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Massachusetts Department of Transportation
Highway Division

Powder Point Bridge Replacement Project

Bridge Design Public Meeting

Duxbury Performing Arts Center

June 18, 2025

Project File No. 612006

Agenda

1. Consulting Parties Meeting
   - Bridge history
   - Historic determination
2. Bridge Design Meeting
   - Environmental considerations
   - Design goals
   - Bridge design
   - Construction
   - Next steps

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Introductions

MassDOT Highway Division Team

- Marco Pereira: Project Manager
- Jeff Shrimpton: Program Engineer for Design, Environmental Section
- Kurt Jergensen: Historic Bridge Specialist, Environmental Section, Cultural Resources Unit
- George Batchelor: State Highway Landscape Architect
- Shane Sousa: District 5 Bridge
- Gareth Saunders: MassDOT Legislative Affairs

Bridge Design Team

- Peter Wu: HDR Project Manager
- Tony Santoro: HDR Deputy Project Manager
- Ben Holsapple: HDR Lead Structural

Consulting Parties Meeting

Drawing from a 1945 postcard

Rebuilt bridge after the 1986 fire

Photos from The Duxbury Rural & Historical Society

Bridge History

- Original timber bridge constructed in 1891
- In 1983, the bridge was submitted for historic determination. The Massachusetts Historic Commission (MHC) determined the 1891 bridge was eligible for National Register
- Bridge damaged by fire in 1985. During repair work, major deterioration was discovered and the Town decided to construct a new timber bridge in 1986
- Bridge has received extensive repairs at the Town's expense since the rebuild, which have become more frequent as the bridge has aged

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Historic Determination

- MassDOT Cultural Resources Unit submitted the bridge for historic determination in 2024
- Due to being built in 1986, MHC and the State Historic Preservation Office (SHPO) concurred that the current bridge is not eligible for listing on the National Register of Historic Places
- The bridge would need to be older than 50 years to meet the benchmark for National Register eligibility

Bridge Design Considerations

- MassDOT will consult with town and local stakeholders to design a bridge that is context sensitive within the landscape
- Aesthetic elements that reflect the character of the community
- Service life 100-year per MassDOT's standards
- More details later in the presentation

Consulting Parties Q&A

Bridge Design Meeting

Project Area

Bridge Condition

Structure

- Entirely timber structure
- Metal fasteners

Condition

- Serious condition due to marine environment
- Some steel and Fiber Reinforced Polymer (FRP) repairs
- In 2013, 40% of piles repaired with fiberglass jackets
- By 2024, only 14% of fiberglass jackets remained
- Vehicles traveling over the bridge are limited to no more than 4 tons in weight

Bridge Assessments, Costs, Repairs

- Bridge requires a "Special Member" inspection due to its poor condition every 6 months.
- Town is investing $300k per year to complete short-term repairs.
- Another $15k per year from town Highway Department for short-term bridge repairs; specifically ongoing deck board maintenance

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MassDOT & Design Team Goals

- Construct a replacement bridge with structurally sound materials that will meet current bridge design standards and improve safety and connectivity for all roadway users throughout the service life of the replacement structure.
- Meets current MassDOT bridge and FHWA bridge requirements, including a 100-year service life.
- Incorporate design elements to create a context sensitive bridge design

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Aesthetic Considerations - Mitchell River Bridge Chatham

