



FRP Decks for Movable Bridges and Historic Vehicle Bridges

August 2019

FRP Infrastructure Products

- Rail Platforms
- Pedestrian/Vehicle Bridges
- Fender Protection Systems
- Trail/Access Bridges
- Utility Products
- Waterfront Solutions
- Specialty Applications



Fiber Reinforced Polymer (FRP) Benefits

Corrosion Resistance to chemicals and water

- Long Lasting
- No Maintenance

Design Flexibility

- Size, shape
- Structural properties

Light Weight

- Laminates are 25% weight of steel
- Panels are 20% of reinforced concrete panels
- Easier installation

Prefabricated Structures

- Incorporate features in shop fabrication
- Accelerated construction



Corrosion Resistance to chemicals and water

Long Lasting; No Maintenance



Light Weight for Sidewalks and Easy Installation



Prefabricated Large Structures Accelerate Construction



100% Domestic Source Material



Design and Architectural Features Molded into Structure



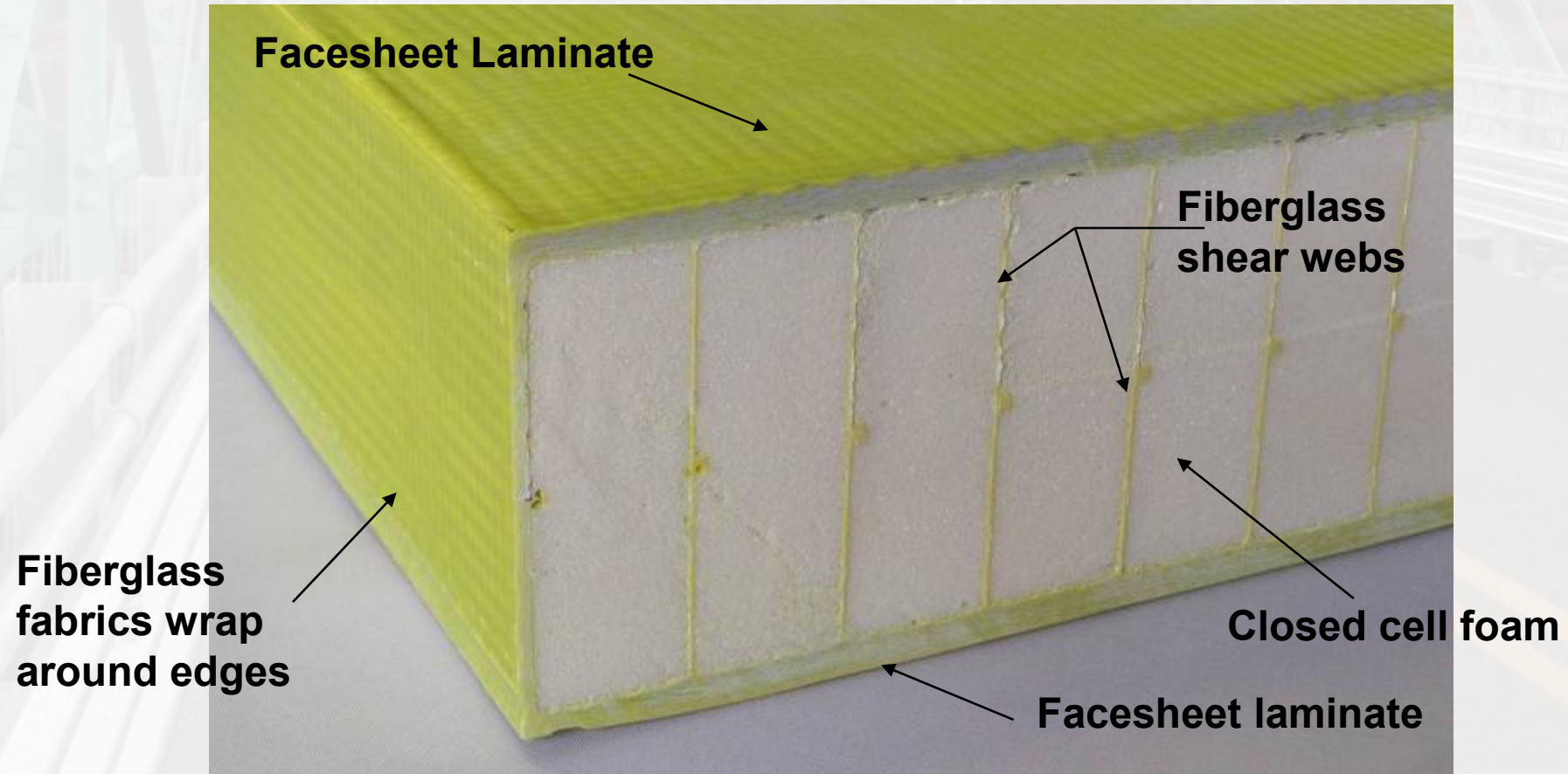
FRP Deck Benefits

FRP Market Fit

- Higher initial material cost of FRP requires the right application
- NOW Value is
 - Installation savings using Prefabricated Bridge Elements
 - Light Weight
 - Concrete = 4.8 kPa (100 psf)
 - Exodermic = 2.6 kPa (55 psf)
 - FRP = 0.8 to 1.25 kPa (16 to 26 psf)
 - Architectural and functional design features
- Best fit for FRP are bridges that must have lighter weight decking
 - Movable bridges
 - Historic steel truss
 - Steel grate replacement

