NASHVILLE FAST FIX 8

40

Introduction

Wayne J. Seger, P.E.

GRESHAM SMITH AND PARTNERS

TN TDOT Department of Transportation

Kiewit Infrastructure Group

NASHVILLE FAST FIX 8 40

Proposed Agenda

- TDOT's short history into ABC
- Background in the project development
- Project Priorities
- Overview of the 8 bridges replaced over the 10 weekends
- Cost of ABC vs. conventional construction
- Post Construction Performance

Nashville, TN

The Beginning ABC in Tennessee:

List of Five Projects:

1. Smith County - SR 24 over Snow Creek (Pilot Project)

Type: Precast Prestressed Full Depth Deck Panels

Contract Method: Design Bid Build with Phase Construction

Letting: October 2009 Completed: July 2010

List of Five Projects:

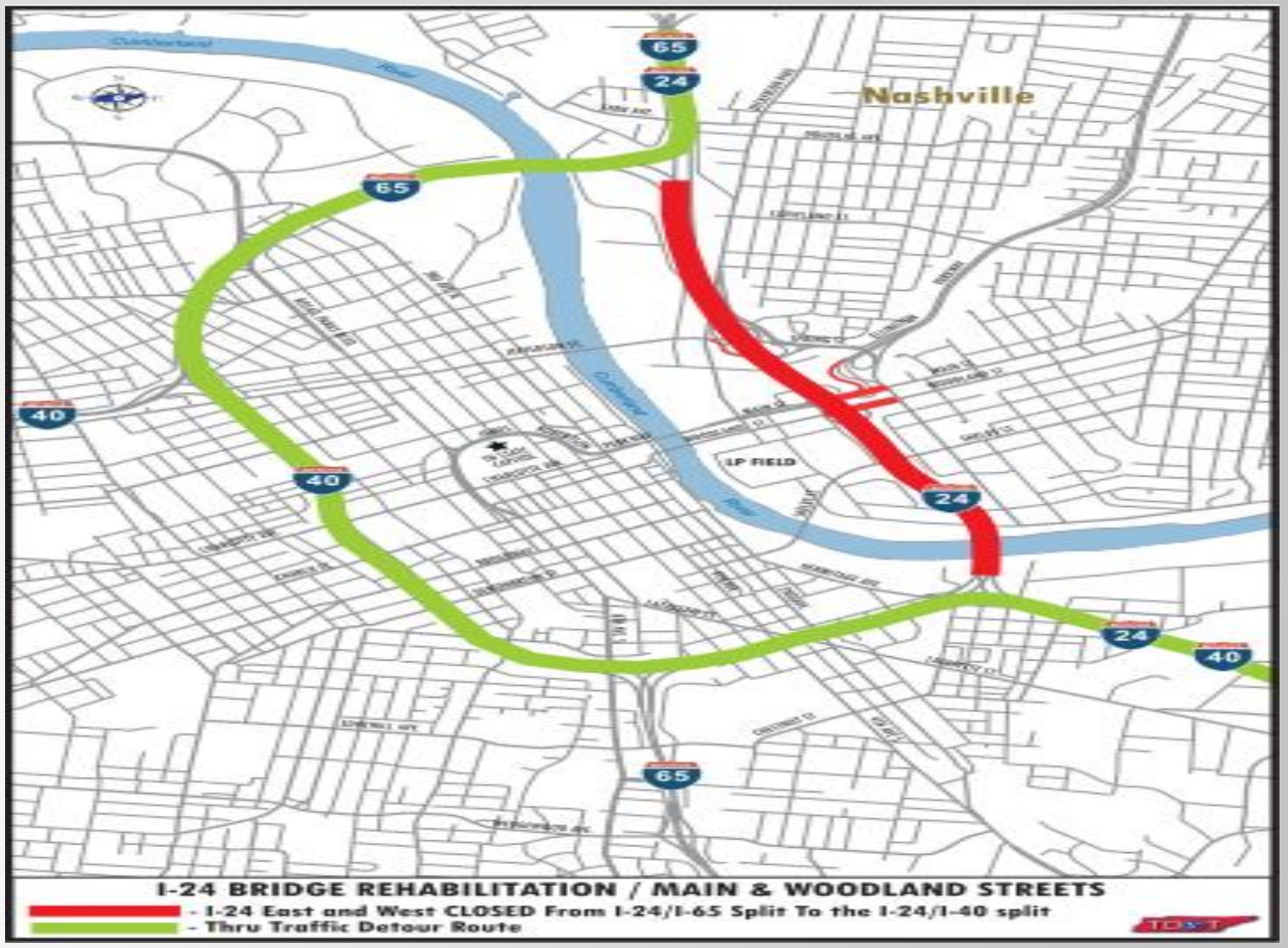
2. Davidson County– I-24 over Main & Woodland St.

