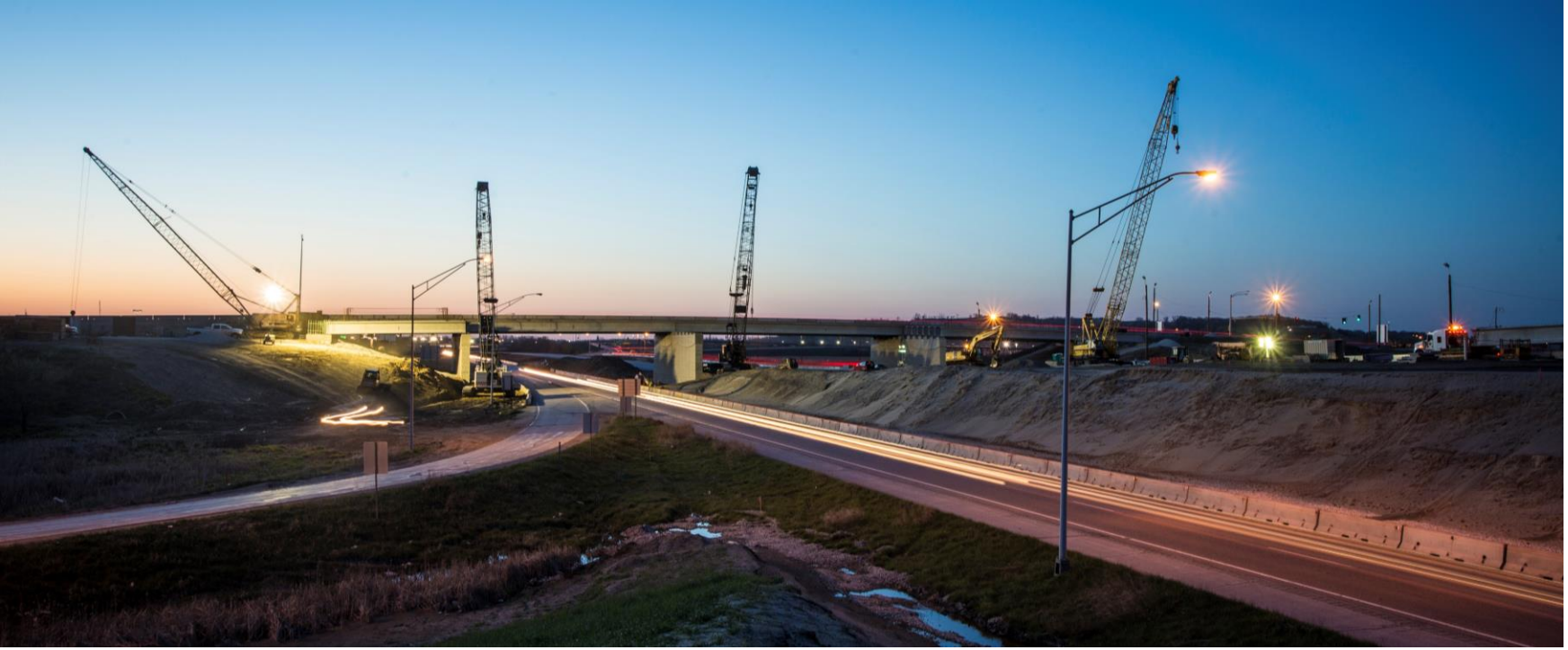
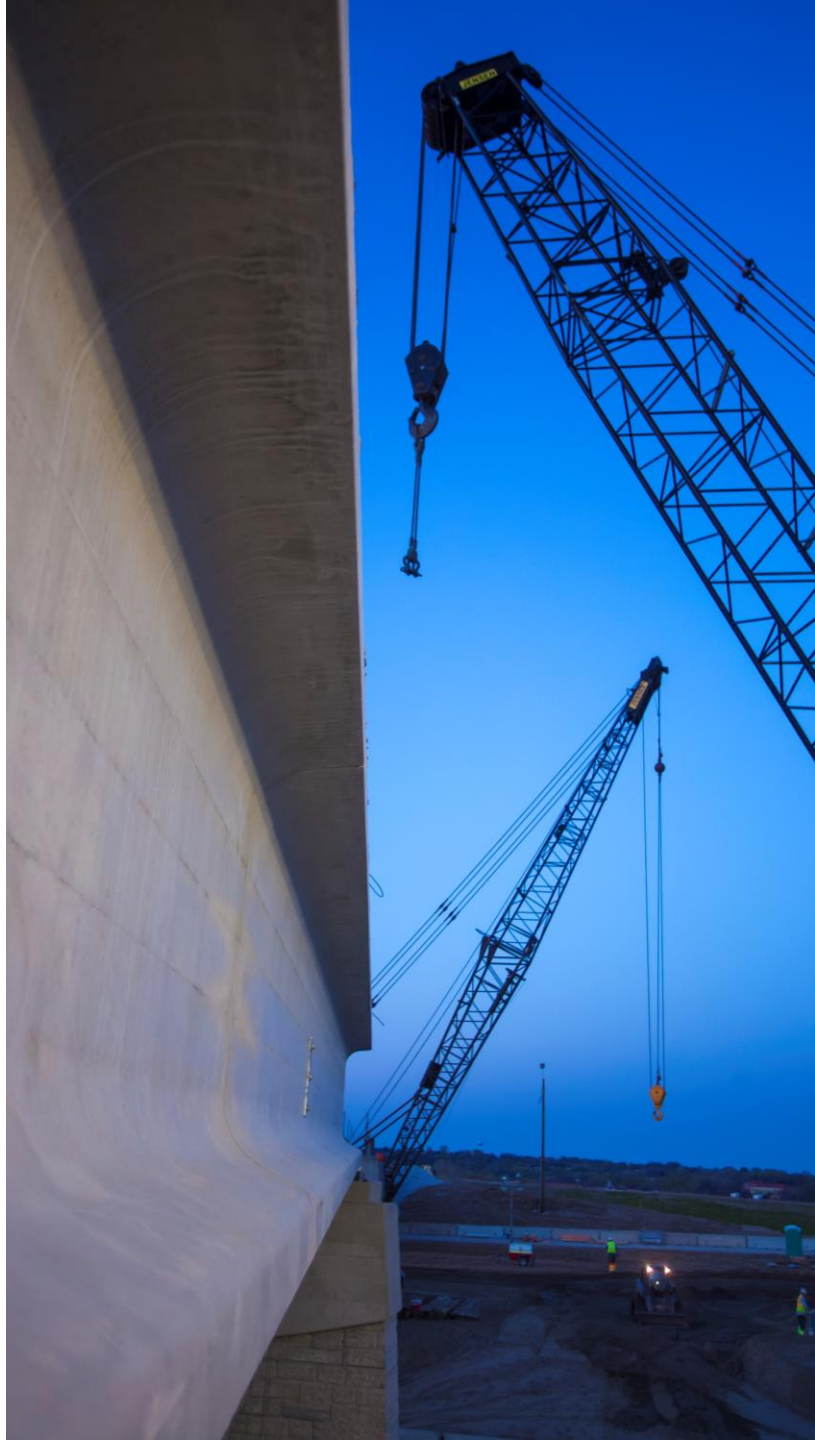
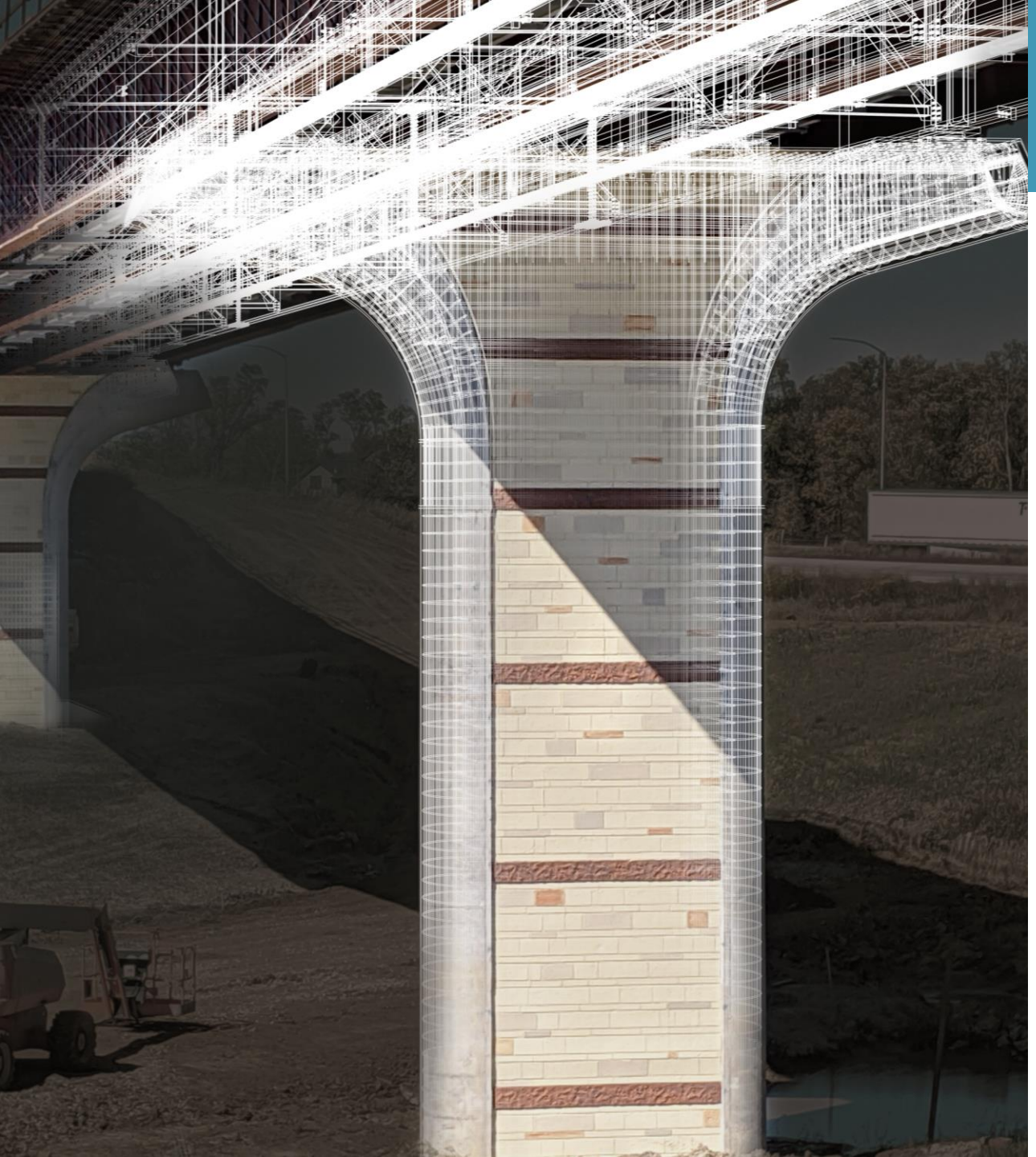




