

Falls Bridge Advisory Committee Meeting #5 – Existing Conditions



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BAC Meeting #5 – Existing Conditions

- Subsurface Soil Conditions
- Hydrology, Hydraulics & Scour
- Right-of-Way & Utilities
- Roadway Geometrics
- Traffic & Accident Data
- Miscellaneous Site Features
- Bridge Terminology
- Bridge Condition
- Bridge Load Capacity



Subsurface Soil Conditions

- Subsurface soil information is used to assess new and existing foundations
- Data collected through field drilling operations in 2010 & 2017
 - Predominantly sands & gravel. Variable thickness of 0 to 15 feet over bedrock.

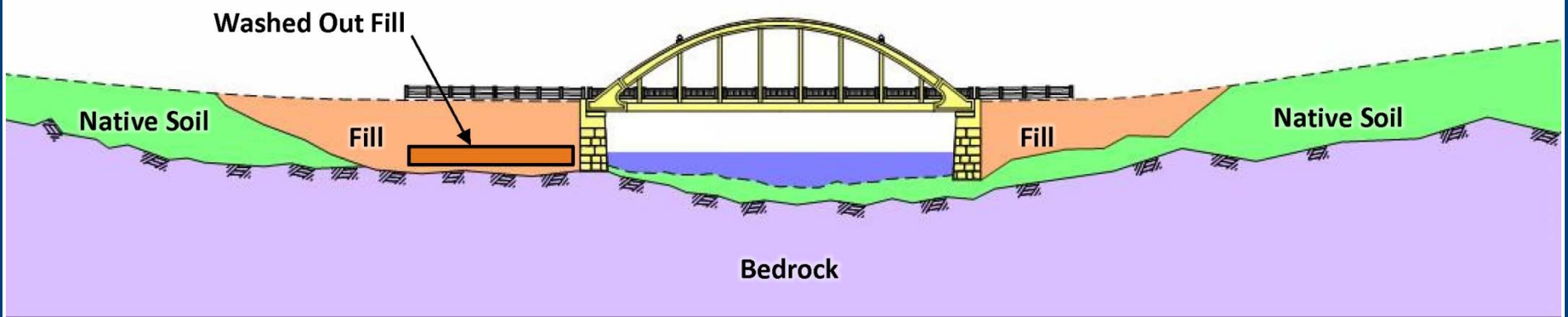
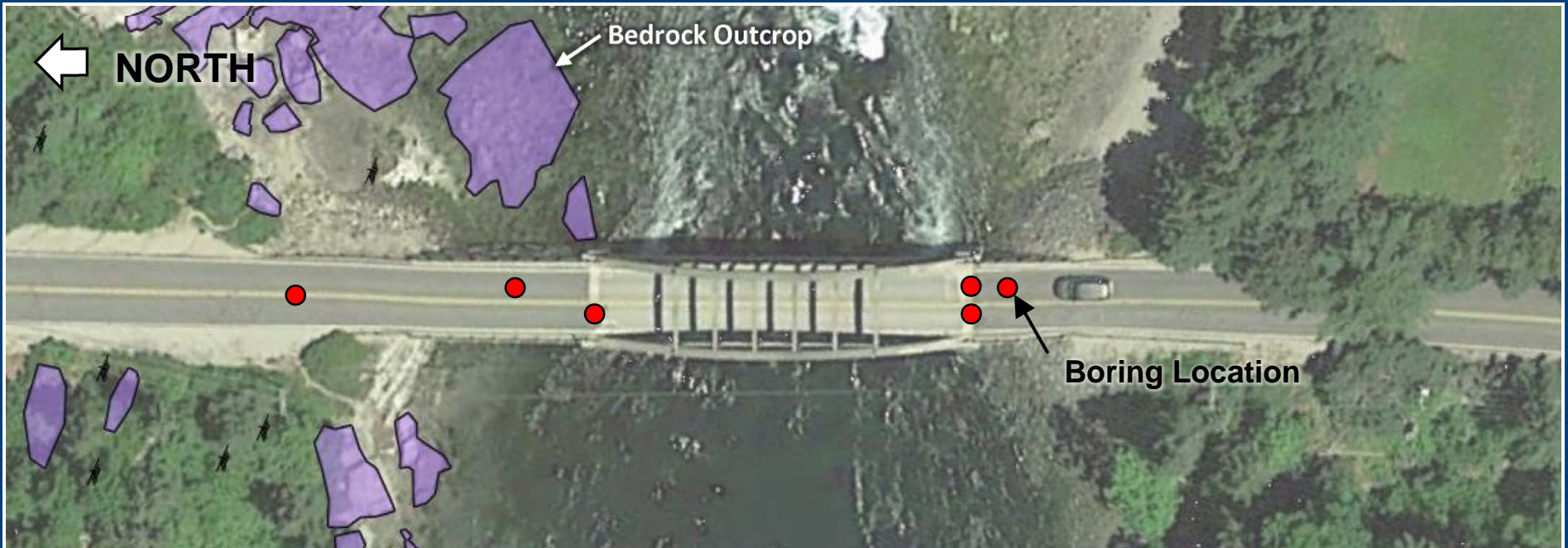


Photo 5: Core box containing dried core from test boring BB-BHF-202:
Left side of core box (top 2.5-foot portion of cores).