Type: Precast Prestressed Full Depth Deck Panels

Contract Method: Design Bid Build with 12 weekend closures

Letting: January 2012 Completed: July 2012

Weekend Closures/Detours



List of Five Projects:

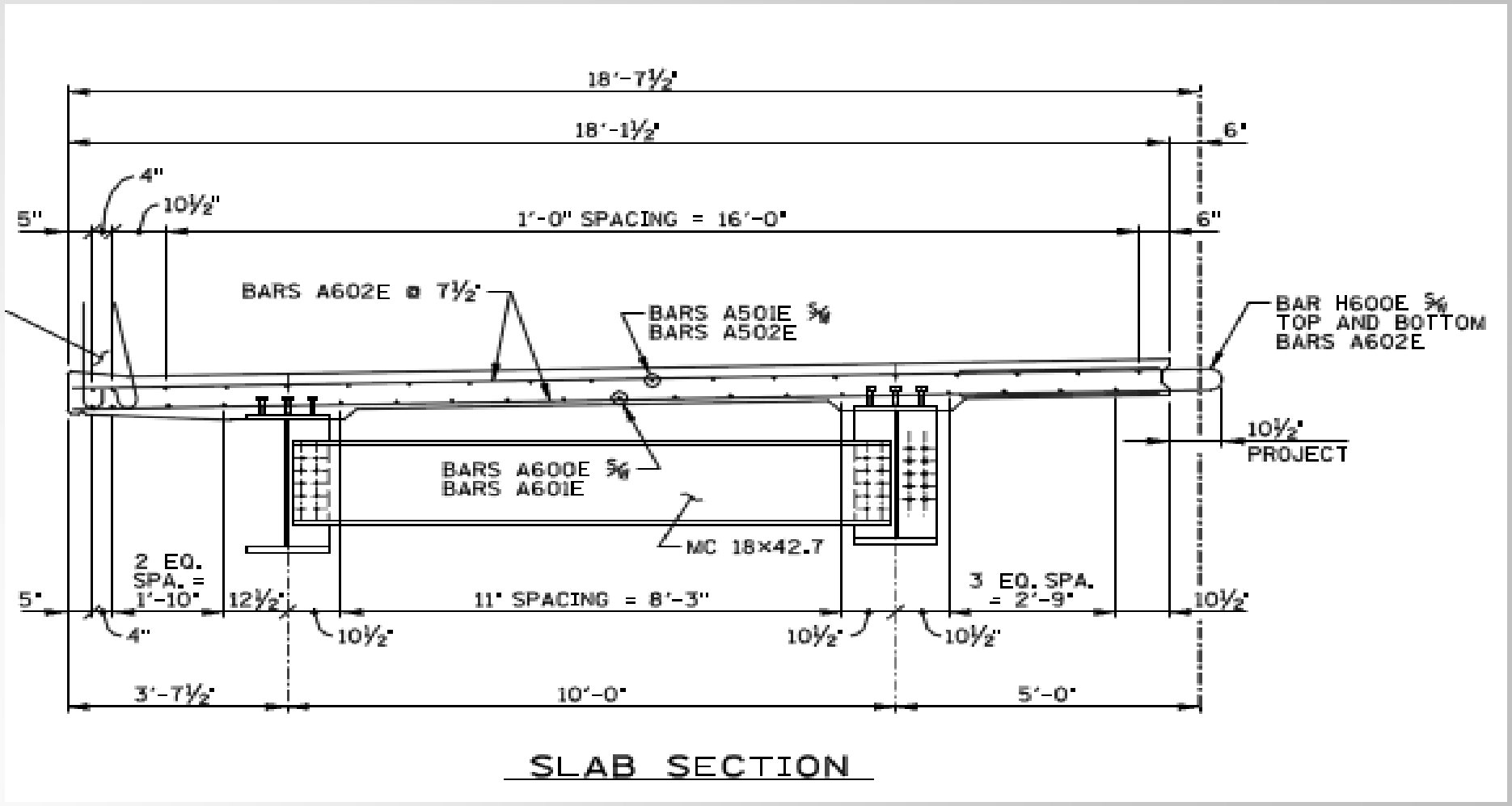
3. Davidson Co. – SR 254 over Otter Creek (Pilot Project)