2023 Iowa DOT Bridge Forum on 3D and Digital Deliverables

Perspective of a National Contractor

MATT BLAKE
10.31.2023



Agenda

01 Industry Wide Challenges

02 Why Digital Deliverables for Construction?

03 Benefits & Use Cases

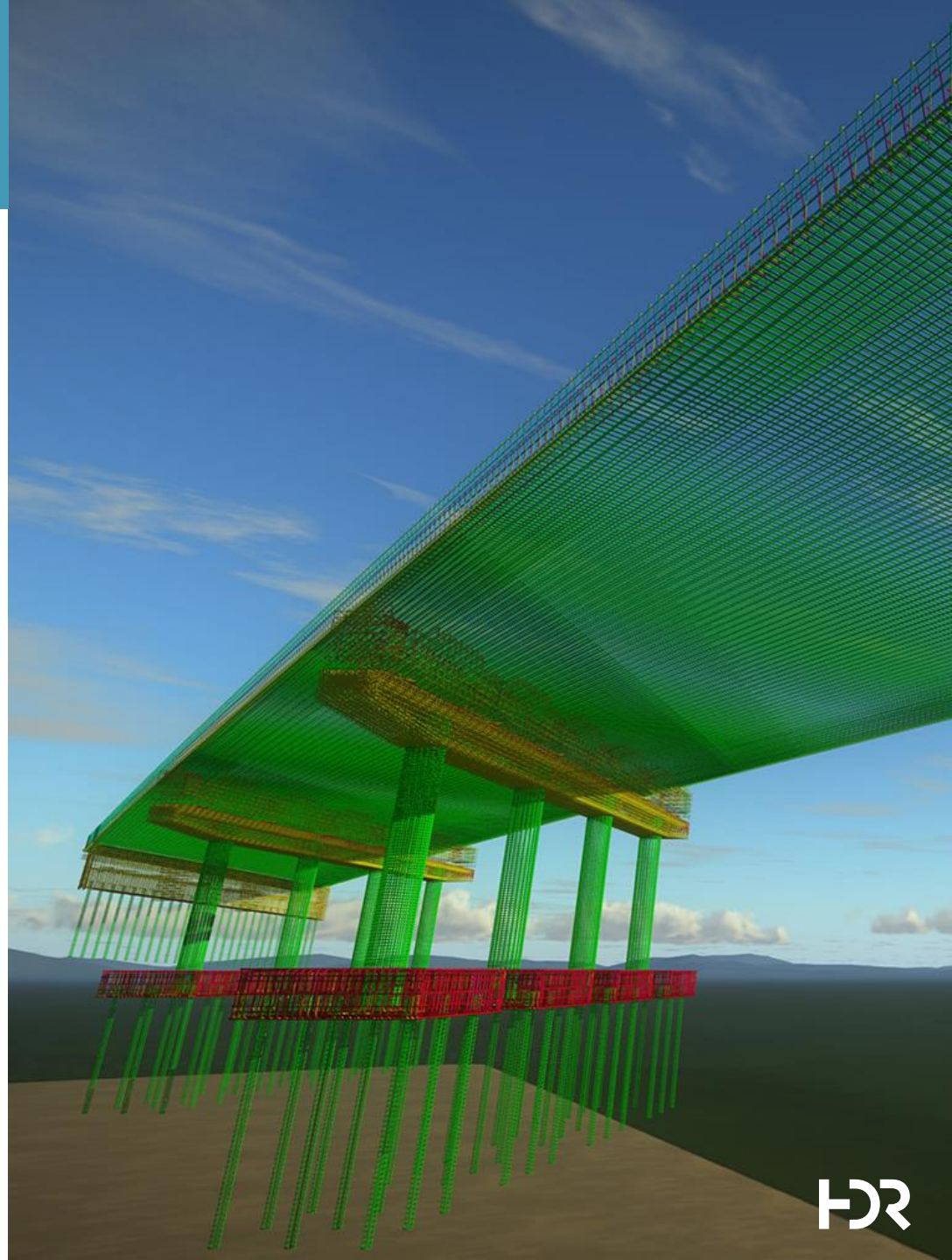
04 How do we get there?

05 Resources Questions

01 Industry Wide Challenges

Recognized Challenges

- Design Development and Management
  - *Quantity Development*
  - *Accurate Cost*
  - *Schedule Certainty*
  - *Constructability/Phasing/ Sequencing*
  - *Risk Mitigation*
  - *Safety*
- Reliance upon provided digital data (MALD)
- Data and design provided in proprietary formats
- Increased efficiencies in estimating, scheduling, and work sequencing
- Clash Detection
- Vocabulary, definitions, and nomenclature



02 Why Digital Deliverables for Construction?

Why?

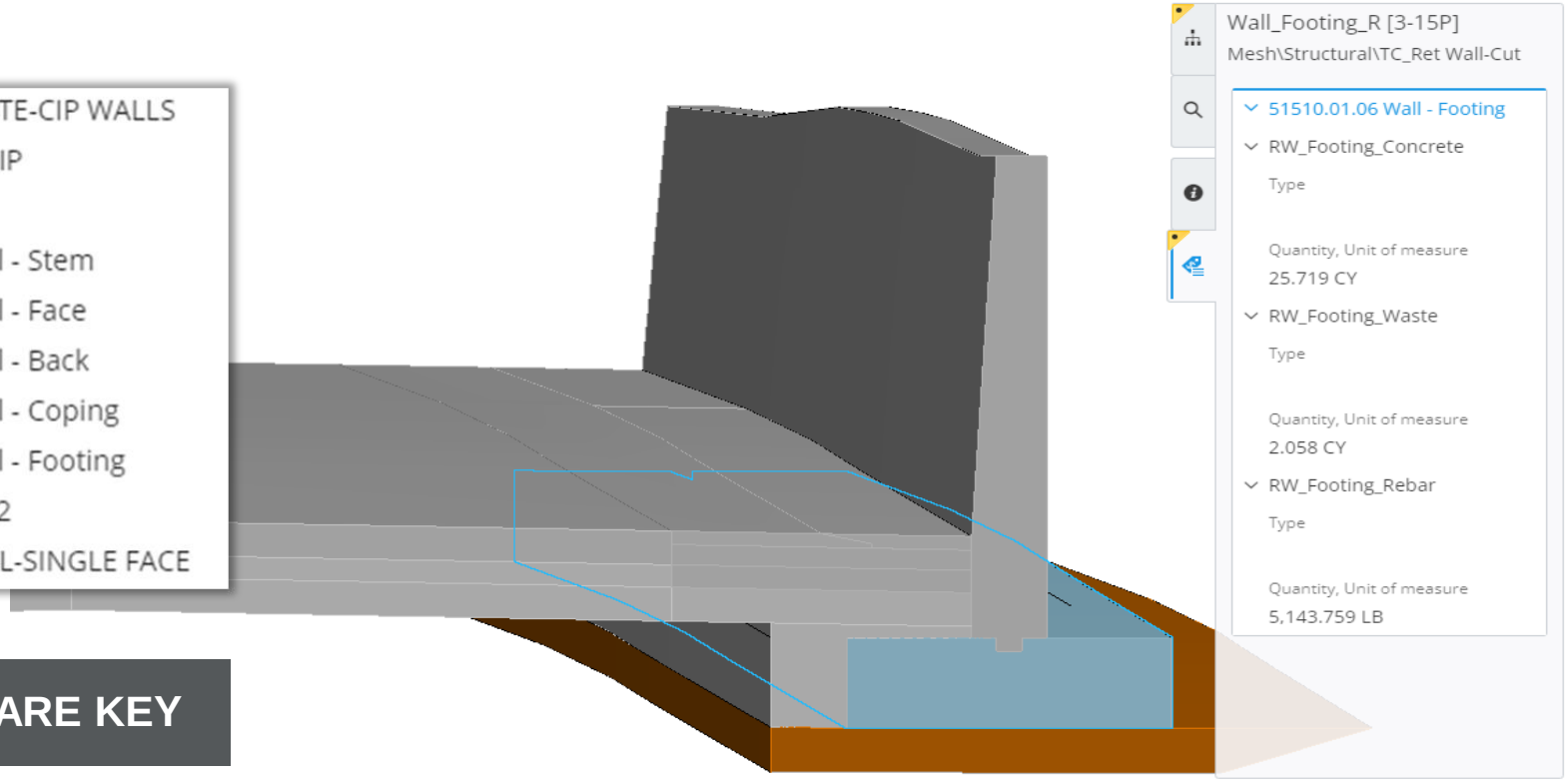
- Consistency
- Accuracy
- Timeliness
- Repeatability
- Transparency and clear understanding design intent
- Durability
- Streamlined Processes
  - *Consistent Training*
  - *Simplified Workflows*
- Optimized Means & Methods
- Reduced Change Orders

