
How We Kept the Dirt and Traffic Moving

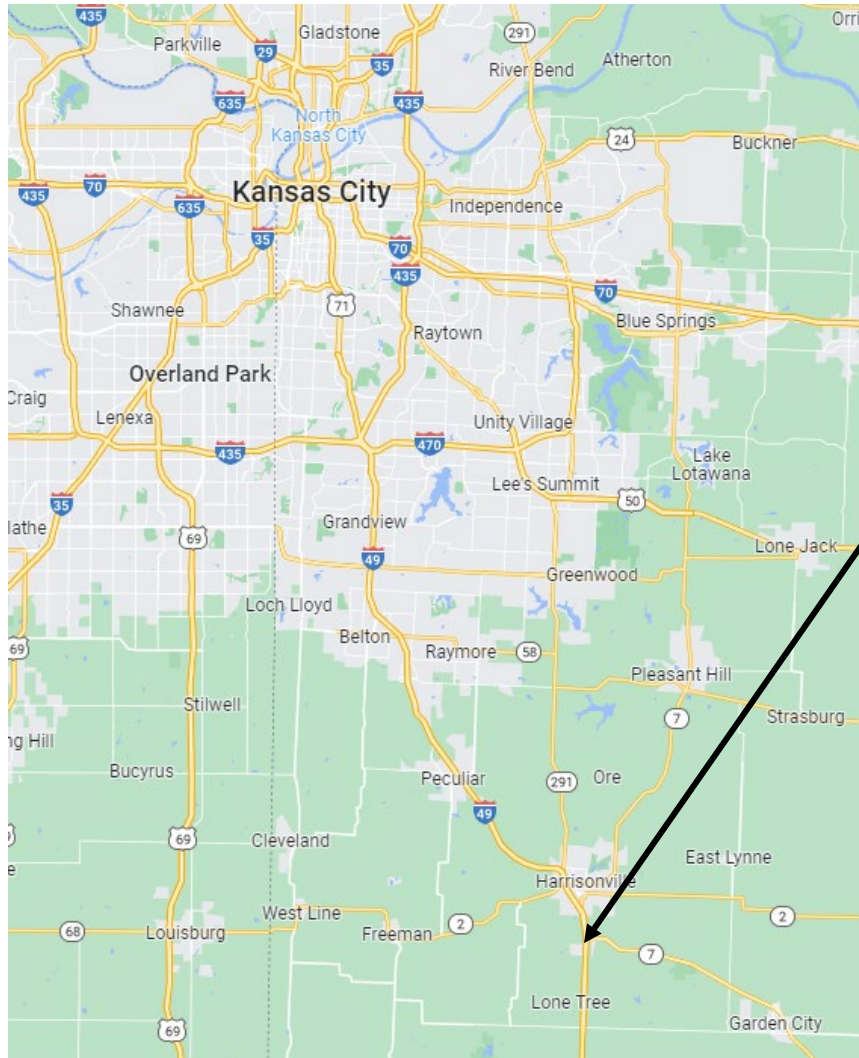
MO-7 and I-49 Interchange Improvements
Harrisonville, Missouri

Ryan Hale, PE - MoDOT
Tawn Nugent, PE, DBIA - TREKK
Sam Tapko, PE - GBA

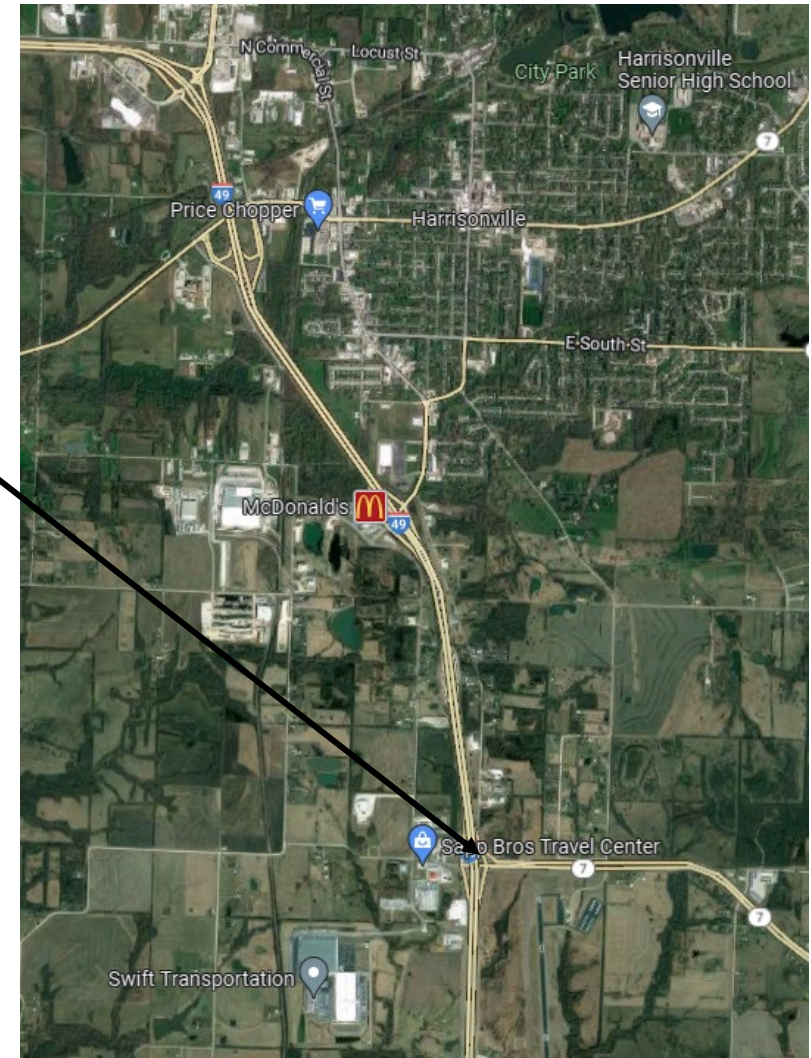
2025 TEAM Conference – March 13, 2025



Project Location



Project Location



Project Location



Project Location



Project Team



- Project oversight
- Traffic analysis
- Construction Inspection



- Project management
- Bridge design
- Traffic design
- LiDAR survey

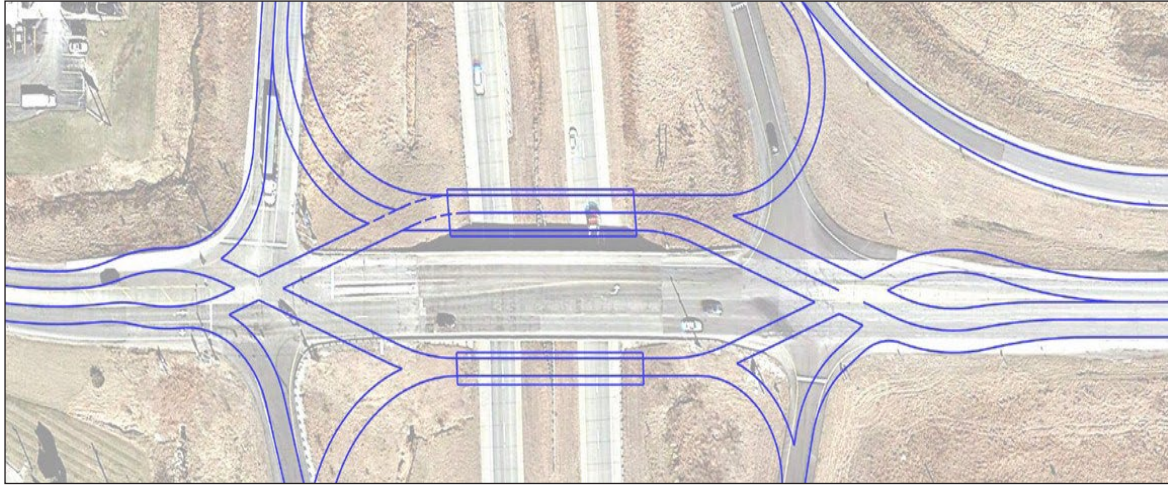


- Roadway design
- Drainage design
- MOT design
- Conventional survey



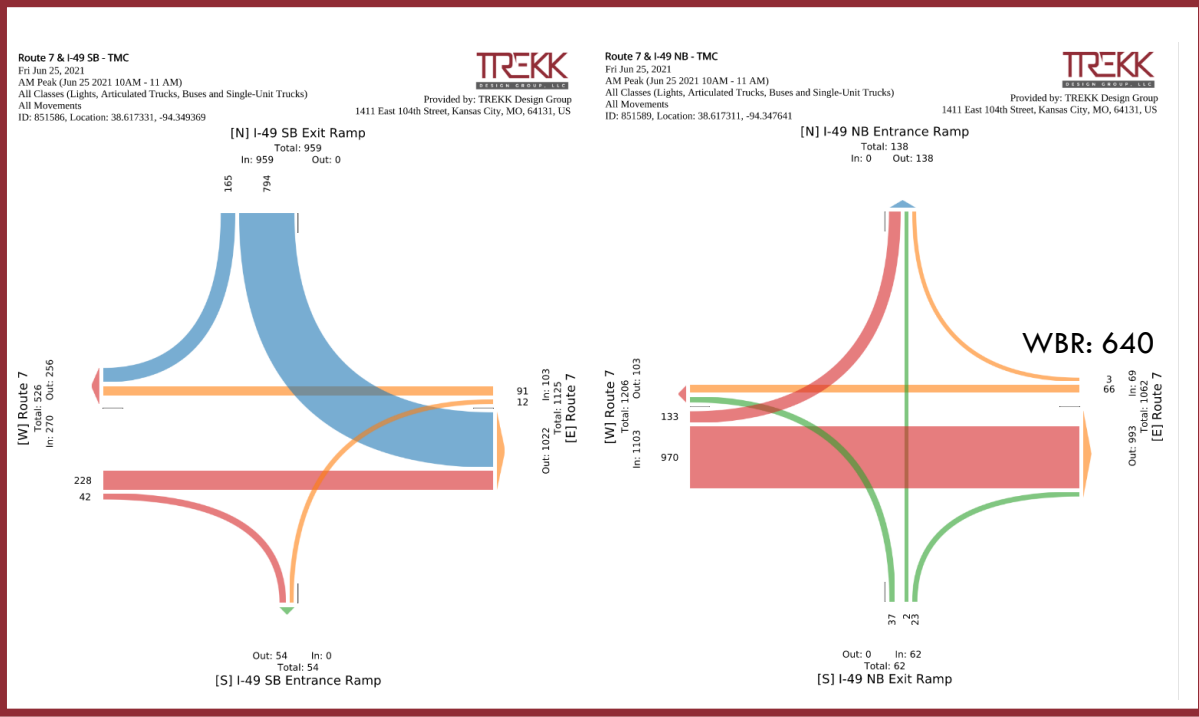
- Geotechnical investigations and analysis

