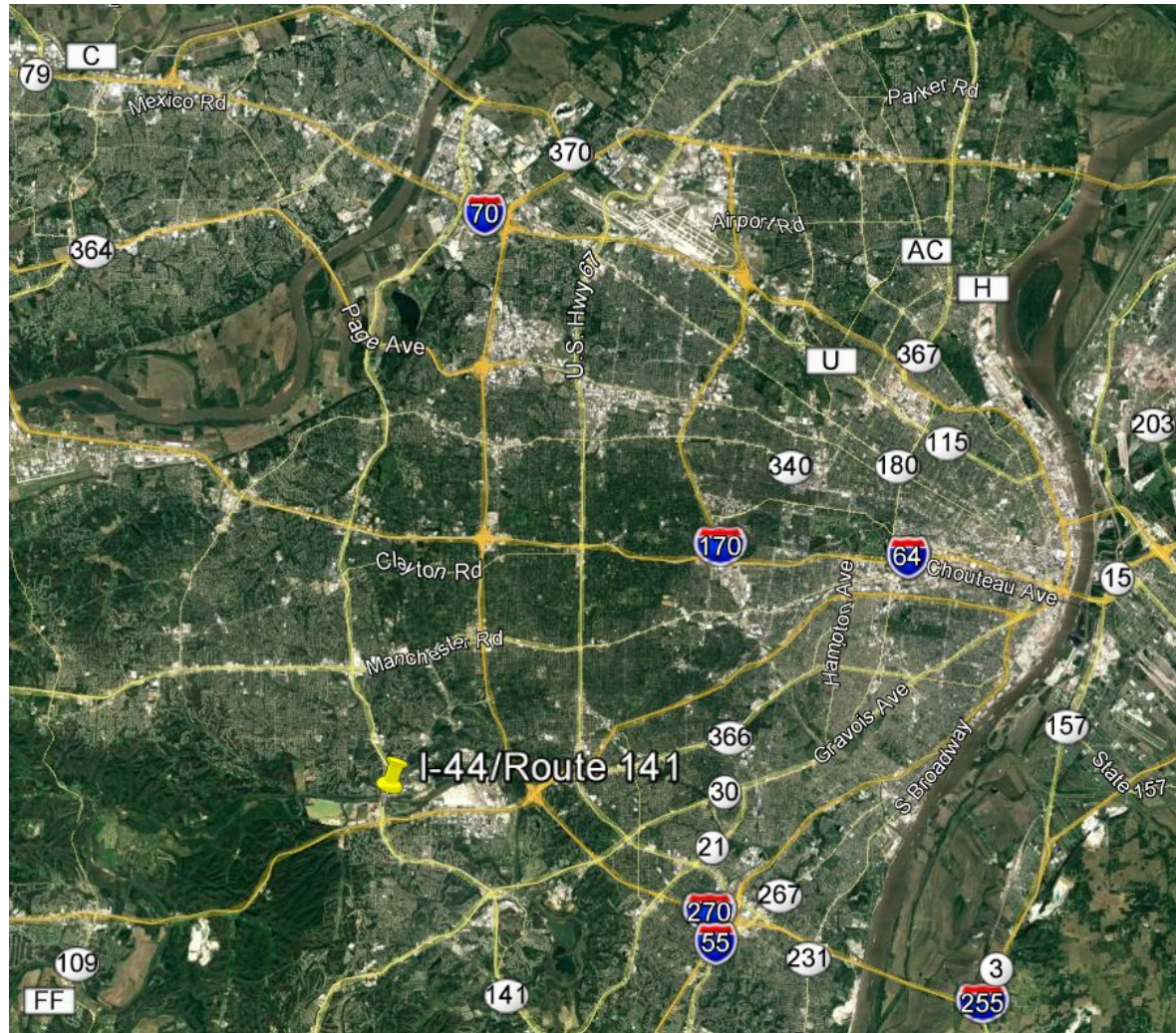




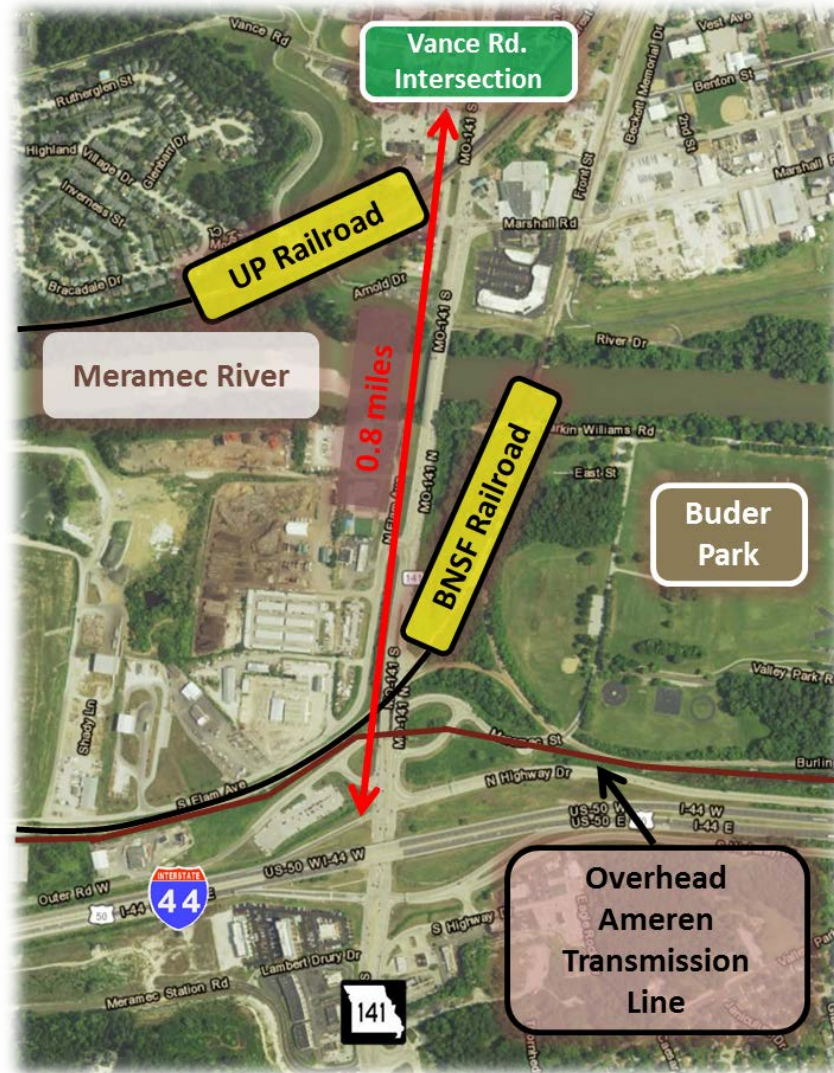
141 / 44 Design-Build Project: Interchange and ThrU-Turns

Kyle Levenhagen, PE - AECOM
Chris Morgan, PE - MoDOT

Project Location



Project Area Map



Project Goals



- ▶ 1. Deliver the project within the program budget of \$25 million.
- ▶ 2. Maximize mobility on Route 141 and improve efficiency at the I-44 interchange and Vance Road intersection.
- ▶ 3. Deliver the project in a manner which demonstrates the importance of safety.
- ▶ 4. Provide a quality project resulting in a long-lasting transportation facility that minimizes future maintenance.
- ▶ 5. Deliver the project using a diverse workforce.
- ▶ 6. Complete the project by July 15, 2018.

