
(29) 35 169

## I-29, I-35, U.S. 169

Planning and Environmental Linkages Appendices

OCTOBER 2023

QU.S. Deparment of Transportation Federal Highway Administration

Mid-America Regional Council

The I-29, I-35, U.S. 169 PEL Public Involvement Plan and Documentation Report, which contains documentation of the robust agency and stakeholder coordination and public involvement efforts that have taken place since the inception of the I-29, I-35, U.S. 169 PEL Study.

Appendix The I-29, I-35, U.S. 169 PEL Baseline Conditions Report, which includes the Purpose and Need statement, a history of previous studies in the corridor, and current traffic, safety, multimodal, engineering, and environmental conditions along the corridor.

- Attachment A: Previous Studies
o Attachment B: Data Collection Plan
- Attachment C: Traffic Forecasting
Memo
o Attachment D: Socio-Economic Demographic Data Tables
- Attachment E: Traffic Safety Analysis Memo

Appendix The I-29, I-35, U.S. 169 PEL Alternatives Analysis and Development Report, which describes

Cthe process and key technical findings used to screen alternatives and define the PEL Recommendation(s). This report includes the following documents as attachments:
o Attachment A: Alternative Screening Methodology
o Attachment B: Universe of Alternatives

- Attachment C: Level 1 Screening Results
o Attachment D: Level 2 Screening Results
o Attachment E: Interchange Concepts
- Attachment F: Level 3 Screening Results
- Attachment G: Engineering Cost Estimates
o Attachment H: 2016 Existing, 2050 Future No-Build, and 2050 Future Build Peak Hour Traffic Volumes

Appendix The I-29, I-35, U.S. 169 PEL to NEPA Transition Report, which documents recommendations, what was studied versus what remains to be studied during NEPA, and commitments to be carried forward through the NEPA phase of project development.
o Attachment A: NEPA Classification Documentation
o Attachment B: I-29, I-35, U.S. 169 PEL FHWA Approval Letter
Appendix The I-29, I-35, U.S. 169 PEL Questionnaire, which will be utilized by the Federal Highway Administration (FHWA) to determine if an effective PEL process has been followed and if the I-29, I-35, U.S. 169 PEL Report can be used to inform future NEPA documentation during project-specific development. It includes the I-29, I-35, U.S. 169 PEL Framework and Methodology Memo as an attachment.
o Attachment A: I-29, I-35, U.S. 169 PEL Framework and Methodology Memo
o Attachment B: I-29, I-35, U.S. 169 PEL Study Team


# I-29, I-35, U.S. 169 

## Appendix A - Public Involvement Plan and Documentation

July 2023 Administration

In Partnership with:

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### 1.0 Public Involvement Plan

## Introduction

The Public Involvement Plan (Plan) is a guide designed to achieve communications and public participation goals during the Missouri Department of Transportation (MoDOT) I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The Plan is a living document and may be updated throughout the project duration.

## Project Overview

In Missouri, I-29/I-35/U.S. 169 provide a critical linkage to the central region of the United States and Kansas City region. In 2020, the I-29/I-35/U.S. 169 PEL Study was submitted for a Better Utilizing Investments to Leverage Development (BUILD) discretionary grant to better understand the traffic movements of these three roadways and supporting arterials and identify ways that they may be optimized to meet the needs of the growing region. The study boundaries of the PEL extend north to Highway 152 and south to the northeast corner of the downtown loop in Kansas City, Missouri.


Source: Study Team.
The primary goal of the PEL Study is to develop both short-term and long-term alternatives
and identify proposed actions to reduce congestion, improve operational performance, and address asset management. The project team will examine alternatives to serve existing and future transportation needs, with the intent to improve traffic operations, travel time, mobility options, and safety issues, as well as integrate with existing and planned transit routes.

Upon conclusion of the study, MoDOT will be positioned to advance the project through the National Environmental Policy Act (NEPA) process for the next phases of work. The study timeline is approximately 14 months and is scheduled to conclude in June 2023.

## Project Identity

The formal name of the study is the MoDOT I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. MoDOT is working in conjunction with a project team led by HNTB (consultant).

The MoDOT logo and other project partner logos will be used on public materials.

## Public Participation Goals

The purpose of the Plan is to build on the following goals:

- Establish a transparent approach to inform and engage project stakeholders in a timely manner.
- Utilize a variety of communications strategies and tools for people to access information that will help them understand the project purpose, engagement opportunities, and schedule.
- Engage with stakeholders to identify and understand potential issues, concerns, and opportunities within the project study area.
- Elicit community feedback on how best to improve and strengthen the I-29/I-35/U.S. 169 corridors and supporting arterial roads.
- Provide MoDOT with meaningful input to address the purpose and need


## Stakeholders

There are a variety of stakeholders in the project study area, including, but not limited to:

- Government Agencies: MoDOT, Federal Highway Administration (FHWA), City of Kansas City, Missouri (KCMO) and KCMO Departments, Mid-America Regional Council (MARC), Kansas City Area Transportation Authority (KCATA), Platte County, Clay County, municipalities within the study area, resource agencies, federally recognized tribes, state, and local elected officials
- Businesses: Area businesses and large employers, trade organizations, healthcare organizations, aviation, chambers of commerce, financial institutions, economic development entities, tax incremental financing (TIF) districts
- Community: Environmental organizations, civic/public interest groups, public libraries, community centers, institutions of higher learning, school districts, transportation organizations
- Residents: Residents within the study area, neighborhood associations
- General: Commuters, transit riders, general public, news media


## Underserved Communities



Study Area Language Spoken at Home


Source: American Community Survey, 2015-2019

Persons of Color Population



- White Alone
- Black Alone
- Ameritan Indian Alone
- Asian Alone
- Pacific Islander Alone
- Other Race Alone
- Two or More Races Alone
- Hispanic

Source: American Community Survey, 2015-2019

Figure 7: Study Area Household Income
Households below Poverty Level


Study Area Household Income


[^0]
## Internet Access Map



Households Without Internet Access

## Outreach Methods

The Plan incorporates several outreach methods to ensure that key messages and information reach the range of stakeholder groups in the study area. To increase awareness and knowledge about the project, the Plan utilizes a diverse mix of communications strategies, tools, and tactics that will continue to engage stakeholders and communities of concern. Public participation outreach activities will be documented throughout the project duration and summarized upon conclusion of the study.

## Stakeholder Outreach

Strategy: The consultant will create and maintain a stakeholder database to engage with people located within the project study area and/or potentially impacted throughout the project duration.

Tools and Tactics: The consultant will:

- Create a stakeholder database and categorize by level of engagement. Using the Public Involvement Management Application (PIMA), stakeholder information can be collected through sign ups on the MoDOT website. Stakeholder outreach including comment management, newsletter information, online public meetings, virtual live public meetings, and surveys can be executed through PIMA and allows information to be collected and managed in one central tool.
- Ensure representation from diverse and disadvantaged groups by using census data and Streetlight origin destination data to identify neighborhoods of underserved populations to target outreach to specific groups and identify locations to share information for planned outreach activities. Outreach activities may include a drop-in center or handing out flyers or surveys at a community-based location such as a neighborhood community center, church, or school.
- Ensure representation from environmental justice groups, such as senior citizens, low-income populations, people with a disability, etc. by using census information to identify underserved and underserved populations to identify locations to share specific information or engage community groups for planned outreach activities. Outreach activities may include a drop-in center or handing out flyers or surveys at a community-based location such as a neighborhood community center, church or school or retirement community.
- Update PIMA database, as necessary, to inform stakeholders throughout the process and share opportunities for public involvement, such as public meetings, surveys, etc.

Deliverables: Stakeholder PIMA database

## One-On-One Interviews

Strategy: The consultant, assisted by MoDOT, will conduct up to five one-on-one interviews with key stakeholders at the beginning of the project study to gather baseline data about population, potential issues, concerns, and opportunities. Organizations interviewed include the Northland Chamber, Northland Neighborhoods Inc., Kansas City Area Transportation Authority (KCATA), Platte County Economic Development Council (EDC) and North Kansas City Business Council. Additional interviews or meetings may be conducted later in the study to share information and gather feedback with other businesses or organizations.

Tools and Tactics: The consultant will:

- Develop interview template/questions
- Conduct and schedule meetings
- Summarize interview notes

Deliverables: Interview template/questions, interview notes, summary of commonalities between interviews

## Community Advisory Committee

Strategy: Facilitate up to four Community Advisory Committee (CAC) meetings with 30-40 identified community members representing a range of interests to present information and elicit feedback at key project milestones on issues, challenges, and opportunities, purpose and need, as well as alternatives and potential impacts.
Gather feedback through interactive input tools, such as Mentimeter or Zoom polling.

Tools and Tactics: The consultant in conjunction with MoDOT will:

- Create meeting roster
- Update CAC information and/or identify replacement members, if necessary
- Draft and send an invitation and email reminders (email and/or hard copy)
- Schedule up to four meetings within the project timeline (in-person or virtual after discussion with MoDOT)
- Edit and review agenda/run of show
- Edit and review presentation
- Schedule run through with project team
- Summarize meetings

Deliverables: CAC roster, content for meeting invitations/emails, agenda/run of show, presentation, meeting summary

## Key Stakeholder Committee Meetings

Strategy: Present project information at up to two regularly scheduled meetings for community, civic, and neighborhood organizations to reach a broader audience. In coordination with MoDOT, the Northland Chamber's Planning and Development Committee was identified as a stakeholder group with a broad attendance base.
Other groups and meetings may be attended to reach additional audiences.

Tools and Tactics: MoDOT and the consultant will:

- Identify trusted community organizations
- Request to present at their meeting
- Schedule and present at meetings, as necessary

Deliverables: Project presentation slide deck

## Public Meetings

Strategy: Facilitate up to three, in-person, open house-style public meetings at specific project milestones to provide information and elicit feedback. Following the in-person public meetings, virtual components will be made available online.

Tools and Tactics: The consultant will:

- Handle logistics for the public meetings, including, but not limited to:
- Identify preferred methods to collect and elicit feedback
- Confirm essential project team staff
- Confirm time/date/location
- Meeting supplies - fact sheet, sign-in sheet, comment card/survey, project boards, refreshments, technology and other items, as needed
MoDOT and the consultant will:
- Promote through multiple communications channels, including, but not limited to:
- Email invitation to stakeholders
- Website content
- Newsletter content
- Social media posts
- News release for MoDOT distribution
- Ad notice in the Northeast News
- Messaging toolkit for distribution to community partners and key stakeholders
Update project website with materials and resources, following meeting
Deliverables: Content for meeting invitations and email newsletters, digital graphic, social media posts, project boards, public meeting messaging toolkit, meeting summaries, attendee list.


## Survey

Strategy: Community members will have the opportunity to take up to three surveys to provide feedback and shape the decision-making process at specific milestones throughout the project process:

- Purpose and need and study goals,
- Universe of alternatives,
- Reasonable alternatives and study outcomes.

Tools and Tactics: The consultant will develop:

- Electronic surveys (hard copy available, upon request)
- QR code linked directly to the survey on printed materials
- Promotion through multiple communications channels, including, but not limited to:
- Project fact sheet
- Website content
- Newsletter content
- Social media posts
- Messaging toolkit for distribution to community partners and key stakeholders

Deliverables: Electronic surveys, dedicated QR code

## Website

Strategy: The consultant will develop project material to be placed on a MoDOT hosted project website. Information should include project overview, study area map, project timeline, key milestones, and information about any upcoming outreach activities. Links to sign up for project information can be found on the website. The website address is: https://www.modot.org/i-29i-35us-169-corridor-study

## Contact Meeting

A project email address has been established for project communication. It is:
KC_I35_I29_Corridor@modot.mo.gov

The consultant will review public comments and will be responsible for drafting comment responses for approval by MoDOT.

Juan Yin, P.E. serves as the project manager and can be contacted by: Email: juan.yin@modot.mo.gov
Phone: 816-607-2216

## Agency Coordination Meeting

Strategy: The consultant will assist MoDOT with conducting agency coordination meetings with the local, state, and federal staff to solicit technical input and expertise throughout the PEL Study and address agency jurisdictional concerns. Agency coordination meetings will be held up to two times during the PEL as noted in Table A.

Tools and Tactics: The consultant will:

- Establish meeting dates, locations, secure meeting facilities, provide facilitation services, and provide technical advice regarding coordination.
- Contact FHWA, Mid-America Regional Council, KCMO, Northland Chamber of Commerce and any additional resource agencies or federally recognized tribes identified by MoDOT.

Deliverables: Meeting invitations, meeting presentation and meeting summaries

## Initial Key Issues

Through the first round of one-on-one meetings, several issues have been identified and can be categorized into the following themes:

- Increasing Development
- Multiple stakeholders noted that there is substantial development occurring in the Northland with the area expected to grow considerably in the coming years. Many were worried that the influx of housing and industrial development might soon lead to higher congestion along the study routes. Areas of interest include the Twin Creeks and Platteville regions. The North Kansas City School District is also growing by approximately 300 students each year.
- Design and Maintenance
- Stakeholders asked that the project team consider designing in a manner that will not require substantial upkeep or maintenance and will still be
aesthetically pleasing well into the future.
- Sustainability and Safety
- Stakeholders conveyed there were numerous safety and environmental issues with current structures along Interstates 29 and 35 . Issues such as noise walls, storm drainage structures to reduce dripping from highways, and safer pedestrian crossings were prominent recurring themes.
- Active Transportation (Bicycle and Pedestrian)
- Increased bicycle lane access and connectivity was a concern for many stakeholders. Along Vivian Road, many neighborhood residents would like access to a bike lane and updated streets. Additionally, stakeholders are looking to connect the M-152 bike trail to the new trail adjacent to the Metro North Crossing development.
- Public Transportation
- Since COVID-19 the Northland has significantly revamped its public transportation system. The pandemic led to increased bus operator shortages resulting in longer wait times and the subsequent closure of many routes. Recently the KCATA has consolidated underperforming Northland bus routes with more efficient routes. For many residents there is a strong push for more efficient, accessible, and less congested bus routes.
- Funding
- Stakeholders inquired about the project budget and timeline for when the funding would have to be secured. They would like to confirm how the project will be funded, what the expected budget is, and a timeline for when the funds would be obtained.


## Key Messages

Strategy: Succinct key messages will be developed to clearly communicate basic project information across a range of collateral materials, including the website. The messages will highlight:

- Purpose and Need:
- Explain to public why this project is needed (identify the problem and how it might be solved)
- Project Overview:
- Project study area
- Who this project impacts
- Project schedule
- What's Next:
- Study activities
- Engagement opportunities
- Develop and share alternatives
- Funding considerations and opportunities

Additionally, public-facing materials will include the following statement:
The Missouri Department of Transportation anticipates incorporating recommendations made as part of the PEL study into future National Environmental Policy Act (NEPA) studies, per Title 23 of the US Code § 168.

## Tools and Tactics:

- Develop key messages in collaboration with MoDOT
- Create outreach materials and provide translation, if appropriate:
- Up to three project fact sheets
- Website content (hosted on MoDOT's website)
- Social media toolkit with sample posts
- Up to three email newsletters

Deliverables: Key messages, project fact sheets, website content, newsletter content, social media toolkit with sample posts

The Plan is a living document, and the timeline will be updated accordingly. Meetings will occur at each phase of the study to present new information and project progress.


### 2.0 Supporting Documents

## List of CAC Members

| Name | Organization |
| :---: | :---: |
| Ron Achelpohl | Marc Transportation |
| Sonja Bennett | Developmental Disabilities Resource Board |
| Eric Bunch | KCMO City Council |
| Tina Chace | Platte County EDC |
| Julie DeJean | The Whole Person |
| Bryant DeLong | North KC |
| Mike Duffy | City of Riverside |
| Kyle Elliott | KCMO Planning and Development |
| AJ Farris | KCATA |
| Rick Fletcher | Missouri Highway Patrol |
| Dan Fowler | KCMO City Council |
| Richard Groves | North KC Business Council |
| Chris Gutierrez | KC SmartPort |
| Tammy Henderson | North Kansas City Schools |
| Darren Hennen | NRCC |
| Deb Hermann | Northland Neighborhoods, Inc |
| Patty Hilderbrand | KCMO Public Works |
| Jenny Johnston | Northland Chamber of Commerce |
| Rick Jones | KCPD Shoal Creek Patrol |
| Jade Liska | KCMO Aviation |
| Sherri McIntyre | City of Liberty |
| Wes Minder | KCMO Water Services |
| Tim Nebbergall | City of Gladstone |
| Jerry Nolte | Clay County Commissioners |
| Kevin O'Neill | KCMO City Council |
| Tony Reinhart | Ford Claycomo Plant |
| Ora Reynolds | Hunt Midwest |
| Nic Riesenberg | North Kansas City Hospital |
| Eric Rogers | BikeWalkKC |
| Ron Schieber | Platte County Presiding Commissioner |
| David Slater | Clay County EDC |
| Todd Spencer | OOIDA |
| Jon Stephens | Port KC |
| Scott Wagner | Kansas City Parks \& Recreations |
| Ryan Wood | Missouri Highway Patrol |
| Sabin Yanez | Northland Chamber Executive Committee |

# MoDOT I29-I35-US169 Community Advisory Committee Meeting \#1 

3:00-4:30 p.m. on July 7, 2022
Location: Virtual - Zoom

The following notes represent the verbal responses and chat comments from July 7, 2022 Community Advisory Committee meeting. The rest of the results are shown in the Menti Presentation.

## Q: Any initial comments or questions? Responses:

- Jerry Nolte (Clay County): Safety and economic development. I think the first thing that comes to mind with Clay County is growth. Vital to look in terms of the dynamic growth in the Northland and make sure it's productive for the citizens. Need to be able to access this to show the growth in Platte and Clay County.
- Wes Minder: Built as part of the Paseo Bridge Project and barriers to get across from both traffic and pedestrians, plus the substandard ramps are the big challenges.

Slide 20 - Do you have changes to the Purpose and Need?

## Responses:

- Captured in Menti

Slide 22 - Do you have any changes to the guiding principles?

## Responses:

- Deb Hermann: One of the biggest issues we have is the freeways put in in the 60s and 70s. They don't have sound walls and have caused drainage issues for the neighborhoods. I wouldn't have to drive far to find weeds waist-deep and trash along our highways. Whatever is designed needs to be maintenance-free because MoDOT can't keep up right now.

Slide 23 - Do you have any changes or additions to the study goals?

## Responses:

- Tony Reinhart: I love the process and the stated goals and conversation about the northland. I'm getting concerned that there are a lot of goals and objectives but a lot of them don't align and create conflict with each other. But there's a lot to look at to get to something that's a priority if someone has to meet these goals because a lot of them are in direct conflict with each other.
- Kip: During our next round of meetings, we'll ask this group to prioritize. Not that the others won't get addressed somehow, but like you said they're in conflict. We'll be asking this group and the public their priorities to help us figure out what to focus on.
- Tony: If there's something connected to the study but not isn't directly in it, can
it be included?
- Kip: If it's in the KCMO/MARC region, then it's going to be included.
- Tammy Henderson: One thing I hope the group also remembers is it's not just residential and commercial groups, but the school districts are growing as well.
- Kip: EDC was telling me more commercial and residential, so any info you have on the school district's growth would be helpful.
- Action: Tammy to send info to the project email
- Darin Hennen: No changes, but curious on the north of the river bullet... is there a reason we're calling out the KC side? Curious as to why it's two bullets
- Kip: I think it can be modified into one. Want to make sure we get all the communities in the Northland

Slide 28 - Would you rather have virtual or in-person meetings for this group?

- Captured in Menti

Slide 29 - What time of day is best for meeting?

- Captured in Menti

Slide 30 - What else would like you to know?

- Captured in Menti


# I-29/I-35/U.S. 169 PEL <br> Community Advisory Committee Meeting \#2 

3:00-5:00 p.m. on October 14, 2022<br>Location: In Person (Northland Regional Chamber of Commerce) and Virtual (Zoom)

## Participants:

## Community Advisory Committee (CAC) members:

Sherri McIntyre (City of Liberty), Tim N (City of Gladstone), Deb Hermann (NNI), Tammy Henderson (North KC Schools), Wes Minder (KCMO), Dan Fowler (KCMO), Kevin O'Neil (KCMO), David Slater (Clay EDC), Yanez (CFSE), Mike Duffy (City of Riverside), a few additional people in the room.

## Project Team:

MoDOT: Mark Fisher, Shelie Daniel, Juan Yin
Olsson Associates: Darren Hennen Parson + Associates: Kaley Wells FHWA: Taylor Peters HNTB: Robyn Arthur, Heriberto Oliveros Guerra, Kip Strauss, Joe Blasi, April English, Teona Jerman Marko, Laura Wagner, Corey Fischer

## Summary:

The following notes represent the verbal responses and chat comments from the meeting.
Slide 1 - 3: Introduction (Mark Fisher, MoDOT)

- No questions were asked from the group.

Slide 4 - 5: Baseline Conditions Report Overview (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 6 - 12: Environmental Conditions (April English, HNTB)

## Questions and Responses:

- Kevin O'Neil (KCMO): Will we be getting an analysis or summary of what we just heard? Were there findings that could create issues down the road?
- April English (HNTB): There is nothing out of the ordinary. There is a lot of limited English proficiency (LEP) in the area. When we do outreach and outreach events, we will make sure to have opportunities for translators at meetings as well as publish papers in different languages (depending on LEP distribution of languages). There are a lot off wetlands, water features, and hazardous materials areas to investigate in the study area. This will all be studied further in the preliminary environmental linkages (PEL) and National Environmental Protection Act (NEPA) process. Right now, we are creating an inventory and it will be studied in a greater level of detail later.
- David Slater (Clay EDC): How much have the levees and wetlands changed since the last study? Why can't we use previous studies? We should limit it to 12 translators.
- April English (HNTB): The number of translators will be based on the data.
- Taylor Peters (FHWA): Translators will be based on the data and can't be limited.
- Kip Strauss (HNTB): A lot of this will be based on the current conditions of the study area and what the area is like.
- In Person Attendee: This is great data. Could this be looked at as opportunities for enhancements- especially for storm water and watersheds?
- Kip Strauss (HNTB): That is a great point. These identified areas will be brought forward to look at as opportunities for enhancements as well.


## Slide 13 - 23: Traffic Conditions (Joe Blasi, HNTB)

## Questions and Responses:

- Wes Minder (KCMO): How is this data collecting the traffic from KS via I-635? The southbound (SB) I-29 to northbound (NB) i-35 is a problem, especially in the PM. A good portion of the population will be taking the l-35 corridor.
- Joe Blasi (HNTB): Are you talking about how traffic patterns may shift in the future? This is meant to focus on the traffic that is coming out of downtown. We have data for traffic coming out of other areas in the study area. In the interest of time, we didn't want to go through all graphs today.
- Wes Minder (KCMO): What about the other 6\%?
- Joe Blasi (HNTB): The other 6\% are at the Parvin Road interchange.
- In Person Attendee: What about the other corridors in the study area?
- Joe Blasi (HNTB): I-35 is up to $18 \%$ and $\mathrm{I}-29$ is $5 \%$ trucks. 15,000 trucks a day is a high number.
- Wes Minder (KCMO): From the exhibits, it appears that the 635 trips using the northern end of the corridor isn't being considered. It looks like everything is coming out of I-635. My concern is if we are looking 20 years out, we may be missing some operational issues on the ramps.
- Joe Blasi (HNTB): I think I know the answer to your previous question now.
- Sherri McIntyre (City of Liberty): The traffic pattern from I-35 to I-29 isn't being shown/considered. Were other corridors looked at in the study area?
- Joe Blasi (HNTB): Absolutely. We will get into other traffic patterns a little more moving forward. All those movements are in the Baseline Conditions Report.
- Kip Strauss (HNTB): We can provide a link to the document.
- Sherri McIntyre (City of Liberty): I think you need to take a hard look at the reoccurring traffic patterns. Look at where Davidson joins in and the spike down- this is pretty much a recurring stop condition. The 10 mph is a lot more frequent than the spike up. The only one's speeding are speeding along to cut into the ones going 10 mph . The problem is a bigger problem then what the graph is showing.
- Wes Minder (KCMO): There is too much merging and operational loss there.
- Sherri McIntyre (City of Liberty): I don't see how the blue line exists as an average speed- you better be prepared to stop as you're driving through there most hours of the day.
- Kip Strauss (HNTB): This is great information. It is more than beyond the data.
- Wes Minder (KCMO): North KC does have the truck traffic that gets on Armour Rd. The grade of the road on Armour could also be lost in the data. Additional acceleration on that ramp may be helpful too.
- Sherri McIntyre (City of Liberty): The SB ramp is operationally a big problem.
- Joe Blasi (HNTB): We're looking at SB in the AM today to point out the main problem areas. We will look at PM in a moment.
- Sherri McIntyre (City of Liberty): Going NB on I-29, you may want to consider that you have significant lane differentials between the right and left lanes. If you watch the traffic on the Scout cameras, you can see a huge difference.
- Joe Blasi (HNTB): Thank you. I see your point in the speed differential.
- Wes Minder (KCMO): I get in that left lane as much as I can because of the merge and speed of traffic. Those little tweaks may help. If you can get in the left lane and don't have to merge, that's great. You can run the risk of someone merging over in front of you though.
- In Person Attendee: Does this take in account ramps or just interstates?
- Joe Blasi (HNTB): Anyone with a cell phone is what is being measured.
- In Person Attendee: The on and off ramps are very problematic. Trying to get off to North Oak will sometimes back up into the interstate. Trying to use the short on-ramps to I-29, there is no merge, and you just must go fast. A dedicated merge lane at the North Oak and Vivion intersection should be added, or the current ramp should be shutdown.
- Joe Blasi (HNTB): FHWA recommends about 2 miles between interchanges. We will be looking into this further.
- Sherri McIntyre (City of Liberty): If you use the corridor enough, you know which lanes to stay in and which to stay out of.
- Joe Blasi (HNTB): Overall, on I-35 past the split with I-29, the SB AM and NB PM are spots to look at in depth with big variable speeds on a recurring basis.
- Sherri McIntyre (City of Liberty): If you're looking at average speeds, this doesn't tell the whole story.
- Chuck Duffy (City of Riverside): Does it make sense to check camera data a couple different time and see what the frequency is in the AM and PM peak times?
- Joe Blasi (HNTB): For the KC Scout cameras- anyone can look at those cameras. Maybe we look at it for 5 days and see if over several days, the exit or ramp was backed up and a certain number of days it wasn't.
- Chuck Duffy (City of Riverside): Yes. It may be something we can't see from cell phone data.
- Kip Strauss (HNTB): We are seeing that this is the average of all lanes, but some lanes still have backups- specifically closer to the ramps. We can investigate some items to confirm.
- Shelie Daniel (MoDOT): I think KC Scout has provided some data. This is mostly based on cell phone data and their speeds. It's important to get this feedback now with this committee.
- Kip Strauss (HNTB): For the public meeting, we could add additional notes that the average speed is across all lanes.
- Sherri McIntyre (City of Liberty): Add additional graphics for I-35 and clean up the graphics for next week's meeting as well.
- In Person Attendee: Since we're using 2019 data, do we know the current conditions for how it has bounced back after the pandemic?
- Joe Blasi (HNTB): We're comparing the volumes in 2019 to 2022. We don't have the same exact data for 2022. The feedback of this group is very helpful to help us know what is going on our there right now compared to what the data is showing happened in 2019. The National Performance Management Research Dataset (NPMRDS) data was pulled from March 2019. It was collected in 2019 and pulled this year.
- Shelie Daniel (MoDOT): When we're communicating to the public that the average travel speed from downtown to Liberty is almost free flow except in a couple areas, they are going to challenge that.
- David Slater (Clay EDC): We drive that and know these graphs aren't right. Be prepared to have people questioning these graphics.
- Sherri McIntyre (City of Liberty): When you look at the graph, I agree with the low points and high points. Most of the time, you have those low points at a re-occurring basis. This is probably true with the average of the speeds but it's not a reliable corridor.
- Mark Fisher (MoDOT): The average speed is the controversy. The public would believe the highs and lows for speeds but not the average.
- Kip Strauss (HNTB): The data is showing the average speed is $20-30$ miles below the posted speed and the l-29 is close to the full speed.
- Sherri McIntyre (City of Liberty): I agree- the public will not agree with the data.
- David Slater (Clay EDC): If you show this to me, I'm going to vote it down because the data shows there's now need for new construction or improvements, but if you live up here and drive the corridor then you know there's a need.
- Joe Blasi (HNTB): So, we need to show the low and high points more and not focus as much on the average speed.
- Shelie Daniel (MoDOT): Everyone agrees on the highs and lows, but it is also like this on Saturday mornings.
- Daren Hennen (Olsson Associates): Even in the most off-peak times and times of the year, we are at a stand-still on I-29. For the public, if you could overlay the graph so people can look at it and see right away what you're talking about, that would be
helpful. De-engineer it as much as you can.

Slide 24 - 26: Safety Conditions (Joe Blasi, HNTB)
Questions and Responses:

- Person in the room: How much is it above the statewide average?
- Joe Blasi (HNTB): There are three areas of concern (slide 26). There are areas where it is 2-3 times the statewide average for crashes.
- David Slater (Clay EDC): If you look north of Brighton, they made improvements from four to six lanes. That is what we are looking for- improvements like that.

Slide 27 - 30: Multimodal Conditions (Kip Strauss, HNTB)

## Questions and Responses:

- In Person Attendee: Were additional graphics put together?
- Kip Strauss (HNTB): Yes, they were put together in the report.

Slide 31 - 37: Engineering Conditions (Heriberto Oliveros Guerra, HNTB)

## Questions and Responses:

- Sherri McIntyre (City of Liberty): I have a hard time on I-29/I-35 between Bedford and $16^{\text {th }}$ street and we re-built that in the last 10 years, shame on us if that is the case.
- Shelie Daniel (MoDOT): The bridge was not redone for that project. The bridge is on our current STIP list for replacement.

Slide 38 - 39: Purpose \& Need (Kip Strauss, HNTB)

## Questions and Responses:

- Shelie Daniel (MoDOT): As we've heard today, reliability is a big factor, as is congestion.
- In Person Attendee: For roadway safety, we could add in something about pedestrians or roadway safety for all users.

Slide 40 - 42: Study Goals \& Guiding Principles (Kip Strauss, HNTB)

## Questions and Responses:

- Darren Hennen (Olsson Associates): The scale of freight movement is bigger than just the Northland.

Slide 43 - 46: Public Engagement Schedule \& Outreach Opportunities (Robyn Arthur, HNTB)

- No questions were asked from the group.

Slide 47 - 48: Universe of Alternatives (Kip Strauss, HNTB)

- No questions were asked from the group.

Slides 49 - 55: Alternatives Screening Methodology (Kip Strauss, HNTB)

## Questions and Responses

- In Person Attendee: Will you investigate further detail for each alternative?
- Kip Strauss (HNTB): In level 2 and 3, we will be looking at individual segments. Level 1 is a higher-level overview.


## Slide 56 - 59: Next Steps \& Closing (Mark Fisher, MoDOT)

## Questions and Responses

- In Person Attendee: Is there an online portion of the public meeting as well?
- Robyn Arthur (HNTB): Yes, it will go live the day after for people to provide comments and it will provide the same information. They will be able to walk through the presentation at their own pace.
- Mike Duffy (City of Riverside): How many segments of interstate highway are one lane only in major urban areas around the country?
- Kip Strauss (HNTB): You could probably count them on one hand.
- Mike Duffy (City of Riverside): We have four, so that's not good.
- Sabin Yanez (CFSE): In some slides, you referenced the transition of the PEL and NEPA document. What is the status of the NEPA process, is it funded?
- Mark Fisher (MoDOT): No, it is not funded.
- David Slater (Clay EDC): The NEPA must be done before we can get a yard of asphalt out there is that correct?
- Shelie Daniel (MoDOT): Yes.
- Dan Fowler (KCMO): I'm assuming I will be out of office before this happens.
- Mark Fisher (MoDOT): If we can see spot improvements with existing bridges or sections that need extra lanes, this gives us the blueprint to make bridge improvements. It doesn't have to all happen at once. We plan to take bits and pieces of this if we can't do the whole corridor at once.
- In Person Attendee: For accidents, the data presented was related to the highway and interstate corridors itself. Did you look at crashes on local streets when they're exiting or entering the interstate/ highway system?
- Kip Strauss (HNTB): We are aware and are addressing those types of issues.
- In Person Attendee: Are you looking at doing a benefit cost analysis (BCA) as part of the evaluation of the alternatives?
- Kip Strauss (HNTB): I don't think we're scoped to come up with a BCA. If a grant was identified that MoDOT wanted to go after, then we could do that.
- Kip Strauss (HNTB): We could also present to the Northland Chamber too as a project update.
- In Person Attendee: Yes, maybe late next winter or the following spring so we're 6-9 months into the project.
- In Person Attendee: This group and others will be more interested when we start seeing alternatives.


# I-29/I-35/U.S. 169 Planning and Environmental Linkages Community Advisory Committee Meeting \#3 

3:00-5:00 p.m. on April 6, 2023, Location: Virtual (Teams) \& In Person

The following notes represent the verbal responses and chat comments from the meeting.
Slide 1 - 5: Introduction (Ben McCabe, MoDOT, Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 6-8: Project Overview (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 9 - 17: Phase 2 Baseline Conditions Report (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 18: Purpose and Need (Kip Strauss, HNTB) Slide 19: Universe of Alternatives (Kip Strauss, HNTB)

- Will you remove new arterial streets?
- Yes, building new streets is not an option.

Slide 20 - 21: Public Meeting \#1 Summary (Robyn Arthur, HNTB)

- No questions were asked from the group.

Slide 22 - 35: Phase 3 Alternatives Development and Analysis (Kip Strauss, HNTB)

## Questions and Responses:

- David Slater: Are you going to remove arterial streets?
- Kip Strauss: This discusses adding arterial streets and roads.
- Terry Leeds Is Antioch Rd. Included in the split?
- Kip Strauss: Yes, it included Antioch Rd.
- David Slater: If you take off Parvin, how big of an impact would that have on federal funding?
- Kip Strauss: We will discuss costs later in the presentation and can discuss Scenario 7.
- Terry Leeds: Were these scenarios weighted?
- Kip Strauss: We did not weight them at this stage. What we are going to go into now are what are the traffic, safety, multimodal, environment and costs tradeoffs, pros and cons.

Slide 36: Phase 3, Level 3 Screening Results - Multimodal and Safety (Brian Comer, HNTB; Joe Blasi, HNTB)

## Questions and Responses:

- Sherri McIntyre: For safety, were there differences in conflict points on freeway vs arterial roads due to speed issues?
- Joe Blasi: At this point we did not use weighting. We counted all freeway conflict points and arterial conflict points. There was no weighting in the conflict points.
- Kip Strauss: The PEL report will have all quantitative scenarios.

Slide 37: Phase 3, Level 3 Screening Results - Traffic (Joe Blasi, HNTB)

- No questions were asked from the group.

Slide 38-39: Phase 3, Level 3 Screening Results - Engineering (Lisa Mosley, HNTB; Heriberto Oliveros Guerra, HNTB)

## Questions and Responses:

- David Slater: For funding, there is currently $\$ 120 \mathrm{M}$ scheduled in one segment. The governor's plan stops where the road turns into two lanes. We could investigate moving this up to tier 1.
- Darren Hennen: If we follow Scenario 7 , just that component is $\$ 90 \mathrm{M}$ in just construction costs.
- Heriberto Oliveros Guerrera: Yes, we will have the detailed cost in the PEL, and we have a cost for every scenario. It is over $\$ 300 \mathrm{M}$ total.
- Shelie Daniels: The dollar signs just mean greater than \$90M.
- Darren Hennen: If tier 1 stops at 90 million dollars, how did we get four times that amount to be funded. The graphic should be split into even buckets.
- Richard D Groves: Is the topic of making the 16th Ave intersection with I-29/I-35 a full diamond intersection related to this study or is it something entirely different? Future traffic growth in and out of North KC will render northbound (NB) access from only Armour Rd/M-210 to be grossly inadequate. This would also enable the Truck Route through North KC from the north to exit at 16th Ave instead of Armour Rd. and onto Linn before getting to 16th Ave.
- Kip Strauss: MoDOT has two bridges in this area in the STIP. I'm sure those bridges will be added with the STIP and looked at in greater detail then.
- Shelie Daniels: The original PEL limits stopped at M-210. MoDOT extended the southern limits to the downtown loop for traffic purposes. We do have this PEL then to use for those viaduct replacements.
- Darren Hennen: When you say greater than $\$ 90 \mathrm{M}$, are you defining an upper limit or is the upper limit \$120M in the pink on the graph to go with the \$30M increments?
- Kip Strauss: It can be way more in $\$ 120 \mathrm{M}$.
- Darren Hennen: Since increments are in \$30M increments, it could be helpful to do equal increments. They're still estimates.
- Darren Hennen: Even with dollar amounts and multiple scenarios, is there one scenario that is the safest and gets the other priorities accomplished?
- Kip Strauss: From the freeway standpoint, Scenarios 5-7 all meet that.
- Shelie Daniels: The way the unfunded needs list is right now, the PEL is in there, but it does not include much of the other projects at this point. This is mostly focused on the split. The study limits exceed the split because you must look at more than just the one area. This could always be pared back if we focus on only a couple areas.
- Sabin Yanez: When you said Scenarios 5-7, this is a policy/ political discussion and not a technical discussion. There will be issues with some of these scenarios.
- Ron Achelpohl: My understanding is that the PEL process narrows down the alternatives that go into NEPA?
- Kip Strauss: If you're asking the project team, yes, we narrow down the number of scenarios in two more slides.
- Scott Wagner: Based on the answer given to Darren's question, I interpret the answer as Scenario 4 provides the minimum benefit at minimum cost, and Scenario 7 is maximum benefit at maximum cost. Is that fair?
- Kip Strauss: It depends on what element you look at. Environmental is next and it has more impacts in Scenario 7 than Scenario 4. Right now, we are presenting the numbers, and nothing is weighted right now.


## Slide 40: Phase 3, Level 3 Screening Results - Environment (April English, HNTB)

## Questions and Responses:

- David Slater: What's the work around for Parvin Rd. access? This is a low-income area around Parvin Rd.
- April English: We did look at impacts to limited English proficiency communities, low-income communities, and minority populations.
- Kip Strauss: It will go into more detail in the NEPA phase. Regarding funding, impacts that lower access for these communities need to be lowered.
- April English: As we move into NEPA, we will do a full community impact analysis and how changes in access impact those communities.
- Kip Strauss: This study narrows down the issues.
- Wes Minder: Any chance we could get the layouts of these options to see what the differences are to compare to the environmental impacts?
- Kip Strauss: For the analysis, we picked a representative interchange for the analysis. We didn't get into the details about if we added a noise or retaining walls or moved configurations. This is the worst-case scenario, and we can take actions to mitigate this.
- Shelie Daniels: Yes, this is worst-case. Engineering paired with environmental analysis can help mitigate this.
- Terry Leeds: For calculating impact acres, is this a preliminary number?
- Kip Strauss: Yes, we put a buffer on the preliminary interchange design. There wasn't the engineering behind that - we just put a 150-foot buffer on the interchange and added up all impacts.
- Joe Blasi: For your question about Scenario 6 vs 7, scenario 6 tries to maintain access safety.
- Sabin Yanez: What are the risk factors farther south (in the corridor) that might influence MoDOT to move this project up (to Tier One)?
- Kip Strauss: Utilities, benefit to cost ratio, recommendations on timing. Bond bridge replacement work.
- Shelie Daniels: Viaduct project in the next two years

Slide 41: Preliminary PEL Recommendation (Kip Strauss, HTNB)

## Questions and Responses:

- Appreciate response on southerly section on this, even with recommendations, what factors may influence the southerly areas to move up in priority in the process? This makes sense, we'd like to see it stay on course.
- We will be developing sections of independent utility; sections that make sense if doing NEPA. Recommendations on prioritizations and looking at benefits to costs. Over 2028, bridges getting replaced north and south of Kitt Bond Bridge.
- Shelie - comment section south of Hwy 210, those two viaduct bridges are already in our program and design with a start date in the next two years. They are over railroad tracks and public input will need to be included. Work with Ben ? Number of lanes, type of spacing will be impactful along Hwy 210 and is happening with or without the PEL.
- David Slater: Do we have NEPA costs?

Kip Strauss: This is strictly construction costs.

- Darren Hennen: Do we have the magnitude of the NEPA costs yet?
- Kip Strauss: No. That will come in the NEPA phase.
- Darren Hennen: We're trying to get at a dollar amount and we're trying to continue pushing it forward. If we get a number for all four zones, that's the number we want to shoot for. We're big dreamers.
- Jenny Johnston: We are really looking for a dollar amount to take to the Governor's office, or other elected officials once we start asking for money for this project.
- Kip Strauss: Roughly 8-10\% (of the construction costs is usually engineering/design costs. No ROW. NEPA costs go to $20-30 \%$. But $10 \%$ over construction costs get you closer to the final.
- Shelie Daniels: For NEPA to finalize documents, you must have some funding available to get documents approved. If we did an EA for the whole area, we are going to have to have some funding.
- Kyle Grayson: You would have to have the next step programmed in the STIP. We wouldn't necessarily do NEPA on one zone. We could pick projects from a zone and not the whole zone so the dollar signs could go down.
- Shelie Daniels: We're hoping the PEL could help us in our decision making on
where to replace bridges and where future priorities are. This is something you guys could think of when you dream big and ask for money.
- Sabin Yanez: So, we need to fund NEPA to keep this process moving.
- Shelie Daniels: After we're done with the PEL, we need to look at projects to move forward. We may have 20million in STIP for Parvin and flyover but everything may cost 200 million so we will have to have funding identified for that.
- Shelie: Thinking as a group for northland of priority, viaduct is already a priority. We have a lot of bridge replacement plans scheduled, I-35/I-29 combined bridges are scheduled and a priority. When bridges are replaced and where we put them and the number of lanes they have, PEL could help with replacement bridges for what we want in the future.
- Will there be any more details developed for complementary strategies, and do they differ for strategies 5, 6 and 7? Are there any costs associated with them that are included in the estimate?
- No, the dollars that you say was a high-level judgment.
- Really need to sit down and have more detailed discussions in the next phase -
Flex demand service, IRIS - will you be able to quantify the impact of that? Or is it still too early?
- It's still too early.
- Downtown baseball is coming in the downtown loop. Will it have an impact on this corridor? Are we anticipating the model will have adequate impact for this?
- Started with future 2050 land use for MARC and talked to EDC and added it on top. Boosted beyond MARCs baseline.
- Sabin Yanez: Are you scoped to identify sections of independent utility with this PEL?

We should be able to narrow this down when we get to the end of the PEL

- Kip Strauss: Yes.
- Scott: I think these three or fine, I'm more interested in a further phase of this project that considers the cost/benefit analysis of each scenario. For example, I could spend $\$ 60$ million more to go from one scenario to another, but improvement is only an incremental one. That may be a difference between wants and needs.

Slide 42 - 45: Phase 4 Organizing the PEL for Success (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 46-48: Schedule of Planned Involvement (Robyn Arthur, HNTB)

## Questions and Responses:

- Ron Achelpohl: Will there be more detailed cost strategies for the complementary alternatives?
- Kip Strauss: Those more detailed complementary alternatives will be discussed in the NEPA phase. This was a high-level judgement. We will sit down and have
more detailed discussion in the next phase.
- Sherri McIntyre Will we be able to quantify the impact of scenarios more than for multimodal?
- Brian Comer: This will be looked at more in the NEPA phase. We will dig more into complementary alternative individual costs.
- Darren Hennen: Considering the potential for downtown baseball, the new business park, and more - does the multi-modal anticipate that growth strategy?
- Kip Strauss: Yes. These scenarios took the land use data from MARC and added the EDC pending projects. We went above the average on this to account for growth.
- Sherri McIntyre: Could you talk more about complementary? One of the goals is to answer the bike/ped question.
- Brian Comer: In terms of what we're talking about, we were looking at improvements that are already programmed and will investigate further in NEPA additional improvements that could be added.
- Sherri McIntyre: If you're going to be building a new bridge, understand that you might want to consider something that has more access.


## Zoom Chat Transcript:

- Minder at 3:50 pm - Can you email out this information please
- Yes, we will be sending out the powerpoint and a survey.
- Richard at $3: 52 \mathrm{pm}$ - Is the topic of making the 16th Ave intersection with I-29/I-35 a full diamond intersection related to this study or is it something entirely different? Future traffic growth in and out of NKC will render NB access from only Armour/MO 210 to be grossly inadequate. This would also enable the Truck Route through NKC from the north to exit at 16th Ave instead of Armour and onto Linn before getting to 16th Ave.
- We didn't come up with detailed interchange concepts in this area, but MoDOT has two viaduct improvements that we will walk through. When they are replacing those bridges, I'm sure these will be looked at in more detail. It will also be looked at in more detail in the NEPA phase. Doesn't mean no improvements but focused on other interchanges. Did that answer your question?
- Richard at - Yes. Thank you.
- Scott at 03:59 pm - Based on the answer given to Darren's question, I interpret the answer as Scenario 4 provides the minimum benefit at minimum cost, and Scenario 7 is maximum benefit at maximum cost. Is that fair?
- Look at obvious ones to screen out and not the ones that need more area (?)
- Minder at 04:02 pm - Any chance we could get the layouts of these options to see what the differences are to compare to the environmental impacts?
- Kip: (re layouts), we laid out 53 different interchange ideas and picked the most representative interchange type and that's what Joe put into the traffic model. April put that into the environmental analysis. Couldn't look at 12 different types so picked what we thought was most representative. The other types will be part
of PEL．Didn＇t get into the details，like adding a retaining wall to save a house． We don＇t think impacts will be nearly as severe as we show on this stage．
－Shelie：No guarantee，like \＃7，didn＇t take away access just changes how they access．Didn＇t say no more access to interstates，just a different way．
－Scott at $4: 17 \mathrm{pm}$－I think these three or fine，I＇m more interested in a further phase of this project that takes into account the cost／benefit analysis of each scenario．For example，I could spend $\$ 60$ million more to go from one scenario to another，but improvement is only an incremental one．That may be a difference between wants and needs．


## Attendees：

MoDOT－Ben McCabe，Juan Yin
HNTB－Kip Strauss，Brian Comer，Joe Blasi，Robyn Arthur，Laura Wagner

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David Slater－Clay County EDC／Mayor of Parkville，MO Darren Hennen－Olsson Jenny Johnston－Northland Regional Chamber of Commerce Tina Chace－Platte County EDC
Terry Leeds－Garver

Sherri McIntyre - KCMO Public Works
Director Jerry Nolte - Clay County
Commissioner, President Kathy Rose -
Mayor of Riverside, MO
Sabin Yanez - Cook, Flatt \& Strobel Engineering
Ron Achelpohl - MARC Director of Transportation and Environment

# I-29/I-35/U.S. 169 Planning and Environmental Linkages Community Advisory Meeting \#4 

3:00 p.m. to 4:30 p.m. on
May 31, 2023, Location:
Virtual (Zoom)

## Project Team Attendees:

HNTB

- Kip Strauss, Heriberto Oliveros Guerra, Lisa Mosley, Joe Blasi, Moriana Jaco, Laura Wagner, April English, Robyn Arthur

MoDOT

- Brooke Rohlfing, Ben McCabe, Melissa Black

Parson + Associates

- Erin Barham, Gina Boucher

CAC Members

- Jerry Nolte, Scott Wagner, Mike Duffy, Sherry McIntyre, Sonja Bennett, Jenny Johnston,David Slater, Marisela Ward, Michael Soodjinda, Ron Achelpohl, Darren Hennen, Sabin Yanez, Terry Leeds, Kevin O'Neil.


## Presentation

Ben McCabe, MoDOT welcomed the group and provided a short update on the current study schedule.

## Recap of Public Meeting No. 2

Kip Strauss, HNTB provided a brief recap of the public meeting and feedback received. A total of 139 people attended the public meeting either in person or virtually. There was strong support for the preliminary PEL recommendations with 41 people expressing their support.

## Preliminary PEL Recommendation

Kip explained that three recommended scenarios (5, 6, and 7) best satisfied the study goals and study purpose. The study team preliminarily recommends that these scenarios
move forward into the National Environmental Policy Act (NEPA) process. He specified that specific corridor recommendations will be determined during the NEPA phase.

Recommended Scenarios

| Scenario 5 | Scenario 6 | Scenario 7 |  |
| :--- | :--- | :--- | :---: |
|  |  | Highway Mainline |  |
| Highway Mainline | Highway Mainline | Capacity + |  |
| Capacity + | Capacity + | Focus Interchanges |  |
| Focus Interchanges | Focus Interchanges | Improvement |  |
| Improvement Lite + | Improvement | Full Build + |  |
| Complementary | Full Build + | Complementary |  |
| Alternatives | Climsolidated/ |  |  |
|  | Elimated Access + |  |  |
| Specific corridor recommendations will be identified in the NEPA phase |  |  |  |

A table was provided to show a more detailed cost estimate breakdown of each scenario as of 2023. The totals did not include right of way, permitting, utility relocations, or engineering costs. STIP was included in Scenario 1, but not included in Scenarios 2-7. They are above and beyond what STIP will fund. More detailed cost estimates will be developed in the NEPA phase. Complementary alternatives will need additional funding from local organizations.

## Questions

Scott Wagner: I'm not clear on the difference between Scenario 1 and the others. If the items on the STIP are not in the other scenarios does that mean that those are additional costs you add to each scenario?

- Kip: Yes, the $\$ 234$ million MoDOT can use to resurface and fix bridges and resurface pavements. If you want to rebuild interchanges and add an additional lane, then those are additional dollars shown in Scenarios 2 through 7.

Scott Wagner: So each scenario is separate from the Scenario STIP projects?

- Kip: Yes. Those in the Scenario 1 shows what MoDOT is funded to implement. All other scenarios will be new costs associated with enhancing the corridors.

Joe Blasi: Viaduct bridges have to be done regardless of what is done in Zone 4. They do not account for widening. For Scenario 6, for example, in Zone 4, would you need to rehab and then widen with additional cost? Yes. Bridge will be where it is currently. Scenario 6 requires additional cost to widen. It is a special case.

Project Prioritization


The study team identified three prioritization phases with Priority 1 projects having the best cost/ benefits and being recommended to advance first. There is not a timeframe for any of the priorities.

Scott Wagner: Solving a lot of Priority 2 problems impacts the downtown loop. Do we feel that the bridge work currently going on in downtown affects priority 2?

- Kip Strauss: Yes, we know that MoDOT is already pursuing enhancements in downtown. The PEL will recommend more detailed traffic modeling to better understand traffic flows and impacts of an additional lane on the downtown freeway loop. There needs to be more detailed analysis on how additional lanes (in Priority 2 areas) will impact the downtown loop.

Sherri McIntyre: I think the U.S. 169 and I-29 Interchange plus an additional lane on U.S. 169 needs to be Phase 2.

- Kip Strauss: We thought about where to cut off each priority 1 and priority 2.

Sherri McIntyre: There's a lot of issues on U.S. 169. Honestly might want to include it in Phase 1.

- Kip Strauss: We didn't see as severe of issues along U.S. 169 compared to Priority 1 and 2.
- Joe Blasi: Compared to the rest of the corridors, we felt that the areas in Priority 1 and Priority 2 need improvements sooner.
- Sherri: There's already traffic in the morning. If we grow it's only going to get worse.

Ron Achelpohl (chat): Can you provide more clarity on the priority of the three segments shown for Priority 3? MoDOT probably wouldn't program these as a single project. He requested to rank them.

- Kip Strauss: You're right. We could break out Priority 3 if the committee feels we need to. We saw fewer traffic and safety issues in the purple area than we did in other areas. We aren't saying there aren't problems in those area we just thought they weren't as pressing.

David Slater (chat): 169 will have a substantial increase as the Twin Creeks Development continues.

Mike Duffy: We have $\$ 174$ million dollars allocated for the selected scenario. We would only need $\$ 150$ million in additional funds. Do we start talking about this as a single project from a funding standpoint and just phase the work? Maybe we are doing projects in all of the priority areas at the same time.

- Kip Strauss: Yes, that would be ideal. We just broke it down to show how much things would cost. But if MoDOT has the funds then that would be great to do it all at once.

Darren Hennen: It feels like the downtown loop should be its own entire project. Our main project focus should be Priority 3 because most of our growth is happening north of downtown.

Scott Wagner: I think we have to be a little anticipatory and move 169 ahead of the other branches on I-29 and I-35.

- Jenny Johnston: I agree 169 should take higher priority than the branch offs on I29 and I-35
- Jerry Nolte: Exactly, these are not three equal needs. 169 is a higher priority looking to the development in process at Twin Creeks.
- Darren: We want to make sure Priority 1 zones covers I-35. We had our highest accident rate in that area.
- Kip Strauss: We will go back and look at that and double check the safety in that area.
- Joe Blasi: Yes Priority 1 does cover the entirety of that safety-focused area.

Sabin Yanez: You kind of have competing goals when thinking about the needs on 169 and I-35. We need to communicate the differences between those areas.

- Kip Strauss: You're right. It sounds like we need to go back and reevaluate with MoDOT

Sherri McIntyre: Phase 1 needs to continue onto 169.

- Kip Strauss: That's a possibility. We will discuss with MoDOT.


## Projects in the STIP

Kip overviewed the current STIP projects and provided a timeline for when each project is expected to occur. The red is bridge replacement, and the green is pavement resurfacing.

David Slater: The original concern of the split is still the highest priority. There is substantial growth and current population that needs the most attention.

## Organizing the PEL for Success

We are getting ready to send to the final PEL documents to MoDOT, KCMO and MARC for review. We are finalizing our reports including the PEL Study Report, PEL Questionnaire, and PEL to NEPA Transition report. Once we finalize the documents, we will post to website at https://www.modot.org/i-29i-35us-169-planning-and-environmental-linkages-pel-study.

All questions and comments can be sent to KC 135 I29 Corridor@Modot.mo.gov.

## Comments/Discussion

Terry Leeds: Is there a chance to make 4 priority levels and move 169 into a new priority?

- Kip Strauss: Yes, we will talk with MoDOT about moving 169 into Priority 1 or create a its own priority level above I-29 and I-35, current Priority 3.
- Joe Blasi: (To advisory committee) If we make 169 separate from Priority 3, do we leave I-29 and I-35 together or do we split them? And if we split which leg should be the highest priority?
- Terry Leeds: I think they are equal.
- Darren: I think they are equal probably. But l-29/I-635 interchange is really important and needs to increase in safety. That one feels like it has a higher priority. We should follow the safety analysis in that area.


## Meeting closing

Kip thanked the group for their feedback and input and participation in the process. We will discuss your comments with MoDOT and make any necessary revisions.

Meeting closed.

## I-29/I-35/U.S. 169

Planning and Environmental Linkages Study Public Meeting \#1 and Survey Summary

## Introduction

The following document summarizes comments from the in-person public meeting, online public meeting and public survey that took place during the initial engagement phase of the I-29/I35/U.S. 169 Planning and Environmental Linkages (PEL)Study. The document is broken down by summarizing the in-person and online public meeting followed by a summary of the public survey. The online public meeting and survey were active concurrently from October 27 through November 14, 2022.

Participants at both the in-person public meeting and online meeting provided comments and feedback. The top concerns include:

- Safety
- Congestion concerns
- Need for improved/updated roadway design
- Bike and pedestrian access


## In-Person and Online Public Meeting \#1 Summary

The I-29/I-35/U.S. 169 PEL in-person Public Meeting \#1 was held from 4-6 p.m. on Thursday, October 27, 2022, at the Northland Neighborhoods, Inc. building. There were 62 attendees at the event. The purpose of the public meeting was to:

- Gather input on the Baseline Conditions in the study area.
- Identify areas of concern from area residents and highway users.
- Gather feedback on the draft purpose and need, universe of alternatives, and alternatives screening evaluation approach.

In addition to the in-person public meeting, an online public meeting was offered as an option for people to access the same information about the study at their convenience. The online public meeting had 214 people participate during the two weeks it was available.

At the in-person public meeting, multiple board stations were set up around the room grouped together in common themes for participants to review and ask questions. Topic areas around the room included:

- Introduction of the study area
- Traffic/congestion/safety
- Environmental factors (geography and population)
- Purpose and need
- Multi-modal considerations
- Universe of alternatives
- Alternative screening methodology
- Public engagement schedule/online comments table

At the traffic and universe of alternatives stations, participants were asked to engage in specific exercises to provide feedback.

Feedback from the in-person public meeting showed the key areas of concern in the study area were predominantly outdated/substandard merging lanes and exit ramps along I-29 and I-35 that cause congestion and accidents, including the Parvin Road and Vivian Road exit ramps that are too short and a common pain point for congestion. Additionally, people were passionate on both sides regarding adding bike lanes/pedestrian accommodations in the project.

## Traffic Dot Exercise Summary (In-Person)

Figures 1 and 2 show the "Traffic - Existing Conditions AM/PM Weekday Peak Hour Speed Reliability" boards. These boards highlight the speed and reliability of segments on I-29, I-35, and U.S. 169 during morning and afternoon peak periods. For this exercise, participants placed dots on specific "pain points" on northbound and southbound routes. In the morning, most of the pain points are near the l-29/I-35 system interchange followed by I-35 southbound between Antioch Road \& I-29. In the evening, the highest concentration of dots are on I-29/I-35 northbound at US-24/Independence Avenue.

Figure 1: Traffic - Existing Conditions: AM Weekday Peak Hour


Figure 2: Traffic - Existing Conditions: PM Weekday Peak Hour


Figures 3 and 4 show the "Existing Traffic Congestion Summary" board and notes of specific pain points that people wrote down to further articulate where they see recurring issues in the study area. This exercise is the same as described with Figures 1 and 2 above, but approached in a way that allowed people to reference a map rather than a graph. Overall, the dots show the highest concentration of issues surrounding the convergence of I-29 and I-35. Areas identified multiple times are the l-35 southbound to I-29 northbound ramp, Parvin Road northbound on-ramp, and Antioch Road interchange. Multiple people mentioned that they often do not use the Antioch Road interchange to get onto the interstate and travel northbound on Antioch Road to Vivian Road to get onto I-29.

Figure 3: Existing Traffic Congestion Summary


Figure 4: Comments of Congestion Summary


Universe of Alternatives Dot Exercise Summary (In-Person)

Figures 5 and 6 show the "Universe of Alternatives" board and public comments. For this activity, people highlighted their favorite and least favorite alternatives and provided any additional comments. In addition to the public's opposition for "No Action" to occur, there are four alternatives that received a high volume of stickers, green for positive and red for a negative view of the alternative.

Highway Build received the most dots with 32 positive and 20 negative, followed by Multi-modal with 13 positive and 15 negative, and Congestion Management with 9 positive and 6 negatives. The Intelligent Transportation Systems, Freight, and Non-Recurring Congestion Management alternatives had the fewest dots but received only positive views. The comments on the notepad showed a need for improved exit ramps and better bike/pedestrian crossings surrounding interstates. Three unique comments to note were to hire more bus drivers, educate drivers, and improve storm runoff quality and quantity.

Figure 5: Universe of Alternatives
Figure 6: Comment of Universe of Alternatives


## Public Comments

Table 1 shows the favorability of the study at this point. Out of 37 comments received, 95 percent of people are either neutral, leaning in favor, or are in favor of improvements to the study area. For both the in-person and online public meetings, these are the top comment themes:

- Safety
- Congestion concerns
- Need for improved/updated roadway design
- Bike and pedestrian access and multi-modal connectivity

Comments specifically mention upgrading or adding additional ramps (especially on Parvin Road and Vivian Road) or were concerned about the safety of I-29 and I-35 merge lanes. Another common theme was the desire for better connectivity for bicyclists and pedestrians in the study area. Appendix A provides the comprehensive list of comments from the in-person and online meeting.

Table 1: Public Favorability of the Study as of Public Meeting \#1

| Not In Favor | Leaning Not In Favor | Neutral | Leaning In Favor | In Favor |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 0 | 10 | 7 | 18 |

## Meeting Promotion

The in-person and online public meetings were publicized through the following:

- Email notification from the study mailing list
- Print and digital advertisements in the Northeast News
- Promotions by Northland Neighborhoods, Inc (NNI) and Northland Reginal Chamber of Commerce
- Missouri Department of Transportation (MoDOT) media alert and news release
- MoDOT email lists for Clay and Platte Counties
- The study webpage on the MoDOT website (https://www.modot.org/i-29i-35us-169- corridor-study)
- Dedicated emails and word of mouth at Community Advisory Committee and Resource Agency meetings
- Social media posts (Facebook and Twitter)
- Four Twitter posts (two before the meeting, one reminder, and one after/thank you)
- Two Facebook posts (one before the meeting and one after)


## B. PEL Electronic Public Survey No. 1 Summary

The electronic public survey No. 1 for the I-29/I-35/U.S. 169 PEL Study was conducted through the ArcGIS Survey 123 platform. A total of 98 people completed the survey which was active from October 27 through November 14, 2022. The purpose of the survey was to help the PEL project team understand primary concerns and priorities the public has for the I-35, I-29 and U.S. 169 corridors. Questions focused on the proposed purpose and need, study goals, universe of alternatives, and pain points users of the corridors experience on a recurring basis.

A copy of the survey questions and responses is provided in Appendix B. The survey was promoted through the Community Advisory Committee, social media outlets, study webpage, and shared from community partners. Figure 7 shows an example of the social media push to promote the survey. The target audience for the survey included people who live, work or commute within the study area.

Figure 7: Kansas City I-29/I-35/U.S. 169 PEL Survey Promotion Tweet


Overall, survey participants agreed with the information being shared in the Baseline Conditions report, which identified existing corridor conditions. Respondents generally agreed that the draft purpose and need contained the right elements. Additionally, respondents specified locations in the corridor that cause concern for drivers. The main concerns respondents identified in various questions regarding the purpose and need and what alternatives will be analyzed include:

- Safety as a primary concern with congestion on the I-29 and I-35 corridors
- Congestion
- Concerns with on/off ramps and merging lanes being too short
- Addressing connectivity with multi-modal options such as bike and pedestrian connections and transit

Priorities for addressing safety and congestion concerns include physical improvements to highway lanes, entrance/exit ramps for interchanges, as well as support for multi-modal needs.

Below are the questions and key takeaways from the survey:
Do you agree the Baseline Conditions (information presented at the public meeting)
represent the primary issues that affect the I-29/I-35/U.S. 169 corridors? Out of the 98 total survey responses there were 86 "Yes" 12 "No".

- If you answered 'No', what other issues need to be taken into consideration or removed from consideration? Nine people responded to this question. Of those nine, common themes were:
- Providing alternative options other than a 'car centric',
- Freeway expansion fix.
- With the Northland growing and concerns for the climate, respondents see a different approach to fixing congestion (especially multi-modal or a focus on pedestrian walkways).
- Focus on $11^{\text {th }}$ Street ramps/traffic and expanding use of video on the highways.

Rank the six issues (needs) below according to what you believe is most important to address in the study area. ( $1=$ Most Important, 6 = Least Important)

Table 8 shows the average score for each category. Overall, respondents want the team to focus on fixing congestion, improving safety and focusing on fixing deficiencies on the network. Traffic congestion, safety and structural deficiencies received the highest average rankings.

Figure 8: Question 2 Rankings
2. Rank the six issues (needs) below according to what you believe is most important to address... * (3) Column Bar \$8


- Referring to the "Other" in Question 2, list the issue(s) that you believe should also be evaluated by the Study Team. Forty-five people responded to this question. Common responses included:
- Reducing vehicle miles travelled,
- Ramps that needed improvements,
- Increasing multi-modal options - especially a light rail and pedestrian/bike path increases,
- Widening roads,
- Improved storm drainage,
- Accommodations for underserved and minority communities.

Of the Study Goals listed below, select up to five that you feel are the most important. Out of the 98 responses, the top three study goals listed that were the most important were to:

- Improve safety (62),
- Reduce congestion (62),
- Improve local vehicle access to downtown and other communities (51).

The three categories that were least selected were accommodate freight movement (8), improve access to industrial and retail centers (10), and sustain public and agency input and support for the project (11).

Figure 9: Question 4 Responses


- If you believe there should be additional study goals added that were not listed in the previous question, please add them below. Thirteen people responded to this question. Additional goals identified by respondents include:
- Future expansion/rapid transit
- Safety/congestion
- Community access (don't break up communities)
- Multi-modal, and re-routing traffic around downtown instead of funneling right through it.

Highway Build alternatives, such as the Universe of Alternatives (No Action, Congestion Management, Intelligent Transportation Systems, Freight, Multi-modal, Non-Recurring Congestion Management) should be prioritized above the other six alternative categories. There were 56 total people who either strongly agreed or agreed. Twenty-six people either strongly disagree or disagree.

Figure 10: Question 6 Responses
6. Highway Build alternatives, such as the ones listed above, should be prioritized above the... *Column Bar Pie Map


Congestion Management alternatives should be prioritized above the other six alternative categories. Overall, 48 respondents either strongly agreed or agreed. Twenty-six people either strongly disagree or disagree.

Figure 11: Question 7 Responses
7. Congestion Management alternatives, such as the ones listed above, should be prioritized... . Column Bar Pie Map


Intelligent Transportation Systems (ITS) alternatives should be prioritized above the other six alternative categories. The majority of responses (39) were neutral to ITS alternatives. Only 13 respondents strongly felt one way or the other.

Figure 12: Question 8 Responses
8. Intelligent Transportation Systems alternatives, such as the ones listed above, should be... . Column Bar Pie Map


Freight alternatives should be prioritized above the other six categories. Responses skewed mostly neutral to negative regarding freight alternatives. Forty-four respondents strongly
disagree or disagree, whereas 17 participants agreed on some level that this should be a prioritized alternative.

Figure 13: Question 9 Responses

```
9. Freight alternatives, such as the ones listed above, should be prioritized above the other six... * Column Bar Pie Map
```



Multi-Modal alternatives should be prioritized above the other six alternative categories. Forty-six respondents strongly agreed or agreed that multi-modal alternatives should be prioritized. However, 28 strongly disagreed or disagreed. Twenty-four responses were neutral.

Figure 14: Question 10 Responses
10. Multi-Modal alternatives, such as the ones listed above, should be prioritized above the... .Column Bar Pie Map


Non-Recurring Congestion Management alternatives should be prioritized above the other six alternative categories. Responses for this question were evenly split (34 to 34) between agreeing or disagreeing on some level. The majority of responses (30) were neutral.

Figure 15: Question 11 Responses
11. Non-Recurring Congestion Management alternatives, such as the ones listed above, shoul... *Column Bar Pie Map


Are there any alternatives missing from the Universe of Alternatives listed above that you believe should be evaluated? 92 out of 98 responses said "No".

- If you answered 'Yes', what additional alternative(s) do you recommend the Study Team evaluate? Five people responded to this question. Responses included:
- A tactic that can improve and encourage additional truck, rail, and river freight movement through the study area, focusing on growth management and adequate public facilities in the Northland
- More bicycle connection to regional assets and downtown
- Diverting regional traffic to I-635 to free up downtown access
- Emphasis on isolating thru traffic from off/on ramps

The summaries for survey questions 13 and 14 are being combined because they are seeking the same information regarding pain points in the study area. Describe the location and issue(s) you've experienced at the spot marked in the map above. Below is the list of "pain points" summarized into bullet points. Figure 16 also shows the locations that people marked.

- I-29/I-35 split is congested, short merging lanes, and dangerous
- General on/off ramps are dangerous
- General congestion is an issue in the study area
- Merging lanes are too short and cause accidents (Parvin Rd is noted a few times regarding this)
- Slow traffic when merging from I-35 to I-435
- Congestion before Parvin exit
- Map is difficult to use on mobile for these interchanges
- North loop and NE interchange is beyond repair and needs to be "eliminated as soon as possible"
- I-29 heading downtown
- Too many on/off ramps and lanes are too short
- Add multi-modal options - area is not pedestrian friendly
- $72^{\text {nd }}$ Street exit off I-29 is severely congested in the morning
- I-29 South past Davison Rd
- Inefficient route to get across the river - need to focus on alternative modes of transportation
- On ramp congestion creates safety issues
- Merging two lanes over for both northbound U.S. 169 and southbound U.S. 169 is unsafe and problematic.
- Expansion of lanes on I-35
- Sharp turns at high speeds with expansion joints cause safety issues - especially with rain
- I-435/Highway 152 needs longer lane for merging traffic on HWY152
- Short on ramp from $10^{\text {th }}$ street to $\mathrm{I}-29 / \mathrm{I}-35$ (East Loop)
- Congestion in I-29/I-35/I-70 loop through Brighton
- On Ramp southbound Oak to I-29 is difficult to merge
- NW Corner of the loop interchange (understand Buck O'Neil bridge needed replacement but the north loops should still get shut down)
- Not part of the survey; I-435 NB off ramp to 45 Highway in Parkville should probably be expanded to two lanes (increased volume in commercial traffic causing some severe backups)
- U.S. 71/l-49 is reduced to one lane heading north on the east side of downtown at Truman Rd
- I-35 and S.H. 152 - long lines to exit the highway
- On/off Ramp at Parvin Rd
- Exit from I-35 onto I-29 northbound
- I-29/I-35 split area has merge lane length issues - too short and causes accidents (both NB \& SB)
- The Pleasant Valley interchange that was redone at high cost is a mess
- Having 2 entrances to the city via the highway is not needed. Substituting one of these 2 paths as a light rail higher capacity than the streetcar would greatly improve car optional commuting and services to the airport

Overall, the focus was on general congestion, safety and merge/diverge difficulties. Pain points were primarily located around the I-29/l-35 system to system interchange. Three specific exits that were highly talked about were Vivion Rd., Parvin Rd., and North Oak Trfwy. off ramps/exits. There were some comments about finding other transportation solutions outside of cars/highway fixes.

Figure 16: Mapped Locations of Pain Points


What types of engagement would you prefer the study team do to keep you informed about the study? The top three preferred methods for engagement were:

- Surveys (50),
- Social media updates (50),
- Virtual meetings (48).

People were also allowed to suggest "Other" methods for the study team to engage with the public. Four people responded and included suggestions such as email updates, a walk audit of the area to better understand current multi-modal challenges, and website information.

Figure 17: Responses for Question 15
15. What types of engagement would you prefer the Study Team do to keep you informed about the... *Column Bar


Please submit any other comments you have below. Refer to the raw responses in Appendix B to review all of the comments. Some of the recurring themes from the comments include:

- Safety
- Expanding outreach beyond the public meetings
- Support for increase in multi-modal options
- Critiques on the road/design
- Funding comments
- General support of the study and appreciation of the team


## C. Conclusion

The main concerns respondents identified throughout the survey include:

- Safety as a primary concern with congestion on the I-29 and I-35 corridors.
- Congestion.
- Concerns with on/off ramps and merging lanes being too short.
- Addressing connectivity with multi-modal options such as bike and pedestrian connections and transit.

Many respondents commented on congestion on the I-29 and I-35 corridors, concerns of on/off ramps, and merging lanes being too short and adding lanes to congestion. There were many comments in support of multi-modal alternatives. There were also comments critical of alternatives. For example, two individuals mentioned that highway widening alternatives are not desirable solutions due to the environmental harm it causes and because there should be more focus on multi-modal options. There was a heavy focus on road design and safety. Out of the 98 survey participants, there were mostly positive responses to the study.

## Appendix A: Public Comments

The following table contains the comprehensive list of comments received at either the inperson or online public meeting. In total, there were 37 comments received. Cells that are not highlighted are comments received at the in-person meeting, and cells that are shaded in blue are comments received from the online meeting. All comments are verbatim.

Table A-1: Public Meeting Comments Summary (In-Person and Online)

| Stakeholder <br> Support | Comment Category | Comment |
| :---: | :--- | :--- |
| Leaning In Favor | Safety | Several dangerous areas going from I-35 to I-29 <br> passed Vivion Road as well as I-29 going north <br> at 69. The Claycomo exit just before Brighton is <br> dangerous as well. <br> People not familiar with the area and wanting to <br> exit to go 152 or Barry Road often get in the <br> wrong lane. |
| In Favor | Traffic | The ramp from I-35 South to I-29 North is an <br> absolute nightmare in the morning. I don't take <br> the exit but the backup that occurs severely <br> impedes southbound traffic and causes abrupt <br> lane changes and stoppages that cause <br> accidents. |
| Neutral |  | Highway safety, widening, traffic flow issues are <br> important, of course, but please stop <br> COMPLETELY DISREGARDING the equity and <br> safety issues for pedestrians, cyllists, and the <br> disabled. These roads were buil almost <br> completely without concern for the <br> neighborhoods they bisected and the people <br> who might want/need to traverse them without a <br> car. These projects are the time to remedy the <br> injury that caused to our communities. |
| Multi-modal |  |  |
| Considerations |  |  |


| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| In Favor | Roadway Design | I-29 North between I-35 and 169 is very confusing and congested. The merging lanes and exits cause drivers to swerve, move around slow or stopped vehicles. It is a very dangerous and poorly marked area. |
| Neutral | Roadway Design | In addition, and contiguous, we are interested in the I-35/l-25 interchange with N Oak Tffy. It's a relatively old-fashioned interchange and entering west/north bound a very short ramp for merging. |
| In Favor | Roadway Design | Please consider additional access ramps on and off I-35/I-29 in North Kansas City at /e 16th Ave, Currently can enter interstate southbound but not northbound. Currently can exit interstate from the south but not the north. Additional ramps would allow the truck route through NKC to go directly onto 16th instead of via Armour and Linn. Traffic from One North is going to increase dramatically with Genesis Fitness, more apartments, and grocery store. They will need more access to and from the north than Armour can handle. |
| In Favor | Roadway Design | On both northbound and southbound $\mathrm{I}-35$, the Parvin road exit (southbound) and onramp (northbound) are terrible for vehicles entering and exiting the interstate. The Parvin Road onramp on northbound is particularly bad because it causes slowdowns for northbound traffic approaching the onramp and cars stop who are entering $\mathrm{I}-35$ and cannot enter the interstate without causing a dangerous condition. |
| In Favor | Roadway Design | it is essential that the entrance ramp from Vivian Road going west to get on either I169 or 29 north be modified. It is extreme difficult to get on 29 while dodging cars going north on 29 and 169. It is also challenging to get on I29 south bound from north Oak since a lane ends and 35 breaks off shortly after. |
| Neutral | Roadway Design | Most of the entrance and exit ramps on Vivion between I35 \& I29 are difficult to navigate, Ramp from SB N Oak to NB 129 SB I35 to NB I 29 - Davidson Rd on ramp Vivion Rd to NB I29 \& 169 crossing traffic to I 29 N |


| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| Neutral | Roadway Design \& Safety | Ramp on Parvin Road to I-35NB - poor visibility and no acceleration lane. Ramp from N Oak NB to 129 - same as above 169SB to I29 SB - too many merging lanes and lane changes to get to exit. <br> N Holmes - doesn't cross I29 and needs to connect neighborhoods and ease traffic on N Oak <br> Exit from I29NB to N Oak dumps into congestion service roads? And too many try to turn left from N Oak to Vivian West. <br> Englewood Road needs "cloverleaves" instead of left turns to 169 and same for $68^{\text {th }} \mathrm{St}$. |
| Neutral | N/A | No comment. |
| In Favor | Daily Commute and Safety | I think the study area should include the entire counties of Clay and Platte. The project area affects out side the study area residents as much as inside. I am glad this area is a focus for improvement because it is only going to get worse as the Northland grows north of 152. There are many unsafe areas within the Project limits interchanges |
| Neutral | Daily Commute and Safety | I am curious if the smaller bridge is listed that is at the bend in I-35 northbound, just after passing Target and about the Winwood Skate Center area I have personally had a couple encounters on that slight turn, when traveling safely at speed limit, when icy conditions are favorable. I have slid side ways more than once during early morning commutes. Luckily I have been able to recover given the small/short bridge meets land and hwy conditions are much more favorable in the lower temperatures when the surface is grounded. I feel that bridge is unsafe given its a surface level section that is nearly unseen. A driver hardly recognizes they are on a raised surface and given the speed limit and degree of the turn on the hwy, its just enough to cause any traveler or younger inexperienced driver a difficult situation. It seems unreasonable to expect MoDot to treat this one section each time we have a down shift in temperatures. Thank you, Concerned Mom of 2 teen drivers |


| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| Not In Favor | Safety, Environmental, and Road/Design | KC doesn't need more highways creating pollution and congestion. Instead of just making the highways wider every ten years MoDOT should focus on more efficient and safe ways of moving people like extending the streetcar into the Northland. Absolutely no more lanes. |
| Leaning in Favor | Roadway Design | The northland is currently designed in a way that requires a car to live a high quality of life. A highway design that minimizes disconnecting existing neighborhoods from the community services (shopping, schools, etc.) should be prioritized over maximizing high speed highway travel. |
| In Favor | Safety and Multi- modal Considerations | Our family commutes to KC daily from I-29/64th st. Concerned that the I-29 and I 35 highways have above average accident rate, are poorly designed (short ramps, poor visibility of line striping). We have an adult child with disabilities and there is a lack of public transportation in the Northland. No way to easily bike or bus into the city. |
| Leaning in Favor | Roadway Design | I-35 from the split all the way to Kearney needs to be 6 lanes. This is the only interstate section that is 4 lanes and has the worst congestion and backups and safety issues. We need attention to this area, as Liberty and the Shoal Creek area has been the fastest growth area of KCMO for decades now. |
| Leaning in Favor | Environmental | I am particularly interested in the impact of roads/bridges on wildlife habitat and migration patterns. I would like to see the implementation of wildlife bridges in new roadway construction/improvement projects. These bridges have been shown to reduce the number of wildlife vs vehicle collisions significantly. |
| Leaning in Favor | Roadway Design | Thanks for the thorough review of issues and opportunity to input. My area of greatest concern is where 71 converts into 29/35 in KC |
|  |  | There's a lot to digest here. Thank you. As a general thought: As a "south of the river" resident who often travels to the "northland" |


| Stakeholder <br> Support | Comment Category | Comment |
| :---: | :--- | :--- |
| Neutral | (and not only to go to the airport, but to shop, <br> dine, visit parks and more); and conceding that <br> the Buck O'Neil Bridge project will significantly <br> improve the options; the "crossing the river" <br> experience is a critical challenge that must be <br> addressed to improve the livability and economy <br> of the Kansas City metropolitan area and by <br> extension, the state of Missouri. Regarding the <br> former, it is challenging enough that a state line <br> bifurcates the KC metro area; the further <br> bifurcation (quadrification?) caused by the <br> Missouri River complicates and frustrates the <br> entire social, cultural, economic and political <br> character of the area even more, but most <br> especially of the City of Kansas City, Mo. <br> Regarding the latter: the Study Area includes <br> the most significant transportation hub of <br> western and northwestern Missouri from the <br> state's northern and western borders to the <br> Missouri iver's eastward turn toward the <br> Mississipi River. The outcome of this study <br> ought to result in solutions designed to feed the <br> primarily rural and largely underserved counties <br> and communities of the central and northwest <br> areas of the state. |  |
| In Favor |  | I think particularly the design and flow from the <br> split going north on I-29 through North Oak, 169 <br> and past 635 has concerns. As far as I-35 |
| northbound is concerned, the main issue to me |  |  |
| is the number of lanes going north. Adding a |  |  |
| third lane as been helpful. Coming south o I-35 |  |  |
| and merging with I-29 as well as coming south |  |  |
| on I-35 and going north on I-29, with the |  |  |
| merging traffic from Antioch Road needs |  |  |
| attention, in my opinion. |  |  |


| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| In Favor | Roadway Design | I'm following because I like to follow construction and improvements. I drive these roads as needed and ride bikes in the area. |
|  |  | 1/29 and I/35 interchange has merging traffic that must change lanes rapidly with little room for merged traffic. This affects both northbound and southbound traffic. Entry ramps at Northbound 29 and Parvins is very short as well as southbound entry lane at Antioch and 169 has entering traffic well as merging traffic in a very small space. |
| In Favor | Multi-modal Considerations | I am highly supportive of the Multi-modal Alternative. More transit options and frequency north from downtown would cause me to use it more. I also support pedestrian and bike infrastructure expansion, as those are currently lacking in many places in the study area. I am very against the Highway Build Alternative, as this will just increased traffic through induced demand. |
| Not in Favor | Roadway Design | I do not like the Highway Build Alternative. This will cause more traffic though induced demand and make the situation even worse. I'd like to see any of the other alternatives as they focus on ways to either move traffic more efficiently or get more cars with single drivers off of the road. |
| Neutral | Multi-modal Considerations | I consider US 169 ( the new broadway brdige ) as an important additional piece to look in the study area. I think the new bridge will reduce congestion and reduce the variability of travel times for the commute. I also think we should connect the streetcar across the river and develop a light rail connection to the the airport. I am not so concerned about the variable times on the freeways during rush hour. Increased transit via light rail, the streetcar extension to the City of North Kansas City and a possible North Oak and/or Antioch Road bus rapid transit would greatly help this part of Kansas City. We need to make sure that there are |


| Stakeholder <br> Support | Comment Category | Comment |
| :---: | :--- | :--- |
| In Favor |  | connected bikeways through this area. We also <br> need to make sure every arterial road has <br> pedestrian access. These measures will reduce <br> the necessity of travel by car in the Northland. |
| In Favor | Positive | I'm very pleased to find out this has been <br> recognized as an area that needs to be <br> addressed. |
| Positive | Welcome your study of potential improvements <br> to these roadway sections, which are vital to the <br> commuting public from Northland communities <br> into Kansas City. |  |
| Roadway Design |  | Favor <br> We definitely need longer entrance and exit <br> ramps in some of these areas as well as some <br> or more lighting for those ramps. The highway <br> speeds should ilso be at least 65 in some <br> areas-55mph is too low. Stoplights at off ramps <br> need to be better timed in some of these areas <br> as well to reduce traffic. |
| Leaning in Favor |  | Roadway Design |


| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| Leaning in Favor | Construction Impacts | what is the impact on the neighborhoods make sure to take care of the damages from construction rerouting .ect, |
| Neutral | Daily Commute | daily commute |
| In Favor | Multi-modal Considerations | I really want to emphasize the extent to which pedestrian and bicycle safety needs to be prioritized. Additionally, pedestrian and bicycle routes should always be prioritized when there is any room that could be provided to them in a right-of-way so that they have routes that are as direct and safe as any that belong to vehicles. Additionally, sound isolation should be prioritized because the noise pollution of vehicles is a huge cost to the people who live nearby. For North Kansas City and the people who live near 35 but east of 35 , we desperately need a safe wide well lit path underneath the bridge. Lastly, all paths across the river should have bicycle paths, but particularly i- 29/35 should have one because there is enough room in the right of way on one shoulder. Missouri DOT should commit to also keeping those paths clean so that people can bike on them safely without dangerous or sharp debris damaging their bicycles or the riders and pedestrians themselves. |
| Neutral | Multi-modal Considerations | We need a safe, attractive, and preference towards pedestrian and bicycle use way to walk and bike under l-35 at armour road, to cross the river towards places like the riverfront, and using some of the right-of-way for bicycle transit Northwest into Platte county. We don't have bicycle Traffic because we don't have any sane ways for people to get to the places they want to go. |

## I-29/I-35/U.S. 169

Planning and Environmental Linkages Study Public Meeting \#2 and Survey Summary

## Introduction

This document summarizes the feedback and comments collected from the second public engagement phase of the I-29/I-35/U.S. 169 PEL Study. This phase included an in-person public meeting, virtual public meeting and a public survey. The information below is categorized into a meeting synopsis followed by a detailed summary of the comments received from the public survey. Both the online meeting and public survey were open from April 12 through April 28, 2023.

## In-Person and Online Public Meeting \#1 Summary

The second I-29/I-35/U.S. 169 PEL in-person Public Meeting was held from 4-6 p.m. on Tuesday April 12, 2023 at Northland Neighborhoods Inc. There were 35 in-person attendees. The purpose of the public meeting was to:

- Share results from the Alternatives Screening process
- Share and gather feedback on the preliminary PEL recommendations
- Allow the general public to speak with project experts
- Identify any concerns or questions from the public relating to the NEPA phase.

In concurrence with the in-person public meeting, a virtual component sharing the same information was made available for the public to access at their convenience. A total of 104 participants joined online.

At the in-person meeting, 17 boards were set up around the room grouped together in common themes for participants to review and ask questions. The boards addressed several main topics including:

- Introduction to the study area
- Public Meeting \#1 Summary/Baseline conditions
- Purpose and need
- PEL Process
- Universe of Alternatives
- Alternative Screening process
- Primary Scenarios and Complementary Scenarios
- Cost, Engineering, Traffic, and Multimodal performance measures
- Preliminary PEL Recommendations
- Public engagement schedule
- Public survey questions


## Preliminary PEL Recommendation Dot Exercise Summary (In-Person)

Figures 1 shows the "Survey Questions" board. This board asked meeting attendees to express their level of support for the preliminary PEL Recommendations. Participants were able to place dots in a table either expressing "yes", "no", or an "I don't know" response to the preliminary PEL Recommendations. They could also place sticky notes with further comment at the bottom of the board. 17 meeting attendees voted "yes" in support of the preliminary PEL recommendations. There was no opposition or uncertainty about the recommendations from those at the in-person meeting.

There were four written comments with three expressing support for the project and a strong desire to see it proceed. One comment encouraged the project team to monitor environmental impacts of Scenario 7 which included consolidated/eliminated access to some communities.

Figure 1: Survey Questions


## Public Comments

Table 1 shows the favorability of the study at this point. Out of 32 comments received, 84 percent of people are leaning in favor or are in favor of improvements to the study area. For both the in-person and online public meetings, these are the top comment themes:

- Improved lighting
- Interchange improvements
- Safety concerns
- Design improvements

Multiple comments called for better lighting within the project limits. Another common theme was improved interchange design for longer or safer merging and exit lanes. Appendix A provides the comprehensive list of comments from the in-person and online public meeting.

Table 1: Public Favorability of the Study as of Public Meeting \#2

| Not In <br> Favor | Leaning Not In <br> Favor | Neutral | Leaning In <br> Favor | In <br> Favor |
| :---: | :---: | :---: | :---: | :---: |
| 0 | 0 | 5 | 4 | 23 |

## Meeting Promotion

The in-person and online public meetings were publicized through the following:

- Email notification from the study mailing list (5)
- Missouri Department of Transportation (MoDOT) media alert and news release
- The study webpage on the MoDOT website (https://www.modot.org/i-29i-35us-169- corridor-study)
- Targeted emails and word of mouth at Community Advisory Committee and Resource Agency meetings
- Social media posts (Facebook and Twitter)
- Three Twitter posts (twice before, once after)
- Three Facebook posts (twice before, once after)


## B. Electronic Public Survey No. 2 Summary

Electronic public survey No. 2 for the I-29/I-35/U.S. 169 PEL Study was conducted through the ArcGIS Survey123 platform. A total of 24 people completed the survey which was active from April 12 through April 28, 2022. The study was designed to understand public opinion of the preliminary PEL Recommendations. Questions asked respondents to express their level of support for the recommendations and allowed them to provide further comments or questions for the study team. The survey was made available to resource agencies, Community Advisory Committee members and the general public.

A copy of the survey questions and responses is provided in Appendix B. The survey was promoted through the Community Advisory Committee, study webpage, email blast and shared by community partners. The target audience for the survey included people who live, work or commute within the study area.
Survey results showed that an overwhelming majority of respondents agreed with the preliminary PEL recommendations. There was little pushback towards these recommendations. Respondents also had the opportunity to provide questions and comments. Below are the raw results and major themes taken from the second public survey.

Figure 2: Question 1

1a. Do you agree with the preliminary PEL Recommendations to carry forward for further detail... Column Bar Pie Map


Question 1: Do you agree with the preliminary PEL recommendations to carry forward for
further detailed National Environmental Policy Act (NEPA) analysis?
All respondents agreed with the preliminary PEL recommendations. There was no opposition from the respondents. This echoed the same sentiments expressed at the in-person public meeting.

Question 1b: If no, why?
There were no responses to this question.
Question 2: Please provide any additional comments or questions about the results or preliminary PEL recommendations.

Thirteen respondents left a comment or question relating to the preliminary PEL
recommendations. Several comment themes stood out including:

- Improved/revamped interchanges
- Better bike and pedestrian access/accommodations
- Anticipated growth in the Northland

The majority of respondents wanted to see significant improvement along most, if not all, of the interchanges within the study area citing safety issues and congestion as major concerns. Table $\mathbf{2}$ provides a full list of all comments received from the public survey.

Table 2: Survey Comments

| Comment Category | Comment |
| :---: | :--- |
| General | $\begin{array}{l}\text { This project is very important to Clay and } \\ \text { Platte Counties, as well as the region. }\end{array}$ |
| Congestion/Multimodal | $\begin{array}{l}\text { This corridor is plagued with traffic } \\ \text { congestion, lack of access for all modes of } \\ \text { transportation, and accidents. Something } \\ \text { needs to be done to improve for all modes of } \\ \text { transportation including potential light rail. }\end{array}$ |
| Interchange Improvements | $\begin{array}{l}\text { The interchanges in the study area all do } \\ \text { need improvements. Improving capacity will } \\ \text { only shift the congestion down the road to the } \\ \text { downtown loop. All the interchanges need to } \\ \text { include pedestrian and separate protected } \\ \text { bike lanes on the roads they intersect / cross } \\ \text { over. }\end{array}$ |
| Interchange Improvements | $\begin{array}{l}\text { The I-29/35 split and I-29/N-Oak interchange } \\ \text { need significant improvements for traffic and } \\ \text { safety reasons. }\end{array}$ |
| Interchange Improvements | $\begin{array}{l}\text { That entire interchange/interstate needs } \\ \text { rebuilt and widened. }\end{array}$ |
| General | $\begin{array}{l}\text { So how will this impact how they will be } \\ \text { changes }\end{array}$ |
| General | Scenario 7 seems to be the way to go. |
| Clease work on these heavy traffic areas |  |
| Congestion/Growth/Safety | $\begin{array}{l}\text { Poon. It truly seems ridiculous that all the } \\ \text { growth in Platte County is expected to merge }\end{array}$ |
| into one lane via I-29 just north of the merge |  |
| with I-35 in the southbound lanes. This is not |  |
| safe and should be fixed quickly. Unrelated, |  |
| but I can't get anyone to respond: the exit/ |  |
| turn lane from northbound I-29 at the NW |  |
| $64 t h ~ S t r e e t / H w y ~ 45 / T o m ~ W a t s o n ~ P a r k w a y ~ i s ~$ |  |
| equally unsafe. Every weekend, I see cars |  |
| exiting from I-29 northbound, turning west/left |  |$\}$


|  | on NW 64th Street and swerving into <br> other lanes to avoid the pillar for I-29 in <br> the middle of that turn. There's finally a <br> yellow split lane sign in front of the <br> pillar, but can we not also stripe the <br> pavement or add additional cones or <br> paint THE PILLAR or add signage <br> ahead of the turn? This has been the <br> site of many crashes and it seems like it <br> could be better communicated with just <br> a few additional <br> resources. Thank you. |
| :---: | :--- |
| Growth | North Kansas City has a few planned <br> projects that might be impacted by the |
| PEL - Diamond Pkwy/14th Ave shared |  |
| use path; E//W |  |
| Connection Shared Use Path under |  |
| Cike/Pedestrian |  |
| I29/35 at Armour/210. |  |
| Bike/Pedestrian | Make sure the study incorporates <br> bike/ped crossing under I29/35 on <br> Vivion Road |
| General | I'm glad the study has identified the <br> need for improved access and <br> increased capacity. It is important to |
| note that there are only a few river |  |
| crossings from the Northland to |  |
| downtown and when one is under |  |
| construction, all routes are effected. |  |
| You see that now with US169 Buck |  |
| ONeil and now there being work along |  |
| I35. It is imperative to include the |  |
| Construction team during the |  |
| development of contractual language |  |
| for contractors. I hope that sufficient |  |
| traffic lanes remain open during peak |  |
| times throughout these interchange full |  |
| builds and capacity expansions. It will |  |
| be critical to commuters. |  |
| Additionally, I think most would prefer a |  |
| short |  |
| time with huge impacts than years of a |  |
| slight impact. Just something to keep in |  |
| mind. |  |

## C. Conclusion

In person and virtual attendees have expressed strong support of the preliminary PEL recommendations. There are several key outcomes that respondents would like to see as a result of the study including but not limited to:

- Interchange improvements
- Better highway/interchange design
- Increased pedestrian and bike access
- Better lighting along the corridor

There was no opposition to the PEL recommendation. Neutral comments related to expanding the project limits, desire for multimodal opportunity, and asking for more detailed analysis of the scenarios as they move forward into the NEPA phase.

## Appendix A: Public Comments

The table below contains a comprehensive list of all public comments received during this engagement period. The list includes comment category as well as comment favorability. Nonhighlighted cells are those collected at the in-person meeting. Cells shaded blue are those collected at the online meeting. Comments have not been edited and are verbatim.