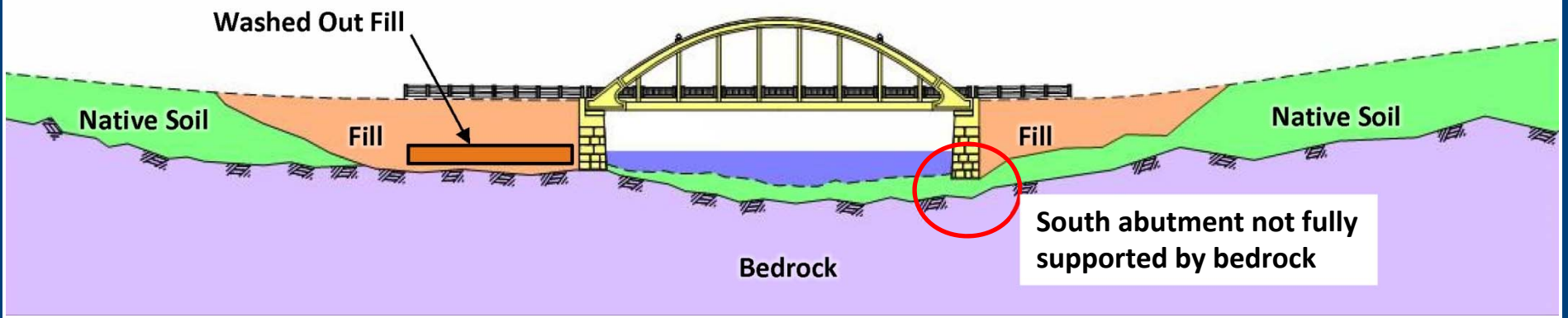
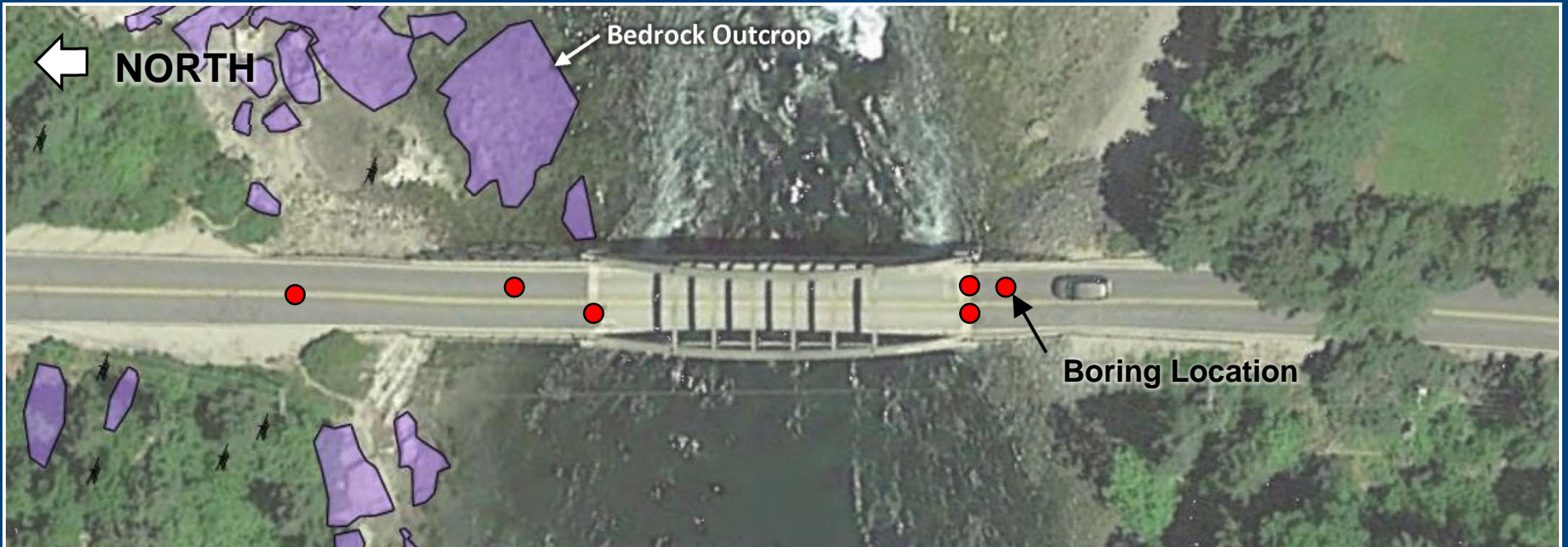
Slots from top to bottom:

- 1) BB-BHF-202, R1 (9 to 14 ft);
- 2) BB-BHF-202, R2 (14 to 19 ft).

Subsurface Soil Conditions



Subsurface Soil Conditions



Hydrology, Hydraulics & Scour

Salt Pond Tidal Basin

- Large tidal basin ~1.1 sq. mile
- Tidal variations of ~10.5' to 11.5' in Blue Hill Bay
- Tidal variations in Salt Pond somewhat less
- Falls bridge is only major inlet



Hydrology, Hydraulics & Scour

Existing Bridge Opening

- Min. Freeboard: 6 Feet
- Width: 100 Feet
- Min. Depth: 6 Feet at low tide
- Very small opening relative to size of basin tidal basin