Timeline

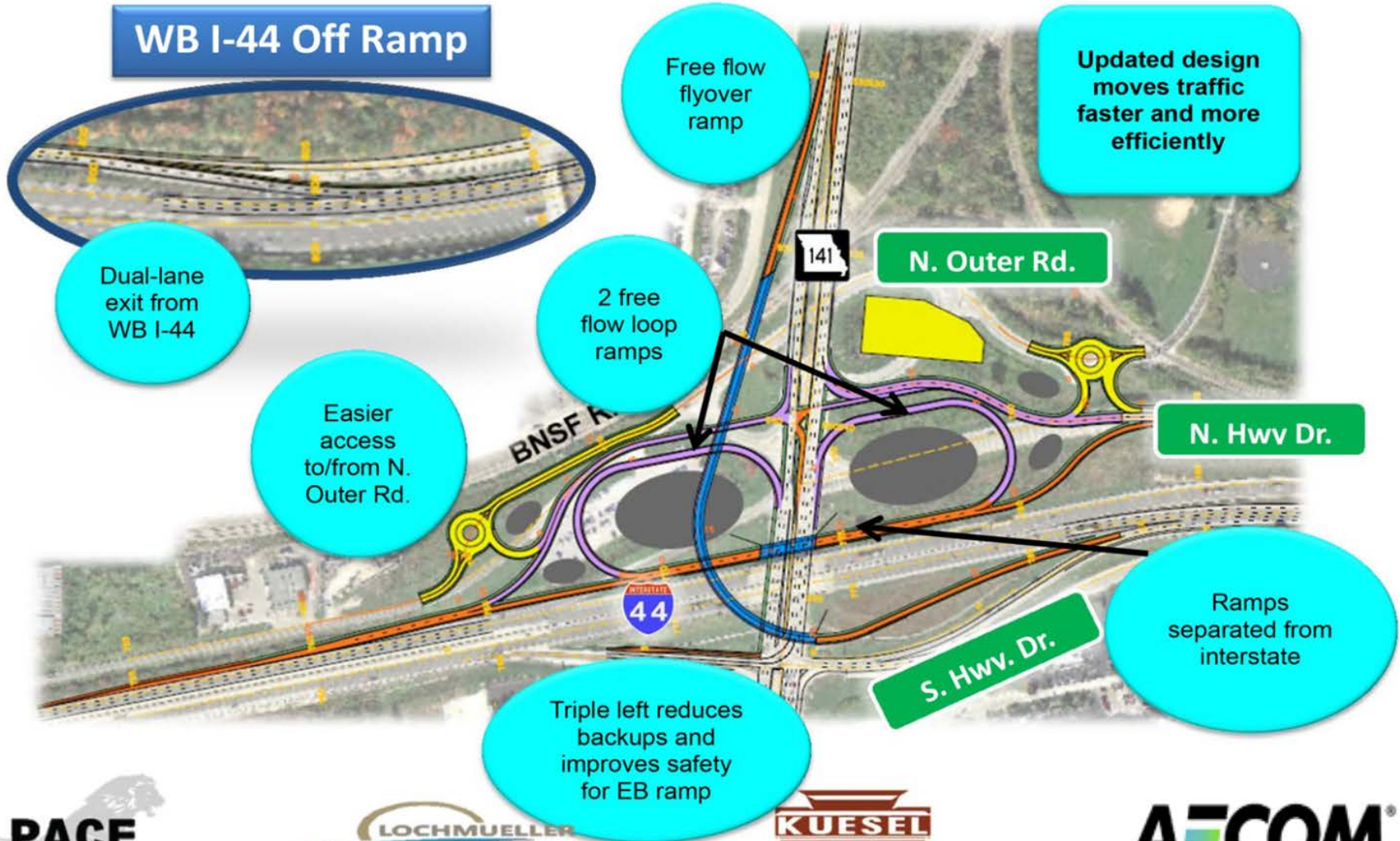


- ▶ Proposal Phase: Fall 2015
- ▶ Team Selection Announced: January 2016
- ▶ Groundbreaking: June 2016
- ▶ Project Completion: July 2018

Project Team Major Participants



I-44 Interchange Segment 1



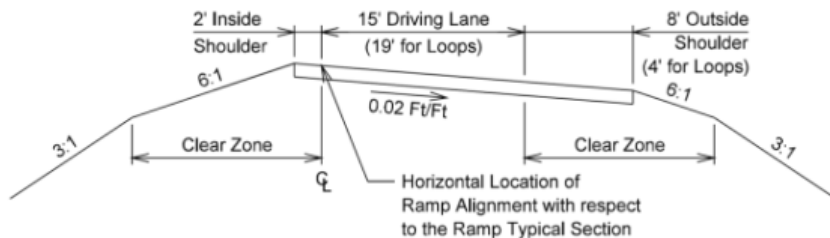
I-44 Interchange



Additional Applicable Standards



- ▶ Loop Ramp Design – South Dakota
- ▶ Bridge – Girder and Barrier Standards – Illinois, Nebraska and Texas



Ameren Tower Relocation



- ▶ Flyover Ramp Clearance Requirements:
 - 23' clearance over railroad
 - 26' clearance under transmission line
- ▶ One tower constructed and the line raised



Ramp 1 (WB On Ramp)



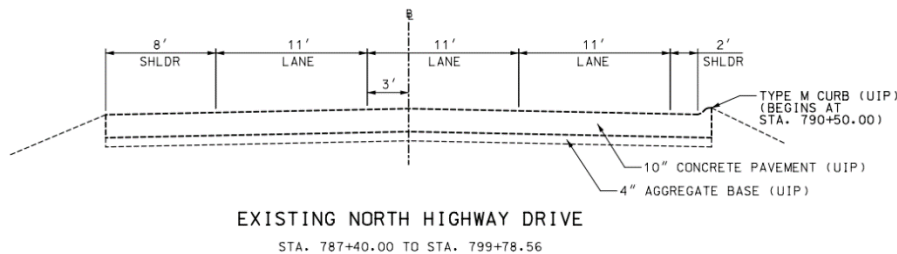
- ▶ Provides access from SB Route 141 to WB I-44
- ▶ Maintains access between Route 141 and N. Outer Road via side ramp
 - Buder Park
 - Lone Elk Park
 - World Bird Sanctuary



