



State of Missouri 2021 Governor's Award for Quality and Productivity Executive Summary

Project or Team Name: Displaced Left-turn Interchange

Nominator: Ryan Hale

Nominating Department: Missouri Department of Transportation

Category: Innovation

Executive Summary: Executive Summary page must be 500 words or less, 12 point, Times New Roman font, and left justified. **Attach the Executive Summary to the front of the nomination.**

MO-152 in Liberty is a major commuter and retail corridor accommodating more than 45,000 vehicles a day. The interchange at I-35 was a source of congestion and safety concerns, particularly during peak traffic times. Additionally, pedestrians were only accommodated on one side of the cross street increasing the potential for dangerous human and vehicle interaction.

The MO-152 bridge over I-35 was nearing the end of its useful life. A team was assembled to find the best way to replace the bridge and widen the corridor for better traffic flow. The original diamond interchange would need to be replaced and innovative thinking would be required to address the interchange's unique challenges.

A traffic modeling study concluded that a traditional diverging diamond interchange (DDI) would not be effective. The team created an arrangement of vehicular movement that it named "displaced left-turn interchange" that is the first of its kind in the world. In traffic modeling studies, the displaced left-turn interchange resulted in 45% less delay and 30% less travel time than a traditional DDI, which has been evidenced after the construction was completed.

The innovative solution eliminates the more traditional left turn at the main intersection. Vehicles must first cross through the opposing through lane at a signal-controlled intersection several hundred feet from the main intersection. Traffic signals at the interchange are made more efficient by altering phases and allowing different traffic movements to move at the same time. The resulting interchange combines the best attributes of traditional diamonds (which excel with high through volumes, but struggle with high left-turn volumes) and DDI (which excel with high left-turn volumes, but struggle with high through volumes).

Since its completion, travel times and queue lengths on the corridor have been reduced and the capacity of the corridor has been substantially increased. Additionally, the unique lane configuration means less bridge and pavement must be constructed and maintained, reducing the project costs. The project also provided an upgrade to pedestrian accommodations on the second side of the cross street for increased safety. The interchange was completed on time and on budget and has been well received by the businesses and communities in the area.

Video Summary: A brief - no longer than three minute - video summary may also be submitted via a link. Submission of a video summary is optional.

[Displaced Left-turn Interchange Video Link](#)



State of Missouri 2021 Governor's Award for Quality and Productivity GUIDELINES

PURPOSE

The Governor's Award for Quality and Productivity (GAQP) recognizes teams that champion service excellence, efficiency and process improvement, and innovation in Missouri state government. All projects must meet requirements of effectiveness, responsiveness, and efficiency of such magnitude that would make the project a model of excellence in state government nationally.

ELIGIBILITY

Any team of individuals employed by the State of Missouri who worked together to implement a project within their own agency, or who have worked with another section, division, department, agency, organization or business to implement a project which exemplifies the purpose of the GAQP, may submit a nomination. The combined number of individuals representing any team should consist of **2 to 20 team members (maximum)** – the majority of whom are state employees.

Teams must provide documentation which includes, but is not limited to, background information, measures, and other supporting material that demonstrates the impact of the project. Projects are encouraged to demonstrate the potential for replication in other jurisdictions or settings.

Once a nomination has been approved by the department/agency and submitted for consideration for the GAQP, additional team members may not be added.

All projects must have been in existence long enough to have a **measurable** impact.

EXECUTIVE SUMMARY

Describe (in 500 words or less) the initial challenge, research, problem-solving measure, documentation, results, etc. Executive summary page must be typed in 12 point, Times New Roman font, and left justified. **Attach the executive summary to the front of the nomination.** [A blank Executive Summary document is available at the end of this document.]

Video Summary: A brief - no longer than three minute - video summary may also be submitted via a link. Submission of a video summary is optional.

NOMINATION PROCESS

A team of managers, directors, and/or state executives reviews nominations and selects the winners of this award which recognizes successful teams in Missouri state government.