Table A-1: Public Meeting Comments Online and In-Person

| Stakeholder Support | Comment Category | Comment |
| :---: | :---: | :---: |
| In Favor | General | Get this done ASAP! |
| In Favor | General | Scenario 7 is the best answer in spite of cost some opposition |
| Neutral | General | Environmental impact of consolidated/eliminated access must be considered for communities. Expected travel time |
| In Favor | General | Please proceed! |
| In Favor | Road/Design | Many interchanges in the study area are outdated. |
| In Favor | Daily Commute, Traffic, Road/Design | I like the alternatives with Highway mainline capacity improvements. Merging is a big issue especially during rush hour - but its becoming more of a daily occurence. Would like to see <br> Vivion/Oak/I29 Intersection Improved. Merging from 169 to 129 North is scary scary scary |
| Leaning In Favor | Safety, Traffic, Road/Design | The interchange needs proper lighting and the trees removed for better safety |
| In Favor | Traffic | All three highways need consistent lighting |
| In Favor | Traffic | All three highways need consistent lighting |
| Leaning In Favor | Noise/Air Quality, Safety, Traffic | Because of our proximity to the I35 SB we hear weekly wrecks at the I35 onramp |


|  |  | from Antioch Rd. and the hiway noise is very load at our location |
| :---: | :---: | :---: |
| Leaning In Favor | Right of Way | It currently is hard to merge onto hwys. Drivers don't merge well and things to come to a full stop. |
| Neutral | N/A | no comment |
| In Favor | Safety/Road/Design/Alternatives | I approve and support the PEL recommendations for MoDOT's I-29/I-35/U.S. 169 PEL Study. |
| In Favor | Road/Design | Restrict LAH access at some interchanges, and eliminate some access. |
| Neutral | Traffic, Alternatives | Was much (if any) consideration given to mass transit/multimodal alternatives to reduce the need for additional capacity? Or were those thrown out because of the significantly higher cost? We cannot build our way out of congestion, so is the MPO, MoDOT and municipalities talking to discuss other solutions that may require more investment but will reduce the number of vehicles on the road longterm? |
| In Favor | Construction, Road/Design, Sustainability | Expansion |
| In Favor | Construction, Road/Design, Sustainability | Expansion |
| In Favor | N/A | Expansion |
| In Favor | Daily Commute, Traffic, Convenience | I am in favor or scenario 7 with 5 and 6 being close behind. To the best ability to do so the construction should fix as many issues as |


|  |  | possible. I would like to see more work options along the 169 corridor. As a resident at 6 th st and 169 , traffic is heavy in both directions of the highway. It is often congested between I29 and 68th st. |
| :---: | :---: | :---: |
| In Favor | Daily Commute, Road/Design, Street Closure | My registered address and my work are both in the Northland. My work is at a church at NE48th St \& I-435. <br> So the work at l-35 \& Brighton does affect how people come to church. I appreciate the information provided. No specific questions today. |
| Not In Favor | Alternatives, Sustainability, Environmental | I strongly oppose any alternative which includes freeway capacity expansion. The PEL study utterly fails to account for induced demand and modal shift effects. Kansas City already has some of the highest freeway miles per capita of any US city, and expanding our freeways will only promote sprawl and increase the burden on our community. Studies have shown conclusively that the PEL's statement that freeway expansion will reduce carbon emissions is categorically false -- when freeways expanded, traffic and travel times do not decrease; instead, demand increases, resulting in more vehicle miles travelled and more carbon emissions. MoDOT shouldn't sell out our future by uselessly expanding freeways. Instead, the study should focus on targeted and incremental improvements to |

$\left.\begin{array}{|c|c|c|}\hline & & \begin{array}{c}\text { current layouts while } \\ \text { supporting the streetcar } \\ \text { extension to North Kansas } \\ \text { City and other } \\ \text { walk/bike/transit measures } \\ \text { to reduce congestion on the } \\ \text { existing system. }\end{array} \\ \hline \text { In Favor } & \text { Safety, Road/Design } & \begin{array}{c}\text { The I-35/29 split, 169 N to I- } \\ \text { 29N (@I-635) are both very } \\ \text { dangerous today. }\end{array} \\ \hline \text { In Favor } & \text { Safety, Traffic, Road/Design } & \begin{array}{c}\text { The I-29/35 Split and the I- } \\ \text { 29/N Oak interchanges, and } \\ \text { the areas between them, } \\ \text { need significant } \\ \text { improvements for traffic and } \\ \text { safety reasons. }\end{array} \\ \hline \text { In Favor } & \begin{array}{c}\text { The split and } \\ \text { Parvi/Davidson }\end{array} \\ \text { interchanges are so rough } \\ \text { and uncomfortable to drive } \\ \text { through. Really the } \\ \text { approach from 210 north to } \\ \text { the split is very rough due to } \\ \text { the fact that I-35 is not the } \\ \text { dominant highway. Many 35 } \\ \text { thru travelers stay in the left } \\ \text { lane up to the split and then } \\ \text { need to merge when they }\end{array}\right\}$
$\left.\begin{array}{|c|c|c|}\hline \text { In Favor } & \text { Safety, Road/Design, } \\ \text { Alternatives }\end{array} \begin{array}{c}\text { This interchange only gets } \\ \text { busier. The interchange } \\ \text { spacing is so tight and } \\ \text { unsafe from 169 south to } \\ \text { Vivion and N Oak. The left } \\ \text { ramps really really need to } \\ \text { be eliminated, this is a very } \\ \text { painful place to travel at } \\ \text { virtually all hours of the day. }\end{array}\right\}$
$\left.\left.\begin{array}{|c|c|c|}\hline & & \begin{array}{c}\text { the opportunity to phase } \\ \text { back as funding and } \\ \text { schedule requires. It will } \\ \text { allow a system to be } \\ \text { improved for the long and } \\ \text { short term needs of the } \\ \text { cooridor. }\end{array} \\ \hline \text { In Favor } & \text { Safety, Traffic, Road/Design } & \begin{array}{c}\text { Scenario 6 should be } \\ \text { explored at this stage with } \\ \text { the opportunity to phase } \\ \text { back as funding and } \\ \text { schedule requires. It will } \\ \text { allow a system to be } \\ \text { improved for the long and } \\ \text { short term needs of the } \\ \text { cooridor. }\end{array} \\ \hline \text { Neutral } & \text { Traffic, Road/Design, Daily } \\ \text { Commute }\end{array} \right\rvert\, \begin{array}{c}\text { In the slide 03/11 that shows } \\ \text { in violet the "areas of } \\ \text { concern," it would seem the } \\ \text { area where the "29" shield } \\ \text { appears (just below and to } \\ \text { the left of the word } \\ \text { Gladstone) to the left of the } \\ \text { merge with I-35 should also } \\ \text { be considered. This is } \\ \text { constantly backed up at }\end{array}\right\}$

Agency List 2022

| Federal Agencies |  |
| :---: | :---: |
| Mr. Josh Tap, NEPA Program Manager **use for EPA** U.S. Environmental Protection Agency <br> 11201 Renner Boulevard <br> Lenexa, Kansas 66219 <br> Tapp.joshua@Epa.gov <br> NEPA Program inbox r7 nepa@epa.gov | Ms. John Weber, Acting Field Supervisor U.S. Fish and Wildlife Services Columbia Ecological Services Field Office 101 Park DeVille Drive, Suite A Columbia, MO 65203-0057 John S Weber@fws.gov |
| Mr. Eric Washburn <br> Commander, Eighth Coast Guard District (dwb) <br> 1222 Spruce Street <br> St. Louis, MO 63103-2398 <br> 314-269-2300 ex. 2378 <br> Eric.Washburn@uscg.mil | Mr. Jorge Lugo-Camacho, State Soil Scientist U.S. Department of Agriculture Natural Resources Conservation <br> Service Parkade Center, Suite 250 <br> 601 Business Loop 70 West <br> Columbia, MO 65203 <br> jorge.lugo-camacho@mo.usda.gov |
| Mr. Roger Knowlton, Program Leader National Park Service 601 Riverfront Drive Omaha, Nebraska 68102-4226 402-661-1558 roger knowlton@nps.gov | Mr. Ken Sessa Federal Emergency Management <br> Agency 11224 Holmes Road <br> Kansas City, MO. 64131 <br> Kenneth.Sessa@fema.dhs.gov |
| Corps District |  |
| Colonel Douglas B. Guttormsen, District Commander U.S. Army Corps of Engineers, Kansas City District 600 Federal Building 601 E. $12^{\text {th }}$ Street Kansas City, MO 64106 Lora.E.Vacca@usace.army.mil | Mr. David Hibbs, Chief Regulatory Branch U.S. Army Corps of Engineers, Kansas City District 600 Federal Building <br> 601 E. $12^{\text {th }}$ Street <br> Kansas City, MO 64106 <br> david.r.hibbs@usace.army.mil |
| State Agencies |  |
| Mr. Rob Hunt, Planning Coordinator Director's Office Missouri Department of Natural Resources P.O. Box 176 Jefferson City, MO 65102 rob.hunt@dnr.mo.gov | Mr. James Remillard, Director State Emergency Management Agency 2302 Militia Drive P.O. Box 116 Jefferson City, MO 65102 james.remillard@sema.dps.mo.gov |
| Ms. Toni Prawl, State Historic Preservation Officer Missouri Department of Natural Resources <br> P.O. Box 176 <br> Jefferson City, MO 65102 <br> toni.prawl@dnr.mo.gov <br> Per email from Toni 10/25/22 include in project email: <br> marie.taylor@dnr.mo.gov <br> jeffrey.alvey@dnr.mo.gov | Sarah Vanderfeltz <br> Federal Assistance <br> Clearinghouse Office of Administration <br> State Capitol Building, Room 125 <br> 201 West Capitol Avenue, P.O. Box <br> 809 Jefferson City, MO 65102 <br> Sara.Vanderfeltz@oa.mo.gov |


| Mr. David Thorne |
| :--- |
| Policy Coordination |
| Missouri Department of Conservation |
| P.O. Box 180 |
| Jefferson City, MO 651012 |
| david.thorne@mdc.mo.gov |

## Tribes (Already Received)

To determine which tribes need to be consultant with on a project go to the Tribal Consultation Map at https://www.modot.org/tribal-consultation and select the county(s) the project is located. Information that needs to be sent to the tribes must go through FHWA. Federal agencies are required to consult on a "government-togovernment" basis with federally recognized Indian tribes. This unique relationship is embodied in the U.S.
Constitution, treaties, court decisions, federal statutes, and executive orders. HP provides up-to-date tribal contact information to FHWA as requested. There is a large turnover of staff in tribal historic preservation offices. Keeping up-to-date information is a challenge.

# I-29, I-35, U.S. 169 PEL Resource Agencies Meeting \#1 <br> 9:00-10:30 a.m. on October 5, <br> 2022 Location: Virtual - Webex 

## Attendees

Department of Natural Resources (DNR): Amanda Burke, Ashley Grupe, Jeffrey Alvey, Rob Hunt, John Hoke

Environmental Protection Agency (EPA): Joe Summerlin, Amber Tilley United States Army Corps of Engineers
(USACE): Brian Donahue State Emergency Management
Agency (SEMA): James Remillard Missouri Department of
Conservation (MDC): David Thorne
MoDOT: Mark Fisher, Brooke Rohlfing, Melissa Scheperle, Kyle Grayson
HNTB: Brian Comer, Kip Strauss, Corey Fischer, Robyn Arthur, April English, Lisa Mosely, Heriberto Oliveros Guerra, Teona Marko

## Summary

The following notes represent the verbal responses and chat comments from the meeting.

## Slide 1 - 10: Introduction (Mark Fischer, MoDOT)

The I-29, I-35, U.S. 169 PEL was overviewed. Information on the study background, project development process, and the study area was provided.

- No questions were asked from the group.

Slide 11 - 12: Baseline Conditions Report Overview (Kip Strauss, HNTB)
A Baseline Conditions Report overview was provided.

- No questions were asked from the group.

Slide 13-19: Environmental Conditions (April English, HNTB)
The environmental conditions of the study area were discussed. Information on known large non-residential projects, minority population, low-income population, limited English proficiency population, historically disadvantaged communities, historic resources, the national wetland inventory, and floodplains and levees were presented to the group. The Baseline Conditions report contains additional information on the environmental conditions.

- No questions were asked from the group

Slide 20 - 30: Traffic Conditions (Corey Fischer, HNTB)
Traffic conditions in the study area were provided. Traffic patterns were analyzed along the I-29, I-35, U.S. 169, and I-29/I-35 corridors including morning and afternoon peak hour speeds.

- No questions were asked from the group.

Slide 31 - 33: Safety Conditions (Corey Fischer, HNTB)
Roadway safety conditions were discussed. Types of crashes along the major corridors were analyzed in the study area.

- No questions were asked from the group.

Slide 34 - 37: Multimodal Conditions (Brian Comer, HNTB)
Multimodal and transit conditions in the study area- including existing public transit services; the existing bike and trail network; and existing pedestrian crossings- were overviewed.

- No questions were asked from the group.

Slide 38 - 44: Engineering Conditions (Heriberto Oliveros Guerra, HNTB)
Existing engineering conditions in the study area- including number and types of interchanges, substandard acceleration and deceleration lanes; substandard ramp design speeds; substandard gore spacing; and bridges of concern- were presented to the group.

- No questions were asked from the group.

Slide 45-46: Purpose \& Need (Kip Strauss, HNTB)
The draft Purpose \& Need includes addressing roadway deficiencies, improving roadway safety, improving roadway capacity, and providing transit and multimodal alternatives.

- No questions were asked from the group.

Slide 47 - 49: Study Goals \& Guiding Principles (Kip Strauss, HNTB)
The draft Guiding Principles were presented to the group. The Guiding Principles will guide the design of the project moving forward.

- No questions were asked from the group.

Slide 50 - 53: Public Engagement Schedule \& Outreach Opportunities (Robyn Arthur, HNTB)
The public engagement schedule was shown to the group. The first Community Advisory Committee meeting (CAC) was held in July 2022. There will be a public meeting on October 27, 2022. A survey will be sent out following the public meeting for input on the draft Purpose \& Need and Guiding Principles. Additional information can be found on the project website: https://www.modot.org/i-29i-35us-169-corridor-study.

- No questions were asked from the group.

Slide 54 - 55: Universe of Alternatives (Kip Strauss, HNTB)
The Universe of Alternatives list identifies a variety of alternatives as possible solutions to transportation issues within the I-29, I-35, U.S. 169 PEL study area. The Universe of Alternatives list was discussed.

- No questions were asked from the group.

Slides 56 - 62: Alternatives Screening Methodology (Kip Strauss, HNTB)
The Alternatives Screening Methodology compares the Universe of Alternatives list to the study goals in a series of three levels.

- No questions were asked from the group.

Slide 63 - 66: Next Steps \& Closing (Mark Fisher, MoDOT)
The next Community Advisory Committee Meeting will be held virtually on October 18, 2022. The first public meeting will be held in-person and online on October 27, 2022.

- No questions were asked from the group.


# I-9/I-35/U.S. 169 Planning and Environmental Linkages Resource Agencies Team Meeting 

9:00-11:00 a.m. on March 27, 2023
Location: Virtual - WebEx
The following notes represent the verbal responses and chat comments from the meeting. Slide
1 - 5: Introduction (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 6-8: Project Overview (Kip Strauss, HNTB; John Fitzpatrick, HNTB)

- No questions were asked from the group.

Slide 9-16: Phase 2 Baseline Conditions Report (John Fitzpatrick, HNTB)

- No questions were asked from the group.

Slide 17: Purpose and Need (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 18: Universe of Alternatives (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 19 - 20: Public Meeting \#1 Summary (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 21 - 34: Phase 3 Alternatives Development and Analysis (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 35: Phase 3, Level 3 Screening Results - Multimodal and Safety (Brian Comer, HNTB; Joe Blasi, HNTB)

- No questions were asked from the group.

Slide 36: Phase 3, Level 3 Screening Results - Traffic (Joe Blasi, HNTB)

- No questions were asked from the group.

Slide 37-38: Phase 3, Level 3 Screening Results - Engineering (Lisa Mosley, HNTB; Heriberto Oliveros Guerra, HNTB)

- No questions were asked from the group.

Slide 39: Phase 3, Level 3 Screening Results - Environment (April English, HNTB)

- No questions were asked from the group.

Slide 40: Preliminary PEL Recommendation (Kip Strauss, HTNB)

- No questions were asked from the group.

Slide 41 - 42: Phase 4 Organizing the PEL for Success (Kip Strauss, HNTB)

- No questions were asked from the group.

Slide 43-48: Schedule of Planned Involvement (Kip Strauss, HNTB)

## Questions and Responses:

- Joe Summerlin: Has there been a plan for an HPA (National Historic Preservation Act) and travel consultation if needed?
- April English: We haven't set any of that up yet, being early in the PEL study. That is something we looked at in the Baseline Conditions report to see what is out in the study area at this point. We will be reaching out and doing the different levels of consultation as we move forward.
- Kip Strauss: That would take place during the NEPA phase after the certain corridors are identified. We will be wrapping up the study and sending the recommendation to MoDOT. It will be up to them to decide which corridors move forward.
- Joe Summerlin: I brought it up because I am working on a study in NE that has been going on for 30 years. It's best to get consultation early. There shouldn't be as many issues if you're staying within the footprint. There is a lot of interest and interaction with the tribes.

Attendees:


## I-29/I-35/U.S. 169 PEL Study Initial Stakeholder Meetings Summary June 14, 2022

One of the key engagement opportunities surrounding the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study was identifying initial key stakeholders and understanding early concerns, opportunities, and issues. The purpose of the initial stakeholder interviews was to gather diverse opinions of the project to ensure that a variety of perspectives were being represented. The initial stakeholder interviews will influence the stakeholder engagement plan and initial project purpose and need. Both of these will continue to be refined as the study progresses. A wide range of other outreach activities are planned for the study such as a community advisory committee, community meetings, project website, electronic surveys and public meetings to name a few.

Initial stakeholders that were identified and interviewed include:

- Northland Chamber
- Northland Neighborhoods Inc.
- KCATA
- North Kansas City Business Council

The initial stakeholders were identified because they were representative of a large group of study area residents and could provide a unique and important perspective that could further inform the study.
These interviews took place in June 2022. The stakeholders cited many concerns and problems in the study area. After conducting interviews, the project team grouped the stakeholders' feedback into multiple themes. The themes are as followed:

- Increasing Development
- Multiple stakeholders noted that there is substantial development occurring in the Northland with the area expected to grow considerably in the coming years. Many were worried that the influx of housing and industrial development might soon lead to higher congestion along the study routes. Areas of interest include the Twin Creeks and Platteville regions. The North Kansas City School District is also growing by 300 students each year.
- Design and Maintenance
- Stakeholders asked that the project team consider designing in a manner that will not require substantial upkeep or maintenance and will still be aesthetically pleasing well into the future. Multiple neighborhood areas are overrun with weeds, unkept grass, and garbage piles. Stakeholders would like for the community to look well maintained and inviting to residents.
- Sustainability and Safety
- Stakeholders conveyed there were numerous safety and environmental issues with current structures along Interstates 29 and 35. Issues such as noise walls, storm drainage structures to reduce dripping from highways, and safer pedestrian crossings were prominent recurring themes.
- Active Transportation (Bicycle and Pedestrian)
- Increased bicycle lane access and connectivity was a concern for many stakeholders. Along Vivian Road, many neighborhood residents would like access to a bike lane and updated streets. Additionally, stakeholders are looking to connect the M-152 bike trail to the new trail adjacent to the Metro North Crossing development.
- Public Transportation
- Since COVID-19 the Northland has significantly revamped its public transportation system. The pandemic led to increased bus operator shortages resulting in longer wait times and the subsequent closure of many routes. Recently the KCATA has consolidated underperforming Northland bus routes with more efficient routes. For many residents there is a strong push for more efficient, accessible, and less congested bus routes.
- Funding
- Stakeholders inquired about the project budget and the timeline for when the funding would have to be secured. They would like to confirm how the project will be funded, what the expected budget is, and a timeline for when the funds would be obtained.


## I-29, I-35, U.S. 169 Promotion Materials

The study team used a variety of promotional methods to advertise public meetings and other public engagement activities including media alerts, newspaper advertisements, social media posts and email blasts to a list of over 400 stakeholders. Additionally, stakeholders were able to correspond directly with the study team by emailing KC I35 I29 Corridor@Modot.mo.gov. The Public Involvement Management Application (PIMA) allowed the study team to respond to questions and comments and document all correspondence. Copies of all promotional materials can be found below.

U.S. Department of Transportation Federal Highway Administration
 4:00-6:00 on Thursday, October 27

u.S. Depariment of Transportation Federal Highway Administration

I-29/I-345/U.S. 169 Estudio de Planificación y Vinculación Ambiental

## 4:00-6:00 el jueves 27 de octubre

Northland Neighborhoods, Inc./ Raymond R. Brock Jr. Hall
5340Chouteau Trafficway, KCMO 64119 Si necesitas servicios de traducción en el evento, contáctanos en KC_I35_I29_Corridor@Modot.mo.gov.

# Missouri Department of Transportation I-29/I-35/U.S. 169 corridor study public meeting scheduled for Oct. 

 27Missouri Department of Transportation (MoDOT) is hosting the first in-person, open house public meeting for the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The PEL study focuses on the I-29/I-35/U.S. 169 corridors to develop both short-term and long- term alternatives for highway improvements to address the following:

- Improving safety for all travelers
- Reducing congestion including heavy truck traffic
- Addressing pavement and bridge conditions
- Positioning for future transportation needs

The project study area extends through portions of Clay, Jackson, and Platte Counties, and the project limits extend along sections of I-29, I-35, and U.S. 169.

What: MoDOT and the project team are gathering insights about challenges and opportunities within the study area and need your input. Learn about the study, ask questions, and submit feedback.

When: Come and go, 4-6 p.m. on Thursday, Oct. 27, 2022
Where: Northland Neighborhoods, Inc., 5340 Chouteau Trafficway, Raymond J. Brock Hall, Kansas City, MO 64119

Following the public meeting, a self-guided virtual presentation and an online survey will be posted on the project webpage at https://www.modot.org/i-29i-35us-169-corridor-study.

We are committed to providing equal access to this event for all participants. If you require translation services or need special assistance for the meeting, please contact the team at least 48-hours in advance of the meeting, at KC_I35_I29_Corridor@Modot.mo.gov.

Estamos comprometidos a proporcionar igualdad de acceso a este evento para todos los participantes. Si necesita servicios de traducción o necesita asistencia especial para la reunión, por favor comuníquese con el equipo al menos 48 horas antes de la reunión: KC_I35_I29_Corridor@Modot.mo.gov

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    ###
10/20/2022
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## About the MoDOT

MoDOT Kansas City maintains more than 7,000 miles of state roadway in nine counties. For more information about MoDOT news, projects or events, please visit http://www.modot.mo.gov/kansascity. For instant updates, follow MoDOT_KC on Twitter, or share posts and comments on our Facebook at www.facebook.com/MoDOT.KansasCity. Sign up online for workzone updates or call 888-ASK-MODOT (275-6636).

Below is content you can easily copy and paste for your email blasts, an electronic or print newsletter, website and social media channels! Please feel free to edit the content and help spread the word about the I-29/I-35/U.S. 169 PEL Study.

## Email Content

Hello Community Partner,
The Missouri Department of Transportation (MoDOT) is hosting an in-person public meeting as part of the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The PEL study focuses on the I-29/I-35/U.S. 169 corridors to develop both short-term and long-term alternatives for highway improvements to address the following:

- Improving safety for travelers
- Reducing congestion including heavy truck traffic
- Addressing pavement and bridge conditions
- Positioning for future transportation needs

MoDOT anticipates incorporating recommendations made as part of the PEL study into future National Environmental Policy Act (NEPA) studies, per Title 23 of the US Code, Part 168.

## MoDOT Needs Your Input!

MoDOT is gathering insights about challenges and opportunities within the study area and needs your input. Please join the project team at an open house, public meeting to provide input, ask questions, and learn more.

## Public Meeting Details

4-6 p.m. on Thursday, October 27, 2022
Northland Neighborhoods Inc.
Raymond J. Brock. Jr. Hall 5340
Chouteau Trafficway Kansas
City, MO 64119
The public meeting is conveniently located on Kansas City Area Transportation Authority (KCATA) bus routes. Come and go anytime between 4-6 p.m. Following the public meeting, check the project webpage for presentation information, a survey, and ways to submit comments online.

A virtual on demand meeting will be available online on Starting Friday, October 28 through November 13. A link will be provided on the webpage: https://www.modot.org/i-29i-35us-169-corridor-study

## Stay Connected

- Attend the public meeting from 4-6 p.m. on Thursday, October 27
- Visit the project webpage at https://www.modot.org/i-29i-35us-169-corridor-study
- Sign up for project update emails

If you have any questions, please reach out to the project team by email at KC I35 I29 Corridor@Modot.mo.gov or phone 816-216-6571.

## Social Media Content

## TWITTER

## Post \#1-BEFORE

MoDOT wants your input! Join the conversation as we evaluate the I-29/I-35/U.S. 169 corridors to develop both short-term and long-term alternatives for improvements. Public meeting info \& details here: https://www.modot.org/i-29i-35us-169-corridor-study

## Post \#2-BEFORE

Join MoDOT and the project team at an open house public meeting for the I-29/I-35/U.S. 169 Planning and Environmental Linkages Study! Stop by from 4-6 p.m. on Thursday, October 27 at @Northland_nni. Add it to your calendar here: https://evt.mx/FhmcYDmV

## Post \#3-REMINDER

Don't forget! The first public meeting for I-29/I-35/U.S. 169 PEL Study is 4-6 p.m. on Thursday, October 27 at @Northland_nni. Come talk to the team about the needs and challenges in the corridors! Create a calendar reminder: https://evt.mx/FhmcYDmV

## Post \#4 - AFTER/THANK YOU

Thank you to everyone who attended the first public meeting regarding the needs for the I-29/I35/U.S. 169 corridors. If you were unable to attend, you can still take a survey until [deadline] and comment online. Visit the project webpage: https://www.modot.org/i-29i-35us-169-corridor-study

## FACEBOOK

## Post \#1 - BEFORE

The Missouri Department of Transportation (MoDOT) is hosting an in-person public meeting as part of the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The PEL study focuses on the I-29/I-35/U.S. 169 corridors to develop both short-term and long-term alternatives for highway improvements to address safety, congestion, pavement and bridge conditions, and future transportation needs.

MoDOT is gathering insights about challenges and opportunities within the study area and needs your input. Please join the project team at an open house, public meeting to provide input, ask questions, and learn more.

## Public Meeting Details

4-6 p.m. on Thursday, October 27, 2022 Northland
Neighborhoods Inc.
5340 Chouteau Trafficway Kansas City,
MO 64119

Come and go anytime between 4-6 p.m. Following the public meeting, check the project webpage for presentation information, a survey, and ways to submit comments online. Add it to your calendar here: https://evt.mx/FhmcYDmV

## Post \#2 - AFTER/THANK YOU

Thank you to everyone who attended the public meetings regarding the I-29/I-35/U.S. 169 PEL Study. If you were unable to attend, you can still comment online! Visit https://www.modot.org/i-29i-35us-169-corridor-study to learn more and take the survey. The survey will close Monday, November 14, 2022.

We appreciate your input!

## Missouri Department of Transportation

## I-29, I-35, U.S. 169 PEL Study: Project Update Join us at our next Public Meeting

The study team welcomes public comment at the next public meeting which will be held Wednesday,
April 12, 2023 at Northland Neighborhoods Inc., 5340 NE Chouteau Trafficway, Kansas City, MO from 5

- 7 p.m. in an open house format. The meeting will provide information on the alternatives screening process and results, preliminary PEL recommendations and project next steps. A virtual component and survey will be available to the general public from April 12 through April 30 to provide additional comment.


## Winter Recap

Over the past several months, the Missouri Department of Transportation (MoDOT) has advanced the Planning and Environmental Linkages (PEL) study of I-29, I-35, and U.S. 169. The primary goal of this study is to identify short-term and long-term solutions that address roadway deficiencies along the corridor, improve safety for travelers, identify multimodal opportunities, and support anticipated growth in the Northland region.

As a part of the Study, the project team developed a Baseline Conditions Report to understand and identify the most prominent issues and needs of the corridor. Several factors were analyzed including environmental conditions, rush hour traffic patterns and impacts, multimodal transportation performance and availability, and roadway and bridge conditions. This comprehensive evaluation allowed the study team to create a Universe of Alternatives that could address corridor needs by improving roadway and bridge conditions, increasing roadway capacity and mobility, providing multimodal options and addressing congestion and safety issues.


On October 27, 2022, an in-person public meeting was held from 4-6 p.m. at Northland Neighborhoods, Inc. to introduce the project to the general public and gather feedback. A virtual component, which included a public survey, also launched on the $27^{\text {th }}$ and ran until November 14, 2022.

In-person and virtually, 270 individuals attended the public meeting and shared several concerns including safety and congestion issues, improved roadway design, and increased bike and pedestrian access. There was special attention given to the North Oak Trafficway, Parvin Road and Vivian Road/US 69 Interchanges with many attendees expressing that these exit ramps were too short and worsened congestion. These sentiments were also echoed in the public survey with significant concerns relating to safety, congestion, and on/off ramp merging and exiting.

Currently the project team is in Phase 3 of the study process in which they have reviewed the Community Advisory Committee, stakeholder and public feedback from the previous Fall meetings and developed solutions that address public concerns and meet the purpose and need of the project.

Within this phase, the project team evaluated potential solutions according to their ability to increase safety, provide multimodal travel options, reduce traffic congestion, limit environmental impacts, and their cost-effectiveness. This evaluation produced a draft PEL recommendation that will be presented at the April in- person and virtual Public Meetings for your feedback. Once a PEL recommendation has been confirmed the project will transition into the NEPA phase.

Missouri Department of Transportation anticipates incorporating recommendations made as part of the PEL study into future NEPA studies, per Title 23 of the US Code, Part 168.

For more information on the project or if you would like to speak with a member of the project team please visit the project website at http://www.modot.org/i-29i-35us-169-corridor-study or email the project team at KC I35 I29 Corridor@modot.mo.gov.

U.S. Department of Transporiation Federal Highway Administration

I-29/I-345/U.S. 169 Planning and Environmental Linkages Study


April 12, 2023 • www.northeastnews.net


Public Meetin


NORTHEAST ALLIANCE TOGETHER

## NEAT CLEAN UP

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Lykins Square: 4115 E $\quad$ IISt, RCMO. 64124
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For more information, please reach out to the project team by email at

## KC I35 I29 Corridor@Modot.mo.gov or call 816-216-6571.

## Missouri Department of Transportation I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) corridor study second public meeting scheduled for April 12 ${ }^{\text {th }}$

Kansas City, Mo. - The Missouri Department of Transportation (MoDOT) is hosting a second inperson, open house public meeting for the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The PEL study focuses on the I-29/I-35/U.S. 169 corridors to develop highway improvement alternatives to address the following:

- Improve roadway safety,
- Address structural and functional roadway deficiencies, including pavement and bridge conditions,
- Improve roadway capacity, mobility, and access to meet traffic and freight movement demands to meet future growth in the Northland, and
- Provide transit and multimodal alternatives.

The project study area extends through portions of Clay, Jackson, and Platte Counties, and the project limits extend along sections of l-29, I-35, and U.S. 169.

What: See corridor concepts and analysis results and provide feedback for the PEL
When: Come and go! 4-6 p.m. on Wednesday, April 12, 2023
Where: Northland Neighborhoods, Inc., 5340 Chouteau Trafficway, Kansas City, MO 64119
Following the in-person public meeting, a self-guided virtual presentation and an online survey will be posted on the project webpage at https://www.modot.org/i-29i-35us-169-corridor-study. Comments will be accepted for two weeks following the public meeting, through April 26, 2023.

MoDOT anticipates incorporating recommendations made as part of the PEL study into future National Environmental Policy Act (NEPA) studies, per Title 23 of the U.S. Code, Part 168.

We are committed to providing equal access to this event for all participants. If you require translation services or need special assistance for the meeting, please contact the team at least 48-hours in advance of the meeting, at: KC I35 I29 Corridor@Modot.mo.gov.

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## About the MoDOT

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http://www.modot.mo.gov/kansascity. For instant updates, follow MoDOT_KC on Twitter, or share posts and comments on our Facebook at www.facebook.com/MoDOT.KansasCity. Sign up online for workzone updates or call 888-ASK-MODOT (275-6636)
For more information, please reach out to the project team by email at I-29, I-35, U.S. 169 Public Involvement Plan and Documentation

Missouri Department of Transportation I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) corridor study second public meeting scheduled for April $12^{\text {th }}$

Kansas City, Mo. - The Missouri Department of Transportation (MoDOT) is hosting a second inperson, open house public meeting for the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) Study. The PEL study focuses on the I-29/I-35/U.S. 169 corridors to develop highway improvement alternatives to address the following:

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MoDOT anticipates incorporating recommendations made as part of the PEL study into future National Environmental Policy Act (NEPA) studies, per Title 23 of the U.S. Code, Part 168.

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#### Abstract

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For more information, please reach out to the project team by email at KC I35 I29 Corridor@Modot.mo.gov or call 816-216-6571.

## Missouri Department of Transportation seeking input on preferred scenarios for I-29/I-35/U.S. 169 corridor study

Kansas City, Mo. - The Missouri Department of Transportation (MoDOT) recently hosted the second public meeting for the I-29/l-35/U.S. 169 Planning and Environmental Linkages (PEL) Study at Northland Neighborhoods, Inc. and presented scenarios for the preliminary PEL recommendation. Scenarios were screened on several factors, including traffic, multimodal, safety, environment, and engineering evaluations. After technical analysis and gathering public input relating to challenges and opportunities in the I-29/I-35/U.S. 169 corridors, the alternatives (a set of potential scenarios) were narrowed down from seven to three.

The three recommended alternatives - scenarios five, six and seven - rose to the top because they provide a high level of traffic performance, address safety concerns in the project limits, address MoDOT's asset preservation needs and provide the greatest opportunity to improve bicycle and pedestrian crossings of the freeways.
"The I-29/35/U.S. 169 PEL study has helped MoDOT understand needs and narrow down solutions that will best address the growth in the region. These scenarios will be carried into the next phase of environmental evaluation, where they will be prioritized even further," said Ben McCabe, MoDOT area engineer for Platte, Clay, and Ray Counties.

The I-29/I-35/U.S. 169 PEL Study is designed to better understand the existing and future traffic, safety, and assets of the I-29/I-35/U.S. 169 corridors. MoDOT anticipates incorporating recommendations made as part of the PEL study into future National Environmental Policy Act (NEPA) studies, per Title 23 of the U.S. Code, Part 168.

Following the public meeting, a self-guided virtual presentation and an online survey will be available on the project webpage at https://www.modot.org/i-29i-35us-169-corridor-study. The online meeting and comment opportunity will close on Friday, April 28, 2023.
"Public feedback is critical throughout the process and we encourage people to weigh in by taking the online survey before it closes," said Juan Yin, P.E., KC District Planning Manager for MoDOT.

Questions? Contact the project team by email at KC I35 I29 Corridor@Modot.mo.gov or phone 816-216-6571.

## \#\#\#\#

4/13/2022

Please forward this message to colleagues who might be interested. If you wish to be removed from this list, have a more appropriate email address or know of a colleague to add, send an email message to: KC I35 I29 Corridor@Modot.mo.gov


#### Abstract

About the MoDOT MoDOT Kansas City maintains more than 7,000 miles of state roadway in nine counties. For more information about MoDOT news, projects or events, please visit http://www.modot.mo.gov/kansascity. For instant updates, follow MoDOT_KC on Twitter, or share posts and comments on our Facebook at www.facebook.com/MoDOT.KansasCity. Sign up online for work zone updates or call 888-ASK-MODOT (275-6636).


## About the I-29/I-35/U.S. 169 Planning and Environmental Linkages Study

The Planning and Environmental Linkages (PEL) Study of the I-29/I-35/U.S. 169 corridors is to develop both short-term and long-term alternatives to improve safety for travelers, reduce congestion including heavy truck traffic, address pavement and bridge conditions, and position the area for future transportation needs. The project study area includes three highly-trafficked highways in the Kansas City metropolitan area that extends through parts of Clay, Jackson, and Platte Counties. In conjunction with MoDOT, the project team is developing both shortterm and long-term alternatives for highway improvements. Learn more at https://www.modot.org/i-29i- 35us-169-corridor-study

# I-29, I-35, U.S. 169 PEL Appendix B - 

## Baseline Conditions Report

June 2023
In Partnership with:
U.S. Department of Transportation

Federal Highway
Administration

MARC
Mid-America Regional Council
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## Attachments

Attachment A - Previous Studies<br>Attachment B - Data Collection Plan<br>Attachment C - Traffic Forecasting Memo<br>Attachment D - Socio-economic Demographic Data Tables<br>Attachment E - Traffic Safety Analysis Memo

## ACRONYMS

| AADT | Average Annual Daily Traffic |
| :--- | :--- |
| ACM | Asbestos Containing Material |
| ADT | Annual Daily Traffic |
| AQL | Aquatic Life |
| ARAN | Automatic Road Analyzer |
| ASTM | American Society for Testing and Materials |
| BG | Block Group |
| BRT | Bus Rapid Transit |
| CAA | Clean Air Act |
| CFR | Code of Federal Regulations |
| CWA | Clean Water Act |
| DHHS | Department of Health and Human Services |
| DTA | Dynamic Traffic Assignment |
| DWS | Drinking Water Supply |
| EJ | Environmental Justice |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |
| E-Start | Environmental Site Tracking and Research Tool |
| FEIS | Final Environmental Impact Study |
| FNB | Future No-Build |
| GIS | Geographic Information System |
| GNIS | Geographic Names Information System |
| HHP | Human-Health Protection (Fish Consumption) |
| HOS | Hours of Service |
| HSM | Highway Safety Manual |
| HSWA | Hazardous and Solid Waste Amendment |
| IND | Industrial |
| IRR | Irrigation |
| IPaC | Information for Planning and Consulting |
| KCATA | Kansas City Area Transportation |
| KCSA | Kansas City Streetcar Authority |
| LBP | Lead Based Paint |
| LEP | Limited English Proficiency |
| LPA | Local Public Agency |
| LWCF | Land and Water Conservation Fund |
| LWW | Livestock and Wildlife Watering |
| MARC | Mid-America Regional Council |
| MCI | Kansas City International Airport |
| MDC | Missouri Department of Conservation |


| MDNR | Missouri Department of Natural Resources |
| :--- | :--- |
| MIS | Major Investment Study |
| MKC | Charles B. Wheeler Downtown Airport |
| MoDOT | Missouri Department of Transportation |
| MOEs | Measures of Effectiveness |
| MSDIS | Missouri Spatial Data Information Service |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NFHL | National Flood Hazard Layer |
| NHD | National Hydrology Database |
| NHS | National Highway System |
| NRHP | National Register of Historic Places |
| NWI | National Wetlands Inventory |
| OD | Origin Destination |
| PASER | Pavement Surface Evaluation and Rating |
| PDO | Property Damage Only |
| PEL | Planning and Environmental Linkages |
| RCRA | Resource Conservation and Recovery Act |
| ROW | Right-of-way |
| SCR | Secondary Contact Recreation |
| SEMA | State Emergency Management Agency |
| STIP | Statewide Transportation Improvement Program |
| TAZ | Traffic Analysis Zone |
| UMKC | University of Missouri, Kansas City |
| USACE | U.S. Army Corps of Engineers |
| USCB | U.S. Census Bureau |
| USFWS | U.S. Fish and Wildlife Services |
| USGS | U.S. Geographical Survey |
| WBC | Whole Body Contact Recreation |

### 1.0 Introduction

The Missouri Department of Transportation (MoDOT) is initiating a Planning and Environmental Linkages (PEL) Study of the I-29, I-35 and U.S. 169 corridors. MoDOT desires to develop both short-term and long-term alternatives and proposed actions for improving existing safety, reducing congestion, improving operational performance, addressing asset management and positioning for future transportation needs along I-29, I-35 and U.S. 169.

The Baseline Conditions provides an existing and future no-build conditions analysis of the community's transportation assets of the I-29, I-35 and U.S. 169 corridors and surrounding area. This report is organized into the following chapters:

- Chapter 2 - Previous Studies
- Chapter 3 - Data Collection
- Chapter 4 - Existing Conditions
- Chapter 5 - Public Engagement
- Chapter 6 - Purpose and Need


### 1.1 PEL Study Area

The PEL study area is generally depicted in Figure 1 and extends through portions of Clay, Jackson, and Platte Counties. As shown in blue, the project limits extend along sections of I-29, I-35 and U.S. 169. The project limits include:

- I-29, from Highway 45 to the I-29/I-35 merge, continuing south across the Missouri River to the northeast corner of the downtown freeway loop.
- I-35, from I-435 to the I-29/I-35 merge.
- U.S. 169, from NW 68 ${ }^{\text {th }}$ Street to I-29.

The study area fully encompasses the project limits and accounts for areas beyond those limits that are anticipated to influence parameters such as traffic operations. The study area also encompasses a broad area to account for community resources, natural resources, and other potential environmental constraints.

Figure 1: PEL Study Area


Source: Study Team.

### 2.0 Previous Studies

Previous studies within the study area were reviewed based on their relevance to the PEL Study. A summary of the 20 studies and projects included in the review is located in Attachment A. While there are likely other studies completed in the study area, these 20 were considered to have the greatest applicability to the I-29, I-35, U.S. 169 PEL. It is not intended to be a complete list of projects in the study area. Figure 2 shows the location of the 20 projects. The numbers on the figure correspond to the project numbers identified in Attachment A. The information contained in these summaries is intended to be a quick reference guide of the history and recommendations provided throughout the study area and the adjoining transportation network that may impact or benefit the future improvement strategies being considered for optimizing the full corridor.

Figure 2: Previous Studies


[^1]The previous studies have all dealt with similar trends of growth and development in the northland. Frequent recommendations in the studies included interchange reconfigurations, with roughly half analyzing an interchange with a goal to improve traffic operations. Most studies summarized the traffic flow, operational levels of service, accessibility, and safety and identified key areas for improvements. The purpose of each project was to improve the existing lane geometry/configuration to meet the expected future growth in each respective area. Three key studies important to highlight are discussed below. The Northland-Downtown Major Investment Study and the I-29/I-35 at The Paseo Bridge FEIS represent two major highway improvement studies performed by MoDOT in the study area and the Connected KC 2050 is the most current Long Range Transportation Plan representing transportation investments planned through 2050 in the study area. These three studies represent the most comprehensive current list of future needs in the study area and represent the best starting point for initial improvement alternatives to be analyzed.

All studies are summarized in Attachment A.

- Connected KC 2050 - The Kansas City metro's regional Long Range Transportation Plan, Connected KC 2050, is a long-term fiscally constrained plan to upgrade and improve transportation infrastructure in the Kansas City metropolitan area. With the focus on growth and redevelopment in the region, the plan hopes to achieve greater access to opportunity, improved public health and safety, a healthier environment, more transportation options, and economic vitality. Based off the project map, the I-29, I-35, U.S. 169 PEL has the opportunity to assist with the regional goals while filling in and focusing on areas where the current regional plan might not be considering. While the plan does have multimodal projects identified in the study area, there are no plans shown for the I-29, I-35 and U.S. 169 study corridors. This is the first project in Attachment A and does not have a number in Figure 2 because it's a regional study.
- Northland-Downtown Major Investment Study - The Northland Downtown Major Investment Study (MIS) is one of the most pertinent studies to the I-29, I-35, U.S. 169 PEL. In 2002, MoDOT, the Mid-America Regional Council (MARC), the Kansas City Area Transportation Authority (KCATA), and other contributors funded a planning study focusing on the downtown business district and the U.S. 169, I-29/I-35, and Route 9 connections. The focus of the study was to look at redeveloping the existing areas while also analyzing all access points to downtown. After narrowing in on a few key areas, the study prioritized analysis of the l-29/I-35 bridge crossings into downtown and current infrastructure and capacity concerns. This project is No. 1 on Figure 2.
- I-29/I-35 Paseo Bridge Final Environmental Impact Statement (FEIS) - As discussed in the Northland Downtown MIS, The Paseo Bridge river crossing into downtown from the north is a major point of concern. The FEIS found that the best way to improve the current configuration would be to rebuild and widen The Paseo Bridge to six through lanes with room for up to two additional lanes for potential growth. A combination of access changes would be made to improve the safety and traffic flow for city traffic in the

I-29/I-35 corridor. The Record of Decision on the FEIS allowed for the approval to construct the new (6-lane bridge) with approval to widen to an 8-lane bridge in the future. The 6 -lane bridge opened in 2011. The Paseo Bridge was renamed the Christopher Kit Bond Bridge. This project is No. 1 on Figure 2.

The remainder of the previous studies reviewed focused on at least one of the six topics below and often addressed multiple.

- Safety
- Traffic Operations
- Accessibility
- Land Development
- Project Coordination
- Multimodal


### 3.0 Data Collection

Data is an important component of the PEL. Therefore, it was important to develop a Data Collection Plan to clearly outline the necessary data collection activities. The Data Collection Plan documented the need for relevant corridor data including traffic, safety, engineering, right-of-way (ROW), environmental, and other data from MoDOT, the study partners, and other sources. The Data Collection Plan determined the data requirements, availability, and sources. The Plan was reviewed and approved by MoDOT at the beginning of the study. The Data Collection Plan is provided in Attachment B.

### 4.0 Existing Conditions

This chapter provides the existing conditions of the PEL study area to represent the baseline conditions. The chapter is organized into the following sections:

- 4.1 Environmental
- 4.2 Traffic and Safety
- 4.3 Multimodal
- 4.4 Engineering


### 4.1 Environmental Conditions

### 4.1.1 Methodology

In order to identify the environmental and infrastructure constraints associated with the study area, information was collected through on-line database searches, imagery analyses, Google Maps, and desktop geographic information system (GIS) analyses. Where applicable, the constraints identified throughout this document are shown graphically in their respective sections.

### 4.1.2 Population and Employment

Population and employment density at the county level and per square mile by traffic analysis zone (TAZ) was analyzed to understand where people live and work in the study area. A TAZ is an area defined by a state or local transportation agency used for tabulating traffic data for to-and-from work and places of residence. These geographical units are used in traffic forecast modeling. ${ }^{1}$

## Population

The study area consists of three counties: Clay, Jackson, and Platte. Jackson County is not part of the northland, but a small part of the county is in the southeast limits of the study area. Table 1 lists the number of people who live or are projected to live in a TAZ within or intersecting the study area in each county in 2015 and 2050. 2015 data was used as this is the base year data that MARC is using in their travel demand model. The year 2050 was used as a projection year because it corresponds with MARC's regional transportation plan, Connected KC 2050. Overall, the population of the study area is expected to increase by 86,568 people (40\%) or roughly 2,474 people ( $1.14 \%$ ) every year. The Twin Creeks KC is comprised of approximately 15,000 acres of multi-use development is expected to account for a significant portion of the

[^2]projected population growth in the study area from 2015 to 2050. Twin Creeks is located north of M-152 and west of U.S. 169.

Table 1: Population in Study Area by County (2015 and 2050)

| County Name | Population in <br> Study Area <br> $(\mathbf{2 0 1 5 )}$ | Population in <br> Study Area (2050) | \% of Total <br> Study Area <br> $(2015)$ | \% of Total <br> Study Area <br> $(2050)$ |
| :---: | :---: | :---: | :---: | :---: |
| Clay | 157,952 | 211,534 | $73 \%$ | $69 \%$ |
| Jackson | 8,785 | 16,428 | $4 \%$ | $5 \%$ |
| Platte | 51,062 | 77,871 | $23 \%$ | $25 \%$ |
| Total | $\mathbf{2 1 7 , 7 9 9}$ | $\mathbf{3 0 5 , 8 3 3}$ | $\mathbf{1 0 0 \%}$ | $\mathbf{1 0 0 \%}$ |
| Source: MARC. |  |  |  |  |

Figure 3 shows the number of residents per square mile in each TAZ within or intersecting the study area in 2015. TAZs with larger population per square mile are generally located in downtown Kansas City, in pockets along I-35 and I-29, and in the Gladstone area. Areas in the northern part of the study area generally have lower numbers of residents per area of the TAZ.

Figure 3: Population in the Study Area by TAZ (2015)


Source: MARC.

## Employment

Table 2 lists the number of people who are employed in a TAZ within or intersecting the study area in each county in 2015 and 2050. In 2015, roughly two-thirds (69\%) of employees in the study area work in Clay County. Platte County has $21 \%$ and Jackson County has 10\% of all employees in the study area since the study area does not include downtown within the freeway loop. All counties in the study area are expected to grow in number of employees. In June 2022,

Ford Motor Company announced that they would be adding 1,100 employees to increase production of the Transit commercial van and the new E-Transit electric vehicle. ${ }^{2}$
Overall, the employment of the study area is expected to increase by 63,055 people ( $58 \%$ ) or roughly 1,802 people (1.66\%) every year.

Table 2: Employment in Study Area by County (2015 and 2050)

| County Name | Employment <br> per County (2015) | Employment per <br> County (2050) | \% of Total <br> Study Area <br> $(\mathbf{2 0 1 5 )}$ | \% of Total <br> Study Area <br> $(\mathbf{2 0 5 0})$ |
| :---: | :---: | :---: | :---: | :---: |
| Clay | 77,245 | 120,011 | $67 \%$ | $69 \%$ |
| Jackson | 13,029 | 13,918 | $11 \%$ | $8 \%$ |
| Platte | 25,078 | 40,838 | $22 \%$ | $23 \%$ |
| Total | $\mathbf{1 1 5 , 3 5 2}$ | $\mathbf{1 7 4 , 7 6 7}$ | $\mathbf{1 0 0 \%}$ | $\mathbf{1 0 0 \%}$ |

Source: MARC.
Figure 4 shows the number of employees per square mile in each TAZ within or intersecting the study area for 2015. High concentrations of employees per square mile in each TAZ are in North Kansas City (Cerner Headquarters, Harrah's Casino, North Kansas City Hospital), east of the downtown freeway loop, the northwest corner of I-29 (KCI Corridor) in the study area, and the northeast corner of I-35 (Claycomo Ford Plant) in the study area. There are also pockets of high-density employment along the study corridors.

[^3]Figure 4: Employment in the Study Area by TAZ (2015)


Source: MARC.
When looking at both population and employment, there is a trend for low employee TAZs to have a greater number of residents and vice versa. This shows that people are living in one part of the study area and traveling to work in another. For example, North Kansas City shows lower population in TAZs but a higher number of employees in the same TAZs. One area with both a higher number of employees and residents is east of the downtown freeway loop due to the high-density housing mixed with a greater number of employment and business opportunities. Employment trends have also shown substantial development along arterial corridors and near major interstates and highways with easy access. Population and employment growth rates
( $40 \%$ and $58 \%$, respectively) show that population is projected to increase employment more than employment numbers from 2015 to 2050. This shows that slightly more people are expected to be employed in the study area than people moving to the study area.

### 4.1.3 Socio-Economic Demographics

The study area encompasses portions of 63 census tracts as delineated by the U.S. Census Bureau (USCB). Within the 63 census tracts, 201 census block groups (BG) were identified to be at least partially contained by the study area as delineated by the USCB in 2020. The census BGs were used in the socioeconomic analyses.

## Environmental Justice Populations

Executive Order (EO) 12898 entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs on minority and low-income populations. The FHWA Order 6640.23A defines a minority as a person who is Black (having origins in any of the black racial groups of Africa); Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or American Indian and Alaska Native (having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition). Minority populations are defined as a percentage of minority persons approaching or exceeding $50 \%$ of a census BG population.

Table 3 presents the demographic percentages of the minority groups present within the study area. Minority populations within the census BGs that are either wholly or partially contained in the study area account for approximately $30 \%$ of the total population.

Table 3: Race/Ethnicity in Study Area

| Minority Populations | Percentage |
| :---: | :---: |
| Black or African American | $11 \%$ |
| American Indian and Alaska Native | $0 \%$ |
| Asian | $3 \%$ |
| Native Hawaiian and Other Pacific Islander | $1 \%$ |
| Other Race | $0 \%$ |
| Two or More Races | $6 \%$ |
| Hispanic or Latino | $9 \%$ |
| Percent Minority for Study Area | $\mathbf{3 0 \%}$ |

Source: U.S. Census Bureau, 2020 Redistricting Data SF (PL 94-171), P2.

Figure 5 presents the distribution of minority populations within the study area that are greater than $50 \%$ at the census BG level. A corresponding table identifying minority percentages at the census BG level is presented in Attachment $\mathbf{D}$.

Figure 5: Minority Population


Source: U.S. Census Bureau, 2020 Redistricting Data SF (PL 94-171), P2.
A low-income population is defined as one with a median income for a family of four equal to or below the Department of Health and Human Services (DHHS) poverty guidelines of $\$ 27,750$ for 2022. The average median household income for the entire study area is $\$ 72,984$. Out of 201 census BGs within the study area, 15 did not report a median household income. Of the 186
census BGs reporting a median household income, six reported median household incomes below the $\$ 27,750$ poverty threshold. Median household incomes for the study area range from $\$ 13,200$ to $\$ 191,786$. Figure 6 presents the distribution of low-income populations within the study area at the census BG level. A corresponding table identifying median household incomes at the census block BG is presented in Attachment $\mathbf{D}$.

Figure 6: Low Income Population


Source: U.S. Census Bureau, B19013 Median Household Income in the Past 12 Months, 2020 ACS 5- Year Estimates.

## Limited English Proficiency Populations

Limited English Proficiency (LEP) persons are defined as individuals who speak English less than "very well." EO 13166, "Improving Access to Services for Persons with Limited English Proficiency" requires federal agencies to examine the services they provide and identify any need for services to those with LEP. The EO requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Restoration Act of 1987 and Title VI regulations against national origin discrimination.

Figure 7 presents the census BGs with LEP populations greater than $5 \%{ }^{3}$ A corresponding table identifying LEP populations at the census BG level is presented in Attachment D. Of the 201 census BGs in the study area, three did not report a population. Of the remaining 198 census BGs reporting a population, 57 have LEP populations greater than $5 \%$.
${ }^{3}$ Safe Harbor LEP Threshold - Identifies actions that will be considered strong evidence of compliance with Title VI of the Civil Rights Act obligations. Safe Harbor requires written translations of vital documents for each LEP group that meets the threshold.

Figure 7: Limited English Proficiency Population


Source: U.S. Census Bureau, B16004, Age by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over, 2020 ACS 5-Year Estimates.

In compliance with EO 13166, public involvement efforts will need to employ the use of bilingual material and/or simultaneous translation, as applicable, so that LEP populations would have meaningful access to the programs, services, and information provided. More information on public involvement activities is provided in Chapter 5.

## Historically Disadvantaged Community

The Justice40 Initiative was created to confront and address decades of underinvestment in disadvantaged communities. Justice40 is an opportunity to address gaps in transportation infrastructure and public services by working toward the goal that many of the Department of

Transportation's (DOT) grants, programs, and initiatives allocate at least $40 \%$ of the benefits from federal investments to disadvantaged communities. Consistent with the Office of Management and Budget's (OMB) Interim Guidance for the Justice40 Initiative, DOT's interim definition of Historically Disadvantaged Communities (DAC) includes (a) certain qualifying census tracts, (b) any Tribal land, or (c) any territory or possession of the United States. The DOT's interim definition for DACs was developed by an internal and external collaborative research process. It includes data for 22 indicators collected at the census tract level and grouped into the following six (6) categories of transportation disadvantage.

- Transportation access disadvantage identifies communities and places that spend more, and take longer, to get where they need to go.
- Health disadvantage identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures.
- Environmental disadvantage identifies communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units.
- Economic disadvantage identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality.
- Resilience disadvantage identifies communities vulnerable to hazards caused by climate change.
- Equity disadvantage identifies communities with a high percentile of persons (age 5+) who speak English "less than well."

As shown in Figure 8, DACs are present within the PEL study area, primarily located in the southern portion of the study area, with one DAC located in the community of Lake Waukomis.

Figure 8: Historically Disadvantaged Communities


Source: U.S. DOT, Transportation Disadvantaged Census Tracts (Historically Disadvantaged Communities).

### 4.1.4 Land Use

Land uses in the study area include agriculture, commercial, public, industrial, office, park, residential, mixed land use, and other uses. Table 4 lists the existing land use categories used for the analysis and their definitions.

Table 4: Existing Land Use Category Definitions

| Existing Land Use <br> Category | Category Definition |
| :---: | :---: |
| Agriculture | Agriculture |
| Commercial | Commercial spaces, hotel/motel |
| Industrial | Industrial/ business |
| Mixed Land Use | Mixed Land Use (example- commercial and residential |
| combined) |  |

Figure 9 shows the location of these land uses in the study area. Residential areas are located throughout the study area while a majority of commercial areas are along major roadways such as I-29, I-35, U.S. 169, and N Oak Trafficway.

Figure 9: Existing Land Use


Source: MARC.

Table 5 presents the acres of each land use and the percentage of area each land use occupies in the study area. 'Residential' and 'Other' land uses are the top two land use categories. 'Other' includes parking areas, ROW, ROW RR, and vacant land. These areas are predominantly located along the Missouri River in the southwest corner of the study area, in the northeast corner around the intersection of Hwy 152 and I-435 and are scattered in the northwest corner of the study area.

Table 5: Existing Land Use Percent of Study Area

| Existing Land Use <br> Category | Acres | Percentage <br> of Study Area |
| :---: | :---: | :---: |
| Agriculture | 2,788 | $4.0 \%$ |
| Commercial | 4,365 | $6.3 \%$ |
| Industrial | 1,825 | $2.6 \%$ |
| Mixed Land Use | 1 | $<0.1 \%$ |
| Office | 1,557 | $2.2 \%$ |
| Park | 260 | $0.4 \%$ |
| Public | 9,662 | $13.9 \%$ |
| Residential | 24,467 | $35.3 \%$ |
| Other | 24,467 | $35.3 \%$ |
| Total | $\mathbf{6 9 , 3 9 3}$ | $\mathbf{1 0 0 \%}$ |

Source: MARC.
Note: 'Other' land use category includes all parking space, ROW, ROW $R R$, and vacant lots/s pace in the study area.

The northland is expected to add 100,000 new residents and 60,000 new employees by 2050 according to MARC. The growth in employment can be attributed to new non-residential projects being planned provided by the Platte and Clay County Economic Development Corporations. Figure 10 shows the location of the new non-residential projects and Table 6 identifies each project.

Figure 10: Known Large Non-Residential Projects


Source: Platte County EDC, Clay County EDC. Note: Corresponding data found in Table 6.

Table 6: Known Large Non-Residential Projects

| Platte County | Clay County | Jackson County |
| :---: | :---: | :---: |
| 1. KC Current Soccer Training Facility <br> 2. Creekside <br> 3. KCl Intermodal Business Centre <br> 4. KCl 29 Logistics Park <br> 5. Platte International Commerce Center <br> 6. Golden Plains Technology Park <br> 7. Twin Creeks/ Platte Purchase <br> 8. Tiffany Greens | 9. Staley Corners/ Marketplace 152 <br> 10. 587 Project <br> 11. Heartland Cold Storage Logistics Center <br> 12. Heartland Meadows Commerce Center <br> 13. Liberty Heartland Logistics Center <br> 14. Liberty Parkway Plaza \& Logistics Center <br> 15. Liberty Commerce Center <br> 16. Ford Plant | 17. KC Riverfront |

Source: Platte County EDC, Clay County EDC. Note: Corresponding data found in Figure 9.

### 4.1.5 <br> Schools

There are 102 schools generally spread evenly throughout the study area in population centers. Schools in the study area are listed in Table 7 and shown in Figure 11.

Table 7: Schools in Study Area

| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 1 | Antioch Middle School | 52 | Withers School |
| 2 | Big Shoal School | 53 | Pleasant Valley School (historical) |
| 3 | Briarcliff Elementary School | 54 | Greenwood School (historical) |
| 4 | Brick Monroe School | 55 | Northern Heights School (historical) |
| 5 | Brookwood School | 56 | Holy Cross Lutheran School |
| 6 | Chapel Hill Elementary School | 57 | Ravenwood Elementary School |
| 7 | Thomas B Chinn Elementary School | 58 | Shoal Creek Elementary School |
| 8 | Chouteau Elementary School | 59 | Topping Elementary School |
| 9 | Clardy School | 60 | West Englewood Elementary School |
| 10 | Cooley School | 61 | Winnetonka High School |
| 11 | Crestview School | 62 | Alexander Doniphan Elementary School |
| 12 | Daag School | 63 | Alfred L Renner Elementary School |
| 13 | Davidson Elementary School | 64 | Clardy Elementary School |
| 14 | Eastgate Middle School | 65 | Crestview Elementary School |
| 15 | Eastwood School | 66 | Eagle Heights Baptist School |
| 16 | Englewood School | 67 | English Landing Elementary School |
| 17 | Faubion School | 68 | Gashland Elementary School |
| 18 | Forest Hills North School | 69 | Gracemor Elementary School |


| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 19 | Golden Oaks Education Center | 70 | Juvenile Justice Center |
| 20 | Kansas City Metropolitan Junior College | 71 | Lakeview Middle School |
| 21 | Karnes School | 72 | Lakewood Elementary School |
| 22 | Lakewood School | 73 | Lewis and Clark Elementary School |
| 23 | Lewis | 74 | Liberty Academy |
| 24 | Linden East School | 75 | Maple Park Middle School |
| 25 | Linden West Elementary School | 76 | North Kansas City High School |
| 26 | Maple Park Junior High School | 77 | Northview Elementary School |
| 27 | Maplewood Elementary School | 78 | Plaza Middle School |
| 28 | Meadowbrook Elementary School | 79 | Pleasant Valley Early Childhood Center |
| 29 | Midwestern Theological Seminary | 80 | Prairie Point Elementary School |
| 30 | Norclay School | 81 | Park Hill South High School |
| 31 | Northgate Middle School | 82 | Maple Valley School |
| 32 | Oak Park High School | 83 | Liberty Oaks Elementary School |
| 33 | Park Hill High School | 84 | Liberty Senior High School |
| 34 | Park Hill Junior High School | 85 | Faith Academy |
| 35 | Renner School | 86 | Warren Hills Elementary School |
| 36 | Roanridge Institute | 87 | South Valley Middle School |
| 37 | Saint Charles Borromeo School | 88 | South Valley Junior High School |
| 38 | Saint Gabriel Catholic School | 89 | Pathfinder Elementary School |
| 39 | Saint James School | 90 | Oakwood Manor Elementary School |
| 40 | Saint Patrick's Elementary School | 91 | Star Day Treatment Center |
| 41 | Saint Pius X High School | 92 | Northwest Regional Youth Center |
| 42 | Saint Therese North Parish School | 93 | Barry School |
| 43 | Southeast Elementary School | 94 | Congress Middle School |
| 44 | Winnwood Elementary School | 95 | Park Hill Day School |
| 45 | Buchanan School | 96 | Outreach Christian Education School |
| 46 | Garrison School | 97 | Oakhill Day School |
| 47 | Line Creek Elementary School | 98 | Saint Andrew the Apostle School |
| 48 | Glenwood School | 99 | National American University Zona Rosa Campus |
| 49 | Big Shoal School | 100 | Grantham University |
| 50 | Hoy School | 101 | Metropolitan Community College Maple Woods Campus |
| 51 | Moscow School | 102 | Northland Innovation Center |

Source: Geographic Names Information System (GNIS), Google Maps.

Figure 11: Schools in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.6 Places of Worship

There are 99 places of worship generally spread evenly throughout the study area in population centers. The places of worship are listed in Table 8 and shown in Figure 12.

Table 8: Places of Worship in Study Area

| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 1 | Bethel Church | 51 | Northgate Baptist Church |
| 2 | Calvary Church | 52 | Northland Chinese Christian Church |
| 3 | Gashland Church | 53 | Northland Christian Church |
| 4 | Glenwood Church | 54 | Northminster Presbyterian Church |
| 5 | Pentecostal Church | 55 | Northside Christian Church |
| 6 | Pine Ridge Church | 56 | Northwest Bible Church |
| 7 | Saint Andrews Church | 57 | Park Hill Baptist Church |
| 8 | Saint Patrick's Church | 58 | Park Hill Christian Church |
| 9 | Saint Stephen Church | 59 | Parvin Road Church of Holiness |
| 10 | Union Church | 60 | Pine Ridge Presbyterian Church |
| 11 | Antioch Church | 61 | Platte Woods United Methodist Church |
| 12 | Mount Olive Church | 62 | Prodigal House Ministries |
| 13 | Little Shoal Baptist Church | 63 | Randolph Baptist Church |
| 14 | Antioch Bible Baptist Church | 64 | Cornerstone Wesleyan Church |
| 15 | Avondale Baptist Church | 65 | Englewood Baptist Church |
| 16 | Avondale United Methodist Church | 66 | Fairview Christian Church |
| 17 | Barry Christian Church | 67 | Faubion United Methodist Church |
| 18 | Berean Apostolic Worship Center | 68 | First Baptist Church of North Kansas City |
| 19 | Beth Haven Church | 69 | First Christian Church |
| 20 | Bethany Baptist Chapel | 70 | First Christian Church of North Kansas City |
| 21 | Bethel United Church of Christ | 71 | Gashland Baptist Church |
| 22 | Central District Pentecostal Church | 72 | of God |


| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 34 | Harvest Church | 84 | Saint Raphaels Church |
| 35 | Heartland Church of Christ | 85 | Saint Therese North Church |
| 36 | Hillside Christian Church | 86 | Set Free Church of Kansas City |
| 37 | Holy Cross Lutheran Church | 87 | Seventh Day Adventist Church |
| 38 | Holy Family Parish Church | 88 | Sherwood Bible Church |
| 39 | Immanuel Presbyterian Church | 89 | Shoal Creek Celebration Center |
| 40 | Kansas City Korean Baptist Church | 90 | Tenth Church of Christ Science |
| 41 | King of Kings Lutheran Church | 91 | Tiffany Fellowship Church |
| 42 | Kingdom Hall of Jehovahs Witnesses | 92 | Timothy Baptist Church |
| 43 | Linden Baptist Church | 93 | Tower View Baptist Church |
| 44 | McMurry United Methodist Church | 94 | Trinity Christian Center |
| 45 | Merry Moments Preschool | 95 | Unity Church Universal |
| 46 | Metro Baptist Church | 96 | Victory Free Will Baptist Church |
| 47 | Moment of Truth Bible Church | 97 | Vivion Road Church of Christ |
| 48 | New Life Community Church | 98 | Winnwood Baptist Church |
| 49 | North Cross United Methodist Church | 99 | Winnwood United Methodist Church |
| 50 | North Heartland Community Church |  |  |

Figure 12: Places of Worship in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.7 Airports/Heliports

There is one airport and two heliports in the study area, listed in Table 9 and shown in Figure
13. The airport and one of the heliports are located in the southern portion of the study area, and one heliport is located along U.S. 169 in the northern portion of the study area.

Table 9: Airports/Heliports in Study Area

| Map ID | Airport Name |
| :---: | :---: |
| 1 | Charles B. Wheeler Downtown |
| Map ID | Heliport Name |
| 2 | North Patrol Division Station |
| 3 | North Kansas City Hospital |

Source: Geographic Names Information System (GNIS), Google Maps.
Figure 13: Airports and Heliports in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.8 Cemeteries

There are ten cemeteries generally spread out within the central and northern portions of the study area, listed in Table 10 and shown in Figure 14.

Table 10: Cemeteries in Study Area

| Map ID | Name |
| :---: | :---: |
| 1 | Barry Cemetery |
| 2 | Davidson Cemetery |
| 3 | East Slope Memorial Gardens |
| 4 | Little Shoal Cemetery |
| 5 | New Stark Cemetery |
| 6 | Pence Cemetery |
| 7 | Roger Cemetery |
| 8 | White Chapel Cemetery |
| 9 | Crowley Cemetery |
| 10 | Saint Matthews Cemetery |

Source: Geographic Names Information System (GNIS), Google Maps.

Figure 14: Cemeteries in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.9 <br> Police Facilities

There are nine police facilities in the study area, listed in Table 11. As shown in Figure 15, emergency services are generally spread out in the study area's population centers and along roadway corridors.

Table 11: Police Facilities in Study Area

| Map ID | Name |
| :---: | :---: |
| 1 | Lake Waukomis Police Department |
| 2 | Gladstone Police Department |
| 3 | North Kansas City Police Department |
| 4 | Pleasant Valley Police Department |
| 5 | Platte Woods Police Department |
| 6 | Northmoor Police Department |
| 7 | Riverside City Police Department |
| 8 | Kansas City Police Department |
| 9 | Claycomo Police Department |

Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.10 <br> Fire Facilities

There are 19 fire facilities in the study area, listed in Table 12. As shown in Figure 15, emergency services are generally spread out in the study area's population centers and along roadway corridors.

Table 12: Fire Facilities in Study Area

| Map ID | Name |
| :---: | :---: |
| 1 | Kansas City Missouri Fire Department Station 25 |
| 2 | Kansas City Missouri Fire Department Station 44 |
| 3 | Lake Waukomis Fire Department |
| 4 | Kansas City Missouri Fire Department Station 40 |
| 5 | Kansas City Missouri Fire Department Station 38 |
| 6 | Kansas City Missouri Fire Department Station 34 |
| 7 | Kansas City Missouri Fire Department Station 14 |
| 8 | Kansas City Missouri Fire Department Station 6 |
| 9 | Kansas City Missouri Fire Department Station 4 |
| 10 | Gladstone Fire Department Station 2 |
| 11 | Pleasant Valley Fire Department |
| 12 | North Kansas City Fire Marshal |
| 13 | North Kansas City Fire Department Station 2 |
| 14 | Kansas City Missouri Fire Department Station 10 |
| 15 | North Kansas City Fire Department Station 1 |
| 16 | Gladstone Fire Department Station 1 |


| Map ID | Name |
| :---: | :---: |
| 17 | Claycomo Fire and Rescue |
| 18 | Avondale Volunteer Fire Department |
| 19 | Riverside Fire Department |
| Source: Geographic Names Information System (GNIS), Google Maps. |  |

### 4.1.11 Hospitals

There are six hospitals in the study area, listed in Table 13. As shown in Figure 15, fire, police, and hospital services are generally spread out in the study area's population centers and along roadway corridors.

Table 13: Hospitals in Study Area

| Map ID | Name |
| :---: | :---: |
| 1 | North Kansas City Hospital |
| 2 | Creekwood Surgery Center |
| 3 | Saint Luke's North Hospital - Barry Road |
| 4 | North Kansas City Hospital Center Wellness Center |
| 5 | Kindred Hospital Northland |

Source: Geographic Names Information System (GNIS), Google Maps.

Figure 15: Fire, Police and Hospital Services in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.12 Parks and Recreational Resources

## Section 4(f) Resources

A Section 4(f) resource is any significant publicly owned park, recreation area, wildlife and waterfowl refuge, or historic property (including archeological sites) protected by 23 Code of Federal Regulations (CFR) 774. Federally funded DOT actions cannot impact Section 4(f)
eligible sites unless there is no "feasible and prudent" alternative. There are 87 parks and/or recreation areas and one wildlife refuge (Big Muddy National Fish and Wildlife Refuge) potentially eligible for Section 4(f) protection in the study area. A list of Section 4(f) parks and one wildlife refuge are provided in Table 14. Section 4(f) historic properties and archeological sites are listed in Table 14 and Table 15, respectively. As shown in Figure 16, their locations are generally widespread throughout the study area. If proposed improvements result in a use of these types of properties, a Section 4(f) evaluation will be required during the National Environmental Policy Act (NEPA) phase.

Table 14: Section 4(f) Resources in Study Area

| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 1 | AJ Wilson Sports Complex | 45 | Maple Woods Natural Area |
| 2 | Anita B Gorman Park | 46 | Maple Woods Nature Preserve |
| 3 | Barry Platte Park | 47 | Maplewoods Greenway |
| 4 | Barry Road Park | 48 | Margaret Kemp Park |
| 5 | Belvidere Park | 49 | Meadow Brook Park |
| 6 | Bennett Park | 50 | Morgan Tract Park |
| 7 | Berkley River Park | 51 | North Brook Park |
| 8 | Big Shoal Park | 52 | North Hills Park |
| 9 | Briarcliff Greenway | 53 | North Hills Park |
| 10 | Briarcliff Park | 54 | Northgate Park |
| 11 | Brookhill Park | 55 | Oak Grove Park |
| 12 | Buckeye Greenway | 56 | Overlook at Pendleton Heights |
| 13 | Central Park | 57 | Park Forest Park |
| 14 | Chaumiere Woods Park | 58 | Penguin Park |
| 15 | Chouteau Greenway | 59 | Platte Purchase Park |
| 16 | Chouteau Park | 60 | Pleasant Valley Park |
| 17 | Clayton Park | 61 | Pleasant Valley Road Athletic Complex |
| 18 | Columbus Square | 62 | Prather Park |
| 19 | Cooley Park | 63 | Richard L Berkley Riverfront Park |
| 20 | Creekwood Park | 64 | Riverside Race Track (historical) |
| 21 | Crestview Park | 65 | Riverview Greenway |
| 22 | Davidson Park | 66 | Riverview Park |
| 23 | Englewood Park | 67 | River Forest Park |
| 24 | Essex Park | 68 | Robert H. Hodge Park |
| 25 | Flora Park | 69 | Robinhood Park |
| 26 | Frank Vaydik Park | 70 | Rock Creek Park |


| Map ID | Name | Map ID | Name |
| :---: | :---: | :---: | :---: |
| 27 | Garrison Square | 71 | Searcy Creek Parkway |
| 28 | Golden Oaks Park | 72 | Sherrydale Park |
| 29 | Happy Rock Park | 73 | Shoal Creek Golf Course |
| 30 | Hidden Valley Park | 74 | Strathbury Park |
| 31 | Highland View Park | 75 | Sunset Park |
| 32 | Hobby Hill Park | 76 | Sycamore Knoll Park |
| 33 | Hodge Park | 77 | Tiffany Hills Park |
| 34 | Hodge Park Athletic Field | 78 | Vivion Road Backyard Wildlife Demonstration |
| 35 | Holland Park | 79 | Waterwell Athletic Complex |
| 36 | Kemp Playground | 80 | Waterworks Park |
| 37 | Kirby Creek Park | 81 | Westboro/Canterbury Greenway |
| 38 | Lakewood Greenway | 82 | Wildberry Park |
| 39 | Lakewood Park | 83 | Willow Brooke Park |
| 40 | Line Creek Greenway | 84 | Wilshire Park |
| 41 | Line Creek Meadows | 85 | Winnwood Park |
| 42 | Line Creek Park | 86 | Wood Bridge Park |
| 43 | Macken Park | 87 | Woodsmoke Park |
| 44 | Maple Park | 88 | Big Muddy National Fish and Wildlife Refuge |

Source: Geographic Names Information System (GNIS), Google Maps.

Figure 16: Section 4(f) Resources in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

## Section 6(f) Resources

A Section 6(f) resource is any public outdoor recreational land acquired or improved with funds authorized under the Land and Water Conservation Fund (LWCF) Act of 1965. Facilities that are LWCF funded must be maintained for outdoor recreation in perpetuity. Impacts to Section 6(f) properties require mitigation that includes replacement of at least equal value and recreation utility. Based on review of the National Park Service database and listed in Table 15, there are

13 Section 6(f) resources within the study area. As shown in Figure 17, their locations are generally widespread throughout the study area.

Table 15: Section 6(f) Resources in Study Area

| Map ID | Section 6(f) Parks |
| :---: | :---: |
| 1 | River Bluff Park |
| 2 | River Forest Park |
| 3 | Hidden Valley Park |
| 4 | Penguin Park |
| 5 | Flora Park |
| 6 | Frank Vaydik Park |
| 7 | Woodsmoke Park |
| 8 | Hobby Hill Park |
| 9 | Oak Grove Park |
| 10 | Barry Platte Park |
| 11 | Line Creek Park |
| 12 | Westboro-Canterbury Greenway |
| 13 | Big Muddy National Fish and Wildlife Refuge |

Source: Land and Water Conservation Fund (LWCF) map, Geographic Names Information System (GNIS), Google Maps.

Figure 17: Section 6(f) Resources in Study Area


Source: The Land and Water Conservation Fund (LWCF) map, Geographic Names Information System (GNIS), Google Maps.

### 4.1.13 Natural Resources

## Vegetation

The majority of the study area is within an urbanized area. There are large sections of upland and riparian forests located in parks and stream corridors. Grassed areas within the residential and industrial areas are predominantly comprised of maintained, cool-season grasses.

## Wildlife Habitat and Migration Patterns

The study area contains habitat that may provide suitable habitat for threatened and endangered species. Wildlife habitat within the study area consists of forested areas, the Missouri River and other streams, and bridges that could provide nesting sites for migratory birds and roosting sites for bat species.

## Threatened and Endangered Species

Federally listed threatened and endangered species are subject to the protection afforded under Section 7 of the Endangered Species Act of 1973, as amended (ESA) (16USC 1531 et seq.). The ESA provides protection of animal and plant species that have been determined to be in population decline and are in jeopardy of becoming extinct.

Table 16 below lists the species identified as potentially occurring within the study area during searches of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) and the Missouri Department of Conservation's (MDC) Missouri Natural Heritage Program databases on July 15, 2022.

Table 16: Threatened and Endangered Species Potentially Occurring Within the Study Area

| Common Name | Scientific Name | Federal <br> Status $^{1}$ | State <br> Status $^{2}$ | Critical Habitat <br> w/in Study Area |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Invertebrates |  |  |  |  |  |
| Monarch Butterfly | Danaus plexippus | Candidate | None |  |  |
| Fishes |  |  |  |  |  |
| Pallid Sturgeon | Scaphirhynchus albus | Endangered | Endangered | None |  |
| Mammals |  |  |  |  |  |
| Gray Bat | Myotis grisescens | Endangered |  |  |  |
| Indiana Bat | Myotis sodalis | Endangered | Endangered | None |  |
| Northern Long-Eared Bat | Myotis septentrionalis | Threatened |  | None |  |

Source: U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) Database, Missouri Department of Conservation's (MDC) Natural Heritage Program Database.

## Water Quality

Section 303(d) of the Clean Water Act (CWA) requires states to identify all water bodies where state water quality standards are not being met. Missouri's water quality standards are defined in the Code of State Regulations 10 CSR 20-7.031. The water quality standards describe the desired condition of Missouri's waterbodies and the methods being utilized to reach or protect those conditions. The Missouri Department of Natural Resources (MDNR) maintains a list of Missouri Section 303(d) impaired waters. The current approved list (2020) was reviewed to
determine if any surface waters within the study area were listed as impaired. The Missouri River and Line Creek were both listed as impaired waters. The impairments of both streams are discussed further below.

- The Missouri River is listed as impaired for the pollutant Escherichia coli (W) which affects the use of the Missouri River for whole body contact recreation.
- Line Creek is listed as impaired for the pollutant Escherichia coli (W) which affects the use of Line Creek for whole body contact recreation.


## Surface Waters

Surface waters within the study area include the Missouri River, Kansas River, Brush Creek, Buckeye Creek, Burlington Creek, East Creek, East Fork Shoal Creek, Jumping Branch, Line Creek, Little Shoal Creek, Mill Creek, Old Maids Creek, Rock Creek, Rush Creek, Searcy Branch, Second Creek, Shoal Creek, White Aloe Branch, and unnamed tributaries. The study area is located within the Independence-Sugar (1024011), Platte (10240012), Lower Kansas, Kansas (10270104), and Lower Missouri-Crooked (10300101) 8-digit hydrologic units. Table 17 below summarizes the stream classifications, use categories, and impairments for the streams/rivers within the study area.

Table 17: Waterbody Classification and Impairment

| Water Body | Stream <br> Classification | Use Classification* | Impairment | Impaired <br> Use |
| :---: | :---: | :---: | :---: | :---: |
| Missouri <br> River | Perennial | AQL, DWS, IND, IRR, <br> LWW, SCR, WBC, HHP | Escherichia coli (W) | WBC |
| Line Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | Escherichia coli (W) | WBC |
| Brush Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Buckeye <br> Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Burlington <br> Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| East Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| East Fork | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| East Fork <br> Shoal Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Jumping <br> Branch | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Little Shoal <br> Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Mill Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Old Maids <br> Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |


| Water Body | Stream <br> Classification | Use Classification* | Impairment | Impaired <br> Use |
| :---: | :---: | :---: | :---: | :---: |
| Rock Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Rush Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Searcy <br> Branch | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Second <br> Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Shoal Creek | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| White Aloe <br> Branch | Intermittent | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Unnamed <br> Tributaries | Intermittent/artificial <br> paths | AQL, IRR, LWW, SCR, <br> WBC, HHP | None | None |
| Wells | NONE | N/A | Unknown | Unknown |
| Other | NONE | N/A | None | None |

* Use Classifications: AQL - Aquatic Life; DWS - Drinking Water Supply; IND - Industrial; IRR - Irrigation; HHP -Human-Health Protection (Fish Consumption); LWW - Livestock \& Wildlife Watering; SCR - Secondary Contact Recreation; WBC - Whole Body Contact Recreation
Source: Missouri Department of Natural Resources (MDNR) GIS Data.


## Water and Monitoring Wells

There are over 2,100 water and monitoring wells within the study area, of which about 1,005 ( $48 \%$ ) are abandoned and about 1,020 ( $49 \%$ ) are monitoring wells used to monitor for a variety of parameters. The remaining 59 wells (3\%) have various listed uses such as domestic, public, irrigation, supply, and unknown. Wells can also act as pathways of pollutants to groundwater.

## Other

There are no known Outstanding National Resource Waters, Outstanding State Resource Waters, cold water habitat, losing streams, or biocriteria reference locations within the study area.

## Waters of the U.S., including Wetlands

Wetland resources are protected under Section 404 of the Clean Water Act (33 US Code [USC] 1344) and Executive Order (EO) 11990 Protection of Wetlands (Environmental Protection Agency (EPA), 1977). This section describes the wetlands, streams, and ponds/lakes within the study area. This analysis was performed using GIS and the USFWS National Wetlands Inventory (NWI) and U.S Geological Survey (USGS) National Hydrology Database (NHD) mapping data.

The NWI wetlands identified within the study area included 405 riverine wetlands located within the various stream/river channels, 142 freshwater emergent wetlands, and 235 freshwater forested/shrub wetlands. The NWI data also identified one lake and 420 freshwater ponds within
the study area. Figure 18 shows NWI locations generally spread along the Missouri River and throughout central and northern portions of the study area. Figure 19 shows NHD locations generally widespread throughout the study area.

Figure 18: National Wetland Inventory (NWI)


Source: Geographic Names Information System (GNIS), Google Maps.

Figure 19: National Hydrology Database (NHD)


Source: Geographic Names Information System (GNIS), Google Maps.
NWI mapped wetlands may or may not be considered jurisdictional by the U.S. Army Corps of Engineers (USACE). To determine if NWI mapped wetlands are jurisdictional, wetland delineations will need to be performed following the methods of the 1987 Corps of Engineers Wetlands Delineation Manual and the Midwest Regional Supplement. A wetland delineation may identify wetlands that are not shown in the NWI data. Section 404 of the Clean Water Act (CWA) prohibits the discharge of dredged or fill material (i.e., sand, soil, rock, construction materials) into waters of the U.S. without a permit from the USACE and may require mitigation.

## Floodways and Floodplains

Floodplains are low-lying land areas that are susceptible to being inundated by floodwaters from any source. Executive Order 11988 on Floodplain Management directs federal agencies "to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

## Regulatory Floodway

FEMA defines the regulatory floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."

## Study Area Regulatory Floodways and Floodplains

The FEMA National Flood Hazard Layer (NFHL) was utilized in ArcGIS to identify floodways and floodplains within the study area. The floodways and floodplains, identified and shown in Figure 20, were associated with the following streams/rivers:

- Missouri River: floodway and 100-year floodplain
- Line Creek: floodway and 100-year floodplain
- Second Creek: floodway and 100-year floodplain
- Rush Creek: 100-year floodplain
- East Fork: floodway and 100-year floodplain
- Old Maids Creek: floodway and 100-year floodplain
- Jumping Branch: floodway and 100-year floodplain
- East Creek: floodway and 100-year floodplain
- Rock Creek: floodway and 100-year floodplain
- Buckeye Creek: floodway and 100-year floodplain
- Searcy Branch: floodway and 100-year floodplain
- Mill Creek: floodway and 100-year floodplain
- Shoal Creek: floodway and 100-year floodplain
- Little Shoal Creek: floodway and 100-year floodplain
- East Fork Shoal Creek: floodway and 100-year floodplain
- Burlington Creek: floodway and 100-year floodplain, and
- White Aloe Branch: 100-year floodplain.

The Missouri State Emergency Management Agency (SEMA) issues floodplain development permits for projects undertaken by the State of Missouri. A "no-rise" certificate would be required before a permit is issued for projects proposed within regulatory floodways.

## Flood Protection Levees

The USACE Civil Works program manages the nation's water resources. Through the Levee Safety Program, the USACE partners with levee sponsors to manage levees that help reduce flood risks to people, businesses, critical infrastructure, and the environment. The protection of the levees and other USACE Civil Works projects are provided by two regulations:

- Section 408: Through Section 408, the USACE may grant permission for another party to alter a Civil Works project as long as the USACE determines that the proposed alteration will not be injurious to the public interest and will not impair the usefulness of the Civil Works project.
- Section 14: Section 14 of the Rivers and Harbors Act of 1899, as amended, and codified at 33 USC 408 (Section 408) provides that the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the alteration or use of any USACE Civil Works project.


## Study Area Levees

The existing levees within the study area are maintained by the levee's sponsor. Each sponsor is responsible for the operation, maintenance, repair, rehabilitation, and replacement of their structure. The levees must meet inspection requirements conducted by the USACE.
The local sponsors are responsible for controlling construction within the critical area of the levee. The USACE provides engineering review to ensure that any work within or near the levee does not reduce the level of protection or integrity of the levee. The critical area is typically the area 300 feet riverward to 500 feet landward of a levee centerline. In some instances, the critical area is extended beyond 500 feet if there are any impacts to the levee.

Within the study area, there are four total levees located on both sides of the Missouri River. Two levees are sponsored by the Riverside Quindaro Bend Levee District, one levee is sponsored by the Birmingham Drainage District, and the fourth levee is sponsored by the City of Kansas City, Missouri, North Kansas City Levee Unit. Figure 20 shows the locations of the four levees along the Missouri River.

Figure 20: Floodplains and Levees


Source: Geographic Names Information System (GNIS), Google Maps.

### 4.1.14 Other Items of Considerations

## Hazardous Materials

The Resource Conservation and Recovery Act (RCRA) of 1976 gives the U.S. Environmental Protection Agency (EPA) the authority to regulate the disposal of hazardous waste. The EPA has delegated authority for executing most of the requirements of RCRA in Missouri to the Missouri Department of Natural Resources (MDNR) Hazardous Waste Program. The Hazardous and Solid Waste Amendment (HSWA) of 1984 mandates corrective action at hazardous waste facilities for all releases of hazardous waste to the environment and includes provisions to regulate underground storage tanks.

A review of available MDNR on-line databases was performed for the study area to determine if any known sites producing, storing, and/or disposing of toxic or hazardous materials might affect the proposed study alternatives. GIS data was downloaded from the MDNR's Environmental Site Tracking and Research Tool (E-Start).

At this time, no recommendations from the PEL study have been identified; therefore, level of risk is not determined for sites within the study area. An environmental regulatory records review assessment (radius report) in accordance with the American Society for Testing and Materials (ASTM) Practice E1527-05, with exceptions to accommodate the particular situations and needs of roadway projects, would be necessary during the schematic and NEPA phase of project development; and if proposed improvements result in a use of these types of properties, a more detailed evaluation will be required.

As listed in Table 18, the study area includes the following hazardous materials sites:

- Two Brownfield Assessment Sites
- One immediately adjacent to l-29 just north of Missouri River
- One in Gladstone, approx. 3500 feet east of U.S. 169
- 12 Active Hazardous Waste Program Cleanup Sites
- Three Operating Underground Storage Tank Facilities where Investigation/Corrective Action is Ongoing or Incomplete
- Five Former Underground Storage Tank Facilities where Investigation/Corrective Action is Ongoing or Incomplete

Table 18: Hazardous Materials Sites in Study Area

| Map ID | Site | Status |
| :---: | :---: | :---: |
| 1 | Brownfield Assessment | Active |
| 2 | Brownfield Assessment | Active |
| 3 | Hazardous Waste Program Cleanup Site | Active |
| 4 | Hazardous Waste Program Cleanup Site | Active |


| Map ID | Site | Status |
| :---: | :---: | :---: |
| 5 | Hazardous Waste Program Cleanup Site | Active |
| 6 | Hazardous Waste Program Cleanup Site | Active |
| 7 | Hazardous Waste Program Cleanup Site | Active |
| 8 | Hazardous Waste Program Cleanup Site | Active |
| 9 | Hazardous Waste Program Cleanup Site | Active |
| 10 | Hazardous Waste Program Cleanup Site | Active |
| 11 | Hazardous Waste Program Cleanup Site | Active |
| 12 | Hazardous Waste Program Cleanup Site | Active |
| 13 | Hazardous Waste Program Cleanup Site | Active |
| 14 | Hazardous Waste Program Cleanup Site | Active |
| 15 | Operating Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 16 | Operating Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 17 | Operating Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 18 | Former Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 19 | Former Underground Storage Tank Facilities | Inventigation/Corrective Action <br> Ongoing or Incomplete |
| 20 | Former Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 21 | Former Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |
| 22 | Former Underground Storage Tank Facilities | Investigation/Corrective Action <br> Ongoing or Incomplete |

Source: Missouri Department of Natural Resources (MDNR) GIS Data.

The above hazardous materials sites, as shown in Figure 21, are generally clustered in the southern portion of the study area near population centers, as well as having a few sites scattered throughout the central and northern portions of the study area.

Figure 21: Hazardous Materials Sites in Study Area


Source: Missouri Department of Natural Resources (MDNR) GIS Data.

A more detailed assessment of impacts to these sites would need to occur for the alternatives identified.

Several overhead and underground utilities are present throughout the study area. Proposed improvements may affect these areas and may result in the need for the relocation or modification of these facilities. There is no known contamination associated with existing utilities; however, the potential exists that contamination could be encountered during utility adjustments. Coordination with utility companies concerning potential contamination would be addressed during the ROW stage of project development.

If the preferred alternative identified through the NEPA process requires the demolition and removal of bridge and/or building structures, asbestos containing materials (ACM) and lead based paint (LBP) testing may be necessary. It is recommended that ACM and LBP testing be performed on the structures to be removed dependent upon the age of the individual structure.

## Oil and Gas Wells

There are 103 oil and gas wells present within the study area as follows: 71 abandoned commercial gas wells, two plugged commercial gas wells, two orphaned commercial gas wells, six abandoned private gas wells, two plugged private gas wells, 10 abandoned oil wells, and 10 plugged oil wells. Oil and gas wells in the study area are listed in Table 19. As shown in Figure 22, oil and gas wells are generally located southeast of l-35, west of Riverside close to the Missouri River, and in the northeast and northwest corners of the study area.

Table 19: Oil and Gas Wells in Study Area

| Map ID | Well Type | Status | Map ID | Well Type | Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Gas (Conventional, <br> Commercial) | Abandoned | 53 | Gas (Conventional, <br> Commercial) | Abandoned |
| 2 | Gas (Conventional, <br> Commercial) | Abandoned | 54 | Gas (Conventional, <br> Commercial) | Abandoned |
| 3 | Gas (Conventional, <br> Commercial) | Abandoned | 55 | Gas (Conventional, <br> Commercial) | Abandoned |
| 4 | Gas (Conventional, <br> Commercial) | Abandoned | 56 | Gas (Conventional, <br> Commercial) | Plugged - <br> Approved |
| 5 | Gas (Conventional, <br> Commercial) | Abandoned | 57 | Gas (Conventional, <br> Commercial) | Abandoned |
| 6 | Gas (Conventional, <br> Commercial) | Abandoned | 58 | Gas (Conventional, <br> Commercial) | Abandoned |
| 7 | Gas (Conventional, <br> Commercial) | Abandoned | 59 | Gas (Conventional, <br> Commercial) | Abandoned |
| 9 | Gas (Conventional, <br> Commercial) | Abandoned | 60 | Gas (Conventional, <br> Commercial) | Abandoned |
| 10 | Gas (Conventional, <br> Commercial) | Abandoned | 61 | Gas (Conventional, <br> Commercial) | Abandoned |
| 11 | Gas (Conventional, <br> Commercial) | Abandoned | 62 | Gas (Conventional, <br> Commercial) | Abandoned |
| Commercial) |  |  |  |  |  |


| Map ID | Well Type | Status | Map ID | Well Type | Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 12 | Gas (Conventional, Commercial) | Abandoned | 64 | Gas (Conventional, Commercial) | Abandoned |
| 13 | Gas (Conventional, Commercial) | Abandoned | 65 | Gas (Conventional, Commercial) | Abandoned |
| 14 | Gas (Conventional, Commercial) | Abandoned | 66 | Gas (Conventional, Commercial) | Abandoned |
| 15 | Gas (Conventional, Commercial) | Abandoned | 67 | Gas (Conventional, Commercial) | Abandoned |
| 16 | Gas (Conventional, Commercial) | Abandoned | 68 | Gas (Conventional, Commercial) | Abandoned |
| 17 | Gas (Conventional, Commercial) | Abandoned | 69 | Gas (Conventional, Commercial) | Abandoned |
| 18 | Gas (Conventional, Commercial) | Abandoned | 70 | Gas (Conventional, Commercial) | Abandoned |
| 19 | Gas (Conventional, Commercial) | Abandoned | 71 | Gas (Conventional, Commercial) | Abandoned |
| 20 | Gas (Conventional, Commercial) | Abandoned | 72 | Gas (Conventional, Commercial) | Abandoned |
| 21 | Gas (Conventional, Commercial) | Abandoned | 73 | Gas (Conventional, Commercial) | Plugged Approved |
| 22 | Gas (Conventional, Commercial) | Abandoned | 74 | Gas (Conventional, Commercial) | Orphaned |
| 23 | Gas (Conventional, Commercial) | Abandoned | 75 | Gas (Conventional, Commercial) | Orphaned |
| 24 | Gas (Conventional, Commercial) | Abandoned | 76 | Gas (Private Use) | Abandoned |
| 25 | Gas (Conventional, Commercial) | Abandoned | 77 | Gas (Private Use) | Abandoned |
| 26 | Gas (Conventional, Commercial) | Abandoned | 78 | Gas (Private Use) | Abandoned |
| 27 | Gas (Conventional, Commercial) | Abandoned | 79 | Gas (Private Use) | Abandoned |
| 28 | Gas (Conventional, Commercial) | Abandoned | 80 | Gas (Private Use) | Abandoned |
| 29 | Gas (Conventional, Commercial) | Abandoned | 81 | Gas (Private Use) | Plugged Approved |
| 30 | Gas (Conventional, Commercial) | Abandoned | 82 | Gas (Private Use) | Plugged Approved |
| 31 | Gas (Conventional, Commercial) | Abandoned | 83 | Gas (Private Use) | Abandoned |
| 32 | Gas (Conventional, Commercial) | Abandoned | 84 | Oil | Abandoned |
| 33 | Gas (Conventional, Commercial) | Abandoned | 85 | Oil | Abandoned |
| 34 | Gas (Conventional, Commercial) | Abandoned | 86 | Oil | Abandoned |
| 35 | Gas (Conventional, Commercial) | Abandoned | 87 | Oil | Plugged Approved |
| 36 | Gas (Conventional, Commercial) | Abandoned | 88 | Oil | Plugged Approved |
| 37 | Gas (Conventional, Commercial) | Abandoned | 89 | Oil | Plugged Approved |


| Map ID | Well Type | Status | Map ID | Well Type | Status |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 38 | Gas (Conventional, Commercial) | Abandoned | 90 | Oil | Abandoned |
| 39 | Gas (Conventional, Commercial) | Abandoned | 91 | Oil | Abandoned |
| 40 | Gas (Conventional, Commercial) | Abandoned | 92 | Oil | Plugged Approved |
| 41 | Gas (Conventional, Commercial) | Abandoned | 93 | Oil | Plugged Approved |
| 42 | Gas (Conventional, Commercial) | Abandoned | 94 | Oil | Plugged Approved |
| 43 | Gas (Conventional, Commercial) | Abandoned | 95 | Oil | Plugged Approved |
| 44 | Gas (Conventional, Commercial) | Abandoned | 96 | Oil | Abandoned |
| 45 | Gas (Conventional, Commercial) | Abandoned | 97 | Oil | Plugged Approved |
| 46 | Gas (Conventional, Commercial) | Abandoned | 98 | Oil | Abandoned |
| 47 | Gas (Conventional, Commercial) | Abandoned | 99 | Oil | Plugged Approved |
| 48 | Gas (Conventional, Commercial) | Abandoned | 100 | Oil | Abandoned |
| 49 | Gas (Conventional, Commercial) | Abandoned | 101 | Oil | Abandoned |
| 50 | Gas (Conventional, Commercial) | Abandoned | 102 | Oil | Plugged Approved |
| 51 | Gas (Conventional, Commercial) | Abandoned | 103 | Oil | Abandoned |
| 52 | Gas (Conventional, Commercial) | Abandoned |  |  |  |

Source: Missouri Spatial Data Information Service (MSDIS).

Figure 22: Oil and Gas Wells in Study Area


Source: Missouri Spatial Data Information Service (MSDIS).

## Historic Resources

Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places (NRHP) is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources. There are 28 properties, three historic districts, and one town in the study area listed on the NRHP. In addition, there are three properties in the study area listed on the Kansas City Register of Historic Places, but not on the NRHP. Only resources listed on the

NRHP and Kansas City Register of Historic Places have been identified. A comprehensive architectural survey has not been completed, thus additional resources eligible for listing have not been identified. Historic properties listed on the NRHP and Kansas City Register of Historic Places are presented in Table 20. As shown in Figure 23, the majority of historic properties are located in the southern portion of the study area near population centers. As discussed in Section 4.1.12, these historic properties are eligible for Section 4(f) protection by 23 CFR 774.

Table 20: Historic Resources in Study Area

| Map ID | National Register of Historic Places |
| :---: | :---: |
| Historic Properties |  |
| 1 | Compton, Dr. James, House* |
| 2 | Kansas City Masonic Temple* |
| 3 | Antioch Christian Church |
| 4 | Henderson, Dr. Generous, House* |
| 5 | Wheeling Corrugating Company Building |
| 6 | Sears, Roebuck and Company Warehouse Building |
| 7 | Helping Hand Institute Building |
| 8 | McMahon Apartments |
| 9 | Maples Apartments |
| 10 | Circle Apartments |
| 11 | Virginia Apartments |
| 12 | Kessler Apartments |
| 13 | Ellsworth Apartments |
| 14 | Maryland Apartments |
| 15 | The Parkview |
| 16 | Vaccaro, Joe, Soda Water Manufacturing Company Building |
| 17 | Blackstone Hotel |
| 18 | Buick Automobile Company Building |
| 19 | Kelley--Reppert Motor Company Building |
| 20 | Kansas City Cold Storage Company Building |
| 21 | Studna Garage Building |
| 22 | A.B.C. Storage and Van Company Building |
| 23 | Atkins--Johnson Farmhouse Property |
| 24 | Smith and Sons Manufacturing Company Building |
| 25 | Armour Theatre Building |
| 26 | Eldridge Arnold Homestead (Woodneath)* |
| 27 | Williams S. Mitchell (Suction-head type dredge) |


| Map ID | National Register of Historic Places |  |
| :---: | :---: | :---: |
| Historic Properties |  |  |
| 28 | Kansas City Public Library Building* |  |
| Historic Districts |  |  |
| 29 | Holy Rosary Historic District |  |
| 30 | Old Town Historic District (Boundary Increase IV) |  |
| 31 | Old Town Historic District (Boundary Increase) |  |
| Historic Town |  |  |
| 32 | Town of Kansas Site |  |
| Map ID | Kansas City Register of Historic Places |  |
| 33 | Unity Headquarters Building |  |
| 34 | Pendleton Heights Historic District |  |
| 35 | Poage-Arnold Residence (Three Gables) |  |

Note: * Also listed on the Kansas City Register of Historic Places
Source: Geographic Names Information System (GNIS), Google Maps.

Figure 23: Historic Resources in Study Area


Source: Geographic Names Information System (GNIS), Google Maps.

## Archeological Resources

As identified in Table 21, there are five listed and nine eligible archeological sites within the study area. In order to protect the sites from looting and further destruction, all archeological site information and locations are not subject to the Freedom of Information Act and are not to be distributed to the public. Accordingly, none of the archeological sites are shown on a map. As discussed in Section 4.1.12, these archeological sites are eligible for Section 4(f) protection by 23 CFR 774.