Project Vision

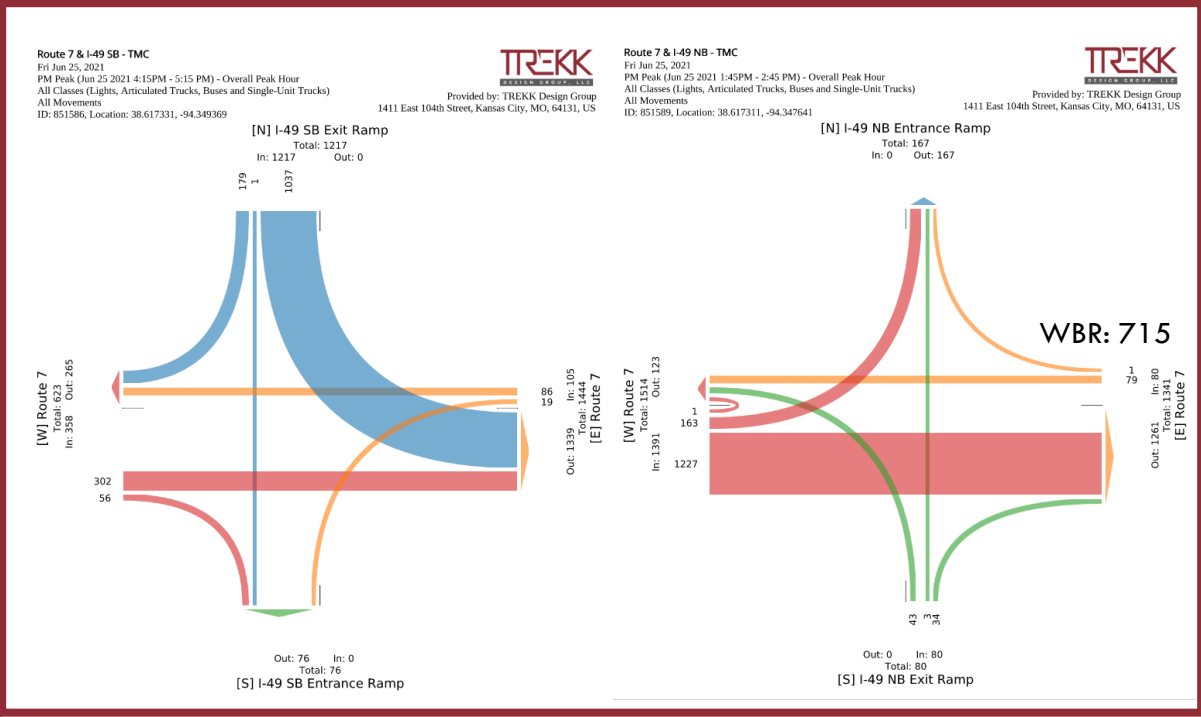


Traffic Patterns/Volumes - Weekday

AM Peak Hour

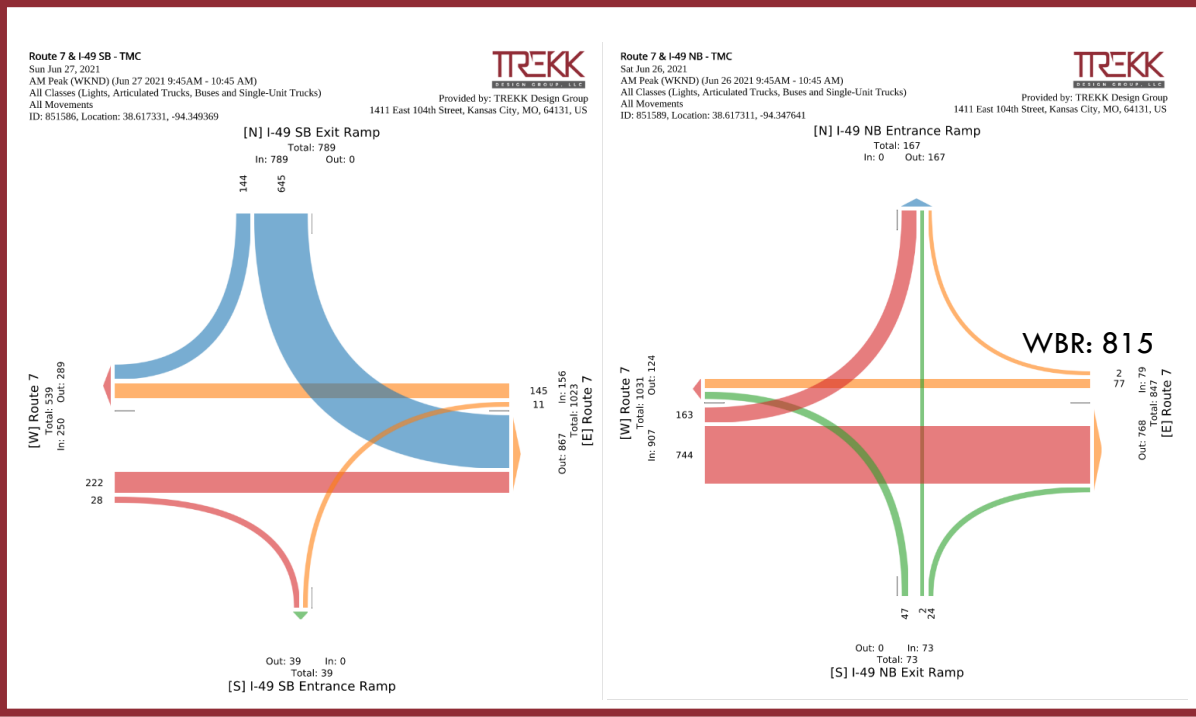


PM Peak Hour



Traffic Patterns/Volumes - Weekend

AM Peak Hour



Route 7 & I-49 NB - TMC

Sat Jun 26, 2021

AM Peak (WKND) (Jun 26 2021 9:45AM - 10:45 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 851589, Location: 38.617311, -94.347641

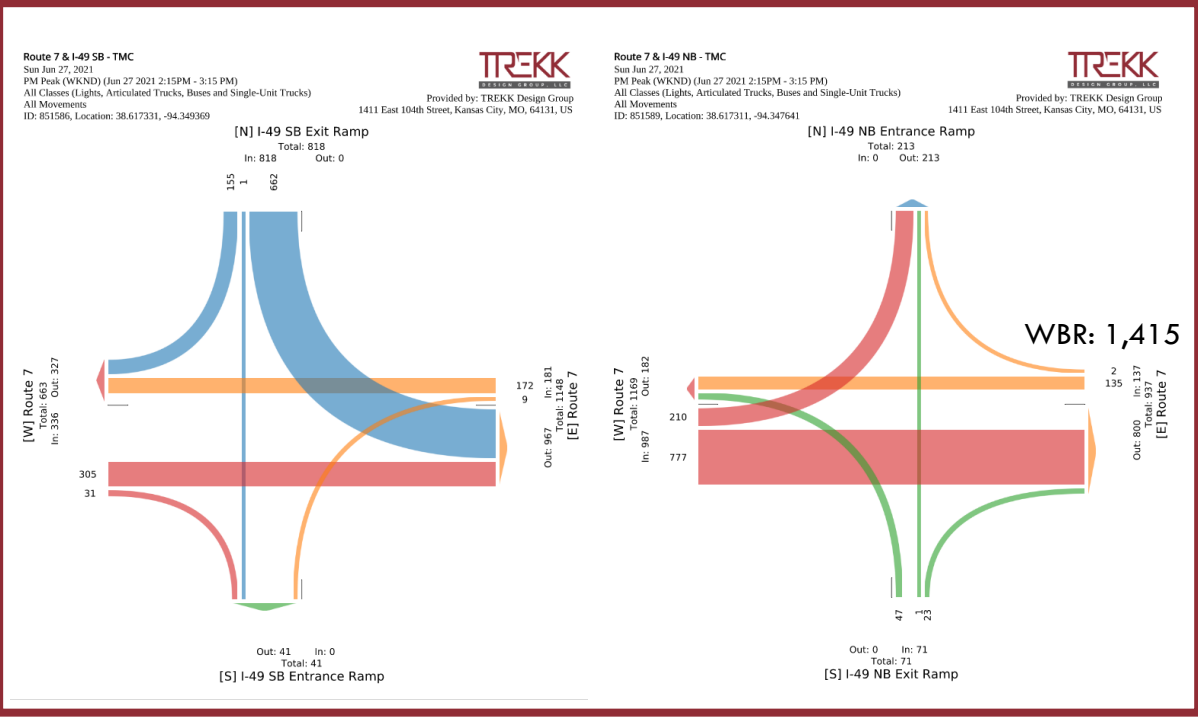
TREKK

DESIGN GROUP, LLC

Provided by: TREKK Design Group

1411 East 104th Street, Kansas City, MO, 64131, US

PM Peak Hour



Route 7 & I-49 NB - TMC

Sun Jun 27, 2021

PM Peak (WKND) (Jun 27 2021 2:15PM - 3:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 851589, Location: 38.617311, -94.347641

TREKK

DESIGN GROUP, LLC

Provided by: TREKK Design Group

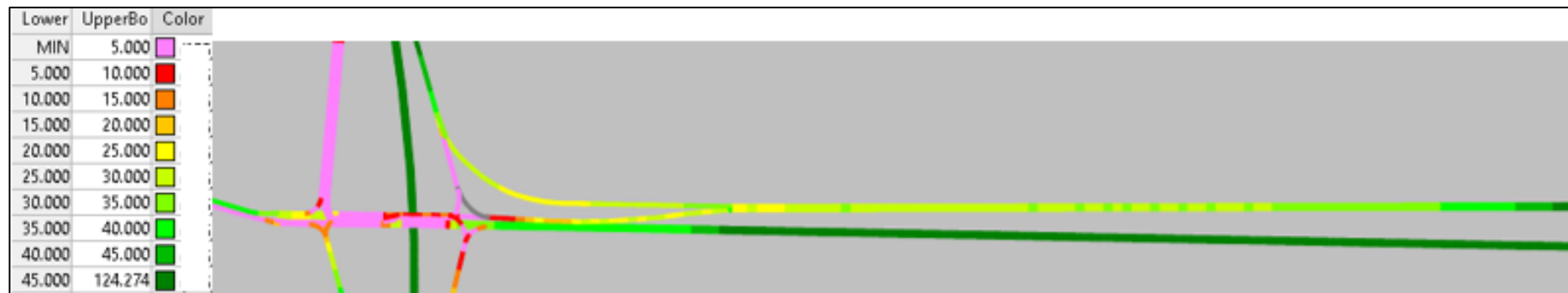
1411 East 104th Street, Kansas City, MO, 64131, US

Northbound MO-7 to Northbound I-49

Looking East on MO-7



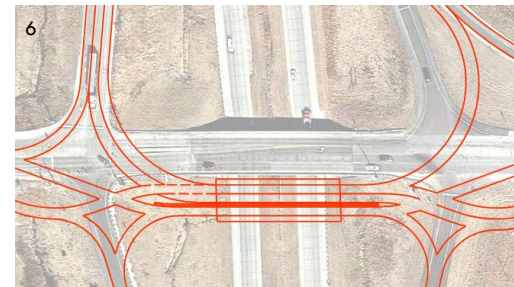
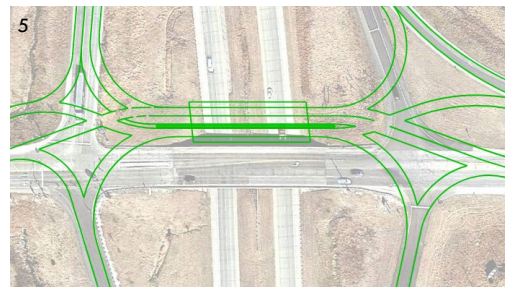
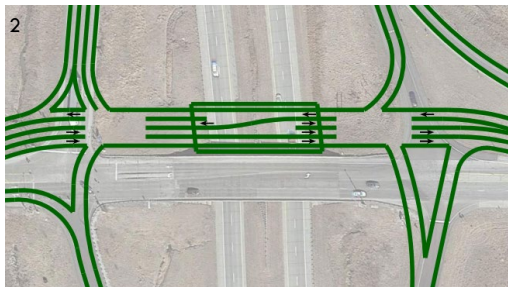
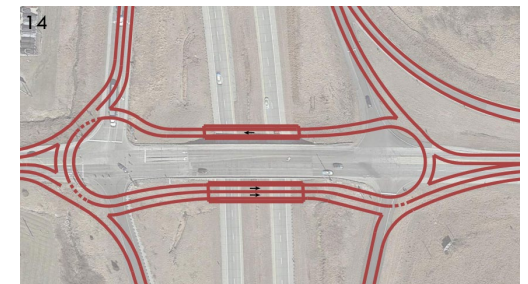
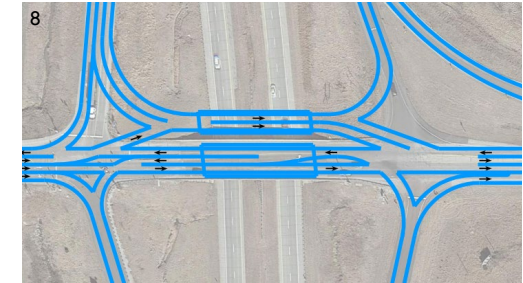
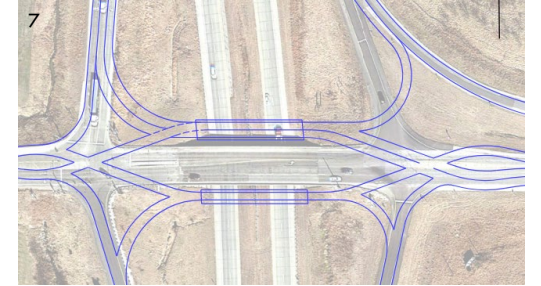
Looking North at MO-7/I-49 Merge



Interchange Evaluation Matrix – Step 1

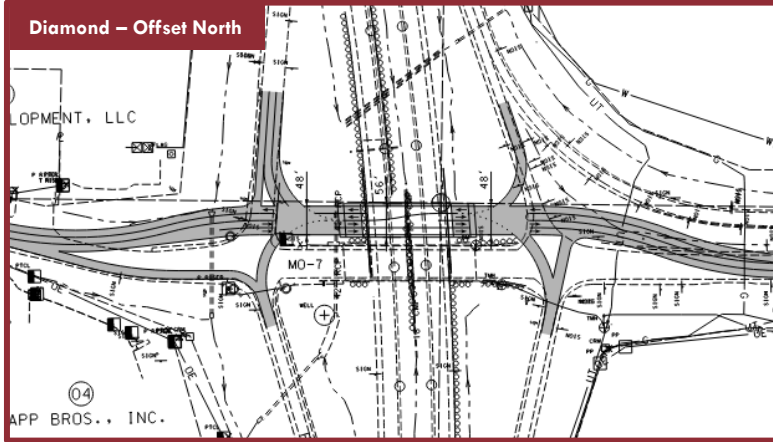
J4P3443, ROUTE 7/I-49 INTERCHANGE IMPROVEMENTS

	Evaluation Factors	Traffic Operations/ Safety	Construction Costs	Driver Comfort/ Expectations	MOT	Constructability	Right-of-Way Acquisition	Local Access	Utility Impacts	Unweighted Score	Weighted Score
	Weighting Factors	10	9	8	7	7	5	4	2		
Concept No.	General Description	1 = Worst Operations 10 = Best Operations	1 = Highest Cost 10 = Lowest Cost	1 = Most Complex 10 = Least Complex	1 = Worst Impact 10 = Least Impact	1 = Most Difficult 10 = Least Difficult	1 = Most Needed 10 = Least Needed	1 = Greatest Impact 10 = Least Impact	1 = Severe Impacts 10 = Minimal Impacts	All Selection Criteria Equal	Weighting Factors Applied
1	Diamond - on alignment	7	7	9	1	2	9	8	7	50	317
2	Diamond - offset north	6	6	8	7	7	7	6	7	54	349
3	Diamond - offset south	6	5	8	6	6	7	7	7	52	330
4	DDI - on alignment	8	8	7	1	2	9	8	7	50	320
5	DDI - offset north	7	7	6	7	7	7	5	7	53	348
6	DDI - offset south	7	6	6	6	6	7	7	7	52	333
7	DDI - split	8	5	7	8	8	9	6	7	58	376
8	Displaced Left	8	4	7	4	5	9	8	7	52	326
9	High Speed Ramps - SB/EB and WB/NB	10	1	8	3	2	2	8	4	38	258
10	Dogbone Roundabouts	4	7	4	2	2	6	8	7	40	239
11	Divergeabout (DDI and Roundabout)	4	6	3	2	2	7	7	7	38	223
12	SPDI	6	3	8	2	4	9	8	7	47	284
13	Diamondabout (Signal/Roundabout)	3	6	4	2	2	7	7	7	38	221
14	Dogbone - Split	4	5	4	8	8	6	8	7	50	305
15	Loop Ramps	5	2	5	5	5	2	8	2	34	224

