

MODERN CONSTRUCTION TECHNIQUES & TECHNOLOGY



PRESENTED BY
WASHTO EMERGING LEADERS:

OMAR DE LEON, P.E.
SAM GRIMSHAW, P.E.
VIDAL FRANCIS, P.E.
CALEB CHRISTMAN, P.E.
TERRENCE LYNCH, P.E.



Presentation Topics

eCONSTRUCTION-3D Modeling

SAFETY-Autonomous TMA Technology

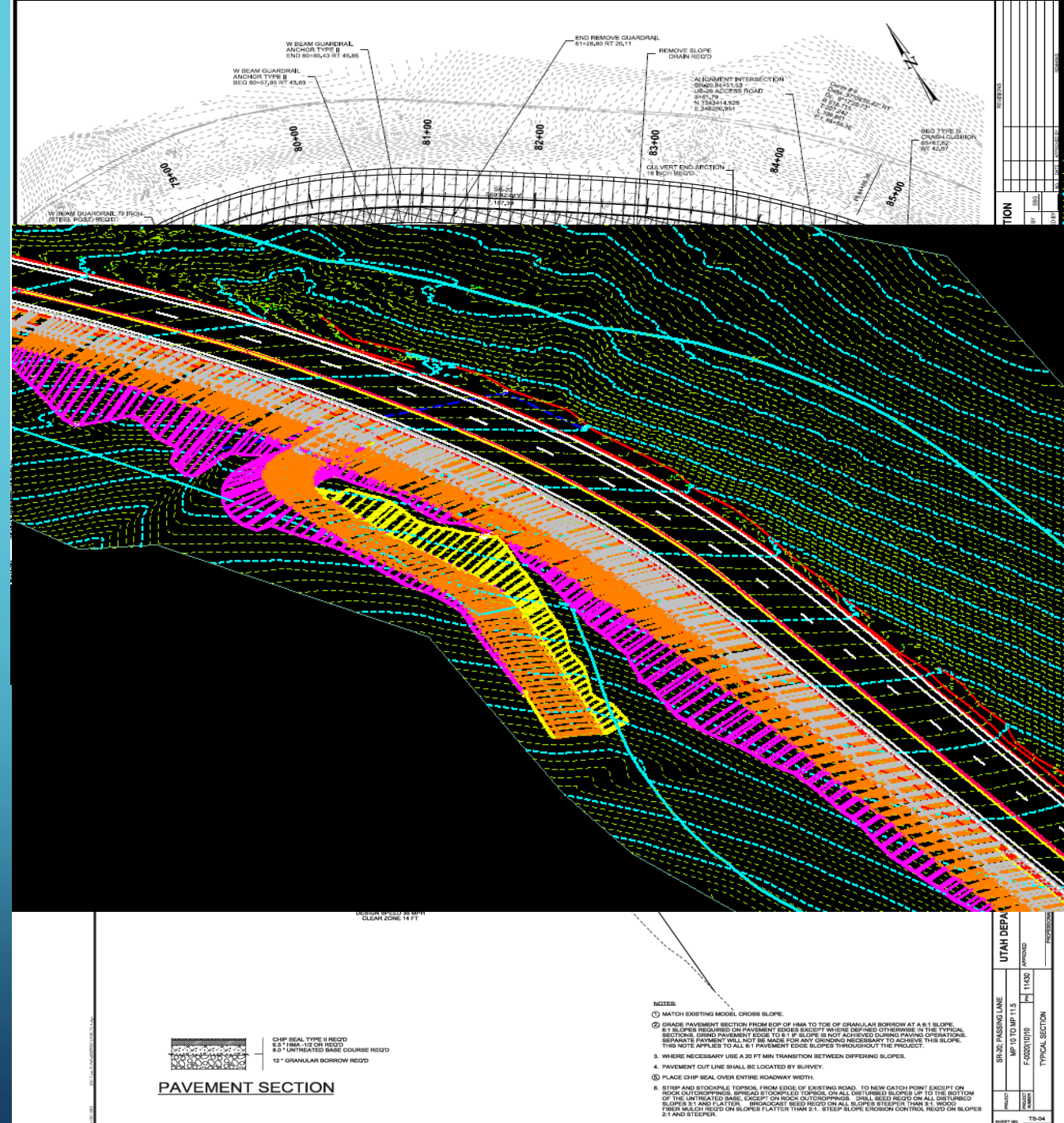
