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NORTHEAST BRIDGE PRESERVATION PARTNERSHIP

I-95 Major Deck and Superstructure Rehabilitation South of the Fort McHenry Tunnel

Northeast Bridge Preservation Partnership Conference
September 20, 2016

David A. LaBella, P.E., Maryland Transportation Authority

Agenda

- About MDTA
- History of FMT
- Project Development
- Project Design Elements
- Project Construction
- Q&A

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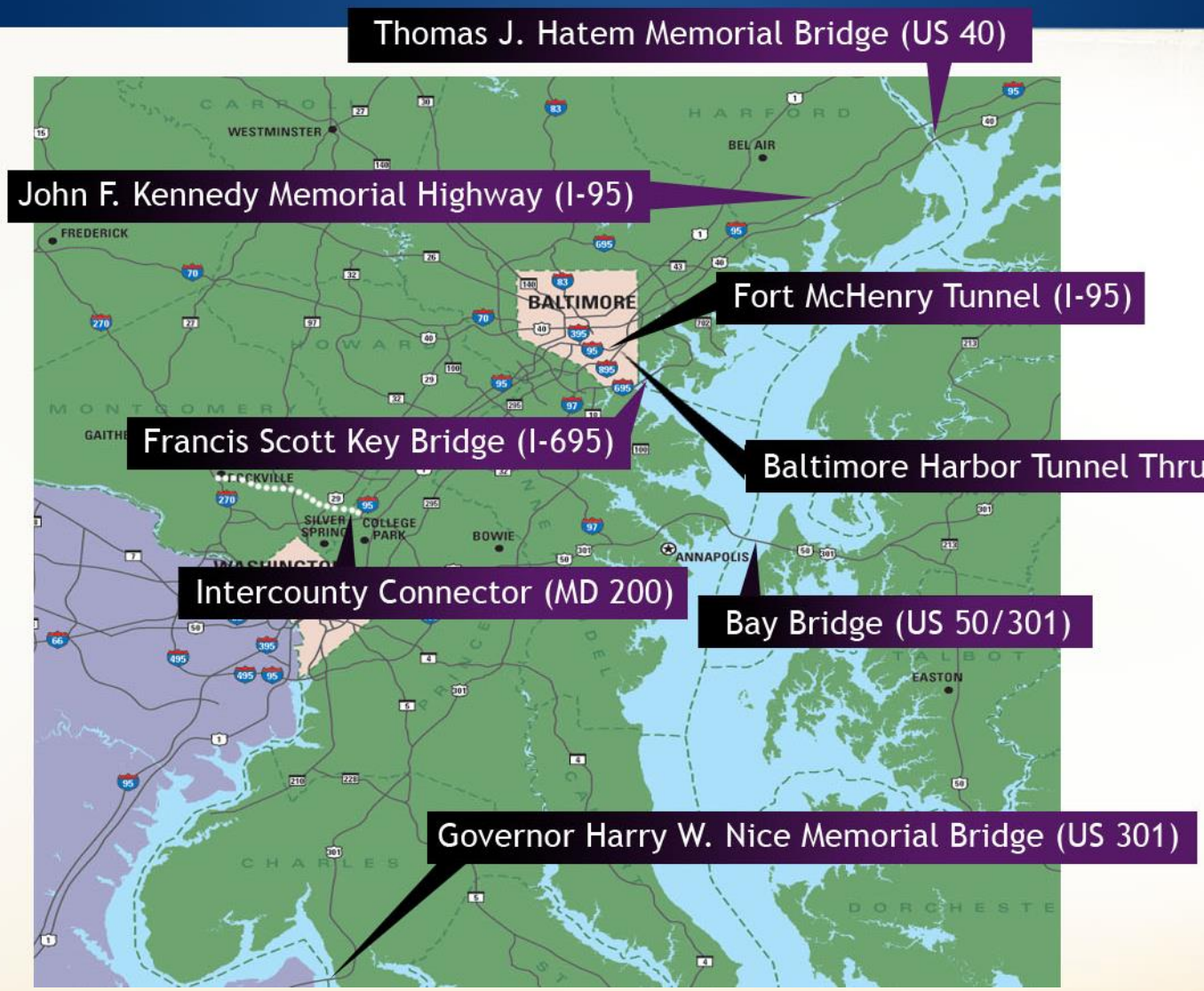

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- William Preston Lane Jr. Memorial (Bay) Bridge (US 50/301) – 4.3 miles
- Francis Scott Key Bridge (I-695) – 11.0 miles (1.9 miles bridge)
- Baltimore Harbor Tunnel (I-895) – 18.25 miles (1.4 miles tunnel)
- Fort McHenry Tunnel (I-95/I-395) – 13.2 miles (1.5 miles tunnel)
- John F. Kennedy Memorial Highway (I-95) – 51.6 miles
  (1.0 mile Millard E. Tydings Memorial Bridge)
- Thomas J. Hatem Memorial Bridge (US 40) – 1.9 miles
- Governor Harry W. Nice Memorial Bridge (US 301) – 2.1 miles
- Intercounty Connector (MD 200) – 17.5 miles

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Project Limits

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I-95, South of Fort McHenry Tunnel to Caton Avenue
Work in Both NB and SB Directions

Project Overview

- **Located in Baltimore City on I-95, South of the Fort McHenry Tunnel to Caton Avenue**
- **Project Length 4.4 miles**
- **Mainline I-95 and Ramp Bridges Serving I-95**
  - **Expansion Joint Replacements**
  - **Riding Surface Replacement**
- **Work Began in 2014 and Completed in 2016**

  (Deck Work - Two Construction Seasons)

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Fort McHenry Tunnel Facility

- **I-95: Construction Dates of Bridges Varied; North of Tunnel Primarily in Early 1970's, South of Tunnel Primarily in Late 1970's**

- **Bridges Comprised of 8 to 8.5 Inch Depth Cast-In Place (CIP) Concrete Decks, Steel Box Girders, and Steel Plate Girder Superstructures**

AVERAGE DAILY TRAFFIC (ADT)	
North of I-395:	South of I-395
68,600 SB	96,900 SB
64,600 NB	96,400 NB
6,900 SB-AM Peak	6,700 SB-AM Peak
2,800 NB-AM Peak	6,600 NB-AM Peak
3,600 SB-PM Peak	7,100 SB-PM Peak
6,000 NB-PM Peak	6,500 NB-PM Peak

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FMT Bridge Deck Rehab History

- **North of FMT was Resurfaced in Early 2000's**
- **Resurfaced 12 Bridges in 2001**
- **Resurfaced 22 Bridges in 2004**
- **South End Had Latex Modified Concrete (LMC) Overlay When Originally Constructed**
- **Epoxy-Coated, Reinforcing Steel, 2-2 ½ Inches Cover**

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MDTA Inspection Program

- **Early 2000's Deck Condition Survey (Sampling, Chloride Testing) Revealed Deck in Fair Condition. High Chloride Levels Extend to 2-inch Depths**

- **Regular Inspections of Decks, Which Included Top Side and Soffit**

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Bridge Deck Conditions

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Bridge Joint Conditions

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Project Scope of Work

- **Mill and Resurface Bridge Decks (Riding Surfaces)**
- **Repair and Replace Aged Bridge Deck Joints and Drainage Troughs**

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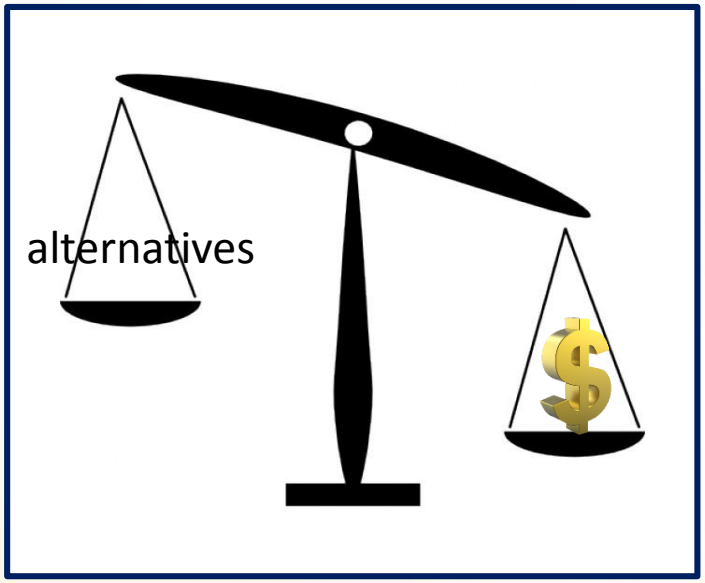
Project Scoping Phase

- **Decision Factors and Process (Brief MDTA's Capital Committee, TSO)**
- **Traffic Impacts and Analysis**
- **Budgeting, CTP Funding**
- **Construction Alternatives (i.e. Phasing, Materials)**



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Potential Issues and "Musts"

- **Concentrated Outreach Before, Throughout, and Following Each Construction Phase Necessary**
- **Deliberate but Efficient Concrete Placement and Curing Vital to Success of Project**
- **Be Ready to Respond to ANYTHING - Schedule Modifications**
  - **Weather / Incidents / Complaints/ Concerns**
- **Diverted Traffic to Alternate Routes to Reduce Travel Delays, Especially During More Impactful Stages**

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ready
when the time comes

Associated Projects

- **I-95 / I-395 Zone Painting and Steel Repairs (Began in 2014)**
- **I-95 High Mast Lighting (Began Early 2015)**
- **I-895 Canton Viaduct (In Design)**

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Project Design Elements

Preliminary Investigations

- **Assessment of Existing Conditions**
  - **Review Historical Data / Inspection Reports**
  - **Baseline Condition Assessment**
  - **Emergency Repairs**
- **Interview Agency Personnel**
- **Evaluation of Findings**
- **Prioritization of Defects**

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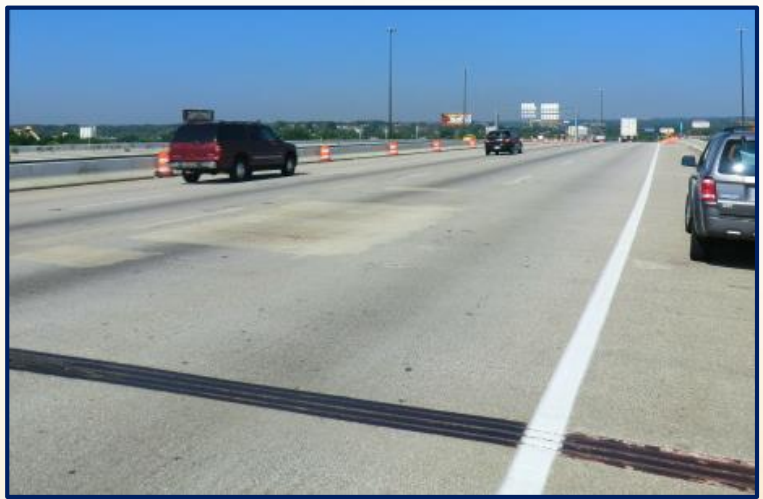