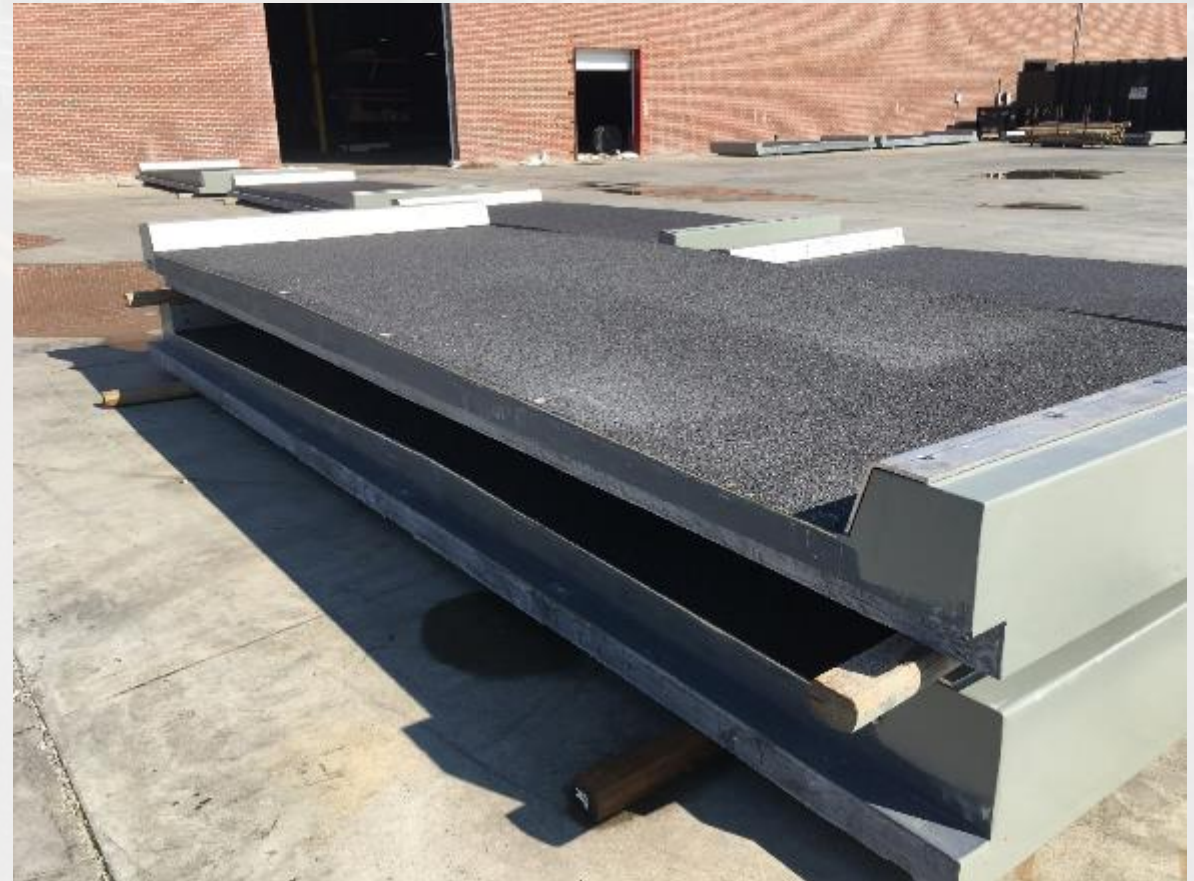
FRP Composite Sandwich Construction

- Consists of fiberglass facing skins on fiberglass webs in foam core
- Design flexibility (stiffness, strength, size)
- Embedded steel for concentrated loads and attachments



FRP Deck Panels - Blackfriars

- 33 panels
- Full transverse width = 17.5 ft
- Length = 6.85 ft
- Crown
 - 2%; not in center
 - Thickness 9.8 inch to 8 inch
- Ship lap joints
- FRP deck at 25 psf