Type: Steel Superstructure Units

Contract Method: Design Bid Build with 1 weekend closure

Letting: Febuary 2014 Completion Date: September 2014

Steel Superstructure Units



SLAB SECTION

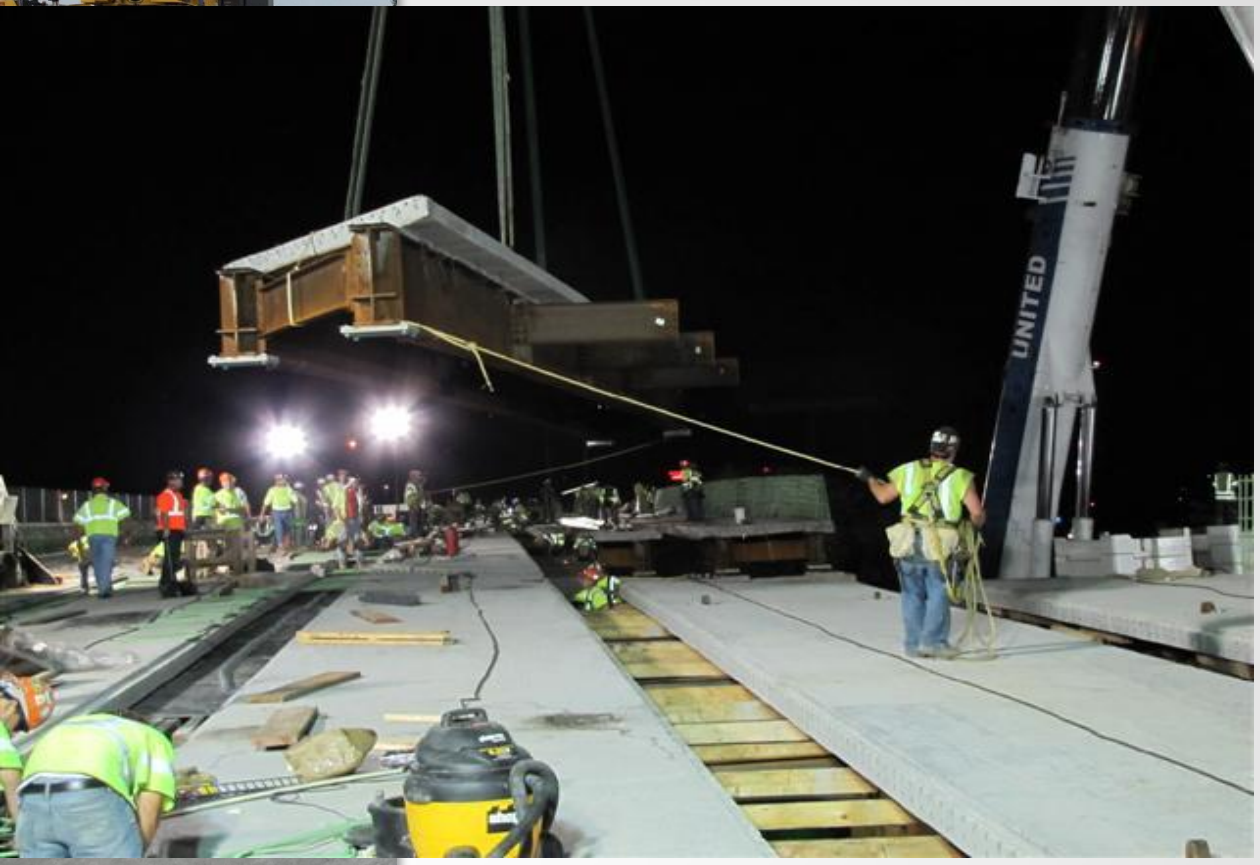
List of Five Projects:

4. Sumner Co. – SR 25 over Liberty Branch

Type: Steel Superstructure Unit or Full Depth Deck Panels

Contract Method: Design Bid Build (Alternates) with 1 weekend closure

Letting: October 2014 Completion Date: August 2015



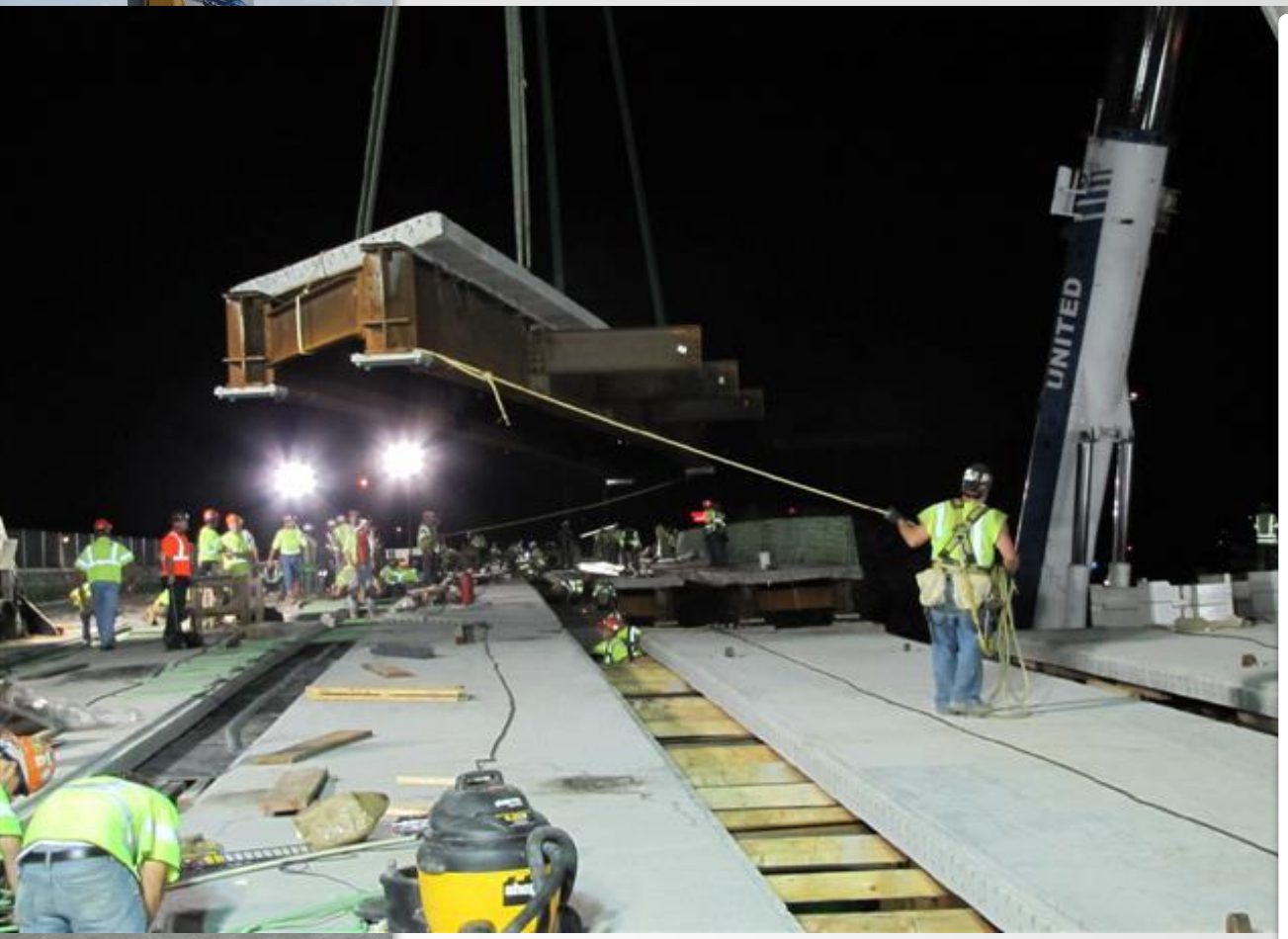
List of Five Projects:

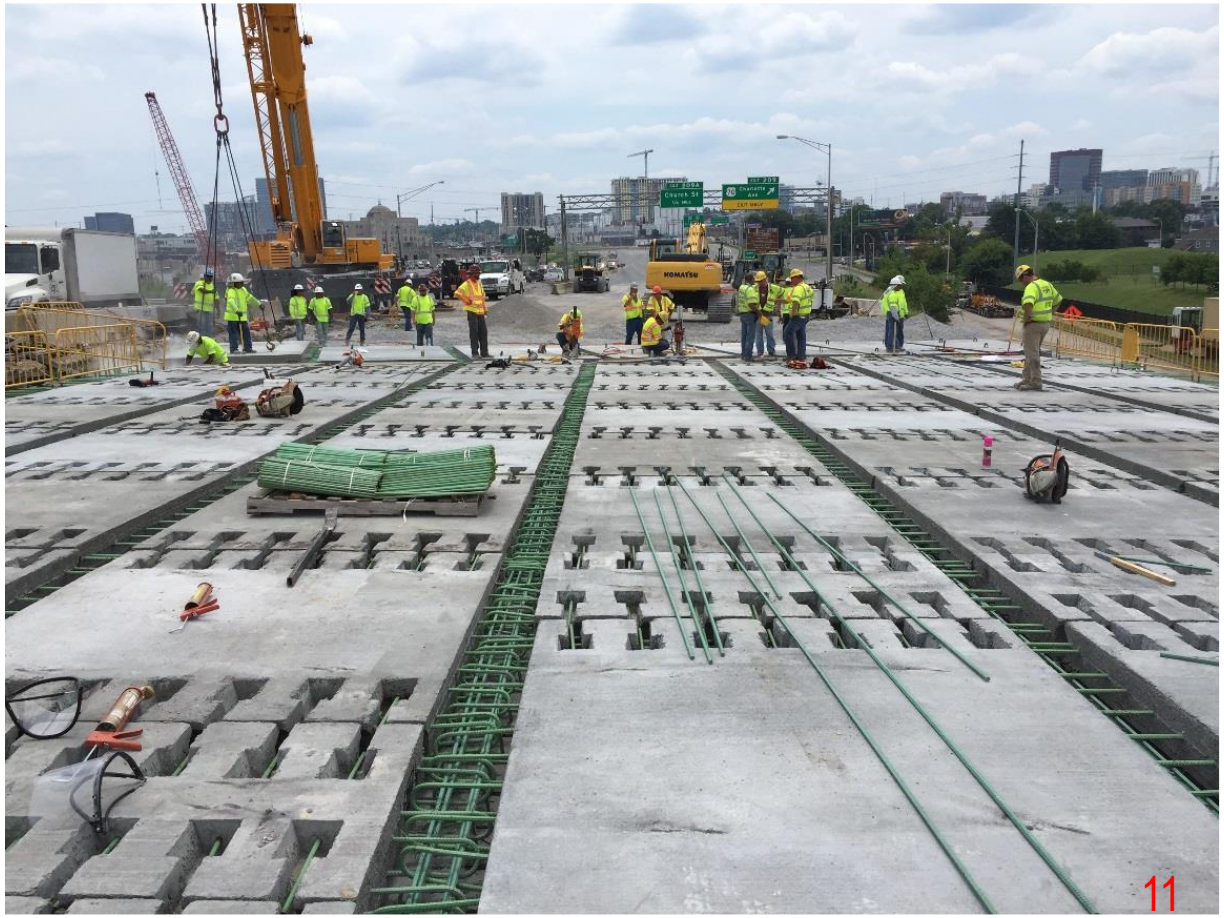
5. Davidson Co.– Fast Fix 8: Four Bridges & 0.5 miles resurfacing)

Type: Contractor Innovation / “Fast 14” Units / Deck Panels

Contract Method: CMGC with 13 weekend closures

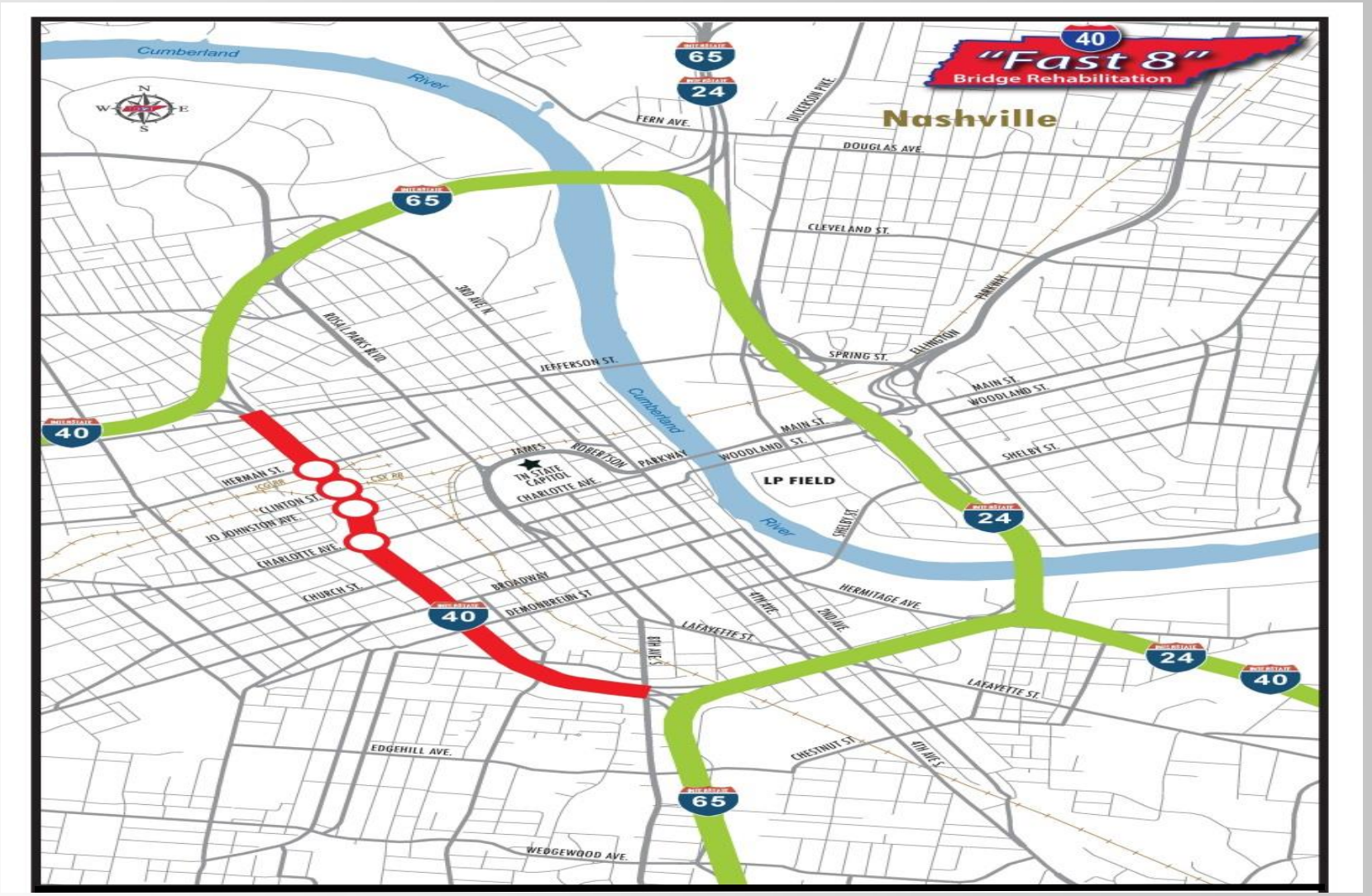
Contract Execution: October 2014 Completion Date: November 2015