Table 21: Archeological Resources in Study Area

| Site ID | NRHP <br> Status | Description |
| :---: | :---: | :---: |
| 23CL123 | Eligible | Site 23CL123 is a prehistoric artifact scatter/historic European grave site first documented in 1969. Located along a ridge overlooking the Missouri River, <br> 23CL123 has been heavily modified during the construction of the interchange of I-435 and Route 210. The portion of the ridge containing the European graves was left intact during the road construction in the center of a full cloverleaf, which also included a portion of the prehistoric component. The site likely continues to the north along the ridge, however, only MoDOT right of way was tested. |
| 23CL1453 | Eligible | Site 23CL1453 is an Urban/Industrial (1900-1960) occupation site with a remaining outbuilding foundation. Historic building materials are associated with the site. |
| 23CL1463 | Eligible | Site 23CL1463 is a prehistoric Late Woodland site with hearth, post molds, and deep pit features. Lithic and ceramic artifacts are associated with the site. |
| 23CL1464 | Eligible | Site 23CL1464 is a prehistoric lithic scatter/historic habitation site with an associated privy, house cellar, house foundation, and well/cistern. Prehistoric lithic artifacts and historic building materials are associated with the site. |
| 23CL1498 | Eligible | Site 23CL498 is a historic late 19th century farmstead consisting of ruins of outbuilding, foundational remnants of two additional buildings and associated features including remnants of a collapsed chimney, stone lined well with a modern concrete cap, and a subterranean cellar. Artifacts consisting of various building materials are associated with the site. |
| 23CL1504 | Eligible | Site 23CL1504 is a prehistoric Middle to Late Archaic lithic tool cache. The lithic artifacts were found in the western $1 / 4$ of the garden just south of the brick home. |
| 23CL1508 | Listed | Site 23CL1508 is an unidentified historic period farmstead with remains of various outbuildings. Artifacts consisting of various building materials were associated with the site. Condition of buildings are variable and some have been demolished. |
| 23CL1531 | Listed | Site 23CL1531 is a historic period site consisting of house, barn, sheds, and other outbuildings dating from Antebellum period (1821-1861) through Urban / Industrial period (1900-1960). The site is now a historic site open to the general public. |
| 23CL1546 | Eligible | Site 23CL1546 is an undefined prehistoric lithic scatter at the top of a ridge overlooking the Missouri River. The site likely continues along the ridge to the north and was likely present to the south prior to road construction, however, only MoDOT right of way was tested for this project. Site is eligible for the NRHP due to intact soils with the presence of cultural lithic remains. |
| 23CL411 | Eligible | Site 23CL411 is a prehistoric lithic scatter/historic farmstead site. Prehistoric lithic flakes and historic building materials are associated with the site. The buildings (and outbuildings) have been remodeled from time to time. It is currently the location of Stroud's Restaurant. |
| 23JA422 | Eligible | Site 23JA422 is a Euromerican 19th to early 20th century habitation site. Artifacts consisting of ceramics, glass, metal, and building materials are associated with the site. |


| Site ID | NRHP <br> Status |  |
| :---: | :---: | :---: |
| 23PL2 | Listed | Site 23PL2 is a prehistoric Woodland period site consisting of a storage pit <br> feature. Lithics, ceramics, and unidentified animal bone were associated with <br> the site. The site is located in a developed urban area. |
| 23PL318 | Listed | Site 23PL318 is a prehistoric Woodland period site with a lithic, ceramics, <br> and unidentified animal bone scatter. |

Source: Geographic Names Information System (GNIS), Google Maps.
Portions of the study area on or near major rivers and streams are more likely to contain unrecorded archeological sites.

## Air Quality

Under the Clean Air Act (CAA), the federal government established the National Ambient Air Quality Standards (NAAQS) to protect public health, safety, and welfare from known or anticipated effects of six criteria pollutants: sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, ozone, and lead. Transportation substantially contributes to four of the six criteria pollutants: ozone, carbon monoxide, particulate matter, and nitrogen dioxide. If an area is determined to not be in attainment with any transportation-related criteria pollutant, they are required to undergo evaluation of regionally significant projects to ensure the overall plan conforms with an approved emissions budget, also known as demonstrating transportation conformity.

The Clay, Jackson, and Platte counties are designated as in attainment for all transportationrelated criteria pollutants at this time; and therefore, conformity requirements of 40 CFR Part 93 do not apply and no further action is required.

## Noise

The 1972 Federal-Aid Highway Act required FHWA to develop a noise standard for new Federal-Aid highway projects. FHWA regulations require MoDOT to 1) Identify traffic noise impacts and examine potential mitigation measures; 2) Incorporate reasonable and feasible noise mitigation measures into its highway projects; and 3) Coordinate with local officials to provide helpful information on compatible land use planning and control during the planning and design of a highway project. MoDOT's Engineering Policy Guide 127.13 Noise describes their implementation of the requirements of FHWA's noise standard at 23 Code of Federal Regulations (CFR) Part 772.

Sensitive noise receptors within the study area include parks and recreation areas, daycares, schools, cemeteries, residences, motels, hotels, places of worship, libraries, and any other lands on which serenity and quite are of extraordinary significance and serve and important need, and where the preservation of those qualities is essential if the lands continue to serve their intended purpose.

### 4.2 Traffic and Safety Conditions

The following section presents the existing and future no-build traffic and safety conditions in the study area.

### 4.2.1 Study Area Travel Patterns

StreetLight 2019 data was collected along the I-29, I-35 and U.S. 169 corridors within the study area. The database uses connected devices to measure vehicle, transit, bike, and foot traffic. The data provides traffic counts, Origin-Destination (OD) data, and other transportation metrics for the project corridors. This data was used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. The data was analyzed in the peak travel direction on each of the corridors.

As shown in Figure 24, drivers on southbound I-29 during the morning peak period are primarily destined to southbound I-635 (29\%), southbound U.S. 169 (23\%), and continuing southbound on I-29/I-35 (18\%). This represents typical commuter patterns within the Kansas City Metro area. The remaining traffic primarily exits at the service interchanges with $2 \%$ utilizing northbound U.S. 169, $7 \%$ using northbound I-35, and only $1 \%$ continuing north on I-35 outside of the study corridors.

Figure 24: SB I-29 Destinations - Existing AM Peak Period


Source: StreetLight, 2019.

The southbound U.S. 169 travel patterns during the morning peak period are shown below in Figure 25. Drivers are primarily destined to southbound U.S. 169 ( $41 \%$ ), southbound I-635 (17\%), and southbound on I-29/I-35 (11\%). These patterns are typical of commuters in the Kansas City Metro area. Fourteen percent of the traffic exits at the service interchanges along U.S. 169. The remaining traffic primarily exits at the service interchanges along $\mathrm{I}-29$ ( $9 \%$ ) and I 35 (5\%).

Figure 25: SB U.S. 169 Destinations - Existing AM Peak Period


Source: StreetLight, 2019.

Figure 26 shows the southbound I-35 traffic distribution during the morning peak period. These drivers are primarily destined to southbound I-435 (34\%) and continue southbound on I-29/I-35 (35\%). These patterns are typical commuter patterns within the Kansas City Metro area. Eight percent of southbound I-35 traffic utilizes I-29 to southbound I-635. It is likely that some of this traffic is utilizing l-635 to bypass downtown Kansas City. Some drivers exit at the service interchanges along I-35 and the southern section of I-29, with very little traffic (2\%) utilizing I-29 north of I-635.

Figure 26: SB I-35 Destinations - Existing AM Peak Period


Source: StreetLight, 2019.

The northbound I-29/I-35 travel patterns during the evening peak period are shown below in Figure 27. 55\% of this traffic utilizes northbound I-35, with $27 \%$ continuing north on I-35 out of the study area. 39\% of the traffic uses northbound I-29, with $15 \%$ continuing north on I-29 out of the study area. Of the $39 \%$ using I-29, $9 \%$ utilizes northbound U.S. 169. The remaining $6 \%$ exits the freeway at NE Parvin Road prior to the I-29/l-35 split.

Figure 27: NB I-29/I-35 Destinations - Existing PM Peak Period


Source: StreetLight, 2019.
In addition to OD information, the StreetLight data provides details on the home and work locations of drivers on the three corridors. This information is shown below in Figure 28 through Figure 34. The gold stars on the figures indicate the location along each corridor the data is representing, which is the home or work location of all vehicles that pass through that specific location on the corridor. The "taller" and lighter squares represent more home or work locations of vehicles on the corridor while the "shorter" and darker squares represent fewer home or work locations.

In general, the denser home locations for drivers on the I-29/I-35 and I-29 corridors can be found near the identified zone, indicating that many trips along the corridors through the zones can be attributed to people living nearby. The home locations of drivers on I-35 extend along I35 to Liberty and further north to Kearney and Excelsior Springs and beyond. In addition, the data also indicates that these corridors serve a broad Kansas City regional area with home locations extending well south of the Missouri River in Missouri and into Kansas.

Similar to the home locations, the denser work locations for drivers on the I-29/I-35 and I-29 corridors can generally be found near the identified gold star location, indicating that many trips along the corridor through the gold star location are related to people working nearby. The primary work locations of vehicles on I-35 are in Liberty, with some extending north into Kearney and Excelsior Springs. There are a couple of work locations in North Kansas City that also have numerous vehicles using l-35. Like the home locations, this data also indicates that these corridors serve a broad Kansas City regional area with work locations extending well south of the Missouri River in Missouri and into Kansas.

Average annual daily traffic (AADT) and truck percentages are shown on Figure 34. The I-29/I35 segment has the most AADT due to both interstates merging heading into and out of downtown Kansas City. However, there is still a considerable amount of traffic moving from I-29 to I-35 and vice versa. Truck percentages are highest on I-35 at over 18\%. The I-29/l-35 corridor also sees a higher percentage of truck traffic, over 11 percent, compared to I-29 and US-169. The passenger vehicle volumes on I-29/I-35 help to temper the truck percentage compared to I-35 where AADT's are lower.

Figure 28: Existing l-29 Weekday Traffic Home Locations


Source: StreetLight, 2022.

Figure 29: Existing l-35 Weekday Traffic Home Locations


Source: StreetLight, 2022.

Figure 30: Existing I-29/I-35 Weekday Traffic Home Locations


Source: StreetLight, 2022.

Figure 31: Existing I-29 Weekday Traffic Work Locations


Source: StreetLight, 2022.

Figure 32: Existing I-35 Weekday Traffic Work Locations


Source: StreetLight, 2022.

Figure 33: Existing I-29/I-35 Weekday Traffic Work Locations


[^4]Figure 34: Truck Traffic Percentages


Source: MoDOT.

### 4.2.2 Methodology for Building the Traffic Network

Dynameq version 4.4 was used for traffic analysis. Dynameq is a mesoscopic traffic simulation software that combines the benefits of travel demand models and microsimulation models. It uses dynamic traffic assignment (DTA) to shift traffic around on the roadways based on network congestion and analyzes traffic operations to report measures of effectiveness (MOEs) such as density, speed, and delay. Dynameq is a product from the same software developer (INRO) as EMME, which is the platform used by Mid-America Regional Council (MARC) for the regional travel demand model. Therefore, there are efficiencies in transferring origin-destination data from the regional EMME model to the subarea Dynameq model. A previously-developed

Dynameq model of downtown Kansas City - created for the Broadway PEL study - was leveraged and expanded for the purposes of this study.

The limits of the original Broadway PEL Dynameq model were between I-635 and I-435 from Shawnee Mission Parkway and Dr. Martin Luther King Jr. Boulevard / Blue Parkway on the south to I-29 and I-35 on the north. This study expanded the model area north to M-152 between I-29 and I-35 as shown in Figure 35.

Figure 35: Dynameq Travel Model Area


Source: Study Team.
Although the project limits mostly consist of roadways north of downtown, the study team wanted to realize the benefits of maintaining the Dynameq model that was used in the Broadway PEL and adding to it for this study to create a regional mesoscopic model that better represented regional travel and could be used for future projects. After the Broadway PEL

Dynameq model was expanded with the EMME network, both networks were joined under one scenario. The expanded portion had to be updated to include the correct intersection network geometry, signal timing plans and speed limits. No network changes were made to the Broadway PEL portion of the network (south of the Missouri River).

Because Dynameq can import network geometries and signal timings from Synchro, the study team was able to utilize Synchro files where available to streamline the network editing process for parts of the network. All other portions of the study area network were manually modified to match satellite imagery. After the network geometry was completely built out, signal timing plans were imported for the AM and PM peak periods. Then the team added 15 -minute and hourly counts on the roadway segments where data was available. Due to the COVID-19 pandemic, the most reliable traffic counts were taken before the year 2020. An annual growth factor of $2.8 \%$ was calculated from a large set of MoDOT counts from 2014 and 2017 and used to adjust the counts to a 2016 base year - the same base year used in the Broadway PEL Study. The counts coded into the network were used later in the calibration stage.

The last step before being able to run the model was to add the EMME OD matrices provided by MARC to the Dynameq model. The model's temporal limits are from 6:00-9:00 AM and from 3:00-7:00 PM. Given these timeframes, a total of seven OD matrices were provided for the expanded Dynameq network from the EMME model, each representing one hour of the peak period. An additional hourly OD matrix was included in each scenario as a model seeding period. The intention of a seeding period is to load vehicles onto the network before the peak begins so that results collected during the first hour of the peak accounts for the vehicles that would already be travelling on the network prior to the peak period beginning. After the study team verified that the origin and destination unique identifiers matched those in the Dynameq model, the AM and PM scenarios were run, beginning the process of calibration.

The Dynameq network was calibrated based on existing 2016 traffic counts, NPMRDS data showing typical speeds on the major highways in the study area and Google Traffic data. Both the AM and PM existing model scenarios were run using DTA up to 100 times or until network convergence was achieved - meaning maximum route choice efficiency was achieved. The DTA simulation results were calibrated by comparing the hourly flow volumes on each network segment with the corresponding traffic count that was imported prior to running the model. Calibration of the model involved identifying the largest discrepancies between link volumes and counts. After traffic counts were rechecked, the matrix adjustment tool was utilized. This tool runs an automated procedure (often referred to as Origin-Destination Matrix Estimation, or ODME) for adjusting the demand matrices of a DTA to improve the similarity between simulated volumes and traffic counts. Once this procedure was completed, the overall model strength in the AM and PM improved to be within the thresholds recommended by the software developer, representing existing 2016 traffic conditions. Speeds on the network were then compared to NPMRDS data to ensure that congestion existing in areas of the model were consistent with one another.

Development of the Future No-Build (FNB) models began with a review of the assumed land use in the MARC regional model. The study team and stakeholders identified several large developments in and around the study area that could significantly impact future traffic volumes. MARC noted that the initial MARC 2050 land use forecast was developed based on the 2010 census and that the employment control total could be underestimated. Therefore, MARC agreed to add the larger northland non-residential developments to support the PEL study as shown previously in Figure 10. Once the land use was updated, MARC ran their regional EMME travel model and provided future subarea OD matrices to the study team in order to develop future traffic volumes. Details of the traffic forecasting process can be found in the Traffic Forecasting Memo in Attachment C. In addition to vehicle demand updates, the FNB models include committed roadway projects, such as the new Buck O'Neil bridge project.

### 4.2.3 Existing 2019 and 2050 Future No-Build Traffic Results

All traffic results are presented by reporting peak hour vehicle speeds on the following mainline segments: I-29, I-35, I-29/35 and U.S.169. Results are reported for the peak direction of travel, which are southbound during the AM and northbound during the PM using National Performance Management Regional Data Set (NPMRDS), from March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM. NPMRDS is nationally collected sample location-based data from mobile phones and vehicle fleets. A Traffic Forecasting Memo was developed to provide a methodology for the projection of traffic for the 2050 planning horizon year. The Traffic Forecasting Memo was also reviewed by MoDOT at the beginning of the study. It is provided in Attachment C.

## Existing Traffic - AM Peak

## I-35 Corridor

The limits for I-35 in the analysis area are from the interchange with I-29 to just north of Pleasant Valley Road. Figure 36 below shows the results for hourly traffic average speed in the peak direction. For this segment, the average speed is approximately 25 mph lower than the posted speed of 65 mph . However, there is a large range of speed variability with speeds ranging from the posted speed to 10 mph . Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The slower speeds are due to narrow shoulder widths coupled with vehicles weaving between the closely spaced interchanges of Chouteau Trafficway, NE Antioch Road and I-29. In particular, more than 1,000 peak hour vehicles based on recent counts are taking the ramp to northbound I-29; those vehicles stack in the right lane through the NE Antioch Rd. interchange as they approach the ramp to northbound I-29. After NE Antioch Rd. and once the vehicles to northbound I-29 have exited, speeds begin to recover heading into the merge with southbound I-29.

Figure 36: Existing (2019) I-35 Southbound AM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## l-29/I-35 Corridor

The limits for the I-29/I-35 combined corridor in the analysis area are from the interchange for I29 and I-35 down to the northeast corner of the downtown loop (Independence Avenue). Figure 37 shows the results for peak hour average speed in the peak direction. At the start of this segment, speeds average near 50 mph but then deteriorate to around 30 MPH south of Route 210.

Slower speeds are due to drivers changing lanes to position for their downtown destinations including a left lane exit at The Paseo, a major split at the northeast corner of the downtown loop and other closely spaced interchanges around the loop that cause vehicles to slow for other merging and diverging vehicles. Congestion may also be due to the narrow viaducts that cause driver discomfort with the braking and weaving, especially with trucks.

Figure 37: Existing (2019) I-29 / I-35 Southbound AM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## l-29 Corridor

The limits for I-29 are from Route 45 and NW 64 ${ }^{\text {th }}$ Street to the l-35 interchange. Figure 38 shows the results for peak hour average speed in the peak direction. For this segment, the average speed is near the posted speeds of 55 mph and 65 mph . There is some speed variability with speeds dropping to 10 and 20 mph . Speed variability could be a result of nonrecurring congestion such as incidents and weather.

Closely spaced interchanges from U.S. 169 to N. Oak Trafficway and a short merge at the N. Oak Trafficway on-ramp create undesirable short weaves and vehicle slowdowns. Regardless, speeds on the majority of the corridor show nearly free-flow conditions throughout the morning peak. Approaching the merge with I-35 when NE Davidson Road merges at the same time that $\mathrm{l}-29$ reduces to a single lane, speeds are reduced slightly. There is no clear peak directional volume south of I-635 which is unique to any other freeway locations in the study area. This is because some drivers originating from I-35 to the north and traveling to destinations in Kansas use northbound I-29 as a link between southbound I-35 and southbound I-635.

Figure 38: Existing (2019) I-29 Southbound AM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## U.S. 169 Corridor

The limits for U.S. 169 extend from NW 68 ${ }^{\text {th }}$ Street to I-29. Figure 39 shows the results for peak hour average speed in the peak direction. Average speeds are approximately 10 mph below posted speeds. There is some speed variability with speeds dropping to 20 and 30 mph . Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The reduced speed is thought to be a result of the U.S. 169 connection with I-29 including the left exit with southbound I-29.

Figure 39: Existing (2019) U.S. 169 Southbound AM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## Existing Traffic - PM Peak

## I-35 Corridor

Figure 40 shows the results for peak hour average speed in the peak direction. Average speeds are approximately 30 mph below posted speeds just north of the I-29/I-35 split at Antioch Road and gradually increase in speed to the posted speed at the north end of the study corridor at I 435. There are portions of the corridor with speed variability dropping to 15 mph . Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

Inside shoulder widths around the NE Antioch Road and Chouteau Parkway interchanges are more narrow than other parts of the corridor which can naturally factor into why reduced speeds are occurring in this location. Additionally, the auxiliary lane that begins at the ramp from southbound I-29 ends at the Chouteau exit ramp, acting as a lane drop and requiring vehicles continuing north on I-35 to transition into two through lanes. issue northbound between Pleasant Valley and Route 291 that can backup beyond I-435 at times.

Figure 40: Existing (2019) I-35 Northbound PM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## I-29 / I-35 Corridor

Average speeds are approximately 25 mph below posted speeds coming out of downtown and gradually increase after the Missouri River to within 10 mph of the posted 55 mph speed, as shown in Figure 41. There are portions of the corridor with speed variability dropping to below 10 mph . Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

Slower speeds can be attributed to industrial land uses and heavy truck traffic in the area as well as steeper grades around the Front Street Interchange. The northbound section between Route 210 and the l-29/I-35 split has slower speeds due to the decision lanes and weaving around NE Parvin Road.

Figure 41: Existing (2019) I-29 / I-35 Northbound PM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## l-29 Corridor

Figure 42 shows the results for peak hour average speed in the peak direction. For this segment, the average speed is near the posted speeds of 55 mph . There is some speed variability with speeds dropping to 10 and 20 mph . Speed variability could be a result of nonrecurring congestion such as incidents and weather.

Closely spaced interchanges from U.S. 169 to N. Oak Trafficway create undesirable short weaves and vehicle slowdowns. Regardless, speeds on the majority of the corridor show nearly free-flow conditions throughout the evening peak.

Figure 42: Existing (2019) I-29 Northbound PM Peak Hour Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## U.S. 169 Corridor

Figure 43 shows the results for peak hour average speed in the peak direction. Average speeds are approximately 10 mph below posted speeds but are near posted speeds at the north end of the study corridor. There is some speed variability with speeds dropping to 15 and 20 mph . Speed variability could be a result of recurring and non-recurring congestion such as incidents and weather.

The reduced speed is thought to be a result of the U.S. 169 connection with I-29 including the left exit with southbound I-29.

Figure 43: Existing (2019) U.S. 169 NB PM Travel Speeds


Source: National Performance Management Regional Data Set (NPMRDS), March 2019, 7:00 to 8:00 AM \& 5:00 to 6:00 PM.

## Future No-Build Traffic - AM Peak

Results from the Future No-Build Dynameq AM model are still under development as of the writing of this report and will be provided in the next draft of the document.

## Future No-Build Traffic - PM Peak

Results from the Future No-Build Dynameq PM model are still under development as of the writing of this report and will be provided in the next draft of the document.

### 4.2.4 Existing and Future No-Build Traffic Conclusions

StreetLight Origin-Destination Data was collected along the I-29, I-35 and U.S. 169 corridors and used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. In the AM peak, the top three destinations for traffic on southbound I-29 was I-635, U.S. 169, and I-29/I-35. From southbound U.S. 169 north of NW 68th Street, more traffic was destined to U.S. 169 south of I-29 than anywhere else. The next biggest destinations were I-635 and I-29/I-35. Traffic on southbound I-35 was mostly destined for either I-435 or I-29/I-35. In the PM peak, the traffic on northbound I-29/I-35 was destined for $\mathrm{I}-35$ more than anywhere else, then I-29.

In addition to OD information, the StreetLight data provides details on the home and work locations of drivers on the three corridors. In general, the data indicates that many trips along the I-29/I-35 and I-29 corridors through the zones can be attributed to people living along the corridor in the study area, whereas the home locations of drivers on I-35 extend beyond the study area along l-35 to Liberty and further north to Kearney and Excelsior Springs. In addition, the data also indicates that these corridors serve a broad Kansas City regional area with home locations extending well south of the Missouri River in Missouri and into Kansas.

The work locations of weekday traffic on the I-29/I-35 and I-29 corridors is similar to that of the home locations - near the corridor within the study area. The primary work locations of vehicles on I-35 are in Liberty, with a couple of work locations in North Kansas City. Like the home locations, this data also indicates that these corridors serve a broad Kansas City regional area with work locations extending well south of the Missouri River in Missouri and into Kansas. Over 11 percent of vehicles travelling on I-29/I-35 and over 18 percent of vehicles on I-35 are heavy trucks. Existing industrial land uses adjacent to the interstate, such as the Northeast Industrial District and Claycomo Ford Plant, contribute to the higher percentages in the corridor. Traffic simulations using Dynameq software were created to replicate Existing 2016 traffic conditions within the study area. Traffic analysis results indicate that the primary locations where issues currently exist are at the following locations:

- I-29/35 northbound between The Paseo and Bedford Avenue
- I-29/35 southbound between Armour Road and Bedford Avenue
- I-35 northbound between NE Antioch Road and Chouteau Trafficway
- I-35 southbound between N Brighton Avenue and I-29

By 2050, issues within the project limits will extend to the following locations:

- I-29/35 northbound from the downtown freeway loop to Bedford Avenue
- I-29/35 southbound between Parvin Road and the downtown freeway loop
- I-35 northbound between I-29 and Chouteau Trafficway
- I-35 southbound between U.S. 69/Vivion Road and I-29
- I-29 northbound from N Oak Trafficway to U.S. 169
- I-29 southbound from upstream of Hwy 45 to I-635
- I-29 southbound between NW Waukomis Drive and N Oak Trafficway
- U.S. 169 northbound between I-29 and NW 68 ${ }^{\text {th }}$ Street
- U.S. 169 southbound approaching NW 68 ${ }^{\text {th }}$ Street


### 4.2.5 Safety Methodology

In conjunction with the traffic operational analysis, an existing and future no build crash analysis was conducted for the I-29, I-35, U.S 169 and I-635 mainlines and portions of M-152.
Additionally, all system-to-system ramps, service ramps and ramp terminal intersections along the study corridors were included in the analysis. The Safety Study Limits extend beyond the Project Limits to analyze safety concerns and crashes within areas that have a high potential to impact traffic operations and safety within the Project Limits. Figure 44 illustrates the limits of the safety analysis for this study.

Figure 44: Safety Analysis Study Limits


Source: Study Team.
The existing safety analysis was conducted using crash data, obtained from MoDOT's Data Zone, for the most current complete five-year period at the time of the analysis (2016-2020). The safety analysis includes a summary of various existing crash characteristics including crash type, crash severity and other prevailing conditions. Crash rates were calculated for the study corridors and compared to Missouri statewide crash averages for similar facilities.

### 4.2.6 Safety Segmentation Approach

Geographic Information Systems (GIS) was used to geolocate crashes within the project study limits using the crash's latitude and longitude; this information was available within the crash dataset. In GIS, the project corridors were segmented into reasonable areas for analysis. These areas were based on the following:

- Highway System-to-System Ramps: gore point to gore point of the ramp at system-tosystem interchanges
- Highway Mainline Interchange Segments: The area between ramp gore points at an interchange
- Highway Mainline Segments: The remaining area of the mainline outside of the interchange
- Ramps: From ramp gore point to gore point for system-to-system ramps and ramp gore point to ramp terminal analysis zone for service ramps
- Ramp Terminals: 500-foot zone around the center of the ramp terminal

Lengths of the segmented areas vary. For highway mainline segments exceeding two miles, the segments were cut in half to provide a smaller analysis zone. In cases where interchanges are closely spaced, shorter segment lengths were established along highway mainlines. Shorter segment lengths have the potential to skew crash rates, as they can inaccurately depict elevated crash frequencies based on the smaller sample size.

### 4.2.7 Safety Quantitative Assessment Approach

A quantitative analysis of crash characteristics within each segment was performed utilizing the data derived from the GIS analysis. Crash characteristics that were evaluated consist of the following:

- Crash Severity: Fatal, Serious Injury, Minor Injury, Property Damage Only (PDO)
- Crash Type: Head-on, Angle, Sideswipe, Single Vehicle, etc.
- Weather Conditions: No Adverse Conditions, Cloudy, Rain, Snow, Fog, etc.
- Road Conditions: Dry, Wet, Snow, Ice, Debris, Mud/Dirt/Sand, etc.

The two most serious levels of crashes (Fatal and Serious Injury) were analyzed in more detail to determine specific circumstances leading to their cause. Addressing Fatal and Serious Injury crashes have the highest potential to save lives of the traveling public.
Once crash characteristics were quantified for each segment, crash rates for all highway mainline segments were calculated. The following equation was used to determine the crash rates:

- $\quad$ Crash Rate $=($ Total Crashes $\times 100,000,000) /($ ADT $\times 365 \times$ Number of Years $\times$ Segment Length)
- ADT = Average Daily Traffic, obtained from traffic count maps or from the traffic counts used in the traffic analysis.
- Segment Length = Centerline segment length of the polygon segment measured in miles. Distances are measured in ArcGIS.

Mainline crash rates were then compared to statewide crash averages, obtained from MoDOT for similar facilities for the same time period of the safety analysis. Crash rates for the system-
to-system ramps, service ramps and ramp terminal intersections were not calculated because no statewide averages exist for comparison.

Utilizing GIS, a density heat map or hotspot analysis was conducted for each study corridor. This analysis identifies areas with high concentrations of crashes.

## Existing Safety Analysis

The project study area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Solutions for these types of crashes usually involve reducing conflict points such as merges and diverges and lowering the overall congestion of a corridor. Crashes primarily occurred during clear and dry conditions.

Overall, the safety analysis identified three specific segments of the study area corridors as areas of concern. These areas each contain a high occurrence of specific types or levels of severity of crashes. They include.

- The I-29/I-35 Combined Corridor between I-70 and the north approach of the Kit Bond Bridge: This area experienced 12 fatal or serious injury crashes during the study period, many where a vehicle overtook a slower moving vehicle.
- I-35 from the I-29/I-35 interchange to the N Brighton Avenue interchange: This segment contains all of the fatal crashes and most of the serious injury crashes along the l-35 corridor. Most of these crashes involved striking guardrails, cable barrier or concrete barriers; however, overall trends of those types of crashes were in line with crash trends for the overall corridor.
- I-29 between NW $72^{\text {nd }}$ Street and M-152: This area experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on, and out of control crashes.

Below is a high-level summary of each corridor within the project study area. A detailed existing safety analysis is included in Attachment E of this document.

## Pedestrian Involved Crashes

Pedestrian involved crashes along each highway corridor were analyzed. These crashes include ones where a pedestrian was involved in the primary incident or a secondary incident while emergency services were responding to the primary incident. Figure 45 shows the location of the pedestrian involved crashes.

Figure 45: Pedestrian Highway Mainline Involved Crashes


Source: Study Team.

Over the 5-year study period, 18 pedestrian involved crashes occurred along the highway portions of the study area. They occurred along all corridors, however a cluster of fatal crashes occurred near the NW Barry Road interchange. Two of these directly involved the pedestrian being struck on the roadway, the other had the pedestrian struck in a secondary incident. According to crash reports several involved pedestrians walking in travel lanes and failing to move out of the path of vehicles. Overall, there does not appear to be a widespread issue with pedestrian involved crashes along the highways.

## Substandard Geometric Features

Substandard geometric features (Gore Spacing, Acceleration and Deceleration Lane Length) identified in section 4.4.4 of this report were compared to crash hotspot maps for all highway corridors.

Figure 46 shows the locations of substandard gore spacing. These primarily occur along I-29 between U.S. 169 and the I-29/I-35 split, an area of high crash densities. Additionally, along the combined I-29/I-35 corridor, the on-ramps from Bedford Avenue/Levee Road have substandard spacing and sit on the edge of the crash hotspot at the southern limits of the study corridor.

Figure 46: Substandard Gore Spacing - Safety


[^5]Figure 47 shows the locations with substandard acceleration and deceleration lanes. These are all located along I-29 between U.S. 169 and the I-29/I-35 split. Five of these are located within the l-29/I-35 interchange, in an area with a high concentration of crashes.

Figure 47: Substandard Acceleration and Deceleration Lanes and Crash Density


Source: Study Team.

## I-29/I-35 Combined Corridor

Running from the northeast corner of the downtown loop to the I-29/l-35 split, this portion of the study area experienced 1,341 crashes during the study period or an average of 0.13 crashes per mile per day over the 5 -year period. The corridor is primarily comprised of low severity crashes (property damage only and minor injury) made up of single vehicle, rear end and sideswipe. Of the 1,341 crashes reported, approximately $77 \%$ of all crashes resulted in property damage only, $23 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (three crashes) resulted in a fatality. Crash types were primarily comprised of
rear end (51.5\%), sideswipe (27.1\%), and single vehicle (15.1\%). Crash rates that exceed the statewide average for an interstate are found on eight of its nine segments, with some exceeding it for both total and fatal crashes as well as combined fatal and serious injury crashes. Figure 48 shows the crash density and location of fatal and serious injury crashes in the corridor.

The area from Independence Avenue north across the Kit Bond Bridge through the Bedford Ave/Levee Rd interchange contains some of the highest crash rates along the corridor. Overall, this portion of the project area is primarily minor injury and property damage only crashes, however 17 fatal and serious injury crashes occurred during the study period. The common theme between many of these higher severity crashes was speeding or a vehicle overtaking one traveling slower.

## I-29 Corridor

The I-29 corridor stretches from the I-29/I-35 split north to the M-152 interchange, covering 12 miles. It experienced 1,463 crashes during the study period or approximately 0.1 crashes per mile per day over the 5 -year study period. In general crashes were shown to be low severity rear end, passing and out-of-control which typically indicate areas of high congestion and lower speeds. Of the 1,463 crashes reported, approximately $81 \%$ of all crashes resulted in property damage only, $18 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (nine crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of rear end (36\%), sideswipe (27\%), and single vehicle ( $26 \%$ ) collisions. Figure 48 shows the crash density and location of fatal and serious injury crashes in the corridor.

While the I-29 corridor does have portions that exceed the statewide average for interstates for total and fatal crashes, it has noticeably lower crash rates than the I-29/I-35 combined or I-35 corridors. Total crash rates north of the l-635 interchange area are well below the statewide average; the exception are fatal crash rates between NW $72^{\text {nd }}$ Street and M-152. This may be due to the overall characteristics of the roadway cross-section and lower traffic volumes. Two areas of focus were identified, from the I-29/I-35 split to I-635 and NW $72^{\text {nd }}$ Street to M152. The I-29/I-35 split to I-635 has crash rates exceeding the statewide average for interstates, but it does experience the highest levels of traffic volume. It experiences higher rates of what are considered congestion related crashes, low severity queue type crashes. The l-29 corridor from NW $72^{\text {nd }}$ Street to M-152 experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on and out-of-control crashes on the mainline.

## I-35 Corridor

An approximate 10-mile stretch of the l-35 corridor, split into 12 study segments, was evaluated from the I-29/I-35 interchange to the interchange at M-152. Between the years 2016-2020, 1,166 crashes were reported along the facility or approximately 0.1 crashes per mile per day over the 5 -year study period, which represents $24 \%$ of all crashes reported along freeways
within the project study limits. Of the 1,166 crashes reported, approximately $83 \%$ of all crashes resulted in property damage only, $16 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (four crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of rear end (41\%) and single vehicle (31\%) collisions. Figure 48 shows the crash density and location of fatal and serious injury crashes in the corridor.

Crash rates were determined to exceed statewide averages for nine of the 12 identified freeway segments along l-35. Several segments surpass two or all three crash rate categories. Segments that have surpassed statewide averages were noted to share similarities in crash severity and crash type. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

Two areas were specifically identified in the analysis as high crash locations; the I-29/I-35 interchange through the N Brighton Avenue interchange, and between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange. The I-29/l-35 interchange to N Brighton Avenue interchange portion of the corridor contains all of the fatal crashes and most of the serious injury crashes. A potential trend among those crashes involved striking guardrails, cable barrier or concrete barriers; however, the overall rate of these types of crashes was in line with the rest of the corridor. The portion of the corridor between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange was shown to have a high density of crashes but only one of the fatal or serious injury crashes. While from a severity level this area isn't a concern, the high density of lower severity, congestion type crashes should be considered with making improvements.

## U.S. 169 Corridor

An eight mile stretch of the U.S. 169 corridor was evaluated from I-29 to M-152. From 2016 through 2020, 422 crashes were reported or approximately 0.03 crashes per mile per day over the 5 -year study period. Approximately $77 \%$ of all crashes resulted in property damage only, $22 \%$ of crashes caused some form of injury to vehicle occupants, and $1 \%$ of crashes (four crashes) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of single vehicle (37\%) and rear end crashes (35\%). Figure 48 shows the crash density and location of fatal and serious injury crashes in the corridor.

In general, crashes on U.S. 169 were shown to be low severity rear end and out of control which typically indicate areas of high congestion and lower speeds. While several segments do experience crash rates that exceed statewide averages, the number of fatal and serious injury crashes is low compared to other corridors in the study. Segments that do experience fatal crash rates that exceed the statewide average each contain only one fatal crash and are of relatively short segment length ( 0.5 miles). Segments less than 1 -mile can distort crash rates.

No specific segments or concerns were identified from a crash trend standpoint along the U.S. 169 corridor with the exception of two pedestrian involved crashes around the U.S. 169 and I-29 interchange. These crashes occurred on two different portions of the interchange and no
correlation between the crashes was determined, this may require further consideration from an engineering standpoint to better deter pedestrians from accessing the freeway.

## I-635 Corridor

A four mile stretch of the I-635 corridor was evaluated from the Missouri River to the interchange at I-29. The I-635 portion of the project study area experiences lower traffic volumes than other interstate facilities within the project study area; the corridor also experiences lower rates of traffic crashes. Between the years 2016-2020, 352 crashes were reported, or approximately 0.05 crashes per mile per day during the 5 -year study period, along the facility, which represents $7 \%$ of all crashes reported along freeways within the project study limits. Of the 352 crashes reported, approximately $76 \%$ of all crashes resulted in property damage only, $23 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (one crash) resulted in a fatality. Crashes occurring along freeway segments primarily consisted of single vehicle ( $47 \%$ ) and rear end ( $20 \%$ ) crashes.

Three of the four corridor segments exceeded statewide crash averages for interstates for either total or fatal crashes. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

The hotspot analysis identified the Horizons Parkway interchange to have the highest concentration of crashes along the l-635 corridor, but these were low severity in nature. The single fatal crash along the corridor during the study period was a wrong way driver. Considering all of this, no specific trends have been identified from a safety standpoint for the I635 corridor.

## M-152 Corridor

Two segments of the M-152 corridor were evaluated along the freeway mainline at the interchanges with I-29 and U.S. 169. Between the years 2016-2020, 90 crashes were reported along the facility, which represents $2 \%$ of all crashes reported along freeways within the project study limits. Of the 90 crashes reported, approximately $77 \%$ of all crashes resulted in property damage only and roughly $23 \%$ of crashes caused some form of injury to vehicle occupants; however, no fatalities were reported.

The analyzed segments of $\mathrm{M}-152$ experienced mostly low severity primarily rear end and angle crashes. This is expected as both segments analyzed are at interchanges and contain high levels of congestion and merge/diverge movements. None exceeded the statewide crash rate for similar facilities.

## Ramps and Ramp Terminals

System-to-system ramps, service ramps, and ramp terminals were analyzed across the entire study area. In total, 49 system-to-system ramps, 84 service ramps and 40 ramp terminal
intersections were identified. 2,551 crashes occurred at these locations between the years 2016 and 2020. Of the 2,551 crashes reported, approximately $75 \%$ resulted in property damage only, $23 \%$ caused minor injury, and approximately $1 \%$ of crashes were fatal or resulted in a serious injury.

In general crashes on service ramps and ramp terminal intersections were low severity with $76 \%$ property damage only and $23 \%$ minor injury, which resulted in primarily rear end (39\%) and angle (22\%) collisions. Additionally, MoDOT has identified several ramps and ramp terminals that may require further considerations under future phases. This compiled list of ramps and ramp terminals can be seen in Table 22.

Table 22: Ramps and Ramp Terminals For Future Consideration

| Ramps and Ramp Terminals |
| :---: |
| I-29/I-35 - Independence Ave Ramp Terminal |
| I-29/I-35 - Berkley Pkwy and E Front St SPUI |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal (On Ramp) |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal |
| I-35 NB - NE Antioch Rd Ramp Terminal |
| I-35 SB - NE Antioch Rd Ramp Terminal |
| I-35 NB - N Chouteau Trfy Ramp Terminal |
| I-35 SB - N Chouteau Trfy Ramp Terminal |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal |
| I-35 NB - NW Barry Rd (M-152) Ramp Terminal |
| I-35 SB - NW Barry Rd (M-152) Ramp Terminal |
| I-29 NB - Route 45 and NW 64th St Ramp Terminal |
| I-29 SB - Route 45 and NW 64th St Ramp Terminal |
| I-29 SB - NW 72nd St Ramp Terminal |
| I-29 SB - NW Barry Rd Ramp Terminal |
| I-29 NB - NW Barry Rd Ramp Terminal |
| US 169 NB \& Barry Rd Ramp Terminal |
| US 169 NB \& Englewood Rd Ramp Terminal |

Source: MoDOT.

## Future No-Build Safety Analysis

A Highway Safety Manual (HSM) analysis of the study corridors was not completed for the future no-build scenario. The project area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Increases in traffic volumes in the future would result in more congestion in a no-build scenario and, therefore, likely more of these crash types. Areas already identified with safety concerns would likely worsen. Also, increased congestion will cause queues to extend further than they do today, potentially causing safety issues in areas not identified as problems today. As traffic operational concerns are addressed through build alternatives, more detailed analysis of the safety issues and potential future safety benefits of projects at those locations should be considered.

Figure 48: Traffic Safety-Crash Density and Fatal and Serious Injury Crashes


### 4.3 Multimodal Conditions

This section provides an overview of the existing multimodal network considerations within the study area. Multimodal considerations include the interstate and highway network, alternative transportation modes such as public transit service as well as active modes such as walking and biking. This section also addresses freight transportation.

### 4.3.1 Methodology

To understand the existing multimodal networks based within the study area, information was collected via online searches, imagery, map, GIS analyses, Google Maps, and varying plans from agencies/organizations. The information has been categorized by transportation mode throughout the following pages.

### 4.3.2 Highways and Roadways

Ranking $28^{\text {th }}$ in the nation for roadway miles per capita and carrying around 47 million vehicle miles of travel per day, the highway and roadway network in the Kansas City region are the foundation of the transportation system ${ }^{4}$.

## Functional Class

The FHWA uses a set of criteria to determine the 'functional classification' of roadways. These classes are designated based on the service a particular roadway was designed to give and are intended to summarize and report the roadway system. There are approximately 258 miles of roadway classifications represented in the study area shown in Figure 49.

[^6]Figure 49: Roadway Functional Classifications


Source: Connected KC 2050, MoDOT Functional Class System.

## National Highway System (NHS)

The NHS consists of roadways important to the nation's economy, defense, and mobility, and includes interstates, principal arterials, strategic highways, major strategic highway connectors, and intermodal connectors. This network is shown in Figure 50.

## Intelligent Transportation Systems (ITS) Infrastructure

The Highlands area of Kansas City has two major ITS infrastructures in place, Operation Green Light (OGL) and KCScout. The first of these, OGL, is an effort to improve the operational characteristics of traffic signals on major routes in the area. This is accomplished through varying methods such as signal timing coordination, communications, incident response, knowledge and resource sharing, and prompt diagnosis and dispatch for malfunctions. This system is shown on Figure 50 as the green dots and lines representing the OGL routes and intersections equipped with the system ${ }^{5}$.

In addition to OGL, KCScout is the second ITS infrastructure represented in the area. KCScout is a traffic management system designed to improve system speed by decreasing the number of rush-hour incidents and improving emergency response times to clear incidents quickly. This system is also shown in Figure $\mathbf{5 0}$ as the black dashed lines along routes equipped with the system, with KCScout message boards represented by half black half yellow circles ${ }^{6}$.
According to the information in Figure 50, there is approximately 27 miles of routes operating with OGL equipment, covering 83 intersections. KCScout covers approximately 63 miles of interstate in the region with 9 message signs.

[^7]Figure 50: Highways and ITS Infrastructure


Source: Connected KC 2050, MARC, KCScout.

## System Condition

The condition of pavement is important for the roadway network to keep functioning, as it affects drivers and freight moving through the region. According to Connected KC 2050's performance measures report, approximately 80\% of pavement was reported to be in 'Good' condition on interstates, while less than $1 \%$ of pavement was reported as being 'poor'. $52 \%$ of non-interstate pavement was reported as being in 'Good' condition while less than $1 \%$ was reported as 'Poor' condition ${ }^{7}$. This pavement condition assessment is based on the MoDOT IRI reports and limited pavement core information. it may not reflect the actual pavement structure condition. More cores will be needed in the future stage to determine the pavement condition. For more detailed analysis, please reference section 4.4 Engineering Conditions.

## Local Public Transit Service

The Kansas City Area Transportation Authority (KCATA) provides public transit service in the Kansas City portion of the northland and contracted service for Riverside, North Kansas City and Gladstone. The RideKC Streetcar line is operated by the Kansas City Streetcar Authority (KCSA). The KCATA provides both fixed-route and flex-route services. Combined, these services under the RideKC brand form the core of the study area's public transportation system. Figure 51 shows the existing local public transit service in the study area.

[^8]Figure 51: Existing Local Public Transit Services


Source: Connected KC 2050, KCATA.

The transit services operating within the study area, shown in Figure 51, are operated by KCATA and the KCSA. These services include the following routes: ${ }^{8}$

- $12^{\text {th }}$ Street
- $3^{\text {rd }}$ - Fairfax
- $9^{\text {th }}$ Street
- Boardwalk/KCI
- Cleveland-Antioch
- Front Street
- Independence
- KC Streetcar
- Main Street MAX
- Meadowbrook
- North Oak
- Northeast - Westside
- The Paseo
- Prospect MAX

The area within the northland had an average daily ridership of approximately 2,644 . To convert this to annual riders an annualization factor was calculated by dividing the total number of unlinked trips by the number of average weekday unlinked trips that the KCATA reported, 12,409,231 total riders and 40,784 average weekday ridership, to FTA for $2019{ }^{9}$. Using this calculation, KCATA's annualization factor is 304.26 , and total ridership for the northland is around 804,390 , or about $6.2 \%$ of the total ridership in 2019 of the KCATA.

## Fast and Frequent Service

There are two transit services considered to be 'Fast and Frequent', the RideKC Streetcar and the RideKC MAX bus services. Both have service frequencies of at least every 15 minutes and longer hours of operations. Frequency reduces waiting and makes connections easier. The fast and frequent services function as the 'spine' of the transit system, connecting key corridors and activity centers together and are supported by 'supporting' services such as local bus service, flex service, and others. The future fast and frequent routes are shown in Figure 52.

[^9]Figure 52: Future Fast Frequent Services


Source: Connected KC 2050, North Oak Corridor Study.

## RideKC Streetcar

The existing 2.2-mile RideKC Streetcar line operates in mixed-traffic from the River Market through downtown Kansas City to Union Station. The RideKC Streetcar has had over six million trips since its opening in 2016. A very small portion of the northernmost streetcar network, part of the loop that runs through the River Market area, is within the study area as shown in Figure 52. KCSA reported over 1 million passenger trips in $2021^{10}$. This is a substantial increase from 2020 when the total ridership was 782,556 . KCSA increased operating hours and service as the demand for ridership increased. This was also in response to the increase in activity and the workforce returning downtown.

There are currently two RideKC Streetcar extensions being implemented: a south extension from Union Station to the University of Missouri, Kansas City (UMKC), and a short Riverfront extension linking the River Market and the Berkley Riverfront area. In addition to these two extensions, there are two planning studies underway to evaluate the feasibility for future extensions: an East-West Study evaluating connections between the Kansas Medical Center and the Truman Sports Complex and a north extension across the Missouri River into North Kansas City. The KCSA is currently working with the KCATA and the City of North Kansas City to refresh the 2014 NorthRail study that evaluated the feasibility of a north extension of the RideKC Streetcar across the Missouri River. The current NorthRail Study is evaluating river crossing options (with a focus on the Heart of America Bridge), preferred alignment (Burlington vs. Swift, shown on Figure 52 as dotted lines), and stop locations including a logical northern terminus around 32nd Avenue. The study also includes a financial analysis of capital and operating costs, funding sources, and possible federal grant opportunities. The objective is to evaluate overall feasibility and reach consensus on a locally preferred alternative based on community input. This study is estimated to be complete by the end of 2022. This NorthRail extension is expected to support major elements of North Kansas City's Master Plan and provide enhanced, fast and frequent, multimodal connectivity across the Missouri River.

## Fast and Frequent Bus Service

There are currently three fast and frequent routes operating within the Kansas City region: Main MAX (of which a small portion of its loop around the River Market lies within the study area, seen in Figure 52), Troost MAX, and the Prospect MAX. MAX service incorporates features of Bus Rapid Transit (BRT) into its system and has been in operation since $2005^{6}$. KCATA reported approximately 1.1 million riders using these MAX routes in 2019 , about $8.9 \%$ of their total ridership that year ${ }^{11}$. There are plans for a future network of fast and frequent routes identified in MARC Smart Moves 3.0 (RideKC's long-term transit and mobility plan for the region). In 2019, KCATA partnered with the cities of Kansas City, North Kansas City, and

[^10]11 "Kansas City Area Transportation Authority", FTA Transit Agency Profiles, accessed August 29, 2022, https://www.transit.dot.gov/sites/fta.dot.gov/files/transit agency profile doc/2019/70005.pdf

Gladstone on the North Oak Transit Improvement Study to evaluate the feasibility of a fast and frequent route along the Burlington/North Oak corridor. The study concluded that a fast and frequent route along this corridor is warranted. The preferred fast and frequent route would run from Crown Center in Kansas City north to 3rd and Grand in the River Market then cross the Missouri River and proceed along Burlington/North Oak to Barry Road. The route will then switch to local service along Barry Road to Boardwalk Square. The service plan for the recommended enhanced North Oak service will align with KCATA's stated guidelines for fast and frequent service. The recommended service would operate from 4:45 a.m. - 12:00 a.m. Monday through Friday (weekdays), 6:15 a.m. - 11:45 p.m. on Saturdays, and 8:15 a.m. 11:45 p.m. on Sundays. Service levels would be approximately twice the current service level on Route 201 with 15-minute frequency during the weekday and 30-minute service on evenings and weekends. In addition to more frequent service, the service would include branded vehicles and highly visible stations (similar to MAX service). Two types of stations are recommended: enhanced stations with a high level of passenger amenities and improved stops (at lower volume locations) with basic amenities. The preferred route is shown in Figure 52 as the bright pink line running north/south through the middle of the study area.

## Flex

Flex services in the network pick up and drop off passengers upon request within their service area. Three flex zones exist fully or partially within the study area:

- 297 Tiffany Springs
- 298 North KC
- 299 Gladstone-Antioch

In addition, several on-demand transit options exist such as RideKC Freedom (the region's ADA paratransit service), and RideKC Microtransit, to serve riders with more limited mobility options or to provide service in limited-service areas ${ }^{6}$.

## Bike/Ped/Micro Mobility

Active mobility is increasingly becoming a popular option for resident's transportation needs. Escooters and e-bikes are examples that have been introduced in portions of the study area, with scooters becoming a mainstay in the region. E-bikes are gaining popularity due to decreasing costs and helping with getting around the varied topography in the region. North Kansas City is implementing complete street improvements that include separated bicycle facilities (also referred to as cycle tracks) and enhanced pedestrian crossings along Armour Road and Burlington Street. The improvements along Burlington will connect to the North Oak corridor complete street improvements in Kansas City north of 32 ${ }^{\text {nd }}$ Street.

The local bike system in the region, RideKC Bike, is a partnership between the KCATA, BikeWalkKC, and Drop Mobility ${ }^{12}$. This system provides an integration of public transit and shared use mobility featuring a mix of traditional bikes and e-bikes. Figure 53 shows the existing bike network and the planned future network, while Figure 54 shows what type of bike facilities make up the existing system. Current and upcoming trail and bike route improvements that are identified as Local Public Agency (LPA) projects are listed in Table 27 under Section 4.4.2 Current and Upcoming Projects.

12 "About", RideKC Bike, accessed July 12, 2022, http://ridekcbike.com/about/.

Figure 53: Existing and Planned Bike Networks


Source: Connected KC 2050.

## RideKC Bike Kiosks

RideKC's bike kiosks offer a $24 / 7$ public bike sharing system as part of RideKC Bike, offering both classic bikes and e-bikes, to ensure that all Kansas City residents have access to a healthy form of mobility. There are four locations within the study area, all but one within the City of North Kansas City:

- $29^{\text {th }} \&$ Swift
- $18^{\text {th }} \&$ Swift
- Armour \& Iron
- $3^{\text {rd }} \&$ Grand

Local Bikeways and Trails ${ }^{13}$
A multitude of trails and paths exist for pedestrians and bicyclists to use to get around the northland, shown in Figure 54. The portions of the network within the study area include numerous types of trails and paths, listed and described in Table 23.

13 "Local Bikeways and Trails (Existing)", accessed July 12, 2022, https://connectedkc.org/plandocuments/.

Figure 54: Existing Bike and Trail Networks


Source: Connected KC 2050.

Table 23: Trails Within Study Area

| Trail Type | Description | \# Of Miles Within Study Area |
| :---: | :---: | :---: |
| Cycle Tracks | Two-Way on-street paths for bicycles physically separated from vehicle traffic. | 0.9 |
| Bike Lanes | Striped lanes in the roadway for use by bicycles. May also be used by electric scooters. | 12.6 |
| Marked Bike Routes | Streets with posted signs indicating a preferred route for bicycles. | 34 |
| Marked Share the Road | Street markings depicting a bicycle with arrows ("Sharrows") or signage reminding motorists to share the road with bicycles. | 2.9 |
| Unmarked Share the Road | Roadways that do not include specific bicycle-related signage yet are open to both bicycle and motorist travel. | 0.3 |
| Pedestrian Hiking Trail | A trail within a park area for the exclusive use of runners and walkers. May be paved, or in an unpaved natural state. | 5.9 |
| Shared Use Path | A multipurpose trail intended exclusively for non-motorized users, including pedestrians and cyclists. | 55.7 |
| Mountain Bike Trails | An unpaved trail for the exclusive use of mountain biking | 0.0 |
| Equestrian Trails | A trail designed for horseback riding use that may also allow hiking and mountain biking. | 0.0 |

Source: Connected KC 2050.

## MetroGreen Trails ${ }^{14}$

MetroGreen is a system of interconnected public and private natural areas, parks, greenways, and trails linking communities throughout the Kansas City region with a total of 324 of the envisioned 1,144 miles of path currently completed. The MetroGreen Action Plan provides a vision for the continued development of this network, which can be seen in Figure 54. Portions of the MetroGreen system within the study area are quantified in Table 24 below:

[^11]Table 24: Miles in Study Area per Project Phase

| Phase | \# Of Miles Within Study <br> Area |
| :---: | :---: |
| Existing | 16.8 |
| Planned - Phase 1 | 1.1 |
| Planned - Phase 3 | 21.9 |

Source: Connected KC 2050.

## Sidewalk System

Sidewalks are the major infrastructure component for pedestrian access to the region, and thus poor sidewalk coverage is a major barrier for pedestrian activity. In addition, it causes problems in pedestrian access to transit services, or the 'first/last mile' problem. This can be seen in the North Oak Transit Study which noted that over $90 \%$ of those that rode the North Oak bus route accessed it by walking to a stop ${ }^{15}$, showing that pedestrian access is important for transit use. Unfortunately, a good portion of the neighborhoods surrounding the North Oak corridor lack continuous sidewalks. Fortunately, there have been recent investments along the North Oak corridor in Kansas City from the North Kansas City limits at $32^{\text {nd }}$ Street to N. Indianola Avenue with new sidewalks, bicycle facilities and new bus stops. These improvements connect to the recently expanded Briarcliff Nature Trail.

The sidewalk system within the study area, shown in Figure 55, is filled with gaps and does not fully cover the pedestrian network (Note: that sidewalk data for Gladstone is not available). Based on GIS data from KCMO, Table 25 shows roads that intersect with I-29, I-35 and U.S. 169 and how many, if any, sidewalks that exist from 0 being none to 2 representing sidewalks present on both sides of the road crossing the corridor. Note that even though some of these roads may have sidewalks, gaps are still present in many of these networks. For example, Guinotte Avenue may have sidewalks on both sides of the street, but they are not continuous and have many gaps in between sections.

15 "Connecting the Northland", North Oak Corridor Transit Study, accessed August 30, 2022, https://ridekc.org/assets/uploads/documents/NorthOak Report 20191018 Final.pdf

Figure 55: Sidewalks


Source: Connected KC 2050; KCMO.
The sidewalk system within the study area, shown in Figure 55, is filled with gaps and does not fully cover the pedestrian network (Note that sidewalk data for Gladstone is not available). Based on GIS data from KCMO, Table 25 shows roads that intersect with I-29, I-35 and U.S. 169 and how many, if any, sidewalks that exist from 0 being none to 2 representing sidewalks present on both sides of the road crossing the corridor. Note that even though some of these roads may have sidewalks, gaps are still present in many of these networks. For example, Guinotte Avenue may have sidewalks on both sides of the street, but they are not continuous
and have many gaps in between sections. Another example is the sidewalks at the bridge on N Brighton Avenue do not extend within MoDOT right of way from ramp to ramp.

Table 25: Existing Sidewalks on Streets Crossing I-29, I-35 and U.S. 169 within the Project Limits

| Road Name | \# Of Sidewalks |
| :---: | :---: |
| I-29 Corridor |  |
| NW 64th St. | 1 |
| NW Roanridge Rd./NW 56th St. | $2^{\text {a }}$ |
| NW Waukomis Dr. | $2^{\text {b }}$ |
| N Oak Trfwy. | 0 |
| NE Davidson Rd. | 0 |
| I-35 Corridor |  |
| N Bryant St. | $2^{\text {c }}$ |
| NE Poe St. | 2 |
| NE Vivion Rd. | 0 |
| N Brighton Ave. | 2 |
| N Chouteau Pkwy. | 1 |
| NE Antioch Rd./Route 1 | $0^{\text {d }}$ |
| U.S. 169 Corridor |  |
| NW 68th St. | 2 |
| NW Englewood Rd. | 2 |
| I-29/35 Corridor |  |
| NE Parvin Rd. | 0 |
| Route 210 (Armour Road) | 2 |
| E 16th Ave. | 0 |
| Bedford Ave. | 0 |
| Levee Rd. | 0 |
| Berkley Pkwy. | 0 |
| Guinotte Ave. | 2 |
| Dora St. | 0 |
| Independence Ave. | 2 |

Source: Connected KC 2050, 2022; KCMO, 2022.
a - Active bridge replacement project added sidewalk with connectivity to two bus stops.
b-Active bridge replacement project includes sidewalk/shared use path at interchange.
c-Bryant Bridge has sidewalks planned on both sides. The job is in scoping and the replacement would replace them.
d-KCMO job programmed that should add sidewalk on south side.

Connectivity across the highways and expressways is another challenge in the northland. Table 25 shows that of the 22 roads that intersect with the highways/expressways of the project area, 12 ( $55 \%$ ) have at least one sidewalk connections that cross over or under the highways. Highways and expressways have traditionally been barriers to pedestrian and bicycle access, so it is imperative that these connections exist for pedestrians and cyclists to get to safely cross under or over these facilities and to wherever they need to go.

## Planned Transit Network

As part of the Connected KC 2050 plan, there are several components in place to advance public and active transit in the northland, seen in Figure 56. These range from sidewalk and bike lane implementation projects to complete street designs, as well as the implementation of mobility hubs and electric vehicle charging stations.

Covered in the Smart Moves 3.0 plan RideKC plans to implement several of these mobility hubs throughout the region ${ }^{16}$. These mobility hubs would be centered in community hot spots where a variety of transit services can come together, where you could potentially switch from bike to bus, bus to streetcar, rent a car or bike, hail a ride, meet a vanpool, or charge an electric vehicle to name a few options. There are nine of these hubs, shown in Figure 56, that will fall within the boundaries of the study area, one of which falls within the project limits (marked with a *):

- $3^{\text {rd }}$ and Grand
- Antioch Center
- Boardwalk Square
- Gladstone
- KCU
- Liberty/Connister Commuter Lot
- Metro North
- North Kansas City
- North Oak and Vivion*

16 "RideKC Smart Moves", KC Smart Moves, accessed July 13, 2022, http://www.kcsmartmoves.org/.

Figure 56: Planned Transit and Bike/Ped Network


Source: Connected KC 2050.

## Aviation

The northland is home to the Kansas City International Airport ( KCl ) and the Charles B. Wheeler Downtown Airport (Downtown Airport). Both facilities are managed by the KCMO Aviation Department. The Kansas City Airport System is an Enterprise Fund Department of KCMO and is supported wholly by airport user charges. KCl generates a significant amount of traffic for commercial flight operations in terms of arrivals and departures as well as air cargo.

Additionally, there is a significant amount of development on the $\mathrm{I}-29$ corridor south of KCI . KCl spans more than 10,000 acres, three terminals, and three runways that can accommodate up to 139 aircraft operations per hour. The KCMO Aviation Department reports that 7,667,004 passengers traveled through KCl in 2021, up 70.8 percent from 2020 and down 34.9 percent from 2019 before the pandemic. Air cargo tonnages, which consist of both freight and mail transported by air, for all carriers at KCl were up 36.2 percent in December with a total of 26.1 million pounds handled. For 2021, 245.8 million pounds of air cargo were handled, up 24.0 percent. Air freight handled at KCl during December amounted to 25.9 million pounds, up 36.0 percent year-over-year. For all of 2021, air freight was up 24.7 percent with a total of 243.7 million pounds handled. Air mail for December was up 68.9 percent from December 2020 with 252,621 pounds handled. Air mail for 2021 was down 26.5 percent from 2020 with 2.1 million pounds handled. A new single terminal is currently under construction and will open in the Spring of 2023. The new single terminal KCl will have 39 gates and will include a 6,300 -spot parking garage, enhanced food and beverage options and amenities.

The Downtown Airport spans approximately 695 acres and is located just across the Missouri River from KCMO's downtown core and serves 700 flights per day. Originally home to commercial aviation, the airport now attracts many corporate, charter and recreational flyers. The airport also serves a critical health need as it is the primary location where organ transports are handled in Kansas City. It is also where many critical care transports, such as those that need transported via helicopter from airport to Children's Mercy (neonatal) after they are flown in by plane. Fixed-base operators service nearly 300 based aircraft, as well as itinerant and charter aircraft, offering fuel, full maintenance, aircraft rentals, sales, and flight training.

There is one airport located within the study area, the Charles B. Wheeler Downtown Airport, in addition to two heliports, shown in Figure 57. There are many helipads in the study area that are now shown.

Charles B. Wheeler Downtown (MKC) ${ }^{17}$ serves as the primary alternative to the Kansas City International Airport (MCI) for larger general aviation and business jets. The airport is a cityowned, public-use airport serving Kansas City, Missouri and can accommodate up to 700 aircraft per day. The airport is open 24 hours a day.

17 "Charles B. Wheeler Downtown Airport", flymkc, accessed June 23, 2022, https://www.flymkc.com/.

Figure 57: Regional Aviation Facilities


Source: Connected KC 2050.

Future numbers of aircraft based at MKC are expected to increase by $11 \%$ to 237 aircraft, with an expected annual operations increase of $22 \%$ to 85,600 flights by $2035^{18}$.
The two heliports belong to the North Patrol Division Station and the North Kansas City Hospital.

## Rail

While the Kansas City region is connected to passenger rail service, there are no stations or passenger rail located within the study area. Instead, there exists a portion of Kansas City's freight rail network.

There are approximately 36.1 miles of freight rail tracks in the area as seen in Figure $58{ }^{19}$. These rails are owned by two railroad companies along with a privately owned company:

- BNSF
- NS
- National Starch

18 "Charles B Wheeler Downtown Airport", MARC, accessed July 19, 2022,
https://www.marc2.org/assets/transportation/RASP/DowntownCharlesBWheeler/MARC SystemPlanSum mary MKC.pdf
19 "Railroads", Connected KC 2050, accessed June 22, 2022, https://connectedkc.org/plan-documents/.

Figure 58: Rail Network


Source: Connected KC 2050.

## $\underline{\text { Rail Yards }}$

In addition to the freight rail tracks, there are two freight rail yards shown in Figure 58 within the study area ${ }^{20}$ :

- North Kansas City Yard
- Murray Yard


## Freight

Historically, much of the growth of Kansas City has come from its position as a major freight hub in the Midwest. Kansas City ranks as the second largest rail center in the nation and is among the top five trucking centers in the nation. Additionally, KCl is one of the most important airfreight hubs in the immediate region.

In 2019 the Kansas City area handled almost 214 million tons of freight cargo from varying modes. By 2045, this is expected to increase to nearly 300 million tons of cargo. Top commodities coming into the area included motorized vehicles, electronics, mixed freight, foodstuffs, and machinery. Top commodities leaving the area included machinery, pharmaceuticals, chemical products, electronics, and foodstuffs ${ }^{21}$.

According to the Connected KC 2050 Plan's Freight section, there are 5 key trends in freight transportation moving into the future ${ }^{22}$ :

1. Increasing demand from e-markets results in the need for smaller warehouses closer to dense population centers.
2. Increasing technological advances in the sharing economy, internet and data, ondemand logistics (like 3D printing), autonomous equipment and vehicles, and alternative fuels for freight transportation fleets.
3. Degrading infrastructure quality across the nation.
4. Changes in safety regulations.
5. Continued globalization of economy.

Figure 59 shows the freight activity areas, bottlenecks, and freight related companies in the study area.

[^12]Figure 59: Freight Related Transportation


Source: Connected KC 2050.

## Freight Activity Areas

Freight activity areas are based primarily on their land use, acreage, and some small adjustments then made based on employment. These areas must meet one of two requirements to be recognized as a freight activity area ${ }^{23}$ :

- Have at least 250 acres of freight related land use, including proposed vacant / agricultural-related land use; and
- If there is less than 250 acres, then the area would be required to have over 3,000 manufacturing jobs.

According to the MARC freight map, the study area has six freight activity areas (note that some are only partially within the study area, marked by a *):

- North Kansas City
- Executive Park*
- Horizons*
- Claycomo Ford* - (Recently added 1,100 jobs to assist in electric vehicle production.)
- Hunt Midwest*
- KCI / Air Cargo \& Industrial*


## Freight Bottlenecks

According to FHWA, a freight bottleneck is defined as "a period of five minutes or more when a segment experienced reported speeds of below $60 \%$ of the reference speed (the $85^{\text {th }}$ percentile of all observed speeds for all time periods)" ${ }^{24}$. The study area has three freight bottlenecks according to the MARC freight map:

- U.S. 169 S north of I-70
- I-29/I-35 between Route 210 (Armour Road) and Independence Avenue
- M-210 west of I-435

[^13]
## Freight Related Companies

Many companies and industries within the study area deal with freight. According to the data within Connected KC 2050, there were 33 industries/companies among six designated industry fields within the study area ${ }^{25}$.

Manufacturing:

- Bunzl Processor Div.
- Claycomo Ford Plant
- Hershey Co.
- Ingredion Inc.
- International Paper Co.
- KCI Inc.
- McConnel \& Assoc.
- Midwest Apparel Group Inc.
- Pioneer Container Corp.
- Pizza Blends Inc.
- Polynt Composites USA Inc. (Two locations)

Regal Plastic Supply Co.

- Tnemec Co. Inc.
- Waldinger Corp.
- Walker Food Products Co.

Retail Trade:

- Sam's Club (Two locations)

Transportation and Warehousing:

- Consolidated Transfer Co. Inc.
- Liquid Transport
- R+L Carriers
- Signature Flight Support
- Terminal Consolidation
- Wagner Industries

Wholesale Trade:

- Brand Energy \& Infrastructure
- Faurecia Automotive
- Ferrellgas

25 "Freight Related Companies", Connected KC 2050, accessed July 13, 2022,
https://connectedkc.org/plan-documents/.

- Gavilon Grain LLC
- Joseph T \& Son Inc.
- Laufer Group Intl.
- Major Brands Inc.
- Midwest Medical Resources Inc.
- SYGMA Network Inc.


## Truck Parking / Rest Areas

Truck parking and rest areas offer amenities and rest to freight drivers moving through the region. It was mentioned in the Connected KC 2050 plan that one of the challenges for future expected amounts of truck freight in the region was truck parking. There are two of these facilities within the study area, shown in Figure 59, based on data from the MARC freight map:

- North Kansas City
- Pleasant Valley


### 4.4 Engineering Conditions

### 4.4.1 Methodology

In order to identify aging and substandard infrastructure within the identified project area, information was collected using Google Earth, MoDOT's Automatic Road Analyzer (ARAN) Viewer, Statewide Transportation Improvement Program (STIP) projects from 2023 to 2027, Local Public Agency (LPA) projects from 2023 to 2024, and MoDOT Bridge Inventory data. Existing conditions and deficiencies identified through the analysis are not formal engineering assessments and will require further engineering inspection and analysis.

### 4.4.2 Current and Upcoming Projects

Recent projects and ones posting in the near future were analyzed using the Missouri 20232027 STIP and the 2023-2024 LPA project lists provided by MoDOT. Roadway, bridge, and intersection improvement projects in the study area were catalogued and mapped in Figure 60, refer to Table 26 and Table 27 for further information about the projects shown.

Figure 60: MoDOT STIP (2023-2027) and Major LPA (2023-2024) Projects


Source: MoDOT 2021-2027 STIP Projects and 2014-2024 LPA Projects, 2022.

Table 26: MoDOT STIP Projects 2023-2027 within the Study Area

| Project Number | County | Route | Description / Location | Letting Date |
| :---: | :---: | :---: | :---: | :---: |
| KU0017 | Platte | I-29 S | Pavement resurfacing from 0.8 mile south of Mexico Avenue to Rte. 69. | 8/1/2024 |
| KU0073 | Clay | $\mathrm{I}-35 \mathrm{~N}$ | Pavement and shoulder resurfacing from bridge over Pleasant Valley Rd. to the I-29/I-35 split. Includes ramps at NE Antioch Road, Chouteau Trafficway, Winn Road and Rte. 69. | 9/1/2024 |
| KU0059 | Clay | I-29 S | Pavement resurfacing from 0.2 mile north of NE Parvin Rd. to Rte. 210. | 11/1/2024 |
| KU0060 | Clay | I-35 S | Pavement resurfacing from 1.6 miles north of $128^{\text {th }}$ Street to Pleasant Valley Rd. | 10/1/2024 |
| KU0064 | Clay | $\begin{aligned} & \text { U.S. } \\ & 169 \text { S } \end{aligned}$ | Pavement resurfacing from I-29 to the Buck O'Neil Bridge. | 10/1/2025 |
| KU0225 | Clay | Ramp I-29S to I-35N N | Bridge rehabilitation over I-35, 0.2 mile south of NE Davidson Rd. and 0.5 mile west of Rte. 1. | 11/1/2026 |
| KU0123 | Clay | CST Bryant St. N | Bridge rehabilitation over I-35, 0.3 mile east of Poe Street and 0.5 mile west of I-435. | 1/1/2027 |
| KU0061 | Clay | I-29 S | Bridge replacement over NE Parvin Rd. 0.7 mile south of Rte. 1 and 1.5 miles north of Rte. 210. | 2/1/2027 |
| 413450 | Platte | $\mathrm{I}-29 \mathrm{~N}$ | Bridge replacement over NW 72nd Street. | 1/20/2023 |
| 413458 | Clay | I-29 S | Bridge replacement over Guinotte Avenue 0.4 mile south of Missouri River and 0.7 mile north of Rte. 24 and over Bedford Ave. 1 mile south of Rte. 210 and 0.5 mile north of Missouri River. | 5/1/2028 |
| KU0099 | Clay | U.S. 169 N | NB Bridge replacement over BNSF Railway 2.7 miles north of Harlem Road and 0.6 mile south of Rte. 9. | 10/1/2025 |

Source: MoDOT 2021-2027 STIP Projects, 2022.

Other LPA projects such as improvements to minor-local roads, trail improvements and bikeroutes within the study area were listed in Table 27.

Table 27: Other LPA Projects 2023-2024 within the Study Area

| Federal Aid Project <br> Number | County | Project Description/Location | Project <br> Status | FFY |
| :---: | :---: | :---: | :---: | :---: |
| STBG- 3323(414) | Clay | Downtown Gladstone North Oak <br> Complete Street | PE | 2023 |
| STBG-3392(407) | Clay | Traffic Signal at 291 and Blue Jay <br> Drive | PE | 2023 |
| TAP-3323(415) | Clay | Vivion Road Trail Extension - <br> From Mulberry Road to N. <br> Belleview. | PE | 2024 |
| STBG-3302 (427) | Clay | Burlington Corridor Phase 3 | PE | 2024 |

Source: MoDOT 2014-2024 LPA Projects, 2022.

### 4.4.3 Existing Pavement Conditions

The existing pavement conditions for I-29, I-35 and U.S. 169 were determined using MoDOT's Automatic Road Analyzer (ARAN). The information and analysis were summarized in Figure 61. MoDOT uses the Pavement Surface Evaluation and Rating (PASER) to evaluate the existing pavement conditions. PASER has a rating from 1 to 10 , with 10 being excellent condition or new pavement, and 1 being failed or needs total reconstruction. In Figure 61, excellent pavement was considered for the sections with a PASER rating of 9-10, good/fair pavement was considered for the sections with a 6-8 rating, and poor pavement was considered for sections with a rating less than 6.

Figure 61: Existing Pavement Conditions Map


Source: MoDOT ARAN Viewer, 2022.

### 4.4.4 Geometric Deficiencies

Geometric deficiencies were identified by using Google Earth, posted speed limits, field visits, and AASHTO's A Policy on Geometric Design of Highways and Streets, "Greenbook", $7^{\text {th }}$ Edition, 2018. Substandard acceleration and deceleration lanes, insufficient gore spacing, deficiencies due to interchange geometry, and sight distance issues are listed in this section.

## Shoulder Widths

Table 28 lists shoulder widths in each major corridor within the study area. Per AASHTO's $A$ Policy on Design Standards - Interstate System, on interstates, outside shoulders less than 10' wide and inside shoulders less than 4 ' wide are considered narrow. On sections where interstates have three or more lanes, inside shoulders less than 10' wide are considered narrow as well.

Table 28: Shoulder Widths within the Study Area

| Location | Right Shoulder Width | Left Shoulder Width |
| :---: | :---: | :---: |
| NB I-35 |  |  |
| Independence Ave. - The Paseo on gore | 10 | 10 |
| The Paseo on gore - Front St off gore | 5 | 5 |
| Front St. - Bedford Ave. | 10 | 10 |
| Bedford Ave. - E 14th Ave | 5 | 5 |
| E 14th Ave. - Armour Rd. | 10 | 10 |
| Armour Rd. - Parvin Interchange Median | 10 | 12 |
| Parvin Interchange Median - NB I-29 exit | 10 | 6 |
| NB I-29 exit - NE Antioch Rd. bridge | 10 | 6 |
| NE Antioch Rd. Bridge | 6 | 4 |
| Antioch on gore - N Brighton Ave. | 10 | 2 |
| N Brighton Ave. - NE Vivion Rd. ramp to l-35 SB | 10 | 2 |
| NE Vivion Rd. ramp to l-35 SB - NE Vivion Rd. Bridge | 11 | 4 |
| NE Vivion Rd. Bridge - Vivion on gore | 10 | 12 |
| Vivion on gore - MM 12.2 | 6 | 6 |
| MM 12.2-Exit 13 | 6 | 4 |
| SB I-35 |  |  |
| End of Pleasant Valley Rd. Ramp to l-35 S - MM 13.6 | 8 | 6 |
| MM 13.6-MM 13.2 | 8 | 4 |
| MM 13.2-N Bryant St. | 12 | 4 |
| N Bryant St. - Poe St. | 6 | 6 |
| Poe St. - MM 11.6 | 6 | 6 |
| MM 11.6-Exit 11 | 6 | 6 |
| Exit 11 - NE Vivion Rd. ramp to l-35 S | 10 | 0 |
| NE Vivion Rd. ramp to l-35 S - Chouteau Trfwy Ramp to I-35 S | 10 | 2 |
| Chouteau Trfwy Ramp to I-35 S - NE Antioch Rd. | 8 | 2 |
| NE Antioch Rd. - I-29/I-35 Merge | 12 | 8 |
| I-29/I-35 Merge - NE Parvin Rd. | 12 | 6 |
| NE Parvin Rd. - end of NE Parvin Rd. Ramp to l-35 S | 10 | 6 |
| end of NE Parvin Rd. Ramp to l-35 S - MM 7.0 | 10 | 15 |
| MM 7.0-Exit 6 | 10 | 15 |
| Exit 6 - Armour Rd. ramp to l-35 S | 10 | 15 |
| Armour Rd. ramp to l-35 S - MM 6.2 | 7 | 10 |
| MM 6.2 - Linn St. ramp to I-35 S | 10 | 10 |


| Linn St. Ramp - Exit 5 | 6 | 4 |
| :---: | :---: | :---: |
| Levee Rd. - Missouri River Bridge | 8 | 10 |
| Missouri River Bridge | 10 | 11 |
| E Front St. - Dora St. | 6 | 3 |
| Dora Street - Exit 4A | 10 | 8 |
| Exit 4A - Independence Ave. | 11 | 11 |
| NB I-29 |  |  |
| Exit 8B (I-29 North) - Exit 1A | 8 | 8 |
| Exit 1A - l-35 S ramp to l-29 N | 10 | 6 |
| I-35 S ramp to l-29 N - NE Davidson Rd. | 8 | 6 |
| NE Davidson Rd. - end of NE Davidson ramp to l-29 North | 10 | 6 |
| end of NE Davidson ramp to I-29 North - MM 1.2 | 12 | 3 |
| MM 1.2-N Oak Trfwy. | 10 | 4 |
| N Oak Trafficway - Exit 2A | Minimum 6 | Minimum 4 |
| Exit 2A - US 169 S Overpass | 10 | 4 |
| US 169 S Overpass - US 169 (N \& S) ramp to I-29 N | 12 | 8 |
| US 169 (N \& S) ramp to I-29 N - MM 2.8 | 12 | 12 |
| MM 2.8-MM 3.2 | 12 | 8 |
| MM 3.2 - NW Waukomis Dr. Overpass | 10 | 8 |
| NW Waukomis Drive Overpass - MM 3.6 | 10 | 10 |
| MM 3.6-I-29/I-635 S split | 10 | 10 |
| I-29/l-635 S split - I-635 ramp to I-29 N | 8 | 8 |
| I-635 ramp to I-29 N - MM 4.4 | 8 | 6 |
| Exit 4 - State Rt. 45 | 10 | 8 |
| SB I-29 |  |  |
| State Rt 45 - NW Prairie View Rd ramp to l-29 S | Minimum 8 | Minimum 7 |
| NW Prairie View Rd. ramp to I-29 S - Exit 3B | 8 | 6 |
| Exit 3B - Exit 3C | Minimum 4 | Minimum 4 |
| Exit 3C - N Oak Trfwy. | Minimum 8 | Minimum 8 |
| N Oak Trfwy. - MM 0.4 | Minimum 4 | Minimum 2.5 |
| MM 0.4-1-35 Merge | Minimum 8 | Minimum 8 |
| NB U.S. 169 |  |  |
| NW Vivion Rd. Exit Gore - I-29 N Exit | 10 | 8 |
| I-29 N Exit l-29 N Overpass | Minimum 4 | Minimum 4 |
| (Under) l-29 N Overpass | Minimum 2 | Minimum 1 |
| I-29 N Overpass - NW Englewood Rd. Exit | 10 | Minimum 2.5 |
| NW Englewood Rd. Exit - NW Englewood ramp to US 169 N | Minimum 8 | 6 |
| NW Englewood ramp to US 169 N - NW 68th St. Exit | 10 | 6 |
| NW 68th St. Exit - NW Barry Rd. | 10 | Minimum 4 |
| NW Barry Road - Rt. 152 Interchange | Minimum 4 | Minimum 8 |
| (Within) Rt. 152 Interchange | Minimum 6 | Minimum 6 |
| NW 96th St Interchange | 10 | 8 |
| SB U.S. 169 |  |  |
| NW 96th St Interchange | Minimum 8 | Minimum 6 |
| Rt. 152 Interchange | Minimum 8 | Minimum 5 |
| Rt. 152 Interchange - NW Barry Rd. Interchange | 8 | 6 |
| (Within) NW Barry Rd. Interchange | 9 | Minimum 4 |


| NW Barry Rd. Interchange - NW 68th St. | 10 | 9 |
| :--- | :---: | :---: |
| NW 68th St. Exit - NW 68th St. ramp to US 169 S | Minimum 8 | Minimum 6 |
| NW 68th St. ramp to US 169 S - NW Englewood Rd. Exit | Minimum 8 | Minimum 6 |
| NW Englewood Rd. Exit - NW Englewood Rd. ramp to US 169 S | Minimum 8 | Minimum 6 |
| NW Englewood Rd. ramp to US 169 S - I-29 | Minimum 6 | Minimum 6 |
| I-29 - NW Vivion Rd. On Ramp | Minimum 4 | Minimum 4 |

## Acceleration and Deceleration Lanes

Figure 62 shows the location of substandard acceleration and deceleration lanes identified within the study area. Refer to Table 29, and Table 30 for further information on deficiencies in acceleration lanes and deceleration lanes, respectively.

Figure 62: Substandard Acceleration and Deceleration Lanes


Source: Study Team analysis using Google Earth.

Table 29: Substandard Acceleration Lanes

| ID | Location | Direction | Ramp | Lane Design | Posted Ramp Speed | Posted HWY Speed | Existing Length | AASHTO Minimum Recommended Lane Length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AL 1 | I-29 | NB | On-ramp from NW Vivion Rd. to NB I-29 | Parallel | 25 mph | 55 mph | 150 ft | 780 ft |
| AL 2 | I-29 | NB | On-Ramp from N Oak Trfwy. to NB I-29 | Parallel | 25 mph | 55 mph | 120 ft | 810 ft |
| AL 3 | I-29 | NB | On-Ramp from NE Davidson Rd. to NB I29 | Parallel | 45 mph | 55 mph | 150 ft | 432 ft |
| AL 4 | I-29 | NB | On-ramp from NE Parvin Rd. to NB I-29 | Parallel | 20 mph | 55 mph | 80 ft | 810 ft |
| AL 5 | I-35 | NB | On-ramp from NE Antioch Rd. to NB I35 | Parallel | 45 mph | 65 mph | 60 ft | 600 ft |

Source: Google Earth, 2022 and AASHTO Greenbook.
Table 30: Substandard Deceleration Lanes

| ID | Location | Direction | Ramp | Lane <br> Design | Posted <br> Ramp <br> Speed | Posted <br> HWY <br> Speed | Existing <br> Length | AASHTO <br> Minimum <br> Recommended <br> Lane Length |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DL 1 | I-35 | SB | Off-ramp from SB I-35 <br> to NE Parvin Rd. | Parallel | 20 <br> mph | 55 mph | 200 ft | 440 ft |
| DL 2 | I-35 | NB | Off-ramp from NB I-35 <br> to NE Antioch Rd. | Tangent | 30 <br> mph | 65 mph | 0 ft | 470 ft |

Source: Google Earth, 2022 and AASHTO Greenbook.

## Gore Spacing

Figure 63 shows the location of substandard gore spacings identified withing the study area.
Refer to Table 31 for further information on gore spacing deficiencies.

Figure 63: Substandard Gore Spacing


Source: Study Team analysis using Google Earth, 2022.

Table 31: Substandard Gore Spacing

| Identifier | Location | Direction | Ramps | Existing Gore Spacing | AASHTO Minimum Recommended Ramp Spacing |
| :---: | :---: | :---: | :---: | :---: | :---: |
| GS 1 | I-29 | NB | On-ramp from WB Vivion Rd. to NB I-29 -Off-ramp from NB I-29 to NB U.S. 169 | 450 ft | 2000 ft |
| GS 2 | I-29 | SB | On-ramp from EB Vivion Rd. to SB I-29 -Off-ramp from SB I-29 to SB N Oak Trfwy. | 400 ft | 1600 ft |
| GS 3 | I-29 | SB | On-ramp from SB N Oak Trfwy. to SB I-29 -Off-ramp from SB I-29 to NB N Oak Trfwy. | 890 ft | 1500 ft |
| GS 4 | I-35 | SB | On-Ramp from SB NE Antioch Rd. to SB I-35 - Off-ramp from SB I35 to NB I-29 | 380 ft | 2000 ft |
| GS 5 | U.S. 169 | SB | On-ramp from NW Vivion Rd. (U.S. 69) to SB U.S. 169 - Off-ramp from SB U.S. 169 to NW Briarcliff Pkwy | 1350 ft | 1600 ft |
| GS 6 | I-35 | NB | On-ramp from Levee Rd. and off-ramp from NB I-29 - On-ramp from tangent section to NB I-29 | 375 ft | 1000 ft |
| GS 7 | I-35 | SB | On-ramp from Bedford Ave. and off-ramp from SB I-29 - On-ramp from tangent section to SB I-29 | 370 ft | 1000 ft |
| GS 8 | I-29 | SB | Off-ramp from SB I-29 to NB I-35 - Off-ramp from SB I-29 to NE Davidson RD. | 500 ft | 1000 ft |

Source: Google Earth, 2022 and AASHTO Greenbook.

### 4.4.5 Interchange Geometry Deficiencies

Table 32 lists all the interchanges analyzed withing the study area and identifies interchanges with missing movements, with left exits or entrances, and whether the interchange is located within one mile of another interchange. The following section also identifies geometric deficiencies not shown in Table 32 at interchanges in the project limits.

Table 32: Interchange Geometry Deficiencies

| Interchange | Type | Full or Partial | Missing Movements | Missing Movements Description | Less than 1 Mile to Other Interchange | Left Exits or Entrances |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29 at Route 45 (NW 64th St.) | Diamond | Full | - | - | - | - |
| $\begin{aligned} & \text { I-29 at NW } \\ & 56 \text { th St. } \end{aligned}$ | Atypical | Partial | X | From NW 56th St to I29 N , from I29 S to NW 56th St | X | X |
| I-29 at I-635 | Directional | Full | - | - | - | - |
| I-29 at NW Gateway Ave. | Directional | Partial | X | From NB I-29 to NW <br> Gateway Ave. | - | - |
| I-29 at NW <br> Waukomis Dr. <br> (Route AA) | Half Diamond | Partial | X | From NW Waukomis Dr. to NBI29, from SB I29 to NW Waukomis Dr. | X | - |
| I-29 at U.S. 169 | Directional with Loop Ramp | Partial | X | From NB I-29 to SB U.S. 169, from NB U.S. 169 to SB I-29 | X | X |
| I-29 at U.S. 69 <br> (NW Vivion Rd.) | Partial <br> Cloverleaf / <br> Diamond <br> Combination | Partial | X | From WB U.S. 69 to SB I-29 | X | - |
| I-29 at N Oak Trafficway | Partial Cloverleaf | Partial | X | From NB I-29 to SB N Oak Trfwy, from SB N Oak Trfwy to NB I29 | X | - |
| I-29 at NE Davidson Rd. | Diamond | Full | - | - | X | - |
| I-29 at l-35 | Directional | Full | - | - | X | X |
| $\mathrm{I}-29 / \mathrm{I}-35 \text { at } \mathrm{NE}$ Parvin Rd. | Folded Diamond | Full | - | - | X | - |
| I-29/I-35 at Route <br> 210 (Armour Rd.) | Partial <br> Cloverleaf / <br> Diamond | Full | - | - | X | - |


| Interchange | Type | Full or <br> Partial | Missing Movements | Missing Movements Description | Less than 1 Mile to Other Interchange | Left Exits or Entrances |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Combination |  |  |  |  |  |
| I-29/I-35 at Diamond Pkwy and E 16th Ave. | Half Diamond | Partial | X | From E 16th Ave. to NB I-29/I-35, from SB I-29/I-35 to E 16th Ave. | X | - |
| I-29/I-35 at Bedford Ave/Levee Rd. | Full Diamond with Slip Ramps | Full | - | - | X | - |
| I-29/I-35 at Berkley Pkwy and E Front St. | Single Point Urban Interchange (SPUI) | Full | - | - | X | - |
| I-29/I-35 at The Paseo | Directional | Partial | X | From NB The Paseo to SB I-35, from NB I-35 to SB The Paseo | X | X |
| I-29/I-35 at Independence Ave | Atypical | Partial | X |  |  |  |
| $\begin{aligned} & \text { I-29/I-35 at I-70/I- } \\ & 35 \end{aligned}$ | Directional | Full | - | - | X | - |
| I-35 at Route 1 (NE Antioch Rd.) | Diamond | Full | - | - | X | - |
| I-35 at N Chouteau Parkway | Diamond | Full | - | - | X | - |
| I-35 at N Brighton Ave. | Half Diamond with Slip Ramp | Partial | X | From N Brighton Ave to NB I-35, from SB I-35 to N Brighton Ave | X | - |
| I-35 at U.S. 69 (NE Vivion Rd.) | Atypical | Partial | X | From NB I-35 to WB U.S. 69 | X | X |
| I-35 at l-435 | Directional | Partial | X | From SB I-35 to NB I-435 | X | X |
| I-435 at U.S. 69 | Diamond | Full | X (1) | (1) |  |  |
| U.S. 169 at NW Englewood Rd. | Diamond | Full | - | - | X | - |


| Interchange | Type | Full or <br> Partial | Missing <br> Movements | Missing <br> Movements <br> Description | Less than 1 <br> Mile to <br> Other <br> Interchange | Left Exits <br> or <br> Entrances |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| U.S. 169 at NW <br> 68th St. | Diamond | Full | - | - | - | - |
| U.S. 169 at U.S. <br> 69 (NW Vivion <br> Rd) | Half <br> Diamond | Partial | $X$ | From SB U.S. <br> 169 to U.S. <br> 69, from U.S. <br> 69 to NB U.S. <br> 169 | $X$ | - |

Source: Google Maps, 2022.
Note 1: This interchange also accommodates movements with I-35, but it does not accommodate the movement from U.S. 69 to NB I-35.

## I-29 at I-35 Interchange

- Southbound I-29 reduces from three lanes (two travel lanes, one acceleration lane) to one lane in a span of 400 feet, south of NE Davidson Road. The proximity of the ramp merge to the lane drop causes a "funnel" effect and leads to a congestion during periods of peak traffic.


## I-29 at N Oak Trafficway Interchange

- The loop ramp from southbound I-29 to northbound N Oak Trafficway has an advisory speed of 20 mph . Per AASHTO Greenbook, the minimum design speed for a ramp based on a 55-mph-highway design speed should be 30 mph . However, for loop ramps only, AASHTO Greenbook recommends a minimum loop ramp design speed of 20 mph for highways with design speeds above 50 mph .


## I-29 at U.S. 169 Interchange

- The southbound U.S. 169 to southbound $\mathrm{I}-29$ ramp is a left exit requiring drivers to make atypical maneuvers. This left exit occurs approximately 0.5 mile south of the NW Englewood Road interchange. As a result, drivers traveling from NW Englewood Road to I-29 have limited time and space to make this maneuver. Additionally, drivers traveling from the left on-ramp acceleration lane from southbound 169 to southbound I-29 to the exit ramp to NW Vivion Road or to the exit ramp to southbound North Oak Trafficway have a very short distance to maneuver.
- There is no direct connection from northbound U.S. 169 to southbound I-29. Drivers must exit U.S. 169 onto NW Vivion Road then take the on-ramp to southbound I-29. This is approximately 1 mile out-of-direction of travel.
- There is no direct connection from northbound I-29 to southbound U.S. 169. Drivers must exit I-29 to NE Vivion Road then take the on-ramp to southbound U.S. 169. This is approximately 1.5 miles out-of-direction of travel.


## I-35 at U.S. 69 (Vivion Road) Interchange

- The I-35 and U.S. 69 interchange has an atypical configuration which may lead to some driver confusion.
- The northbound I-35 ramp to northbound U.S. 69 has an adverse curve towards the right followed by another curve to the left while northbound $\mathrm{I}-35$ is curving to the left. This ramp is posted with an advisory speed limit of 45 mph .
- Drivers traveling on the on-ramp from southbound U.S. 69 ramp to southbound I- 35 have a stop condition at a skewed intersection for northbound U.S. 69.
- The northbound I-35 exit to northbound U.S. 69 has residential driveways prior to merging with northbound U.S. 69. In this case, drivers are focused on merging to U.S. 69 and not focused on drivers going in or out of the driveways.
- The ramp from southbound U.S. 69 to southbound I-35 is a left entrance. Drivers traveling on southbound I-35 may not expect the left entrance. Furthermore, the recommended gap, after the acceleration length, to merge to southbound I-35 is less than the minimum 300 ft recommended by AASHTO Greenbook.
- The off-ramp from southbound I-35 to U.S. 69 does not meet the minimum design speed per AASHTO Greenbook. This off-ramp has a posted advisory speed of 15 mph . Per AASHTO Greenbook, since SB I-35 has a posted speed limit of 65 mph , this off-ramp should have a minimum design of speed of 20 mph . AASHTO Greenbook recommends a ramp design speed of 30 mph for highways with a design speed of 65 mph .
- There is no direct connection from northbound I-35 to southbound/westbound U.S. 69 . Drivers must exit at the N Brighton Avenue or exit at the U.S. 69 interchange and drive north 1.64 miles out-of-direction of travel to the I-35/I-435 interchange.


## I-35 at N Brighton Ave Interchange

- The I-35 at N Brighton Avenue interchange is a half diamond interchange which causes some driver expectancy confusion. There is not a turn lane from northbound Brighton Ave. to southbound $\mathrm{I}-35$ nor any signals for this movement.
- The ramp from NE Winn Road to l-35 south is a slip ramp from a two-way street and requires drivers traveling south on Winn Road to cross northbound traffic to enter the
ramp. Northbound Winn Road drivers have a "STOP" and "No Right Turn" sign. Winn Road drivers cannot turn right; they must travel north to the U.S. 69 interchange to enter the interstate.


## I-35 at NE Antioch Rd Interchange

- Because of the proximity of the on-ramp from southbound I-29 to northbound I-35 and the off-ramp from northbound I-35 to NE Antioch Road and the added lane after the onramp, drivers on northbound I-35 may have difficulties with certain maneuvers.


## I-29/l-35 at NE Parvin Road

- As stated in Table 29 and shown in Figure 62, the on-ramp from NE Parvin Road to northbound I-29/I-35 has a short acceleration length. Furthermore, drivers traveling on this ramp need to maneuver across two lanes of traffic to continue on northbound I-29.
- The ramp from NE Parvin Road to northbound I-29/I-35 has a steep grade and a tight ramp radius that may not meet the minimum design speed per AASHTO Greenbook. From aerial, this ramp has a tighter radius than the loop ramp from southbound I-29/l-35 to Parving Rd which has an advisory speed of 20 mph . Therefore, the loop ramp from NE Parvin Road to northbound I-29/I-35 may not meet the minimum design speed per AASHTO Greenbook as stated above.
- The loop ramp from southbound I-29 to Parvin Rd has an advisory speed of 20 mph . Per AASHTO Greenbook, the minimum design speed for a ramp based on a $55-\mathrm{mph}$ design speed should be 30 mph . However, for loop ramps only, AASHTO Greenbook recommends a minimum ramp design speed of 20 mph for highways design speeds above 50 mph .


### 4.4.6 Sight Distance Deficiencies

## Northbound and southbound I-29/I-35 exit to Armour Road

This intersection is signalized, but right-turn on red is allowed. The bridge piers and intersection configuration limit the ability of a driver making a right-hand turn to see oncoming traffic. Figure 64 and Figure 65 are views from each of these ramp terminals.

Figure 64: Northbound I-29/I-35 Ramp Terminal onto Route 210 (Armour Rd.)


Source: Google Earth, 2022.
Figure 65: Southbound I-29/I-35 Ramp Terminal onto Route 210 (Armour Rd.)


Source: Google Earth, 2022.

## Northbound and southbound I-29 exit to NE Davidson Road

Bridge piers, guide signs in the wrong location, and vegetation limit the ability of a driver making a right-hand turn to see oncoming traffic. An important consideration is that NE Davidson Road has bike lanes on both shoulders. Figure 66 and Figure 67 are pictures taken from each of these ramp terminals.

Figure 66: Northbound I-29 Ramp Terminal onto NE Davidson Road


Source: Photo taken on 9/22/2022.

Figure 67: Southbound I-29 Ramp Terminal onto NE Davidson Road


Source: Photo taken on 9/22/2022.

### 4.4.7 Bridge Concerns

Bridge inventory data was provided by MoDOT for all bridges within the study area. This data was analyzed with specific focus on substructure, superstructure, deck, vertical clearances, and whether bridge railings, guardrail transitions, approach guardrail, and guardrail ends meet acceptable standards. MoDOT assigns a rating to the deck, superstructure, and substructure condition of each bridge. A rating of 8 or 9 is considered very good or excellent condition, a rating from 5 to 7 is considered fair, satisfactory, or good condition, and when the assigned rating is less than or equal to 4 , the bridge is considered deficient or in poor condition.

Additionally, annual daily traffic (ADT) and percent truck traffic have been considered. Figure 68 displays the locations of the bridges of high concern within the project area. Pertinent data for each of these bridges is listed in Table 32.

Figure 68: High Priority Bridges of Concern Locations


Source: MoDOT Bridge Inventory, 2022.

