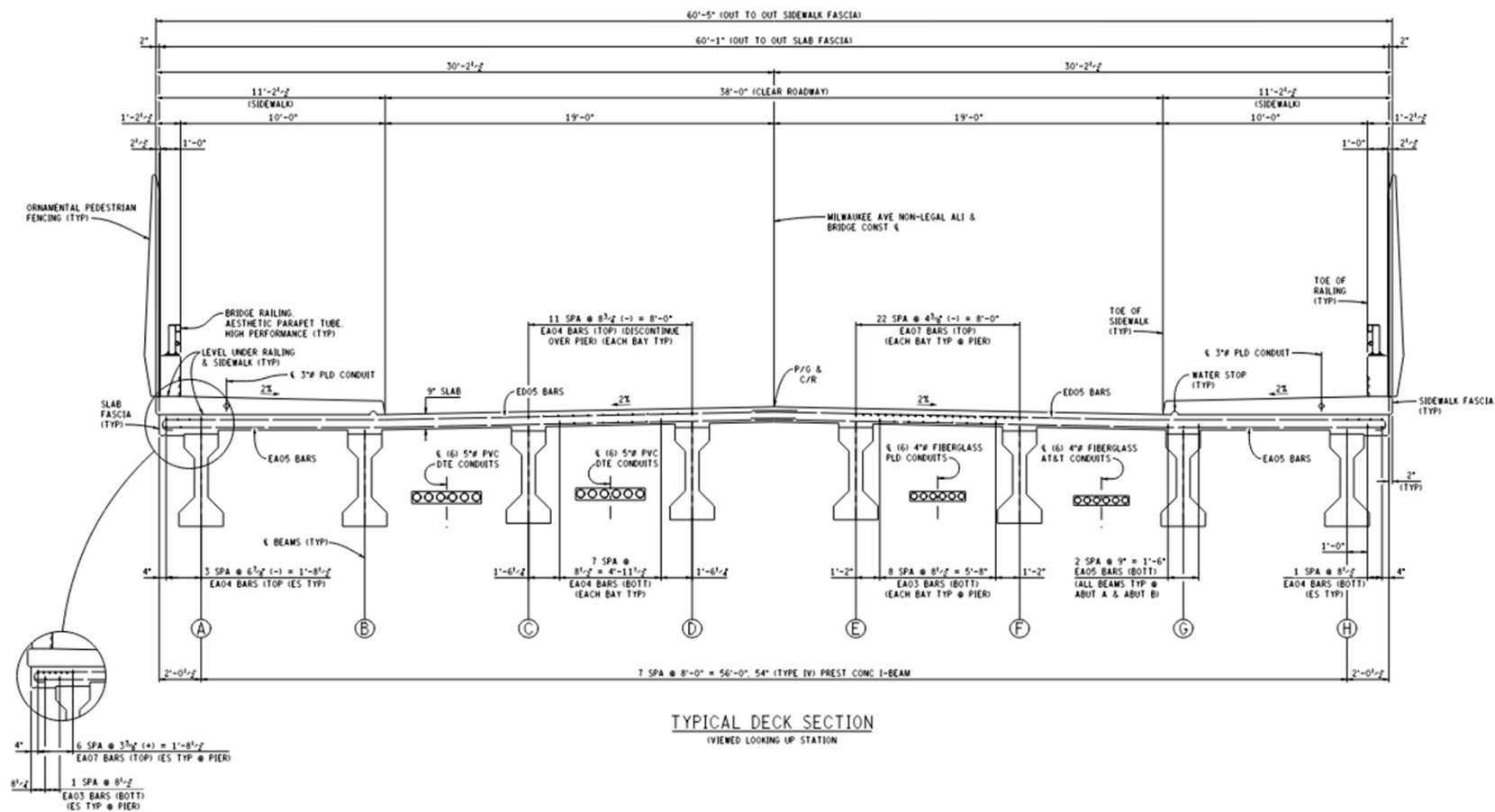


#3, Sheet 15



#4, Sheet 62





TYPICAL DECK SECTION
(VIEWED LOOKING UP STATION)

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



NO SCALE

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CHKD BY: NTL CORR BY: ERM
FILE: 502_82252_deck.dgn

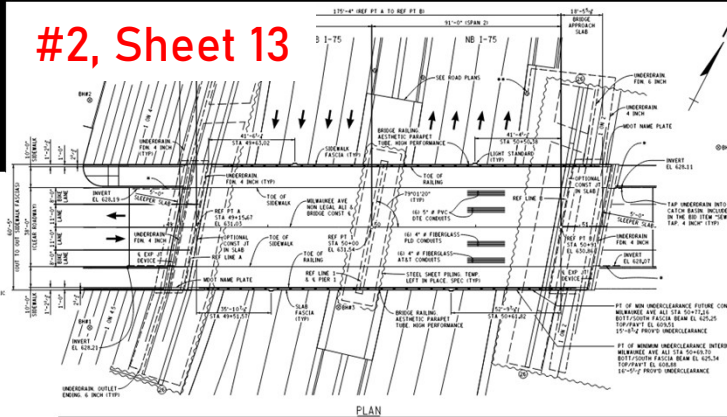
DATE: 09/03/2019
DESIGN UNIT: DOMOSO
TSC: DETROIT

CS: 502 OF 82252
JN: 200222A

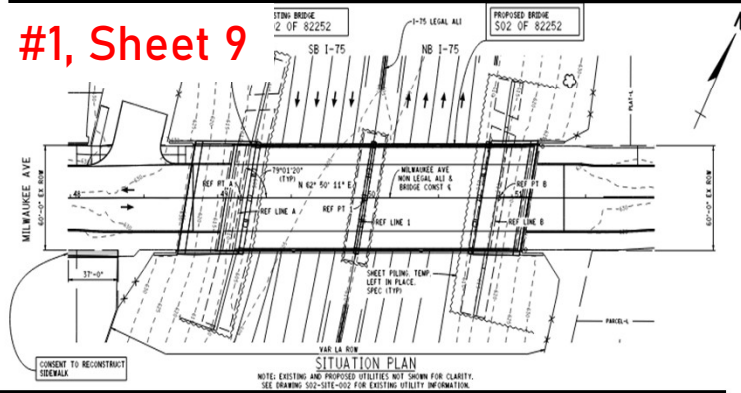
SUPERSTRUCTURE DETAILS

DRAWING SHEET
502 SECT 2
DECK 002 63

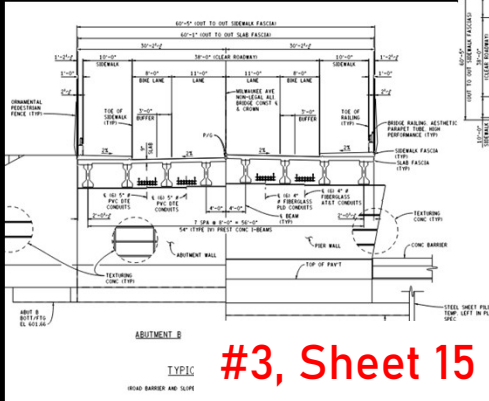
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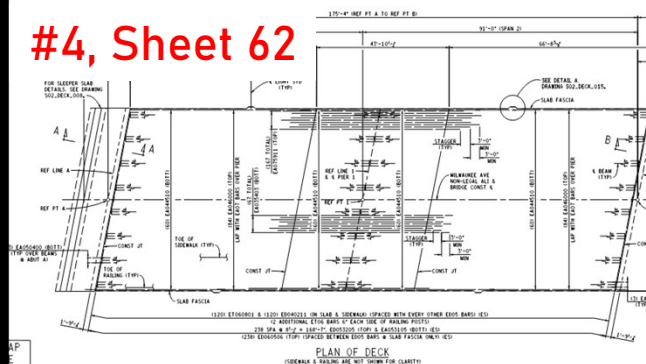
#1, Sheet 9