FAST FIX 8 Project

Project Overview



Downtown Traffic -140,000 ADT

Project History

- Numerous Ongoing Maintenance Issues
- 140,000+ ADT
- Major Downtown Access Points

Project Objectives

- Interstate traffic lane closures on weekends only – 13 maximum
- All interstate traffic lanes and ramps had to be open Monday thru Friday
- Good condition bridges that require little to no maintenance
- Community Outreach well in advance and “buy in”
- Railroad / Utility Impacts and challenges
- Procurement of Materials
- Constructability
- 1st CMGC project experience

Community Relations Involvement

- Very Early coordination with our Community Relations Division
- Held a press conference on site months before construction
- Used Twitter, Facebook, YouTube, Instagram, Flickr, Vine, Pinterest, TDOT website for regular project updates
- Kept the local media, TV and radio, current on project activities and progress
- Provided weekend videos of construction to media for reporting
- Made sure there was a safe space on site for media to do their reporting during the weekend construction

Bridge Site 1 – Herman Street

345’ Bridge
4 Continuous Bridge Spans
Rolled Wide Flange Beams
Multi-Post Bents
On-Going Deck Maintenance

Herman Street Highlights

- Superstructure Replaced with Structural Steel Superstructure Units
  - 16 Units set per weekend (more than any previous weekend project)
  - Units were longer, wider & heavier than previous projects
  - Link Slab used for Live Load Continuity

Tri-Star Detail added to bridge rails

Bridge Site 2 – CSXT & Clinton

428’ Bridge
6 Continuous Bridge Spans
Rolled Wide Flange Beams
Multi-Post Bents
On-Going Deck Maintenance

Selected Option – Clinton – CSXT Crossing

Clinton / CSXT Highlights

- Six span bridge replaced with two single span structures
  - Retaining walls used to eliminate end spans and two interior spans
  - Pre-weekend work did not impact interstate traffic
  - Replacement structures used prestressed beams and full depth deck panels

Bridge Site 3 – Jo Johnson Avenue

178’ Bridge
3 Span Continuous
AASHTO I Beams
Multi-Post Bents
On-Going Deck Maintenance

I-40 over JoJohnson Avenue

Bridge Site 4 – Charlotte Ave.

