



U.S. Department
of Transportation

**Federal Highway
Administration**

Case Study: Iowa DOT 3D Model Deliverable

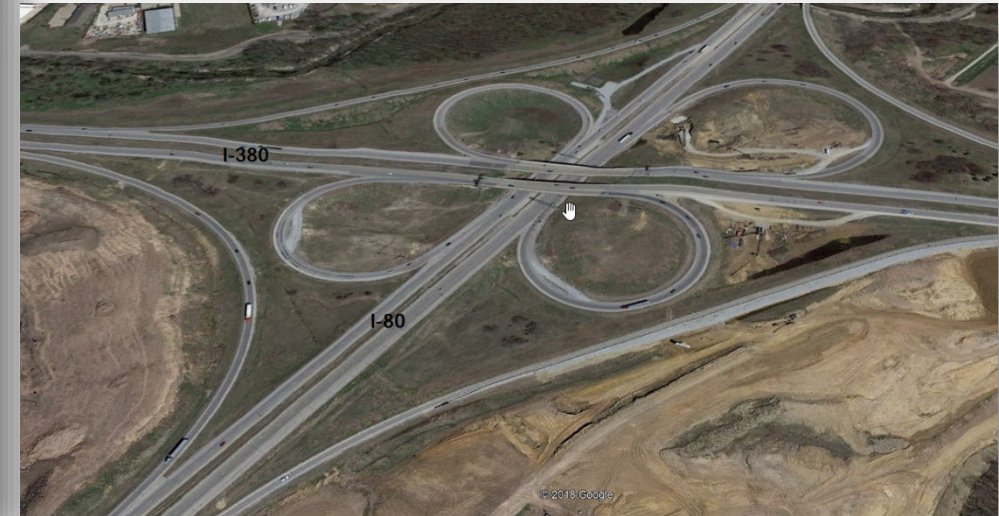
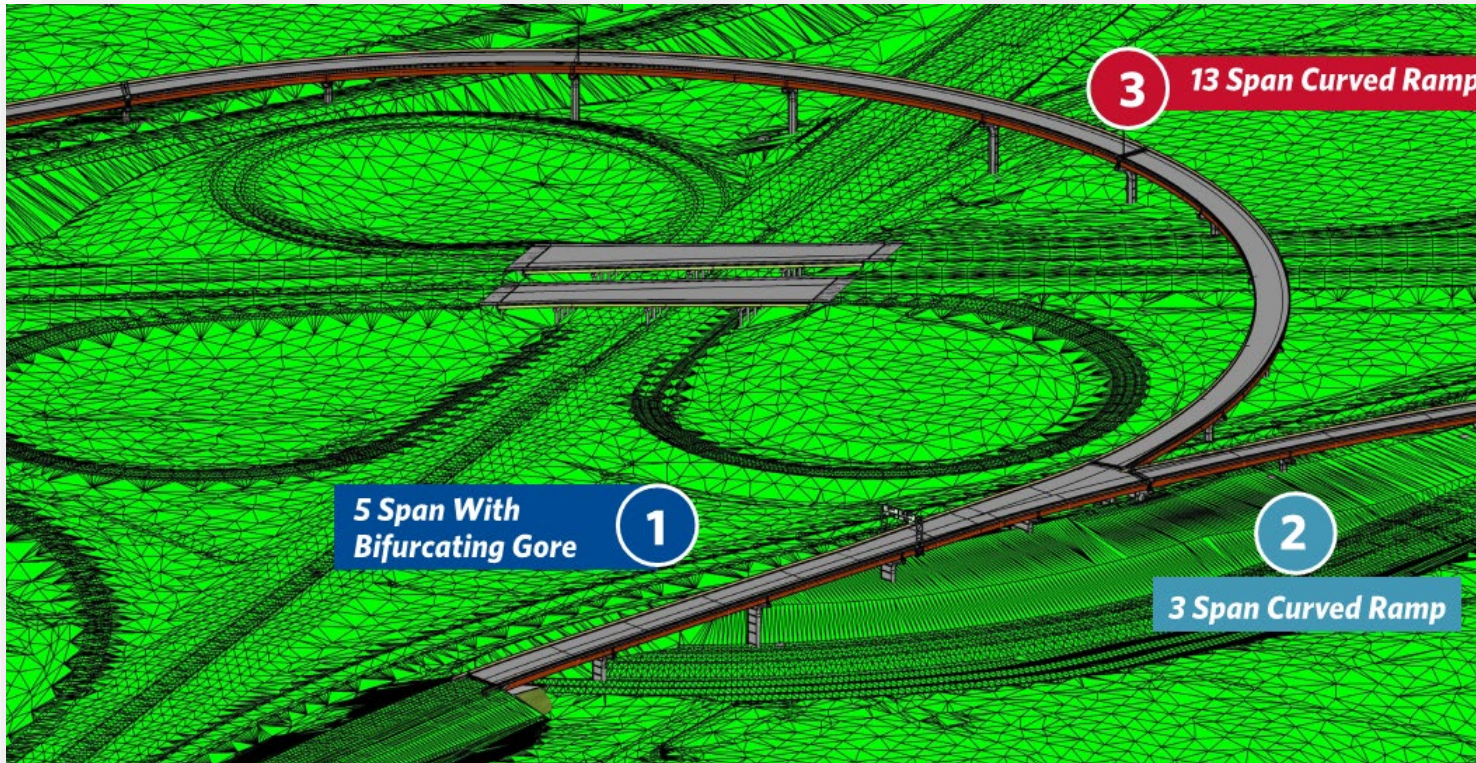
I-80 Eastbound Ramps at I-380