Final Scope of Project

- **Rehabilitation to 28 Bridges**
- **Overlay of 18 Bridge Decks**
- **Replacement of 67 Joints**

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Desoto Road Test Project

- **Completed in 2012**
- **Evaluate Manpower / Traffic Impacts / Noise Levels / Production Rates**

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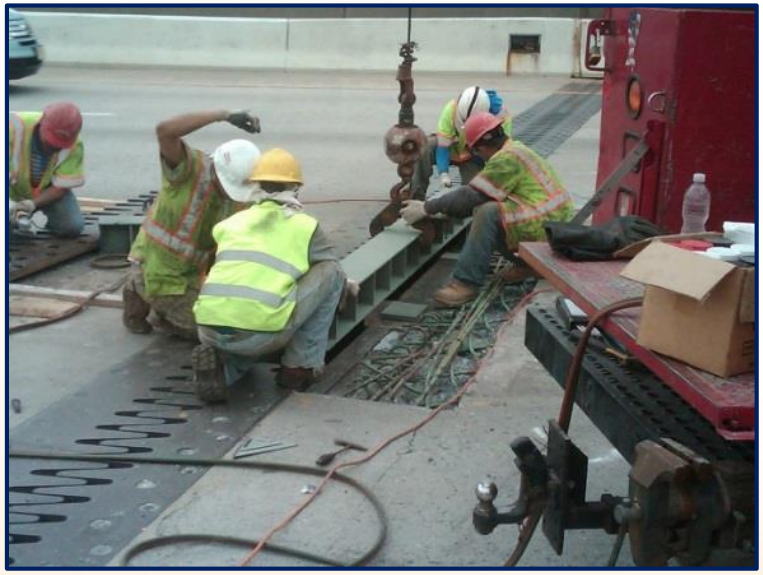
Key Findings:

- Long Term Traffic Shifts Required
- Multiple Crews to Work on Multiple Bridges / Simultaneously
- Single, Double, Triple Lane Closures
- Need for rapid strength concrete materials



Traffic Impacts

- **Maintenance of Traffic (MOT) on Segments of I-95, & On and Off Ramps**
- **Lane Splits and Shifts on I-95 Mainline – Construction Areas in Each Direction**
- **Full-Time and Part-Time Ramp Closures, and Detours Around the Work Zone**
- **Non-Emergency Lane Closures Restricted to "Off-Peak" and "Non-Event" Hours, Days, Nights & Weekends**
- **Diversions to Other Harbor Crossings**
- **Significant Impacts During Peak Hours Particularly in "Split Traffic" Phases**

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Maintenance of Traffic

- **Staged Construction with Ramp Closures**
- **16 Separate Work Zones**
- **Up to 5 Stages in Each Work Zone**

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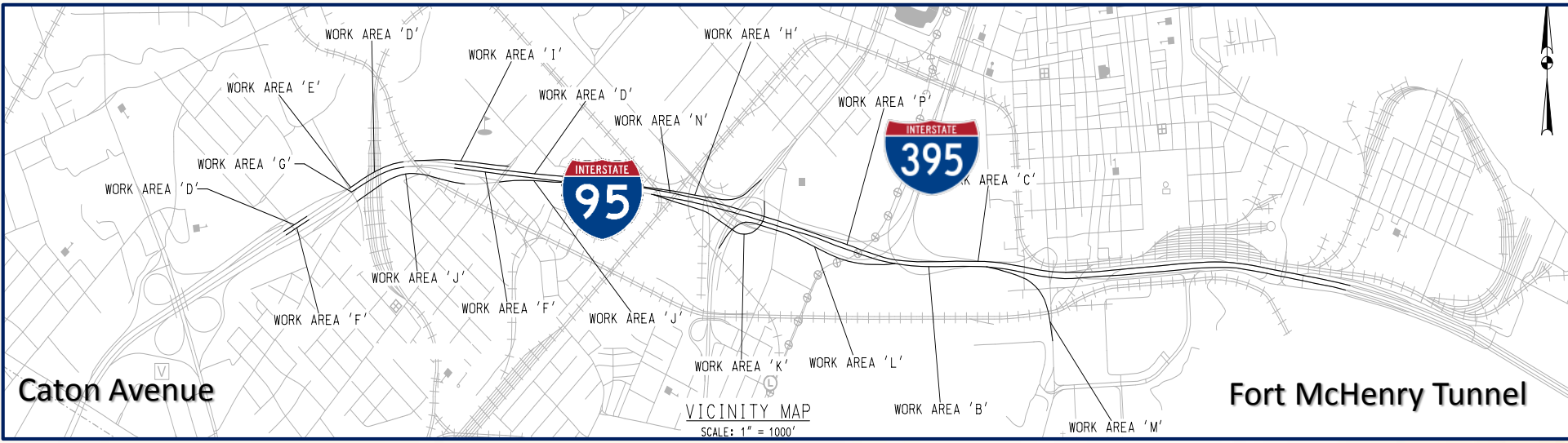
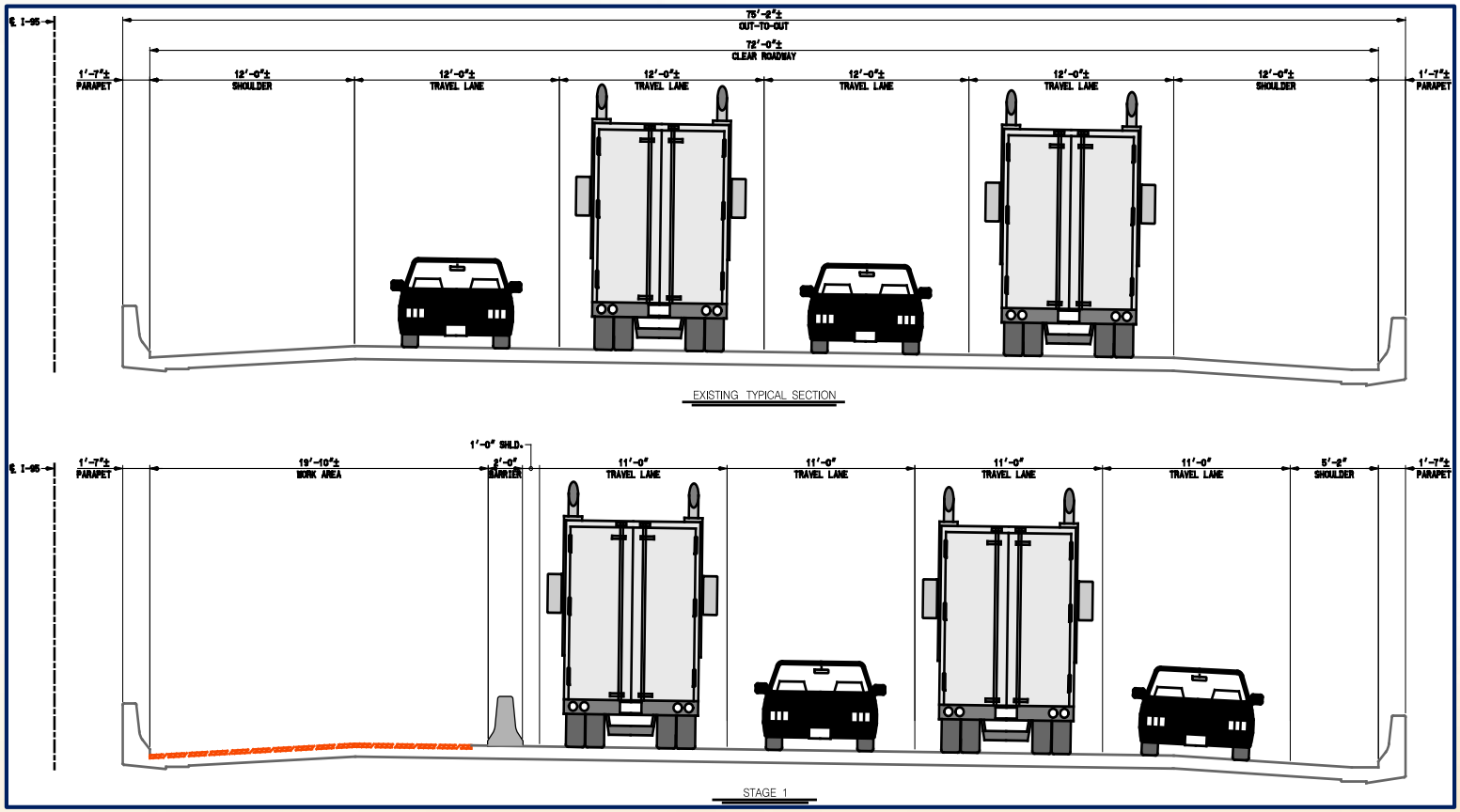


Maintenance of Traffic - Mainline

Sequence of Construction



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Maintenance of Traffic - Mainline

Sequence of Construction

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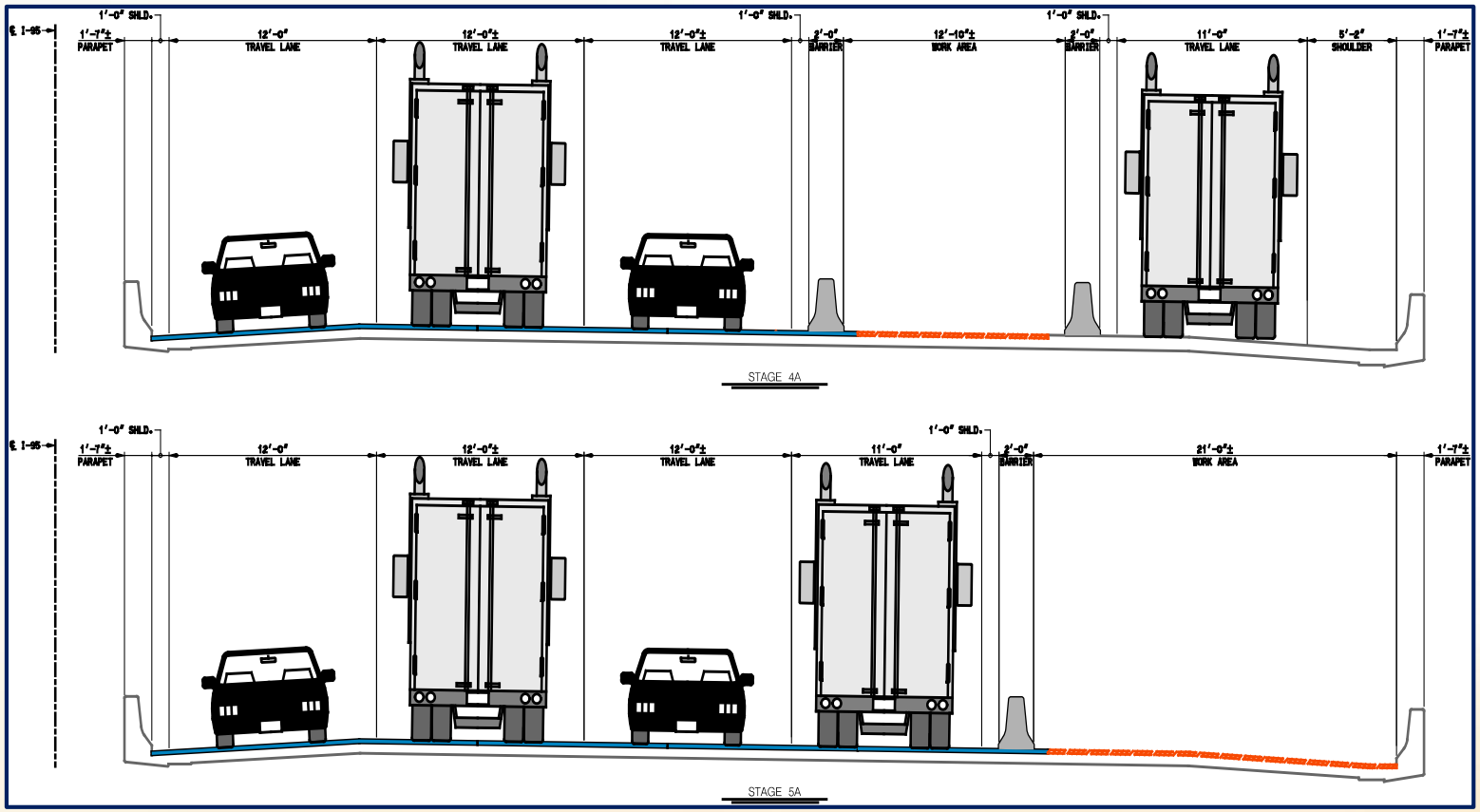
Maintenance of Traffic - Mainline

