Taking CMGC Delivery to New Heights

CTDOT's Walk Bridge Program

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March 12, 2024

Federal Transit Administration

www.walkbridgect.com

Walk Bridge over the Norwalk River

HNTB

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WALK BRIDGE PROGRAM


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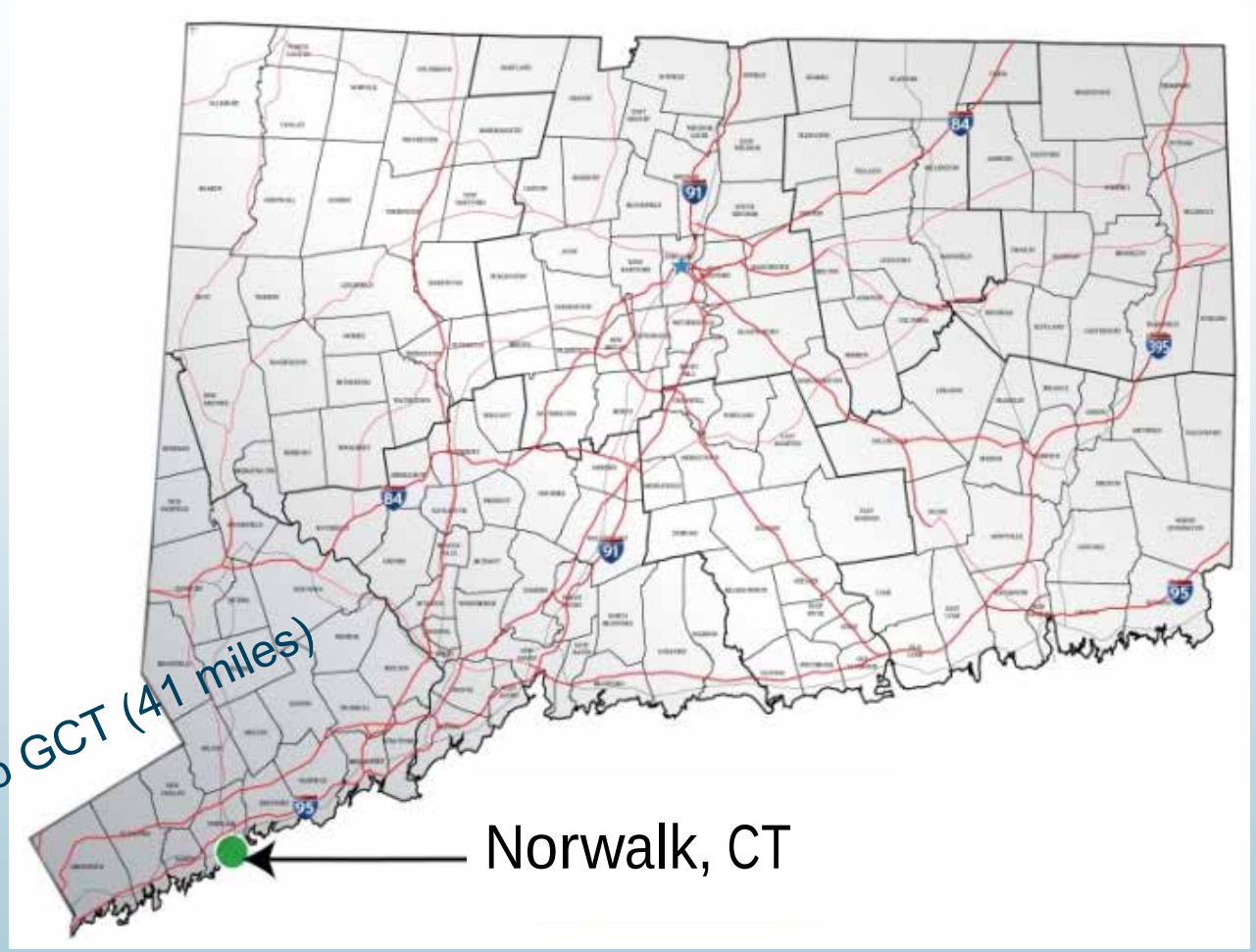
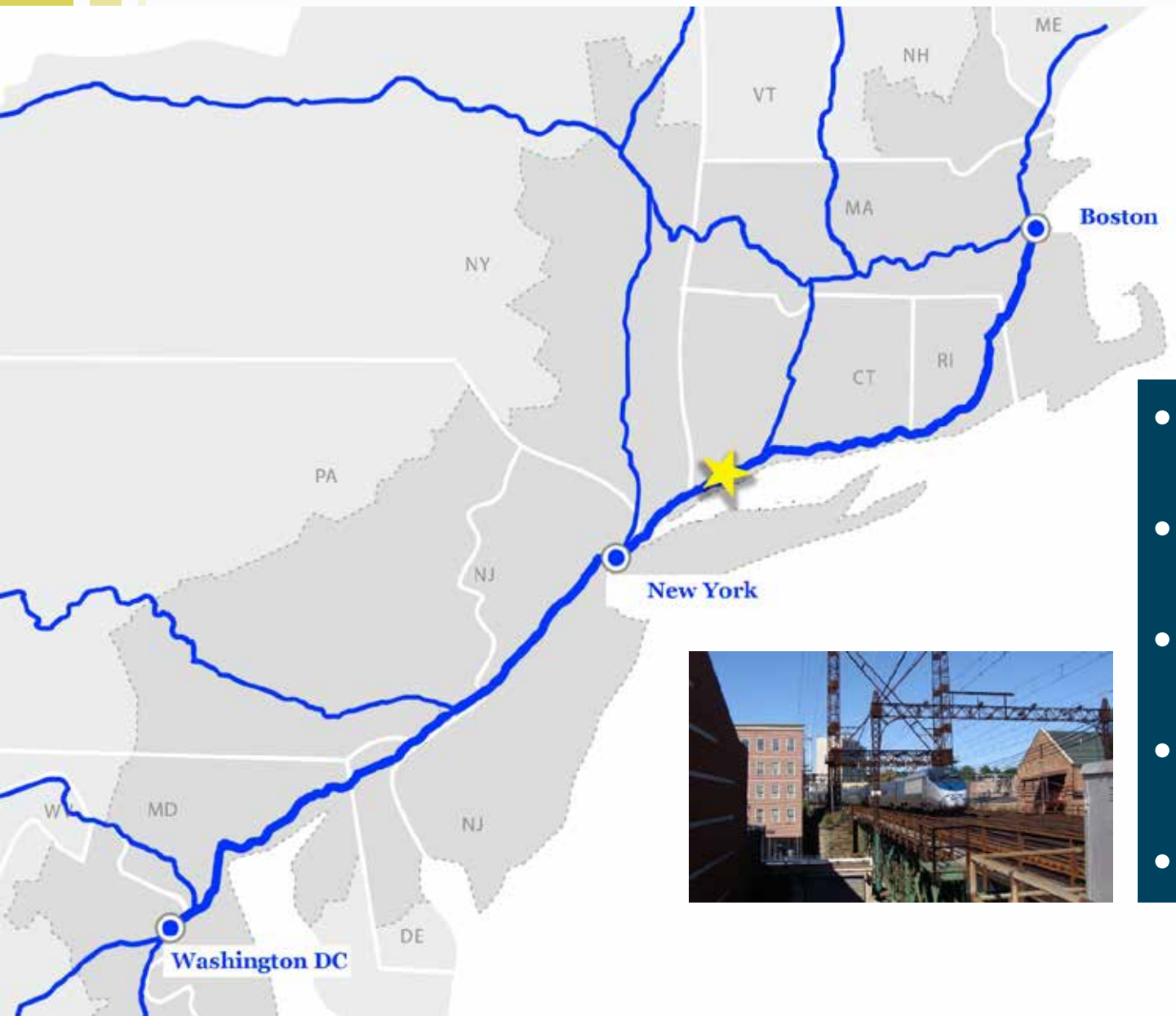
Project Location



- Coastal Connecticut urban area settled around the new rail line since 1851.
- Part of the great NYC metro area.
- 41 miles from Grand Central Terminal.
- CTDOT owns all commuter rail lines in the State (since 1853).

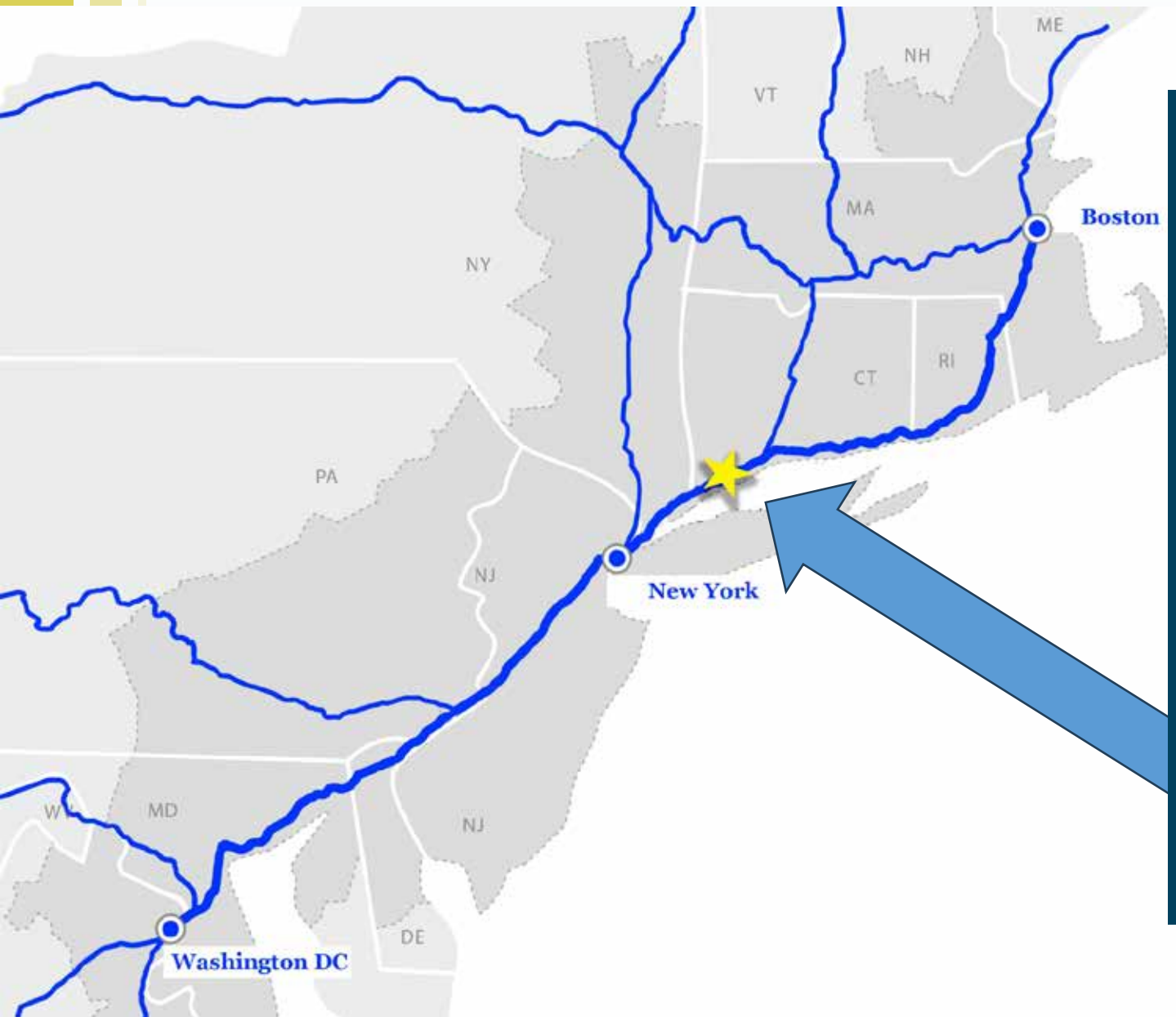
Walk Bridge - - A Critical Transportation Link



"Given the critical role of the Northeast Corridor, any kind of Walk Bridge failure is unacceptable."

- Approx.125,000 passengers daily
- Approx. 175 trains per day
- Projected ridership will double by 2030
- One of 14 movable bridges on the NEC
- Average age > 100 years in service

Rail Bridge Project Names



10 Movable Bridges on the NEC in CT

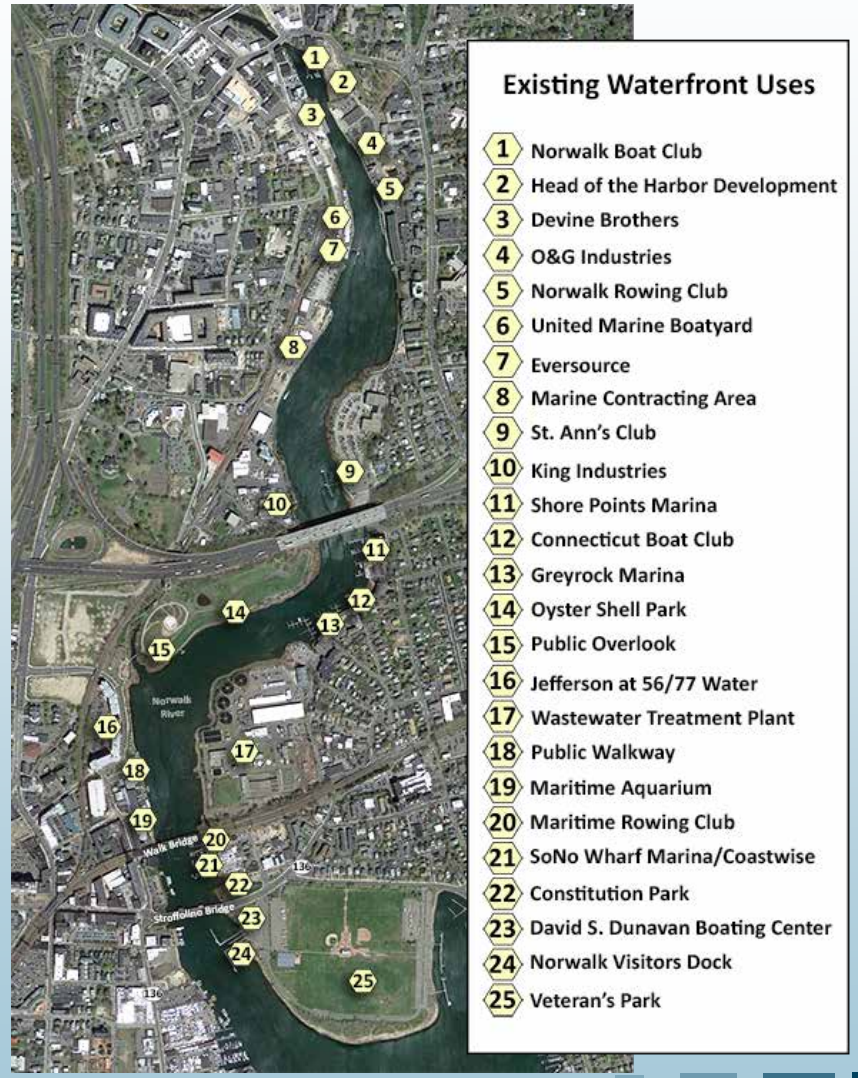
- Mystic River - - MYST
- Shaw's Cover - - SHAW
- Thames River - - GROT
- Niantic River - - NANN
- Connecticut River - - CONN
- Housatonic River - - DEVO
- Pequonnock River - - PECK
- Saugatuck River - - SAGA
- **Norwalk River - - WALK**
- Cos Cobb - - COBB

Site Constraints

Location Detail

Existing Bridge

Waterway Users and River Navigation



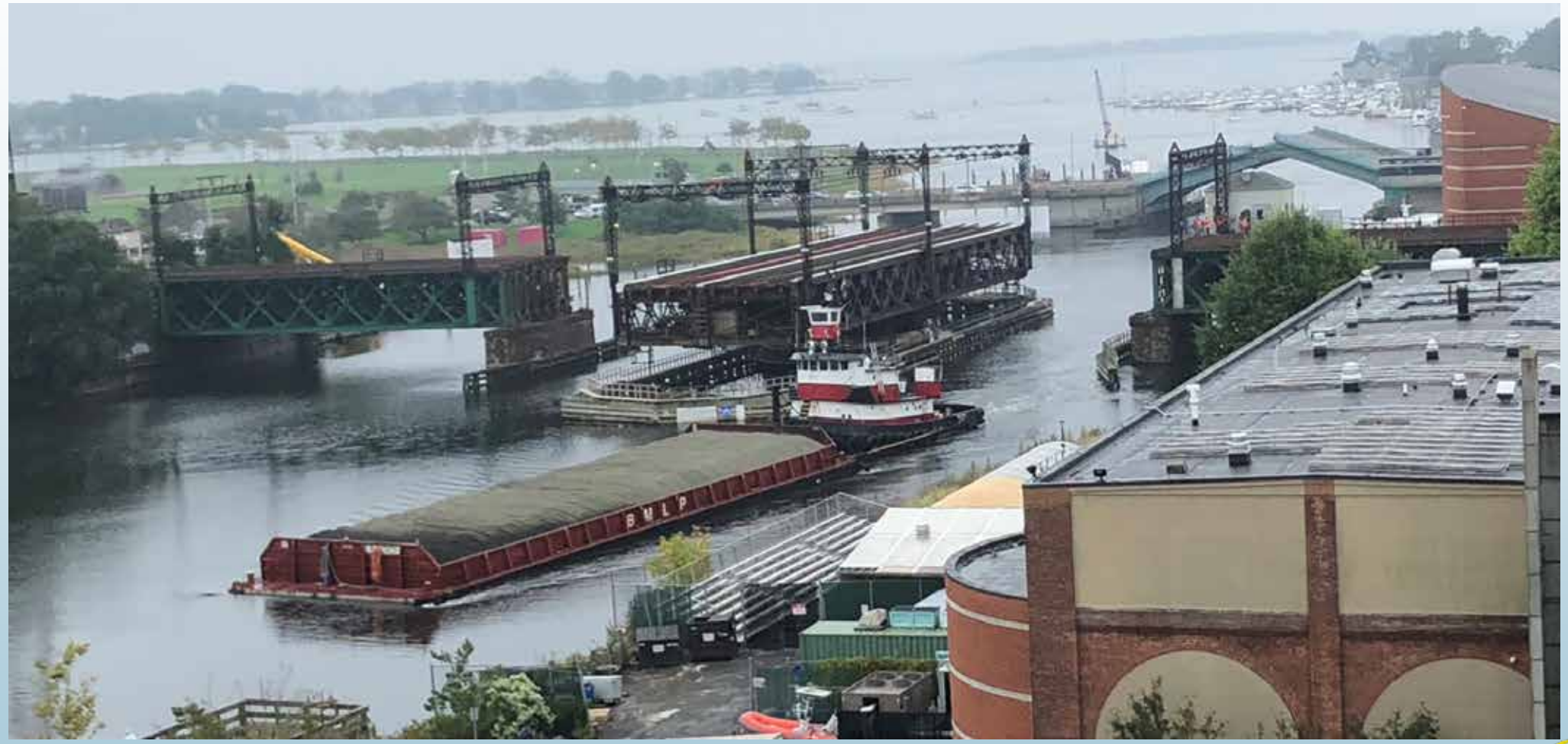
Existing Waterfront Uses

1. Norwalk Boat Club
2. Head of the Harbor Development
3. Devine Brothers
4. O&G Industries
5. Norwalk Rowing Club
6. United Marine Boatyard
7. Eversource
8. Marine Contracting Area
9. St. Ann's Club
10. King Industries
11. Shore Points Marina
12. Connecticut Boat Club
13. Greyrock Marina
14. Oyster Shell Park
15. Public Overlook
16. Jefferson at 56/77 Water
17. Wastewater Treatment Plant
18. Public Walkway
19. Maritime Aquarium
20. Maritime Rowing Club
21. SoNo Wharf Marina/Coastwise
22. Constitution Park
23. David S. Dunavan Boating Center
24. Norwalk Visitors Dock
25. Veteran's Park

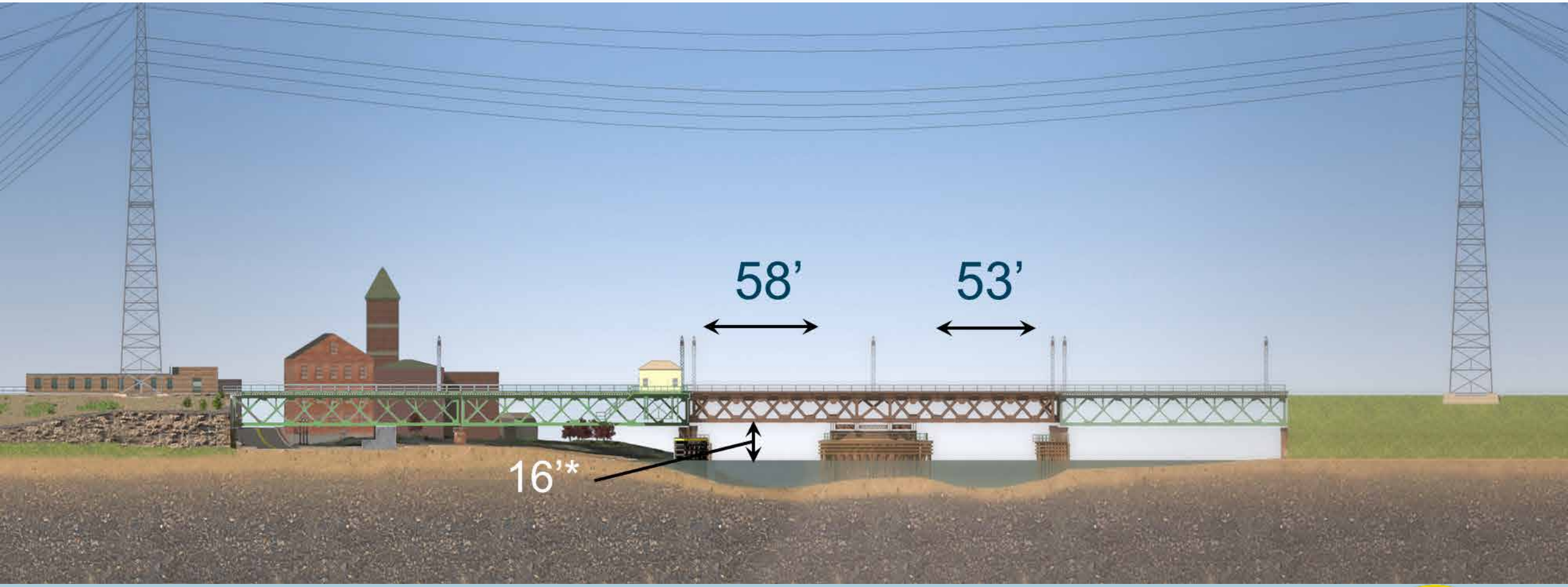
Norwalk River is home to more than 60 navigation-dependent facilities, more than any other waterway in the State of Connecticut.