Accelerated Bridge Construction

ECONSTRUCTION

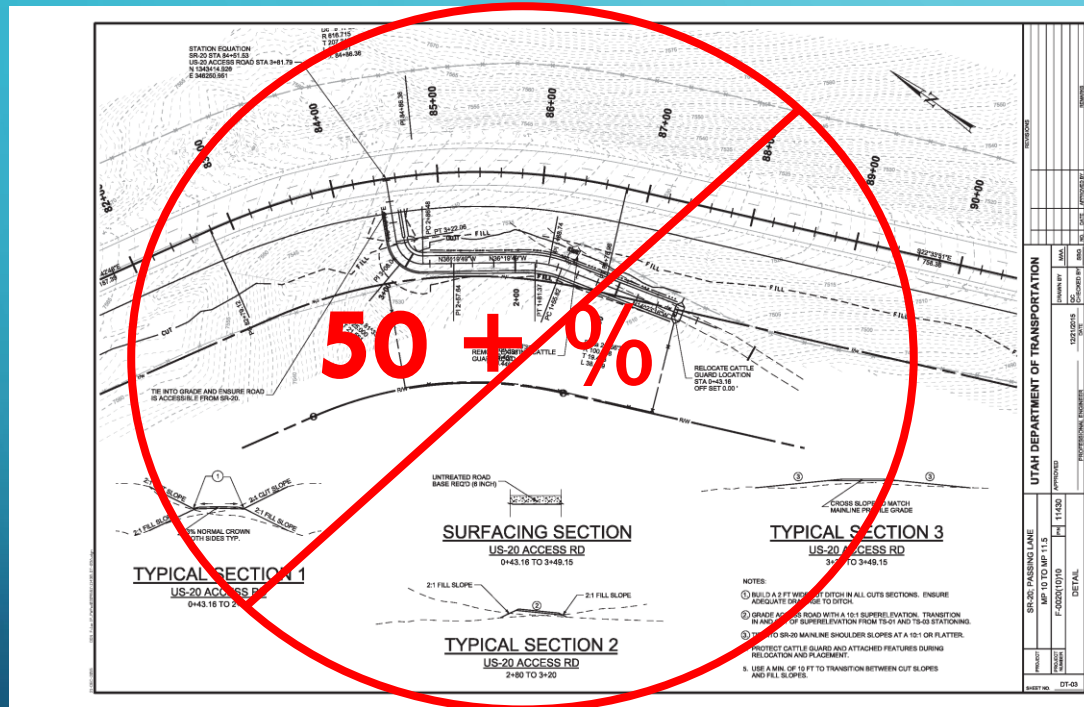
- UTILIZE TECHNOLOGY
- OWNER BENEFITS
- CONTRACTOR BENEFITS

CURRENT PRACTICE

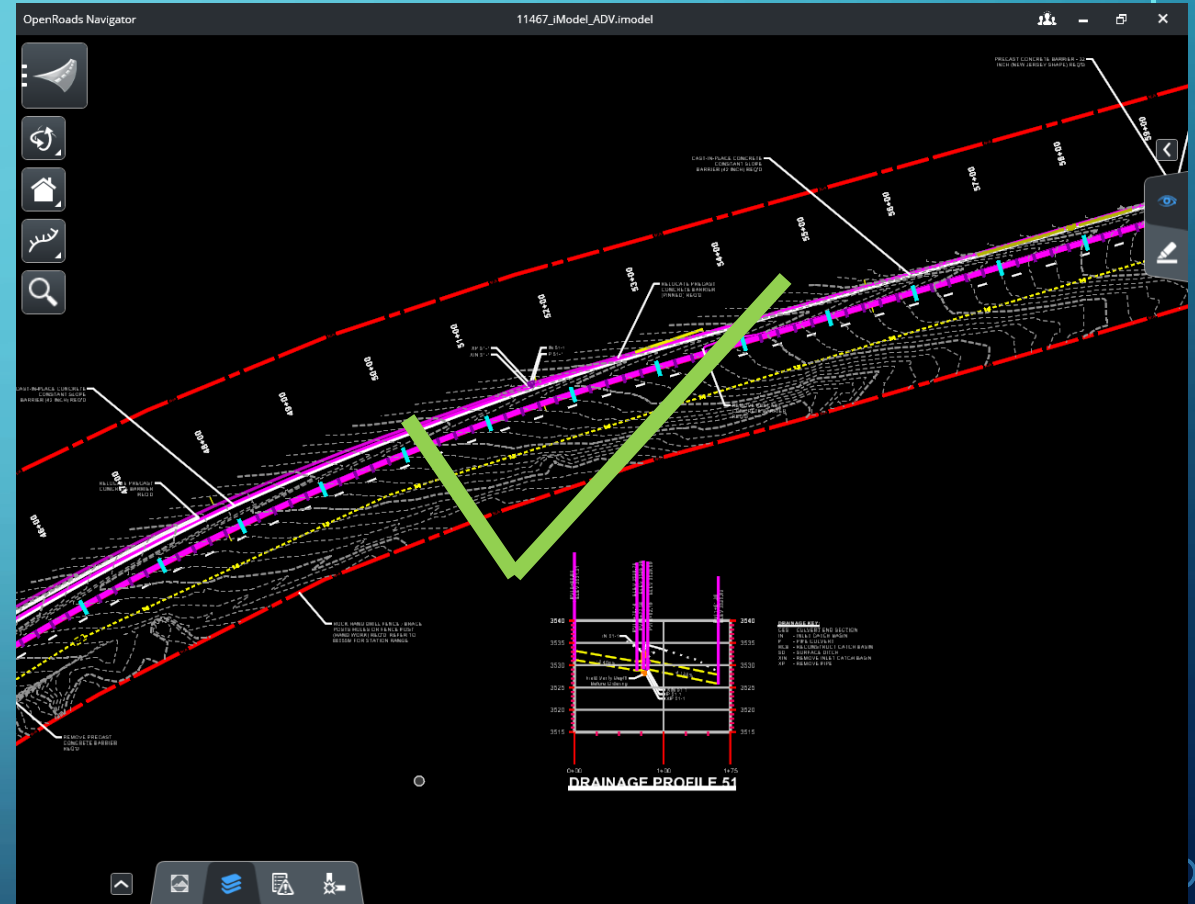
- INEFFICIENT TECHNOLOGY USAGE
- DESIGNER TAKES 3D & MAKES 2D
- CONTRACTOR 2D INTO 3D



