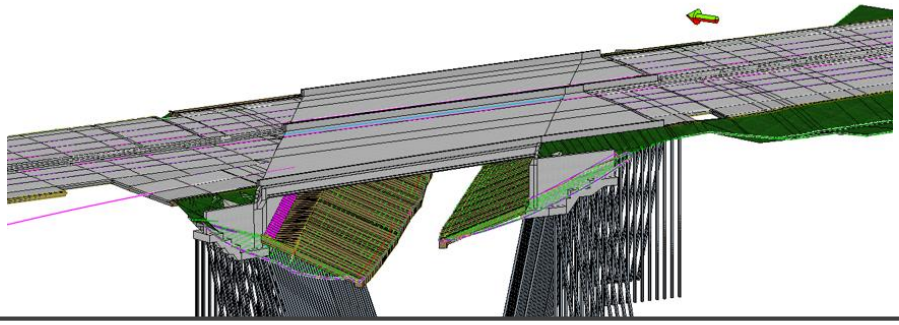
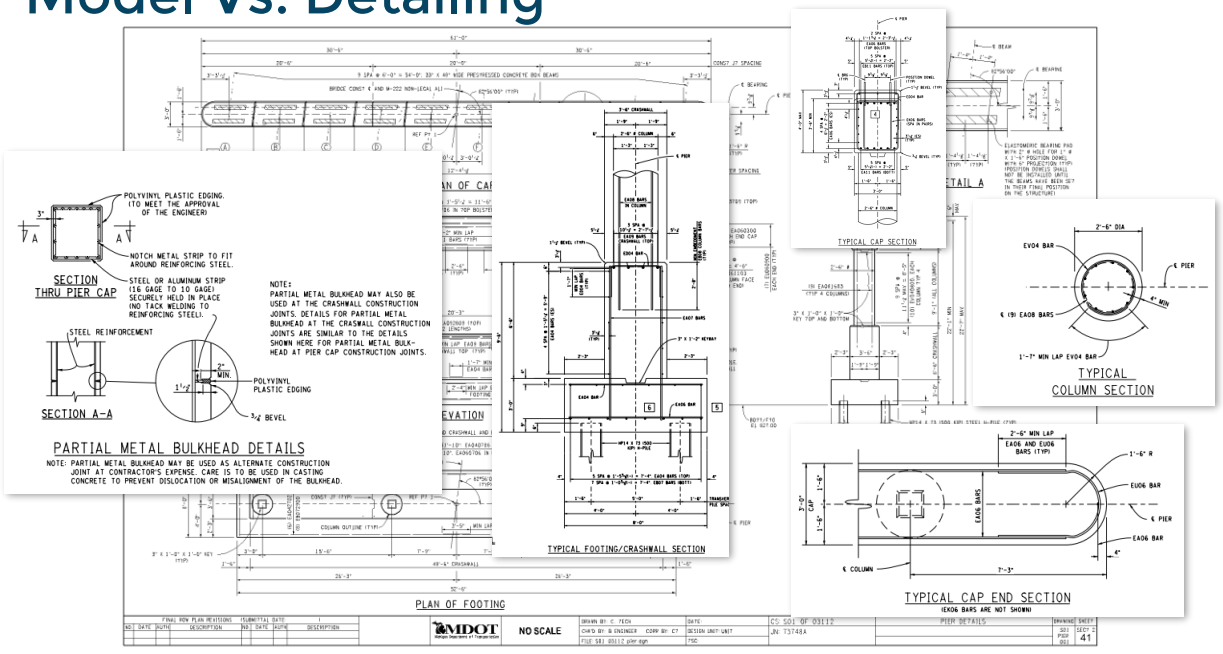


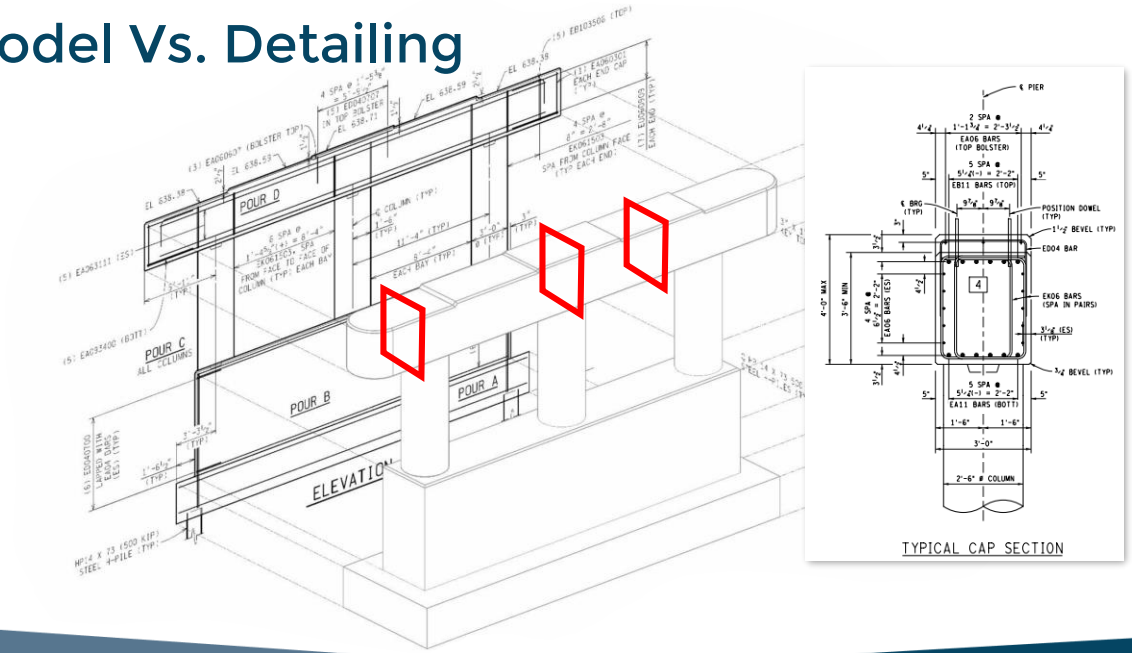
3D BIM MODELING

Brad Wagner, PE – MDOT Chief Structure Design Engineer
Marcia Yockey, PE – MDOT Bridge Support Specialist

