



PART III

Vision Zero Action Plan
OKLAHOMA CITY



PART III

Chapter 4: Designing a Solution

Systemic Countermeasures
Targeted Countermeasures
Countermeasure Exhibits

Chapter 5: Getting to Zero

Past Plan Reviews
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CHAPTER 4: DESIGNING THE SOLUTION

> ***The targeted recommendations on the chosen study corridors entail specific countermeasures based on the crash history, roadway geometry, intersection control, and context.***

This chapter outlines the seven priority corridors that were chosen for further examination. These roadway segments were selected due to their abnormally high Critical Crash Rates, as well as their local significance. The corridors were identified by the VZAB at the second meeting, and further refined in conversations with City Staff. The targeted recommendations on the chosen study corridors entail specific countermeasures based on the crash history, roadway geometry, intersection control, and context. Additionally, this chapter provides a Systemic Countermeasure Toolbox; consisting of a variety of roadway countermeasures that may be used by cities and organizations throughout the region to further mitigate safety beyond the eight corridors in this study.

SYSTEMIC COUNTERMEASURES

This portion of the VZAP details systemic countermeasures that can be implemented across the City of Oklahoma City to enhance safety **beyond the targeted countermeasures** on the selected study corridors. Precedence should be given to roadways and intersections along the HIN and Disadvantaged Census Tracts due to the crash history and creating a safer network for disadvantaged communities.

A countermeasure toolbox is a comprehensive collection of strategies and countermeasures designed to address specific traffic safety concerns. This toolbox provides the City of Oklahoma City with a range of options and resources to effectively improve safety and enhance the overall performance of roadways and transportation systems. The systemic countermeasure toolbox is detailed in the table below. Each countermeasure has an associated Crash Modification Factor (CMF). This figure if the ratio of crashes that can be expected to occur after the countermeasure has been implemented. These figures are provided by the CMF Clearinghouse, which is a national tool that provides CMF data, educates CMF users, and facilitates CMF research nationwide to compile the most reliable studies for increased accuracy in assigning CMFs.

TABLE 20: SYSTEMIC COUNTERMEASURES

Countermeasures	CMF	Context (Urban/ Rural)
Medians and Pedestrian Refuge Islands	0.29	Urban
Median Barriers	0.29	Both
Rectangular Rapid Flashing Beacons (RRFB)	0.31	Both
Bike Lanes	0.435	Both
Dedicated Left- and Right-Turn Lanes at Intersections	0.52 – 0.86	Both
Roadway Reconfiguration	0.53	Urban
Roundabouts	0.59	Both
Sidewalks	0.598	Both
Lighting	0.68	Both
Reduced Left-Turn Conflict Intersections	0.7029	Both
Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections	0.732	Both
Crosswalk Visibility Enhancements	0.732	Both
Longitudinal Rumble Strips	0.745	Rural
Enhanced Delineation for Horizontal Curves	0.82	Rural
Retroreflective Backplates	0.85	Both
Appropriate Speed Limits	0.856	Both
Pedestrian Hybrid Beacons	0.883	Urban
Leading Pedestrian Interval	0.9	Urban
Corridor Access Management	0.93	Both
Wider Edge Lines	0.97	Both
Yellow Change Intervals	0.99	Both

FIGURE 18: MEDIAN & PEDESTRIAN REFUGE ISLAND



Source: Adobe Stock

MEDIANS AND PEDESTRIAN REFUGE ISLANDS

Medians in urban and suburban areas can be defined by pavement markings, raised areas, or islands to separate motorized and non-motorized road users. Medians may also serve as a refuge for pedestrians. **A median with marked crosswalks can lead to a 46% reduction in pedestrian crashes.**

A pedestrian refuge island is a median with a refuge area that is intended to help protect pedestrians who are crossing a road. **Pedestrian Refuge Islands contribute to a 56% reduction in pedestrian crashes.**

FIGURE 19: MEDIAN BARRIER



Source: Adobe Stock

MEDIAN BARRIERS

Median barriers are longitudinal barriers that separate opposing traffic on a divided highway and are designed to redirect vehicles striking either side of the barrier. These barriers can take the form of cable barriers, concrete barriers, or metal-beam guardrails. Median barriers significantly reduce the number of cross-median crashes. These barriers significantly reduce head-on crashes and fatalities by physically separating the two sides of the road. **Median Barriers Installed on Rural Four-Lane Freeways lead to a 97% reduction in cross-median crashes.**