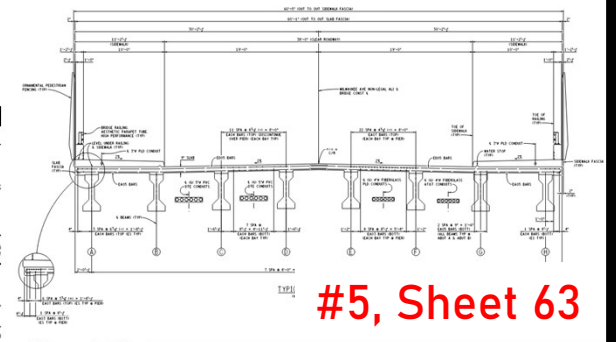
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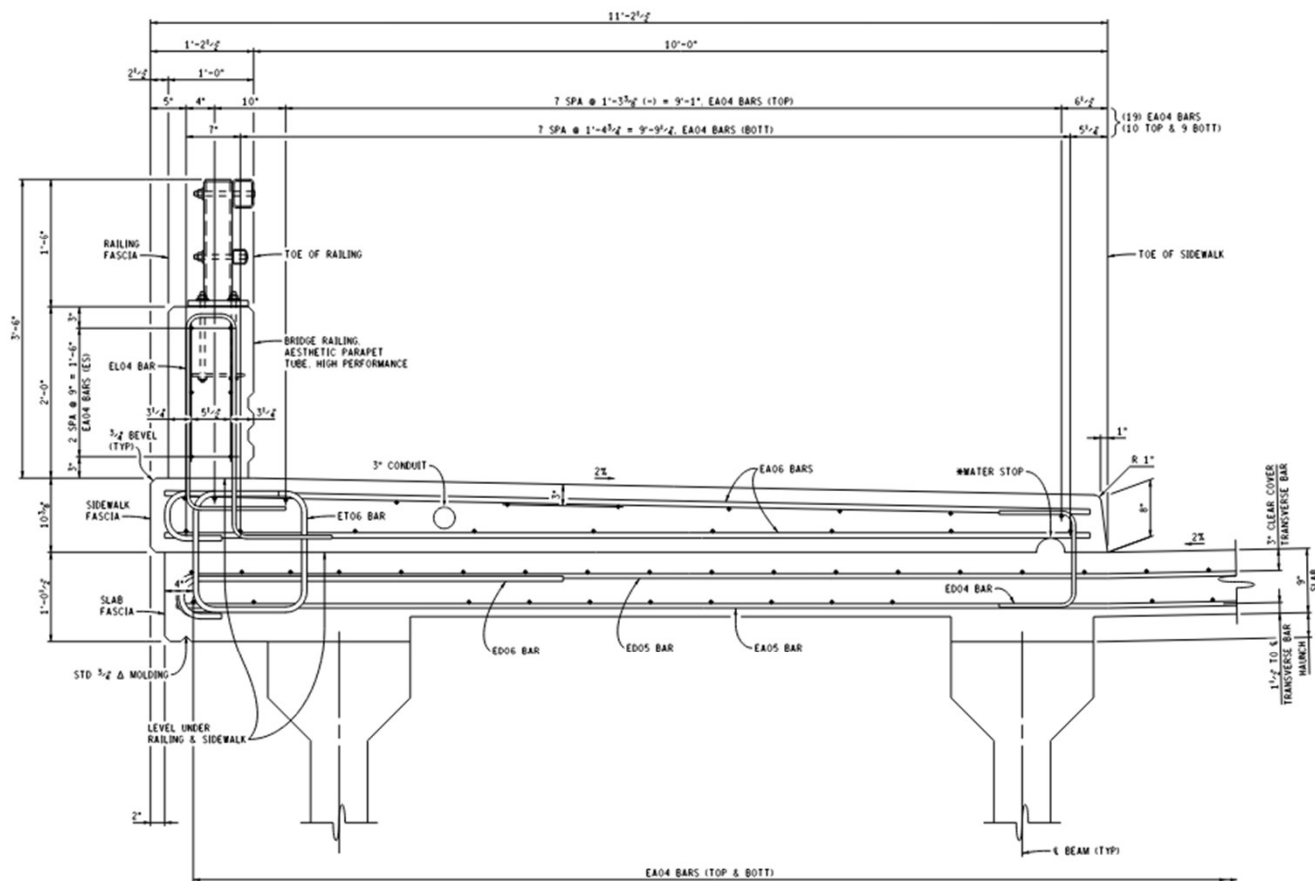


#4, Sheet 62



#5, Sheet 63





SECTION THRU RAILING AND SIDEWALK

* 3" X 4" & FORMING NOT REQUIRED
(EAOT (TOP) OVER PIER NOT SHOWN
(FENCING NOT SHOWN)

FINAL ROW PLAN REVISIONS (SUBMITTAL DATES)				1			
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION



NO SCALE

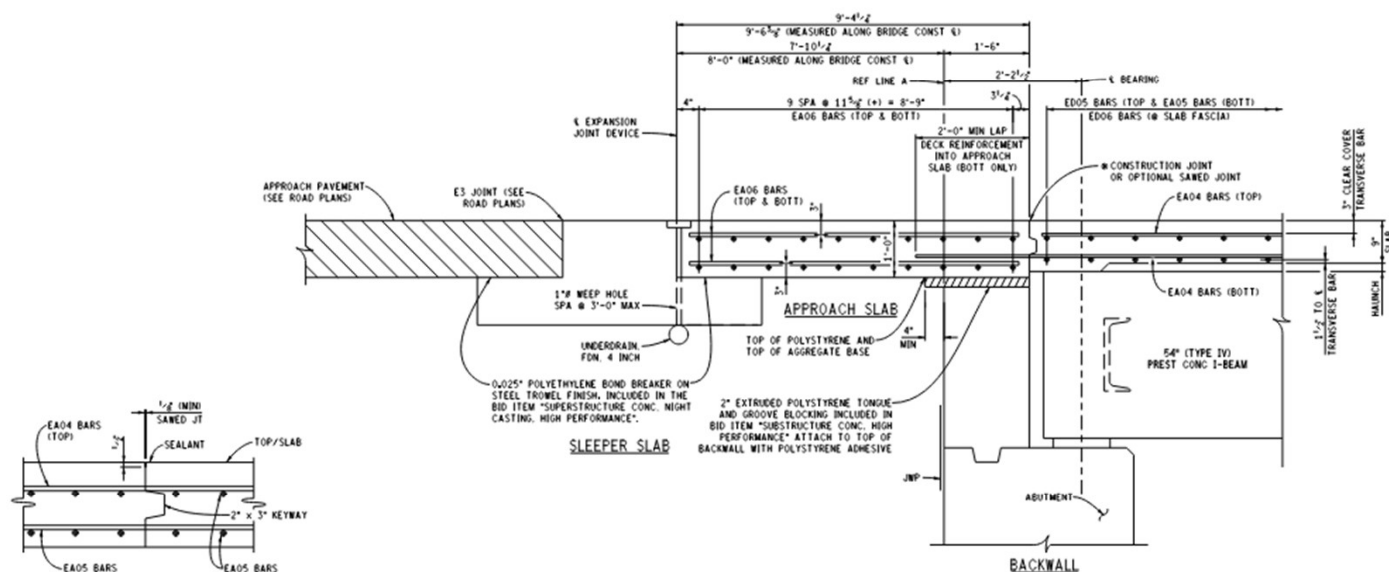
DRAWN BY: Eric R. McGowan
CHK'D BY: NTL CORR BY: ERM
FILE: 502-82252_deck.dgn

DATE: 06/27/2019
DESIGN UNIT: DOMOSO
TSC: DETROIT

CS: 502 OF 82252
JN: 200222A

SUPERSTRUCTURE DETAILS

DRAWING SHEET
502 DECK
006 67



TYPICAL CONSTRUCTION JOINT

JOINT TO BE FILLED TO 1/2\"/>

SECTION A-A

* IF CONSTRUCTION JOINT NOT USED, PROVIDE 3\"/>

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



NO SCALE

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CHK'D BY: WTL
FILE: S02_82252_deck.dgn

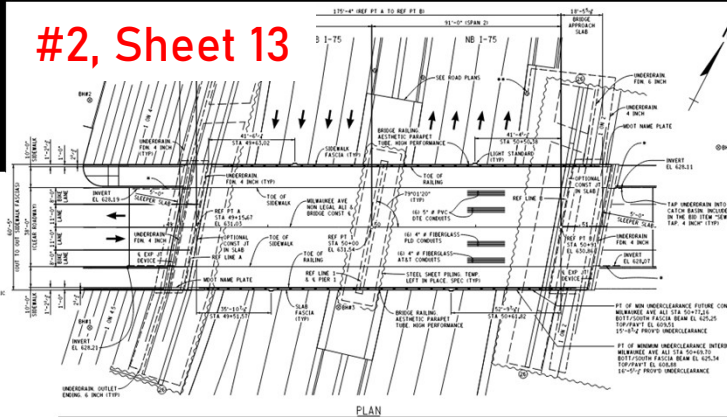
DATE: 08/28/2019
CORR BY: TJM
DESIGN UNIT: DONOSO
TSC: DETROIT