N. Highway Drive



- ▶ Restriped to accommodate three lanes between I-44 off ramp and C-D Road
- ▶ Moved Intersection at Route 141 further to the north



Interstate 44



- ▶ Auxiliary Lanes Extended to/from Bowles Ave. Exit (under separate contract)



C-D Road

- ▶ Allows most turning traffic to avoid Route 141 / N. Hwy. Dr. intersection
- ▶ Barrier-separated from I-44
- ▶ Curved alignment



Ramp 6 (SB 141 to EB I-44) Flyover



- ▶ Single Lane Ramp
- ▶ Cost-efficient geometrics / span arrangements
- ▶ Prestressed concrete girder superstructure
- ▶ Hammerhead Piers
- ▶ Coordination with BNSF



Ramp 6 (SB 141 to EB I-44) Flyover



C-D Bridge



- ▶ Single span over Route 141
- ▶ Prestressed concrete girder superstructure
- ▶ Integral end bents



Value-Added Improvements



- ▶ Extended northbound left turn lane at Elam Avenue
- ▶ Eastbound approach improvements at Meramec Station (south) intersection
- ▶ Widened shoulder for southbound Route 141 under I-44



Drainage Design



- ▶ Does NOT Address River Flooding

- ▶ Drainage Task Force Meetings
 - AECOM/Pace/MoDOT equal partners in design
 - Drainage Modeling provided by designer and owner

- ▶ SE & SW Quad Options Evaluated
 - Detention Basins/Ditch Widening
 - Additional Pipes
 - Raise Route 141
 - Acquisition of Park Land (SE Quad)

Drainage Design



- ▶ SE Quad Improvements
 - Segregated Detention Basin at SE corner of Route 141 /S. Highway Drive
 - Detention Basin/Ditch Widening in front of Steak 'n Shake
 - 5' X 2' Box Culvert under Ramp 6 (Flyover Ramp)



Drainage Design



- ▶ SW Quad Improvements
 - Expanded Storage Volume of Existing Infield
 - Added new pipe under Ramp 2 (EB Off Ramp)