1. Secure nomination packet from your [agency/department GAQP coordinator](#) or on the GAQP web page at <http://www.training.oa.mo.gov/erp/index.htm>.
2. Complete the nomination form (providing ALL information requested)
3. Forward completed nomination form to the [agency/department GAQP agency coordinator](#).
4. Agency/department GAQP coordinator reviews nomination form and ensures that all information and documentation is complete and accurate.
5. Agency/department coordinator secures agency/department director endorsement signature and forwards completed nomination packet to GAQP state program coordinator.
6. **Do not submit hard copies of information, documentation, videos, etc.**

CATEGORIES

Customer Service

The winning team(s) will identify and develop measures to improve customer service in Missouri state government. The winning project(s) will establish how its development and implementation provided the agency a means to more effectively satisfy customer, stakeholder, and public expectations. This will include, but is not limited to, communication, information, responsiveness, resolution of problem(s), and on-time, reliable, consistent customer service delivery.

Efficiency / Process Improvement

The winning team(s) will develop an effective and creative approach in using state resources to implement a new process or deliver a product or service. Implementation of the winning project must have improved the overall quality of products and services, significantly enhanced operational efficiency, simplified work processes, generated increased revenues, or reduced spending.

Innovation

The winning team(s) will develop and implement a new process/product/service or a better application to an existing process/product/service to create an “added value” to state government. The winning project will deliver benefits to the citizens of Missouri through advances in vital services such as healthcare, education, communications, transportation, etc.

Pinnacle Award

The winning team will be chosen from a nominated team if, in the opinion of the Selection Committee, the nomination clearly encompasses multiple award categories in a manner that exemplifies the spirit of the Governor’s Award, or exceeds all other nominations. This award is not open for nomination and may only be used by the GAQP Selection Committee.

Examples of previous winning nominations for the above categories are available by visiting the following link: [previous winning nominations](#).

Agency/Department Coordinator Forwards Complete Packet to:

Governor’s Award for Quality and Productivity
Office of Administration – Division of Personnel
Attn: Julie Schlup
Truman State Office Building, Room 430
301 East High Street
Jefferson City, MO 65101

Julie.Schlup@oa.mo.gov
573-522-1336

<http://www.training.oa.mo.gov/recognition.htm>



State of Missouri – 2021 Governor’s Award for Quality and Productivity

NOMINATION FORM

I. GENERAL INFORMATION

Department: Missouri Department of Transportation (MoDOT)

1. **Project or team name:** Displaced Left-turn Interchange
2. **List the name of all team members, job titles, state agency department, and/or other organizations including public, private sector or business:** *(Please list alphabetically by last name – 2 to 20 team members maximum.)*

1. Justin Adams (TranSystems)
2. Shelie Daniel – Design Liaison Engineer, MoDOT
3. John Findlay (City of Liberty)
4. Ryan Hale – Senior Highway Designer, MoDOT
5. Jeff Hardy – District Design Engineer, MoDOT
6. Alejandro Martinez – Senior Traffic Studies Specialist, MoDOT
7. Wes Minder (City of Kansas)
8. Andy Noll (City of Liberty)
9. Derek Olson – District Traffic Engineer, MoDOT
10. Doug Parke (TranSystems)
11. Ericka Ross – Temp Engineering Manager, MoDOT
12. Joshua Scott – Transportation Project Designer, MoDOT
13. Mike Wahlstedt (TranSystems)
14. Juan Yin - Transportation Project Manager, MoDOT

3. **Nomination Category:** *(Check only one.)*

INNOVATION

CUSTOMER SERVICE

EFFICIENCY / PROCESS IMPROVEMENT

4. **Explain why you selected this category:**

The displaced left-turn interchange at I-35 and MO-152 is the first of its kind in the world. The interchange design is entirely new and allows about 45,000 daily motorists in the area to travel quicker and safer than ever before. With the new lane arrangement, travelers and businesses alike benefit from the increased capacity of the corridor while reducing the congestion and safety concerns the interchange experienced in the past.

In the busiest hour of the day, the displaced left-turn interchange results in vehicle delay being reduced 45% and travel times being reduced 30%. This is compared to the best-performing traditional interchange option. It also allows 1,800 more vehicles to pass through the interchange. These results translate to improved customer service, fewer traffic incidents, and a more satisfying experience on the road. Each improvement is vital to MoDOT’s mission of safety, service and stability.

II. BACKGROUND

1. **When did the team begin its work?**

The idea was first conceived in April 2017.

2. **What date did the team initiate the implementation phase of the project?**

Vehicles began using the displaced left-turn interchange in August of 2019.