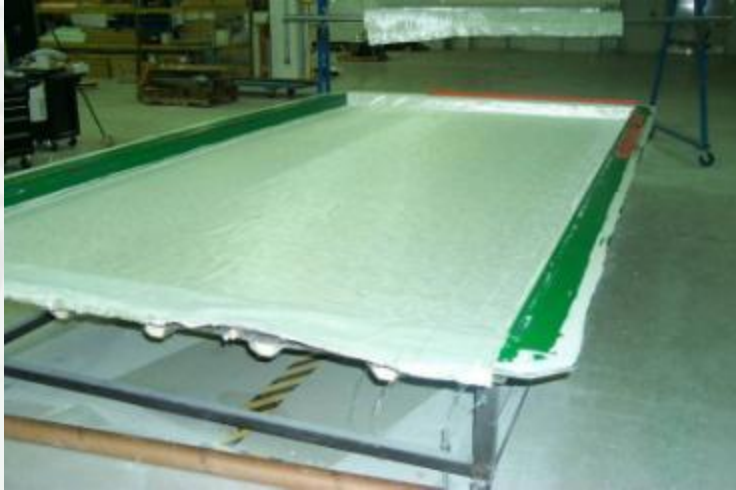
FRP Deck Panels



- Depth of 7 inches
- Crown
- Weight is 19 psf
- Wear Surface is polymer concrete



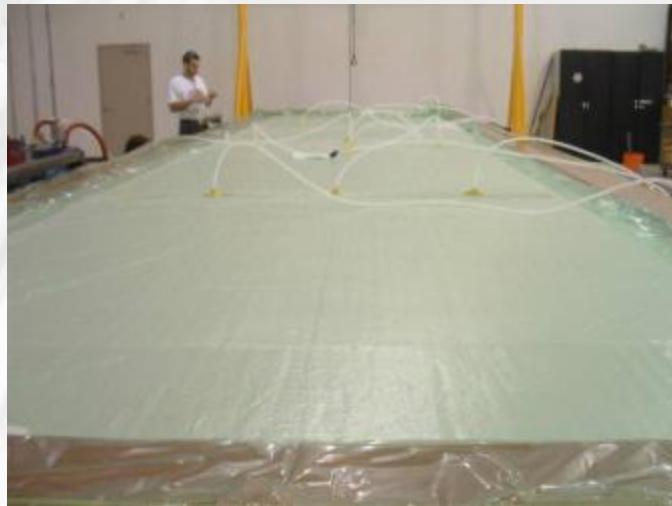
FRP Deck Manufacturing



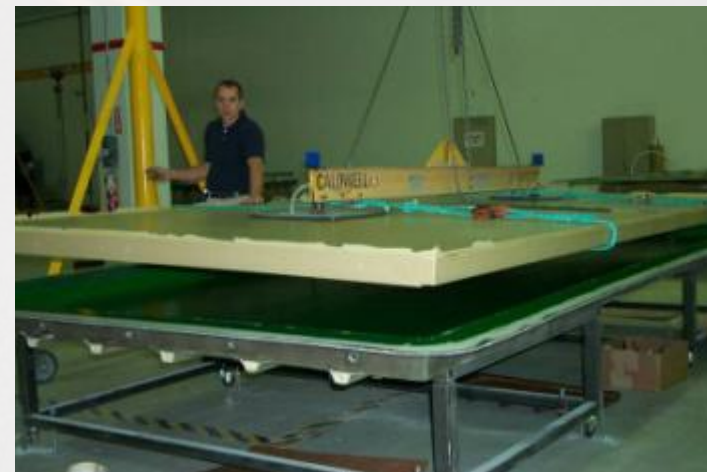
Fiberglass layers in molding tool



Internal core with fibers for shear



Sealed and ready for resin infusion



Solid part removed from mold



Vehicle Bridge Decks

Rocks Village Swing Span Truss Bridge Haverhill, Mass



- Deck Size Six spans; Total of 809 feet
Two widths of 21.25 feet and 25.3 feet Deck Area
18,776 square feet
- Deck Weight 19 psf
- Requirements HS-25 Vehicle. L/500 deflection.
- Superstructure Steel truss with longitudinal beams
- Deck to Beam Connection Welded shear studs and grout
- Wear Surface Polymer concrete
- Guard Rail Attached to deck; side and top
- Special Requirements Steel plate expansion joints at ends of all six spans.
Attached access platform. Manhole in swing span.





