

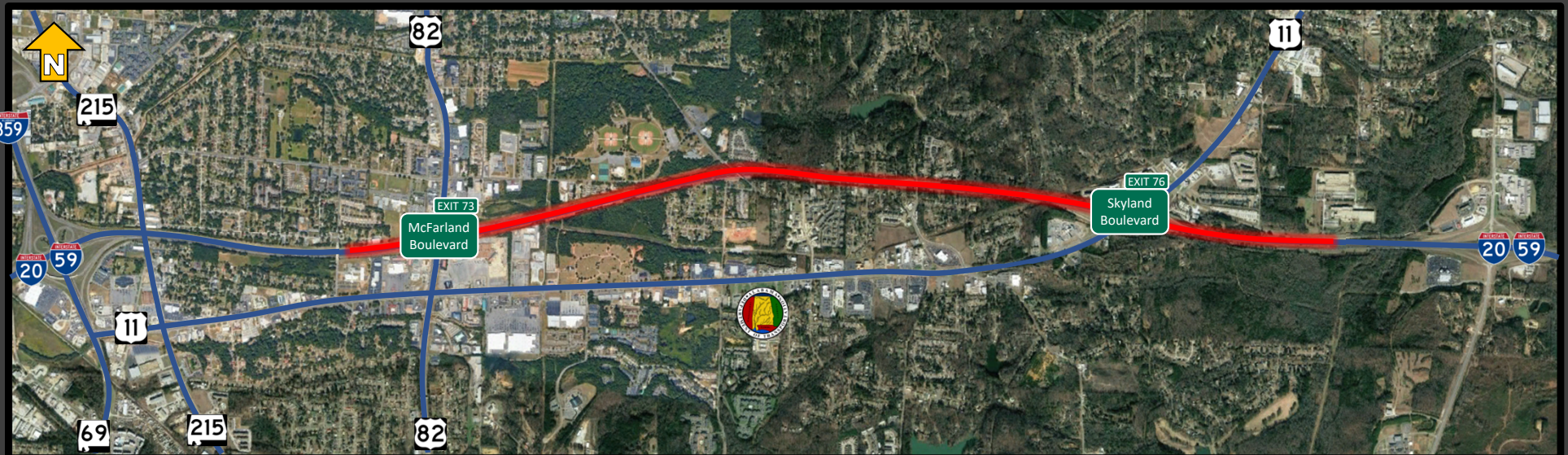
CONSTRUCTION OF ALABAMA'S FIRST SINGLE POINT URBAN INTERCHANGE (SPUI)

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

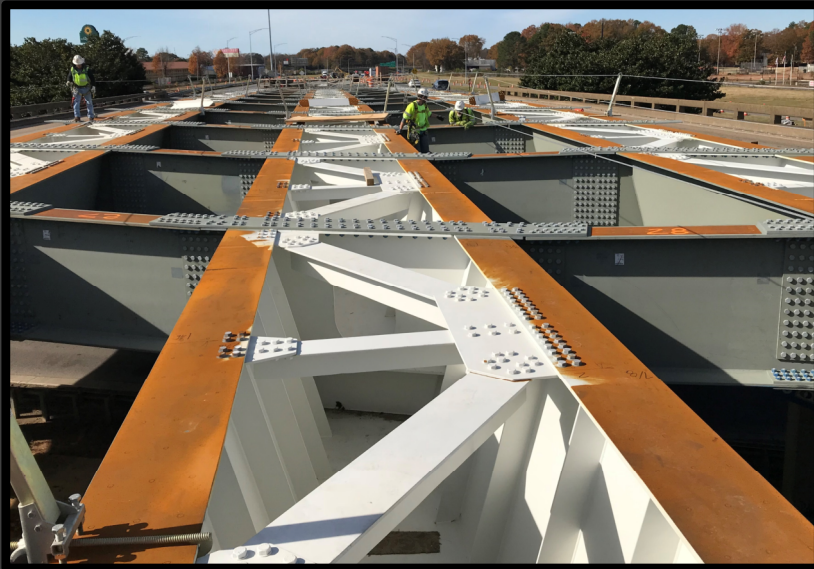
- Deep Foundation H-Piles
 - 284 – 12”
 - Estimated 7,245 LF of piling
- 3 intermediate bents,
 - 27 – 36” Round Columns
- 4 Spans for a Total Length Over 350’
- Girders
 - 68 – BT-54 Girders
 - Length: 55’ to 105’
 - Each Weighs up to 90,000 lbs





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.