Sequence of Construction



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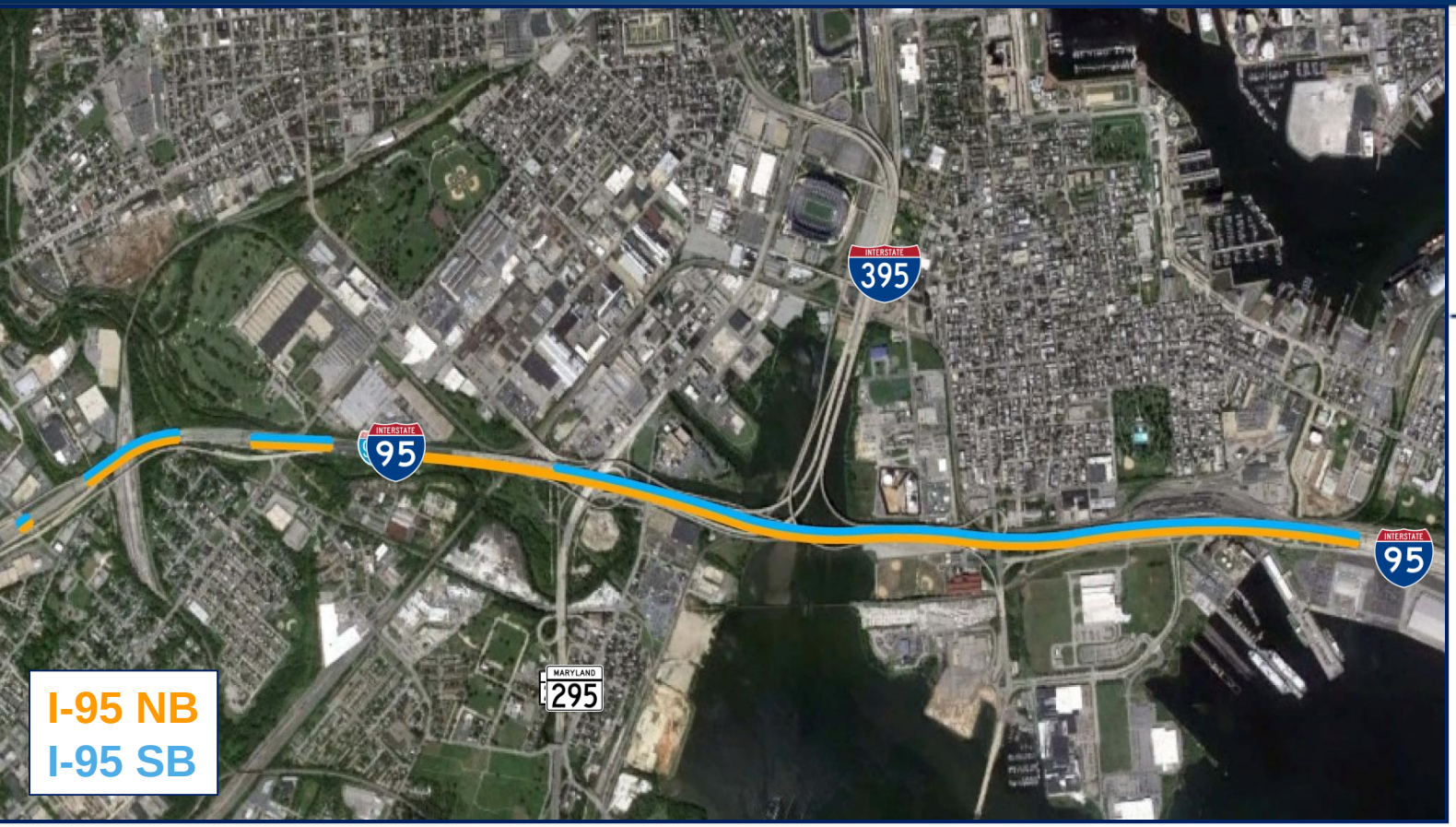
Traffic Impacts - Mainline



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- Mainline Lane Shifts
- All Lanes Open with Reduced Widths
- Lane Closures Only "Off-Peak" Hours

Traffic Impacts - Ramps

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KEY:

- **Full-time Closures (Up to 1-2 Weeks at a Time)**
- **Part-time Closures (Nights / Weekends)**
- **Open, but Reduced to One Lane**

Full-Time Ramp Closures

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- McComas Street to I-95 Southbound
- Hanover Street to I-95 Southbound

> Never at the Same Time

- Washington Boulevard to I-95 Southbound
- MD 295 Northbound to I-95 Northbound
- I-95 Northbound to Hanover Street
- I-95 Northbound to Key Highway

> Never at the Same Time

Limited Ramp Closures

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- I-95 Southbound to I-395 Northbound
- I-95 Southbound to MD 295 Southbound
- Russell Street to I-95 Southbound
- I-95 Southbound to Caton Avenue
- Caton Avenue to I-95 Northbound
- I-95 Northbound to Russell Street
- I-395 Southbound to I-95 Northbound

- I-95 Northbound to I-395 Northbound
- I-395 Southbound to I-95 Southbound

Maintenance of Traffic

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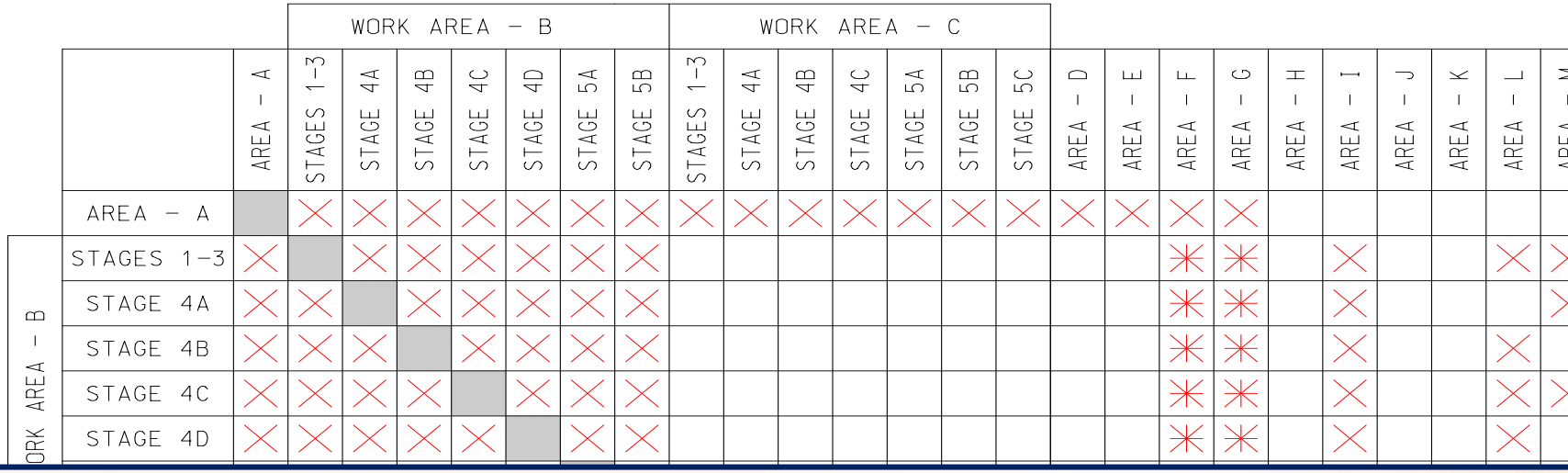
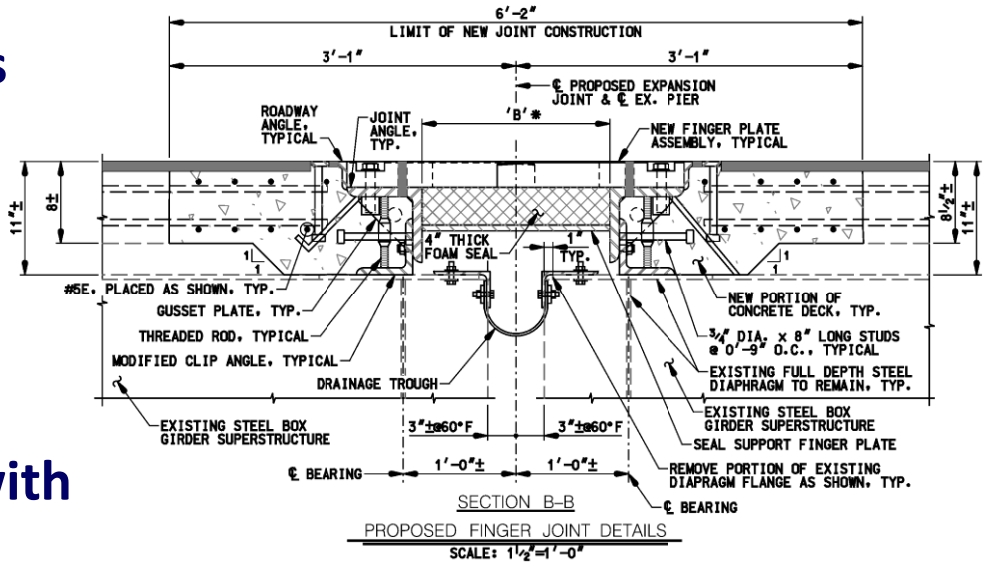