Existing Bridge

Existing Bridge

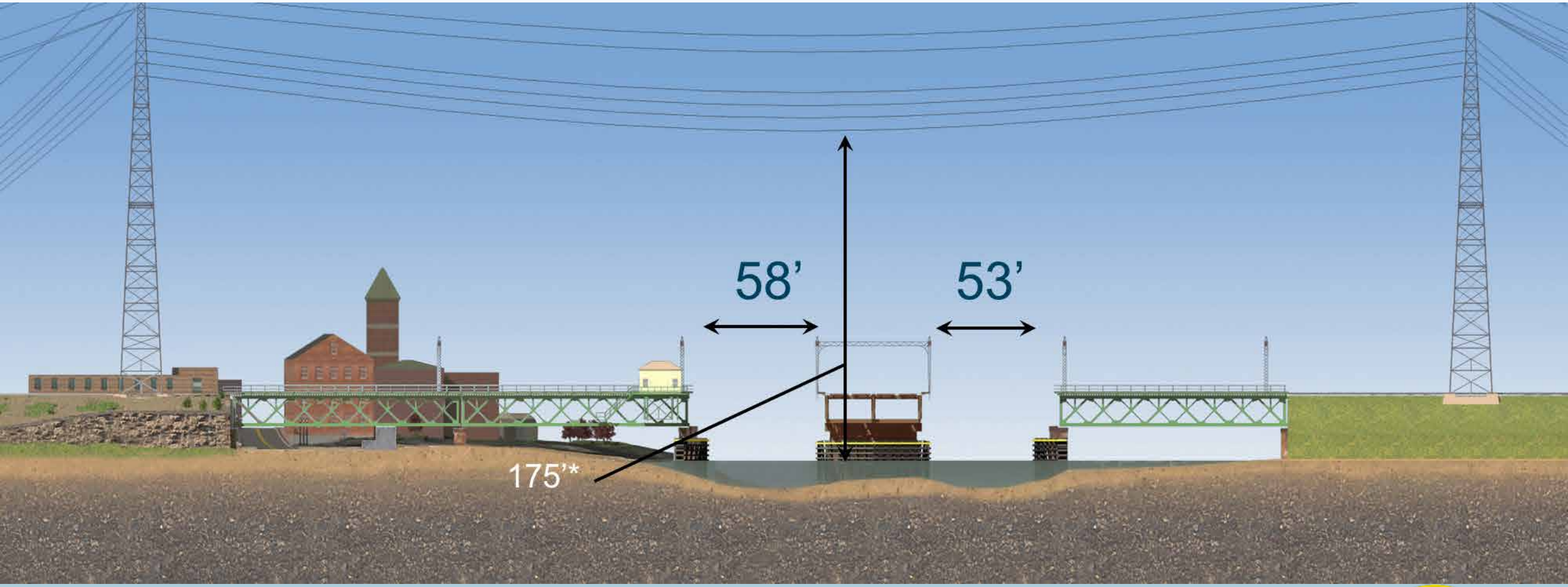


Existing Bridge – span closed



*above MHW

Existing Bridge – span open



*above MHW

Existing Bridge Configuration

Bridge Issues Prompted Action

- Recent history of span opening and closing difficulties.
- Bridge failure shuts down the NEC
- Hurricane Sandy demonstrated need for resiliency.
- Making only emergency and scheduled maintenance repairs will not stop failures and unexpected expense.

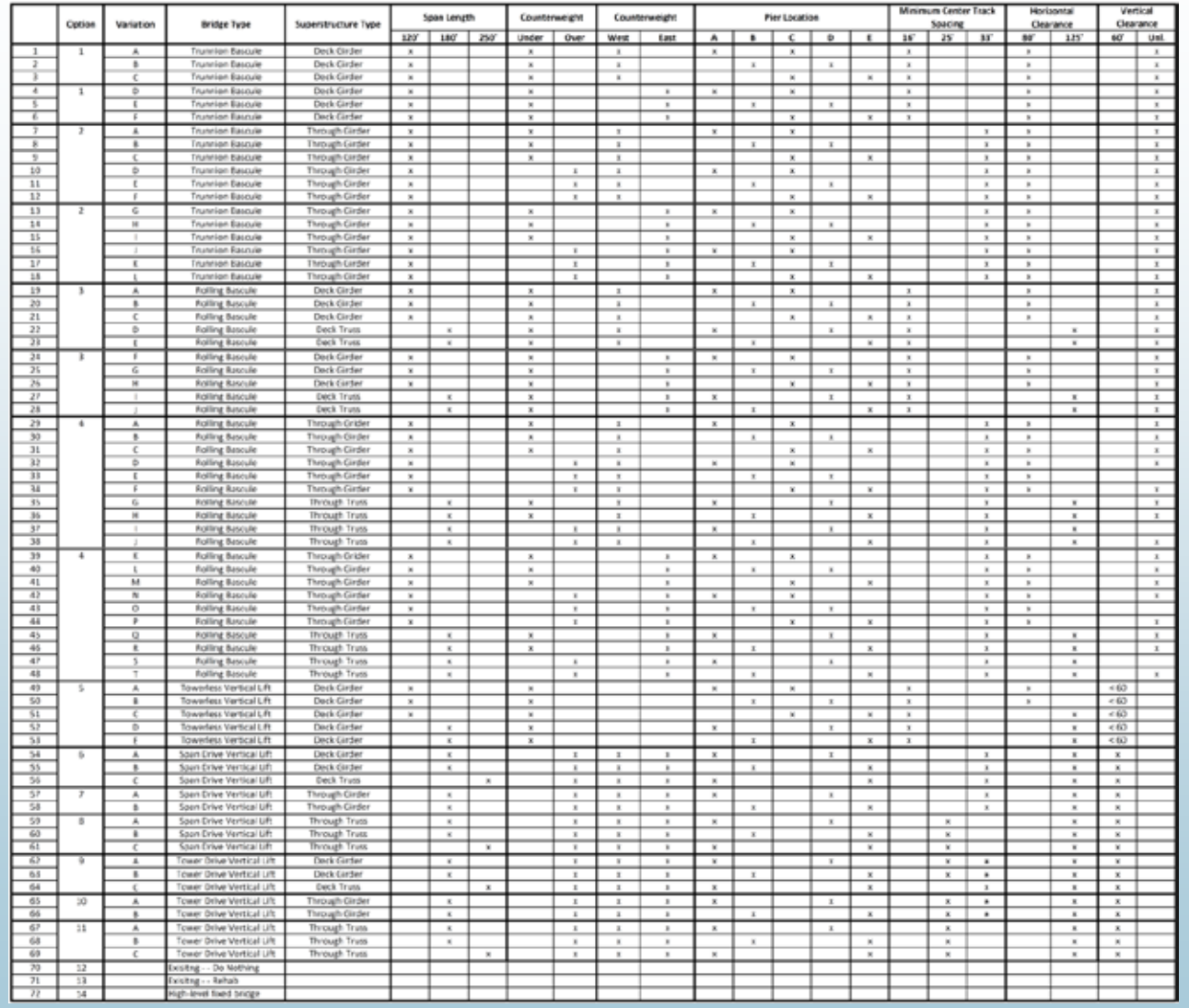
Purpose and Need

- Replace the deteriorated bridge with a **resilient** bridge
- Enhance the **safety and reliability** of rail service
- Offer **operational flexibility** and ease of maintenance
- Provide for increased efficiencies of **rail transportation**
- Maintain and improve **navigational capacity** and dependability
- Incorporate bridge **redundancy** and provide a **sustainable** bridge for significant weather events

Project Goals

- Complete the project in a safe and efficient manner, in compliance with all environmental requirements.
- Maintain rail service throughout construction.
- Maintain navigation and access to the Norwalk River.
- Minimize disruption to the surrounding community.

Alternatives Development



	Option	Variation	Bridge Type	Superstructure Type	Span Length			Counterweight		Counterweight		Pier Location					Minimum Center Track Spacing			Horizontal Clearance		Vertical Clearance	
					123'	180'	250'	Under	Over	West	East	A	B	C	D	E	16'	25'	33'	80'	125'	60'	Unl.
1	1	A	Trunnion Bascule	Deck Girder	x			x		x		x		x			x			x			x
2		B	Trunnion Bascule	Deck Girder	x			x		x			x		x		x			x			x
3		C	Trunnion Bascule	Deck Girder	x			x		x				x		x	x			x			x
4	1	D	Trunnion Bascule	Deck Girder	x			x			x	x		x			x			x			x
5		E	Trunnion Bascule	Deck Girder	x			x			x		x		x		x			x			x
6		F	Trunnion Bascule	Deck Girder	x			x			x			x		x	x			x			x
7	7	A	Trunnion Bascule	Through Girder	x			x		x		x		x					x	x			x
8		B	Trunnion Bascule	Through Girder	x			x		x			x		x				x	x			x
9		C	Trunnion Bascule	Through Girder	x			x		x				x		x			x	x			x
10		D	Trunnion Bascule	Through Girder	x				x	x		x		x					x	x			x
11		E	Trunnion Bascule	Through Girder	x				x	x			x		x				x	x			x
12		F	Trunnion Bascule	Through Girder	x				x	x				x		x			x	x			x
13	2	G	Trunnion Bascule	Through Girder	x			x			x	x		x					x	x			x
14		H	Trunnion Bascule	Through Girder	x			x			x		x		x				x	x			x
15		I	Trunnion Bascule	Through Girder	x			x			x			x		x			x	x			x
16		J	Trunnion Bascule	Through Girder	x				x		x	x		x					x	x			x
17		K	Trunnion Bascule	Through Girder	x				x		x		x		x				x	x			x
18		L	Trunnion Bascule	Through Girder	x				x		x			x		x			x	x			x
19	3	A	Rolling Bascule	Deck Girder	x			x		x		x		x			x			x			x
20		B	Rolling Bascule	Deck Girder	x			x		x			x		x		x			x			x
21		C	Rolling Bascule	Deck Girder	x			x		x				x		x	x			x			x
22		D	Rolling Bascule	Deck Truss		x		x		x		x			x		x				x		x
23		E	Rolling Bascule	Deck Truss		x		x		x			x			x	x				x		x
24	3	F	Rolling Bascule	Deck Girder	x			x			x	x		x			x			x			x
25		G	Rolling Bascule	Deck Girder	x			x			x		x		x		x			x			x
26		H	Rolling Bascule	Deck Girder	x			x			x			x		x	x			x			x
27		I	Rolling Bascule	Deck Truss		x		x			x	x			x		x				x		x
28		J	Rolling Bascule	Deck Truss		x		x			x		x			x	x				x		x
29	4	A	Rolling Bascule	Through Girder	x			x		x		x		x					x	x			x
30		B	Rolling Bascule	Through Girder	x			x		x			x		x				x	x			x
31		C	Rolling Bascule	Through Girder	x			x		x				x		x			x	x			x
32		D	Rolling Bascule	Through Girder	x				x	x		x		x					x	x			x
33		E	Rolling Bascule	Through Girder	x				x	x			x		x				x	x			
34		F	Rolling Bascule	Through Girder	x				x	x				x		x			x	x			x
35		G	Rolling Bascule	Through Truss		x		x		x		x			x				x		x		x
36		H	Rolling Bascule	Through Truss		x		x		x			x			x			x		x		x
37		I	Rolling Bascule	Through Truss		x			x	x		x			x				x		x		
38		J	Rolling Bascule	Through Truss		x			x	x			x			x			x		x		x
39	4	E	Rolling Bascule	Through Girder	x			x			x	x		x					x	x			x
40		L	Rolling Bascule	Through Girder	x			x			x		x		x				x	x			x
41		M	Rolling Bascule	Through Girder	x			x			x			x		x			x	x			x
42		N	Rolling Bascule	Through Girder	x				x		x	x		x					x	x			x
43		O	Rolling Bascule	Through Girder	x				x		x		x		x				x	x			
44		P	Rolling Bascule	Through Girder	x				x		x			x		x			x	x			x
45		Q	Rolling Bascule	Through Truss		x		x			x	x			x				x		x		x
46		R	Rolling Bascule	Through Truss		x		x			x		x			x			x		x		x
47		S	Rolling Bascule	Through Truss		x			x		x	x			x				x		x		
48		T	Rolling Bascule	Through Truss		x			x		x		x			x			x		x		x
49	5	A	Towerless Vertical Lift	Deck Girder	x			x				x		x			x			x		< 60	
50		B	Towerless Vertical Lift	Deck Girder	x			x					x		x		x			x		< 60	
51		C	Towerless Vertical Lift	Deck Girder	x			x						x		x	x				x	< 60	
52		D	Towerless Vertical Lift	Deck Girder		x		x				x			x		x				x	< 60	
53		E	Towerless Vertical Lift	Deck Girder		x		x					x			x	x				x	< 60	
54	6	A	Span Drive Vertical Lift	Deck Girder		x			x	x	x	x			x				x		x	x	
55		B	Span Drive Vertical Lift	Deck Girder		x			x	x	x		x			x			x		x	x	
56		C	Span Drive Vertical Lift	Deck Truss			x		x	x	x	x				x			x		x	x	
57	7	A	Span Drive Vertical Lift	Through Girder		x			x	x	x	x			x				x		x	x	
58		B	Span Drive Vertical Lift	Through Girder		x			x	x	x		x			x			x		x	x	
59	8	A	Span Drive Vertical Lift	Through Truss		x			x	x	x	x			x			x			x	x	
60		B	Span Drive Vertical Lift	Through Truss		x			x	x	x		x			x		x			x	x	
61		C	Span Drive Vertical Lift	Through Truss			x		x	x	x	x				x		x			x	x	
62	9	A	Tower Drive Vertical Lift	Deck Girder		x			x	x	x	x			x			x	a		x	x	
63		B	Tower Drive Vertical Lift	Deck Girder		x			x	x	x		x			x		x	a		x	x	
64		C	Tower Drive Vertical Lift	Deck Truss			x		x	x	x	x				x			x		x	x	
65	10	A	Tower Drive Vertical Lift	Through Girder		x			x	x	x	x			x			x	a		x	x	
66		B	Tower Drive Vertical Lift	Through Girder		x			x	x	x		x			x		x	a		x	x	
67	11	A	Tower Drive Vertical Lift	Through Truss		x			x	x	x	x			x			x			x	x	
68		B	Tower Drive Vertical Lift	Through Truss		x			x	x	x		x			x		x			x	x	
69		C	Tower Drive Vertical Lift	Through Truss			x		x	x	x	x				x		x			x	x	
70	12		Existing - - Do Nothing																				
71	13		Existing - - Rehab																				
72	14		High-level fixed bridge																				

- Cost
- Environmental Impacts
- Stakeholder Coordination
- Engineering Challenges
- Construction Impacts
- Construction Schedule
- Construction Risks and Challenges
- Maintenance and Inspection
- Resiliency, redundancy
- Railroad Operations
- Navigation Clearances
- Safety and Security
- Aesthetics and context

Alternatives Development

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21		C	Rolling Bascule	Deck Girder	x			x		x				x		x	x			x			x
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33		E	Rolling Bascule	Through Girder	x				x	x			x		x				x	x			
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50		B	Towerless Vertical Lift	Deck Girder	x			x					x		x		x			x		< 60	
51		C	Towerless Vertical Lift	Deck Girder	x			x						x		x	x				x	< 60	
52		D	Towerless Vertical Lift	Deck Girder		x		x				x			x		x				x	< 60	
53		E	Towerless Vertical Lift	Deck Girder		x		x					x			x	x				x	< 60	
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56		C	Span Drive Vertical Lift	Deck Truss			x		x	x	x	x				x			x		x	x	
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58		B	Span Drive Vertical Lift	Through Girder		x			x	x	x		x			x			x			x	
59	8	A	Span Drive Vertical Lift	Through Truss		x			x	x	x	x			x			x			x	x	
60		B	Span Drive Vertical Lift	Through Truss		x			x	x	x		x			x					x	x	
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62	9	A	Tower Drive Vertical Lift	Deck Girder		x			x	x	x	x			x			x	a		x	x	
63		B	Tower Drive Vertical Lift	Deck Girder		x			x	x	x					x		x	a		x	x	
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67	11	A	Tower Drive Vertical Lift	Through Truss		x			x	x	x	x			x			x			x	x	
68			Tower Drive Vertical Lift	Through Truss		x			x	x	x		x			x		x			x	x	
69			Tower Drive Vertical Lift	Through Truss			x		x	x	x	x				x					x	x	
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HNTB

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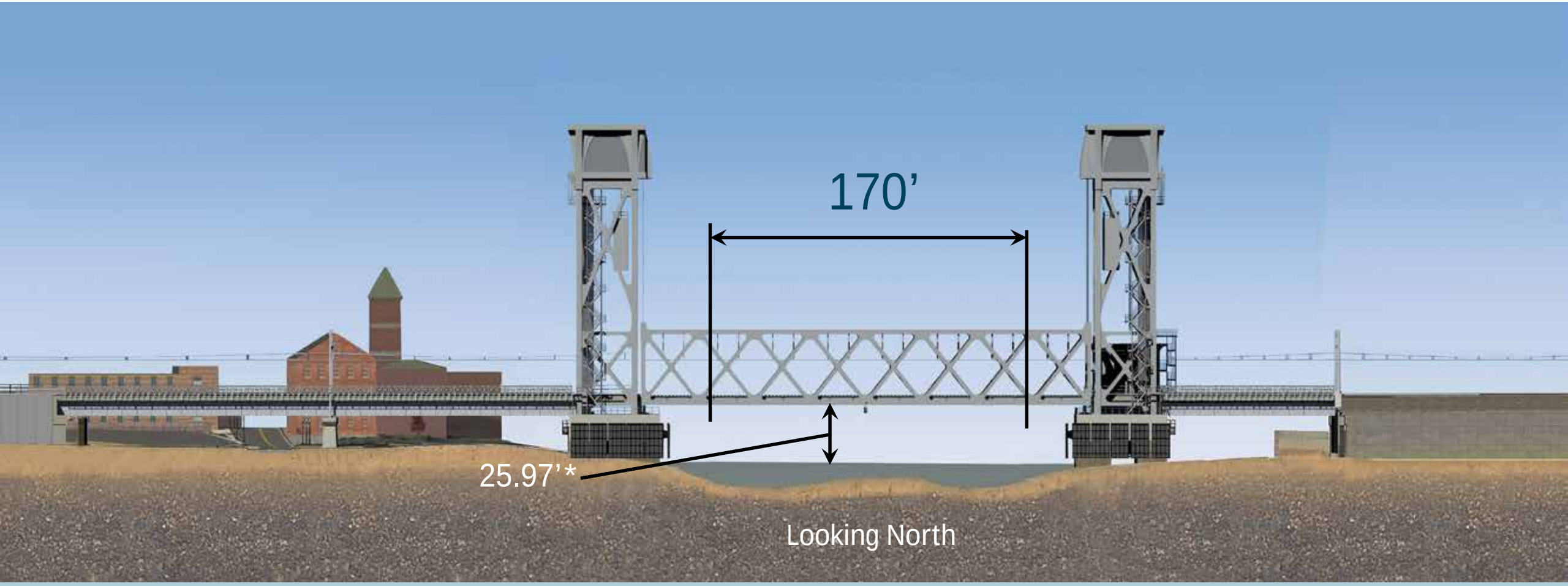
Preferred Alternative