196’ Bridge
3 Span Continuous
Fabricated “K” Frame
Wide Flange Splice Segments
Frame Supported on Thrust Blocks
Emergency Deck Repairs in 2013

NASHVILLE FAST FIX 8 40

Charlotte Avenue Initial Inspection

ABC vs Conventional Construction

Project	Br Cost/SF	Project Cost/SF	Year
SR24 / Snow Creek *	$171/SF	$200/SF	2009
I-24 / Main St. -Woodland *	$159/SF	$222/SF	2012
SR254 / Otter Creek *	$344/SF	$450/SF	2014
SR25 / Liberty Branch *	$210/SF	$310/SF	2014
Fast Fix 8	$315/SF	$400/SF	2015
ABC average	$240/SF	$317/SF	
Conventional Construction	$125-$150/SF	$225-$250/SF	current

- Bridge Cost / sq. ft. includes only bridge items such as concrete, reinforcing steel, prestressed girders, structural steel, excavation of substructure, piling, etc.
- Project Cost / sq. ft. is total project cost divided by bridge deck area

* Projects that were design-bid-build

Lessons Learned

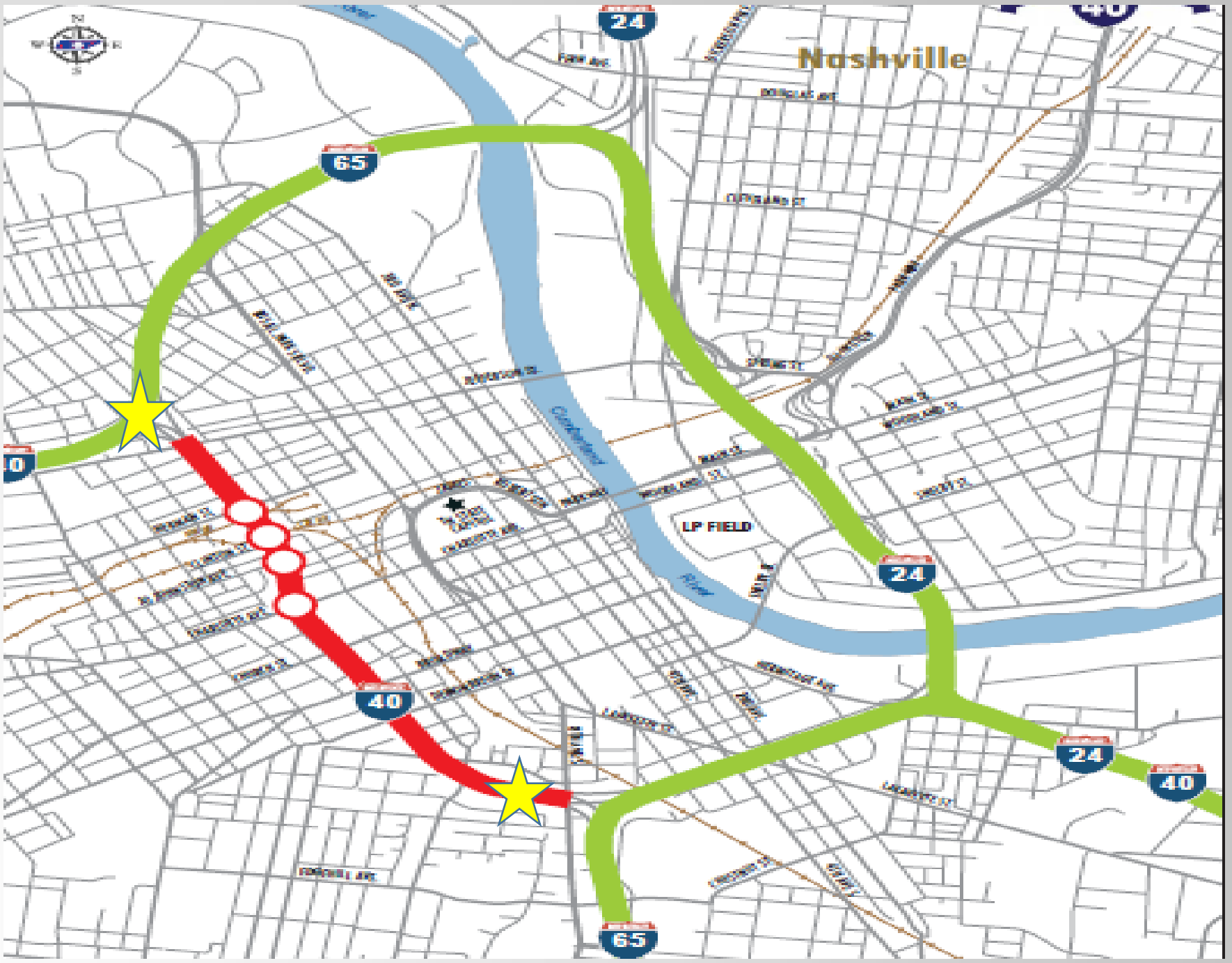
- **Early Coordination and Community Outreach**
- Early Contractor Involvement with CM/GC Contract
  - Team Approach to Project (Owner-Contractor-Designer)
  - Personnel Continuity between Design and Construction Phases
- Communication between owner, designer, and contractor is imperative all of the way through the project.
- Set the maximum allowable construction and traffic lane closure times at the beginning of the project planning and stick to it.
- Work operations, such as demolition and new bridge construction were improved from weekend to weekend by observations and time studies

Lessons Learned con't.