RECTANGULAR RAPID FLASHING BEACONS (RRFB)

A rectangular rapid flashing beacon (RRFB) is a pedestrian-activated traffic control device installed at crosswalks to enhance visibility and alert drivers to the presence of pedestrians. When activated, the RRFB emits a rapid, alternating pattern of flashing lights to alert oncoming drivers to yield to pedestrians crossing the street. **According to FHWA, RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks with varied speed limits, crossing distances, and number of travel lanes.**

FIGURE 20: RECTANGULAR RAPID FLASHING BEACON



Source: FHWA

BIKE LANES

A bike lane is a designated area of a roadway that is reserved for bicycles, typically marked with pavement markings and signage. Bike lanes provide cyclists with a dedicated space to ride, improving safety by reducing conflicts with motor vehicles, and encouraging more people to choose bicycling as a mode of transportation. **Bike Lane Additions can reduce crashes by up to 49% for total crashes on urban 4-lane undivided collectors and local roads and 30% for total crashes on urban 2-lane undivided collectors and local road**s. Notably, the introduction of bike lanes has led to a reduction in crashes across all categories, not just those involving vulnerable road users. This is particularly significant, as bike lanes increase average daily bicycle traffic by approximately 20%, while simultaneously reducing crashes across all modes of transportation.

FIGURE 21: BIKE LANE



Source: City of Oklahoma City

FIGURE 22: DEDICATED LEFT- AND RIGHT-TURN LANES



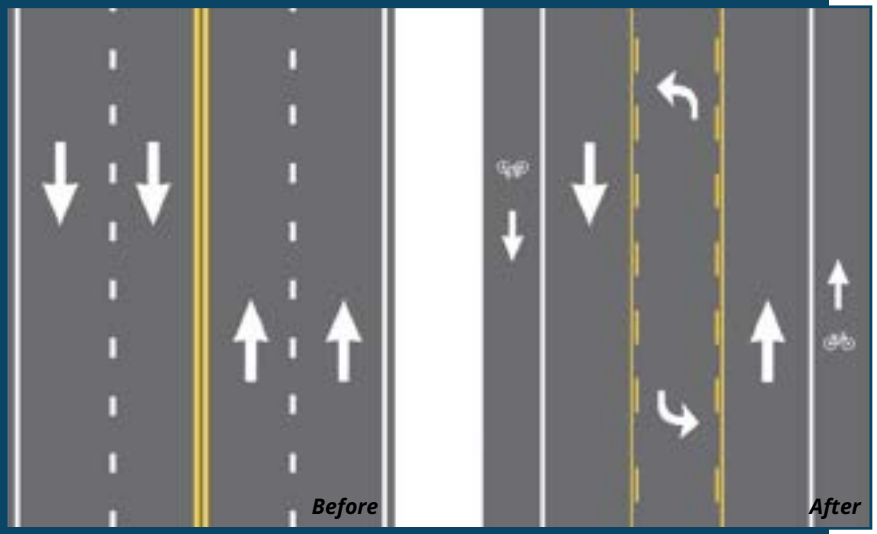
Source: Adobe Stock

DEDICATED LEFT- AND RIGHT-TURN LANES AT INTERSECTIONS

Auxiliary turn lanes—either for left-turns or right-turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Turn lanes can be designed to provide for deceleration prior to a turn, as well as for storage of vehicles that are stopped and waiting for the opportunity to complete a turn.