Outline

- Project overview
- BIM for Infrastructure approach
- Available technologies
- Model development
- Results
- Contractor bidding and training
- Project letting
- Lessons learned



Iowa DOT I-80/I-380 Interchange

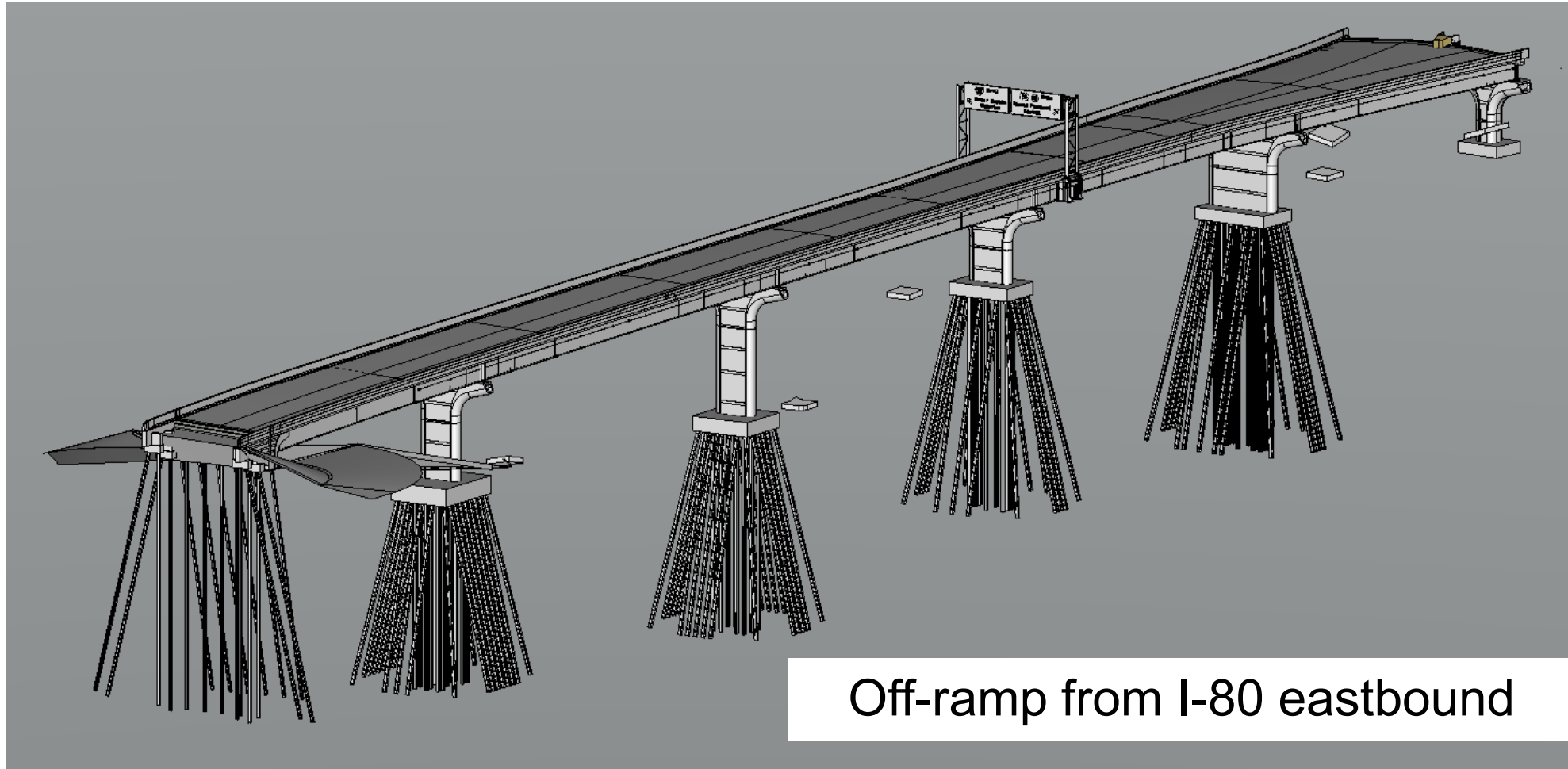


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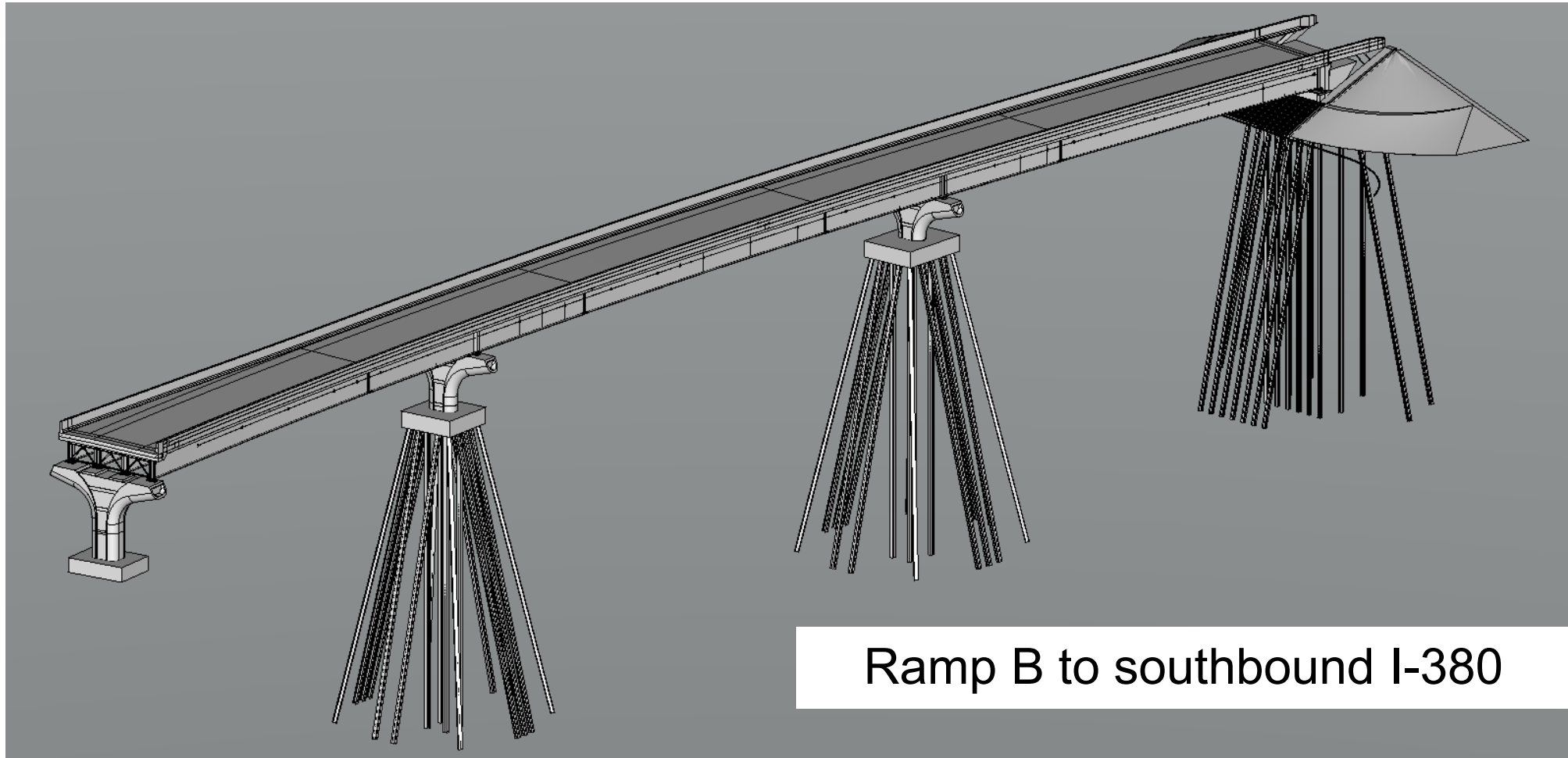
3D Model Scope