240’ Vertical Lift Span

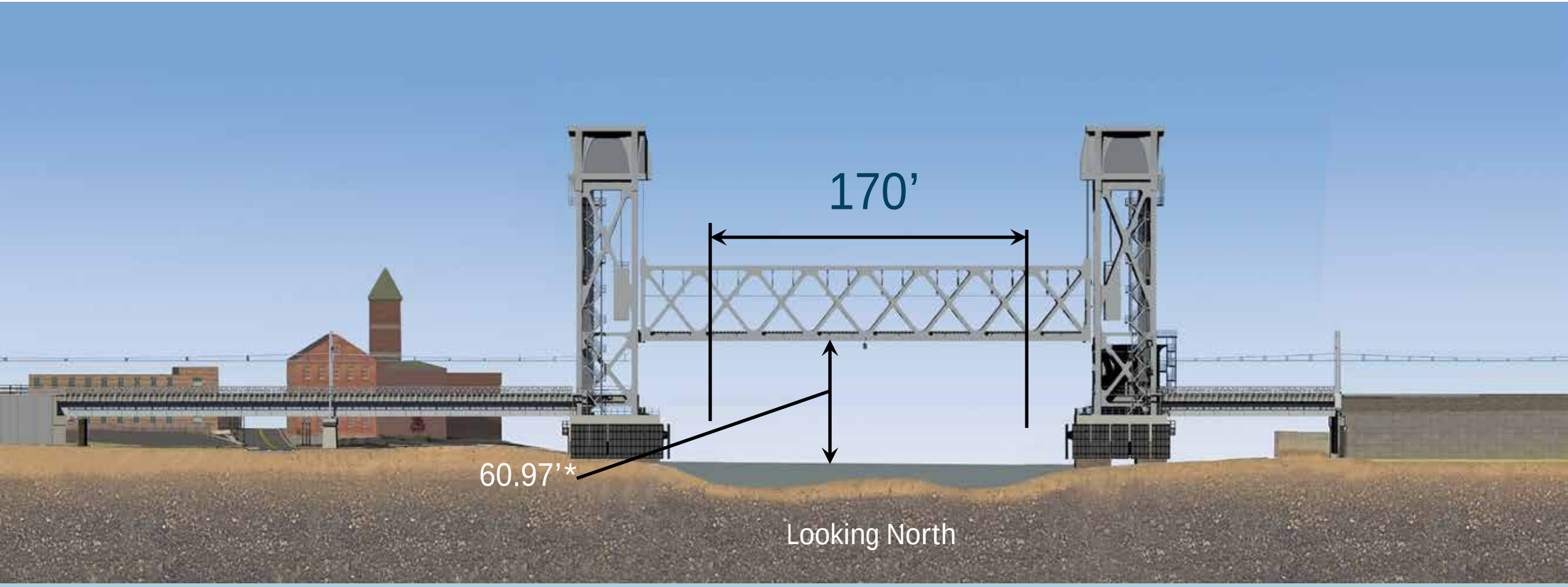
- Maintenance of rail and waterway traffic
- Shortest construction schedule
- Lowest risk during construction
- Shortest period of navigation restrictions
- Fewest foundations in water
- Improved alignment with Stroffolino Bridge

Preferred Alternative – span down



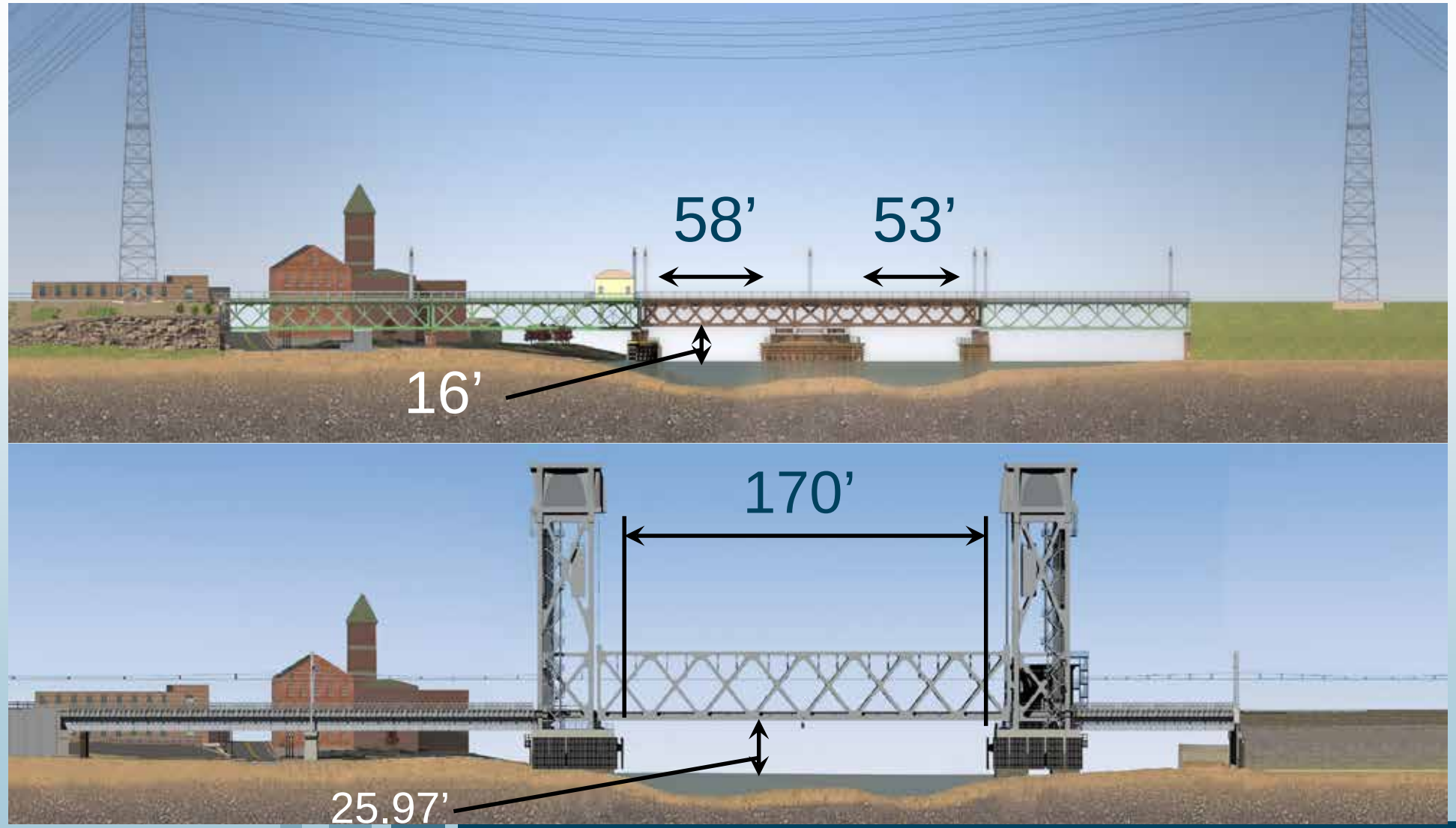
*above MHW

Preferred Alternative – span up



*above MHW

Bridge Comparison



Walk Bridge Program

More than just a Bridge

- Norwalk River crossing
- 5 undergrade bridges
- Rail yard and additional track capacity; new interlocking
- Rail station reconstruction
- Utility relocations
- 1 mile+ of upgrades
- Environmental mitigation
- Community enhancements

WALK BRIDGE

TIME-2 AND ASSOCIATED PROJECTS

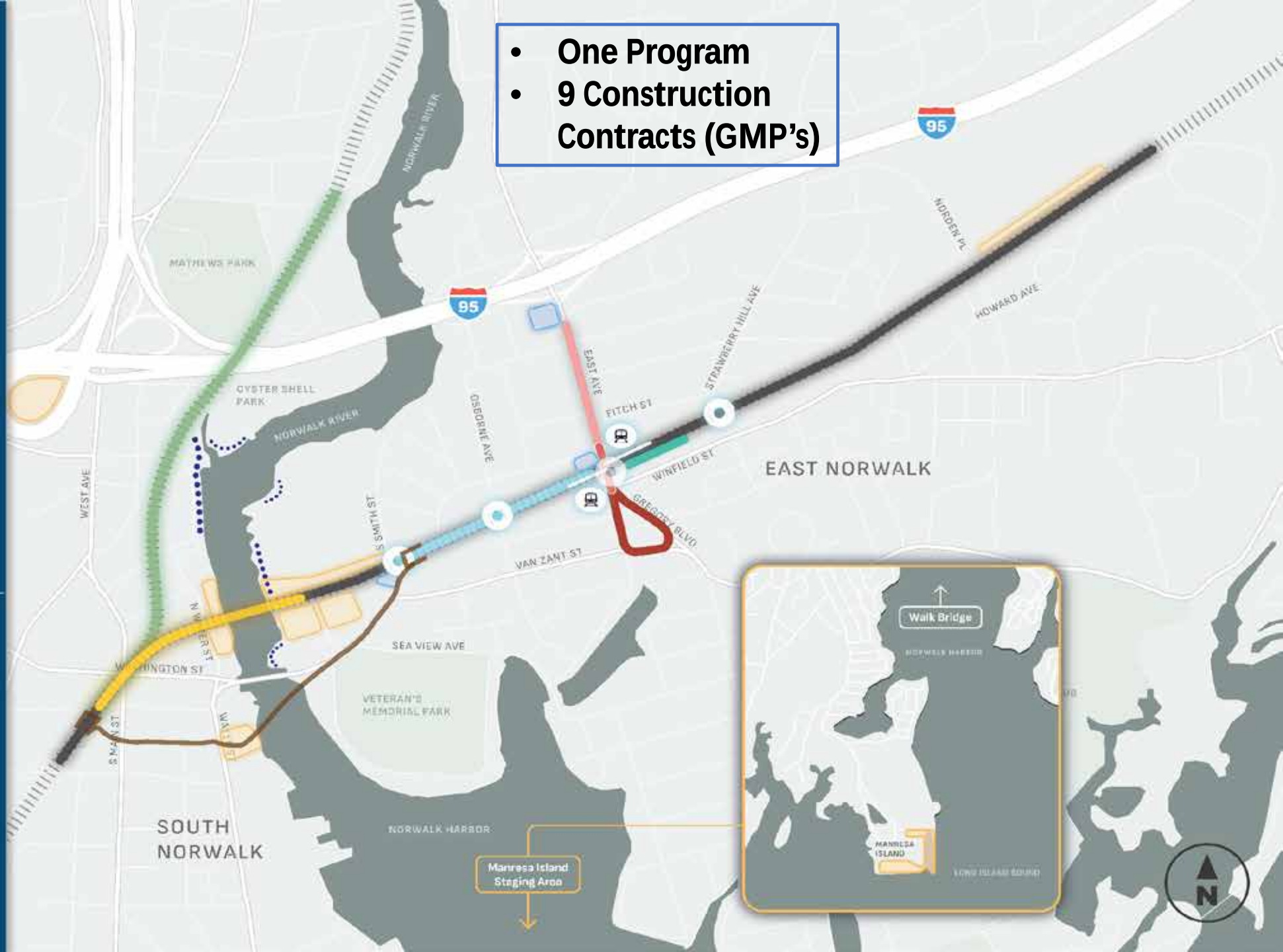
- Walk Bridge replacement (301-0176)
- Danbury branch dockyard project (301-0180)
- Retaining wall 427 (301-0190)
- Advanced catenary project (301-0524)
- Advanced utilities and roadway improvements on East Avenue (301-0515)
- East Avenue railroad bridge and roadway upgrades (102-0297)
- East Norwalk connectivity enhancements (102-0375)
- CP243 interlocking project (301-0181)
- Eversource Bypass Project (301-0500)

- East Norwalk train station upgrades (north and south platforms)
- (TIME-2) Local railroad bridge replacement (301-0187, 301-0188, 301-0189, 301-0529)
- Walk Bridge construction and staging
- TIME-2 construction and staging
- Wetland revitalization areas

WALK BRIDGE

TIME FOR CT

- One Program
- 9 Construction Contracts (GMP's)



Multi-discipline effort

1. Structures
2. Architecture
3. Mechanical
4. Electrical
5. Geotechnical

Multi-discipline effort

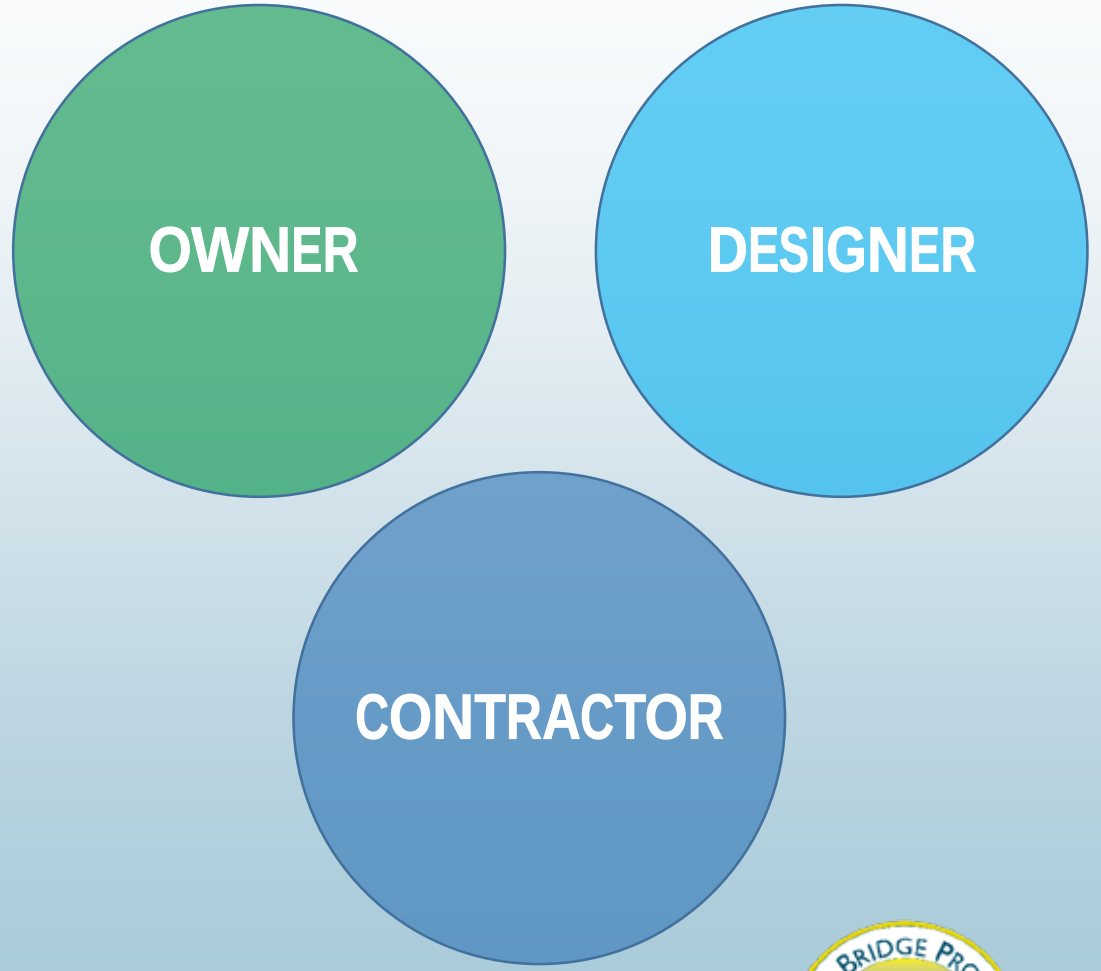
1. Structures
2. Architecture
3. Mechanical
4. Electrical
5. Geotechnical
6. Tunnels
7. Roadway
8. Traffic
9. Site civil
10. Retaining walls
11. Landscaping
12. Utilities
13. Railroad track
14. Overhead Contact System
15. Traction Power
16. Substations
17. Communications
18. Signals
19. Commuter rail station
20. Railroad operations analysis
21. Hydraulics and Hydrology
22. NEPA documentation
23. Environmental permitting
24. Environmental mitigation
25. Construction engineering

Challenges and Risks

- Safety
- Century-old infrastructure
- Complex design and construction
- Multiple disciplines
- Maintaining rail operations
- Multiple railroad operators
- Maintaining navigation
- Complex assortment of vocal stakeholders
- Right-of-way constraints
- Bridge Aesthetics
- Traffic Impacts
- Business Impacts
- Shellfish industry impacts
- Parking
- Natural Resource Impacts
- Cultural Resource Impacts
- Strict environmental approvals
- Adjacent Projects
- Cost and Schedule

Aligning Project Goals

- Budget and Schedule
- Cost certainty
- Manage risk
- Innovation
- Value engineering
- Early procurement
- Optimize schedule and phasing
- Environmental compliance
- Public and Stakeholder engagement
- Minimize delays and claims

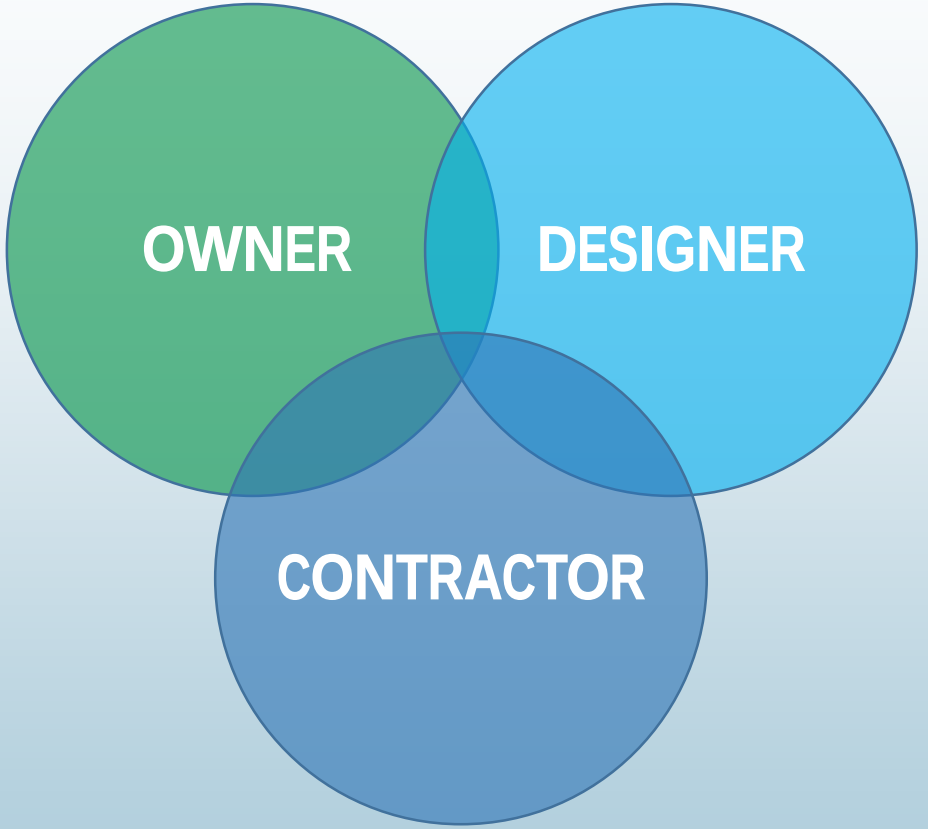


Aligning Project Goals

- Budget and Schedule
- Cost certainty
- Manage risk
- Innovation
- Value engineering
- Early procurement
- Optimize schedule and phasing
- Environmental compliance
- Public and Stakeholder engagement
- Minimize delays and claims
- **Early contractor engagement**

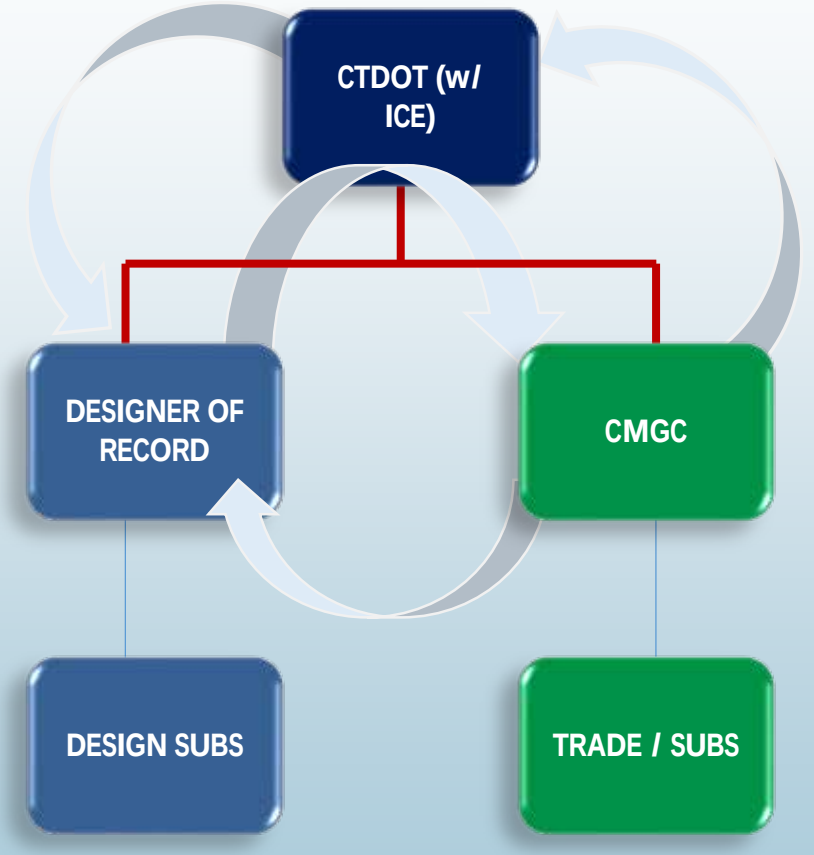
Why CMGC?

Obtain construction and technical expertise from a Contractor during the pre-construction phase to optimize cost, schedule, and quality through risk mitigation.