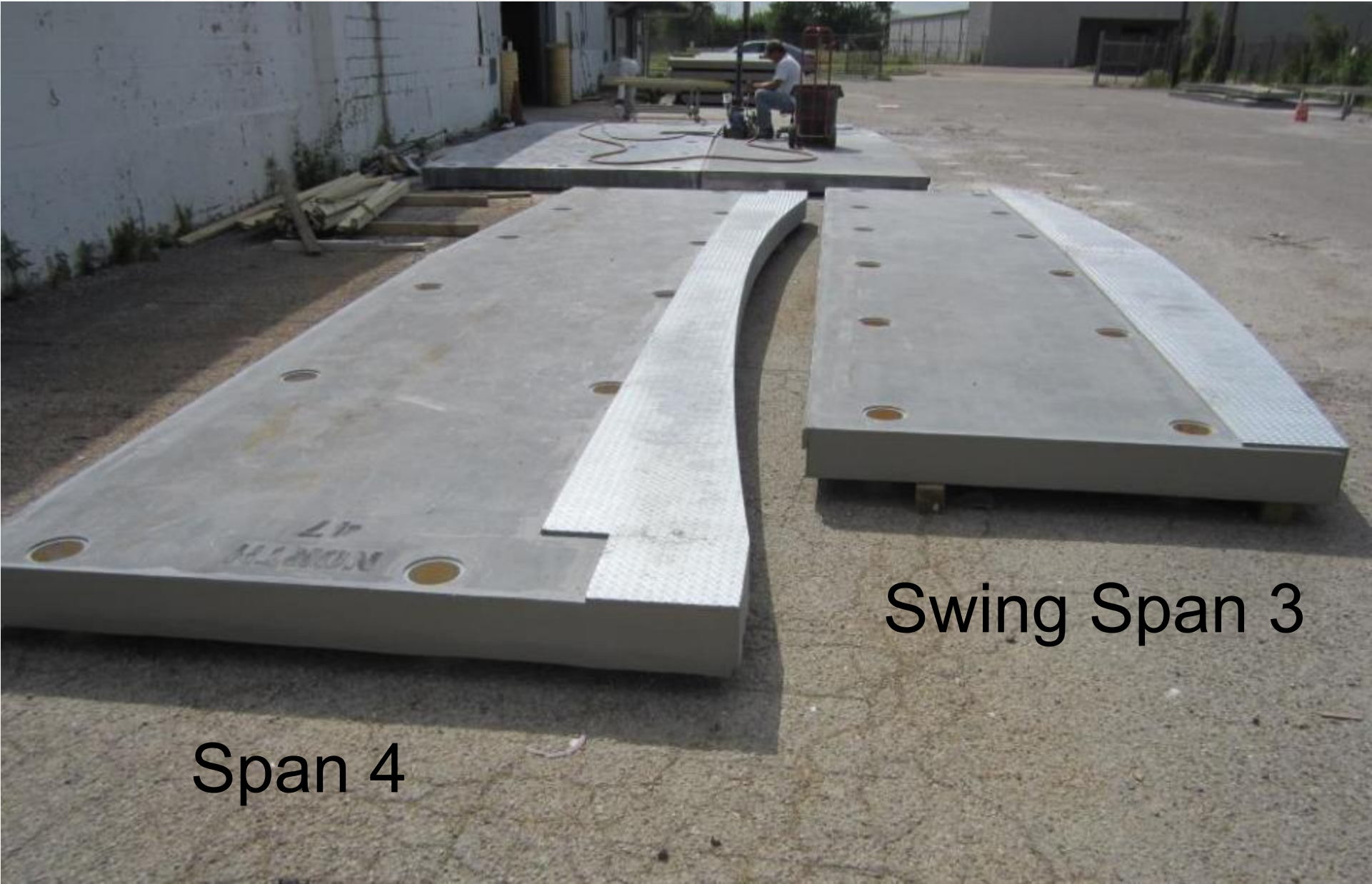








Expansion Joint Panels at Swing Span



Span 4

Swing Span 3

Installed Panels at Expansion Joint

- Very little construction tolerance for growth or shortfall
- Account for temperature during installation
- Last panel size was adjusted based on survey of installed panels