		WORK AREA – B								WORK AREA – C																			
		AREA – A	STAGES 1–3	STAGE 4A	STAGE 4B	STAGE 4C	STAGE 4D	STAGE 5A	STAGE 5B	STAGES 1–3	STAGE 4A	STAGE 4B	STAGE 4C	STAGE 5A	STAGE 5B	STAGE 5C	AREA – D	AREA – E	AREA – F	AREA – G	AREA – H	AREA – I	AREA – J	AREA – K	AREA – L	AREA – M
	AREA – A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
WORK AREA – B	STAGES 1–3	X		X	X	X	X	X	X										✳	✳		X			X	X
	STAGE 4A	X	X		X	X	X	X	X										✳	✳		X				X
	STAGE 4B	X	X	X		X	X	X	X										✳	✳		X			X	
	STAGE 4C	X	X	X	X		X	X	X										✳	✳		X			X	X
	STAGE 4D	X	X	X	X	X		X	X										✳	✳		X			X	

Joint Repairs

Replacement of 67 Expansion Joints

- **Various Joint Types**
  - **Finger Joints**
  - **Strip Seals**
  - **Compression Seals**
  - **Poured Seals**
- **Behind Barrier with Overlay**
- **Labor Intensive Work – Time Consuming**
- **Drainage Troughs**



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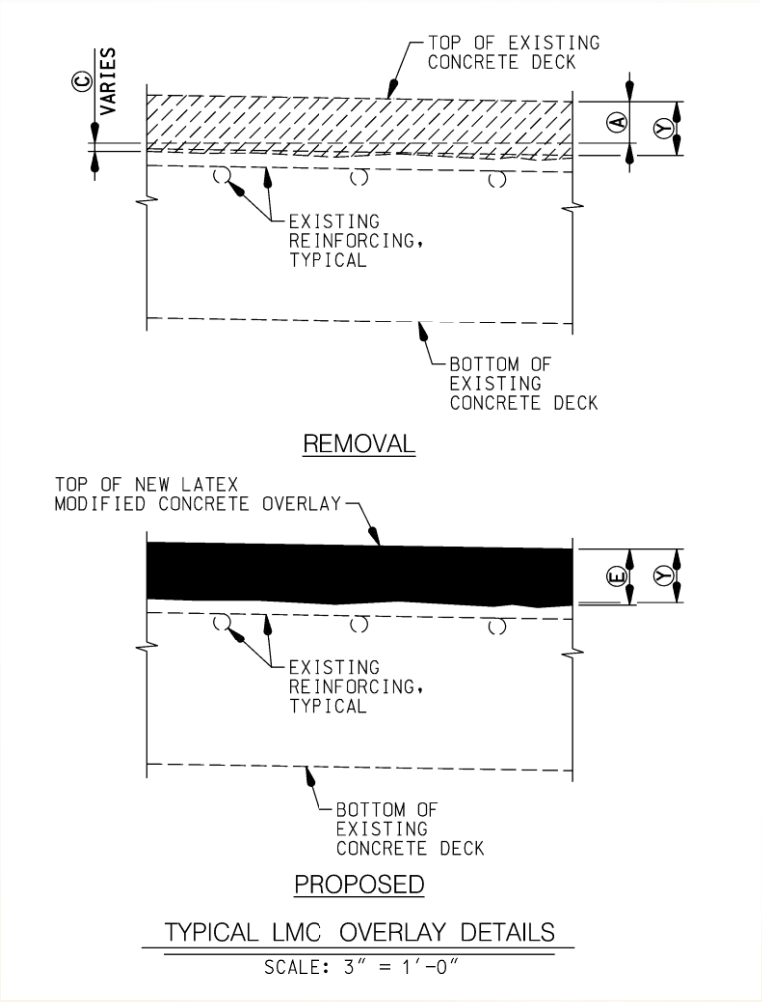
Construction Specifications

Development of the LMC Specifications

- **Remove an Average of 2 Inches of Surface Mechanical Milling (1.25 in) / Hydrodemolition (0.75 in)**
- **Additional Removal to Repair Deteriorated Concrete**
- **Clean up Debris, Loose Concrete**
- **Epoxy Coat Exposed Steel**
- **Additional Steel Reinforcement as Needed**
- **Provide Shielding and Forms As Necessary**
- **Clean (Waterblast or Abrasive Blast) Surface**



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Construction Specifications

Unique LMC Elements Incorporated:

- **Hydrodemolition Effluent**
  - **Trucking offsite**
  - **MDE Industrial Waste Discharge Permit**
- **Test Holes in Existing Deck – Every 100sy**
  - **Locating Reinforcing Steel**
  - **Thickness of Existing LMC Overlays**
- **Weight Restrictions for Milled Decks**
  - **Maximum Axle Load – 18kips**
  - **Maximum Uniform Load – 450 psf**

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Concrete Payment Items

Items Included:

- **SY Removal and Disposal of Existing Wearing Surface**
- **CY Removal of Portions of Existing Deck**
- **CY Additional Removal of Portions of Existing Deck (Beyond Established Removal)**
- **CY Furnishing LMC (Per Meter Readings)**
- **SY Placing LMC (Including Grooving, Curing, etc.)**
- **LF Repair Bar**
- **SF Formwork for Full Depth Deck Repairs**

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Public Outreach

Key Message: Avoid Area, if Possible

- Crucial to Alert Transportation Stakeholders and the Public About the Project's Necessity, Components, Schedule, Traffic Impacts, and Detours
- Motorists Advised of Traffic Impacts and Delays, and Encouraged to Use Alternate Routes

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Public Outreach

Strategy:

- **Proactive Media Outreach, Traffic Reporter Briefing, News Releases and Traffic Advisories**
- **Coordination with EZPass Customers, Elected Officials, Schools, Businesses, Emergency Services, Hospitals, and Industry Groups**
- **Website and Social Media Updates**
- **Print, Radio, Outdoor and Digital Communications**
- **Ground-Mounted / Overhead Dynamic Message Signs (DMS)**
- **Printed Materials – Posters, Flyers, Postcards for Adjacent Residents and Businesses**

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Public Outreach

Sister Agencies Targeted:

- Maryland Stadium Authority
- Baltimore City Department of Transportation
- Baltimore City Police/Fire Department
- Maryland Transit Administration Police
- State Highway Administration
- Maryland Port Administration

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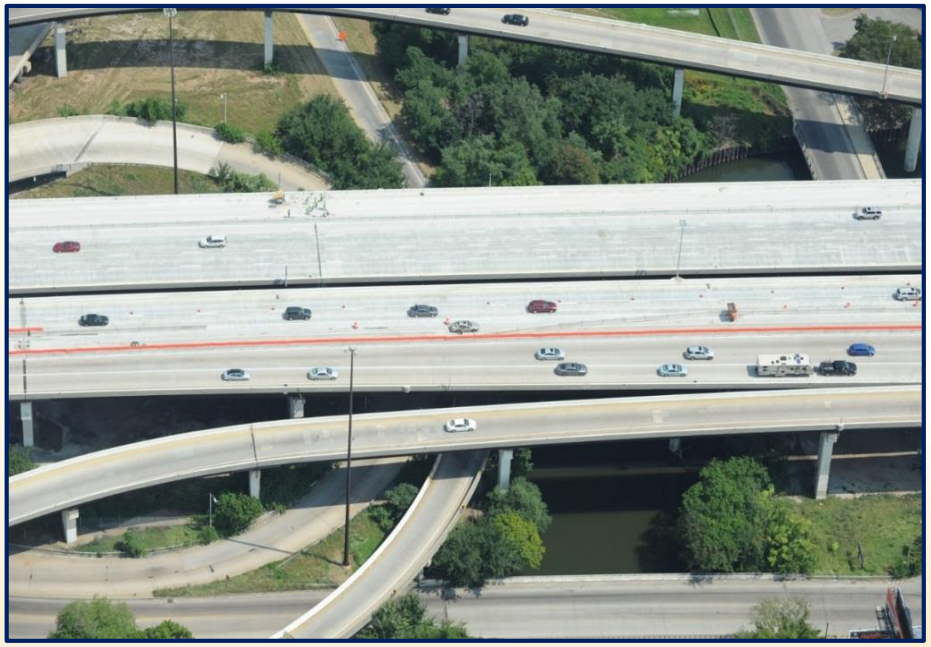
Bidding - Goals

- **Get Strong Bidding Pool and Competition**
- **Respond to Contractor Questions During Bidding Period**
- **Recognize Project Challenges (MOT Restrictions, Surface Removal, Cleaning)**
- **Incentives / Penalties**

Contract Particulars

- **Deliberate Bidding Period (7 Weeks)**
- **Partnering Required**
- **4 Bids Received**
- **Wagman Heavy Civil (York, PA)**
- **$51,106,123.39**
- **26% MBE Goal**



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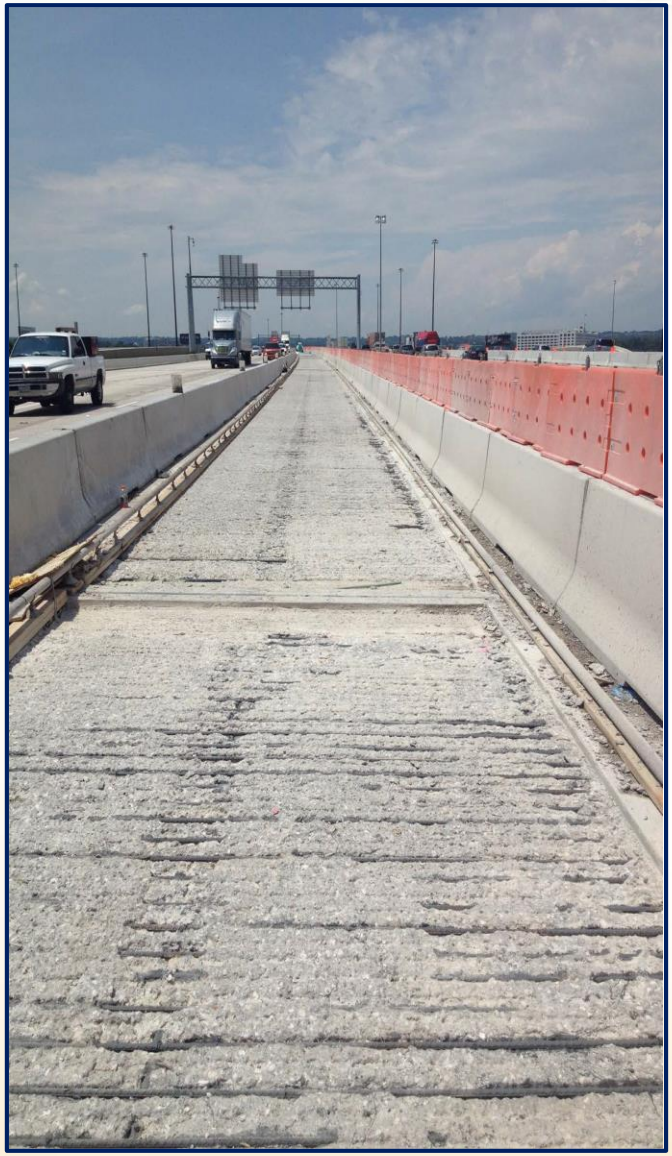
Project Construction

