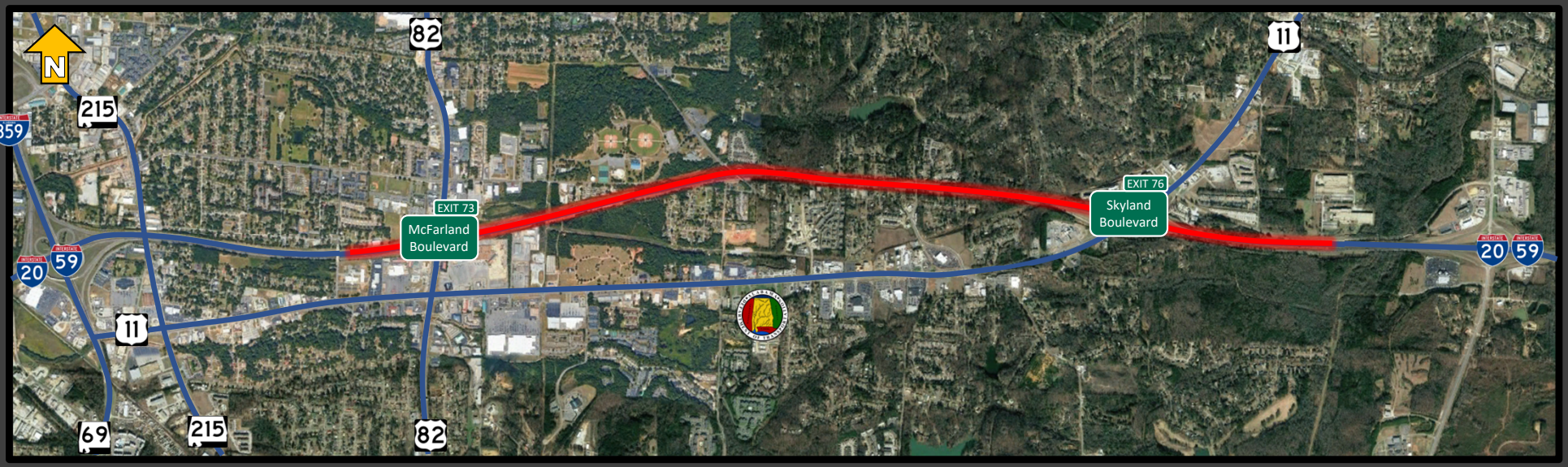
CONSTRUCTION OF ALABAMA'S FIRST SINGLE POINT URBAN INTERCHANGE (SPUI)

Wallace McAdory, III, PE
Assistant Region Engineer
ALDOT West Central Region

Project Overview

- Owner: ALDOT
- General Contractor: Brasfield & Gorrie
- Engineer: AECOM
- Contract Amount: $83,409,790.11
- Contract Completion: December 18, 2020

- I-20/59 ADT: 60,004 (2017) & 98,323 (2037)
- ≈ 4.2 miles of interstate widening
- 2 bridge replacements
- Decorative Lighting