Table 33: High Priority Bridges of Concern

| Bridge No. | Yr. <br> Built | Facility Carried | Feature Intersected | ADT | Truck Traffi <br> c | Guardrail Barrier Conditions (See Notes) | Deck Rating Code | Super. <br> Rating <br> Code | Sub. Rating Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L0656 | 1954 | $\begin{gathered} \text { U.S. } 69 \text { to l-35 } \\ \text { S } \end{gathered}$ | I-35 | 1860 | 5 | 1 | 5 | 5 | 4 |
| L0756 | 1958 | Bryant St. S | I-35 | 3416 | 5 | 1, 2, 3, 4 | 6 | 6 | 5 |
| L0782 | 1953 | Independence Ave. W | I-29 | 6115 | 7 | 1, 2, 3, 4 | 7 | 7 | 6 |
| A1579 | 1969 | Ramp I-35 S to l-435 S | I-35 | 13556 | 16 | 1, 3, 4 | 6 | 6 | 8 |
| A1763 | 1967 | $\begin{gathered} \text { Ramp I-29 S to } \\ \mathrm{I}-35 \mathrm{~N} \end{gathered}$ | I-35, I-29 | 15833 | 12 | - | 5 | 5 | 6 |
| L0642 | 1954 | $\mathrm{l}-35 \mathrm{~N}$ | MO 269 | 34299 | 18 | - | 6 | 6 | 5 |
| L0654 | 1954 | I-35 S | MO 1 | 40177 | 18 | 4 | 7 | 8 | 5 |
| L0660 | 1954 | I-29 N | NE Parvin Rd. | 51393 | 12 | - | 7 | 5 | 6 |
| L0692 | 1957 | Ramp NW Gateway Ave. | I-29, Ramp I635 N to I-29 | 3608 | 5 | - | 5 | 5 | 6 |
| L0719 | 1957 | I-29 N | $\begin{gathered} \text { Ramp U.S. } \\ 169 \text { S to I-29 } \\ \text { S, U.S. } 1 \end{gathered}$ | 56182 | 6 | - | 7 | 6 | 5 |
| $\begin{aligned} & \text { L0788 } \\ & \text { L0789 } \end{aligned}$ | 1953 | I-29 N/S | Guinotte Ave, BNSF Railroad | 110905 | 12 | - | 6 | 5 | 5 |

Source: MoDOT Bridge Inventory, 2022.
Guardrail/Barrier Condition Notes:
Note 1: Bridge railing does not meet standard.
Note 2: Approach guardrail does not meet standard.
Note 3: Approach guardrail ends do not meet standard.
Note 4: Bridge barrier transition does not meet standard.
The bridges listed in Table 33 are a high priority concern due to their structural condition as well as the high ADT and high percent truck traffic carried. The highest priority concern was structural condition, especially for bridges with high traffic volumes. Other concerning criteria that may indicate a need for rehabilitation or replacement were posted loads and vertical clearance issues, which are documented below in Table 34 and Table 35 respectively. Some of these bridges overlap with those of high priority, while others are structurally sound but exhibit other deficiencies.

Table 34: Bridges with Load Postings

| Bridge Number | Year <br> Built | Facility Carried | Feature Intersected | Load Posting (tons) |
| :---: | :---: | :---: | :---: | :---: |
| A1159 | 1967 | I-29 N | MO 45 | N/A |
| A1580 | 1969 | Ramp l-435 N to I-35 S | I-35, l-435 | 65 |
| A1763 | 1967 | Ramp l-29 S to I-35 N | I-35, l-29 | 65 |
| L0641 | 1954 | I-35 S | MO 269 | 65 |
| L0656 | 1954 | U.S. 69 S | I-35 | 65 |
| L0689 | 1957 | I-29 S | Line CR | N/A |
| L0692 | 1957 | Ramp NW Gateway Ave. | I-29, Ramp I-635N to I-29 | 55 |
| L0756 | 1958 | Bryant St S | I-35 | 45 |
| L0757 | 1958 | U.S. 69 S | I-35 | 50 |
| L0782 | 1953 | Independence Ave. W | I-29 | 40 |
| L0788 | 1953 | I-29 S | Guinotte Ave. | 65 |
| L0789 | 1953 | I-29 S | $14^{\text {TH }}$ Ave, BNSF Railroad | 45 |

Source: MoDOT Bridge Inventory, 2022.
Note: Bridges with N/A were noted to have a load posting, but the load limit was not available.

Table 35: Bridges with Vertical Clearance Issues

| Bridge Number | Year <br> Built | Facility Carried | Feature Intersected | Vertical Clearance |
| :---: | :---: | :---: | :---: | :---: |
| A1159 | 1967 | I-29 S | MO 45 | Under: 15'-5" |
| A1159 | 1967 | I-29 N | MO 45 | Under: 15 "-1" |
| A1579 | 1969 | Ramp I-35 S to I-435 S | I-35 | Over: 15'-0" <br> Under: 15'-10" |
| A1582 | 1969 | Ramp I-35 N to l-435 S | U.S. 69 | Under: 15'-4" |
| A1583 | 1969 | Ramp I-435 N to I-35 N | U.S. 69 | Under: 15'-8" |
| A1687 | 1967 | Ramp I-29 N to I-635 S | I-29, Ramp I-29 S to NW Gateway Ave. | Under: 16'-2" |
| A1761 | 1967 | Ramp I-35 S to I-29 N | Ramp I-29 N to NE Davidson Rd. | Under: $\mathbf{1 5}^{\prime}-1{ }^{\prime \prime}$ |
| A1762 | 1967 | Ramp 1-29 S to l-35 N | NE Davidson Rd. | Under: 15'-1" |
| A1763 | 1967 | Ramp l-29 S to l-35 N | I-35, I-29 | Under: 15'-8" |


| Bridge Number | Year Built | Facility Carried | Feature Intersected | Vertical Clearance |
| :---: | :---: | :---: | :---: | :---: |
| A3389 | 1981 | Ramp I-435 S to U.S. 69 N | I-35 | Over: $16^{\prime}-0^{\prime \prime}$ <br> Under: $16^{\prime}-2^{\prime \prime}$ |
| A3416 | 1981 | 1-435 S | U.S. 69 | Under: 15'-10" |
| A5604 | 1996 | U.S. 169 N | NW Englewood Rd. | Under: 14'-11" |
| A5605 | 1996 | U.S. 169 S | NW Englewood Rd. | Under: 14'-9" |
| A6200 | 2000 | U.S. 169 S | NW 68 ${ }^{\text {th }}$ St | Under: 14'-7" |
| A7644 | 2010 | Ramp l-29 S to Independence Ave. | I-29 | Under: 15'-4" |
| A7647 | 2009 | I-29 S | Ramp Front St E to I-29 N | Under: 14'-11" |
| A7654 | 2010 | I-29 S | Ramp MO 210 to I-29 S, Ramp M | Under: 14'-11" |
| L0642 | 1954 | $\mathrm{I}-35 \mathrm{~N}$ | MO 269 | Under: 16'-0" |
| L0653 | 1954 | I-35 N | MO 1 | Under: 15'-3" |
| L0654 | 1954 | 1-35 S | MO 1 | Under: 15'-3' |
| L0656 | 1954 | U.S. 69 | I-35 | Under: 14'-11" |
| L0658 | 1955 | I-29 N | 1-35 | Under: 15'-8" |
| L0659 | 1954 | I-29 S | NE Parvin Rd. | Under: 14'-11" |
| L0699 | 1955 | I-29 S | NE Davidson Rd. | Under: 14'-9" |
| L0701 | 1957 | I-29 N | N Oak Trfwy. | Under: 15'-3' |
| L0702 | 1957 | I-29 S | N Oak Trfwy. | Under: 15'-3' |
| L0720 | 1957 | 1-29 S | U.S. 69 | Under: 15'-3" |
| L0721 | 1957 | I 29 N | U.S. 69 | Under: 14'-7" |
| L0756 | 1958 | Bryant St. S | 1-35 | Under: 16'-0" |
| L0782 | 1953 | Independence Ave. W | I-29 | Under: 14'-11" |
| L0788 | 1953 | I-29 S | Guinotte Ave, Dora St. | Under: 14'-5" |
| L0789 | 1953 | 1-29 S | $14^{\text {TH }}$ Ave, BNSF Railroad | Under: 16'-0" |

Source: MoDOT Bridge Inventory, 2022.
Note: "Under" indicates the vertical clearance under the roadway to the intersected feature. "Over" indicates the vertical clearance over the roadway to the intersected feature.

### 5.0 Public Engagement

The following chapter summarizes the resource agency and tribal coordination, stakeholder engagement, and public involvement activities that have or will be taking place during the Baseline Conditions phase of the I-29, I-35, U.S. 169 PEL study as well as future public engagement activities planned for the PEL.

### 5.1 Public Involvement Plan

To provide a framework for all public involvement activities, the study team created a Public Involvement Plan. The detailed Plan summarizes public outreach goals and objectives and identifies the specific stakeholder groups to be included during the PEL study. The plan also outlines all activities, messaging, outreach methods and deliverables. To help inform the Public Involvement Plan, conversations were had between the project team and various interested stakeholders including, but not limited to, resource agencies, tribes, local officials, businesses and the public. Materials were presented in languages alternative to English as needed and specific outreach to underserved populations identified will be done through neighborhood groups and community groups.

Ongoing and anticipated public involvement activities are outlined in Figure 69 and summarized below:

Figure 69: Schedule of Planned Public Involvement Activities Throughout Study Phases


Source: Study Team.

### 5.1.1 Resource Agency Coordination

The study team, in partnership with FHWA, created a list of key federal, state and local resource agencies and officials that would be considered coordinating agencies. All tribal coordination occurred through MoDOT and FHWA. Two meetings will be held with resource agencies to provide them an update and gather input. These groups were invited to become coordinating agencies and receive all updates and project information.

### 5.1.2 Purpose and Need Analysis Agency Coordination

Agencies will be able to provide their feedback on all aspects of the PEL including the Purpose and Need, Alternatives Development and Analysis as shown in Figure 69.

At the beginning of the study, key stakeholders were identified to participate in interviews to help understand project concerns, opportunities, and issues. Key stakeholders that were selected for interviews included the:

- Northland Chamber,
- Northland Chamber Planning and Development Committee,
- Northland Neighborhoods Inc.,
- Kansas City Area Transportation Authority, and
- North Kansas City Business Council

These stakeholders were identified because they were representative of a large group of study area residents and could provide a unique and knowledgeable perspective that could further inform the study. Interviews took place in June 2022. In summary, the key concerns and opportunities that were discussed included:

- Increasing Development - Several stakeholders noted that there is substantial development occurring in the northland with the area to grow significantly in the coming years. Many expressed concerns about the influx of housing and industrial development leading to higher congestion within the study area. Specific development areas identified included the Twin Creeks and Platteville regions. It was also noted that the North Kansas City School District is growing by 300 students annually.
- Design and Maintenance - Many stakeholders asked that the study team consider choosing alternatives that will not require substantial upkeep and maintenance and will still be aesthetically pleasing well into the future. Currently, many residential areas are overrun with weeds, unkept grass, and garbage. Stakeholders want their community to look maintained and inviting to residents.
- Sustainability and Safety - There were numerous safety concerns raised about current structures along I-29 and I-35. Other common issues included traffic noise, storm drainage structures, and safer pedestrian crossings.
- Active Transportation (Bicycle and Pedestrian) - Increased bicycle lane access and connectivity is a concern for various stakeholders. Specifically, along NW Vivion Road and $\mathrm{M}-152$ bike trail into the metro North Crossing Development.
- Public Transportation - COVID-19 led to a significant revamping of the public transportation throughout the northland. Recently, the KCATA has consolidated underperforming northland bus routes with more efficient routes. For many riders, there is a strong desire for more efficient, accessible, and less congested bus routes.
- Funding - There were several questions about the budget, funding sources, and the timeline for when funds would need to be secured.


### 5.1.3 Public Engagement Activities

Table 36 outlines the public engagement activities that have already or will be taking place over the course of the PEL study.

Table 36: Public Outreach Schedule

| Date | Activity | Topic |
| :---: | :---: | :---: |
| June 2022 | Stakeholder Interviews (5) | - Study Introduction <br> - Initial Interviews and Data Gathering |
| June 9, 2022 | Northland Chamber Presentation |  |
| June 24, 2022 | Platte County EDC |  |
| July 7, 2022 | Community Advisory Committee Meeting \#1 |  |
| July 27, 2022 | MARC Presentation |  |
| October 5, 2022 | Resource Agency Meeting \#1 | - Study Introduction <br> - Baseline Conditions <br> - Alternatives Development \& Analysis Introduction |
| October 18, 2022 | Community Advisory Committee Meeting \#2 |  |
| October 2022 | Public Survey |  |
| October 27, 2022 | Public Meeting \#1 |  |
| Feb/March 2023 | Community Advisory Committee Meeting \#3 | - Alternatives Development \& Analysis Results <br> - Transition to NEPA Recommendations |
| March/April 2023 | Resource Agency Meeting \#2 |  |
| March/April 2023 | Public Meeting \#2 |  |
| May/June 2023 | Community Advisory Committee Meeting \#4 | - Transition to NEPA Recommendations <br> - Final PEL |

Source: Study Team.

### 5.1.4 Public Meetings

As part of MoDOT's extensive public outreach activities, there will be two public meetings that will provide the general public with the opportunity to learn more about the project, speak with the project team, and provide input. The first public meeting will be held in October 2022.

### 5.1.5 Community Presentations

To further engage community members and civic organizations, a variety of community presentations were given by MoDOT and the study team. The purpose of these presentations was to introduce the project and provide organizations with an opportunity to submit their feedback. The first of these presentations was given to the Northland Chamber Planning and Development Committee on June 9, 2022. A second presentation was given to the MARC Highway Committee, on July 27, 2022. More presentations are anticipated as the study advances.

### 5.1.6 Community Advisory Group

The study team created a list of stakeholders that may have significant interest in the study or who lived/worked throughout the study area. Those stakeholders were contacted by MoDOT to inquire about their interest in serving on the Community Advisory Group. The committee is comprised of 36 members who represent a range of industries, interests, and communities in the study area. The purpose of this committee is to provide MoDOT with meaningful and insightful input relating to safety, congestion, and other issues along I-29,I-35, and U.S.169. The committee is not required to reach a consensus on issues, however the influence they provide in considering detailed aspects of the project aides MoDOT in making the best possible decisions needed to advance the study.

The first meeting was held virtually July 7, 2022, via Zoom and 21 members attended. This meeting was designed to introduce the study and gather initial feedback on the preliminary Purpose and Need, study goals, and guiding principles. The next meeting is scheduled for October 18, 2022.

### 5.1.7 Public Survey

In October 2022, MoDOT will disseminate a public survey to gather input on the project's preliminary Purpose and Need. This survey will be published on a date that aligns with the first public meeting and will give the general public the opportunity to be engaged with the study and submit their questions and concerns to the Study Team.

### 5.1.8 Additional Outreach and Collateral

As part of MoDOT's outreach efforts, materials such as flyers and newsletters will be developed for meetings to promote public meetings. All materials will be created in alternative languages if needed as identified in Chapter 4. Specific efforts will be made to build awareness of the study in underserved populations by working with neighborhood groups and community groups. MoDOT's website provides information about the study and a way to sign up for additional information and to get the latest updates or notifications about upcoming events. The website link is: www.modot.org/i-29i-35us-169-corridor-study

### 6.0 Purpose and Need

This chapter provides a summary of the purpose and need for improvements along I-29,I-35, and the U.S. 169 project limits. The purpose and need are part of the Planning and Environmental Linkages study process. The study will assess the issues and needs identified below.

### 6.1 Structural and Functional Roadway and Bridge Deficiencies

As discussed in Section 4.4, various roadways throughout the study area have geometric and structural issues. From a geometric standpoint, several locations were identified with substandard acceleration lanes (Table 29), deceleration lanes (Table 30), and gore spacing (Table 31). Several roads in the study area also have substandard interchange geometry and inadequate sight distances at intersections. As shown in Figure 68, 13 bridges are considered high priority bridges of concern based on their deck, substructure, superstructure, and/or guardrail/barrier conditions, as well as the ADT and percent truck traffic on these bridges. Other concerning criteria that indicate a need for bridge rehabilitation or replacement include posted loads and vertical clearance issues, as documented in Table 34 and Table 35 respectively.

### 6.2 Roadway Safety Issues

As discussed in Section 4.2.7, an existing and future no build crash analysis was conducted for the I-29, I-35, U.S 169 and I-635 mainlines, portions of M-152 as well as all system-to-system ramps, service ramps and ramp terminal intersections along the study corridors. The study area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Solutions for these types of crashes usually involve reducing conflict points such as merges and diverges and lowering the overall congestion of a corridor. Crashes primarily occur during clear and dry conditions. Overall, the safety analysis identified three specific segments of the study area corridors as areas of concern. These areas each contain a high occurrence of specific types or levels of severity of crashes and considerations should be made during the alternatives analysis portion of this study. They include:

- The I-29/I-35 combined corridor between Independence Avenue and the north side of the Kit Bond Bridge: This area experienced 10 fatal or serious injury crashes during the study analysis period, many where a vehicle overtook a slower moving vehicle. Additionally, there were eight head-on crashes within this area between The Paseo ramps and immediately north of the Bedford Avenue/Levee Road interchange.
- I-35 from the I-29/I-35 interchange to the N Brighton Avenue interchange: This portion of the l-35 corridor contains all of the fatal crashes and most of the serious injury crashes along the l-35 corridor. Most of these crashes involved striking guardrails, cable barrier or concrete barriers, however overall trends of those types of crashes were in line with the overall corridor.
- I-29 between $72^{\text {nd }}$ Street and $\mathrm{M}-152$ : This area experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on, and out-of-control crashes.

A high-level summary of each corridor in the study area is presented in Table 37.

Table 37: Crash Data Summary for Corridors in Study Area

| Corridor | No. of <br> Crashes | Damage Type |  |  | Property <br> Damage | Injury | Fatal |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rear End | Sideswipe <br> or Angle ${ }^{*}$ | Single <br> Vehicle |  |  |  |  |  |
| I-29/I-35 <br> Combined | 1,341 | $77 \%$ | $23 \%$ | $<1 \%$ | $52 \%$ | $27 \%$ | $15 \%$ |
| I-29 | 1,463 | $81 \%$ | $18 \%$ | $<1 \%$ | $36 \%$ | $27 \%$ | $26 \%$ |
| I-35 | 1,166 | $83 \%$ | $16 \%$ | $<1 \%$ | $41 \%$ | -- | $31 \%$ |
| U.S. 169 | 422 | $77 \%$ | $22 \%$ | $1 \%$ | $35 \%$ | -- | $37 \%$ |
| I-635 | 352 | $76 \%$ | $23 \%$ | $<1 \%$ | $20 \%$ | -- | $47 \%$ |
| M-152 | 302 | $71 \%$ | $29 \%$ | -- | $35 \%$ | $22 \%^{*}$ | -- |
| Ramps/ Ramp <br> Terminals | 2,567 | $75 \%$ | $23 \%$ | $<1 \%$ | -- | -- | -- |

Source: 2016-2020 MoDOT Crash Data.

### 6.3 Traffic Congestion and Access Issues, Including Heavy Truck Traffic

Traffic analysis of the existing conditions within the study area shows several locations where speeds drop below free-flow speed. In the AM peak, speeds drop on southbound I-35 between N Brighton Avenue and $\mathrm{I}-29$ due to vehicles changing lanes and positioning for the $\mathrm{I}-29$ merge. In particular, more than 1,000 peak hour vehicles are taking the ramp to northbound I-29; those vehicles stack in the right lane through the NE Antioch Road interchange as they approach the ramp to northbound I-29. Farther south, speeds again drop beginning around the Christopher Kit Bond Bridge due to drivers changing lanes to position for their downtown destinations including a left lane exit at The Paseo, a major split at the northeast corner of the downtown loop and other closely spaced interchanges around the loop. Speeds on southbound U.S. 169 and I-29 are generally at or near free flow speeds during the AM peak.

In the PM peak, congested locations mirror those in the AM peak. On northbound I-29/I-35, reduced speeds surround the Christopher Kit Bond Bridge. Slower speeds can be attributed to industrial land uses and heavy truck traffic in the area as well as steeper grade differences
between the ramps at Front Street and I-29/I-35. Farther north after the split with I-29, a reduction in average speed occurs on I-35 around the NE Antioch Road and N Chouteau Parkway interchanges. The auxiliary lane that begins at the ramp from southbound I-29 ends at the N Chouteau Parkway exit ramp, acting as a lane drop and requiring vehicles continuing north on I-35 to transition into two through lanes. Near free flow speeds exist throughout the rest of northbound I-35 and along I-29 and U.S. 169.

Heavy truck traffic can negatively impact the traffic operations on I-29/I-35, I-35, and arterial roadways. Over 11 percent of vehicles travelling on I-29/I-35 and over 18 percent of vehicles on $\mathrm{l}-35$ are heavy trucks. Existing industrial land uses adjacent to the interstate, such as the Northeast Industrial District and Claycomo Ford Plant, contribute to the higher percentages in the corridor. Slower truck traffic coming on and off of the interstate can quickly erode network performance, especially during peak periods.

StreetLight Origin-Destination Data was collected along the I-29, I-35 and U.S. 169 corridors and used to identify travel patterns and determine where traffic was going after entering the study area on each of the corridors. In the AM peak, the top three destinations for traffic on southbound I-29 was I-635, U.S. 169, and I-29/I-35. From southbound U.S. 169 north of NW 68th Street, more traffic was destined to U.S. 169 south of I-29 than anywhere else. The next biggest destinations were I-635 and I-29 / I-35. Traffic on southbound I-35 was mostly destined for either I-435 or I-29/I-35. In the PM peak, the traffic on northbound I-29/I-35 was destined for $\mathrm{I}-35$ more than anywhere else, then I-29.

Mid-America Regional Council also assesses congestion in the region in the Congestion Management Report, 2021, which measured traffic congestion in 2019 and 2020.

### 6.4 Growth in the Northland

The population and employment of the study area counties is expected to increase by $40 \%$ and $37 \%$, respectively, from 2015 to 2050. As shown in Figure 10, growth in the northland is also demonstrated by the many non-residential projects planned for Platte and Clay Counties, as well as Jackson County.

### 6.5 Lack of Transit and other Multimodal Alternatives

Much of the northland is challenging to serve with high-frequency fixed-route transit due to several factors including its geographic size, low-density land use pattern, dispersed activity centers, few major east-west and north-south arterial roads (compared to other parts of the metro area) and disconnected pedestrian and bicycle networks. The major northland transit routes 201, 229, 231, 233, 235, 236, 237, 238, and 535 serve the I-29, I-35 and U.S. 169, Burlington/North Oak, and Antioch corridors. Most of these routes have service frequencies between 30 and 60 minutes. In addition, service to KCl is lacking - only two routes provide service to the airport, one with a 30 to 60-minute frequency (only operating on weekdays) and
the other is a limited express service moving from downtown Kansas City to KCl (also only operating on weekdays).

The other challenging issue is that although there is good coverage on the major corridors, these corridors are separated by one or two miles and first and last connections into the surrounding neighborhoods are challenging due to the disconnected sidewalk network. In addition, many of the arterial roads that intersect project area Interstates and highways do not have pedestrian facilities crossing under/over them, shown in Table 25, making active transportation and transit inefficient and, potentially, dangerous. Where bike facilities do exist, they are often shared with pedestrians on shared use walking trails or use marked/shared roads (sharrows), which tend to provide less protection for cyclists.

The Connected KC 2050 Plan identified 10 major bottlenecks that hamper freight access into and out of the Kansas City area. Three of these bottlenecks occur within the study area:

- US 169 at I-70/I-35/US-40/US-24, Buck O'Neil (under construction),
- I-29/I-35 S at Independence Avenue, and
- MO-210 E at I-435 (completed in 2019)

These bottlenecks are caused by traffic congestion on highways that serve large volumes of freight truck traffic. The expected increase in future freight demand is only expected to exacerbate this issue without operational changes ${ }^{26}$.

The study also identified the need for additional truck parking facilities, allowing drivers to meet their federally mandated hours of services (HOS) rest breaks and off-duty requirements, and to provide parking for staging for just-in-time deliveries to area distribution and manufacturing facilities, including the Claycomo Ford Plant. Drivers who have not found parking before exceeding their HOS or are early for their just in time delivery slot, are often forced to park in unauthorized, unsafe locations including highway shoulders, on and off ramps, or on local streets. There are currently two truck parking locations in the study area.

### 6.6 Purpose of the Project

In summary, the northland growth is resulting in traffic, safety, engineering and multimodal needs in the project limits as discussed above. As a result, the purpose of the project is to:

- Address structural and functional roadway deficiencies, including pavement and bridge conditions
- Improve roadway safety

26 "Understanding Freight Bottlenecks", US FHWA, accessed August 25, 2022, https://highways.dot.gov/public-roads/marapr-2007/understanding-freight-bottlenecks

- Improve roadway capacity, mobility and access to meet traffic and freight movement demands to meet future growth in the northland
- Provide transit and multimodal alternatives


### 6.7 Study Goals

In addition to the purpose and need, study goals were established to balance transportation and environmental outcomes of the PEL. Input sought from the Community Advisory Committee, resource agencies and the public was incorporated to develop study goals and guiding principles. The study goals were used in the evaluation of alternatives. A listing of the study goals is presented below.

- Avoid and/or minimize impacts to the human and natural environment
- Sustain public and agency input and support for the project
- Maximize cost efficiency
- Improve system reliability
- Improve opportunity for regional connectivity
- Improve local vehicle access to downtown Kansas City and other communities north of the river
- Improve access to industrial and retail centers and neighborhoods
- Connect bicycle pedestrian friendly facilities
- Accommodate existing transit, future transit and transit-oriented development
- Minimize roadway disruptions during construction
- Improve safety
- Reduce congestion
- Accommodate freight movement
- Reduce maintenance


### 6.8 Guiding Principles

Guiding principles that will influence the overall project include (listed in no particular order):

- Open public participation process
- Support of local, regional, and statewide land use and transportation plans
- Support equity and mobility needs
- Context Sensitive Solutions
- Aesthetically pleasing
- Optimize opportunities for economic development
- Future flexibility
- Modernize transportation system
- Augment or improve the built and natural environment



## Attachment A Summary of Previous Studies

September 2022
U.S. Department of Transportation Federal Highway
Administration

In Partnership with:

Mid-America Regional Council
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### 1.0 Introduction

The Missouri Department of Transportation (MoDOT) is initiating a Planning and Environmental Linkages (PEL) Study of the I-29, I-35, and U.S. 169 corridors. MoDOT desires to develop both short-term and long-term alternatives and actions for improving safety, reducing congestion, improving operational performance, and addressing asset management and future transportation needs along I-29, I-35, and U.S. 169. The overarching goal of the PEL Study is to develop a clear and supported plan of action addressing deficiencies in the study area.

### 1.1 Purpose of the Summary

The purpose of this Previous and Ongoing Related Projects Summary is to provide a literature review and short content summaries of key studies and projects considered by the study team to have the greatest applicability to the I-29, I-35, U.S. 169 PEL as the study team moves forward with the evaluation of potential improvement strategies. The information contained in these summaries are intended to be a quick reference guide for the study team of the history and recommendations of the ongoing and past work efforts that have been conducted in the study area and its adjoining transportation network that may impact or benefit the future improvement strategies being considered.

### 1.2 Potential Benefit of Previous Studies to the I-29, I-35, U.S. 169 Corridor

The project summaries can offer several potential benefits to the PEL study team as they move forward with the development and evaluation of practical improvement strategies, including:

- A comprehensive summary of the history, key findings, major recommendations, and successful implementation of the corridor transportation improvements over the past few decades.
- Historical, existing, and projected data on the corridor's key needs and issues that can be used to support the evaluation of the corridor and its potential improvement strategies, including travel demand models and projections, and safety, freight and ITS data.
- Background information on ongoing and future related regional projects in the study area.
- A summary of the key findings of prior studies. This information will help evaluate if the applicability and effectiveness of these types of strategies has shifted since the timing of the past studies due to changes in study area corridor travel characteristics and development patterns.


### 1.3 Organization

This attachment is organized into one- to two-page summaries of each ongoing or previously implemented I-29, I-35, U.S. 169 study area project that is considered to influence the PEL study area and the improvement strategies being considered. Table 1 shows the projects that the study team selected for literature review.

Table 1: I-29, I-35, U.S. 169 PEL
Previous Related Projects

| Project No. | Project Name | Project Sponsor | Page No. |
| :---: | :---: | :---: | :---: |
| 1 | Northland Downtown Major Investment Study (MIS) | Missouri Department of Transportation, MidAmerica Regional Council, Kansas City Area Transit Authority | A-7 |
| 2 | I-29/I-35 Paseo Bridge <br> Final Environmental Impact Statement (FEIS) | Missouri Department of Transportation, Federal Highway Administration | A-9 |
| 3 | Route 152/Kansas Street and I-35 Traffic Safety and Operations Report | Missouri Department of Transportation | A-11 |
| 4 | I-435 Lane Balance Letter | Missouri Department of Transportation | A-13 |
| 5 | Route 45 and I-29 Traffic Safety and Operations Report | Missouri Department of Transportation | A-14 |
| 6 | I-35 and Pleasant Valley Road/US-69 AJR | Missouri Department of Transportation | A-15 |
| 7 | US-69 \& Pleasant Valley Road Corridor Sustainability Places Plan | Mid-America Regional Council, Clay County, The Village of Claycomo, and Pleasant Valley | A-16 |
| 8 | Claycomo Area Transportation Study | The Village of Claycomo | A-17 |
| 9 | I-29/35 \& MO 210 Interchange J4P3095C | Missouri Department of Transportation | A-18 |
| 10 | I-35 J4I3111 | Missouri Department of Transportation | A-19 |
| 11 | Southbound I-29 at US-169 Traffic and Safety Report | Missouri Department of Transportation | A-20 |
| 12 | US-69 Loop Crashes | Missouri Department of Transportation | A-21 |


| Project <br> No. | Project Name | Project Sponsor | Page <br> No. |
| :---: | :---: | :---: | :---: |
| 13 | 2012-2018 Freeway Pedestrian Crash <br> Figure | Missouri Department of Transportation | A-22 |
| 14 | TIS QuikTrip | Missouri Department of Transportation | A-23 |
| 15 | Staley Corners TIS | Missouri Department of Transportation | A-24 |
| 16 | Marketplace 152 TIS | Missouri Department of Transportation | A-25 |
| 17 | Tiffany Greens TIS | Missouri Department of Transportation | A-26 |
| 18 | MO 152 \& N. Platte Purchase Drive <br> Interchange Evaluation | Missouri Department of Transportation | A-28 |
| 19 | Twin Creeks Village TIS | Missouri Department of Transportation | A-29 |
| 20 | Twin Creeks Walkability Study | Missouri Department of Transportation | A-30 |

The project summaries are organized as follows:

- Project Number- Each document is numbered for ease of reference in Table 1.
- Project Title - The name of the project document.
- Project Sponsor - The agency or person responsible for conducting the project.
- Date/Last Updated Date - The most recent date available for the project and its findings.
- Status - The phase the project is currently within (e.g., Early Feasibility/Planning, NEPA, Design, Implemented).
- Relevant Files Available - Applicable documents or web sites available for the project for further information.
- Project Purpose - A brief purpose statement for the project.
- Project Summary - A brief summary of the history/background, key findings, and recommendations as a result of the project.
- Benefit of Proposed Project - How the project benefits the area.
- Potential Benefit to I-29, I-35, U.S. 169 PEL - How the project may benefit the PEL.


### 2.0 Study Area Map

Project study numbers and locations coordinate with the project numbering throughout this document and shown in Figure 1.

Figure 1: Previous and Ongoing Projects Map


[^14]
### 3.0 Previous Related Projects Summaries

The following sections provide the project summaries of each I-29, I-35, U.S. 169 previous or ongoing related project that were considered to be beneficial to the I-29, I-35, U.S. 169 PEL.

## Regional Project

Project Title: Connected KC 2050
Project Sponsor: Mid America Regional Council
Date/Last Updated Date: June 2020
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Regional LongRange Planning

Relevant Files Available: Connected KC 2050

## Project Purpose:

Connected KC 2050, the Kansas City metro's regional transportation plan, serves as a blueprint for managing the region's transportation system. MARC's Board of Directors adopted the plan at its June 23, 2020, meeting.

Required by the federal government, this plan identifies transportation improvements for the next 30 years. As the metropolitan planning agency for the Kansas City region, the Mid-America Regional Council is required to update the regional transportation plan every five years. Connected KC 2050 replaces Transportation Outlook 2040.

## Project Summary (Background, Key Findings, Recommendations):

CONNECTED KC 2050 is the metropolitan transportation plan for Greater Kansas City. It provides a policy framework for the investment of anticipated federal, state, and local funds based on anticipated needs and regional goals and objectives through the year 2050. The plan contains:

Vision - a long-term vision for the region's transportation system.
Goals and strategies - what the region wants to achieve by the year 2050 and how we plan to do it.

> Connected KC 2050 seeks to advance a shared vision for our region - one that balances a thriving economy, social equity and a healthy environment, meeting today's needs without compromising the needs of future generations.
> Greater Kansas City is a region of opportunity. Its robust economy, healthy environment and social capacity support the creativity, diversity and resilience of its people, places and communities.
> Formed at the confluence of rivers, trails and trains on the border of two states, Greater Kansas City is a place of interconnection, where people of all backgrounds are welcome and where commerce and ideas flow as freely as the rivers and streams that run through and define it.
> Our people thrive here, in safe, walkable and well-maintained neighborhoods. We have abundant opportunities for education, and work in fulfilling jobs at businesses that can compete with any in the world. We enjoy, protect and preserve our region's natural beauty. We care for our neighbors and our communities.
> We lead by example. Our region has the strength to not only bounce back from adversity, but bounce forward, confidently, into the future.

| Major Policy Goals | Performance Goals |
| :---: | :---: |
| Access to Opportunity | Safety |
| Public Health and Safety | Infrastructure Condition |
| Healthy Environment | Congestion Reduction |
| Transportation Choices | System Reliability |
| Economic Vitality | Freight Movement \& Economic Vitality |
|  | Environmental Sustainability |
|  | Reduced Project Delivery Delay |

Transportation projects - major regional transportation investments that help accomplish goals. See the most recent project list for more information.

Figure 2: Project Map


Benefit of Proposed Project: CONNECTED KC 2050 focuses on the entire Kansas City metropolitan area. All improvements consider the potential growth, quality of life, safety and maintenance, environmental concerns, innovation, and various different modes of transit that would affect the project area(s).

Potential Benefit to I-29, I-35, U.S. 169 PEL: The geographic overlap between CONNECTEED KC 2050 and the current study area conditions will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine where upgrades are already being anticipated, where under represented areas exist, and if the current and future projects may apply to the current study.

## Project Number 1

Project Title: Northland Downtown Major Investment Study (MIS)
Project Sponsor: Missouri Department of Transportation in coordination with Mid-America Regional Council and Kansas City Area Transit Authority (KCATA)

Date/Last Updated Date: 2002

## Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Feasibility Study/Planning

Relevant Files Available: The final report is available upon request in hard copy format.
Project Purpose: In 1998, MODOT and KCATA, along with many other contributors, funded a study along routes U.S. 169, I-29, and Route 9 connecting the Northland to the Downtown KC Business District. The purpose of the study was to analyze the current systems and look at ways to redevelop existing areas while promoting personal mobility and quality of life. This study also looked into future scenarios of staying at or above the level of service (LOS) D and assuring improvements would benefit the regional economic growth goals. Safety and cost were also included as goals of this study.

Project Summary (Background, Key Findings, Recommendations): For the study, different travel patterns were identified as problematic for the current and future usage. Daily trips across the Missouri River to get from the Northland to Downtown were expected to increase by 42\% between 1990 and 2020. Aging infrastructure, lack of multimodal river crossing options and looming traffic congestion were all issues that were looking to be addressed. Within the Northland, as businesses grow, intra-Northland travel would also need more efficient and accommodating solutions to help solve the current east-west mobility problems.

This study made numerous findings throughout the project study area, however, to help guide the process towards the most influential recommendations, the following were established:

- While the KCI Airport was included in the study area, the main concerns and investment opportunities were most needed elsewhere.
- The intra-Northland mobility issues would be difficult to solve given the scope of this specific study. It would be better solved as an independent study.
- The main areas of focus were the bridge crossings and the complexity of current and future infrastructure and capacity concerns.
- The Central Business Corridor Transit Planning study, which required close consideration and integration with the current study, recommended ongoing coordination for connecting transit lines between the Northland and Downtown.
- The need for highway and bridge improvements over the river would snowball into needing to address concerns for the downtown freeway loop travel analyses and land use concerns. It was decided to add the Downtown Loop to the scope due to this finding.

In order to address the maximum number of goals, the recommended improvements consisted of the following:

- Increased Bike/Ped considerations at the Heat of America Bridge as well as additional access along l-29 interchange improvements.
- Expanding the existing bus services in the Northland along with implementing a fixed guideway transit line from the vicinity of I-29 and U.S. 169 to Downtown. Continuing to plan for an improved transit line from Downtown to KCI.
- Client Ventures - Adding ITS variable messaging signs on U.S. 169 and Route 9 corridors as part of MoDOT's KC Scout project. Implementing Mid America Regional Council's (MARC) regional transportation demand management policies and tools along the corridor.
- I-29 Corridor - Reconstruct/upgrade existing interchanges and widen and upgrade mainline lanes from U.S. 169 to the Downtown Loop.
- Improve access in and out of the Downtown Loop and coordinate with other studies currently underway.
- Continue to watch for joint development opportunities with space provisions for fixed guideway transit.

Benefit of Proposed Project: To better serve the Northland, these improvements would benefit the I-29 system preservation with all the interchange and mainline improvements. The quality of life would increase due to the addition of improved transit services, Northland mobility, and enhanced highway and bridge connections across the Missouri River for both transit and nonmotorized vehicles accessing Downtown. Other benefits would include safety improvements when reconstructing the l-29 corridor, continuing to promote land use and development goals from FOCUS, and improving the connection between the regional economies of the Northland and Downtown.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The historical comparison of the Northland Downtown (MIS) to the current study area conditions will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist and if these recommendations may apply to the current study.

## Project Number 2

Project Title: I-29/I-35 Paseo Bridge Final Environmental Impact Statement (FEIS)
Project Sponsor: Missouri Department of Transportation, in coordination with the Federal Highway Administration

Date/Last Updated Date: 2006

## Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): NEPA

Relevant Files Available: The final report is available upon request in hard copy format.
Project Purpose: The purpose of the I-29/l-35 proposed reconstruction was originally to satisfy the goals and objectives identified in previous studies: the Northland-Downtown MIS (as previously mentioned), and the Kansas City Area Long Range Transportation Plan. This project would serve to improve the safety and efficiency of trips along the 4.7 -mile section of I-29/I-35, focusing on the bridge connection between the Northland and the Kansas City Central Business District (CBD). Specifically, this project would look to replace the deteriorating infrastructure and update intersections to improve traffic operations and safety, improve the linkage and capacity demands across the Missouri River, and better facilitate the movement of trucks.

Project Summary (Background, Key Findings, Recommendations): With the research and background already established from previous studies, this project began looking at operational and capacity modifications from the northern terminus at Armour Road to the southern terminus connecting to the existing CBD freeway loop. This corridor encompasses the Paseo Bridge which carries I-29/l-35 traffic across the Missouri River. A wide range of concepts were initially considered based on previous study recommendations. These initial concepts were then screened down to determine which concepts would generally achieve the goals of the project. Following MARC's travel demand model, the various build concepts were also screened using Level of Service (LOS) as the operational condition's measurement tool. With concept screening and LOS consideration, it was determined that a no build, and two future build alternatives would be carried forward for further deliberation.

- No-Build
- Widen to Six Through Lanes / Reserve for Two Additional Lanes
- Widen to Six Through Lanes / Reserve for Two Additional High Occupancy Vehicle (HOV) Lanes

The project corridor was then split into three subcorridors for evaluation purposes. The subcorridors and the various alternatives are summarized below:

- North Subcorridor (M-210/Armour Road to $14^{\text {th }}$ Avenue): The Build alternative included widening the l-29/l-35 mainline to six through lanes while also reserving two additional lanes for the future and modifying the interchange at M-210/Armour Road and the half interchange at $16^{\text {th }}$ Avenue.
- River Crossing Subcorridor (14 ${ }^{\text {th }}$ Avenue to Dora Street): The Build alternative widened the corridor to six through lanes with sufficient right-of-way to eventually widen to eight, and also rehabilitate the Paseo bridge along with several other interchange options. The bridge improvement included fully replacing the Paseo Bridge.
- CBD North Loop Subcorridor (Dora Street to Broadway Boulevard): The Build alternative included modifications to the north leg of the CBD Loop, and several corridor interchange options. The connection from I-29/I-35 to the CBD Loop maintains the same 6 through lane configuration, however the ramp connections once downtown had various concepts.

The selected preferred alternative was a combination of segment alternatives. The North Subcorridor Build, River Crossing Subcorridor with any of the bridge alternatives, and then the CBD North Loop subcorridor alternative. The CBD North Loop Subcorridor removed the I-35 to U.S. 24/Independence Avenue and from I-70 WB at Admiral ramps. The existing Paseo Boulevard left-hand configurations were reconstructed as right-hand configurations.

Benefit of Proposed Project: These improvements would benefit the I-29/I-35 corridor by upgrading the mainline and creating interchange and safety improvements. This would benefit the future traffic flow and system operations, in turn creating a better LOS along the corridor. Other benefits would include improving the Paseo Bridge structure and adding a safer and more efficient downtown connection.

Potential Benefit to the I-29, I-35, U.S. 169 PEL: The historical comparison of the I-29/I-35 Paseo bridge FEIS to the current study area conditions will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist and if these recommendations may apply to the current study.

## Project Number 3

Project Title: Route 152/Kansas Street and I-35 Traffic Safety and Operations Report
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: August 2018

## Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented

Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The project corridor is located in a rapidly developing area of Kansas City and Liberty in the northeast part of the study area and is being directly affected by the surrounding growth. These changes are creating significant safety and traffic congestion issues. The primary purpose of this project was to enhance the capacity and safety of the Route $152 /$ Kansas Street corridor, including the I-35 interchange, in order to address the concerns of the stakeholders in the area. Additionally, replacing the existing bridge over I- 35 would solve the concerns regarding the structural integrity of the aging structure. This project would provide safety and operational benefits to road users, support the local economic development, and improve the bridge condition.

Project Summary (Background, Key Findings, Recommendations): Located in the City of Liberty, Missouri and the City of Kansas City, Missouri, the project corridor is a combination of three separate projects (J4S3083, J4P3203, J43299) located at along Route 152/Kansas Street, encompassing both the l-35 interchange and the Route 291 intersection. This existing corridor was found to have queueing problems that exceeded the length of the necessary turn bays or caused traffic to back up into adjacent intersections. Along with traffic concerns, the crash rates along the Route 152/Kansas Street corridor were significant with Rear End crashes, Out of Control/Passing crashes, and Turning crashes being the predominant crash types.

There were four I-35 interchange alternatives: (A) Standard Diamond Interchange, (B) Single Point Urban Interchange (SPUI), (C) Diverging Diamond Interchange (DDI), and (D) Displaced Left-Turn (DLT) Diamond Interchange. Based on the operational and safety impact considerations of each alternative, the DLT diamond configuration would be the best alternative for reconstruction of the l-35/Route 152 interchange. This alternative provides the most costeffective means of meeting the needs of the key stakeholders and is recommended as the preferred option to carry through to the final design process. Other improvements include widening Route 152 to 11 ft lanes, adding dual right and left turn lanes, expanding the length of turn bays, adding through lanes between I-35 and Route 291, and many other additional improvements.

Benefit of Proposed Project: These improvements would benefit the corridor by upgrading both the Route 152/Kansas Street corridor and the I-35 Interchange. This would benefit the future traffic flow and system operations and improve the safety conditions throughout the corridor. Other benefits would include improving the l-35 bridge structure and maximizing the efficiency of the Route 521/Kansas Street mainline. At the time of this summary, the preferred alternative has been built.

Potential Benefit to I-29,I-35, U.S. 169 PEL: The Route 152/Kansas Street and I-35 Traffic Safety and Operations Report will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if other similar interchange improvements exist and if these recommendations helped improve overall l-35 corridors operations.

## Project Number 4

Project Title: I-435 Lane Balance Letter
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: September 2014

## Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented/Planned

Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to reduce the number of required lane changes by rebalancing the lane configuration along the l-435 corridor from the l-35 interchange southbound toward the Missouri River in Clay County, Missouri. This lane rebalance would improve the efficiency usage along the corridor in the southbound direction and coordinate more effectively with the volume of traffic all merging together within the project area.

Project Summary (Background, Key Findings, Recommendations): The existing corridor had poor lane continuity between the l-35 interchange and the Missouri River. Drivers traveling southbound through the I-35 interchange had to make two lane changes to stay on I-435, due to the left most through lane ending at two separate locations. The preferred alternative shifted the lanes so that the lane reduction points would occur on the right side of the traveled way. Not only did the preferred alternative improve lane continuity for southbound I-435 by removing the left-lane merge, but it also placed priority on the route with the higher volume. Rebalancing from the right side affected 284 lane changes versus the existing 1,607 lane changes from the left side.

Benefit of Proposed Project: These improvements benefited the corridor by reducing the number of forced lane changes, reducing the number of merge-related crashes, and increasing the average travel speed compared to the existing geometry. At the time of this summary, the north half of the preferred alternative had been built. The southern half was under construction.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The I-435 Lane Balance Letter will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similar lane balance improvements exist and if these recommendations may apply to the PEL study area.

## Project Number 5

Project Title: Route 45 and I-29 Traffic Safety and Operations Report
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: November 2015
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: This project is located on Route 45 at the I-29 interchange in Kansas City, Missouri. The purpose of the project was to increase both capacity and safety of the Route 45 and I-29 interchange in order to accommodate the existing and future needs in the area. The preferred alternative should be feasible, cost effective, and have minimal impacts on the surrounding environment. The project should provide road user benefits and support economic development.

Project Summary (Background, Key Findings, Recommendations): The existing project area is located in a developing portion of Kansas City, Missouri. Improving the I-29 interchange would allow for better access and mobility along Route 45 . Currently, the Route 45 and I-29 southbound ramp intersection is located in close proximity to Prairie View Road and Route 45 intersection. Before any alternatives were analyzed, the City of Kansas City, Missouri already announced the plan to relocate the intersection at Prairie View Road. Prairie View Road and Chatham would be combined and moved farther away from the I-29 interchange to the current Chatham location. This allowed for greater possibilities when dealing with the potential I-29 and Route 45 alternatives. The two build alternatives were based upon traditional diamond and diverging diamond interchanges (DDI). It was found that the traditional diamond interchange proved to be the best alternative because it met the needs of the project while remaining cost effective. The traditional diamond alternative agreed with the relocation of Prairie View Road, improved Route 45 lane continuity and tun-lane conditions, provided additional capacity for all ramps, and removed all permissive left turns from Route 45 to improve the safety conditions along the corridor.

Benefit of Proposed Project: These improvements would benefit the corridor by upgrading the Route 45 corridor and the l-29 Interchange. This would benefit the future traffic flow and system operations and improve the safety conditions. Other benefits would include economic enhancements and future development opportunities in the surrounding area. The traditional diamond had been built at the time of this summary.

Potential Benefit to I-29, I-35, U.S. 169 PEL: Route 45 and I-29 Traffic Safety and Operations Report will be beneficial to the I-29, I-35, U.S. 169 PEL study as a result of the improvements that were made along Route 45 at the I-29 Interchange.

## Project Number 6

Project Title: l-35 and Pleasant Valley Road/U.S. 69 AJR
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: October 2013
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to increase the capacity and enhance the safety of the I-35 and Pleasant Valley Road interchange in order to better accommodate the current and future needs of the surrounding users.

Project Summary (Background, Key Findings, Recommendations): The interchange connected I-35 to Pleasant Valley Road, South Liberty Parkway, and U.S. 69. Just to the west of the interchange was the intersection of Church Road and Pleasant Valley Road. The future build alternative moved the existing configuration to the east side of I-35 to give more space for nearby interchanges, such as the Church Road and Pleasant Valley Road. The goal of the preferred alternative was to increase the length of the acceleration/deceleration lanes, add fulllength auxiliary lanes, upgrade the horizontal and vertical alignment deficiencies, replace the aging infrastructure, improve route connections, and provide new facilities for pedestrian and bike access.

The preferred alternative was an "offset diamond" configuration. The interchange combines most of the interstate ramp movements into a single, signalized intersection The only ramp to not be included in the intersection is the I-35 SB on-ramp which was realigned as the southbound leg of the Pleasant Valley Road and Church Road interchange.

Benefit of Proposed Project: This preferred alternative mitigated the existing and future congestion issues and safety deficiencies along the corridor and provided road user benefits and supports economic development. At the time of this summary, the build alternative has been built.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The I-35 and Pleasant Valley Road AJR will be beneficial to the I-29, I-35, U.S. 169 PEL study evaluate the current operations in the study area.

## Project Number 7

Project Title: U.S. 69 \& Pleasant Valley Road Corridor Sustainability Places Plan
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: October 2013

Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Feasibility

Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to determine the best way to benefit the U.S. 69/Pleasant Valley Road Corridor through the MARC Planning Sustainable Places grant. A project team, consisting of a variety of stakeholders, was assembled to provide the best opportunities for the corridor. The development goals of the project were to improve the aesthetic quality and visibility of businesses, attract new businesses, improve connectivity to local parks and train networks, increase housing density and attract mixed use development along the corridor. The transportation goals of the project included improving the safety and operational characteristics, creating multi-modal access, improving access management, and creating a streetscape plan to beautify and improve usage along the corridor.

Project Summary (Background, Key Findings, Recommendations): The Project corridor was broken into four segments in order to better assess what improvements were most necessary given the location. Each segment was analyzed based on land use and market analysis, planning area and housing conditions, and transportation.

The overall recommendations included focusing on land use plans and zoning ordinances to support increased residential densities, partnering with local agencies to provide housing rehabilitation programs for all ages, available housing programs, and rental and ownership housing options. The focus on housing also partnered well with parks and trail opportunities, such as regional trails and floodplain areas. Connecting trails existing trails to amenities like the Kansas City Athletic Complex was also recommended. Other recommendations focused on multi-modal opportunities like 10' wide sidewalks for trail use. Adding sidewalks to both sides of all cross sections, add pedestrian accommodations for intersection crossings, and corridor beautification along sidewalks and trails. General cross-sections were provided to show potential improvements at various locations along the corridor to match the recommendations.

This corridor was re-evaluated on Project 8 through Claycomo. Also, through KCMO, Vivion road had a similar study for Streetscape.

Benefit of Proposed Project: Every aspect of improvement would benefit the corridor by allowing for better transportation access and mobility for the surrounding residents in the study area. The efforts to beautify and improve safety would work to increase the population along the corridor while enhancing the surrounding businesses and new business that's drawn to the improved accessibility along the corridor. At the time of this summary, little-to-no land use improvements had been made.

Potential Benefit to I-29, I-35, U.S. 169 PEL: U.S. 69 \& Pleasant Valley Road Corridor Sustainability Places Plan will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similar multimodal solutions exist and if these recommendations may apply to the current study.

## Project Number 8

Project Title: Claycomo Area Transportation Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: May 2021
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to assess the transportation needs of the Village of Claycomo and its surrounding areas in order to better accommodate the current and future needs of the surrounding transportation users.

Project Summary (Background, Key Findings, Recommendations): The Village is located at the I-35, I-435, and U.S. 69 interchanges in the northeastern part of the Kansas City Metropolitan Area. Currently the corridor crash rates exceed the statewide average, and the corridor lacks other safety access like sidewalks, protected crossing locations, and dedicated bicycle infrastructure. Limited access to the major regional employer, Ford Kansas City Assembly Plant, currently causes congestion for all corridor users and the future traffic forecast derived from MARC Travel Demand Model expects traffic conditions to worsen along the corridor.

The recommendations from the study included creating a new road to address access issues at Ford and improve overall congestion throughout the corridor, improve intersection capacity to relieve intersection delays, and use concepts from complete streets to address the pedestrian and bicycle access and safety improvements along the U.S. 69 corridor.

Benefit of Proposed Project: These recommendations would provide traffic operation and safety improvements along the corridor while adding multi-modal access along U.S. 69. At the time of this summary, little-to-no improvements had been built.

Potential Benefit to I-29, I-35, U.S. 169 PEL: Claycomo Area Transportation Study will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist with safety and traffic operations, as well as multi-modal solutions and if these recommendations may apply to the current study.

## Project Number 9

Project Title: I-29/35 \& MO 210 Interchange J4P3095C
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: August 2014
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to improve the I-29/35 \& Mo 210 interchange.
Project Summary (Background, Key Findings, Recommendations): There was significant congestion on WB Mo 210 during the AM and PM peaks. The majority of the congestion occurs in the right lane, where the queue generally extends from Taney past Vernon (Mo 1). The queue frequently extends to Walker. This is because the traffic going to both NB and SB I-29/35 are required to use the right lane through these signals. It is not practical to provide enough green time to move this amount of traffic in one lane. It is also worth noting that the other two lanes, especially the center lane, are generally under-utilized. The proposed solution was to provide access to SB I-29/35 from the center lane. This would be achieved by ending the right lane at the NB onramp, ending the lane as a right-lane-must-turn-right condition. An island would be built to separate the NB and SB movements. Other future improvements could include improving the right turn radius to NB I-29/35 and improving the spacing between Taney and the NB onramp.

Benefit of Proposed Project: This project benefits the corridor by improving the safety and traffic operations along the corridor. At the time of this summary, the recommended alternative had been built.

Potential Benefit to I-29, I-35, U.S. 169 PEL: Route I-29/I-35 \& MO 210 Interchange will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist due to other interchanges facing congestion issues and if these recommendations may apply to the current study.

## Project Number 10

Project Title: I-35 J4I3111
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: February 2016
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this proposal was to increase the safety and traffic operations at the I-35/I-29 split in Clay County.

Project Summary (Background, Key Findings, Recommendations): I-35 in Clay County was redesigned to have l-35 merge from four through lanes down to three through lanes at the same location where Route 210 merges onto NB I-35. This on-ramp from westbound Route 210 receives roughly half the standard acceleration length set by AASHTO guidelines. Crash rates at this on-ramp location have dramatically increased since the corridor was redesigned. The proposed alternative increases the acceleration lane by 735 feet. This would be done by shifting the lanes so that both the left and right shoulder widths are reduced, and the merging lane is widened to 12 feet to match the other three through lanes.

Benefit of Proposed Project: This proposed alternative would greatly benefit the safety along the on-ramp from westbound Route 210 onto northbound I-35 allowing more time for traffic to merge onto l-35. This would also improve congestion and level of service at the westbound Route 210 on-ramp connection. At the time of this summary, the build alternative had been constructed.

Potential Benefit to I-29, I-35, U.S. 169 PEL: I-35 \& Route 210 on-ramp lengthening will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist due to other ramp connections facing congestion/safety issues and if these recommendations may apply to the current study.

## Project Number 11

Project Title: Southbound I-29 at U.S. 169 Traffic and Safety Report
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: October 2016
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to redesign the configuration at I-29 and U.S. 169 in Clay County, Missouri to fix the congestion experienced due to the existing ramp configurations. The first solution was to extend an auxiliary lane on southbound I-29 so that it doesn't cut off at the southbound U.S. 169 ramp but continues to the northbound U.S. 169 ramp. The second improvement was to reconfigure the southbound U.S. 169 ramp onto southbound I-29 by merging the ramp from southbound U.S. 169 onto the mainline from the inside lane while shifting the I-29 through lanes.

Project Summary (Background, Key Findings, Recommendations): At this project location, I-29 technically carries two through lanes but behaves like a single through lane due to the lane ending and beginning happening on opposite sides of the traveled way. The proposed configuration would provide two continuous through lanes throughout the entire corridor along I29. The analysis shows that this would help increase travel speeds along the corridor. It was pointed out, however, that the capacity of the interstate would be surpassed by the future year of 2040. Therefore, this specific configuration change was only analyzed through the future year of 2030. The one downfall of the proposed configuration was creating a forced merge from the southbound U.S. 169 traffic onto southbound I-29, which used to connect as an indefinite through lane. Due to the reconfiguration, the distance between the on-ramp from southbound U.S. 169 and the off-ramp to U.S. 69/Vivion Road is fixed, adding any length to the deceleration lane would require shortening the acceleration lane or shortening the lane shift. It was decided that maximizing the acceleration length for the southbound U.S. 169 on-ramp and maintaining standard lane shift distances for mainline l-29 were of greater importance than the deceleration lane length for the off-ramp to U.S. 69/Vivion Road. The deceleration length is approximately 300', which is less than the AASHTO Green Book minimum 440'. More studies and alternatives were discussed as additional recommendations to the proposed analysis.

Benefit of Proposed Project: The proposed configuration is anticipated to improve traffic safety, traffic flow, and reduce driver confusion. While the proposed improvements are not anticipated to eliminate congestion long-term, these improvements are shown to be an improvement over the existing condition. The proposed lane configuration was implemented at the time of this summary.

Potential Benefit to the I-29, I-35, U.S. 169 PEL: Route I-29 and U.S. 169 Interchange will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities exist due to other interchanges facing congestion issues and if these recommendations may apply to the current study.

## Project Number 12

Project Title: U.S. 69 Loop Crashes
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: 2017 to 2020
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Informational
Relevant Files Available: The figure is available upon request in electronic copy format.
Project Purpose: The purpose of this figure was to see the out-of-control crashes occurring at the I-35 \& U.S. 69/Vivion loop ramp. The figure differentiates the crashes if they occurred on wet or dry pavement.

Project Summary (Background, Key Findings, Recommendations): Looking at the figure, it can be observed that most of the crashes occurred along 80 feet of guardrail facing the loop offramp. The majority of crashes occurred with dry pavement conditions. Only 12 crashes (out of the 35 shown on the figure) occurred with wet pavement conditions throughout the 4 -year period. The arrows also indicate the orientation and the final resting place of the vehicles after hitting the guardrail.

Benefit of Proposed Project: This figure has the ability to provide information on the safety concerns at this location for future efforts to improve the ramp configuration. Further studies and field knowledge will need to be provided in order to assist this figure in future action.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The I-35 \& U.S. 69/Vivion loop ramp will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similar existing safety hazards are present at other locations and in what magnitude these safety hazards occur across the study area.

## Project Number 13

Project Title: 2012-2018 Freeway Pedestrian Crash Figure
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: 2012 to 2018
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Informational
Relevant Files Available: The figure is available upon request in electronic copy format.
Project Purpose: The purpose of this figure was to show the freeway pedestrian crashes from 2012 to 2018. The figure breaks the pedestrian crashes down by color coding fatal crashes and disabling injury crashes. The different symbols represent the direction of pedestrian travel and if the crash was a secondary pedestrian crash (following a vehicle-to-vehicle crash).

Project Summary (Background, Key Findings, Recommendations): From the figure, it can be observed that the majority of freeway pedestrian crashes occurred along the major interstates (I-49, I-70, I-29, and I-35). Unfortunately, the majority of the pedestrian crashes resulted in fatalities.

Benefit of Proposed Project: Overall, this figure benefits the study area by indicating where improvements need to be made to address pedestrian safety. A fence was installed on top of the median barrier on I-29 in the vicinity of Barry Road to prevent pedestrian crossings. The fence was extended to south of Mo 45 in 2019.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The freeway pedestrian crashes figure will be beneficial to the I-29, I-35, U.S. 169 PEL study to incorporate improved pedestrian safety measures throughout each corridor being studied, specifically along I-35 and I-29.

## Project Number 14

Project Title: QuikTrip Traffic Impact Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: May 2018
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Implemented
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this study was to analyze the traffic impacts regarding the relocation of QuikTrip Store \#0153. The store would move from the northeast quadrant of Armour Road and Knox Street to the southeast quadrant of Armour Road and Ozark Street.

Project Summary (Background, Key Findings, Recommendations): This study was analyzed with consideration of other recommended projects (ex: Armour Complete Street Study) along the Armour Road corridor. The general findings of the analysis concluded that two existing drives would be used as access points to the new QuikTrip location. Due to increased turning volume to the new QuikTrip location, reducing the westbound lanes along Armour Road from 3 lanes to 2 lanes, and modifications of the southbound right-turn movement at Armour Road and the southbound I-29 off-ramp were considered and eventually implemented.

One corridor recommendation was modifying the westbound lane configuration along Armour Road from east of the interchange to Ozark Street to two, instead of three, westbound through lanes. Another recommendation was to provide a 250 ' plus taper westbound left-turn lane and right-turn lane at the intersection of Armour Road and Ozark Street. Signal timing modifications would be expected to improve traffic operations and signalize the intersection of southbound I29 off-ramps and Armour Road while also adding a right-turn lane adjacent to the dual left-turn lanes at the intersection.

Benefit of Proposed Project: This study helped to improve the traffic flow along Armour Road due to the QuikTrip relocation closer to l-29. The recommendations provided smoother movement, improved safety, and better levels of service along the corridor while also coordinating with other studies along Armour Road. At the time of this summary, QuikTrip had been relocated with corresponding geometry additions.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The QuikTrip relocation TIS will be beneficial to the I-29, I-35, U.S. 169 PEL study along Armour Road as well as to determine if similar project coordination's exist along the study area and how best to implement the alignment from coexistent analysis.

## Project Number 15

Project Title: Staley Corners Traffic Impact Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: July 2019
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to look at potential traffic impacts associated with the proposed Staley Corners development, which will consist of commercial and residential land use in City of Kansas City, Clay County. The project site is located at the intersection of N Indiana Avenue and NE Barry Road. The goal is to maintain acceptable levels of service on the impacted road network.

Project Summary (Background, Key Findings, Recommendations): The project is currently surrounded by stop controlled intersections, other than the MO Route 152 interchange. NE Barry Road is classified as a four-lane Thoroughfare but is currently a two-lane roadway that has not been improved to its ultimate cross-section. It was found that the projected development would require many geometric improvements by phase. Left-turn lanes with at least 100' in length plus taper length should be constructed at NE Barry Road at Drive 3 (Phase 3) and $N$ Indiana Avenue at Drive 1 and 2 (Phase 1, 2, and 3 depending on entrance and direction of traffic). A westbound right-turn lane with the same length requirements should be constructed at NE Barry Road at Drive 3 (Phase 3). An additional southbound through lane should be constructed on N Indiana Avenue between Drive 2 and NE Barry Road (Phase 1) and a second northbound left-turn lane should be constructed on $N$ Indiana and NE Barry Rod (Phase 2). Along with the other Phase 1 improvements, a second westbound left-turn lane should be constructed on NE Barry at the intersection of N Indiana Avenue.

Benefit of Proposed Project: These recommendations will lead to better levels of service and traffic flow for admitting access into the new proposed development. The roadway improvements were assumed to be in addition to ADA accessibility, no sight impediment for pedestrians and drivers, and good levels of illumination along the roadways accessing the site. At the time of this summary, little-to-no improvements had been made.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The Staley Corners TIS will be beneficial to the I29, I-35, U.S. 169 PEL study to determine if similarities in new development along the corridor exist and what coordination needs to take place in order to maintain good levels of service and accessible use for travelers.

## Project Number 16

Project Title: Marketplace 152 Traffic Impact Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: May 2016
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this project was to examine the potential impacts of the proposed Marketplace 152 development. The project consisted of commercial land usages in Clay County, Kansas City. The site is located on the southwest corner of N Indiana Avenue and NE Barry Road. The goal was to maintain acceptable levels of service on the impacted road network.

Project Summary (Background, Key Findings, Recommendations): The project is currently surrounded by stop controlled intersections, other than the MO Route 152 interchange. NE Barry Road is classified as a four-lane Thoroughfare but is currently a two-lane roadway that has not been improved to its ultimate cross-section. Recommendations from the traffic analysis included the construction of a 250' northbound left-turn lane at Drive 2, the addition of a signalized intersection at N Indiana Avenue and NE Barry Road prior to the construction of Drives 3 or 4 or Lots $4-8$, and additional storage to the westbound right turn lane on the westbound off ramp from MO-152 should be added for a total of 350'.

Benefit of Proposed Project: These recommendations will lead to better levels of service and traffic flow for admitting access into the new proposed development. This also benefits the overlapping Staley Corners TIS study. Both studies can be used to assess that the improvements will maintain the traffic operations along the corridor due to future development. At the time of this summary, little-to-no improvements had been made.

Potential Benefit to the I-29, I-35, U.S. 169 PEL: The Market Place TIS will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities in new development along the corridor exist and what coordination needs to take place in order to maintain good levels of service and accessible use for travelers.

## Project Number 17

Project Title: Tiffany Greens Traffic Impact Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: January 2021
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electric copy format.
Project Purpose: The purpose of this project was to examine the potential impacts of the proposed development located west of N. Green Hills Road between N.W. Old Tiffany Springs Road and N.W. 108 ${ }^{\text {th }}$ Street in Kansas City, Missouri. This study area incorporates analysis on seven intersections surrounding the site.

Project Summary (Background, Key Findings, Recommendations): In general, the existing roadway network around the proposed development site consists of 2-lane open-ditch roadway sections with 10 -foot lanes and minimal shoulder. There are planned improvements along N . Green Hills Road between N.W. Old Tiffany Springs Road and N.W. 108 ${ }^{\text {th }}$ Street to improve the roadway to a three-lane section. A roundabout controlled intersection is proposed at the intersections of Tiffany Springs Parkway and N.W. 108 ${ }^{\text {th }}$ Street. However, these planned improvements had no timeline on when construction would start, therefore this study analyzed existing conditions only. At the time of this summary, the roundabout at Tiffany Springs Parkway had been added.

The analysis was broken down by the three phases of development (Phase 1, 2, and 3). The general findings concluded that the existing corridor is operating well and that there is minimal trip generation in the area. Another finding was that the planned improvements along N . Green Hills Road should be constructed no later than 2045 in order to support anticipated traffic growth and development. Also, N.W. Old Tiffany Greens Parkway, when constructed as a two-lane section, will be adequate to support the traffic generated by the proposed development.

The recommended improvements were found for Phases 2 and 3 but no recommendations were found for Phase 1. The following table includes Phase 2 and 3 recommendations.

| Intersection | Mitigation <br> Recommendation |  |
| :---: | :---: | :---: |
| Phase 2 | Development Threshold |  |
| N. Green Hills Road and <br> N.W. Tiffany Springs <br> Parkway | NB Left-Turn (250') | 45 or more trips generated in Phase ID <br> Areas 11, 12, 13, 15D, 16, or 17 |
| N. Green Hills Road and <br> N.W. Old Stagecoach <br> Road | NB Right-Turn <br> $\left(150^{\prime}\right)$ | Any construction completed within Phase <br> 2 except if in Phase ID Area 14 or 15A |
| N. Green Hills Road and <br> Drive 4 | NB Left-Turn (250') | Any construction completed within Phase <br> 2 except if in Phase ID Area 14 or 15A |
| Phase 3 |  |  |

At the time of this summary, no phases of the planned improvements had been initiated.
Benefit of Proposed Project: This study benefits the proposed development by maintaining efficient traffic flow and levels of service around the development site. This study also incorporated the other studies around the corridor and helps determine proper coordination.

Potential Benefit to I-29, I-35, U.S. 169 PEL: The Tiffany Greens TIS will be beneficial to the I29, l-35, U.S. 169 PEL study to determine if similarities in new development along the corridor exist and what coordination needs to take place in order to maintain good levels of service and accessible use for travelers.

## Project Number 18

Project Title: MO 152 \& N. Platte Purchase Drive Interchange Evaluation
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: January 2020
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this report was to document the traffic operations for the MO 152 \& N. Platte Purchase Drive interchange. The study area includes the intersections of N Fountain Hills Drive, the MO 152 westbound ramps, eastbound ramps, and the NW $88{ }^{\text {th }}$ Street intersection.

Project Summary (Background, Key Findings, Recommendations): There were six different alternatives analyzed throughout the study. It was found that the $3 / 4$ Access alternative was the preferred alternative because it preformed the best given the respective measures (Travel Time, Overall Vehicle Delay, Driver Expectations, Access to Proposed Development, etc.). The 3/4 Access alternative balanced the strengths of the RIRO and Full Access alternatives. It was recommended that the Kansas City Metro should proceed carefully when projecting increased vehicular-only movements due to the large growth in multi-modal usage. This recommendation does not fully meet the MODOT access management guidelines; therefore, it is also recommended that the existing MODOT right-of-way north of the westbound offramp from MO 152 be dedicated to the City of Kansas City, Missouri.

Benefit of Proposed Project: The proposed $3 / 4$ Access will provide a safe interchange configuration for the foreseeable future and provide additional unquantifiable benefits. These benefits include separating school traffic from commercial traffic, separating residential traffic of Fountain Hills neighborhood, and promoting growth in the Northland Region of the Kansas City Metro Area. At the time of this study, no improvements to the MO 152 \& N. Platte Purchase Drive interchange.

Potential Benefit to the I-29, I-35, U.S. 169 PEL: The MO 152 \& N. Platte Purchase Drive Interchange Evaluation will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities in interchange analysis along the corridor exist and what coordination needs to take place in order to maintain good operations while adapting to the surrounding growth and development in the area.

## Project Number 19

Project Title: Twin Creeks Village Traffic Impact Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: February 2020
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: This project incorporates a mixed-use development with 8 separate projects areas located northwest of the MO 152 \& N. Plate Purchase Drive interchange in Kansas City, Missouri. The purpose of this report was to document the traffic operations for the new development along the corresponding corridors. Twenty new access points are to be added along interconnected street network.

Project Summary (Background, Key Findings, Recommendations): This study was closely coordinated with the MO 152 \& N. Platte Purchase Drive Interchange Evaluation due to overlapping corridors. Traffic volumes and models were utilized for consistency between the two studies. Interchange analysis was not included as part of this study due to its analysis in the coordinated study.

It was recommended that Drive 8A have a three-quarter $(3 / 4)$ access option due to better operations and traffic flow at that intersection and at adjacent intersections. Specific lane geometry details at various intersections are listed in the report. No other further improvements are anticipated for the future planned traffic-volume scenario. It should be noted that proposed volumes represent a "worst case scenario" considering that the separate land uses would not typically experience their peak times simultaneously.

Benefit of Proposed Project: This analysis benefits the total study area by assessing the best way to maintain the most efficient traffic flow as possible due to the different development areas. This endeavor will generate a significant amount of traffic volume, which aligns with the City's desire to grow the area. The traffic is adequately dispersed between the various project sites and planned public infrastructure. At the time of this summary, no improvements had been made.

Potential Benefit to I-29, I-35, U.S. 169 PEL: Twin Creeks Village TIS will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities in new development along the corridor exist and what coordination needs to take place in order to maintain good levels of service and accessible use for travelers.

## Project Number 20

Project Title: Twin Creeks Walkability Study
Project Sponsor: Missouri Department of Transportation
Date/Last Updated Date: February 2020
Status (e.g., Early Feasibility/Planning, NEPA, Design, Implemented): Planning/Design
Relevant Files Available: The final report is available upon request in electronic copy format.
Project Purpose: The purpose of this study was to look at pedestrian walkability based on the design of the pedestrian environment, assigning levels of service based upon measurements of directness, continuity, ease of street crossings, visual interest, and security.

Project Summary (Background, Key Findings, Recommendations): Two external sites were considered for this study: The Manor Homes of Fox Crest and Fountain Hills. Both are residential areas within the study area. Based on the Twin Creeks Village Development, the study area is expected to provide adequate on-site pedestrian facilities, including internal routes to access the developing edges, in accordance with the City's walkability requirements. In order to improve the directness within the Twin Creeks Village development, paved pedestrian and bicycle paths should be constructed to connect both residential areas to the proposed schools. It was also recommended to connect the existing path on the south edge of the Fountain Hills subdivision to the new site on the southeast corner of N. Platte Purchase Drive and Fountain Hills Drive.

Benefit of Proposed Project: This project benefits the corridor by aligning the multi-modal aspects with the future surrounding development. The coordination with the Twin Creeks development plan will help make sure every aspect of the study area is accounted for. At the time of this summary, no improvements had been made.

Potential Benefit to I-29, I-35, U.S. 169 PEL: Twin Creeks Village Walkability Study will be beneficial to the I-29, I-35, U.S. 169 PEL study to determine if similarities in new development along the corridor exist and what coordination needs to take place in order to maintain good accessibility and use for the growing number of multimodal travelers.


# I-29, I-35, U.S. 169 PEL 

Attachment B -

## Data Collection Plan and Checklist

September 2022
In Partnership with:

Federal Highway Administration

MARC
Mid-America Regional Council

## MoDOT Data Collection Plan and Checklist

| Project Information |  |  |
| :---: | :---: | :---: |
| Project Name | I-29/I-35/U.S. 169 PEL |  |
| Project STIP ID | J413087 |  |
| Project Description | A planning study of the I-29, I-35 and U.S. 169 corridors, north of the Missouri River, to examine alternatives to reduce overall congestion and improve safety within the study limits, to serve existing and future needs, with the intent to improve traffic operations, travel time, and safety for these interstates and adjacent highways serving the northern portions of the KC Metro. |  |
| Project Location / Study Limits | I-29/I-35 - downtown loop to MO-152 U.S. 169 - from I-29 to MO-152 |  |
| City / County | Kansas City / Clay, Jackson, and Platte County |  |
| MoDOT District | KC District |  |
| MoDOT Project Manager | Juan Yin |  |
| Consultant Project Manager (Firm / Name) |  | HNTB / Kip Strauss |
| Data Collection Sub-Consultant (Firm) |  | StreetLight, GHA |
| Date of Checklist Submittal |  | 6/9/22 |

This data collection plan and checklist supplements EPG 905.3 Transportation Impact Analysis and is provided to coordinate data collection efforts for all MoDOT TIAs, traffic forecasts, capacity analyses, and other applicable projects. This document includes:

- Data Request by Discipline
- Checklist 1: General traffic count conditions that are applicable to both turning movement counts (TMCs) and roadway segment counts.
- Checklist 2: Traffic count conditions that are specific to both TMC and roadway segment counts.
- Checklist 3: Supplemental data that is needed to inform traffic capacity analysis MOEs and is to be requested in addition to traffic volumes.
- Table 1: A summary of all data collection locations for the transportation project. This table summarizes the locations, timeframes, and types of all data to be collected. This table will be populated once the available counts have been inventory and the data gaps have been identified.
- Figure 1: Please provide an accompanying map of all traffic count locations with this data collection plan and checklist. The ID number should match between Table 1 and Figure 1. Additionally, clear symbology should be provided to distinguish the types of counts in the map.

Initially, already-available data identified below will be gathered and inventoried. Then, up to ten roadway segment counts and up to ten intersection turning movement counts will be collected within the boundaries of the MoDOT Dynameq model limits to fill in holes in the available data. In addition to identifying some data to be collected initially, the Checklists below will outline the parameters by which the additional counts will be collected, even though the locations are not yet known.

The list below along with the Checklists that follow make up the data collection request. Data requested from MoDOT will note in bold "Provided by MoDOT" following the data item or "Data request to MoDOT" in the Notes section of the Checklists. Other partners (e.g. KCMO, MARC, etc.) may also be listed as data sources.

## Traffic and Safety

- A month of 2016 (current Dynameq model calibration year) - or more recent if 2016 is not available - 24-hour mainline directional ADT counts at available locations in the study area between the Missouri River and M-152 between I-635/I-29 and I-435/I-35 (see Figure 1), broken down by FHWA vehicle classifications and in 15 -minute bins (if available). At a minimum, it is our understanding that MoDOT has information available from permanent counters on I-29 south of Barry Road, I-35 south of M-152, and I-35 north of Cambridge (state line). (Provided by MoDOT)
- Kansas City Scout speed data (and volume, if reliable) for 2016 at available locations between the Missouri River and M-152 between I-635/I-29 and I-435/I-35 (see Figure 1). (Provided by KC Scout and processed by the Consultant)
- Historical turning movement counts and average daily traffic data since 2016 for any segment and intersection available between the Missouri River and M-152 between I-635/I29 and I-435/I-35 (see Figure 1). (Provided by MoDOT, Operation Green Light (OGL), and KCMO)
- The Consultant will collect minimal new traffic counts to fill gaps in the expanded Dynameq model area where no other data is available. A COVID adjustment may be applied to this data if it is deemed necessary.
- Weekday counts at up to 10 Intersections: AM (6-9) and PM (4-7) peak period Turning Movement Counts (TMC) within the study area. Exact time periods for TMC may change based on the 24 -hour counts
- 24-Hour mainline, ramp and arterial directional Average Daily Traffic (ADT) counts at up to 10 selected locations within the study area, broken down by the Federal Highway Administration (FHWA) vehicle classifications.
- Travel time data for the AM and PM peak periods from the National Performance Management Resource Data Set (NPMRDS) for 2016 data available between the Missouri River and M-152 between I-635/I-29 and I-435/I-35 (see Figure 1). (Provided by MoDOT and processed by the Consultant)
- Origin-Destination (OD) volumes and percentages within the study corridor collected using Streetlight's Advanced Analytics for 100 zones.
- Existing and proposed land uses in the study area (Provided by KCMO. Other cities will be obtained by MARC or the respective city by the Consultant)
- Existing corridor conditions and lane configurations/assignments based on field observations by the Consultant.
- Signal phasing and timing plans for all available signals in the proposed model expansion area between I-29/I-35 and M-152 (see Figure 1), including signals at ramp terminals along the boundaries. (Provided by MoDOT, KCMO, and OGL)
- Any available Synchro models that include portions of the expanded study area. (Provided by MoDOT, KCMO, and OGL)
- Relevant traffic or development studies between the Missouri River and M-152 between I-635/I-29 and I-435/l-35 (see Figure 1). (Provided by KCMO and other cities)
- Crash data - collect historical crash data for 2016-2020 on mainlines, ramps and crossing arterials. Gather statewide crash rates for the same five-year period and roadway types, as well as the latest approved crash modification factor (CMF) list. (Provided by MoDOT)


## Multimodal

- Previous Studies in the Study Area (Provided by MoDOT, KCMO and MARC)
- Northland Downtown MIS - Team already has
- I-29/I-35 EIS / IJR - Team already has
- North Oak Corridor: Complete Streets Plan
- US-69/Pleasant Valley Road Corridor Sustainable Places Plan - Team already has
- Existing and proposed bicycle and pedestrian facilities and demand at local access interchanges. This will be gathered with existing counts where available and collected with the new TMCs.
- Freight data, including truck ODs from StreetLight
- Existing transit operations including existing and proposed ridership and routes from KCATA


## Engineering

- Completed study reports, "as-built plans", existing schematic, right-of-way maps, and current aerial photography and mapping for the study corridor. Other information of this type will be provided on as needed basis. (Provided by MoDOT)
- Existing and planned major utilities (Provided by MoDOT)
- Field Reconnaissance - collect additional field data, as needed, through field investigations using windshield surveys of accessible areas.
- Existing Corridor Conditions (Provided by MoDOT)
- Pavement Inspection Reports
- Bridge Inspection Reports
- As-Built Plans
- Design Exceptions
- Existing ROW line work and ownership as needed (Provided by MoDOT)
- Survey (Topo, LIDAR, contours) (Provided by MoDOT and KCMO)


## Environmental

- Collect, assemble and review relevant, best available data for the study area from existing sources, including federal, state, regional and local governmental entities, and private companies to support the development of the PEL Study. Data collected will be limited to existing database searches, data from previously conducted studies, and windshield surveys. Field surveys and right-of-entry will not be obtained. Data needed to inform planning level environmental analysis will include:
- Land Use - existing use plans and zoning data from KCMO and other cities
- Land Cover - any local coverage of existing and/or future land cover from KCMO and other cities
- Demographics - census data and local population at an appropriate geographic level from KCMO \& MARC and other cities
- Neighborhoods and Community Resources from KCMO and other cities
- Administrative - schools, places of worship, and cemeteries from KCMO and other cities
- Visual and Aesthetic Qualities
- Existing Transportation Facilities
- Railroads -railroads, including grade crossings information
- Future railroad lines proposed
- Abandoned railroad lines
- Intermodal facilities
- Air Quality, including potential qualitative and quantitative analysis requirements during NEPA. No air quality analysis will be performed.
- Identify the NEPA "emissions burden analysis" and MOVES model necessary data. In the PEL to NEPA Transition Report, the necessary data will be discussed. No analysis will be performed.
- Noise - notable noise sensitive receptors
- Hazardous Waste - contamination and hazardous material sites from publicly available electronic databases.
- Threatened and Endangered Species - Missouri Natural Heritage Program data from Missouri Department of Conservation and US Fish \& Wildlife Service and data on wildlife habitat/migration sites patterns
- Natural Areas and Ecosystems
- Parklands/Trails/Recreation/Conservation Areas - local, state, and federal parks, trails, wildlife management areas, wilderness areas, and other resources that may qualify for Section 4(f) or 6(f) protections.
- Wetlands/Waters of the U.S./Hydric Soils - National Wetland Inventory (NWI) data and other wetlands data collected at the state, county, or municipal level
- Wetland Reserve Program areas
- Floodplains - FEMA flood prone areas (Q3 data), and any local data on flood prone areas
- Historic and Archeological Resources - Known archeological sites/districts, historic sites/districts, and properties listed on the National Register of Historic Places and city or county databases available in GIS-compatible formats
- Utilities/Transmission - major existing and proposed electric, water, communication lines
- Power Stations - existing and proposed power stations (e.g. hydro, coal)
- Topographic Maps - Digital
- Existing Mine and Quarry Locations
- Soils - NRCS Soil Survey Geographic (SSURGO) database
- Known adverse geologic conditions
- Best Available Aerial Photography - at minimum, USGS Orthophoto Quarter Quadrangle imagery, or best available imagery from state or local governments

Checklist 1: General Traffic Count Conditions

| Description | Yes | No | Notes |  |
| :--- | :--- | :--- | :--- | :--- |
| All overlapping pre-existing count data that has been collected <br> within the past three years has been compiled prior to scoping <br> and will be used to the extent possible in this Data Collection <br> Plan. Refer to https://www.modot.org/traffic-volume-maps for <br> MoDOT traffic volume maps. ${ }^{2}$ |  | $\square$ |  | This serves as a data request to MoDOT for any <br> detailed segment and intersection count data <br> available since 2016 between the Missouri River <br> and M-152 between 635/29 and 435/35 (see <br> Figure 1) |
| Data format is consistent with MoDOT needs <br> (e.g. PetraPro, Excel) |  | $\square$ | $\square$ | Excel is preferred |

[^15]I-29, I-35, U.S. 169 PEL - Baseline Conditions, Attachment B

Checklist 1 (Continued): General Traffic Count Conditions

| Description | Yes | No | Notes |
| :--- | :---: | :---: | :---: |
| Collect bi-directional data (covers all travel movements) | $\square$ | $\square$ |  |
| Use a count collection duration that is appropriate relative to the <br> project type and data needs: <br> TMC counts to estimate 24-hour volumes: Minimum <br> 12-hour duration from 6 AM to 6 PM. |  |  |  |
| - TMC counts to estimate peak hour traffic only: |  |  |  |
| Minimum two-hour duration counts from 7 AM to 9 AM |  |  |  |
| and from 4 PM to 6 PM. |  |  |  |

${ }^{1}$ Please use "Notes" to elaborate on special circumstances for data collection.

Checklist 2: TMC and Roadway Segment Traffic Count Conditions

| Count Type | Description | Yes | No | Notes |
| :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { Turning Movement } \\ & \text { Counts } \end{aligned}$ | The lesser of the intersecting roads carries at least 400 vehicles per day (if not, then please specify in the notes why an intersection that does not meet this criteria is being scoped for data collection). | $\square$ | $\square$ |  |
|  | Data is collected from all approaches (includes driveways or access connections that act as an approach) | $\square$ | $\square$ |  |
|  | Collect data in intervals that are no larger than 60-minute durations (15-minute intervals preferred) | $\square$ | $\square$ | 15-minute intervals |
|  | Pedestrians will be counted and tabulated on the approach they cross (include pedestrians within any crosswalks and/or crossing within approximately 50 feet of the intersection). | $\square$ | $\square$ |  |
|  | Bicyclists will be counted and tabulated by movement | $\square$ | $\square$ |  |
|  | Collect data for a minimum contiguous 24 - to 48 -hour period, or one to two weeks if daily variation throughout the week is desired. | $\square$ | $\square$ | 24- to 48-hours |
|  | Collect data in intervals that are no larger than 60-minute durations (15-minute intervals preferred) | $\square$ | $\square$ | 15-minute intervals |

${ }^{1}$ Please use "Notes" to elaborate on special circumstances for data collection.

Checklist 3: Supplemental Data

| Description | Yes | No | Notes |  |
| :--- | :--- | :--- | :--- | :--- |
| NPMRDS / HERE Travel Time, Segment Speed, and <br> Reliability Data | $\square$ |  | This serves as a data request to MoDOT for <br> available 2016 data between the Missouri River and <br> M-152 between I-635/I-29 and I-435/I-35 (see <br> Figure 1) |  |
| Floating Car Travel Time Runs in the Field | $\square$ | $\square$ | According to Scope travel time data from the <br> NPMRDS will be used on mainline and select <br> alternative routes. |  |
| General Traffic Observations <br> (Driver Behavior, Compliance, etc.) | $\square$ | $\square$ |  |  |
| Observations of Unique Operations (e.g., Railroad Crossing, <br> Midblock Pedestrian Crossings, Toll Operations, Ramp <br> Metering, etc.) | $\square$ | $\square$ | $\square$ | Will collect while in field |$|$| Dashcam Video of Study Area Operations |
| :--- |


| Queue Measurements or Estimates | $\square$ | $\square$ | Significant queues will be noted during field |
| :--- | :--- | :--- | :--- | observations

${ }^{1}$ Please use "Notes" to elaborate on who is responsible; when, where, and how data will be collected; or any special circumstances for data collection.

Checklist 3 (Continued): Supplemental Data

| Description | Yes | No | Notes |
| :---: | :---: | :---: | :---: |
| Signal Phasing and Timing Plans | $\square$ | $\square$ | This serves as a data request to MoDOT and KCMO for the signal phasing and timing plans for all available signals in the proposed model expansion area between $\mathrm{I}-29 / \mathrm{I}-35$ and $\mathrm{M}-152$ (see Figure 1), including signals at ramp terminals along the boundaries. |
| Field Observation of Signal Operations | $\square$ | $\square$ | Can observe a signal if needed to help model |
| Transit Data (Service Plan, Ridership, On-Time Performance, Stop Dwell Times, etc.) | $\square$ | $\square$ | Existing and proposed ridership and routes from KCATA |
| As-Built Plans or Other Geometric Information | $\square$ | $\square$ | This serves as a request for as-built plans, existing schematics, right-of-way maps, and current aerial photography and mapping for the study corridor. |
| Parking Information | $\square$ | $\square$ |  |
| Travel Demand Model Output (e.g., from MPO) | $\square$ | $\square$ | MARC will provide OD matrices as inputs to Dynameq model |
| Applicable Planning Documents (e.g. LRTP, STIP, TIP) | $\square$ | $\square$ | Existing and proposed land uses in the study area, provided by KCMO, MARC, or other cities |
| Reports from Other Relevant Studies | $\square$ | $\square$ | This serves as a data request to MoDOT and KCMO for any recent relevant traffic studies between the Missouri River and M-152 between $\mathrm{I}-635 / \mathrm{I}-29$ and $\mathrm{I}-435 / \mathrm{I}-35$ (see Figure 1) |
| Crash Data (Including Summaries, Crash Reports, Statewide Rates, etc.) | $\square$ | $\square$ | This serves as a data request for historical crash data for 2016-2020 on mainlines, ramps and crossing arterials; statewide crash rates for the same five-year period and roadway |


|  |  |  | types; as well as the latest approved crash <br> modification factor (CMF) list |
| :--- | :---: | :---: | :--- |
| Origin and Destination Study | $\square$ | $\square$ | Will use StreetLight's Advanced Analytics for 100 <br> zones. |
| Other (Please Specify) | $\square$ | $\square$ |  |

${ }^{1}$ Please use "Notes" to elaborate on who is responsible; when, where, and how data will be collected; or any special circumstances for data collection.

Table 1: Data Collection Locations

| ID | Location | Day(s) of Week | Duration / Time of Day | Type of Count | Desired Data | Is this New Data? |  | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Yes | If No, then Date of Pre-Existing Data |  |
|  | To be determined | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
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|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |
|  |  | Choose an item. | Choose an item. | Choose an item. | Choose an item. | $\square$ |  |  |

[^16]


## I-29, I-35, U.S. 169 PEL

Attachment C -
Traffic Forecasting Memo

## September 2022

Federal Highway
Administration

Mid-America Regional Council

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### 1.0 Introduction

The objective of this memorandum is to define the procedures to forecast traffic volumes for use in the operational analysis of the Missouri Department of Transportation (MoDOT) I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) study. Traffic projections will be based on historical and collected traffic data, forecasts from other area studies, and outputs from the MidAmerica Regional Council (MARC) travel demand model (TDM). The procedures described below define the approach for estimating the corridor level traffic along the I-29, I-35, and U.S. 169 corridors within the defined project limits, as shown in Figure 1.

Figure 1: Project Study Limits


### 2.0 Methodology

Table 1 below shows the number of AM and PM alternatives that will forecasted and modeled in Dynameq, the years modeled, and the subarea OD provided by MARC that will be used as input for each of the Dynameq models.

Table 1: Planned Dynameq Alternatives

| Year | MARC Subarea ODs | Dynameq No-Build <br> Alternatives | Dynameq Build <br> Alternatives |
| :---: | :---: | :---: | :---: |
| 2016 | AM and PM matrices | AM \& PM Models | NA |
| 2022 | NA | AM \& PM Models | NA |
| 2030 | AM and PM matrices with <br> TIP and LRTP projects | AM \& PM Models |  |
| 2050 | AM and PM matrices with <br> LRTP financially <br> constrained projects | AM \& PM Models | Three to ten alternative <br> improvements which could <br> look at 2030 and/or 2050 <br> and different background <br> assumptions |
| 2050 | AM and PM matrices with <br> LRTP projects and other <br> assumed capacity <br> improvements | NA | NA |

Forecast volumes will be developed for MoDOT's I-29/I-35/U.S. 169 PEL study based on the following procedures.

### 2.1 Base Year Volumes (2016)

The previously developed base year (2016) Dynameq model will be expanded to include the portion of the northland bounded by $\mathrm{I}-29, \mathrm{I}-35$, and $\mathrm{M}-152$. A subarea OD matrix of the expanded study area from the MARC model, StreetLight data, NPMRDS travel time data, KC Scout speed data, and available counts (all from 2016 if available or more recently otherwise) in this expanded area will be used to calibrate the expanded Dynameq model. New 2022 data may be collected at up to ten intersections and up to ten segments to fill gaps in otherwise available data. In places where a newer traffic count has been collected (e.g. 2017-2022), historical traffic data trends will be used to determine a reduction rate to convert volumes back to the 2016 base Dynameq model year. The resulting volumes in the 2016 expanded and calibrated Dynameq model will represent the base year volumes for this study.

### 2.2 Future No-Build Peak Hour Forecasting Methodology

Future no-build AM and PM peak hour traffic forecasts will be determined for the years 2030 and 2050. Future no-build represents a future condition where committed transportation projects have been constructed except for those directly related to this proposed project. MARC future land use will be compared against known development in the study area (i.e. new industrial development around KCl airport) and adjusted as necessary. MARC will run the travel demand model with the updated land use and provide subarea OD matrices for 2030 and 2050 which will be adjusted as necessary per existing calibration and checked against historical growth rates for reasonableness. These updated OD matrices will be used in the Dynameq model, which will be updated based on the future no-build roadway network, to generate 2030 and 2050 future nobuild traffic forecasts. In addition, an interim forecast for 2022 (existing) will be developed using
linear interpolation between 2016 and 2030. No peak spreading will be assumed in order to identify expected demand.

### 2.3 Future Build Peak Hour Forecasting Methodology

Future build AM and PM peak hour traffic forecasts will be determined for the years 2030 and 2050. In addition to the ODs provided for future no-build, MARC will provide an additional subarea OD matrix for 2050 with assumed (but not committed) capacity improvements to the roadway network. The assumed capacity improvements will be agreed on by the project team and may include improvements outside of the project limits. The three OD matrices from MARC (2030 and two 2050 scenarios) can be used in the Dynameq model to analyze varying build alternatives with and without capacity improvements that would be expected to affect demand. The MARC model will account for induced demand in terms of vehicles from other parts of the regional network shifting to the improved I-29 and I-35 corridors. No additional induced demand is assumed, such as changes to the future land use based on transportation improvements, and no peak spreading will be assumed in order to identify expected demand.


# I-29, I-35, U.S. 169 PEL 

Attachment D -

## Socio-economic Demographic Data

## September 2022

In Partnership with:


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### 1.0 Minority Percentage by Block Group

Table 1 identifies minority percentages at the census BG level. A highlighted row indicates the BG has a minority percentage equal to or greater than $50 \%$.