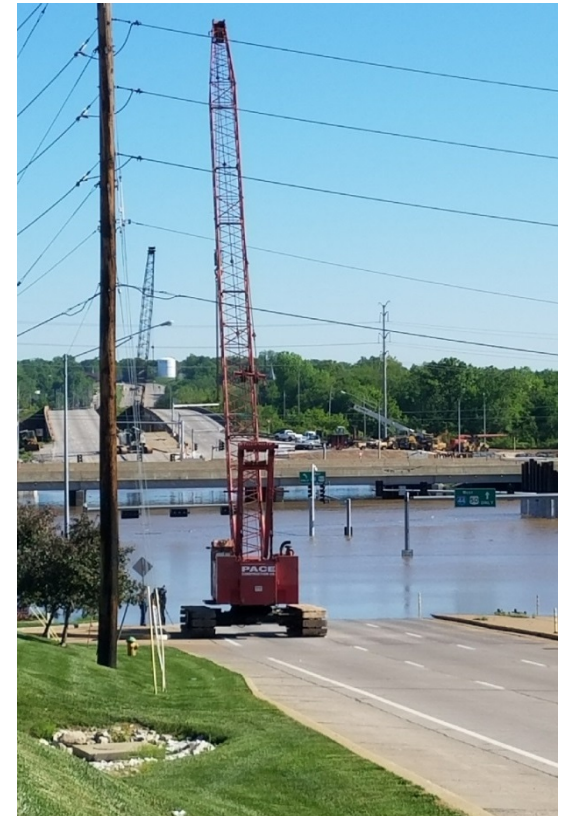
The Flood of 2017



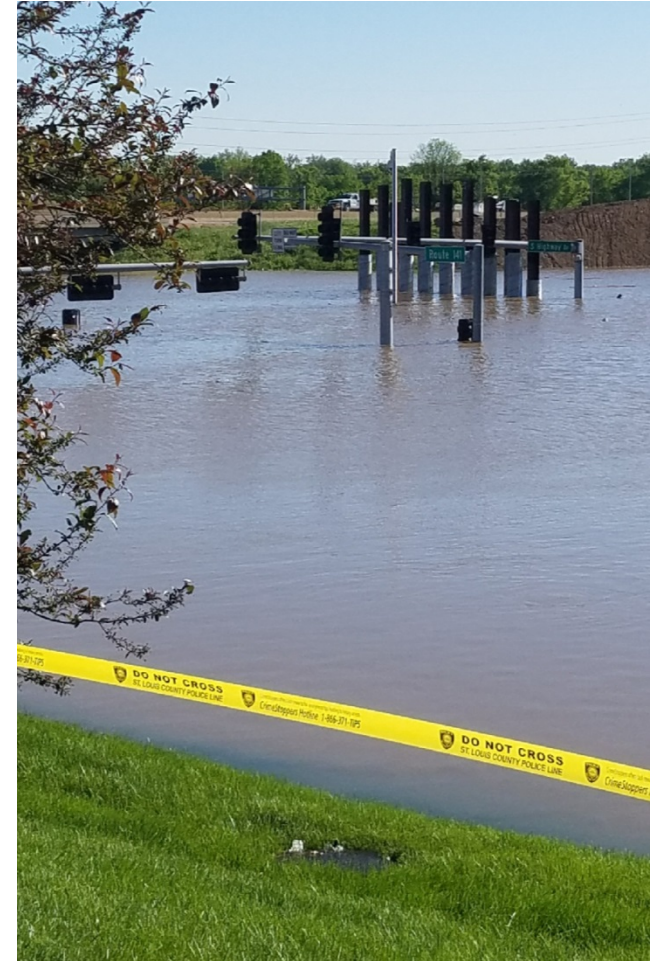
The Flood of 2017



- ▶ Late April/Early May
- ▶ Equipment Moved to High Ground
- ▶ In-Progress Work and Traffic Control Devices Secured



The Flood of 2017



The Flood of 2017



- ▶ River Crest: Elevation 435 +/-
- ▶ Route 141 Low Point: Elevation 419 +/-
- ▶ Road Closures: Route 141 - 8 Days
I-44 - 2 Days