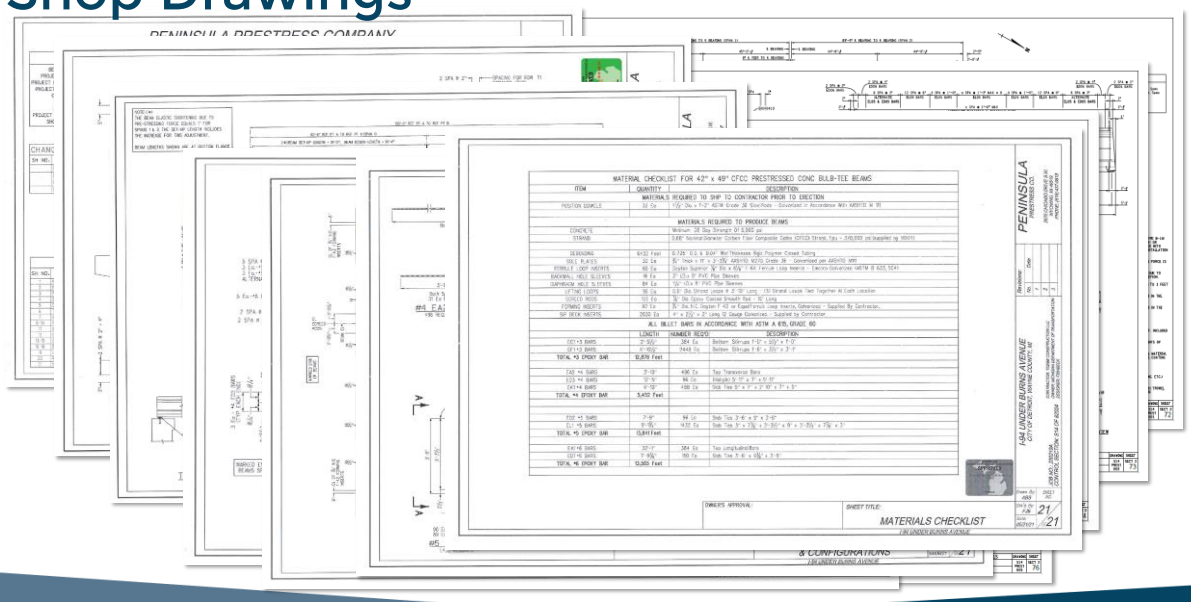
Model Vs. Detailing



Model Vs. Detailing



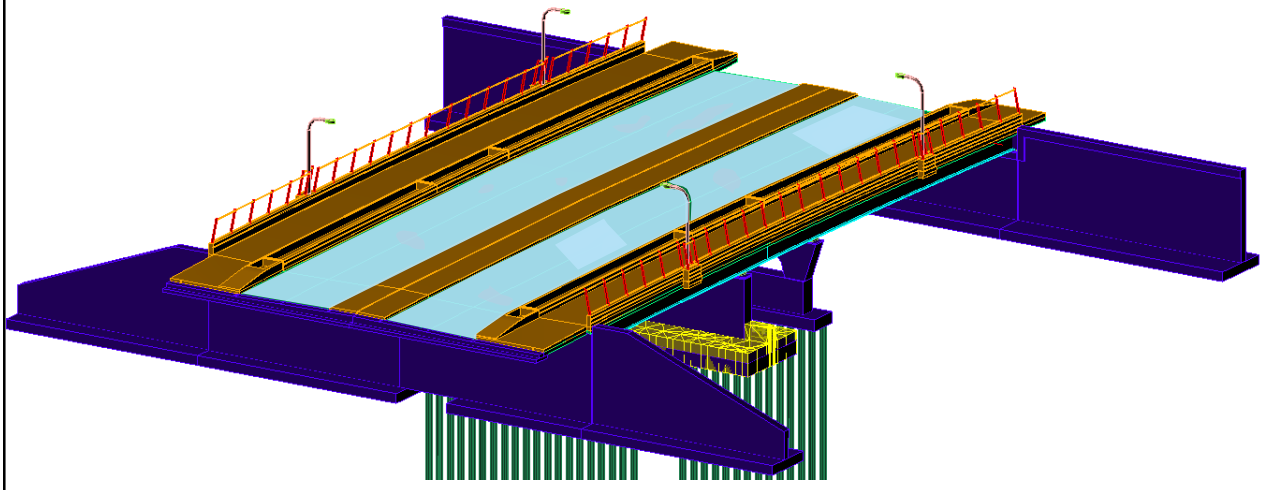
Shop Drawings



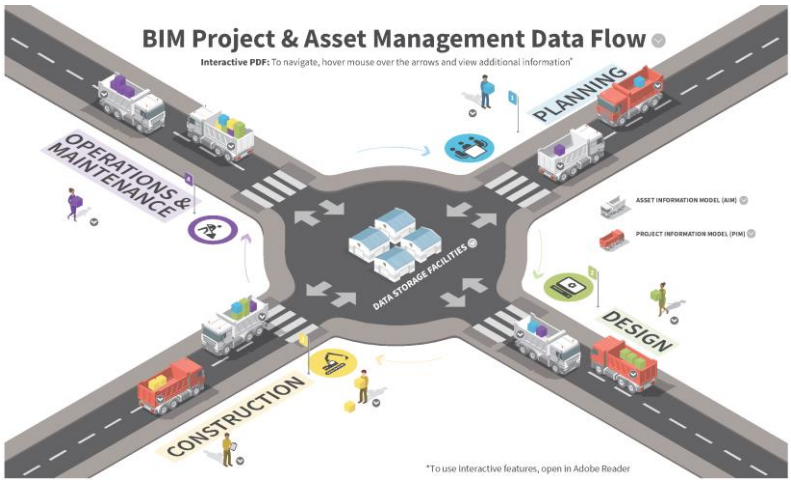
Bridge Inspections

Image courtesy of Michigan Tech Research Institute

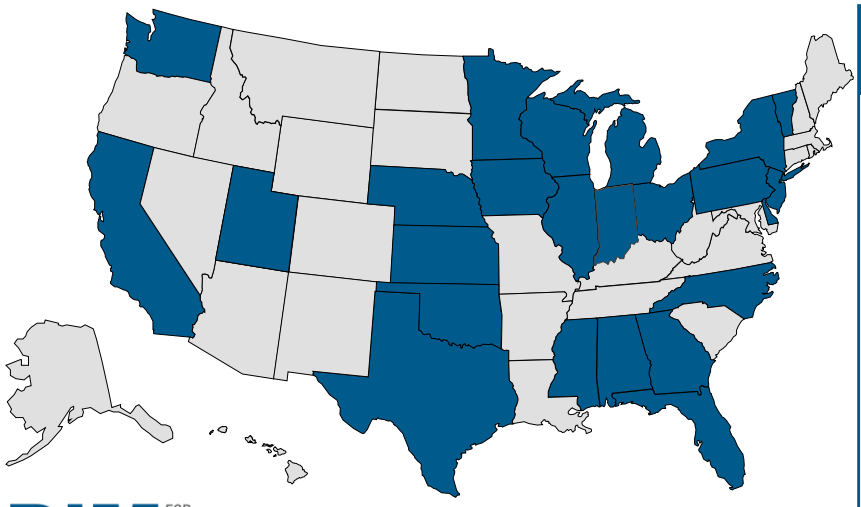
Future Rehabilitation



Long Term



Transportation Pooled Fund – TPF-5(372)