Off-ramp from I-80 eastbound



3D Model Scope

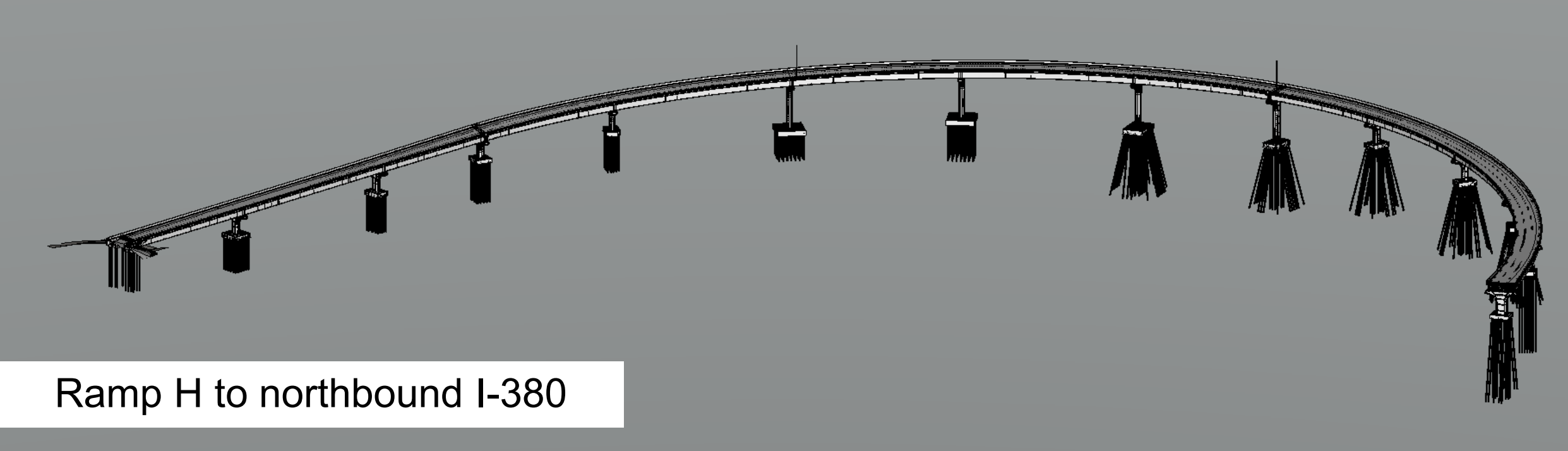


Ramp B to southbound I-380





3D Model Scope

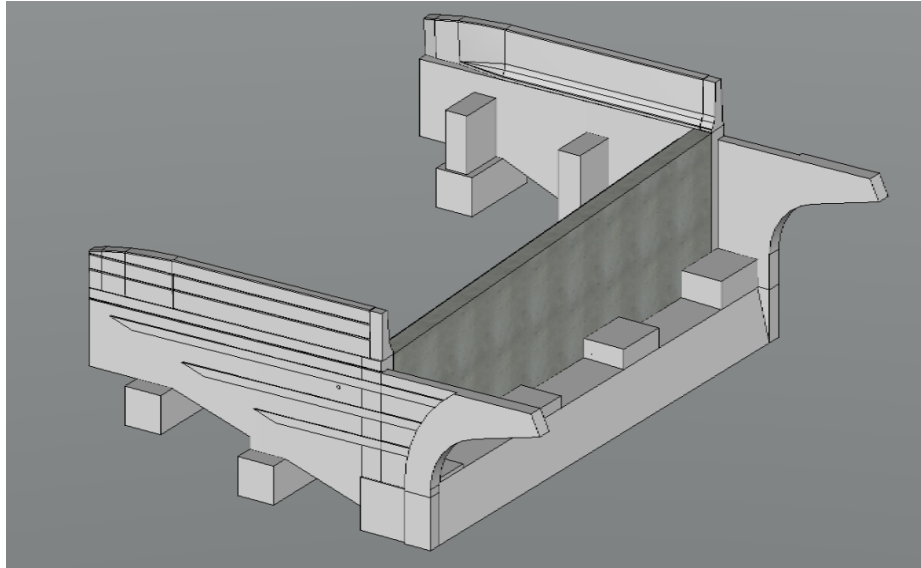
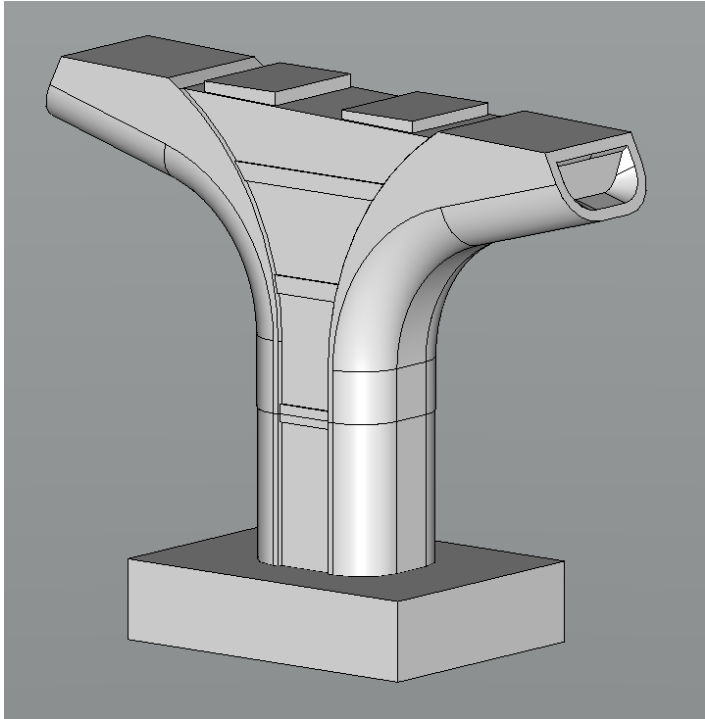