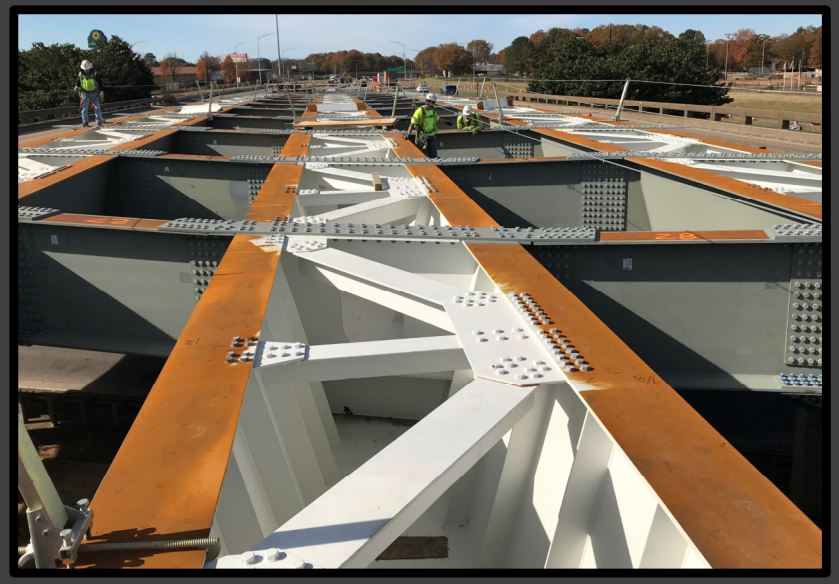
Widening

Skyland Blvd. Bridge

- Deep Foundation H-Piles
  - 284 – 12”
  - Estimated 7,245 LF of piling
- 3 intermediate bents,
  - 27 – 36” Round Columns
- 4 Spans for a Total Length Over 350’
- Girders
  - 68 – BT-54 Girders
  - Length: 55’ to 105’
  - Each Weighs up to 90,000 lbs

McFarland Blvd. Bridge

- Drilled shaft foundations
- Mass concrete abutments/thrust blocks
- 7 steel tub girders
- 2 independent steel arches
- Single span of 256’-10 ¼”