Durable Deliverables Through Connected Data

- What is the common thread?
- Structured data
- Capturing Incidental Quantities in the Model

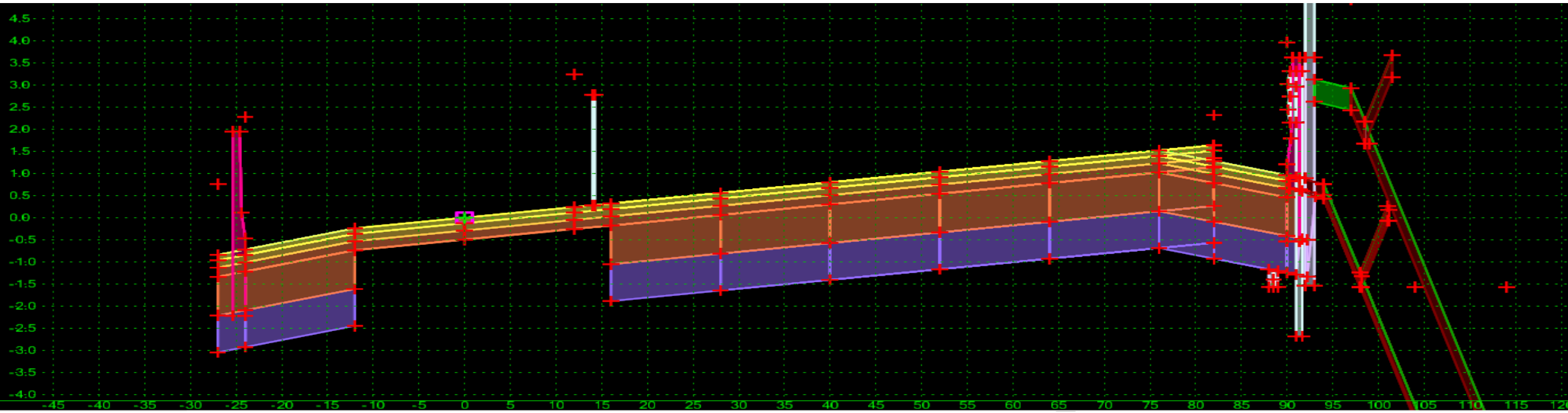
51510.01 RW_CIP_01		
RW_CIP_Concrete	24.649	CY
RW_CIP_Form	1,198.643	SF
RW_CIP_Waste	1.232	CY
RW_CIP_Rebar	3,769.141	LB
RW_CIP_Coping	16.471	LF
RW_Footing_Concrete	25.721	CY
RW_Footing_Form	978.374	SF
RW_Footing_Waste	2.058	CY
RW_Footing_Rebar	5,144.218	LB

- 51500 STRUCTURAL CONCRETE-CIP WALLS
  - 51510 RETAINING WALL-CIP
    - 51510.01 RW_CIP_01
      - 51510.01.01 Wall - Stem
      - 51510.01.02 Wall - Face
      - 51510.01.03 Wall - Back
      - 51510.01.04 Wall - Coping
      - 51510.01.05 Wall - Footing
    - 51510.02 RW_CIP_02
  - 51520 RETAINING WALL-SINGLE FACE



STRUCTURED & CONNECTED DATA ARE KEY

Data Embedment



PROPERTIES OF 3D MODELS

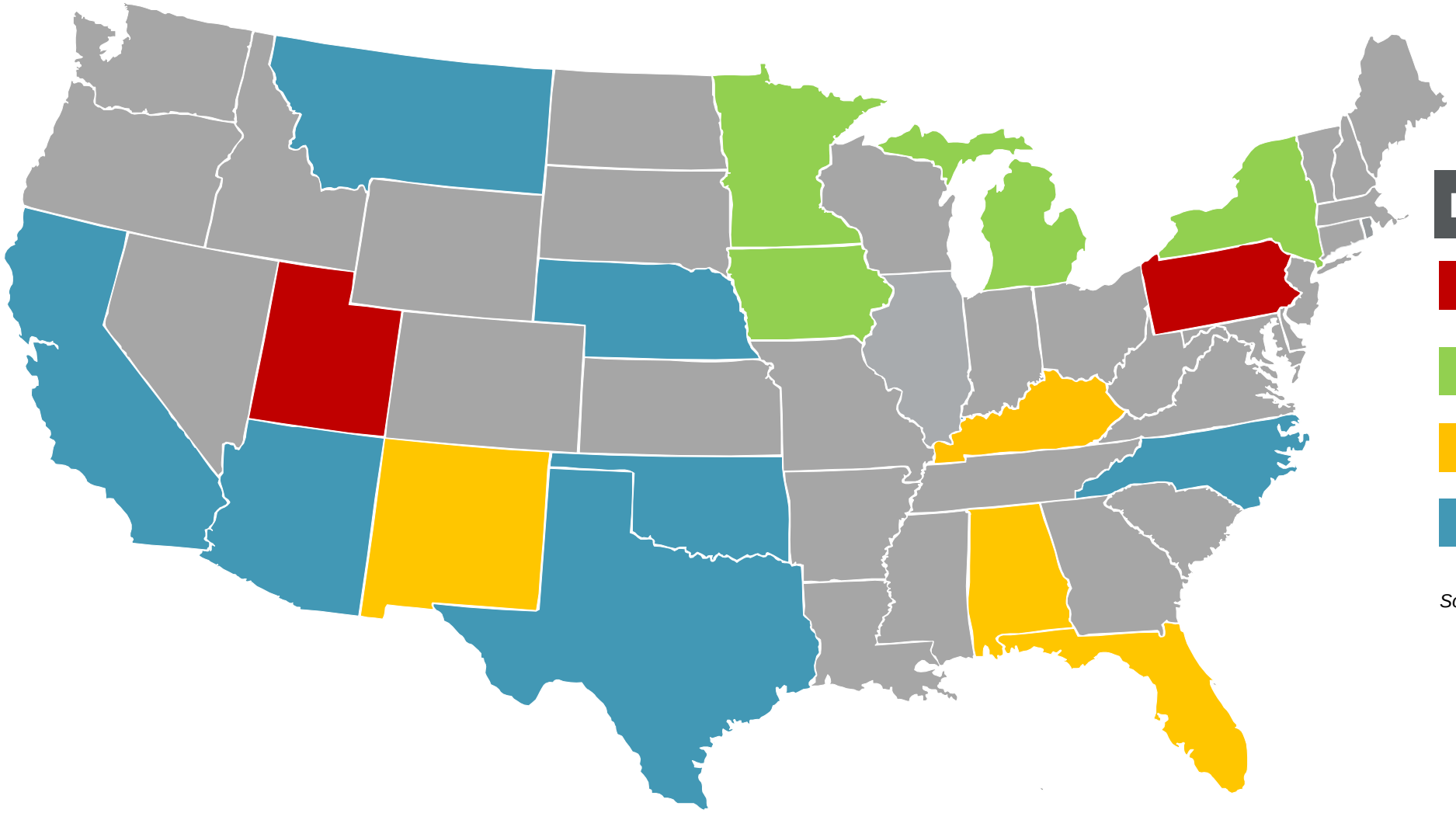
Integrating future surface & point needs in project templates