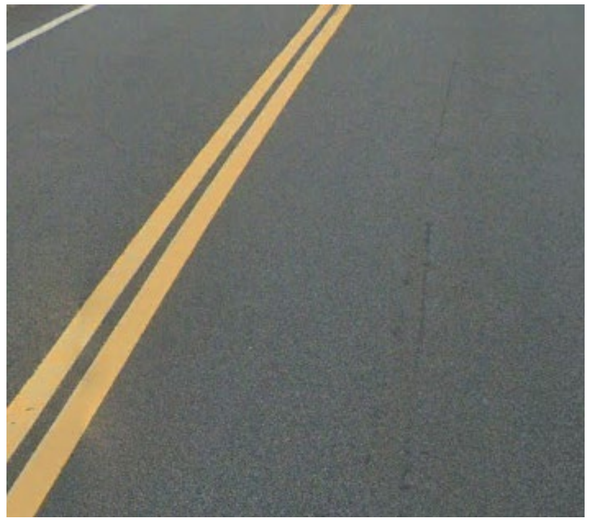
Timber Railing

Context-Appropriate Piers

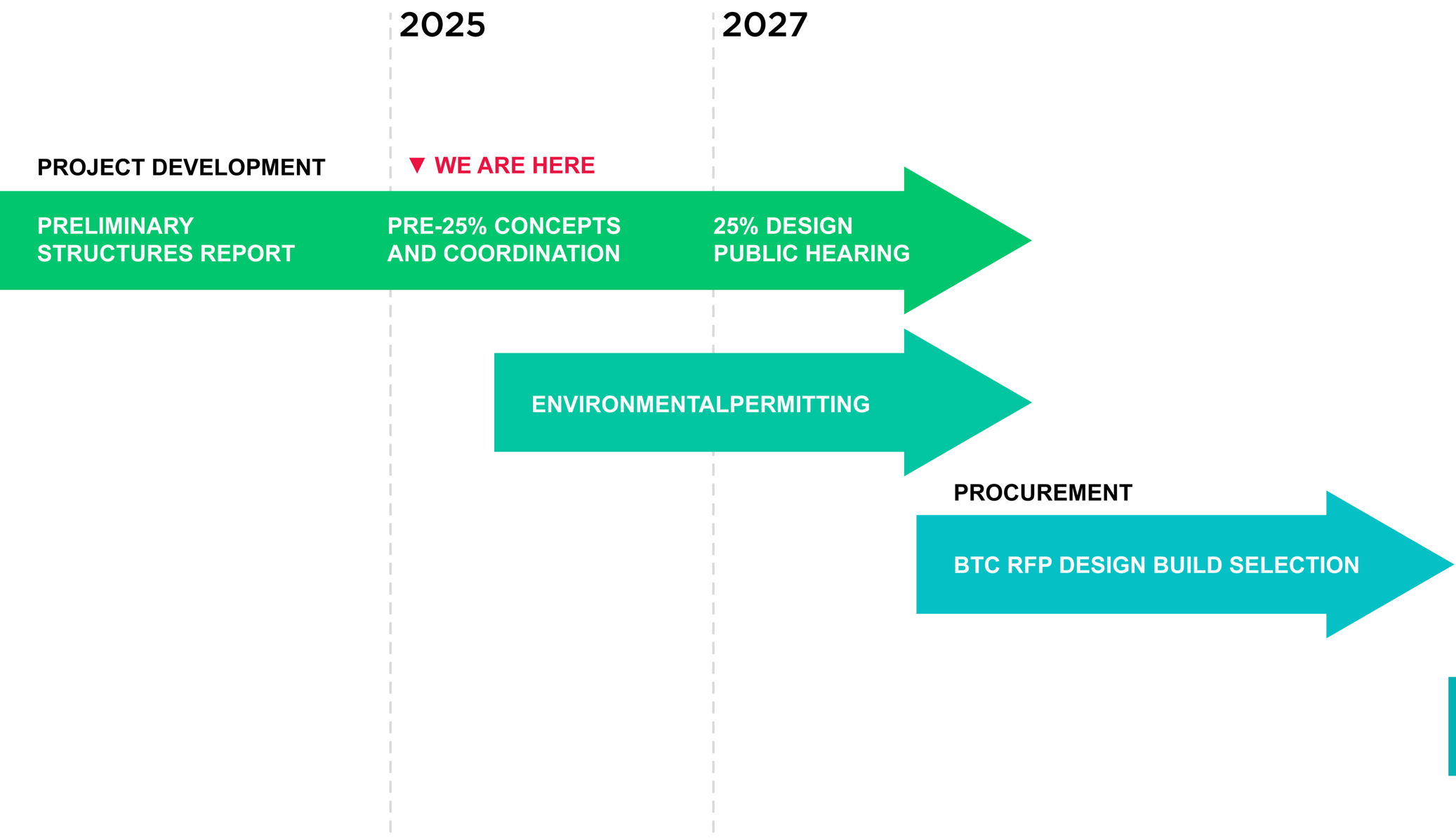
Aesthetic Considerations

Mitchell River Drawbridge, Chatham – Abutments

Grooved Concrete Instead of Asphalt



Current Design Status-Design Build



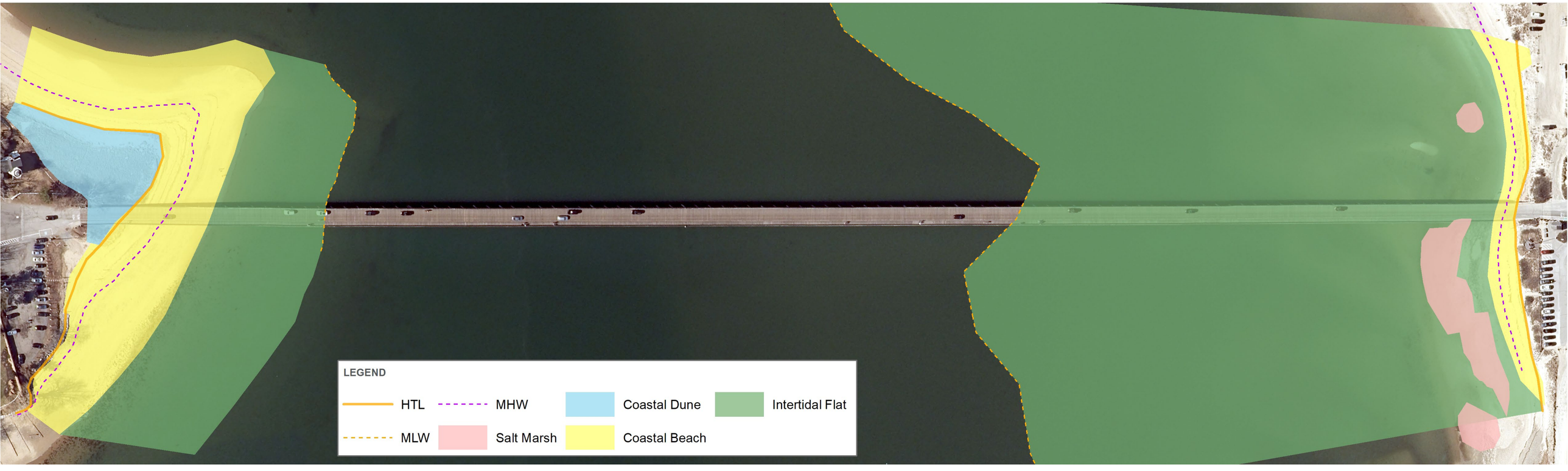
Environmental Considerations

- Presence of Natural Resource Areas

  Ex. Waters of the U.S., Saltmarsh, Intertidal Flats

- Potential Habitat for Rare, Threatened, and Endangered Species

  Ex. Bat, Avian, and Aquatic Species



Environmental Interagency Coordination

- United States Coast Guard (USCG)
- United State Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife Service (USFWS)