Swing Span Operation



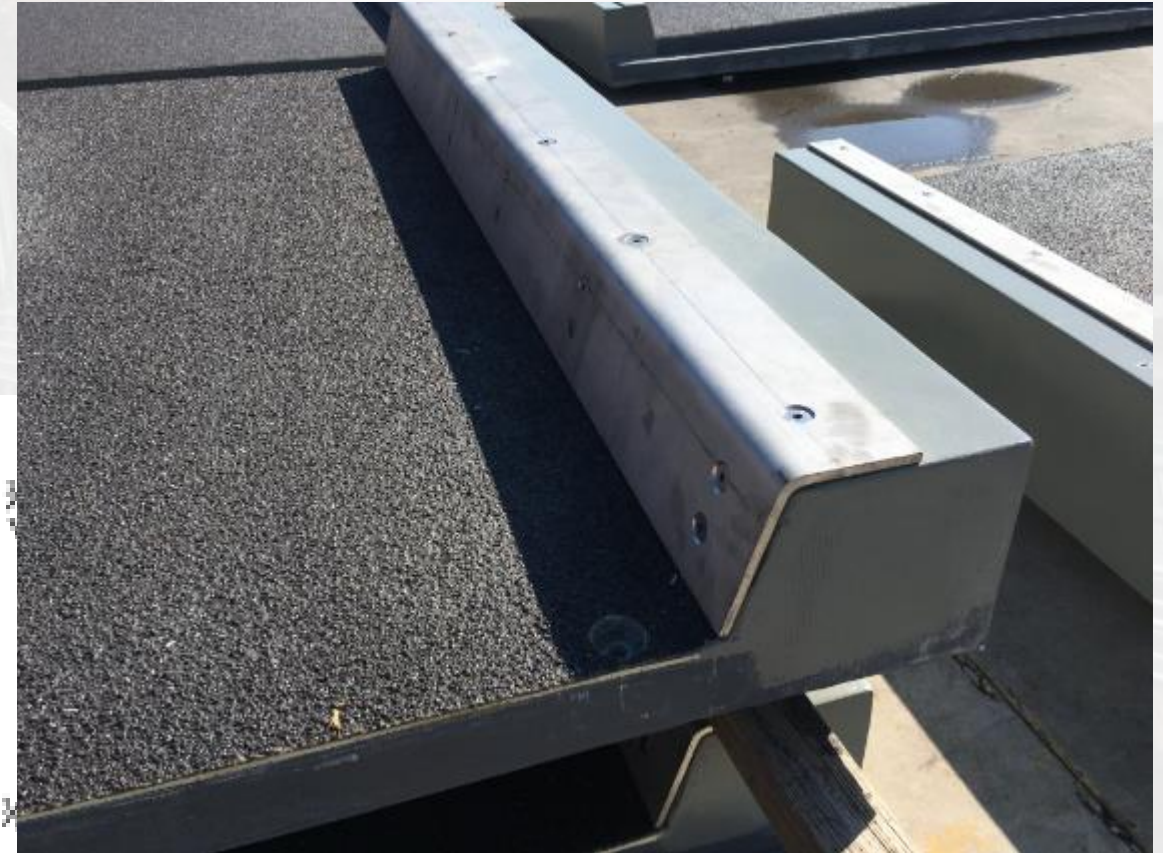
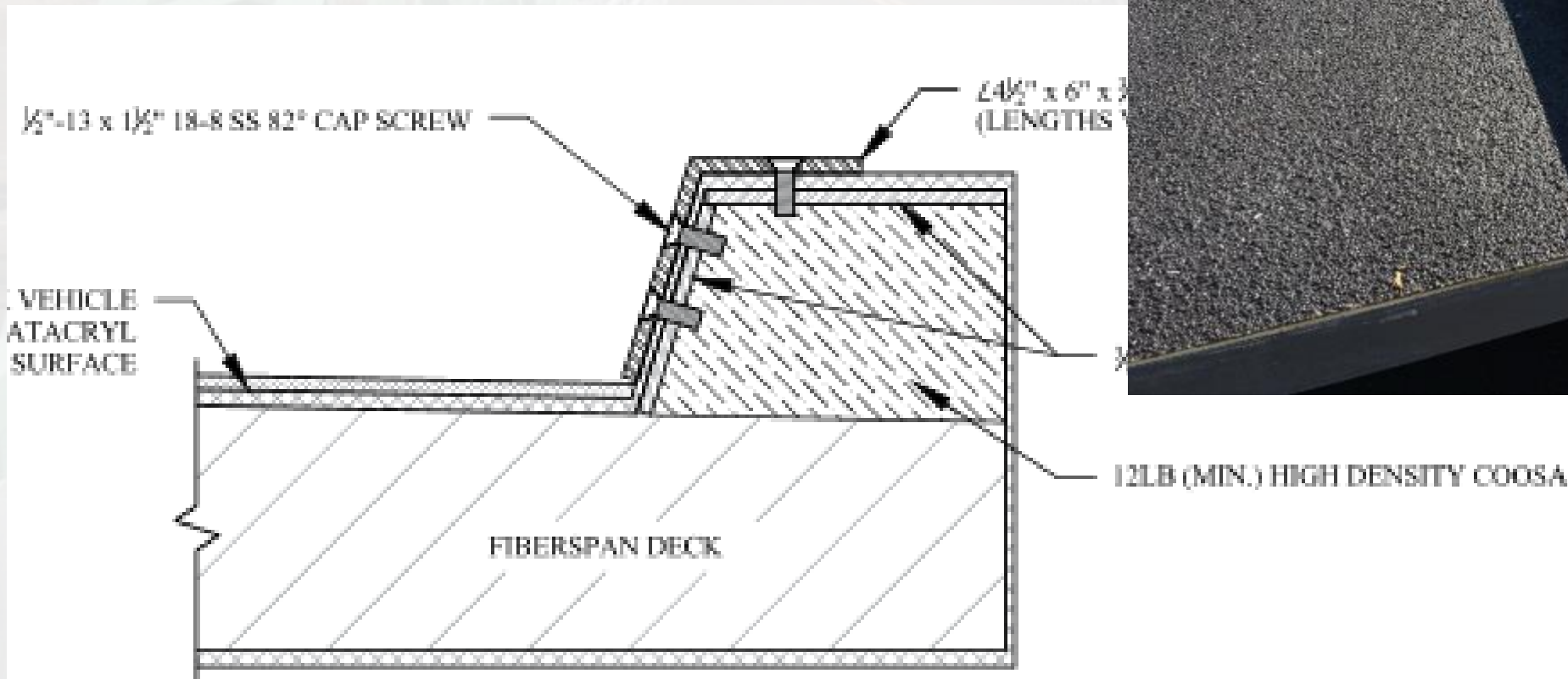
Blackfrairs Bridge, London, Ontario