OWNER GAINS



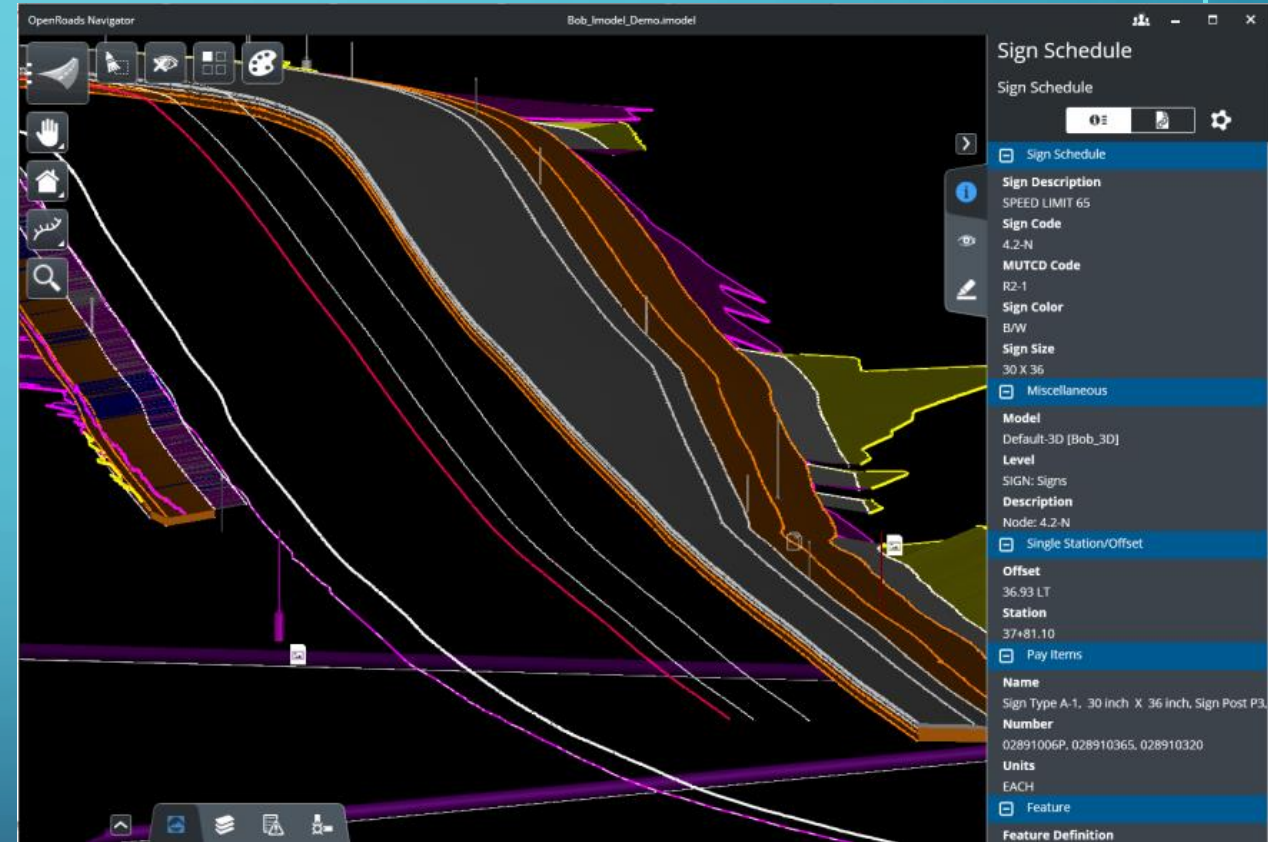
REDUCTION IN SHEET PRODUCTION & DUPLICATION OF WORK