- National Oceanic and Atmospheric Administration (NOAA)
- Massachusetts Department of Environmental Protection (MassDEP)
- Mass Wildlife
- Mass Division of Marine Fisheries (MassDMF)
- Massachusetts Office of Coastal Zone Management (CZM)

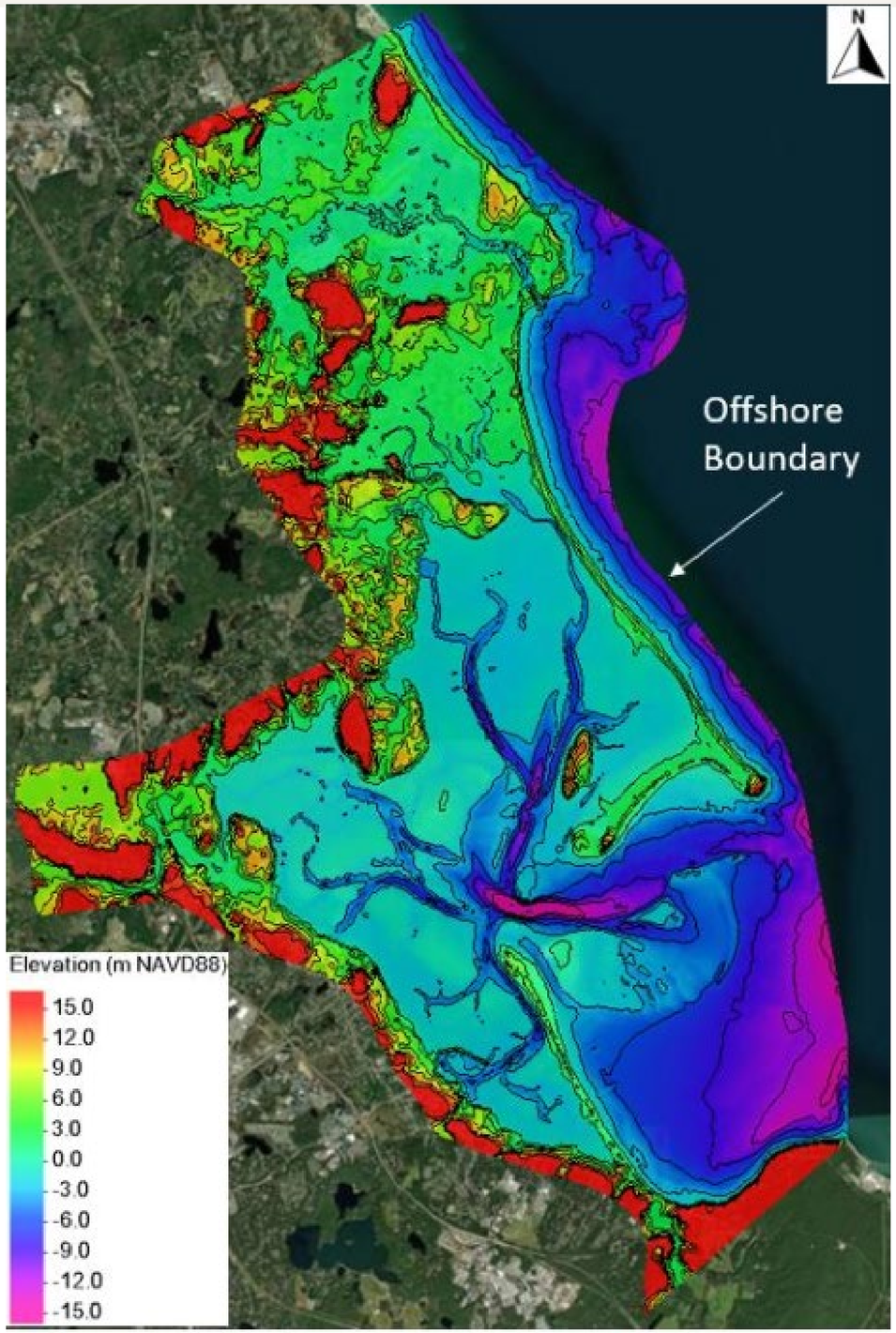


Figure 1. MIKE 21 HD FM Model Domain

Hydraulic Considerations

- Bridge area is subject to both riverine behavior and coastal (storm surge and tidal) behavior.
- Significant sea level rise is expected
- Located within FEMA Flood Zone AE
- Preliminary models indicate several feet of potential underwater erosion at piers during storm events
- Data collection is underway to calibrate models
- Replacement bridge foundation will need to extend to bedrock approx. 80 ft down