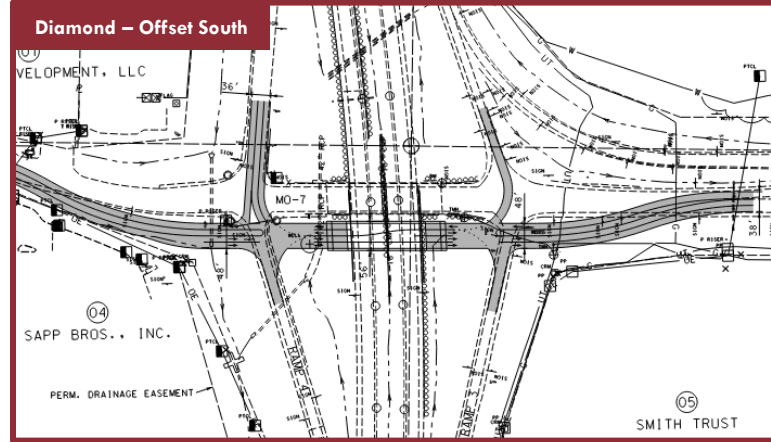


Interchange Evaluation Matrix – Step 2

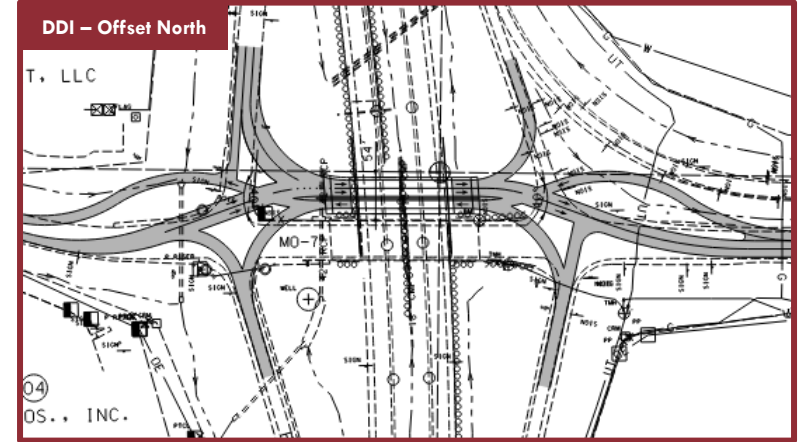
Diamond – Offset North



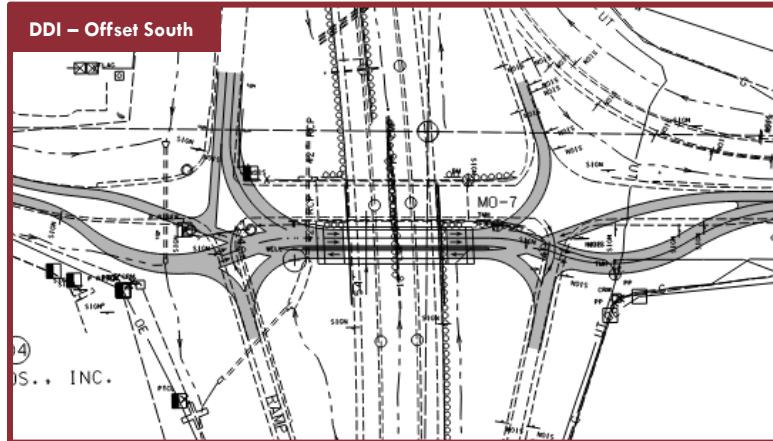
Diamond – Offset South



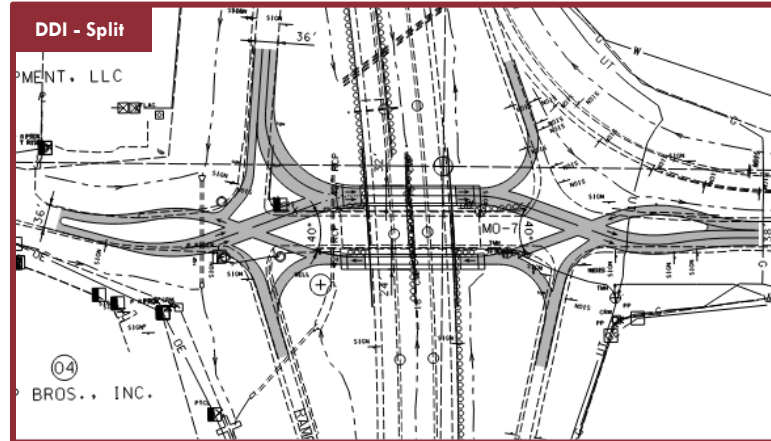
DDI – Offset North



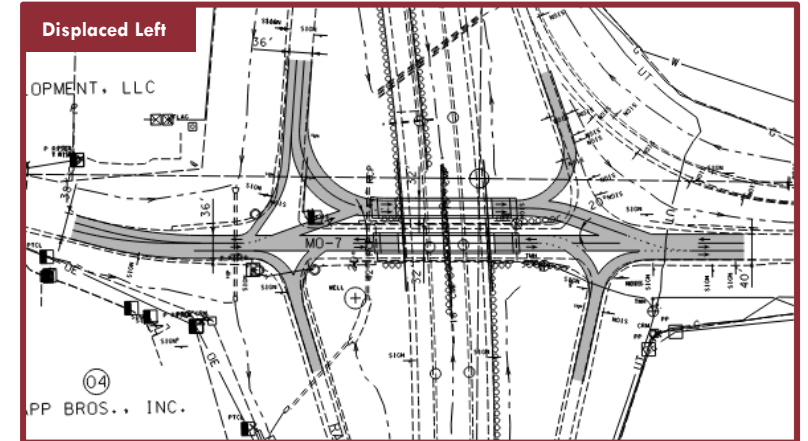
DDI – Offset South



DDI - Split



Displaced Left



Interchange Evaluation Matrix – Step 2

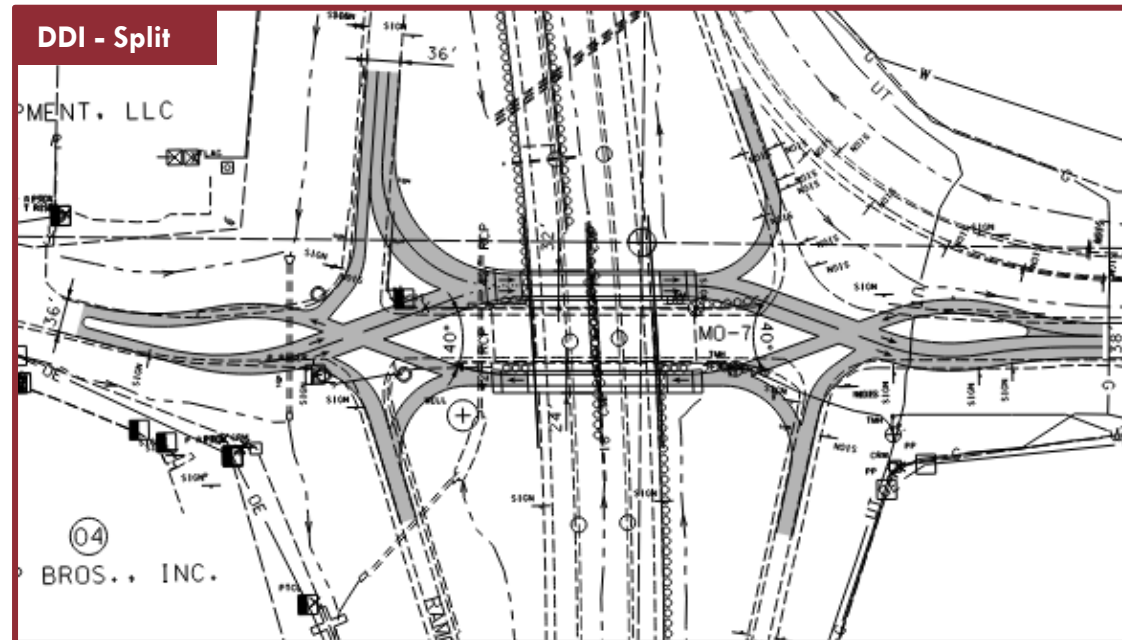
J4P3443, ROUTE 7/I-49 INTERCHANGE IMPROVEMENTS

	Evaluation Factors	Traffic Operations/ Safety	Construction Costs	Driver Comfort/ Expectations	MOT	Constructability	Right-of-Way Acquisition	Local Access	Utility Impacts	Unweighted Score	Weighted Score
	Weighting Factors	10	9	8	7	7	5	4	2		
Concept No.	General Description	1 = Worst Operations 10 = Best Operations	1 = Highest Cost 10 = Lowest Cost	1 = Most Complex 10 = Least Complex	1 = Worst Impact 10 = Least Impact	1 = Most Difficult 10 = Least Difficult	1 = Most Needed 10 = Least Needed	1 = Greatest Impact 10 = Least Impact	1 = Severe Impacts 10 = Minimal Impacts	All Selection Criteria Equal	Weighting Factors Applied
2	Diamond - offset north	6	6	8	7	8	7	9	9	60	372
3	Diamond - offset south	6	6	8	8	8	5	7	3	51	349
5	DDI - offset north	8	7	6	7	7	7	10	9	61	382
6	DDI - offset south	8	7	6	7	7	6	10	5	56	369
7	DDI - split	8	7	7	8	6	10	10	10	66	407
8	Displaced Left	5	6	5	4	5	10	10	10	55	317
										TOP 3	TOP 3

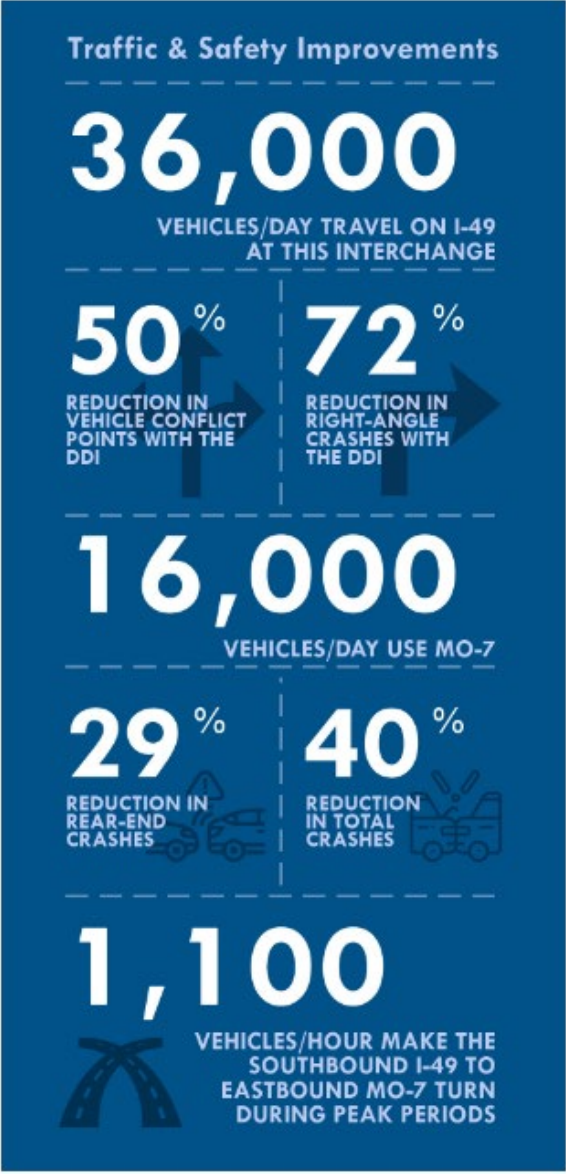
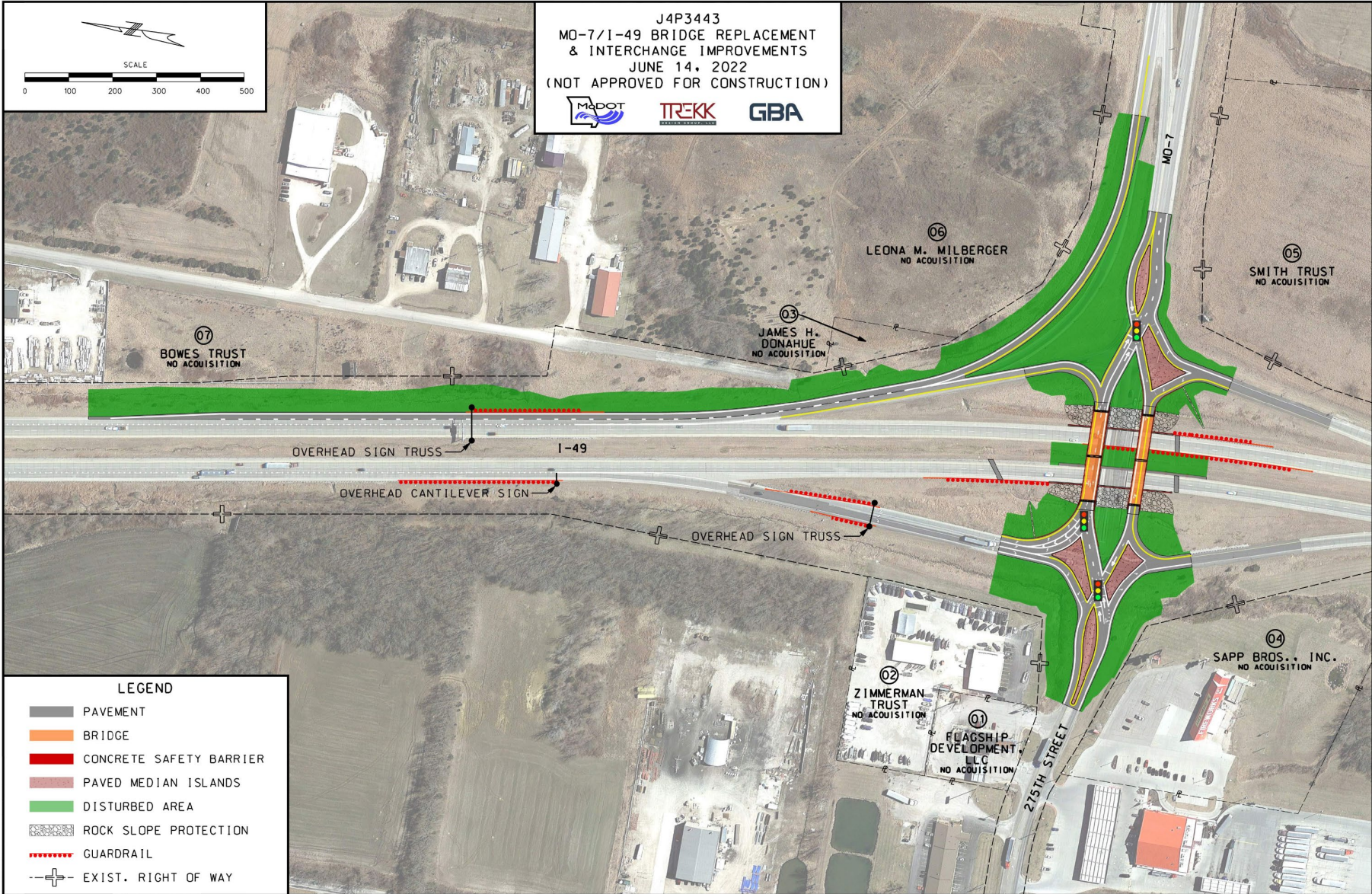
Interchange Evaluation Matrix – Step 3