Traffic Control

Automatic Optimization

Number: 7
 Intersection: SPUI
 Control Type: Signalized
 Analysis Method: HCM 6b Edition

Name:
 Show Name:
 Approach: Northbound, Southbound, Eastbound

Lane Configuration:

Northbound			Southbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
254	1273	133	443	1053	425	288	0	473
Total Analysis Volume (veh)			Total Analysis Volume (veh)			Total Analysis Volume (veh)		
254			1073			79		

Subsection Settings:

Priority Scheme	Major	Major	Minor
Analyze Intersection?			
Analysis Period	1 hour		
Located in CBD	<input type="checkbox"/>		
Controller ID	-		
Signal Coordination Group	-		
Cycle Length (s)	100		
Coordination Type	Time of Day Pattern Coordinated		
Activation Type	Fixed time		
Offset (s)	0.0		
Offset Reference	Lead/Green		
Permissive Mode	SingleLead		
Lead time (s)	0.00		
Pedestrian Walking Speed (ft/s)	1.0		

Phasing & Timing:

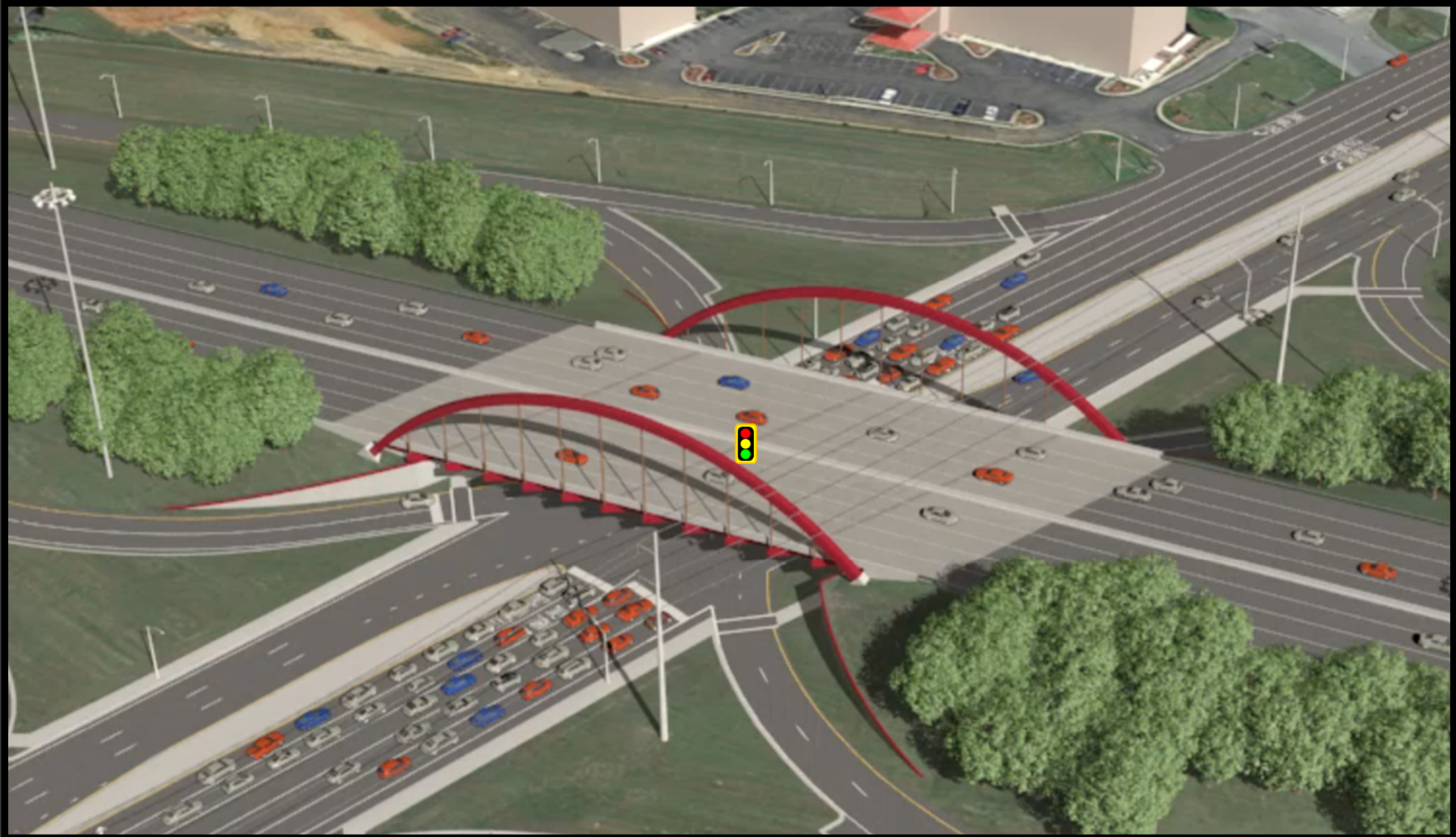
Control Type	Protected	Permissive	Permissive	Protected	Permissive	Permissive	Permissive	Protected	Permissive	Permissive	Permissive
Allow Lead-Lag Optimization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Signal Group	1	6	0	5	2	0	3	0	0	0	0
Auxiliary Signal Groups											
Lead / Lag	Lead			Lead							Lead