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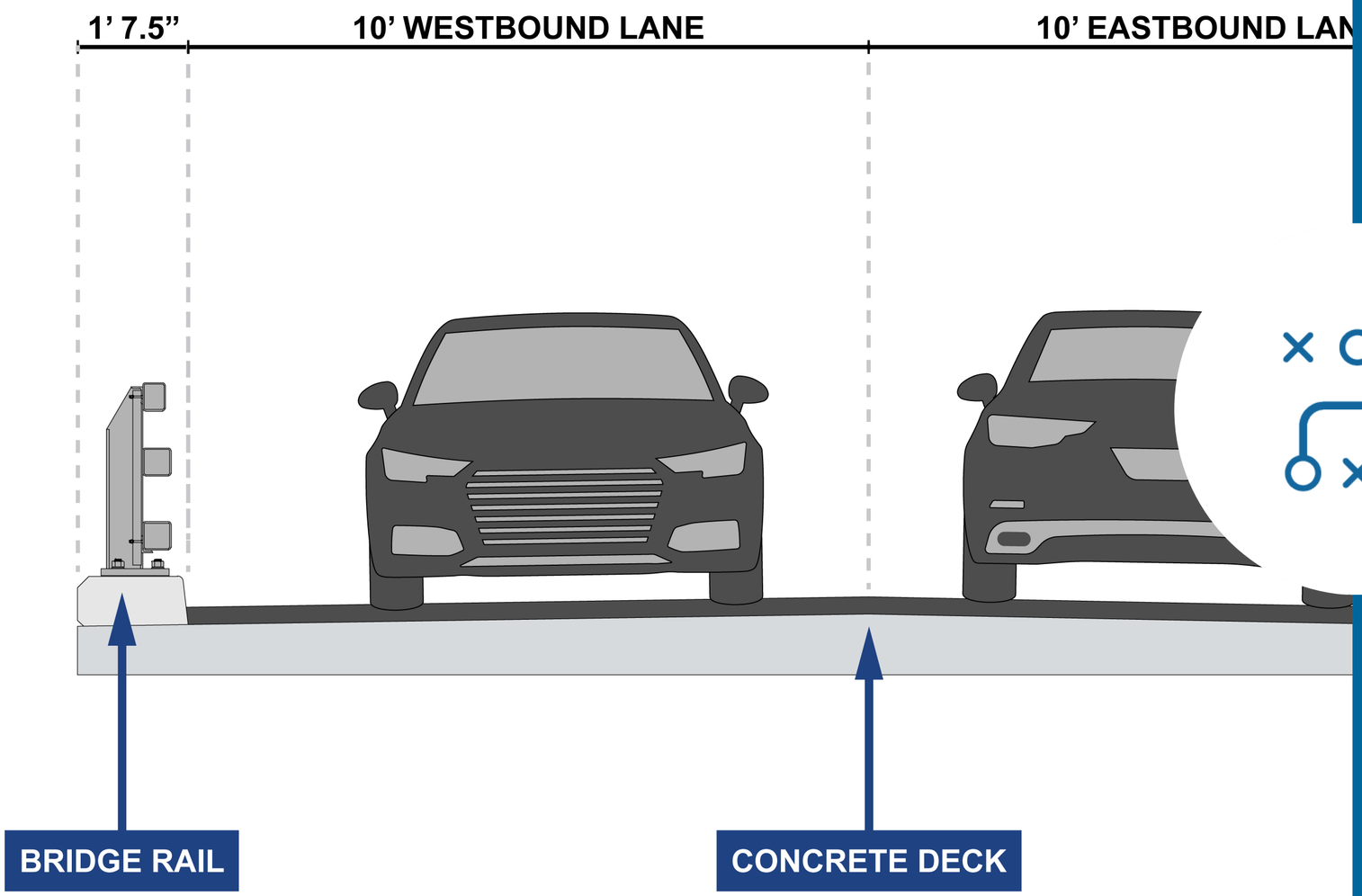