While turn lanes provide measurable safety and operational benefits at many types of intersections, they are particularly helpful at two-way stop-controlled intersections. Many of the projects the Traffic Services Division added to the 2017 GO Bond list were to upgrade existing intersections with dedicated left turn lanes. All traffic signals approved through the Traffic and Transportation Commission are approved requiring dedicated left turn lanes per staff recommendations. **A dedicated turn lane can lead to a 28-48% reduction in total crashes.**

FIGURE 23: ROADWAY RECONFIGURATION



Source: FHWA

ROADWAY RECONFIGURATION

A roadway reconfiguration usually involves converting an existing four-lane roadway into a three-lane roadway. Implementing a roadway reconfiguration can improve safety, calm traffic, provide better mobility and access for all users, and enhance the quality of life in a community. Roadway reconfigurations make a roadway more "complete" by adding bike lanes or areas for pedestrians. Sometimes, roadway reconfigurations are called road diets. There are generally some capacity concerns with roadway reconfigurations, due to their reduction in lanes, however, it is important to note that they are only recommended in roadways that experience no more than 12,000 AADT, so in instances where a greater number of lanes is necessary, this countermeasure is not considered. Additionally, introducing center turnlanes will reduce conflicts between vehicles turning and through traffic, thereby improving throughput and reducing rear-end crashes in many instances. **In the context of a 4-lane to 3-lane reconfiguration, a road segment can experience up to a 47% reduction in total crashes.**

ROUNDABOUTS (RAB)

A roundabout is a type of circular intersection where traffic flows continuously around a central island. Vehicles entering a roundabout must yield to traffic already circulating within it, promoting a smooth and efficient flow of traffic with reduced conflict points compared to traditional intersections. Roundabouts are designed to improve safety, reduce congestion, and enhance traffic flow. **Roundabouts lead to a 78-82% reduction in fatal and injury crashes.**

FIGURE 24: ROUNDABOUT



Source: Adobe Stock

SIDEWALKS

A sidewalk is a designated pathway alongside a road or street intended for pedestrian use. It provides a safe and separate space for pedestrians to walk, separated from vehicular traffic. Sidewalks enhance pedestrian safety by reducing the risk of collisions with vehicles, promoting walking as a mode of transportation, and providing accessible routes for people of all ages and abilities. **Sidewalks can contribute up to an 89% reduction in crashes involving pedestrians walking along roadways.**

FIGURE 25: SIDEWALK



Source: Adobe Stock

FIGURE 26: CORRIDOR LIGHTING



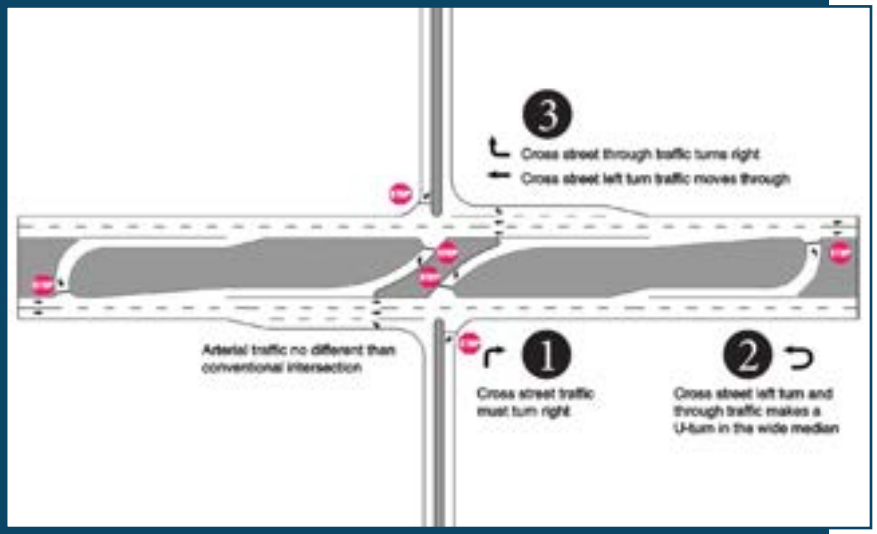
Source: Adobe Stock

LIGHTING

The number of fatal crashes occurring in daylight is about the same as those in darkness. However, the nighttime fatality rate is three times the daytime rate despite only 25 percent of vehicle miles traveled (VMT) occurring at night. At nighttime, vehicles traveling at higher speeds may not be able to stop once a hazard or change in the road ahead becomes visible by the headlights. Therefore, improvements to the lighting infrastructure of a roadway lead to a highly visible, safer roadway.