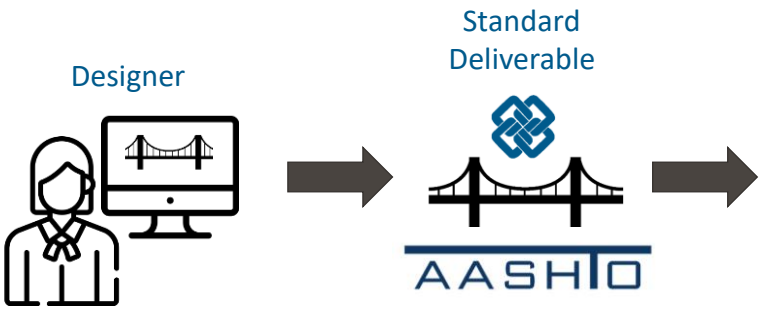


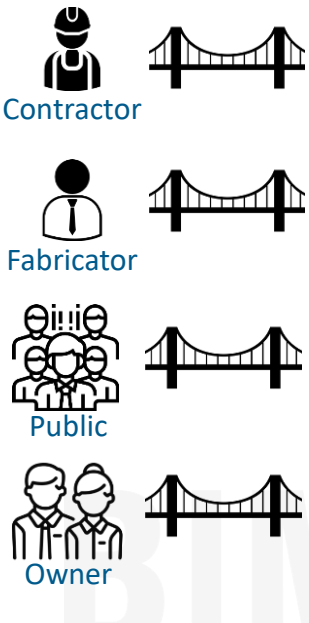
24 STATES PARTICIPATING

01 Alabama
02 California
03 Delaware
04 Florida
05 Georgia
06 Illinois
07 Indiana
08 Iowa
09 Kansas
10 Michigan
11 Minnesota
12 Mississippi
13 Nebraska
14 New Jersey
15 New York State
16 North Carolina
17 Ohio
18 Oklahoma
19 Pennsylvania
20 Texas
21 Utah
22 Vermont
23 Washington
24 Wisconsin
FHWA

BIM FOR BRIDGES AND STRUCTURES TPF-5(372)

AASHTO BRIDGE VISION



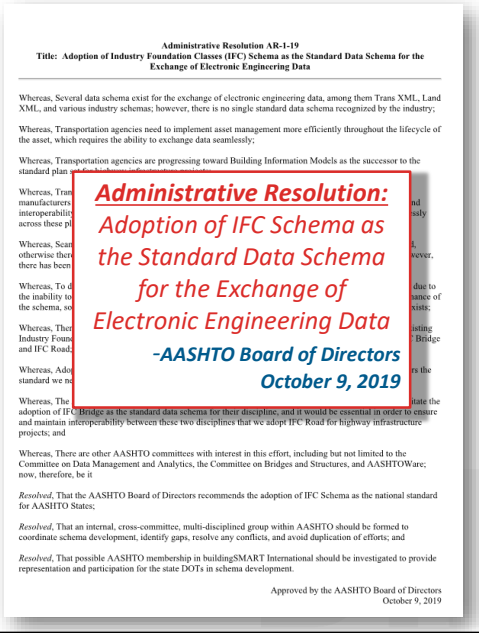


BIM FOR BRIDGES AND STRUCTURES TPF-5(372)

AASHTO ADOPTION OF IFC

- 2017
  - AASHTO Committee on Bridges and Structures adopts IFC
- 2019
  - AASHTO Board of Directors/ Council on Highways and Streets adopts IFC
- 2022
  - AASHTO CBS to vote on IFC Information Delivery Manual

BIM FOR BRIDGES AND STRUCTURES TPF-5(372)



Administrative Resolution AR-1-19
Title: Adoption of Industry Foundation Classes (IFC) Schema as the Standard Data Schema for the Exchange of Electronic Engineering Data

Whereas, Several data schema exist for the exchange of electronic engineering data, among them Trans XML, Land XML, and various industry schemas; however, there is no single standard data schema recognized by the industry;

Whereas, Transportation agencies need to implement asset management more efficiently throughout the lifecycle of the asset, which requires the ability to exchange data seamlessly;

Whereas, Transportation agencies are progressing toward Building Information Models as the successor to the standard plan

Whereas, Tran
manufacturers
interoperabilit
across these pl

Whereas, Sear
otherwise ther
there has been

Whereas, To d
the inability to
the schema, so

Whereas, Ther
Industry Foun
and IFC Road;

Whereas, Ado
standard we ne

Whereas, The
adoption of IFC Bridge as the standard data schema for their discipline, and it would be essential in order to ensure and maintain interoperability between these two disciplines that we adopt IFC Road for highway infrastructure projects; and

Whereas, There are other AASHTO committees with interest in this effort, including but not limited to the Committee on Data Management and Analytics, the Committee on Bridges and Structures, and AASHTOWare; now, therefore, be it

Resolved, That the AASHTO Board of Directors recommends the adoption of IFC Schema as the national standard for AASHTO States;

Resolved, That an internal, cross-committee, multi-disciplined group within AASHTO should be formed to coordinate schema development, identify gaps, resolve any conflicts, and avoid duplication of efforts; and

Resolved, That possible AASHTO membership in buildingSMART International should be investigated to provide representation and participation for the state DOTs in schema development.

Approved by the AASHTO Board of Directors
October 9, 2019

Administrative Resolution:
Adoption of IFC Schema as the Standard Data Schema for the Exchange of Electronic Engineering Data
-AASHTO Board of Directors
October 9, 2019

Consultant Team & Industry Partners

HDR

AEC 3

FAIR CAPE CONSULTING

UF UNIVERSITY of FLORIDA

jō consulting

SOFTWARE VENDOR INVOLVEMENT

Bentley SOLIBRI A NEMETSCHEK COMPANY AUTODESK INEIGHT AASHTOWare

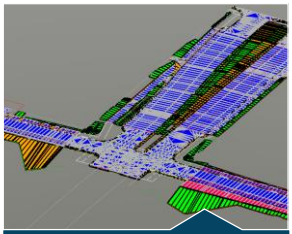
invicara OpenDesign alliance Trimble EriksonSOFTWARE ALLPLAN A NEMETSCHEK COMPANY

LARSA LUSAS MIDAS Engineering Software CSiBRIDGE BSI Bridge Software Institute BridgeSight Software™

Digital Delivery at MDOT

Project Signature Sheet

- Engineer stamp any file type
- PDFs, DGNs, Spreadsheets, etc.