Current Required Design Standards

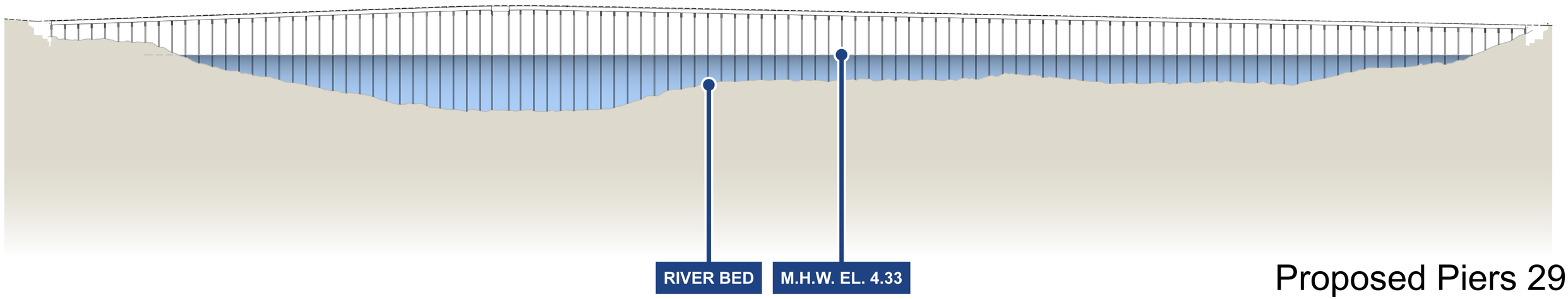
Current Required Design Standards

Service Life

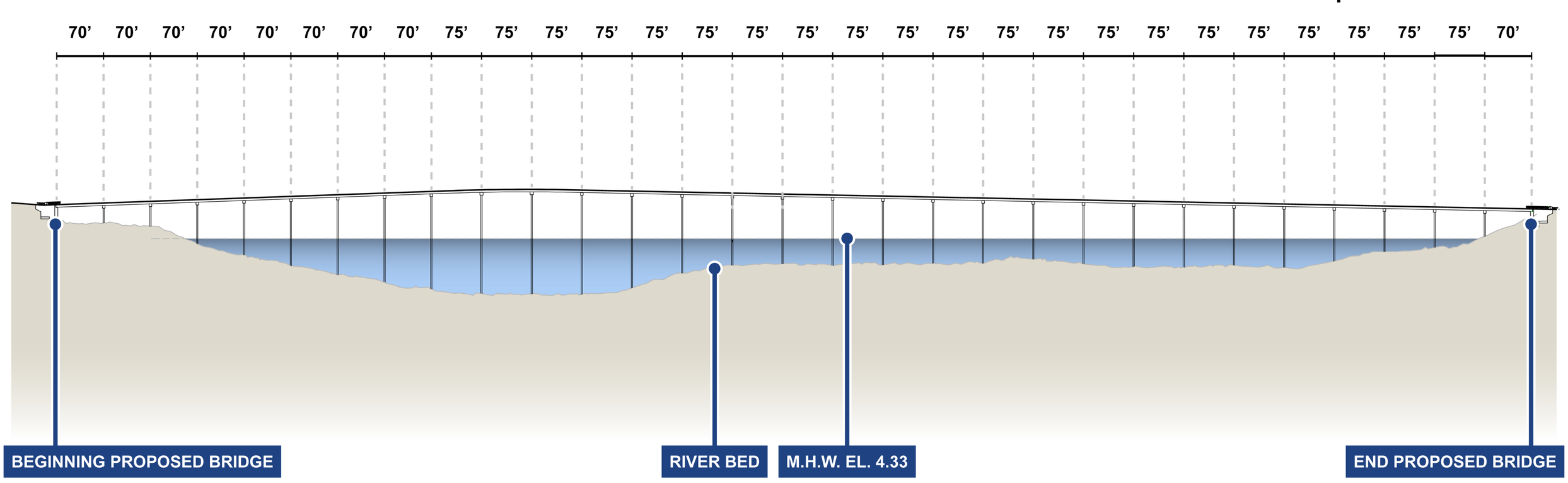
- MassDOT requires a 100-year bridge service life
  - Existing timber structure: less than 40 years-not satisfactory
  - Substructure downgraded to poor condition in 2012