CS: S02 OF 82252
JN: 200222A

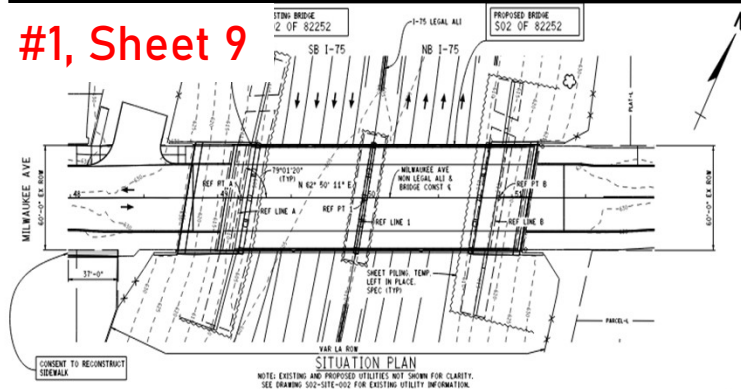
SUPERSTRUCTURE DETAILS

DRAWING SHEET
S02 SECT 2
009 70

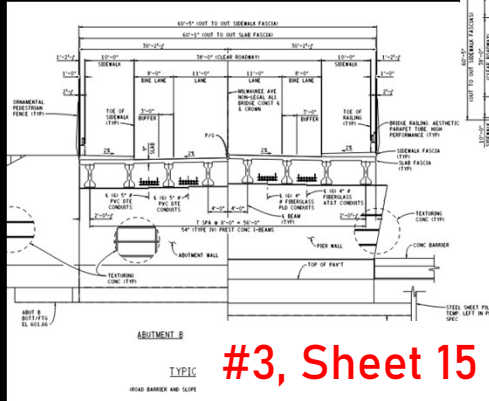
#2, Sheet 13



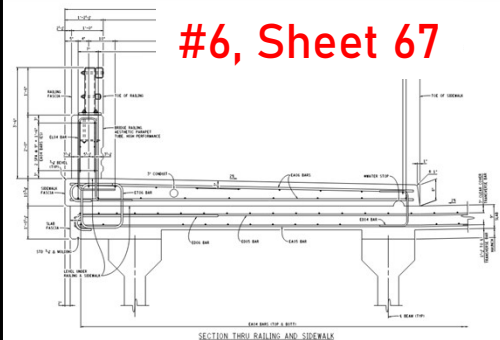
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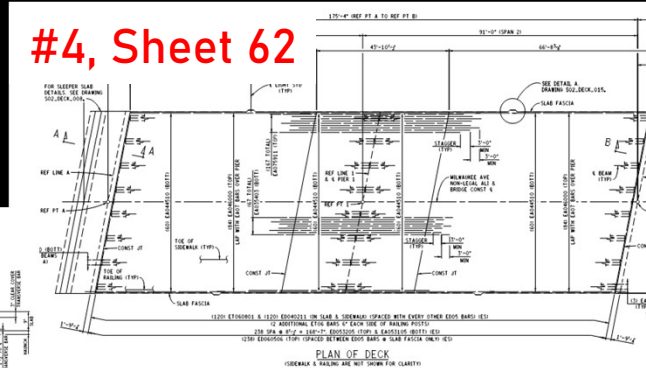
#3, Sheet 15



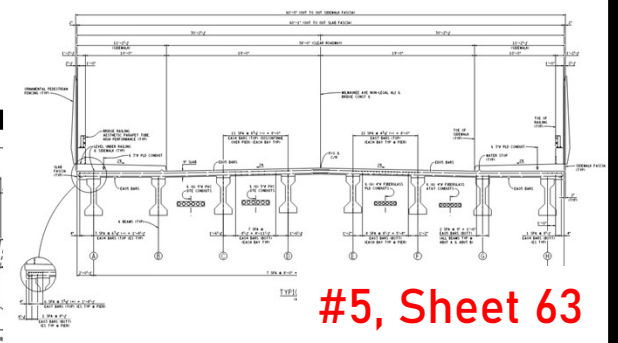
#6, Sheet 67



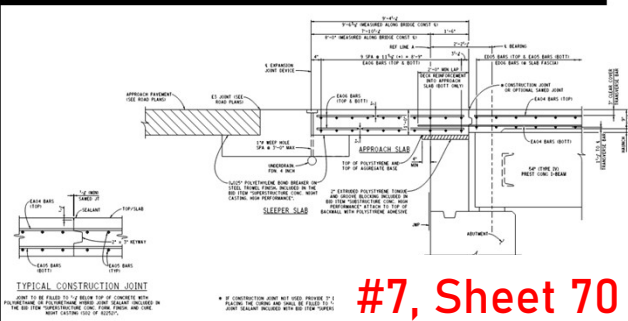
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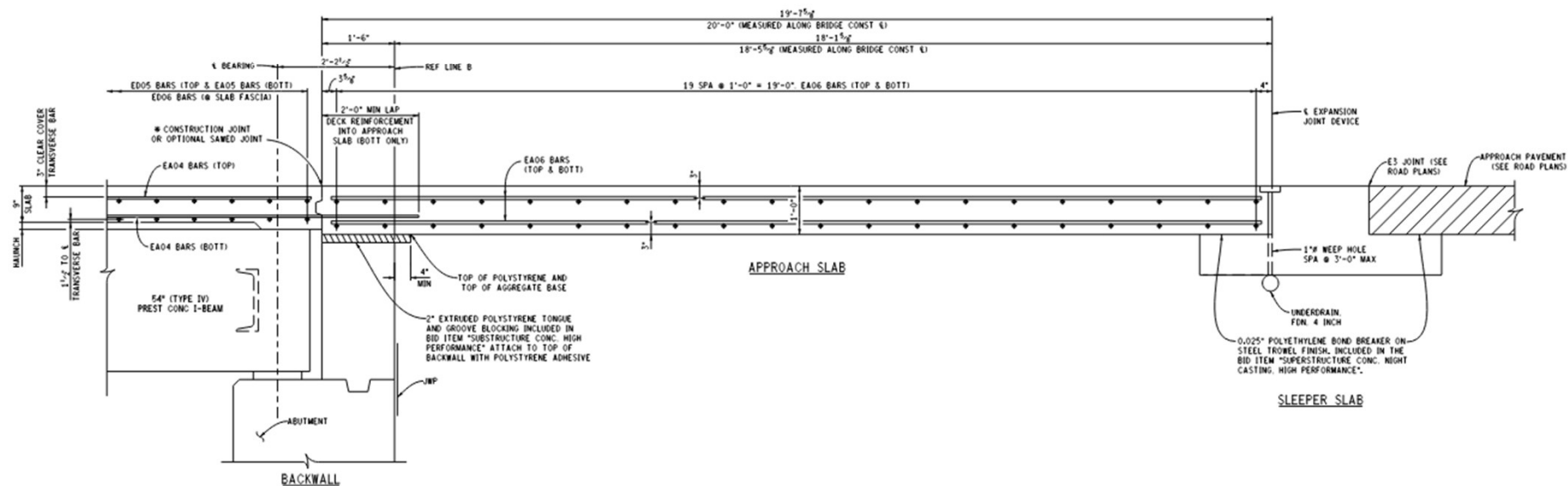


#5, Sheet 63



#7, Sheet 70





SECTION B-B

* IF CONSTRUCTION JOINT NOT USED, PROVIDE 3" DEEP BY 1/2" MIN WIDE SAWED JOINT, JOINT TO BE SAWED WITHIN 24 HOURS OF PLACING THE CURING AND SHALL BE FILLED TO 1/2" BELOW TOP OF CONCRETE WITH POLYURETHANE OR POLYURETHANE HYBRID JOINT SEALANT INCLUDED WITH BID ITEM "SUPERSTRUCTURE CONC. FORM FINISH AND CURE NIGHT CASTING (S02 OF 82252)".

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



NO SCALE

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CHKD BY: WTL
FILE: S02_82252_deck.dgn

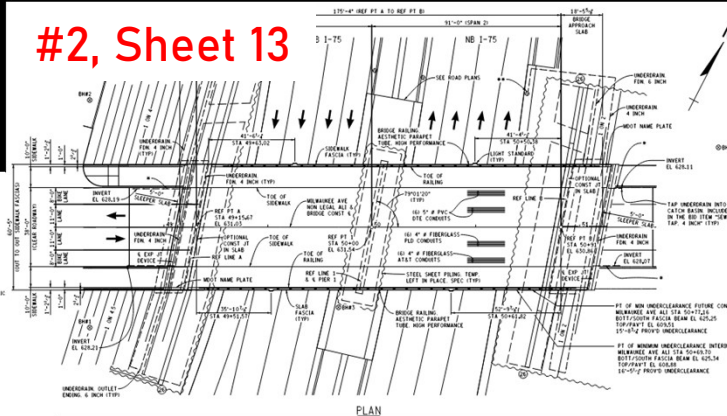
DATE: 08/28/2019
CORR BY: TJM
TSC: DETROIT

CS: S02 OF 82252
JNC: 200222A

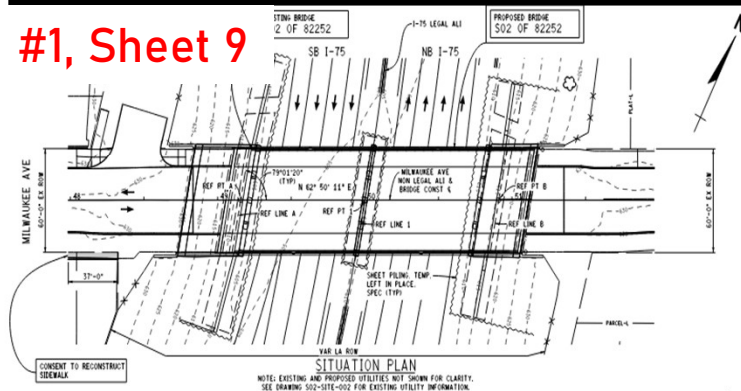
SUPERSTRUCTURE DETAILS

DRAWING SHEET
S02 DECK
010 71

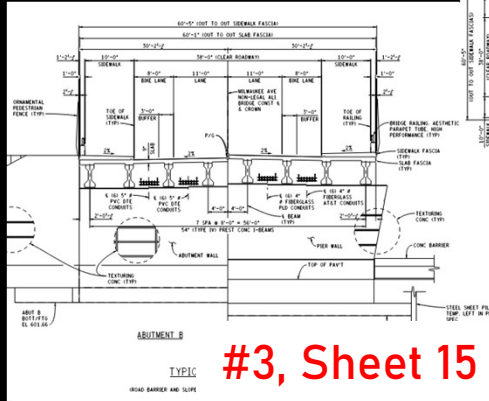
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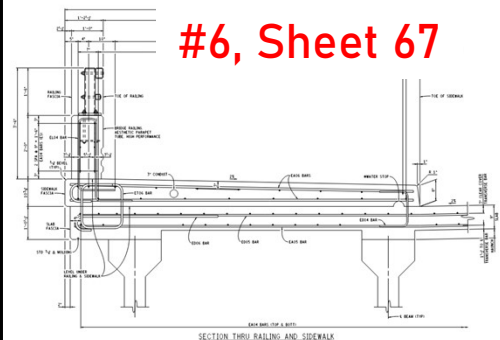
#1, Sheet 9