WORKFLOW INTEGRATION

Enhanced 3D models facilitate digital workflows across life of project

Digital Delivery State of the Practice

Model as the Legal Document



LEGEND

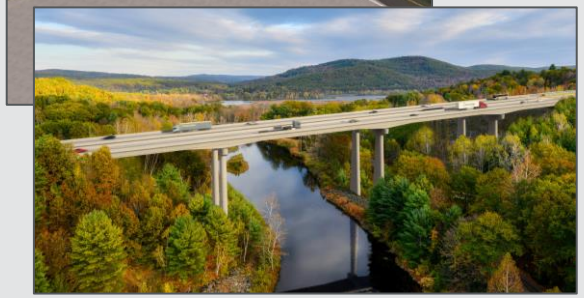
- Pilot – Planless MALD – Level 4
- Pilot – Bridge/ AMG MALD – Level 3
- Pilot – AMG MALD – Level 3
- Strategic Planning for MALD

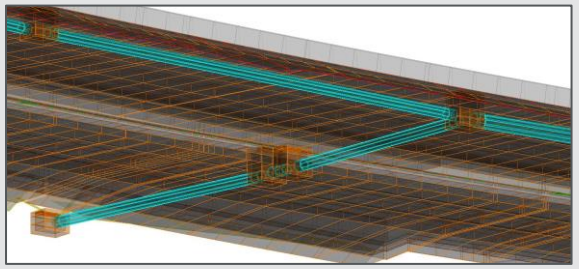
Source : HDR – September 2023

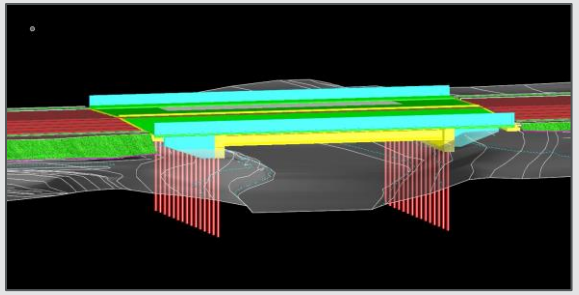
03 Benefits & Use Cases

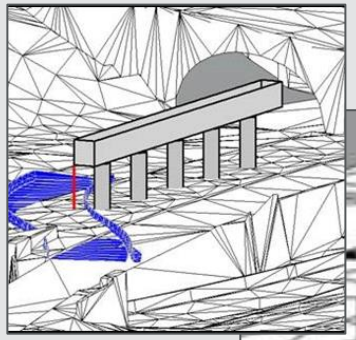
Benefits for All Stakeholders

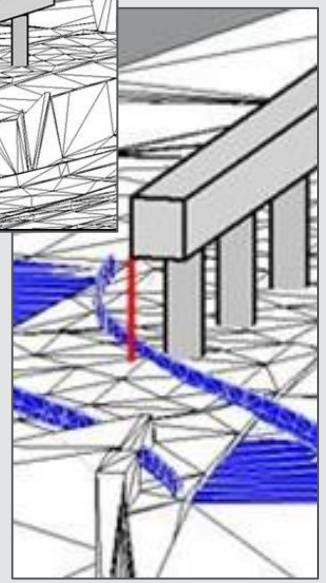
Visualization	Multi-Disciplinary Coordination	Clearance Checks	Field of Vision Studies
Photorealistic renderings from Design Data to communicate information to all stakeholders	Clear and transparent coordination among project disciplines to eliminate overlap and potential issues prior to construction	Coordinate temporary alignments with existing/proposed structures	Produce field of vision confirmation using 3D model camera locations











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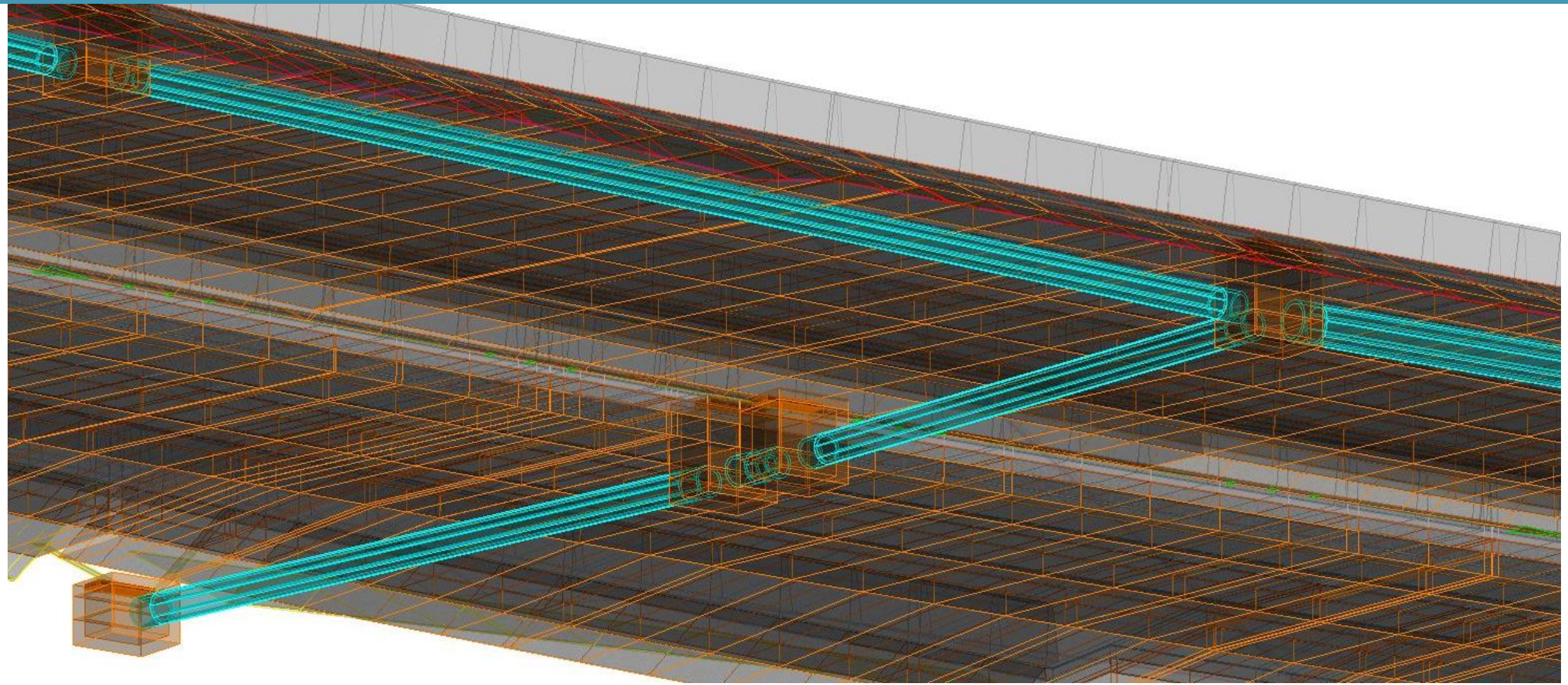

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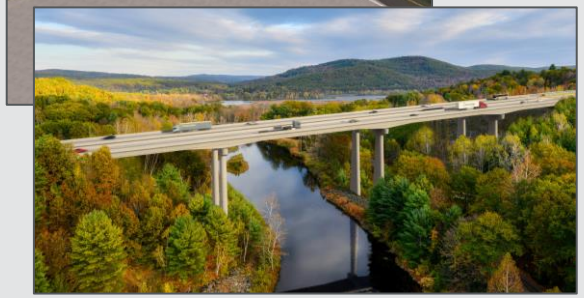
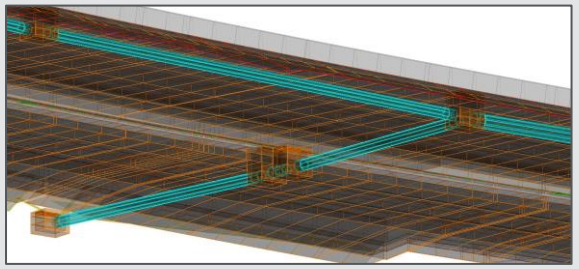
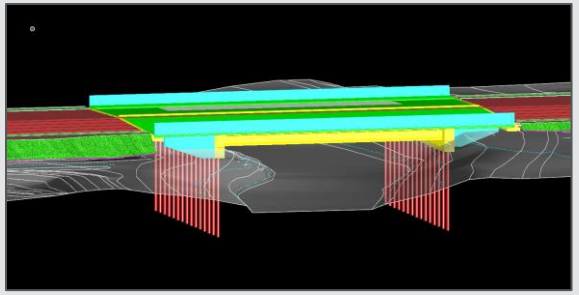
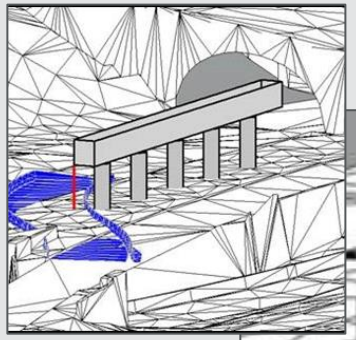
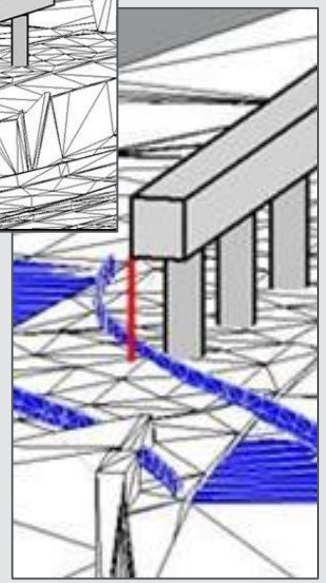