Construction Aspects

- Schedule
- MOT Phases / Lane Shifting
- Deck Removal
- Deck Preparation
- LMC Placement / Curing / Grooving
- Joint Replacement



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Scheduling

- **Began in March Each Year – Weather Dependent**
- **April 1st – "Up and Running" with Work Areas**
- **Seasons ended October 2014 and September 2015**
- **TOTAL LMC Duration – 13 Months**

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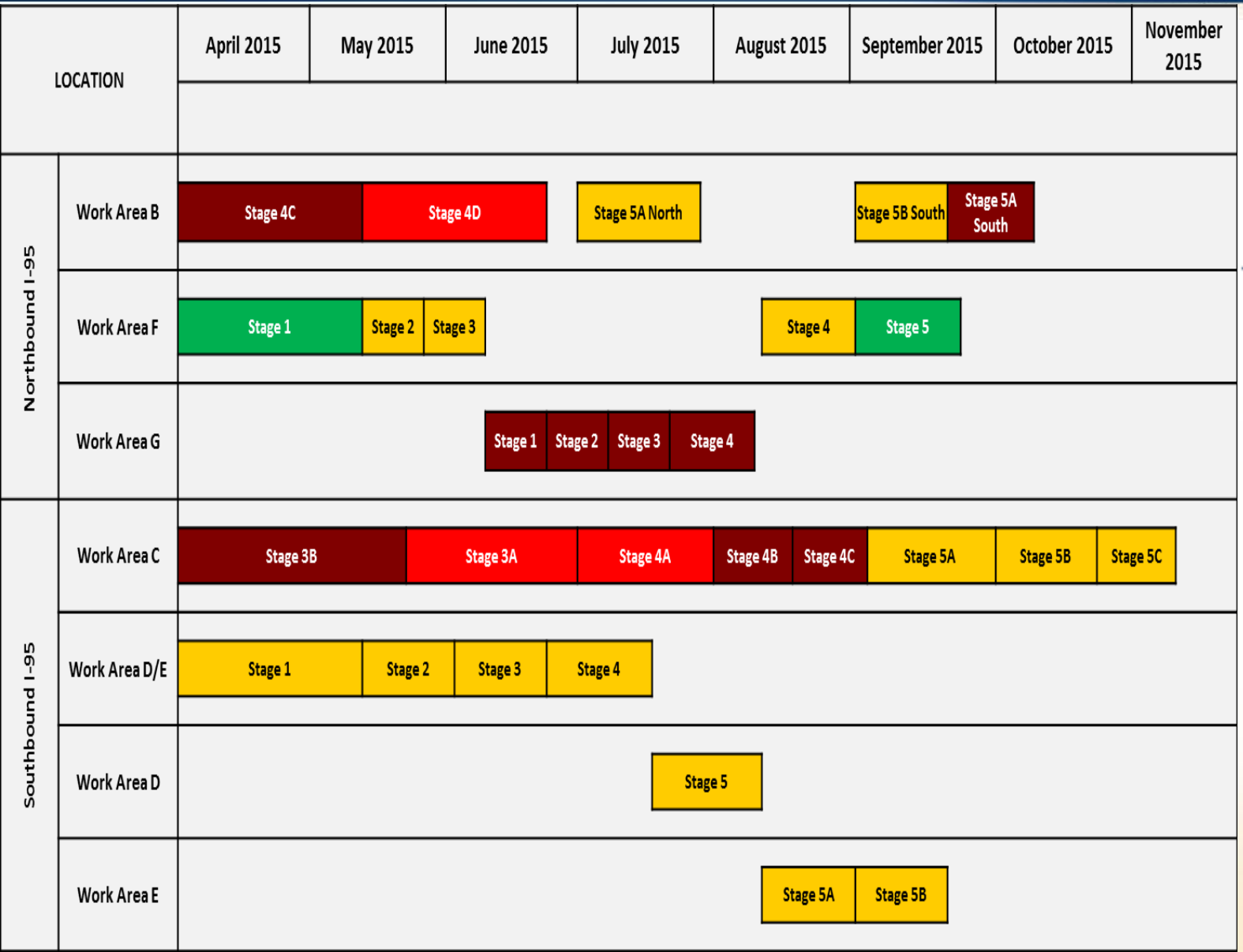
2014 Project Schedule

Location		April 2014	May 2014	June 2014	July 2014	August 2014	September 2014	October 2014	November 2014
Northbound I-95	Work Area B	Stage 1		Stage 2	Stage 3A	Stage 3B	Stage 4A	Stage 4B	Stage 5A	Stage 5B
	Work Area P		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5			
Southbound I-95	Work Area C						Stage 2	Stage 2	Stage 3A	

2015 Project Schedule



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Maintenance of Traffic (MOT) Phases

- **47 Work Areas Required Traffic Pattern Shifts**
- **Traffic Sensitive Work Areas had Calendar and Duration Limitations**
- **Restrictions on Work Areas Performed Concurrently**
- **Seasons Over November 2014 and September 2015**

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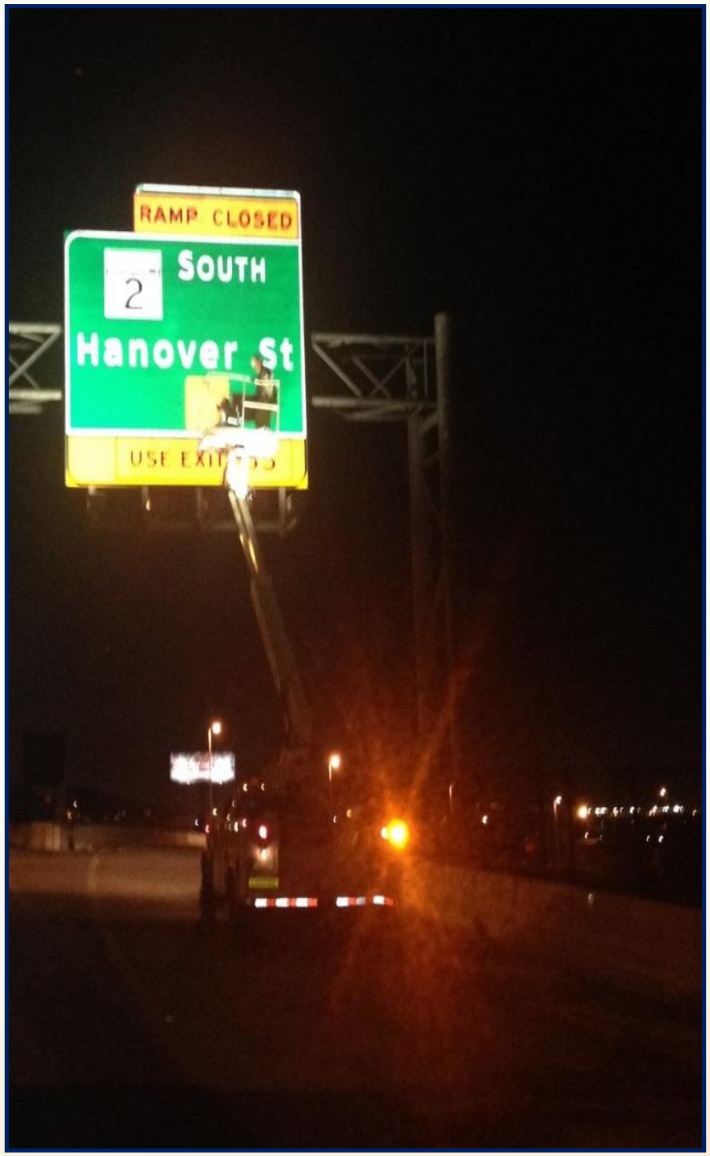
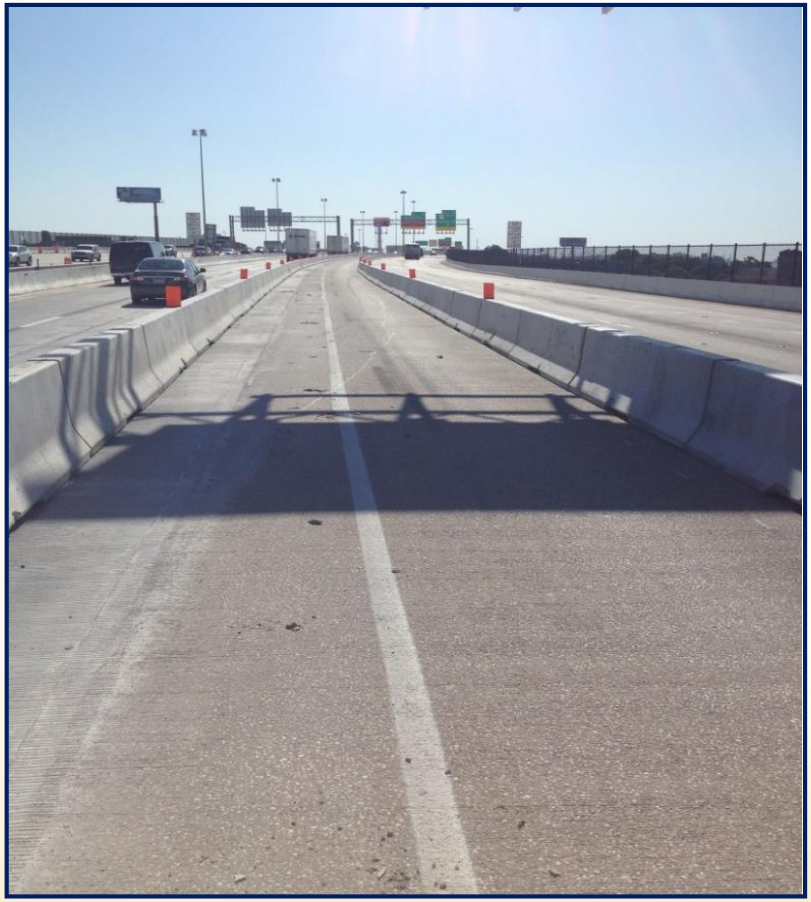
Maintenance of Traffic (MOT)