Why…

- **a Single Point Urban Interchange (SPUI)?**
- **an arch suspension bridge?**

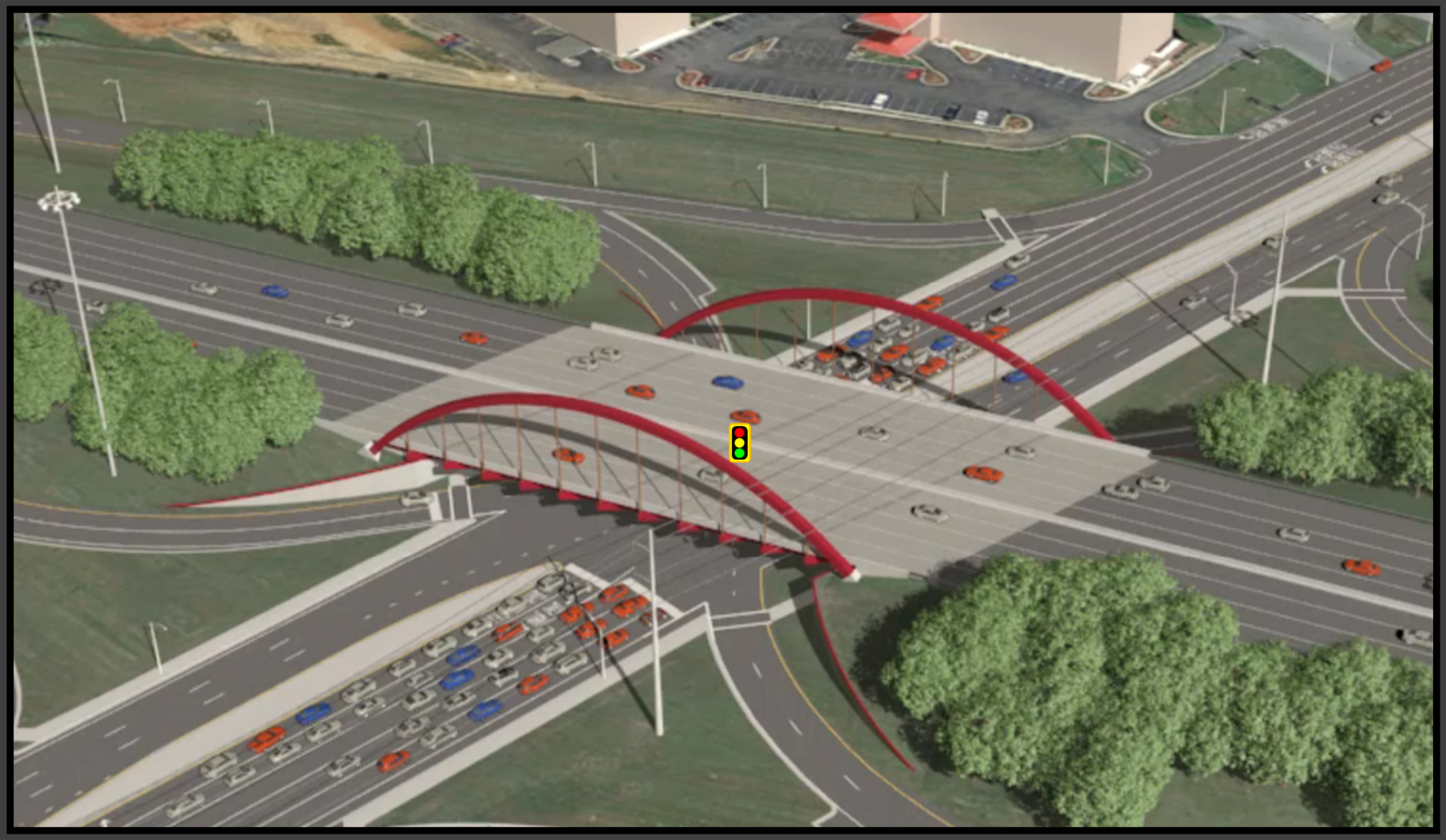
Existing Interchange

- Conventional Diamond Interchange
- 2 Sets of Signals
- Poor Level of Service
- Limited ROW

Analysis, Design, & Selection

- Modeled new designs.
- Simulations evaluated.

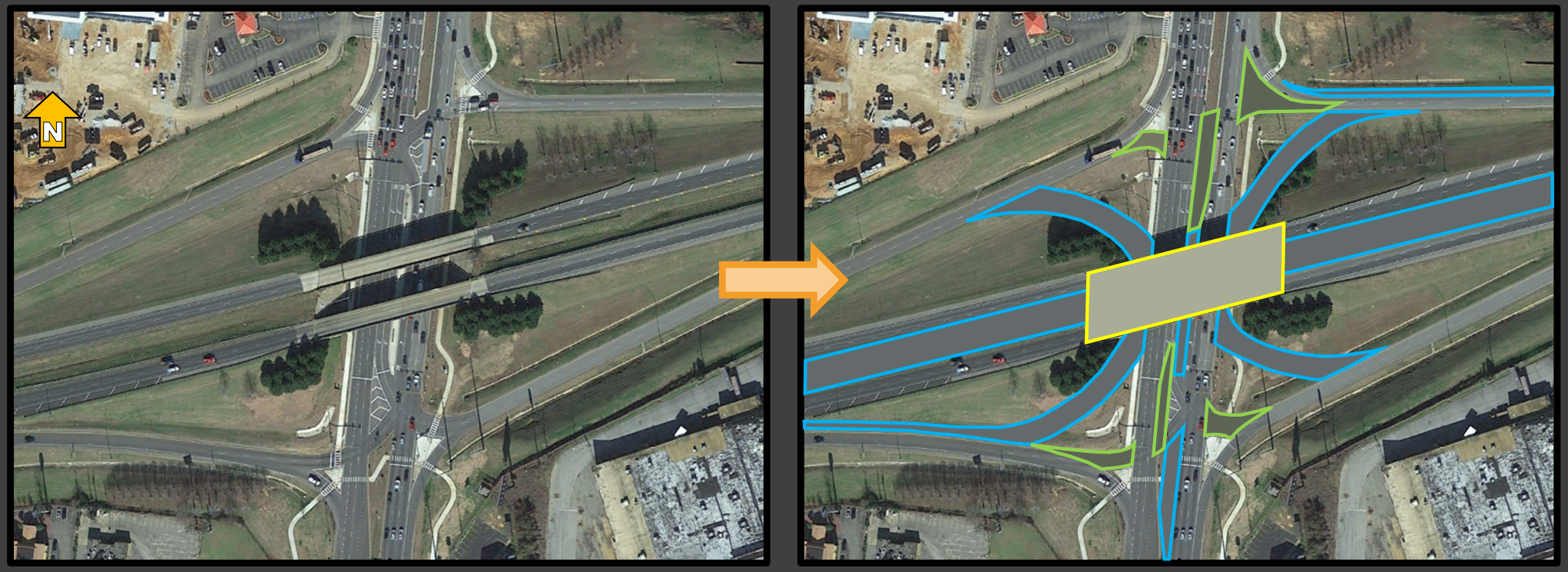
- Single Point Urban Interchange (SPUI)
  - Requires fewer traffic signals.
  - Improves safety.
  - Increases efficiency.
  - Improves travel time.
  - Accommodates large vehicles.
  - Level of service improvements.