3. Is the project:

Time Limited

Completed

Ongoing

III. PROJECT DESCRIPTION

1. Why was the project necessary?

The focal point of this project was the interchange with I-35. MO-152 (Kansas Avenue) is a major commuter and retail corridor carrying more than 45,000 vehicles per day, and the original diamond interchange was not able to handle all the traffic at the busiest times of day. Pedestrian accommodations were on only one side of the cross street. Replacing the previous bridge over I-35 addressed concerns regarding the design life of the structure.

The displaced left-turn geometry was created for the interchange to address challenges at the interchange/corridor while meeting the needs of all stakeholders. The traffic modeling study indicated that in the busiest hour of the day, the displaced left-turn geometry would result in 45% less delays and 30% less travel time than the next best option. It would also allow an additional 1,800 more vehicles to pass through the interchange and provide an upgrade to pedestrian accommodations on the second side of the cross street for increased safety. Minimizing construction impacts was important to the cities, the school district and the retailers on the corridor, so it was vital that the construction be done quickly. The entire interchange was closed on May 31, 2019 to replace the bridge and modify the interchange configuration. The first-of-its-kind displaced left-turn interchange was opened an astounding three months later on August 28, 2019. The total closure allowed the new interchange to open in its final form, which let motorists to get familiar with the layout more easily. Since its completion, travel times and queue lengths on the corridor have been reduced, and the capacity of the corridor has been substantially increased.

2. What were the primary goals of the project? *(150 words or less.)*

The goal of the project was two-fold: To physically replace the MO-152 bridge over I-35 as it was approaching the end of its useful life, and to widen the corridor for more efficient and safer traffic flow. The goal was to quickly and safely move as many users as possible through the interchange.

3. Describe the project: *(200 words or less.)*

The displaced left-turn interchange (I-35 at MO-152) is an arrangement of vehicular movements that is the first of its kind built in the world. The primary innovation of this project has been named displaced left-turn. This design was created after a thorough traffic modeling study, which examined other diamond interchanges including traditional, diverging (DDI), and single point exchanges. The innovation makes the traffic signals more efficient by altering phases and allowing different traffic movements to move at the same time. The displaced left-turn eliminates a more traditional left turn at the main intersection. Instead, vehicles must first cross through the opposing through lane at a signal-controlled intersection, which is several hundred feet from the main intersection. The displaced left turn interchange is a successful innovation because it combines the best attributes of traditional diamonds (which excel with high through volumes, but struggle with high left-turn volumes) and DDIs (which excel with high left-turn volumes, but struggle with high through volumes).

4. What technology, if any, was used in the development, implementation, maintenance or measurement of the project? *(150 words or less.)*

The use of traffic modeling software was crucial for this innovation. This software predicts how traffic operations vary based upon the geometric layout of roadways. The unique part of the displaced left-turn interchange was the creation of a new layout that is different from other interchanges. It allows for a unique combination of traffic movements to proceed simultaneously. This layout increases the ability of an interchange to get users through efficiently and safely at higher traffic volumes. This location is the first in the world to use such a design.

Other technologies used by MoDOT include:

- Collecting survey data and using traffic cameras to gain insights to user patterns.
- Developing traffic models that mimicked existing conditions as well as projected future operations.
- Developing contract plans with Computer Aided Drafted Design (CADD) software.
- Sending electronic communication to community members so they were aware of the proposal.

5. Explain how the accomplishment of the team exceeds its regular duties and responsibilities.

(150 words or less.)

The team really had to think outside of the box in order to solve challenges unique to this interchange. While MoDOT works to complete many interchange replacements, it's rare that a new kind of interchange takes shape from research undertaken by the project team. In order to determine if the idea was feasible, the team brainstormed potential impacts to users. The team communicated the idea within MoDOT to ensure management approval. The team also communicated to local stakeholders. Members of the public saw video simulations which allowed them to visualize the interchange and potential traffic flow upon completion of the project. The promise of those simulations was realized after opening, when congestion problems which had been common several hours a day disappeared, and users were able to get through the area quicker and safer with more reliable travel times.