Closures and Lane Splits



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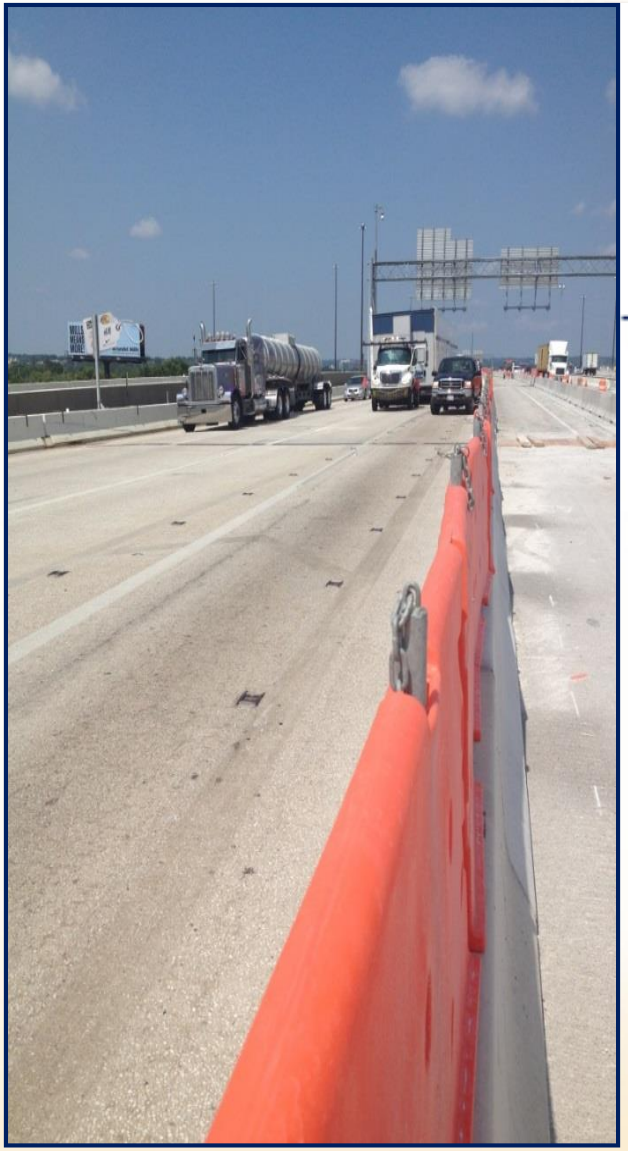
Maintenance of Traffic (MOT)



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Mobilization

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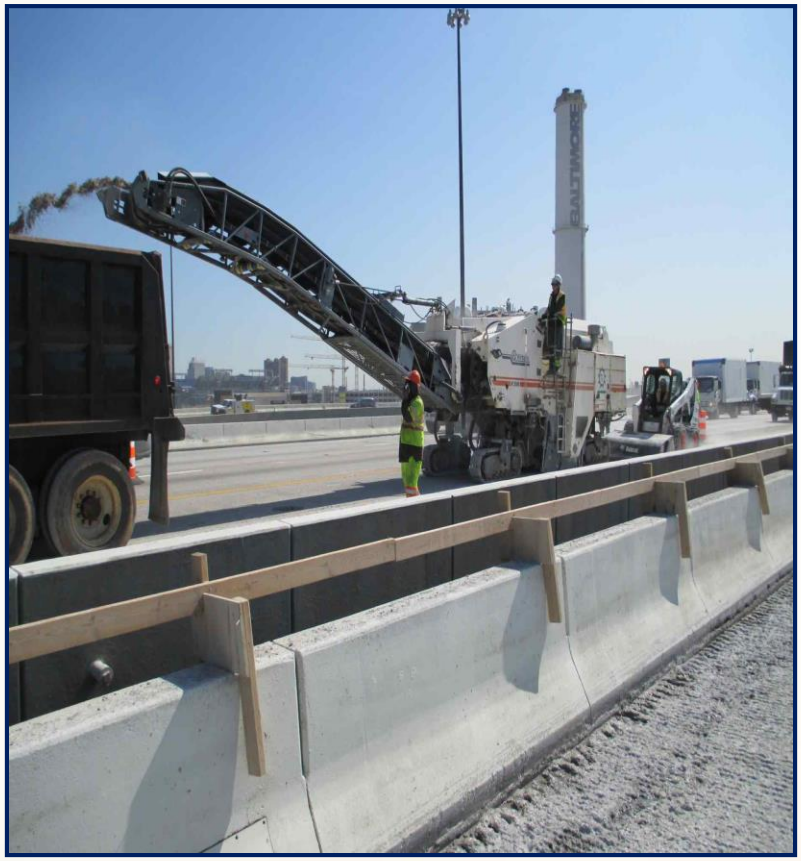
Deck Removal (Mechanical)



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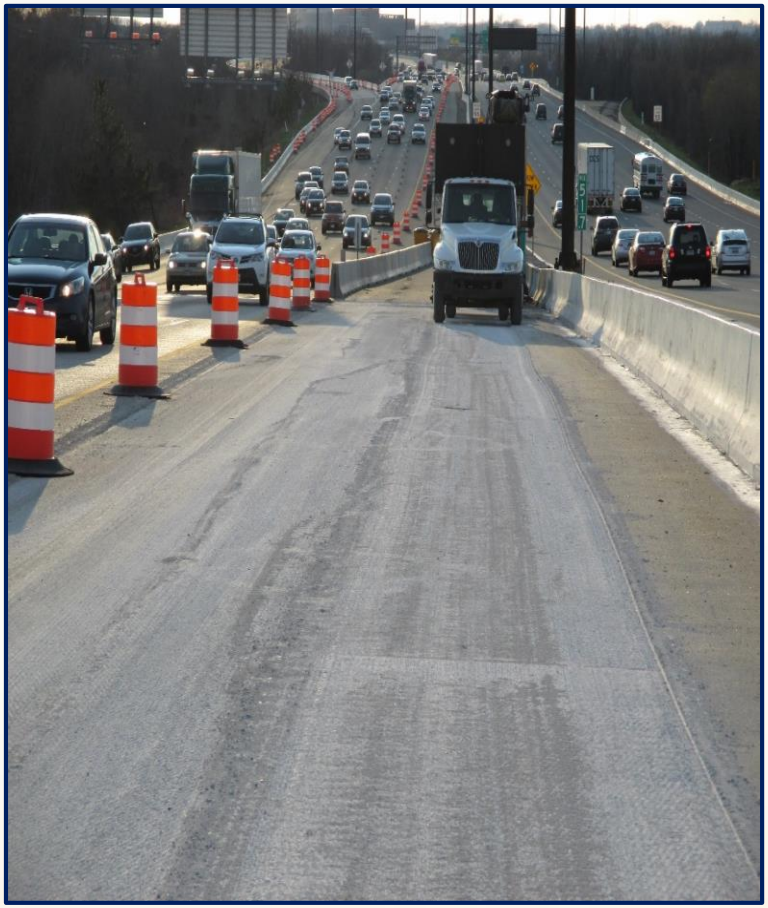
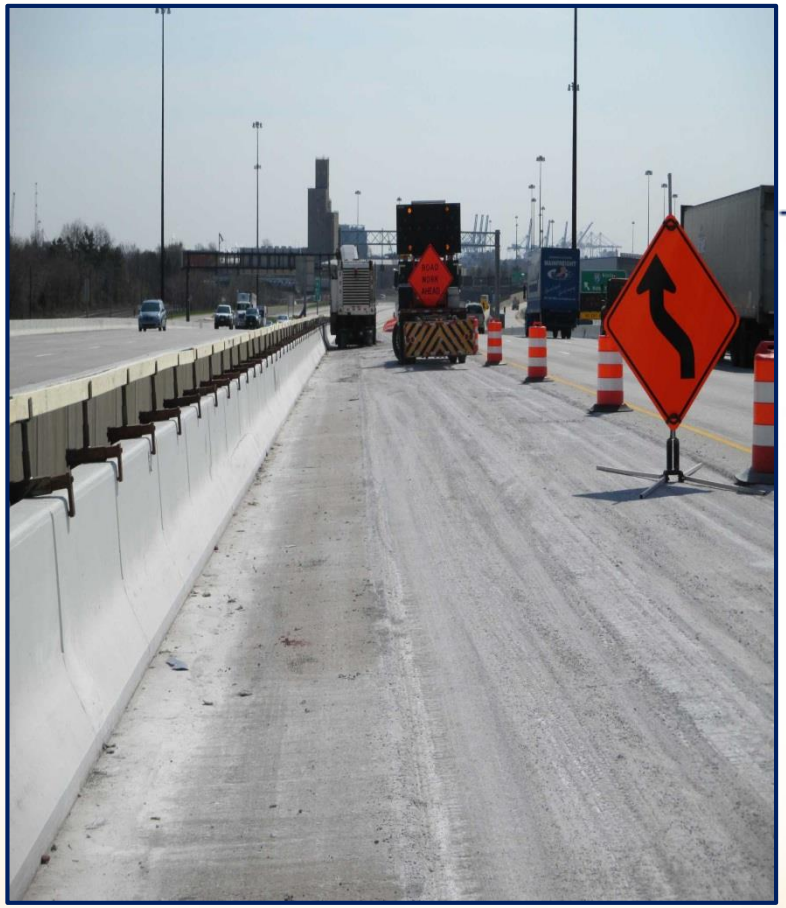
Milled Deck





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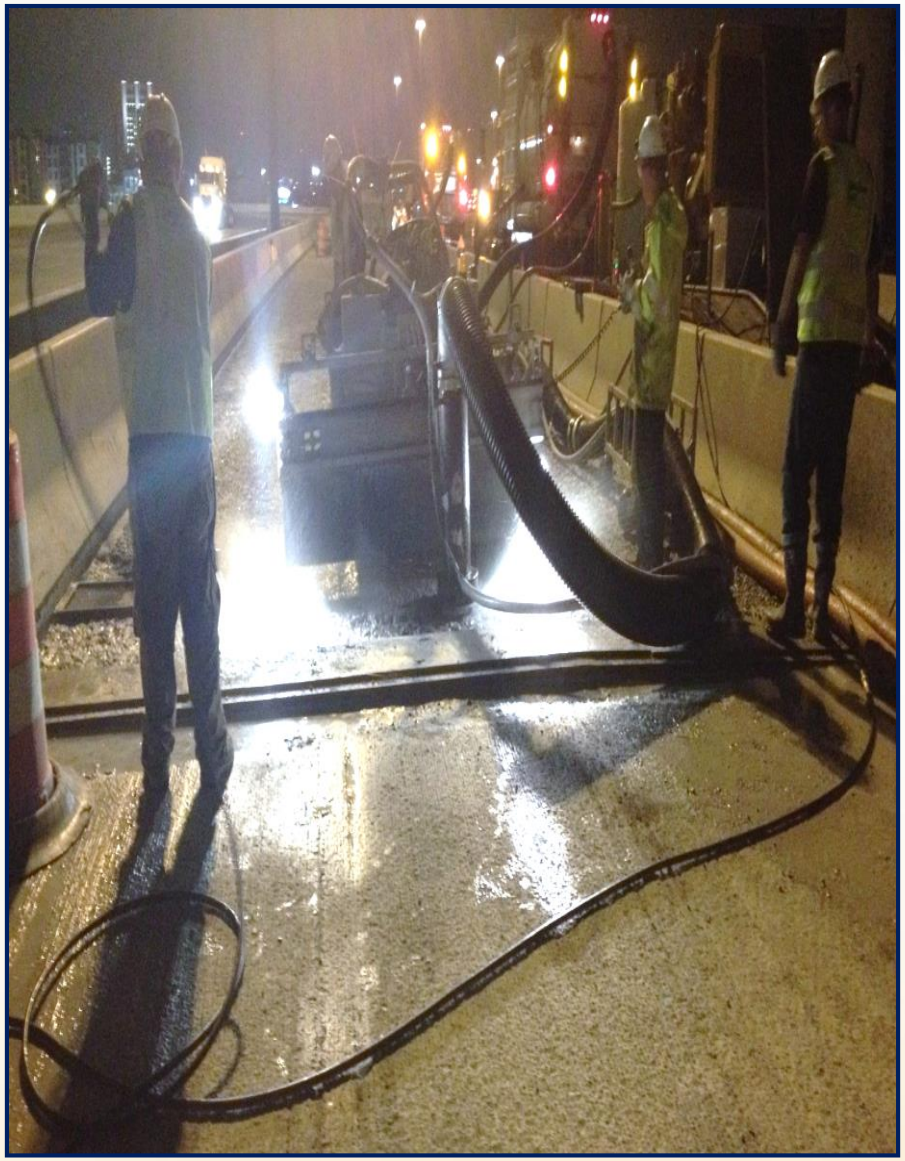
Deck Removal (Hydro)