GREATER ACCURACY AND EFFICIENCY

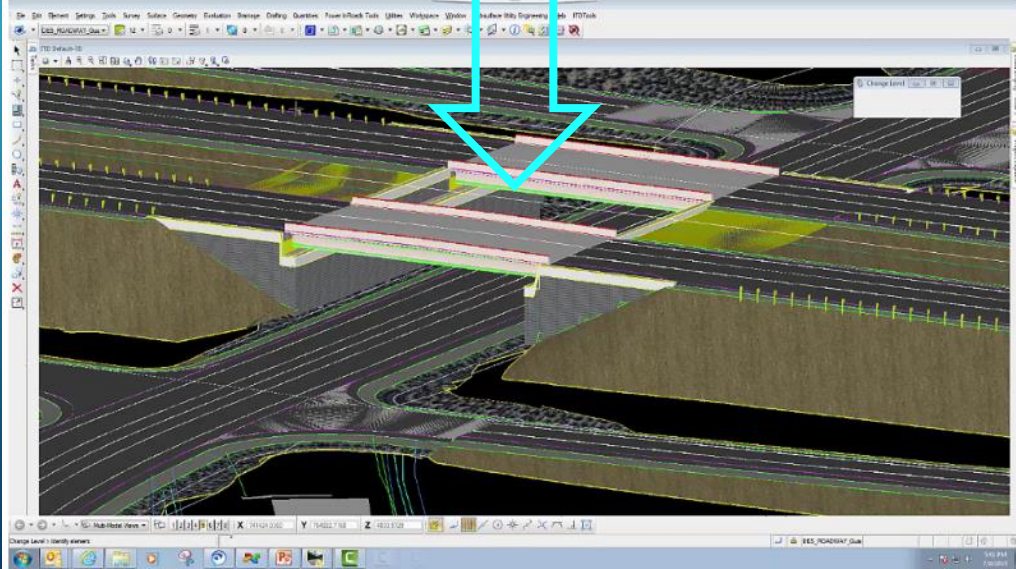
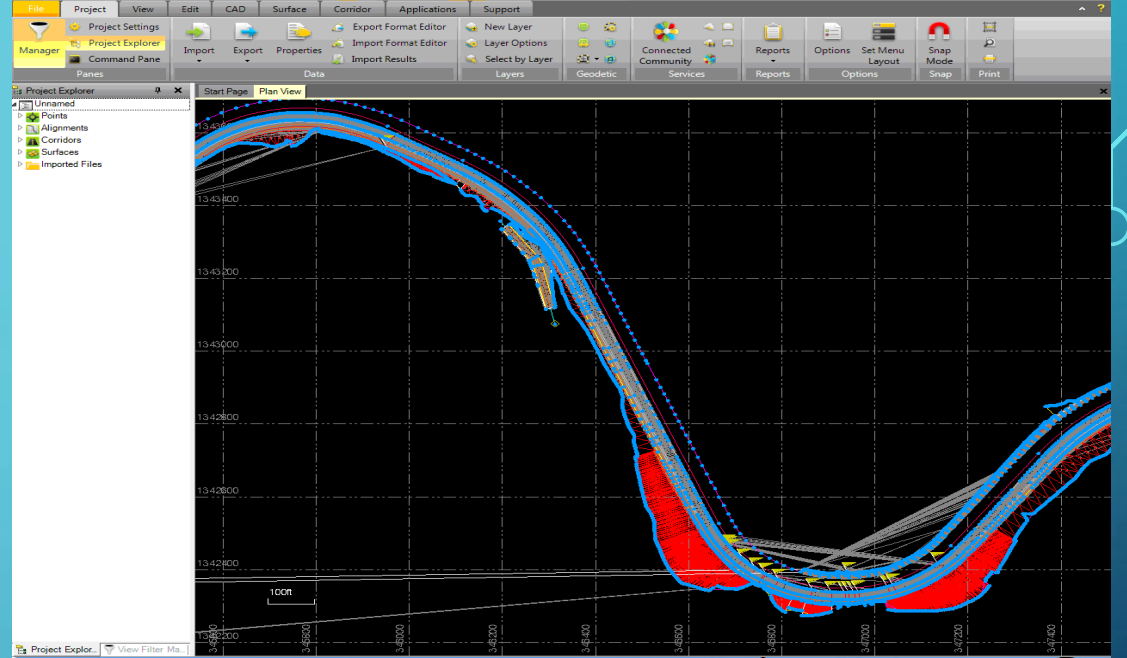
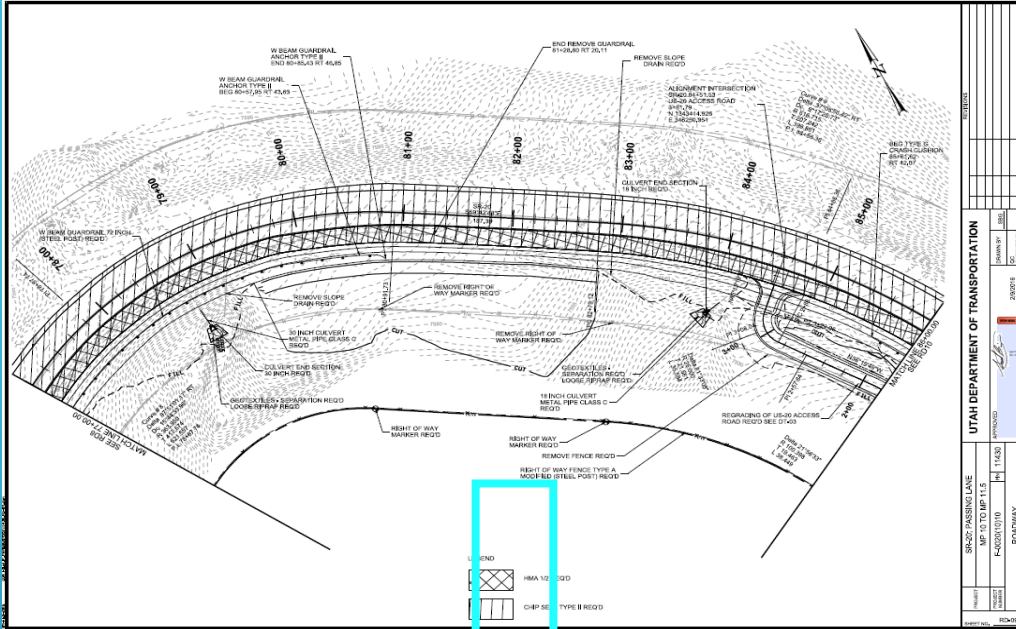
OWNER GAINS CONT.