Pier Layout

Existing Piers: 108



Proposed Piers 29

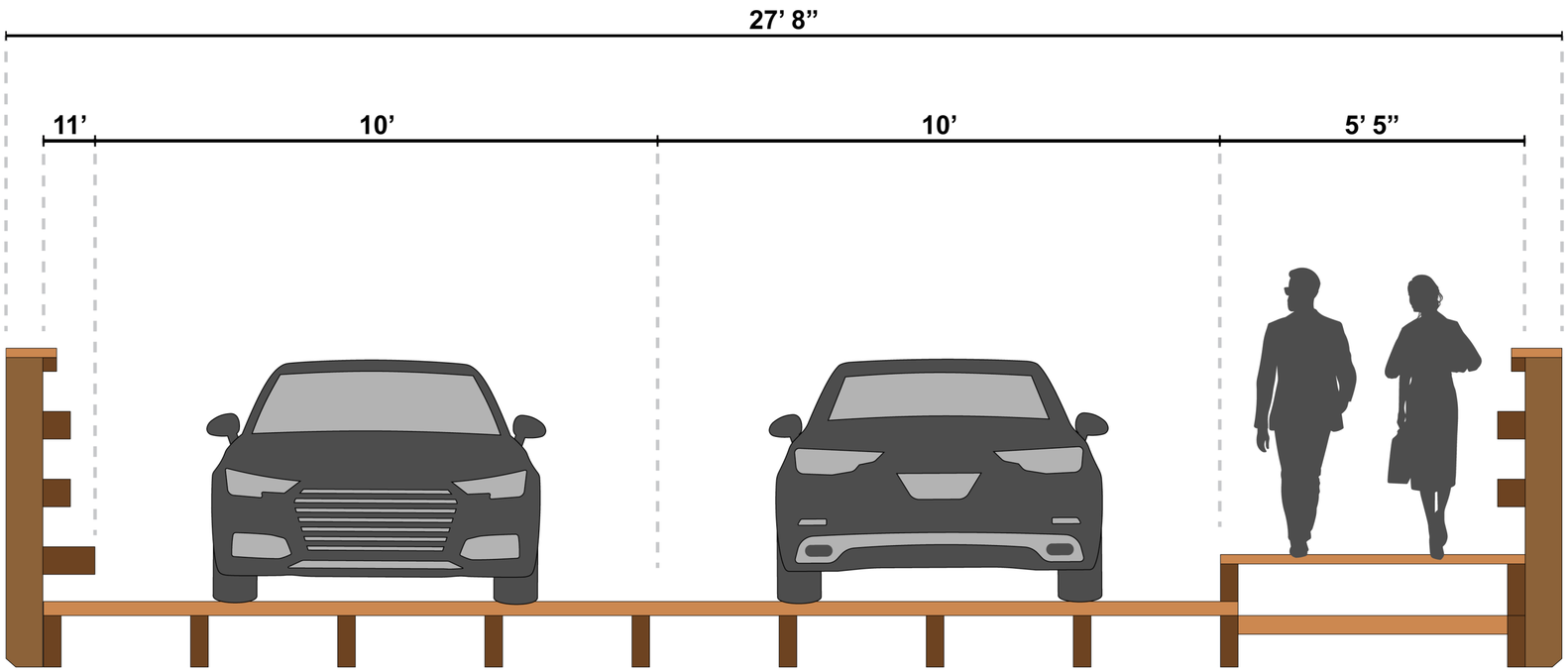


Proposed Pile Layout

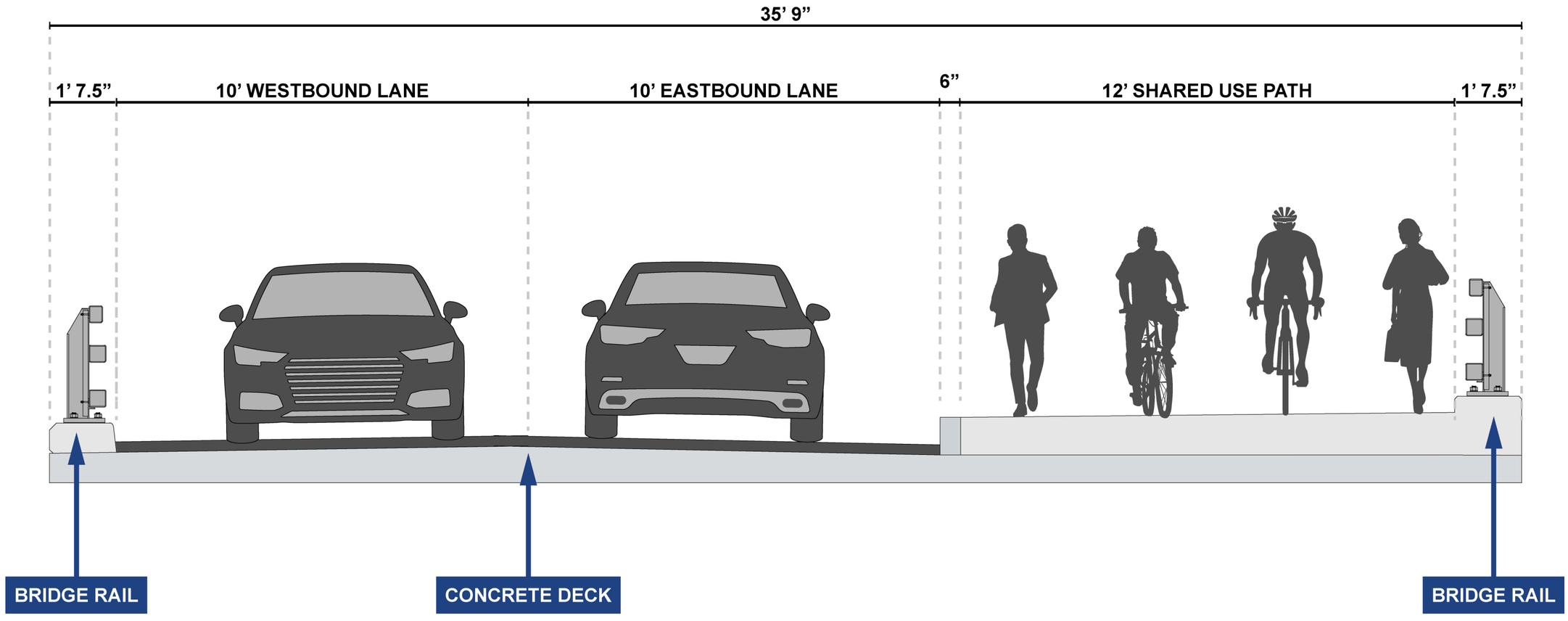
- Modern materials allow for fewer piers in the water and longer spans
- Pile installation and permitting restrictions on in-water construction is likely to be a major driver of the construction schedule
- Matching the existing number of piers may add up to an additional **$50M** and would have a dramatic effect on constructability and construction schedule
- Environmental benefits to fewer piers

Bridge Elements and Aesthetic Decisions

Existing Bridge



Possible Bridge Cross Section



Railings

- Federal requirements are that bridge railings must be crash tested to the Manual for Assessing Safety Hardware (MASH)
- MassDOT has several standard bridge railings that are MASH compliant
- There are no MASH compliant timber railings but there are solutions to allow for the use of a timber rail