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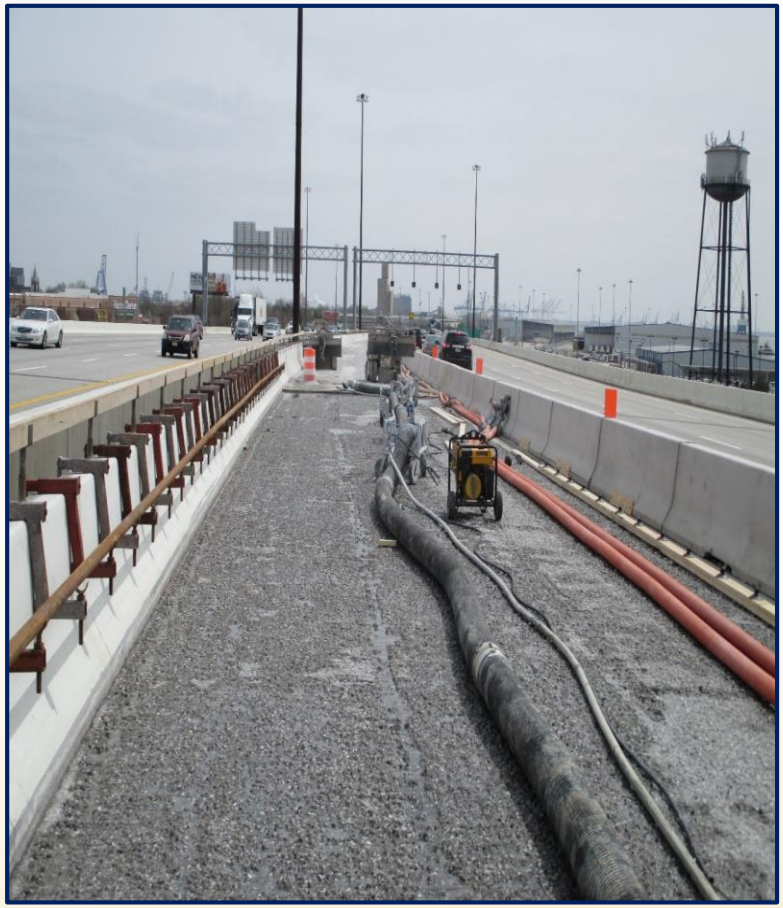
Hydro Deck



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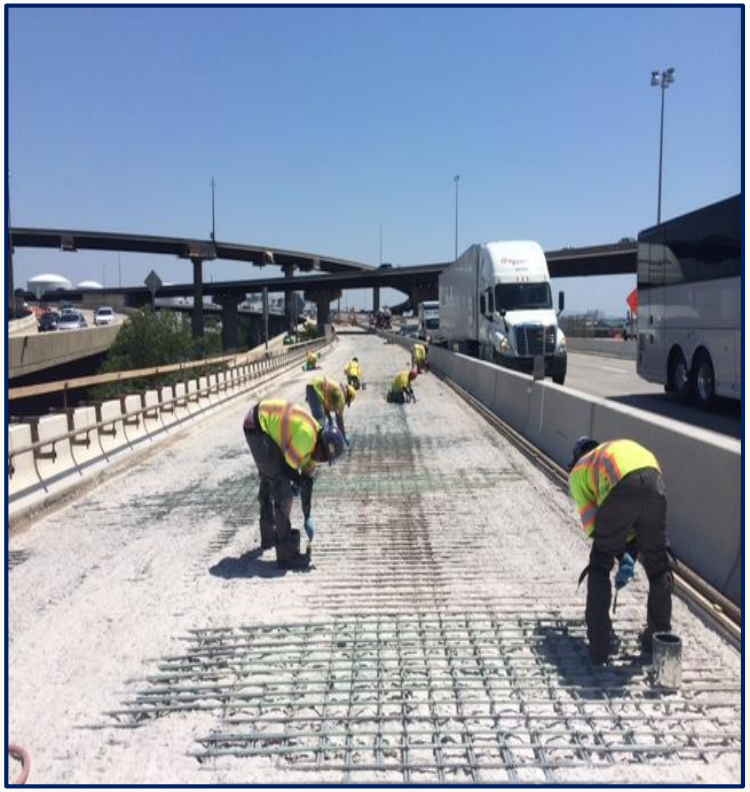
Deck Preparation



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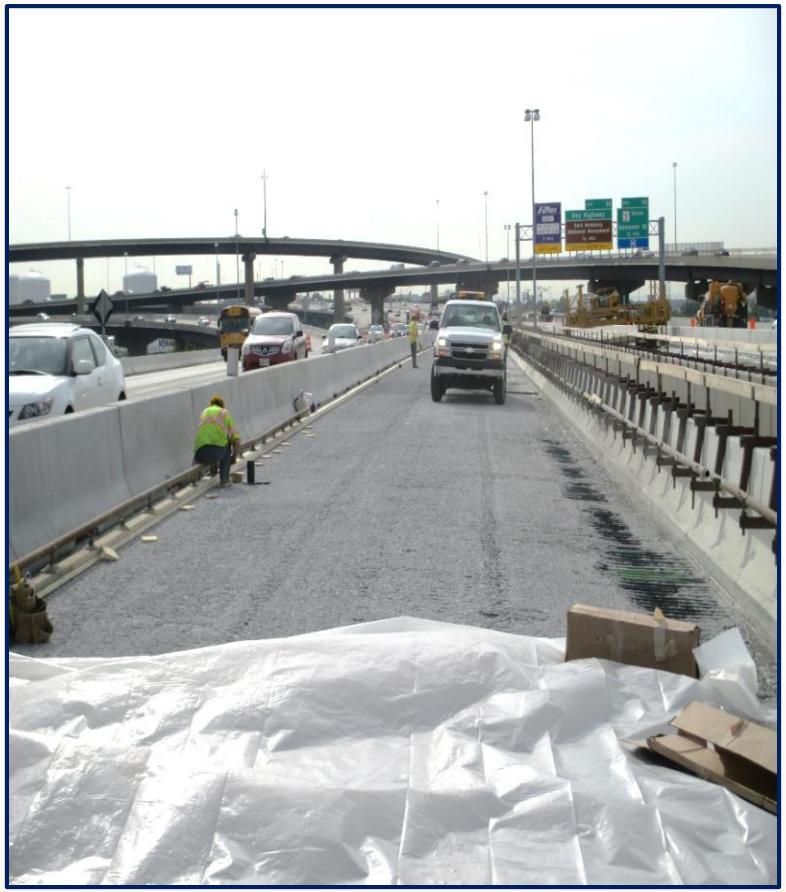
Deck Preparation



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Placement of LMC

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Placement of LMC

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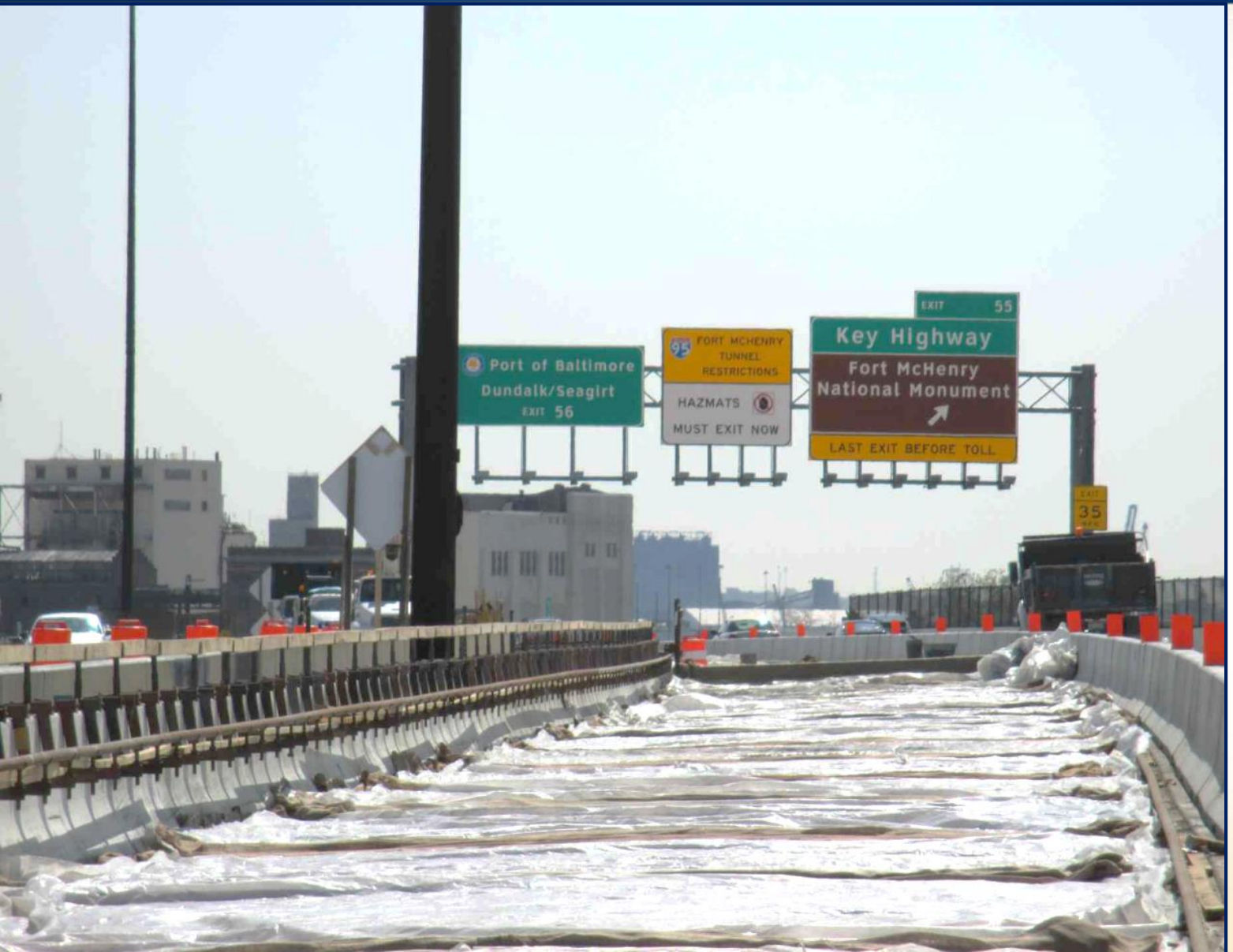
LMC Curing