J4P3443, ROUTE 7/I-49 INTERCHANGE IMPROVEMENTS

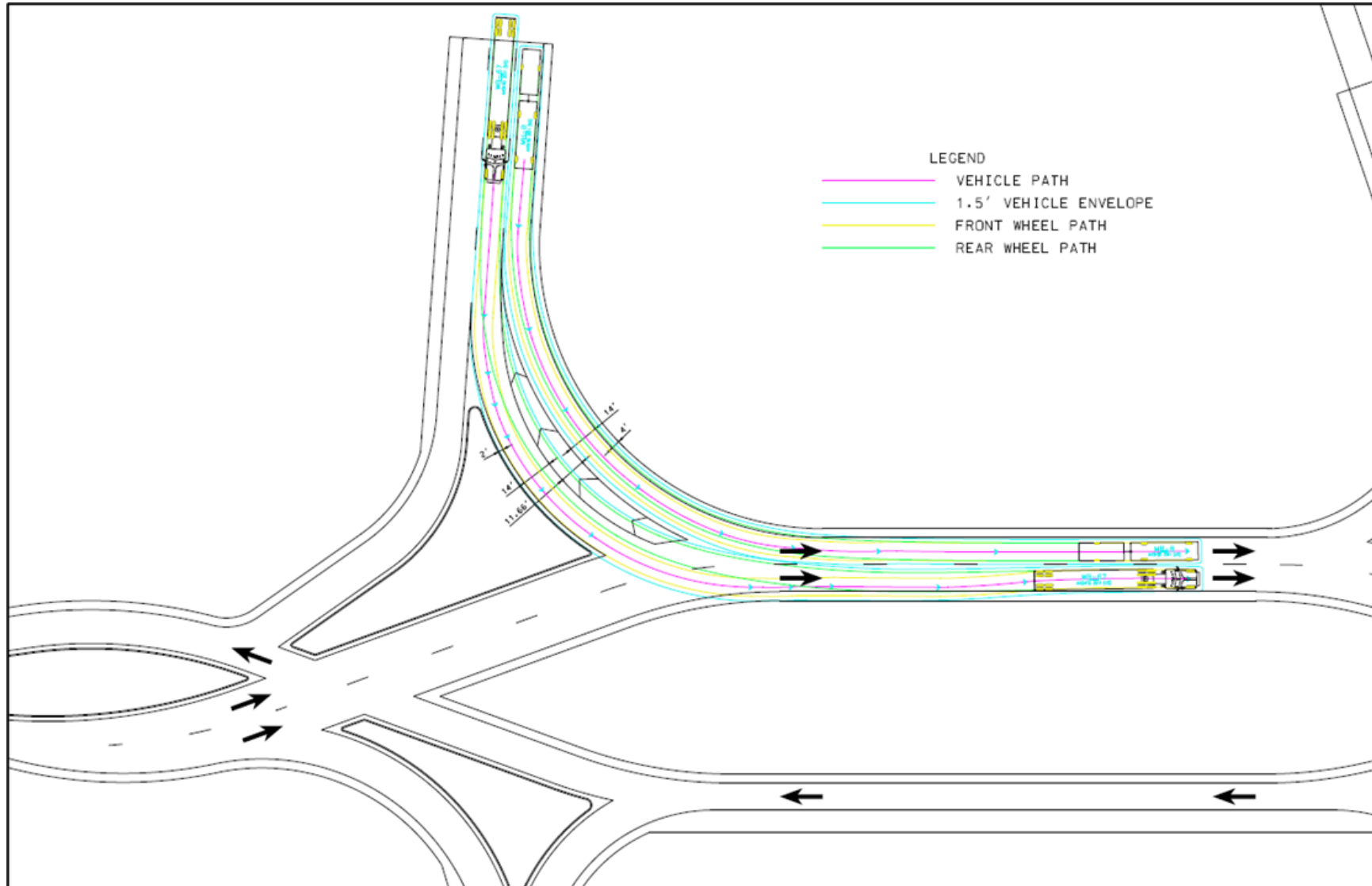
	Evaluation Factors	Traffic Operations	Safety	Construction Costs	Driver Comfort/Expectations	MOT	Constructability	Right-of-Way Acquisition	Local Access	Utility Impacts	Unweighted Score	Weighted Score
	Weighting Factors	10	10	9	8	7	7	5	4	2		
Concept No.	General Description	1 = Worst Operations 10 = Best Operations	1 = Worst Operations 10 = Best Operations	1 = Highest Cost 10 = Lowest Cost	1 = Most Complex 10 = Least Complex	1 = Worst Impact 10 = Least Impact	1 = Most Difficult 10 = Least Difficult	1 = Most Needed 10 = Least Needed	1 = Greatest Impact 10 = Least Impact	1 = Severe Impacts 10 = Minimal Impacts	All Selection Criteria Equal	Weighting Factors Applied
2	Diamond - offset north	6	5	8	7	8	8	8	10	9	69	448
5	DDI - offset north	7	7	8	6	7	7	7	10	9	68	451
7	DDI - split	8	8	7	7	6	6	8	10	9	69	461