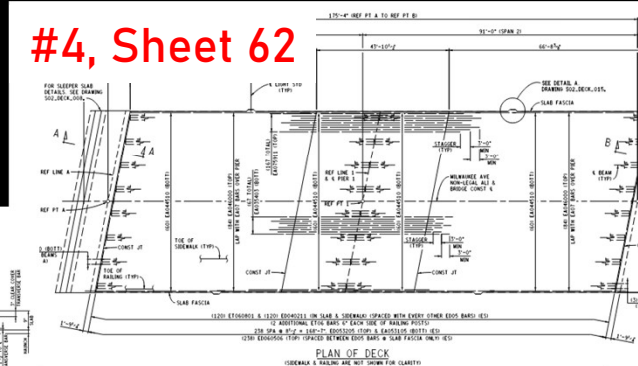
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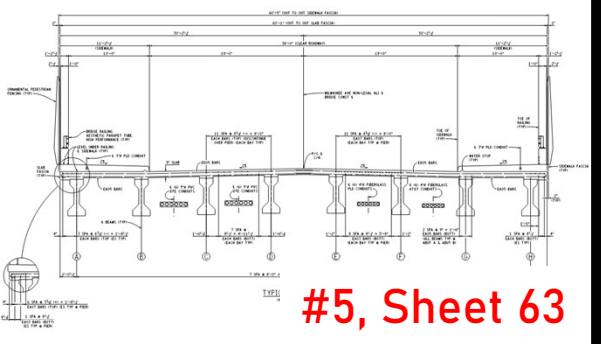
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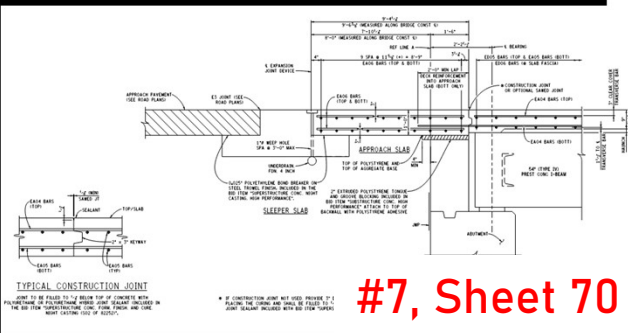
#4, Sheet 62



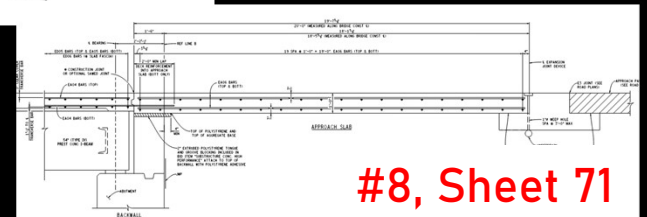
#5, Sheet 63

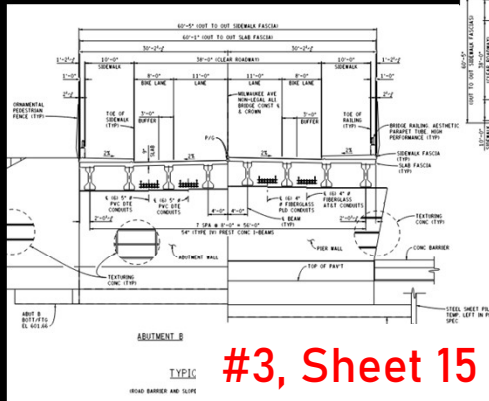


#7, Sheet 70

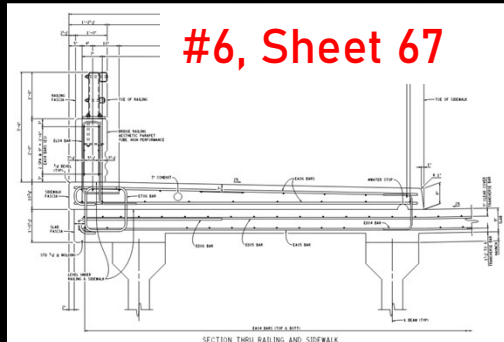


#8, Sheet 71

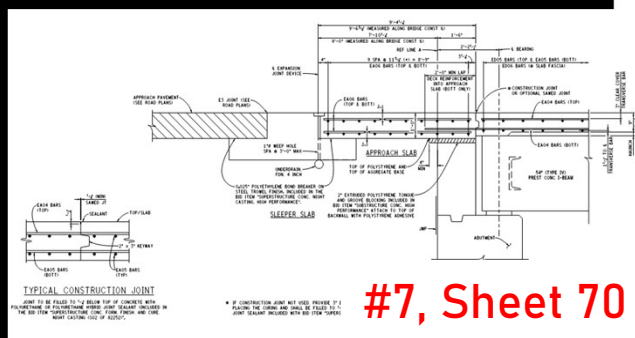




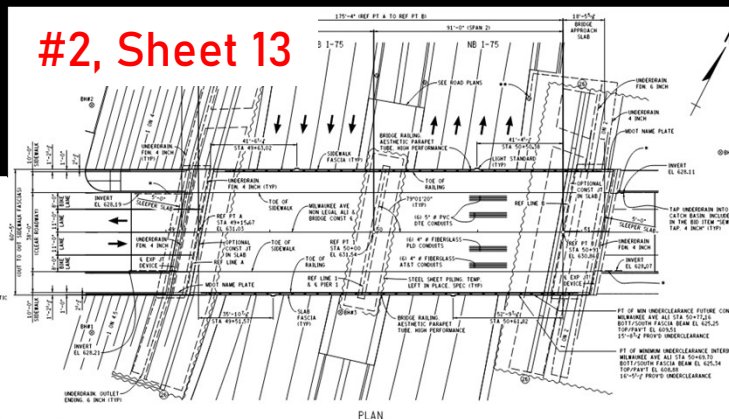
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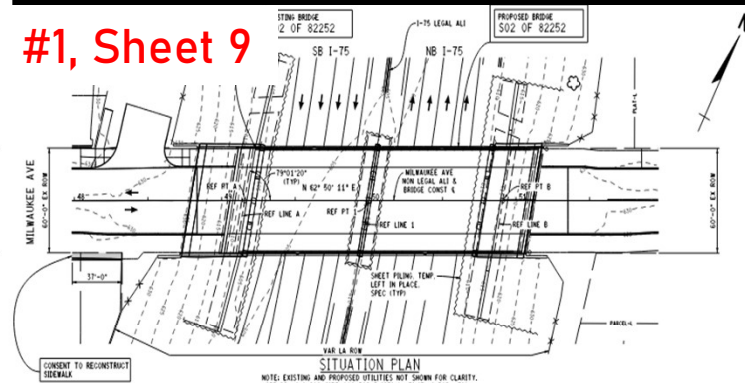
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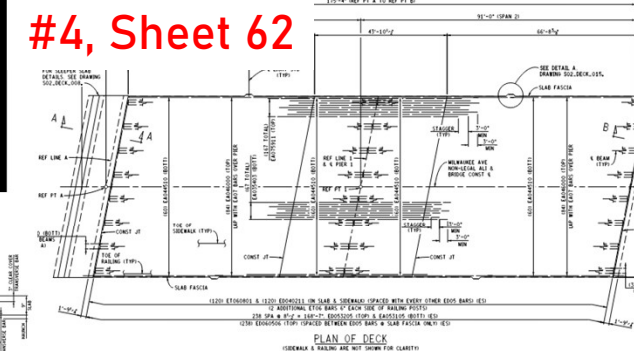
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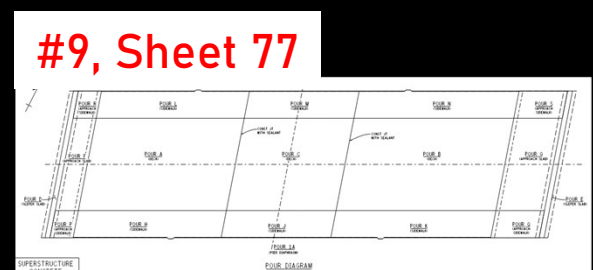
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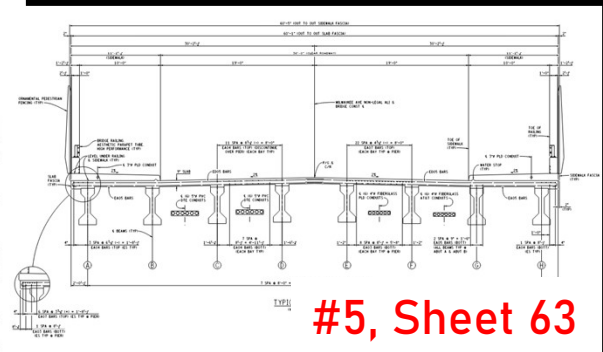
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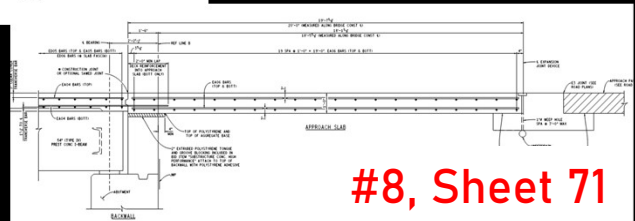
#4, Sheet 62