Deliver RID Models

- Designers create models
- Develop review process
- Field data sharing
- Develop Champions

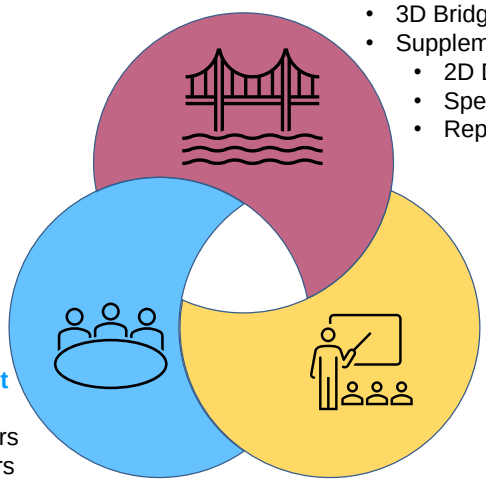
Project PDF

- Why 11x17?
- Screens over paper
- Learn Pain Points

Pilot Model Delivery

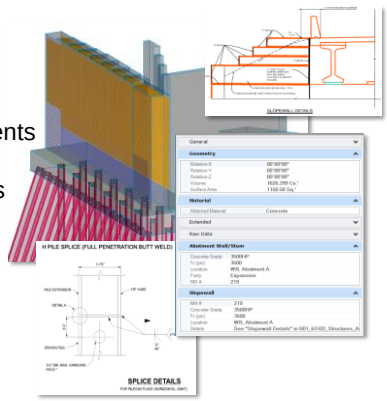
- Follow Lead states
- Bid using Model
- Stakeholder Engagement
- Develop Workflows

Pilot Elements



Contractual Model

- 3D Bridge Model
- Supplemental Documents
  - 2D Details
  - Special Provisions
  - Reports



Training

- Bidders
- Construction
- Reviewers
- Designers

Photo courtesy of Granite Construction

Engagement

- DDWG
- Contractors
- Fabricators
- Surveyors
- Other states

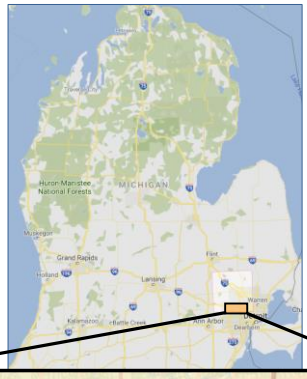
I-696 EB & WB OVER ROUGE RIVER

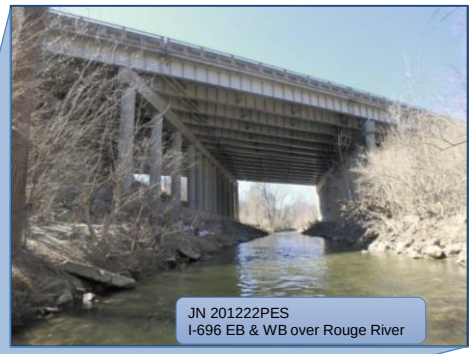
Bureau of Bridges & Structures

Oakland TSC

Michael Baker & Associates

Engineering Support Services



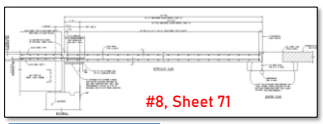


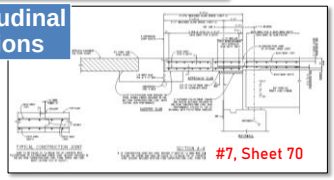
I-696 RECONSTRUCTION
8.5 miles of road work
Rehabilitation of 10 bridges
$225 Million construction value

- Structure Replacement
  - Existing: 3-Span Steel Plate Girders
  - Proposed: Single Span PC Bulb Tee Beams
- August 2022 Letting
  - June Posting
  - Pre-Bid Training in May/June