Adequate lighting (i.e., at or above minimum acceptable standards) is based on research recommending horizontal and vertical illuminance levels to provide safety benefits to all users of the roadway environment. Adequate lighting can also provide personal security benefits for non-personal vehicle users as they travel along and across roadways. Increased lighting can come in the form of intersection or corridor lighting depending on the needs of the community. **Lighting can reduce pedestrian nighttime crashes by up to 42%.**

FIGURE 27: REDUCED LEFT-TURN CONFLICT INTERSECTION EXAMPLE



Source: FHWA

REDUCED LEFT-TURN CONFLICT INTERSECTIONS

Reduced left-turn conflict intersections (RCUT) are geometric designs that alter how left-turn movements occur. These intersections simplify drivers' decision-making and minimize the potential for higher-severity crash types, such as head-on and angle. Variations on the U-Turn are typical of these intersections. One type of these intersections, **the RCUT intersection, has been shown to lead to a 54% reduction in fatal and injury crashes.**

SYSTEMIC APPLICATION OF MULTIPLE LOW-COST COUNTERMEASURES AT STOP-CONTROLLED INTERSECTIONS

This systemic approach to stop-controlled intersection safety involves deploying a package of multiple low-cost countermeasures, including enhanced signing and pavement markings, at intersections. These countermeasures increase driver awareness and recognition of the intersections and potential conflicts. **This application is associated with a 10% reduction of fatal and injury crashes at all locations/types/areas.**

FIGURE 28: STOP-CONTROLLED INTERSECTION



Source: FHWA

CROSSWALK VISIBILITY ENHANCEMENTS

Crosswalk visibility enhancements encompass multiple strategies that can be used alone or in combination. High-visibility crosswalks use an inlay or thermoplastic tape patterns that are visible to the driver and pedestrians from far away. Improved lighting illuminates with a positive contrast that makes the pedestrian more visible by placing luminaries in forward locations. Enhanced signage and pavement markings alert the driver in advance that a pedestrian crosswalk is approaching, using either signage or pavement markings. **High-visibility crosswalks can reduce pedestrian injury crashes up to 40%.**

FIGURE 29: CROSSWALK VISIBILITY ENHANCEMENT



Source: Adobe Stock

FIGURE 30: LONGITUDINAL RUMBLE STRIPS



Source: Adobe Stock

LONGITUDINAL RUMBLE STRIPS

Longitudinal rumble strips are milled or painted installations on the ground that alert a driver through vibration and sound. A longitudinal rumble strip is on the shoulder, edge, or near or at the center line of an undivided roadway. These are intended to warn drivers whose vehicles are crossing centerlines through the creation of noise and vehicular vibration. **Longitudinal rumble strips can result in a 44-64% reduction in head-on fatal and injury crashes on two-lane rural roads.**

FIGURE 31: ENHANCED DELINEATION FOR HORIZONTAL CURVE



Source: Adobe Stock

ENHANCED DELINEATION FOR HORIZONTAL CURVES

Enhanced delineation for horizontal curves includes various strategies implemented in advance or within curves. Pavement markings, center, and edge lines help drivers establish their position on the road. In-lane curve warning pavement markings are solid center lines on two-lane roads that warn drivers that a curve is approaching. Retroreflective strips are material on signposts that reflect light back to the driver to help draw attention to the sign during the night. A delineator is a retroreflective device placed on a post or roadside barrier along the side of the road that lets a driver align themselves on the road. Chevron signs placed on the outside of the curve or on the edge of the road inform the driver of the direction of the road. Enhanced visibility at horizontal curves can be improved by adding or upgrading to larger, retroreflective signs. Dynamic curve warnings detect vehicle speeds approaching a curve and alert drivers if the vehicular speed exceeds the speed limit. **Sequential Dynamic Chevrons, a type of enhanced delineation, can lead to a 60% reduction in fatal and injury crashes.**

RETROREFLECTIVE BACKPLATES

A retroreflective backplate is a backplate made by framing traffic signals with a 1-to-3-inch yellow retroreflective border. They improve the visibility of the signal by creating an illuminated border to provide greater contrast from the area around the signal. The backplates lead to improvements in both daytime and nighttime conditions. Oklahoma City Traffic Services Division has previously updated standards to include retroreflective backplates with 2" retroreflective border. **Safety benefits for retroreflective backplates include a 15% reduction in total crashes.**