Table 1: Race and Ethnicity at Census Block Group Level in Study Area

| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Not Hispa | nic or La |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some Other Race | Two or More Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 202.01 | 1 | 1110 | 670 | 77 | 14 | 67 | 43 | 3 | 84 | 152 | 440 | 40\% |
| 202.01 | 2 | 1553 | 815 | 349 | 12 | 77 | 14 | 8 | 93 | 185 | 738 | 48\% |
| 202.01 | 3 | 911 | 524 | 95 | 5 | 60 | 9 | 2 | 50 | 166 | 387 | 42\% |
| 202.01 | 4 | 757 | 429 | 87 | 7 | 125 | 12 | 3 | 38 | 56 | 328 | 43\% |
| 202.01 | 5 | 1092 | 591 | 220 | 10 | 88 | 6 | 6 | 41 | 130 | 501 | 46\% |
| 202.02 | 1 | 1219 | 959 | 39 | 0 | 35 | 0 | 2 | 84 | 100 | 260 | 21\% |
| 202.02 | 2 | 1944 | 1296 | 234 | 4 | 171 | 0 | 2 | 85 | 152 | 648 | 33\% |
| 202.02 | 3 | 772 | 671 | 18 | 1 | 0 | 0 | 3 | 31 | 48 | 101 | 13\% |
| 202.02 | 4 | 932 | 713 | 44 | 4 | 16 | 0 | 3 | 56 | 96 | 219 | 23\% |
| 203 | 1 | 674 | 495 | 58 | 3 | 22 | 4 | 1 | 39 | 52 | 179 | 27\% |
| 203 | 2 | 1776 | 1123 | 201 | 25 | 109 | 24 | 3 | 105 | 186 | 653 | 37\% |
| 203 | 3 | 1423 | 1017 | 68 | 10 | 34 | 5 | 0 | 110 | 179 | 406 | 29\% |
| 203 | 4 | 1636 | 1030 | 211 | 8 | 105 | 8 | 11 | 88 | 175 | 606 | 37\% |
| 203 | 5 | 1179 | 628 | 220 | 4 | 145 | 3 | 2 | 45 | 132 | 551 | 47\% |


| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Not Hispanic or Latino |  |  |  |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some <br> Other <br> Race | Two or More <br> Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 204 | 1 | 988 | 741 | 42 | 0 | 59 | 0 | 5 | 39 | 102 | 247 | 25\% |
| 204 | 2 | 649 | 402 | 52 | 0 | 37 | 2 | 3 | 64 | 89 | 247 | 38\% |
| 204 | 3 | 924 | 215 | 401 | 3 | 48 | 62 | 8 | 48 | 139 | 709 | 77\% |
| 205 | 1 | 927 | 458 | 258 | 1 | 38 | 1 | 5 | 69 | 97 | 469 | 51\% |
| 205 | 2 | 1260 | 883 | 104 | 7 | 30 | 1 | 8 | 91 | 136 | 377 | 30\% |
| 205 | 3 | 817 | 377 | 209 | 3 | 90 | 4 | 3 | 61 | 70 | 440 | 54\% |
| 205 | 4 | 904 | 615 | 67 | 9 | 48 | 3 | 0 | 60 | 102 | 289 | 32\% |
| 205 | 5 | 773 | 470 | 99 | 9 | 40 | 2 | 2 | 48 | 103 | 303 | 39\% |
| 205 | 6 | 629 | 444 | 61 | 2 | 10 | 0 | 5 | 30 | 77 | 185 | 29\% |
| 205 | 7 | 942 | 655 | 140 | 8 | 16 | 0 | 5 | 52 | 66 | 287 | 30\% |
| 206.02 | 1 | 664 | 427 | 55 | 1 | 20 | 0 | 2 | 62 | 97 | 237 | 36\% |
| 206.02 | 2 | 718 | 504 | 85 | 6 | 7 | 4 | 4 | 29 | 79 | 214 | 30\% |
| 206.02 | 3 | 951 | 601 | 159 | 7 | 24 | 0 | 3 | 49 | 108 | 350 | 37\% |
| 206.02 | 4 | 1138 | 571 | 313 | 0 | 46 | 5 | 6 | 92 | 105 | 567 | 50\% |
| 206.02 | 5 | 946 | 264 | 440 | 2 | 32 | 14 | 7 | 85 | 102 | 682 | 72\% |
| 206.03 | 1 | 875 | 635 | 35 | 5 | 11 | 0 | 4 | 85 | 100 | 240 | 27\% |
| 206.03 | 2 | 790 | 606 | 35 | 0 | 10 | 1 | 4 | 70 | 64 | 184 | 23\% |
| 206.03 | 3 | 1924 | 1332 | 225 | 7 | 22 | 12 | 19 | 118 | 189 | 592 | 31\% |
| 206.03 | 4 | 607 | 412 | 48 | 1 | 7 | 7 | 3 | 50 | 79 | 195 | 32\% |
| 206.04 | 1 | 1959 | 926 | 586 | 4 | 57 | 5 | 10 | 116 | 255 | 1033 | 53\% |
| 206.04 | 2 | 742 | 531 | 23 | 4 | 29 | 10 | 0 | 64 | 81 | 211 | 28\% |
| 206.04 | 3 | 715 | 501 | 36 | 8 | 10 | 11 | 2 | 56 | 91 | 214 | 30\% |


| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Not Hispanic or Latino |  |  |  |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some Other Race | Two or More Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 206.04 | 4 | 1190 | 775 | 112 | 10 | 20 | 4 | 1 | 92 | 176 | 415 | 35\% |
| 206.04 | 5 | 878 | 566 | 104 | 3 | 32 | 0 | 1 | 61 | 111 | 312 | 36\% |
| 208.02 | 1 | 1930 | 1649 | 55 | 9 | 22 | 0 | 2 | 101 | 92 | 281 | 15\% |
| 208.02 | 2 | 726 | 584 | 41 | 2 | 6 | 1 | 3 | 43 | 46 | 142 | 20\% |
| 208.03 | 1 | 1403 | 1082 | 89 | 12 | 6 | 18 | 6 | 94 | 96 | 321 | 23\% |
| 208.03 | 2 | 538 | 394 | 35 | 1 | 0 | 3 | 4 | 44 | 57 | 144 | 27\% |
| 208.03 | 3 | 965 | 804 | 34 | 5 | 14 | 1 | 3 | 44 | 60 | 161 | 17\% |
| 209.01 | 1 | 1129 | 879 | 82 | 1 | 51 | 4 | 1 | 31 | 80 | 250 | 22\% |
| 209.01 | 2 | 1525 | 1090 | 90 | 4 | 76 | 1 | 6 | 111 | 147 | 435 | 29\% |
| 209.01 | 3 | 1108 | 787 | 119 | 6 | 9 | 8 | 1 | 60 | 118 | 321 | 29\% |
| 209.01 | 4 | 1006 | 740 | 39 | 3 | 24 | 3 | 3 | 73 | 121 | 266 | 26\% |
| 209.01 | 5 | 1339 | 1068 | 53 | 1 | 30 | 6 | 2 | 76 | 103 | 271 | 20\% |
| 209.02 | 1 | 1571 | 1180 | 85 | 16 | 32 | 3 | 3 | 88 | 164 | 391 | 25\% |
| 209.02 | 2 | 991 | 719 | 46 | 6 | 13 | 2 | 6 | 75 | 124 | 272 | 27\% |
| 210.01 | 1 | 904 | 622 | 116 | 3 | 12 | 8 | 4 | 66 | 73 | 282 | 31\% |
| 210.01 | 2 | 1159 | 655 | 196 | 4 | 12 | 17 | 7 | 72 | 196 | 504 | 43\% |
| 210.01 | 3 | 911 | 677 | 43 | 10 | 10 | 3 | 10 | 64 | 94 | 234 | 26\% |
| 210.01 | 4 | 742 | 623 | 13 | 5 | 7 | 6 | 0 | 34 | 54 | 119 | 16\% |
| 210.03 | 1 | 1900 | 1305 | 268 | 9 | 57 | 6 | 11 | 88 | 156 | 595 | 31\% |
| 210.03 | 2 | 984 | 772 | 44 | 3 | 24 | 5 | 3 | 60 | 73 | 212 | 22\% |
| 210.03 | 3 | 1231 | 983 | 79 | 1 | 31 | 1 | 15 | 63 | 58 | 248 | 20\% |
| 210.04 | 1 | 654 | 464 | 33 | 2 | 21 | 2 | 1 | 62 | 69 | 190 | 29\% |


| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not Hispanic or Latino |  |  |  |  |  |  |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some Other <br> Race | Two or More Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 210.04 | 2 | 664 | 525 | 25 | 0 | 17 | 6 | 1 | 41 | 49 | 139 | 21\% |
| 210.04 | 3 | 1172 | 865 | 94 | 9 | 15 | 5 | 3 | 67 | 114 | 307 | 26\% |
| 210.04 | 4 | 578 | 459 | 14 | 0 | 2 | 0 | 1 | 39 | 63 | 119 | 21\% |
| 211.01 | 1 | 750 | 544 | 42 | 3 | 19 | 9 | 6 | 42 | 85 | 206 | 27\% |
| 211.01 | 2 | 739 | 614 | 29 | 1 | 12 | 6 | 8 | 31 | 38 | 125 | 17\% |
| 211.01 | 3 | 1347 | 1013 | 106 | 2 | 26 | 12 | 4 | 84 | 100 | 334 | 25\% |
| 211.01 | 4 | 785 | 645 | 19 | 5 | 6 | 3 | 2 | 42 | 63 | 140 | 18\% |
| 211.01 | 5 | 811 | 564 | 95 | 7 | 11 | 16 | 3 | 53 | 62 | 247 | 30\% |
| 211.01 | 6 | 691 | 471 | 34 | 12 | 9 | 13 | 0 | 65 | 87 | 220 | 32\% |
| 211.03 | 1 | 937 | 707 | 67 | 3 | 15 | 2 | 6 | 54 | 83 | 230 | 25\% |
| 211.03 | 2 | 1184 | 898 | 64 | 4 | 14 | 14 | 12 | 78 | 100 | 286 | 24\% |
| 211.03 | 3 | 861 | 620 | 37 | 11 | 10 | 26 | 6 | 89 | 62 | 241 | 28\% |
| 211.03 | 4 | 790 | 561 | 76 | 2 | 9 | 29 | 3 | 42 | 68 | 229 | 29\% |
| 211.04 | 1 | 760 | 665 | 25 | 0 | 16 | 1 | 0 | 19 | 34 | 95 | 13\% |
| 211.04 | 2 | 929 | 708 | 49 | 1 | 24 | 4 | 9 | 35 | 99 | 221 | 24\% |
| 211.04 | 3 | 648 | 373 | 109 | 4 | 29 | 63 | 4 | 31 | 35 | 275 | 42\% |
| 211.04 | 4 | 850 | 598 | 75 | 1 | 16 | 30 | 4 | 73 | 53 | 252 | 30\% |
| 211.05 | 1 | 1207 | 754 | 261 | 8 | 13 | 15 | 1 | 77 | 78 | 453 | 38\% |
| 211.05 | 2 | 1009 | 737 | 52 | 1 | 15 | 6 | 7 | 98 | 93 | 272 | 27\% |
| 211.05 | 3 | 750 | 595 | 22 | 0 | 26 | 0 | 5 | 51 | 51 | 155 | 21\% |
| 211.05 | 4 | 770 | 552 | 27 | 5 | 7 | 0 | 7 | 76 | 96 | 218 | 28\% |
| 212.04 | 1 | 1070 | 616 | 90 | 2 | 89 | 16 | 6 | 78 | 173 | 454 | 42\% |


| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Not Hispanic or Latino |  |  |  |  |  |  | Hispanic or Latino | Total Minority Population | Minority Percentage |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some <br> Other <br> Race | Two or More <br> Races |  |  |  |
| 212.04 | 2 | 2038 | 1208 | 351 | 10 | 53 | 16 | 12 | 148 | 240 | 830 | 41\% |
| 212.04 | 3 | 1091 | 733 | 113 | 5 | 45 | 0 | 2 | 71 | 122 | 358 | 33\% |
| 212.04 | 4 | 1480 | 1001 | 132 | 6 | 46 | 16 | 7 | 106 | 166 | 479 | 32\% |
| 212.08 | 1 | 1229 | 918 | 85 | 7 | 20 | 7 | 4 | 64 | 124 | 311 | 25\% |
| 212.08 | 2 | 728 | 478 | 78 | 12 | 17 | 3 | 5 | 36 | 99 | 250 | 34\% |
| 212.08 | 3 | 913 | 441 | 280 | 0 | 24 | 14 | 6 | 55 | 93 | 472 | 52\% |
| 212.08 | 4 | 1346 | 846 | 233 | 2 | 35 | 13 | 7 | 78 | 132 | 500 | 37\% |
| 212.08 | 5 | 653 | 325 | 211 | 2 | 14 | 2 | 5 | 38 | 56 | 328 | 50\% |
| 212.08 | 6 | 1189 | 852 | 100 | 7 | 45 | 20 | 2 | 65 | 98 | 337 | 28\% |
| 212.09 | 1 | 843 | 613 | 97 | 0 | 14 | 2 | 2 | 45 | 70 | 230 | 27\% |
| 212.09 | 2 | 1526 | 1158 | 72 | 8 | 48 | 9 | 6 | 67 | 158 | 368 | 24\% |
| 212.09 | 3 | 2092 | 1686 | 122 | 7 | 59 | 1 | 7 | 79 | 131 | 406 | 19\% |
| 212.1 | 1 | 1915 | 1370 | 151 | 6 | 144 | 1 | 6 | 70 | 167 | 545 | 28\% |
| 212.1 | 2 | 897 | 663 | 65 | 4 | 62 | 0 | 3 | 46 | 54 | 234 | 26\% |
| 212.1 | 3 | 642 | 459 | 51 | 0 | 23 | 5 | 8 | 50 | 46 | 183 | 29\% |
| 212.1 | 4 | 914 | 652 | 103 | 0 | 40 | 2 | 2 | 39 | 76 | 262 | 29\% |
| 212.11 | 1 | 1463 | 1085 | 97 | 8 | 32 | 4 | 9 | 105 | 123 | 378 | 26\% |
| 212.11 | 2 | 1341 | 1060 | 100 | 2 | 31 | 1 | 3 | 57 | 87 | 281 | 21\% |
| 212.12 | 1 | 2765 | 1977 | 268 | 3 | 92 | 4 | 15 | 198 | 208 | 788 | 28\% |
| 212.12 | 2 | 2118 | 1456 | 239 | 6 | 94 | 10 | 6 | 149 | 158 | 662 | 31\% |
| 212.12 | 3 | 1871 | 1444 | 122 | 10 | 70 | 7 | 2 | 83 | 133 | 427 | 23\% |
| 212.13 | 1 | 1145 | 801 | 77 | 4 | 36 | 2 | 9 | 80 | 136 | 344 | 30\% |


|  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Race/EthnicityNot Hispanic or Latino |  |  |  |  |  |  |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some Other Race | Two or More Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 212.13 | 2 | 2048 | 1076 | 590 | 9 | 55 | 9 | 12 | 112 | 185 | 972 | 47\% |
| 212.14 | 1 | 1417 | 1069 | 129 | 0 | 63 | 0 | 4 | 58 | 94 | 348 | 25\% |
| 213.03 | 1 | 2795 | 2278 | 98 | 8 | 59 | 3 | 6 | 188 | 155 | 517 | 18\% |
| 213.03 | 2 | 910 | 810 | 38 | 3 | 18 | 0 | 0 | 20 | 21 | 100 | 11\% |
| 213.03 | 3 | 1360 | 1154 | 34 | 5 | 56 | 0 | 2 | 60 | 49 | 206 | 15\% |
| 213.07 | 1 | 804 | 498 | 127 | 3 | 35 | 18 | 3 | 48 | 72 | 306 | 38\% |
| 213.07 | 2 | 858 | 561 | 67 | 3 | 68 | 3 | 5 | 58 | 93 | 297 | 35\% |
| 213.07 | 3 | 1299 | 989 | 57 | 1 | 68 | 5 | 10 | 76 | 93 | 310 | 24\% |
| 213.07 | 4 | 1743 | 1355 | 78 | 9 | 50 | 0 | 4 | 108 | 139 | 388 | 22\% |
| 213.07 | 5 | 1007 | 640 | 183 | 4 | 23 | 3 | 1 | 54 | 99 | 367 | 36\% |
| 213.07 | 6 | 1911 | 1465 | 130 | 8 | 67 | 6 | 10 | 95 | 130 | 446 | 23\% |
| 213.09 | 1 | 1552 | 1256 | 96 | 3 | 78 | 0 | 2 | 42 | 75 | 296 | 19\% |
| 213.09 | 2 | 1819 | 1520 | 63 | 0 | 120 | 0 | 2 | 53 | 61 | 299 | 16\% |
| 213.09 | 3 | 2540 | 2179 | 50 | 4 | 89 | 0 | 2 | 138 | 78 | 361 | 14\% |
| 213.12 | 1 | 1888 | 1522 | 69 | 4 | 86 | 2 | 8 | 98 | 99 | 366 | 19\% |
| 213.12 | 3 | 3927 | 3264 | 160 | 7 | 81 | 1 | 6 | 193 | 215 | 663 | 17\% |
| 213.13 | 1 | 1997 | 1573 | 85 | 7 | 31 | 3 | 7 | 127 | 164 | 424 | 21\% |
| 213.13 | 2 | 2039 | 1595 | 100 | 5 | 33 | 7 | 11 | 140 | 148 | 444 | 22\% |
| 213.13 | 3 | 1275 | 999 | 57 | 5 | 22 | 1 | 11 | 77 | 103 | 276 | 22\% |
| 214.01 | 2 | 1446 | 1289 | 23 | 1 | 0 | 1 | 3 | 60 | 69 | 157 | 11\% |
| 214.01 | 3 | 1622 | 1356 | 81 | 5 | 23 | 0 | 9 | 75 | 73 | 266 | 16\% |
| 214.03 | 1 | 1629 | 1346 | 56 | 12 | 11 | 0 | 3 | 110 | 91 | 283 | 17\% |


| Race/Ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Not Hispanic or Latino |  |  |  |  |  |  |  |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some <br> Other <br> Race | Two or More Races | Hispanic or Latino | Total <br> Minority Population | Minority Percentage |
| 214.04 | 1 | 2038 | 1641 | 133 | 9 | 11 | 8 | 13 | 115 | 108 | 397 | 19\% |
| 214.04 | 2 | 1261 | 1065 | 60 | 4 | 17 | 0 | 9 | 64 | 42 | 196 | 16\% |
| 214.04 | 3 | 1517 | 1268 | 58 | 3 | 13 | 1 | 5 | 94 | 75 | 249 | 16\% |
| 218.08 | 2 | 2285 | 1888 | 108 | 10 | 81 | 4 | 6 | 83 | 105 | 397 | 17\% |
| 218.08 | 3 | 1354 | 1057 | 103 | 5 | 9 | 0 | 1 | 64 | 115 | 297 | 22\% |
| 221 | 1 | 622 | 480 | 34 | 4 | 18 | 3 | 5 | 24 | 54 | 142 | 23\% |
| 221 | 2 | 748 | 587 | 84 | 1 | 26 | 0 | 0 | 8 | 42 | 161 | 22\% |
| 221 | 3 | 1506 | 980 | 189 | 4 | 45 | 18 | 9 | 92 | 169 | 526 | 35\% |
| 221 | 4 | 799 | 462 | 170 | 5 | 19 | 10 | 0 | 37 | 96 | 337 | 42\% |
| 221 | 5 | 579 | 399 | 68 | 1 | 11 | 11 | 1 | 30 | 58 | 180 | 31\% |
| 221 | 6 | 1089 | 816 | 111 | 0 | 7 | 4 | 13 | 49 | 89 | 273 | 25\% |
| 222 | 1 | 1221 | 840 | 79 | 10 | 22 | 1 | 9 | 86 | 174 | 381 | 31\% |
| 222 | 2 | 2121 | 1495 | 112 | 8 | 19 | 4 | 21 | 156 | 306 | 626 | 30\% |
| 222 | 3 | 768 | 593 | 21 | 3 | 13 | 0 | 12 | 45 | 81 | 175 | 23\% |
| 223.02 | 1 | 2783 | 2305 | 71 | 11 | 25 | 1 | 7 | 139 | 224 | 478 | 17\% |
| 223.02 | 2 | 873 | 753 | 11 | 1 | 10 | 0 | 0 | 42 | 56 | 120 | 14\% |
| 223.02 | 3 | 17 | 7 | 0 | 0 | 2 | 0 | 0 | 5 | 3 | 10 | 59\% |
| 223.02 | 4 | 1926 | 1685 | 40 | 3 | 28 | 0 | 8 | 81 | 81 | 241 | 13\% |
| 300.03 | 1 | 2554 | 1654 | 360 | 5 | 163 | 4 | 15 | 166 | 187 | 900 | 35\% |
| 301.03 | 1 | 1282 | 1026 | 67 | 8 | 23 | 10 | 2 | 75 | 71 | 256 | 20\% |
| 301.03 | 3 | 1204 | 969 | 26 | 4 | 17 | 3 | 15 | 72 | 98 | 235 | 20\% |
| 301.03 | 4 | 1149 | 665 | 241 | 4 | 56 | 16 | 0 | 75 | 92 | 484 | 42\% |




|  |  |  |  |  | Rac | /Ethnic |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Not Hispa | nic or La | tino |  |  |  |  |  |
| Census Tract | Census Block | Total Population | White | Black or African American | American Indian and Alaska Native | Asian | Native Hawaiian and Other Pacific Islander | Some <br> Other <br> Race | Two or More Races | Hispanic or Latino | Total Minority Population | Minority Percentage |
| 152 | 2 | 803 | 625 | 40 | 6 | 58 | 1 | 6 | 40 | 27 | 178 | 22\% |
| 152 | 3 | 344 | 200 | 72 | 8 | 10 | 0 | 3 | 21 | 30 | 144 | 42\% |
| 154.01 | 1 | 392 | 112 | 183 | 16 | 15 | 1 | 4 | 21 | 40 | 280 | 71\% |
| 154.01 | 2 | 418 | 172 | 175 | 2 | 2 | 1 | 2 | 16 | 48 | 246 | 59\% |
| 154.01 | 3 | 1328 | 31 | 814 | 3 | 44 | 0 | 3 | 44 | 389 | 1297 | 98\% |
| 154.02 | 2 | 645 | 179 | 302 | 0 | 112 | 2 | 0 | 20 | 30 | 466 | 72\% |
| 155 | 1 | 370 | 201 | 34 | 1 | 15 | 0 | 0 | 8 | 111 | 169 | 46\% |
| 157.02 | 3 | 645 | 356 | 129 | 2 | 33 | 2 | 2 | 48 | 73 | 289 | 45\% |
| 159 | 1 | 762 | 445 | 74 | 0 | 179 | 0 | 7 | 25 | 32 | 317 | 42\% |
| 159 | 2 | 1193 | 516 | 354 | 2 | 14 | 1 | 9 | 42 | 255 | 677 | 57\% |
| Study Area Total |  | 246,397 | 173,319 | 25,977 | 956 | 8,214 | 1,531 | 1,023 | 13,953 | 21,424 | 73,078 | N/A |
| Study Area Percentage |  | N/A | 70\% | 11\% | 0\% | 3\% | 1\% | 0\% | 6\% | 9\% | N/A | 30\% |

Source: U.S. Census Bureau, 2022 Redistricting Data SF (PL 94-171), P2

### 2.0 Low Income by Block Group

Table 2 presents the distribution of low-income populations within the study area at the census BG level. A highlighted row indicates the median income of the block group is equal to or less than the 2022 DHHS poverty guideline of $\$ 27,750$.

Table 2: Low Income at Census Block Group Level in Study Area

| Census Tract | Low Income |  |
| :---: | :---: | :---: |
|  |  | Median Income |
|  | 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |
| 202.01 | 1 | $\$ 33,077$ |
| 202.01 | 2 | $\$ 58,868$ |
| 202.01 | 3 | $\$ 39,817$ |
| 202.01 | 4 | $\$ 55,536$ |
| 202.01 | 5 | $\$ 39,458$ |
| 202.02 | 1 | $\$ 89,063$ |
| 202.02 | 2 | $\$ 75,375$ |
| 202.02 | 3 | $\$ 128,261$ |
| 202.02 | 4 | $\$ 120,313$ |
| 203 | 1 | $\$ 47,083$ |
| 203 | 2 | $\$ 64,405$ |
| 203 | 3 | $\$ 36,397$ |
| 203 | 4 | $\$ 33,864$ |
| 203 | 5 | $\$ 68,819$ |
| 204 | 1 | $\$ 57,679$ |
| 204 | 2 | $\$ 65,905$ |
| 204 | 3 | $\$ 24,375$ |
| 205 | 1 | $\$ 32,658$ |
| 205 | 2 | $\$ 77,670$ |
| 205 | 3 | - |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 205 | 4 | \$113,382 |
| 205 | 5 | \$70,703 |
| 205 | 6 | \$35,139 |
| 205 | 7 | - |
| 206.02 | 1 | \$47,500 |
| 206.02 | 2 | \$46,250 |
| 206.02 | 3 | \$66,081 |
| 206.02 | 4 | \$49,886 |
| 206.02 | 5 | - |
| 206.03 | 1 | \$54,048 |
| 206.03 | 2 | \$53,958 |
| 206.03 | 3 | \$46,738 |
| 206.03 | 4 | \$52,639 |
| 206.04 | 1 | \$86,111 |
| 206.04 | 2 | \$50,598 |
| 206.04 | 3 | \$48,778 |
| 206.04 | 4 | \$59,815 |
| 206.04 | 5 | \$49,474 |
| 208.02 | 1 | \$56,970 |
| 208.02 | 2 | - |
| 208.03 | 1 | \$55,451 |
| 208.03 | 2 | \$53,558 |
| 208.03 | 3 | \$70,000 |
| 209.01 | 1 | \$125,329 |
| 209.01 | 2 | \$48,041 |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 209.01 | 3 | \$52,147 |
| 209.01 | 4 | \$93,750 |
| 209.01 | 5 | \$58,799 |
| 209.02 | 1 | \$62,692 |
| 209.02 | 2 | \$67,727 |
| 210.01 | 1 | \$33,915 |
| 210.01 | 2 | \$39,870 |
| 210.01 | 3 | \$56,875 |
| 210.01 | 4 | \$71,000 |
| 210.03 | 1 | \$56,469 |
| 210.03 | 2 | \$86,111 |
| 210.03 | 3 | \$102,875 |
| 210.04 | 1 | \$67,917 |
| 210.04 | 2 | \$44,327 |
| 210.04 | 3 | \$62,596 |
| 210.04 | 4 | \$74,821 |
| 211.01 | 1 | \$67,153 |
| 211.01 | 2 | \$60,769 |
| 211.01 | 3 | \$34,453 |
| 211.01 | 4 | \$50,804 |
| 211.01 | 5 | - |
| 211.01 | 6 | \$67,281 |
| 211.03 | 1 | \$69,864 |
| 211.03 | 2 | \$100,179 |
| 211.03 | 3 | \$60,682 |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 211.03 | 4 | \$77,783 |
| 211.04 | 1 | \$79,427 |
| 211.04 | 2 | \$52,717 |
| 211.04 | 3 | \$50,245 |
| 211.04 | 4 | \$72,396 |
| 211.05 | 1 | \$43,702 |
| 211.05 | 2 | \$71,630 |
| 211.05 | 3 | \$127,708 |
| 211.05 | 4 | \$81,736 |
| 212.04 | 1 | \$60,817 |
| 212.04 | 2 | \$52,542 |
| 212.04 | 3 | \$64,554 |
| 212.04 | 4 | - |
| 212.08 | 1 | \$56,280 |
| 212.08 | 2 | \$65,109 |
| 212.08 | 3 | \$55,799 |
| 212.08 | 4 | \$52,750 |
| 212.08 | 5 | \$39,020 |
| 212.08 | 6 | \$108,942 |
| 212.09 | 1 | \$46,458 |
| 212.09 | 2 | \$104,750 |
| 212.09 | 3 | \$92,228 |
| 212.1 | 1 | \$82,974 |
| 212.1 | 2 | \$61,875 |
| 212.1 | 3 | \$116,442 |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 212.1 | 4 | \$56,940 |
| 212.11 | 1 | \$60,451 |
| 212.11 | 2 | \$66,838 |
| 212.12 | 1 | \$104,792 |
| 212.12 | 2 | \$68,266 |
| 212.12 | 3 | \$108,587 |
| 212.13 | 1 | \$86,705 |
| 212.13 | 2 | \$49,358 |
| 212.14 | 1 | \$89,141 |
| 213.03 | 1 | \$128,289 |
| 213.03 | 2 | \$134,598 |
| 213.03 | 3 | \$191,786 |
| 213.07 | 1 | \$89,474 |
| 213.07 | 2 | \$87,457 |
| 213.07 | 3 | \$164,038 |
| 213.07 | 4 | \$130,000 |
| 213.07 | 5 | \$35,030 |
| 213.07 | 6 | \$70,809 |
| 213.09 | 1 | \$94,286 |
| 213.09 | 2 | \$188,421 |
| 213.09 | 3 | \$181,875 |
| 213.12 | 1 | \$135,000 |
| 213.12 | 3 | \$97,201 |
| 213.13 | 1 | \$81,771 |
| 213.13 | 2 | \$89,559 |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 213.13 | 3 | \$119,625 |
| 214.01 | 2 | \$107,773 |
| 214.01 | 3 | \$104,049 |
| 214.03 | 1 | \$51,828 |
| 214.04 | 1 | \$45,781 |
| 214.04 | 2 | \$101,414 |
| 214.04 | 3 | - |
| 218.08 | 2 | \$97,846 |
| 218.08 | 3 | \$106,900 |
| 221 | 1 | \$46,089 |
| 221 | 2 | \$53,191 |
| 221 | 3 | \$35,005 |
| 221 | 4 | \$50,668 |
| 221 | 5 | \$32,635 |
| 221 | 6 | \$57,431 |
| 222 | 1 | \$80,721 |
| 222 | 2 | \$78,810 |
| 222 | 3 | \$39,034 |
| 223.02 | 1 | \$85,513 |
| 223.02 | 2 | \$74,536 |
| 223.02 | 3 | - |
| 223.02 | 4 | \$134,327 |
| 300.02 | 1 | \$71,932 |
| 300.02 | 2 | \$33,173 |
| 300.02 | 3 | \$32,368 |


| Low Income |  |  |
| :---: | :---: | :---: |
| Census Tract | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |  |
| 300.03 | 1 | \$75,350 |
| 300.04 | 1 | \$80,083 |
| 300.04 | 2 | \$110,889 |
| 300.04 | 3 | \$61,084 |
| 300.04 | 4 | \$86,033 |
| 301.01 | 1 | \$87,784 |
| 301.01 | 2 | \$101,016 |
| 301.02 | 1 | \$66,205 |
| 301.02 | 2 | \$120,263 |
| 301.02 | 3 | \$99,706 |
| 301.03 | 1 | \$83,669 |
| 301.03 | 3 | \$82,740 |
| 301.03 | 4 | \$32,423 |
| 302.01 | 1 | \$98,444 |
| 302.01 | 2 | \$133,920 |
| 302.01 | 3 | \$100,141 |
| 302.01 | 4 | - |
| 302.07 | 1 | \$97,917 |
| 302.07 | 2 | \$131,513 |
| 302.07 | 3 | \$67,926 |
| 302.07 | 4 | \$103,333 |
| 302.07 | 5 | \$99,423 |
| 302.07 | 6 | \$79,063 |
| 302.1 | 1 | \$103,092 |
| 302.11 | 1 | \$98,164 |


| Low Income |  |  |
| :---: | :---: | :---: |
|  | Block Group | Median Income |
|  | 2022 DHHS Poverty Guideline ${ }^{1}=\$ 27,750$ |  |
| 302.11 | 2 | $\$ 34,492$ |
| 302.11 | 3 | $\$ 55,598$ |
| 302.12 | 1 | $\$ 87,829$ |
| 302.12 | 2 | $\$ 60,964$ |
| 302.12 | 3 | $\$ 83,500$ |
| 302.13 | 1 | $\$ 67,188$ |
| 302.13 | 2 | $\$ 65,676$ |
| 302.14 | 1 | $\$ 66,250$ |
| 302.15 | 1 | $\$ 67,794$ |
| 302.16 | 1 | $\$ 93,214$ |
| 302.16 | 2 | $\$ 74,007$ |
| 303.08 | 1 | $\$ 64,167$ |
| 303.08 | 2 | $\$ 85,272$ |
| 303.08 | 4 | $\$ 53,750$ |
| 3 | 1 | $\$ 48,953$ |
| 3 | 2 | - |
| 3 | 3 | $\$ 17,041$ |
| 10 | 2 | - |
| 10 | 3 | $\$ 25,218$ |
| 152 | 1 | $\$ 76,250$ |
| 152 | 2 | $\$ 77,361$ |
| 152 | 3 | - |
| 154.01 | 1 | $\$ 22,112$ |
| 154.01 | 2 | - |
| 154.01 | 3 | $\$ 13,200$ |
|  |  |  |
|  |  |  |


| Census Tract | Low Income |  |
| :---: | :---: | :---: |
|  | Block Group | Median Income |
| 2022 DHHS Poverty Guideline ${ }^{1}=\mathbf{\$ 2 7 , 7 5 0}$ |  |  |
| 154.02 | 2 | \$14,441 |
| 155 | 1 | \$38,333 |
| 155 | 2 | - |
| 157.02 | 3 | \$49,063 |
| 159 | 1 | \$51,841 |
| 159 | 2 | - |
| Study Area Average Median Household Income |  | \$72,984 |

Source: U.S. Census Bureau, B19013 Median Household Income in the Past 12 Months, 2020 ACS 5- Year Estimates
${ }^{1}$ The 2022 Department of Health and Human Services (DHHS) Poverty Guideline listed is for a family of four

- = median household income data not available

Source: U.S. Census Bureau, B19013 Median Household Income in the Past 12 Months, 2020 ACS 5- Year Estimates.

### 3.0 Limited English Proficiency (LEP) by Block Group

Table 3 presents the census BGs with percent of LEP. A highlighted row indicates the block group has a percent LEP greater than or equal to $5 \%$.

Table 3: Limited English Proficiency at Census Block Group Level in Study Area

| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  | Total LEP | Percent LEP |
| Census Tract | Block <br> Group | Total <br> Population 5 Yrs and Over | Percent <br> Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other |  |  |
| 202.01 | 1 | 1209 | 0\% | 0\% | 2\% | 3\% | 66 | 5\% |
| 202.01 | 2 | 1016 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 202.01 | 3 | 456 | 7\% | 0\% | 0\% | 0\% | 32 | 7\% |
| 202.01 | 4 | 629 | 0\% | 6\% | 10\% | 0\% | 97 | 15\% |
| 202.01 | 5 | 929 | 5\% | 2\% | 0\% | 0\% | 58 | 6\% |
| 202.02 | 1 | 1619 | 0\% | 0\% | 0\% | 0\% | 6 | 0\% |
| 202.02 | 2 | 1639 | 0\% | 8\% | 0\% | 1\% | 138 | 8\% |
| 202.02 | 3 | 669 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 202.02 | 4 | 787 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 203 | 1 | 398 | 7\% | 0\% | 0\% | 0\% | 27 | 7\% |
| 203 | 2 | 1982 | 1\% | 0\% | 10\% | 0\% | 229 | 12\% |
| 203 | 3 | 1403 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 203 | 4 | 1177 | 1\% | 5\% | 0\% | 0\% | 62 | 5\% |
| 203 | 5 | 1137 | 2\% | 0\% | 7\% | 0\% | 100 | 9\% |
| 204 | 1 | 942 | 0\% | 0\% | 3\% | 0\% | 30 | 3\% |
| 204 | 2 | 663 | 11\% | 0\% | 3\% | 1\% | 101 | 15\% |
| 204 | 3 | 865 | 22\% | 0\% | 0\% | 3\% | 218 | 25\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 205 | 1 | 722 | 0\% | 0\% | 4\% | 0\% | 26 | 4\% |
| 205 | 2 | 1301 | 0\% | 3\% | 0\% | 0\% | 37 | 3\% |
| 205 | 3 | 496 | 0\% | 40\% | 11\% | 0\% | 256 | 52\% |
| 205 | 4 | 998 | 1\% | 0\% | 0\% | 0\% | 7 | 1\% |
| 205 | 5 | 560 | 2\% | 2\% | 0\% | 0\% | 24 | 4\% |
| 205 | 6 | 535 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 205 | 7 | 795 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 206.02 | 1 | 388 | 9\% | 0\% | 0\% | 0\% | 33 | 9\% |
| 206.02 | 2 | 575 | 0\% | 0\% | 0\% | 2\% | 11 | 2\% |
| 206.02 | 3 | 1119 | 9\% | 0\% | 3\% | 9\% | 240 | 21\% |
| 206.02 | 4 | 871 | 3\% | 0\% | 7\% | 0\% | 90 | 10\% |
| 206.02 | 5 | 492 | 0\% | 8\% | 0\% | 14\% | 109 | 22\% |
| 206.03 | 1 | 381 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 206.03 | 2 | 1116 | 3\% | 0\% | 0\% | 0\% | 32 | 3\% |
| 206.03 | 3 | 1487 | 4\% | 0\% | 1\% | 0\% | 70 | 5\% |
| 206.03 | 4 | 773 | 0\% | 0\% | 1\% | 0\% | 4 | 1\% |
| 206.04 | 1 | 1899 | 5\% | 0\% | 0\% | 0\% | 86 | 5\% |
| 206.04 | 2 | 766 | 15\% | 0\% | 0\% | 0\% | 114 | 15\% |
| 206.04 | 3 | 607 | 12\% | 0\% | 0\% | 0\% | 72 | 12\% |
| 206.04 | 4 | 983 | 9\% | 0\% | 2\% | 0\% | 109 | 11\% |
| 206.04 | 5 | 694 | 2\% | 0\% | 0\% | 0\% | 12 | 2\% |
| 208.02 | 1 | 2151 | 1\% | 0\% | 2\% | 0\% | 56 | 3\% |
| 208.02 | 2 | 447 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 208.03 | 1 | 1922 | 0\% | 1\% | 0\% | 0\% | 25 | 1\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Total <br> Population 5 <br> Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 208.03 | 2 | 392 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 208.03 | 3 | 659 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 209.01 | 1 | 1104 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 209.01 | 2 | 1095 | 0\% | 2\% | 0\% | 0\% | 22 | 2\% |
| 209.01 | 3 | 1146 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 209.01 | 4 | 624 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 209.01 | 5 | 1483 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 209.02 | 1 | 1191 | 2\% | 1\% | 0\% | 0\% | 32 | 3\% |
| 209.02 | 2 | 713 | 4\% | 0\% | 0\% | 0\% | 27 | 4\% |
| 210.01 | 1 | 1065 | 0\% | 0\% | 0\% | 2\% | 25 | 2\% |
| 210.01 | 2 | 1109 | 3\% | 0\% | 0\% | 0\% | 36 | 3\% |
| 210.01 | 3 | 817 | 0\% | 1\% | 1\% | 0\% | 11 | 1\% |
| 210.01 | 4 | 843 | 0\% | 0\% | 0\% | 0\% | 4 | 0\% |
| 210.03 | 1 | 1725 | 0\% | 0\% | 0\% | 0\% | 14 | 1\% |
| 210.03 | 2 | 799 | 0\% | 5\% | 0\% | 0\% | 38 | 5\% |
| 210.03 | 3 | 1268 | 0\% | 1\% | 1\% | 0\% | 27 | 2\% |
| 210.04 | 1 | 537 | 4\% | 0\% | 0\% | 0\% | 20 | 4\% |
| 210.04 | 2 | 566 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 210.04 | 3 | 1271 | 5\% | 0\% | 0\% | 0\% | 68 | 5\% |
| 210.04 | 4 | 451 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.01 | 1 | 1015 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.01 | 2 | 814 | 0\% | 0\% | 1\% | 0\% | 12 | 1\% |
| 211.01 | 3 | 991 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.01 | 4 | 641 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 211.01 | 5 | 258 | 5\% | 0\% | 0\% | 0\% | 14 | 5\% |
| 211.01 | 6 | 720 | 0\% | 0\% | 2\% | 0\% | 12 | 2\% |
| 211.03 | 1 | 1039 | 1\% | 0\% | 0\% | 0\% | 10 | 1\% |
| 211.03 | 2 | 1272 | 0\% | 1\% | 0\% | 0\% | 18 | 1\% |
| 211.03 | 3 | 1051 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.03 | 4 | 657 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.04 | 1 | 566 | 0\% | 0\% | 7\% | 0\% | 38 | 7\% |
| 211.04 | 2 | 1106 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.04 | 3 | 584 | 0\% | 0\% | 7\% | 0\% | 38 | 7\% |
| 211.04 | 4 | 1092 | 0\% | 0\% | 0\% | 13\% | 143 | 13\% |
| 211.05 | 1 | 1101 | 0\% | 2\% | 0\% | 0\% | 20 | 2\% |
| 211.05 | 2 | 851 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.05 | 3 | 818 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 211.05 | 4 | 938 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.04 | 1 | 942 | 3\% | 0\% | 17\% | 0\% | 187 | 20\% |
| 212.04 | 2 | 1894 | 2\% | 0\% | 1\% | 0\% | 53 | 3\% |
| 212.04 | 3 | 545 | 4\% | 0\% | 0\% | 0\% | 22 | 4\% |
| 212.04 | 4 | 1295 | 0\% | 2\% | 0\% | 0\% | 30 | 2\% |
| 212.08 | 1 | 1377 | 0\% | 0\% | 1\% | 0\% | 14 | 1\% |
| 212.08 | 2 | 339 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.08 | 3 | 548 | 6\% | 0\% | 0\% | 0\% | 31 | 6\% |
| 212.08 | 4 | 846 | 7\% | 0\% | 0\% | 0\% | 62 | 7\% |
| 212.08 | 5 | 985 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.08 | 6 | 914 | 0\% | 2\% | 0\% | 0\% | 22 | 2\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 212.09 | 1 | 761 | 0\% | 0\% | 0\% | 13\% | 97 | 13\% |
| 212.09 | 2 | 827 | 1\% | 0\% | 2\% | 0\% | 31 | 4\% |
| 212.09 | 3 | 3409 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.1 | 1 | 2358 | 1\% | 0\% | 0\% | 0\% | 35 | 1\% |
| 212.1 | 2 | 715 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.1 | 3 | 363 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.1 | 4 | 702 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.11 | 1 | 1897 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.11 | 2 | 1039 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 212.12 | 1 | 1884 | 0\% | 0\% | 2\% | 0\% | 30 | 2\% |
| 212.12 | 2 | 1563 | 0\% | 1\% | 0\% | 0\% | 22 | 1\% |
| 212.12 | 3 | 1343 | 0\% | 0\% | 3\% | 1\% | 54 | 4\% |
| 212.13 | 1 | 1304 | 6\% | 0\% | 0\% | 0\% | 78 | 6\% |
| 212.13 | 2 | 1505 | 1\% | 5\% | 3\% | 1\% | 146 | 10\% |
| 212.14 | 1 | 1128 | 0\% | 0\% | 1\% | 0\% | 11 | 1\% |
| 213.03 | 1 | 2340 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 213.03 | 2 | 757 | 0\% | 0\% | 0\% | 1\% | 8 | 1\% |
| 213.03 | 3 | 1038 | 0\% | 1\% | 0\% | 0\% | 6 | 1\% |
| 213.07 | 1 | 867 | 0\% | 0\% | 0\% | 3\% | 26 | 3\% |
| 213.07 | 2 | 789 | 0\% | 0\% | 12\% | 0\% | 94 | 12\% |
| 213.07 | 3 | 1863 | 0\% | 0\% | 3\% | 0\% | 50 | 3\% |
| 213.07 | 4 | 1097 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 213.07 | 5 | 568 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 213.07 | 6 | 1246 | 3\% | 0\% | 0\% | 0\% | 40 | 3\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 213.09 | 1 | 1124 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 213.09 | 2 | 1358 | 0\% | 0\% | 1\% | 0\% | 11 | 1\% |
| 213.09 | 3 | 2068 | 0\% | 0\% | 2\% | 0\% | 44 | 2\% |
| 213.12 | 1 | 1804 | 1\% | 0\% | 0\% | 0\% | 21 | 1\% |
| 213.12 | 3 | 2568 | 1\% | 1\% | 0\% | 0\% | 43 | 2\% |
| 213.13 | 1 | 1007 | 2\% | 0\% | 0\% | 0\% | 20 | 2\% |
| 213.13 | 2 | 1848 | 0\% | 2\% | 2\% | 0\% | 77 | 4\% |
| 213.13 | 3 | 1412 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 214.01 | 2 | 1342 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 214.01 | 3 | 1631 | 0\% | 1\% | 0\% | 0\% | 12 | 1\% |
| 214.03 | 1 | 1541 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 214.04 | 1 | 1574 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 214.04 | 2 | 1232 | 0\% | 0\% | 0\% | 1\% | 8 | 1\% |
| 214.04 | 3 | 1588 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 218.08 | 2 | 1690 | 0\% | 0\% | 4\% | 0\% | 70 | 4\% |
| 218.08 | 3 | 1612 | 0\% | 2\% | 0\% | 0\% | 33 | 2\% |
| 221 | 1 | 419 | 0\% | 0\% | 1\% | 0\% | 3 | 1\% |
| 221 | 2 | 764 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 221 | 3 | 1624 | 6\% | 0\% | 0\% | 0\% | 91 | 6\% |
| 221 | 4 | 747 | 0\% | 0\% | 6\% | 0\% | 42 | 6\% |
| 221 | 5 | 474 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 221 | 6 | 1055 | 5\% | 0\% | 0\% | 0\% | 58 | 5\% |
| 222 | 1 | 945 | 0\% | 0\% | 2\% | 0\% | 15 | 2\% |
| 222 | 2 | 2547 | 1\% | 0\% | 0\% | 1\% | 65 | 3\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 222 | 3 | 524 | 1\% | 0\% | 0\% | 4\% | 25 | 5\% |
| 223.02 | 1 | 3154 | 1\% | 0\% | 0\% | 0\% | 25 | 1\% |
| 223.02 | 2 | 776 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 223.02 | 4 | 1753 | 0\% | 0\% | 0\% | 0\% | 2 | 0\% |
| 300.02 | 1 | 918 | 0\% | 0\% | 0\% | 3\% | 29 | 3\% |
| 300.02 | 2 | 1081 | 1\% | 0\% | 3\% | 4\% | 95 | 9\% |
| 300.02 | 3 | 973 | 0\% | 0\% | 0\% | 4\% | 44 | 5\% |
| 300.03 | 1 | 2284 | 0\% | 0\% | 7\% | 0\% | 158 | 7\% |
| 300.04 | 1 | 1104 | 1\% | 0\% | 0\% | 0\% | 11 | 1\% |
| 300.04 | 2 | 546 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 300.04 | 3 | 1339 | 4\% | 0\% | 4\% | 0\% | 100 | 7\% |
| 300.04 | 4 | 2128 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 301.01 | 1 | 2218 | 1\% | 0\% | 0\% | 0\% | 17 | 1\% |
| 301.01 | 2 | 1351 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 301.02 | 1 | 1050 | 0\% | 2\% | 2\% | 0\% | 35 | 3\% |
| 301.02 | 2 | 1023 | 1\% | 0\% | 0\% | 0\% | 10 | 1\% |
| 301.02 | 3 | 1683 | 1\% | 0\% | 0\% | 0\% | 19 | 1\% |
| 301.03 | 1 | 1454 | 0\% | 0\% | 4\% | 0\% | 62 | 4\% |
| 301.03 | 3 | 1541 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 301.03 | 4 | 610 | 0\% | 0\% | 0\% | 15\% | 94 | 15\% |
| 302.01 | 1 | 885 | 0\% | 2\% | 0\% | 4\% | 59 | 7\% |
| 302.01 | 2 | 1519 | 0\% | 4\% | 0\% | 0\% | 63 | 4\% |
| 302.01 | 3 | 1397 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.07 | 1 | 1199 | 0\% | 1\% | 4\% | 0\% | 65 | 5\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Languages Spoken by LEP Population |  |  |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 302.07 | 2 | 673 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.07 | 3 | 1442 | 1\% | 0\% | 0\% | 0\% | 17 | 1\% |
| 302.07 | 4 | 742 | 4\% | 0\% | 1\% | 0\% | 37 | 5\% |
| 302.07 | 5 | 974 | 0\% | 1\% | 0\% | 3\% | 37 | 4\% |
| 302.07 | 6 | 600 | 0\% | 2\% | 0\% | 0\% | 9 | 2\% |
| 302.1 | 1 | 1820 | 1\% | 0\% | 1\% | 0\% | 53 | 3\% |
| 302.11 | 1 | 1005 | 0\% | 0\% | 0\% | 7\% | 68 | 7\% |
| 302.11 | 2 | 607 | 2\% | 0\% | 0\% | 0\% | 14 | 2\% |
| 302.11 | 3 | 1086 | 3\% | 0\% | 1\% | 0\% | 48 | 4\% |
| 302.12 | 1 | 1191 | 0\% | 3\% | 0\% | 0\% | 39 | 3\% |
| 302.12 | 2 | 883 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.12 | 3 | 1773 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.13 | 1 | 2415 | 3\% | 3\% | 1\% | 0\% | 175 | 7\% |
| 302.13 | 2 | 758 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.14 | 1 | 2242 | 1\% | 0\% | 6\% | 0\% | 159 | 7\% |
| 302.15 | 1 | 1323 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 302.16 | 1 | 3031 | 1\% | 0\% | 0\% | 0\% | 30 | 1\% |
| 302.16 | 2 | 1318 | 0\% | 6\% | 5\% | 0\% | 140 | 11\% |
| 303.08 | 1 | 945 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 303.08 | 2 | 1154 | 3\% | 0\% | 0\% | 0\% | 36 | 3\% |
| 303.08 | 4 | 748 | 0\% | 3\% | 0\% | 0\% | 20 | 3\% |
| 3 | 1 | 834 | 3\% | 0\% | 11\% | 0\% | 124 | 15\% |
| 3 | 2 | 42 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 3 | 3 | 681 | 0\% | 0\% | 10\% | 4\% | 98 | 14\% |


| Limited English Proficiency (Speak English Less Than Very Well) |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | nguages Spoken | by LEP Population |  |  |  |
| Census Tract | Block Group | Population 5 Yrs and Over | Percent Spanish | Percent IndoEuropean | Percent Asian and Pacific Islander | Percent Other | Total LEP | Percent LEP |
| 10 | 2 | 935 | 18\% | 1\% | 0\% | 6\% | 231 | 25\% |
| 10 | 3 | 1319 | 0\% | 0\% | 3\% | 18\% | 279 | 21\% |
| 152 | 1 | 1322 | 0\% | 0\% | 1\% | 0\% | 7 | 1\% |
| 152 | 2 | 922 | 0\% | 0\% | 3\% | 4\% | 59 | 6\% |
| 152 | 3 | 334 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 154.01 | 1 | 744 | 0\% | 0\% | 13\% | 13\% | 196 | 26\% |
| 154.01 | 2 | 663 | 0\% | 0\% | 0\% | 0\% | 0 | 0\% |
| 154.01 | 3 | 930 | 3\% | 0\% | 0\% | 9\% | 118 | 13\% |
| 154.02 | 2 | 690 | 0\% | 1\% | 0\% | 6\% | 50 | 7\% |
| 155 | 1 | 334 | 3\% | 0\% | 0\% | 0\% | 11 | 3\% |
| 157.02 | 3 | 616 | 3\% | 0\% | 0\% | 0\% | 16 | 3\% |
| 159 | 1 | 796 | 2\% | 0\% | 0\% | 0\% | 15 | 2\% |
| 159 | 2 | 1156 | 0\% | 1\% | 0\% | 0\% | 7 | 1\% |
| Total for Study Area |  | 220,550 | 1\% | 1\% | 1\% | 1\% | 7,974 | 4\% |

Source: U.S. Census Bureau, B16004, Age by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over, 2020 ACS 5-Year Estimates


# I-29, I-35, U.S. 169 PEL 

Attachment E -

## Traffic Safety Analysis

Mid-America Regional Council

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## Attachments

Attachment A - Ramps and Terminals Results
Attachment B-Heatmaps

### 1.0 Introduction

As part of the I-29/I-35/U.S. 169 Planning and Environmental Linkages (PEL) study, an existing crash analysis was conducted along portions of the I-29, I-35, U.S. 169, and I-635 mainlines; three interchanges along $\mathrm{M}-152$ were also analyzed. Additionally, all system-to-system ramps, service ramps and ramp terminals within the project study corridors were analyzed. Utilizing crash data obtained from the Missouri Department of Transportation (MoDOT) for the most complete five-year period available at the time the analysis was completed (Summer 2022), 2016-2020, the existing crash analysis is intended to summarize existing crash characteristics (crash severity, crash type, and other prevailing conditions as necessary) and identify high-density crash locations. Figure 1 shows the limits of the safety analysis. These limits are slightly different from the project limits with the inclusion of the entirety of I-635 and extension of I-29, I-35, and U.S. 169 to $\mathrm{M}-152$ to provide additional analysis for potential improvements along those corridors.

Figure 1: Safety Study Limits


During the evaluation period MoDOT has undertaken several projects to improve safety and traffic flow. Analysis of the effectiveness of these projects is not included in this memo. However, the impact may be visible in the safety data presented, Projects and year completed include;

- I-29 \& Route 45 (NW 64 ${ }^{\text {th }}$ St.) interchange improvements (mainly on the crossroad): 2020
- I-35 \& Route 152 interchange improvements (mainly on the crossroad): 2019
- Southbound U.S. 169 aux lane from NW Englewood Rd to I-29: 2019
- U.S. 169 accel/decel improvements at NW Englewood Rd and NW 68 ${ }^{\text {th }}$ St: 2019
- Northbound I-29 accel improvement at Route 210 (Armour Rd): 2017
- Southbound I-29 aux lane thru U.S. 169 interchange: 2017
- I-35 \& U.S. 69/Pleasant Valley Rd/S Liberty Pkwy interchange improvements: 2016
- U.S. 169 \& NW Englewood Rd interchange improvements (mainly on crossroad): 2020


### 2.0 Existing Crash Analysis

Approximately 42 miles of freeway, split into 47 study segments, were evaluated. These study segments consisted of interchange areas (between ramp gore points) and freeway segments outside of the interchange areas. Additionally, ramps at system-to-system interchanges, ramps at service interchanges and ramp terminal intersections were evaluated but analyzed independently of the mainline analysis.

Between the years 2016-2020, 4,821 crashes were reported along freeways within the safety study limits. This represents approximately three crashes per day on average for the entirety of the five-year evaluation period. Of the 4,821 crashes reported, approximately $80 \%$ of all crashes resulted in property damage only, $20 \%$ caused some form of injury to vehicle occupants, and less than $1 \%$ of all crashes ( 21 crashes) resulted in a fatality (Figure 2). Crashes occurring along freeway segments primarily consisted of rear end (40\%), single vehicle (27\%), and sideswipe (24\%) collisions (Figure 3).

Figure 3: Crash Severity - Freeways
Figure 2: Crash Type - Freeways


As shown in Figure 2, approximately 1.5\% (76 total crashes) reported along freeways within the project study area resulted in a fatal and serious injury. Of the five freeway facilities evaluated, the majority of these crashes, approximately $62 \%$, were noted to have occurred along the I-29 corridor including the stretch of freeway shared with I-35. Fatal and serious injury crashes reported, along all five evaluated freeway facilities, primarily consisted of single vehicle collisions due to the driver losing control and colliding with a fixed object on the side of the roadway. A full breakdown of crash types for all fatal and serious injury crashes experienced along freeway mainlines can be seen in Table 1.

Table 1: Crash Type - Freeway (F+SI)

| Crash Type | Total F+SI <br> Crashes | Percentage \% |
| :---: | :---: | :---: |
| SINGLE VEHICLE | 30 | $39.5 \%$ |
| REAR END | 18 | $23.7 \%$ |
| SIDESWIPE | 9 | $11.8 \%$ |
| PEDESTRIAN | 8 | $10.5 \%$ |
| HEAD ON | 6 | $7.9 \%$ |
| ANGLE | 2 | $2.6 \%$ |
| OTHER | 2 | $2.6 \%$ |
| PARKING OR PARKED CAR | 1 | $1.3 \%$ |
| Total | $\mathbf{7 6}$ |  |

Source: 2016-2020 MoDOT Crash Data

Table 2 summarizes total crashes occurring along the five evaluated corridors within the study area.

Table 2: Freeway Summary

| Freeway | Total Crashes | Total Fatality Crashes | Total <br> Fatal and Serious Injury Crashes | Average Corridor Crash Rate (Crashes per HMVMT) | Average Corridor Fatal Crash Rate (Crashes per HMVMT) | Average Corridor Fatal + Serious Injury Crash Rate (Crashes per HMVMT) | ```Percent of Segments Above Statewide Average for Total Crashes``` | Percent of Segments Above Statewide Average for Fatal Only Crashes | Percent of <br> Segments Above Statewide Average for Fatal and Serious Injury Crashes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{gathered} \text { I-29/I-35: I-70 to } \\ \text { I-29/I-35 } \\ \text { Interchange } \\ \hline \end{gathered}$ | 1,345 | 3 | 23 | 137.56 | 0.31 | 2.36 | 78\% | 22\% | 22\% |
| I-29: l-29/l-35 Interchange to M - 152 | 1,450 | 9 | 24 | 77.12 | 0.48 | 1.28 | 42\% | 33\% | 33\% |
| I-35: I-29/I-35 Interchange to NW Barry Rd (M152) | 1,139 | 4 | 16 | 95.49 | 0.34 | 1.34 | 67\% | 33\% | 42\% |
| U.S. 169: I- 29/U.S. 169 Interchange to M- 152 | 445 | 4 | 8 | 71.01 | 0.64 | 1.28 | 57\% | 57\% | 0\% |
| I-635: Missouri River to I-29/I635 Interchange | 352 | 1 | 5 | 84.08 | 0.24 | 1.19 | 75\% | 25\% | 0\% |
| M-152: I-29 Interchange/U.S. 169 Interchange | 90 | 0 | 0 | 42.88 | 0.00 | 0.00 | 0\% | 0\% | 0\% |
| All Freeway Segments | 4,821 | 21 | 76 | - | - | - | 57\% | 32\% | 23\% |

Source: 2016-2020 MoDOT Crash Data

## Weather Conditions

Overall, weather conditions did not appear to be a leading cause for the occurrence for a majority of the crashes experienced along freeway mainlines; approximately $84 \%$ of all crashes occurred during no adverse weather conditions. Although $75 \%$ of all crashes occurred on dry roadway surfaces, $22 \%$ of crashes occurred on wet, snowy, or icy roads. With a higher percentage of single vehicle collisions experienced along study corridors, a majority of which resulted from the driver losing control, road surface conditions could potentially be a contributing factor.

## Pedestrian Involved Crashes

Pedestrian involved crashes along each freeway corridor were analyzed. These crashes include ones where a pedestrian was involved in the primary incident or a secondary incident while emergency services were responding to the primary incident. Figure 4 shows the location of the pedestrian involved crashes.

Figure 4: Pedestrian Involved Crashes


Over the 5-year study period, 18 pedestrian involved crashes occurred along the highway portions of the study area. They occurred along all corridors, however a cluster of fatal crashes occurred near the NW Barry Road interchange. Two of these directly involved the pedestrian being struck on the roadway, the other had the pedestrian struck in a secondary incident. According to crash reports several involved pedestrians walking in travel lanes and failing to move out of the path of vehicles. Overall, there does not appear to be a widespread issue with pedestrian involved crashes along the freeways.

## Substandard Geometric Features

Substandard geometric features (Gore Spacing, Acceleration and Deceleration Lane Length) identified in a separate analysis (documented in the Existing Conditions Report) were compared to crash hotspot maps for all highway corridors.

Figure 5 shows the locations of substandard gore spacing. These primarily occur along I-29 between U.S. 169 and the I-29/I-35 split, an area of high crash densities. Additionally, along the combined I-29/I-35 corridor, the on-ramps from Bedford Ave/Levee Rd have substandard spacing and sit on the edge of the crash hotspot at the southern limits of the study corridor.

Figure 5: Substandard Gore Spacing - Safety


Figure 6 shows the locations with substandard acceleration and deceleration lanes. These are all located along I-29 between U.S. 169 and the I-29/I-35 split. Five of these are located within the I-29/I-35 interchange, in an area with a high concentration of crashes.

Figure 6: Substandard Acceleration and Deceleration Lanes and Crash Density


### 2.1 I-29/I-35 Combined Corridor Analysis

The combined portion of I-29 and I-35 runs from the northeast corner of the Kansas City Downtown Loop at the Independence Avenue/The Paseo interchange approximately 5.5 miles to where they split. The corridor was split into nine (9) segments for the analysis. Between the years 2016-2020, 1,345 crashes were reported along the combined I-29/I-35 corridor, which represents
$26 \%$ of all crashes reported along freeways within the project study limits. Of the 1,345 crashes reported, approximately $77 \%$ of all crashes resulted in property damage only, $23 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes ( 3 crashes) resulted in a fatality (Figure 7). Crash types (shown in Figure 8) were primarily comprised of rear end (51\%), sideswipe (27\%), and single vehicle (15\%).

Figure 8: Crash Severity - I-29/I-35 Combined


Figure 7: Crash Type - I-29/I-35 Combined


Approximately $86 \%$ of all crashes occurred during no adverse weather conditions (Clear or Cloudy). A collective $8 \%$ of crashes were noted to have occurred on either wet, snowy, or icy roads. The weather or roadway conditions do not appear to have a significant impact on crashes along the corridor.

## Crash Rates

Interstates in Missouri have a statewide average crash rate of 80.07 crashes per hundred million vehicle miles traveled (HMVMT), a combined fatal and serious injury crash rate of 1.95 crashes per HMVMT and an average fatal crash rate of 0.40 crashes per HMVMT. Of the nine identified freeway segments on the combined I-29/l-35 corridor, eight surpassed at least one of Missouri's statewide average crash rates. Three of the nine segments (I-70 to The Paseo, Berkley Pkwy and E Front St Interchange, and NE Parvin Road Interchange) are more than double the statewide average crash rate. Two segments have fatal and combined fatal and serious injury crash rates exceeding the statewide average, I-70 to The Paseo and Bedford Ave/Levee Rd to E 14th Ave. Table 2 below shows the full breakdown.

Table 3: Crash Rates - I-29/I-35 Combined

| Segment | Segment <br> Length (mi.) | Average Daily Two-Way Traffic | Total Crash Rate (HMVMT) | Fatal Crash Rate (HMVMT) | F+SI Crash Rate (HMVMT) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| I-29/I-35-I-70 to The Paseo | 0.88 | 99,030 | 160.33* | 1.26* | 6.92* |
| I-29/I-35 - Berkley Pkwy and E Front St Interchange | 0.4 | 108,385 | 224.97* | 0.00 | 1.26 |
| I-29/I-35 - Berkley Pkwy to Levee Rd | 0.44 | 108,385 | 137.88* | 0.00 | 1.15 |
| I-29/I-35-Bedford Ave/Levee Rd Interchange | 0.36 | 108,385 | 71.62 | 0.00 | 0.00 |
| I-29/I-35-Bedford Ave/Levee Rd to E 14th Ave | 0.41 | 108,385 | 155.37* | 1.23* | 3.70* |
| I-29/I-35-E 14th Ave to E 19th Ave | 0.59 | 74,274 | 97.53* | 0.00 | 1.25 |
| I-29/I-35-Route 210 (Armour Rd) Interchange | 0.76 | 92,971 | 141.14* | 0.00 | 1.55 |
| I-29/I-35-Route 210 (Armour Rd) to NE Parvin Rd | 1.25 | 92,971 | 88.64* | 0.00 | 1.41 |
| I-29/I-35 - NE Parvin Rd Interchange | 0.45 | 92,971 | 218.72* | 0.00 | 1.31 |
|  | Missouri Statewide Average ${ }^{1}$ |  | 80.07 | 0.40 | 1.95 |

${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for an interstate facility.
*Denotes segments with crash rates higher than statewide averages

## Crash Density/Hotspots

A heatmap showing the concentration of all crashes along the I-29/l-35 corridor was created using ArcGIS to identify crash hotspots. The heatmap shows a high density of crashes from the Independence Avenue interchange north across the Kit Bond Bridge, at the Route 210 (Armour Rd) interchange and at the NE Parvin Road interchange entering the I-29/I-35 split. The areas of high crash density correspond to areas with the highest traffic volumes and rates of crashes. The crash density can be seen in Figure 9.

Figure 9: Crash Density - I-29/I-35 Combined Corridor


## Fatal and Serious Injury Crashes

The two most serious levels of crashes (fatal and serious injury) were analyzed to determine specific circumstances leading to their cause. Addressing fatal and serious injury crashes have the highest potential to save lives of the traveling public. Within the I-29/I-35 combined corridor, a total of three fatal and 20 serious injury crashes occurred during the study period. The location of these crashes can be seen in Figure 10.

Figure 10: Fatal and Suspected Serious Injury Crashes - I-29/I-35 Combined Corridor


These high severity crashes correlate to the location of the highest density of crashes along the I-29/I-35 combined corridor. The I-70 to Berkley Pkwy/E Front Street segment had two fatal crashes and ten serious injury crashes during the study period. From Bedford Ave/Levee Rd to E 14th Ave, immediately north of the Kit Bond Bridge, one fatal and four serious injury crashes were experienced. The reaming six serious injury crashes occurred on the segment between Armour Rd and Parvin Rd.

## I-70 to The Paseo

The fatal crashes involved a pedestrian and a motorcyclist. The pedestrian was struck by a vehicle traveling northbound. The motorcyclist was speeding and changing lanes erratically and struck multiple vehicles. The serious injury crashes were rear end and out of control crashes mostly under clear/dry conditions. These crashes appear to be attributed to speeding and failure to maintain control of the vehicle.

## Bedford Ave/Levee Rd to E 14th Ave

The fatal crash in this area occurred in the southbound travel lanes when a speeding driver lost control striking another vehicle. One serious injury crash involved a wrong way driver striking multiple vehicles while traveling northbound in the southbound lanes immediately north of the southbound exit ramp to Bedford Ave/Levee Rd. Another serious injury crash involved a southbound vehicle striking a pedestrian who had entered the roadway, due to a believed medical emergency leading up to the incident. The remaining serious injury crashes occurred under clear and dry conditions and resulted from to the driver losing control.

## Armour Rd to Parvin Rd

Along this segment, six serious injury crashes were experienced during the study period. two crashes, a result of a rear end collision, occurred; one when a vehicle traveling southbound lost control and struck the back of another vehicle that was actively being towed on the shoulder, and the other occurring as a vehicle traveling southbound attempted to make a lane change. The remaining serious injury crashes all occurred due to the driver losing control and colliding with a fixed object on the side of the roadway.

## I-29/I-35 Combined Corridor Conclusion

The l-29/I-35 combined corridor is typified by high crash rates throughout. Eight of the nine analysis segments exceed the statewide average crash rate for interstates, with several more than double. The area from I-70 north across the Kit Bond Bridge in particular has significantly high crash rates. Overall, this portion of the project area had primarily minor injury and property damage only crashes; however, 23 fatal and serious injury crashes did occur in the five-year period analyzed. The only commonality between many of these higher severity crashes was speeding or a vehicle overtaking one traveling slower. Crashes were primarily rear end with over $50 \%$ of all crashes, followed by sideswipe and single vehicle. This corridor did experience eight head-on crashes, these were not primarily due to wrong way drivers as 6 of the 8 occurred when vehicles crashed for other reasons and were spun around to be hit again in the front. Two were due to wrong way drivers, both occurring in the southbound lanes north of the Bedford Ave/Levee Rd interchange.

### 2.2 I-29 Corridor Analysis

An approximate 12 -mile stretch of the I-29 corridor, divided into 12 study segments, was evaluated from the I-29/l-35 split to the interchange at M-152. Between the years 2016-2020, 1,450 crashes were reported along the facility, which represents $30 \%$ of all crashes reported along freeways within the safety study limits. Of the 1,450 crashes reported, approximately $81 \%$ of all crashes resulted in property damage only, $18 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (nine crashes) resulted in a fatality (Figure 11). Crashes occurring along freeway segments primarily consisted of rear end (36\%), sideswipe (28\%), and single vehicle (27\%) collisions (Figure 12).


Figure 12: Crash Severity - I-29

Figure 11: Crash Type - I-29

Approximately $80 \%$ of all crashes occurred during no adverse weather conditions. A total of $8 \%$ of crashes were noted to have occurred on either wet, snowy, or icy roads. The weather or roadway conditions do not appear to have a significant impact on crashes along the corridor.

## Crash Rates

Of the 12 identified segments along l-29, eight were noted to have surpassed at least one of Missouri's statewide interstate average total crash rate, combined fatal and serious injury or fatal crash rate. Three distinct areas were identified and grouped based on high crash rates: the I-29/I35 interchange, the U.S. 169 interchange through the I-635 interchange, and the NW $72^{\text {nd }}$ Street interchange through the $\mathrm{M}-152$ interchange. Each area contains a crash rate in excess of statewide averages. The area between NW $72^{\text {nd }}$ Street and the M-152 interchange significantly exceeded the statewide average fatal crash rate and is discussed later in this section.

Table 4 summarizes crash rates for the 12 segments evaluated along the I-29 corridor.

Table 4: I-29 Crash Rates
$\left.\begin{array}{|c|c|c|c|c|c|}\hline \text { Segment } & \begin{array}{c}\text { Segment } \\ \text { Length } \\ \text { (mi.) }\end{array} & \begin{array}{c}\text { Total } \\ \text { Two-Way Traffic } \\ \text { Avash } \\ \text { Rate }\end{array} & \begin{array}{c}\text { Fatal } \\ \text { Crash } \\ \text { Rate } \\ \text { (HMVMT) }\end{array} & \begin{array}{c}\text { F+SI Crash } \\ \text { (HMMMT) }\end{array} \\ \text { (HMVMT) }\end{array}\right\}$
${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for an interstate facility.
*Denotes segments with crash rates higher than statewide averages

Crash Density/Hotspots
A heatmap showing the concentration of all crashes along I-29 was created. This heatmap can be seen in Figure 13: Crash Density - I-29 Corridor.

Figure 13: Crash Density - I-29 Corridor


Based on the crash heatmap shown in Figure 13, the highest density of crashes was experienced from the I-29/I-35 interchange through the I-635 interchange, a ramp dense portion of the corridor with a number of closely spaced merge/diverge points and weaving maneuvers. The majority of crashes experienced along this portion of the corridor resulted in property damage only. Additionally, the primary crash types experienced along this section of the I-29 corridor consisted of rear-end and sideswipe collisions. Due to the nature of crashes experienced on the freeway, crashes can be attributed to elevated levels of congestion, as rear-end and sideswipe collisions are usually indicative of highly congested areas and are typically attributed to lower speed crashes.

## Fatal and Serious Injury Crashes

The two most serious levels of crashes (fatal and serious injury) were analyzed to determine specific circumstances leading to their cause. Addressing Fatal and suspected serious injury crashes have the highest potential to save lives of the traveling public. Within the $\mathrm{I}-29$ corridor, a
total of nine fatal and 15 serious injury crashes occurred during the study period. The location of these crashes can be seen in Figure 14.

Figure 14: Fatal and Suspected Serious Injury Crashes - I-29


Figure 14 shows that while there are a number of fatal and serious injury crashes occurring along the corridor, a higher density of fatal crashes are experienced in the northern part of the corridor, between NW $72^{\text {nd }}$ Street and M-152. This area experiences a fatal crash rate of three to four times the Missouri statewide average, despite having a total crash rate noticeably lower than the statewide average.

NW 72 ${ }^{\text {nd }}$ Street to M-152
This portion of the corridor accounts for six of the nine fatal crashes reported along the interstate. Fatal crashes included two pedestrians involved and two head-on. Both pedestrian crashes occurred in the southbound direction, however they did not occur in the same specific area. The
head-on crashes occurred in both directions. The final two fatal crashes were a rear end and an out-of-control collision.

In this area, NW $72^{\text {nd }}$ Street and M-152, two serious injury crashes were reported: One of which involving a pedestrian. This pedestrian involved incident occurred at the NW Barry Road interchange on l-29 near one of the pedestrian fatalities. The other serious injury crashes involved a single vehicle losing control.

While there are not clear correlations between the fatal injury crashes between NW $72{ }^{\text {nd }}$ Street and $\mathrm{M}-152$, this area does have a higher concentration of them than the rest of the $\mathrm{I}-29$ corridor. Further consideration from an engineering standpoint is needed to determine the potential causes.

## Rest of I-29 Corridor

Outside of the NW $72^{\text {nd }}$ Street to M-152 area, an additional 16 fatal or serious injury crashes (three fatal and 13 serious injury) occurred along the I-29 corridor. No apparent clusters of these crashes were observed. In general, the fatal crashes were head-on or pedestrian involved, and the serious injury crashes were rear end or passing, with most occurring during daylight hours.

## I-29 Corridor Conclusion

The I-29 corridor has segments that exceed the statewide averages for both total and fatal crashes. While total crash rates north of the l-635 interchange area all well below the statewide average, the fatal crash rates between NW $72^{\text {nd }}$ Street and M-152 are higher than statewide averages. This may be due to the overall characteristics of the roadway cross-section and lower traffic volumes.

In general, crashes were shown to be low severity rear end, passing and out of control, which typically indicate areas of high congestion and lower speeds. Two areas of focus were identified, from the I-29/l-35 split to I-635 and NW 72 ${ }^{\text {nd }}$ Street to M-152. The I-29/I-35 split to I-635 has crash rates exceeding the statewide average, but it does experience the highest levels of traffic volume. It experiences higher rates of what are considered congestion related crashes, or low severity queue type crashes. The NW $72^{\text {nd }}$ Street to $\mathrm{M}-152$ experienced high rates of fatal and injury crashes, specifically pedestrian related, head-on, and out of control crashes.

### 2.3 I-35 Corridor Analysis

An approximate 10-mile stretch of the l-35 corridor, split into 12 study segments, was evaluated from the I-29/I-35 interchange to the interchange at M-152. Between the years 2016-2020, 1,139 crashes were reported along the facility, which represents $24 \%$ of all crashes reported along freeways within the project study limits. Of the 1,139 crashes reported, approximately $84 \%$ of all crashes resulted in property damage only, $16 \%$ of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (four crashes) resulted in a fatality (Figure 15). Crashes occurring along freeway segments primarily consisted of rear end (41\%) and single vehicle (32\%) collisions (Figure 16). Weather did not appear to be a leading cause for the occurrence of most crashes as approximately $86 \%$ of all crashes occurred during no adverse weather conditions. Although roadway surface conditions were reportedly dry for approximately $74 \%$ of crashes, $25 \%$ of crashes were noted to have occurred on either wet, snowy, or icy roads.

Figure 15: Crash Severity - I-35


Figure 16: Crash Type - I-35


```
- REAR END (41.1%)
- SINGLE VEHICLE (31.6%)
- SIDESWIPE (19.8%)
- OTHER (5.4%)
| ANIMAL (1.2%)
- PARKING OR PARKED CAR (0.4%)
- HEAD ON (0.3%)
- BACKING (0.2%)
- ANGLE (0.1%)
- PEDESTRIAN (0.1%)
- U - TURN (0.0%)
```


## Crash Rates

Of the 12 identified segments along l-35, nine were noted to have surpassed at least one of Missouri's statewide interstate average total crash rate, combined fatal and serious injury crash rate, or fatal crash rate. Several segments surpass two or all three crash rate categories. Segments that have surpassed statewide averages were noted to share similarities in crash severity and crash type. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

Table 5 summarizes crash rates for the 12 segments evaluated along the l-35 corridor.

Table 5: Crash Rates - I-35

| Segment | Segment <br> Length <br> (mi.) | Total <br> Average Daily Two- <br> Way Traffic <br> Crash <br> Rate | Fatal <br> Crash <br> Rate <br> (HMVMT) | F+SI Crash <br> Rate <br> (HMMMM) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (HMMT) |  |  |  |  |

${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for an interstate facility.
*Denotes segments with crash rates higher than statewide averages

## Crash Density/Hotspots

A heatmap showing the concentration of all crashes along l-35 was created using ArcGIS to identify crash hotspots. This heatmap can be seen in Figure 17.

Figure 17: Crash Hotspot - I-35


Based on the crash heatmap shown in Figure 17, a higher density of crashes was experienced along the I-35 corridor from the I-29/I-35 interchange through the Brighton Avenue interchange, but also in the section between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange. These areas correlate with areas of high crash rates along the corridor.

Additionally, the primary crash types experienced along these portions of the I-35 corridor consisted of rear-end, single vehicle and sideswipe collisions. Due to the nature of crashes experienced on the freeway, crashes can be attributed to elevated levels of congestion, as rearend and sideswipe collisions are usually indicative of highly congested areas and are typically attributed to lower speed crashes.

## Fatal and Serious Injury Crashes

The two most serious levels of crashes (fatal and serious injury) were analyzed to determine specific circumstances leading to their cause. Addressing fatal and suspected serious injury
crashes have the highest potential to save lives of the traveling public. Within the I-35 corridor a total of four fatal and 12 serious injury crashes occurred during the study period. The location of these crashes can be seen in Figure 18.

Figure 18: Fatal and Suspected Serious Injury Crashes - I-35


Figure 18 shows one cluster of fatal and serious injury crashes within the l-35 corridor, from NE Antioch Road through the N Brighton Avenue interchange. This area also correlates to the area of highest crash density along the corridor. There were four fatal and eight serious injury crashes along this stretch of road.

## N Antioch Road through the N Chouteau Trafficway Interchange

No apparent connection was found between the fatal crashes between N Antioch Road and the N Chouteau Trafficway interchange. Both occurred during clear and dry conditions, with a mixture of daytime and nighttime occurrences. One involved a rear end chain reaction during congestion, and the second involved a pedestrian laying in a travel lane.

Of the serious injury crashes, three of the five involved vehicles striking guardrails or concrete barriers due to losing control. The fourth involved a motorcycle splitting traffic and losing control, while the fifth involved a rear end chain reaction during congestion. This signals a potential concern about collisions with fixed objects such as guardrail or cable barrier. However, the proportion of fixed object crashes and crashes specifically involving guardrail, cable barrier, or concrete barriers within this portion of the l-35 corridor is the same or actually slightly lower than the full I-35 corridor.

## N Brighton Avenue Interchange

At the N Brighton Avenue interchange, one fatal crash involved a pedestrian, however the crash report was unclear on the circumstances around the crash; the other fatal crash occurred due to a loss of control and striking of the cable barrier during dry and clear conditions. Two of the three serious injury crashes reported in this area resulted from the driver losing control and either overturning or striking the cable barrier. The last remining serious injury crash resulted due to a failed attempt to change lanes.

## I-35 Conclusion

The I-35 corridor is typified by high crash rates across several areas. In general, crashes were shown to be low severity rear end, sideswipe and single vehicle which typically indicate areas of high congestion and lower speeds. Two areas were specifically identified in the analysis as high crash locations; the I-29/I-35 interchange through the N Brighton Avenue interchange, and between the I-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange. The I-29/I-35 interchange to N Brighton Avenue interchange portion of the corridor contains all of the fatal crashes and most of the serious injury crashes. A potential trend among those crashes involved striking guardrails, cable barrier or concrete barriers; however, the overall rate of these types of crashes was in line with the rest of the corridor. The portion of the corridor between the l-435 and U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy interchange was shown to have a high density of crashes but only one of the fatal or serious injury crashes. While from a severity level this area isn't a concern, the high density of lower severity, congestion type crashes should be considered with making improvements.

### 2.4 U.S. 169 Corridor Analysis

An approximate 8-mile stretch of the U.S. 169 corridor was evaluated from the I-29/U.S. 169 interchange to the interchange at $\mathrm{M}-152$. Between the years 2016-2020, 445 crashes were reported along the facility, which represents $8 \%$ of all crashes reported along freeways within the project study limits. Of the 445 crashes reported, approximately $77 \%$ of all crashes resulted in property damage only, $22 \%$ of crashes caused some form of injury to vehicle occupants, and 1\% of crashes (four crashes) resulted in a fatality (Figure 19). Crashes occurring along freeway segments primarily consisted of single vehicle (37\%) and rear end (36\%) collisions (Figure 20). Weather conditions did not appear to be a leading cause for the occurrence of most crashes as approximately $86 \%$ of all crashes occurred during no adverse weather conditions. In an evaluation of road surface conditions along this stretch of the U.S. 169 corridor, it was determined that approximately $65 \%$ of all crashes occurred on dry roadways, while a collective $29 \%$ of crashes occurred on wet, snowy, slushy, or icy roadway surfaces. With a higher percentage of single
vehicle collisions reported along the facility, a majority of which resulted from the driver losing control, road surface conditions could be a contributing factor.

Figure 19: Crash Severity - U.S. 169


Figure 20: Crash Type - U.S. 169


Crash Rates
Freeways in Missouri have a statewide crash rate of 93.55 crashes per HMVMT, a combined fatal and serious injury crash rate of 3.24 crashes per HMVMT, and a fatal crash rate of 0.67 per HMVTM. Of the seven identified freeway segments on U.S. 169, six were noted to have surpassed at least one of Missouri's statewide average total crash or fatal crash rate. One segment - NW Englewood Rd Interchange- was noted to have surpassed both of Missouri's statewide crash rates for total and fatal crashes. No segments exceeded the statewide crash rate for combined fatal and serious injury crashes. Segments that surpassed statewide averages were noted to share similarities in crash severity and crash type. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type. Table 6 summarizes crash rates for the seven segments evaluated along the U.S. 169 corridor.

Table 6: Crash Rates - U.S. 169

| Segment | Segment <br> Length <br> (mi.) | Total <br> Average Daily Two- <br> Way Traffic | Frash <br> Rate <br> (HMVMT) | Crash <br> Rate <br> (HMVMT) | Crash <br> Rate |
| :--- | :---: | :---: | :---: | :---: | :---: |
| (HMVMT) |  |  |  |  |  |

[^17]
## Crash Density/Hotspots

A heatmap showing the concentration of all crashes along U.S. 169 was created using ArcGIS to identify crash hotspots. This heatmap can be seen in Figure 21.

Figure 21: Crash Hotspot - U.S. 169


As seen in Figure 21, the highest concentration of crashes occurred in areas with interchanges, specifically the interchange at U.S. 169 \& Englewood Road. Over the duration of the five-year evaluation period, 2016-2020, 85 crashes were reported at the NW Englewood Road interchange. Approximately $79 \%$ of crashes occurring at the interchange resulted in property damage only, roughly $20 \%$ of crashes caused some form of injury to vehicle occupants, and $1 \%$ of crashes (one crash) resulted in a fatality. Rear end collisions (47\%) were noted to be the leading crash type, followed by single vehicle and sideswipes which respectively accounted for $27 \%$ and $15 \%$ of all reported crash types.

## Fatal and Serious Injury Crashes

The two most serious levels of crashes (fatal and serious injury) were analyzed to determine specific circumstances leading to their cause. Addressing fatal and serious injury crashes have the highest potential to save lives of the traveling public. Within the U.S. 169 corridor, a total of four fatal and four serious injury crashes occurred during the study period. The location of these crashes can be seen in Figure 22.

Figure 22: Fatal and Suspected Serious Injury Crashes - U.S. 169


Figure 22 shows the fatal and serious injury crashes spread throughout the corridor with no specific concentrations. As shown in Table 6, several segments have fatal crash rates that exceed the statewide average, though each of these segments only contains one fatal crash over the study period. One fatal and one serious injury was pedestrian involved, and both occurred in the vicinity of the I-29/U.S. 169 interchange, though not in the same immediate area. Other notable factors include four of the eight crashes occurred on wet or icy pavement; however, crash
statistics for the entire U.S. 169 corridor noting road conditions is in line with other facilities within the study area.

## U.S. 169 Conclusion

In general, crashes on U.S. 169 were shown to be low severity rear end and out of control which typically indicate areas of high congestion and lower speeds. While several segments do experience crash rates that exceed statewide averages, the number of fatal and serious injury crashes is low compared to other corridors in the study. Segments that do experience fatal crash rates that exceed the statewide average each contain only one fatal crash and are of relatively short segment length ( 0.5 miles). Segments less than 1 -mile can distort crash rates.

No specific segments or concerns were identified from a crash trend standpoint along the U.S. 169 corridor with the exception of two pedestrian involved crashes around the U.S. 169 and I-29 interchange. These crashes occurred on two different portions of the interchange and no correlation between the crashes was determined, this may require further consideration from an engineering standpoint to better deter pedestrians from accessing the freeway.

### 2.5 I-635 Corridor Analysis

An approximate 4-mile stretch of the I-635 corridor was evaluated from the Missouri River to the interchange at I-29. Between the years 2016-2020, 352 crashes were reported along the facility, which represents $7 \%$ of all crashes reported along freeways within the project study limits. Of the 352 crashes reported, approximately $76 \%$ of all crashes resulted in property damage only, 23\% of crashes caused some form of injury to vehicle occupants, and less than $1 \%$ of crashes (one crash) resulted in a fatality (Figure 23). Crashes occurring along freeway segments primarily consisted of single vehicle ( $47 \%$ ) and rear end ( $20 \%$ ) collisions (Figure 24). With a higher percentage of single vehicle collisions reported along the facility, a majority of which resulted from the driver losing control, weather and road surface conditions could be a contributing factor. Approximately $64 \%$ of crashes occurred during no adverse weather conditions, while a collective $31 \%$ of crashes occurred during rain, sleet, snow fog/mist events. In terms of road surface conditions, approximately $59 \%$ of crashes occurred on dry roadway surfaces, while a collective $36 \%$ of crashes occurred on roadway surfaces that were either wet, snowy, slushy, or icy.


## Crash Rates

Of the four identified segments along I-635, three were noted to have surpassed at least one of Missouri's statewide interstate total crash rate, combined fatal and serious injury crash rate or fatal crash rate. No segments exceeded the combined fatal and serious injury crash rate. Segments that have surpassed statewide averages were noted to share similarities in crash severity and crash type. Crashes occurring along these segments primarily resulted in property damage only with rear end collisions being the leading crash type.

Table 7 summarizes crash rates for the seven segments evaluated along the l-635 corridor.
Table 7: Crash Rate - I-635

| Segment | Segment <br> Length <br> (mi.) | Average Daily <br> Two-Way Traffic | Total <br> Crash <br> Rate <br> (HMVMT) | Fatal <br> Crash <br> Rate <br> (HMVMT) | F+SI Crash <br> Rate <br> (HMVMT) |
| :--- | :---: | :---: | :---: | :---: | :---: |
| I-635- Horizons Pkwy Interchange | 1.16 | 56,716 | $106.61^{*}$ | 0.00 | 0.83 |
| I-635- U.S. 69 Interchange | 0.81 | 56,728 | 57.24 | 0.00 | 0.00 |
| I-635-M-9 Interchange | 1.00 | 60,479 | $84.26^{*}$ | 0.00 | 1.81 |
| I-635-M-9 to I-29 Interchange | 1.00 | 57,181 | 79.54 | $0.96^{*}$ | 1.92 |
|  | Missouri Statewide Average ${ }^{\mathbf{1}}$ | $\mathbf{8 0 . 0 7}$ | $\mathbf{0 . 4 0}$ | $\mathbf{1 . 9 5}$ |  |

[^18]
## Crash Density/Hotspots

A heatmap showing the concentration of all crashes along l-635 was created using ArcGIS to identify crash hotspots. This heatmap can be seen in Figure 25.

Figure 25: Crash Hotspot - I-635


Based on the heatmap shown in Figure 25, the highest density of crashes is centered around the Horizons Parkway interchange followed by the area immediately north of the NW River Park Drive/Highway 9 interchange. These areas correlate to the areas with the highest crash rates along the corridor. Neither of these areas experienced a fatal or suspected serious injury crash during the study period. They primarily experienced property damage only crashes that were out of control in nature.

## Fatal and Serious Injury Crashes

The two most serious levels of crashes (fatal and serious injury) were analyzed to determine specific circumstances leading to their cause. Addressing fatal and suspected serious injury crashes have the highest potential to save lives of the traveling public. Within the I-635 corridor, a total of one fatal and four serious injury crashes occurred during the study period. The location of these crashes can be seen in Figure 26.

Figure 26: Fatal and Suspected Serious Injury Crashes - I-635


The fatal crash was located in the northbound travel lane between the l-29 interchange and the M-9 interchange. This fatal head on crash occurred at night when a wrong way driver struck another vehicle; It was clear and dry during the incident. Of the four serious injury crashes reported along the corridor, two of these crashes are the result of the driver being distracted or losing control and colliding with a fixed object (guardrail, ditch) on the side of the roadway. The remaining two serious injury crashes resulted in a sideswipe and rear end collision due to a failed attempt to change lane or being unable to stop during slowing traffic conditions.

## I-635 Conclusion

The I-635 portion of the project study area experiences lower traffic volumes than other interstate facilities within the project study area and also experiences lower crash rates. While several studied segments do exceed the statewide crash rates for similar facilities, crashes tended to be low severity and single vehicle or rear end type. The hotspot analysis identified the Horizons Parkway interchange to have the highest concentration of crashes along the I-635 corridor, but these were low severity in nature. The single fatal crash along the corridor during the study period was a wrong way driver. Considering all of this, no specific concerns or correctable crash patterns have been identified from a safety standpoint for the I-635 corridor.

### 2.6 M-152 Corridor Analysis

Two segments of the $\mathrm{M}-152$ corridor were evaluated along the freeway mainline at the interchanges with I-29 and U.S. 169. Between the years 2016-2020, 90 crashes were reported along the facility, which represents $2 \%$ of all crashes reported along freeways within the project study limits. Of the 90 crashes reported, approximately $77 \%$ of all crashes resulted in property damage only and roughly $23 \%$ of crashes caused some form of injury to vehicle occupants; however, no fatalities were reported (Figure 27). Unlike the other mainline corridors analyzed in this study, the highway classification along M-152 changes, becoming an arterial with at-grade signalized intersections east of I-435 and is referred to as Barry Road. For this reason, crashes occurring along M-152 at the I-35 interchange are accounted for in the ramp terminal analysis in section 2.7 of this document. Crashes occurring along the freeway portion of $\mathrm{M}-152$ primarily consisted of single vehicle (52\%) and sideswipe (17\%) collisions (Figure 28). Weather did not appear to be a leading cause for the occurrence of most crashes as approximately $86 \%$ of all crashes occurred during no adverse weather conditions. Roadway surface conditions were reportedly dry for approximately $56 \%$ of crashes, however, $42 \%$ of crashes were noted to have occurred on either wet, snowy, or icy roads. With a higher percentage of single vehicle collisions experienced along the corridor, a majority of which resulted from the driver losing control, road surface conditions could potentially be a contributing factor.

Figure 27: Crash Severity - M-152
Figure 28: Crash Type - M-152


Crash Rates
Of the two identified segments, neither surpassed the Missouri statewide crash rate for a freeway facility for total crashes, combined fatal and serious injury crashes, or fatal crashes.

Table 8 summarizes crash rates for the three segments evaluated along the $\mathrm{M}-152$ corridor.
Table 8: Crash Rate - M-152

| Segment | Segment <br> Length <br> (mi.) | Average Daily <br> Two-Way Traffic | Total <br> Crash <br> Rate <br> (HMVMT) | Fatal <br> Crash <br> Rate <br> (HMVMT) | F+SI <br> Crash <br> Rate |
| :--- | :---: | :---: | :---: | :---: | :---: |
| (HMVMT) |  |  |  |  |  |$|$

${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for a freeway facility
*Denotes segments with crash rates higher than statewide averages
Crash Density/Hotspots
Due to the short non-contiguous segments, a crash density analysis was not completed for M 152.

## Fatal and Serious Injury Crashes

No fatal or serious injury crashes occurred along the segments of $\mathrm{M}-152$ analyzed for this study.

## M-152 Conclusion

The analyzed segments of $\mathrm{M}-152$ experienced mostly low severity primarily rear end and angle crashes. This is expected as both segments analyzed are at interchanges and contain high levels of congestion and merge/diverge movements.

### 2.7 Ramps and Ramp Terminals Analysis

System-to-system ramps, service ramps, and ramp terminals were analyzed across the entire study area. In total, 49 system-to-system ramps, 84 service ramps and 40 ramp terminal intersections were identified. 2,551 crashes occurred at these locations between the years 2016 and 2020. Of the 2,551 crashes reported, approximately $75 \%$ resulted in property damage only, $23 \%$ caused minor injury, and approximately $1 \%$ of crashes were fatal or resulted in a serious injury. A detailed analysis of service ramps and ramp terminal intersections was not completed for this project, however tables showing crash severity and type for each can be found in Attachment A.

## System-to-System Ramps

In total, 362 crashes occurred on the 49 system-to-system ramps across the project corridor. Approximately $72 \%$ were property damage only with an additional $26 \%$ resulting in minor injury. The remaining $2 \%$ are spread across fatal and serious injury, with serious injury crashes making up a majority. One fatal and five serious injury crashes were experienced along system-to-system ramps. Crashes primarily consisted of single vehicle (61\%), rear end (20\%), and sideswipe (12\%). Figures 29 and 30 show the breakdown of crashes for the system-to-system ramps. Additionally, a full breakdown of each system-to-system ramp can be found in Attachment A.

Figure 29: Crash Severity - System-to-System Ramp
Figure 30: Crash Type - System-to-System Ramp


Crash rates and hotspot analyses were not completed for the system-to-system ramps due to the short length of the ramps. Short segments tend to inflate crash rates and show inconclusive results for hotspot analyses.

## Fatal and Serious Injury Crashes

One fatal and five serious injury crashes occurred on system-to-system ramps.

- Fatal
- I-635 NB to I-29 NB - Crash report lacked full details. Listed as a head-on collision that occurred around 4 am under clear and dry conditions.
- Serious Injury
- I-29 SB to U.S. 169 NB - Motorcycle crash caused by driver losing control for unknown reasons and striking the guardrail. Occurred at 4 am under dry and clear conditions.
- I-29 NB to I-635 SB - Pedalcycle involved crash caused by the cyclist attempting to cross the roadway. Occurred at $12: 15 \mathrm{pm}$ under cloudy and dry conditions.
- I-29 SB to M-152 WB - Crash report lacked full details. Listed as an out-of-control collision that occurred during the night under clear and dry conditions.
- M-152 WB to U.S. 169 NB - Motorcycle crashed cause by driver losing control. Occurred at 7:25 pm under clear and dry conditions.
- M-152 WB to I-29 NB - Crash report lacked full details. Listed as an out-of-control collision that occurred during the night under clear and dry conditions.

No patterns or trends can be determined from the few fatal and suspected serious injury crashes, though the I-635 northbound to l-29 northbound ramp did experience both a fatal and a serious injury crash during the study period. While these two crashes do not seem to have any correlation, consideration of the geometrics and operations should be completed.

## Service Ramps and Ramp Terminal Intersections

A detailed analysis of service ramps and ramp terminal intersections was not completed for this project, however tables showing crash severity and type for each can be found in Attachment A. In general crashes on service ramps and ramp terminal intersections were low severity with 76\% property damage only and $23 \%$ minor injury, which resulted in primarily rear end (39\%) and angle ( $22 \%$ ) collisions. Additionally, MoDOT has identified several ramps and ramp terminals that may require further considerations under future phases. This compiled list of ramps and ramp terminals can be seen in Table 9.

Table 9: Future Considerations - Ramps \& Ramp Terminals

| Ramps and Ramp Terminals |
| :--- |
| I-29/I-35 - Independence Ave Ramp Terminal |
| I-29/I-35 - Berkley Pkwy and E Front St SPUI |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal (On Ramp) |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal |
| I-35 NB - NE Antioch Rd Ramp Terminal |
| I-35 SB - NE Antioch Rd Ramp Terminal |
| I-35 NB - N Chouteau Trfy Ramp Terminal |
| I-35 SB - N Chouteau Trfy Ramp Terminal |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal |
| I-35 NB - NW Barry Rd (M-152) Ramp Terminal |
| I-35 SB - NW Barry Rd (M-152) Ramp Terminal |
| I-29 NB - Route 45 and NW 64th St Ramp Terminal |
| I-29 SB - Route 45 and NW 64th St Ramp Terminal |
| I-29 SB - NW 72nd St Ramp Terminal |
| I-29 SB - NW Barry Rd Ramp Terminal |
| I-29 NB - NW Barry Rd Ramp Terminal |
| US 169 NB \& Barry Rd Ramp Terminal |
| US 169 NB \& Englewood Rd Ramp Terminal |

## Ramps and Ramp Terminals Conclusion

System-to-system ramps, service ramps and ramp terminal intersections experienced primarily low severity single vehicle, rear end or sideswipe crashes. Overall, less than $0.5 \%$ of crashes were fatal or suspected serious injury across all ramps and ramp terminals. The low severity and high prevalence of congestion related crash types (single vehicle, rear end and sideswipe) points to overall roadway congestion influencing crashes at these locations.

### 3.0 Conclusion

The project study area is typified by relatively low severity crashes which are primarily single vehicle, rear end or sideswipe in nature. These crash characteristics point to areas of lower speeds and high congestion. Solutions for these types of crashes usually involve minimizing conflict points such as merges and diverges and reducing the overall congestion of a corridor. Crashes primarily occurred during clear and dry conditions.

Overall, the safety analysis identified three specific segments of the study area corridors as areas of concern. These areas each contain a high occurrence of specific types or levels of severity of crashes and considerations should be made during the alternatives analysis portion of this study. They include.

- The I-29/I-35 Combined Corridor between I-70 and the north approach of the Kit Bond Bridge: This area experienced 12 fatal or serious injury crashes during the study period, many where a vehicle overtook a slower moving vehicle.
- I-35 from the I-29/I-35 interchange to the N Brighton Avenue interchange: This segment contains all of the fatal crashes and most of the serious injury crashes along the l-35
corridor. Most of these crashes involved striking guardrails, cable barrier or concrete barriers; however, overall trends of those types of crashes were in line with crash trends for the overall corridor.
- I-29 between NW $72^{\text {nd }}$ Street and M-152: This area experienced high rates of fatal and serious injury crashes, specifically pedestrian related, head-on, and out of control crashes.

As the project progresses, a detailed safety analysis should be done at each proposed improvement location to further determine the need or impact of the improvements.