Ramp H to northbound I-380



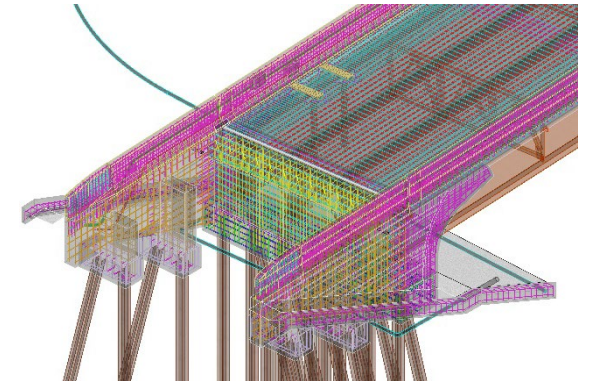
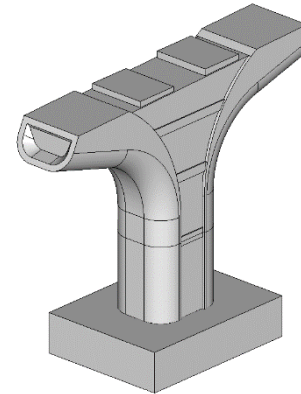
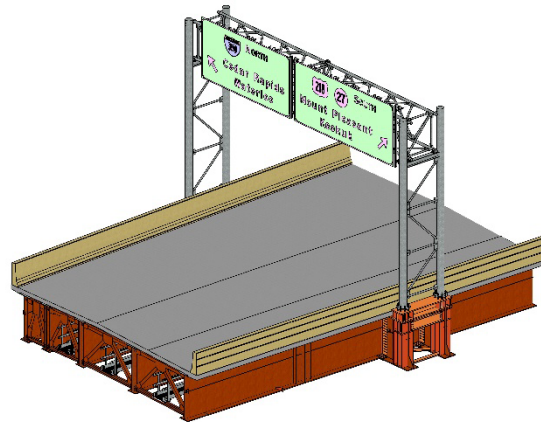
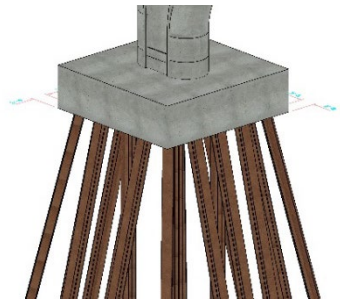
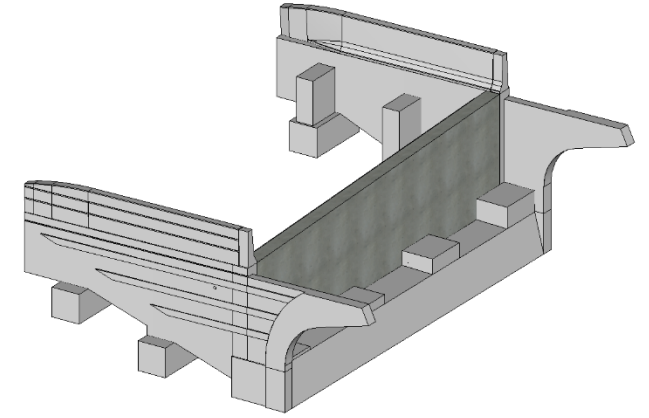
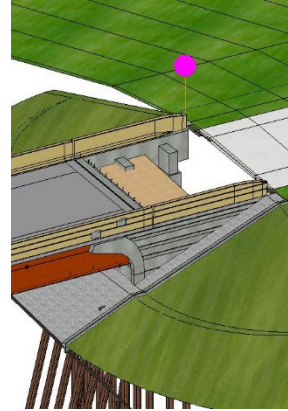
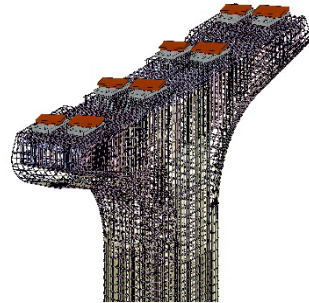
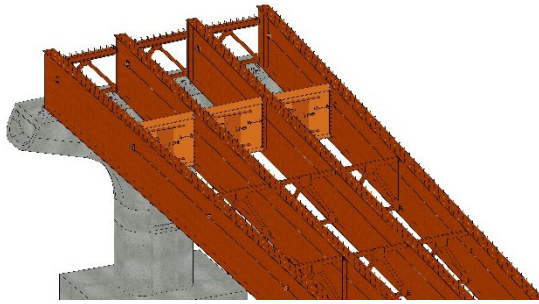