UDOT SR-20 PASSING LANES MLD



FIELD STAFF USING ECONSTRUCTION & 3D TECHNOLOGIES

CONTRACTOR GAINS



US-20 Thornton Interchange - Idaho

NO MORE REVERSE ENGINEERING

GREATER ACCURACY/LESS RISK

NO STAKES!

SR-20 Passing Lanes - Utah



E-CONSTRUCTION

- IMPROVE ADMIN AND INSPECTION
- 3D DATA – MORE EFFICIENT/ACCURATE
- INTELLIGENT MODEL DATA FOR CONSTR.
- CHECK GRADES REALTIME
- REALTIME GEO-LOCATION FEATURE IDENTIFICATION
- VIEW 3D FOR CLASH DETECTION

Colorado DOT
Royal TRUCK & EQUIPMENT INC.
KRATOS UNMANNED SYSTEMS DIVISION

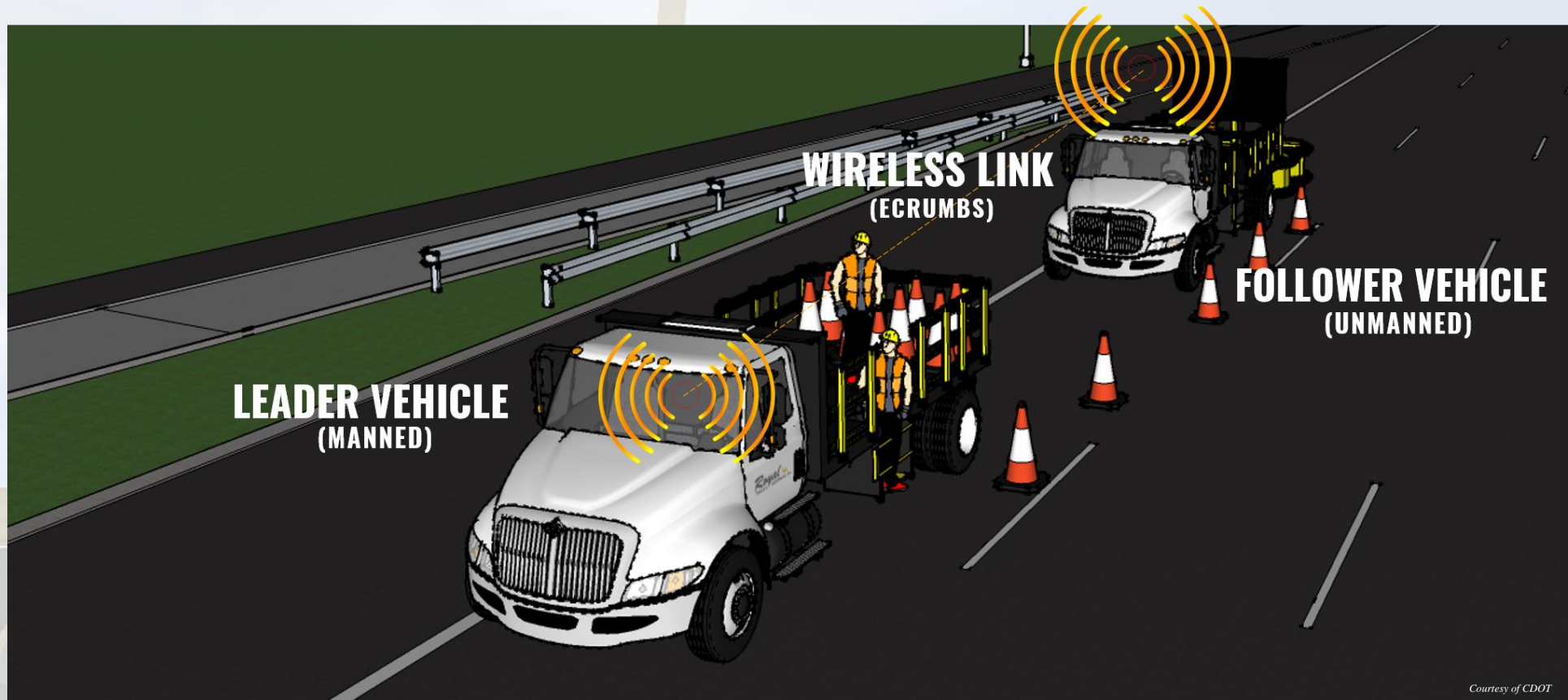


Autonomous Impact Protection Vehicle



Autonomous Truck-Mounted Attenuator (ATMA)

How the ATMA Works | System & Components



Safety Advantage:
Remove our employees out of harms way



Autonomous Truck-Mounted Attenuator (ATMA)

How the ATMA Works | System & Components | Follow Vehicle

- Can be operated manually with little adjustment
- Take seconds to convert



Autonomous Truck-Mounted Attenuator (ATMA)

How the ATMA Works | System & Components | Follow Vehicle

- Can be operated manually with little adjustment
- Take seconds to convert



Autonomous Truck-Mounted Attenuator (ATMA)

How the ATMA Works | System & Components | Follow Vehicle

- Can be operated manually with little adjustment
- Take seconds to convert

Other Features:

- External E-stop buttons through out
- Real time 360 viewing camera w/in-cab monitor
- “Black Box” recording system
- Rear radar speed feedback sign
- Mini message board messaging system
- Remote shut off and restart prevention
- Lead vehicle remote manual control