## Attachment A - Ramps and Terminals Results

- System-to-System Ramps
- Service Ramps
- Ramp Terminal Intersections


## System-to-System Ramps

## Crash Severity

| STS: I-635 NB to I-29 SB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 2 | 2 | 1 | 0 | 6 |
|  | PROPERTY DAMAGE ONLY | 6 | 1 | 1 | 3 | 1 | 12 |
|  | TOTAL | 7 | 3* | 3 | 4 | 1 | 18 |

*High friction surface
treatment (HFST) added
in 2017

| $\begin{aligned} & \text { STS: I-635 NB } \\ & \text { to I-29 NB } \end{aligned}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 1 | 0 | 1 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 5 | 4 | 0 | 1 | 0 | 10 |
|  | PROPERTY DAMAGE ONLY | 9 | 6 | 2 | 4 | 1 | 22 |
|  | TOTAL | 14 | 10* | 2 | 6 | 1 | 33 |

*High friction surface treatment (HFST) added in 2017

| $\begin{gathered} \text { STS: I-29 NB to } \\ \text { I-635 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 1 | 0 | 0 | 0 | 0 | 1 |
|  | MINOR INJURY | 4 | 2 | 0 | 0 | 0 | 6 |
|  | PROPERTY DAMAGE ONLY | 5 | 3 | 0 | 2 | 2 | 12 |
|  | TOTAL | 10* | 5 | 0 | 2 | 2 | 19 |

*High friction surface treatment (HFST) added in an unknown
year

| $\begin{gathered} \text { STS: I-29 SB to } \\ \text { I-635 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 2 | 2 | 3 | 8 |
|  | TOTAL | 1 | 1* | 2 | 2 | 3 | 9 |

*High friction surface treatment (HFST) added in 2017

| $\begin{gathered} \text { STS: I-29 SB to } \\ \text { U.S. } 169 \text { SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 1 | 0 | 0 | 3 | 0 | 4 |
|  | TOTAL | 1 | 0 | 0 | 3 | 0 | 4 |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
| STS: U.S 169 <br> NB to I-29 NB SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | MINOR INJURY | 0 | 0 | 1 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE <br> ONLY | 1 | 2 | 0 | 1 | 2 | 6 |
|  | TOTAL | 1 | 1 | 1 | 2 | 7 |  |


| STS: I-29 SB to U.S. 169 NB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 4 | 1 | 1 | 3 | 0 | 9 |
|  | TOTAL | 4 | 1* | 1 | 4 | 0 | 10 |
| *High friction surface treatment (HFST) added in 2017 |  |  |  |  |  |  |  |
| STS: U.S. 169 SB to I-29 NB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 3 | 1 | 0 | 4 |
|  | TOTAL | 0 | 1 | 3 | 1 | 0 | 5 |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
| STS: U.S. 169 <br> SB to I-29 SB | MINOR INJURY | 0 | 0 | 1 | 0 | 1 | 2 |
|  | PROPERTY DAMAGE | 0 | 0 | 2 | 2 | 0 | 4 |
|  | ONLY | 0 | 0 | 3 | 2 | 1 | 6 |


| STS: I-29 NB to U.S. 169 NB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 1 | 1 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 2 | 0 | 0 | 3 |
|  | TOTAL | 0 | 1 | 3 | 1 | 0 | 5 |


| $\begin{gathered} \text { STS: I-35 SB to } \\ \text { I-29 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 1 | 1 | 0 | 2 | 5 |
|  | PROPERTY DAMAGE ONLY | 5 | 2 | 4 | 5 | 5 | 21 |
|  | TOTAL | 6 | 3 | 5 | 5 | 7 | 26 |


| $\begin{gathered} \text { STS: I-29 NB to } \\ \text { I-35 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 3 | 6 | 1 | 1 | 1 | 12 |
|  | TOTAL | 3 | 7 | 1 | 1 | 1 | 13 |


| $\begin{gathered} \text { STS: I-35 SB to } \\ \text { I-29 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 1 | 1 | 0 | 1 | 3 |
|  | PROPERTY DAMAGE ONLY | 1 | 3 | 3 | 2 | 0 | 9 |
|  | TOTAL | 1 | 4 | 4 | 2 | 1 | 12 |
| $\begin{gathered} \text { STS: I-29 SB to } \\ \text { I-35 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 4 | 2 | 1 | 8 |
|  | PROPERTY DAMAGE ONLY | 1 | 5 | 2 | 4 | 5 | 17 |
|  | TOTAL | 2 | 5 | 6 | 6 | 6 | 25 |
| STS: I-29 NB to M-152 WB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 1 | 1 | 0 | 3 |
|  | TOTAL | 0 | 1 | 1 | 1 | 0 | 3 |
| $\begin{gathered} \text { STS: I-29 NB to } \\ \text { M-152 EB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | TOTAL | 0 | 1 | 0 | 1 | 0 | 2 |


| $\begin{aligned} & \text { STS: M-152 EB } \\ & \text { to I-29 SB } \end{aligned}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |


| $\begin{aligned} & \text { STS: M-152 EB } \\ & \text { to l-29 NB } \end{aligned}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |


| STS: I-29 NB to M-152 WB Loop | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 1 | 0 | 0 | 1 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |


| STS: M-152 <br> WB to I-29 SB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 1 | 0 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 3 | 3 | 2 | 0 | 0 | 8 |
|  | TOTAL | 4 | 3 | 3 | 0 | 0 | 10 |


| $\begin{gathered} \text { STS: I-29 SB to } \\ \text { M-152 EB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 1 | 1 | 0 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 2 | 2 | 1 | 1 | 0 | 6 |
|  | TOTAL | 2 | 3 | 2 | 1 | 0 | 8 |


| $\begin{gathered} \text { STS: I-29 SB to } \\ \text { M-152 WB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 1 | 0 | 0 | 0 | 0 | 1 |
|  | TOTAL | 1 | 1 | 0 | 0 | 0 | 2 |


| STS: M-152 <br> WB to I-29 NB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | MINOR INJURY | 1 | 1 | 0 | 0 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 2 | 1 | 0 | 2 | 0 | 5 |
|  | TOTAL | 3 | 3 | 0 | 2 | 0 | 8 |


| STS: I-29 NB Between M-152 Loop Ramps | Crash Severity | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 1 | 0 | 0 | 0 | 0 | 1 |
|  | TOTAL | 1 | 0 | 0 | 1 | 0 | 2 |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
| STS: I-29 NB <br> Ent. M-152 <br> Loops | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE <br> ONLY | 2 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 2 | 0 | 0 | 0 | 2 |  |


| STS: U.S. 169 NB to M-152 EB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 0 | 1 | 2 | 4 |
|  | TOTAL | 0 | 1 | 0 | 2 | 2 | 5 |


| STS: M-152 EB to U.S. 169 NB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 2 | 0 | 0 | 2 |
|  | TOTAL | 0 | 0 | 2 | 0 | 0 | 2 |


| STS: M-152 EB to U.S. 169 SB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 0 | 0 | 0 | 1 |


| STS: U.S. 169 SB to M-152 EB | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 2 | 0 | 0 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 1 | 0 | 0 | 2 |
|  | TOTAL | 0 | 3 | 1 | 0 | 0 | 4 |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
| STS: U.S. 169 <br> NB to M-152 <br> WB | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 2 | 2 | 1 | 0 | 0 |
|  | PROPERTY DAMAGE <br> ONLY | 0 | 1 | 0 | 0 | 0 | 1 |
|  | TOTAL | 0 | 2 | 1 | 0 | 6 |  |


| $\begin{gathered} \text { STS: M-152 } \\ \text { WB to U.S. } 169 \\ \text { SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 2 | 0 | 1 | 0 | 3 |
|  | PROPERTY DAMAGE ONLY | 3 | 3 | 0 | 0 | 0 | 6 |
|  | TOTAL | 3 | 5* | 0 | 1 | 0 | 9 |

*High friction surface
treatment (HFST)
added in 2017

| $\begin{gathered} \text { STS: M-152 } \\ \text { WB to U.S. } 169 \\ \text { NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 1 | 1 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 1 | 0 | 0 | 1 |
|  | TOTAL | 0 | 0 |  | 0 | 1 | 2 |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
| STS: U.S. 169 <br> SB to M-152 <br> WB | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 3 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE <br> ONLY | 0 | 1 | 0 | 1 | 0 | 0 |
|  | TOTAL | 1 | 0 | 1 | 0 | 5 |  |


|  | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
| STS - I-635 NB <br> \& US 69 EB | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 |  |
|  | PROPERTY DAMAGE <br> ONLY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | TOTAL | 0 | 0 | 1 | 0 | 1 |  |


| $\begin{gathered} \text { STS - US } 69 \\ \text { EB \& I-635 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 1 | 0 | 1 | 1 | 0 | 3 |
|  | TOTAL | 1 | 0 | 1 | 1 | 0 | 3 |


| $\begin{gathered} \text { STS - I-635 SB } \\ \& \text { US } 69 \mathrm{~EB} \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 1 | 1 | 0 | 3 |
|  | TOTAL | 1 | 1 | 1 | 1 | 0 | 4 |


| $\begin{gathered} \text { STS - US } 69 \\ \text { EB \& I-635 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 1 | 0 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |


| $\begin{aligned} & \text { STS - I-635 SB } \\ & \& \text { US } 69 \mathrm{WB} \end{aligned}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 2 | 0 | 0 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 3 | 1 | 2 | 2 | 0 | 8 |
|  | TOTAL | 3 | 3 | 2 | 2 | 0 | 10 |


| $\begin{gathered} \text { STS - I-635 NB } \\ \& \text { US } 69 \mathrm{WB} \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 3 | 0 | 0 | 3 |
|  | PROPERTY DAMAGE ONLY | 2 | 0 | 0 | 0 | 0 | 2 |
|  | TOTAL | 2 | 0 | 3 | 0 | 0 | 5 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS - US } 69 \\ \text { WB \& I-635 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PROPERTY DAMAGE ONLY | 1 | 1 | 2 | 0 | 1 | 5 |
|  | TOTAL | 1 | 1 | 2 | 1 | 1 | 6 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS - US } 69 \\ \text { WB \& I-635 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 1 | 0 | 0 | 1 | 2 |
|  | TOTAL | 0 | 1 | 0 | 0 | 1 | 2 |


| STS - I-435 NB Off Ramp | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 1 | 0 | 0 | 1 | 3 |
|  | PROPERTY DAMAGE ONLY | 3 | 0 | 1 | 1 | 0 | 5 |
|  | TOTAL | 4 | 1 | 1 | 1 | 1 | 8 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS - I-435 NB } \\ \text { \& I-35 NB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 2 | 0 | 1 | 1 | 0 | 4 |
|  | PROPERTY DAMAGE ONLY | 1 | 1 | 1 | 1 | 2 | 6 |
|  | TOTAL | 3 | 1 | 2 | 2 | 2 | 10 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS - I-435 NB } \\ \text { \& I-35 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 1 | 1 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 3 | 0 | 0 | 3 |
|  | TOTAL | 0 | 0 | 3 | 0 | 1 | 4 |
|  |  |  |  |  |  |  |  |
| $\begin{aligned} & \text { STS - I-435 SB } \\ & \text { On Ramp } \end{aligned}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 0 | 1 | 1 | 3 |
|  | PROPERTY DAMAGE ONLY | 2 | 0 | 1 | 0 | 1 | 4 |
|  | TOTAL | 3 | 0 | 1 | 1 | 2 | 7 |


| $\begin{gathered} \text { STS }-\mathrm{I}-35 \mathrm{NB} \& \\ \mathrm{I}-435 \mathrm{SB} \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 1 | 0 | 1 | 1 | 0 | 3 |
|  | TOTAL | 1 | 0 | 1 | 1 | 0 | 3 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS }-1-35 \text { SB \& } \\ \text { I-435 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 2 | 0 | 0 | 1 | 1 | 4 |
|  | PROPERTY DAMAGE ONLY | 2 | 4 | 3 | 8 | 5 | 22 |
|  | TOTAL | 4 | 4 | 3 | 9 | 6 | 26 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS - I-435 SB } \\ \text { \& I-35 SB } \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 1 | 0 | 0 | 1 | 0 | 2 |
|  | PROPERTY DAMAGE ONLY | 3 | 1 | 0 | 0 | 1 | 5 |
|  | TOTAL | 4 | 1 | 0 | 1 | 1 | 7 |
|  |  |  |  |  |  |  |  |
| $\begin{gathered} \text { STS }-\mathrm{I}-35 \mathrm{NB} \& \\ \mathrm{I}-435 \mathrm{NB} \end{gathered}$ | CRASH SEVERITY | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
|  | FATAL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | SERIOUS INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | MINOR INJURY | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PROPERTY DAMAGE ONLY | 0 | 0 | 1 | 0 | 0 | 1 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |


| $\begin{gathered} \text { STS: I-635 } \\ \text { NB to I-29 } \\ \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 5 | 2 | 3 | 4 | 0 | 14 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 1 | 0 | 0 | 0 | 1 | 2 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 1 | 1 | 0 | 0 | 0 | 2 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 7 | 3 | 3 | 4 | 1 | 18 |


| $\begin{gathered} \text { STS: I-635 } \\ \text { NB to I-29 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 1 | 0 | 1 | 0 | 0 | 2 |
|  | FIXED OBJECT | 0 | 0 | 0 | 1 | 0 | 1 |
|  | HEAD ON | 0 | 0 | 0 | 1 | 0 | 1 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 9 | 7 | 0 | 1 | 1 | 18 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 4 | 2 | 1 | 3 | 0 | 10 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 14 | 10 | 2 | 6 | 1 | 33 |


| $\begin{aligned} & \text { STS: I-29 NB } \\ & \text { to I-635 SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 1 | 0 | 0 | 0 | 0 | 1 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 1 | 0 | 0 | 0 | 0 | 1 |
|  | OUT OF CONTROL | 4 | 5 | 0 | 1 | 1 | 11 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PASSING | 3 | 0 | 0 | 0 | 1 | 4 |
|  | PEDALCYCLE | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 10 | 5 | 0 | 2 | 2 | 19 |


| $\begin{aligned} & \text { STS: } 1-29 \text { SB } \\ & \text { to } 1-635 \text { SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 2 | 2 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 1 | 0 | 0 | 0 | 0 | 1 |
|  | OUT OF CONTROL | 0 | 1 | 1 | 0 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 1 | 2 | 1 | 4 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 1 | 2 | 2 | 3 | 9 |


| $\begin{aligned} & \text { STS: I-29 SB } \\ & \text { to U.S. } 169 \\ & \text { SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 1 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 2 | 0 | 2 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 0 | 0 | 3 | 0 | 4 |


| $\begin{gathered} \text { STS: U.S } 169 \\ \text { NB to I-29 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 2 | 1 | 1 | 1 | 6 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 1 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 2 | 1 | 1 | 2 | 7 |


| $\begin{gathered} \text { STS: I- } 29 \text { SB } \\ \text { to U.S. } 169 \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 3 | 1 | 1 | 4 | 0 | 9 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 1 | 0 | 0 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 4 | 1 | 1 | 4 | 0 | 10 |


| $\begin{gathered} \text { STS: U.S. } 169 \\ \text { SB to I-29 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 2 | 1 | 0 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 3 | 1 | 0 | 5 |


| STS: U.S. 169 <br> SB to I-29 SB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 1 | 0 | 0 | 1 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 2 | 1 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 1 | 1 | 2 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 3 | 2 | 1 | 6 |


| $\begin{gathered} \text { STS: I-29 NB } \\ \text { to U.S. } 169 \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 1 | 0 | 0 | 1 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 1 | 1 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 3 | 1 | 0 | 5 |


| $\begin{aligned} & \text { STS: } 1-35 \text { SB } \\ & \text { to I- } 29 \text { SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 3 | 2 | 0 | 1 | 2 | 8 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 2 | 0 | 2 | 3 | 1 | 8 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 1 | 1 | 3 | 1 | 4 | 10 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 6 | 3 | 5 | 5 | 7 | 26 |


| $\begin{aligned} & \text { STS: I-29 NB } \\ & \text { to I-35 NB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 1 | 0 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 2 | 0 | 0 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 1 | 2 | 0 | 0 | 1 | 4 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 1 | 3 | 0 | 1 | 0 | 5 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 7 | 1 | 1 | 1 | 13 |


| $\begin{aligned} & \text { STS: I-35 SB } \\ & \text { to I-29 NB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 1 | 0 | 0 | 0 | 0 | 1 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 2 | 2 | 0 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 3 | 2 | 0 | 1 | 6 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 4 | 4 | 2 | 1 | 12 |


| $\begin{aligned} & \text { STS: I-29 SB } \\ & \text { to I-35 NB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 1 | 1 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 3 | 4 | 4 | 12 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 1 | 0 | 1 | 2 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 2 | 4 | 1 | 2 | 0 | 9 |
|  | RIGHT ANGLE | 0 | 0 | 1 | 0 | 0 | 1 |
|  | TOTAL | 2 | 5 | 6 | 6 | 6 | 25 |


| STS: I-29 NB to M-152 WB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 1 | 0 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 0 | 1 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 1 | 1 | 0 | 3 |


| STS: I-29 NB <br> to M-152 EB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 0 | 1 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 0 | 1 | 0 | 2 |


| STS: M-152 <br> EB to I-29 SB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { EB to I-29 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |


| $\begin{aligned} & \text { STS: I-29 NB } \\ & \text { to M-152 } \\ & \text { WB - Loop } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 1 | 0 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { WB to I-29 } \\ \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 1 | 0 | 0 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 4 | 1 | 3 | 0 | 0 | 8 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 4 | 3 | 3 | 0 | 0 | 10 |


| $\begin{aligned} & \text { STS: I-29 SB } \\ & \text { to } \mathrm{M}-152 \mathrm{~EB} \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 1 | 0 | 0 | 0 | 1 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 2 | 1 | 2 | 1 | 0 | 6 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 1 | 0 | 0 | 0 | 1 |
|  | TOTAL | 2 | 3 | 2 | 1 | 0 | 8 |


| $\begin{gathered} \text { STS: } 1-29 \text { SB } \\ \text { to M-152 } \\ \text { WB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 1 | 0 | 0 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 1 | 0 | 0 | 0 | 2 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { WB to I-29 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 1 | 0 | 0 | 0 | 0 | 1 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 2 | 3 | 0 | 2 | 0 | 7 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 3 | 0 | 2 | 0 | 8 |


| STS: I-29 NB <br> Between M- <br> 152 Loop <br> Ramps | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 0 | 1 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 0 | 0 | 1 | 0 | 2 |


| STS: I-29 NB <br> Ent. M-152 <br> Loops | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 1 | 0 | 0 | 0 | 0 | 1 |
|  | OUT OF CONTROL | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 2 | 0 | 0 | 0 | 0 | 2 |


| STS: U.S. 169 NB to M-152 EB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 0 | 1 | 2 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 1 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 0 | 2 | 2 | 5 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { EB to U.S. } \\ 169 \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 2 | 0 | 0 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 2 | 0 | 0 | 2 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { EB to U.S. } \\ 169 \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 0 | 0 | 0 | 1 |


| STS: U.S. 169 SB to M-152 EB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 3 | 0 | 0 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 3 | 1 | 0 | 0 | 4 |


| STS: U.S. 169 NB to M-152 WB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 2 | 2 | 0 | 0 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 1 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 2 | 2 | 1 | 0 | 5 |


| $\begin{gathered} \text { STS: M-152 } \\ \text { WB to U.S. } \\ 169 \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 3 | 4 | 0 | 0 | 0 | 7 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 1 | 0 | 1 |
|  | REAR END | 0 | 1 | 0 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 5 | 0 | 1 | 0 | 9 |


| $\begin{aligned} & \text { STS: M-152 } \\ & \text { WB to U.S. } \\ & 169 \text { NB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 1 | 0 | 1 | 2 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 1 | 0 | 1 | 2 |


| STS: U.S. 169 <br> SB to M-152 <br> WB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 1 | 0 | 0 | 1 | 0 | 2 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 2 | 1 | 0 | 0 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 1 | 0 | 1 | 0 | 5 |


| $\begin{gathered} \text { STS - I-635 } \\ \text { NB \& US } 69 \\ \text { EB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 1 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 0 | 1 | 0 | 1 |


| $\begin{gathered} \text { STS - US } 69 \\ \text { EB \& I-635 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 1 | 1 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 0 | 1 | 1 | 0 | 3 |


| $\begin{gathered} \text { STS - I-635 } \\ \text { SB \& US } 69 \\ \text { EB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 1 | 1 | 1 | 0 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 1 | 1 | 1 | 0 | 4 |


| $\begin{gathered} \text { STS - US } 69 \\ \text { EB \& I-635 } \\ \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 1 | 0 | 0 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |


| STS - I-635 <br> SB \& US 69 <br> WB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 1 | 0 | 0 | 0 | 0 | 1 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 3 | 2 | 2 | 0 | 8 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 1 | 0 | 0 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 3 | 2 | 2 | 0 | 10 |


| $\begin{gathered} \text { STS - I-635 } \\ \text { NB \& US } 69 \\ \text { WB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 2 | 0 | 2 | 0 | 0 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 1 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 2 | 0 | 3 | 0 | 0 | 5 |


| $\begin{gathered} \text { STS - US } 69 \\ \text { WB \& I-635 } \\ \text { SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 1 | 1 | 1 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 1 | 2 | 1 | 1 | 6 |


| $\begin{gathered} \text { STS - US } 69 \\ \text { WB \& I-635 } \\ \text { NB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 0 | 0 | 1 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 1 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 1 | 0 | 0 | 1 | 2 |


| STS - I-435 <br> NB Off Ramp | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 1 | 1 | 1 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 1 | 0 | 0 | 0 | 0 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 3 | 1 | 0 | 0 | 0 | 4 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 4 | 1 | 1 | 1 | 1 | 8 |


| STS - I-435 <br> NB \& I-35 <br> NB | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 2 | 1 | 1 | 5 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 1 | 1 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 2 | 1 | 0 | 1 | 0 | 4 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 1 | 2 | 2 | 2 | 10 |


| $\begin{gathered} \text { STS - I-435 } \\ \text { NB \& I-35 SB } \end{gathered}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 2 | 0 | 1 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 3 | 0 | 1 | 4 |


| $\begin{aligned} & \text { STS - I-435 } \\ & \text { SB On Ramp } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 1 | 0 | 0 | 0 | 0 | 1 |
|  | OUT OF CONTROL | 1 | 0 | 0 | 1 | 1 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 1 | 0 | 0 | 0 | 1 | 2 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 1 | 0 | 0 | 1 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 3 | 0 | 1 | 1 | 2 | 7 |


| $\begin{aligned} & \text { STS - I-35 NB } \\ & \text { \& I-435 SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 1 | 0 | 1 | 1 | 0 | 3 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 1 | 0 | 1 | 1 | 0 | 3 |


| $\begin{aligned} & \text { STS - I-35 SB } \\ & \& I-435 S B \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 1 | 0 | 1 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 3 | 1 | 7 | 5 | 16 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 1 | 0 | 1 | 1 | 1 | 4 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 3 | 1 | 1 | 0 | 0 | 5 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 4 | 4 | 3 | 9 | 6 | 26 |


| $\begin{aligned} & \text { STS - I-435 } \\ & \text { SB \& I-35 SB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 2 | 1 | 0 | 0 | 1 | 4 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 2 | 0 | 0 | 1 | 0 | 3 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 4 | 1 | 0 | 1 | 1 | 7 |


| $\begin{aligned} & \text { STS - I-35 NB } \\ & \& \text { I-435 NB } \end{aligned}$ | CRASH TYPE | 2016 | 2017 | 2018 | 2019 | 2020 | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AVOIDING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | CHANGING LANE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | DEER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | FIXED OBJECT | 0 | 0 | 0 | 0 | 0 | 0 |
|  | HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 |
|  | JACKKNIFE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
|  | OUT OF CONTROL | 0 | 0 | 1 | 0 | 0 | 1 |
|  | PARKING OR PARKED CAR | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PASSING | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDALCYCLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 |
|  | REAR END | 0 | 0 | 0 | 0 | 0 | 0 |
|  | RIGHT ANGLE | 0 | 0 | 0 | 0 | 0 | 0 |
|  | TOTAL | 0 | 0 | 1 | 0 | 0 | 1 |

## Service Ramps and Ramp Terminals

Crash Severity

| Name | Type | Fatal | Serious Injury | Minor Injury | Property Damage Only | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29/I-35 SB - Independence Ave On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 - Independence Ave Ramp Terminal | Terminal | 0 | 2 | 31 | 61 | 94 |
| I-29/I-35 SB - Independence Ave/The Paseo Off Ramp | Ramp | 0 | 0 | 2 | 8 | 10 |
| I-29/I-35 NB - Independence Ave/The Paseo On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29/l-35 NB - Berkley Pkwy and E Front St Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| l-29/l-35 SB -Berkley Pkwy and E Front St On Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-29/l-35 SB - Berkley Pkwy and E Front St Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29/l-35 NB - Berkley Pkwy and E Front St On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35-Berkley Pkwy and E Front St SPUI | Ramp | 0 | 1 | 15 | 49 | 65 |
| I-29/l-35 SB - Route 210 (Armour Rd) On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 NB - Route 210 (Armour Rd) On Ramp (Loop) | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-29/l-35 SB - Route 210 (Armour Rd) Off Ramp | Ramp | 0 | 0 | 2 | 11 | 13 |
| I-29/I-35 NB - Route 210 (Armour Rd) On Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-29/I-35 SB - Route 210 (Armour Rd) On Ramp (Loop) | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal (On Ramp) | Terminal | 0 | 1 | 8 | 63 | 72 |
| I-29/l-35 NB - Route 210 (Armour Rd) Ramp Terminal | Terminal | 0 | 2 | 12 | 52 | 66 |
| I-29/l-35 SB - Route 210 (Armour Rd) Ramp Terminal | Terminal | 0 | 1 | 6 | 30 | 37 |
| I-29/l-35 NB - NE Parvin Rd On/Off Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29/I-35 SB - NE Parvin Rd On/Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-29/I-35 NB - NE Parvin Rd Ramp Terminal | Terminal | 0 | 0 | 4 | 12 | 16 |
| I-29/I-35 SB - NE Parvin Rd Ramp Terminal | Terminal | 0 | 1 | 1 | 6 | 8 |
| I-35 NB - NE Antioch Rd Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-35 NB - NE Antioch Rd Ramp Terminal | Terminal | 0 | 0 | 8 | 43 | 51 |
| I-35 SB - NE Antioch Rd Ramp Terminal | Terminal | 0 | 3 | 16 | 39 | 58 |
| I-35 SB - NE Antioch Rd On Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-35 NB - NE Antioch Rd On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-35 SB - NE Antioch Rd Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-35 NB - N Chouteau Trfy Ramp Terminal | Terminal | 0 | 1 | 11 | 37 | 49 |


| Name | Type | Fatal | Serious Injury | Minor Injury | Property Damage Only | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-35 SB - N Chouteau Trfy Ramp Terminal | Terminal | 0 | 0 | 19 | 39 | 58 |
| I-35 NB - N Chouteau Trfy Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-35 SB - N Chouteau Trfy On Ramp | Ramp | 0 | 0 | 1 | 0 | 1 |
| I-35 SB - N Chouteau Trfy Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-35 NB - N Chouteau Trfy On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-35 NB - Brighton Ave Ramp Terminal | Terminal | 0 | 1 | 7 | 19 | 27 |
| I-35 SB - Brighton Ave Ramp Terminal | Terminal | 0 | 0 | 3 | 15 | 18 |
| I-35 NB - Brighton Ave Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-35 SB - Brighton Ave On Ramp | Ramp | 0 | 0 | 0 | 4 | 4 |
| I-35 NB - U.S. 69 (NE Vivion Rd) Ramp Terminal | Terminal | 0 | 0 | 3 | 5 | 8 |
| I-35 SB - U.S. 69 (NE Vivion Rd) Ramp Terminal | Terminal | 0 | 0 | 5 | 15 | 20 |
| I-35 SB - U.S. 69 (NE Vivion Rd) Off Ramp | Ramp | 0 | 0 | 5 | 28 | 33 |
| I-35 NB - U.S. 69 (NE Vivion Rd) Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-35 SB - U.S. 69 (NE Vivion Rd) On Ramp | Ramp | 0 | 0 | 0 | 3 | 3 |
| I-35 NB - U.S. 69 (NE Vivion Rd) On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | Terminal | 0 | 1 | 5 | 40 | 46 |
| I-35 SB U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | Terminal | 0 | 1 | 0 | 27 | 28 |
| I-35 SB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy On Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | Terminal | 0 | 0 | 0 | 18 | 18 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | Ramp | 0 | 0 | 1 | 6 | 7 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| Pleasant Valley Rd - U.S. 69 SB Ramp | Ramp | 0 | 0 | 1 | 0 | 1 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy On Ramp | Ramp | 0 | 1 | 3 | 11 | 15 |
| I-35 SB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | Ramp | 0 | 0 | 3 | 3 | 6 |
| I-35 NB - NW Barry Rd (M-152) Ramp Terminal | Terminal | 0 | 5 | 40 | 99 | 144 |
| I-35 SB - NW Barry Rd (M-152) Ramp Terminal | Terminal | 0 | 0 | 28 | 105 | 133 |
| I-35 NB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 1 | 3 | 4 |
| I-35 SB - NW Barry Rd On Ramp | Ramp | 0 | 0 | 2 | 4 | 6 |
| I-35 NB - NWBarry Rd On Ramp | Ramp | 0 | 0 | 0 | 4 | 4 |
| I-35 SB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 0 | 4 | 4 |
| I-29 NB - NE Davidson Rd Ramp Terminal | Terminal | 0 | 0 | 3 | 12 | 15 |


| Name | Type | Fatal | Serious Injury | Minor Injury | Property Damage Only | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29 SB - NE Davidson Rd Ramp Terminal | Terminal | 1 | 0 | 3 | 19 | 23 |
| I-29 NB - NE Davidson Rd On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29 SB - NE Davidson Rd Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-29 SB - NE Davidson Rd On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29 NB - NE Davidson Rd Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-29 SB - N Oak Trafficway On Ramp (Loop) | Ramp | 0 | 2 | 0 | 1 | 3 |
| I-29 SB - N Oak Trafficway Off Ramp | Ramp | 0 | 0 | 1 | 1 | 2 |
| I-29 SB - N Oak Trafficway On/Off (Loop) Ramp | Ramp | 0 | 0 | 2 | 2 | 4 |
| I-29 NB - N Oak Trafficway Ramp Terminal | Terminal | 0 | 0 | 3 | 14 | 17 |
| I-29 NB - N Oak Trafficway On (Loop)/Off Ramp | Ramp | 0 | 0 | 2 | 5 | 7 |
| I-29 SB - U.S. 69 (NW Vivion Rd) Ramp Terminal | Terminal | 0 | 0 | 4 | 11 | 15 |
| I-29 NB - U.S. 69 (NW Vivion Rd) On Ramp | Ramp | 0 | 0 | 1 | 3 | 4 |
| I-29 NB - U.S. 69 (NW Vivion Rd) On Ramp (Loop) | Ramp | 0 | 0 | 0 | 3 | 3 |
| I-29 SB - U.S. 69 (NW Vivion Rd) On/Off Ramp | Ramp | 0 | 0 | 4 | 5 | 9 |
| I-29 NB - U.S. 69 (NW Vivion Rd) Ramp Terminal | Terminal | 0 | 0 | 7 | 31 | 38 |
| I-29 NB - U.S. 69 (NW Vivion Rd) Off Ramp | Ramp | 0 | 0 | 1 | 0 | 1 |
| I-29 SB - NW Waukomis Dr Ramp Terminal | Terminal | 0 | 0 | 1 | 1 | 2 |
| I-29 NB - NW Waukomis Dr Ramp Terminal | Terminal | 0 | 0 | 3 | 10 | 13 |
| I-29 NB - NW Waukomis Dr Off Ramp | Ramp | 0 | 0 | 0 | 3 | 3 |
| I-29 SB - NW Waukomis Dr On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29 NB - Route 45 and NW 64th St Ramp Terminal | Terminal | 0 | 1 | 17 | 50 | 68 |
| I-29 SB - Route 45 and NW 64th St Ramp Terminal | Terminal | 0 | 1 | 47 | 130 | 178 |
| I-29 SB - Route 45 and NW 64th St Off Ramp | Ramp | 0 | 0 | 3 | 4 | 7 |
| I-29 SB - Route 45 and NW 64th St On Ramp | Ramp | 0 | 0 | 0 | 4 | 4 |
| I-29 NB - Route 45 and NW 64th St Off Ramp | Ramp | 0 | 0 | 1 | 3 | 4 |
| I-29 NB - Route 45 and NW 64th St On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-29 SB - NW 72nd St Ramp Terminal | Terminal | 0 | 1 | 15 | 34 | 50 |
| I-29 SB - NW 72nd St On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29 NB - NW 72nd St Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| I-29 NB - NW 72nd St Ramp Terminal | Terminal | 0 | 0 | 10 | 29 | 39 |
| I-29 NB - NW 72nd St On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |


| Name | Type | Fatal | Serious Injury | Minor Injury | Property Damage Only | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29 SB - NW 72nd St Off Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29 SB - NW Barry Rd Ramp Terminal | Terminal | 0 | 1 | 25 | 73 | 99 |
| I-29 NB - NW Barry Rd Ramp Terminal | Terminal | 0 | 0 | 27 | 84 | 111 |
| I-29 NB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 1 | 4 | 5 |
| I-29 SB - NW Barry Rd On Ramp | Ramp | 0 | 1 | 1 | 6 | 8 |
| I-29 NB - NW Barry Rd On Ramp | Ramp | 0 | 0 | 0 | 2 | 2 |
| I-29 SB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 1 | 5 | 6 |
| US 169 NB \& 68th St Ramp Terminal | Terminal | 0 | 0 | 7 | 29 | 36 |
| US 169 SB \& 68th St Ramp Terminal | Terminal | 0 | 0 | 8 | 17 | 25 |
| US 169 NB \& Barry Rd Ramp Terminal | Terminal | 0 | 0 | 21 | 39 | 60 |
| US 169 SB \& Barry Rd Ramp Terminal | Terminal | 0 | 0 | 1 | 13 | 14 |
| US 169 SB - NW Barry Rd On Ramp (Loop) | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Barry Rd On Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| US 169 NB - NW Barry Rd Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW Barry Rd On Ramp | Ramp | 0 | 0 | 1 | 2 | 3 |
| US 169 SB - NW 68th St Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW 68th St On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW 68th St Off Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| US 169 NB - NW 68th St On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Englewood Rd Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW Englewood Rd On Ramp | Ramp | 0 | 0 | 1 | 0 | 1 |
| US 169 NB - NW Englewood Rd Off Ramp | Ramp | 0 | 0 | 1 | 0 | 1 |
| US 169 SB - NW Englewood Rd On Ramp | Ramp | 0 | 0 | 0 | 1 | 1 |
| US 169 NB \& Englewood Rd Ramp Terminal | Terminal | 0 | 0 | 18 | 50 | 68 |
| US 169 SB \& Englewood Rd Ramp Terminal | Terminal | 0 | 0 | 9 | 31 | 40 |
| I-635 SB - Horizons Pkwy Ramp Terminal | Terminal | 0 | 0 | 0 | 6 | 6 |
| I-635 NB - Horizons Pkwy Ramp Terminal | Terminal | 0 | 0 | 0 | 4 | 4 |
| I-635 NB - Horizons Pkwy Off Ramp | Ramp | 0 | 0 | 0 | 3 | 3 |
| I-635 SB - Horizons Pkwy On Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |
| I-635 SB - Horizons Pkwy Off Ramp | Ramp | 0 | 0 | 0 | 0 | 0 |


| Name | Type | Fatal | Serious <br> Injury | Minor <br> Injury | Property <br> Damage <br> Only |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Total |  |  |  |  |  |$|$| 1 |
| :---: |
| I-635 NB - Horizons Pkwy On Ramp |
| I-635 SB - U.S. 69 Off Ramp |
| I-635 NB - U.S. 69 On Ramp |

Crash Type

| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29/I-35 SB - Independence Ave On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 - Independence Ave Ramp Terminal | 24 | 0 | 2 | 1 | 1 | 0 | 1 | 39 | 18 | 6 | 2 | 94 |
| I-29/I-35 SB - Independence Ave/The Paseo Off Ramp | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 10 |
| I-29/I-35 NB - Independence Ave/The Paseo On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| I-29/I-35 NB - Berkley Pkwy and E Front St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-29/I-35 SB -Berkley Pkwy and E Front St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| I-29/I-35 SB - Berkley Pkwy and E Front St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 NB - Berkley Pkwy and E Front St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 - Berkley Pkwy and E Front St SPUI | 3 | 0 | 1 | 1 | 2 | 0 | 0 | 20 | 23 | 15 | 0 | 65 |
| I-29/I-35 SB - Route 210 (Armour Rd) On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29/I-35 NB - Route 210 (Armour Rd) On Ramp (Loop) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-29/I-35 SB - Route 210 (Armour Rd) Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 3 | 0 | 13 |
| I-29/I-35 NB - Route 210 (Armour Rd) On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| I-29/I-35 SB - Route 210 (Armour Rd) On Ramp (Loop) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal (On Ramp) | 15 | 0 | 1 | 3 | 1 | 0 | 0 | 17 | 18 | 16 | 1 | 72 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29/I-35 NB - Route 210 (Armour Rd) Ramp Terminal | 12 | 0 | 0 | 0 | 0 | 0 | 1 | 33 | 15 | 5 | 0 | 66 |
| I-29/I-35 SB - Route 210 (Armour Rd) Ramp Terminal | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 11 | 4 | 0 | 37 |
| I-29/I-35 NB - NE Parvin Rd On/Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I-29/I-35 SB - NE Parvin Rd On/Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I-29/I-35 NB - NE Parvin Rd Ramp Terminal | 10 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 16 |
| I-29/I-35 SB - NE Parvin Rd Ramp Terminal | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 8 |
| I-35 NB - NE Antioch Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I-35 NB - NE Antioch Rd Ramp Terminal | 22 | 0 | 0 | 3 | 0 | 0 | 1 | 12 | 10 | 2 | 1 | 51 |
| I-35 SB - NE Antioch Rd Ramp Terminal | 28 | 0 | 1 | 2 | 1 | 0 | 0 | 12 | 7 | 6 | 1 | 58 |
| I-35 SB - NE Antioch Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-35 NB - NE Antioch Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-35 SB - NE Antioch Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-35 NB - N Chouteau Trfy Ramp Terminal | 5 | 0 | 1 | 1 | 0 | 0 | 0 | 31 | 7 | 4 | 0 | 49 |
| I-35 SB - N Chouteau Trfy Ramp Terminal | 24 | 0 | 0 | 2 | 0 | 0 | 0 | 25 | 5 | 2 | 0 | 58 |
| I-35 NB - N Chouteau Trfy Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-35 SB - N Chouteau Trfy On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| I-35 SB - N Chouteau Trfy Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| I-35 NB - N Chouteau Trfy On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-35 NB - Brighton Ave Ramp Terminal | 8 | 0 | 1 | 2 | 0 | 0 | 0 | 13 | 2 | 1 | 0 | 27 |
| I-35 SB - Brighton Ave Ramp Terminal | 4 | 0 | 0 | 1 | 0 | 2 | 0 | 4 | 3 | 4 | 0 | 18 |
| I-35 NB - Brighton Ave Off Ramp | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| I-35 SB - Brighton Ave On Ramp | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 4 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-35 NB - U.S. 69 (NE Vivion Rd) Ramp Terminal | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 2 | 2 | 0 | 8 |
| I-35 SB - U.S. 69 (NE Vivion Rd) Ramp Terminal | 7 | 0 | 1 | 0 | 0 | 1 | 0 | 4 | 2 | 5 | 0 | 20 |
| I-35 SB - U.S. 69 (NE Vivion Rd) Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 0 | 33 |
| $\begin{aligned} & \text { I-35 NB - U.S. } 69 \text { (NE Vivion Rd) Off } \\ & \text { Ramp } \end{aligned}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| $\qquad$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 |
| I-35 NB - U.S. 69 (NE Vivion Rd) On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | 12 | 0 | 0 | 3 | 1 | 0 | 0 | 20 | 1 | 8 | 1 | 46 |
| I-35 SB U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 3 | 1 | 0 | 28 |
| I-35 SB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Ramp Terminal | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 2 | 2 | 0 | 18 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 2 | 0 | 0 | 7 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| Pleasant Valley Rd - U.S. 69 SB Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| I-35 NB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy On Ramp | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 4 | 6 | 3 | 0 | 15 |
| I-35 SB - U.S. 69/ Pleasant Valley Rd/ S Liberty Pkwy Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 6 |
| I-35 NB - NW Barry Rd (M-152) Ramp Terminal | 21 | 0 | 0 | 4 | 0 | 0 | 1 | 89 | 23 | 6 | 0 | 144 |
| I-35 SB - NW Barry Rd (M-152) Ramp Terminal | 51 | 1 | 0 | 2 | 1 | 0 | 0 | 46 | 24 | 6 | 2 | 133 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | UTurn | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-35 NB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 |
| I-35 SB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 6 |
| I-35 NB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 4 |
| I-35 SB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 4 |
| I-29 NB - NE Davidson Rd Ramp Terminal | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 1 | 15 |
| I-29 SB - NE Davidson Rd Ramp Terminal | 11 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 2 | 6 | 0 | 23 |
| I-29 NB - NE Davidson Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| I-29 SB - NE Davidson Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I-29 SB - NE Davidson Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29 NB - NE Davidson Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| I-29 SB - N Oak Trafficway On Ramp (Loop) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| I-29 SB - N Oak Trafficway Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I-29 SB - N Oak Trafficway On/Off (Loop) Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 |
| I-29 NB - N Oak Trafficway Ramp Terminal | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 3 | 0 | 0 | 17 |
| I-29 NB - N Oak Trafficway On (Loop)/Off Ramp | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 2 | 0 | 7 |
| I-29 SB - U.S. 69 (NW Vivion Rd) Ramp Terminal | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 3 | 0 | 15 |
| $\begin{aligned} & \text { I-29 NB - U.S. } 69 \text { (NW Vivion Rd) On } \\ & \text { Ramp } \end{aligned}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 4 |
| $\begin{aligned} & \text { I-29 NB - U.S. } 69 \text { (NW Vivion Rd) On } \\ & \text { Ramp (Loop) } \end{aligned}$ | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 |
| I-29 SB - U.S. 69 (NW Vivion Rd) On/Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 9 |
| I-29 NB - U.S. 69 (NW Vivion Rd) Ramp Terminal | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 30 | 2 | 1 | 1 | 38 |
| I-29 NB - U.S. 69 (NW Vivion Rd) Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-29 SB - NW Waukomis Dr Ramp Terminal | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| I-29 NB - NW Waukomis Dr Ramp Terminal | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 9 | 1 | 1 | 0 | 13 |
| I-29 NB - NW Waukomis Dr Off Ramp | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 |
| I-29 SB - NW Waukomis Dr On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29 NB - Route 45 and NW 64th St Ramp Terminal | 22 | 0 | 0 | 2 | 0 | 0 | 0 | 38 | 4 | 2 | 0 | 68 |
| I-29 SB - Route 45 and NW 64th St Ramp Terminal | 81 | 0 | 0 | 3 | 1 | 0 | 0 | 74 | 12 | 7 | 0 | 178 |
| I-29 SB - Route 45 and NW 64th St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 7 |
| I-29 SB - Route 45 and NW 64th St On Ramp | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 4 |
| I-29 NB - Route 45 and NW 64th St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 4 |
| I-29 NB - Route 45 and NW 64th St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-29 SB - NW 72nd St Ramp Terminal | 18 | 0 | 0 | 3 | 0 | 1 | 1 | 21 | 5 | 1 | 0 | 50 |
| I-29 SB - NW 72nd St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| I-29 NB - NW 72nd St Off Ramp | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| I-29 NB - NW 72nd St Ramp Terminal | 18 | 0 | 0 | 1 | 0 | 0 | 0 | 15 | 2 | 3 | 0 | 39 |
| I-29 NB - NW 72nd St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| I-29 SB - NW 72nd St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| I-29 SB - NW Barry Rd Ramp Terminal | 26 | 0 | 0 | 3 | 0 | 0 | 1 | 47 | 20 | 2 | 0 | 99 |
| I-29 NB - NW Barry Rd Ramp Terminal | 26 | 0 | 0 | 0 | 2 | 0 | 1 | 64 | 15 | 3 | 0 | 111 |
| I-29 NB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | 5 |
| I-29 SB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 0 | 8 |
| I-29 NB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| I-29 SB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 6 |
| US 169 NB \& 68th St Ramp Terminal | 7 | 0 | 0 | 0 | 1 | 0 | 0 | 22 | 5 | 1 | 0 | 36 |
| US 169 SB \& 68th St Ramp Terminal | 6 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 4 | 2 | 0 | 25 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| US 169 NB \& Barry Rd Ramp Terminal | 30 | 0 | 0 | 1 | 0 | 0 | 0 | 16 | 7 | 5 | 1 | 60 |
| US 169 SB \& Barry Rd Ramp Terminal | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 1 | 0 | 14 |
| US 169 SB - NW Barry Rd On Ramp (Loop) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| US 169 NB - NW Barry Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW Barry Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| US 169 SB - NW 68th St Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW 68th St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW 68th St Off Ramp | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| US 169 NB - NW 68th St On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 SB - NW Englewood Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US 169 NB - NW Englewood Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| US 169 NB - NW Englewood Rd Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| US 169 SB - NW Englewood Rd On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| US 169 NB \& Englewood Rd Ramp Terminal | 17 | 0 | 0 | 1 | 0 | 0 | 0 | 39 | 6 | 5 | 0 | 68 |
| US 169 SB \& Englewood Rd Ramp Terminal | 7 | 0 | 0 | 2 | 0 | 0 | 0 | 21 | 9 | 1 | 0 | 40 |
| I-635 SB - Horizons Pkwy Ramp Terminal | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 6 |
| I-635 NB - Horizons Pkwy Ramp Terminal | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 |
| I-635 NB - Horizons Pkwy Off Ramp | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 3 |
| I-635 SB - Horizons Pkwy On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-635 SB - Horizons Pkwy Off Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I-635 NB - Horizons Pkwy On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |


| Name | Angle | Animal | Backing | Head On | Other | Parking | Pedestrian | Rear <br> End | Sideswipe | Single Vehicle | $\begin{aligned} & \text { U- } \\ & \text { Turn } \end{aligned}$ | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I-635 SB - U.S. 69 Off Ramp | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 12 | 0 | 15 |
| I-635 NB - U.S. 69 On Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 |

## Attachment B - Heatmaps

- Fixed Object
- Daytime Crashes - 6 am to 7 pm
- Nighttime Crashes - 7 pm to 6 am
- AM Peak Period - 6 am to 9 am
- PM Peak Period - 3 pm to 7 pm
- Non-Peak Period
- Rear End Crashes
- Sideswipe Crashes
- Single Vehicle Crashes
- Weather Condition - Cloudy
- Weather Conditions - Precipitation (Rain, Sleet, Snow)


## Fixed Object Crashes

- Crashes that involved striking a fixed object, not necessarily the primary crash type.



## Daytime Crashes - 6 am to 7 pm



## Nighttime Crashes - 7 pm to 6 am



## AM Peak Period Crashes - 6 am to 9 am



## PM Peak Period Crashes - 3 pm to 7 pm



## Non-Peak Period Crashes



## Rear End Crashes



## Sideswipe Crashes



## Single Vehicle Crashes



## Weather Condition - Cloudy



## Weather Condition - Precipitation (Rain, Sleet, Snow)




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## Attachments

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## Acronyms

| ASM | l-29, I-35, U.S. 169 PEL Alternatives Screening Methodology |
| :--- | :--- |
| CAC | Community Advisory Committee |
| Dynameq | Dynameq software version 4.4 |
| EJ/LEP | Environmental Justice/Limited English Proficiency |
| HDCs | Historically Disadvantaged Communities |
| KCATA | Kansas City Area Transit Authority |
| KCMO | Kansas City, Missouri |
| LOS | Level of Service |
| MARC | Mid-America Regional Council |
| MoDOT | Missouri Department of Transporation |
| NEPA | National Environmental Policy Act |
| NRHP | National Register of Historic Places |
| PEL | Planning and Environmental Linkages |
| ROW | Right-of-Way |
| SB | Southbound |
| STIP | Statewide Transportation Improvement Program |
| VHT | Vehicle Hours Traveled |
| VMT | Vehicle Miles Traveled |

### 1.0 Introduction

The Missouri Department of Transportation (MoDOT) has initiated a Planning and Environmental Linkages (PEL) Study of the I-29, I-35 and U.S. 169 corridors. MoDOT desires to develop both short-term and long-term alternatives and proposed actions for improving safety, reducing congestion, improving operational performance, addressing asset management and positioning for future transportation needs along I-29, I-35 and U.S. 169.

This report summarizes the alternatives developed to meet the PEL's Purpose and Need and study goals and the analysis completed. It is organized into the following chapters:

- Chapter 2 - Alternative Screening Process
- Chapter 3 - Universe of Alternatives
- Chapter 4 - Level 1 Alternative Screening
- Chapter 5 - Level 2 Alternative Screening
- Chapter 6 - Level 3 Alternative Screening/Scenario Development
- Chapter 7 - PEL Recommendations

The PEL study area extends through portions of Clay, Jackson and Platte Counties, Missouri. As shown in blue (Figure 1 from the Study Team (Consultant Team and MoDOT)), the project limits, which represent where capital improvements are being evaluated, extend along sections of I-29, I-35 and U.S. 169. The project limits include:

- I-29, from Route 45 (NW 64 ${ }^{\text {th }}$ St.) to the I-29 at I-35 merge, continuing south across the Missouri River to the northeast corner of the downtown freeway loop.
- I-35, from I-435 to the I-29 at I-35 merge.
- U.S. 169, from NW 68 ${ }^{\text {th }}$ St. to I-29.

The study area encompasses the limits of future projects and accounts for areas beyond those limits that are anticipated to influence parameters such as traffic operations and area to account for community resources, natural resources and other potential environmental constraints. Baseline conditions were developed within the study area boundary.

Figure 1: PEL Study Area


Source: Study Team.
After the Baseline Conditions were identified for the entire project limits, needs were prioritized into low and high priority categories (Figure 2). Although mainline improvements were analyzed for the entire project limits, the high priority focus sections became the focus of this PEL Study and were analyzed at a more comprehensive level because the Baseline Condition report identified this area as the most critical area of the project limits. We also received feedback from stakeholders and the public that the High Priority section was the most critical area within the project limits. Results in this report represent the high priority section.

Figure 2: PEL Focus Sections


Source: Study Team.

### 2.0 Alternatives Screening Process

To ensure that each alternative was examined consistently, and evaluations were unbiased, an I-29, I-35, U.S. 169 PEL Alternatives Screening Methodology (ASM) was established before alternatives were developed or screened. The ASM in Attachment A details the three levels of alternatives screening and is depicted in Figure 3.

Beginning with the Universe of Alternatives, including the No-Action Alternative, the ASM served as the framework for analyzing and screening alternatives. The No-Action Alternative represents the baseline condition in the PEL study area, meaning no improvements would be implemented other than normal operations and maintenance, including projects already programmed within the fiscally constrained Mid-America Regional Council (MARC) long-range transportation plan, Connected KC 2050 and Transportation Improvement Program (TIP) and MoDOT's Statewide Transportation Improvement Plan (STIP). The three screening levels that comprise the ASM include:

- Level 1-Qualitative fatal flaw screening of the Universe of Alternatives based on the Purpose and Need to arrive at the Preliminary Alternatives;
- Level 2 - Qualitative screening of the Preliminary Alternatives based on the Study Goals to identify the Primary and Complementary Alternatives ${ }^{1}$. The combination of Primary and Complementary Alternatives will be bunded into Scenarios
- Level 3 - Primarily quantitative screening with some qualitative screening of the Scenarios based on the Study Goals to arrive at the Recommended Scenarios.

Figure 3: Alternative Screening Process (Shown in Phase 3)


Source: Study Team.

[^19]
### 3.0 Universe of Alternatives

The initial Universe of Alternatives were developed and reviewed by the Core Team (Study Team, Kansas City, Missouri (KCMO), and MARC). The Community Advisory Committee (CAC) and the public were given the opportunity to review and comment on these alternatives. The Universe of Alternatives were grouped into six families (Highway Build, Congestion Management, Intelligent Transportation Systems, Freight, Multi-Modal and Non-Recurring Congestion Management) plus the No-Action, shown in Figure 4. A description of each alternative is discussed in greater detail in the Universe of Alternatives report in Attachment B.

Figure 4: Universe of Alternatives


## Highway Build

- Main Lane Widening
- Main Lane pavement Rehabilitation
- Elevated Lanes
- Collector / Distributor (C/D) Roads
- Dedicated Truck Lanes/Ramps
- Auxiliary Lanes
- Frontage Road Improvements
- Intersection Improvements
- Interchange Improvements
- Ramp Consolidation / Elimination
- Roadway Shoulder Improvements
- Horizontal / Vertical Curve Improvements
- Bottleneck Removal
- Bypass Route
- Increase the number of lanes without highway widening
- Geometric Design Improvements
- New Freeways
- New Arterial Streets


## Congestion Management

- Information Systems / Advanced Traveler Information
- High Occupancy Vehicle (HOV)
- Managed Lanes
- Reversible Lanes
- Ramp Metering
- Hard Shoulder Running
- Travel Demand Management (TDM)
- Transportation System Management and Operations (TSM\&O)
- Wayfinding / Signage
- Arterial Improvements
- Land Use Policy
- Access Management Strategies
- Alternative Route Improvements


## Intelligent Transportation Systems

- Traveler Information Systems
- ITS Support Infrastructure
- Aggressive Incident

Clearance

- Traffic Signal

Preemption/Transit Signal Priority

- Hazardous Materials Tracking and Emergency Response
- CCTV Cameras/Traffic Flow Monitoring
- Signal Operation \& Management
- Dynamic Merge Control
- Integrated Corridor Management
- Connected Vehicles


## . Freight

- Commercial Vehicle Geometric Accommodations
- Enhanced Weigh Stations
- Intermodal Connector Roads
- Truck Lane Restrictions
- Intelligent Commercial Vehicle Parking


## Multimodal

- Arterial Bus Transit
- Increase bus route
- Express Bus Transit coverage/frequency
- Bus on Shoulder
- Arterial Bus Lanes
- Arterial Bus Rapid Transit
- Multimodal Transportation Corridors/Centers
- Light Rail (Streetcar)
- Park-and-Ride Lots
- Heavy Rail
- In-line Transit Station
- High Speed Rail
- Transit Enhancements
- Bicycle / Pedestrian
- Mobility Hubs
- Commuter Rail
- Microtransit


## Non-Recurring Congestion Management

- Crash Investigation Sites
- Roadside / Motorist Assist Enhancements
- Improvements to Detour Routes
- Variable Speed Limits (Speed Harmonization)
- Queue Warning
- Enhanced Work Zones

Source: Study Team.

### 4.0 Level 1 Alternative Screening

The ASM outlines the fatal flaw screening process to determine if the Universe of Alternatives meets the Purpose and Need. This section documents the Level 1 Screening and its results. The Universe of Alternatives Screening matrix is provided in the Level 1 Screening Results document in Attachment C.

### 4.1 Alternatives Eliminated from Further Study

The following alternatives were eliminated from further consideration because they did not meet the Purpose and Need or were not feasible. Four highway-build alternatives, three multi-modal alternatives, and one congestion management alternative were eliminated from further study based on the rationale below.

## Highway Build

- Elevated Lanes - This alternative was deemed not feasible and eliminated because of the high construction costs and impacts to the surrounding area.
- Bypass Route - This alternative was deemed not feasible and eliminated due to the high impacts and high construction costs.
- New Freeways - This alternative was deemed not feasible and eliminated because of the high construction costs and impacts to the area.
- New Arterial Streets - This alternative was deemed not feasible and eliminated due to the high impacts to the local area and cost of construction.


## Multi-modal

- Heavy Rail - This alternative was deemed not feasible and eliminated due to the high construction costs and fixed route of the rail system.
- Commuter Rail - This alternative was deemed not feasible and eliminated because of the high construction costs and the amount of right-of-way (ROW) needed.
- High Speed Rail - This alternative was deemed not feasible and eliminated because of the high construction costs and the amount of ROW needed.


## Congestion Management

- Managed Lanes - This alternative was eliminated due to tolling not having legislative authority in Missouri at the time the alternatives were screened.


### 4.2 Level 1 Screening Results

After the Level 1 screening was completed, the Preliminary Alternatives shown in Figure 5 remained and will be further evaluated under the Level 2 screening criteria.

Figure 5: Level 1 Screening Results


Source: Study Team.
Note: Alternatives shown in red were screened from further analysis.

### 5.0 Level 2 Alternative Screening

For Level 2, qualitative criteria were utilized to evaluate and screen the Preliminary Alternatives against the study goals. Alternatives were rated on how well they were able to achieve the study goals I-29, I-35, U.S. 169 PEL Baseline Conditions Report's in Section 6.0.

Level 2 is mostly a qualitative screening process and the ratings given were based on the rationale and methods detailed in Attachment A, Alternatives Screening Methods. The Level 2 Screening Results in Attachment $\mathbf{D}$ documents how each alternative, including the No-Action Alternative, meets the study goals.

### 5.1 Alternatives Eliminated from Further Study

As detailed in the ASM, weighted measures were developed and applied based on the importance of a study goal. Preliminary Alternatives that received a negative score were screened out from further study. Although the No-Action Alternative does not meet the Purpose and Need and received a negative score, the No-Action Alternative was carried through the analysis for comparison.

The following Preliminary Alternatives were screened out from further consideration due to their negative weighted measure scores.

## Congestion Management

- Hard Shoulder Running - Hard shoulder running received a weighted score of -0.1. Study goals associated with hard shoulder running that received a negative score were safety, environment and public input. Safety received an overall negative score due to the impacts to safety on the freeway mainline at conflict zones such as interchange onand off-ramps and the potential to interfere with emergency vehicles. Environment received a negative score for potential impacts to ROW/parcels/structures; displacements; environmental justice/ limited English populations (EJ/LEP) and historically disadvantaged communities (HDCs); carbon emission reduction; archeological sites, National Register of Historic Places (NRHP) sites, parks, surface water crossings, wetlands, threatened/endangered species and high-risk hazardous materials sites. Impacts to noise sensitive receivers adjacent to roadways and potential noise mitigation that would result from additional vehicles on the shoulders also received a negative score. Additionally, there was a lack of public support for the hard running shoulder alternative.


## Multi-Modal

- Arterial Bus Lanes - Arterial Bus lanes received a weighted score of -0.1 due to vehicles operating in exclusive lanes for bus transit travel on arterial routes. Study goals
that contributed to the overall negative score were cost, environment and public input. The planning-level construction costs received a negative score. Environmental received a negative score for potential displacements and impacts to ROW/parcels/structures; EJ/LEP populations and HDCs; carbon emission reduction; archeological sites, NRHP sites, parks, surface water crossings, wetlands, threatened/endangered species and high-risk hazardous materials sites. Impacts to noise sensitive receivers adjacent to roadways and potential noise mitigation that would result from an exclusive bus lane on arterial roadways also received a negative score. Public input received a negative score due to lack of support.


### 5.2 Level 2 Screening Results

The remaining alternatives moving forward to the Level 3 Screening are shown in Figure 6.

Figure 6: Level 2 Screening Results

## No Action

## Highway Build

- Aggressive Incident Clearance
- Traffic Signal Preemption/Transit Signal Priority
- Hazardous Materials Tracking and Emergency Response
- ITS Support Infrastructure
- CCTV Cameras/Traffic Flow Monitoring
- Main Lane Widening
- Signal Operation \& Management
- Main Lane pavement Rehabilitation
- Dynamic Merge Control
- Integrated Corridor Management
- Collector / Distributor (C/D) Roads
- Connected Vehicles
- Dedicated Truck Lanes/Ramps
- Auxiliary Lanes
- Frontage Road Improvements
- Intersection Improvements
- Interchange Improvements
- Ramp Consolidation / Elimination
- Roadway Shoulder Improvements
- Horizontal / Vertical Curve Improvements


## Freight

- Bottleneck Removal
- Bypass Route
- Increase the number of lanes without highway widening
- Geometric Design Improvements
- New Freeways
- New Arterial Streets


## Congestion Management

- Information Systems / Advanced Traveler Information
- High Occupancy Vehicle (HOV)
- Managed Lanes
- Reversible Lanes
- Ramp Metering
- Hard Shoulder Running
- Travel Demand Management (TDM)
- Transportation System Management and Operations (TSM\&O)
- Wayfinding / Signage
- Arterial Improvements
- Land Use Policy
- Access Management Strategies
- Alternative Route Improvements


## Non-Recurring <br> Congestion Management

- Crash Investigation Sites
- Roadside / Motorist Assist Enhancements
- Improvements to Detour Routes
- Variable Speed Limits (Speed Harmonization)
- Queue Warning
- Enhanced Work Zones
- Increase bus route coverage/frequency
- Multimodal Transportation Corridors/ Centers
- Park-and-Ride Lots
- In-line Transit Station
- Transit Enhancements
- Mobility Hubs
- Microtransit
- Arterial Bus Transit
- Express Bus Transit
- Bus on Shoulder
- Arterial Bus Lanes
- Arterial Bus Rapid Transit
- Light Rail (Streetcar)
- Heavy Rail
- High Speed Rail
- Bicycle / Pedestrian


### 6.0 Level 3 Alternative Screening/Scenario Development

All of the Preliminary Alternatives from Level 2, excluding Hard Shoulder Running and Arterial Bus Lanes, were recommended to advance to Level 3 screening. Prior to the Level 3 screening, these Preliminary Alternatives were first categorized as either Primary or Complementary Alternatives, and then grouped into seven Scenarios (combinations of Alternatives) of improvements. For the Highway Build family, eight of the 14 Preliminary Alternatives from Level 2 results were determined to be Primary and six were classified as Complementary. In Level 3, a quantitative analysis was primarily performed. A description of the methods used to quantify the measures for each analysis group can be found in Attachment A.

### 6.1 Scenario Development

From the Primary and Complementary Alternatives, Scenarios were developed to establish a comprehensive transportation solution. The Primary Alternatives have the greatest ability to address the Purpose and Need and study goals. Therefore, modifying the Primary Alternatives characteristics in the scenarios provides the most insight into each scenario's overall performance. Figure 7 illustrates the seven Scenarios.

In Level 3, there were 14 Highway Build alternatives that were split into Primary and Complementary alternatives, like all alternatives were. Eight Highway Build Primary Alternatives and six Complementary Alternatives were included with Scenarios 2 through 7.

## Highway Build

- Main Lane Widening (Primary Alternative)
- Main Lane pavement Rehabilitation (Complementary Alternative)
- Elevated Lanes
- Collector / Distributor (C/D) Roads (Primary Alternative)
- Dedicated Truck Lanes/Ramps (Complementary Alternative)
- Auxiliary Lanes (Primary Alternative)
- Frontage Road Improvements (Complementary Alternative)
- Intersection Improvements (Complementary Alternative)
- Interchange Improvements (Primary Alternative)
- Ramp Consolidation / Elimination (Primary Alternative)
- Roadway Shoulder Improvements (Complementary Alternative)
- Horizontal / Vertical Curve Improvements (Complementary Alternative)
- Bottleneck Removal (Primary Alternative)
- Bypass Route
- Increase the number of lanes without highway widening (Primary Alternative)
- Geometric Design Improvements (Primary Alternative)
- New Freeways
- New Arterial Streets

Figure 7: Scenarios


All complementary alternatives were evaluated as a group within each scenario, except the No-Action.

## Highway Build

Freight

- Commercial Vehicle Geometric

Accommodations

- Dedicated Truck Lanes/Ramps
- Main Lane Pavement Rehabilitation
- Frontage Road Improvements
- Enhanced Weigh Stations
- Intersection Improvements
- Intermodal Connector Roads
- Roadway Shoulder Improvements
- Horizontal/Vertical Curve Improvements
- Truck Lane Restrictions
- Intelligent Commercial Vehicle Parking


## Congestion <br> Management

- Information Systems / Advanced Traveler Information
- High Occupancy Vehicle (HOV)
- Reversible Lanes
- Ramp Metering
- Travel Demand Management (TDM)
- Transportation System Management and Operations (TSM\&O)
- Wayfinding / Signage
- Arterial Improvements
- Land Use Policy
- Access Management Strategies
- Alternative Route Improvements

Intelligent
Transportation Systems

- Traveler Information Systems
- Aggressive Incident Clearance
- Traffic Signal Preemption/Transit Signal Priority
- Hazardous Materials Tracking and Emergency Response
- ITS Support Infrastructure
- CCTV Cameras/Traffic Flow Monitoring


## Multimodal

- Arterial Bus Transit
- Express Bus Transit
- Bus on Shoulder
- Arterial Bus Rapid Transit
- Light Rail (Streetcar)
- Bicycle/Pedestrian
- Increase Bus Route Coverage/Frequency
- Multimodal Transportation Corridors/Centers
- Park-and-Ride Lots
- In-Line Transit Stations
- Transit Enhancements
- Mobility Hubs
- Microtransit
- Signal Operation \& Management
- Dynamic Merge Control
- Integrated Corridor Management
- Connected Vehicles

Source: Study Team.

### 6.2 Scenarios Analyzed

The seven Scenarios were illustrated to view the proposed improvements. The following section outlines Scenarios 1 through 7 in greater detail.

## Scenario 1: No-Action Scenario

Scenario 1 represents the No-Action that is required for the PEL planning and National Environmental Policy Act (NEPA)-level alternatives analysis, as shown in Figure 8. The NoAction Scenario represents projects in MARC's LRTP and TIP as well as MoDOT's STIP and transit projects by the Kansas City Area Transportation Authority (KCATA). All scenarios include these committed projects.

Figure 8: Scenario 1


Source: MoDOT 2024-2028 STIP and KCATA.

## Scenario 2: Highway Mainline Capacity + Complementary Alternatives Scenario

Scenario 2 represents the Highway Mainline Capacity plus Complementary Alternatives as shown in Figure 9. This scenario includes widening the I-29, I-35, U.S. 169 and dual-designated I-29/I-35 mainlines, within the existing ROW, along with the Complementary Alternatives shown. The Kit Bond Bridge would not be physically widened, but an additional lane would be accommodated with restriping to the existing bridge.

Figure 9: Scenario 2


[^20]
## Scenario 3: Interchange Missing Movements + Complementary Alternatives Scenario

Scenario 3 focuses on adding missing ramp movements to I-29 at U.S. 169, I-29 at N. Oak Trafficway (Trfwy.), and I-35 at U.S. 69 (NE Vivion Rd.) plus the associated Complementary Alternatives. This scenario does not include highway mainline capacity improvements. Figure 10 illustrates Scenario 3.

Figure 10: Scenario 3


[^21]
## Scenario 4: Focus Interchanges Improvement Full Build (with Aux. Lanes) + Complementary Alternatives Scenario

Scenario 4 focuses on improving four interchange areas plus additional Complementary Alternatives. This scenario does not include highway mainline capacity improvements or widening. The interchange improvements proposed would be at I-29 at U.S. 169, I-29 at N. Oak Trfwy, I-29 at I-35 and I-35 at U.S. 69 (NE Vivion Rd). Figure 11 illustrates Scenario 4.

Figure 11: Scenario 4


Source: Study Team.

## Scenario 5: Highway Mainline Capacity + Focus Interchanges Improvements Lite + Complementary Alternatives Scenario

Scenario 5 represents the Highway Mainline Capacity plus lite interchange improvements and Complementary Alternatives. Under a lite interchange improvements scenario, a total interchange rebuild would not occur at the locations indicated, but MoDOT would focus on the most critical needs of the interchanges through practical design. Figure 12 illustrates the interchange locations where lite improvements would occur (same four locations as in Scenario 4) as well as additional Complementary Alternatives.

Figure 12: Scenario 5


[^22]
## Scenario 6: Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Complementary Alternatives Scenario

Scenario 6 represents the Highway Mainline Capacity plus interchange improvements Full Build plus Complementary Alternatives. Interchange improvements Full Build is a total rebuild of the focus interchanges. This is essentially a combination of Scenarios 2 and 4. Figure 13 shows the Full Build interchange locations and Complementary Alternatives for Scenario 6.

Figure 13: Scenario 6


[^23]
## Scenario 7: Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Consolidated/Eliminated Access + Complementary Alternatives

Scenario 7 is the same as Scenario 6 except for a few key ramp removals/consolidations. In Scenario 7, closely spaced ramps along the mainline are removed to improve operations. Examples include the N. Brighton Avenue ramps on I-35, the U.S. 69 (NW Vivion Rd) ramps on $\mathrm{I}-29$, and the interior-facing ramps at NE Davidson Rd., Route 1 (NE Antioch Rd.), and NE Parvin Rd. at the I-29/I-35 split. Figure 14 shows the focus interchange locations and Complementary Alternatives.

Figure 14: Scenario 7


[^24]
### 6.3 Interchange Concepts

A total of 53 interchange concepts were developed by the Study Team as depicted in
Attachment E. Multiple concepts were developed for each of the focus interchanges, including:

- I-29 at I-35 Interchange - 13 concepts
- I-29 at U.S. 169 Interchange - 9 concepts
- I-29 at N. Oak Trfwy - 14 concepts
- I-35 at U.S. 69 (NE Vivion Rd.) and N Brighton Ave. - 17 concepts

From the 53 interchange concepts, the Study Team chose the most representative concept for each Scenario at the focus interchanges. The representative interchange concepts are marked as such in Attachment E. All interchange concepts will be carried forward into NEPA.

### 6.4 Level 3 Scenario Screening

The seven Scenarios were further analyzed based on the Level 3 screening categories of Traffic, Safety, Multimodal, Environmental, Cost Efficiency and Maintenance, and Engagement Input and are summarized below. Additional details for each category can be reviewed in Attachment F.

### 6.4.1 Traffic

The Study Team evaluated 34 measures using a regional Dynameq travel model including projected volumes for 2050 as detailed in Attachment F. All 34 performance measures were summarized into five representative measures in Table 1. These measures were representative of highway demand, mobility and travel time, arterial mobility and operations during construction. The scenario names in Table 1 have been color coded to easily distinguish similar elements among each scenario.

Scenarios 2, 5, 6 and 7 provided the greatest overall traffic performance results for level of service, speed, travel time and vehicles served based on increased freeway capacity.
Signalized intersections are generally predicted to operate well for all Scenarios, although some localized improvements may be identified in more detailed studies. Severity of lane closures and detours during construction is anticipated to be worse for more complex scenarios, such as Scenarios 5, 6 and 7. Complex scenarios are those with substantial changes to the existing road network.

Additional microsimulation analysis is recommended during the NEPA phase to determine the impacts of I-29/I-35 capacity improvements on the downtown freeway loop and vice versa. Specifically, future traffic volumes on I-29/I-35 north of the downtown freeway loop may be metered in the northbound direction due to capacity limitations within the loop. Capacity improvements on southbound I-29/I-35 may induce demand that the capacity of the loop cannot
accommodate, leading to additional congestion. These potential interdependencies should be studied in more detail before specific improvements are advanced for I-29/l-35 south of the split.

While additional capacity may not be added to the downtown loop prior to the horizon year 2050, highway widening is more likely to occur north of the project limits. Therefore, to account for the increased traffic demand that would result from widening north of the project limits, the traffic analysis for the mainline capacity scenarios assumed that there would be additional capacity north of the project limits along U.S. 169 and I-35, and that the I-29/I-635 interchange would be reconfigured to address a future bottleneck that was revealed in the traffic modeling (see Figure 3 in Attachment A - Alternative Screening Methodology). This traffic modeling assumption was used in Scenarios 2, 5, 6 and 7 because these were Scenarios that included mainline widening within the PEL project limits. It was assumed that if freeways within the project limits were not widened (i.e. Scenarios 1, 3, and 4), then the highways north of the project limits also would not be widened

Table 1: Traffic Results by Scenario


Source: Study Team.

### 6.4.2 Safety

The Study Team evaluated four safety measures as detailed in Attachment F. The measures were summarized into the two representative measures in Table 2. When conducting the safety analysis, the number of conflict points along the freeway and at each interchange were analyzed for each Scenario. Generally, facilities with fewer conflict points have fewer crashes. Conflict points on the freeway and arterial roadways were analyzed separately.

Interchange and roadway configurations for Scenarios 1 and 2 follow, or are very close to, the existing alignments. Today, the roadways and interchanges have numerous ramps (on and off the freeway) and conflict points.

In Scenario 3, freeway conflict points increase due to the addition of ramps between I-29 and U.S. 169. Arterial conflict points decrease at I-35 and N Oak Trafficway due to the new diamond interchange configuration that removes multiple connections. In Scenarios 4, 5 and 6, interchanges would be fully reconstructed allowing more movements at each ramp connection to the arterial roadways. The reconfigurations will increase the number of arterial conflict points but will allow for removal of other ramp connections to the freeway.

In Scenario 7, some ramp movements would be removed to improve traffic flow on I-29 and I35. Fewer ramps also result in fewer arterial connections with fewer overall conflict points.

Table 2: Safety Results by Scenario

| Measure | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 | Scenario 6 | Scenario 7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | No Action | Highway Mainline Capacity + Complementary Alternatives | Interchange <br> Missing <br> Movements + <br> Complementary <br> Alternatives | Focus Interchanges Improvement Full Build (with Aux. Lanes) + Complementary Alternatives | Highway Mainline Capacity + Focus Interchanges Improvement Lite + Complementary Alternatives | Highway Mainline Capacity + <br> Focus Interchanges Improvement Full Build + Complementary Alternatives | Highway Mainline Capacity + <br> Focus Interchanges Improvement Full Build + Consolidated/ Eliminated Access + Complementary Alternatives |
| Safety |  |  |  |  |  |  |  |
| Freeway conflict points |  |  |  |  |  |  |  |
| Number of arterial connection conflict points |  |  |  |  |  |  |  |


| Positive |  | Negative |
| :---: | :---: | :---: |
| $\bigoplus$ | Complete Achievement / High Impact | $\bigoplus$ |
| $\bigoplus$ | Substantial Achievement / Substantial Impact | $\bigoplus$ |
| $\bigoplus$ | Half Achievement / Moderate Impact | $\bigoplus$ |
| $\bigoplus$ | Some Achievement / Some Impact | $\bigoplus$ |

[^25]
### 6.4.3 Multimodal

The Study Team evaluated two multimodal measures as detailed in Attachment $F$ that were summarized as shown in Table 3. All multimodal Scenarios provide the opportunity to improve bicycle/pedestrian crossings of the freeways. Improved bicycle/pedestrian opportunities would be incorporated into proposed interchanges. For more complete interchange improvements, Scenarios 4-7 include opportunities to enhance bicycle/pedestrian connections by rebuilding interchanges. Scenario 6 substantially improves bicycle/pedestrian connectivity due to the opportunity to add reconstructed interchanges. Alternatively, Scenario 7 does not rank as positively due to interchange consolidations that eliminate access for some bicycle/pedestrian connections.

Table 3: Multimodal Results by Scenario


Source: Study Team.

### 6.4.4 Environmental

Twenty-three performance measures were evaluated for environmental components of each Scenario, as shown in Attachment F. The representative performance measures are shown in Table 4. These measures were generally representative of impacts resulting from ROW acquisition such as displacements, impacts to EJ/LEP populations or HDCs, and impacts to natural resources. Carbon emissions were also reviewed from a traffic standpoint.

As shown in Table 4, Scenarios 1 and 2 had the lowest number of potential environmental impacts. It was assumed that the mainline widening in Scenario 2 could be done within existing ROW. The largest portion of environmental impacts would be a result of new interchange ramps in combination with roadway widening. With more in-depth engineering analysis set to occur in the NEPA phase, there is the potential for environmental impacts shown in Scenarios 3-7 to be reduced.

Although vehicle miles traveled (VMT) increases for the added capacity scenarios which may increase carbon emissions, this increase may be mitigated by the decrease in vehicle hours traveled (VHT) seen in the same scenarios; when mainline capacity and interchanges are improved, VHT are reduced.

Table 4: Environmental Results by Scenario


Source: Study Team.

### 6.4.5 Cost Efficiency and Maintenance

Interchange concepts in Section 6.3 were developed at each of the focus interchanges for each Scenario. In order to develop planning-level construction cost estimates of the representative interchange configurations for each Scenario, the corridor was split into four zones. These zones were identified to facilitate the determination of quantities and costs as shown in Figure 15.

Figure 15: Construction Cost Estimate Zones


[^26]The zones include the focus areas identified and cover the project limits in its totality as described below:

- Zone 1: Along I-29, from the extension of N. Troost Ave. to the I-29 at Route 45 (NW 64 ${ }^{\text {th }}$ St.) Interchange. And, along U.S. 169 from the I-29 at U.S. 169 Interchange to the U.S. 169 at NW $68^{\text {th }}$ St. Interchange.
- Zone 2: Section between the extension of N. Troost Ave. on I-29 to mile marker 7.6 on I-29 / I-35 at NE Parvin Rd. and to mile marker 9.2 on I-35 east of Antioch Rd.
- Zone 3: Along I-35, from mile marker 9.2 east of Antioch Rd. to the east side of the I-35 at I-435 Interchange.
- Zone 4: Along I-29 / I-35, from mile marker 7.6 on I-29 / I-35 to the north of the NE corner of the Loop at Independence Ave. (U.S. 24).

Table 5: Construction Costs by Scenario

| Goals | Measure |  | Scenario 1 |  | Scenario 2 |  | Scenario 3 |  | Scenario 4 |  | Scenario 5 |  | Scenario 6 | Scenario 7 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | No Action STIP Projects |  | Highway Mainline Capacity + Complementary Alternatives |  | Interchange <br> Missing <br> Movements + <br> Complementary <br> Alternatives |  | Focus Interchanges Improvement Full Build (with Aux. Lanes) ${ }^{+}$ Complementary Alternatives |  | Highway Mainline Capacity + Focus Interchanges Improvement Lite + Complementary Alternatives |  | Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Complementary Alternatives |  | Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Consolidated/ Eliminated Access + Complementary Alternatives |  |
| Maximize Cost Efficiency | Zone 1: I-29 from l-29/35 Split to M-45 and U.S. 169 from I-29 to 68th Street | \$ | 23,741,400 | \$ | 70,400,000 | \$ | 20,900,000 | \$ | 90,000,000 | \$ | 108,700,000 | \$ | 145,200,000 | \$ | 141,200,000 |
|  | Zone 2: 1-29/1-35 Split | \$ | 19,337,000 | \$ | 52,300,000 | - |  | \$ | 57,100,000 | \$ | 55,600,000 | \$ | 80,000,000 | \$ | 52,500,000 |
|  | Zone 3: 1-35 from l-29/35 Split to l-435 | \$ | 8,100,000 | \$ | 36,000,000 | \$ | 9,200,000 | \$ | 12,800,000 | \$ | 40,500,000 | \$ | 44,200,000 | \$ | 40,600,000 |
|  | Zone 4: I-29/35 Split to N.E. Corner of Downtown Loop | \$ | 178,712,000 | \$ | 101,500,000 | - |  | - |  | \$ | 101,500,000 | \$ | 101,500,000 |  | \$ 101,500,000 |
|  | Total Construction Costs All Zones | \$ | 234,179,000 | \$ | 260,200,000 | \$ | 30,100,000 | \$ | 159,900,000 | \$ | 306,300,000 | \$ | 370,900,000 | \$ | 335,800,000 |
|  | Total investment required by others (transit, city, etc.) |  | \$ |  | \$ |  | \$ |  | \$ |  | \$\$ |  | \$\$ |  | \$ |

[^27]Source: Study Team

In looking at the planning-level construction costs of each scenario, Scenarios 2, 5, 6 and 7 are the highest cost scenarios. These scenarios include mainline widenings, and all but Scenario 2 include interchange improvements. Zone 1 has the highest cost of construction for Scenarios 6 and 7 because of mainline widening and interchange reconstruction at I-29 at U.S. 169 and I-29 at N Oak Trafficway Interchanges. The second highest construction cost zone is Zone 4 due to bridge widening assumed along all bridges, except for the Kit Bond Bridge, in this zone. Zone 2 is the third most costly zone. In this Zone, the I-29 at I-35 interchange is modified to include the reconstruction and capacity expansion of the large flyover bridges at this interchange. More detailed information on engineering and construction costs can be found in Attachment G.

### 6.4.6 Engagement Input

The Study Team held an in-person public meeting on April 12, 2023, from 4-6 p.m. at Northland Neighborhoods Inc. Thirty-five people signed into the meeting and reviewed displays regarding alternative screening methodology, results and Scenarios. Attendees were asked to provide feedback on the Scenarios by placing a dot indicating their support. Figure 16 and Table 6 shows the public's responses to the questions asked at Public Meeting \#2.

Figure 16: Public Meeting \#2 Input


Source: Study Team, Public Meeting \#2 display with attendee input.

Table 6: Public Input from Public Meeting \#2 Survey Question

| Do you agree with the preliminary PEL recommendations to carry <br> forward for further detailed NEPA analysis? |  |  |
| :--- | :---: | :---: |
|  | In Favor | Not in Favor |
| In Person Meeting (35) | 17 | 0 |
| Online Meeting (104) | 24 | 0 |

Source: Study Team.
Note: (number in parenthesis is the number of meeting attendees)
At the in-person public meeting, the first question asked attendees was if they agreed with the Scenarios. A total of 17 participants responded "yes" that they were in support of and agreed; there was no opposition or uncertainty expressed at the public meeting.

Several commentors expressed their support or asked other questions. Of the four comments received, three expressed support of the project. One comment encouraged the Study Team to further analyze Scenario 7 to determine how consolidated/eliminated access might impact certain communities.

A virtual public meeting, which shared all the same information as the in-person meeting, included a survey that was available from April 12 to April 28, 2023. A total of 104 people attended the online meeting. The online survey questions were the same as those presented at the in-person meeting. Via the online survey, 24 respondents expressed their support of the Recommended Scenarios. There were 32 public comments received during the online meeting.

For both the in-person and online public meetings, these are the top comment themes:

- Improved lighting
- Interchange improvements
- Safety concerns
- Design improvements


### 7.0 PEL Recommendations

Based on the results of the Level 3 Screening Analysis, the Study Team recommends that Scenarios 5, 6 and 7 move forward from the PEL to the NEPA phase. Table 7 outlines the three Recommended Scenarios.

Table 7: Recommended Scenarios

| Scenario 5 | Scenario 6 | Scenario 7 |
| :---: | :---: | :---: |
| Highway Mainline Capacity + <br> Focus Interchanges Improvement Lite + Complementary Alternatives | Highway Mainline <br> Capacity + <br> Focus Interchanges Improvement <br> Full Build + <br> Complementary <br> Alternatives | Highway Mainline <br> Capacity + <br> Focus Interchanges <br> Improvement <br> Full Build + <br> Consolidated/ <br> Eliminated Access + <br> Complementary <br> Alternatives |
| Specific corridor recommendations will be identified in the NEPA phase |  |  |

Source: Study Team.
The three Recommended Scenarios all provide a high level of traffic performance while addressing safety concerns. Although Scenarios 2 through 7 include complementary multimodal improvements, Scenarios 5, 6 and 7 provide the greatest benefits by also addressing congestion management, intelligent transportation systems, freight and non-recurring congestion.

Even though the three Recommended Scenarios have more environmental impacts than Scenarios 1 through 4, these environmental impacts are likely to be avoided, minimized, and/or mitigated as individual projects are identified, and more detailed design and analysis progresses in the NEPA phase.


# I-29, I-35, U.S. 169 PEL Attachment A - Alternative Screening Methodology 

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## Attachment

Attachment A - Level 1, 2 and 3 Alternative Evaluation Criteria and Performance Measures Matrices

## Acronyms

| AASHTO | American Association of State Highway Transportation Officials |
| :--- | :--- |
| ASM | Alternatives Screening Methodology |
| CAC | Community Advisory Committee |
| EJ | Environmental Justice |
| GNIS | Geographic Names Information Systems |
| HDC | Historically Disadvantaged Communities |
| KCMO | City of Kansas City, Missouri |
| LEP | Limited English Proficiency |
| LOS | Level of Service |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| MARC | Mid-America Regional Council |
| MoDOT | Missouri Department of Transportation |
| NEPA | National Environmental Policy Act |
| NRHP | National Register of Historic Places |
| PEL | Planning and Environmental Linkages |
| ROW | Right-of-Way |
| USGS | U.S. Geological Survey |
| VHT | Vehicle Hours Traveled |
| VMT | Vehicle Miles Traveled |

### 1.0 Introduction and Planning Context

The purpose of the I-29, I-35, U.S. 169 Planning and Environmental Linkage (PEL) Alternative Screening Methodology (ASM) is to provide a decision-making framework to determine how well each of the developed alternatives meets the I-29, I-35, U.S. 169 PEL purpose and need and study goals. The I-29, I-35, U.S. 169 PEL Study will be used to develop and evaluate transportation alternatives using a tiered screening process to identify the alternatives that will best solve the transportation problems in the corridors. The recommendations identified in the PEL Study will be moved into subsequent stages of project development in accordance with the PEL planning guidelines established in Moving Ahead for Progress in the 21st Century (MAP21) and in the Mid-America Regional Council's (MARC's) regional transportation plan, Connected KC 2050, as described in the I-29, I-35, U.S. 169 PEL Baseline Conditions Report's Purpose and Need, in Section 6.0.

The first step in the alternative screening process is the development of a framework, or funnel approach with a rationale for eliminating alternatives in the study area (Figure 1). The Northland is defined as the same as the Study Area for the purposes of this PEL. The ASM will be used to evaluate the alternatives in a sequential process to narrow the results from a Universe of Alternatives, which includes all reasonable solutions to the transportation needs, to a set of Preliminary Alternatives, then Primary and Complementary Alternatives that result in Recommended Scenarios for future project development. The alternatives development and screening evaluation from the Study Team (MoDOT and the consultant team) is based upon the purpose and need (Table 1) and the study goals (Table 2).

Figure 1: I-29, I-35, U.S. 169 PEL Study Area


Source: Study Team.

Table 1: Purpose and Need

## Need

Purpose

- Structural and functional roadway and bridge deficiencies
- Roadway safety issues
- Traffic congestion and access issues, including heavy truck traffic
- Growth in the Northland
- Address structural and functional roadway deficiencies, including pavement and bridge conditions
- Improve roadway safety
- Improve roadway capacity, mobility and access to meet traffic and freight movement demands due to future growth in the Northland
- Accommodate transportation needs related to population and development growth occurring in the Northland
- Lack of transit and other multimodal alternatives

Provide transit and multimodal alternatives
Source: Study Team.
Table 2: Study Goals (Listed in no particular order)

| Study Goals |  |
| :---: | :---: |
| - Avoid and/or minimize impacts to the human and natural environment | - Connect bicycle and pedestrian friendly facilities |
| - Sustain public and agency input and support | - Accommodate existing transit, future transit and transit-oriented development |
| - Maximize cost efficiency | - Minimize roadway disruptions during construction |
| - Improve system reliability | - Improve safety |
| - Improve opportunity for regional connectivity | - Reduce congestion |
| - Improve local vehicle access to downtown Kansas City, North Kansas City, Kansas City North, Gladstone, Riverside, and other communities north of the Missouri River | - Accommodate freight movement |
| - Improve access to industrial, office, retail, activity centers and neighborhoods | - Reduce maintenance |

[^28]
### 2.0 Alternative Screening Framework

The ASM is established before alternatives are developed to ensure that each alternative is examined consistently and evaluations are unbiased. Each of the alternatives, including the NoAction Alternative, will be evaluated using this methodology. The No-Action Alternative represents the baseline condition in the I-29, I-35, U.S. 169 PEL study area as if no improvements are implemented other than normal operations and maintenance. The No-Action Alternative also includes projects already programmed within the fiscally constrained regional transportation plan.

The three screening levels that comprise the ASM include:

- Level 1 is a qualitative screening of the Universe of Alternatives based on the purpose and need to arrive at the Preliminary Alternatives;
- Level 2 is a qualitative screening of the Preliminary Alternatives based on the study goals to identify the Primary and Complementary Alternatives. The combination of Primary and Complementary Alternatives will be bunded in to Scenarios;
- Level 3 is primarily a quantitative analysis with some qualitative screening of the Scenarios based on the study goals to determine the Recommended Scenarios.

The effectiveness of each alternative will be measured by a wide range of criteria and tools. The potential impacts of each alternative will be analyzed and documented by the Alternatives Development and Analysis Report. The alternatives at each screening level that meet the established criteria will be advanced to the next screening level for further evaluation, while those that do not will be eliminated from further consideration.

The alternative screening process is similar to a funnel with multiple levels of analysis that may merge alternatives, needs, and goals into a set of refined transportation scenarios through an elaborate "filtering", or evaluation process as shown in Figure 2.

Figure 2: Alternative Screening Process


### 2.1 Level 1 Screening

The Level 1 (Fatal Flaw Screening) involves the evaluation of the Universe of Alternatives across a spectrum of modes and strategies. The Study Team will develop the Universe of Alternatives using available industry resources with input received from the Core Team (the Study Team, MARC and the City of Kansas City Missouri (KCMO)), Community Advisory Committee (CAC), stakeholders and the public. Fatal flaw criteria will be used to evaluate and screen the Universe of Alternatives against the purpose and need.

In Level 1 screening, alternatives are given a pass or fail rating based on if it meets the purpose and need. A pass rating is not required for all of the five needs to move to the next level; however the alternative must show an overall positive impact on the I-29, I-35, and U.S. 169 corridors in order to advance for further analysis. Practicable alternatives that meet the purpose and need will be advanced to Level 2 as Preliminary Alternatives. Generally, an alternative is practicable if it: 1) meets the purpose and need; 2) is available and capable of being implemented (i.e., it can be accomplished within the financial resources that could reasonably be made available, and it is feasible from the standpoint of technology and logistics); and 3) will not create other unacceptable impacts such as severe operation or safety problems, or serious socioeconomic or environmental impacts. ${ }^{1}$ Alternatives that are clearly impractical based on cost or effectiveness are eliminated at this level.

### 2.2 Level 2 Screening

The Level 2 screening includes a qualitative analysis of each of the Preliminary Alternatives against the study goals. At Level 2 , the study goals will be grouped into the following categories:

- Traffic and Safety;
- Cost Efficiency and Maintenance;
- Environmental; and
- Engagement Input

Each Preliminary Alternative will be assessed according to a five-level rating system as defined in Table 3.

In Level 2, the numerous study goals will be prioritized by applying weighted measures in order to emphasize the critical needs and goals of the PEL study and are further explained below.

- Traffic and Safety were given a multiplier weight of 2.0 because they are a primary need;

[^29]- Cost Efficiency and Maintenance and Environmental were assigned a multiplier weight of 1.0 because they were prioritized study goals; and
- Multimodal (including bicycle, pedestrian and transit) and Engagement Input were additional study goal priorities and assigned a multiplier weight of 0.5.

Overall scores could range from -2.0 to 2.0. If an alternative scored $<0$, it was recommended to be removed from further study. After the Level 3 analysis, Scenarios that best meet the established study goals will result in Recommended Scenarios.

Table 3: Preliminary Alternative Rating System

| Rating | Meaning | Score |
| :---: | :---: | :---: |
| ++ | Substantial positive effects | 2 |
| + | Some positive effects | 1 |
| O | Neutral effects | 0 |
| - | Some negative effects | -1 |
| -- | Substantial negative effects | -2 |

Source: Study Team.
The remaining alternatives after Level 2 screening are categorized into two groups:

- Primary Alternatives, which are capable of making a substantial impact on the congestion problems on I-29, I-35, U.S. 169 as stand-alone options; and
- Complementary Alternatives, such as Transportation System Management (TSM) and Intelligent Transportation Systems (ITS), which will be combined with the Primary Alternatives to improve the efficiency of the transportation system.

After Level 2 screening, various combinations of Primary Alternatives and Complementary Strategies will be grouped into three to ten Scenarios for further evaluation in Level 3.

### 2.3 Level 3 Screening

In Level 3, the Scenarios (bundles of alternatives) will begin to take the shape of complete transportation solutions, including number of highway lanes and bridge/interchange concepts, supplemented with other modes of transportation and congestion management strategies, including multimodal improvements.

Each Scenario will be developed to a level of detail needed to define the general location and potential right-of-way (ROW) requirements. The level of alternative development should be sufficient to allow for a mostly quantitative evaluation of the following categories:

- Traffic ${ }^{2}$;
- Safety ${ }^{2}$;
- Multimodal ${ }^{2}$;
- Cost Efficiency and Maintenance;
- Environmental; and
- Engagement Input.


### 3.0 Level 1 Alternative Evaluation Criteria and Performance Measures

The following sections provide additional details for each of the evaluation criteria and measures for each of the needs listed in Table 1. Attachment A shows the qualitative evaluation matrix to be utilized during the screening process.

### 3.1 Structural and Functional Roadway and Bridge Deficiencies

Roadway and bridge structural deficiencies are due to the deterioration of concrete and asphalt over time. Portions of the I-29, I-35, and U.S. 169 corridors will need some level of rehabilitation within the expected timeframe that alternatives may be developed. Alternatives that correct structural deficiencies will receive a pass rating.

Roadway and bridge functional deficiencies include geometric features that do not meet current design standards, such as narrow lanes and shoulders, and inadequate ramp lengths and spacing as defined by the American Association of State Highway and Transportation Officials (AASHTO) and MoDOT. Alternatives that correct these issues will receive a "pass" rating.

### 3.2 Roadway Safety

Safety is important to all modes of travel (bicycle, pedestrian, transit, and vehicular) in the corridors. The high traffic volumes in the study area combined with operational deficiencies of the roadway are important safety factors to be considered. Alternatives which reduce the number of conflict points and thus vehicle crash rates for all modes of travel will receive pass ratings.

### 3.3 Traffic Congestion

Congestion relief is an important part of the purpose and need. Study alternatives must provide an improvement in mobility and travel time along the I-29, I-35, and U.S. 169 corridors and an

[^30]improvement in access to downtown Kansas City and other communities north of the Missouri River, as compared to the No-Action Alternative.

For the Level 1 screening, mobility will be evaluated in terms of travel speeds, which is an easily understandable measure of congestion and travel performance. Generally, alternatives which provide the largest improvement to travel speeds along I-29, I-35, and U.S. 169 will receive a pass rating. Note that in subsequent phases of the alternative screening process, measures of mobility other than travel speeds such as travel time to key destinations, duration of congestion, vehicle miles traveled (VMT), vehicle hours traveled (VHT), and average delay per motorist will be utilized to evaluate mobility.

### 3.4 Growth in the Northland

Growth in the Northland will be addressed to ensure that the I-29, I-35, and U.S. 169 corridors can accommodate this future development. Alternatives that improve study area (interstates, freeways, and arterials) access needs to meet demands of future growth in the Northland will receive pass ratings.

### 3.5 Lack of Transit and Other Multimodal Alternatives

The study corridors carry a high level of automobile and freight traffic but lack ample transit and other modes as alternatives. Alternatives that provide transit and other modal options (connections, access, ROW space for facilities, etc.) will receive a pass rating.

### 4.0 Level 2 Alternative Evaluation Criteria and Performance Measures

The following sections provide additional details on the evaluation criteria and measures for each of the study goals listed in Table 2. Attachment $\mathbf{A}$ includes the qualitative evaluation matrix to be utilized during the screening process. The discussion below and matrix in Attachment $\mathbf{A}$ is organized by the four categories and will be analyzed using the five-level rating system discussed in Section 2.2. The analysis will be based on available data presented in the I-29, I-35, U.S. 169 PEL Baseline Conditions Report, Study Team input, and public engagement.

### 4.1 Traffic and Safety

There are 10 study goals associated with the Traffic and Safety category. The criteria and measures that will be used to evaluate this category are described below and documented in Attachment A.

### 4.1.1 Reduce Congestion

## Congestion Relief

Level 2 screening will be a qualitative assessment of mobility for all vehicles. The evaluation will analyze the ability of an alternative to provide improved mobility on the interstates, highway and arterial streets in the study area as compared to the No-Action Alternative. Alternatives that provide the worst level of service (LOS) will receive the lowest ratings.

## Transportation Efficiency

Transportation efficiency is measured by an assessment of changes in travel times and average speeds for all vehicles through the study area transportation network resulting from the implementation of an alternative. The qualitative evaluation will analyze the ability of an alternative to provide an improved travel time and peak hour speeds as compared to the NoAction Alternative. Alternatives that provide the best travel times will receive the highest ratings.

### 4.1.2 Accommodate Freight Movement

## Congestion Relief

Level 2 screening will be a qualitative assessment of freight mobility. The evaluation will analyze the ability of an alternative to provide improved freight mobility on the interstates, highway and arterial streets in the study area as compared to the No-Action Alternative. Alternatives that provide the worst level of service will receive the lowest ratings.

## Transportation Efficiency

Transportation efficiency is measured by a qualitative assessment of changes in freight travel times and average speeds through the study area transportation network resulting from the implementation of an alternative. The evaluation will analyze the ability of an alternative to provide an improved travel time and peak hour speeds as compared to the No-Action Alternative. Alternatives that provide the best travel times will receive the highest ratings.

### 4.1.3 Improve Local Vehicle Access to and from Downtown Kansas City and other Communities North of the River

## Mobility

Alternatives should provide improved mobility for through traffic and more efficient connections to and from downtown Kansas City and in communities north of the river. Level 2 screening will be a qualitative assessment of freeway and arterial improvements to provide improved access to and from these areas. Alternatives that provide the worst mobility will receive the lowest ratings.

## Travel Time

Alternatives should enable traffic to move more efficiently along freeways to and from downtown Kansas City. Level 2 screening will be a qualitative assessment of freeways to evaluate travel time to and from downtown Kansas City and other key destinations as compared to the NoAction Alternative. Alternatives that provide the best travel times will receive the highest ratings.

### 4.1.4 Improve Regional Connectivity

Alternatives should consider locations and design features that allow better regional street connectivity between communities. Level 2 screening will be a qualitative assessment of the ability of each alternative to allow these connections by providing full access at local service and system interchanges as compared to the No-Action Alternative. Alternatives that provide full access interchanges meeting AASHTO design standards will receive the highest ratings.

### 4.1.5 Connect Bicycle/Pedestrian Friendly Facilities

Bicycle and pedestrian connectivity are measured by how well an alternative accommodates bicycle and pedestrian access across the I-29/I-35/U.S. 169 freeways within the study area. Level 2 screening will be a qualitative assessment of each alternative's ability to fill bicycle and pedestrian gaps as compared to the No-Action Alternative. Alternatives that provide access and fill bicycle/pedestrian gaps will receive the highest ratings.

### 4.1.6 Accommodate Existing Transit, Future Transit and Transit-oriented Development

Transit accommodation will be qualitatively measured by the ridership potential of an alternative along the I-29, I-35, and U.S. 169 corridors. The potential diversion from auto trips to transit trips and the contribution of transit reducing demand for the highway will be assessed as compared to the No-Action Alternative. Alternatives that provide a higher potential to attract transit riders will receive the highest ratings.

### 4.1.7 Improve System Reliability

## Incident Management

This criterion addresses the impacts of alternatives on the ability to safely, promptly, and reliably respond to incidents in the study area. Level 2 screening will be a qualitative assessment of the potential improvements to incident management as compared to the No-Action Alternative. A higher rating will be given to an alternative that improves the ability to manage incidents along the freeway corridors through better detection, improved response times, and removal of vehicles from traffic lanes.