3D Model Scope



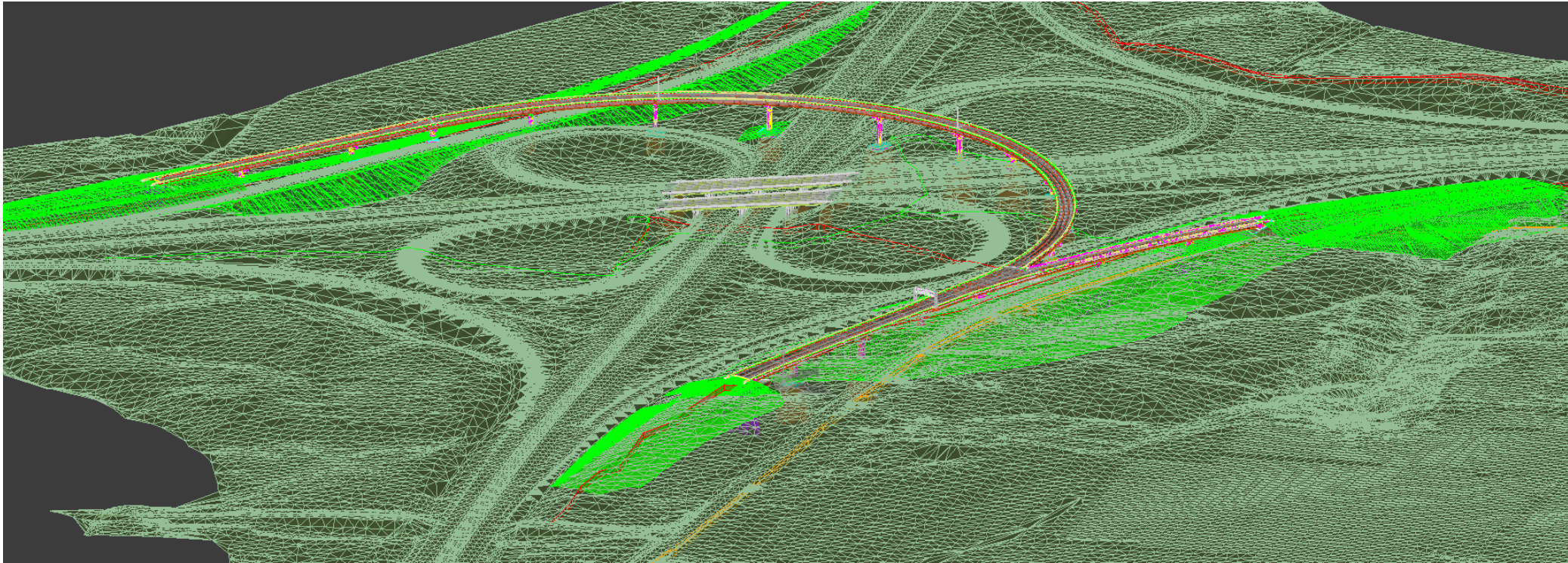
BIM for Infrastructure Approach

Model Element Breakdown



BIM for Infrastructure Approach

Federated Model



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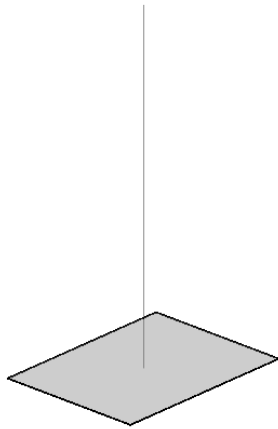
BIM for Infrastructure Approach

			Level of Development (LOD,) Grade, and Model Element Author (MEA)										
Model Elements			CONSTRUCTION DOCUMENTATION			CONSTRUCTION			AS-BUILT			Add Data Spec	Notes
Level	Element Id	Included in Proje	LOD	Grade	MEA	LOD	Grade	MEA	LOD	Grade	MEA		
Level 2	Bridges	Yes											
Level 3	Bridge Substructure	Yes											
Level 4	Bridge Foundation Piling	Yes	300	A		400							
Level 4	Wingwalls	Yes	300	A		350							
Level 4	Bridge Foundation Footings	Yes	300	A		350							
Level 4	Bridge Abutments	Yes	300	A		350							
Level 4	Bridge Piers and Bents	Yes	300	A		350							
Level 3	Bridge Superstructure	Yes											
Level 4	Bridge Decks and Deck Supports	Yes	350	A		350							
Level 4	Bridge Beams	Yes	350	A		400							
Level 4	Girders	Yes	300	A		400							
Level 4	Bridge Joints	Yes	300	A		400							
Level 4	Bridge Bearings	Yes	300	A		400							
Level 4	Bridge Median Barriers	Yes	350	A		350							
Level 3	Bridge Signaling and Control	Yes											
Level 4	Bridge Signage	Yes	200	A		400							
Level 4	Bridge Traffic Barriers	Yes	350	A		350							
Level 3	Bridge Appurtenances	Yes											
Level 4	Bridge Approach Slabs	Yes	350	A		350							
Level 4	Bridge Noise Walls	Yes	200	A		350							
Level 3	Bridge Ancillary Systems	Yes											
Level 4	Bridge Lighting	Yes	300	A		350							
Level 4	Bridge Drainage Systems	Yes	300	A		350							
Level 3	Bridge Decks	Yes											
Level 4	Concrete Bridge Decks	Yes	350	A		350							
Level 4	Wearing Surfaces	Yes	300	A		350							
Level 4	Bridge Barriers	Yes	350	A		350							
Level 4	Curb	Yes	300	A		350							

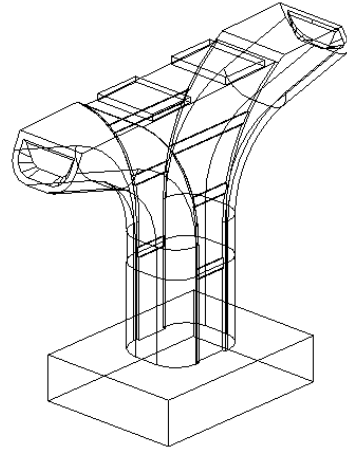


BIM for Infrastructure Approach

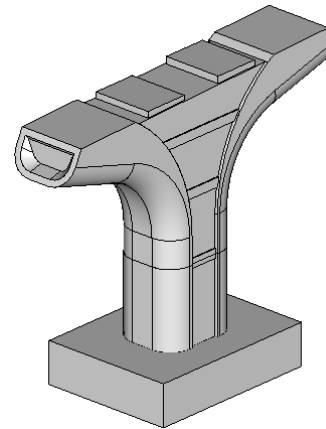
Level of Development (simplified)