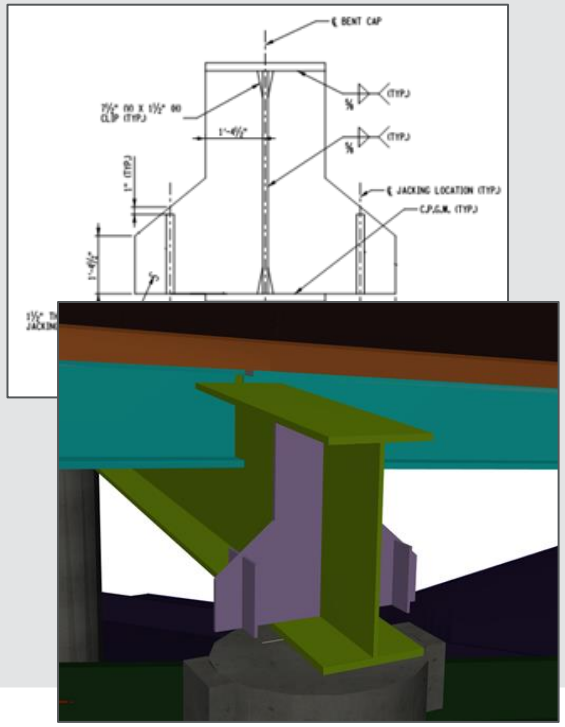




Benefits for All Stakeholders

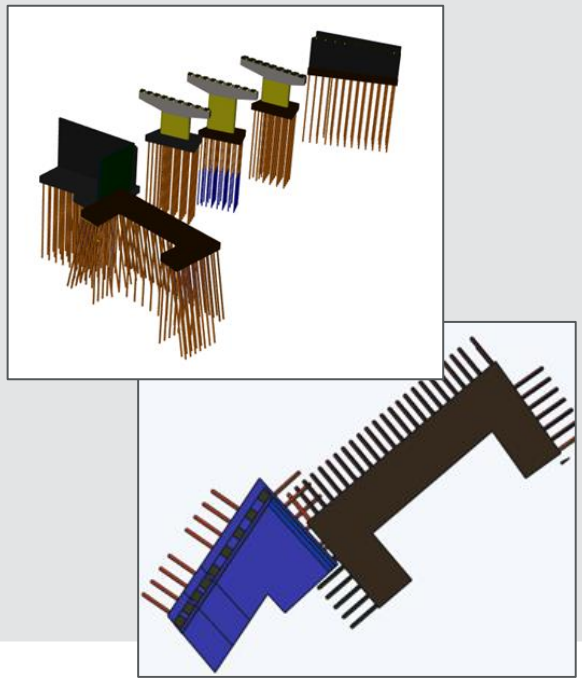
Geometry Coordination

Visualize unique details to facilitate team and stakeholder collaboration



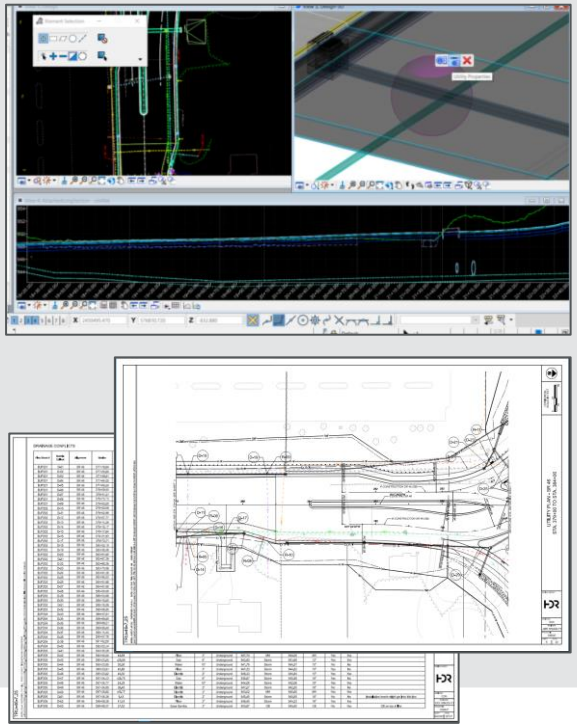
Clash Detection

Coordinate proposed construction and existing conditions for constructability, before ”real” impacts arise



Utility Coordination

Ability to coordinate & adjust for impacts to existing utilities reducing risk, cost & schedule

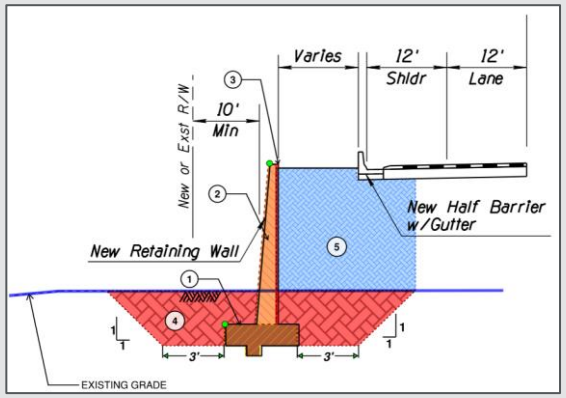


Quantities

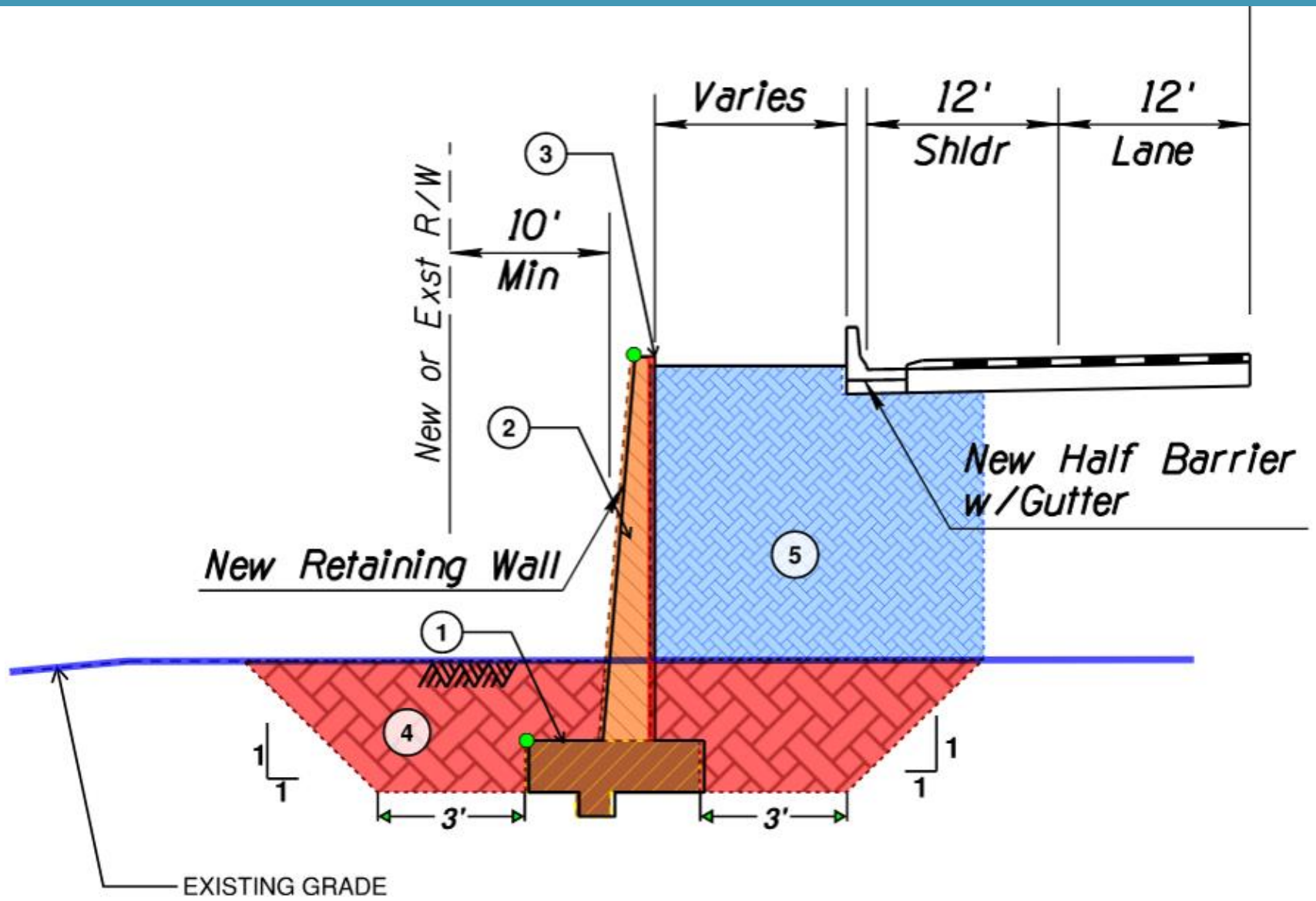
Generate accurate & timely quantities in a repeatable manner to drive decisions