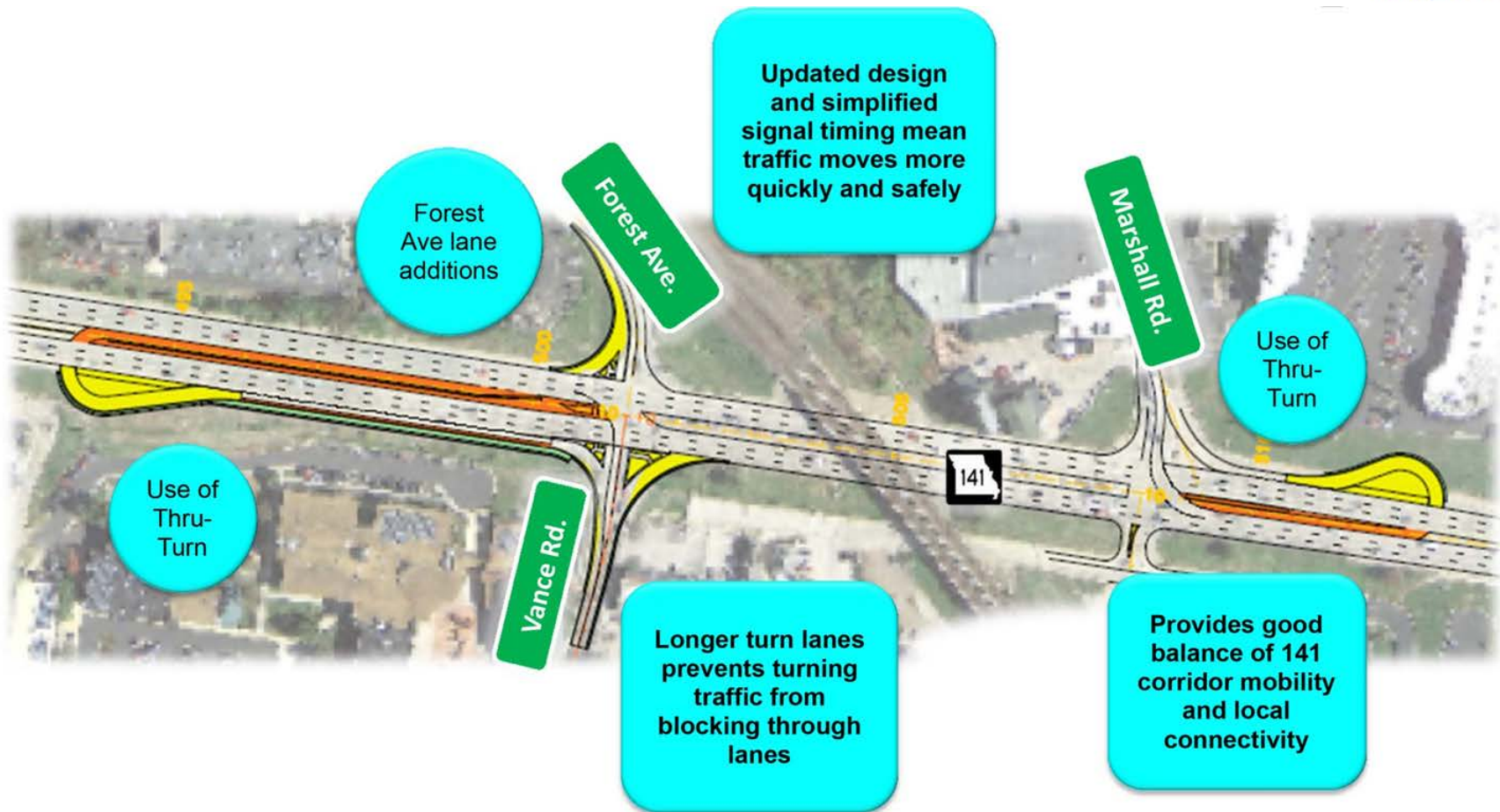
The Flood of 2017



- ▶ Work Halted for up to 2 Weeks
- ▶ Partial Rebuilding of East MSE Wall at C-D Bridge Required



Vance Road Intersection Segment 2



ThrU-Turns



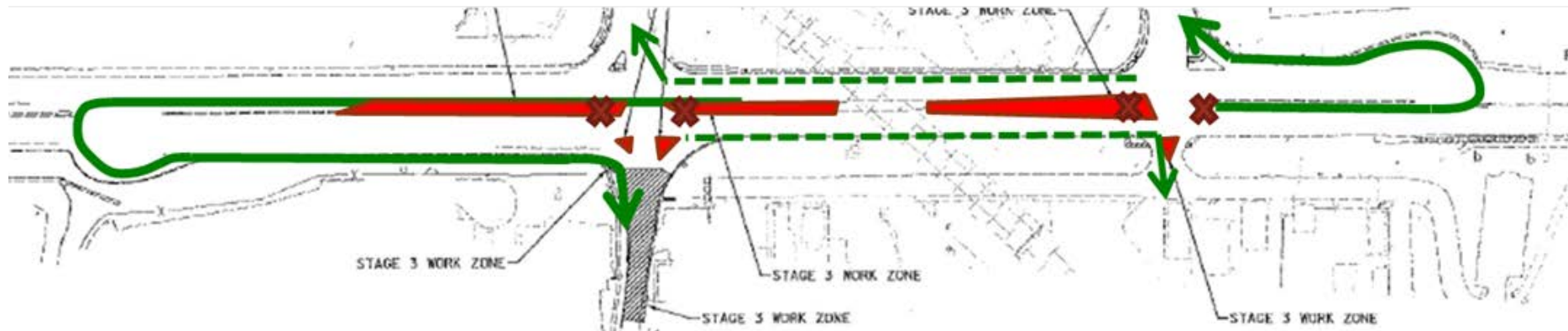
- ▶ Facilitate left turns from Route 141 to side roads



ThrU-Turns How They Work



- ▶ Left Turns Prohibited at Intersections
- ▶ Reduce Conflict Points
- ▶ Simplified Signal Design (2-Phase)



ThrU-Turns

Why use ThrU-turns on 141?



- ▶ UPRR Bridge Constraint
- ▶ Utility Corridor on West Side of Route 141
- ▶ Minimal Right-of-Way Impact
- ▶ Provide Pair Instead of Single ThrU-Turn



Thru-Turns Informing the Public



- ▶ Stakeholder Meetings
- ▶ Web Updates
 - Project Website
 - YouTube Videos
- ▶ Brochures
- ▶ Press Releases
- ▶ Door Hangers

- ▶ Thru-Turn Web Page:
www.modot.org/thru-turns

How do they work?

Have you ever tried to turn left out of a parking lot onto a busy road and found it so hard to get a space to make your turn that you turned right and made a U-turn? In many cases it was faster than waiting to directly make a left turn. Thru-turns use many of the same concepts to make a more efficient and safer left turn.