Sequence:

Ring 1	1	2	3	-	-	-	-	-	-	-	-
Ring 2	5	6	7	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-



Why?



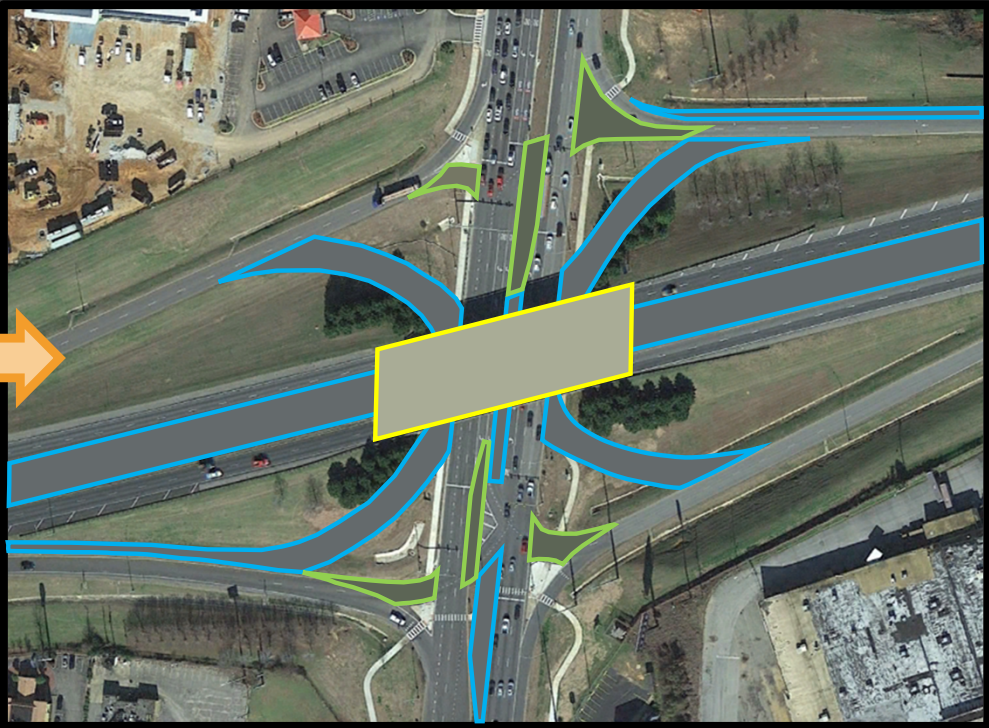
Design Rendering

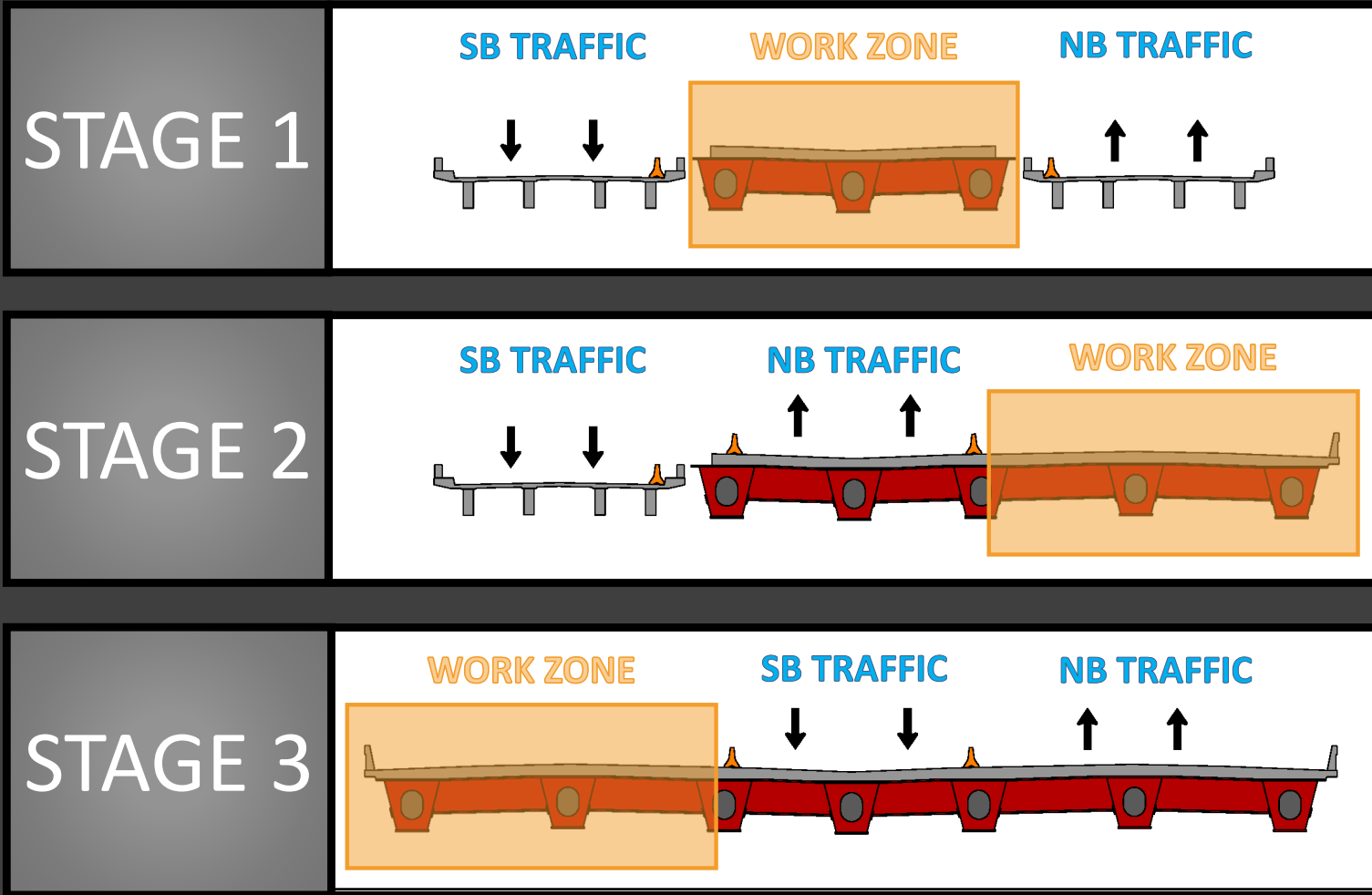


SPUI & McFarland Blvd. Bridge Construction

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







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)





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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





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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





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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.