- Wrought iron bowstring arch-truss bridge
- Rehabilitation in 2017-18
 - Truss lifted from abutments; cut in half; repaired in shop
 - FRP deck at 25 psf
- Design
 - HS-20 (75% CL 3-625-ONT)
 - L/500 deflection
 - Stringer spacing of 39 inch
- Bridge Size
 - 221 ft x 17.5 ft for area of 4251 sf

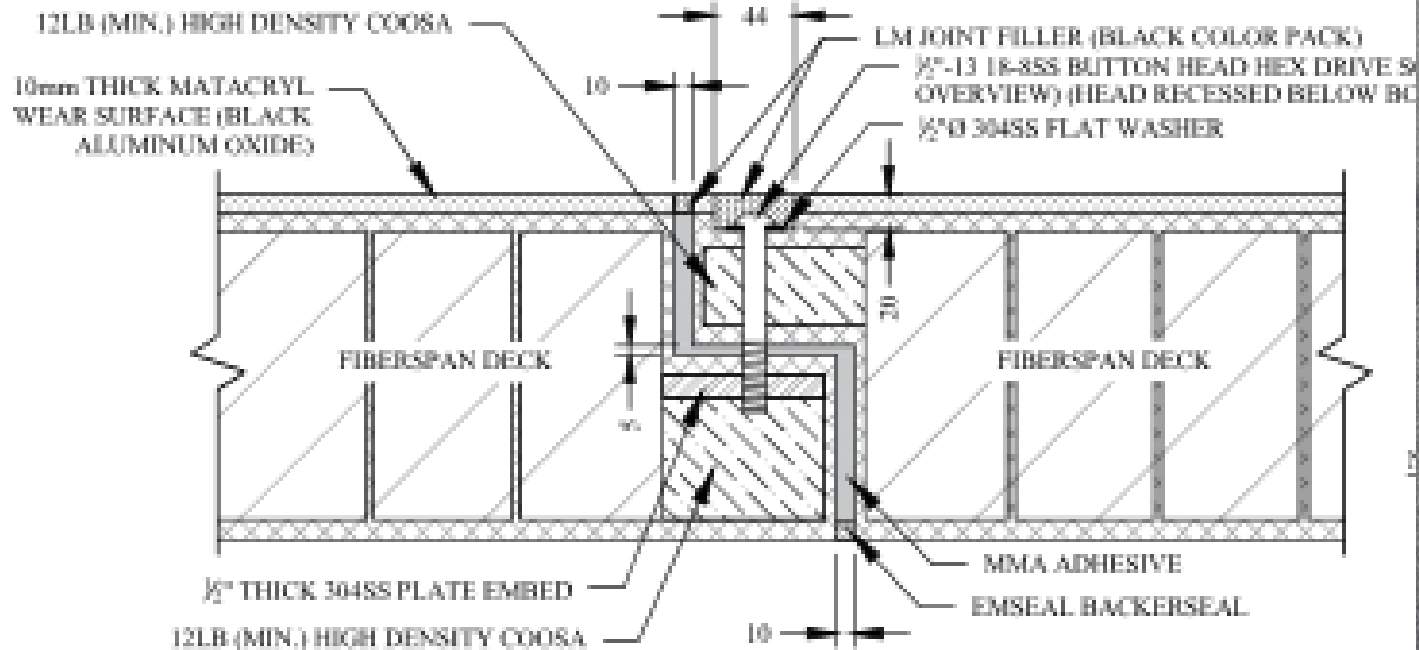


Design Features – Blackfriars

- Stainless steel curb armor for snow plows



Panel to Panel Joints





Light Weight Installation





Minto Bridges, Ottawa, Ontario



FRP Deck Panels: Crown, Non-slip overlay, Ship lap joints, trench drains, curbs