- *Planning*
- *Budgeting*
- *Bidding*
- *Construction*
- *Asset Management*

Different Models for Different Uses



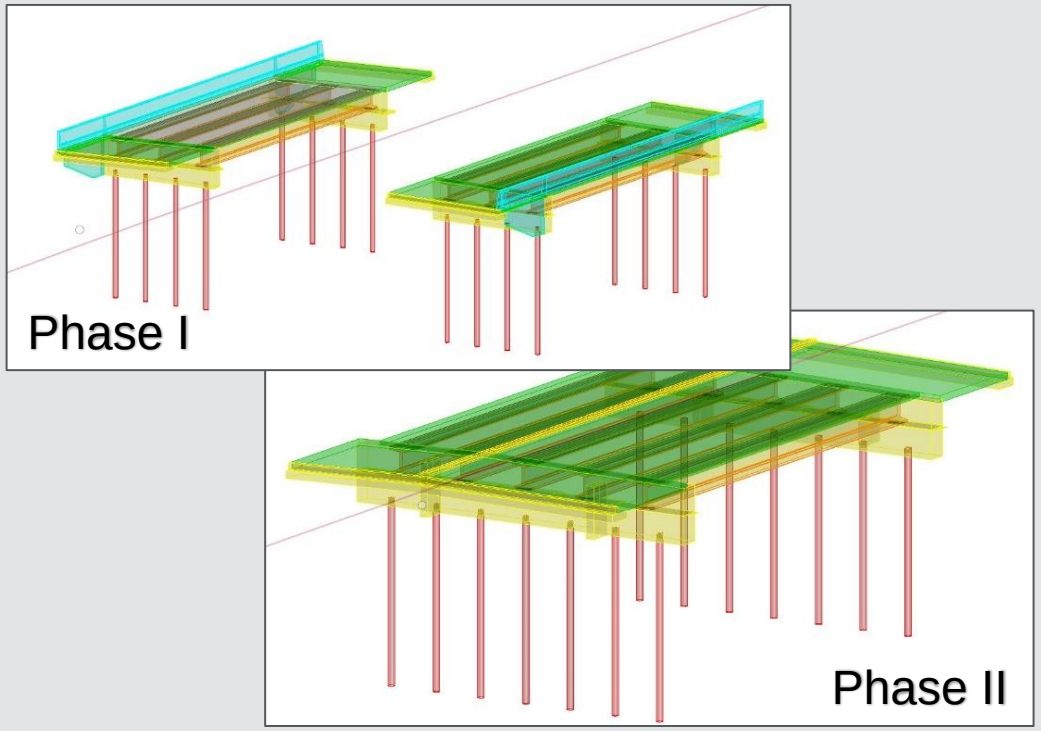
Benefits for All Stakeholders

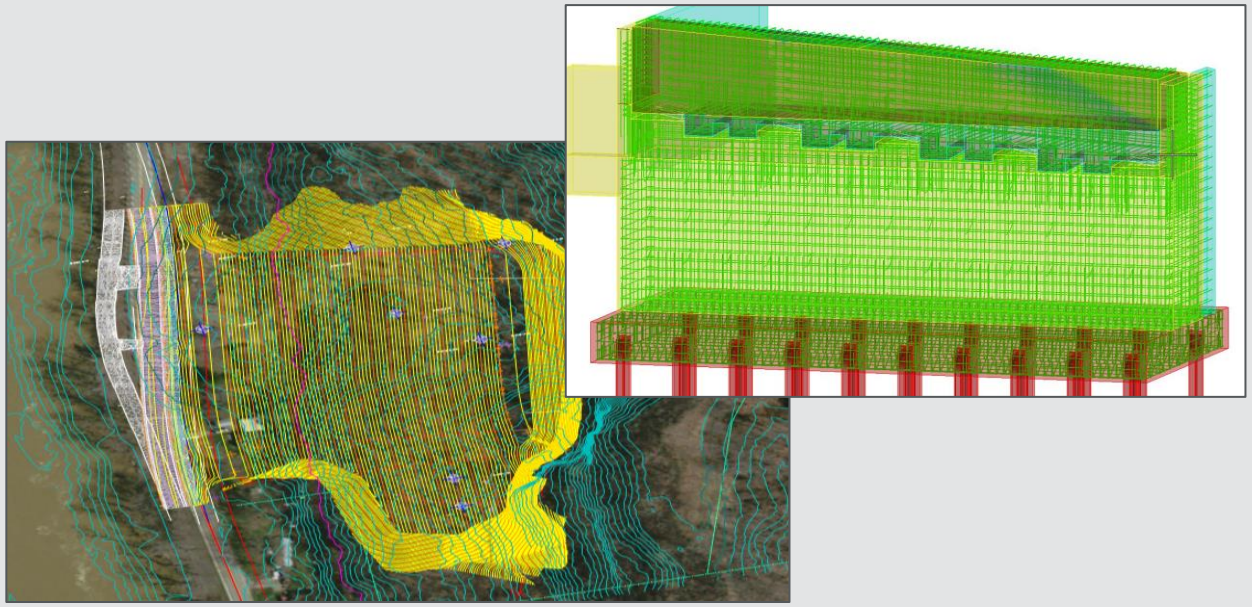


Construction & Constructability

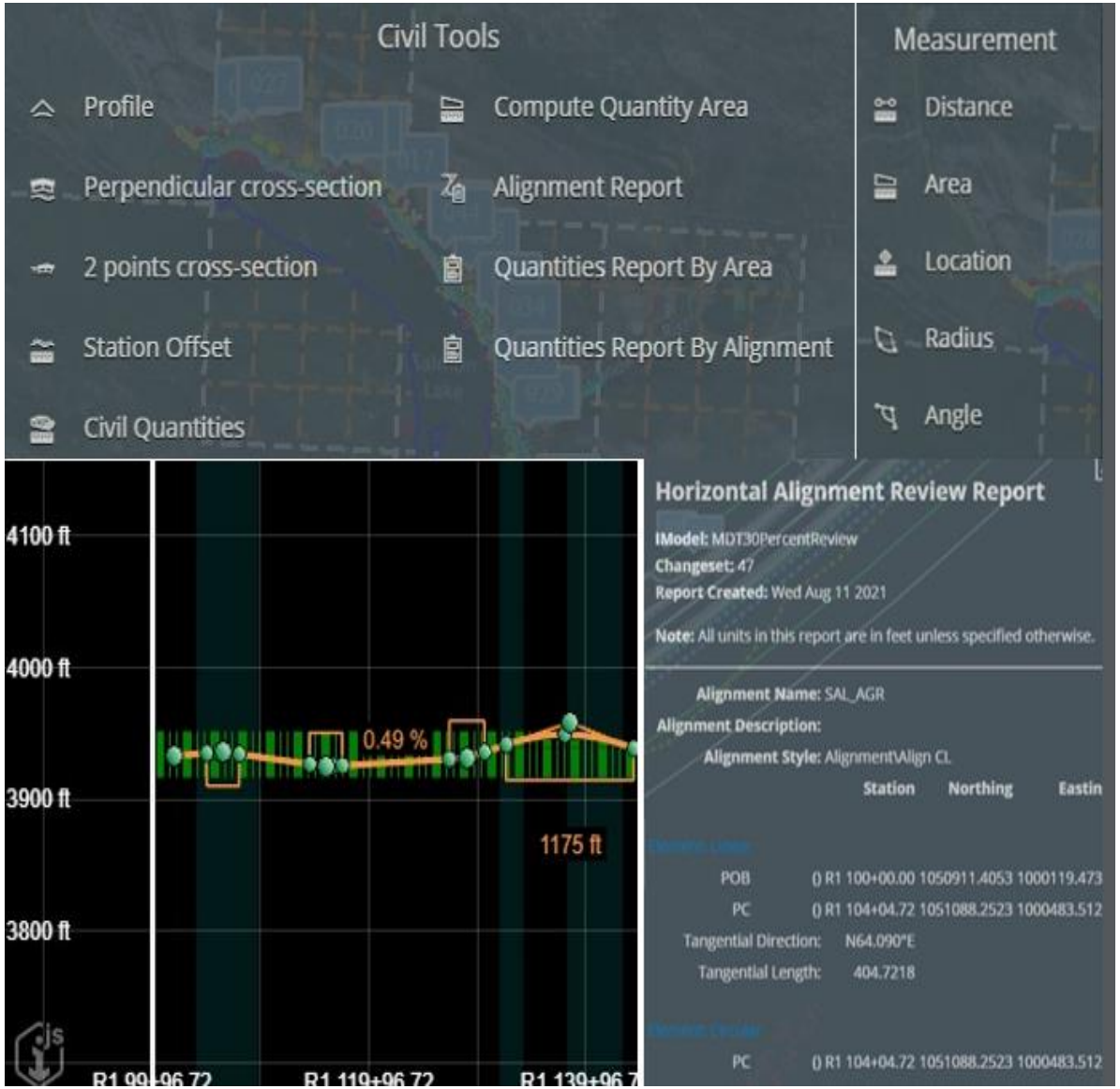
Design Model vs Construction Model