Hydrology, Hydraulics & Scour

Hydraulics

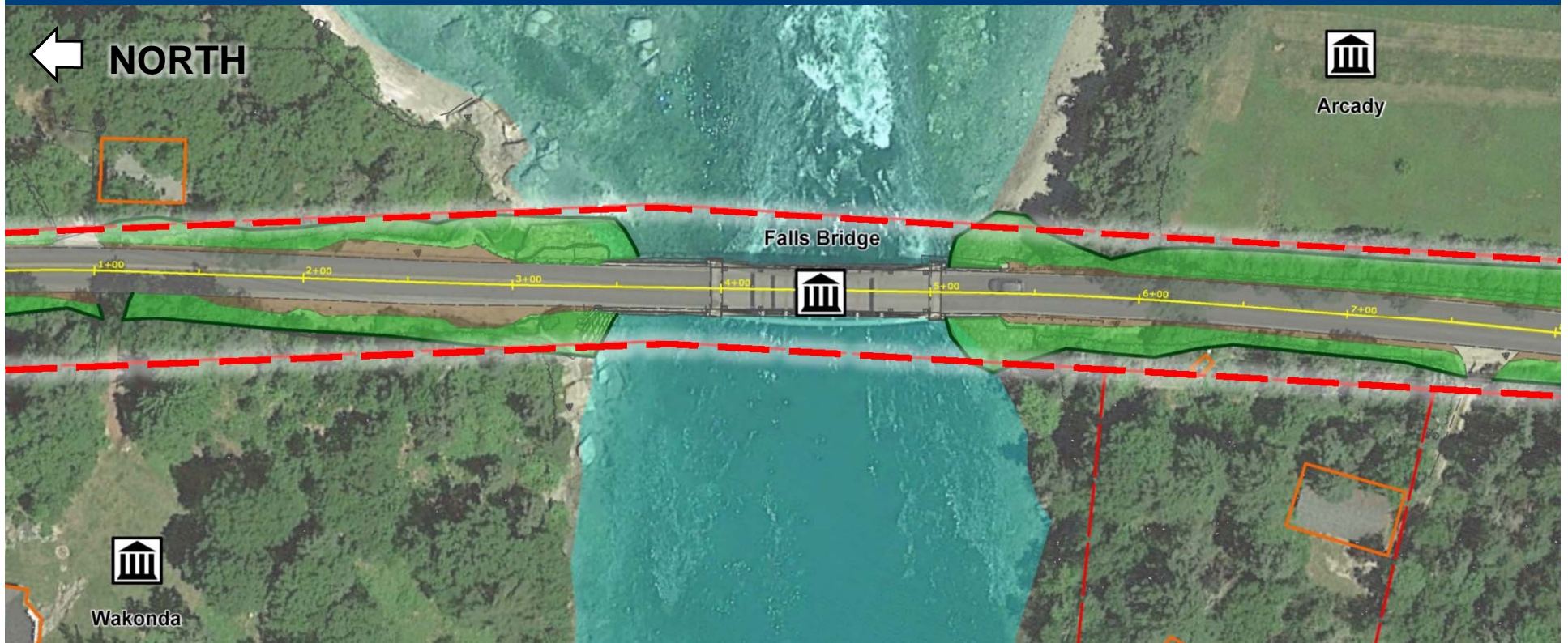
- Max. currents of ~15 Ft./Sec.
- Turbulent flow & standing rapids



Right-of-Way

Public Right-of-Way

- 66 Feet wide
- Roadway not centered in right-of-way



Right-of-Way

- Many projects require additional property rights
- Established right-of-way process in place
 - Follows State and Federal laws
 - Federally funded projects follow FHWA “Uniform Act”
- What activity requires a right-of-way process
 - Fee interest acquisition
 - Easements (e.g. drainage or slope easements)
 - Temporary rights (construction work, temporary bridge)
 - Follows state and federal laws

Utilities

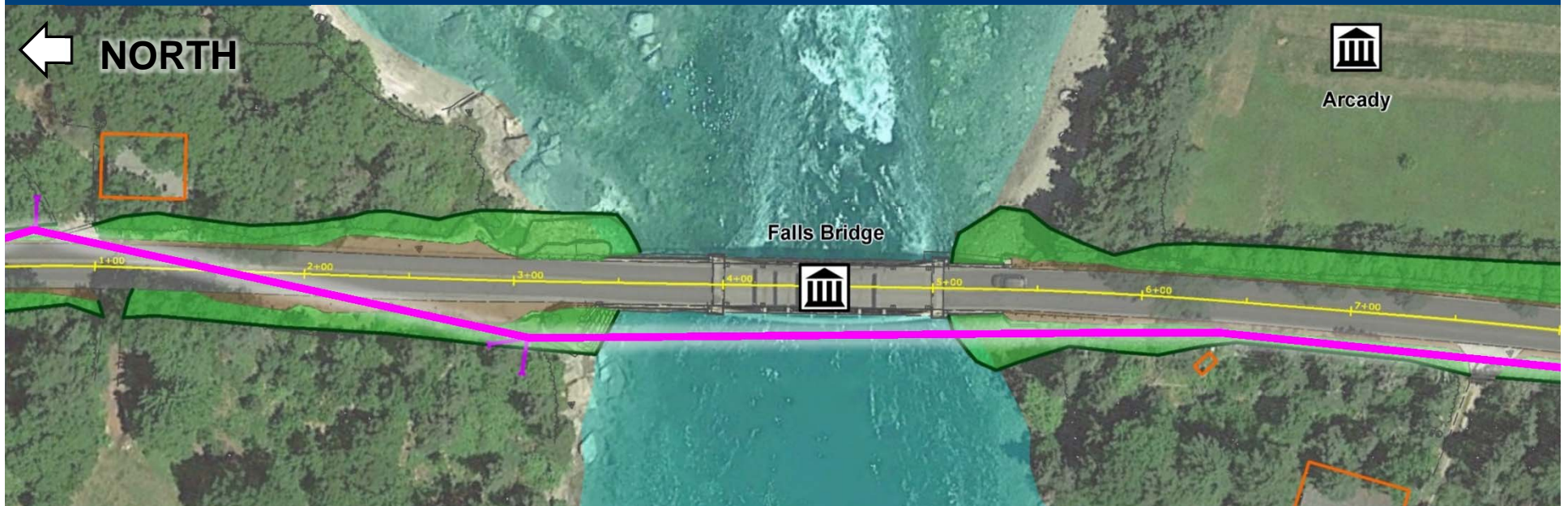
Aerial Utilities Present:

- Bangor Hydro Electric Company
- FairPoint Communications
- Time Warner Cable

Close proximity to bridge



Utility Lines West of Bridge

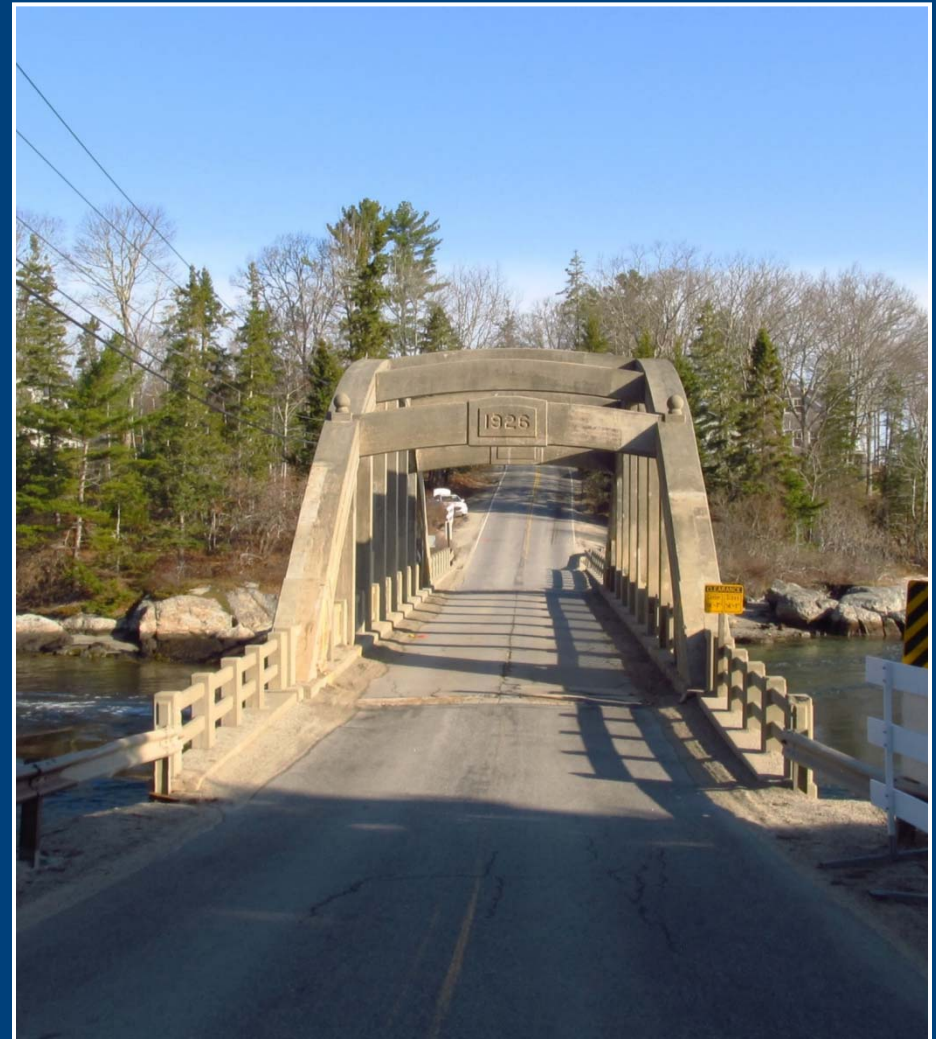


Utilities

- Utility adjustments required on many projects
- Work follows MaineDOT utility coordination process
 - Identify utilities
 - Proactively coordinate project design and utility work
- Utility coordination process considers:
 - Safe working clearances from electrical conductors (10' Min.)
 - Utility poles locations relative to travel lane
 - Type of relocations required (temporary, permanent, or both)?
 - If utilities will be relocated, where will they go?

Bridge Geometrics

- Main Span: ± 100 Ft.
- N. Approach: ± 100 Ft.
- S. Approach: ± 30 Ft.
- Max. Vehicle Height: 14'-1"
- Curb-to-Curb Width: 20'-4"



Roadway Geometrics

Horizontal Alignment

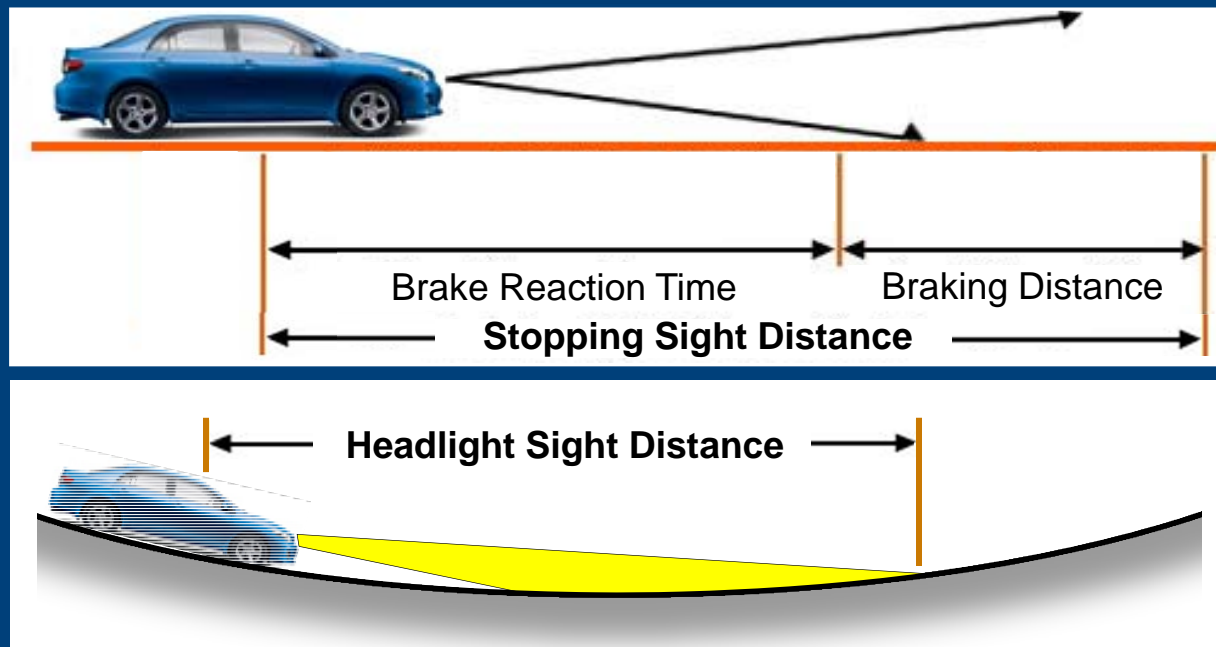
- Roadway and bridge width is substandard
 - Roadway paved width = ~20', informal shoulders
 - Bridge paved width = ~20'-4", no shoulders
 - MaineDOT standards recommended 24' width (lanes + shoulders)
- Minimum curvature, satisfies current design standards