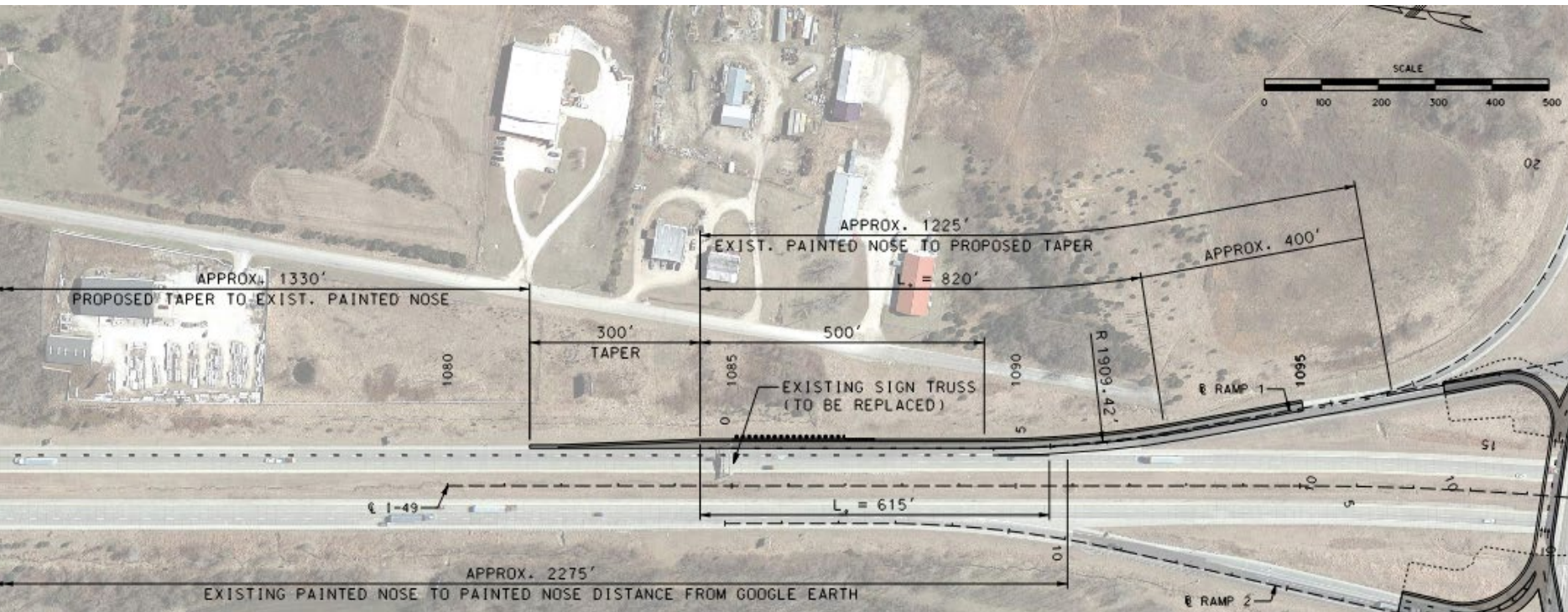
Preferred Alternative



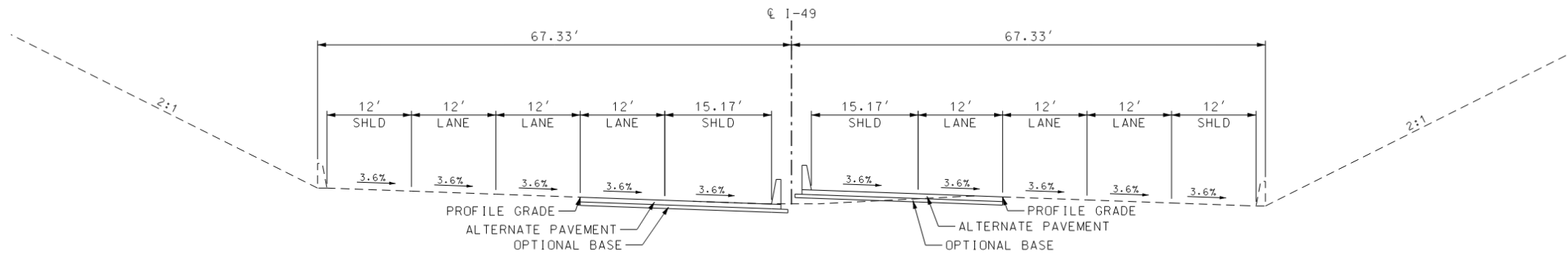
Design Vehicle



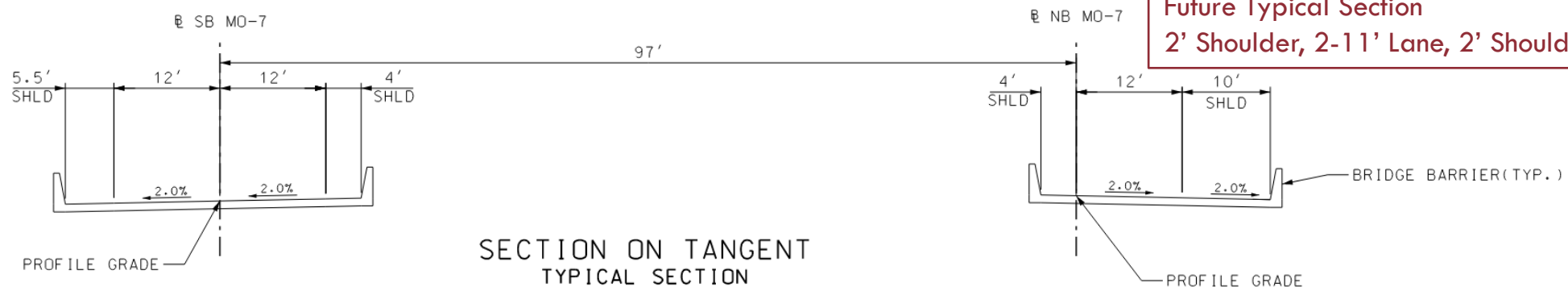
Northbound MO-7 to Northbound I-49



Future Growth Considerations



SECTION ON SUPERELEVATED CURVE
FUTURE TYPICAL SECTION I-49 AT MO-7
FOR INFORMATION ONLY



Future Typical Section
2' Shoulder, 2-11' Lane, 2' Shoulder

Eastbound

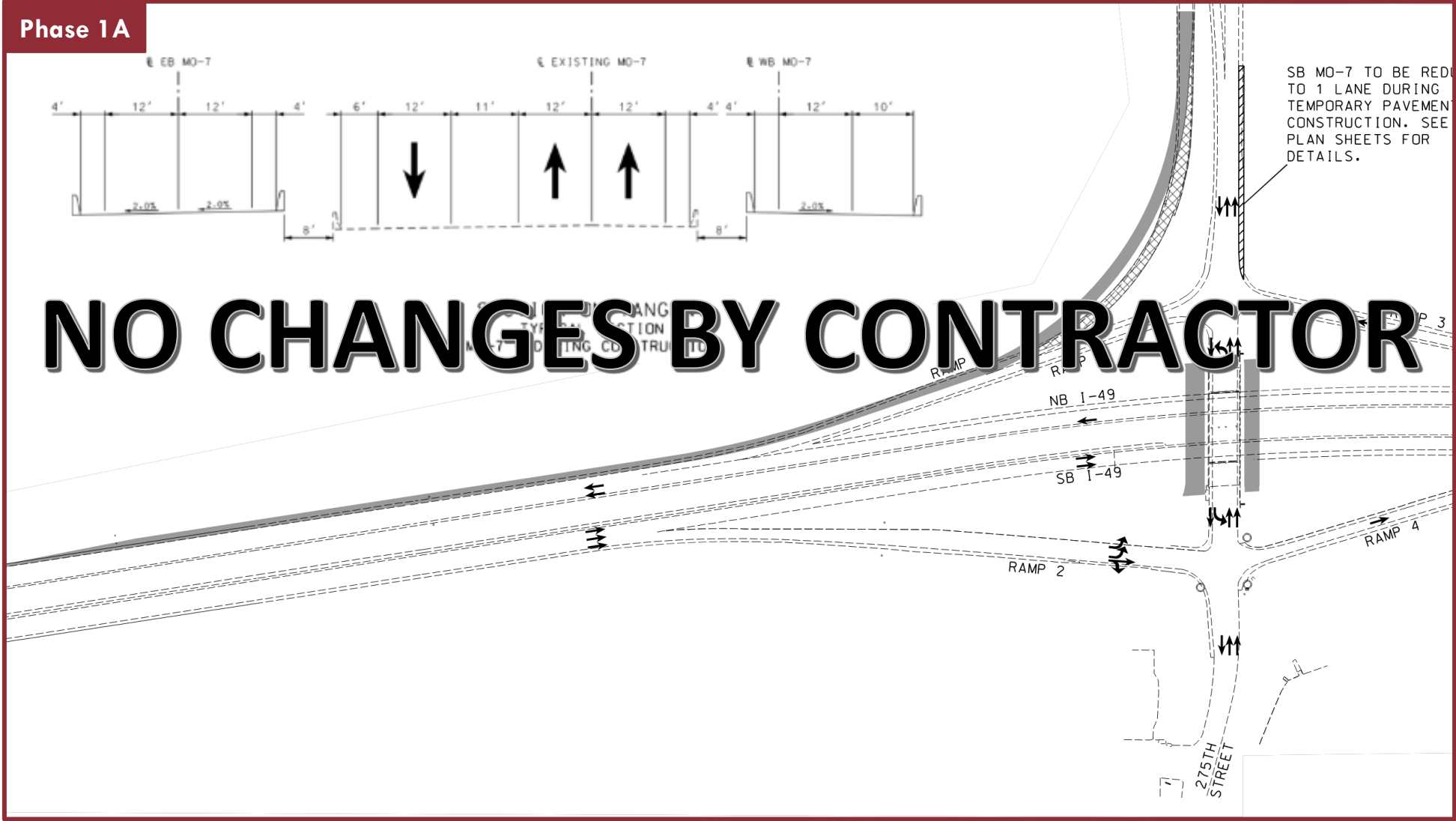
SECTION ON TANGENT
TYPICAL SECTION
NB & SB MO-7
STA. 13+35.41 TO STA. 15+43.91 NB MO-7
STA. 13+42.51 TO STA. 15+51.01 SB MO-7
(THROUGH BRIDGES)