- Debrief or Lessons Learned Meetings after every closure was beneficial
- Conduct weekly progress meetings between all partners to discuss upcoming work as well as trying to prepare for the unexpected…..what if scenarios. Discuss staffing, equipment needs and placement, and weather conditions
- Most beams and panels superstructure replacements can be done in weekends
- Keep the door of innovation open during the planning and design phases.

Keys to the Successful Project

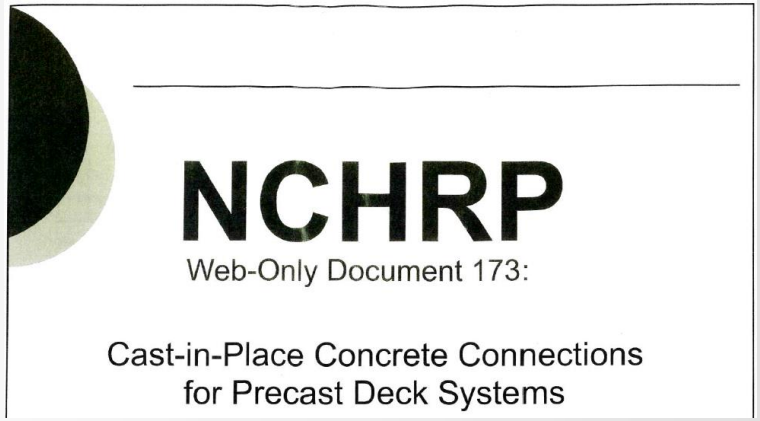
- Good Public Relations Involvement
- Good Detour Route and multiple alternate routes for the thru-traveller
- On-Site Bridge Farm or Fabrication Yard
- Ready-Mix Type Closure Pour Material
- First use of spray applied bridge deck sealant
- Developed experience with the CMGC project delivery method


Nashville
24
65
40
LP FIELD
Cumberland River

Bridge Farm and Staging

Mock Up Test for the 4 x 4 Closure Pour Concrete Mix

STRUCTURAL CLOSURE POUR PERFORMANCE CRITERIA TABLE				
PERFORMANCE CHARACTERISTIC	TEST METHOD	PERFORMANCE CRITERIA		
COMPRESSIVE STRENGTH (CS) KSI	ASTM C39 (MODIFIED)	6.0 ≤ CS @ 8 HOURS (OVERNIGHT CURE) @ 7 DAYS (7 DAY CURE)		
SHRINKAGE (S) (CRACK AGE, DAYS)	AASHTO PP34 (MODIFIED)	20 < S		
BOND STRENGTH (BS), PSI	ASTM C882 (MODIFIED)	300 < BS		
CHLORIDE PENETRATION (ChP) (DEPTH FOR PERCENT CHLORIDE OF 0.2% BY MASS OF CEMENT AFTER 90 DAY PONDING), (IN)	ASTM C1543 (MODIFIED)	ChP < 1.5		
FREEZING AND THAWING DURIBILITY (F/T). (RELATIVE MODULUS AFTER 300 CYCLES)	ASTM C666 PROCEDURE A (MODIFIED)	GRADE 1	GRADE 2	GRADE 3
		70% ≤ F/T	80% ≤ F/T	90% ≤ F/T



Spray Applied Deck Membrane

First use of spray applied membrane by TDOT.

Click to View
(right click to "Open link in new tab")

TN TDOT Department of Transportation

Future ABC in Tennessee

- Davidson County, I-24 over Spring St., I-24 over Oldham St. and CSX RR
- Montgomery County, SR48 over Little Bartons Cr. and Louise Cr.
- Rutherford County, SR1 over Harts Branch
- Robertson County, SR49 over Millers Cr. And Calebs Cr.
- Shelby County, NSRR over I-240, SR57WB over I-240, SR57 EB over I-240, Park Avenue over I-240 - CMGC

Module 2 Construction Manager / General Contractor Project Delivery
11:40 - 12:20 Lia Obaid

Module 3 I-40 / Jo Johnson Avenue Construction Details
12:20 – 1:00 Terry Mackie

Module 4 I-40 / Herman Street & Railroad Construction Details
1:00 – 1:40 Ted Kniazewycz

Module 5 I-40 / Clinton Avenue & CSX RR Construction Details
1:40 – 2:20 Terry Mackie

Module 6 I-40 / Charlotte Avenue Construction Details
2:40 – 3:00 Ted Kniazewycz

Lessons Learned

Questions