#9, Sheet 77



#5, Sheet 63



#8, Sheet 71

BOTTOM OF SLAB ELEVATIONS

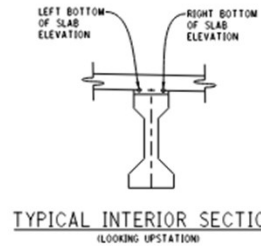
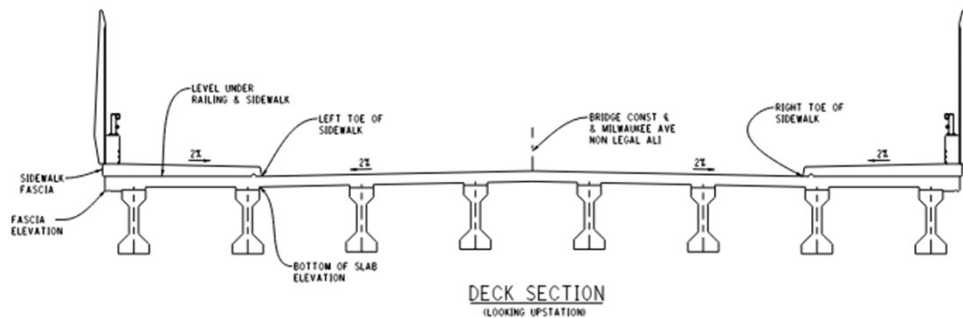
[illegible]

BULKHEAD ELEVATIONS

	ABUT A		ABUT B	
A	630.74	631.20	631.17	630.43
B	630.72	631.21	631.19	630.46
C	630.85	631.35	631.34	630.62
D	630.99	631.51	631.51	630.80
E	630.97	631.50	631.51	630.82
F	630.79	631.34	631.26	630.69
G	630.63	631.19	631.22	630.57
H	630.61	631.17	631.21	630.59

SCREED ELEVATIONS

LEFT SIDE OF SIDEWALK	630.73	630.88	631.00	631.10	631.17	631.21	631.21	631.19	631.16	631.16	631.19	631.19	631.17	631.10	631.20	630.85	630.67	630.47
RIGHT SIDE OF SIDEWALK	630.64	630.80	630.94	631.05	631.13	631.17	631.19	631.19	631.16	631.16	631.20	631.22	631.21	631.14	631.07	630.94	630.77	630.57



NOTES:

BOTTOM OF SLAB ELEVATIONS ARE AT RIGHT ANGLES TO THE BEAM CENTERLINE AND ARE BASED ON THE CONDITION THAT THE BEAMS AND DIAPHRAGMS ARE COMPLETELY ERECTED WITH NO OTHER LOADS APPLIED. THESE ELEVATIONS INCLUDE ALLOWANCE FOR VERTICAL CURVE AND DEFLECTION DUE TO FORMS, STEEL REINFORCEMENT, CONCRETE SLAB, SIDEWALK, RAILING AND UTILITIES.

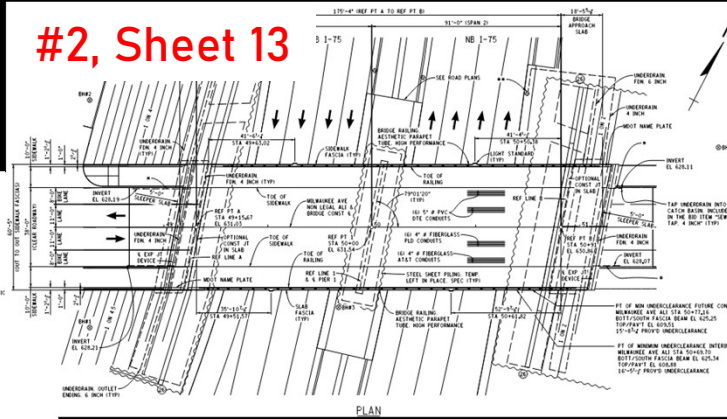
SCREED ELEVATIONS ARE BASED ON THE CONDITION THAT NO SLAB CONCRETE HAS BEEN CAST AND THAT FORMWORK AND STEEL REINFORCEMENT ARE IN PLACE.

SCREED RAILS FOR FINISHING OF STRUCTURAL CONCRETE SHALL BE LOCATED OVER FASCIA BEAMS.

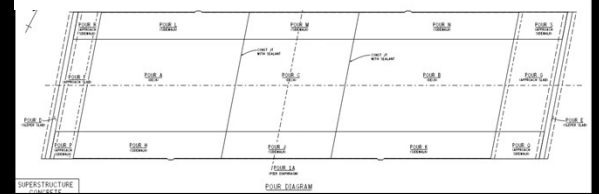
SECTION FOR BOTTOM OF SLAB AND SCREED ELEVATIONS ARE GIVEN FROM CENTERLINE OF BEARING TO CENTERLINE OF BEARING AT EQUAL SPACING.

[illegible]