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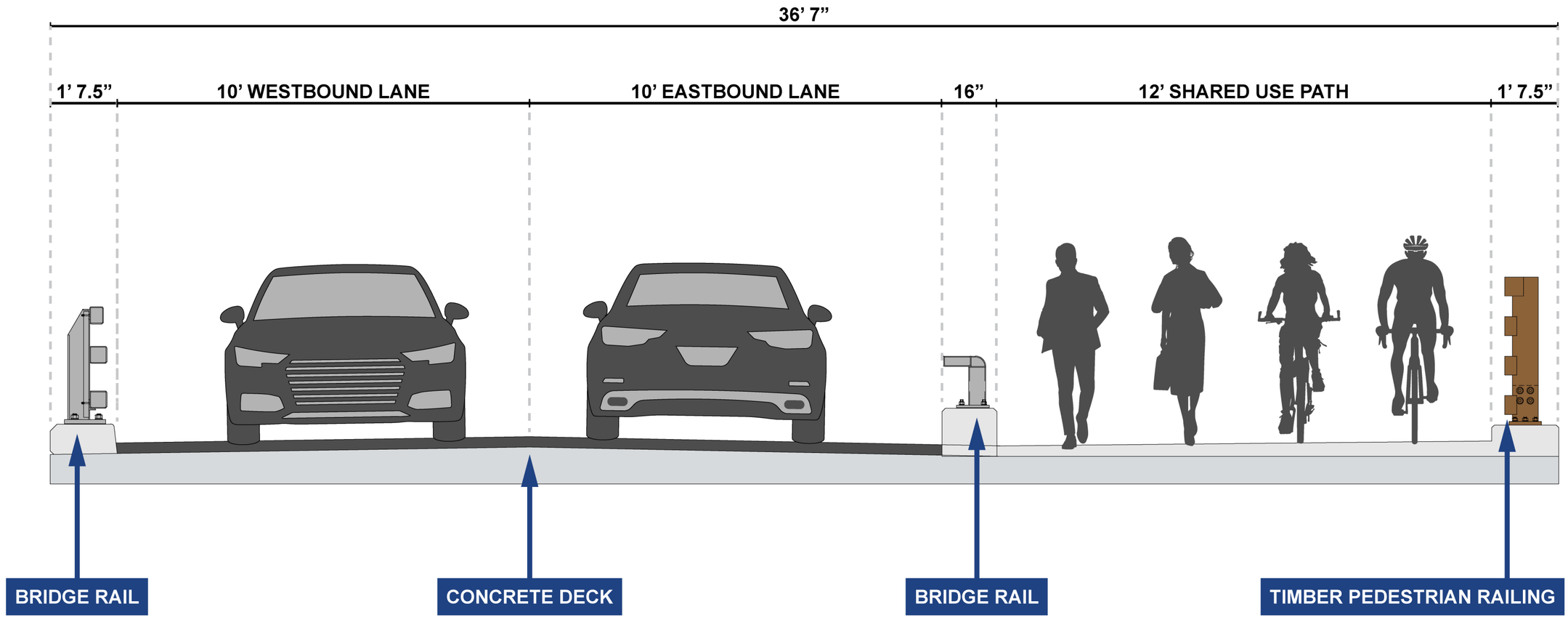
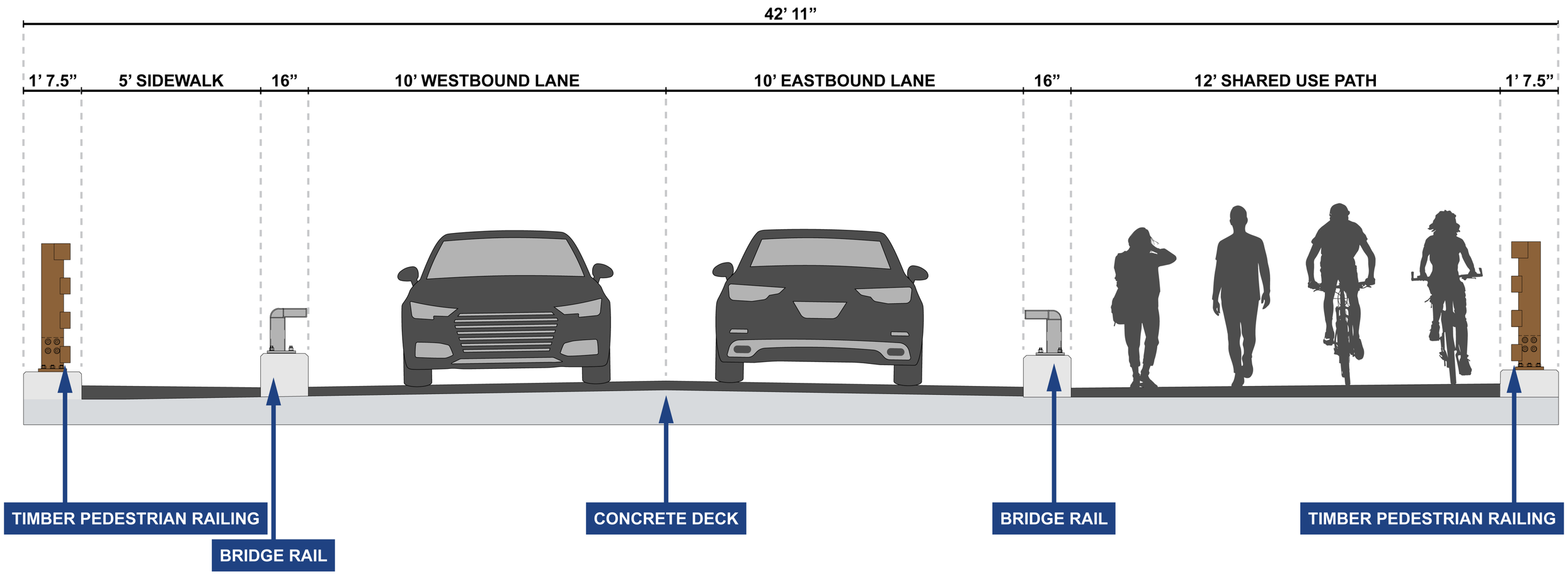
Possible Bridge Cross Section (2)