## Emergency Vehicle Access

Alternatives should provide access for emergency vehicles responding to incidents within the study area. Level 2 screening will be a qualitative assessment of the travel time from a first responder site to an incident as compared to the No-Action Alternative. Alternatives that improve emergency vehicle travel times will receive the highest ratings.

### 4.1.8 Minimize Roadway Disruptions during Construction

Construction generally requires temporary lane closures and detours. It is important that the alternatives minimize disruption to neighborhood businesses and residential neighborhoods during construction. An alternative that has little or no effect during construction will generally have a neutral rating. An alternative that is likely to cause greater inconvenience to the public during construction because of its proximity to more intense development, or in areas where ROW is limited, will be given a more negative rating. Level 2 will be a qualitative screening based on engineering judgment of the number and severity of road/lane closings impacting existing mobility and access for each alternative as compared to the No-Action Alternative.

### 4.1.9 Improve Safety

## Freeway Conflict Points

Conflict points exist where vehicles need to cross paths to reach desired destinations. Level 2 qualitative screening will be based on the probable number of conflict points for the preliminary layout of each alternative as compared to the No-Action Alternative. Proper access management techniques reduce the number of conflicts in order to provide a safer route. Alternatives that provide the fewest conflict points along the mainline will receive the highest ratings.

## Ramp Spacing

Level 2 qualitative screening will be based on the number of ramps per direction for the preliminary layout of each alternative as compared to the No-Action Alternative. AASHTO recommends a maximum of two ramps per direction per mile for urban interstates. Alternatives that come closest to meeting this threshold will receive higher ratings.

## Ramp Acceleration and Deceleration Lengths

Proper ramp lengths are required to allow motorists to accelerate to freeway speeds when entering the interstate, and to decelerate as they approach intersections when leaving the interstate. Level 2 will include a qualitative assessment of the ability of an alternative to improve ramp junctions for each alternative as compared to the No-Action Alternative. Alternatives that improve ramp junctions will receive the highest ratings.

## Freeway and Bridge Structural Condition

Alternatives must improve the structural conditions of the freeway and bridges, which are showing signs of deterioration due to age. Level 2 screening will be a qualitative evaluation of each alternative's ability to improve the roadway and bridges to acceptable structural conditions as compared to the No-Action Alternative. Alternatives that improve freeway and bridge structural conditions will receive the highest ratings.

## Arterial Connection Conflict Points

Arterial conflict points exist where vehicles need to cross paths to reach desired destinations on the arterial network. Proper access management techniques reduce the number of conflicts in order to provide a safer route. Level 2 qualitative screening will be based on the probable number of arterial conflict points for the preliminary layout of each alternative as compared to the No-Action Alternative. Alternatives that provide the fewest conflict points at arterial connections will receive highest ratings.

### 4.1.10 Improve Access to Industrial, Retail Centers and Neighborhoods

This criterion addresses how well an alternative provides a supportive climate for economic development and how well an alternative improves access to retail and neighborhoods. Level 2 screening will be a qualitative assessment of travel times between key business sites and neighborhoods within the study area as compared to the No-Action Alternative. Alternatives that provide access to existing/potential areas of economic activity within the study area without negatively impacting the surrounding area and neighborhoods will receive higher ratings.

### 4.2 Cost Efficiency and Maintenance

There is one study goal associated with the Cost Efficiency and Maintenance category. The criteria and measures that will be used to evaluate this category are described below and are documented in Attachment A.

### 4.2.1 Construction and Maintenance Cost

Level 2 screening will be qualitative based on probable cost estimates for both construction and projected maintenance. Alternatives with lower construction and maintenance costs will be ranked higher than alternatives with high costs as compared to the No-Action.

### 4.2.2 ROW Acquisition

ROW acquisition costs consist of acquiring land (parcels) and the cost of displacements. Level 2 screening will be a qualitative analysis based on ROW required for typical sections for each alternative compared to the No-Action Alternative. Those alternatives that have substantial ROW requirements and costs will be rated lower than alternatives with minor ROW requirements and costs.

### 4.2.3 Utilities and Infrastructure

Each alternative's impact to major utilities and infrastructure will be a qualitative assessment based on costs for utilities required for typical sections for each alternative compared to the NoAction Alternative. Alternatives with substantial impacts to major utilities and infrastructure will be rated lower than alternatives with minor impacts to major utilities and infrastructure. Level 2 screening will be a qualitative assessment based on costs for utilities required for typical sections for each alternative compared to the No-Action Alternative.

### 4.2.4 Investment Required by Others

Construction of some improvements to the I-29, I-35, US 169 corridors may require expenditures by local governments to accommodate the resulting change in traffic patterns. Level 2 screening will be a qualitative assessment of potential financial impact to local governments.

### 4.3 Environmental

There is one study goal associated with the Environmental category, which is to avoid and/or minimize impacts to the human and natural environment. This goal will be subdivided into the following classifications:

- Community Impacts;
- Cultural Resources Impacts;
- Natural Resources Impacts; and
- Other Impacts.

The criteria and measures that will be used to evaluate this category are described below and are documented in Appendix A.

### 4.3.1 Community Impacts

## Neighborhood Characteristics

The alternatives should avoid impacts to existing and proposed neighborhoods, have minimal effect on community cohesion, and enhance neighborhoods' qualities. Level 2 screening will use typical sections and the parcel data for Clay, Jackson, and Platte Counties to qualitatively assess the potential impacts to parcels, structures, and displacements. Alternatives with a greater number of parcel impacts, structure impacts and displacements will be rated lower than other alternatives.

## Environmental Justice (EJ), Limited English Proficiency (LEP), and Historically Disadvantaged Communities (HDCs)

Potential impacts to the social and economic environment of the study area will be identified. EJ and LEP issues will be analyzed in order to prevent the potential for discrimination and disproportionately high and adverse effects to minority, low-income, and non-English speaking populations. Demographics from the latest available U.S. Census Bureau data regarding minority, low-income, and LEP populations will be documented and compared. In addition, HDCs will also be assessed through the U.S. Department of Transportation. For Level 2 screening purposes, the following three measures will be evaluated: 1) Are EJ/LEP populations and/or HDCs present in the study area?; 2) Is there a potential for adverse impacts to EJ/LEP populations and/or HDCs (e.g., displacements, changes to access, etc.)?; and 3) Is there a potential for beneficial impacts and/or mitigation to offset any potential adverse impacts to EJ/LEP populations and/or HDCs (e.g., improved community cohesion, improved mobility and safety, etc.)? Alternatives which could potentially adversely impact EJ/LEP populations and/or HDCs while not providing potential beneficial impacts and/or the likelihood of mitigation for any potential adverse impacts will be ranked lower than alternatives which do not result in potential adverse impacts or could potentially provide beneficial impacts and/or mitigate for adverse impacts.

### 4.3.2 Cultural Resources Impacts

## Archaeological Sites

Alternatives should avoid or minimize impacts to archaeological sites. Recorded archaeological sites will be determined through MoDOT record searches. Level 2 screening will be based on an assessment of each alternative's probable impact to cemeteries and archeological sites listed or eligible for listing in the National Register of Historic Places (NRHP). Lower ratings will be assigned to those alternatives with a greater number of negative impacts to cemeteries and eligible NRHP properties.

## Historic Resources

Alternatives should avoid or minimize impacts to historic resources. For screening purposes, historic resources are considered to be those listed or eligible for the NRHP as determined through record searches from the U.S. Geological Survey's (USGS) Geographic Names Information System (GNIS). Level 2 screening will be based on an assessment of each alternative's probable impact to NRHP listed or eligible structures and historic districts. Lower ratings will be assigned to those alternatives with a greater number of negative impacts to NRHP listed or eligible structures or historic districts.

### 4.3.3 Natural Resources Impacts

## Section 4(f)/Section 6(f) Resources

The alternatives should avoid or minimize impacts to Section 4(f) resources, including public parks, recreation areas, and wildlife or waterfowl refuges, or any publicly or privately owned historic site listed or eligible for listing on the NRHP. Section 4(f) resources will be identified through the use of USGS GNIS and Google Maps. The potential impact of each alternative will be documented and compared. Level 2 screening will be based on an assessment of each alternative's probable impact to known resources. Alternatives that potentially negatively impact Section 4(f) resources will receive a negative rating, while the alternatives that do not will receive a neutral rating.

## Water Resources

Alternatives should avoid or minimize impacts to jurisdictional waters of the U.S., including wetlands. The number of surface water crossings and acres of jurisdictional features potentially affected by each of the alternatives will be identified and compared. Level 2 screening will be based on an assessment of each alternative's probable impact to jurisdictional waters. Alternatives that have greater negative impacts to water resources will receive a lower rating compared to those with fewer negative impacts.

## Biological Resources

Biologically sensitive areas will be identified such as state and federally listed, threatened and endangered species and their habitat. The potential for occurrence of impacts to threatened and endangered species and their habitat, as well as other wildlife habitat areas will be evaluated and compared for each alternative. Level 2 screening will be based on each alternative's probable impact to listed and non-listed species and/or habitat. Lower ratings will be assigned to those alternatives with greater negative impacts to listed and non-listed species and/or habitat.

### 4.3.4 Other Impacts

## Hazardous Materials

A list of existing known hazardous materials sites will be obtained from the Missouri Department of Natural Resources Environmental Site Tracking and Research Tool (E-Start). Level 2 screening will be based on an assessment of the sites that may negatively affect construction of each Preliminary Alternative. Lower ratings will be assigned to those alternatives likely to negatively impact a greater number of hazardous materials sites.

## Traffic Noise

Noise sensitive receivers (schools, hospitals, parks, residences, etc.) directly adjacent to each alternative will be identified. Level 2 screening will be based on a determining existing noise sensitive receivers, potential impacts, and the likelihood of mitigation. Alternatives which would move potential sources of noise closer to noise sensitive receivers (e.g., highway build alternatives) will be rated lower than alternatives that would not move noise sources or potentially increase noise impacts. The likelihood of noise mitigation being feasible and reasonable where traffic noise impacts likely already exist will also be considered in the evaluation.

### 4.4 Engagement Input

There is one study goal associated with the Engagement Input category, which is to sustain public and agency input and support. The criteria and measures that will be used to evaluate this category are described below and are documented in Appendix A.

### 4.4.1 Sustain Public and Agency Input and Support for the I-29, I- 35, US 169 Corridor Improvements

The I-29, I-35, US 169 PEL will be developed in a manner that continues to be supported by both agencies and the public. The Study Team will engage with the public and participating agencies to address their vision for the study area. Alternatives that have broad public and agency support will be rated higher than those that do not.

### 5.0 Level 3 Alternative Evaluation Criteria and Performance Measures

The following sections provide additional details on the evaluation criteria and measures for each of the study goals listed in Table 2. Attachment A includes the quantitative evaluation matrix to be utilized during the screening process. The discussion below and the matrix in Attachment $\mathbf{A}$ is organized by six categories. The analysis will be based on available data presented in the l-29, I-35, U.S. 169 PEL Baseline Conditions Report and Study Team input.

### 5.1 Traffic

There are seven study goals associated with the Traffic category. Dynameq software version 4.4 will be used to generate numerous outputs to evaluate the traffic performance of different Scenarios including for the goals of reducing congestion, accommodating freight movement, improving local vehicle access to and from Downtown Kansas City and other communities north of the Missouri River, and to improve access to industrial, retail centers, and neighborhoods. Such metrics from Dynameq include level of service, speed, vehicle hours of delay, total travel time, and vehicle miles traveled. The goal of improving regional connectivity will be evaluated by the number of locations allowing full access interchanges. The goal of improving system
reliability will measured by evaluating potential improvements to incident management and emergency vehicle travel time. Lastly, the goal of minimizing roadway disruptions during construction will look at the number and severity of roadway closures.

Figure 3 shows the assumptions used for the traffic modeling. It was assumed that there would be additional capacity north of the study area to make sure that the appropriate traffic demand entered the study area model along U.S. 169 and I-35. Additionally, the I-29/I-635 interchange was reconfigured to address a future bottleneck that was revealed in the modeling. This traffic modeling assumption was used in Scenarios 2, 5, 6 and 7 because these were the Scenarios that included mainline widening within the PEL study area. It was assumed that if freeways within the project limits were not widened, then these other highways farther to the north also would not be widened.

Figure 3: Scenario 2, 5, 6 and 7 Traffic Demand Model Assumptions


Source: Study Team.

### 5.2 Safety

The study goal of improving safety will be evaluated by analyzing the following:

- Number of freeway mainline conflict points in weaving/merge/diverge areas;
- Number of ramps per mile;
- Number of substandard ramp junctions after improvements;
- Number of High Priority Bridges of Concern that would remain unimproved; and
- Number of arterial conflict points.


### 5.3 Multimodal

There are two study goals associated with the Multimodal category. The goal of connecting bicycle/pedestrian friendly facilities will be evaluated by looking at the number gaps in the bicycle/pedestrian network across freeways. The goal of accommodating existing and future transit and transit-oriented development will be evaluated by reviewing transit ridership in the study area. Existing facilities; current and future MARC projects; and other planned improvements for bicycle/pedestrian and transit facilities will be included in this analysis.

### 5.4 Cost Efficiency and Maintenance

Maximizing cost efficiency and reducing maintenance is the one study goal associated with this category. This will be evaluated using the following measures: 1) planning level cost estimates for total conceptual cost and projected maintenance cost and 2 ) required investment by others.

Four zones were identified in the study area limits to facilitate the determination of quantities and costs as shown in Figure 4.

Figure 4: Construction Cost Estimate Zones


Source: Study Team.

- Zone 1: Along I-29, from the extension of N Troost Ave. to the $\mathrm{I}-29 / \mathrm{NW} 64^{\text {th }} \mathrm{St}$ Interchange. And, along U.S. 169 from the I-29/U.S. 169 Interchange to the U.S. 169/NW 68 ${ }^{\text {th }}$ St Interchange.
- Zone 2: Section between the extension of N Troost Ave. on I-29 to mile marker 7.6 on I$29 / \mathrm{l}-35$ south of Parvin Rd. and to mile marker 9.2 on I-35 east of Antioch Road.
- Zone 3: Along I-35, from mile marker 9.2 east of Antioch Road to the east side of the I-35/l-435 Interchange.
- Zone 4: Along I-29/I-35, from mile marker 7.6 on I-29/I-35 to the north of the NE corner of the Kansas City loop at Independence Ave. (U.S. 24).

Roadway and bridge concepts will be developed for the Scenarios analyzed in Level 3. The concepts will be developed in 2D in a PDF format without taking into consideration an in-depth
horizontal and vertical design. The concepts that best represent the Scenarios for each zone will be selected to determine relative quantities and costs.

New roadway construction will include many components such as ROW, engineering, utility relocation, and mitigation in addition to construction costs. For Level 3 screening, only construction costs will be considered in 2023 dollars to determine the relative cost among the various Scenarios.

In the factored cost estimate, similar projects constructed in the region will be reviewed and a percentage of roadway elements will be developed. Factors will be assigned to different items such as grading, drainage, surfacing, traffic engineering, and walls. The cost estimate will multiply the pavement total cost with the factors to estimate the cost of each item. The selected concepts for each Scenario will be used to determine square yard areas for new pavement and bridge quantities. Unit costs per square yard for new pavement and new bridge areas will be based on previous construction projects in the region. A contingency of $30 \%$ and mobilization of $10 \%$ will be added to the total cost in 2023 dollars; however inflation will not be considered.

### 5.5 Environmental

The one study goal for the Environmental category is to avoid and/or minimize impacts to the human and natural environment. Potential direct impacts to the environmental resources will be evaluated based on the concept developed for each Scenario. The concept, including anticipated ramping, interchanges, and intersections will be overlaid with the environmental resources of the study area. Similar environmental measures to those in the Level 2 Screening will be utilized for assessing potential environmental impacts. Impacts will be calculated via spatial analysis with ArcGIS. When possible, impacts will be quantified by count or acreage. When quantification is not reasonable, potential impacts will be qualitatively assessed.

### 5.6 Engagement Input

The one study goal of the Engagement Input category is to sustain public and agency input and support. It will be measured using input gained from the CAC, agencies, and from the public as the study progresses.

### 6.0 Evaluation Screening Matrices

The methodology described in this document will be followed to evaluate alternatives. The alternative screening process discussed in the ASM will be documented Alternatives Development and Analysis Report and included in the PEL Study Report. Utilizing this screening process and decision-making framework will ultimately lead to a PEL Recommendation that can be transitioned to projects to be further analyzed during the NEPA phase.

## Attachment A

## Level 1, 2 and 3 Alternative Evaluation Criteria and Performance Measures Matrices

| Level 1 Screening Matrix |  |  |
| :---: | :---: | :---: |
| Need | Purpose | Measure |
| Structural and Functional Roadway and Bridge Deficiencies |  |  |
| Structural roadway and bridge deficiencies - Aging roadway. Functional roadway and bridge deficiencies - lane/shoulder widths, ramp spacing, ramp lengths. Functional bridge deficiencies - aging bridge. | Improving roadway and bridge to state of good repair. Brining roadway and bridge up to current design standards. | Does alternative improve roadway and bridge structural conditions? Does the alternative improve roadway and bridge functional deficiencies? |
| Roadway Safety |  |  |
| Roadway - High crash rates in the 1-29, 1-35, US 169 corridor | Improving transportation Facilities to reduce roadway crash rates | Does the alternative have the potential to reduce the number of conflict points and thus vehicle crash rates? |
| Traffic Congestion |  |  |
| Congestion along the $1-29,1-35$, US 169 corridor | Improving roadway capacity, mobility and access to meet traffic and freight movement | Does alternative improve mobility and travel time along the corridor and at interchanges/intersections to reduce congestion? |
| Growth in Northland |  |  |
| Accommodate transportation needs related to population and development growth occurring in the Northland. | Improving mobility needs to meet demands of future growth in the Northland | Does alternative improve access to the Northland area? |
| Lack of transit and other multimodal alternatives |  |  |
| Multimodal Alternatives | Providing transit and multimodal alternatives | Does alternative improve transit connections or access, or increase ROW space for facilities? |



| Level 3 Screening Matrix |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Study Goals |  | Criteria | Measure | Source | Method |
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|  |  | E/LEP/HDCs |  | Source: U.S. Census Buresu 2020 Redlatricting Data SF (PL. 94-171). American Communty Survey 2020 5-Year Estimates B19013 Median Household income and 816004 Age by Language Spoken at Home by Abiny to speak Englian for the Fopulaton 5 Years and Over. | Quastave |
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|  | Nourial Rezource impacs | Section 41/Sectosn 5n Resources | Fark Impacts | Source: U.S. Geological Survey Geographic Names Informaton Syatem, Google Maps. Method: Acsezsment of each altemative's potential Impact to known mapped parks | aunitate |
|  |  | Water Resource: |  | Source: U.3. Geological Survey National Hydrology Database, U.S. Fiah and Widife Service Nastional Wetands Inventory. Method: Aasesament of each alematives' potential tand features. | Cusurtate |
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### 1.0 Introduction

The initial set of possible solutions to the transportation issues identified in the Purpose and Need chapter of the I-29, I-35, U.S 169 PEL Baseline Conditions Report is referred to herein as the Universe of Alternatives (Alternatives). Each alternative will be screened in the areas of traffic, safety, engineering, environmental, and public input, as described in the I-29, I-35, U.S 169 PEL Alternative Screening Methodology, to determine how well each alternative meets the purpose and need and the study goals that have been established for the project. Alternatives that do not satisfy the criteria will be eliminated from consideration, while successful alternatives will be refined and moved to the next level of screening. As the study progresses, more detailed analysis will be completed allowing for additional screening of the Alternatives. The Alternatives are divided into the following six categories:

- No Action
- Highway Build
- Congestion Management
- Intelligent Transportation Systems
- Freight
- Multi-Modal and
- Non-Recurring Congestion Management

Initial screening will evaluate individual alternatives while later screening will combine individual alternatives into basic scenarios (bundles) that will be evaluated. The reasonable scenarios that best meet the purpose and need and study goals will then be advanced to the NEPA phase for further development.

The Alternatives for the l-29, I-35, U.S 169 PEL Study were developed utilizing information from the Mid-America Regional Council's Congestion Management Toolbox Update (2013), Connected KC 2050 (the Kansas City metro's regional transportation plan), study team input, and input from the Community Advisory Committee, public, and other stakeholders.

### 2.0 Universe of Alternatives

The Alternatives list, shown in Figure 1, identifies a variety of possible solutions to transportation issues within the I-29, I-35, U.S. 169 PEL study area. The Alternatives are broken down by category and further explained below.

Figure 1: Universe of Alternatives


### 2.1 No-Action

The No-Action Alternative represents the baseline condition in the PEL study area, meaning no improvements would be implemented other than normal operations and maintenance, including projects already programmed within the fiscally constrained Mid-America Regional Council
(MARC) long-range transportation plan, Connected KC 2050 and Transportation Improvement Program (TIP) and MoDOT's Statewide Transportation Improvement Plan (STIP).

The No-Action Alternative provides a baseline to gauge how effective various alternatives will be at accomplishing the purpose and need and study goals for the project. This alternative is required to be considered in the PEL and NEPA analyses. In addition to the programmed transportation improvements that have been identified as fiscally constrained in the regional transportation plan, the No-Action Alternative includes the preservation of the existing transportation network and all of the short-term operational and maintenance improvements currently underway and planned within the study area.

### 2.2 Highway Build

Highway Build Alternatives represent capital improvements (capital improvements are permanent structural changes that enhance its value, increase its useful life, or allow for a new use) to the I-29, I-35, and U.S. 169 mainlines, associated ramps, and functional interchange areas.

### 2.2.1 Mainline Widening

This alternative includes the addition of general-purpose lanes to the existing interstate and highway mainline roadways, which is one of the most common methods used to increase roadway capacity.

### 2.2.2 Mainline Pavement Rehabilitation

This alternative rehabilitates pavement along the existing I-29, I-35, and U.S. 169 mainlines.

### 2.2.3 Elevated Lanes

This alternative includes increasing roadway capacity in the existing right-of-way (ROW) by adding express lanes on structure directly above the existing roadway.

### 2.2.4 Collector/Distributor Roads

Collector/Distributor (C/D) roads consist of local access lanes, usually parallel to, but separated from the existing corridor, in order to remove local traffic from the mainline through traffic. This alternative eliminates a significant amount of weaving from the mainline, allowing through traffic to flow more freely.

### 2.2.5 Auxiliary Lanes

This alternative provides an extra lane between on and off-ramps to allow for safer weaving and merge / diverge movements.

### 2.2.6 Dedicated Truck Lanes / Ramps

The addition of trucks to the mainline reduces travel speeds and safety due to their large size and slow response time. This alternative provides truck-only lanes and ramps in order to separate trucks from mainline traffic.

### 2.2.7 Frontage Road Improvements

This alternative improves the geometry and connectivity of the frontage road system, allowing for more efficient separation of local traffic from the mainline.

### 2.2.8 Intersection Improvements

Intersection improvements consist of modifications to existing intersections near l-29, I-35, and U.S. 169 to improve traffic flow and reduce conflict points. This could include the addition or modification of signals, additional turning lanes, or control of traffic movements.

### 2.2.9 Interchange Improvements

Congested interchanges can cause traffic to back up onto the mainline of interstates or highways, causing further congestion and unsafe conditions. This alternative replaces, or makes geometric improvements to, existing interchanges that are not functioning at an acceptable level.

### 2.2.10 Ramp Consolidation / Elimination

Current design standards suggest no more than two ramps, per direction, per mile for urban interstates. This alternative improves mainline traffic flow and safety by consolidating the number of entrance and exit points along the study corridor.

### 2.2.11 Roadway Shoulder Improvements

Adequate shoulders provide space for emergency stops and emergency vehicle access, provides the driver with a sense of comfort in congested areas, and improves the capacity of the mainline travel lanes. This alternative increases the width of shoulders in the corridor to current design standards.

### 2.2.12 Horizontal / Vertical Curve Improvements

The I-29, I-35, and U.S. 169 facilities within the study area have substandard horizontal and/or vertical curves in some locations that make the road less safe due to limited sight distance. This alternative will modify the roadway to meet existing American Association of State Highway and Transportation Officials (AASHTO) standards for horizontal and vertical curves.

### 2.2.13 Bottleneck Removal

Spot locations with recurring high congestion, or bottlenecks, cause significant delay and unsafe conditions. These areas can often be improved with alternatives focused on the immediate area in order to reduce the congestion at a lower cost than improvements to the whole corridor.

### 2.2.14 Bypass Route

The addition of an alternate route on a new alignment or an improvement to an existing bypass route can draw traffic from a congested route, thereby improving the level of service of the original route.

### 2.2.15 Increasing the Number of Lanes Without Highway Widening

This alternative takes advantage of "excess" width in the highway cross section that is used for breakdown lanes or medians or uses available pavement from existing lanes by reducing their width to increase the number of lanes without widening.

### 2.2.16 Geometric Design Improvements

This alternative includes widening to provide shoulders, acceleration/deceleration lanes, additional turn lanes at intersections, improved sight lines, and auxiliary lanes to improve merging and diverging. Portions of the I-29 and I-35 corridors have ramps that do not meet current length requirements for safe acceleration and deceleration.

### 2.2.17 New Freeways

This alternative includes the construction of new, access-controlled, high-capacity roadways in areas previously not served by freeways.

### 2.2.18 New Arterial Streets

This alternative involves the construction of new, higher-capacity roads which are designed to carry large volumes of traffic between areas in urban settings.

### 2.3 Multi-Modal

Other travel mode alternatives represent capital and operating improvements to transit, rail, bike, and pedestrian modes.

### 2.3.1 Arterial Bus Transit

This alternative provides new or expanded bus service along existing roadways.

### 2.3.2 Express Bus Transit

This alternative provides or expands bus service that operates on existing arterials or freeways to provide modal options to commuters who follow consistent work trip patterns. Buses usually stop every 3 to 5 miles in the suburban area and then travel non-stop into the downtown area.

### 2.3.3 Bus on Shoulder

Bus on shoulder provides the option for buses to travel on the highway shoulder during peak travel times or incidents.

### 2.3.4 Arterial Bus Lanes

This alternative provides exclusive lanes for bus transit on arterial routes.

### 2.3.5 Arterial Bus Rapid Transit

This alternative provides enhanced bus service that operates on exclusive ROW or in the existing traffic stream for advantages similar to rail transit, but with lower cost. Stops are usually at distances of $1 / 2$ mile or greater.

### 2.3.6 Light Rail (Streetcar)

This alternative provides rail service that operates with a single railcar or multiple connected cars, either on exclusive ROW or in the traffic stream. Stops are usually at distances of $1 / 2$ mile or greater.

### 2.3.7 Heavy Rail

This alternative provides rail service that operates on exclusive ROW with multiple connected passenger railcars. Stops are usually at distances of $1 / 2$ mile or greater.

### 2.3.8 Commuter Rail

This alternative provides rail service that operates on freight rail corridors between city centers and suburbs with multiple connected cars. Stops are usually at distances of greater than 2 miles.

### 2.3.9 High Speed Rail

This alternative provides rail service that operates in exclusive ROW at significantly higher speeds than traditional rail. Stops are usually located at large cities along the rail corridor.

### 2.3.10 Bicycle / Pedestrian

This alternative provides improved or new sidewalks, trails and bicycle lanes (separated bike lanes or sharrows) for better non-motorized connectivity across I-29, I-35 and U.S. 169.

### 2.3.11 Increase Bus Route Coverage/Frequency

This alternative increases bus route coverage and/or frequency to provide better accessibility to transit to a greater share of the population. Additionally, increasing frequency makes transit more attractive to use.

### 2.3.12 Multi-Modal Transportation Corridors/Centers

This alternative provides a single facility or corridor that combines multiple modes of transit including bus, rail, pedestrians and bicycles. By combining multi-modal transportation into one corridor, more capacity is available on existing congested corridors.

### 2.3.13 Park-and-Ride Lots

This alternative provides specialized parking lots that are used in conjunction with various transit services such as express bus, bus rapid transit and rail. Services from park-and-ride lots are designed to concentrate transit demand, enabling transit services that could not otherwise be cost-effective.

### 2.3.14 Mobility Hubs

Mobility hubs are places that connect people to multiple alternative transportation modes in one location including but not limited to public transit, bike share, ride share, car share and other ways for people to get where they want to go without a private vehicle. These hubs provide important first and last mile connections for traditional fixed route public transit.

### 2.3.15 In-line Transit Station

In-line transit stations are transit facilities that are typically located within the median of divided highways. Passengers can transfer from high-speed express bus routes to local circulators that may travel through a residential or employment area.

### 2.3.16 Transit Enhancements

This alternative includes providing upgrades to existing transit services to increase transit use. Transit enhancements include vehicle replacement/upgrades and better shelters or stations. This could also include service enhancements such as increasing service frequency and span.

### 2.3.17 Microtransit

Microtransit is a demand response public transit service that offers highly flexible routing and scheduling. This type of service can provide transit options in areas that are difficult to serve with traditional fixed route transit service and can provide first and last mile connections. Examples include scooter and bike share.

### 2.4 Congestion Management

Congestion management strategies represent alternatives to general purpose highway lanes that focus on reducing congestion to I-29, I-35, and U.S. 169 by either adding capacity or reducing demand.

### 2.4.1 Information Systems / Advanced Traveler Information

This alternative includes use of en-route traveler information systems and/or pre-trip advanced traveler information. Traveler information systems provide messages to drivers related to weather, travel times, emergencies, delays, upcoming construction projects, etc. Dynamic message signs display short messages to drivers, and radio broadcasts can provide information in greater detail. To disseminate advanced traveler information (pre-trip), a wide range of media can be used. Radio broadcasts, internet sites, and mobile devices can all be used to inform drivers of travel conditions before and during a trip.

### 2.4.2 Managed Lanes

This alternative provides a travel lane for transit, vehicles with more than one occupant and/or vehicles willing to pay a toll for travel time savings. At this time, Missouri does not have tolling legislation. Managed lanes can provide many mobility benefits to motorists.

### 2.4.3 Reversible Lanes

Reversible lanes are useful in areas with high directional flow during peak hours. This alternative provides lanes that can be quickly modified to allow travel in either direction in response to peak travel periods.

### 2.4.4 Ramp Metering

This alternative includes signals placed on entrance ramps to manage the number of vehicles entering the traffic stream. Ramp meters improve the rate of traffic flow and safety on the major roadway by reducing the number of vehicles entering the weaving area at a time from minor roadways.

### 2.4.5 Hard Shoulder Running

Hard shoulder running is an active traffic management alternative that allows vehicles to use a paved shoulder as an additional lane during peak congestion periods. These lanes can allow all vehicles or certain vehicles such as transit, HOVs, or High Occupancy Toll (HOT) vehicles. Dynamic overhead signs are used to inform drivers if the shoulder is open for use. In addition to mitigating peak-period congestion, this technology can also mitigate congestion related to traffic incidents.

### 2.4.6 Travel Demand Management (TDM)

This alternative includes the application of strategies to reduce travel demand or spread the demand out over a longer period of time. Specific strategies could include alternative work hours, telecommuting and ridesharing. Alternative work hours can help decrease the intensity of the peak congestion period by shifting some commuters to other times of the day. For some, telecommuting or working from home can eliminate the need to drive in to work altogether, resulting in a lower daily traffic volume. These alternatives both depend on whether employers allow for nontraditional work hours. Ridesharing is an alternative that can be used in accordance with Hard Shoulder Running or other managed lanes. By providing an incentive (the ability to use an HOV lane), commuters may be encouraged to carpool, resulting in a lower daily traffic volume. Other incentives, such as employer incentives, can also encourage the use of rideshare.

### 2.4.7 Transportation System Management and Operations (TSM\&O)

TSM\&O is a planning tool that increases the efficiency of the transportation system by using technology to minimize the effects of vehicle congestion. TSM\&O can involve equipment, such as signals and communication devices, and technology to monitor traffic and make adjustments to traffic operations on a real-time basis when more vehicles are using the road than can pass through without causing congestion. TSM\&O can also involve improvements to the street and highway network such as lane modifications and parking configuration.

### 2.4.8 Wayfinding / Signage

This alternative improves signage along the study area to provide the traveler better information to aid in decision-making. It allows for a safer travel experience by reducing maneuvers such as last-second weaving to reach a desired exit.

### 2.4.9 Existing Arterial Improvements

This alternative includes increasing capacity and safety on existing parallel arterial roads, which can reduce demand on the interstate mainline. Improvements could be, but are not limited to,
additional lanes or traffic signal improvements. Improvements to arterial roads that connect to I29, I-35 and U.S. 169 can also be made.

### 2.4.10 Land Use Policy

This alternative includes the careful consideration of land use in relation to transportation, which plays a large role in mitigating congestion. Land use policy can reduce the number of vehicle trips that are made in a study area.

### 2.4.11 High Occupancy Vehicle (HOV)

This alternative increases corridor capacity while at the same time provides an incentive for single-occupant drivers to shift to ridesharing. These lanes are most effective as part of a comprehensive effort to encourage HOVs, including publicity, outreach, park-and-ride lots, and rideshare matching services.

### 2.4.12 Alternative Route Improvements

This alternative involves improving existing alternative routes that would be utilized for trips instead of I-29, I-35, or U.S. 169. Improvements could reduce demand on the interstate mainline.

### 2.5 Non-Recurring Congestion

FHWA estimates that non-recurring congestion can represent more than half of total congestion. Non-recurring traffic represents traffic incidents, bad weather, work zones, and special events.

### 2.5.1 Crash Investigation Sites

This alternative involves the implementation of crash investigation sites, which are designated zones off the mainline where crashes can be investigated safely. By removing the vehicles from the original incident location, the persons and vehicles involved in the crash are safe from additional harm. Also, the mainline is less likely to experience secondary incidents. In the case of major incidents, these locations can serve as staging areas. These zones are typically placed in locations where crashes tend to occur more frequently.

### 2.5.2 Roadside / Motorist Assist Enhancements

Roadside and motorist assistance is an alternative or set of alternatives that can reduce the amount of time that an incident is impeding traffic flow. Quick response time can be vital not only to the incident at hand, but also to preventing secondary incidents from occurring. Frequent mile markers (as frequent as a tenth of a mile) help motorists to more precisely communicate their location. Service patrols also decrease response time and prevent incidents by removing obstructions or dealing with other possible sources of congestion.

### 2.5.3 Improvements to Detour Routes

This alternative includes increasing capacity and safety on detour routes during construction by using existing shoulders as additional lanes, widening the detour route to accommodate additional lanes, and improving the road surface to allow for higher speeds.

### 2.5.4 Variable Speed Limits (Speed Harmonization)

Speed harmonization is an incident management alternative that can include the use of dynamic signs to communicate a variable speed limit on a freeway during an incident. Non-recurring reasons to vary the speed include construction, adverse weather conditions, traffic incidents, concerts, and special events. Variable speed limits in non-recurring conditions help reduce secondary crashes. The dynamic signs can be multifunctional. Not only can they display the speed limit, but they can also communicate a lane closure due to an incident or operate along with Hard Shoulder Running and Queue Warning.

### 2.5.5 Queue Warning

This alternative includes use of a queue warning system, which is typically utilized in addition to speed harmonization. Dynamic signs are mounted on the sides of the same gantries used for the speed harmonization signs, and a congestion icon is lit when congestion downstream is present. Queue warning systems have been reported to reduce the frequency of traffic incidents.

### 2.5.6 Enhanced Work Zones

This alternative improves traffic operations and safety during construction using intelligent transportation system, design and operations in order to minimize traffic delays, maintain or improve motorist and worker safety, complete roadwork in a timely manner, and maintain access for businesses and travelers.

### 2.6 Freight

Freight alternatives represent solutions focused on large commercial vehicles that facilitate the movement of goods.

### 2.6.1 Commercial Vehicle Geometric Accommodations

Large commercial vehicles inherently operate under different characteristics than cars. Trucks may be forced to speed up or slow down at a different rate than cars, which can lead to unsafe maneuvers and increase congestion on the road. Making roadway adjustments can reduce congestion and increase the freight efficiency in the region, making it more attractive to future growth. Common commercial vehicle geometric accommodation techniques include improving
shoulder width and material, turning radii, parking, acceleration and deceleration lane, and truck and car separations.

### 2.6.2 Enhanced Weigh Stations

Virtual weigh stations (VWS) or "Enhanced Weigh Stations"" provide the opportunity to maintain commercial vehicle law enforcement along the corridor without the need of stopping freight vehicles or acquiring additional right-of-way for construction of fixed weigh stations. A VWS is an enforcement facility that is monitored from another location using technology such as weigh-in-motion scales or sensors, camera systems, communications infrastructure, license plate and/or USDOT number reader systems, and which does not require continuous staffing or a fixed building outside the roadway.

### 2.6.3 Intermodal Connector Roads

National Highway System (NHS) connectors are the public roads leading to major intermodal terminals. Although they account for less than one percent of NHS mileage, NHS connectors are key conduits for the timely and reliable delivery of goods. Intermodal connectors are often referred to as the "last mile". Intermodal connector roads can reduce truck traffic of heavily traveled freeways, improve safety at crossings and on freeways, and remove bottleneck and increase speeds on freeways and near freight distribution centers.

### 2.6.4 Truck Lane Restrictions

This alternative aims to separate trucks from passenger vehicles and pedestrians. Truck lane restrictions prevent trucks from traveling on certain roadways or lanes and may call for weight restrictions on certain bridges. The most common reasons for implementing truck lane restrictions include improving highway operations, reducing crashes, pavement and structural considerations, and construction work zone restrictions.

### 2.6.5 Intelligent Commercial Vehicle Parking

In recent years, truck driver fatigue has been considered a contributing factor in several truckrelated crashes. One issue contributing to truck driver fatigue may be the lack of safe, available truck parking near freeways. As a result, truck drivers may drive longer than is safe, or may be unable to obtain undisturbed sleep during a rest period. ITS technology can be used to automatically count or estimate occupied parking spaces and convey the information in realtime via signage or other means of traveler information distribution. This information helps truck drivers to plan resting stops along the road, which will help reduce driver fatigue and increase the safety of the road.

### 2.7 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) uses technology to enhance the movement of goods and people.

### 2.7.1 Traveler Information Systems

Traveler Information Systems provide an extensive amount of data to travelers, such as real time speed estimates on the web or over wireless devices, and transit vehicle schedule progress. This provides travelers with real-time information that can be used to make trip and route choice decisions. Information can be accessed via the web, dynamic message signs, 511 systems, Highway Advisory Radio (HAR), or handheld wireless devices.

### 2.7.2 Incident Clearance

Traffic Incident Clearance is the practice of rapidly and safely removing temporary obstructions, such as disable or wrecked vehicles, or spilled cargo from the roadway. Techniques and policies for aggressive incident include detection, response, and clearance. Detection is the ability to quickly find and verify incidents as they occur (via cameras, sensors, etc.). Responsiveness includes quickly dispatching resources and town trucks. Clearance involves aggressively removing vehicles from lanes and managing congested traffic until free flow is restored.

### 2.7.3 Traffic Signal Preemption/Transit Signal Priority

This alternative gives special treatment to transit vehicles at signalized intersections. Transit Signal Preemption/Transit Signal Priority (TSP) systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance. For example, some systems extend the duration of green signals for public transportation vehicles when necessary. Because transit vehicles can hold many people, giving priority to transit can potentially increase the person throughput of an intersection.

### 2.7.4 Hazardous Materials Tracking and Emergency Response

Hazardous materials, which include fuels, fertilizers, and others, are an important part of the national and global economy. When a crash involving hazardous materials occurs, ITS systems can be used to measure the severity of the crash through on-board sensors, determine the location through various positioning systems and communicate this information to emergency responders.

### 2.7.5 ITS Support Infrastructure

Most intelligent transportation system (ITS) strategies are supported by aa Traffic Operations Center (TOC) or Traffic Management Center (TMC) and communications infrastructure. At the
operations center information from a corridor is collected, and decisions are made on how to manage the corridor. The communications infrastructure allows the operations center to interact with the tech. Maintaining the most up-to-date infrastructure will allow ITS to work most efficiently.

### 2.7.6 CCTV Cameras/Traffic Flow Monitoring

A closed-circuit television (CCTV) camera provides live images from the field to the TMC and can be used for a wide range of monitoring, detection, verification, and response activities using pan, tilt, and zoom features achieved from the TMC via camera control units. CCTV cameras are a means for incident verification by TMC operators since most incidents are detected by 911 calls or system traffic flow detection. They are also used for detecting bad weather conditions, monitoring of traffic conditions and incident response, real-time assistance to emergency responders, and verification of messages on dynamic message sings. CCTV camera feed can also be used in automated incident detection systems. They can be installed on structures, poles, and tall buildings, and require adequate field to center communications capability. CCTV cameras/traffic flow monitoring can help reduce congestion and improve safety on the I-29, I-35, and U.S. 169 corridors.

### 2.7.7 Signal Operation \& Management

This alternative includes traffic signal improvements to increase travel speed, reduce stop-andgo traffic, and increase intersection capacity. Improvements can include updating signal equipment and improving signal timing and coordination.

### 2.7.8 Dynamic Merge Control

Dynamic merge control, or junction control, regulates or closes specific lanes upstream of an interchange. Agencies can change the amount of access based on traffic demand from two entering roadways. Control strategies improve the operation of roads that have more lanes entering the merge area than leaving.

### 2.7.9 Integrated Corridor Management

Integrated Corridor Management (ICM) systems combine individual transportation assets along a corridor into one integrated operating system. By partnering local, state, and private agencies responsible for freeway, arterial, and transit operation within the corridor, ICM offers an opportunity to optimize transportation throughout the entire network by combining technologies and sharing information between network partners. This allows for the leveraging of underutilized infrastructure and improved dissemination of information to the traveling public.

### 2.7.10 Connected Vehicles

This alternative considers the future use of connected and autonomous vehicles (CAV).
Freeways with varying levels of congestion could benefit from CAV technology as these systems will enable travelers to have safer, more predictable travel conditions. Commercial vehicle fleets may see the most immediate benefits as the numerous applications of CAV systems can improve safety and efficiency which relate to those that spend a majority of their time on the road.


## I-29, I-35, U.S. 169 PEL Attachment C - Level 1 Results

Table 1: Level 1 Results

|  | Alternative | Structural and Functional Roadway and Bridge Deficiencies | Roadway Safety | Traffic Congestion (and Access Issues, Including Heavy Truck Traffic) | Growth in the Northland | Lack of Transit and other Multimodal Alternatives | Practicality | Pass/Fail, and Justification for Fail Rating |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2.1 | No-Action | Fail | Fail | Fail | Fail | Fail | Fail | Fail - Does not address any P\&N elements |
| 2.2 | Highway-Build |  |  |  |  |  |  |  |
| 2.2.1 | Main Lane Widening | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.2 | Main Lane Pavement Rehabilitation | Fail | Pass | Fail | Pass | Fail | Pass | Pass |
| 2.2.3 | Elevated Lanes | Pass | Pass | Pass | Pass | Fail | Fail | Fail - High cost and Impacts |
| 2.2.4 | Collector/Distributor (C/D) Roads | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.5 | Dedicated Truck Lanes / Ramps | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.6 | Auxillary Lanes | Fail | Pass | Pass | Fail | Fail | Pass | Pass |
| 2.2.7 | Frontage Road Improvements | Fail | Pass | Pass | Fail | Fail | Pass | Pass |
| 2.2.8 | Intersection Improvements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.9 | Interchange Improvements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.10 | Ramp Consolidation / Elimination | Fail | Pass | Fail | Pass | Fail | Pass | Pass |
| 2.2.11 | Roadway Shoulder Improvements | Fail | Pass | Pass | Fail | Fail | Pass | Pass |
| 2.2.12 | Horizontal / Vertical Curve Improvements | Fail | Pass | Pass | Fail | Fail | Pass | Pass |
| 2.2.13 | Bottleneck Removal | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.14 | Bypass Route | Fail | Pass | Pass | Pass | Fail | Fail | Fail - High cost and Impacts |
| 2.2.15 | Increase the Number of Lanes without Highway Widening | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.16 | Geometric Design Improvements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.2.17 | New Freeways | Pass | Pass | Pass | Pass | Fail | Fail | Fail - High cost and Impacts |
| 2.2.18 | New Arterial Street | Fail | Pass | Pass | Pass | Pass | Fail | Fail - High cost and Impacts |
| 2.3 | Multi-Modal |  |  |  |  |  |  |  |
| 2.3.1 | Arterial Bus Transit | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.2 | Express Bus Transit | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.3 | Bus on Shoulder | Fail | Pass | Pass | Pass | Pass | Pass | Pass - May require legislation |
| 2.3.4 | Bus Lanes | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.5 | Arterial Bus Rapid Transit | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.6 | Light Rail (Streetcar) | Fail | Fail | Fail | Pass | Pass | Pass | Pass |
| 2.3.7 | Heavy Rail | Fail | Pass | Pass | Pass | Pass | Fail | Fail - High cost and fixed route |
| 2.3.8 | Commuter Rail | Fail | Pass | Pass | Pass | Pass | Fail | Fail - Very high cost and ROW needed |
| 2.3.9 | High Speed Rail | Fail | Pass | Pass | Pass | Pass | Fail | Fail - Very high cost and ROW needed |
| 2.3.10 | Bicycle / Pedestrian | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.11 | Increase Bus Route Coverage/Frequency | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.12 | Multi-Modal Transportation Corridors/Centers | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.13 | Park-and-Ride Lots | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.14 | In-Line Transit Station | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.15 | Transit Enhancements | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.16 | Mobility Hubs | Fail | Pass | Pass | Pass | Pass | Pass | Pass |
| 2.3.17 | Microtransit | Fail | Pass | Pass | Pass | Pass | Pass | Pass |


|  | Alternative | Structural and Functional Roadway and Bridge Deficiencies | Roadway Safety | Traffic Congestion (and Access Issues, Including Heavy Truck Traffic) | Growth in the Northland | Lack of Transit and other Multimodal Alternatives | Practicality | Pass/Fail, and Justification for Fail Rating |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2.4 | Congestion Management |  |  |  |  |  |  |  |
| 2.4.1 | Information Systems / Advanced Traveler Information | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.2 | High Occupancy Vehicle (HOV) | Fail | Pass | Pass | Pass | Fail | Pass | Pass - May require legislation |
| 2.4.3 | Managed Lanes | Fail | Pass | Pass | Pass | Fail | Fail | Fail - Tolling is not allowed in Missouri at this time |
| 2.4.4 | Reversible Lanes | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.5 | Ramp Metering | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.6 | Hard Shoulder Running | Fail | Pass | Pass | Pass | Fail | Pass | Pass - May require legislation |
| 2.4.7 | Travel Demand Management (TDM) | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.8 | Transportation System Management \& Operations (TSM\&O) | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.9 | Wayfinding / Signage | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.10 | Arterial Improvements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.11 | Land Use Policy | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.12 | Access Management Strategies | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.4.13 | Alternative Route Improvements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5 | Non-Recurring Congestion |  |  |  |  |  |  |  |
| 2.5.1 | Crash Investigation Sites | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5.2 | Roadside / Motorist Assist Enhancements | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5.3 | Improvements to Detour Routes | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5.4 | Variable Speed Limits (Speed Harmonization) | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5.5 | Queue Warning | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.5.6 | Enhanced Work Zones | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.6 | Freight |  |  |  |  |  |  |  |
| 2.6.1 | Commercial Vehicle Geometric Accomodations | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.6.2 | Enhanced Weigh Stations | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.6.3 | Intermodal Connector Roads | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.6.4 | Truck Lane Restrictions | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.6 .5 | Intelligent Commercial Vehicle Parking | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7 | Intelligent Transportation Systems |  |  |  |  |  |  |  |
| 2.7.1 | Traveler Information Systems | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.2 | Aggressive Incident Clearance | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.3 | Traffic Signal Preemption/Transit Signal Priority | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.4 | Hazardous Materials Tracking and Emergency Response | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7 .5 | ITS Support Infrastructure | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.6 | CCTV Cameras/Traffic Flow Monitoring | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.7 | Signal Operation \& Management | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.8 | Dynamic Merge Control | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.9 | Integrated Corridor Management | Fail | Pass | Pass | Pass | Fail | Pass | Pass |
| 2.7.10 | Connected Vehicles | Fail | Pass | Pass | Pass | Fail | Pass | Pass |



## I-29, I-35, U.S. 169 PEL Attachment D - Level 2 Results

U.S. Department of Transportation

Federal Highway
Administration

Table 1: Level 2 Results


|  | Scoring Legend |  |
| :---: | :---: | :---: |
| 2 |  |  |
|  | ++ | Substantial Positive Effects |
|  | + | Some Positive Effects |
| 0 | + | Neutral Effects |
| -1 | - | Some Negative Effects |
| -2 | -- | Substantial Negative Effects |
|  | Shaded alternatives were eliminated in Level 1 |  |
|  |  |  |


| For Measures |  |
| :---: | :---: |
|  | Traffic |
|  | Safety |
|  | Multi-Modal |
|  | Costs |
|  | Environment |
|  | Engagement Input |



|  | Scoring Legend |  | For Measures | Score of neutral " 0 " assigned because 1 ) at this level of screening, the nature (beneficial or adverse) and level/severity of potential direct environmental impacts is difficult to determine |
| :---: | :---: | :---: | :---: | :---: |
| 2 | ++ | Substantial Positive Effects | Traffic |  |
| 1 | + | Some Positive Effects | Safety | of potential direct environmental impacts (e.g., intersection improvements) and more detailed |
| 0 | O | Neutral Effects | Multi-Modal | design will occur during the Level 3 analysis OR 2) the alternative will likely be designed and |
| -1 | - | Some Negative Effects | Costs | footprint will be determined by the implementing agency. |
| -2 | -- | Substantial Negative Effects | Environment |  |
|  | Shad | ernatives were eliminated in Level 1 | Engagement Input |  |

## I-29, I-35, U.S. 169 PEL

## Attachment E - Interchange Concepts

## I-29 at I-35






I-29/35 Split Interchange: Full Area










## I-29 at U.S. 169











## I-29 at N Oak Trfwy.

I-29-N. Oak Concept: 1


Proposed
Removed


Eliminates weaves in between ramps
Improves gore spacing by reconfiguring N. Oak ramps and removing Vivion Road interchange.

Level 3 Performance Measures

Disadvantages
Requires additional bridges/tunnels.


I-29-N. Oak Concept: 1B
Proposed

## Scenarios 4 and 6

This interchange concept was used to evaluate Level 3 Performance Measures

- Provides all movements.

Advantages:
No additional ROW
Eliminates weaves in between ramps at N Oak interchange

Disadvantages:

- Requires additional bridges/tunnels.
$\square$ Removed

















## I-35 at U.S. 69 (NE Vivion Rd.)



I-35/Vivion Rd Concept: 1B


## Advantages

-Addition of missing movements
Reduction of conflict points
-Aux lane between ramps
-Use of existing bridges

- Improves access to SB I-35

Disadvantages:
-ROW acquisition
Realignment of
-Hard to get sidewalks on existing bridges
-Removes Winn Rd access to Brighton Ave

I-35/Vivion Rd. Concept: 1C





I-35/Vivion Rd. Concept: 3 Proposed Removed


Advantages:
-Addition of missing movements Reduction of conflict points Removal of left on-ramp -Increased pedestrian safety No ROW Acquisition

Disadvantages
-Realignment of SB I-35
-New Bridges
Proximity to outer road

I-35/Vivion Rd
Concept: 4




| tanainasers |
| :---: |
| $\square$ |



I-35 - Vivion Rd. Concept: 7


$\square$
Proposed
Removed
Scenarios 3 and 5This interchange conceptwas used to evaluateLevel 3 PerformanceMeasures
Measures


## Advantages

Eliminates left entrance from Vivion Rd. to SB I-35, and removes bridge of concern.
No new bridges needed.

Replaces slip-ramp at the Brighton interchange. No additional ROW needed at Vivion.

## I-35 - Vivion Rd. Concept: 8B



## l-35 at N Brighton Ave.






# I-29, I-35, U.S. 169 PEL 

## Attachment F - Level 3 Results

Table 1: Level 3 Results


|  |  |  |  |  | Scenario 1 |  | Scenario 2 |  | Scenario 3 |  | Scenario 4 |  | Scenario 5 |  | Scenario 6 |  | Scenario 7 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Selected Factor for Qualitative Rating Summarizing Results |  | Traffic Study Area / Project Limits | No Action |  | Highway <br> Mainline Capacity + Complementary Alternatives |  | Interchange <br> Missing <br> Movements + <br> Complementary <br> Alternatives |  | Focus <br> Interchanges <br> Improvement <br> Full Build (with <br> Aux. Lanes) + <br> Complementary <br> Alternatives |  | Highway Mainline Capacity + <br> Focus <br> Interchanges <br> Improvement <br> Lite + <br> Complementary <br> Alternatives |  | Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Complementary Alternatives |  | Highway Mainline Capacity + <br> Focus <br> Interchanges <br> Improvement <br> Full Build + Consolidated/ Eliminated Access + Complementary Alternatives |  |
|  | Method |  |  |  | NB | SB | NB | SB | NB | SB | NB | SB | NB | SB | NB | SB | NB | SB |
| Dynameq model | Quantitative | Yes |  | Project Limits | 36\% | 30\% | 3\% | 10\% | 36\% | 32\% | 35\% | 35\% | 4\% | 13\% | 6\% | 9\% | 0\% | 15\% |
| Dynameq model | Quantitative | No |  | Project Limits | 33\% | 41\% | 4\% | 13\% | 34\% | 44\% | 30\% | 47\% | 3\% | 19\% | 8\% | 21\% | 1\% | 21\% |
| Dynameq model | Quantitative | No |  | Project Limits | 1,049 | 1,648 | 244 | 613 | 1,024 | 1,631 | 1,031 | 1,741 | 193 | 887 | 297 | 786 | 178 | 950 |
| Dynameq model | Quantitative | No | - | Project Limits | 9,617 | 10,095 | 8,967 | 9,706 | 9,577 | 10,031 | 9,537 | 10,172 | 8,897 | 9,797 | 9,078 | 9,813 | 8,778 | 9,547 |
|  |  | No |  | Project Limits | 926,743 |  | 1,018,825 |  | 922,994 |  | 930,467 |  | 1,004,541 |  | 1,019,022 |  | 988,883 |  |
|  |  | No |  | Project Limits | 450,352 | 476,391 | 493,113 | 525,711 | 448,594 | 474,401 | 453,571 | 476,896 | 492,109 | 512,432 | 498,288 | 520,734 | 491,471 | 497,412 |
| Dynameq model | Quantitative | No |  | Project Limits | 47 | 47 | 55 | 54 | 47 | 47 | 48 | 47 | 55 | 52 | 55 | 53 | 56 | 52 |
| Dynameq model | Quantitative | Yes |  | Project Limits | 1.9 | 2.0 | 1.2 | 1.2 | 1.9 | 2.0 | 1.8 | 2.2 | 1.1 | 1.4 | 1.2 | 1.4 | 1.1 | 1.6 |
| Dynameq model | Quantitative | No |  | Project Limits | 5,110 | 4,386 | 5,210 | 5,629 | 5,153 | 4,300 | 5,139 | 4,391 | 5,134 | 5,759 | 5,119 | 5,790 | 5,065 | 5,861 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,058 | 3,955 | 4,389 | 4,849 | 4,132 | 3,956 | 4,206 | 3,236 | 4,480 | 4,455 | 4,460 | 3,593 | 4,453 | 3,550 |
| Dynameq model | Quantitative | No |  | Project Limits | 3,745 | 3,037 | 5,285 | 5,190 | 3,631 | 3,001 | 3,830 | 3,400 | 4,868 | 4,852 | 5,331 | 5,122 | 5,784 | 5,205 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,788 | 4,940 | 6,034 | 5,866 | 4,776 | 4,992 | 4,703 | 4,906 | 6,096 | 5,770 | 6,088 | 5,942 | 6,000 | 5,780 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,254 | 4,136 | 4,116 | 4,206 | 4,343 | 4,150 | 4,513 | 4,071 | 4,111 | 4,239 | 4,064 | 4,144 | 4,191 | 4,90 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,623 | 5,019 | 4,913 | 5,210 | 4,615 | 4,971 | 4,668 | 4,961 | 4,916 | 4,964 | 4,976 | 5,048 | 5,109 | 4,969 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,015 | 3,222 | 4,405 | 4,348 | 4,068 | 3,114 | 4,82 | 3,661 | 4,424 | 3,732 | 4,648 | 4,428 | 4,694 | 4,005 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,261 | 3,425 | 6,073 | 6,049 | 4,259 | 3,486 | 4,206 | 4,658 | 5,836 | 5,010 | 6,198 | 6,064 | 6,519 | 6,338 |
| Dynameq model | Quantitative | No |  | Project Limits | 4,967 | 4,967 | 6,244 | 6,779 | 5,122 | 5,069 | 5,095 | 5,463 | 6,440 | 6,788 | 6,497 | 6,966 | 5,793 | 6,864 |
| Dynameq model | Quantitative | No |  | Project Limits | 1,688 | 1,844 | 2,697 | 2,269 | 1,678 | 1,854 | 1,796 | 2,178 | 1,790 | 1,867 | 2,519 | 2,673 | 2,886 | 2,388 |
|  |  | Yes | - $\downarrow$ | Project Limits | 41,509 | 38,931 | 49,366 | 50,395 | 41,777 | 38,893 | 42,338 | 40,925 | 48,095 | 47,436 | 49,900 | 49,770 | 50,494 | 49,150 |


| For Measures |  |
| :---: | :---: |
|  | Traffic |
|  | Safety |
|  | Multi-Modal |
|  | Costs |
|  | Environment |
|  | Engagement Input |








## I-29, I-35, U.S. 169 PEL

## Attachment G - Engineering Costs Estimates

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## Acronyms

| FT | Feet |
| :--- | :--- |
| M | Million |
| Misc | Miscellaneous |
| MoDOT | Missouri Department of Transportation |
| MPH | Miles Per Hour |
| No. | Number |
| PEL | Planning and Environmental Linkages |
| ROW | Right-of-Way |
| SB | Southbound |
| STIP | Statewide Transportation Improvement Program |

### 1.0 Introduction

This appendix provides the engineering cost estimate methodology used in the Planning and Environmental Linkages (PEL) Study. Scenario 6 is used to demonstrate the methodology used to calculate the planning-level construction costs for each of the seven scenarios. At this preliminary and conceptual level, several assumptions were made and an initial design criteria was developed.

### 2.0 MoDOT STIP Projects

Figure 1 illustrates the Missouri Department of Transportation (MoDOT) Statewide Transportation Improvement Program (STIP) projects within the project limits. These projects consist of planned and committed projects in the project limits. STIP projects are included in Scenarios 1 through 7.

Figure 1: MoDOT STIP Projects


Source: Study Team.

Several pavement resurfacing jobs are listed in the STIP and spread throughout the corridor (shown in green in Figure 1). Table 1 provides a summary of each bridge replacement programmed STIP project highlighted in Figure 1. The transit flex/on-demand services shown by the gray hatching have been implemented under the RideKC IRIS service that began operating in March of 2023. Future transit investments shown (the North Oak corridor, North Rail corridor and KCI Express) come from sources including MARC's Connected KC 2050 plan and the North Rail study, with the North Oak 'Fast \& Frequent' corridor included in MARC's TIP.

Table 1: MoDOT Bridge Replacement STIP Projects

| STIP <br> Number | Bridges <br> To Be <br> Replaced | Bridge Location | Scope <br> Fiscal <br> Year | Cost <br> Estimate <br> (in 1,000) |
| :--- | :---: | :---: | :---: | :---: |
| 413458 | L0788, <br> L0789 | Bridges over Guinotte Ave. (0.4 mile south of <br> Missouri River and 0.7 mile north of Route 24) <br> and over Bedford Ave. (1.0 mile south of Route <br> 210 and 0.5 mile north of Missouri River) | 2028 | $\$ 183,000$ |
| KU0025 | A176 | Bridge over I-29 and I-35 (0.2 mile south of NE <br> Davidson Rd. and 0.5 mile west of Route 1) | 2027 | $\$ 10,274$ |
| KU0061 | L0659, <br> L0660 | Bridges over NE Parvin Rd. (0.7 mile south of <br> Route 1 and 1.5 miles north of Route 210) | 2027 | $\$ 9,063$ |
| KU0123 | L0756 | Bryant St. bridge replacement over I-35 (0.3 <br> mile east of Poe St. and 0.5 mile west of I-435) | 2027 | $\$ 1,897$ |

Source: MoDOT STIP.
There is one bridge replacement project (MoDOT Project No. J4S341943419) from U.S. 69 to I35 SB. This project is in the scoping phase and is not programmed as of the date of this report, thus not shown in Table 1. The estimated cost of the project is $\$ 5 \mathrm{M}$. MoDOT is set to invest $\$ 234 \mathrm{M}$ in the corridor with programmed bridge replacement and resurfacing projects.

After reviewing all concepts and STIP programed projects, the interchange concepts that were the most representative of each scenario at each interchange location were selected to determine relative quantities and costs for the entire scenario (Table 4). Representative interchanges used in the Level 3 analysis are identified in Appendix E.

### 3.0 Assumptions, Unit Costs and Initial Design Criteria

Two main assumptions were made, the interchange concept for each focus area that's representative of the scenario, and whether the bridges in the project limits would be widened or
replaced and expanded. To determine the second assumption for each bridge, it was considered whether the bridge was a bridge of concern, a visual analysis on Google Maps/Street View, year built, and the bridge typical section. Exhibits to show these assumptions were developed and are shown at the end of the document. Also, an initial design criterion was developed, and unit costs were assumed for the cost estimate.

Table 2: Typical Sections

| Road Type | Width (FT) | Shoulder Type |
| :--- | :---: | :---: |
| Mainline | 12 | - |
| Ramp | 14 | - |
| Shoulder 1 | 8 | Ramp (Outside) Shoulder |
| Shoulder 2 | 10 | Mainline (Outside) Shoulder |
| Shoulder 3 | 4 | Mainline (Inside)/Ramp (Inside) <br> Shoulder |
| Shared Used Path | 10 | - |
| Sidewalk | 5 | - |

Source: Study Team.

Table 3: Initial Design Criteria

| Design Criteria | MPH | Condition | Radius (FT) |  |
| :--- | :---: | :---: | :---: | :---: |
|  |  |  | $6 \%$ in 8\% <br> emax table | 4\% in emax <br> 4\% Table |
| Mainline design speed | 55 | - | 1920 | 1190 |
| Ramps design speed | 45 | Ideal | 1250 | 711 |
| Ramps design speed | 40 | Minimum | 965 | 533 |

Table 4: Unit Costs

| Unit Costs | 2023 Dollars |
| :--- | :---: |
| Pavement Cost (per SQYD) | $\$ 80$ |
| Bridge replacement (per SQFT) - Zone 1 | $\$ 250$ |
| Bridge replacement (per SQFT) - Zone 2 | $\$ 300$ |
| Bridge replacement (per SQFT) - Zone 3 | $\$ 200$ |
| Bridge replacement (per SQFT) - Zone 4 | $\$ 300$ |

Source: Study Team.

### 4.0 Quantities and Factored Estimate

Based on the typical sections assumed and the initial design criteria, quantities were determined for each zone for each of the seven scenarios. By using the unit costs assumed, a factored estimate was applied to account for grading, drainage, surfacing, traffic engineering, walls, and
other items. The factors used in the factored estimate were based on historical project costs in the region. A contingency of $30 \%$ was added as well as a mobilization cost of $10 \%$. All costs are reported in 2023 dollars without considering inflation.

Table 5: Factored Cost Estimate Zone 1 - Scenario 6

| Zone 1: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 238,697 | \$19,095,755 |
| New bridge(s) | SQFT | \$250 | 188,328 | \$47,081,900 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$19,095,755 | \$5,728,726 |
| Grading |  | 0.500 | \$19,095,755 | \$9,547,877 |
| Drainage |  | 0.250 | \$19,095,755 | \$4,773,939 |
| Surfacing |  | 1.200 | \$19,095,755 | \$22,914,906 |
| Traffic engineering |  | 0.300 | \$19,095,755 | \$5,728,726 |
| Misc |  | 0.100 | \$19,095,755 | \$1,909,575 |
| Walls |  | 0.200 | \$19,095,755 | \$3,819,151 |
| Total (2023 dollars) |  |  |  | \$101,504,801 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$145,151,865 |

Source: Study Team.
Table 6: Factored Cost Estimate Zone 2 - Scenario 6

| Zone 2: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 130,509 | \$10,440,743 |
| New bridge(s) | SQFT | \$300 | 87,083 | \$26,124,780 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$10,440,743 | \$3,132,223 |
| Grading |  | 0.500 | \$10,440,743 | \$5,220,372 |
| Drainage |  | 0.250 | \$10,440,743 | \$2,610,186 |
| Surfacing |  | 1.200 | \$10,440,743 | \$12,528,892 |
| Traffic engineering |  | 0.300 | \$10,440,743 | \$3,132,223 |
| Misc |  | 0.100 | \$10,440,743 | \$1,044,074 |
| Walls |  | 0.200 | \$10,440,743 | \$2,088,149 |
| Total (2023 dollars) |  |  |  | \$55,880,898 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$79,909,684 |

Source: Study Team.

Table 7: Factored Cost Estimate Zone 3 - Scenario 6
Zone 3: New Construction Breakdown

| Item | Unit | Unit Cost | Quantity | Total Cost |
| :---: | :---: | :---: | :---: | :---: |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 100,920 | \$8,073,604 |
| New bridge(s) | SQFT | \$200 | 39,399 | \$7,879,740 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$8,073,604 | \$2,422,081 |
| Grading |  | 0.500 | \$8,073,604 | \$4,036,802 |
| Drainage |  | 0.250 | \$8,073,604 | \$2,018,401 |
| Surfacing |  | 1.200 | \$8,073,604 | \$9,688,324 |
| Traffic engineering |  | 0.300 | \$8,073,604 | \$2,422,081 |
| Misc |  | 0.100 | \$8,073,604 | \$807,360 |
| Walls |  | 0.200 | \$8,073,604 | \$1,614,721 |
| Total (2023 dollars) |  |  |  | \$30,889,511 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$44,172,000 |

Source: Study Team.
Table 8: Factored Cost Estimate Zone 4 - Scenario 6

| Zone 4: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 109,277 | \$8,742,153 |
| New bridge(s) | SQFT | \$300 | 153,481 | \$46,044,420 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Grading |  | 0.500 | \$8,742,153 | \$4,371,076 |
| Drainage |  | 0.250 | \$8,742,153 | \$2,185,538 |
| Surfacing |  | 1.200 | \$8,742,153 | \$10,490,583 |
| Traffic engineering |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Misc |  | 0.100 | \$8,742,153 | \$874,215 |
| Walls |  | 0.200 | \$8,742,153 | \$1,748,431 |
| Total (2023 dollars) |  |  |  | \$70,959,556 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$101,472,165 |

Source: Study Team.

## Estimated Costs Summary

A summary table is shown below with the estimated new construction costs. New construction costs do not include Right-of-Way (ROW), Permitting, Utility Relocation, or Design/Construction Engineering costs. The estimated costs will be refined in the NEPA phase of this project.

Table 9: Scenario 6 Estimated Cost Summary

| Zone | New Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 145,200,000$ |
| 2 | $\$ 80,000,000$ |
| 3 | $\$ 44,200,000$ |
| 4 | $\$ 101,500,000$ |
| Total | $\$ 370,900,000$ |

Source: Study Team.
Note: 2023 Dollars

Information and tables for scenarios 2, 3, 4, 5, and 7 are provided below.

## Scenario 2

Table 10: Factored Cost Estimate Zone 1 - Scenario 2

| Zone 1: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 156,960 | \$12,556,801 |
| New bridge(s) | SQFT | \$250 | 53,713 | \$13,428,300 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$12,556,801 | \$3,767,040 |
| Grading |  | 0.500 | \$12,556,801 | \$6,278,400 |
| Drainage |  | 0.250 | \$12,556,801 | \$3,139,200 |
| Surfacing |  | 1.200 | \$12,556,801 | \$15,068,161 |
| Traffic engineering |  | 0.300 | \$12,556,801 | \$3,767,040 |
| Misc |  | 0.100 | \$12,556,801 | \$1,255,680 |
| Walls |  | 0.200 | \$12,556,801 | \$2,511,360 |
| Total (2023 dollars) |  |  |  | \$49,215,182 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$70,377,710 |

Source: Study Team.

Table 11: Factored Cost Estimate Zone 2 - Scenario 2

| Zone 2: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 80,533 | \$6,442,642 |
| New bridge(s) | SQFT | \$300 | 60,521 | \$18,156,240 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$6,442,642 | \$1,932,793 |
| Grading |  | 0.500 | \$6,442,642 | \$3,221,321 |
| Drainage |  | 0.250 | \$6,442,642 | \$1,610,660 |
| Surfacing |  | 1.200 | \$6,442,642 | \$7,731,170 |
| Traffic engineering |  | 0.300 | \$6,442,642 | \$1,932,793 |
| Misc |  | 0.100 | \$6,442,642 | \$644,264 |
| Walls |  | 0.200 | \$6,442,642 | \$1,288,528 |
| Total (2023 dollars) |  |  |  | \$36,517,769 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollar) |  |  |  | \$52,220,410 |

Source: Study Team.

Table 12: Factored Cost Estimate Zone 3 - Scenario 2

| Zone 3: New Construction Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 68,391 | \$5,471,319 |
| New bridge(s) | SQFT | \$200 | 47,836 | \$9,567,120 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$5,471,319 | \$1,641,396 |
| Grading |  | 0.500 | \$5,471,319 | \$2,735,660 |
| Drainage |  | 0.250 | \$5,471,319 | \$1,367,830 |
| Surfacing |  | 1.200 | \$5,471,319 | \$6,565,583 |
| Traffic engineering |  | 0.300 | \$5,471,319 | \$1,641,396 |
| Misc |  | 0.100 | \$5,471,319 | \$547,132 |
| Walls |  | 0.200 | \$5,471,319 | \$1,094,264 |
| Total (2023 dollars) |  |  |  | \$25,160,380 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$35,979,343 |

Source: Study Team.

Table 13: Factored Cost Estimate Zone 4 - Scenario 2

| ZONE 4: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 109,277 | \$8,742,153 |
| New bridge(s) | SQFT | \$300 | 153,481 | \$46,044,420 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Grading |  | 0.500 | \$8,742,153 | \$4,371,076 |
| Drainage |  | 0.250 | \$8,742,153 | \$2,185,538 |
| Surfacing |  | 1.200 | \$8,742,153 | \$10,490,583 |
| Traffic engineering |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Misc |  | 0.100 | \$8,742,153 | \$874,215 |
| Walls |  | 0.200 | \$8,742,153 | \$1,748,431 |
| Total (2023 dollars) |  |  |  | \$70,959,556 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$101,472,165 |

Source: Study Team.

Table 14: Scenario 2 Estimated Cost Summary

| Zone | New <br> Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 70,400,000$ |
| 2 | $\$ 52,300,000$ |
| 3 | $\$ 36,000,000$ |
| 4 | $\$ 101,500,000$ |
| Totals | $\$ \mathbf{2 6 0 , 2 0 0 , 0 0 0}$ |

Source: Study Team. Note: 2023 Dollars

## Scenario 3

Table 15: Factored Cost Estimate Zone 1 - Scenario 3

| Zone 1: New construction cost breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 25,261 | \$2,020,880 |
| New bridge(s) | SQFT | \$250 | 35,275 | \$8,818,750 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$2,020,880 | \$606,264 |
| Grading |  | 0.500 | \$2,020,880 | \$1,010,440 |
| Drainage |  | 0.250 | \$2,020,880 | \$505,220 |
| Surfacing |  | 1.200 | \$2,020,880 | \$2,425,056 |
| Traffic engineering |  | 0.300 | \$2,020,880 | \$606,264 |
| Misc |  | 0.100 | \$2,020,880 | \$202,088 |
| Walls |  | 0.200 | \$2,020,880 | \$404,176 |
| Total (2023 dollars) |  |  |  | \$14,578,258 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$20,846,909 |

Source: Study Team
Table 16: Factored Cost Estimate Zone 2 - Scenario 3

| Zone 2: New Construction Cost Breakdown |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :--- | :---: |
| Item | Unit | Unit cost | Quantity | Total cost |  |  |
|  <br> shoulder pavement | SQYD | $\$ 80$ | 0 | $\$$ | - |  |
| New bridge(s) | SQFT | $\$ 300$ | 0 | $\$$ | - |  |
|  |  | Factor | Pavement cost |  |  |  |
| General |  | 0.300 | $\$$ | - | $\$$ |  |
| Grading | 0.500 | $\$$ | - | $\$$ | - |  |
| Drainage | 0.250 | $\$$ | - | $\$$ | - |  |
| Surfacing | 1.200 | $\$$ | - | $\$$ | - |  |
| Traffic engineering |  | 0.300 | $\$$ | - | $\$$ |  |
| Misc | 0.100 | $\$$ | - | $\$$ | - |  |
| Walls | 0.200 | $\$$ | - | $\$$ | - |  |
| Total (2023 dollars) |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Source: Study Team.

Table 17: Factored Cost Estimate Zone 3 - Scenario 3

| Zone 3: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit cost | Quantity | Total cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 27,920 | \$2,233,600 |
| New bridge(s) | SQFT | \$200 | 0 | \$ |
|  |  | Factor | Pavement cost |  |
| General |  | 0.300 | \$2,233,600 | \$670,080 |
| Grading |  | 0.500 | \$2,233,600 | \$1,116,800 |
| Drainage |  | 0.250 | \$2,233,600 | \$558,400 |
| Surfacing |  | 1.200 | \$2,233,600 | \$2,680,320 |
| Traffic engineering |  | 0.300 | \$2,233,600 | \$670,080 |
| Misc |  | 0.100 | \$2,233,600 | \$223,360 |
| Walls |  | 0.200 | \$2,233,600 | \$446,720 |
| Total (2023 dollars) |  |  |  | \$6,365,760 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$9,103,037 |

Source: Study Team.
Table 18: Factored Cost Estimate Zone 4 - Scenario 3

| Zone 4: New Construction Cost Breakdown |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :--- | :---: | :---: |
| Item | Unit | Unit cost | Quantity | Total cost |  |  |  |
|  <br> shoulder pavement | SQYD | $\$ 80$ | 0 | $\$$ | - |  |  |
| New bridge(s) | SQFT | $\$ 300$ | 0 | $\$$ | - |  |  |
|  |  | Factor | Pavement cost |  |  |  |  |
| General |  | 0.300 | $\$$ | - | $\$$ |  |  |
| Grading | 0.500 | $\$$ | - | $\$$ | - |  |  |
| Drainage | 0.250 | $\$$ | - | $\$$ | - |  |  |
| Surfacing | 1.200 | $\$$ | - | $\$$ | - |  |  |
| Traffic engineering |  |  |  |  |  |  |  |
| Misc | 0.300 | $\$$ | - | $\$$ | - |  |  |
| Walls | 0.100 | $\$$ | - | $\$$ | - |  |  |
| Total (2023 dollars) | 0.200 | $\$$ | - | $\$$ | - |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Source: Study Team

Table 19: Scenario 3 Estimated Costs

| Zone | New <br> Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 20,900,000$ |
| 2 | - |
| 3 | $\$ 9,200,000$ |
| 4 | - |
| Totals | $\$ 30,100,000$ |

Source: Study Team. Note: 2023 Dollars

## Scenario 4

Table 20: Factored Cost Estimate Zone 1 - Scenario 4

| Zone 1: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit cost | Quantity | Total cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 98,471 | \$7,877,680 |
| New bridge(s) | SQFT | \$250 | 161,706 | \$40,426,500 |
|  |  | Factor | Pavement cost |  |
| General |  | 0.300 | \$7,877,680 | \$2,363,304 |
| Grading |  | 0.500 | \$7,877,680 | \$3,938,840 |
| Drainage |  | 0.250 | \$7,877,680 | \$1,969,420 |
| Surfacing |  | 1.200 | \$7,877,680 | \$9,453,216 |
| Traffic engineering |  | 0.300 | \$7,877,680 | \$2,363,304 |
| Misc |  | 0.100 | \$7,877,680 | \$787,768 |
| Walls |  | 0.200 | \$7,877,680 | \$1,575,536 |
| Total (2023 dollars) |  |  |  | \$62,877,888 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$89,915,380 |

Source: Study Team.

Table 21: Factored Cost Estimate Zone 2 - Scenario 4

| Zone 2: New Construction Cost Breakdown |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
|  <br> shoulder pavement | SQYD | $\$ 80$ | 75,940 | $\$ 6,075,200$ |
| New bridge(s) | SQYD | $\$ 300$ | 75,286 | $\$ 22,585,800$ |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | $\$ 6,075,200$ | $\$ 1,822,560$ |
| Grading |  | 0.500 | $\$ 6,075,200$ | $\$ 3,037,600$ |
| Drainage | 0.250 | $\$ 6,075,200$ | $\$ 1,518,800$ |  |
| Surfacing |  | 1.200 | $\$ 6,075,200$ | $\$ 7,290,240$ |
| Traffic engineering |  | 0.300 | $\$ 6,075,200$ | $\$ 1,822,560$ |
| Misc | 0.100 | $\$ 6,075,200$ | $\$ 607,520$ |  |
| Walls | 0.200 | $\$ 6,075,200$ | $\$ 1,215,040$ |  |
| Total (2023 dollars) |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Total (2023 dollars) |  |  |  |  |

Source: Study Team.

Table 22: Factored Cost Estimate Zone 3 - Scenario 4

| Zone 3: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit cost | Quantity | Total cost |
| Roadway lane \& shoulder pavement | SQYD | \$80 | 39,254 | \$3,140,320 |
| New bridge(s) | SQFT | \$200 | 0 | - |
|  |  | Factor | Pavement cost |  |
| General |  | 0.300 | \$3,140,320 | \$942,096 |
| Grading |  | 0.500 | \$3,140,320 | \$1,570,160 |
| Drainage |  | 0.250 | \$3,140,320 | \$785,080 |
| Surfacing |  | 1.200 | \$3,140,320 | \$3,768,384 |
| Traffic engineering |  | 0.300 | \$3,140,320 | \$942,096 |
| Misc |  | 0.100 | \$3,140,320 | \$314,032 |
| Walls |  | 0.200 | \$3,140,320 | \$628,064 |
| Total (2023 dollars) |  |  |  | \$8,949,912 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$12,798,374 |

Source: Study Team.

Table 23: Factored Cost Estimate Zone 4 - Scenario 4

| Zone 4: New Construction Cost Breakdown |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |  |
|  <br> shoulder pavement | SQYD | $\$ 80$ | 0 | - |  |
| New bridge(s) | SQFT | $\$ 300$ | 0 | - |  |
|  |  | Factor | Pavement Cost |  |  |
| General |  | 0.300 | - | - |  |
| Grading | 0.500 | - | - |  |  |
| Drainage | 0.250 | - | - |  |  |
| Surfacing | 1.200 | - | - |  |  |
| Traffic engineering |  |  |  |  |  |
| Misc | 0.300 | - | - |  |  |
| Walls | 0.100 | - | - |  |  |
| Total (2023 dollars) | 0.200 | - | - |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Total (2023 dollars) |  |  | Contingency | $30 \%$ |  |

Source: Study Team.

Table 24: Scenario 4 Estimated Cost Summary

| Zone | New <br> Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 90,000,000$ |
| 2 | $\$ 57,100,000$ |
| 3 | $\$ 12,800,000$ |
| 4 | - |
| Totals | $159,900,000$ |

Source: Study Team.
Note: 2023 Dollars

## Scenario 5

Table 25: Factored Cost Estimate Zone 1 - Scenario 5

| Zone 1: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 179,694 | \$14,375,538 |
| New bridge(s) | SQFT | \$250 | 140,016 | \$35,004,050 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$14,375,538 | \$4,312,661 |
| Grading |  | 0.500 | \$14,375,538 | \$7,187,769 |
| Drainage |  | 0.250 | \$14,375,538 | \$3,593,884 |
| Surfacing |  | 1.200 | \$14,375,538 | \$17,250,645 |
| Traffic engineering |  | 0.300 | \$14,375,538 | \$4,312,661 |
| Misc |  | 0.100 | \$14,375,538 | \$1,437,554 |
| Walls |  | 0.200 | \$14,375,538 | \$2,875,108 |
| Total (2023 dollars) |  |  |  | \$75,974,333 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$108,643,296 |

Source: Study Team.
Table 26: Factored Cost Estimate Zone 2 - Scenario 5

| Zone 2: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 90,760 | \$7,260,780 |
| New bridge(s) | SQFT | \$300 | 60,521 | \$18,156,240 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$7,260,780 | \$2,178,234 |
| Grading |  | 0.500 | \$7,260,780 | \$3,630,390 |
| Drainage |  | 0.250 | \$7,260,780 | \$1,815,195 |
| Surfacing |  | 1.200 | \$7,260,780 | \$8,712,937 |
| Traffic engineering |  | 0.300 | \$7,260,780 | \$2,178,234 |
| Misc |  | 0.100 | \$7,260,780 | \$726,078 |
| Walls |  | 0.200 | \$7,260,780 | \$1,452,156 |
| Total (2023 dollars) |  |  |  | \$38,849,464 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$55,554,734 |

Source: Study Team

Table 27: Factored Cost Estimate Zone 3 - Scenario 5

| Zone 3: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 91,173 | \$7,293,862 |
| New bridge(s) | SQFT | \$200 | 37,368 | \$7,473,600 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$7,293,862 | \$2,188,158 |
| Grading |  | 0.500 | \$7,293,862 | \$3,646,931 |
| Drainage |  | 0.250 | \$7,293,862 | \$1,823,465 |
| Surfacing |  | 1.200 | \$7,293,862 | \$8,752,634 |
| Traffic engineering |  | 0.300 | \$7,293,862 | \$2,188,158 |
| Misc |  | 0.100 | \$7,293,862 | \$729,386 |
| Walls |  | 0.200 | \$7,293,862 | \$1,458,772 |
| Total (2023 dollars) |  |  |  | \$28,261,105 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$40,413,381 |

Source: Study Team.

Table 28: Factored Cost Estimate Zone 4 - Scenario 5

| Zone 4: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
|  <br> Shoulder <br> Pavement | SQYD | \$80 | 109,277 | \$8,742,153 |
| New bridge(s) | SQFT | \$300 | 153,481 | \$46,044,420 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Grading |  | 0.500 | \$8,742,153 | \$4,371,076 |
| Drainage |  | 0.250 | \$8,742,153 | \$2,185,538 |
| Surfacing |  | 1.200 | \$8,742,153 | \$10,490,583 |
| Traffic engineering |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Misc |  | 0.100 | \$8,742,153 | \$874,215 |
| Walls |  | 0.200 | \$8,742,153 | \$1,748,431 |
| Total (2023 dollars) |  |  |  | \$70,959,556 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$101,472,165 |

Source: Study Team.

Table 29: Scenario 5 Estimated Cost Summary

| Zone | New <br> Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 108,700,000$ |
| 2 | $\$ 55,600,000$ |
| 3 | $\$ 40,500,000$ |
| 4 | $\$ 101,500,000$ |
| Totals | $\$ 306,300,000$ |

Source: Study Team. Note: 2023 Dollars

## Scenario 7

Table 30: Factored Cost Estimate Zone 1 - Scenario 7

| Zone 1: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 232,307 | \$18,584,581 |
| New bridge(s) | SQFT | \$250 | 183,061 | \$45,765,200 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$18,584,581 | \$5,575,374 |
| Grading |  | 0.500 | \$18,584,581 | \$9,292,291 |
| Drainage |  | 0.250 | \$18,584,581 | \$4,646,145 |
| Surfacing |  | 1.200 | \$18,584,581 | \$22,301,498 |
| Traffic engineering |  | 0.300 | \$18,584,581 | \$5,575,374 |
| Misc |  | 0.100 | \$18,584,581 | \$1,858,458 |
| Walls |  | 0.200 | \$18,584,581 | \$3,716,916 |
| Total (2023 dollars) |  |  |  | \$98,731,257 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$141,185,697 |

Source: Study Team.

Table 31: Factored Cost Estimate Zone 2 - Scenario 7

| Zone 2: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 96,935 | \$7,754,772 |
| New bridge(s) | SQFT | \$300 | 48,476 | \$14,542,680 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$7,754,772 | \$2,326,431 |
| Grading |  | 0.500 | \$7,754,772 | \$3,877,386 |
| Drainage |  | 0.250 | \$7,754,772 | \$1,938,693 |
| Surfacing |  | 1.200 | \$7,754,772 | \$9,305,726 |
| Traffic engineering |  | 0.300 | \$7,754,772 | \$2,326,431 |
| Misc |  | 0.100 | \$7,754,772 | \$775,477 |
| Walls |  | 0.200 | \$7,754,772 | \$1,550,954 |
| Total (2023 dollars) |  |  |  | \$36,643,779 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$52,400,604 |

Source: Study Team.

Table 32: Factored Cost Estimate Zone 3 - Scenario 7

| Zone 3: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 89,884 | \$7,190,715 |
| New bridge(s) | SQFT | \$200 | 39,399 | \$7,879,740 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$7,190,715 | \$2,157,214 |
| Grading |  | 0.500 | \$7,190,715 | \$3,595,357 |
| Drainage |  | 0.250 | \$7,190,715 | \$1,797,679 |
| Surfacing |  | 1.200 | \$7,190,715 | \$8,628,858 |
| Traffic engineering |  | 0.300 | \$7,190,715 | \$2,157,214 |
| Misc |  | 0.100 | \$7,190,715 | \$719,071 |
| Walls |  | 0.200 | \$7,190,715 | \$1,438,143 |
| Total (2023 dollars) |  |  |  | \$28,373,277 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$40,573,787 |

Source: Study Team.

Table 33: Factored Cost Estimate Zone 4 - Scenario 7

| Zone 4: New Construction Cost Breakdown |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Item | Unit | Unit Cost | Quantity | Total Cost |
| Roadway Lane \& Shoulder Pavement | SQYD | \$80 | 109,277 | \$8,742,153 |
| New bridge(s) | SQFT | \$300 | 153,481 | \$46,044,420 |
|  |  | Factor | Pavement Cost |  |
| General |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Grading |  | 0.500 | \$8,742,153 | \$4,371,076 |
| Drainage |  | 0.250 | \$8,742,153 | \$2,185,538 |
| Surfacing |  | 1.200 | \$8,742,153 | \$10,490,583 |
| Traffic engineering |  | 0.300 | \$8,742,153 | \$2,622,646 |
| Misc |  | 0.100 | \$8,742,153 | \$874,215 |
| Walls |  | 0.200 | \$8,742,153 | \$1,748,431 |
| Total (2023 dollars) |  |  |  | \$70,959,556 |
|  |  |  | Contingency | 30\% |
|  |  |  | Mobilization | 10\% |
| Total (2023 dollars) |  |  |  | \$101,472,165 |

Source: Study Team.

Table 34: Scenario 7 Estimated Cost Summary

| Zone | New <br> Construction <br> Costs |
| :---: | :---: |
| 1 | $\$ 141,200,000$ |
| 2 | $\$ 52,500,000$ |
| 3 | $\$ 40,600,000$ |
| 4 | $\$ 101,500,000$ |
| Totals | $335,800,000$ |

Source: Study Team.
Note: 2023 Dollars


August 2023

In Partnership with:

2

Mid-America Regional Council

In April 2022, the Missouri Department of Transportation (MoDOT) began the Interstate (I)-29, I-35, U.S. Highway (U.S) 169 Planning and Environmental Linkages (PEL) Study to identify the Purpose and Need for improvements within the I-29, I-35, U.S. 169 study area and determine viable alternatives for a long-term solution and recommendations that can be carried forward seamlessly into National Environmental Policy Act (NEPA) studies. This document provides the planning-level traffic volumes for the PEL Study.

The graphics show the hourly peak volumes for Existing (2016), Future No-Build (2050), and Future Build (2050) scenarios. The reported AM peak hour is 7:00-8:00 am and the PM peak hour is 4:00-5:00 pm. The traffic volumes were developed by taking direct output from Dynameq models from the I-29/I-35/US 169 PEL study (which have small imbalances) and smoothing and rounding the data so it balances. The volumes are intended to be used at a planning study level, and not for detailed design.

The existing volumes were developed based on the counts taken pre-pandemic and adjusted to a 2016 base year to match the base year of the Mid-America Regional Council's (MARC) regional EMME travel demand model. Before calibrating the existing Dynameq models, the EMME origin-destination (OD) matrices provided by MARC were incorporated into the Dynameq model. Both AM and PM existing models were run using Dynamic Traffic Assignment (DTA) up to 100 iterations or until network convergence was achieved. The DTA simulation results were validated by comparing hourly flow volumes on each network segment with corresponding traffic counts.

To develop Future No-Build volumes, 2050 subarea OD matrices were provided by MARC after running the travel demand model with updated land use and committed roadway projects. The ODs were adjusted per existing calibration and checked against historical growth rates for reasonableness. The OD matrices are used in the Dynameq model, which was updated based on the future no-build road network, to generate 2050 Future No-Build traffic volumes.

The Future Build traffic volumes were generated from Scenario 6 in the PEL Study. The PEL Study recommended Scenarios 5, 6 and 7. Scenario 6 is a representative build configuration from the PEL that added mainline capacity and rebuilt several interchanges in the study corridor. Actual improvements to be made to the corridor will be determined in future NEPA phases. As input to the Build Dynameq model, new 2050 subarea OD matrices were provided from the MARC model with assumed capacity improvement to the road network. These OD matrices are used in the Dynameq model, which was updated based on representative mainline and interchange improvements, to generate 2050 Build volumes.

# 2016 Existing Balanced Peak Hour 

 Volumes - All Vehicle ClassesAM Peak Hour - 7:00 to 8:00
PM Peak Hour - 4:00 to 5:00



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure




Davidson

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure


## Old Pike Rd



29

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
——
$=$ Bridge structure



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure






Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
LEGEND
$\mathrm{XX}(\mathrm{XX})=$ AM (PM) Peak Hour Volumes
$\longrightarrow$
$\rightarrow$

$=$| Direction of Travel (not quantity of |
| :---: |
| lanes) |

$=$ Bridge structure


Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure




Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure




Chouteau
Trafficway

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure





# 2050 Future No-Build Balanced Peak Hour 

Volumes - All Vehicle Classes

AM Peak Hour - 7:00 to 8:00
PM Peak Hour - 4:00 to 5:00



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure



Bedford Avenue

Note: These volumes are for planning level use only and are not to be used for design purposes

| LEGEND |
| :---: |
| $\mathrm{XX}(\mathrm{XX})=$ AM (PM) Peak Hour Volumes |
| $\rightarrow$= Direction of Travel (not quantity of <br> lanes) |
| $=$ Bridge structure |



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure






## Old Pike Rd

Trafficway



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure





## Englewood Rd

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

$X X(X X)=A M(P M)$ Peak Hour Volumes
LEGEND
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure
Kansas City, MO
Prepared By: HNTB
DATE: July 2023


Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)


## Drive

Note: These volumes are for planning level use only and are not to be used for design purposes



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure


Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure


Route 45


Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure




Chouteau
Trafficway

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
—
$=$ Bridge structure



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure



$$
\begin{aligned}
& \text { NOT TO }
\end{aligned}
$$

$$
435
$$

# 2050 Future Build Balanced Peak Hour Scenario 6 

Highway Mainline Capacity + Focus Interchanges Improvement Full Build Volumes - All Vehicle Classes

AM Peak Hour - 7:00 to 8:00
PM Peak Hour - 4:00 to 5:00



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure


Bedford Avenue

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

$X X(X X)=A M(P M)$ Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure

Bedford Avenue (not in model)


Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\xrightarrow{ـ}$
= Bridge structure




Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure


Note: These volumes are for planning level use only and are not to be used for design purposes

| LEGEND |
| :---: |
| $\mathrm{XX}(\mathrm{XX})=$ AM (PM) Peak Hour Volumes |
| $\rightarrow$= Direction of Travel (not quantity of <br> lanes) |
| $\rightarrow$ |




Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure





Englewood Rd

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\xrightarrow{ }$
= Bridge structure




Drive

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\xrightarrow{ }$
= Bridge structure



Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure


Meadowvale Drive (not in model)

Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
= Bridge structure

$29$




Note: These volumes are for planning level use only and are not to be used for design purposes

## LEGEND

XX (XX) = AM (PM) Peak Hour Volumes
$\longrightarrow=$ Direction of Travel (not quantity of lanes)
$\longrightarrow$
$=$ Bridge structure




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# I-29, I-35, U.S. 169 Appendix D PEL to NEPA Transition Report 

September 2023
In Partnership with:

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## Attachments

Attachment A - NEPA Classification Documentation

## Acronyms

| AASHTO | American Association of State Highway and Transportation Officials |
| :--- | :--- |
| AJR | Access Justification Report |
| CAC | Community Advisory Committee |
| CFR | Code of Federal Regulations |
| EDC | Every Day Counts |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| GIS | Geographic Information System |
| HSM | Highway Safety Manual |
| I | Interstate |
| MoDOT | Missouri Department of Transportation |
| MPH | Miles Per Hour |
| NB | Northbound |
| NE | Northeast |
| NEPA | National Environmental Policy Act |
| PEL | Planning and Environmental Linkages Study |
| SB | Southbound |
| STIP | Statewide Transportation Improvement Program |
| T\&E | Threatened and Endangered |
| U.S. | U.S. Highway |
| WB | Westbound |

### 1.0 Introduction

In order to be seamlessly incorporated into the National Environmental Policy Act (NEPA) phase, all corridor and subarea studies utilizing the Planning and Environmental Linkages (PEL) study approach should follow Federal Highway Administration (FHWA) established PEL regulations, legislation, and guidance and include extensive public involvement and agency coordination. The regulations for a PEL study are formalized in the Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule (23 CFR 450), which details how results or decisions of transportation planning studies may be used as part of the overall project development process consistent with NEPA. Appendix A to Part 450—Linking the Transportation Planning and NEPA Processes - describes how information, analysis, and products from transportation planning can be incorporated into and relied upon in NEPA documents under existing laws ${ }^{1}$. Some of the key criteria that a Federal agency must consider in deciding whether to adopt planning level analyses or decisions in the NEPA process include: ${ }^{2}$

- Involvement of interested state, local, tribal and Federal agencies;
- Public review;
- Reasonable opportunity to comment during the development of the corridor or subarea planning study;
- Documentation of relevant decisions in a form that is identifiable and available for review during the NEPA scoping process and can be appended to or referenced in the NEPA document; and
- The review by FHWA and the Federal Transit Administration (FTA), as appropriate.

In an effort to link planning studies to environmental processes that are compliant with NEPA, FHWA developed Guidance on Using Corridor and Subarea Planning to Inform NEPA, April 5, 2011. This guidance encourages the integration of initial highway and transit planning efforts into a NEPA process to minimize duplication of effort, number of review cycles and project costs. Likewise, and consistent with 23 CFR 450, the PEL Questionnaire acts as a summary of the planning process, designed to ensure planning information and decisions are properly documented for utilization during the NEPA phase of project development.

### 2.0 I-29, I-35, U.S. 169 PEL Overview

The Missouri Department of Transportation (MoDOT) conducted the Interstate (I)-29, I-35, U.S. Highway (U.S.)169 PEL Study to develop conceptual transportation alternatives that would address transportation system mobility, safety, and roadway and bridge deficiencies along I-29, I-35, and U.S. 169 within the PEL study area, as shown in Figure 1. Several technical reports

[^31]provide an overview of the I-29, I-35, U.S. 169 PEL, including guidance on the PEL process (I29, I-35, U.S. 169 PEL Framework and Methodology Memo); details about the extensive public and agency outreach (I-29, I-35, U.S. 169 PEL Public Involvement Plan and Documentation Report); and background and supporting documentation of the problems (I-29, I-35, U.S. 169 PEL Baseline Conditions Report) and potential solutions (I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report) for the I-29, I-35, and U.S. 169 facilities, all of which can be found as appendices to the I-29, I-35, U.S. 169 PEL Report.

The I-29, I-35, U.S. 169 PEL Study provided a tool for engaging the public and agencies in developing improvements within the study area and created a link between past, current, and future transportation decisions, thus potentially minimizing any duplication of effort and time lost between studies. The I-29, I-35, U.S. 169 PEL Study is expected to shorten the time needed to implement a project by allowing planning level decisions to be carried into future, more detailed environmental studies.

Figure 1: PEL Study Area


Source: Study Team.

### 3.0 PEL Recommendations

### 3.1 PEL Recommended Scenarios

Three PEL Recommended Scenarios were identified to be carried forward to NEPA. These scenarios meet the Purpose and Need and study goals as outlined in the I-29, I-35, U.S. 169 Baseline Conditions (Section 6.7) shown in Figure 2.