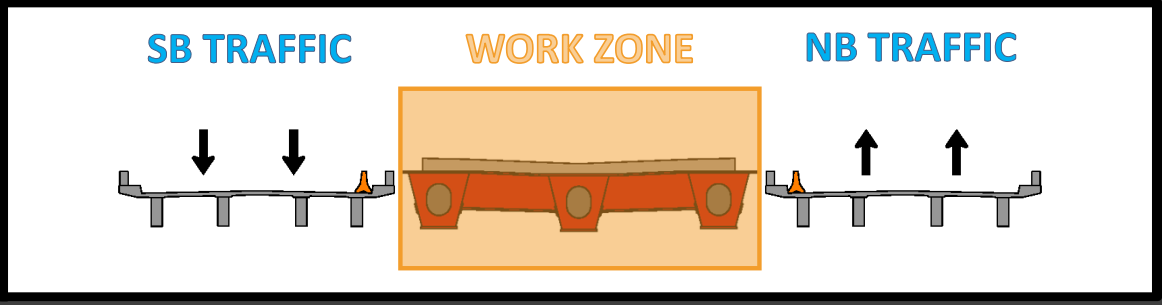
Design Rendering

SPUI & McFarland Blvd. Bridge Construction

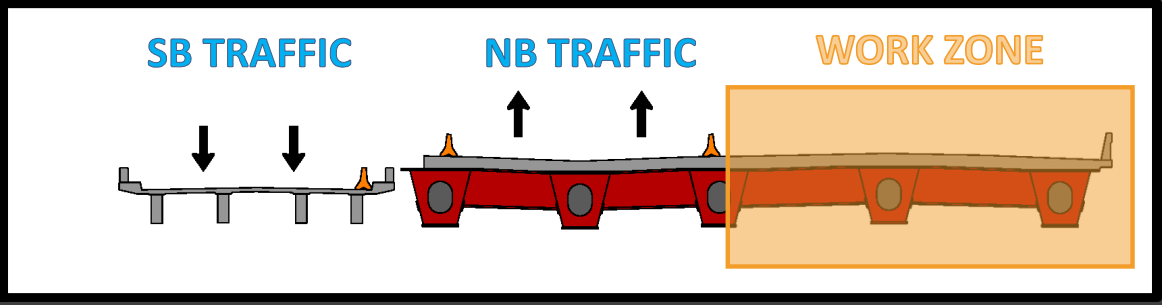
- Ramp Geometry Changes
- Simplified Construction Phases – Stages
- Foundation Installation
- Temporary Bent Construction
- Girder Installation
- Bridge Demolition
- Arch Construction
- Decorative Paint Color
- Decorative Lighting