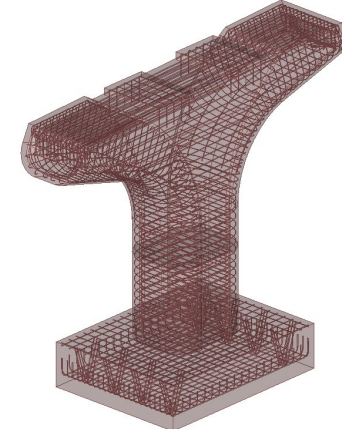
100
Concept



200
Preliminary



300
Final Design



350-400
Construction-
Fabrication



Results



Provide BIM model for information

Hybrid Model

- Ramp BH & H bridges - 2D plan deliverable (*BIM model for information*)
- Ramp B bridge - BIM model deliverable (*BIM model deliverable with links augmenting model*)

- Reduce contractor risk
- Promote BIM usage
- Gather information on BIM usage (*during construction*)



Results



Results

Appendix A: Digital Contract Files Listing

The digital files listed below are contained within the bid order package, associated with the project number IM-080-6(355)239--13-52 available for download at: http://www.iowadot.gov/contracts/lettings.html	STRUCTURAL DESIGN
	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. Signature _____ Date _____ Printed or Typed Name _____ My license renewal date is December 31, 2019
Digital files shown in the table below are covered by this seal listed in pages: 1 of 1	
52080355_420 BIM\	Date Modified:
52080355_420_iM.i.dgn	4/30/2018
References\	
52080355_420_OBM_iM.i.dgn	4/30/2018
52080355_420_PS_iM.i.dgn	4/30/2018

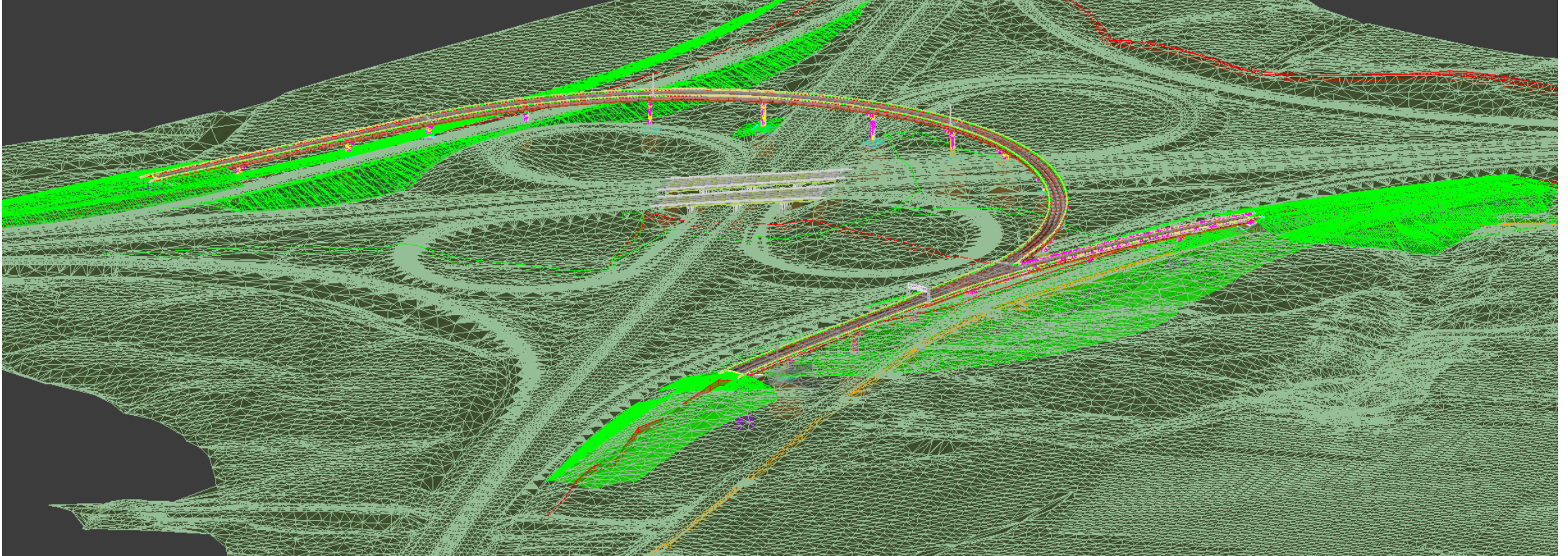
**Special Provision developed
for digital file delivery**

- List of files and access instructions
- Software requirements
- Information hierarchy
- LOD table for each element type
- List of known deficiencies within the model
- Appendix with seal and list of covered digital files
- List of referenced files provided for information only