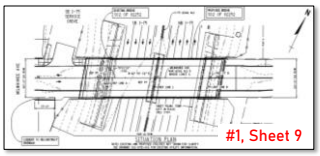
Risky Habits

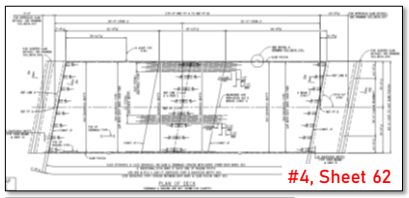
Longitudinal Sections

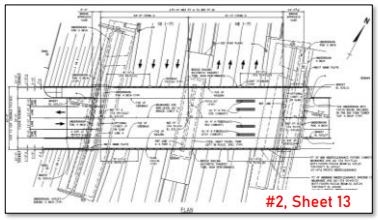


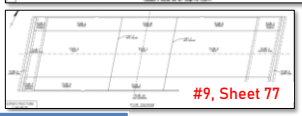


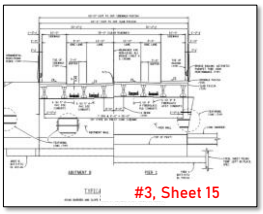
Plan Views

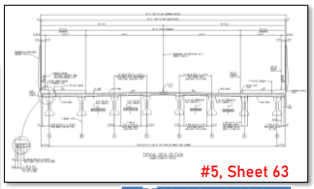


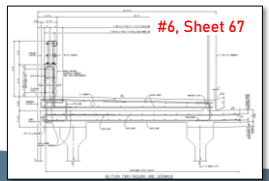


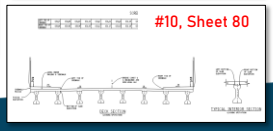






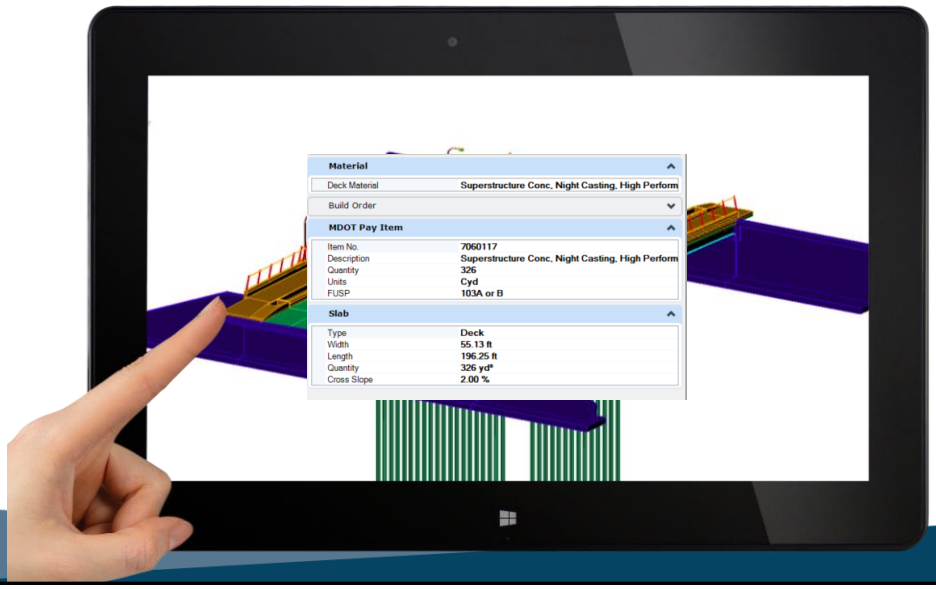




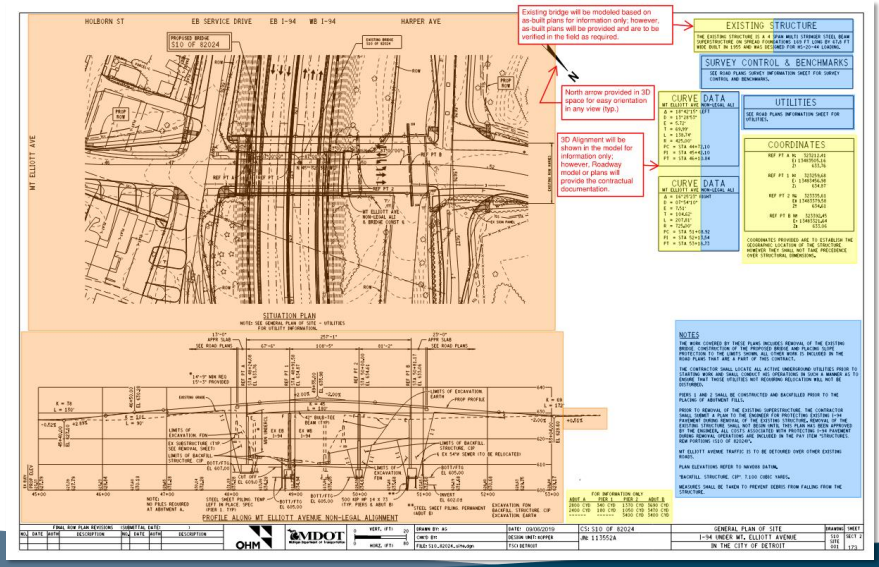


Transverse Cross - Sections

Dynamic Information Model

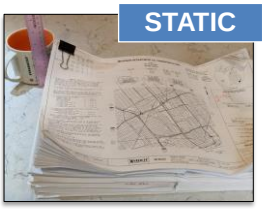


Rethinking Details



3D Model as Legal Document

- Access design from model
- Dynamic Digital File
- Saved Views
- Annotations
- Supplemental Documents



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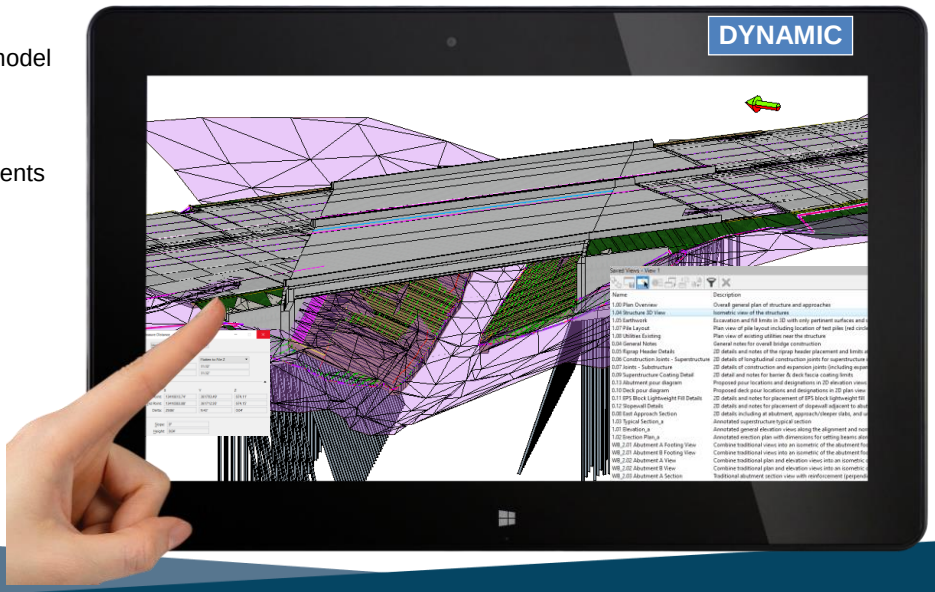

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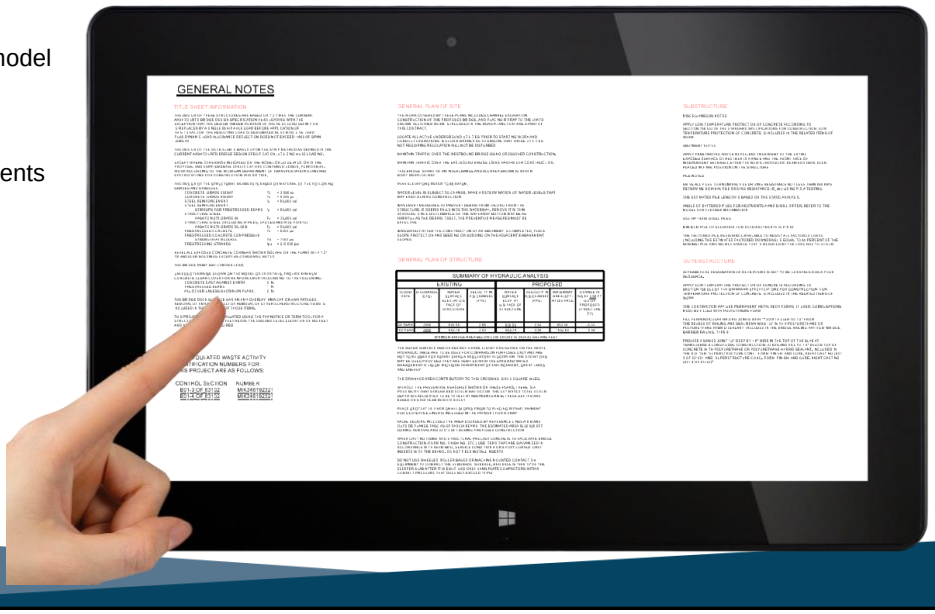