Autonomous Truck-Mounted Attenuator (ATMA)

CDOT Deployment | Challenges / System Limitation

- Varying follow gap
- Traffic lights
- Overpasses/Tunnels
- Turn signal activation
- Front Radar around corners
- Lead Vehicle Awareness



Autonomous Truck-Mounted Attenuator (ATMA)

Proposal For use | Possibilities

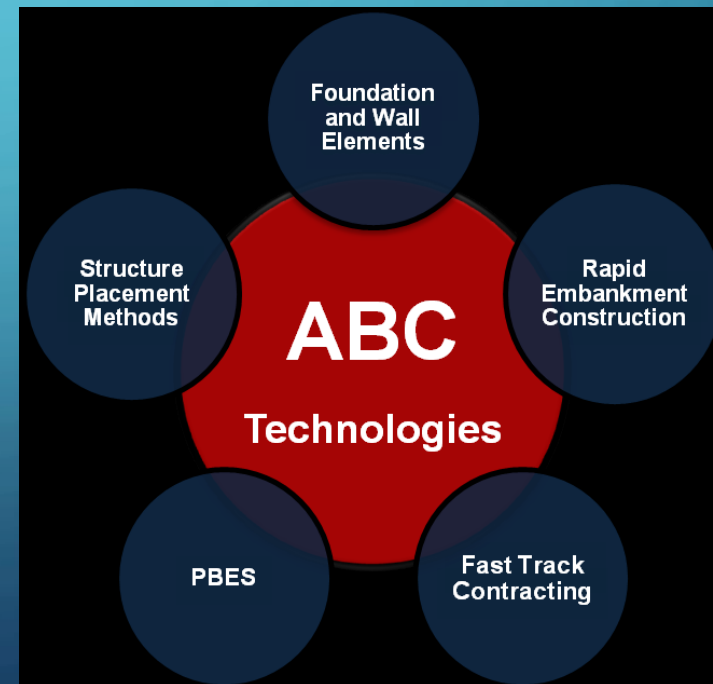
- Traffic control
- Materials Testing/Survey
- Striping
- Shoulder Applications: Sweeping, etc

Each operation will have its own specific set challenges that may require system configuration.



ACCELERATED BRIDGE CONSTRUCTION (ABC)

- ABC uses innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce construction time that occurs when building, replacing or, rehabilitating bridges.





- ABC improves

- Safety for public and agency/contractor personnel
- Material Quality and product durability

- ABC reduces

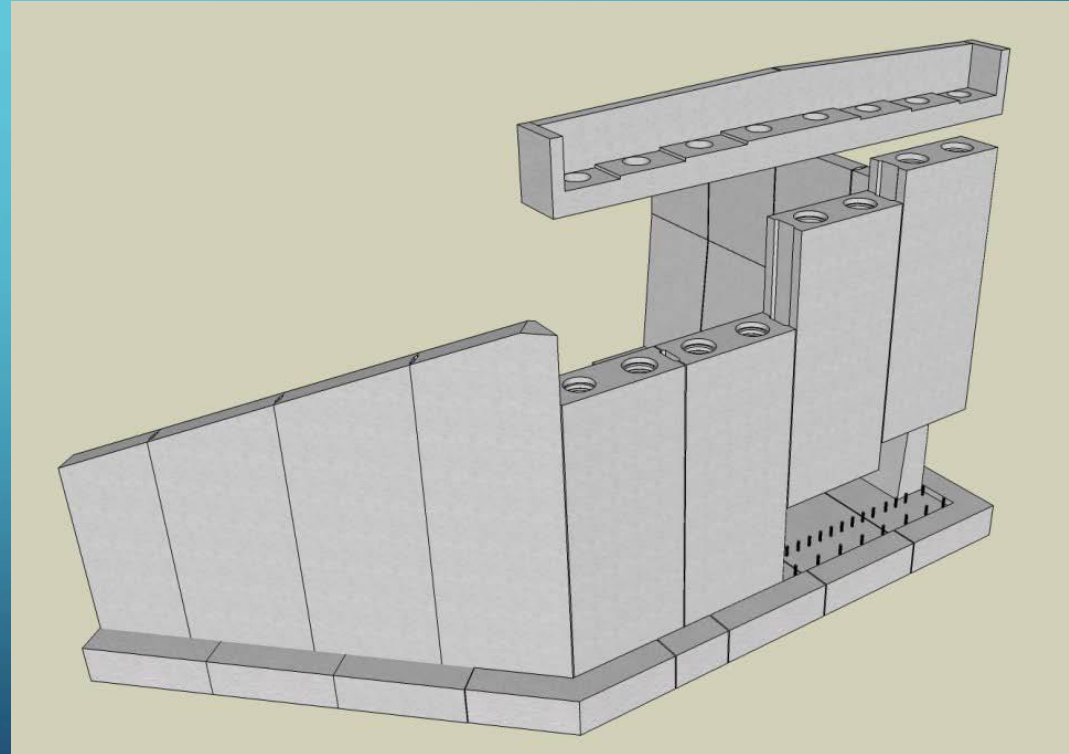
- Traffic impacts
 - Onsite construction time
 - Weather related delays
- 