Figure 2: PEL Recommended Scenarios

| Scenario 5 | Scenario 6 | Scenario 7 |
| :---: | :---: | :---: |
| Highway Mainline <br> Capacity + <br> Focus Interchanges Improvement Lite + Complementary Alternatives | Highway Mainline <br> Capacity + <br> Focus Interchanges Improvement <br> Full Build + <br> Complementary <br> Alternatives | Highway Mainline <br> Capacity + <br> Focus Interchanges <br> Improvement <br> Full Build + <br> Consolidated/ <br> Eliminated Access + <br> Complementary <br> Alternatives |
| Specific corridor recommendations will be identified in the NEPA phase |  |  |

Source: Study Team.

### 3.2 PEL Projects

Projects were identified for the PEL Recommended Scenarios. Project prioritization helps MoDOT rank the order in which to approach a larger PEL study area. The Study Team (Consultant Team and MoDOT) considered safety, traffic, and infrastructure needs within the PEL project area when developing a project prioritization. Priorities may change based on a major developments that could occur within the study area, such as the announcement for a new Royals Stadium.

Project prioritization is categorized by Priority 1, Priority 2, and Priority 3 designations. Figure 3 shows these levels of prioritization for segments of the corridor. Statewide transportation improvement program (STIP) projects may be implemented within the project limits regardless of the priority shown on the map.

Priority 1 refers to sections that should be improved first and prioritized within the project limits because they contain the most significant existing traffic congestion, safety concerns, and bridge needs, and provide the greatest cost benefit. Priority 1 was studied with the greatest level of detail. Priority 2 areas would provide the second greatest benefit to cost within the project limits, but were not studied to the same level of detail as Priority 1. Priority 2 sections were evaluated for traffic and safety performance and mainline infrastructure needs. More
detailed analysis is required to determine key regional impacts and interchange concepts. Priority 3 areas would have the lowest benefit to cost and were also not studied to the same level of detail as Priority 1. Priority 3 sections were evaluated for traffic and safety performance and mainline infrastructure needs, but interchange concepts were not developed. Further analysis would be required to determine recommended future improvements. Because traffic and safety analyses were performed in the study area, needs outside of the project limits were also identified. Projects are listed in no particular order under each priority section below.

Figure 3: Project Prioritization


Source: Study Team.
Note: Projects for each priority are listed in the text below.

### 3.2.1 Priority 1 Projects

A. I-35 at Vivion Road (U.S. 69) Interchange

The southbound (SB) Vivion Road (U.S. 69) to SB I-35 ramp bridge (LO656) was constructed in 1954 and is listed as a high priority bridge of concern. Vivion Road (U.S. 69) bridges (L0757 and L0758) were both built in 1958. Any future widening of I-35 through this location may require the Vivion Road bridges to be replaced.

Several existing conditions could be improved upon with future improvements at the I-35 at U.S. 69 (Northeast (NE) Vivion Road) Interchange. SB I-35 drops from three lanes (two through lanes plus auxiliary) to two lanes at the SB I-35 to Vivion Road loop ramp, which has a tight radius and a speed differential from 65 miles per hour (MPH) on mainline to 15 MPH on the loop ramp. The SB Vivion Road (U.S. 69) to SB I-35 movement is a left entrance ramp, whereas a right entrance ramp would meet driver expectancy and current interstate standards. There are driveways along the northbound (NB) I-35 to Vivion Road ramp, and drivers cannot go from NB I-35 to westbound (WB)/SB Vivion Road. A project at this location would provide an opportunity to improve the issues stated and accommodate mainline widening on I-35 through the interchange.

## B. l-35 from west of Antioch Road Interchange to Vivion Road (U.S. 69)

All bridges on this section of I-35 are approximately 70 years old and are near the end of their lifespan (L0653, L0654, L0641, L0642, and L0655). The bridge on SB I-35 over Antioch Road (L0654) and the bridge on NB I-35 over Chouteau Trafficway (L0642) are listed as high priority bridges of concern. Mainline widening to six lanes would improve traffic operations through this section of I-35.This section was identified as an area of safety concern as part of the baseline conditions analysis.

## C. I-29/I-35 Split

The SB I-29 to NB I-35 flyover bridge (A1763) and the I-29/I-35 bridges over Parvin Road (L0659 and L0660) are scheduled for replacement in 2027 in the STIP. All three of these bridges are listed as high priority bridges of concern. Bridges at this interchange were built in 1954 and 1967.

In this area, SB I-29 has a one-lane section, with existing sub-standard acceleration and deceleration lane lengths. Tight radii on the Parvin Road loop ramps cause traffic and safety concerns. A project at this location would provide an opportunity to address the issues stated and accommodate mainline widening on I-29 and I-35 through the interchange.

## D. I-29 from north of the I-29 at Davidson Road Interchange to Waukomis Drive including N Oak Interchange and U.S. 169 Interchange

There are several bridges in this area that are reaching the end of their useful life. The bridges at I-29 and North Oak Trafficway (L0701 and L0702) and Vivion Road (L0720 and L0721) Interchanges were built in 1957, along with two bridges of concern (L0719 and A1613) at the I29 at U.S. 169 Interchange. There are many closely spaced ramps and missing interchange movements in this section. To accommodate future traffic, mainline widening is needed. As these bridges get older and require more maintenance, improvements in this section provide an opportunity to replace these bridges and widen I-29 to six lanes. Improvements to the
interchanges would provide more distance between ramps and add missing interchange movements.

### 3.2.2 Priority 2 Projects

A. I-29/I-35 from north of I-29/I-35 at Armour Road Interchange to the NE corner of the Kansas City downtown loop (or Independence Avenue).

The viaduct bridges north and south of the Missouri River (L0788 and L0789) are scheduled to be replaced in 2028, and both bridges are listed as high priority bridges of concern. For the viaduct north of the river, there is an opportunity to provide additional mainline through lanes and auxiliary lanes on the bridge between Bedford/Levee and $16^{\text {th }}$ Street, as well as provide wider shoulders for both bounds of I-29/I-35 to improve congestion. For the viaduct south, there is an opportunity to provide additional mainline through lanes. Further traffic modeling and analysis is required along I-29/I-35 to determine the impacts of mainline and bridge widening and its interaction with the Kansas City downtown loop.

### 3.2.3 Priority 3 Projects

A. U.S. 169 from the I-29 at U.S. 169 Interchange to the U.S. 169 at NW $68^{\text {th }}$ Street Interchange
U.S. 169 widening from the I-29 and U.S. 169 Interchange to the U.S. 169 at NW 68 ${ }^{\text {th }}$ Street Interchange was identified as a future need.

### 3.2.4 Priority 4 Projects

## A. I-29 at l-635 Interchange

Future needs were identified at the I-29 and I-635 interchange, including ramp reconfiguration.
B. Bryant Street bridge over I-35 (L0756)

This bridge is scheduled to be replaced in 2027.

### 3.2.5 Needs Outside of the Project Limits

A. I-635 Across the Missouri River

Although this area was not in the project limits, future widening needs were identified to provide three continuous lanes in each direction for I-635 across the Missouri River.
B. I-35 North of I-435

Although this area was not in the project limits, future widening needs were identified to provide three lanes in each direction for I-35 north of I-435. The assumed northern terminus of the widening in this study was at the U.S. 69 interchange for Excelsior Springs.
C. U.S. 169 North of the NW 68 ${ }^{\text {th }}$ Street Interchange

Widening U.S. 169 to three lanes in each direction was identified as a future need to be extended beyond the I-29 to NW 68 ${ }^{\text {th }}$ Street Interchange section within the study area up to Missouri Highway (Hwy) 152.
D. Missouri Hwy 152 from I-29 to l-35

Although this area was not in the project limits, the study found that widening Missouri Hwy 152 between I-29 and I-35 provided benefits within the study area in terms of reducing traffic demand along both I-29 and I-35 north of the split.

### 4.0 Issues to be Studied and Analyses to be Performed in Greater Detail During NEPA

### 4.1 Design

### 4.1.1 Design Refinements of Interchange Concepts

As presented in the I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report, 53 interchange improvement concepts at four focus areas were developed. Although all interchange concepts will be carried over into NEPA, the best performing concepts will be evaluated in more detail in the NEPA phase. A more in-depth analysis, including establishing conceptual alignments and developing proposed typical sections and plan graphics, will help refine the potential impacts. Project costs and right-of-way and environmental impacts will adjust as the chosen concepts are developed.

### 4.1.2 Further Analysis on Bridges of Concern and Other Bridges

The I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.4.7) designated bridges of concern along the corridors within the project limits. Some of these bridges of concern are programmed to be replaced or rehabilitated in the current STIP, however, the following bridges of concern are not currently programmed to be replaced or rehabilitated in the STIP:

- Bridge L0782, built in 1953, carries Independence Avenue over I-29/I-35.
- Bridge L0654, built in 1954, carries SB I-35 over Antioch Road.
- Bridge L0642, built in 1954, carries NB I-35 over Chouteau Parkway.
- Bridge A1579, built in 1969, carries Ramp I-35 S to I-435 S over I-35.
- Bridge A1613, built in 1965, carries NB I-29 over NB U.S. 169.
- Bridge L0719, built in 1957, carries NB I-29 over SB U.S. 169.
- Bridge L0692, built in 1957, carries Ramp NW Gateway Avenue to NB I-29 over I-29.

Further analysis is necessary during NEPA to determine the type of maintenance each of these bridges of concern will require, or if the bridge needs to be replaced.

Although the following bridges were not identified as bridges of concern, they should also be evaluated as a twin bridge of the bridge of concern:

- Bridge L0653, built in 1954, carries NB I-35 over Antioch Road.
- Bridge L0641, built in 1954, carries SB I-35 over Chouteau Parkway.


### 4.1.3 Cost estimate refinements

In order to develop planning level construction cost estimates of the representative interchange configurations for each Scenario, the corridor was split into four zones as part of the Level 3 Screening in the I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.
These zones were identified to facilitate the determination of quantities and costs, as shown in Figure 4.

Figure 4: Construction Cost Estimate Zones


Source: Study Team.
Planning level construction costs for one representative interchange concept are presented in the I-29, I-35, U.S. 169 Alternatives Development and Analysis Report. More detailed cost estimates will be developed in the NEPA phase.

### 4.1.4 Future Adjacent Studies

Capacity improvements outside of the project limits were determined necessary to accurately evaluate the PEL project limits. These improvements allow the full traffic demand to enter the project limits and avoid backups from congestion outside the PEL project limits.

- I-35 from I-435 north beyond Missouri Hwy 152
- U.S. 169 from NE 68 ${ }^{\text {th }}$ Street north beyond Missouri Hwy 152

MoDOT has acknowledged that each of these areas requires additional study before any improvements are recommended as projects. During NEPA, coordination with MoDOT will occur to document the status of these improvements and their relationship with any identified NEPA preferred alternative. Additional study will also be needed at the I-29 at I-635 interchange.

### 4.2 Modeling

### 4.2.1 Mobility

Planning level modeling using Dynameq software was conducted during the PEL. This model's strength is that it looks at regional and local traffic diversions and high-level operations for the strategies analyzed. More detailed operational analysis at the interchange level would be needed during NEPA; therefore, multiple Vissim model runs should be performed. Vissim model runs during the 2050 design year AM/PM peak periods are recommended for each of the projects analyzed during NEPA. The models would be used to optimize and refine the PEL Recommended projects, and complete an Access Justification Report (AJR).

Additionally, further modeling is needed to determine whether the downtown freeway loop can accommodate additional volume that would result from widening the dual-designated portion of l-29/I-35.

### 4.2.2 Safety

A Highway Safety Manual (HSM) analysis of the No-Action and any NEPA build alternatives would be performed. The analysis would provide a more detailed understanding of the safety measures of effectiveness for the AJR.

### 4.3 Environmental Resources/Issues

### 4.3.1 Field Work and Impact Analyses

During the PEL phase, environmental impacts were evaluated based on information generally collected through easily attainable database searches, imagery analyses, and desktop geographic information system (GIS) evaluations. The resulting resource inventory of the study area is presented in the I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.1). Comprehensive field work and detailed impact analyses using an increasingly developed NEPA-
level schematic for an identified preferred alternative would be completed, including, but not limited to, the following:

- Community Impacts (displacements, Environmental Justice populations, public facilities, community cohesion, access, etc.) - Examples include historically disadvantaged and Limited English Proficiency communities along the I-29/I-35 corridor in Kansas City, MO;
- Waters of the U.S., including Wetlands (Preliminary Jurisdictional Determination); National emergent wetlands to be cognizant of are those east of Chouteau Trafficway along the I-35 corridor and Forested Wetlands west of N.W. Waukomis Road along the I-29 corridor.
- Threatened and Endangered (T\&E) Species - T\&E species that may have habitat or be present in the study area are the Monarch Butterfly, Pallid Sturgeon, Gray Bat, Indiana Bat and Northern Long-Eared Bat;
- Vegetation/Habitat - Wildlife habitats within the study area consists of forested areas, the Missouri River and other streams, and bridges that could provide nesting sites for migratory birds and roosting sites for bat species;
- Hazardous Materials - There are a number of hazardous material sites adjacent to the I-29/I-35 corridor south of M-210 (Armour Road) due to the industrial nature of the area;
- Air Quality (Greenhouse Gas) - Clay, Platte and Jackson Counties are all designated as in attainment at this time;

Under the Clean Air Act (CAA), the federal government established the National Ambient Air Quality Standards (NAAQS) to protect public health, safety, and welfare from known or anticipated effects of six criteria pollutants: sulfur dioxide, particulate matter, carbon monoxide, nitrogen dioxide, ozone, and lead. Transportation substantially contributes to four of the six criteria pollutants: ozone, carbon monoxide, particulate matter, and nitrogen dioxide. If an area is determined to not be in attainment with any transportationrelated criteria pollutant, they are required to undergo evaluation of regionally significant projects to ensure the overall plan conforms with an approved emissions budget, also known as demonstrating transportation conformity.

The Clay, Jackson, and Platte counties are designated as in attainment for all transportation-related criteria pollutants at this time; and therefore, conformity requirements of 40 CFR Part 93 do not apply and no further action is required.

However, the 2023 Ozone Season has been very active. The first exceedance of the Ozone National Ambient Air Quality Standard (NAAQS) occurred during Memorial Day weekend, and ten days have already exceeded this health standard as of June 18, 2023. As of June 14, 2023, five of six regional monitors are in violation for 2023, and the Critical Design Value used by EPA to determine Air Quality Standard Attainment is tentatively in violation at one monitor. Coordination with the Mid-America Regional Council will continue when projects transition to the NEPA phase.

- Existing Noise Measurements and Noise Analysis - Sensitive noise receptors are more predominant along the individual I-29 and I-35 corridors where residential and park type land uses are most predominant and will be studied in more detail during NEPA;
- Cultural Resources - The majority of the historic resources are located at the south end of the I-29/I-35 in close proximity to the downtown freeway loop south of the Missouri River;
- Indirect and Cumulative Impacts - Due to the size of the Study Area and the PEL level of study, these impacts will be analyzed during the NEPA phase;


### 4.3.2 Permitting

The need for the following permits would be evaluated during NEPA for a preferred alternative:

- U.S. Army Corps of Engineers (USACE): Section 404 of the Clean Water Act (CWA) (33 USC 1344); and
- Missouri Department of Natural Resources (MDNR): Section 401 of the CWA (33 USC 1344) Water Quality Certification and a Section 402 of the CWA (33 USC 1342) National Pollutant Discharge Elimination System (NPDES) Land Disturbance Stormwater General Permit.


### 4.3.3 Mitigation and Commitments

During NEPA, mitigation strategies to avoid or minimize any adverse impacts would be determined and carried forward to inform the construction process. Mitigation strategies would be incorporated into plans to ensure that implementation occurs through proper execution of final plans and specifications. Provisions will be included in the PS\&E that would trigger Job Special Provision the contractor to make every reasonable effort to minimize construction impacts, including noise through abatement measures, such as work-hour controls and proper maintenance of muffler systems.

### 4.4 Identification of Cooperating and Participating Agencies

Coordination would continue with MoDOT and FHWA on the identification of cooperating and participating agencies. Cooperating agency means any Federal, state, tribal or local agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project. Cooperating agencies may adopt the environmental document of a lead agency when, after an independent review of the document, the cooperating agency concludes that its comments and suggestions have been satisfied ${ }^{3}$.

Invitation letters would be sent by the lead agency to all potential cooperating agencies outlining involvement requirements and a request for acceptance. It is anticipated that USACE would adopt the FHWA NEPA document as its environmental document.

[^32]Participating agencies are Federal or non-Federal agencies that may have an interest in the project, but involvement does not imply support for a proposed project, nor do they have jurisdiction over or special expertise with respect to evaluation of the project ${ }^{4}$. Agency meetings were established to facilitate Federal, state, and local agency coordination during the PEL Study. Eleven agencies were invited, and their participation set the foundation for future agency coordination in NEPA. It is likely that participating agencies would include some of the agency meeting members that participated in the PEL process.

### 5.0 Issues and Analyses to be Continued Through NEPA

### 5.1 Public, Agency, and Stakeholder Coordination

Meetings with the Community Advisory Committee (CAC), agencies, and the public, similar to those held throughout the PEL would continue throughout NEPA. Likewise, it is anticipated that the NEPA process would include public meetings and/or public hearings, as necessary as per the level of environmental analysis for a project. Public meetings and hearings would be held in accordance with MoDOT public involvement practices and NEPA guidelines. Additional opportunities for public involvement would be held as needed and per FHWA and MoDOT request.

### 5.2 Every Day Counts (EDC)

As an FHWA EDC-1 initiative, the PEL process was utilized for the proposed project to shorten project delivery. Results of the PEL Study would be used to inform the NEPA phase, resulting in less duplication of effort and in more informed project-level decisions. Likewise, the FHWA EDC-2 initiative of Implementing Quality Environmental Documents (IQED) was applied in the PEL by developing a specified Purpose and Need that supports the alternatives screening process and preparing technical reports and public presentations that utilized effective visualization and communication of data to the public. Products and presentations developed during the NEPA phase would continue to implement EDC best practices.

### 5.3 NEPA Classification

The study team reviewed the pertinent sections of MoDOT's Engineering Policy Guide and the Programmatic Agreement (PA) between the FHWA, Missouri Division and MoDOT regarding the processing of actions classified as categorical exclusions for Federal-Aid Highway Projects (May 2023). The following section was shared with FHWA in August 2023. Table 1 shows the possible NEPA classifications.

[^33]Table 1: Possible NEPA Classifications

| MoDOT/FHWA Programmatic Agreement | NEPA Classification |
| :--- | :---: |
| Did not exceed the PA thresholds | PCE |
| Exceeded the PA thresholds, but the action <br> qualifies as a CE2 | CE2 |
| Unusual circumstances* exist that may <br> require an EA or EIS | EA or EIS |
| ${ }^{*} 40$ CFR $\$ 1508.423$ CFR $\$ 771117($ a) |  |

*40 CFR § 1508.4, 23 CFR § 771.117(a)
The study team analyzed seven 2024 - 2028 STIP projects and five Priority 1 projects in accordance with Appendix A of the PA. Each of the 30 "c list" project types and criteria were reviewed and assigned using information from the I-29/I-35/U.S. 169 PEL Report and as summarized in Attachment A of this PEL to NEPA Transition Report. After the project type was determined, the twelve projects were then analyzed against the criteria and thresholds in Section IV.A.1.b of the PA.

The STIP and PEL Priority 1 Projects shown in Table 2 are expected to meet the requirements of 23 CFR $771.117(\mathrm{~b})$ and 40 CFR 1508.4 and unusual circumstances that would require the preparation of an EA or EIS are not expected. The PEL Phase 1 projects in Table 2 are recommended to be a CE2 primarily due to the need for an additional mainline lane in each direction and/or to accommodate an additional mainline lane in each direction when an interchange is improved.

If at any time during the environmental review it becomes apparent that these projects are not expected to meet the requirements of a PCE or CE2, or that there is a potential for unusual or significant environmental impacts, MoDOT will immediately notify FHWA.

Table 2: STIP and PEL Priority 1 Project Recommended NEPA Classifications

| Project | STIP/Job <br> Number | Description | "c" list <br> Project <br> Type | PCE/CE2 |  |
| :---: | :---: | :--- | :---: | :---: | :---: |
|  |  |  |  |  |  |
| 1 | KU0017 | Pavement Resurfacing frojects 0.8 mile south of <br> Mexico Avenue to Route 69 | 26 | PCE |  |
| 2 | KU0073 | Pavement and shoulder resurfacing from <br> Pleasant Valley Road to I-29. Includes ramps at <br> Antioch Road, Choteau Trafficway, Winn Road, <br> and Route 59 | 26 | PCE |  |
| 3 | KU0059 | Pavement resurfacing from 0.2 mile north of <br> Parvin Road to Route 210 | 26 | PCE |  |


| Project | STIP/Job Number | Description | "c" list Project Type | PCE/CE2 |
| :---: | :---: | :---: | :---: | :---: |
| 4 | KU0123 | Bridge rehabilitation over I-35, 0.3 mile east of Poe Street and 0.5 mile west of I-435. Project involves bridge L0756 | 28 | PCE |
| 5 | KU0025 | Bridge rehabilitation over I-35, 0.2 mile south of Davidson Road and 0.5 mile west of Route 1. Project involves bridge A1763. | 28 | PCE |
| 6 | KU0061 | Bridge rehabilitation over Parvin Road 0.7 mile north of Route 1 and 1.5 miles south of Route 210. Project involves bridges L0659 and L0660. | 28 | PCE |
| 7 | 413458 | Bridge replacement over Guinotte Avenue 0.4 mile south of Missouri River and 0.7 mile north of Route 24 and over Bedford Avenue 1 mile south of Route 210 and 0.5 mile north of Missouri River. Project involves bridges L0788 and L0789 | 28 | PCE |
| PEL Phase 1 Projects |  |  |  |  |
| 8 | NA | Added mainline capacity of one lane in each direction on I-29 and I-35 corridors | 26 | CE2 |
| 9 | NA | I-35 at Vivion Road (U.S. 69) Interchange | 26 | CE2 |
| 10 | NA | I-35 from west of Antioch Road Interchange to Vivion Road | 26 | CE2 |
| 11 | NA | I-29/I-35 Split | 26 | CE2 |
| 12 | NA | I-29 from north of the I-29 at Davidson Road Interchange to Waukomis Drive including North Oak Interchange and U.S. 169 Interchange | 26 | CE2 |

Note: NA - Not Assigned Yet
${ }^{1}$ Assumed to be stand-alone projects; however, these projects could be bundled and implemented in phases as funding is available. Logical termini and independent utility will be further evaluated to confirm a project can be constructed absent of the construction of other projects in the Priority 1 area.

Projects 4, 5, and 6 (STIP projects KU0123, KU0025, and KU0061) shown in Table 2 are listed as bridge rehabilitation projects in the 2024-2028 STIP. The MoDOT Kansas City District has indicated that the 2025-2029 STIP will describe these projects as bridge replacements. Project 7 (STIP Job Number 4I3458) obtained environmental clearance on January 9, 2020.

The recommended NEPA classifications may be revisited once preliminary engineering and more detailed traffic and safety operations analysis has been performed.

### 6.0 FHWA I-29, I-35, U.S. 169 PEL Recognition

FHWA provided a written letter, acknowledging the successful completion of the I-29, I-35, U.S. 169 PEL Study in accordance with the FHWA PEL guidance and planning regulations; concurrence with the identified I-29, I-35, U.S. 169 PEL Recommended Scenarios and projects; and concurrence that the planning products completed as part of the I-29, I-35, U.S. 169 PEL

Study shall be used to inform NEPA. The FHWA approval letter is provided in Attachment B FHWA I-29, I-35, US 169 PEL Approval letter.


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### 1.0 NEPA Classification Documentation

This Appendix provides additional detail on each of the seven 2024-2028 STIP and five Priority 1 projects identified in the I-29, l-35, US 169 PEL.

## STIP Projects

The 2024-2028 STIP projects are shown in Figure 1.
Figure 1: STIP Projects


Source: Study Team.

## STIP Pavement Resurfacing Projects

- Project 1: Pavement Resurfacing from 0.8 mile south of Mexico Avenue to Route 69
- Job Number: KU0017
- County: Platte
- Project Location/Description:
- Figure 1
- Existing Facility: This route includes part of the mainline of I-29 and Route 69.
- Project Description (Project Type): Pavement resurfacing (26)
- Project 2: Pavement and shoulder resurfacing from Pleasant Valley Road to I-29. Includes ramps at Antioch Road, Choteau Trafficway, Winn Road, and Route 59
- Job Number: KU0073
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: This route includes the mainline of I-35 and ramps at Antioch Road, Choteau Trafficway, Winn Road, and Route 59.
- Project Description (Project Type): Pavement and shoulder resurfacing (26)
- Project 3: Pavement resurfacing from 0.2 mile north of Parvin Road to Route 210
- Job Number: KU0059
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: This route includes the mainline of I-29/I-35.
- Project Description (Project Type): Pavement resurfacing (26)


## STIP Bridge Rehabilitation Projects

- Project 4: Bridge rehabilitation over I-35, 0.3 mile east of Poe Street and 0.5 mile west of I-435. Project involves bridge L0756
- Job Number: KU0123
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: The bridge (L0756) is located over I-35, 0.3 mile east of Poe Street and 0.5 mile west of I-435.
- Project Description (Project Type): Bridge rehabilitation (28)
- Project 5: Bridge rehabilitation over I-35, 0.2 mile south of Davidson Road and 0.5 mile west of Route 1. Project involves bridge A1763
- Job Number: KU0025
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: The bridge (A1763) is located over I-35, 0.2 mile south of Davidson Road and 0.5 mile west of Route 1.
- Project Description (Project Type): Bridge rehabilitation (28)
- Project 6: Bridge rehabilitation over Parvin Road 0.7 mile north of Route 1 and 1.5 miles south of Route 210. Project involves bridges L0659 and L0660
- Job Number: KU0061
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: The two bridges (L0659 and L0660) are located over Parvin Road 0.7 mile north of Route 1 and 1.5 miles south of Route 210.
- Project Description (Project Type): Bridge rehabilitation (28)
- Project 7: Bridge replacement over Guinotte Avenue 0.4 mile south of Missouri River and 0.7 mile north of Route 24 and over Bedford Avenue 1 mile south of Route 210 and 0.5 mile north of Missouri River. Project involves bridges L0788 and L0789
- Job Number: 413458
- County: Clay
- Project Location/Description:
- Figure 1
- Existing Facility: The two bridges (L0788 and L0789) are located over Guinotte Avenue 0.4 mile south of Missouri River and 0.7 mile north of Route 24 and over Bedford Avenue 1 mile south of Route 210 and 0.5 mile north of Missouri River.
- Project Description (Project Type): Bridge replacement (28)


## PEL Priority 1 Projects

Four priority areas were determined as shown in Figure 2.
Figure 2: I-29, I-35, US 169 PEL Priority Areas


Source: Study Team.
The PEL Study analyzed seven scenarios (Scenario 1 was the No Action) that were carried through a rigorous three-level analysis focusing on traffic, safety, environmental, multimodal, engineering and cost of the proposed improvements. Of the seven scenarios, three (Scenarios 5,6 , and 7) were the Recommended Scenarios and included two primary improvements:

- Added through lane capacity in each direction
- Interchange improvements


## Scenario 5: Highway Mainline Capacity + Focus Interchanges Improvements Lite + Complementary Alternatives Scenario

Scenario 5 represents the Highway Mainline Capacity plus lite interchange improvements and Complementary Alternatives. Under a lite interchange improvements scenario, a total interchange rebuild would not occur at the locations indicated, but MoDOT would focus on the most critical needs of the interchanges through practical design.

## Scenario 6: Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Complementary Alternatives Scenario

Scenario 6 represents the Highway Mainline Capacity plus interchange improvements Full Build plus Complementary Alternatives. Interchange improvements Full Build is a total rebuild of the focus interchanges. This is essentially a combination of Scenarios 2 and 4.

## Scenario 7: Highway Mainline Capacity + Focus Interchanges Improvement Full Build + Consolidated/Eliminated Access + Complementary Alternatives

Scenario 7 is the same as Scenario 6 except for a few key ramp removals/consolidations. In Scenario 7, closely spaced ramps along the mainline are removed to improve operations. Examples include the N. Brighton Avenue ramps on I-35, the U.S. 69 (NW Vivion Rd) ramps on $\mathrm{I}-29$, and the interior-facing ramps at NE Davidson Rd., Route 1 (NE Antioch Rd.), and NE Parvin Rd. at the l-29/l-35 split. Additional access to local roads will be provided via new ramps and connections.

From this analysis, five Priority 1 projects were developed and as shown in Figure 3 and further described below.

Figure 3: Priority 1 Projects


[^34]- Project 8: Mainline widening of I-29 and I-35
- Job Number: N/A
- Counties: Clay and Platte
- Project Location/Description:
- Figure 3 and PEL Report Attachment E (Interchange Concepts) pages E15 - E-42
- Existing Facility: The existing facility includes the I-29, I-35, and I-29/I-35. The $\mathrm{I}-29$ and I-35 corridors are primarily two lanes in each direction and separated by a grass median. I-29/I-35 is primarily three lanes in each direction separated by a concrete barrier median.
- Project Description (Project Type): Add an additional mainline through lane in each direction on I-29 from U.S. 169 to U.S. 69/Vivian Road Interchange on I-35. (26)
- Project 9: I-35 at Vivion Road (U.S. 69) Interchange
- Job Number: N/A
- County: Clay
- Project Location/Description:
- Figure 3 and PEL Report Attachment E (Interchange Concepts) pages E43 - E-56
- Existing Facility: The existing facility includes the interchange of I-35 and U.S. 69 (NE Vivion Rd). In the area of the I-35 and U.S. 69 (NE Vivion Rd.) interchange is generally three lanes in each direction on I-35. U.S. 69 (NE Vivion Rd.) to the west of I-35 has two lanes in each direction separated by a grass median until the U.S. 69 (NE Vivion Rd.) and N Hardesty Ave intersection. The U.S. 69 (NE Vivion Rd.) overpass at the interchange is 2 lanes both westbound and eastbound.

The southbound (SB) Vivion Road (U.S. 69) to SB I-35 ramp bridge (L0656) was constructed in 1954 and is listed as a high priority bridge of concern. Vivion Road (U.S. 69) bridges (L0757 and I-29/ I-35/ U.S. 169 PEL to NEPA Transition Report 5 L0758) were both built in 1958.

- Project Description (Project Type): Depending on the scenario that is selected, the proposed facility could include a full-rebuild, partial rebuild or modified access to the improved interchange(s). Several existing conditions could be improved upon with future improvements at the I-35 at U.S. 69 (Northeast (NE) Vivion Road) Interchange. SB I-35 drops from three lanes (two through lanes plus auxiliary) to two lanes at the SB I-35 to Vivion Road loop ramp, which has a tight radius and a speed differential from 65 miles per hour (MPH) on mainline to 15 MPH on the loop ramp. The SB Vivion Road (U.S. 69) to SB I-35 movement is a left entrance ramp, whereas a right entrance ramp would meet driver expectancy and current interstate standards. There are driveways along the northbound (NB) I-35 to Vivion Road ramp, and drivers cannot go from NB I-35 to westbound (WB)/SB Vivion Road. A project at this location would provide an opportunity to improve the issues stated and accommodate mainline widening on I-35 through the interchange.
- Project 10: I-35 from west of Antioch Road Interchange to Vivion Road
- Job Number: N/A
- County: Clay
- Project Location/Description:
- Figure 3 and PEL Report Attachment E (Interchange Concepts) pages E57 - E-60
- Existing Facility: The existing facility includes mainline I-35 from west of the Antioch Road interchange to the NE side of the Antioch Road interchange. The $\mathrm{I}-35$ at Chouteau Trafficway interchange is located along this segment. Mainline I-35 is primarily two lanes in each direction separated by a grass median.

All bridges on this section of I-35 are approximately 70 years old and are near the end of their lifespan (L0653, L0654, L0641, L0642, and L0655). The bridge on SB I-35 over Antioch Road (L0654) and the bridge on NB l-35 over Chouteau Trafficway (L0642) are listed as high priority bridges of concern.

- Project Description (Project Type): Depending on the scenario that is selected, the proposed facility could include a full-rebuild, partial rebuild or modified access to the improved interchange(s). (26)
- Project 11: I-29/I-35 Split
- Job Number: N/A
- County: Clay
- Project Location/Description:
- Figure 3 and PEL Report Attachment E (Interchange Concepts) pages E-1-E-14
- Existing Facility: The existing facility includes the convergence I-29 and I-35. In the area of the I-29/I-35 interchange, I-35 and I-29 are generally 2 lanes in each direction separated by a grass median. South of the interchange on the segment of the corridor that is I-29/I-35, there are generally 3 lanes in each direction separated by a concrete barrier median.
- Project Description (Project Type): Depending on the scenario that is selected, the proposed facility could include a full-rebuild, partial rebuild or modified access to the improved interchange(s).

The SB I-29 to NB I-35 flyover bridge (A1763) and the I-29/I-35 bridges over Parvin Road (L0659 and L0660) are scheduled for replacement in 2027 in the STIP. All three of these bridges are listed as high priority bridges of concern. Bridges at this interchange were built in 1954 and 1967.

In this area, SB I-29 has a one-lane section, with existing sub-standard acceleration and deceleration lane lengths. Tight radii on the Parvin Road loop ramps cause traffic and safety concerns. A project at this location would provide an opportunity to address the issues stated and accommodate mainline widening on I-29 and I-35 through the interchange. (26)

- Project 12: I-29 from north of the I-29 at Davidson Road Interchange to Waukomis Drive including North Oak Interchange and U.S. 169 Interchange
- Job Number: N/A
- County: Clay
- Project Location/Description:
- Figure 3 and PEL Report Attachment E (Interchange Concepts) pages E-15-E-42
- Existing Facility: The existing facility includes the I-29 at N Oak Trafficway interchange and the I-29 at U.S. 169 interchange. I-29 is generally 2 lanes in each direct separated by a grass median in this corridor.

There are several bridges in this area that are reaching the end of their useful life. The bridges at I-29 and North Oak Trafficway (L0701 and L0702) and Vivion Road (L0720 and L0721) Interchanges were built in 1957, along with two bridges of concern (L0719 and A1613) at the I29 at U.S. 169 Interchange. There are many closely spaced ramps and missing interchange movements in this section.

- Project Description (Project Type): Depending on the scenario that is selected, the proposed facility could include a full-rebuild, partial rebuild or modified access to the improved interchange(s).

As these bridges get older and require more maintenance, improvements in this section provide an opportunity to replace these bridges and widen I-29 to six lanes. Improvements to the interchanges would provide more distance between ramps and add missing interchange movements. (26)


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Notes
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I-29, I-35, U.S. 169 Attachment B
I-29, I-35, U.S. 169 PEL FHWA Approval Letter
September 2023

Federal Highway Administration

## Missouri Division <br> 9/27/2023

3220 W. Edgewood, Suite H Jefferson City, Missouri 65109
(573) 636-7104

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In Reply Refer To: HAD-MO

Mr. Ed Hassinger, P.E.
Chief Engineer
Missouri Department of Transportation
Jefferson City, MO 65102
Subject: I-29, I-35, U.S. 169 Planning and Environment Linkages Study
Dear Ed Hassinger:
This letter is to acknowledge the completion of the I-29, I-35, U.S. 169 Planning Study and Planning and Environment Linkages (PEL) Questionnaire undertaken by The Missouri Department of Transportation (MoDOT), in partnership with the City of Kansas City, MidAmerica Regional Council, and the Federal Highway Administration (FHWA). This planning study was undertaken in a manner consistent with planning guidance (23 CFR 450).

The strengths of this planning study include a comprehensive investigation and identification of the transportation problems in the study area, as well as the strategies and reasonable alternatives for improvements. In addition, the public involvement and agency coordination process undertaken for the study was valuable, though additional public involvement and agency coordination will likely be necessary as projects proceed through the National Environmental Policy Act (NEPA) process.

The completed PEL Questionnaire provides an effective summary of the work completed and the information that will be needed for a project to enter the NEPA process. At that time, it may be necessary, depending on the circumstances, for FHWA to meet with MoDOT to determine the scope and level of NEPA documentation needed.

We appreciated the opportunity to comment on and actively participate in the development of this planning study and report. If you have any questions, please feel free to contact Taylor Peters, Environmental Specialist, at (573) 638-2621 or by email at taylor.peters@dot.gov.

Lauren Paulwell
Acting Program Team Leader
FHWA - Missouri Division

Cc: $\quad$ Melissa Scheperle, MoDOT Kyle Grayson, MoDOT
Taylor Peters, FHWA
Kevin Irving, FHWA


# I-29, I-35, U.S. 169 Appendix E PEL Questionnaire 

In Partnership with:

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## Attachments

Attachment A - I-29, I-35, U.S. 169 PEL Framework and Methodology Memo Attachment B - I-29, I-35, U.S. 169 PEL Study Team

## Acronyms

| CAC | Community Advisory Committee |
| :--- | :--- |
| Clay EDC | Clay County Economic Development Council |
| FHWA | Federal Highway Administration |
| I | Interstate |
| LPA | Local Public Agency |
| LWCF | Land and Water Conservation Fund Act of 1965 |
| MARC | Mid-America Regional Council |
| MoDOT | Missouri Department of Transportation |
| NEPA | National Environmental Policy Act |
| OD | Origin-Destination |
| OOIDA | Owner Operator Independent Drivers Association |
| PEL | Planning and Environmental Linkages |
| PIP | I-29, I-35, U.S. 169 PEL Public Involvement Plan |
| ROW | Right-of-Way |
| STIP | Statewide Transportation Improvement Program |
| U.S. | U.S. Highway |

## FHWA PEL Questionnaire

The Federal Highway Administration (FHWA) developed a questionnaire to serve as a guide for Planning and Environmental Linkages (PEL) Studies. This questionnaire is intended to act as a summary of the planning process and help facilitate the transition from planning to National Environmental Policy Act (NEPA) studies. Listed below are responses to the FHWA PEL Questionnaire for the Interstate (I)-29, I-35, U.S. Highway (U.S) 169 PEL Study. The responses and information were developed throughout the planning process and summarizes the approach used for the I-29, I-35, U.S. 169 PEL Study. The answers are succinct, with identification of where more detailed can be found.

### 1.0 Background

## a. Who is the sponsor of the PEL Study? (State DOT, Local Agency, Other)

The City of Kansas City, Missouri secured a Build Grant in 2020 for a PEL Study and transferred the funds and sponsorship to the Missouri Department of Transportation (MoDOT).
b. What is the name of the PEL Study document and other identifying project information (e.g. sub-account or State Transportation Improvement Program (STIP) numbers, long-range plan or transportation improvement program years)?

Identifying project information associated with the I-29, I-35, U.S. 169 PEL Study is as follows:

- PEL Study Name: I-29, I-35, U.S. 169 PEL Study
- MoDOT Job Number: J4I3087
- MoDOT High Priority Unfunded Needs List - Listed as a Tier 2 Unfunded Need.
- STIP: State Transportation Improvement Program (STIP) bridge and resurfacing projects within the project limits were identified in the PEL. More information regarding STIP projects and other identified projects can be found in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.4).
- Mid-America Regional Council (MARC) Long-Range Transportation Plan - No projects within the PEL limits are currently identified in the MARC LRTP fiscally constrained list.
c. Who was included on the Study Team (Name and title of agency representatives, consultants, etc.)?

The primary lead for the study was MoDOT, and its study partners were the City of Kansas City, Missouri and MARC. The Consultant Team consisted of HNTB Corporation as the prime
consultant with support from TREKK Design Group and Parson \& Associates. A listing of key staff is presented in Attachment B.
d. Provide a description of the existing transportation facility within the corridor, including project limits, modes, functional classification, number of lanes, shoulder width, access control and type of surrounding environment (urban vs. rural, residential vs. commercial, etc.).

The PEL study area and project limits are depicted in Figure 1 and extend through portions of Clay, Jackson and Platte Counties. As shown in blue, the project limits extend along sections of I-29, I-35, and U.S. 169. The project limits include:

- I-29, at Route 45 to the I-29/I-35 split, continuing south across the Missouri River to the northeast corner of the downtown freeway loop.
- I-35, at I-435 to the I-29/I-35 split.
- U.S. 169 at NW 68 ${ }^{\text {th }}$ Street to I-29.

Figure 1: PEL Study Area


Source: Study Team.

The study area encompasses a broad area that includes traffic, safety, community resources, natural resources, and other potential environmental constraints. The study area serves the following modes: car, truck, bike/pedestrian, and bus transit.

Many different roadway classifications can be found in the study area, including interstates, U.S. highways, principal arterials, minor arterials, major collectors, and minor collectors. The project limits consist of interstates and U.S. highway with principle arterial cross streets at the service interchanges. The interstates are both two and three lanes in each direction, while the U.S. highway is two lanes in each direction. Shoulder widths along the corridor range from 4 to 12 feet.

Access to I-29, I-35, and U.S. 169 is primarily controlled via entrance and exit ramps. The study area predominantly consists of residential, commercial, industrial, and public spaces. Other land uses in the study area include parking, public right-of-way (ROW) for streets and railroad and vacant land. A comprehensive evaluation of existing conditions in the entire study area can be found in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.0).

## e. Provide a brief chronology of the planning activities (PEL Study) including the year(s) the studies were completed.

A total of 20 studies or planning activities were considered to influence the PEL study area and the improvement strategies. The most relevant studies performed along the project limits are:

- Northland-Downtown Major Investment Study (2002)
- I-29/I-35 Paseo Bridge Final Environmental Impact Statement (2006)

The PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 2.0) lists all I-29, I-35, U.S. 169 PEL previous related project names, sponsors, completion dates , and additional information.

## f. Are there recent, current or near future planning studies or projects in the vicinity? What is the relationship of this project to those studies/projects?

Recent, current, and near future projects were analyzed using the Missouri 2023-2027 STIP and the 2023-2024 Local Public Agency (LPA) project lists provided by MoDOT. Roadway, bridge and intersection improvement projects in the study area were catalogued and mapped in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.4.4). Refer to this report for further information about the projects. These projects will further improve pavement conditions, bridges, and roadways in and leading into the study area.

### 2.0 Methodology Used

## a. What was the scope of the PEL Study and the reason for completing it?

The City of Kansas City, Missouri secured a Build Grant in 2020 for a PEL Study in 2021 and transferred the funds and sponsorship to MoDOT). The planning grant stated:
"This study will document the existing conditions, impact to freight, and potential solutions to serve the movement of goods and people. It is anticipated that improvements will be identified, with the input from key public and private partners in the area, to support the long-term economic health of the region. Further, it is anticipated that the ultimate solutions will be developed in a manner that can be phased
 in for construction in cost-effective manners." I-29/I-35 Corridor Study Planning Application, May 2020.

The I-29, I-35, U.S. 169 PEL Study is a planning level effort with the intent of establishing a link with past planning efforts and providing an updated study for the subsequent NEPA phase. This was accomplished through establishing the Purpose and Need statement and study goals for improvements; initiating public participation and agency coordination; and engaging in an alternatives development and evaluation process. The decision-making process and issues identified during the PEL Study are integral to defining the parameters and facilitating the transition from the PEL phase to the NEPA phase of project development. The PEL Study scope includes:

- Analyzing existing baseline conditions;
- Determining/defining the Purpose and Need and study goals;
- Describing the affected environment;
- Developing and evaluating alternatives;
- Engaging the public and agencies in the planning process; and
- Recommending scenario(s) for further study in NEPA.

The PEL process encourages:

- Early communication, coordination, and collaboration;
- Timely input from stakeholders, including other local, state and federal agencies, and the public;
- Better informed and strategic transportation decisions; and
- Efficient and cost-effective solutions that addresses climate change/resiliency, environmental justice (including Justice 40 and the US Department of Transportation's Equity Action Plan) and avoids adverse environmental impacts.

Details about the I-29, I-35, U.S. 169 PEL Study scope and process are outlined in the I-29, I35, U.S. 169 PEL Framework and Methodology Memo in Attachment A.

## b. Did you use NEPA-like language? Why or why not?

Yes, NEPA-like language was used throughout the PEL Study to further establish the link between NEPA and planning. These terms are consistent with those used in NEPA. The planning level process included developing planning products that could be readily incorporated and used to inform the NEPA phase.
c. What were the actual terms used and how did you define them? Provide examples or list.

Example NEPA terms used in the PEL include:

- Study Area - The study area is the area the Study Team analyzed traffic, safety and community impacts. This is further defined in Section 1.d and shown in Figure 1, above.
- Project Limits - The project limits encompass the area where capital improvements were being studied. This is further defined in Section 1.d and shown in Figure 1, above.
- Affected Environment - The existing social, economic, and environmental conditions for the I-29, I-35, U.S. 169 PEL Study Area. Inventory and evaluation of the affected environment provides the baseline information to be used in further project development and is documented in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.0).
- Environmental Justice - The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Executive Order (EO) 12898 issued by President Clinton mandates that Federal agencies achieve environmental justice. Environmental Justice was evaluated during the Level 2 and Level 3 alternative screenings. Environmental Justice was analyzed in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.1.3).
- Minority Population - Any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons who will be similarly affected by a proposed FHWA program, policy and/or activity. A minority is a person who is Black, Hispanic, Asian American/Pacific Islander,
or American Indian/Alaskan Native. Minority populations were analyzed in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 4.1.3).
- Low-income Population - Any readily identifiable groups of low-income persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers) who will be similarly affected by a proposed FHWA program, policy, and/or activity. Low-income populations were analyzed in the Baseline Condition Report.
- Baseline Conditions - The existing traffic, safety, engineering, multimodal, and environmental conditions for the I-29, I-35, U.S. 169 PEL Study Area. Inventory and evaluation of the existing study area provides the baseline information to be used in further project development and is documented in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 1.1).
- Purpose and Need - The Purpose and Need was developed through the review of data and analysis from previous studies, assessing current and future conditions, and engaging the public, agencies, and stakeholders to assist in defining the key needs and to address future mobility needs within the study area. This is detailed more in the PEL Report Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions (Section 6.0).
- Alternatives Screening Methodology - The Alternative Screening Methodology (ASM) provides a decision-making framework to determine how well each of the developed alternatives meets the I-29, I-35, U.S. 169 PEL Purpose and Need and study goals. The ASM can be found in the PEL Report Appendix C, I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.
- Universe of Alternatives - The Universe of Alternatives was developed based on the needs of the study area; public, stakeholder, and agency input; and relevant studies. The PEL Study alternatives, as developed throughout the screening process, are further defined in Section 6 and additional details can be found in the PEL Report Attachment A, Alternatives Screening Methodology, of Appendix C, I-29, I-35, U.S 169 PEL Alternatives Analysis and Development Report
- Reasonable Alternatives - A reasonable range of alternatives that are technically and economically feasible and meet the purpose and need for the proposed action.
- Alternatives Development and Analysis Report - The Alternatives Development and Analysis Report summarizes the alternatives developed to meet the PEL's Purpose and Need, study goals, and the analysis completed. The report can be found in the PEL Report Appendix C, I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.
- Regulatory Terms - Various other NEPA regulatory terms were used, such as Section 404 of the Clean Water Act, 23 CFR Part 774 - Parks, Recreation Areas, Wildlife and

Waterfowl Refuges, and Historic Sites (Section 4(f)), and Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965.

## d. How do you see these terms being used in NEPA documents?

The methodologies used to arrive at decisions and subsequent analysis and reports, such as the Purpose and Need and Alternatives Development and Analysis Report, used NEPA-like language. The terms are consistent with NEPA documents; therefore, the transition to the NEPA phase can be seamless and consistent.
e. What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by state DOT and the local agency, with buy-in from FHWA, the USACE, and USFWS and other resource/regulatory agencies.

Meetings were held at major milestones with agencies, stakeholders, and the public throughout the PEL Study. Figure 2 details the key steps and coordination points in the decision-making process.

Figure 2: Schedule of Planned Public Involvement Activities Throughout Study Phases


The key decision-makers and stakeholders, and a list of meetings that were conducted are listed in the PEL Report Appendix A, l-29, I-35, U.S. 169 PEL Public Involvement Plan and Documentation.

## f. How should the PEL information be presented in NEPA?

PEL study products may be incorporated as appendices, referenced in text, and included in the project record of the NEPA analysis, as warranted. The information produced and decisions made during the PEL study will serve as a starting point for more detailed analyses during d NEPA.

### 3.0 Agency Coordination

a. Provide a synopsis of coordination with Federal, tribal, state, and local environmental, regulatory and resource agencies. Describe their level of participation and how you coordinated with them.

The PEL Report Appendix A, I-29, I-35, U.S. 169 PEL Public Involvement Plan and
Documentation, includes the Public Involvement Plan (PIP) prepared prior to the initiation of the I-29, I-35, U.S. 169 PEL Study. The PIP outlines various avenues for agency involvement and the dissemination of study-related information.

Early in the planning process, the Study Team established the Community Advisory Committee (CAC) to serve as the primary means of stakeholder coordination. Four CAC meetings were held at major study milestones. PEL analyses and documents were presented to the CAC, and comments were solicited. The Study Team responded to CAC comments, and CAC input was considered throughout the PEL process. Agency coordination was initiated at study inception and continued throughout the PEL process. More detailed information regarding agency coordination and the CAC can be found in the PEL Report Appendix A, I-29, I-35, U.S. 169 PEL Public Involvement Plan and Documentation.
b. What transportation agencies (e.g. for adjacent jurisdictions) did you coordinate with or were involved during the PEL Study?

The following agencies, community, and business organizations were represented on the CAC. Transportation agencies and civic leaders were invited to participate in meetings held throughout the I-29, I-35, U.S. 169 PEL Study. Participants represented the following organizations:

- Bike Walk KC
- Development Disability Research Board (DRBCC)
- City of Kansas City, Missouri
- City of North Kansas City, Missouri
- City of Riverside, Missouri
- City of Liberty, Missouri
- City of Gladstone, Missouri
- Clay County, Missouri
- Clay County Economic Development Council (Clay EDC)
- FHWA
- Ford Motor Company
- Hunt Midwest, Real Estate Development Company
- Kansas City Smart Port
- Missouri Highway Patrol
- MARC
- Mattie Rhodes Community Center
- MoDOT
- Northland Chamber
- Northland Chamber Planning and Development Committee
- Northland Neighborhoods Inc.
- North Kansas City Schools
- Kansas City Area Transportation Authority (KCATA)
- North Kansas City Business Council
- Owner Operator Independent Drivers Association (OOIDA)
- Platte County, Missouri
- The Whole Person


## c. What steps will need to be taken with each agency during NEPA scoping?

It is anticipated that agencies would continue to be engaged during the NEPA process in accordance with the jurisdiction of each agency. Agencies will be notified of the PEL study's completion and the final I-29, I-35, U.S. 169 PEL Report will be available on the MoDOT website. The agency contacts that who were involved with the I-29, I-35, U.S. 169 PEL Study would be maintained and updated once NEPA is initiated. Resource Agency, Project Partner, CAC, and public community meetings would continue during NEPA. Cooperating and participating agencies would be identified by MoDOT and FHWA during the NEPA phase, which is further described in the PEL Report Appendix D, I-29, I-35, U.S. 169 PEL to NEPA Transition Report.

### 4.0 Public Coordination

## a. Provide a synopsis of your coordination efforts with the public and stakeholders.

The I-29, I-35, U.S. 169 PEL Study Team identified and executed opportunities for public and stakeholder engagement. Several stakeholder engagement tools were utilized including establishing a CAC, stakeholder interviews, and presentations to community groups. Public involvement strategies included public meetings, media releases, email communications, social media posts by MoDOT, public surveys, and virtual online meetings. Below is a summary of meetings for the CAC, resource agencies, and the public.

Public Meetings:

- Two public meetings offered in person.
- Two virtual meetings (available for two weeks).
- Two public surveys were available to provide participants with an additional opportunity to provide comment.
- Presentations to community groups including the Northland Chamber, Clay County EDC, Platte County EDC, Northland Problem Solvers, and MARC's Total Transportation Policy and Highway committees.

All public outreach was advertised in a manner consistent with NEPA public meetings and MoDOT public notification policy. Additionally, information was provided to the CAC to help promote the meeting to its members and constituents. Summaries of both public meetings, public surveys, and comments received,, including responses,, are documented in the PEL Report Appendix A, l-29, I-35, U.S. 169 PEL Public Involvement Plan and Documentation Report.

### 5.0 Purpose and Need for the I-29, I-35, U.S. 169 PEL Study

a. What was the scope of the I-29, I-35, U.S. 169 PEL Study and the reason for completing it?

The scope and reason for completing the I-29, I-35, U.S. 169 PEL Study is discussed in

## Section 2.a.

b. Provide the Purpose and Need statement, or the corridor vision and transportation goals and objectives to realize that vision.

The needs of the project limits were identified as:

- Structural and functional roadway and bridge deficiencies;
- Roadway safety issues;
- Traffic congestion and access issues, including heavy truck traffic;
- Growth in the Northland; and
- Lack of transit and other multimodal alternatives.

The purpose of the project is to:

- Address structural and functional roadway deficiencies, including pavement and bridge conditions;
- Improve roadway safety;
- Improve roadway capacity, mobility and access to meet traffic and freight movement demands to meet future growth in the northland; and
- Provide transit and multimodal alternatives

In addition to the Purpose and Need, study goals were established to balance transportation and environmental outcomes of the PEL. Input sought from the CAC, resource agencies and the public was incorporated to develop study goals and guiding principles. The study goals were used in the evaluation of alternatives. Guiding principles that will influence the overall project were also evaluated. The Purpose and Need, guiding principles, and study goals of the project can be found in the PEL Report, Appendix B, I-29, I-35, U.S. 169 PEL Baseline Conditions Report (Section 6.0).
c. What steps will need to be taken during the NEPA process to make this a project-level Purpose and Need statement?

The Purpose and Need statement was developed in accordance with Appendix A, 23 CFR 450 - Linking the Transportation Planning and NEPA Processes (23 USC 139), which details how information, analyses, and products from transportation planning can be incorporated seamlessly into the NEPA process at the project level. MoDOT will coordinate with FHWA to determine if refinement of the purpose and need is needed at the project-level during NEPA.

### 6.0 Range of Alternatives

Planning teams need to be cautious during the alternative screening process; alternative screening should focus on Purpose and Need/corridor vision, fatal flaw analysis, and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alternatives that have fatal flaws or do not meet the Purpose and Need/corridor vision cannot be considered viable alternatives, even if they reduce impacts to a particular resource. Detail the range of alternatives considered, screening criteria and screening process, including:
a. What types of alternatives were looked at? (Provide a one or two sentence summary and reference document)

The comprehensive list and descriptions of possible alternatives to the transportation needs is described in the PEL Report Appendix C, I-29, I-35, U.S 169 PEL Alternatives Analysis and Development Report. Alternatives that did not satisfy the criteria were eliminated from consideration, while successful alternatives were refined and moved to the next level of screening.
b. How did you select the screening criteria and screening process?

The Alternative Screening Methodology established the screening criteria and screening process. The screening criteria were based on the Purpose and Need and study goals. The screening process is shown in Figure 3 and can be found in the PEL Report Attachment A, Alternatives Screening Methodology, of Appendix C, I-29, I-35, U.S 169 PEL Alternatives Development and Analysis Report. Alternatives screened out in Levels 1, 2, and 3 were determined unreasonable; and those passing each level of screening were considered
reasonable ${ }^{1}$. Level 1 was a fatal flaw analysis. Levels 2 and 3 further analyzed the reasonable alternatives resulting from the Level 1 screening to a greater level of detail. Guidance from $2 \underline{3}$ CFR 450 Appendix A, specifically Question 11, was followed during the screening process to determine if alternatives were unreasonable (did not meet the purpose and need) and/or infeasible in accordance with 23 CFR 450.318(a)(e). Additionally, the process cited in $\underline{23 \text { CFR }}$ 450.318(b) was followed and included public and agency participation, review and documentation. This PEL Study is compliant with 23 U.S.C. 168, which grants the authority for the direct incorporation of planning products, such as the I-29, I-35, U.S 169 PEL Alternatives Development and Analysis Report, in the environmental review process by reference or incorporation directly.

[^35]Figure 3: Alternative Screening Process

## 1-29, I-35 AND US 169 PEL APPROACH



Source: Study Team.
c. For alternative(s) that were screened out, briefly summarize the reasons for eliminating the alternative(s). (During the initial screenings, this generally will focus on fatal flaws)

## Level 1

The following alternatives from the Universe of Alternatives were eliminated from further consideration either because they did not meet the Purpose and Need or they were deemed unreasonable. Four highway-build alternatives, three multi-modal alternatives, and one congestion management alternative were eliminated from further study. More detailed information regarding the results of the Level 1 Screening analysis is included in the PEL Report Appendix C, I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.

## Highway Build

- Elevated Lanes
- Bypass Route
- New Freeways
- New Arterial Street


## Multimodal

- Heavy Rail
- Commuter Rail
- High Speed Rail


## Congestion Management

- Managed Lanes


## Level 2

Although the No-Action Alternative does not meet the Purpose and Need and Study Goals, the No-Action Alternative was carried through the analysis for comparison. The following alternatives were screened out from further consideration due to their negative scores in the Level 2 qualitative screening.

## Multimodal

- Arterial Bus Lanes


## Congestion Management

- Hard Shoulder Running

More detailed information regarding the results of the Level 2 Screening analysis is included in the PEL Report Appendix C, I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.

## Level 3

After Level 2, seven Scenarios, including the No-Action Alternative, were evaluated in Level 3. Scenarios 1, 2, 3, and 4 were eliminated from further evaluation and will not be advanced to NEPA as a PEL Recommended Scenario. Further details regarding the Level 3 Screening analysis can be found in PEL Report Appendix C, I-29, I-35, U.S. 169 PEL Alternatives Development and Analysis Report.
d. Which alternatives should be brought forward into NEPA and why?

Based on the results of the Level 3 Screening Analysis, the Study Team recommends that Scenarios 5, 6, and 7 move forward from the PEL to the NEPA phase. Table 1 outlines the three Recommended Scenarios.

Table 1: PEL Recommended Scenarios

| Scenario 5 | Scenario 6 | Scenario 7 |
| :--- | :--- | :--- |
|  |  | Highway Mainline |
| Highway Mainline | Highway Mainline | Capacity + |
| Capacity + | Capacity + | Focus Interchanges |
| Focus Interchanges | Focus Interchanges | Improvement |
| Improvement Lite + | Improvent | Full Build + |
| Complementary | Complementary | Consolidated/ |
| Alternatives | Alternatives | Climinated Access + |
|  | Complementary |  |
| Alternatives |  |  |
| Specific corridor recommendations will be identified in the NEPA phase |  |  |

Source: Study Team.
The three Recommended Scenarios all provide a high level of traffic performance while addressing safety concerns and infrastructure needs and provide the greatest opportunity for multi-modal solutions. Although the three Recommended Scenarios have more environmental impacts in this early PEL phase than Scenarios 1 through 4, it is anticipated that many environmental impacts could be avoided, substantially reduced, and/or mitigated in the NEPA phase.

## e. Did the public, stakeholders, and agencies have an opportunity to comment during this process?

As described in Sections 2.e, 3.a, 3.b and 4.a, the I--29, I-35, U.S. 169 PEL Study provided substantial opportunity for comment and outreach, allowing for the public - both in-person and virtually online, stakeholders, and agencies to be engaged throughout the alternatives screening process. At the conclusion of the CAC and agency presentations, participants were sent a survey to provide comment on the preliminary PEL recommendations for future study under NEPA. A summary of the public meetings is presented in the PEL Report Appendix A, I-29, I35, U.S. 169 Public Involvement Plan and Documentation Report. A summary of the CAC meeting minutes, and other coordination is summarized in Section 2.e and shown in PEL Report Appendix A, I-29, I-35, U.S. 169 Public Involvement Plan and Documentation Report.

## f. Were there unresolved issues with the public, stakeholders and/or agencies?

Comments from both the public meeting and the survey indicated a desire to further evaluate the preliminary PEL Recommended Scenarios in more detail, especially Scenario 7, which could potentially result in consolidated or eliminated access to some Northland communities.

Several comments expressed a need for improved lighting throughout the study area to mitigate accidents and other issues.

### 7.0 Planning Assumptions and Analytical Methods

a. What is the forecast year used in the I-29, I-35, U.S. 169 PEL Study?

The forecast year is 2050 .

## b. What method was used for forecasting traffic volumes?

Traffic assumptions started with those from the Connected KC 2050 metropolitan transportation plan. These assumptions were the foundation for the MARC Travel Demand Model - the official travel-forecasting model for the Kansas City region. The Study Team then coordinated with MARC and stakeholders on future economic development. As a result, MARC added additional developments into its base model. The updated MARC model was then used to develop the traffic volumes for the Dynameq traffic modeling tool. More information can be found in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.2).

Table 2 below shows the number of AM and PM scenarios that were forecasted and modeled in Dynameq, the years modeled, and the subarea origin-destination (OD) provided by MARC that was used as input for each of the Dynameq models.

Table 2: Dynameq Model Scenarios

| Year | MARC Subarea ODs | Dynameq No- <br> Build <br> Scenarios | Dynameq Build Scenarios |
| :---: | :---: | :---: | :---: |
| 2016 | AM and PM matrices | AM \& PM <br> Models | NA |
| 2050 | AM and PM matrices with <br> LRTP financially <br> constrained projects | AM \& PM <br> Models |  |
| 2050 | AM and PM matrices with <br> LRTP projects and other <br> assumed capacity <br> improvements | NA | Six 2050 AM and PM Build Scenarios |

Source: Study Team.
Detailed methodology for forecasting traffic volumes can be found in the PEL Report
Attachment A, Alternative Screening Methodology, of Appendix C, I-29, I-35, U.S. 169
PEL Alternatives Analysis and Development Report.

## c. Are the planning assumptions and the corridor vision/Purpose and Need statement consistent with the long-range transportation plan?

The I-29, I-35, U.S. 169 PEL Study Purpose and Need statement supports the goals from the approved Connected KC 2050 Plan, as outlined in Table 3.

## Table 3: Consistency of the I-29, I-35, U.S. 169 PEL Study with the Connected KC 2050 Plan

## Connected KC 2050 Plan Goals and Vision

## I-29, I-35, U.S. 169 PEL Study

 Purpose and Need \& Study GoalsAccess to opportunity (AO) - Support a connected system that enables access to all activities, allowing people to succeed by removing transportation barriers.

Public health and safety (PHS) - Foster healthy communities and individuals by providing safe and secure places to live, walk, bike, ride the bus, and drive with clean air to breathe.

Healthy environment (HE) - Prioritize and support investments that reduce pollution and greenhouse gas emissions and preserve and restore ecosystem health.
Transportation choices (TC) - Provide a range of transportation choices for communities across the region to allow for ease of travel, as well as public health and environmental benefits.

Economic vitality (EV) - Maintain a multimodal transportation system that supports the efficient movement of people and goods and promotes economic development.

Focus on centers and corridors (FCC) Focus energy around key activity centers and the corridors that connect them to help promote livable, vibrant, resilient, and adaptable places.

Climate protection and resilience (CPR) Take a multi-pronged approach to building resilience and reducing climate risks to transportation infrastructure and area communities while also ensuring that the transportation system's impact on the climate decreases significantly over time.

The following Purpose and Need and study goals of the I-29, I-35, U.S. 169 PEL Study correlate to the listed Connected KC 2050 Goals and Vision as noted in parentheses:

- Address structural and functional roadway deficiencies, including pavement and bridge conditions; (FCC)
- Improve roadway safety; (EV, FCC)
- Improve roadway capacity, mobility, and access to meet traffic, and freight movement demands to address future growth in the Northland; (TC, FCC, NFS, PI, DT)
- Provide transit and multimodal alternatives; (PHS, HE, TC, DT)
- Avoid and/or minimize impacts to the human and natural environment; (PHS, PI)
- Sustain public and agency input and support for the project; (AO)
- Maximize cost efficiency; (NFS)
- Improve system reliability; (FCC, TC, EV)
- Improve opportunity for regional connectivity; (FCC, TC, EV)
- Improve local vehicle access to downtown Kansas City and other communities north of the river; (FCC, TC, EV)
- Improve access to industrial and retail centers and neighborhoods; (FCC, EV, PI)
- Connect bicycle pedestrian friendly facilities; (PI, PHS, CPR, HE)
- Accommodate existing transit, future transit, and transit-oriented development; (EV, PHS, HE)

| Connected KC 2050 Plan Goals and Vision | I-29, I-35, U.S. 169 PEL Study Purpose and Need \& Study Goals |
| :---: | :---: |
| New funding sources (NFS) - Consider new or additional funding streams to promote regional transportation projects and services. | - Minimize roadway disruptions during construction; (TC, FCC) <br> - Improve safety; (PI, DT) <br> - Reduce congestion; (DT, TC) <br> - Accommodate freight movement; (AO, EV) <br> - Reduce maintenance; (PI, DT) |
| Prioritize investments (PI) — Invest in projects that incorporate more than one strategy and bring benefits to the most people, making our limited resources go further. |  |
| Data and technology (DT) -Incorporate datadriven transportation planning into plans and programs. |  |

Source: MARC's Connected KC 2050 (June 2020) and I-29, I-35, U.S. 169 PEL Study (2023).

## d. What were the future year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs and network expansion?

The following summarizes the land use, economic development, transportation costs, and network expansion assumptions.

## Land Use

Land use assumptions started with those from the Connected KC 2050 metropolitan transportation plan (2020). These assumptions were the foundation for the MARC Travel Demand Model. MARC noted that the initial MARC 2050 land use forecast was developed based on the 2010 census and that the employment control total could be underestimated. Census data for 2020 was not available during the development of the MARC Connected KC 2050 land use plan. Therefore, MARC agreed to add several larger Northland non-residential developments to the model assumptions to support the PEL Study. The Study Team and stakeholders identified several large developments in and around the study area that could substantially impact future traffic volumes. The location of the new non-residential projects is listed in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.1.4). Each of these projects was included in the estimation of future traffic forecasts.

## Economic Development

Economic development within the project limits was assumed to be positively affected as mobility improved due to the reduced travel times to reach key destinations.

## Transportation Costs/Impacts

Although traditional transportation costs/impacts analysis, such as reduced travel time, compared to transportation infrastructure dollar costs (also expressed as benefit/cost ratio), was not performed in the I-29, I-35, U.S. 169 PEL Study, the Dynameq model was used to analyze transportation costs/impacts. Transportation costs/impacts are factors such as travel time and
reduction in intersection delay. These factors were analyzed in addition to a number of other mobility and safety measures.

## Network Expansion

Network expansion within the MARC Travel Demand Model includes only those projects currently committed to in the STIP, with a few exceptions. The following uncommitted capacity improvements outside the PEL focus areas were determined necessary to accurately evaluate the PEL study area:

- I-35 from I-435 north to north of Missouri Highway (Hwy) 152;
- The I-29 and I-635 interchange; and
- U.S. 169 from I-29 north to north of Missouri Hwy 152.

These additional improvements were deemed necessary to allow the full traffic demand to enter the study area and avoid backups from congestion outside the PEL project limits impacting the traffic and safety inside the PEL project limits. MoDOT has acknowledged that each of these areas requires additional study before any improvements are committed. During NEPA, coordination with MoDOT will occur to document the status of these plans and their relationship with the NEPA preferred alternative.

### 8.0 Environmental Resources (Wetlands, Cultural, Etc.) Reviewed.

8.1 For each resource or group of resources reviewed, provide the following: a. In the I-29, I-35, U.S. 169 PEL Study, at what level of detail was the resource reviewed and what was the method of review?

Environmental resources were reviewed from late 2022 and early 2023 based on existing datasets, studies, and plans. Qualitative and/or quantitative detail was provided for resource areas using GIS desktop and internet research. Existing resources present in the study area have been identified and documented in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.1).
b. Is this resource present in the area and what is the existing environmental condition for this resource?

Many environmental resources are present within the study area. Details on the existing environmental conditions of these resources are provided for each in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.1).
c. What are the issues that need to be considered during NEPA, including potential resource impacts and potential mitigation requirements (if known)?

During NEPA, additional analysis and a detailed schematic will be prepared. Identified issues to consider during NEPA, including potential resource impacts and mitigation/commitments, are described in the PEL Report Appendix D, I-29, I-35, U.S. 169 PEL to NEPA Transition Report.
d. How will the data provided need to be supplemented during NEPA?

At the PEL-level of analysis, environmental resources were evaluated based on information generally collected through easily attainable database searches, imagery analyses and desktop evaluations. The resulting resource inventory of the study area is presented in the PEL Report Appendix B, I-29, I-35, U.S. 169 Baseline Conditions Report (Section 4.1). Comprehensive field work and detailed impact analyses using an increasingly developed, NEPA-level schematic design will be completed during NEPA.

### 9.0 List environmental resources you are aware of that were not reviewed in the PEL Study and why? Indicate whether or not they will need to be reviewed in NEPA and explain why.

The level of analysis detail would be greater in a NEPA study for all resources. Indirect and cumulative impacts were not reviewed (see Section 10 below).

### 10.0 Were cumulative impacts considered in the I-29, I-35, U.S. 169 PEL Study? If yes, provide the information or reference where it can be found.

Neither cumulative, nor indirect impacts were considered in the I-29, I-35, U.S. 169 PEL Study. Schematic design and project details necessary to adequately assess indirect and cumulative impacts were not developed during the PEL. The PEL Recommended Scenarios would be further studied and refined in the NEPA phase of project development.

### 11.0 Describe any mitigation strategies discussed at the planning level that should be analyzed during NEPA.

During the PEL, resources were identified in the study area with the goal to avoid, minimize and/or mitigate any adverse impacts during NEPA for a preferred alternative and carried forward to inform the design process. Mitigation strategies would be incorporated into plans to ensure that implementation occurs through proper execution of the plans, specifications, and estimates (PS\&E) contract. Mitigation strategies are also discussed in Section 8.c.

### 12.0 What needs to be done during NEPA to make information from the PEL Study available to the agencies and the public? Are there PEL Study

products which can be used or provided to agencies or the public during the NEPA scoping process?

The I-29, I-35, U.S. 169 PEL Report will be incorporated into the NEPA process by reference and become part of the administrative record and history of the decision-making process. Further, the I-29, I-35, and U.S. 169 PEL Report, including associated technical appendices, will be integrated into the NEPA process and made available to the public, as well as the CAC members who were engaged during the PEL process. The I-29, I-35, U.S. 169 PEL Report, PEL Questionnaire and PEL to NEPA Transition Report will be available on the project website.

### 13.0 Are there any other issues a future project team should be aware of? <br> Examples: Controversy, utility problems, access or ROW issues, encroachments into ROW, problematic landowners and/or groups, contact information for stakeholders, special or unique resources in the area, etc.

Issues a future project team should be aware of are summarized in the l-29, I-35, U.S. 169 PEL to NEPA Transition Report, (Section 4.0).

# I-29, I-35, U.S. 169 PEL <br> Attachment A - Framework and Methodology Memo 

## December 2022

In Partnership with:

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### 1.0 Introduction

The Missouri Department of Transportation (MoDOT) is initiating a Planning and Environmental Linkages (PEL) Study of the I-29/I-35/U.S. 169 corridors. MoDOT desires to develop both short-term and longterm alternatives and proposed actions for improving safety, reducing congestion, improving operational performance, and addressing asset management and future transportation needs along I-$29,1-35$, and U.S. 169. The overarching goal of the PEL Study is to develop a clear and supported plan of action addressing deficiencies along I-29, I-35, and U.S. 169.

In the spirit of cooperation and collaboration and acknowledging the critical role that a number of agencies play in achieving the transportation goal outlined above, this Framework and Methodology Agreement has been developed to foster proactive working relationships among MoDOT and key agencies, including the Federal Highway Administration (FHWA); Kansas City, Missouri (KCMO); and the Mid-America Regional Council (MARC). MoDOT, in coordination with the FHWA, are the lead agencies and KCMO, and MARC are partners for the PEL Study. The cooperation among the lead agencies and partners will be integral to the success of a collaborative environmental and transportation planning process, which will identify issues and inform the subsequent National Environmental Policy Act (NEPA) phase. It is anticipated the lead agencies and partners will participate in expedited reviews, with the goal of completing the PEL Study within a 12-month time frame.

### 1.1 Purpose of the Framework and Methodology

The purpose of this Framework and Methodology is to describe and encourage the use of a PEL Study to meet agency requirements while expediting transportation program delivery for I-29/I-35/U.S. 169. The Framework and Methodology formalizes the scope, schedule and expected outcomes for the I-29/I35/U.S. 169 PEL process. The lead agencies and partners are committed to follow a process that encourages:

- Early communication, coordination, and collaboration;
- Timely input from stakeholders, including other local, state and federal agencies, and the public;
- Better informed and strategic transportation decisions; and
- Efficient and cost-effective solutions that addresses climate change/resiliency, environmental justice (including Justice 40 and the US Department of Transportation's Equity Action Plan), and avoids adverse environmental impacts.


### 1.2 PEL Study Area

The proposed PEL Study Area is generally depicted in Figure 1 and extends through portions of Clay, Jackson, and Platte Counties. As shown in blue, the project limits extend along sections of I-29, I-35, and U.S. 169. The project limits follow I-29 from Highway 45 southeast to the I-29/I-35 merge and then continues south across the Missouri River to connect into the northeast corner of the downtown freeway loop. In addition, the project limits follow I-35 from I-435 southwest to the I-29/I-35 merge and a portion of U.S. 169 from NW 68 ${ }^{\text {th }}$ Street south to its merge with I-29. The study area fully
encompasses the project limits and accounts for areas beyond those limits that are anticipated to influence parameters such as traffic operations. The study area also encompasses a broad enough area to account for community resources, natural resources, and other potential environmental constraints.

Figure 1 - PEL Study Area


### 2.0 PEL Process Framework

The PEL process links planning and NEPA. The purpose of PEL is to conduct a planning process with procedures and documentation that are aligned with and acceptable for use in future NEPA studies. By following the PEL process, revisiting past decisions and duplicating analysis and documentation can be avoided during the NEPA phase. During the PEL phase, the Study Team (MoDOT and its consultants) will begin data collection and conduct preliminary analysis that will be used to inform the NEPA phase, including but not limited to:

- Establishing the Preliminary Purpose and Need Statement, including goals and objectives:
- Identifying key environmental and community resources and constraints;
- Developing and screening alternatives;
- Determining risks and preparing potential mitigation strategies; and
- Developing a plan that identifies sections of independent utility and a transition from the PEL to NEPA phase.

These planning and analysis activities, conducted with input from stakeholders and the general public, will produce transportation planning products that effectively serve both MoDOT's and the KCMO's transportation needs and meet the requirements of MARC's regional transportation planning process. FHWA will review and concur with the development of this PEL Study and its use in the subsequent NEPA phase.

### 2.1 PEL Legislation

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) The 2005 surface transportation funding and authorization bill included several provisions intended to enhance the consideration of environmental issues and impacts within the transportation planning process, and it encouraged the use of the products from planning in the NEPA process. Specifically, Section 6001, Environmental Considerations in Planning, requires certain elements and activities to be included in the development of long-range transportation plans, including:

- Consultations with resource agencies, such as those responsible for land-use management, natural resources, environmental protection, conservation and historic preservation, which shall involve, as appropriate, comparisons of resource maps and inventories;
- Discussion of potential environmental mitigation activities;
- Participation plans that identify a process for stakeholder involvement; and
- Visualization of proposed transportation strategies where practicable.


## Statewide and Metropolitan Planning Regulations

In 2007, FHWA issued new planning regulations that eliminated the requirement for a major investment study and implemented provisions enacted by SAFETEA-LU. In its place, the regulations created a new optional procedure for linking transportation planning and NEPA studies. These procedures are contained in 23 CFR 450.212 (statewide planning), 23 CFR 450.318 (metropolitan planning), and Appendix A (Linking the Transportation Planning and NEPA Processes). FHWA provided further direction on using corridor and subarea planning to bridge the transportation planning and NEPA processes in its April 2011 guidance document, Guidance on Using Corridor and Subarea Planning to Inform NEPA.

## Moving Ahead for Progress in the 21 ${ }^{\text {st }}$ Century (MAP-21)

This 2012 funding bill promoted accelerated project delivery and encouraged innovation through the increased use of programmatic approaches and planning and environmental linkages.

## Fixing America's Surface Transportation (FAST Act)

This 2015 funding bill amended and refined the authority to carry out PEL, which was incorporated into
joint FHWA/Federal Transit Administration (FTA) planning regulations in May 2016. The FAST Act established that "Planning Products" are legitimate and should be incorporated under NEPA.

### 2.2 PEL Guidance

## Every Day Counts Initiatives

The PEL process is part of FHWA's Every Day Counts (EDC) Initiatives, intended to identify, develop, and deploy innovative techniques aimed at shortening project delivery. Since FHWA initiated the first EDC group of initiatives in 2011, FHWA has developed EDC Initiatives on a bi-annual basis. The following is a synopsis of the EDC Initiatives that will be addressed as part of the I-29/I-35/U.S. 169 PEL Study, as best practices that MoDOT can implement now and investigate for future applicability:

- PEL Initiative (EDC-1, 2011-2012) encourages the use of information developed in planning to inform the NEPA process.
- Implementing Quality Environmental Documents (IQED) Initiative (EDC-2, 2013-2014) identifies best practices for project delivery, such as preparing effective summaries and technical reports, developing effective visualization and public presentations, and developing a specific purpose and need that supports the alternatives screening process in selecting the alternatives for further evaluation.
- Improving Collaboration and Quality Environmental Documentation (IQED) Initiative (EDC-3, 2015-2016) builds on EDC-2 through the creation of an online workspace and collaboration forum (eNEPA) for major projects requiring a NEPA Environmental Impact Statement (EIS) or Environmental Assessment (EA). The goal of EDC-3 is to provide tools to enable collaborative, concurrent, timely, and transparent interagency reviews.
- Virtual Public Involvement (VPI) (EDC-5 and 6, 2019-2022) helps identify issues and concerns early, which can ultimately accelerate delivery. Virtual public involvement strategies supplement traditional face-to-face information sharing with technology platforms that increase the number and variety of methods agencies use to inform the public, receive feedback, and collect and consider comments.


### 2.3 PEL Process Components

To meet the legislative requirements and federal guidance, the PEL Study for I-29/I-35/U.S. 169 will be NEPA-like, using similar language and planning steps, and will incorporate the following components:

- Coordination with local, state, and federal agencies;
- Context Sensitive Design/Solutions (CSD/S), a collaborative approach that involves the public and stakeholders in development of context sensitive design solutions;
- Opportunities for public input and agency comments on the PEL Study;
- Documentation of relevant decisions in a format that is identifiable and available for review during the environmental review process, so that it can be appended or referenced in the NEPA document; and
- Completion of FHWA's Planning/Environmental Linkages Questionnaire.

With a view towards achieving consistency with federal, regional, and local planning efforts, it is anticipated that the PEL process and its recommendations will be informed by and will inform MARC's Metropolitan Transportation Plan, Connected KC 2050, MARC's Transportation Improvement Program (TIP), and MoDOT's Statewide Transportation Improvement Program (STIP).

### 2.4 PEL Process Expected Outcomes

The I-29/I-35/U.S. 169 PEL process is expected to result in the following outcomes:

- Identifying stakeholders;
- Define the travel corridors;
- Developing the preliminary purpose and need, and goals and objectives;
- Identifying environmental constraints of the study area;
- Developing performance measures for alternatives:
- Developing alternatives and defining modes of travel;
- Screening and evaluating alternatives in an iterative process;
- Identifying potential community benefits and impacts;
- Identifying potential environmental impacts and mitigation strategies/priorities;
- Refining the travel corridor (including segments of independent utility and logical termini);
- Documenting the PEL process in a PEL Study Report; and
- Establishing and documenting a PEL-NEPA transition process, including implementation scenarios.


### 3.0 Methodology

Section 3 presents an overview of the methodology that the Study Team will follow for the I-29/I35/U.S. 169 PEL Study. Section 3.1 highlights key PEL Study coordination requirements with FHWA, and Section 3.2 provides an overview of the public involvement and coordination efforts with stakeholders and federal, state, regional, and local agencies. The tasks and planning products resulting from the PEL Study are presented in Section 3.3. The PEL Study will follow the timelines shown in Figure 2, the PEL Study Process/Product Flow Chart (at the end of this document).

### 3.1 FHWA Coordination Points

The Study Team has developed the proposed PEL process framework and methodology, planning products, and schedule for the study which are contained in this document. The Study Team will meet with FHWA to receive feedback on these items and confirm that the proposed PEL process will satisfy the legislative and regulatory guidance. After FHWA has reviewed the proposed PEL process and concurred that it will produce planning products that meet the conditions for use in NEPA, the Study Team will begin public involvement efforts with stakeholders, agencies, and the public.

The Study Team will coordinate with FHWA as required throughout the PEL process to obtain input at key coordination points during the PEL Study. The list of local, state, and federal, agencies and the respective coordination responsibilities will be determined in conjunction with FHWA as part of the Stakeholder and Public Involvement Plan described below.

### 3.2 Outreach and Stakeholder Engagement

The Study Team will prepare a Stakeholder and Public Involvement Plan (SPIP) for the PEL Study. The SPIP will include the approach and tools to be used to effectively communicate and coordinate with agencies, stakeholder groups, and the general public throughout the PEL process. In addition to traditional outreach activities, the SPIP will describe innovative approaches to engage the public through early and often interaction. In conjunction with the SPIP, the Study Team will create a brand and messaging template to be used consistently throughout the PEL Study's phases. The SPIP will be a living document that is amended throughout the PEL Study as necessary to effectively coordinate with agencies, stakeholders, and the general public. Public involvement efforts will be completed in accordance with the most current version of MoDOT's Public Involvement Guidance which includes linking to MoDOT's website to ensure logical public access as well as a plan for transition to MoDOT ownership when study is complete. Outreach activities will be documented via meeting minutes and substantive comments addressed in that documentation.

Stakeholder, agency, and public meetings will be held in conjunction with key milestones. Table 1 presents the anticipated outreach activities based on the PEL Study task and Figure 2 shows the timeline for PEL outreach and stakeholder engagement coordination points.

Resource agency coordination meetings with local, state, and federal staff will be held to solicit technical input and expertise throughout the PEL Study and to address each agency's jurisdictional concerns. As shown in Figure 2, the first resource agency meeting will be held in between the baseline conditions and at the alternatives development and analysis phases. This meeting will include solicitation of input from resource agencies on the preliminary purpose and need, existing conditions/environmental constraints within the study area, and Universe of Alternatives. The second resource agency meeting will be held in between the alternatives development and analysis and transition to NEPA phases and will include solicitation of input on the Reasonable Alternatives and alternatives screening process.

Stakeholder outreach will occur via two ways: (1) via one-on-one and/or group meetings (up to 10 meetings) and (2) via key stakeholder committee meetings (up to two meetings). The Study Team will identify key stakeholder groups, disadvantaged communities, key corridor businesses, neighborhood associations, elected officials, and established groups to meet with and present to as part of the PEL Study.

A Community Advisory Committee (CAC) will be established and up to four meetings will be held during the course of the PEL Study. The CAC will include representation from stakeholder groups. Two-way communication between the CAC and the Study Team will begin early in the planning and concept development process and continue through alternatives screening and development of the PEL Study Report. The CAC will be inclusive and represent diverse views.

Two public meetings will be conducted, as shown in Figure 2. The first public meeting will occur between the baseline conditions and alternatives development and analysis phases. At this meeting, the public will have the opportunity to provide input on the preliminary purpose and need, existing conditions/environmental constraints of the study area, and Universe of Alternatives. The second public
meeting will be held between the alternatives development and analysis and transition to NEPA phases. At this second meeting, input will be solicited on the Reasonable Alternatives and alternative screening process. MoDOT will determine if meetings are to be held virtually or in-person, with an on-demand component posted to the website hosted by MoDOT. In addition to public meetings, the website will include information about the PEL process, as well as opportunities for public participation and comment. Materials will be disseminated to the public and updated via the website, social media, email blasts, and through other means throughout the duration of the PEL Study.

Table 1 - Anticipated Agency, Stakeholder and Public Involvement Meetings

| Outreach Activity | PEL Study Task ${ }^{1}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Task 1/Task 2 | Task 3 | Task 3 | Task 4 |
|  | Study Initiation, Baseline <br> Conditions, and Purpose and Need (Kick-Off) | Alternatives Development and Analysis (Universe of Alternatives) | Alternatives Development and Analysis (Reasonable Alternatives) | Transition to NEPA <br> (PEL Study Report) |
| Resource Agency Coordination Meetings |  | $\checkmark$ (1) |  | $\checkmark$ (1) |
| Stakeholder one-on-one and group meetings | $\checkmark$ (10) |  | $\checkmark$ (10) |  |
| Key Stakeholder Committee meetings | $\checkmark$ (1) |  | $\checkmark$ (1) |  |
| Community <br> Advisory Committee | $\checkmark$ (1) | $\checkmark$ (1) | $\checkmark$ (1) | $\checkmark$ (1) |
| PEL Public Meetings |  | $\checkmark$ (1) | $\checkmark$ (1) |  |

## Notes:

1 Tasks outlined in Section 3.3 and presented in Figure 2.
$\checkmark$ indicates meeting will occur in noted study phase.
(\#) indicates the number of meetings to occur in the noted task.

Figure 2 - PEL Outreach and Stakeholder Engagement Coordination Points


Key:

### 3.3 PEL Study Tasks and Products

The Study Team has proposed six PEL Study tasks and associated planning products in accordance with federal guidance. Completion of these tasks will address the questions posed by FHWA's Planning/Environmental Linkages Questionnaire, which will be used as a guide throughout the I-29/I35/U.S. 169 PEL Study process. In the following subsections, the planning products associated with each task are described. The PEL Study Process/Product Flow Chart, presented in Figure 3, outlines the timeline of tasks and PEL Study products.

Figure 3 - PEL Study Process/Product Flow Chart


### 3.3.1 Task 1 - Study Initiation

## Framework and Methodology

The PEL Framework and Methodology (this document) formalizes the scope, schedule, and expected outcomes of the I-29/I-35/U.S. 169 PEL Study.

### 3.3.2 Task 2 - Baseline Conditions

## Data Collection and Traffic Projection Plan

The Study Team will develop a Data Collection and Traffic Projection Plan documenting the need for relevant corridor data (traffic, safety, engineering, right-of-way, survey, environmental, etc.) from MoDOT and other sources. Data will be compiled and reviewed for applicability. Data collected will be used to analyze existing transportation conditions within the study area.

## Baseline Conditions Report

Traffic and safety, multimodal, engineering, and environmental data will be analyzed in the baseline conditions report. In addition, the No-Build condition will be compared against the existing conditions analysis to evaluate the impacts based on various performance measures.

The needs of the study area will be analyzed within the baseline conditions report. A draft purpose and need will be developed through coordination with MoDOT; FHWA; KCMO; MARC; Northland Chamber of Commerce; Clay, Platte, and Jackson Counties; and other stakeholders. Primary purpose and need elements will be focused on operations and safety. Other elements may include but are not limited to transportation equity, growth, development, economic, and multimodal criteria.

In addition, the following adopted MARC plans and policies will be used in the development of the purpose and need, screening criteria, and alternatives development:

- Metropolitan Transportation Plan (Connected KC 2050)
- Kansas City Regional Climate Action Plan
- Clean Air Action Plan
- Green Infrastructure Framework
- Natural Resource Inventory
- Regional ITS Architecture
- Congestion Management Process Policy; and
- Complete and Green Streets Policy.

The Baseline Conditions Report will include:

- Summary of Previous Studies and Project History Technical Report
- PEL Study Area Map
- Existing Conditions
- No-Build Analysis
- Preliminary Purpose and Need
- Environmental Constraints


### 3.3.3 Task 3 - Alternatives Development and Analysis

## Alternatives Screening Methodology (ASM) Technical Report

The Study Team will establish an ASM to assist in evaluating the alternative improvements to determine associated impacts and benefits on area transportation, environment, and land use conditions. The ASM will establish performance measures, evaluation criteria, and the alternatives screening process. The evaluation criteria will address the purpose and need and study goals. Evaluation matrices will be developed and used to provide relative comparison of the impacts and benefits of the various alternatives considered. The ASM will outline the following alternative development and screening steps:

1. Identification of the Universe of Alternatives - The Study Team will conduct a workshop meeting with the study partners to discuss and formulate the Universe of Alternatives. The Universe of Alternatives will be developed based on the information gathered in Task 2 - Baseline Conditions and the criteria developed in the ASM.
2. Fatal Flaw Evaluation (Level 1 Screening) - The Study Team will conduct fatal flaw evaluations of the Universe of Alternatives based on the purpose and need and study goals. The fatal flaw evaluation will be compiled into a Level 1 screening matrix and information supporting the reasons why high-level concepts should not be carried forward within the PEL Study will be included.
3. Development of the Reasonable Alternatives - The Study Team will use the results of the Level 1 screening to further develop Reasonable Alternatives that satisfy the purpose and need and project goals.
4. Reasonable Alternatives Evaluation (Level $\mathbf{2}$ Screening) - The Study Team will utilize a Dynameq model to analyze the operations of the Reasonable Alternatives in the Interim and Ultimate design years. Dynameq is a regional mesoscopic model that analyzes the travel demand and operations of the study area. The Buck O'Neal Project Dynameq model will be used, expanded and calibrated for this study. Safety will be evaluated using a combination of crash modification factors and qualitative comparison to the existing and No-Build alternatives. Other aspects to be evaluated include environmental issues and high-level construction cost estimates (assumptions will be approved by MoDOT and cost estimates will be separated by segments of independent utility).

The Refined Alternatives development and evaluation (Level 3 Screening) that would lead to a preferred alternative(s) will be performed in the NEPA phase and not as part of this PEL Study.

## Alternatives Development and Analysis Report

The Alternatives Development and Analysis Report will document the alternatives development and screening processes as well as the results from the screening analyses. It will include the following:

- Universe of Alternatives workshop notes
- Universe of Alternatives descriptions
- Fatal Flaw Evaluation - Level 1 Screening matrix and discussion of results
- Reasonable Alternatives descriptions
- Reasonable Alternatives Evaluation - Level 2 Screening matrix and discussion of results


### 3.3.4 Task 4 - Transitioning to NEPA

## PEL Study Report

The Study Team will prepare a PEL Report that documents the data gathered, analysis conducted, alternatives considered, and the agency, stakeholder, and public input received throughout the PEL Study. The report will include documentation, informative maps and other graphics depicting the major milestones from the purpose and need to the alternatives screening results and recommendations. The PEL Study Report will include the FHWA developed PEL Questionnaire to assist in ensuring the PEL Study meets the requirements of 23 CFR $450.212,450.318$ and Appendix A. The PEL to NEPA Transition Report will be prepared to address 1) issues not reviewed in the PEL Study and why and whether they would be reviewed in a NEPA study; 2) mitigation/permitting to be addressed during the NEPA phase; 3) funding/phasing possibilities; and 4) the type of NEPA document(s) that are recommended to be prepared for each segment that will move forward as a project after the PEL phase.

### 3.3.5 Task 5 - Outreach and Stakeholder Engagement

## Stakeholder and Public Involvement Plan (SPIP)

As discussed in Section 3.2, the SPIP presents a roadmap for stakeholder, agency and public outreach for the I-29/I-35/U.S. 169 PEL Study.

### 3.3.6 Task 6 - Project Management

## Project Record

The Study Team will provide the project record to MoDOT to maintain such that it may be incorporated into a future administrative record for any subsequent or future NEPA study.

## Agreement

We, the undersigned, concur with the I-29/I-35/U.S. 169 PEL Framework and Methodology and are committed to supporting this Agreement. We will strive to fulfill the aspects of the Agreement, including active participation in the PEL process; effectively communicating and coordinating with other agencies, and providing resources to assure that the planning processes are able to move forward.

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| :--- | :--- |

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[^0]:    Source: American Community Survey, 2015-2019

[^1]:    Source: Study Team. Note: The numbers correspond to projects shown in Attachment A.

[^2]:    ${ }^{1}$ Traffic Analysis Zones, https://onlinepubs.trb.org/onlinepubs/conferences/2017/censusdata/TAZ Paper.pdf

[^3]:    ${ }^{2}$ KCUR, Ford Motor Company announcement, June 2022

[^4]:    Source: StreetLight, 2022.

[^5]:    Source: Study Team.

[^6]:    4 "Existing Transportation Facilities", Connected KC 2050, accessed August 10, 2022, https://connectedkc.org/wp-content/uploads/2020/04/Existing-transportation-facilities.pdf

[^7]:    5 "Operation Green Light", MARC, accessed September 14, 2022, https://www.marc.org/transportation/transportation-programs/operation-green-light
    6 "KCScout", KCScout, accessed September 14, 2022, http://www.kcscout.com/

[^8]:    7 "System Performance Report", Connected KC 2050, accessed July 18, 2022, https://connectedkc.org/wp-content/uploads/2020/03/Performance-measures.pdf.

[^9]:    8 "RideKC Maps and Schedules", RideKC, last modified October 24, 2021, https://ridekc.org/routes.
    9 "Kansas City Area Transportation Authority", FTA Transit Agency Profiles, accessed August 29, 2022, https://www.transit.dot.gov/sites/fta.dot.gov/files/transit agency profile doc/2019/70005.pdf

[^10]:    10 "KCSA, 2019 KCSA Daily Ridership, 2019, distributed by KCSA.

[^11]:    14 "MetroGreen", Connected KC 2050, accessed July 12, 2022, https://gis2.marc2.org/arcgis/rest/services/Transportation/ConnectedKC2050/MapServer/2.

[^12]:    20 "Rail Yards", Connected KC 2050, accessed June 22, 2022, https://connectedkc.org/plan-documents/.
    21 "Freight", Connected KC 2050, accessed August 9, 2022, https://connectedkc.org/wpcontent/uploads/2020/04/Freight.pdf
    22 "Freight", Connected KC 2050, accessed August 9, 2022, https://connectedkc.org/wpcontent/uploads/2020/04/Freight.pdf

[^13]:    23 "Freight Activity Area", MARC, accessed July 13, 2022, https://gis2.marc2.org/arcgis/rest/services/Transportation/FreightMap/MapServer/16.
    24 "Freight Bottlenecks", Connected KC 2050, accessed July 13, 2022,
    https://gis2.marc2.org/arcgis/rest/services/Transportation/ConnectedKC2050/MapServer/24.

[^14]:    Source: Study Team

[^15]:    ${ }^{1}$ Please use "Notes" to elaborate on special circumstances for data collection.
    ${ }^{2}$ Disclaimer: MoDOT's interactive AADT map shows volumes at some locations that are associated with actual count data and some data that are estimated volumes (not based on count data). If the analyst has any data concerns, then please contact the MoDOT TMS unit.

[^16]:    ${ }^{1}$ Provide ID number to match Figure 1 map, if applicable

[^17]:    ${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for freeway facility. *Denotes segments with crash rates higher than statewide averages

[^18]:    ${ }^{1}$ Missouri Statewide Averages reflect the most recent 5-year Highway Crash Statistics (2016-2020) for an interstate facility.
    *Denotes segments with crash rates higher than statewide averages

[^19]:    ${ }^{1}$ A Primary Alternative can stand on its own in addressing the Purpose and Need. A Complementary Alternative cannot stand on its own in addressing the Purpose and Need but does support a Primary Alternative in addressing the Purpose and Need and Study Goals.

[^20]:    Source: Study Team.

[^21]:    Source: Study Team.

[^22]:    Source: Study Team.

[^23]:    Source: Study Team.

[^24]:    Source: Study Team.

[^25]:    Source: Study Team.

[^26]:    Source: Study Team.

[^27]:    All costs are in 2023 Dollars. New Construction costs do not include Right of Way, Permitting, Utility Relocation, or Design/Construction Engineering Costs

    STIP Projects inside the project limits were included in Scenario 1.
    Scenarios 2 through 7 do not include the STIP projects included in Scenario 1
    For STIP resurfacing projects that are both inside and outside the project limits, the estimated cost by percentage inside the project limits is included in Scenario 1

[^28]:    Source: Study Team.

[^29]:    ${ }^{1}$ The evaluation of alternatives must consider a reasonable range of options that could fulfill the project purpose and need. Reasonable alternatives include those that "are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (Council on Environmental Quality, 1981).

[^30]:    ${ }^{2}$ For the Level 2 screening, Traffic and Safety were included as one category and included Multimodal goals. For the Level 3 screening, Traffic and Safety were split into 2 separate categories and Multimodal was created as a separate category for ease of public understanding.

[^31]:    ${ }^{1}$ FHWA. 2008. Planning and Environmental Linkages Implementation Resource Guide.
    ${ }^{2}$ AASHTO. 2008. Using the Transportation Planning Process to Support the NEPA Process.

[^32]:    ${ }^{3} 40$ CFR 1508.5

[^33]:    ${ }^{4}$ Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) Section 6002

[^34]:    Note: Priority 1 projects are only located in the Priority 1 area shown in Figure 2.

[^35]:    ${ }^{1}$ Reasonable alternatives (as defined in 40 CFR 1508.1(z) is an alternative that is technically and economically feasible and meets the purpose and need for the proposed action.