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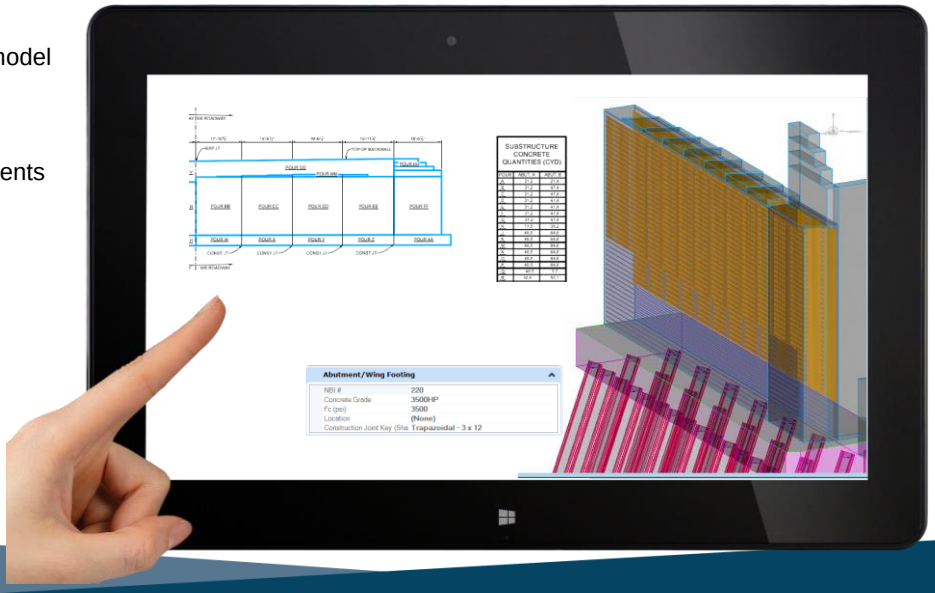

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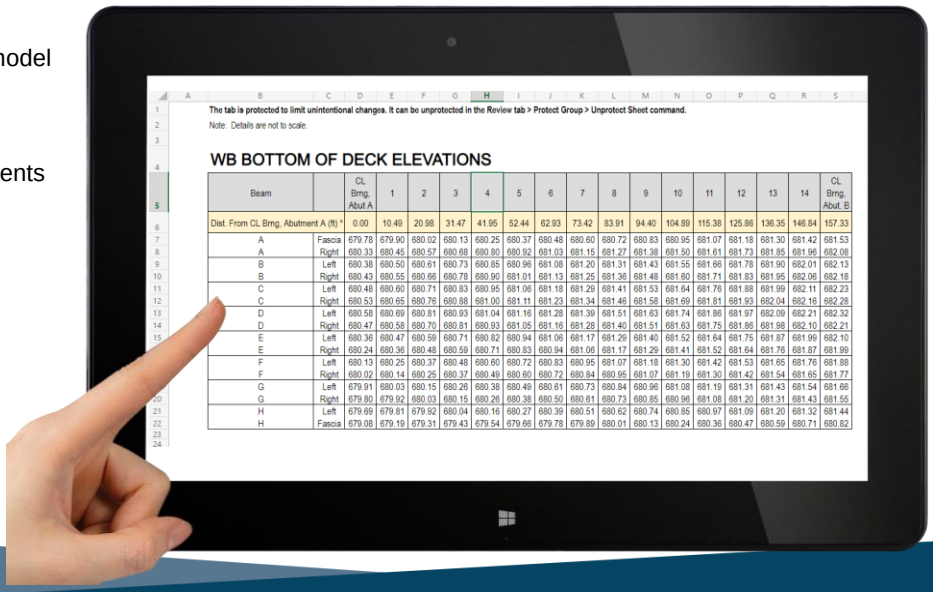

The tab is protected to limit unintentional changes. It can be unprotected in the Review tab > Protect Group > Unprotect Sheet command.

Note: Details are not to scale.

WB BOTTOM OF DECK ELEVATIONS

Beam		CL Brng. Abut A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	CL Brng. Abut. B
Dist. From CL Brng. Abutment A (ft) *		0.00	10.49	20.98	31.47	41.95	52.44	62.93	73.42	83.91	94.40	104.89	115.38	125.86	136.35	146.84	157.33
A	Fascia	679.78	679.90	680.02	680.13	680.25	680.37	680.48	680.60	680.72	680.83	680.95	681.07	681.18	681.30	681.42	681.53
A	Right	680.33	680.45	680.57	680.68	680.80	680.92	681.03	681.15	681.27	681.38	681.50	681.61	681.73	681.85	681.96	682.08
B	Left	680.38	680.50	680.61	680.73	680.85	680.96	681.08	681.20	681.31	681.43	681.55	681.66	681.78	681.90	682.01	682.13
B	Right	680.43	680.55	680.66	680.78	680.90	681.01	681.13	681.25	681.36	681.48	681.60	681.71	681.83	681.95	682.06	682.18
C	Left	680.48	680.60	680.71	680.83	680.95	681.06	681.18	681.29	681.41	681.53	681.64	681.76	681.88	681.99	682.11	682.23
C	Right	680.53	680.65	680.76	680.88	681.00	681.11	681.23	681.34	681.46	681.58	681.69	681.81	681.93	682.04	682.16	682.28
D	Left	680.58	680.69	680.81	680.93	681.04	681.16	681.28	681.39	681.51	681.63	681.74	681.86	681.97	682.09	682.21	682.32
D	Right	680.47	680.58	680.70	680.81	680.93	681.05	681.16	681.28	681.40	681.51	681.63	681.75	681.86	681.98	682.10	682.21
E	Left	680.36	680.47	680.59	680.71	680.82	680.94	681.06	681.17	681.29	681.40	681.52	681.64	681.75	681.87	681.99	682.10
E	Right	680.24	680.36	680.48	680.59	680.71	680.83	680.94	681.06	681.17	681.29	681.41	681.52	681.64	681.76	681.87	681.99
F	Left	680.13	680.25	680.37	680.48	680.60	680.72	680.83	680.95	681.07	681.18	681.30	681.42	681.53	681.65	681.76	681.88
F	Right	680.02	680.14	680.25	680.37	680.49	680.60	680.72	680.84	680.95	681.07	681.19	681.30	681.42	681.54	681.65	681.77
G	Left	679.91	680.03	680.15	680.26	680.38	680.49	680.61	680.73	680.84	680.96	681.08	681.19	681.31	681.43	681.54	681.66
G	Right	679.80	679.92	680.03	680.15	680.26	680.38	680.50	680.61	680.73	680.85	680.96	681.08	681.20	681.31	681.43	681.55
H	Left	679.69	679.81	679.92	680.04	680.16	680.27	680.39	680.51	680.62	680.74	680.85	680.97	681.09	681.20	681.32	681.44
H	Fascia	679.08	679.19	679.31	679.43	679.54	679.66	679.78	679.89	680.01	680.13	680.24	680.36	680.47	680.59	680.71	680.82