- ABC can minimize

- Environmental impacts
 - Alignment impacts
 - Utility relocations and right-of-way take
- 
- 

COMMON ABC TECHNIQUE:

- PREFABRICATED BRIDGE ELEMENTS AND SYSTEMS (PBES) – DEF.: STRUCTURAL COMPONENTS BUILT OFFSITE TO REDUCE THE ONSITE TIME AND IMPACT TIME TYPICAL OF CONVENTIONAL CONSTRUCTION
 - Foundations, Piers
 - Beams and Girders
 - Stay-in-Place Deck Forming
 - Full-Depth Deck Panels
 - Modular Superstructure Systems
 - Abutments →
 - Wing and Retaining Walls



ABC ADVANTAGES VS. DISADVANTAGES OF PBES

- Advantages

- Reduced Road User Impacts
- Improved Worker and Motorist Safety
- Expedited Project Planning Process
- Improved Quality
- Improved Constructability
- Reduced Cost to Society *

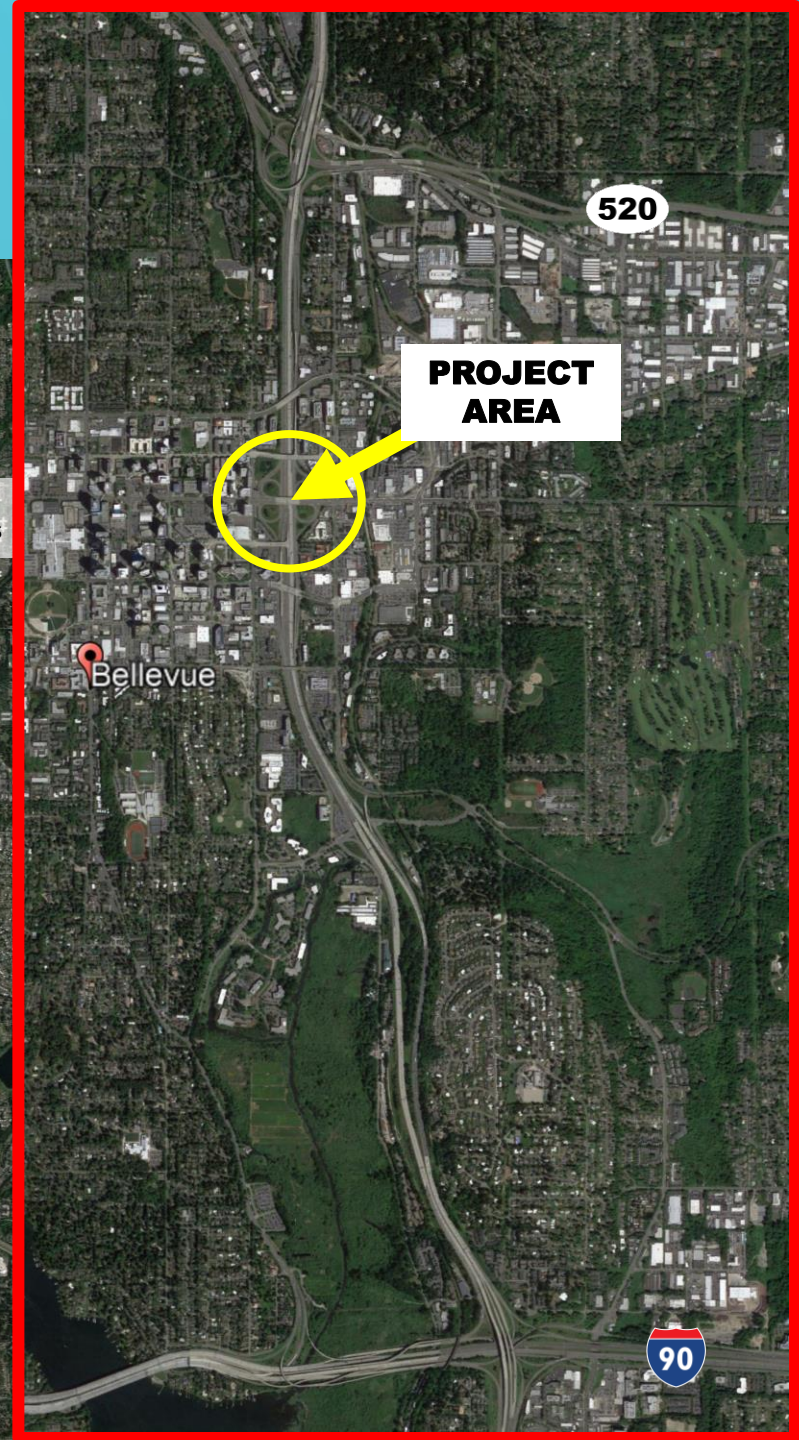
- Disadvantages

- Increased construction costs (10-30%)

Project Background:

NE 8th St., Bellevue, WA (Pop. 140,000)

- 20,000 Veh/Day
- Few I-405 Crossings



The background is a solid teal color with a subtle gradient. In the four corners, there are decorative white line-art elements resembling circuit traces or fiber optic paths, with small circles at the end of the lines.

VIDEO – NE 8TH STREET, BELLEVUE WA.