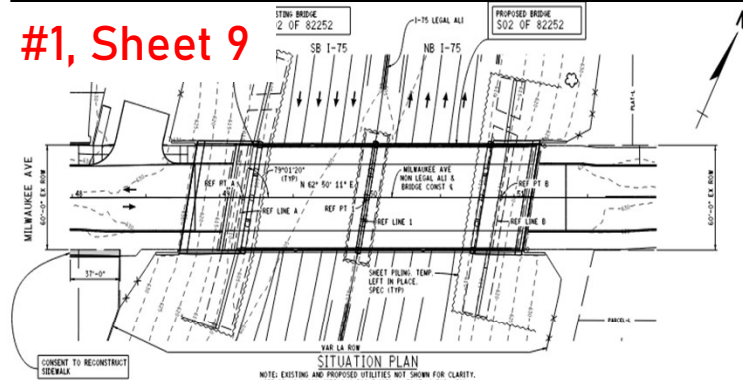
#2, Sheet 13



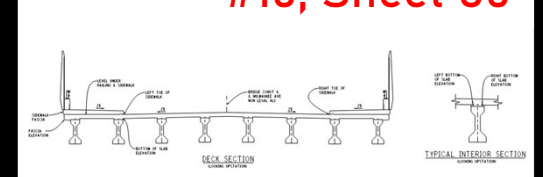
#9, Sheet 77



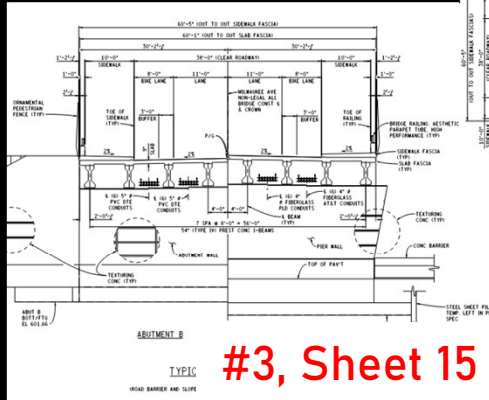
#1, Sheet 9



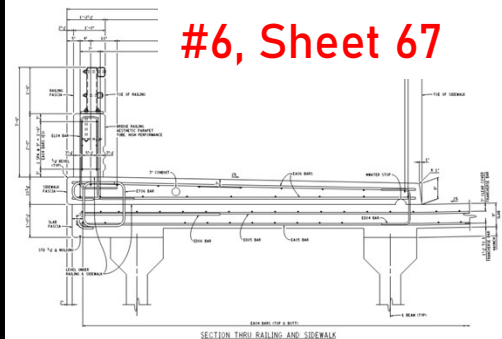
#10, Sheet 80



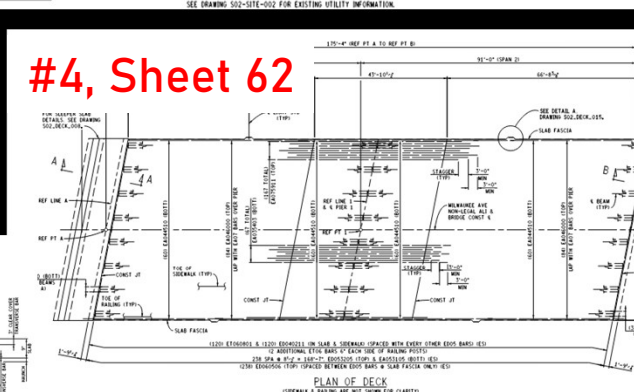
#3, Sheet 15



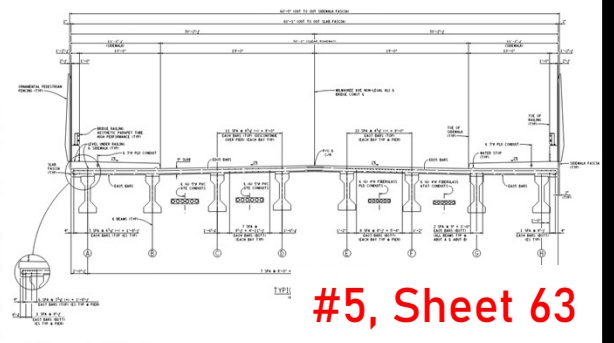
#6, Sheet 67



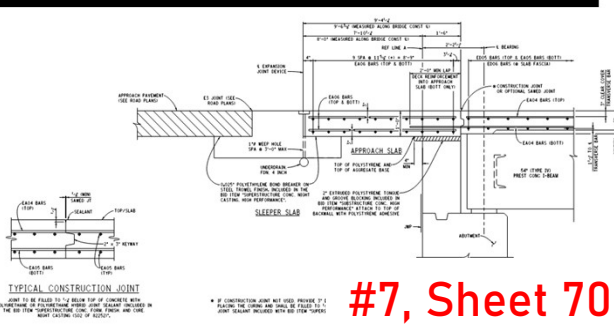
#4, Sheet 62



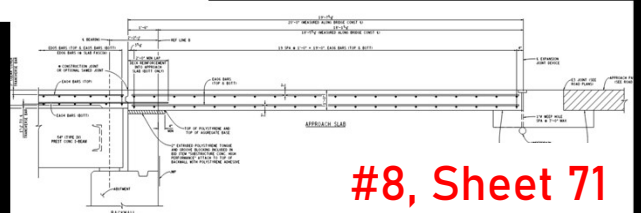
#5, Sheet 63



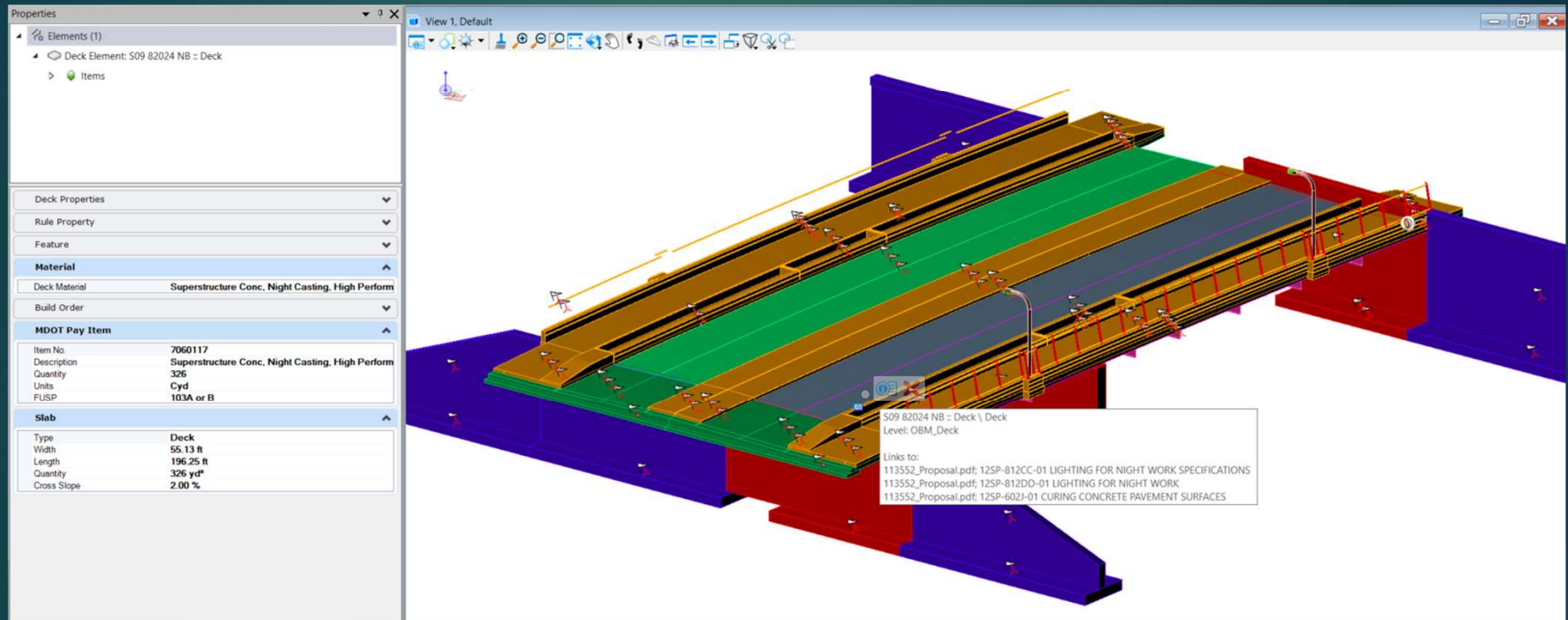
#7, Sheet 70



#8, Sheet 71



Information Model



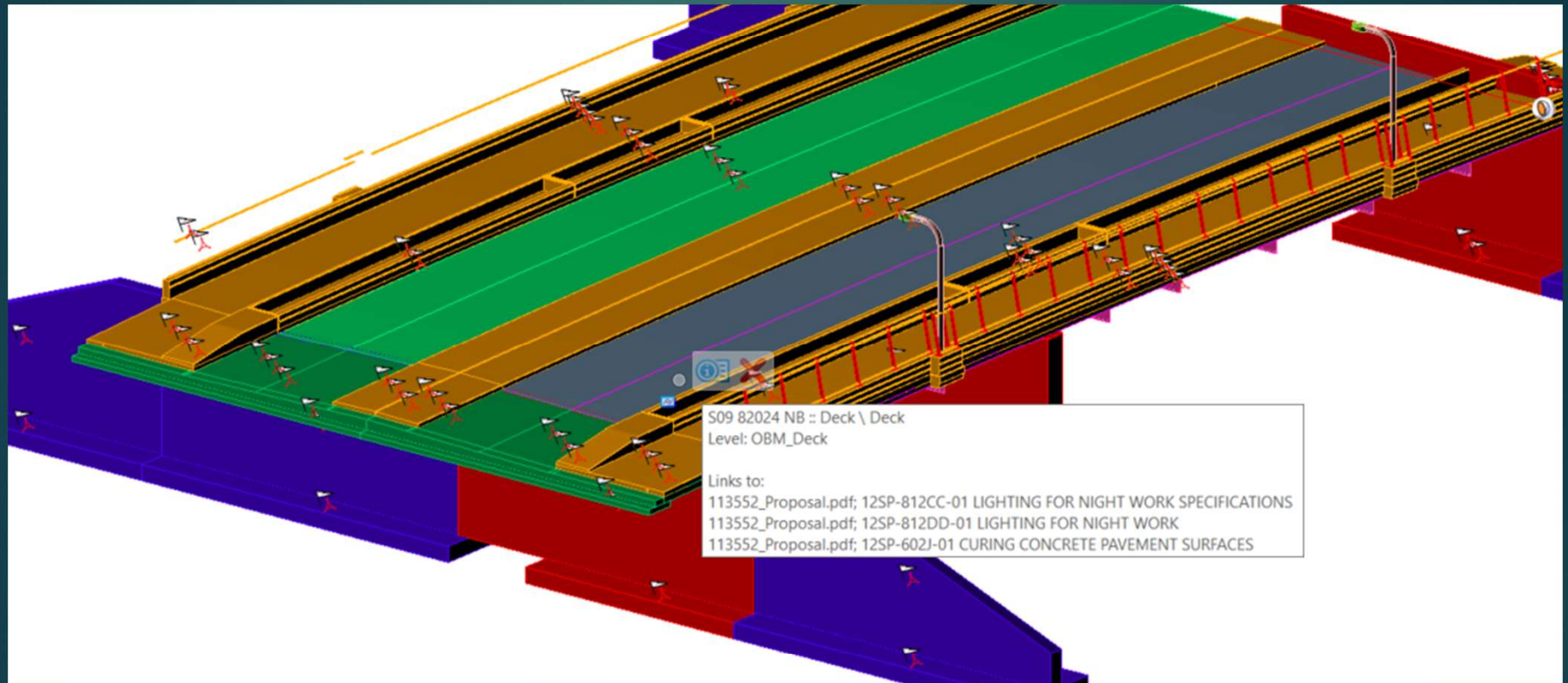
Information Model

Attribution

Material	
Deck Material	Superstructure Conc. Night Casting. High Perform
Build Order	
MDOT Pay Item	
Item No.	7060117
Description	Superstructure Conc. Night Casting. High Perform
Quantity	326
Units	Cyd
FUSP	103A or B
Slab	
Type	Deck
Width	55.13 ft
Length	196.25 ft
Quantity	326 yd ³
Cross Slope	2.00 %

Information Model

Supplemental Documents



Information Model Supplemental Documents

12SP-812DD-01

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
LIGHTING FOR NIGHT WORK

OPR:RAL

1 of 1

APPR:B
FHW#

Delete subsection 812.04.T, on page 631 of the Standard Specifications in its entirety and replace it with the following:

T. **Ltg for Night Work.** The unit price for Ltg for Night Work includes area lighting plan and furnishing, installing, relocating, replacing, and r for the entire project. There will be no adjustments in the lump sum the number or type of lighting systems or if stand by units are requi night work on the project as described in subsection 812.03.H and Engineer.