With a thru-turn, drivers wanting to turn left drive through the intersection and make a U-turn at a signalized median crossover. After making their U-turn, they get into the right-most lane and make a right turn. Since they are not in the intersection, other traffic movements are possible.

The key element is that the thru-turn may take you a little out of the way, but can help more people make a left turn quicker. In addition, it can also provide more space for left turns in areas where there is limited space before the intersection. There are fewer changes required for the signal at the intersection, which means that engineers can give more time to the through traffic (and get them through the intersection faster too.) The turn is wide enough to handle all traffic, including busses, and can easily handle a large number of cars.

Alternative intersections, such as the thru-turn reduce the amount of time that traffic spends waiting for a turn by at least 25 percent. That means that even with the extra distance drivers must travel (maybe a fifth of a mile) they can still get through the turn quicker.



Traditional left turns can back up and block the through lanes.

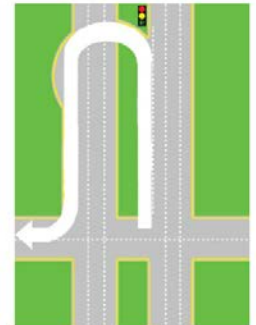


Thru-turns can help traffic turn left quicker and safer.

They can also improve the amount of traffic that can get through the intersection by up to 50 percent. This helps reduce the congestion on the through roadway and the cross street during peak traffic periods.

It may be a little different, but it is faster and it reduces the wait time at left turns – it's safer for drivers and for pedestrians. Thru-turns help keep you moving and keep you safer.

**Making it
Thru
a thru-turn**



ThrU-Turns Smooth Rollout



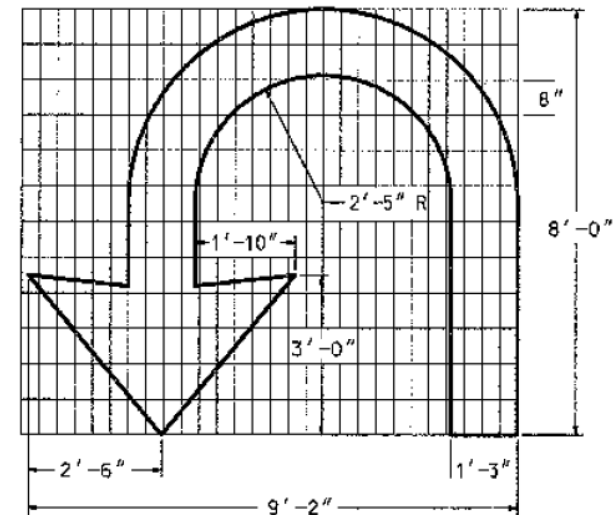
- ▶ Changeable Message Signs (CMS)
- ▶ Open After End of School Year
- ▶ Single Construction Phase Opening
- ▶ Law Enforcement Presence



ThrU-Turns Signing and Pavement Markings



- ▶ MoDOT EPG & MUTCD Guidance
- ▶ Similar Location Types
- ▶ State DOTs



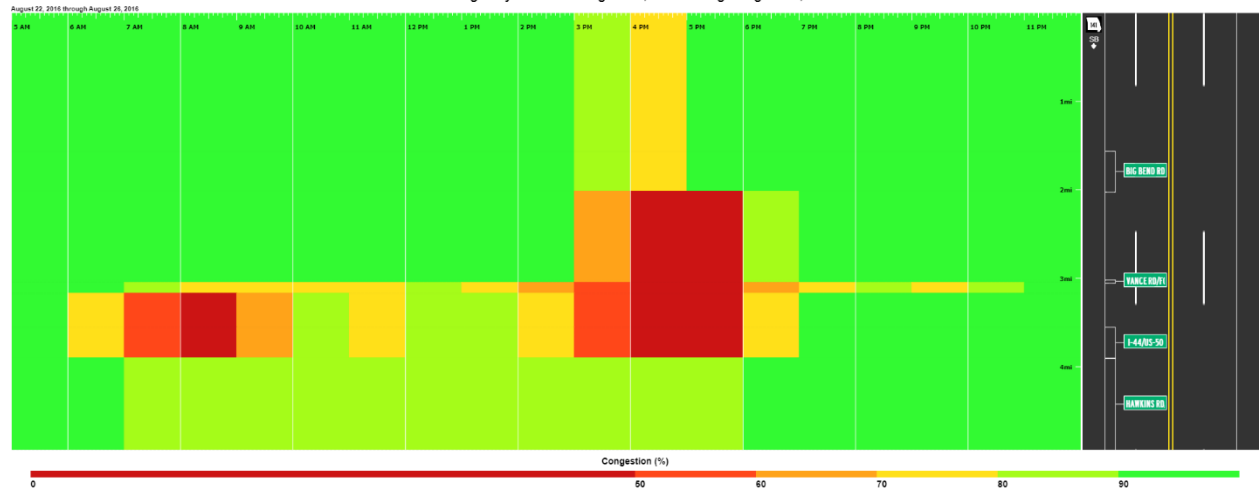
PAVEMENT MARKING, ARROW, TYPE 7
WHITE
(26.0 SQ. FT.)