Roadway Geometrics

Vertical Alignment

- Stopping & headlight sight distance

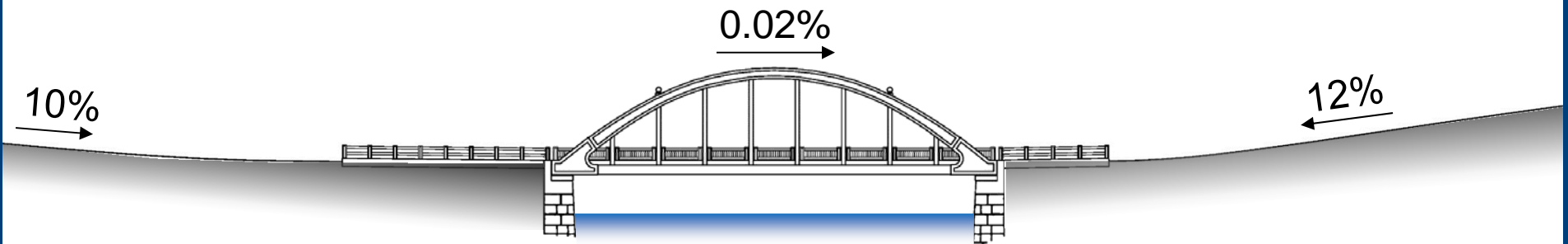


- Posted Speed Limit = 20 MPH
- Recommended Stopping Sight Distance = 115 Feet

Roadway Geometrics

Vertical Alignment

- Bridge is located in the valley of two hills
- Controlling headlight sight distance = 54 feet < 115 feet
 - Sufficient for a design speed of ± 10 mph
- Max. existing roadway grade = 12% > 9% standard



Vertical Roadway Profile

Traffic & Accident Data

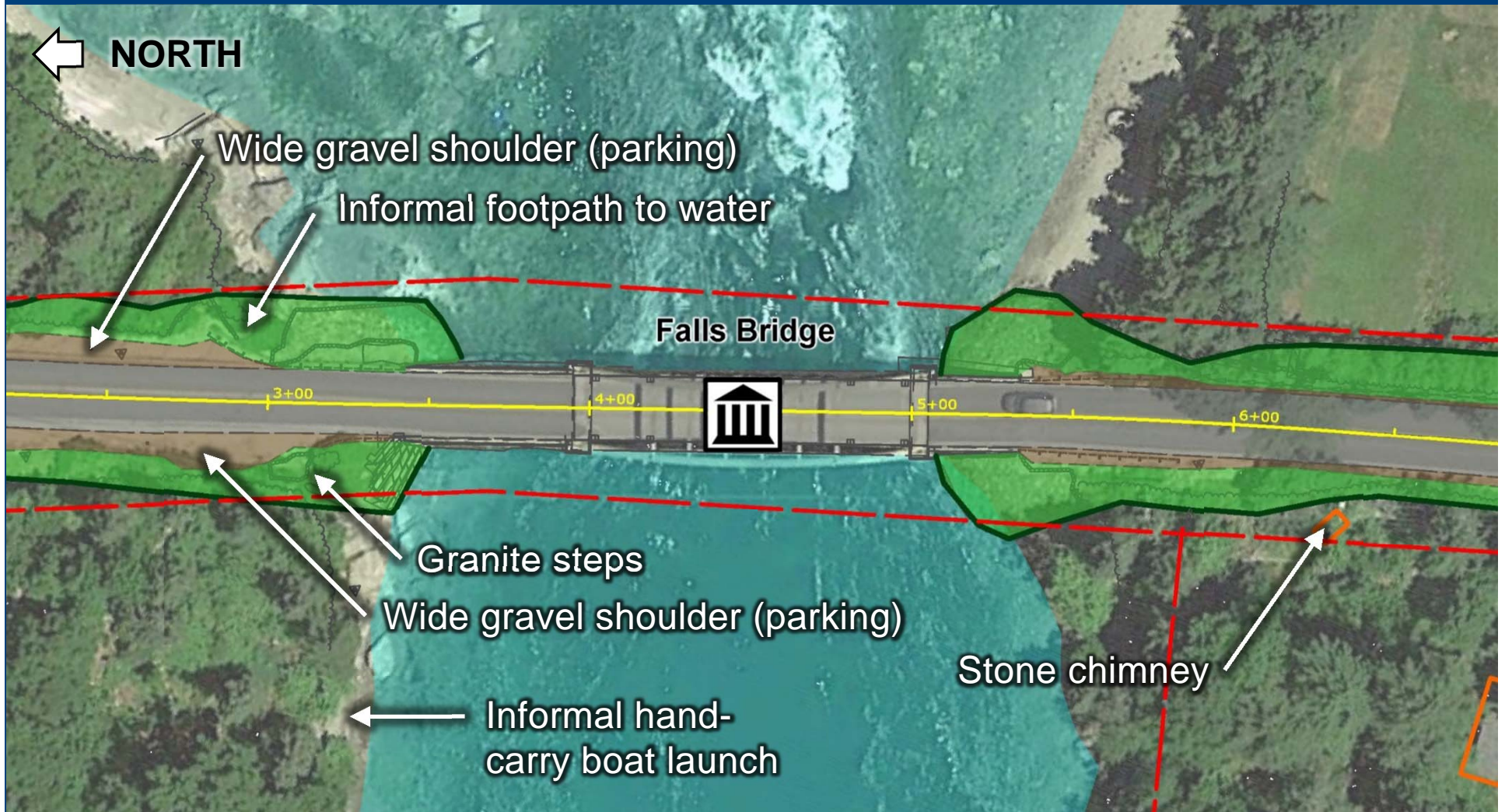
Traffic Data

- Average Annual Daily Traffic (AADT)
 - 1730 vehicles per day (2014 count)
 - Peak Hour Volume = 268