510

12SP-812CC-01

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
LIGHTING FOR NIGHT WORK SPECIFICATIONS

OPR:RAL

1 of 3

APPR:BMB:
FHWA:AF

Delete subsection 812.03.H, on page 619 of the Standard Specifications for in its entirety and replace it with the following:

H. **Lighting for Night Work.** Furnish, install, operate, maintain and replac fixed, portable, or equipment mounted lighting systems that provide ligh worker and inspector safety on and around the worksite. Provide lighti workers and inspectors to clearly conduct all operations and inspections d darkness. Provided lighting systems must meet the requirements set for Rule 408.40133 Illumination, MIOSHA Rule 408.42223 (7) Traffic Control, the Standard Specifications for Construction, and the contract.

Provide and position the lamps to meet the following lighting requiremen minimum illumination intensity of 10 foot-candles (108 lux) on a jobsite wher work is being performed. Maintain a minimum of 5 foot-candles (54 lux) i entire area of operation where workers may pass through on foot or are p not performing construction work. Vehicle or equipment headlights are not an approved light source.

Lighting levels will be measured with an illuminance meter. Readings from are not acceptable. Readings will be taken where the work is being p horizontal plane 3 feet above the pavement or ground surface. When nece additional lights to overlap the footprints of the lights so that the lighting rec continuous, and do not fall below the minimum lighting requirements throug area.

Submit a "work area lighting plan" to the Engineer for review for approval 14 calendar days prior to the start of work. The Engineer will have 7 cal review the plan for approval or provide comments for plan revisions req approval. At a minimum, the plan must include the proposed lighting construction equipment, vehicles and pedestrian paths, identification o persons of authority (including contact information) on the project site i execute the plan requirements, and measures that will be taken to ensure c the plan. All costs and any additional time required to obtain an approv lighting plan" will not be cause for delay or impact claims.

Design and operate the lighting system to avoid glare that interferes with ti or inspection personnel. Aim flood, spot or stadium type luminaries downw and rotated outward no greater than 30 degrees from nadir (straight do balloon lights at least 12 feet above the roadway.

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12SP-602J-01

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
CURING CONCRETE PAVEMENT SURFACES

CFS:JFS

1 of 3

APPR:ARB:TES:03-21-17
FHWA:APPR:03-31-17

a. **Description.** This work sets forth requirements for curing horizontal and vertical surfaces of the concrete pavement. All work will be in accordance with the standard specifications, except as modified herein.

Curing requirements for temporary concrete pavements are not covered by this special provision and will be in accordance with the standard specifications.

b. **Materials.** Curing materials are specified in subsection 903.06.A of the Standard Specifications for Construction.

c. **Construction.** For concrete pavements other than temporary applications the following requirements apply.

1. Curing. Curing operations will take precedence over texturing in accordance with subsection 602.03.K of the Standard Specifications for Construction.

Include details for the operation and oversight of curing in the approved Quality Control (QC) plan.

The curing period will commence immediately after application of curing compound and must be continuously maintained until the pavement concrete attains the opening to traffic flexural strength.

Use the fully-automatic, self-propelled mechanical atomizing power sprayer approved by the Engineer to apply the curing compound. Operate the equipment to direct the curing compound onto the surface from two different lateral directions. Do not allow the sprayer to ride on the pavement surface. Ensure the sprayer covers the entire pavement horizontal and vertical surfaces with no puddling, dripping, or non-uniform application occurs.

A foot bridge, or other means, may be used to apply curing compound for concrete pavements and shoulders less than 24 feet wide. The atomizing mechanical sprayer must be capable of uniformly applying the curing compound at the specified rate and timeliness, as described in this special provision.

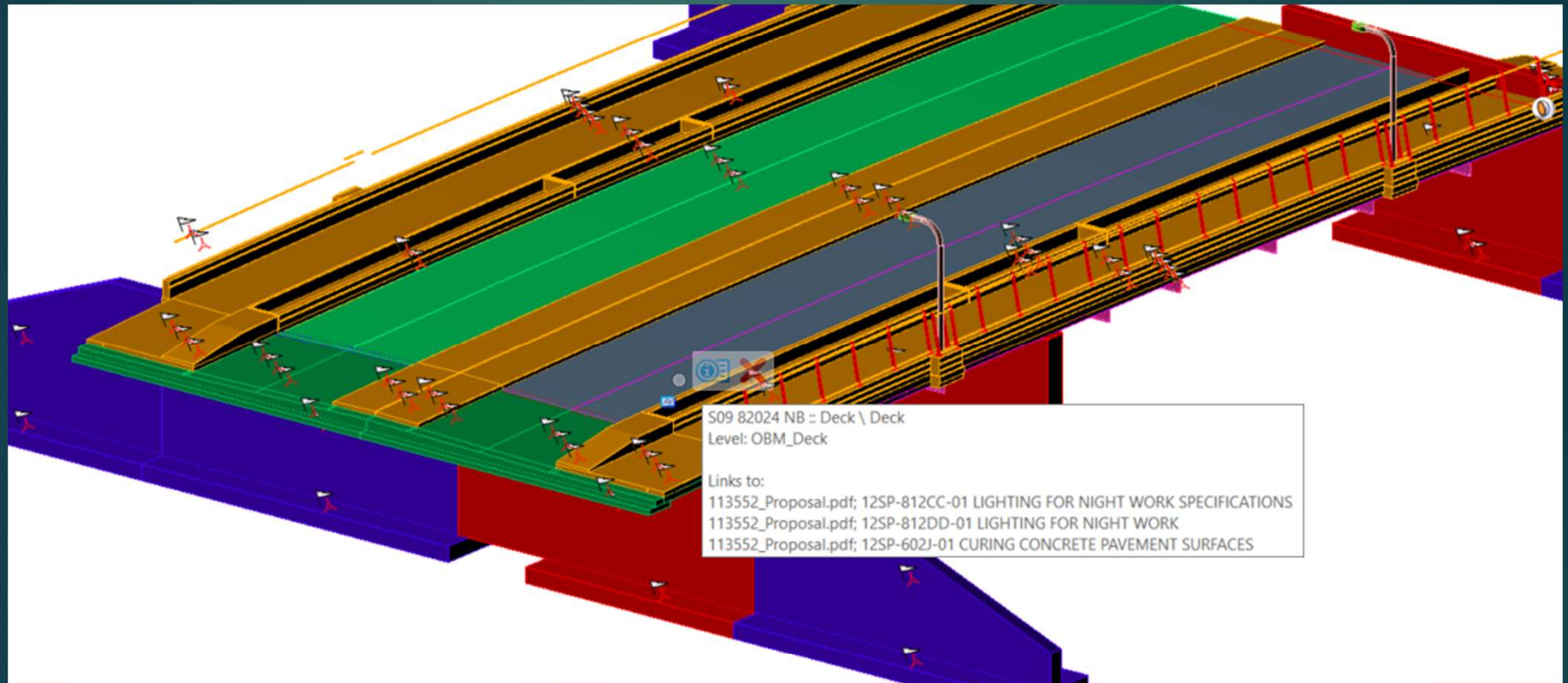
Do not commence concrete paving until it is demonstrated to the Engineer that the curing materials and personnel are on site and the curing equipment is fully operational.

Maintain a thoroughly mixed compound in accordance with the manufacturer's recommendations. Do not dilute curing compound.