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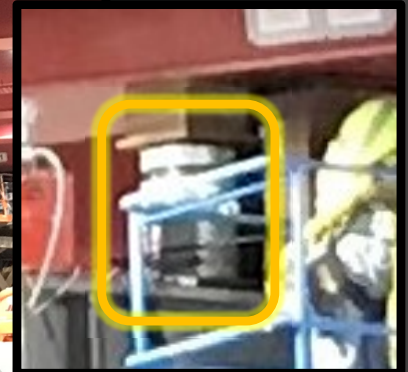
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Decorative Paint Color

- 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
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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

MARCH						
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27	28	29	30	31		

APRIL						
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17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY						
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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

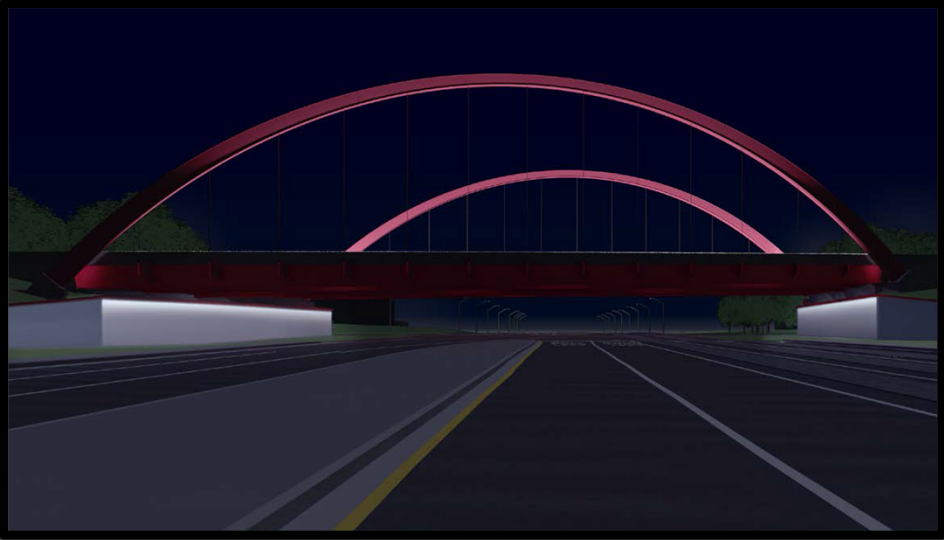


Comparisons

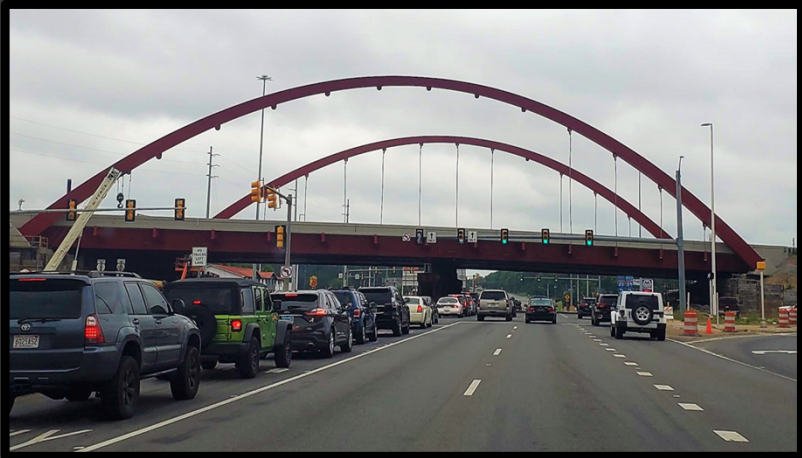
- Design Renderings
- Finished Construction



Comparisons: Design Renderings vs Finished Construction



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Finished Construction

THANK YOU!



ANY QUESTIONS?