Accident Data

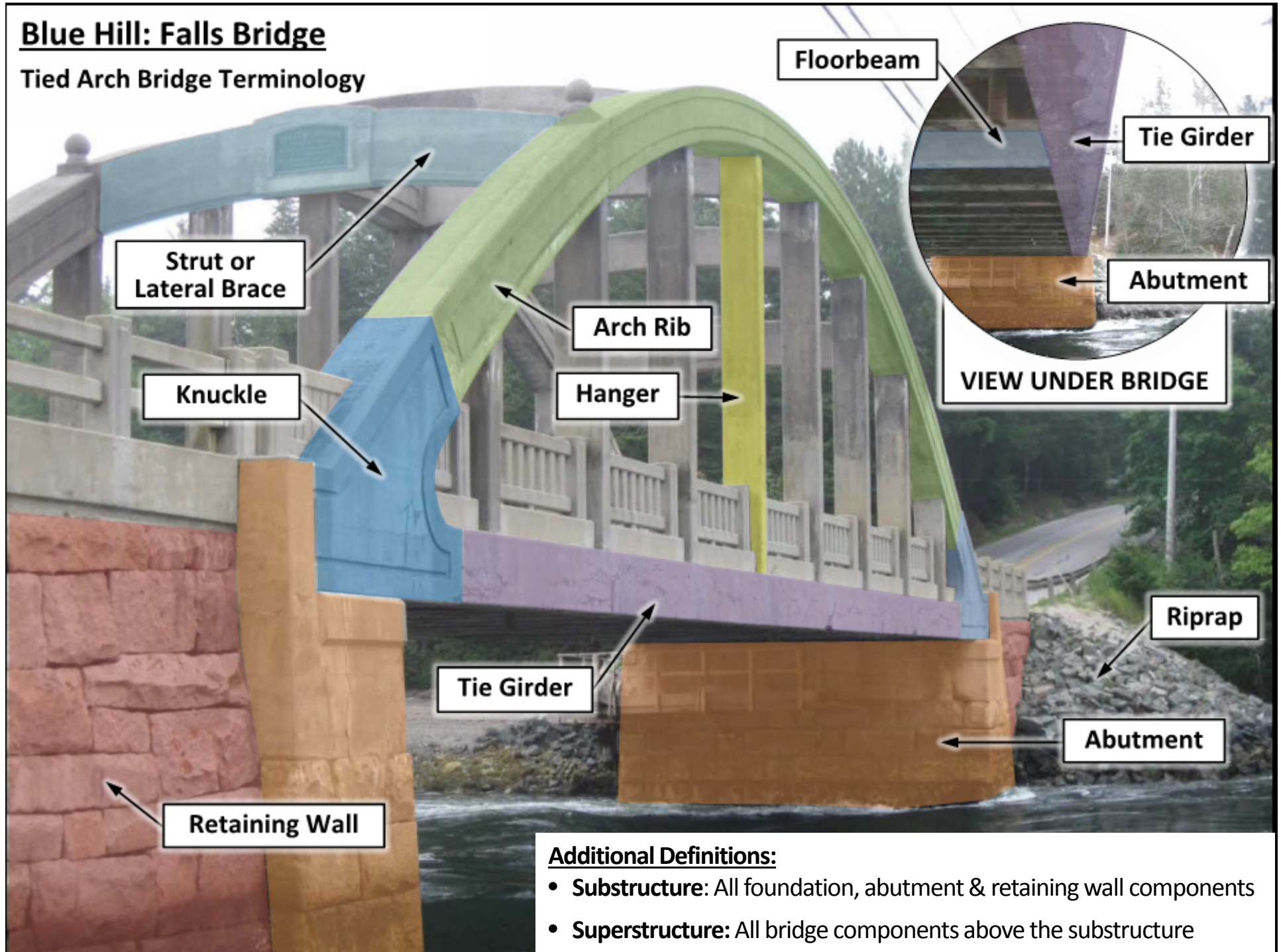
- Most recent 3-year period (2014-2016)
 - 2-mile segment: Route 175 between Parker Point Rd. & Wharf Rd.
 - Eight recorded motor vehicle crashes
 - One single vehicle crash near the Falls Bridge (attributed to icy roadway)

Other Site Features



Blue Hill: Falls Bridge

Tied Arch Bridge Terminology



Additional Definitions:

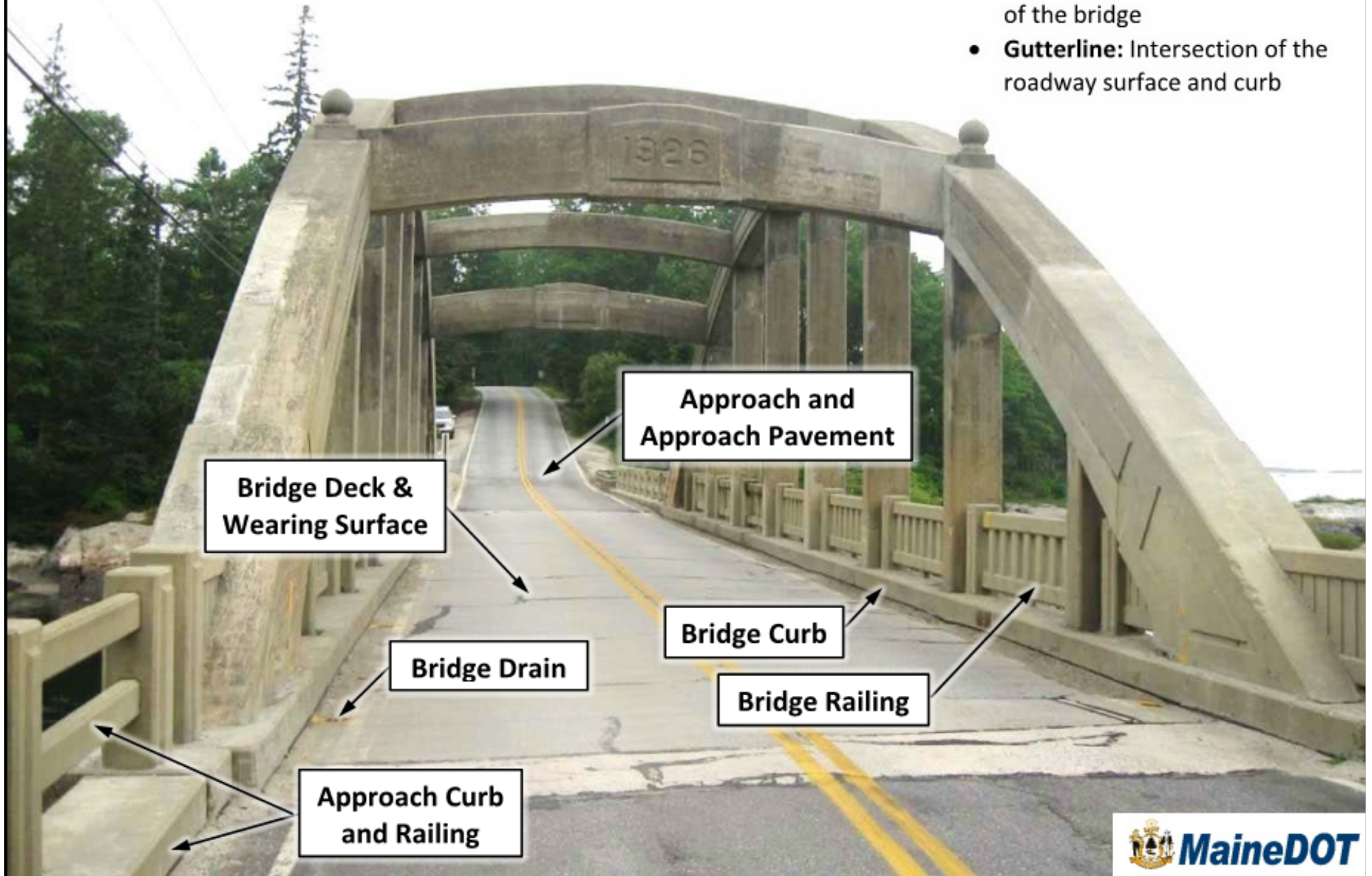
- **Substructure:** All foundation, abutment & retaining wall components
- **Superstructure:** All bridge components above the substructure

Blue Hill: Falls Bridge

Tied Arch Bridge Terminology

Additional Definitions:

- **Fascia:** Exterior / Outside face of the bridge
- **Gutterline:** Intersection of the roadway surface and curb



Bridge Condition

Routine Bridge Inspections

- Completed bi-annually in accordance with FHWA guidelines
- Key bridge components assessed using standard 0-9 rating scale
 - Condition Rating of “9” = Excellent condition
 - Condition Rating of “0” = Failed condition, bridge closed

Falls Bridge 2016 NBIS Condition Ratings

Condition	
(58) DECK	4 - Poor Condition (advanced deterioration)
(59) SUPERSTRUCTURE	5 - Fair Condition (minor section loss)
(60) SUBSTRUCTURE	4 - Poor Condition (advanced deterioration)
(61) CHANNEL & CHANNEL PROTECTION	7 - Bank protection needs minor repairs
(62) CULVERT	N - Not Applicable

Bridge Condition

Routine Bridge Inspections

- Any bridge that has a Condition Rating of 4 or lower is considered structurally deficient
 - This does not mean the bridge is unsafe
 - These bridges typically need maintenance, repair, rehabilitation, or replacement to address deficiencies
 - To remain open to traffic, structurally deficient bridges may need to be posted to restrict the vehicle weights
- The Falls Bridge is considered Structurally Deficient
 - Bridge deck condition rating of “4”, or poor condition
 - Substructure (abutments) condition rating of “4”, or poor condition