6. Which of the following describes the intended benefits of the project? (Check all that apply and provide an explanation. - 150 words or less)

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> Cost Reduction | <input checked="" type="checkbox"/> Time Savings | <input checked="" type="checkbox"/> Increased Effectiveness |
| <input checked="" type="checkbox"/> Improved Process | <input checked="" type="checkbox"/> Other: Increased Mobility | |

Explain the intended benefits:

Safety is at the forefront of everything MoDOT does. By reducing signal phases and relocating the turning movements, conflict points have been improved. This reduces congestion and the potential for crashes.

Compared to other interchanges moving a similar amount of traffic, the displaced left-turn interchange reduces project costs. The unique lane configuration creates less bridge and pavement construction and maintenance needs. This will save MoDOT a substantial amount of time and money in the future.

Displaced left-turn interchanges also provide time savings to MoDOT but more importantly the travelling public. During the afternoon rush hour, the innovation reduces delays by 45% and travel time by 30% when compared to other interchange designs. It also allowed 1,800 more vehicles to pass through the interchange.

IV. RESULTS / MEASUREMENT

1. Explain how the success of the project was measured and what outcomes were achieved. (Explanation should not exceed 300-500 words.)

The displaced left-turn interchange at I-35 and MO-152 was deemed a success on many levels. Based on values from the US Bureau of Labor Statistics, the improved interchange saves the community \$1.8 million per year in congestion costs.

Additionally, reduced congestion and greater safety provides increased customer service to the community and motorists who use the interchange. The interchange reconstruction allows travelers to access their destinations quicker and safer than ever before. The project also provided an upgrade to pedestrian accommodations on the second side of the cross street for increased safety. Proper planning allowed for completion of the project on-time and on-budget. Cities benefitting from the innovative interchange have reached out to MoDOT to express their appreciation.

One of the biggest benefits came from the original thinking of the interchange's designers. By proving this never before designed concept works in reducing congestion and crashes, MoDOT has shown it is possible to build more displaced left-turn interchanges. Considering the displaced left-turn interchange can handle more traffic than a diverging diamond, serious congestion and safety problems can be alleviated with the

construction of more displaced left-turn interchanges in the future. Other State DOTs and MoDOT districts have already shown interest in the displaced left-turn interchange. Organizations are willing to use the displaced left-turn interchange to solve their problems since the very first one has been built and proven successful.

2. Are the benefits derived from this project: (Check only one.)

Recurring One-time

3. If recurring, how will the benefits be sustained? (Explain in 150 words or less.)

At the I-35 and MO-152 interchange, the displaced left-turn interchange was designed to provide benefits 24 hours per day and 7 days per week for 365 days per year. Beyond reducing congestion and improving safety for motorists, the upgraded pedestrian accommodations allow for foot traffic on both sides of the street instead of forcing pedestrians to cross the busy street to access the sidewalk. Replacing the previous bridge over I-35 addressed concerns regarding the design life of the structure. The innovative interchange will continue to provide service to the community both now and into the foreseeable future along with motorists around the world as this new design is imitated.

V. RECOGNITION / AWARDS

1. Has this project previously been nominated for the Governor's Award for Quality and Productivity? If yes, when?

No

2. If yes, for which category was it nominated?


3. Has this project received any other awards or recognition? If yes, describe.

- 2021 MoDOT Innovations Challenge Winner
- 2021 American Council of Engineering Companies (ACEC of Missouri) Engineering Excellence Award Winner
- Published in the International Transportation Research Board (TRB) National Cooperative Highway Research Program (NCHRP) Publication: "[2020 Synthesis on Alternative Intersection Design and Selection](#)"
- Presented at the 2020 Institute of Transportation Engineers (ITE) annual meeting

Nominating Department: Transportation

Name: Ryan Hale

Telephone Number: 816-607-2219

Signature: 

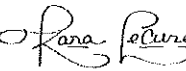
Ryan Hale
2021.07.26 06:45:00

E-Mail Address: Ryan.Hale@Modot.mo.gov

VII. DEPARTMENT COORDINATOR'S INFORMATION

Name: Kara LeCure

Telephone Number: (573)751-3302

Signature: 

Kara LeCure
2021.07.23 07:56:06
-05'00'

E-Mail Address: Kara.LeCure@modot.mo.gov

VIII. DEPARTMENT DIRECTOR APPROVAL

Department Director's Name:
Patrick McKenna

Signature: 

Nomination must be signed ONLY by the Department Director to be eligible for consideration. Nominations not signed by the Department Director will be returned to the agency coordinator.