N

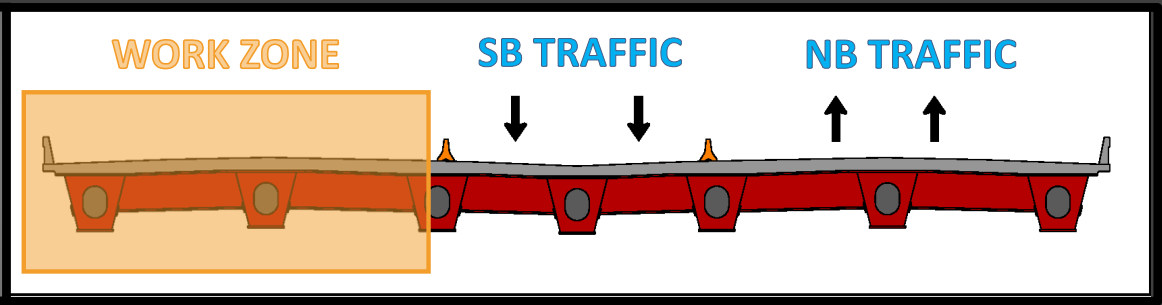
STAGE 1



STAGE 2



STAGE 3



Foundation Installation

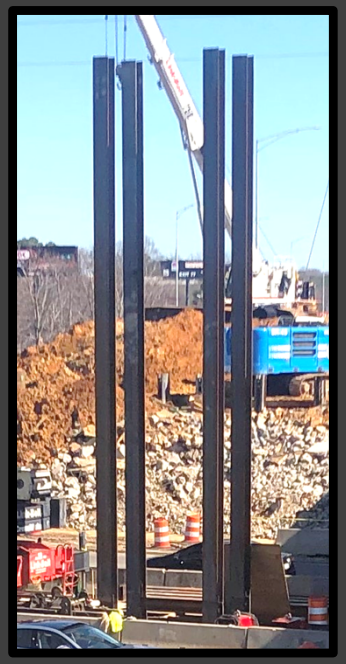
- 30 – 54” diameter drilled shafts
- 545,300 lbs steel reinforcement
- 1,177 cy bridge substructure concrete
- 3,420 lbs structural steel
- 1 each – structural steel superstructure (incl arch ribs approx. 2,384,860 lbs)

Foundation Installation

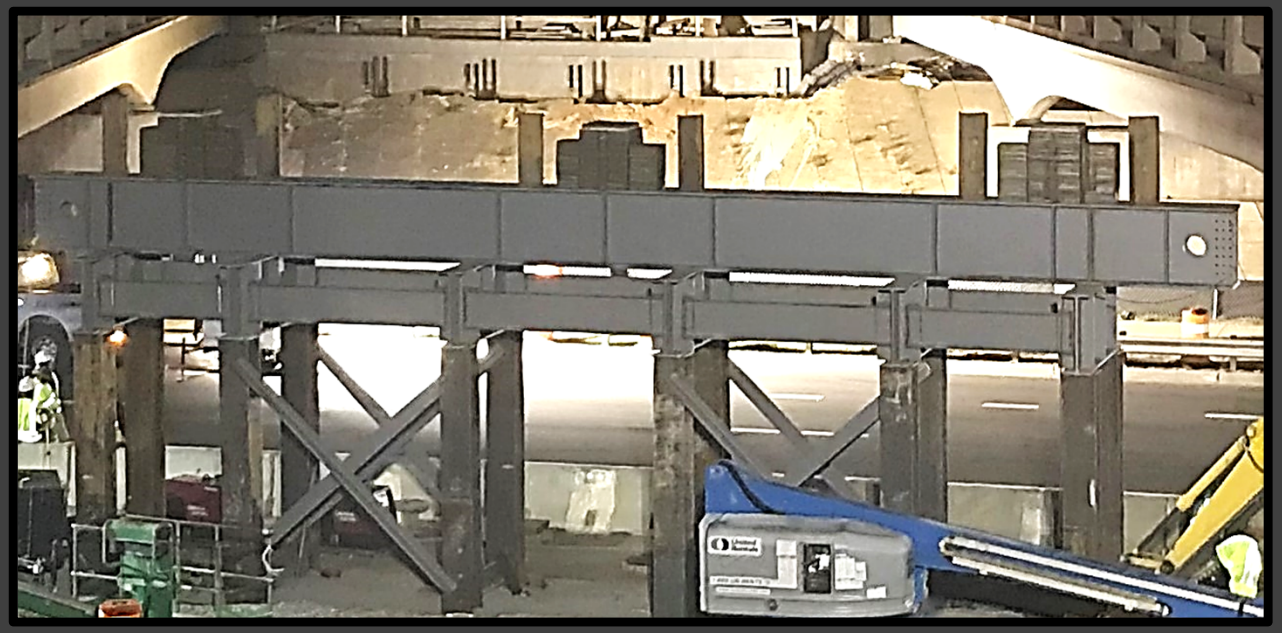
- 30 – 54” diameter drilled shafts
- 545,300 lbs steel reinforcement
- 1,177 cy bridge substructure concrete
- 3,420 lbs structural steel
- 1 each – structural steel superstructure (incl arch ribs approx. 2,384,860 lbs)