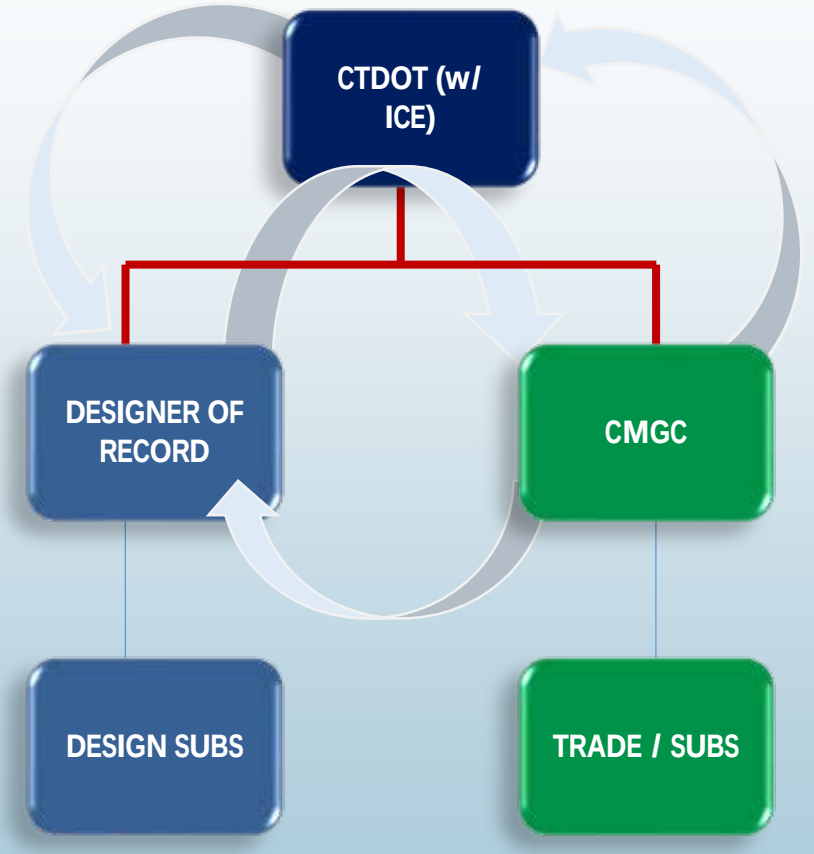
Factors influencing CMGC

- High complexity
  - ROW needs and impacts
  - Environmental approvals
  - CM/GC input on constructability essential for success
- Separate construction packages
  - Early procurement of long lead items
  - Breakout GMPs
- Owner control
  - Reduce risk
- Fosters innovation
  - Upfront value engineering
- Best value
  - Quality, cost and schedule



CMGC – an Integrated Team Approach

- Manage risk
- Maintain budget
- Innovation
- Value engineering
- Early procurement
- Optimize schedule and phases
- ROW impacts
- Environmental Approvals
- Minimize delays and claims



Designer Role during CMGC Delivery

- Trusted advisor to the owner
- Engineer-of-record
- Establish design criteria
- Finalize design to support CMGC process
- On-schedule milestone submittals
- Prepare engineer's estimate and schedule (if needed).
- Participate in project meetings
  - General coordination with owner and contractor
  - Design workshops
  - Risk workshops
  - Public and Stakeholder Coordination
  - Quantity and cost reconciliation

Leveraging CMGC for Walk Bridge

- Design Development and Innovation
- Design Quality
- Constructability Input
- Construction Workplans
- ROW Constraints
- Environmental Approvals
- Stakeholder consensus
- Public and Business Involvement
- Packaging and Early Procurement
- Risk Mitigation
- Cost and Schedule

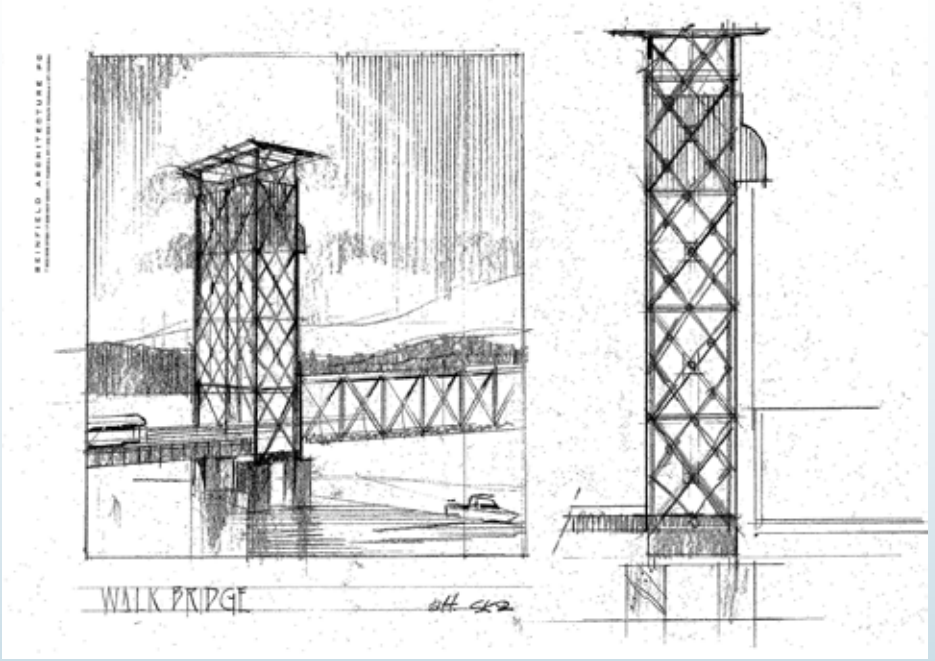
Risk Mitigation

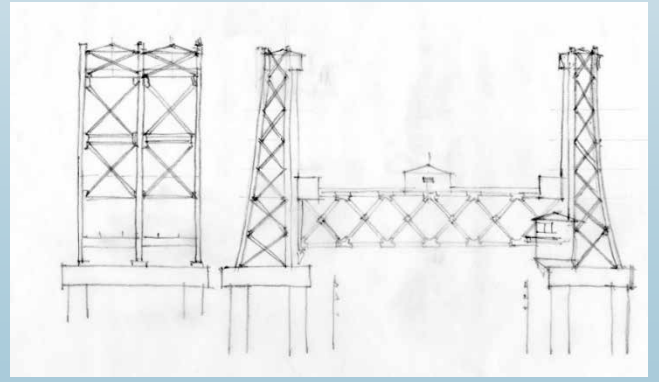
Key Public and Stakeholder Concerns

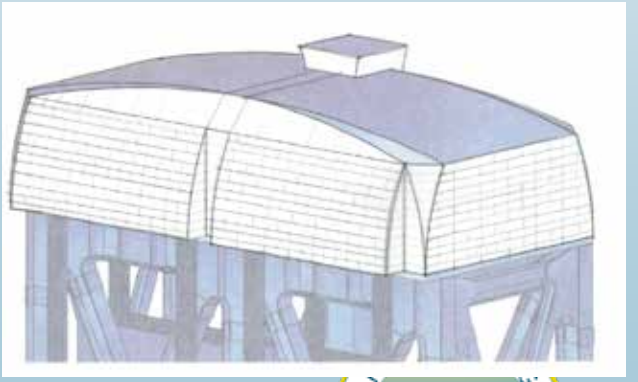
- Bridge Aesthetics
- Environmental and Historic Impacts
- Right-of-way impacts
- Future property use
- Traffic Impacts
- Business Impacts
- Related Project Coordination
- Parking
- Public Involvement
- Project Communications
- Mitigation Plans

Stakeholder Consensus - DAC

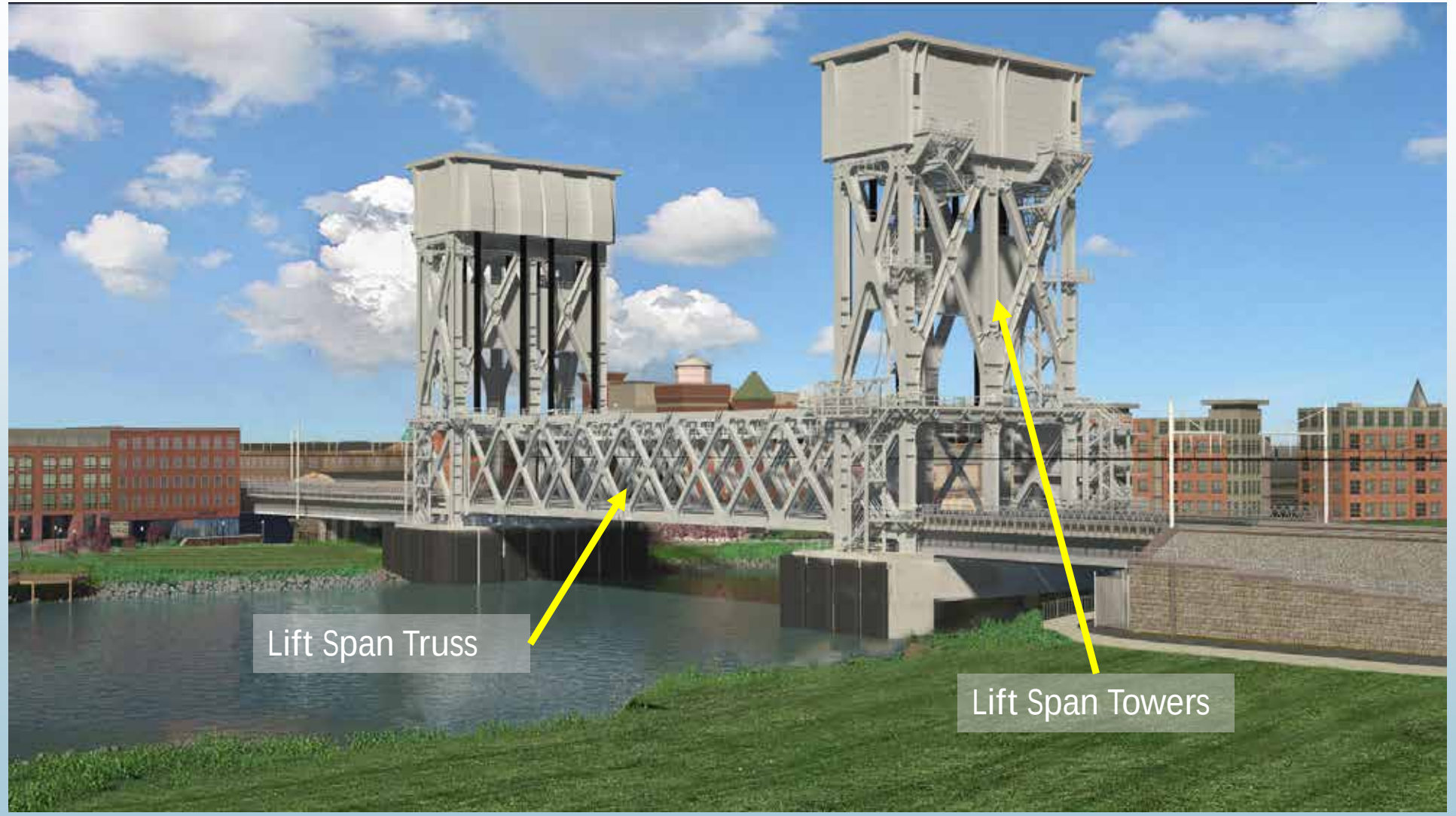
- Collaborate on key design decisions and project elements
- Project Themes
- Span Geometry
- Colors, finishes and lighting
- Tower heights and configurations
- Redundancy and Resiliency
- Constructability
- ABC Techniques
- Site constraints
- **Contractor Input**







Design Development and Innovation



Design Development and Innovation

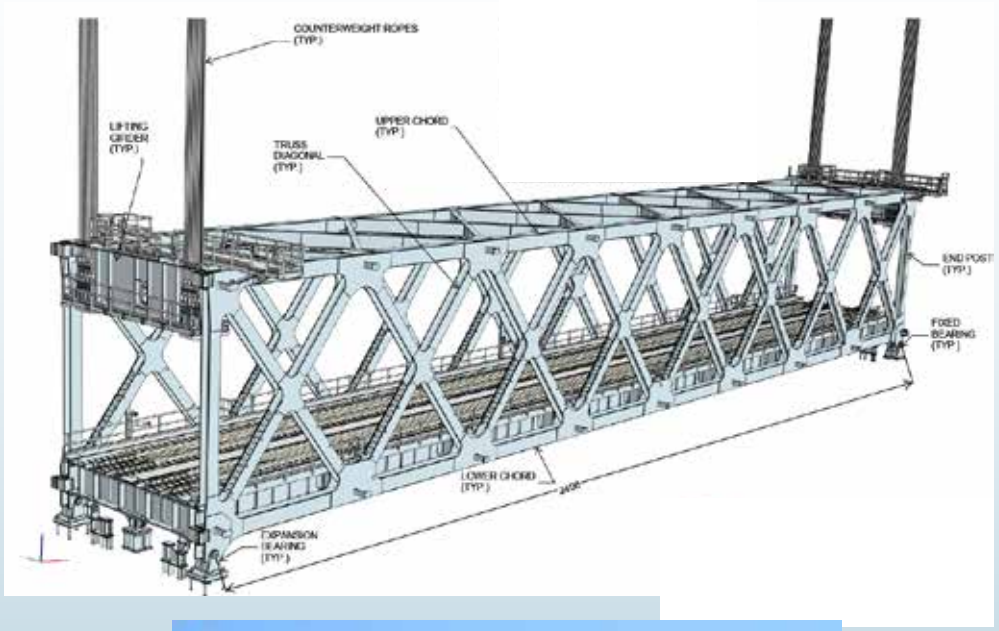
- All steel superstructure
- AREMA Chapter 15
- Open sections (rolled or built-up)
- ASTM A709 Grade 50
- ASTM A148 Grade 80-50 (> 4”)
- ASTM F3125, Grade A325 bolts
- Corrosion Protection systems:
  - Metalized primary members
  - Galvanized access system
  - Painted aesthetic railing
- Address project goals

Project Element	Tons
Lift Span	2,800
Lift Span Towers	2,630
Counterweights	390
Miscellaneous	400
Total Project	7,200

Design Development and Innovation

Lift Span Trusses

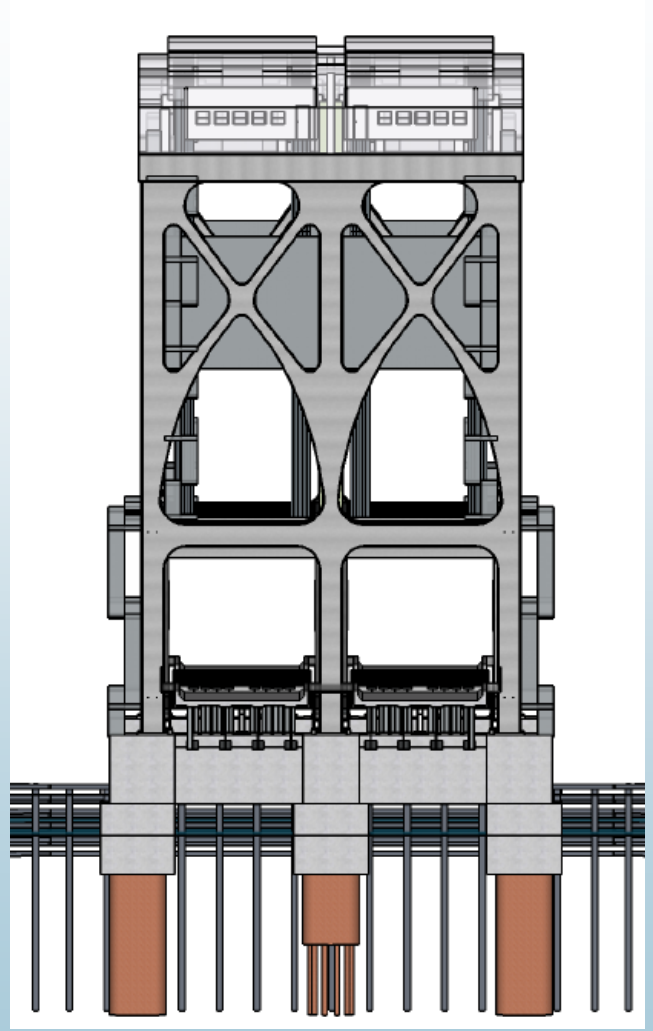
- Double Intersecting Warren Truss without verticals
- No sway frames
- Framed-in floor system
- Open shapes
- FRP railing and walkways
- Aesthetic lighting
- CMGC Coordination:
  - Fabrication details, erection and design
  - Accelerated Bridge Construction



Design Development and Innovation

Lift Span Towers

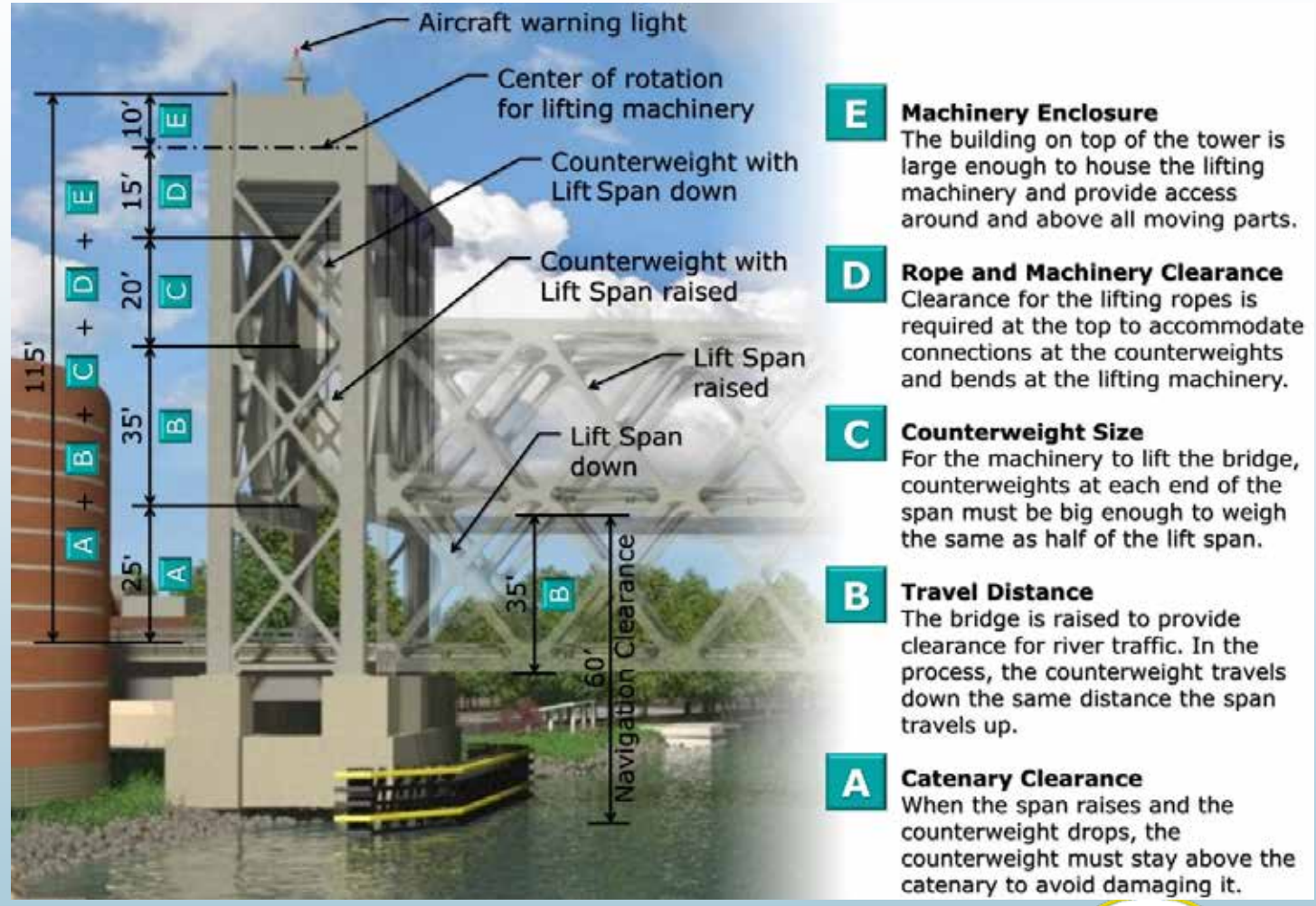
- DAC input
- Tower drive lift span
- Supports DL of lift span
- Erect tower around operating railroad
- Pre-assembled open section
- Conceal access stairs and platforms
- CMGC Coordination
  - Fabrication details
  - Transportation
  - Erection sequence