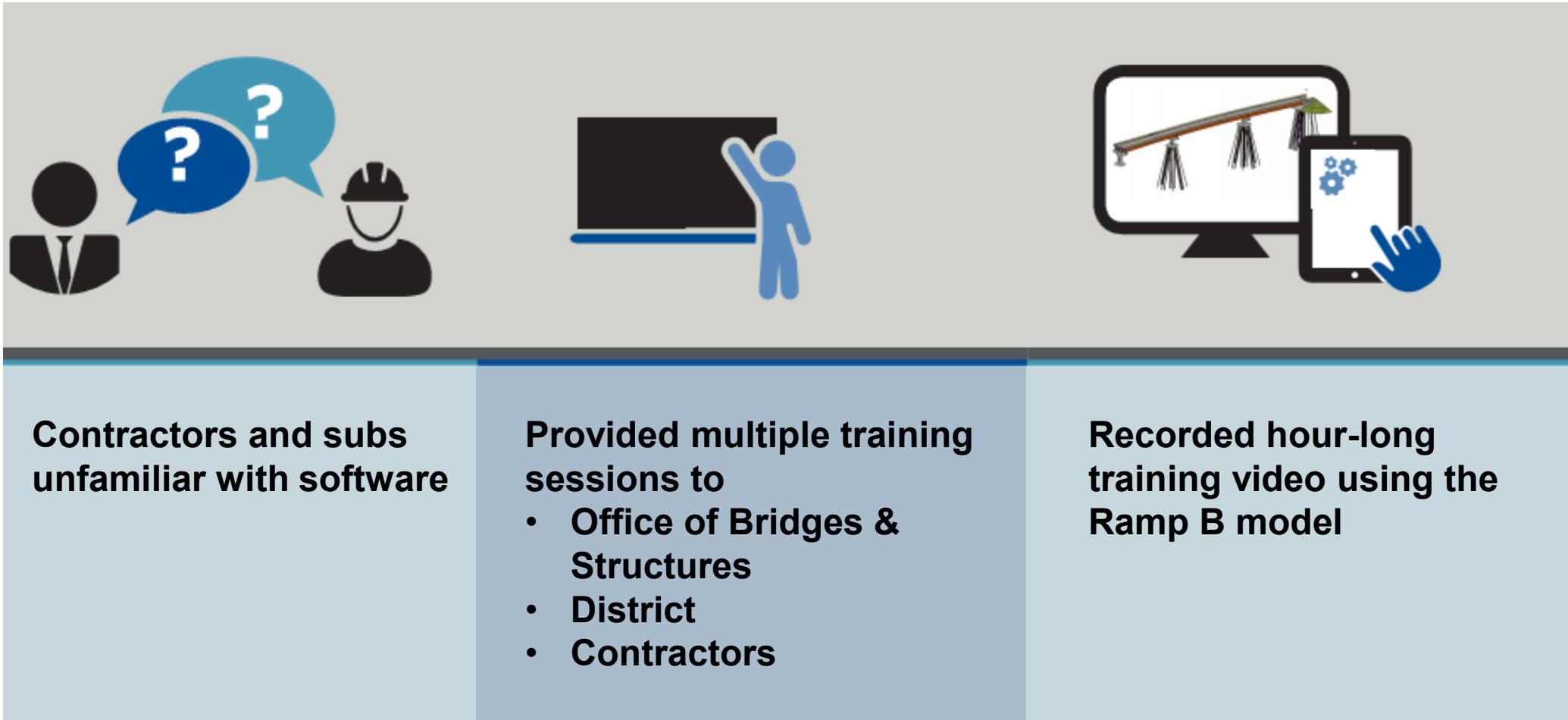


Contractor Bidding

Model Deliverables



Contractor Training



Project Letting



PROJECT AWARDED

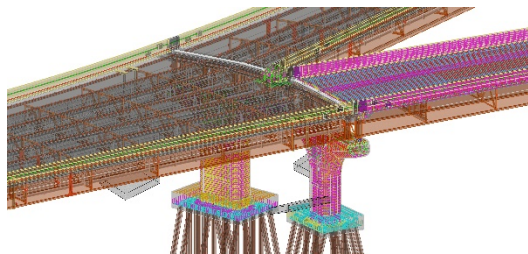
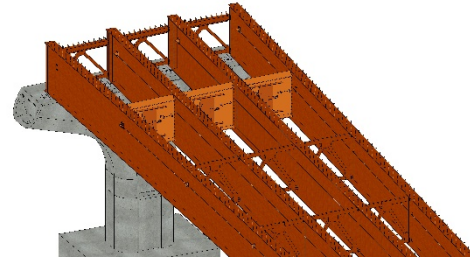
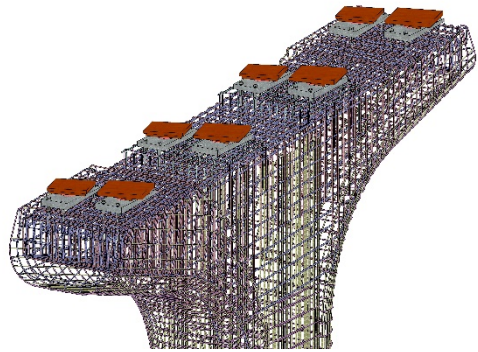
APPARENT LOW BID

**UNDER ENGINEER'S
ESTIMATE**

**CONTRACTOR ATTENDED
ALL AGC MEETINGS**



Lessons Learned



- OBM capable of only basic structure element shapes
- Rebar model was not able to be directly transferred to bar bending equipment
- More than one program will be needed to supply desired complex shapes
- Industry continues to struggle with access model data





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