Temporary Bent Construction

- Designed by the contractor
- HP14x117 driven pile foundation
- Dbl W35x232 for bent cap



- Welded structure
- Designed to use for jacking and lowering bridge using shim plates
- Removed after final arch installation



Temporary Bent Construction

- Designed by the contractor
- HP14x117 driven pile foundation
- Dbl W35x232 for bent cap
- Welded structure
- Designed to use for jacking and lowering bridge using shim plates
- Removed after final arch installation

Girder Installation

- Installed temporary bent
- Detailed erection plan and pickup points
- 54-hour window for complete shutdown of McFarland (interstate to remain open)
- Work around University of Alabama home football games

Girder Installation

- Installed temporary bent
- Detailed erection plan and pickup points
- 54-hour window for complete shutdown of McFarland (interstate to remain open)
- Work around University of Alabama home football games

Bridge Demolition

- 54-hour window
- Removal of superstructure, substructure, and debris
- Developed engineered demolition plan to avoid impacts to newly constructed bridge
- Controlled collapse of bridge focusing on “attach zones”
- Used 2-ft layer of sand to protect roadway below

Timelapse of NB Bridge Demolition

Arch Construction

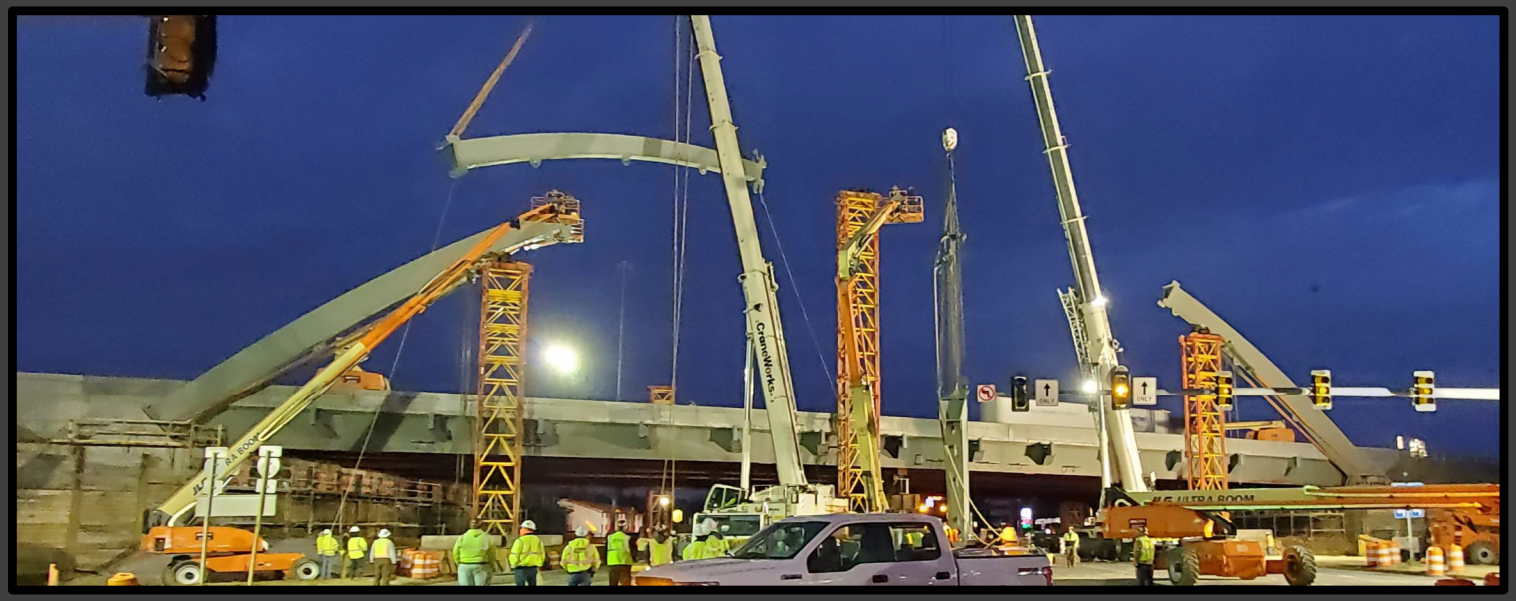
- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.