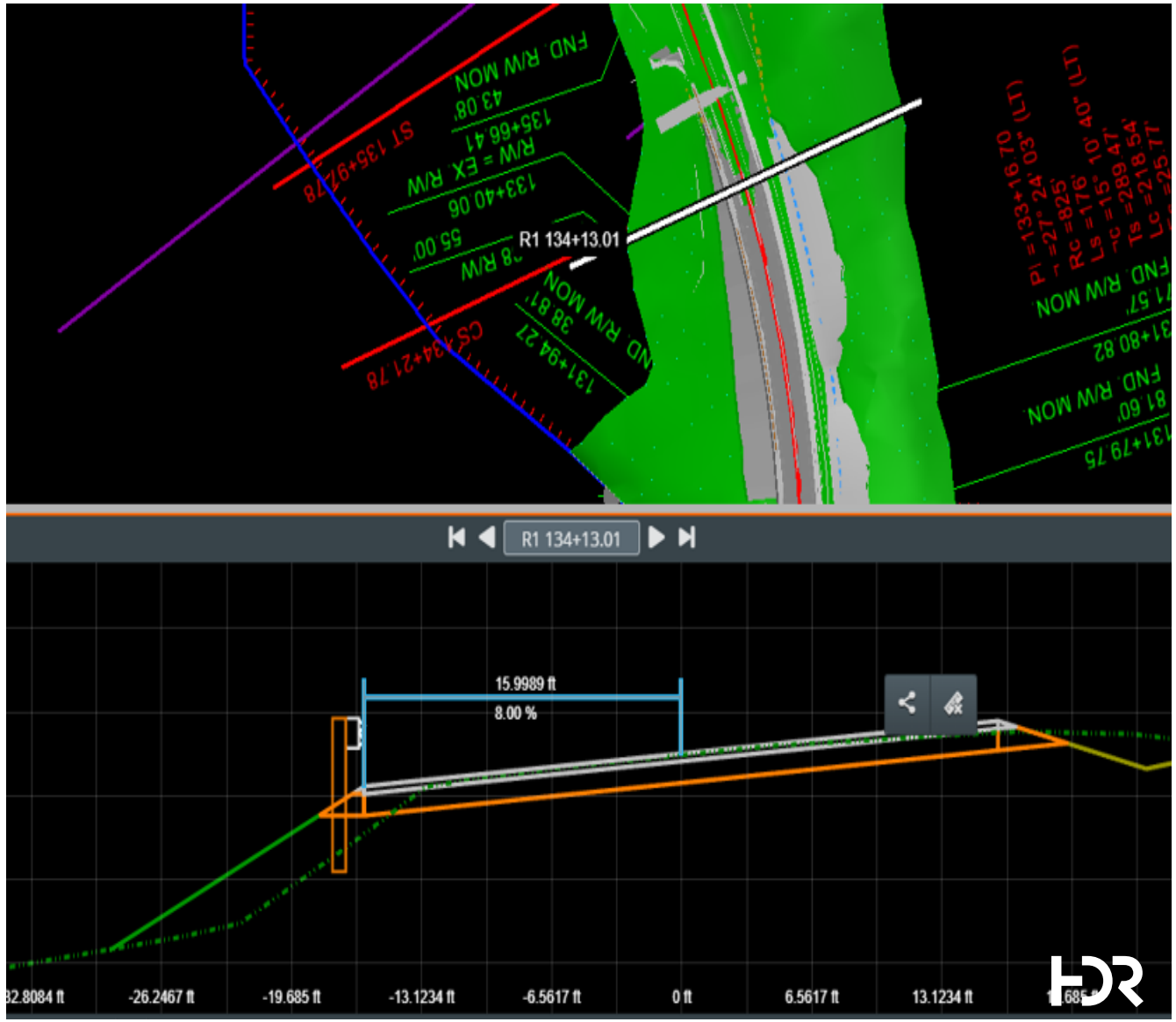
Construction Staging & Sequencing	Detailed Means & Methods Evaluation & Selection
Model staging facilitates construction.	Ability to build virtually in a digital environment while leveraging and assessing multiple construction scenarios and approaches, varying materials, and different equipment.