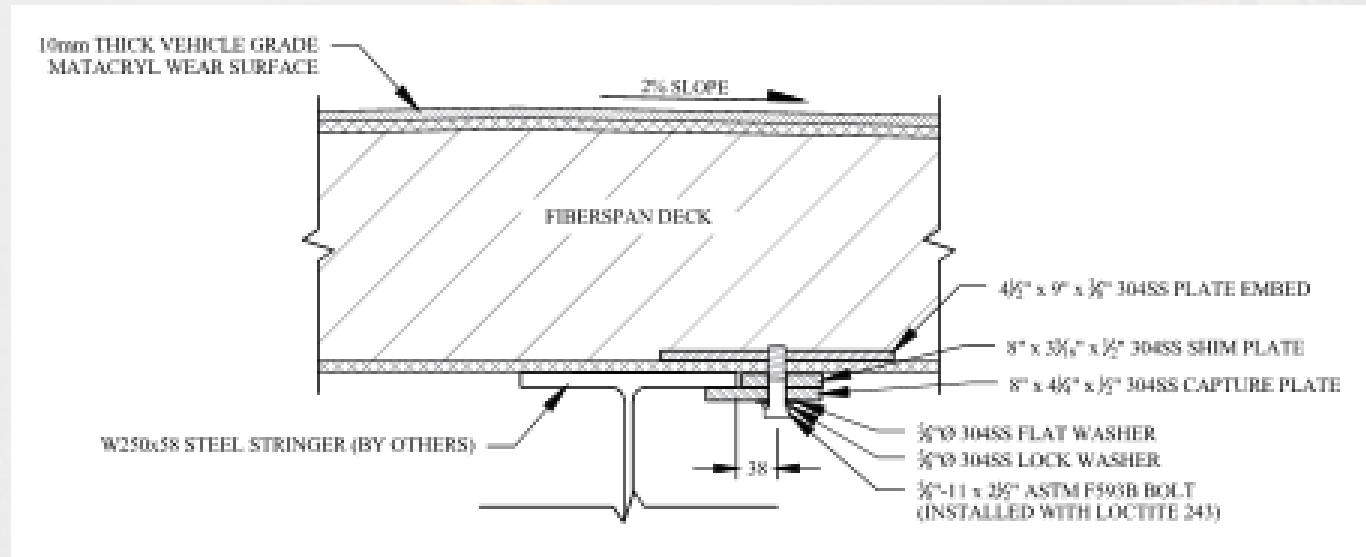
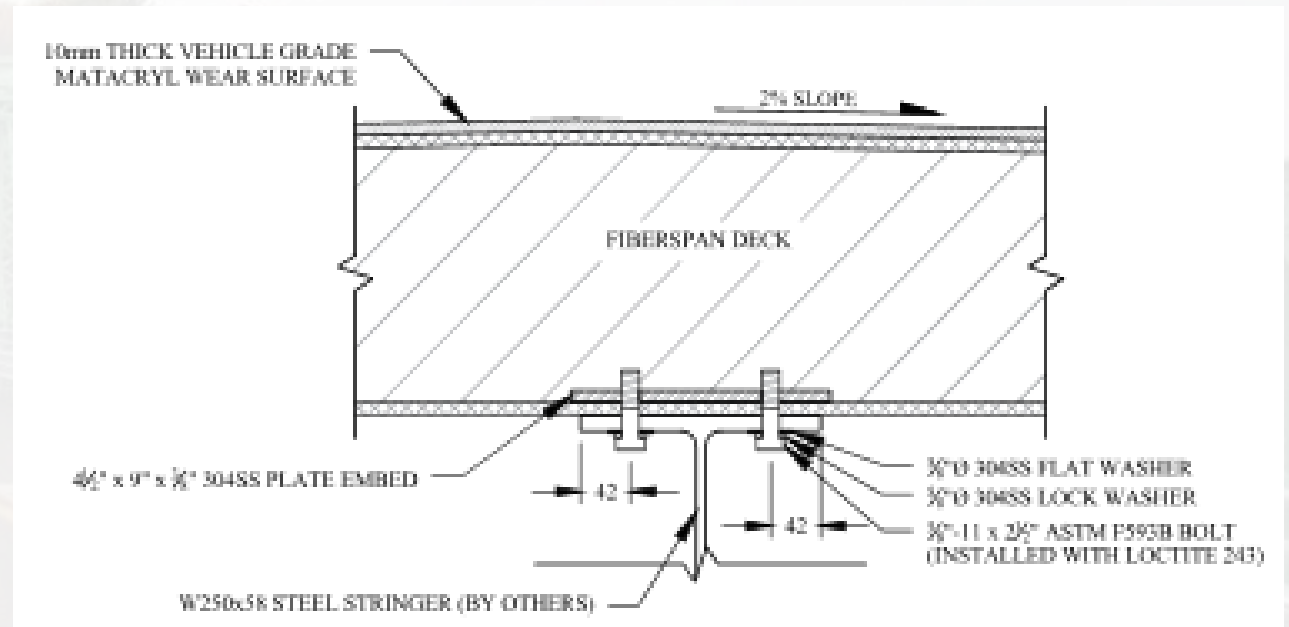


08/22/2016



Deck Connection

- Fixed connection at one end to handle braking loads
- Clip connection in other panels for thermal expansion differences



**Embedded
Steel in
Bottom of
Deck
Panel**



Expansion Joints

- Steel rail and gland systems
- Armor ends for impact



Franklin Bridge

Design

HL-93 with L/500
deflection

30 psf live load

Steel stringers

Bridge Size

182 ft x 31 ft for
area of 5642 sf





- Depth of 7 inches
- Weight is 23.5 psf
- Wear Surface is aluminum oxide aggregate