ThrU-Turns Southbound Traffic Comparison



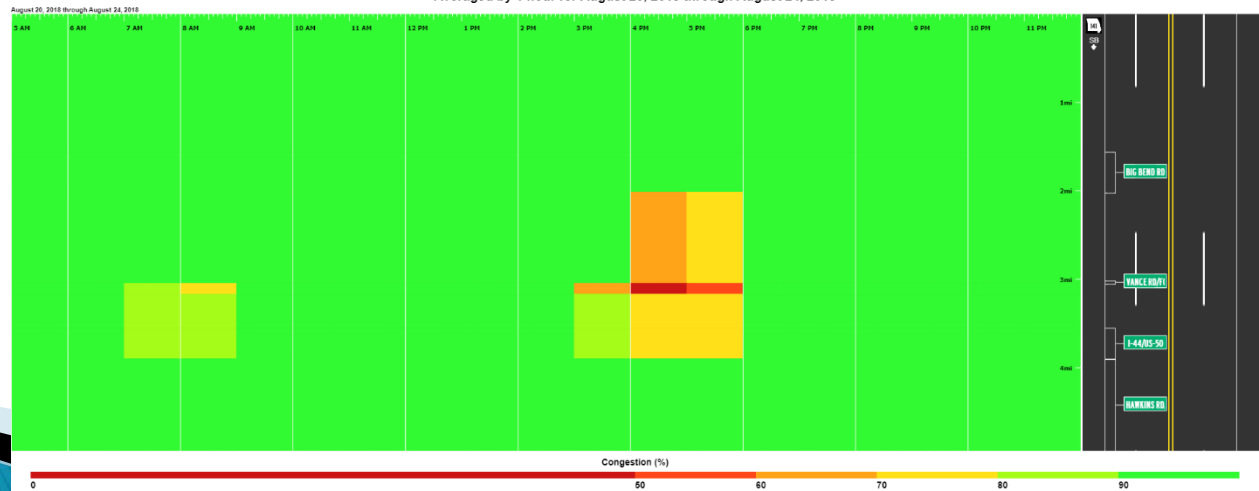
- ▶ August 2016

Congestion for MO-141 Southbound between Big Bend Rd and Hawkins Rd/Gladiator Dr using HERE data
Averaged by 1 hour for August 22, 2016 through August 26, 2016



- ▶ August 2018

Congestion for MO-141 Southbound between Big Bend Rd and Hawkins Rd/Gladiator Dr using HERE data
Averaged by 1 hour for August 20, 2018 through August 24, 2018



ACEC/MO 2019 Engineering Excellence Grand Award Winner



MoDOT I-44 at Route 141 \ Design-Build

Callouts:

- Free flow loop ramp
- Ramps separated from interstate
- New detention basin
- Triple left reduces backups and improves safety for EB off-ramp
- Free flow loop ramp
- Easier access from north outer rd.
- New Roundabouts on both sides of intersection
- Free flow flyover ramp
- Relocated Park and Ride

Legend: New Pavement (Orange), New Bridge (Green), Improvement (Blue)

About the Project
 AECOM leading the design for Pace Construction allowed MoDOT to address two major safety issues along the Route 141 corridor at I-44. (1) At the I-44 interchange, three new ramps pulled significant volumes of traffic out of previously congested intersections, improving corridor mobility and safety. (2) AECOM was able to reduce delays and crashes caused by left turning traffic queueing into the through lanes of Route 141 at the Vance Road and Marshall Road intersections by designing the first thrU-turns in Missouri.

Callouts:

- Right turn exit only
- Improved pedestrian crossing
- North ThrU-Turn
- South ThrU-Turn
- New right turn lane
- New left turn lane

AECOM Imagine it. Delivered.
 Entering Firm: AECOM
 Client: MoDOT (Pace Construction)
 Location: St. Louis County, MO

For More Information



- ▶ Online:

www.modot.org/route-141-i-44-design-build-project/

- ▶ Contacts:

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