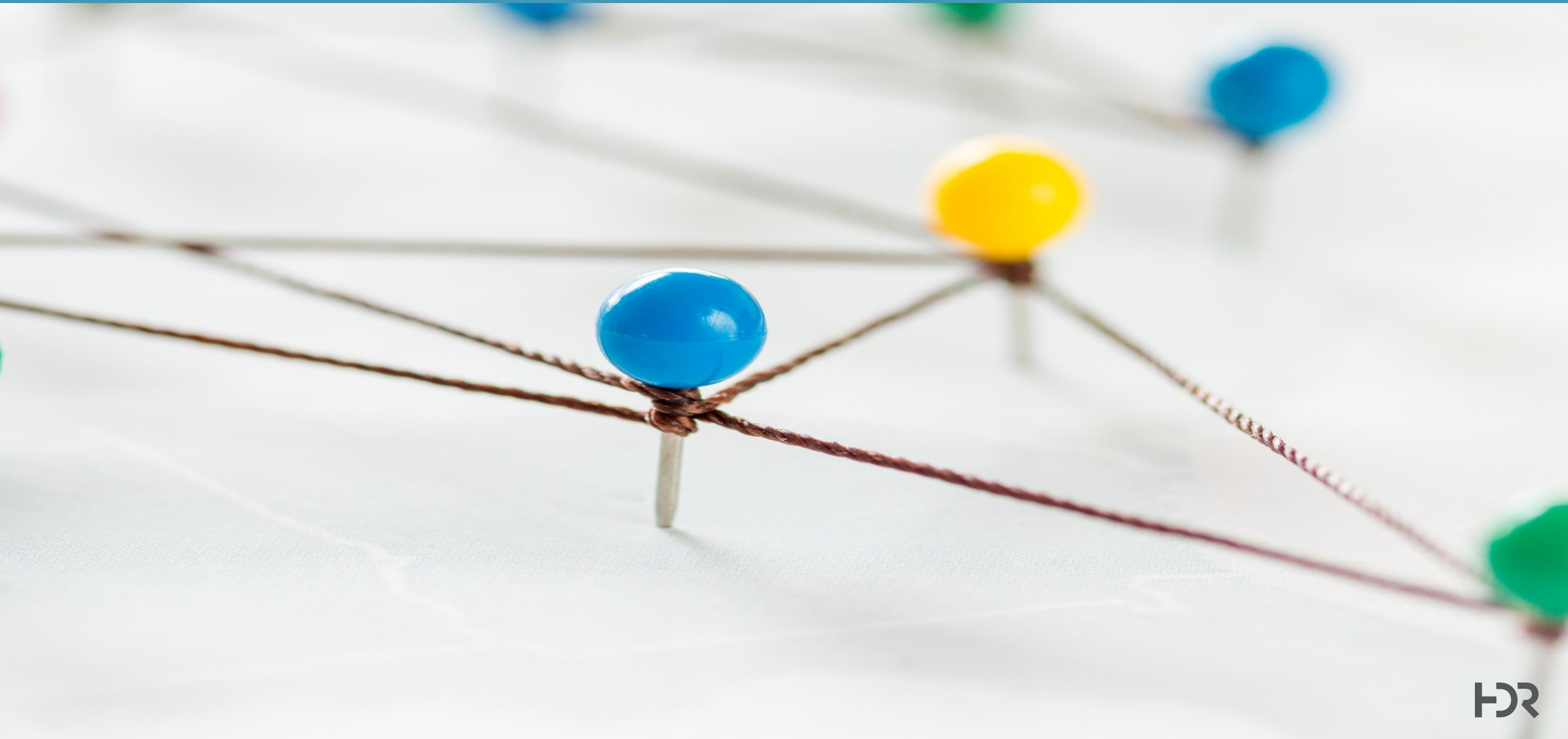
Design Reviews





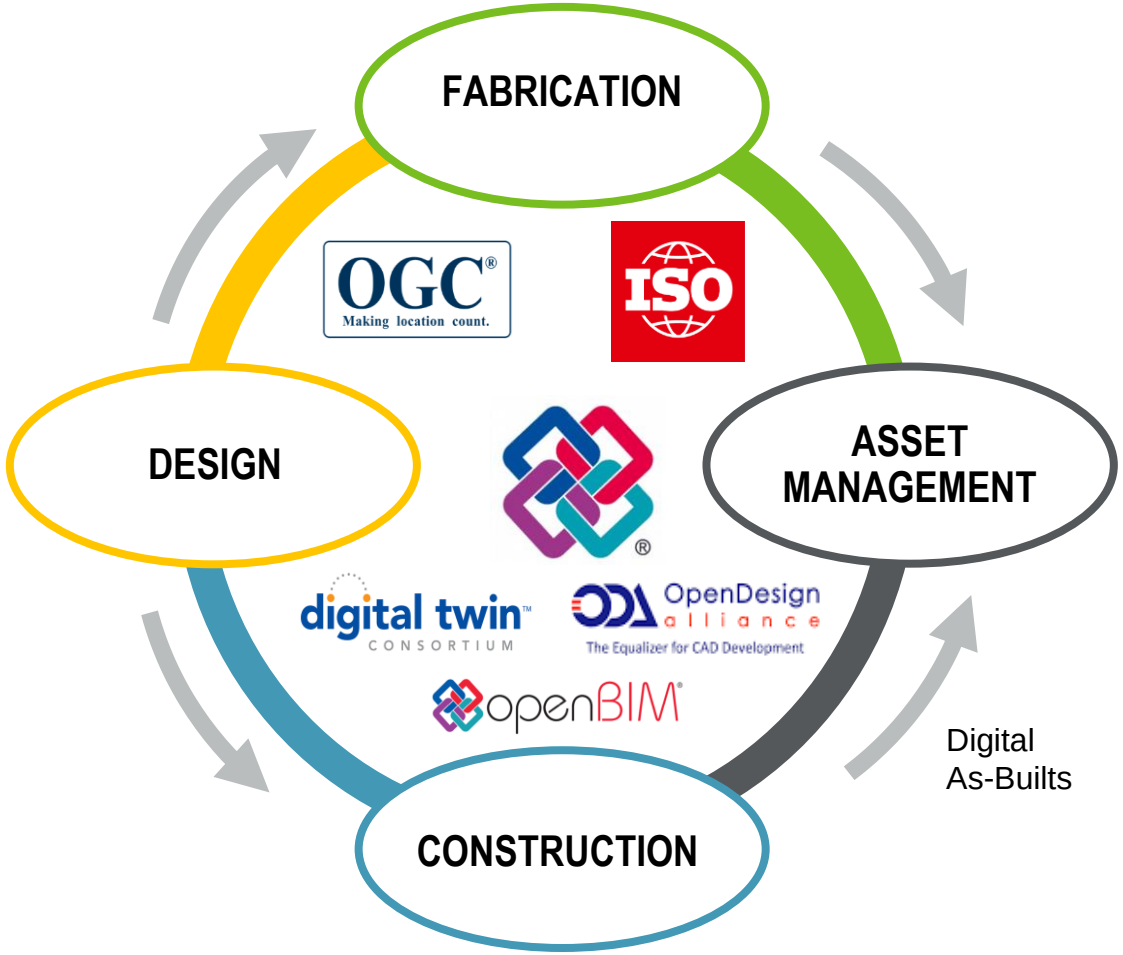
04 How do we get there?

Complete the Cycle



A National Vision for Standardization

Transportation industry's vision is to leverage a digital delivery approach throughout the lifecycle



ARTBA – WHITE PAPER

Accelerating Digital Construction

KEY TAKE-AWAYS:

- Use Funding to Leverage Proven Technologies and Advance Acceleration of Digital Construction
- Incentivize use of digital construction on projects
- Encourage the investment in open data standards
- Promote Model as the Legal Document – **the Digital Deliverable Needs to be the Contractual Deliverable.**

"Contractors must be able to rely on digital files and realize the benefits. Standardization and interoperability are key factors."

05 Resources & Questions

Additional Resources

AGC Digital Means & Methods Task Force

AGC.org

ACEC.org

Digital Construction Policy Statement

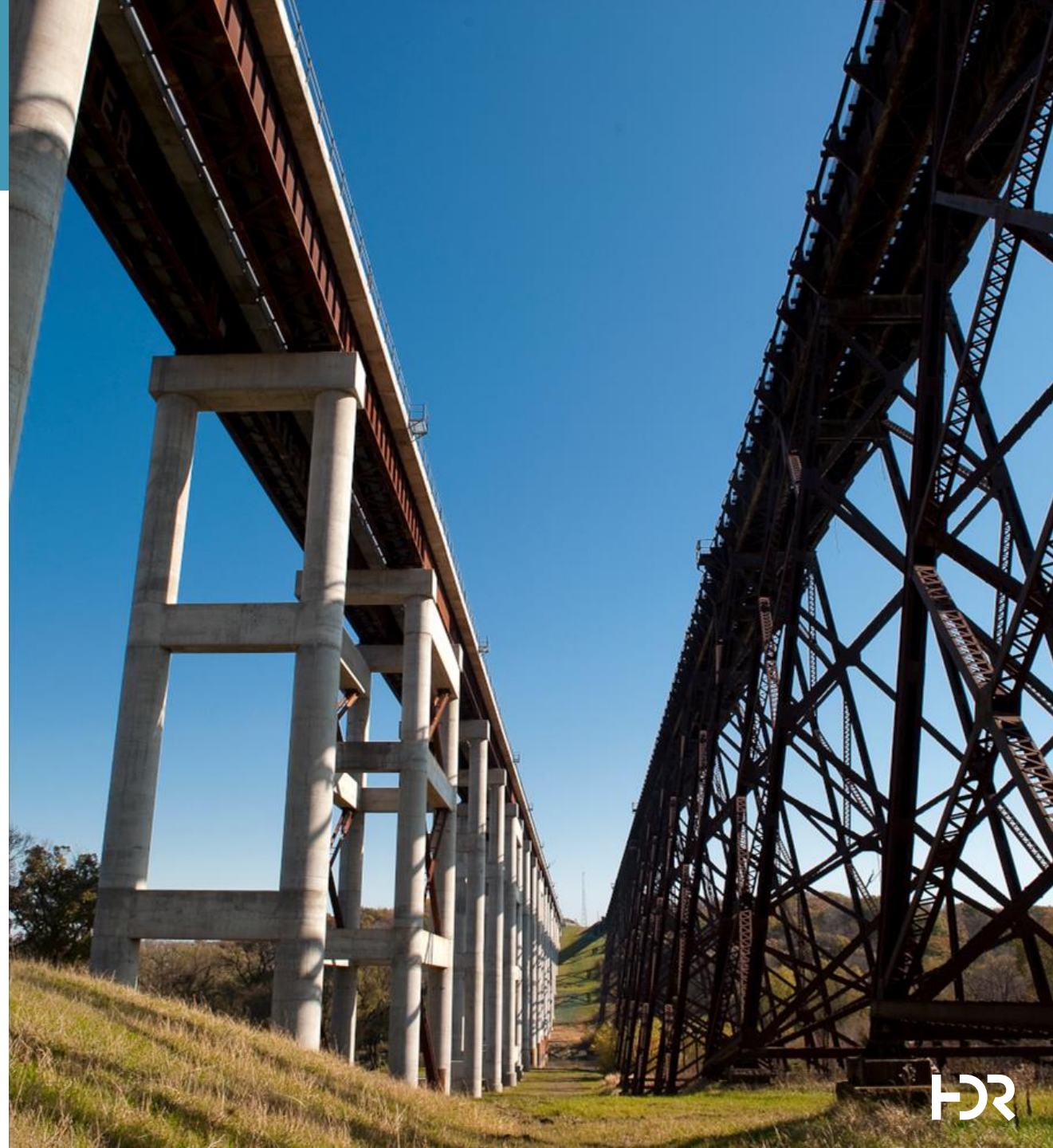
Accelerating Digital Construction Whitepaper

Open Standards and ISO Specifications

buildingSMART Roads and Bridges Committee

Questions?

Matt Blake

HDR - Transportation Digital Delivery Principal Advisor

Matt.Blake@hdrinc.com