Arch Construction

- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.

Arch Construction

- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.



Arch Construction

- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.

Arch Construction

- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.

Arch Construction

- Temporary Erection Towers
- Erection Scheme
  - Weekday, Daytime
  - Weekend
- Field Splices
- Cable installation and tensioning.
- Jacking and removal of temporary bent.

Decorative Paint Color

- Consulted with the University of Alabama's to color match their Crimson.
- Selected Crimson PMS 201, Federal Standard 595 Color FS 21136

Decorative Lighting

- Consultant
  - HLB Lighting Design
- Schemes
  - Traffic
  - High Five
  - Roll Tide
  - Solemn Holidays
  - December Holidays
  - Fireworks

SPUI & McFarland Blvd. Bridge Construction

JANUARY						
S	M	T	W	R	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

FEBRUARY						
S	M	T	W	R	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

MARCH						
S	M	T	W	R	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL						
S	M	T	W	R	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY						
S	M	T	W	R	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE						
S	M	T	W	R	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY						
S	M	T	W	R	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST						
S	M	T	W	R	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER						
S	M	T	W	R	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER						
S	M	T	W	R	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER						
S	M	T	W	R	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER						
S	M	T	W	R	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

TRAFFIC

ROLL TIDE

DECEMBER HOLIDAYS

HIGH FIVE

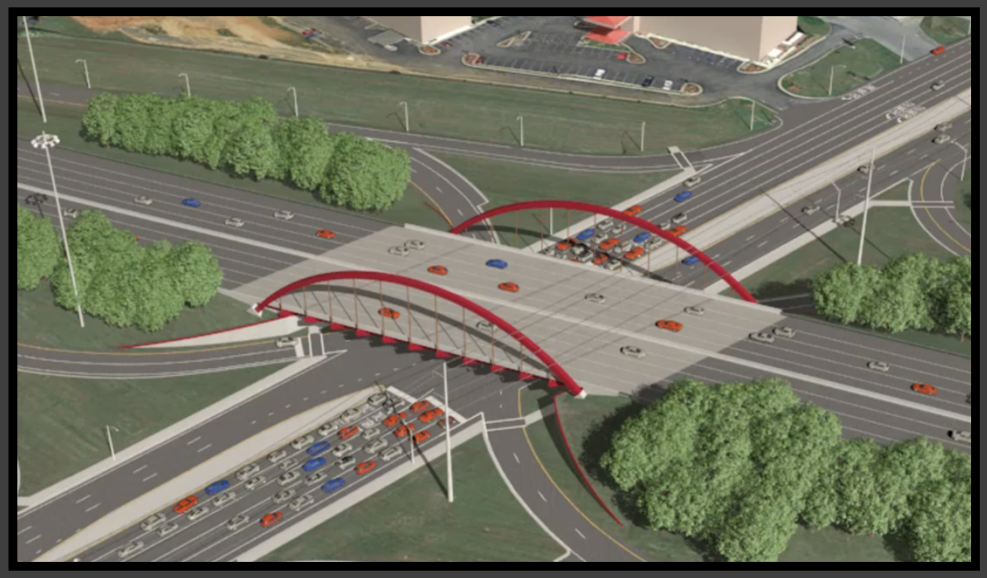
SOLEMN HOLIDAY

FIRE WORKS

Example Schedule for the 2022 Calendar Year

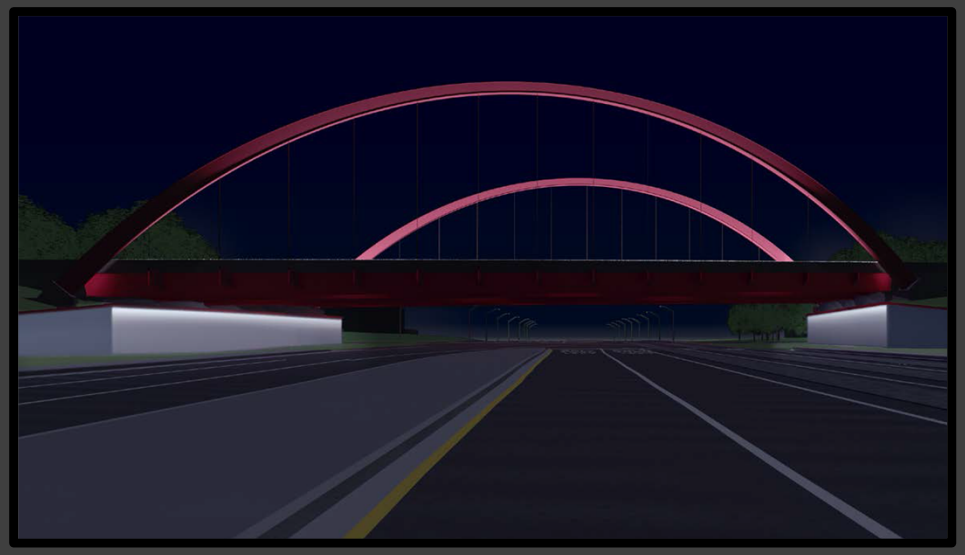
Comparisons

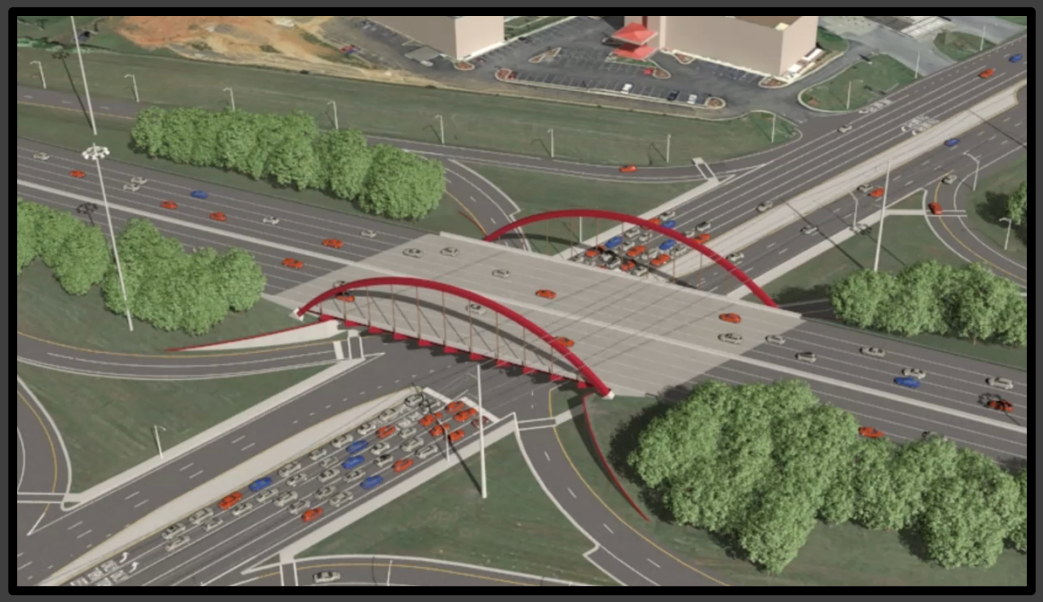
- Design Renderings



- Finished Construction

Comparisons: Design Renderings vs Finished Construction





Comparisons: Design Renderings vs Finished Construction

Finished Construction

THANK YOU!

ANY QUESTIONS?