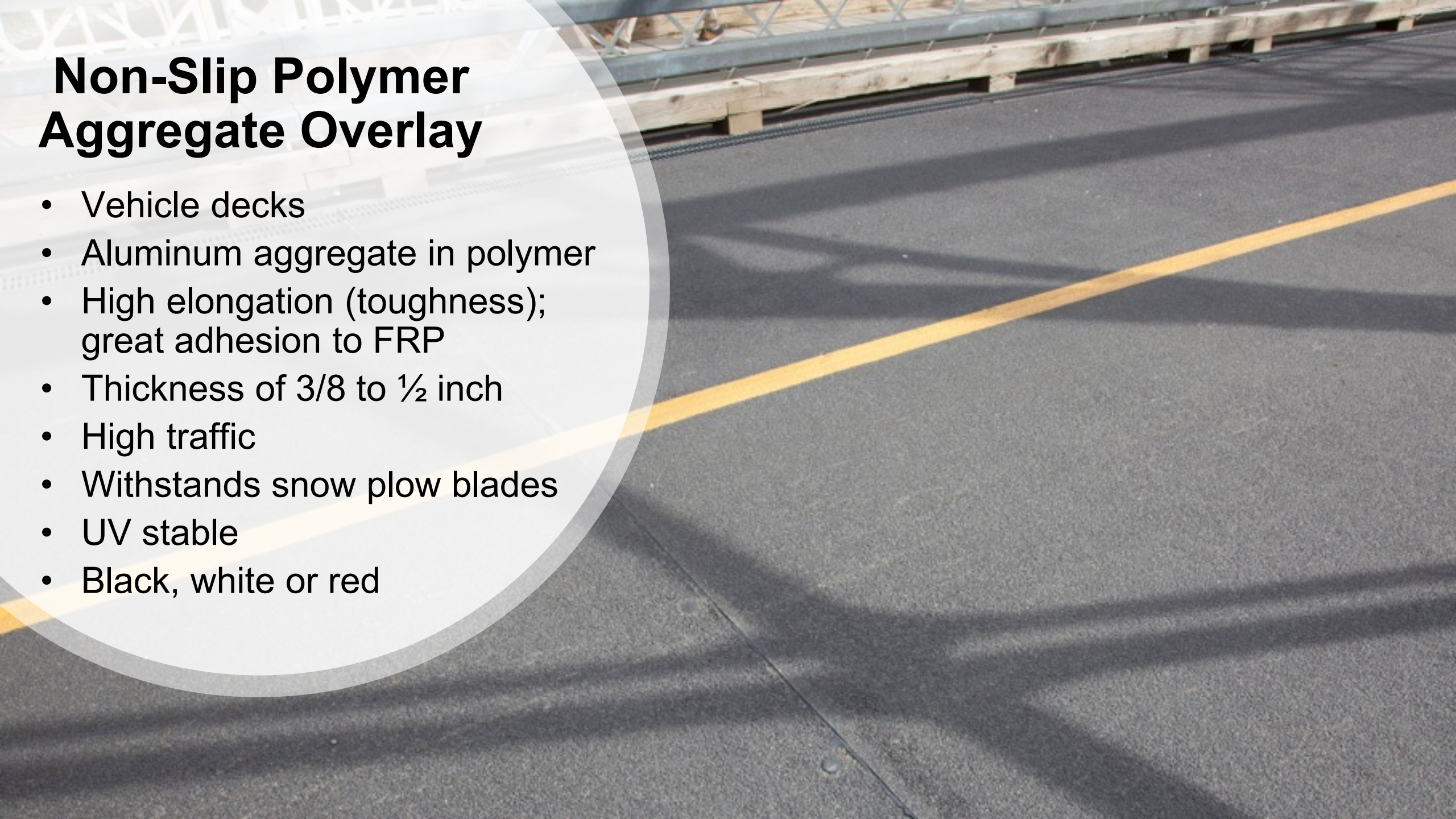
Functional Features

- Lift points
- Drain scuppers



Non-Slip Polymer Aggregate Overlay

- Vehicle decks
- Aluminum aggregate in polymer
- High elongation (toughness); great adhesion to FRP
- Thickness of 3/8 to 1/2 inch
- High traffic
- Withstands snow plow blades
- UV stable
- Black, white or red



FRP Products Offer Excellent Solution for Infrastructure

A curved concrete bridge with a red metal railing, supported by concrete pillars, under an overcast sky. The bridge is the central focus of the image, curving from the left towards the right. The railing is a dark red color, and the bridge deck is a light grey concrete. The background shows a cloudy sky and some greenery.

- Installation photos and videos
 - www.compositeadvantage.com
 - www.youtube.com/CompositeAdvantage

- For more information, contact:
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