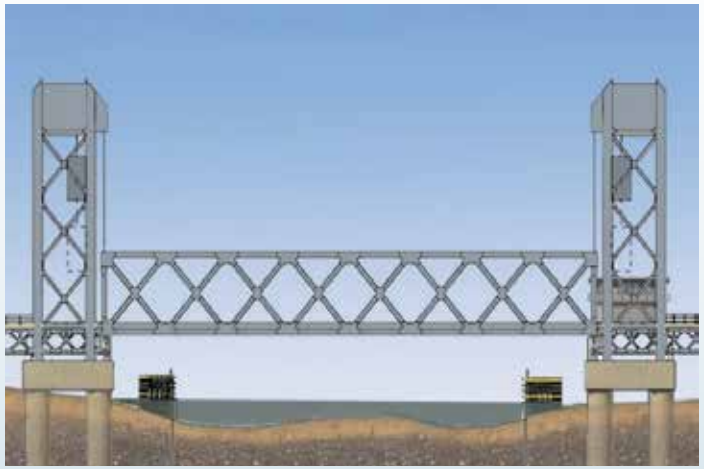
Tower End View

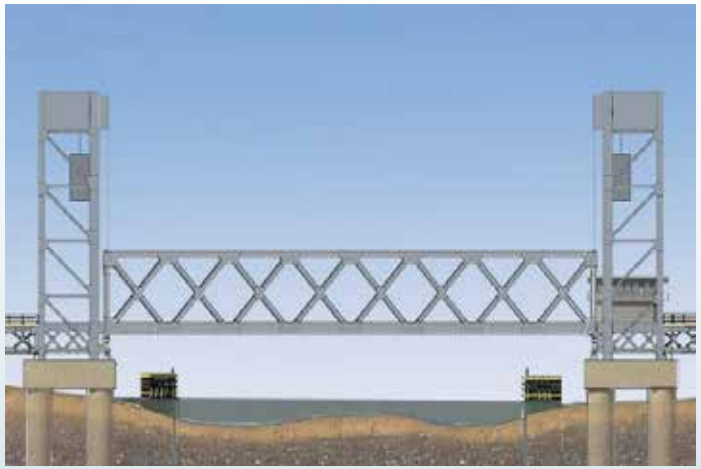
Lift Span Tower Design Parameters

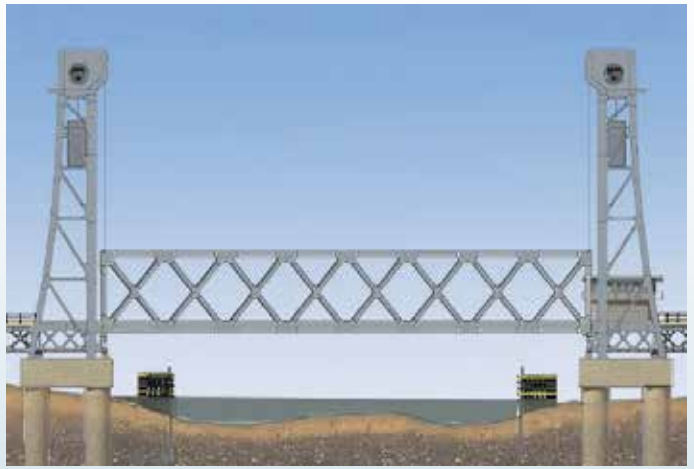
- Tower Height and width
- Tower Geometry – straight, angled and curved legs
- Top of Tower configuration
- Aesthetic Lighting
- CMGC Coordination
  - Fabrication details
  - Transportation
  - Erection sequence

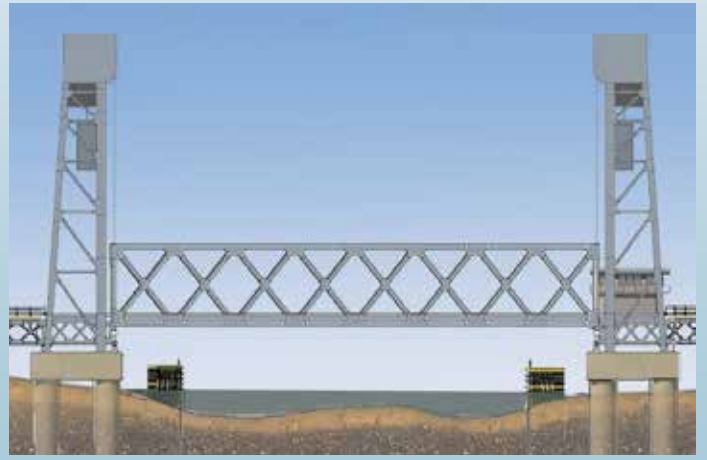


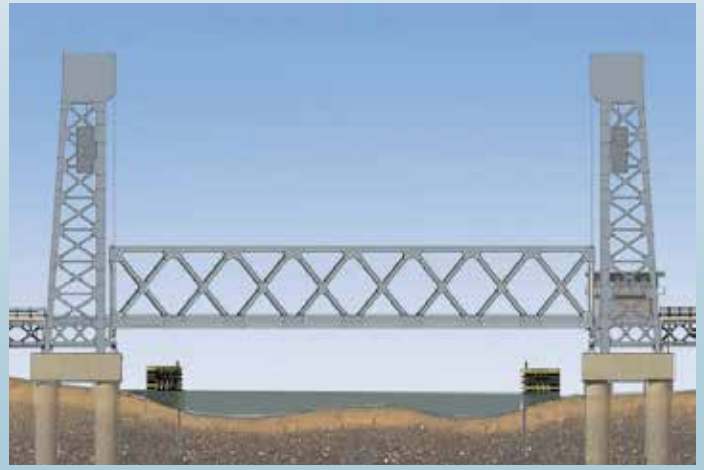
Evolution of Design

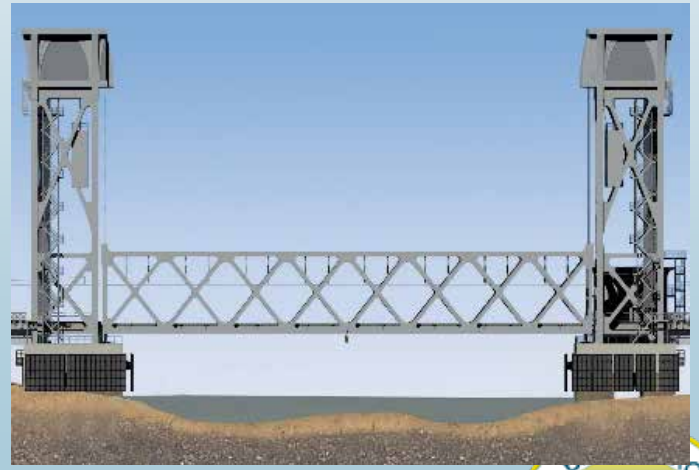




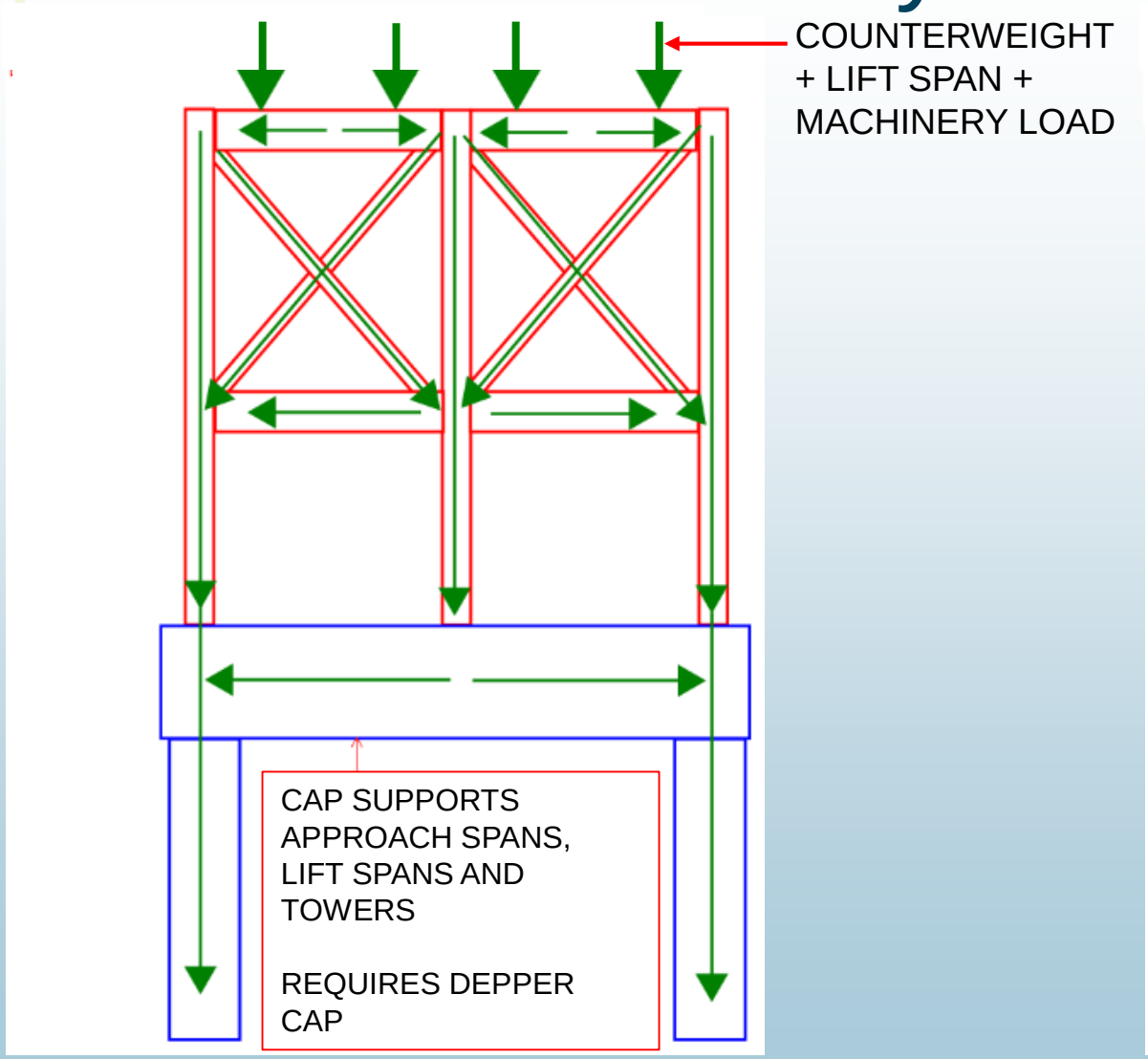


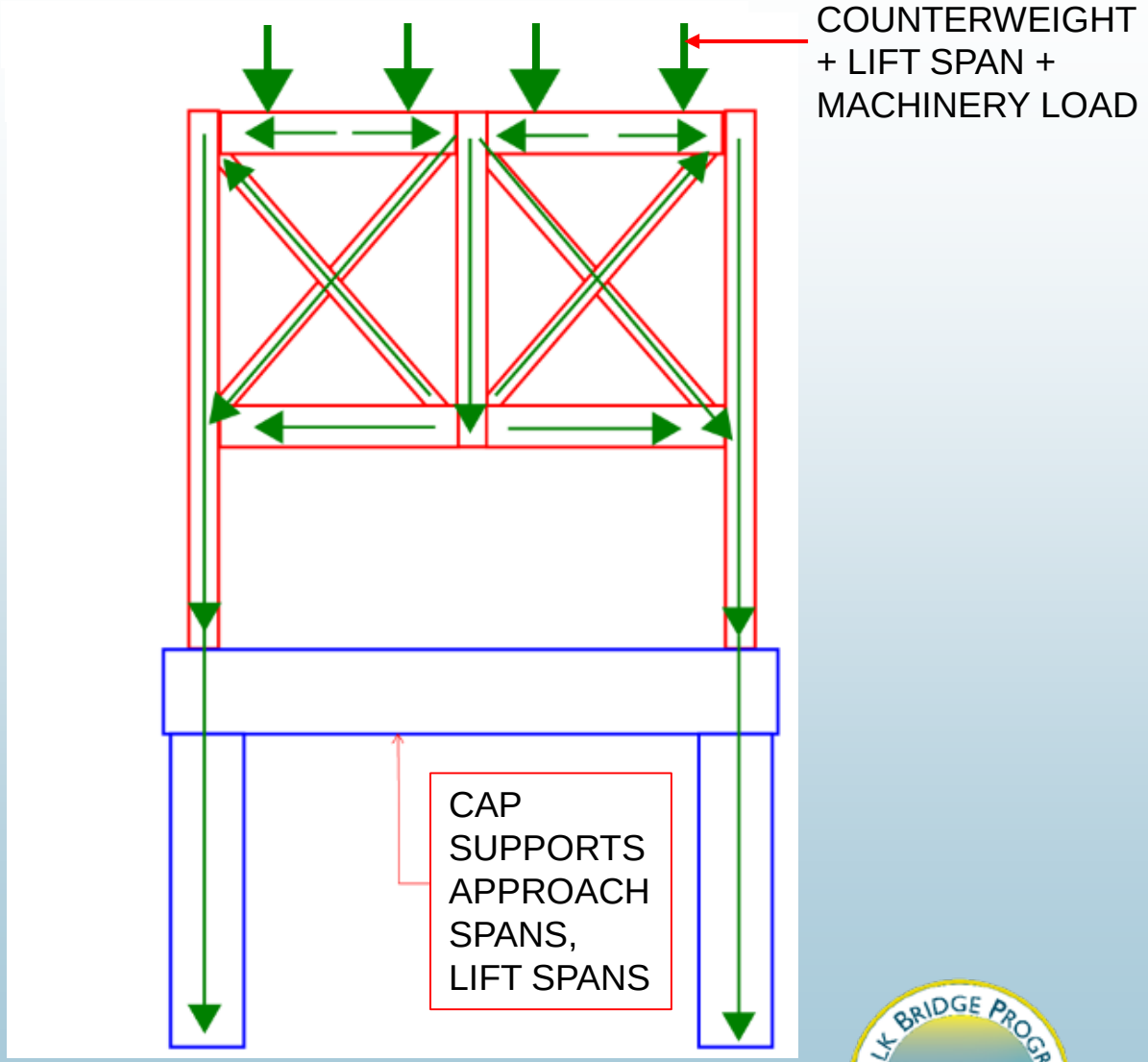






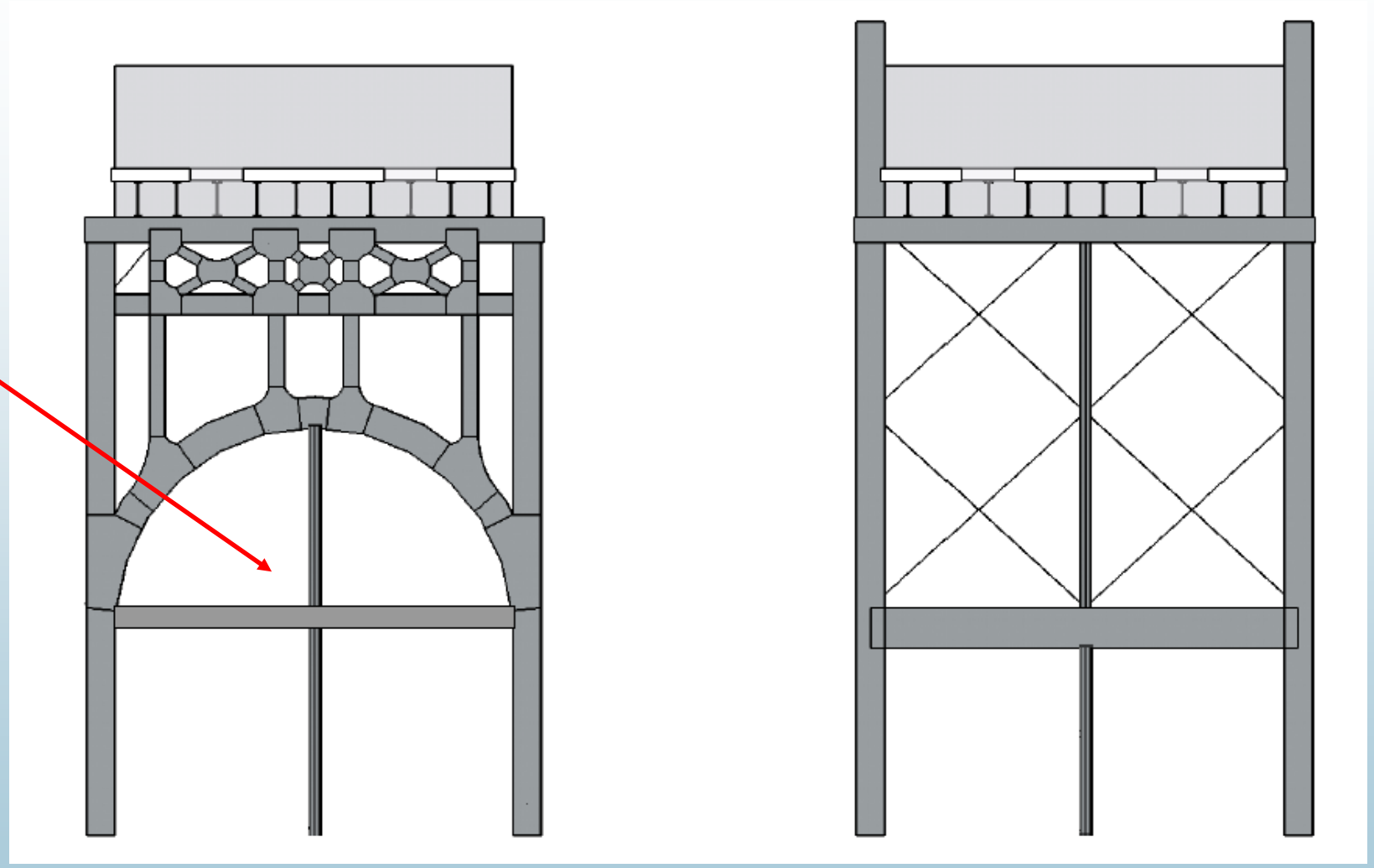
Tower Structural System





Tower Structural System

Span Guide Support (non-load carrying)