Possible Bridge Cross Section (3)



Aesthetic Considerations - Mitchell River Bridge Chatham

Timber Railing

Context-Appropriate Piers

Aesthetic Considerations Mitchell River Drawbridge, Chatham – Pile and pile caps

Aesthetic Considerations

Mitchell River Drawbridge, Chatham – Abutments

Driving Surface

- Standard bridge of this type and profile: Asphalt roadway surface and concrete sidewalk surface.
- Potential for a concrete surface on the roadway is also being investigated. Surface would need to be grooved transversely; we are exploring various concrete surface types which could be part of future discussion.
- Maintenance cost of timber deck is double the maintenance costs of concrete deck
- Timber deck does not protect structural elements the same way a concrete deck does - more rapid deterioration.

Grooved Concrete Instead of Asphalt

Construction

Replacement Bridge Location

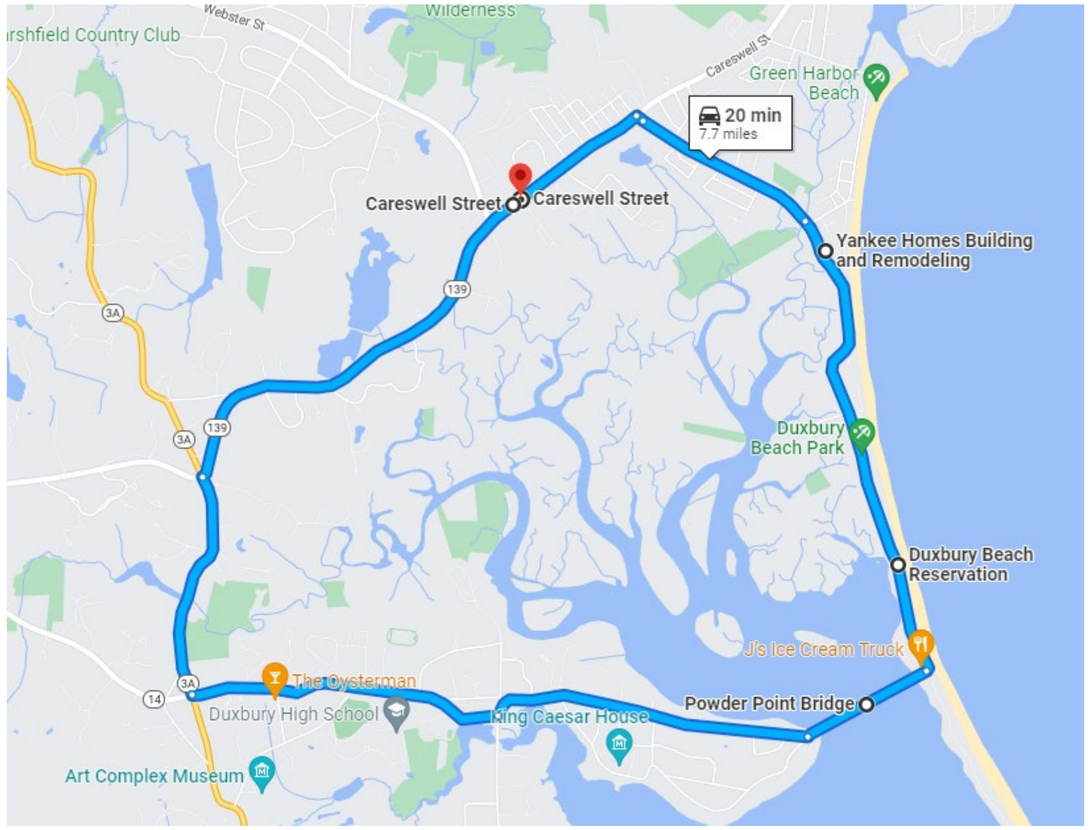
Maintain Existing Location-

Rationale

- Minimize Right of Way (ROW) Impacts
- Minimize Environmental Impacts
- Minimize roadwork at the approaches
- Minimize change for the community

Construction Considerations

- Bridge will need to be closed
- Beach Access
- Detours
- Water/Barge Access
- Time of year restrictions
- Incentives/Disincentives



Draft Design and Public Information Schedule

Summer
2025

Bridge design public meeting #1

Fall
2025

Bridge design public meeting #2 or design charette

Spring
2026

Bridge design public meeting #3

Spring
2027

Base Technical Concept (BTC)

Project advertised

Spring
2027

Design Public Hearing

Stay Informed

- Project Website: https://www.mass.gov/powder-point-bridge-replacement-project

- Project Email: powderpointbridgereplacement@dot.state.ma.us

Questions

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Massachusetts Department of Transportation
Highway Division

Thank You

Design Public Information Meeting

June 18, 2025

Project File No. 612006

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