– COURTESY OF HDR ENGINEERING, ATKINSON CONST., & WSDOT

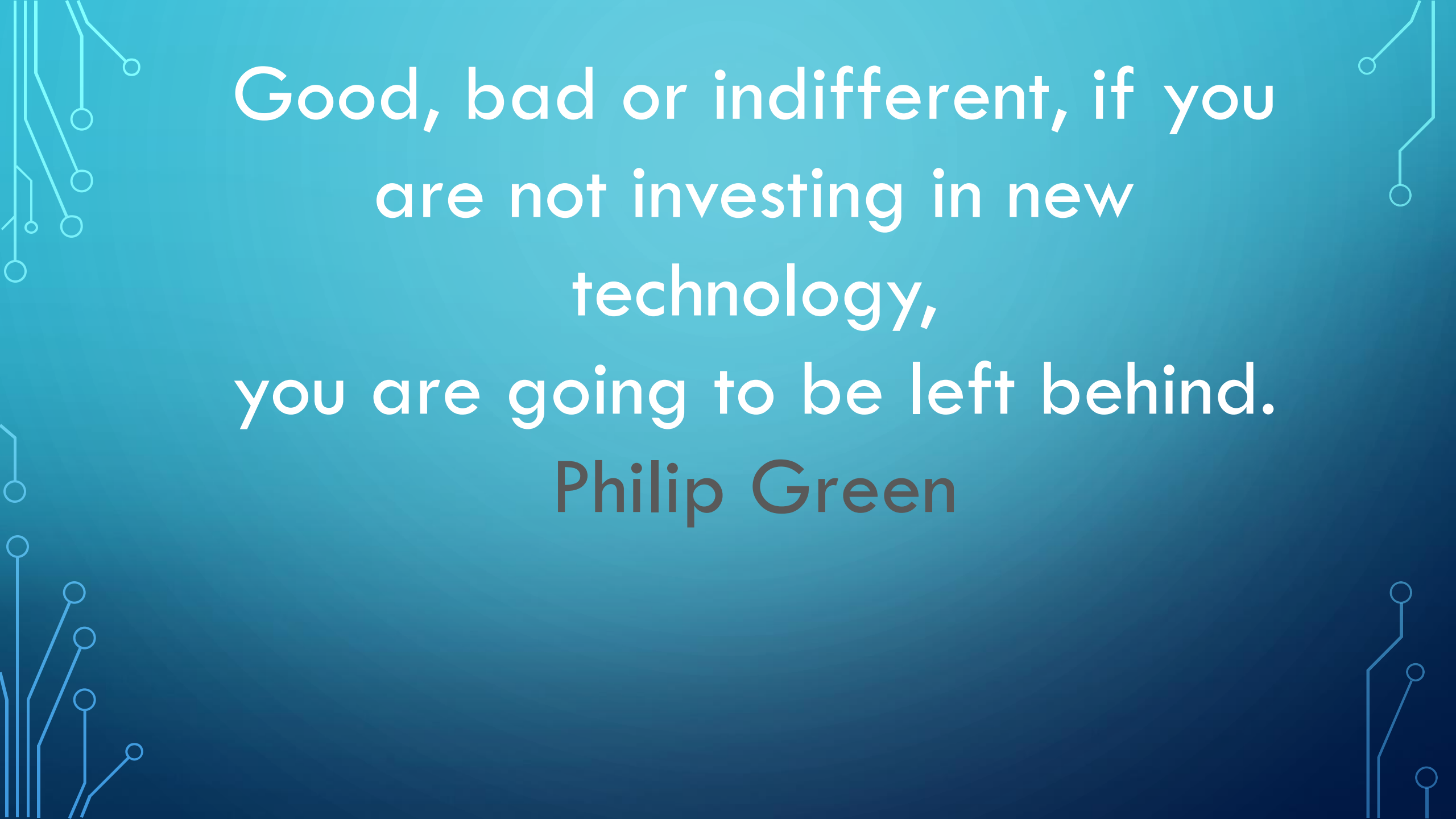


Modern Construction

eCONSTRUCTION-3D Modeling

SAFETY-Autonomous TMA Technology

Accelerated Bridge Construction

The background is a teal-to-blue gradient. In the corners, there are decorative white circuit-like lines with small circles at the ends, resembling a network or data flow diagram.

Good, bad or indifferent, if you
are not investing in new
technology,
you are going to be left behind.

Philip Green

SPECIAL THANKS:
WADE ALLEN ITD
BRYAN YOUNG ITD
MIKE MCKEE HORROCKS
GEORGE LUKES UDOT
TYRELL WOOD UDOT

REFERENCE: ACCELERATED BRIDGE CONSTRUCTION – EXPERIENCE IN DESIGN, FABRICATION, AND ERECTION OF PREFABRICATED BRIDGE ELEMENTS AND SYSTEMS. FHWA PUBLICATION NO. HIF-12-013, PUBLICATION DATE 11-01-2011.

FOR MORE INFO CONTACT

OMAR DE LEON, P.E. - OMAR.X.DELEON@TXDOT.GOV
SAM GRIMSHAW, P.E. - SGRIMSHAW@UTAH.GOV
VIDAL FRANCIS, P.E. - VIDAL.T.FRANCIS@ODOT.STATE.OR.US
TERRENCE LYNCH, P.E. – LYNCHTE@WSDOT.WA.GOV
CALEB CHRISTMAN, P.E. – CCHRISTM@ND.GOV