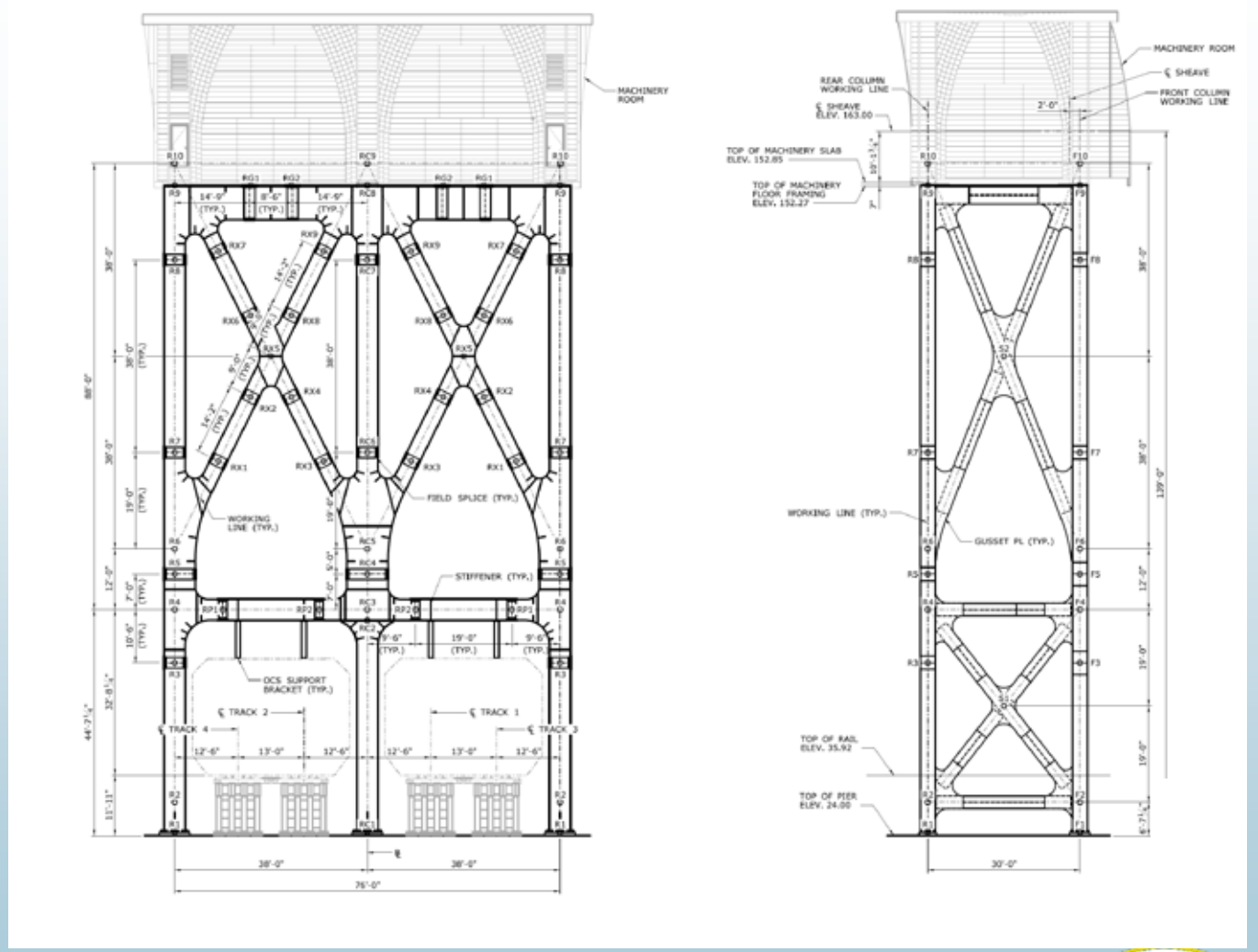


Arch Concept

Cross-bracing concept

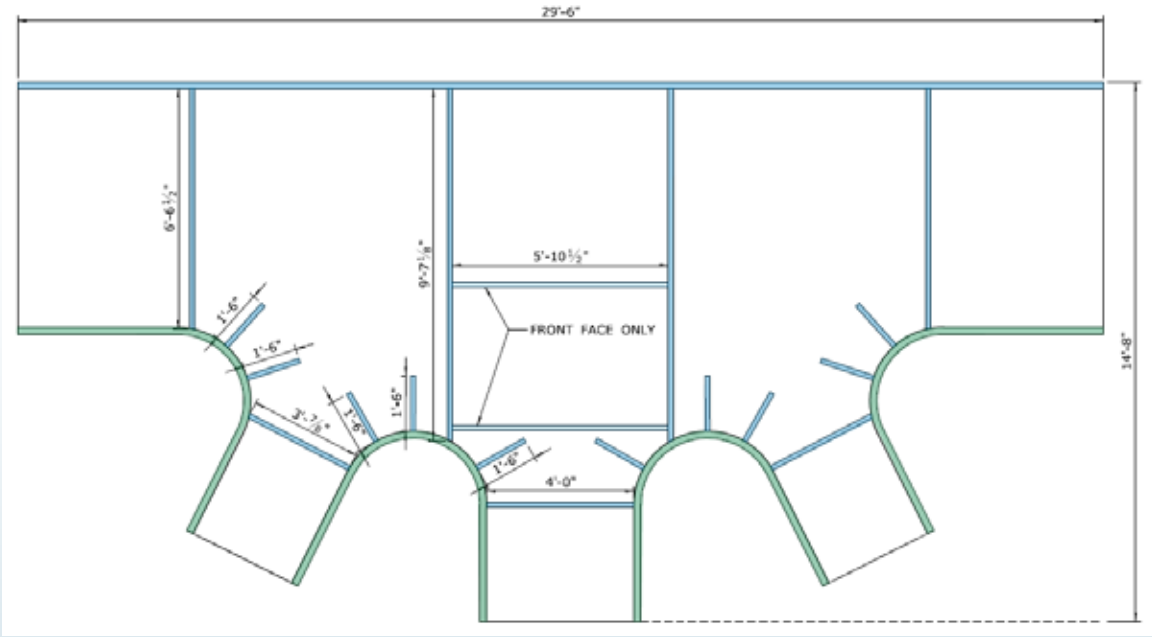
Tower Structural System

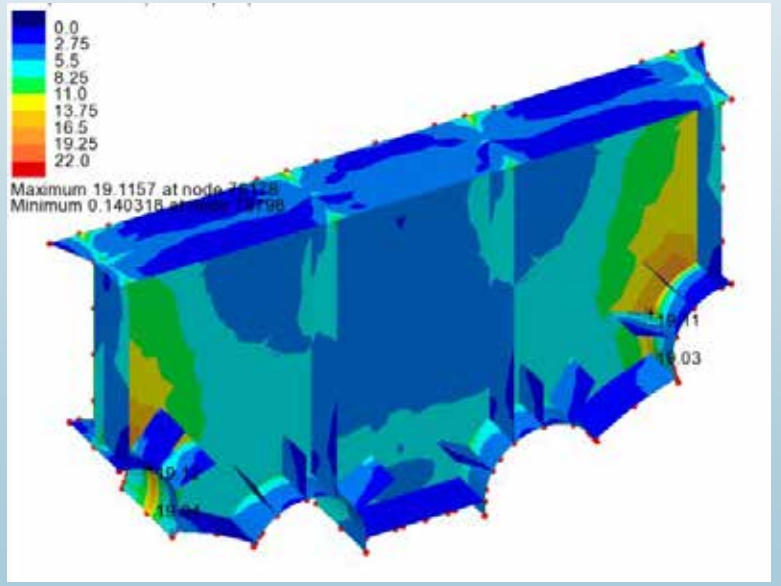
- Arch Frame transfers loads directly to foundations
- Reduced number of members; open sections
- Support of guides for lift span movement
- CMGC Coordination
  - Fabrication details
  - Transportation
  - Erection sequence
  - Construction loads



Analysis Requirements

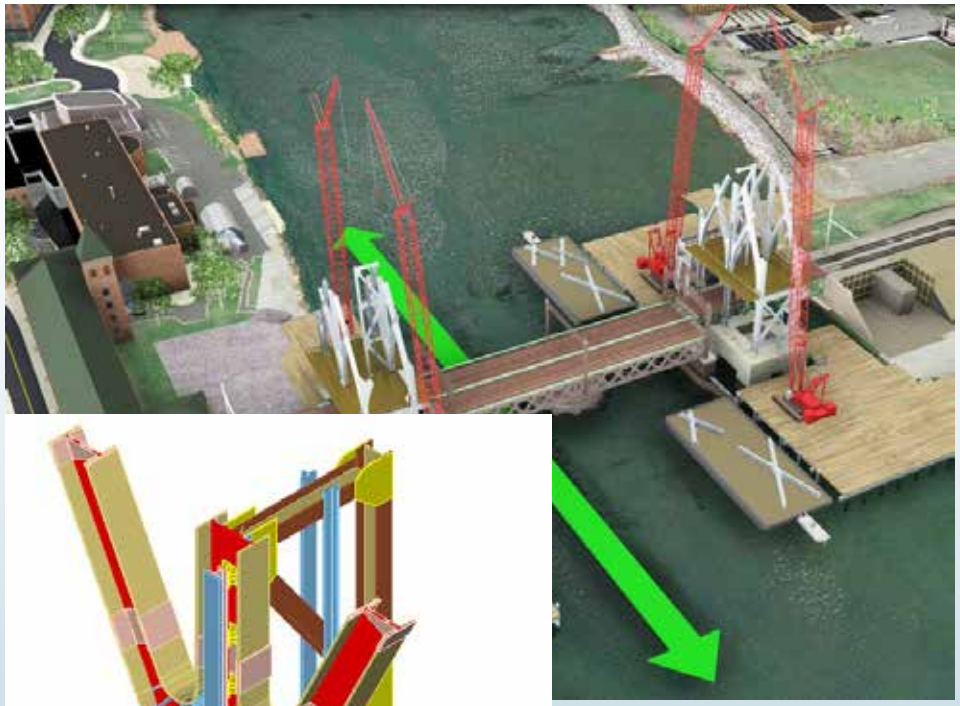
- Overall structural model (CSI)
- Detail analysis of tower joints (LUSAS)
- Stiffener Requirements
- Analysis during temporary conditions
- Construction Loading
- CMGC Coordination
  - Fabrication details
  - Transportation
  - Erection sequence
  - Construction loads

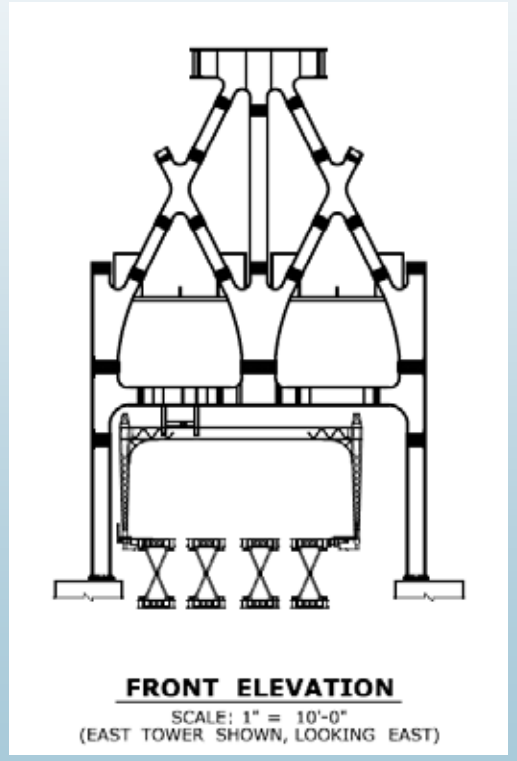


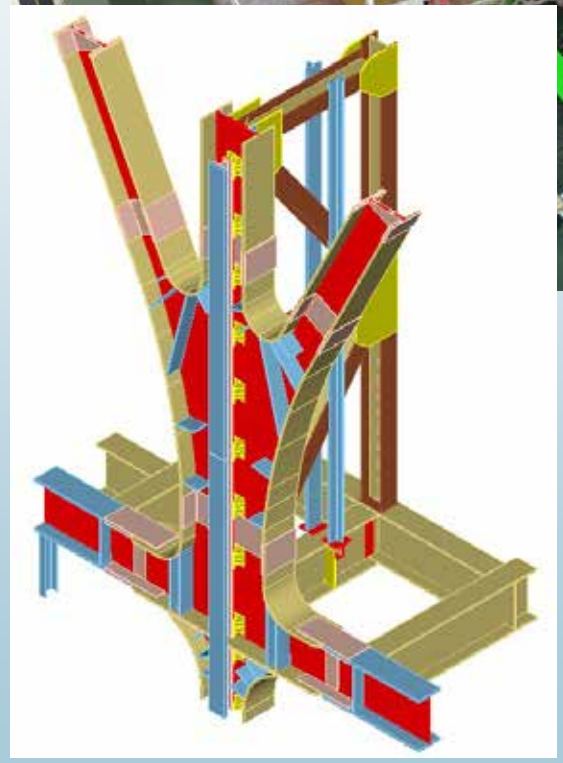


Erection Sequence

- Detailed sequence
- Temporary conditions and construction loading
- Visualization details for internal and external coordination
- CMGC Coordination
  - Fabrication details
  - Transportation
  - Erection sequence
  - Construction loads







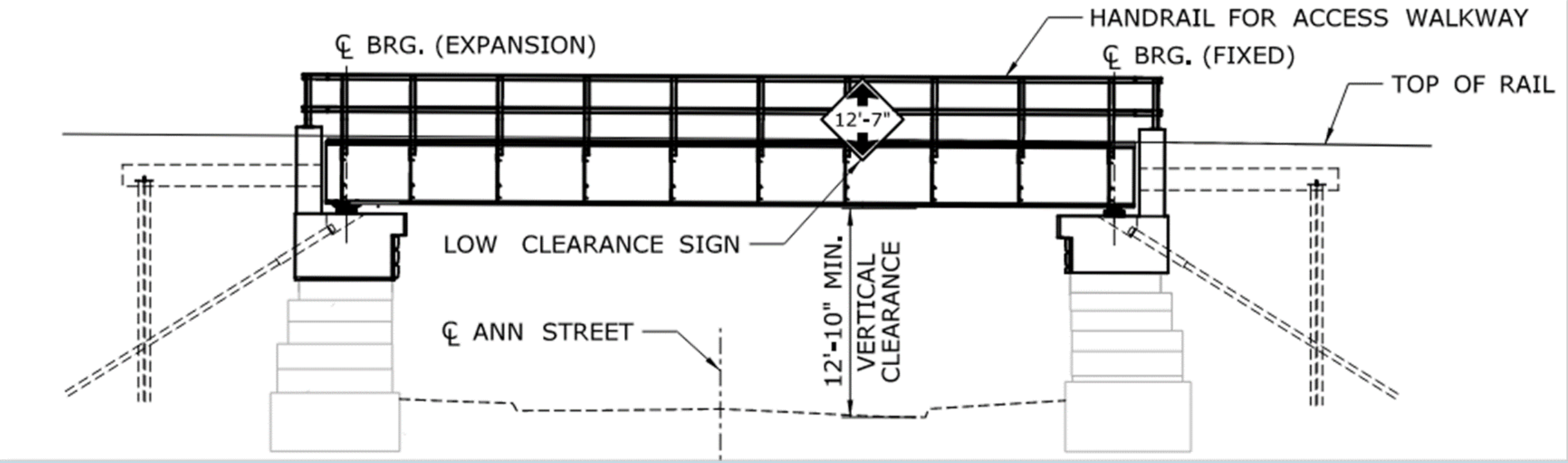
Ann Street Bridge Replacement

Existing Ann Street Bridge

Design Development and Innovations

- Phased Construction: keeping one track open
- Re-use substructure
  - Preserve historic brownstone
  - Micropile-supported approach slab
  - Tie-backs
- Split pipe bearing stiffeners

Design Solution



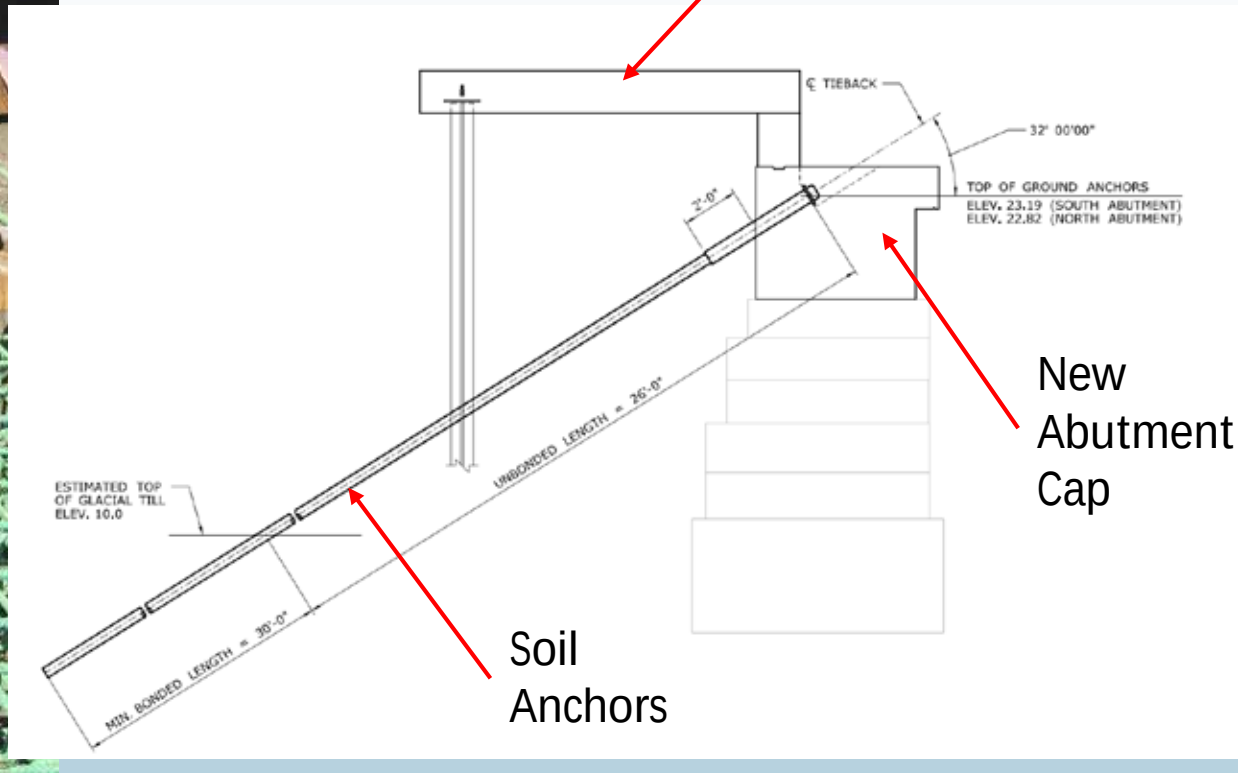
- Phased Construction
- 2-tracks to 3-track conversion
- Reuse of existing stone abutments
- Approach slab on micropiles
- Soil anchors/tie-backs
- Stone re-use
- Split-pipe stiffeners

Staged construction

Staged construction

Micropiles under approach slab

Approach Slab Installation



Abutment Cross Section

Stone Facing of New Abutment Cap

Stone Facing of New Abutment Cap

Split-pipe bearing stiffener

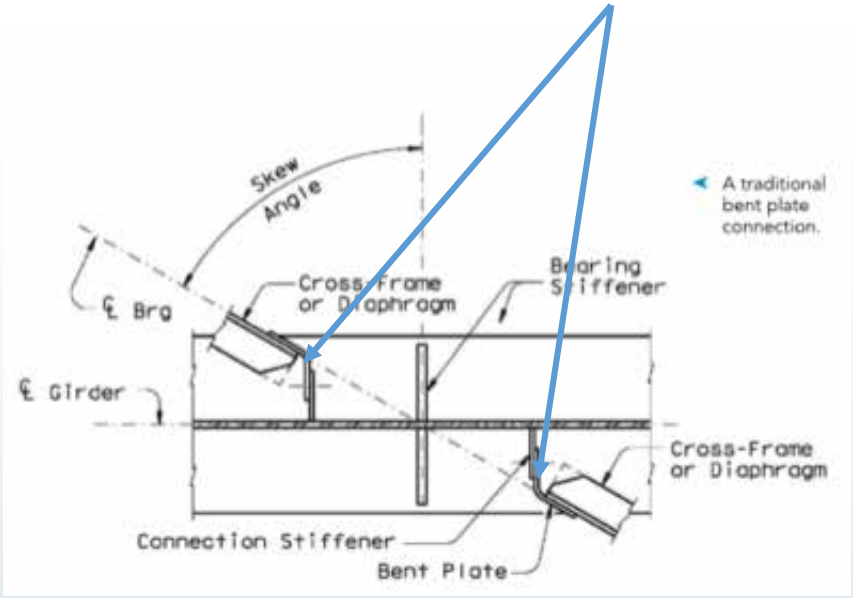
Literature:

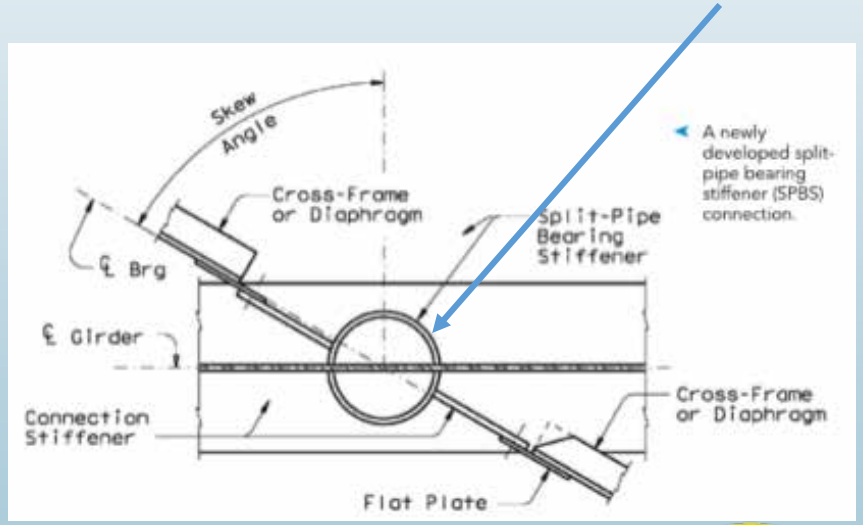
- Traditional Bent Plate Connection:
- Most flexible component of connection.
- Not recommended for skews > 20°

Innovative Split-Pipe Bearing Stiffener

- Increased stiffness at girder ends.
- Standardized fabrication.

(Reference: Zhao, Y., Frank, K., and Holt, J. ,"Two Halves are Better than None", Modern Steel Construction July 2016,)

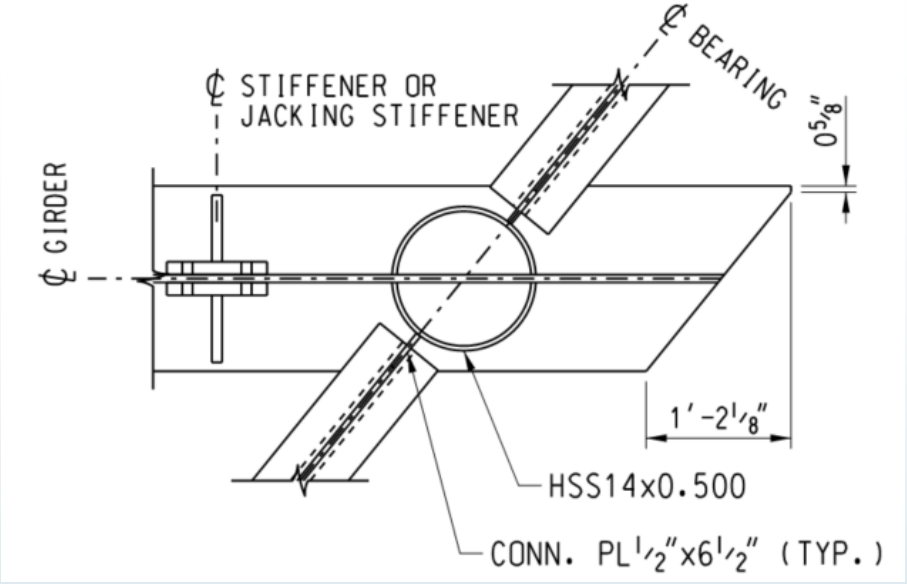


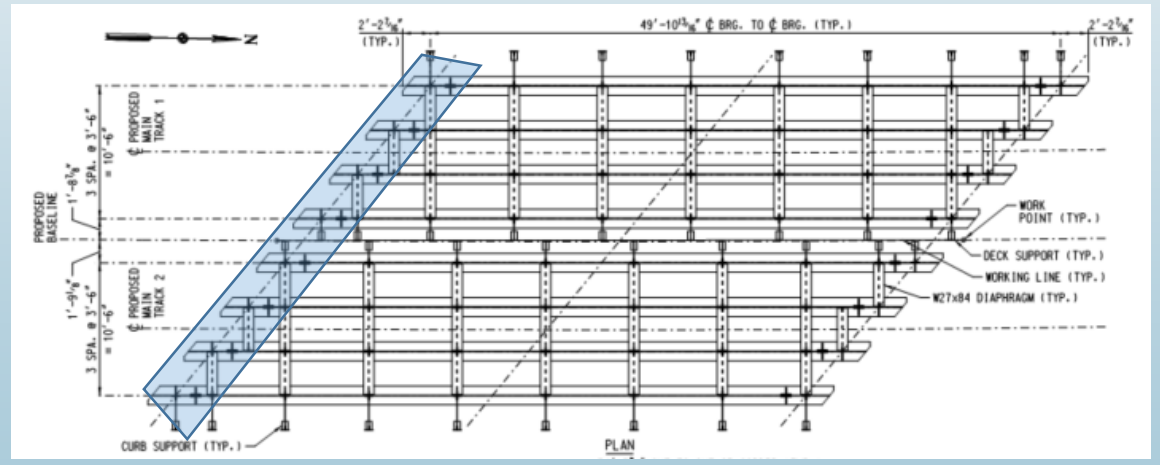


Split-pipe bearing stiffener

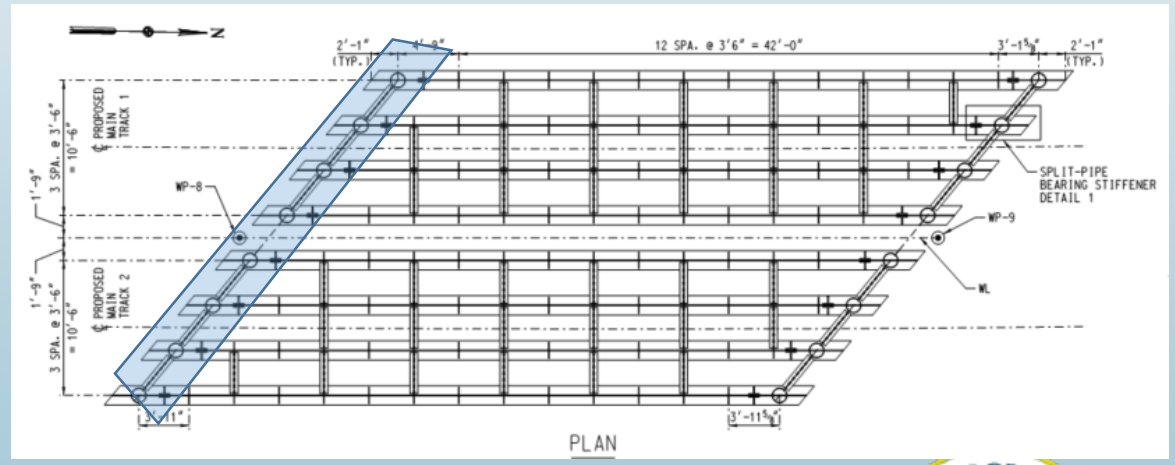
Application:

- Varying skew angles – standard detail
- Skew angles > 45°
- Allows for consistent diaphragm spacing





Option 1: Not Preferred



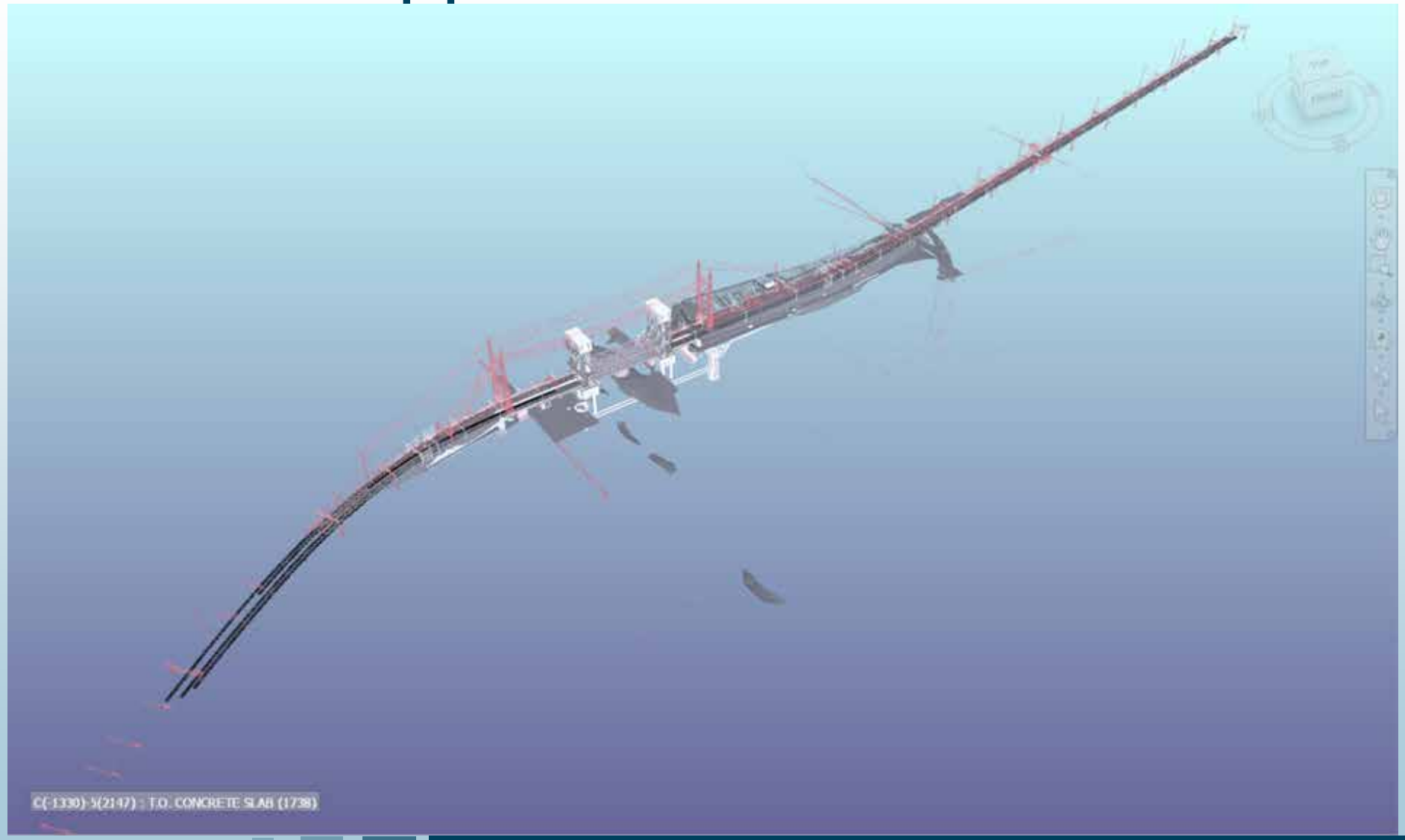
Split Pipe

Split-pipe bearing stiffener

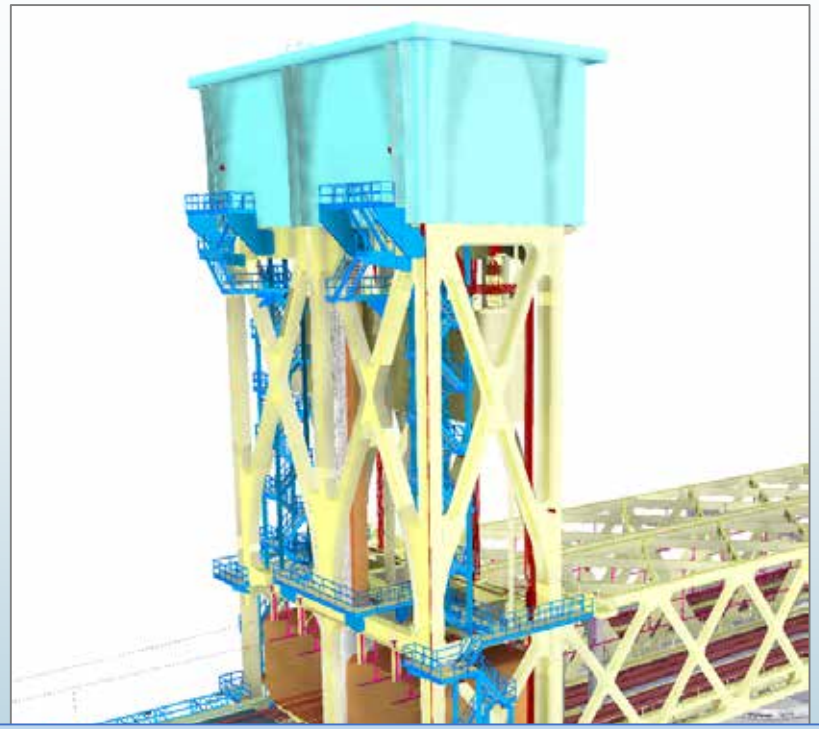
Split-pipe bearing stiffener

Ann Street Bridge Replacement

Model First Approach



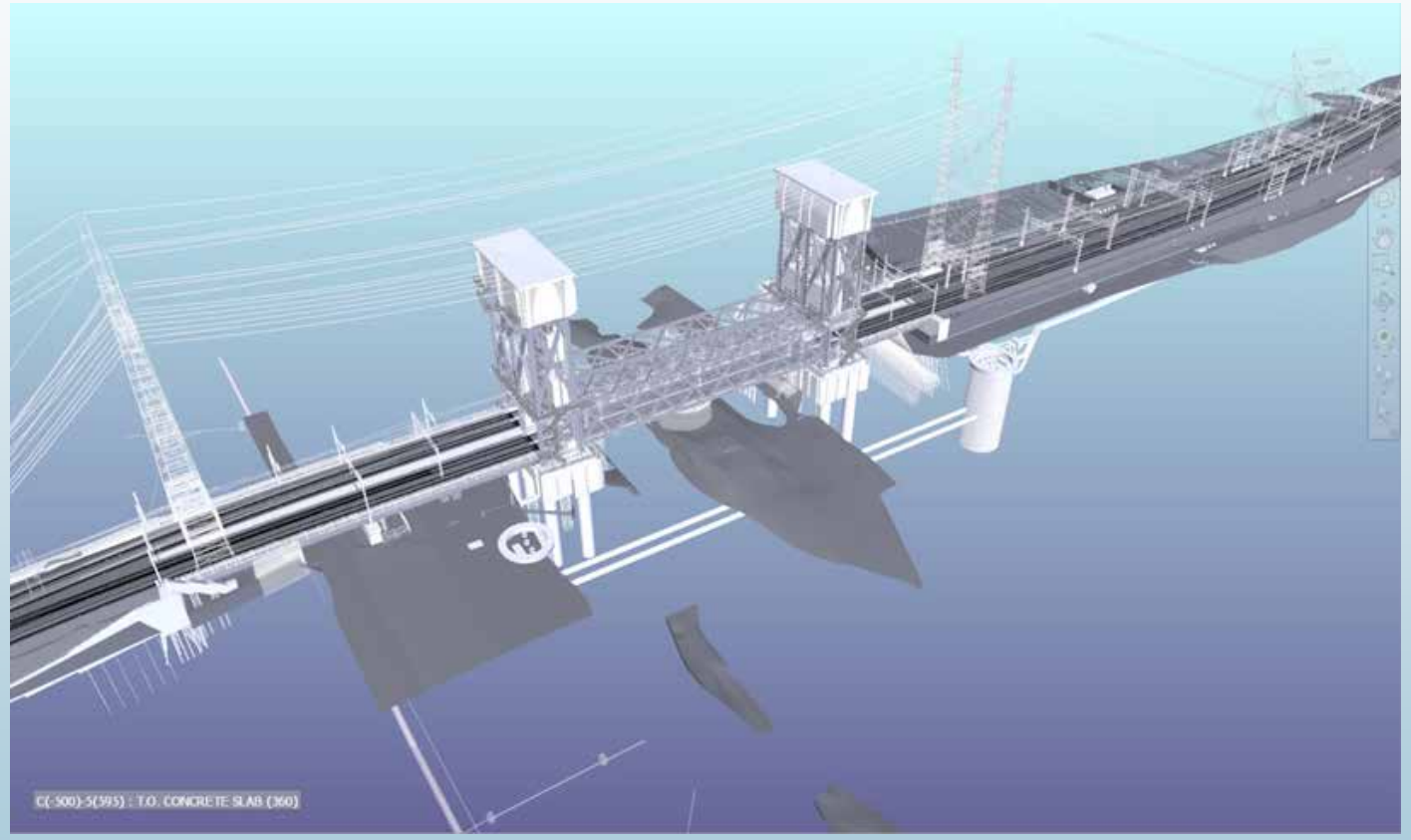
Model First – Digital Twin Strategy



The creation of "intelligent" 3D models that assigns valuable attributes (metadata) to each graphical element. This intelligence enables BIM to integrate with other systems throughout the entire project lifecycle.

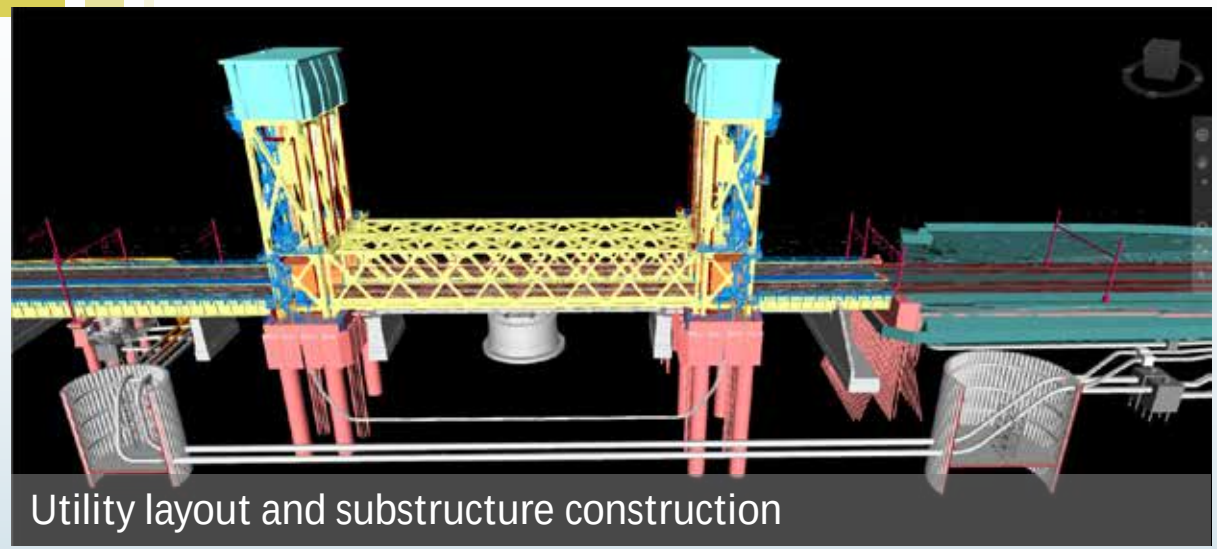
- Conceptual / Preliminary Design Iterations
- Existing Conditions (As-Built) Modelling
- Design Analysis Studies (Clash Detection)
- 3D Visualizations - Renderings, Real-Time, AR/VR)
- 4D Simulations – Adds Project Schedule Sequence Iterations
- 5D - Adds Preliminary Quantities & Cost Estimation
- Early Constructability Studies
- Environmental Impact Studies
- Early Geospatial Mapping Integrations

Model First – Digital Twin Strategy

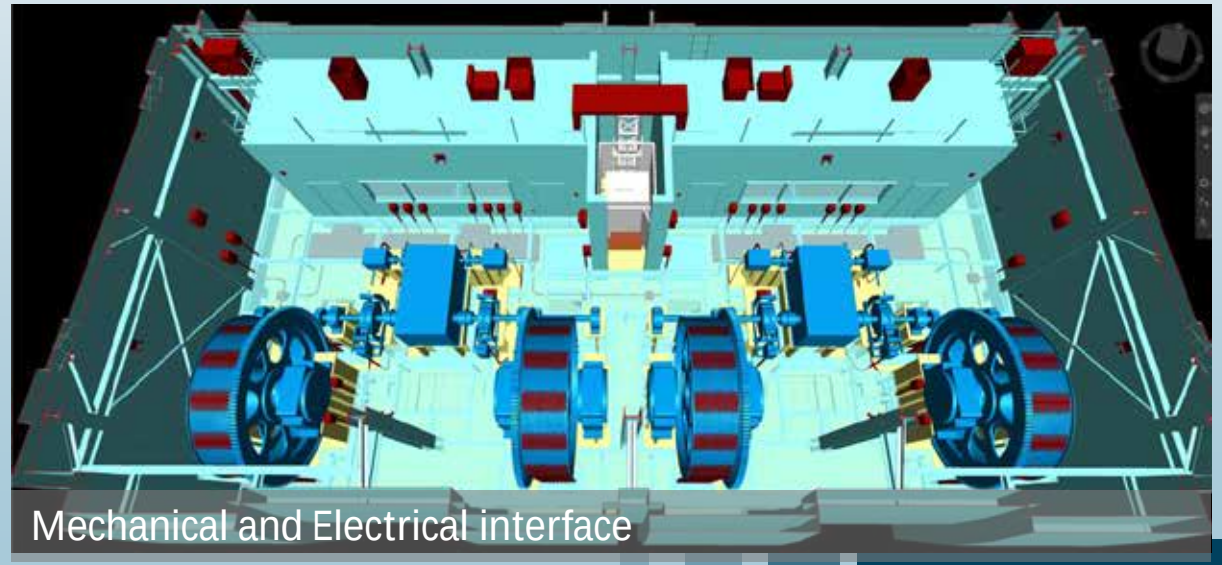


- Alternatives Analysis
- Design Development and Project Delivery
- Clash Detection and conflict resolution
- Constructability Input and Reviews
- Contractor Workplans
- Environmental Approvals
- Public Involvement
- 4D and 5D modeling
- Construction and as-builts
- Asset Management