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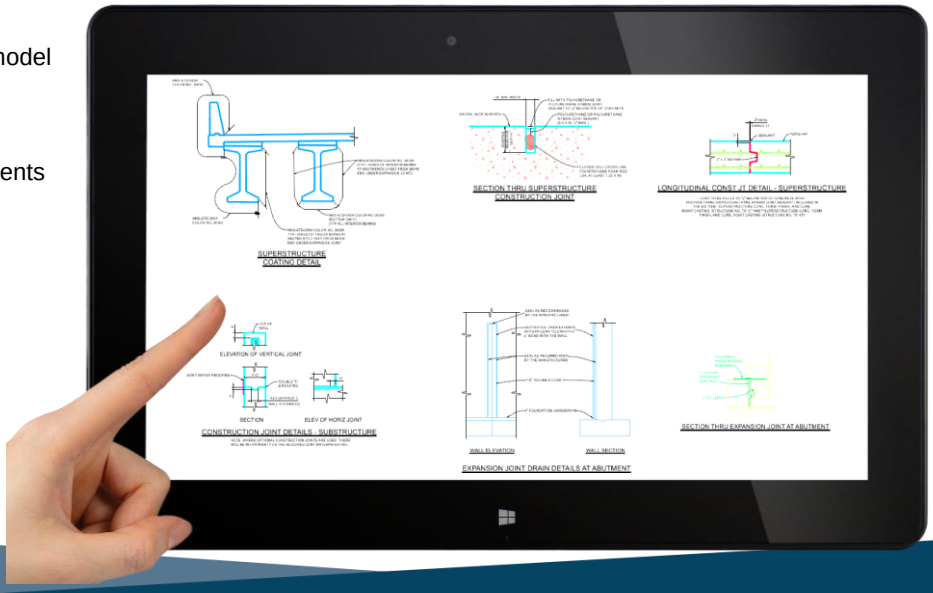
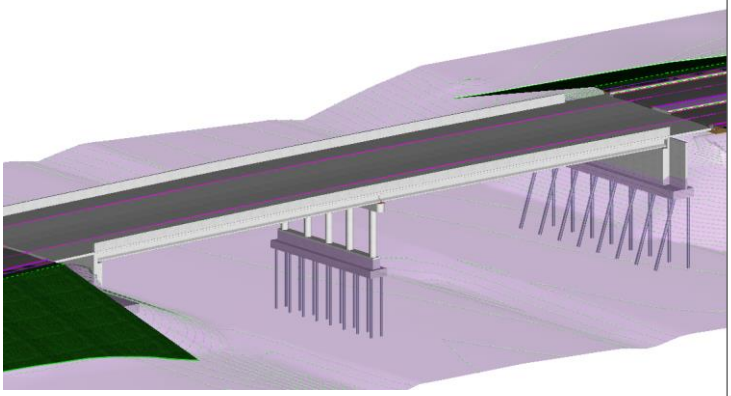
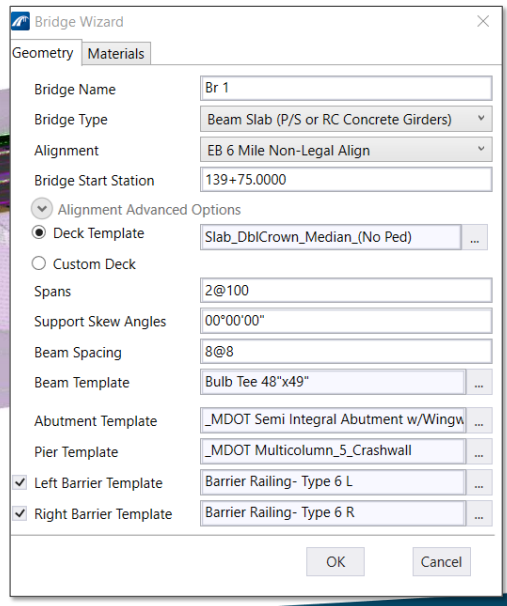
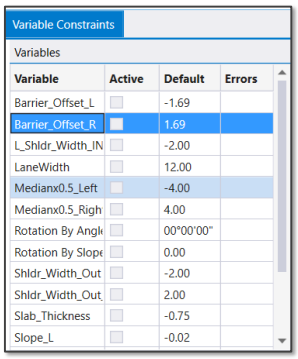