Westbound

Construction



Construction Sequencing



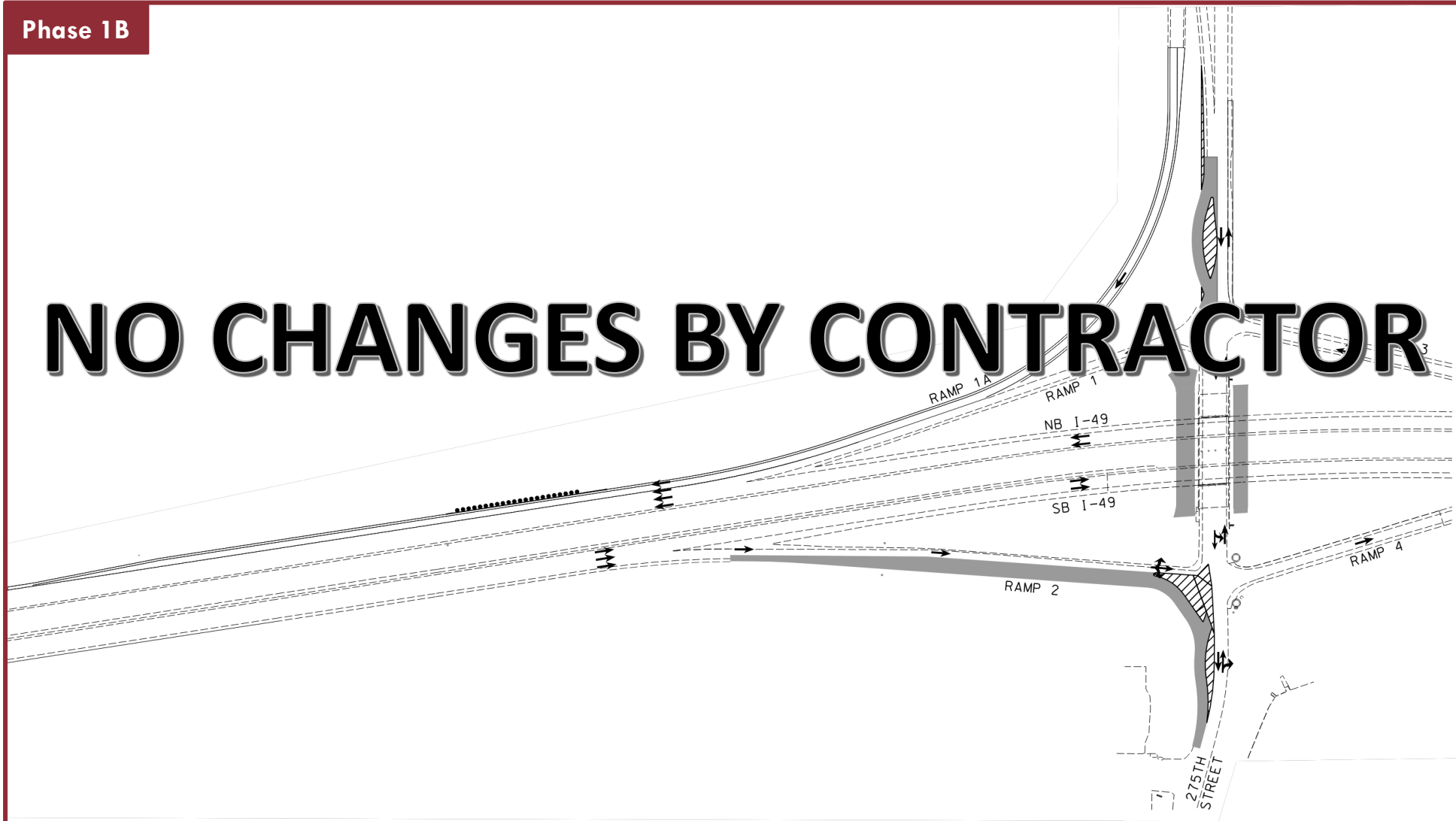
Bridge Construction



Construction Sequencing

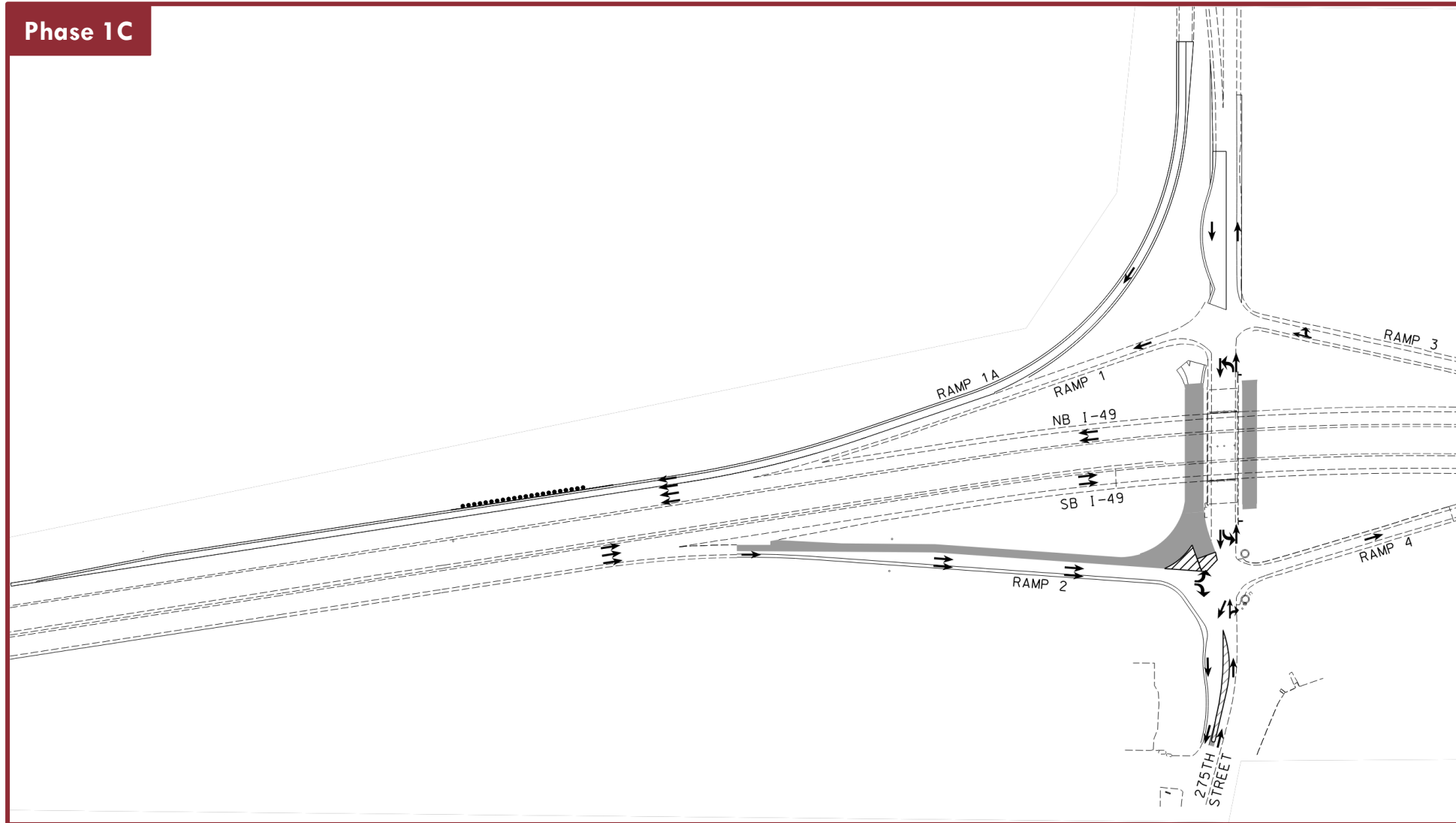
Phase 1B

NO CHANGES BY CONTRACTOR

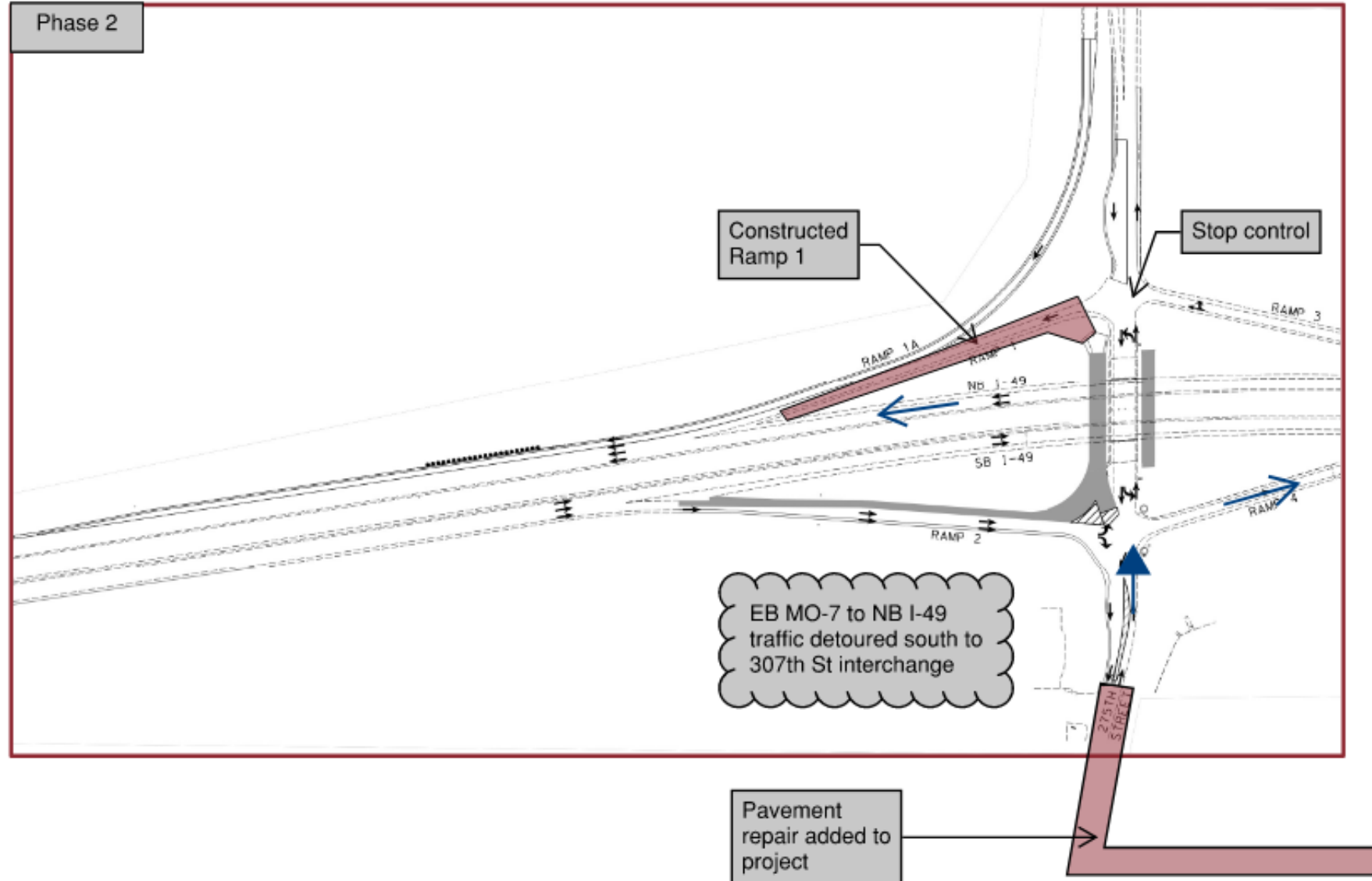


Construction Sequencing

Phase 1C



Construction Sequencing – Modifications by Contractor

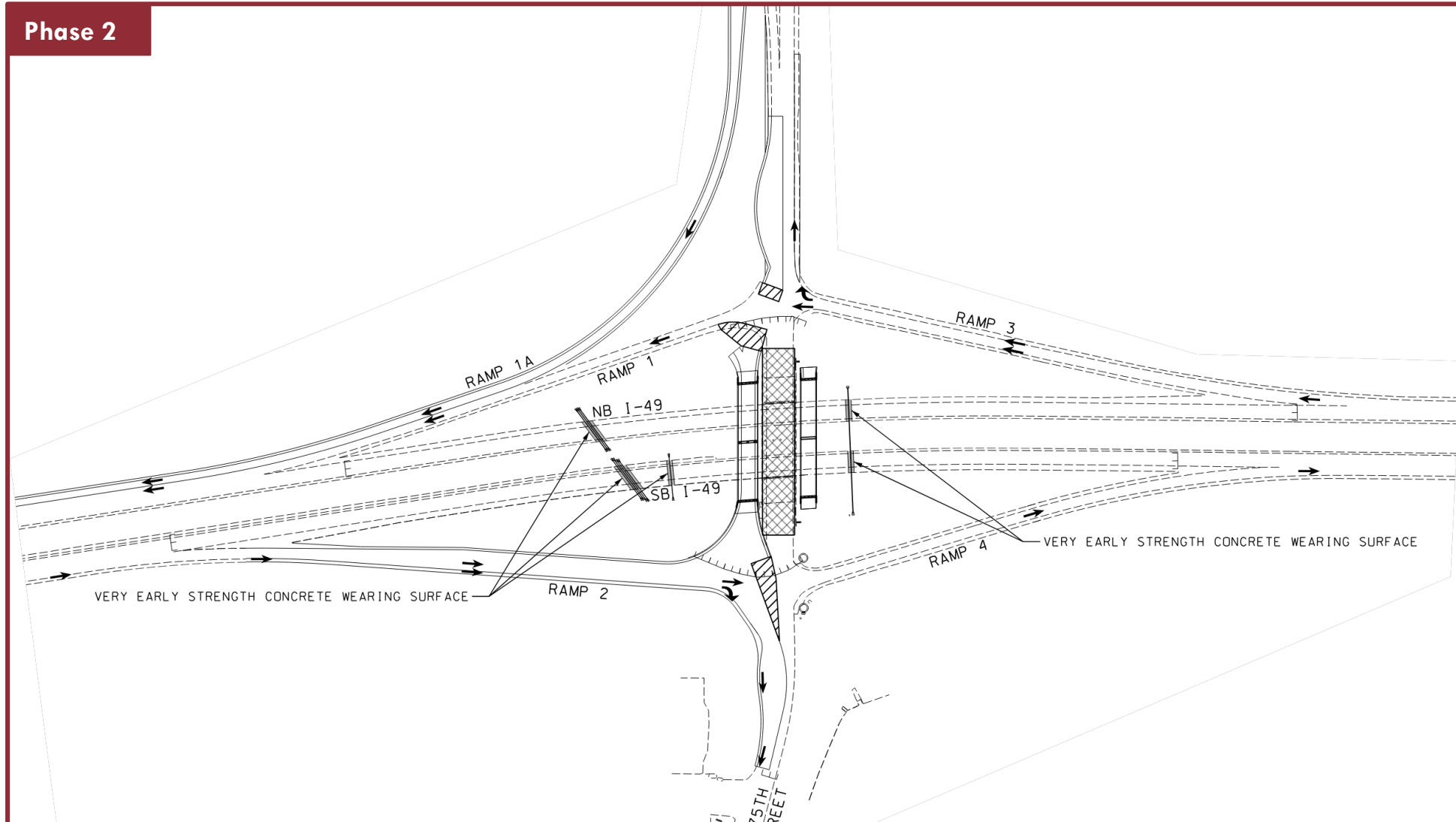


MO -7 Construction

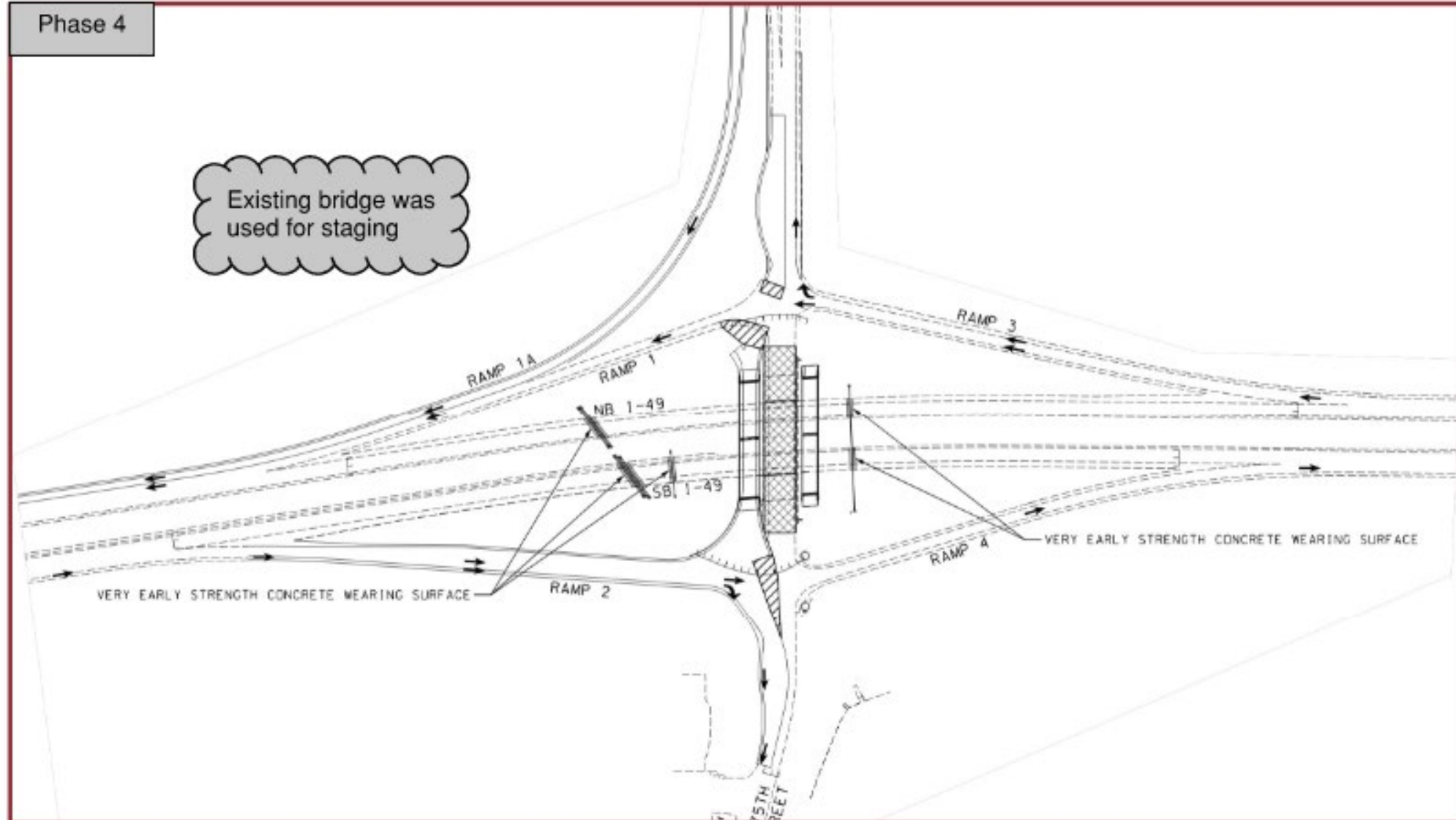


Construction Sequencing

Phase 2



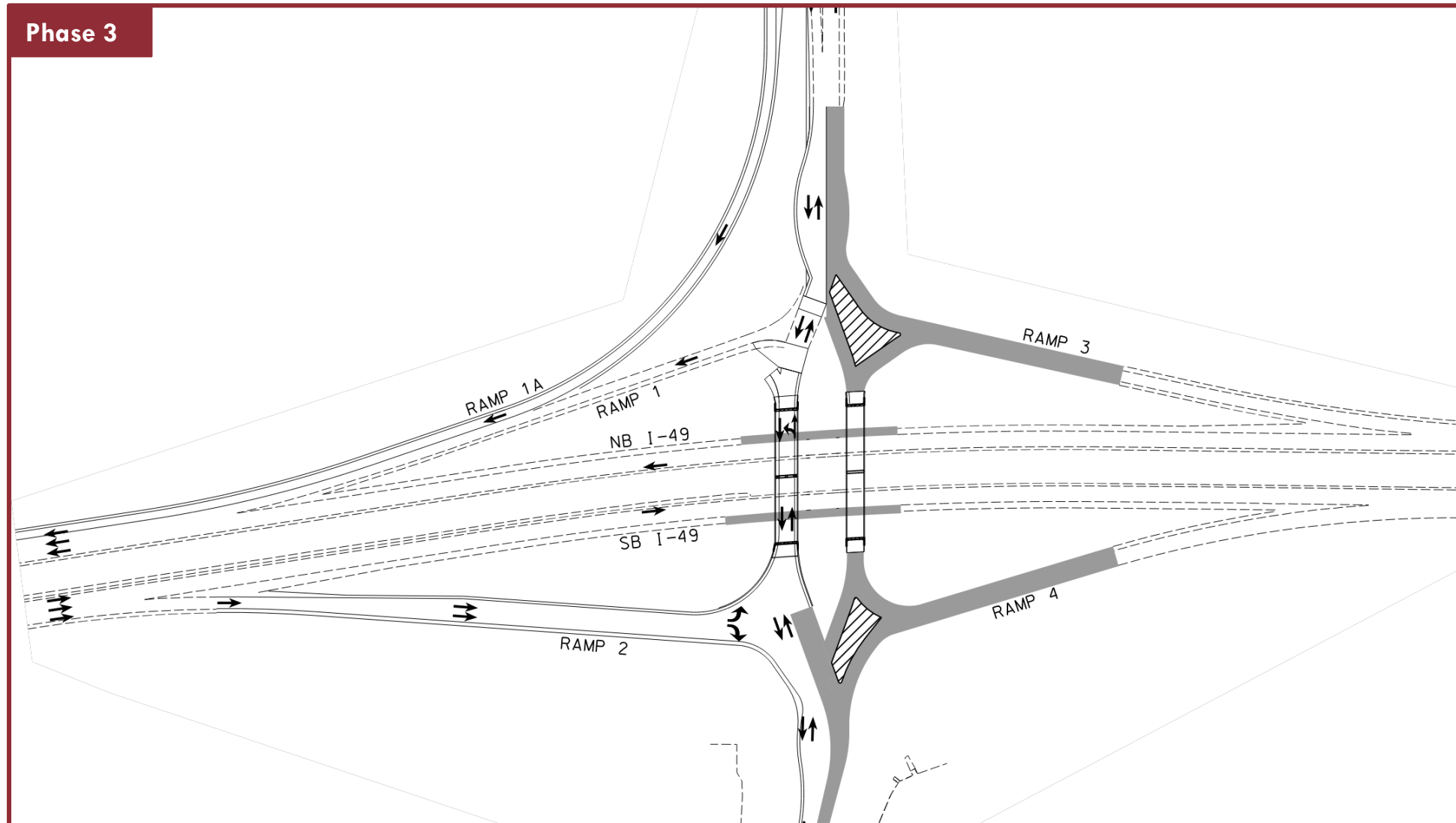
Construction Sequencing – Modifications by Contractor