Bridge Condition - Deck

Rating = 4 – Poor Condition



Concrete cracking

Area of previous repair

Exposed reinforcing

Deterioration on Underside of Deck

Bridge Condition - Deck

Rating = 4 – Poor Condition



Areas of heavy cracking throughout

Areas of previous repair throughout

Deterioration at Deck Roadway Level

Bridge Condition - Substructure

Rating = 4 – Poor Condition



Bridge Condition - Substructure

Rating = 4 – Poor Condition



Bridge Condition - Substructure

Rating = 4 – Poor Condition



Concrete Spalling at Abutment



Settling Masonry

Bridge Condition - Substructure

Rating = 4 – Poor Condition



South Abutment
Southeast corner

Concrete Spalling at Abutment



Shifting Granite
Stones

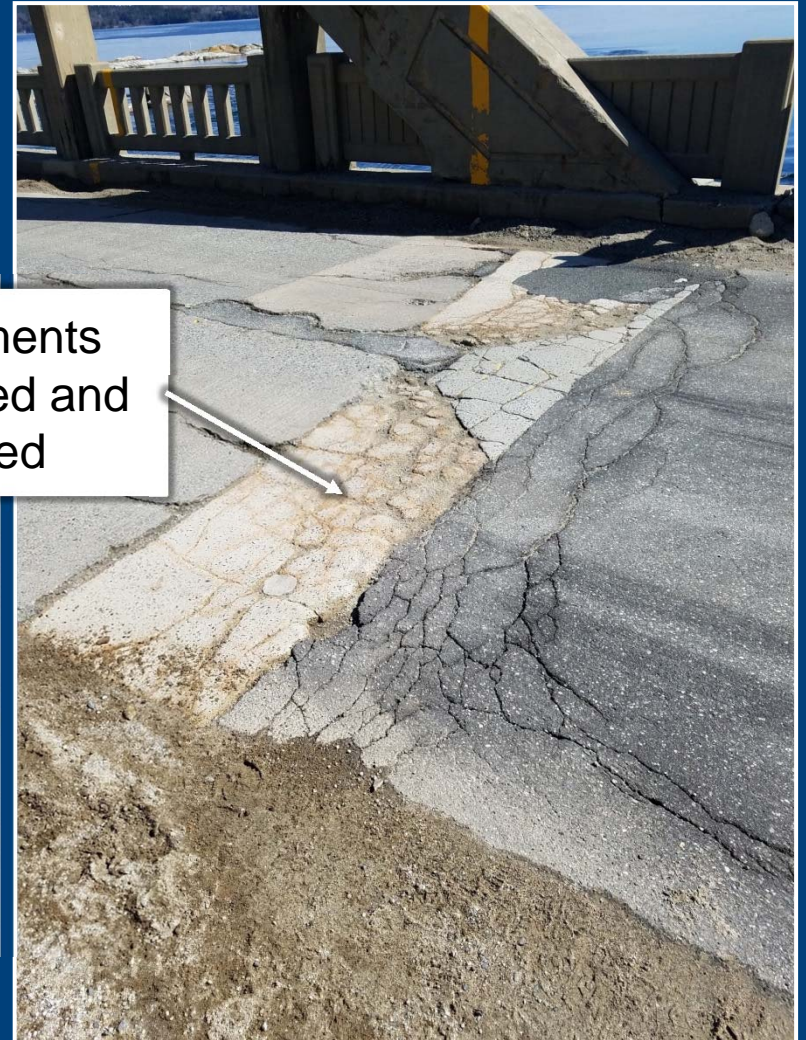
Settling & Shifting Masonry

Bridge Condition - Substructure

Rating = 4 – Poor Condition



Top of abutments heavily cracked and deteriorated



Bridge Condition - Superstructure

Rating = 5 – Fair Condition



Deteriorating Concrete at Northwest Knuckle

Bridge Condition - Superstructure

Rating = 5 – Fair Condition



Deteriorating Concrete at Northeast Knuckle

Bridge Condition - Superstructure

Rating = 5 – Fair Condition



West Arch Tie Girder

Previous Bridge Investigations

Performed in 2009 - 2011

- Concrete Cores collected
 - Compressive strength testing
 - Chloride testing
 - Carbonation testing
 - Petrographic Testing
- Data will be used to support the development of a comprehensive rehabilitation strategy



Concrete Coring



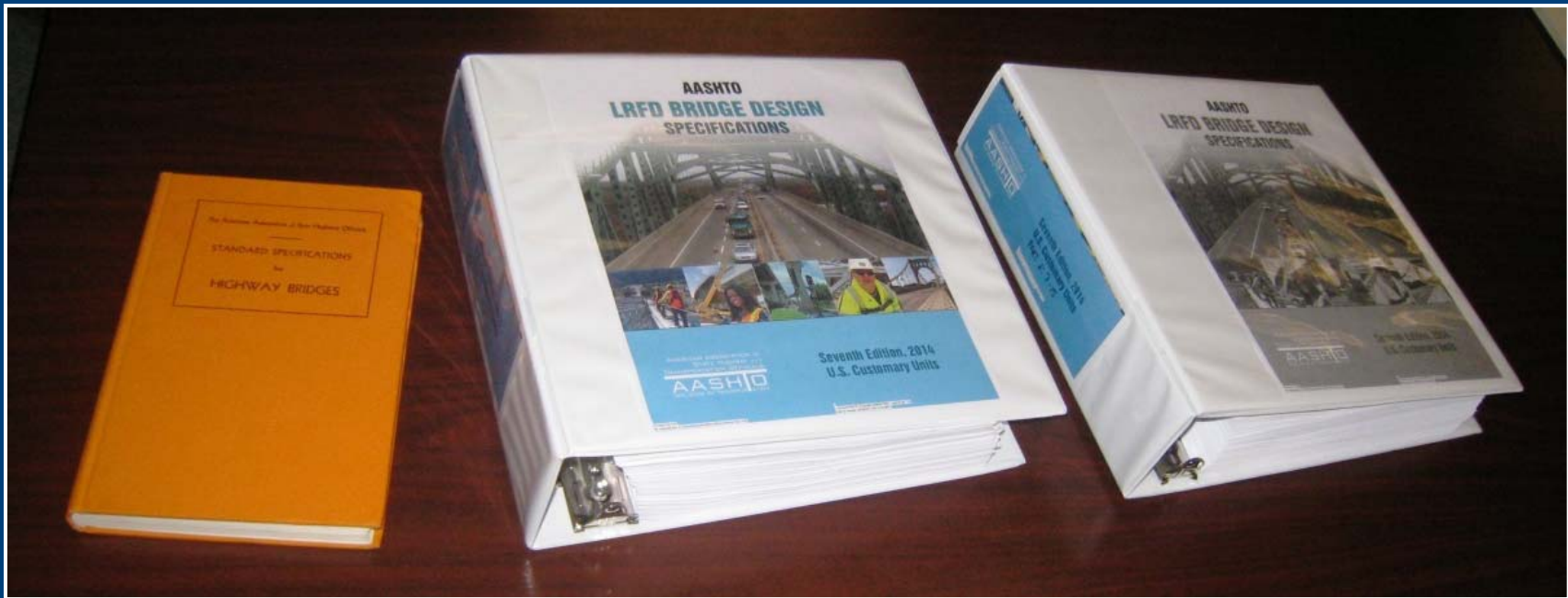
Concrete Core w/ Dye Penetrant

Bridge Capacity Evaluations

- Load capacity evaluation is currently ongoing
 - Completed in accordance with current State and Federal standards
 - Anticipate completion in July 2017
- Assessing all components of tied arch system
- Compares bridge capacity to demand created by vehicles
- Options for addressing load capacity concerns:
 - Strengthening
 - Bridge load posting

Modern vs. Historic Design Standards

- Major differences in design philosophy and requirements exist
- It may be desirable to leave some non-compliant items as-is
- Design team will evaluate these items on a case-by case basis



1940's bridge design (left) compared to two-volume current code (right)

Modern vs. Historic Design Standards

- Example of substandard elements requiring evaluation
 - Roadway geometrics
 - Guardrail, bridge railing and approach railing



Existing Bridge and Approach Railing



Approach Guardrail

Questions & Discussion

