3D BIM MODELING

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

What if?.....
Model Vs. Detailing

PARTIAL METAL BULKHEAD DETAILS

Metal structural details are provided in the drawings for the purpose of illustrating the construction details. The drawings show the metal structural elements and how they are to be fabricated and installed. The details are shown in a clear and concise manner, with annotations and symbols used to provide additional information. The drawings are intended to be used by the contractors and subcontractors to fabricate and install the metal structural elements in accordance with the specifications and drawings.
Future Rehabilitation

Long Term

BIM Project & Asset Management Data Flow

*To use interactive features, open in Adobe Reader
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

AASHTO BRIDGE VISION

Designer  
Contractor

Standard Deliverable

Fabricator

Owner

Public
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

Consultant Team & Industry Partners

SOFTWARE VENDOR INVOLVEMENT
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

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**Pilot Elements**

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

**Training**
- Bidders
- Construction
- Reviewers
- Designers

**Engagement**
- DDWG
- Contractors
- Fabricators
- Surveyors
- Other states

Photo courtesy of Granite Construction
I-696 EB & WB OVER ROUGE RIVER

- 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

- Plan Views
  - #1, Sheet 9
  - #4, Sheet 62
  - #9, Sheet 77
  - #3, Sheet 15
- Longitudinal Sections
  - #8, Sheet 71
  - #7, Sheet 70
- Transverse Cross Sections
  - #6, Sheet 67
  - #5, Sheet 63

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

I-696 RECONSTRUCTION
I-275 to Lahser Road

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

Rethinking Details
3D Model as Legal Document

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

STATIC

DYNAMIC
3D Model as Legal Document

- Access design from model
- Dynamic Digital File
- Saved Views
- Annotations
- Supplemental Documents
3D Model as Legal Document

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

Parametric Modeling

Variable Constraints

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Solids Modeling
Solids Modeling

Clash Detection
Plan Production

QUESTIONS?