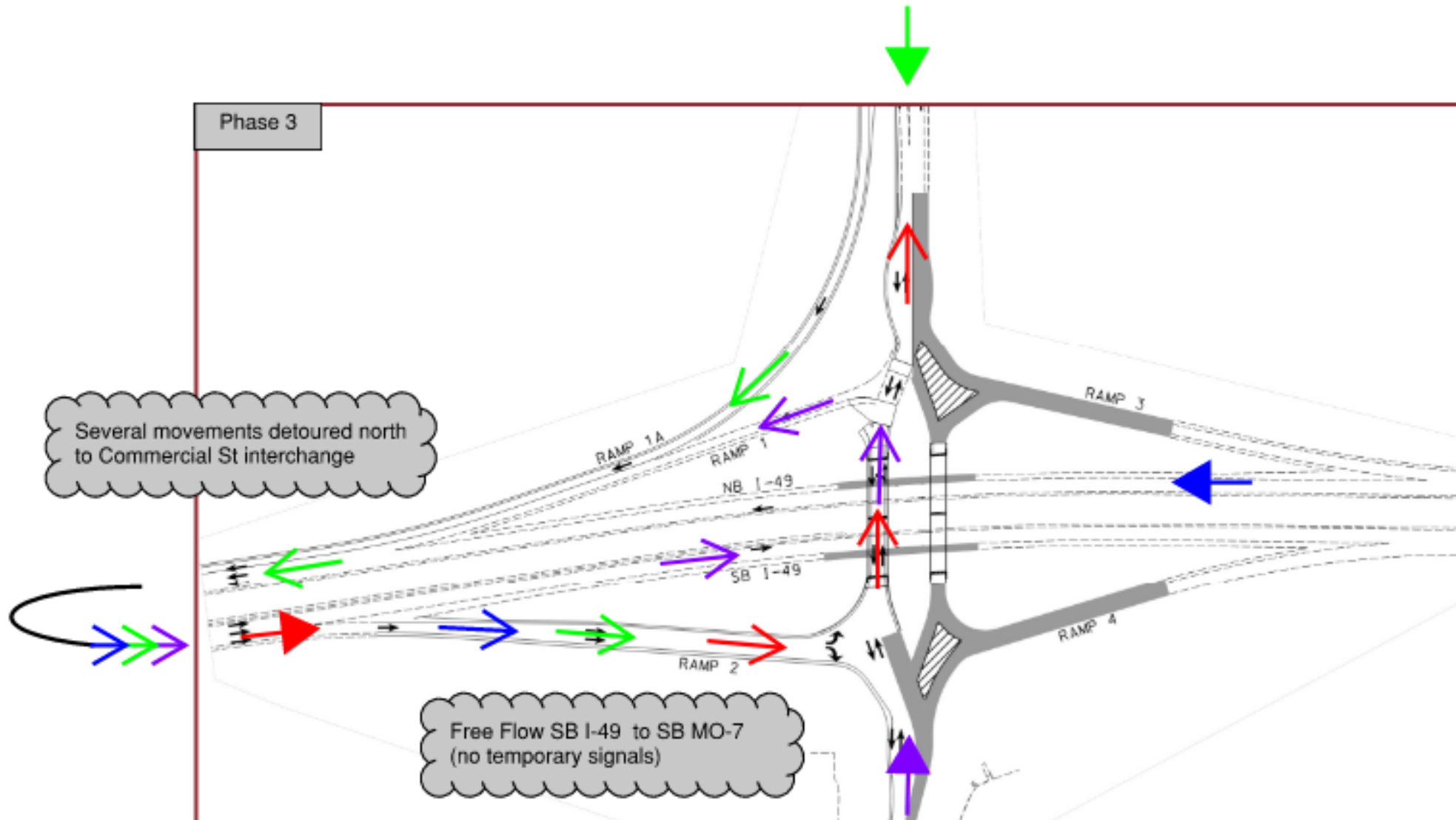
Bridge Demolition and Pipe Installation



Construction Sequencing



Construction Sequencing – Modifications by Contractor

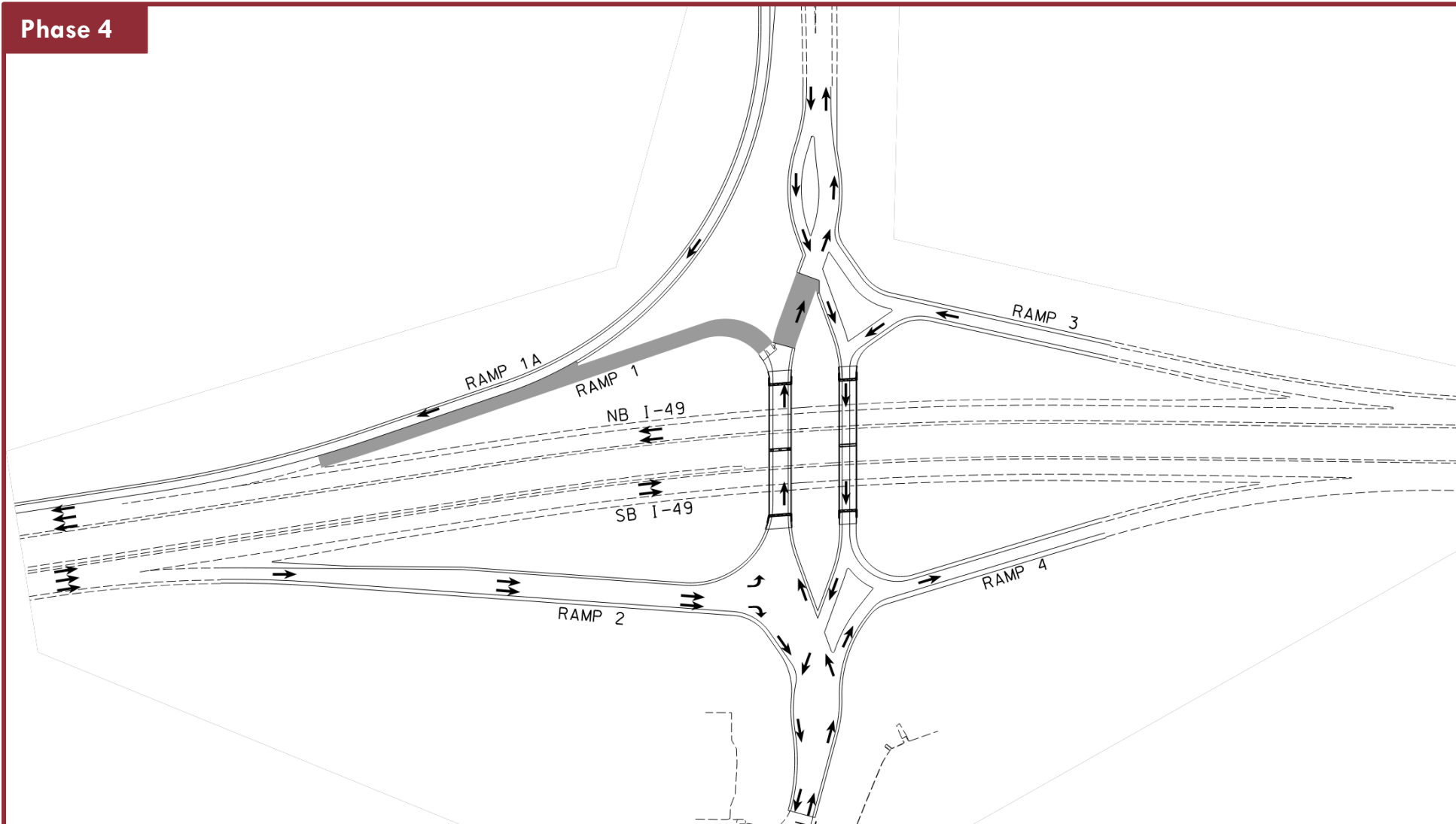


Ramp Construction

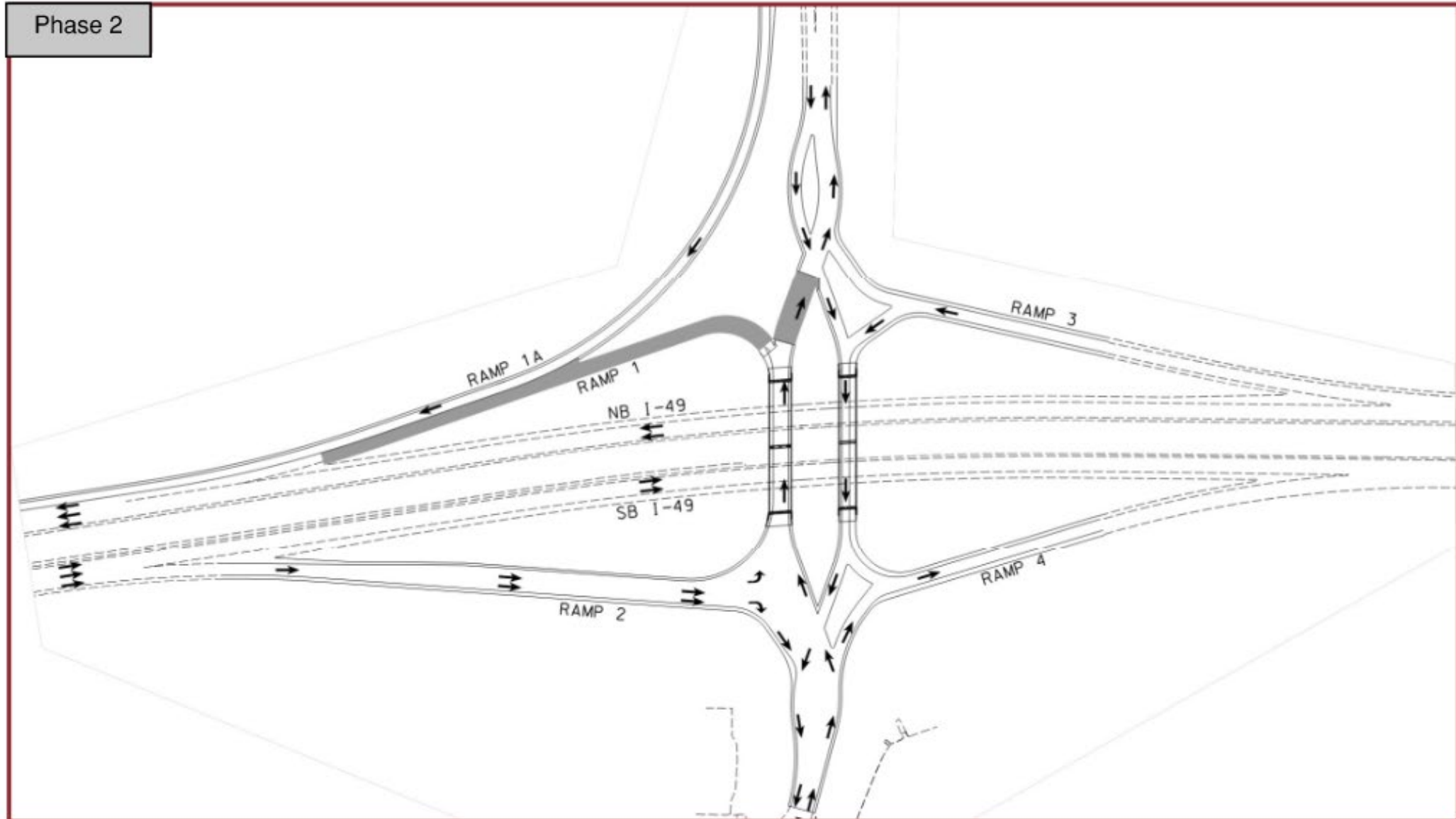


Construction Sequencing

Phase 4

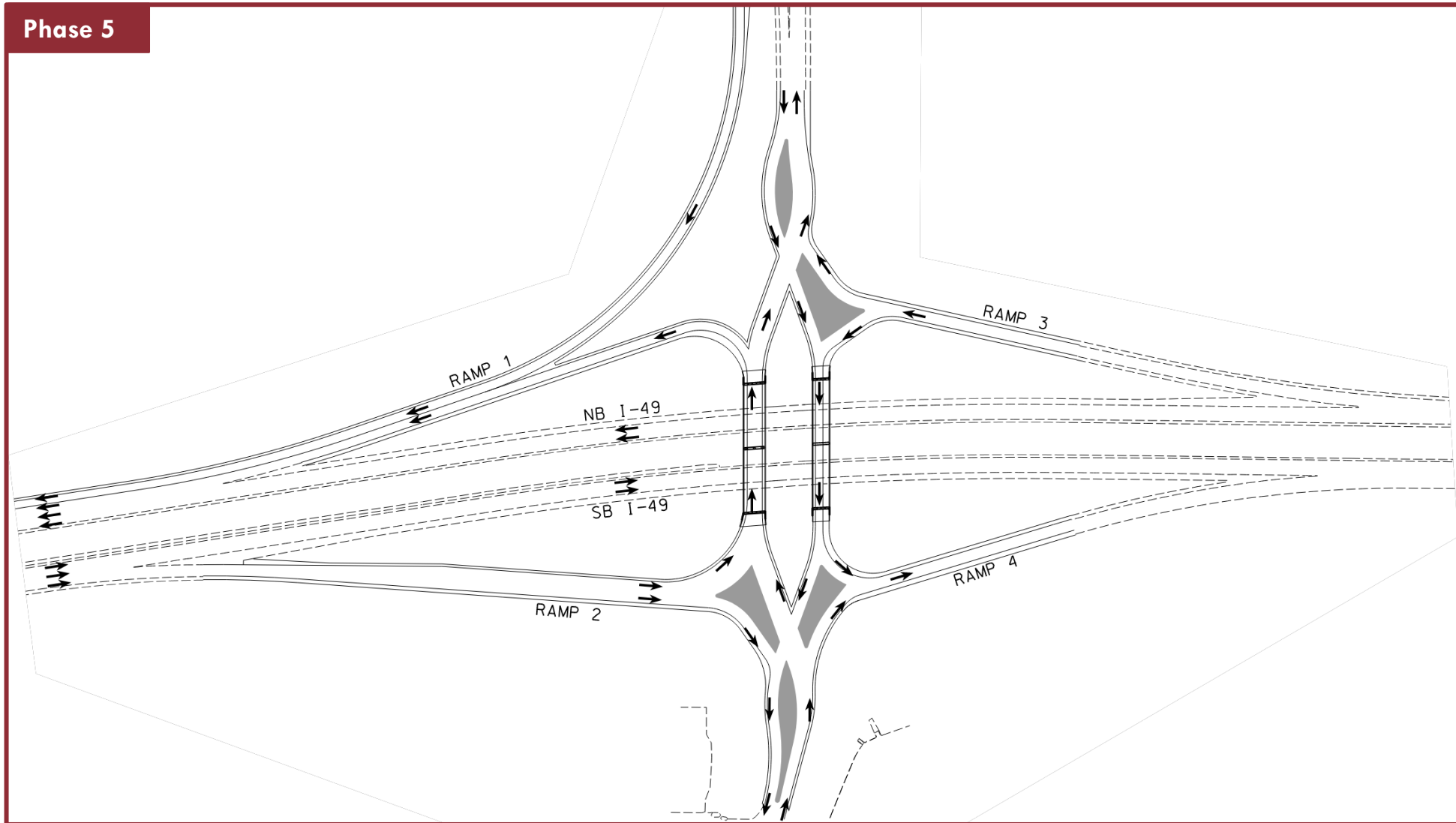


Construction Sequencing – Modifications by Contractor

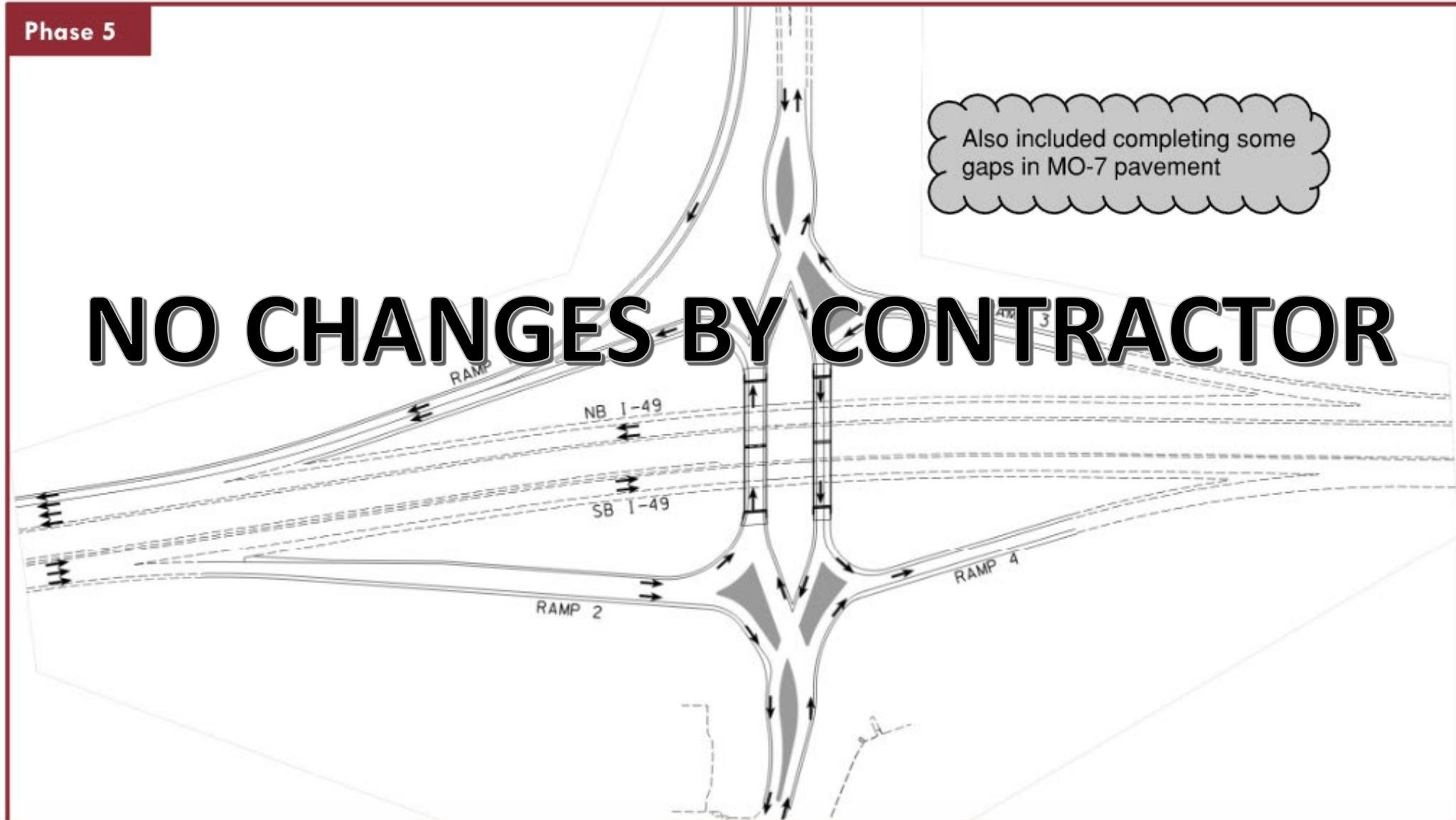


Construction Sequencing

Phase 5



Construction Sequencing – Modifications by Contractor



Construction Complete



Construction Complete



Construction Complete



Construction Complete



Schedule - Liquidated Damages

Construction NTP: July 10, 2023
Completion Date: June 28, 2024

Actual Completion: April 12, 2024

1.1 Per the traffic control plans, the liquidated damages will be assessed if the following timeframes are not adhered to:

Phase 1A Temporary pavement construction to be done no sooner than September 5, 2023

Phase 1B Traffic configuration and construction activities shall not begin until Ramp 1A is reopen and no sooner than September 5, 2023

Phase 1C Traffic configuration and construction activities shall not begin until Ramp 1A is reopen and no sooner than September 5, 2023

Phase 2 Traffic configuration and construction activities are limited to 72 hours and shall be open to traffic prior to Monday at 5:30 a.m.

Phase 4 Construction activities shall be complete no later than May 22, 2024