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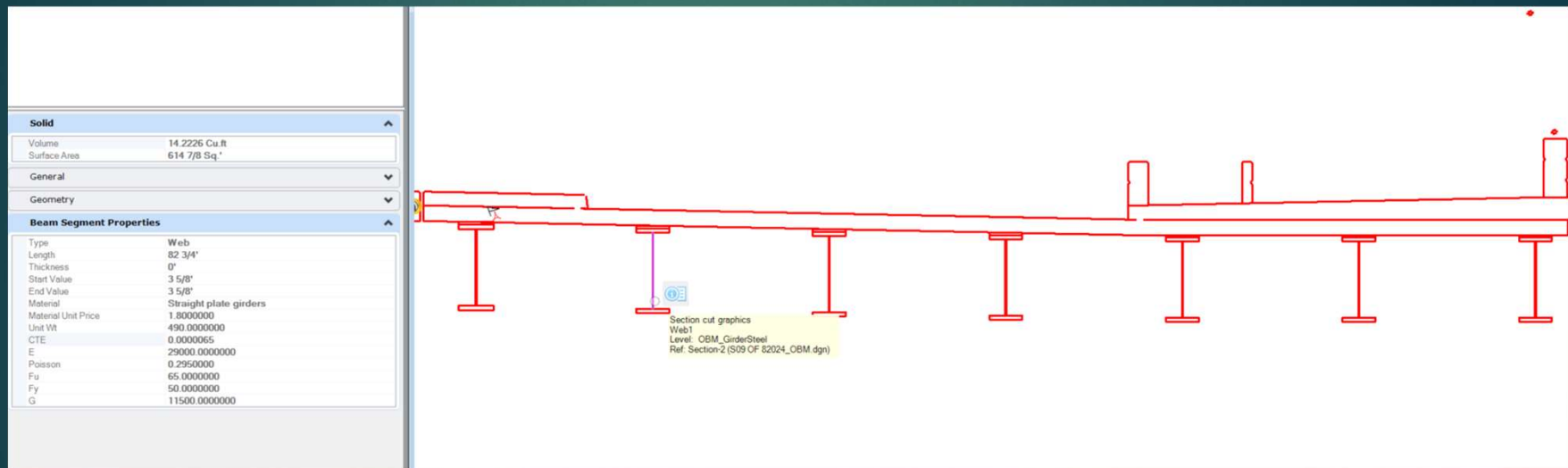
Information Model

Supplemental Documents



Information Model

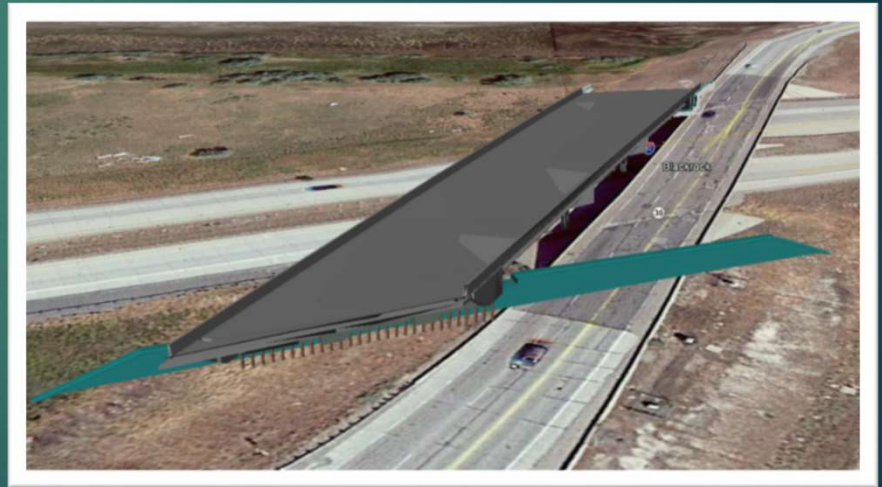
Dynamic Cross-Sections



I-80 Blackrock Bridge Replacements

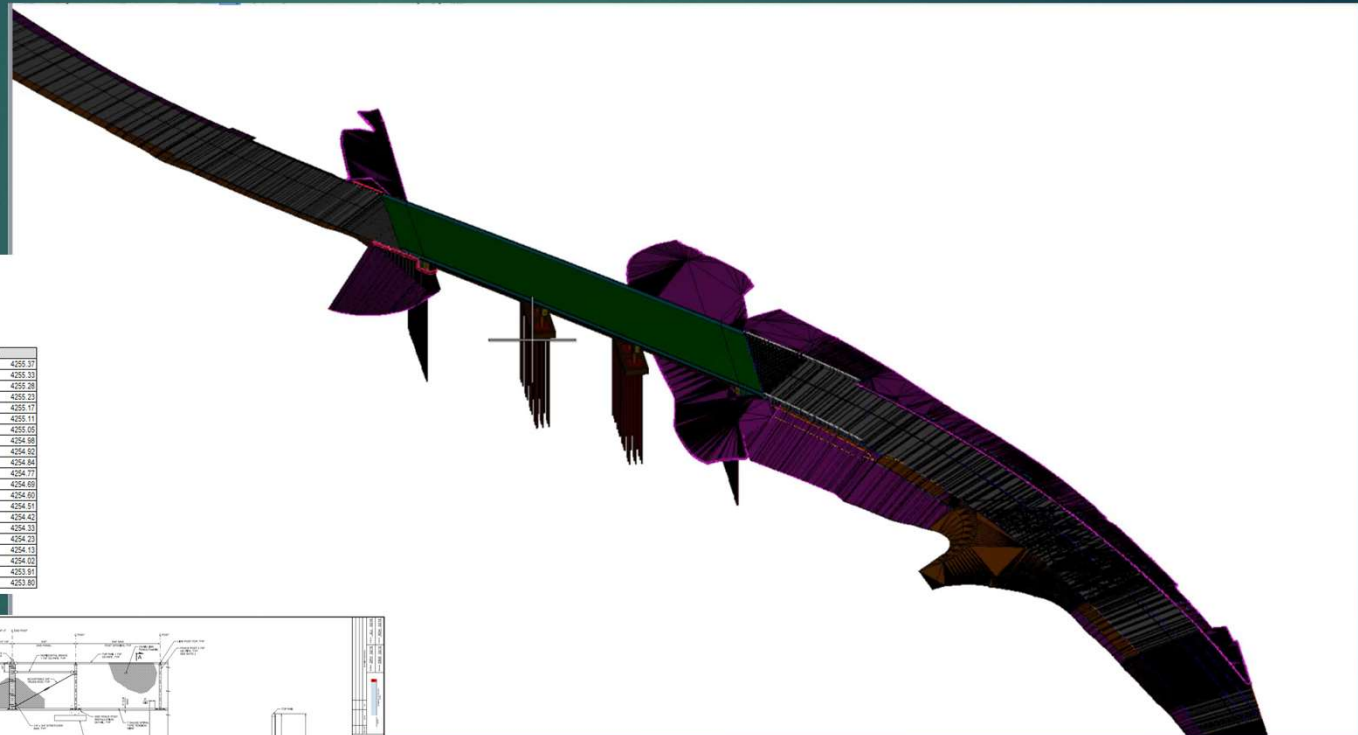
Scott Fernald Granite Construction Co. Utah

- ▶ Parallel steel girder bridges on I-80 over UPRR
- ▶ Concrete prestressed girder bridge carrying SR-36 over I-80
- ▶ UDOT's first bridge project using the model as the legal document
- ▶ CMGC - Granite Construction won the contract around 30% design progress



Model, Detail, Spreadsheet, Or....

Scott Fernald Granite Construction Co. Utah

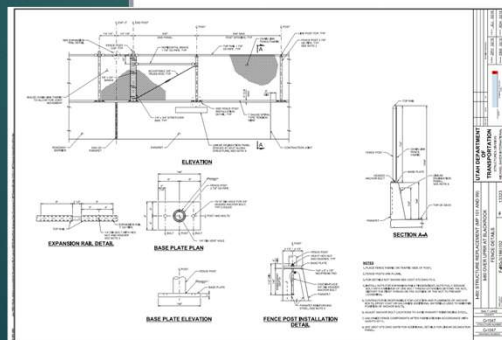


Deck Elevation Report

By: DFJ
Check By: DPH

Parallel to start support
Alignment with offset = 0.000 (Polyester Overlay)
-SD EB - 2 Lane
Span 4

Point Of Interest	Station - Bridge Axis(ft)	Offset - Bridge Axis(ft)	Elevation(ft)
0.000%	2014+97.77	0.00	4285.37
0.050%	2015+09.03	0.00	4285.33
0.100%	2015+20.30	0.00	4285.29
0.150%	2015+32.58	0.00	4285.25
0.200%	2015+44.83	0.00	4285.17
0.250%	2015+56.09	0.00	4285.11
0.300%	2015+67.35	0.00	4285.05
0.350%	2015+79.62	0.00	4284.98
0.400%	2015+91.89	0.00	4284.92
0.450%	2015+103.15	0.00	4284.84
0.500%	2015+114.41	0.00	4284.77
0.550%	2015+125.68	0.00	4284.69
0.600%	2015+136.94	0.00	4284.60
0.650%	2015+148.21	0.00	4284.51
0.700%	2015+159.47	0.00	4284.42
0.750%	2015+170.74	0.00	4284.33
0.800%	2015+182.00	0.00	4284.23
0.850%	2015+193.27	0.00	4284.13
0.900%	2017+09.03	0.00	4284.03
0.950%	2017+20.30	0.00	4283.91
1.000%	2017+32.58	0.00	4283.80



Software

Scott Fernald Granite Construction Co. Utah

Design Software (Bentley)



ProConcrete
Steel Reinforcement
Design & Quantities



LEAP
Structural Analysis
???



OpenBridge Modeler
3D Structure Models



OpenRoads Designer
3D Road Models



Bluebeam
Studio



ProjectWise

Construction Software

Weekly Training Meetings



GRANITE

Thank you for your time. We're available at:

WagnerB@Michigan.gov

YockeyM@Michigan.gov

Comments

Thoughts

QUESTIONS