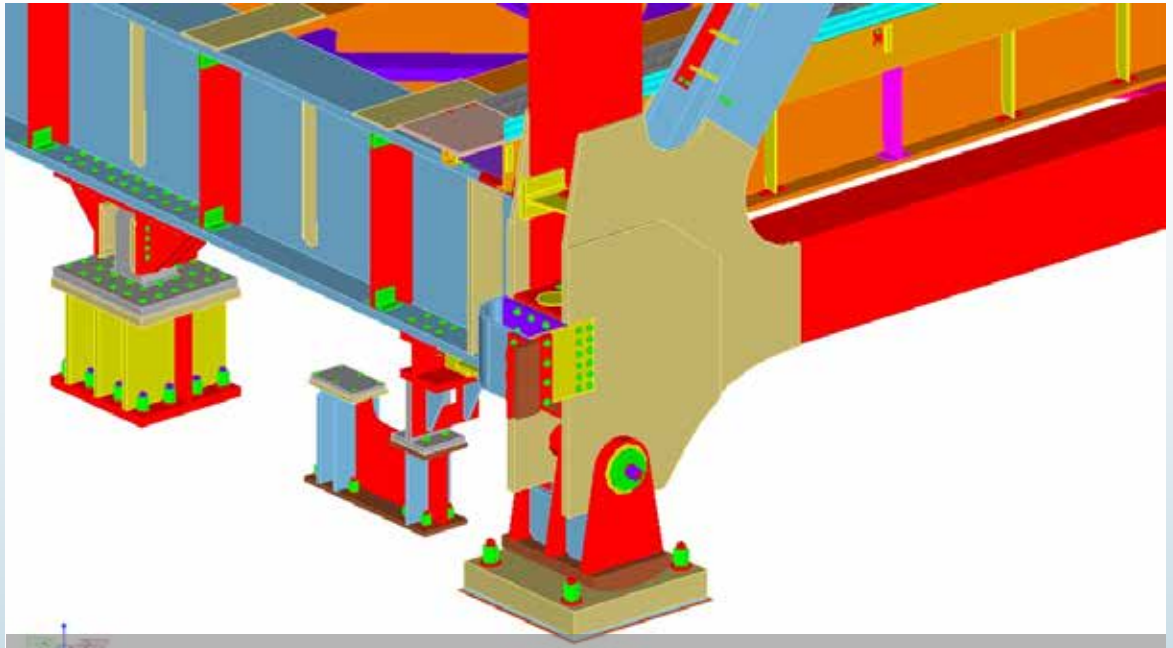
Clash Detection and Gap Analysis



Utility layout and substructure construction

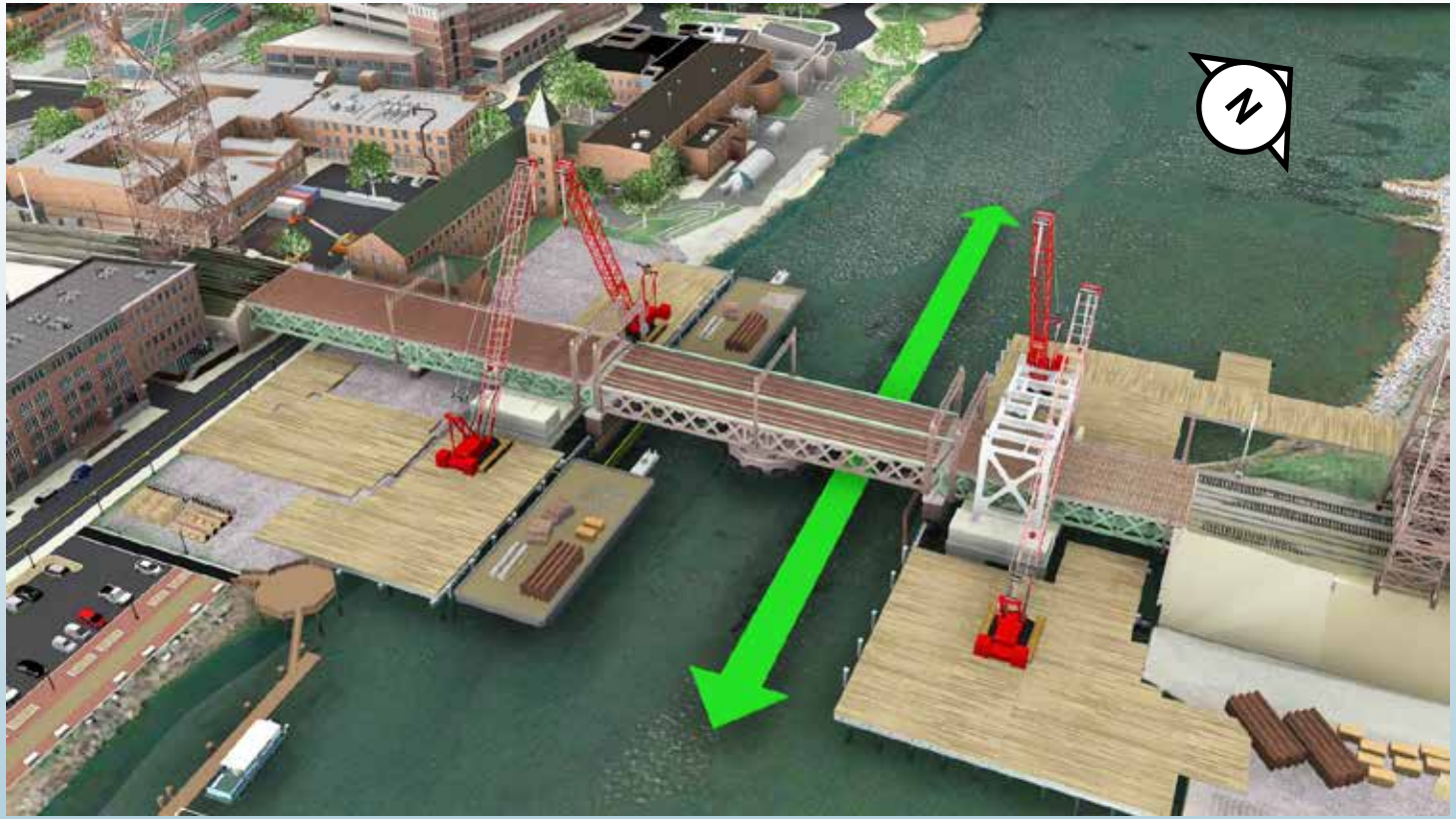


Mechanical and Electrical interface



Truss end panel fit-up

Constructability Input



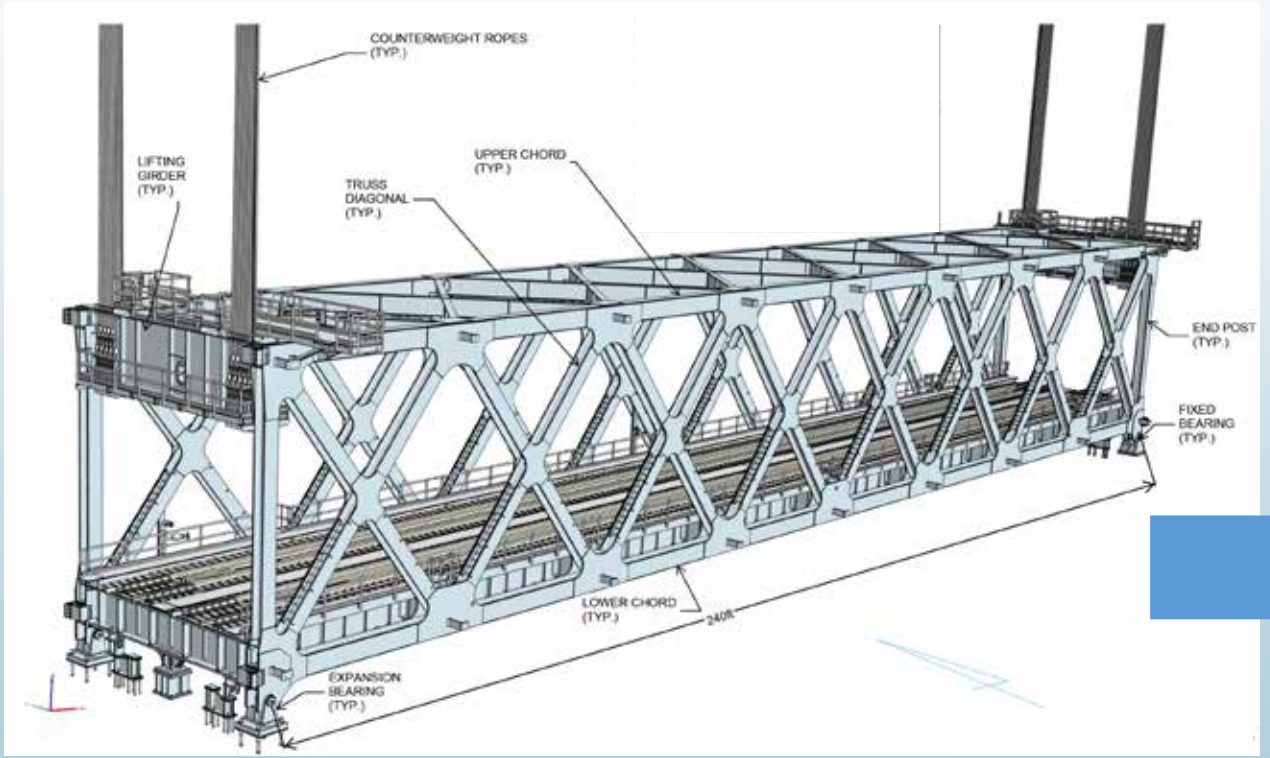
CMGC means and methods for temporary platforms reflected in design documents and permit applications. Model First enabled consensus building with agencies and waterway users.

Constructability Input and Reviews

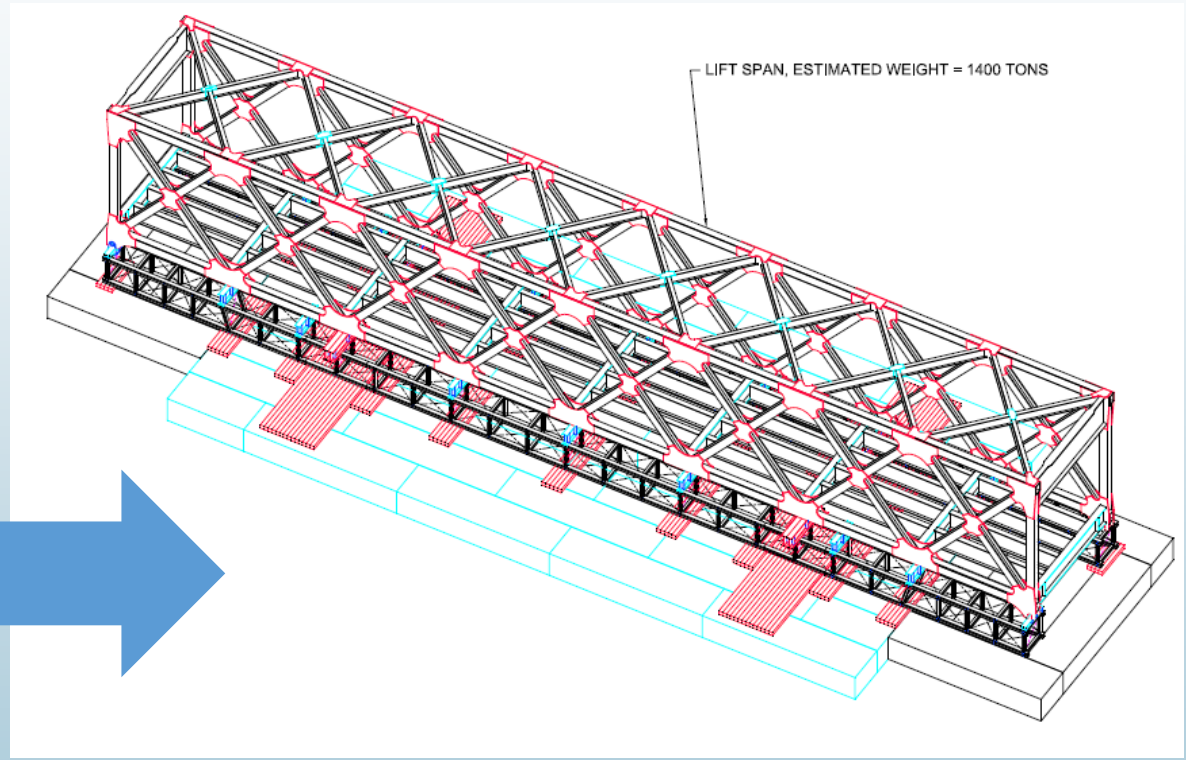
CMGC means and methods for accelerated span installation techniques to demonstrate equipment and channel closure needs, while validating clearances.

Keeping the trains moving

Syncing Design and Construction



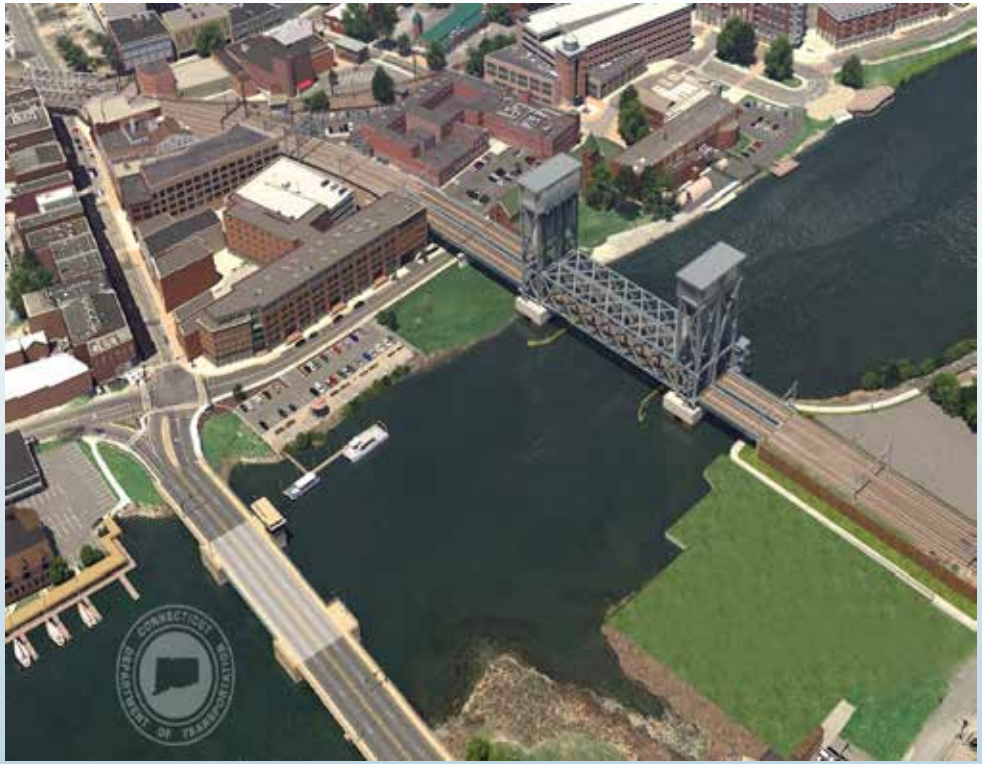
Design Model



Contractor Model

Agency Coordination and Approvals

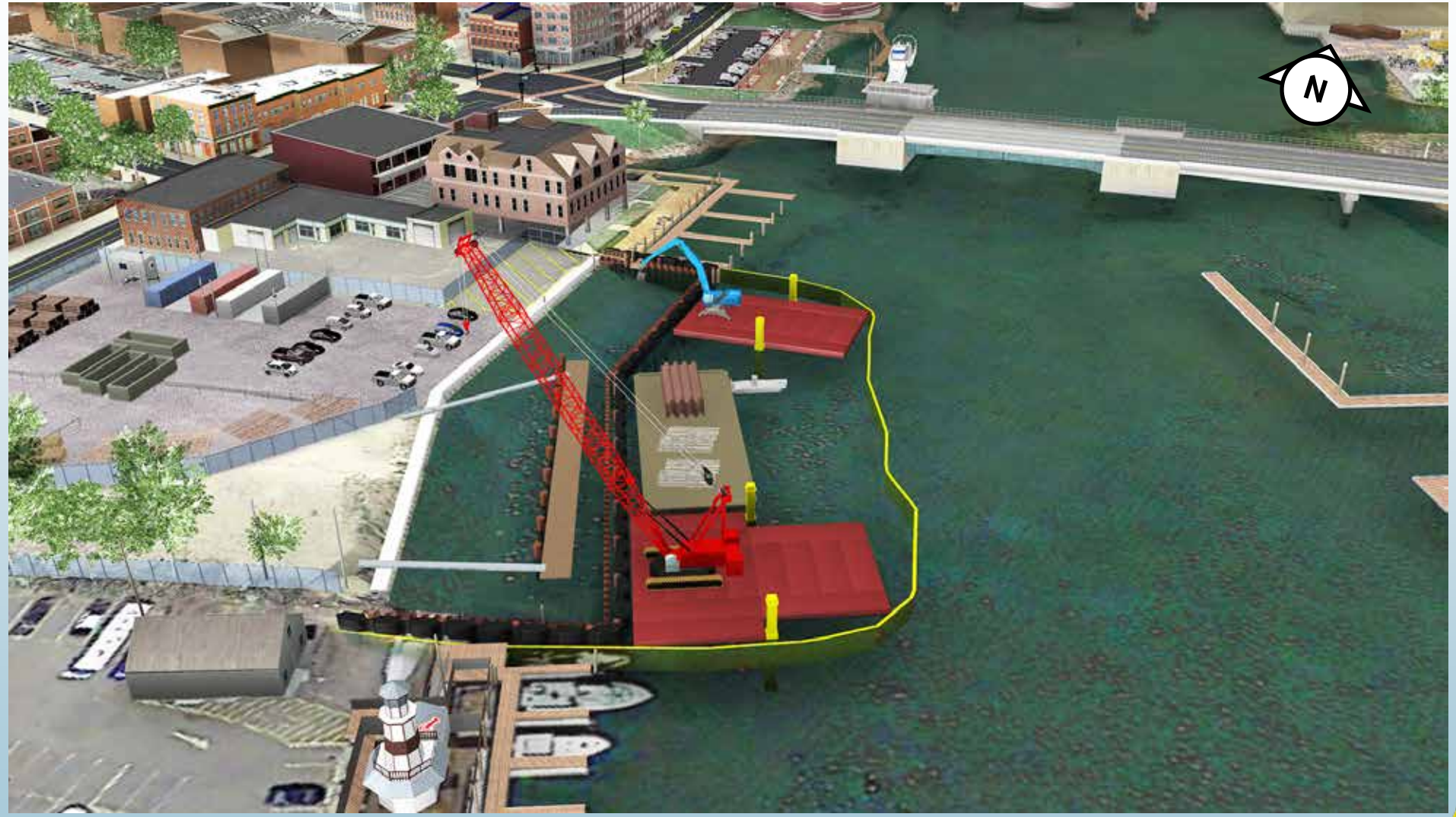
Agency Coordination and Approvals



To implement the new bridge while maintaining rail and navigation traffic, a step-by-step construction sequence will be utilized, these construction steps are referred to as "Construction Activities (CAs)" that generally follow the overall construction sequence. Details of these CAs are outlined in the permit applications.

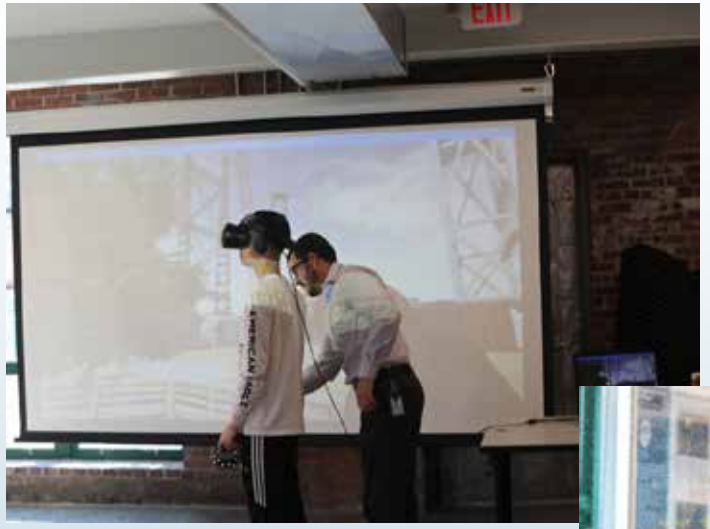
NUMBER	CONSTRUCTION ACTIVITY
1	IMAX REMOVAL
2	DUCT BANK INSTALLATION
3	VESSEL DOCK RELOCATION
4	MARINE STAGING YARD
5	NORTHWEST TRESTLE
6	SOUTHWEST TRESTLE
7	NORTHEAST TRESTLE
8	SOUTHEAST TRESTLE
9	PIER 2
10	PIER 3
11	BARGE MOORING
12	SUBMARINE CABLE REMOVAL
13	SWING SPAN REMOVAL
14	EXISTING PIER REMOVAL
15	FENDER INSTALLATION
16	WETLAND MITIGATION
17	DREDGING
18	LIFT SPAN INSTALLATION
19	MANRESA ISLAND STAGING & STORAGE

Agency Coordination and Approvals

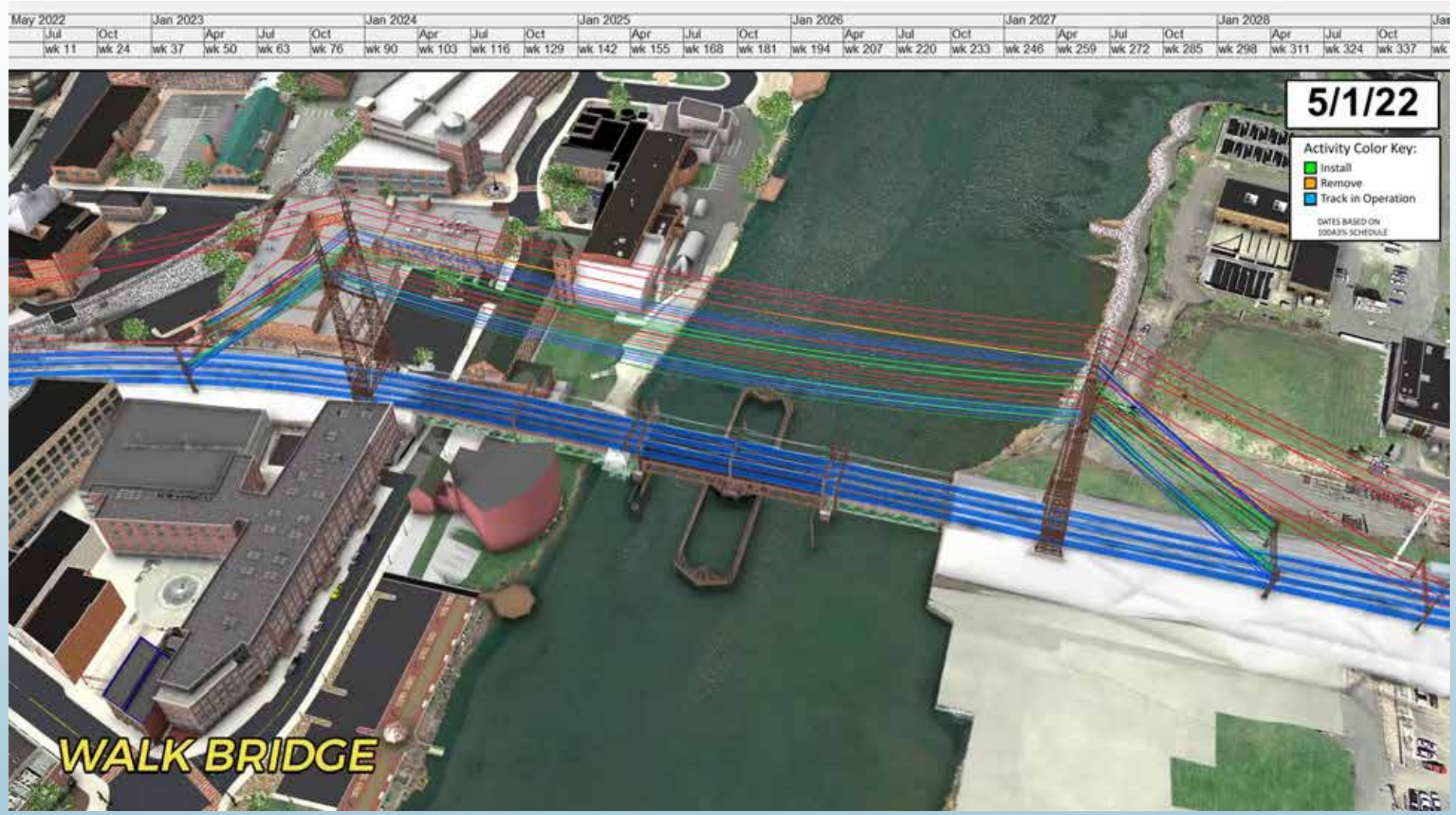


Agency Coordination and Approvals

Public Outreach



3D/4D/5D modeling



Current Status

Construction of Walk Bridge and local bridges began Summer of 2023. Six of the 7 remaining construction packages have been awarded.

Construction of $380M rail infrastructure projects completed in December 2023. Designated as a top rail project of 2023 by Railway Track and Structures.

Project Partners

- Connecticut DOT - - Owner
- Cianbro-Middlesex JV - - CMGC
- Metro-North RR - - Rail operator
- Amtrak - - Railroad Stakeholder
- WSP - - Program Manager
- Louis Berger - - CEI
- FTA - - lead federal agency and funding partner
- FRA - - cooperating agency and funding partner

Questions