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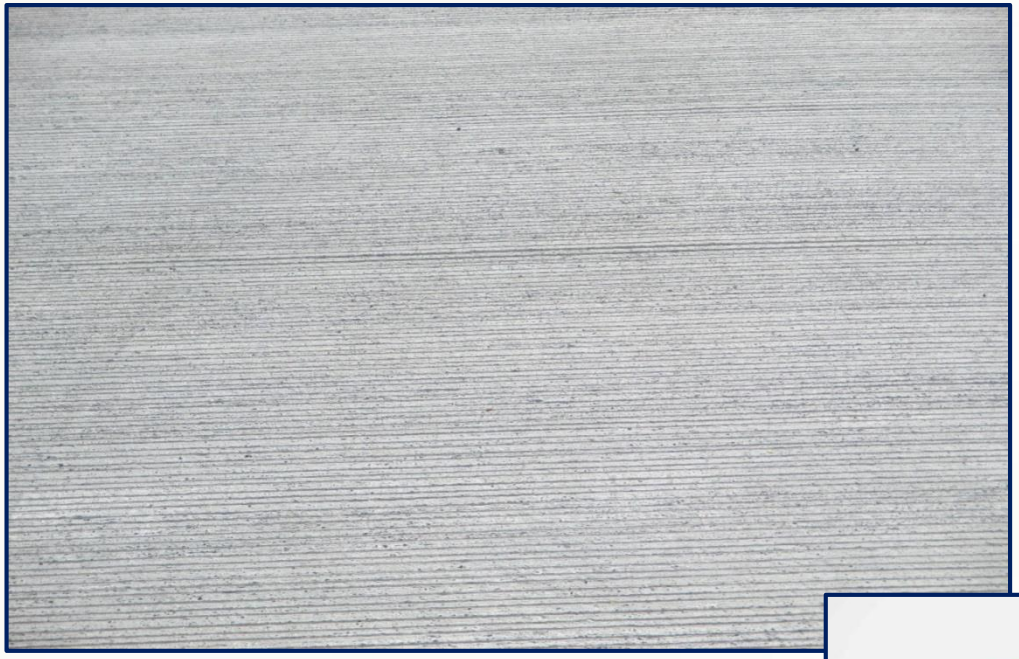
Deck Grooving



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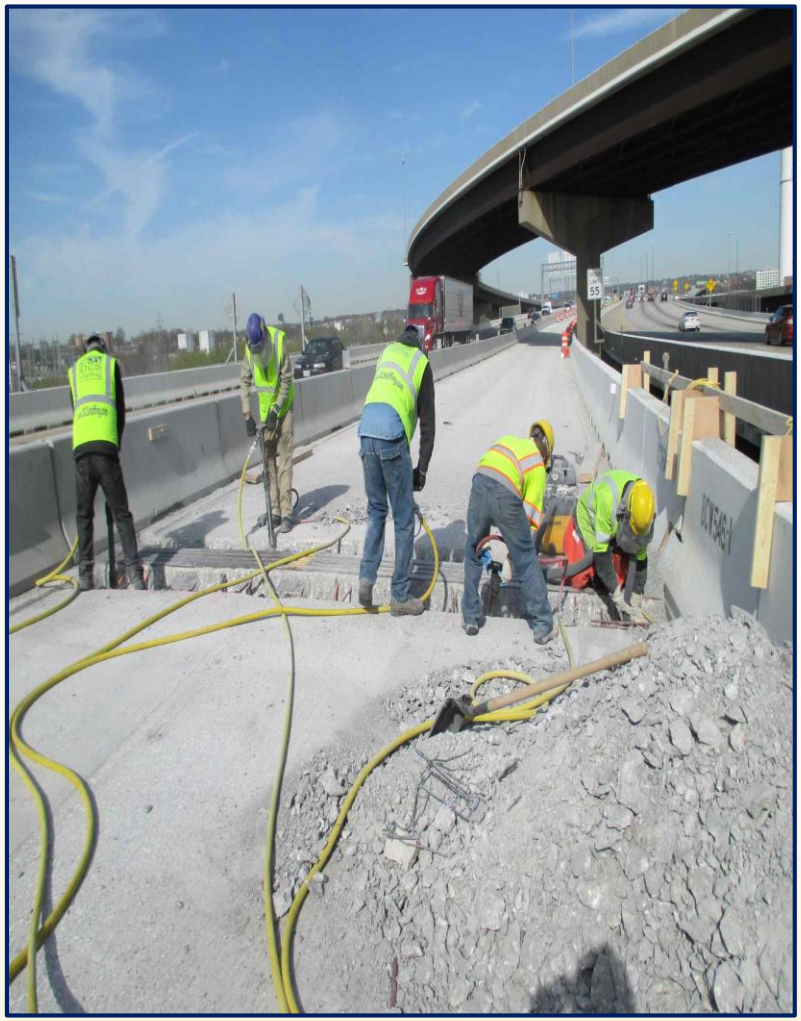
NORTHEAST BRIDGE PRESERVATION PARTNERSHIP

Joint Removal



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Joint Installation

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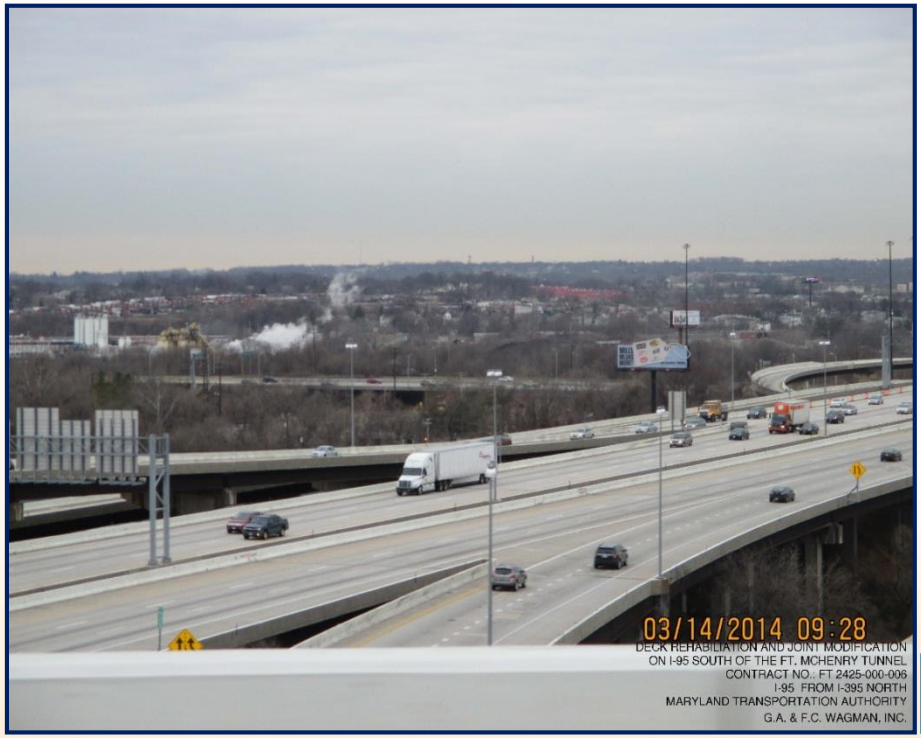
BRIDGE PRESERVATION PARTNERSHIP

Project Facts

- **47 Total Work Area (Traffic Shifts Occurring as Often as Every Few Days - 14 in 2014; 33 in 2015)**
- **1,247,342 LF (236 Linear Miles) of Temporary Markings**
- **275,163 LF (528 miles) of Temporary Barrier**
- **2,725 LF (About ½ mile) of Joint Replacements**



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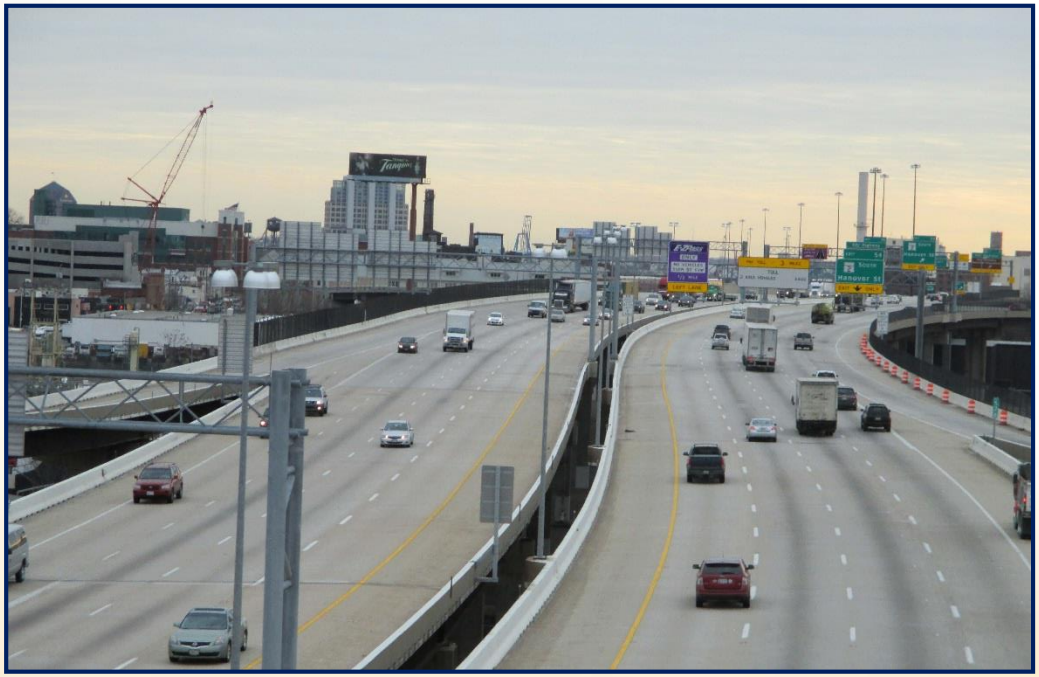
Project Facts

- **236,735 SY (About 44 Football Fields) of Latex Modified Concrete Placement**
- **15,695 CY (the Equivalent of Almost 31,400 Tons) of LMC Placement**
- **106,540 LF (20 Linear Miles) of Permanent Markings**
- **10,900 Tons of HMA on Roadway Approaches**



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Thank you!

Questions?