Project Bids

Engineer's Final Estimate: \$10,740,519



CONTRACT ID :230519-C04
LETTING DATE :05/19/23

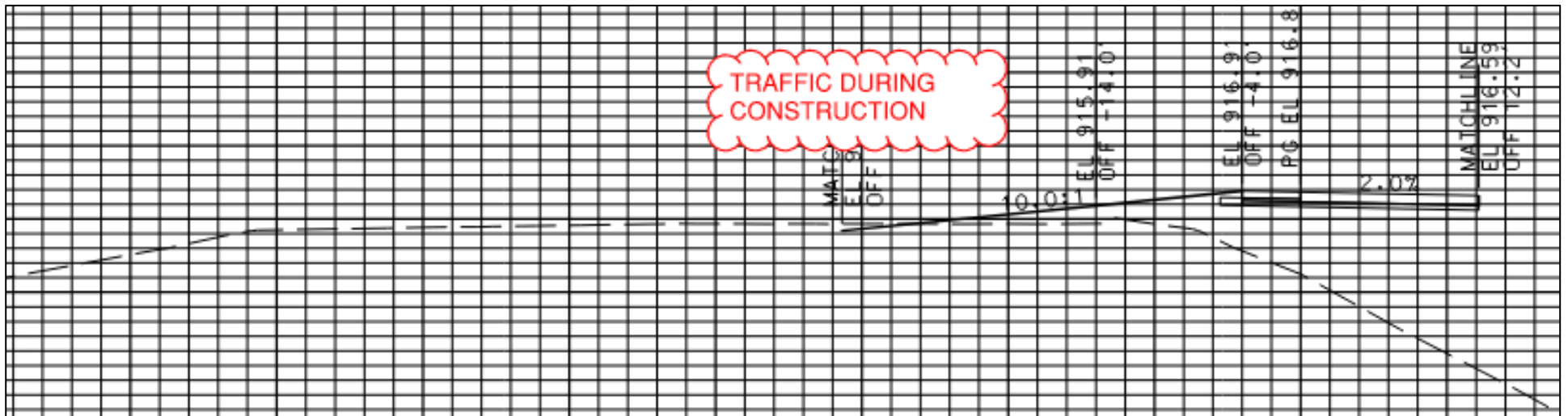
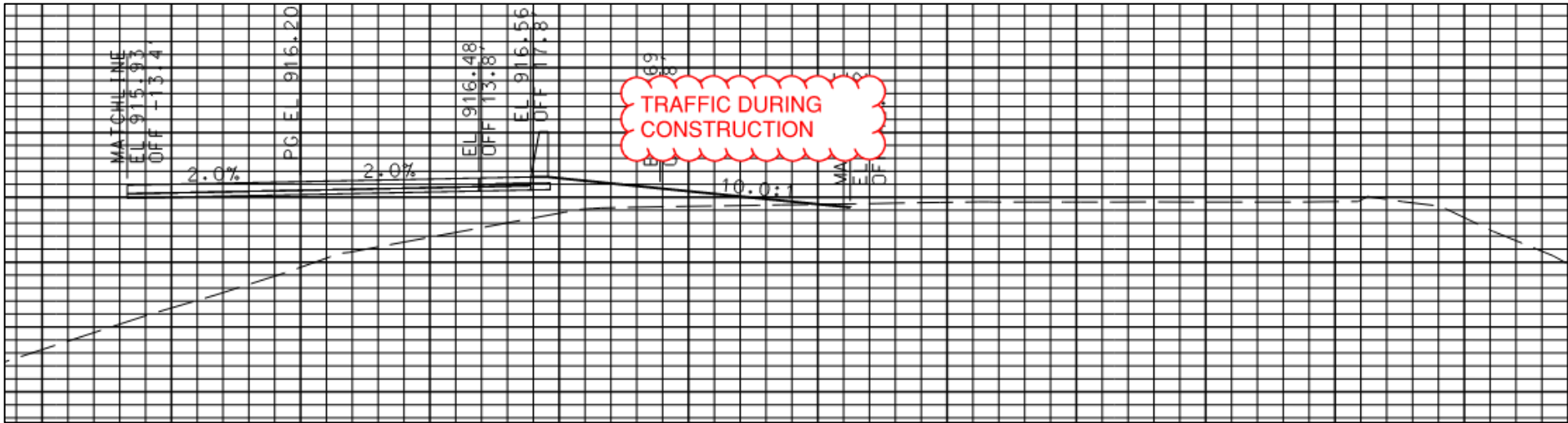
VENDOR RANKING

Call Order:C04
Contract ID:230519-C04
Letting Date:May 19, 2023 12:00:00 AM
Contract Description:J4P3443 - ROUTE I-49 - CASS COUNTY
Counties:CASS
District:Kansas City
Project(s):FAF 7-1(46)

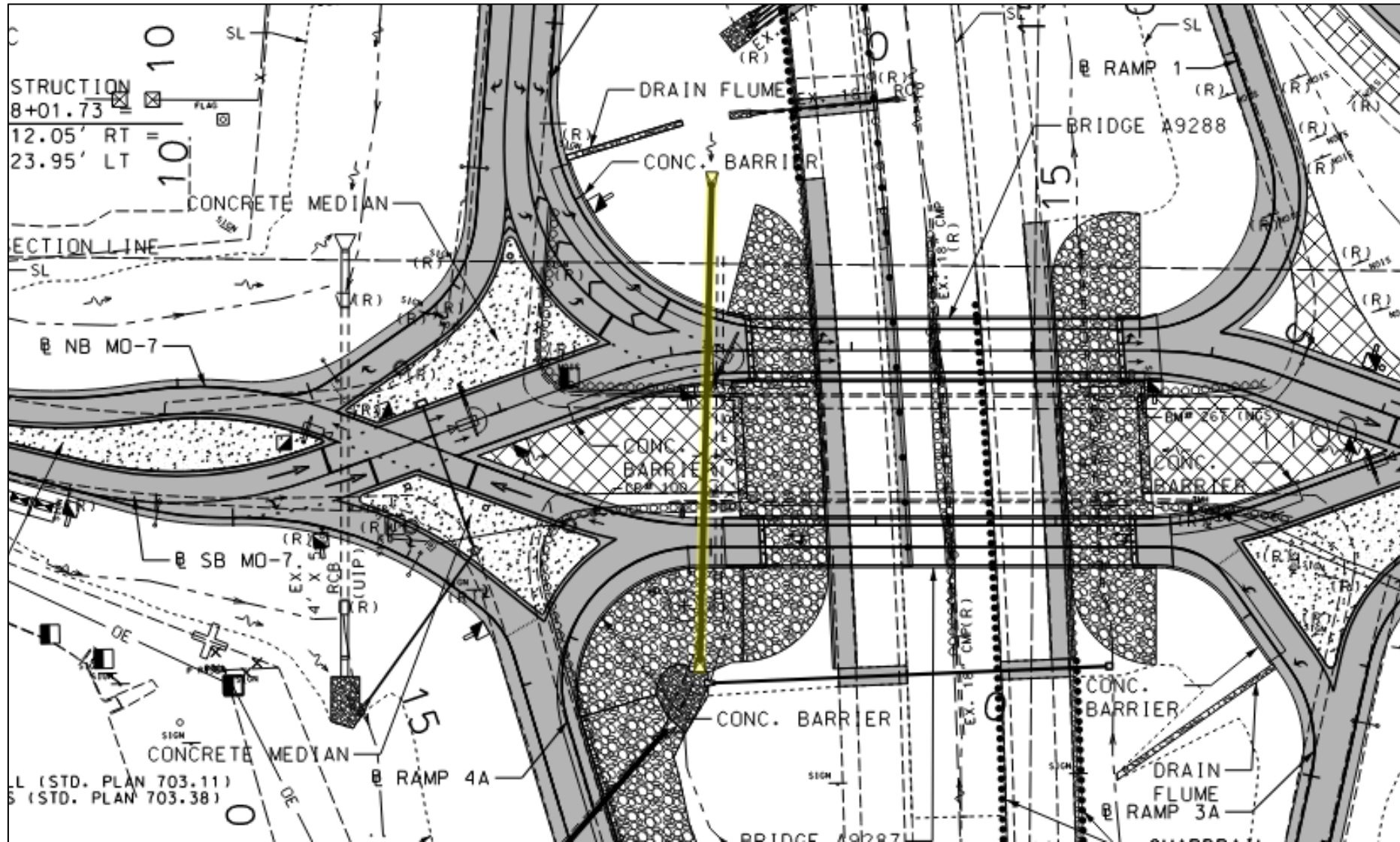
Rank	Vendor ID	Vendor Name	Total Bid	Percent Of Low Bid
1	0010739	Radmacher Brothers Excavating Co., Inc.	\$10,985,676.85	100.000
2	0025982	Miles Excavating, Inc.	\$11,279,067.56	102.671
3	0010445	Emery Sapp & Sons, Inc.	\$11,671,613.65	106.244
4	0010955	Pyramid Contractors, Inc.	\$11,997,953.18	109.215
5	0010142	Clarkson Construction Company	\$12,595,689.51	114.656

Actual Final Cost: \$10,959,917

Construction Lessons Learned



Construction Lessons Learned



[illegible]

Project Highlights



Key improvements included the following:



Reduced vehicle conflict points by 50% and simplified left-turn movements



75-year lifespan for the new bridge



Improved ramp configurations to optimize traffic flow and reduce bottlenecks



Standard clearance requirements



Enhanced connection between I-49 and Route 7

Contact Information

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Sam Tapko, PE

Transportation Project Leader

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