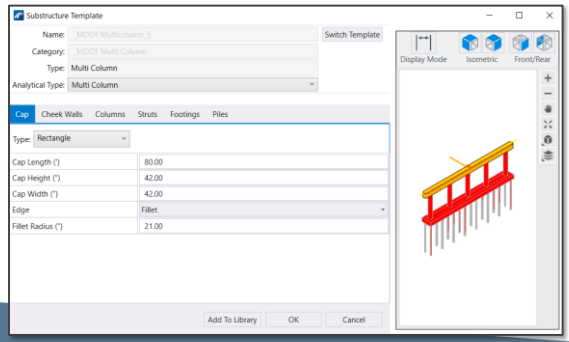
Parametric Modeling

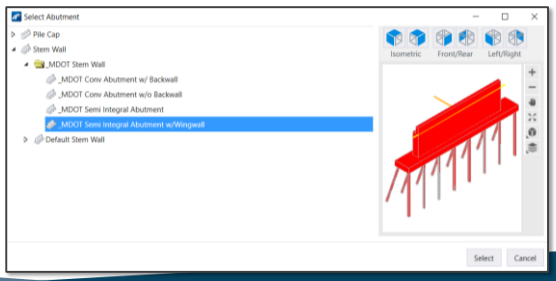




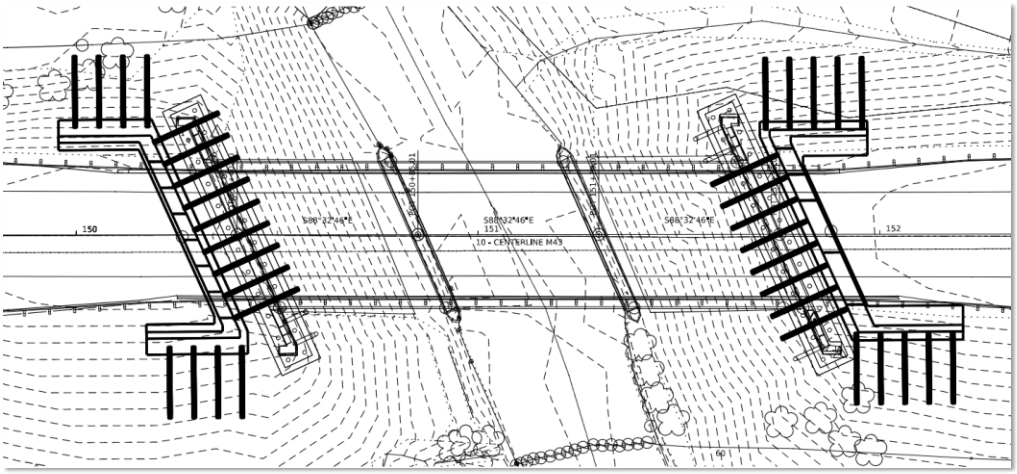
Parametric Modeling



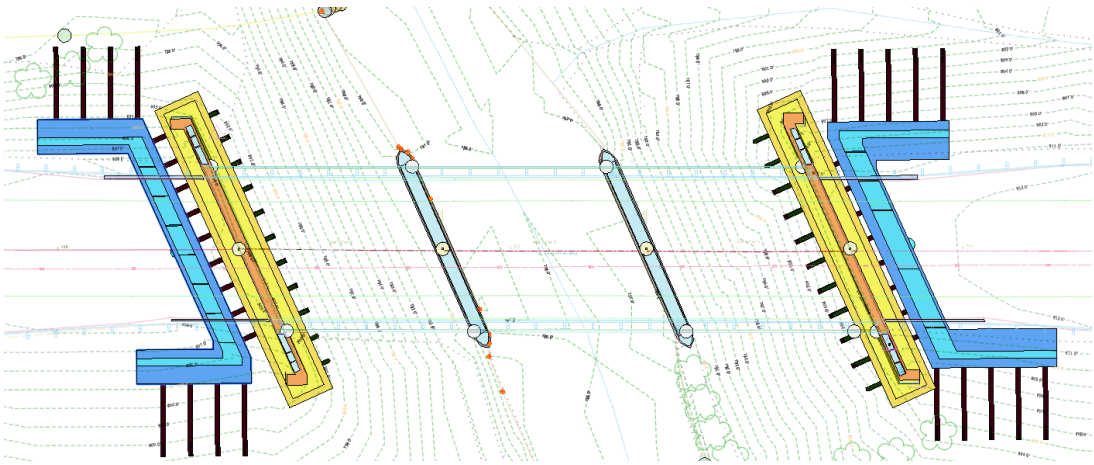




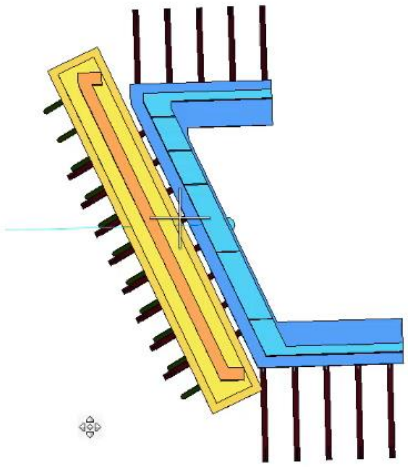
Solids Modeling



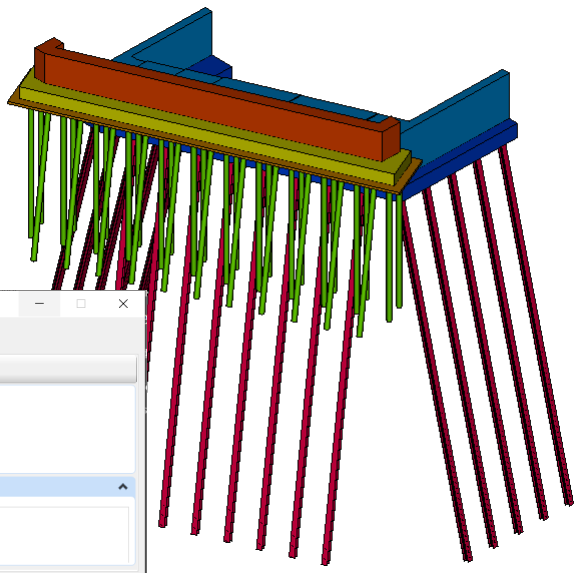
Solids Modeling

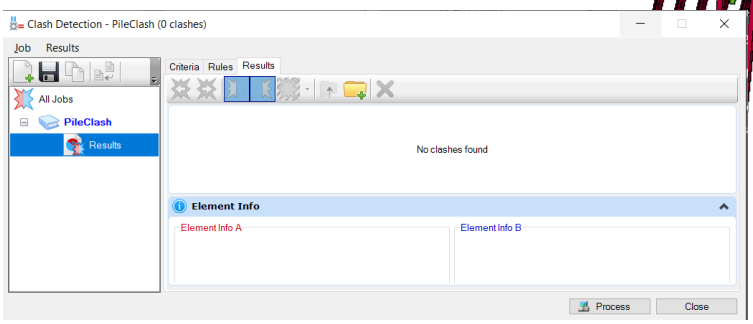


Solids Modeling

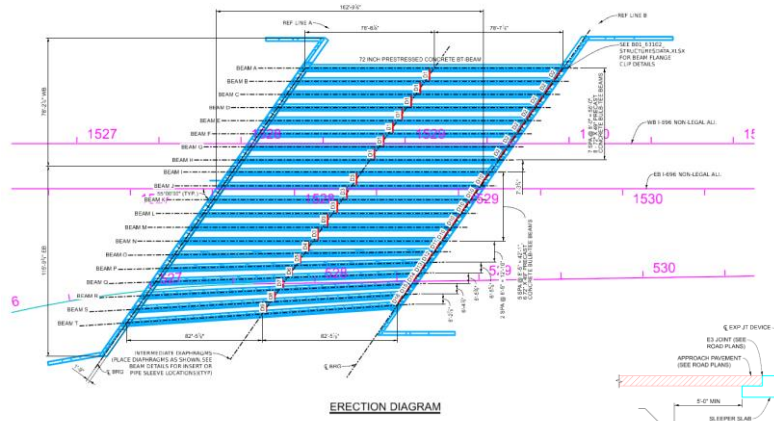


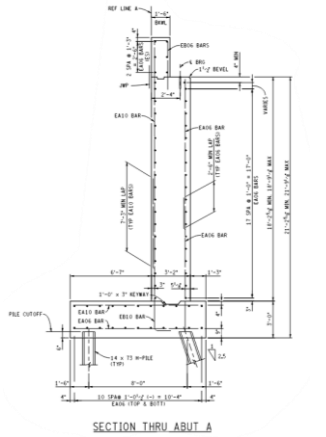
Clash Detection

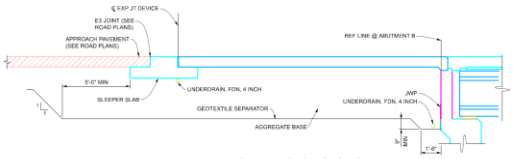




Plan Production







QUESTIONS?