FIGURE 32: RETROREFLECTIVE BACKPLATES



Source: FHWA

APPROPRIATE SPEED LIMITS

Posted speed limits are often the same as the legislative statutory speed limit. Agencies with the authority to set speed limits can establish non-statutory speed limits or designate reduced speed zones, and an increasing number are doing so. Roadway safety experts agree that speed control is one of the most important methods for reducing fatal and serious injury crashes. A driver may not see or be aware of the conditions along a corridor and may drive at a speed that feels reasonable for themselves but may not be for all system users, especially vulnerable road users, such as children and seniors. **A driver traveling at 30 miles per hour who hits a pedestrian has a 45 percent chance of killing or seriously injuring them. At 20 miles per hour, that percentage drops to 5 percent.**

FIGURE 33: SPEED LIMIT SIGN



Source: Adobe Stock

FIGURE 34: PEDESTRIAN HYBRID BEACON



Source: Adobe Stock

PEDESTRIAN HYBRID BEACONS

The pedestrian hybrid beacon (PHB) is a traffic control device designed to help pedestrians safely cross higher-speed roadways at midblock crossings and uncontrolled intersections. They are often installed at school crossings, parks, or other areas with large amounts of foot traffic. PHBs are typically effective at locations where three or more lanes will be crossed or in areas with high traffic volume. If PHBs are not familiar to a community, agencies and other governmental departments may need to provide education campaigns to ensure proper utilization. **PHBs can lead to a 55% reduction in pedestrian crashes.**

FIGURE 35: LEADING PEDESTRIAN INTERVAL



Source: sangabrielcity.com

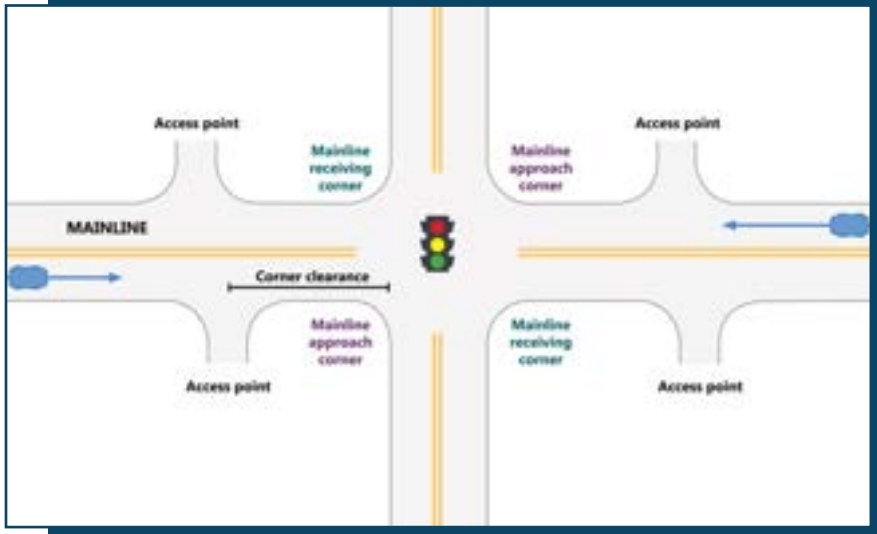
LEADING PEDESTRIAN INTERVAL

A leading pedestrian interval (LPI) allows pedestrians to enter the crosswalk at an intersection 3-7 seconds before vehicles receive a green indication. An LPI increases pedestrian visibility, aiming to reduce conflict with vehicles. LPI also helps pedestrians who may require more time to cross the street. **Installing an LPI can lead to a 13% reduction in pedestrian-vehicle crashes at intersections.** The Traffic Services Division has programmed 234 of 842 signalized intersection (27%) with LPI, many in the Downtown and Bricktown areas.

CORRIDOR ACCESS MANAGEMENT

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion. While access management is a broad topic, strategies can include the intentional spacing of intersections, utilizing protected turn lanes, and generally minimizing conflict points on a corridor. **Safety benefits include a 25 to 31% reduction in fatal and injury crashes along urban/suburban arterials.**

FIGURE 36: CORRIDOR ACCESS MANAGEMENT



Source: FHWA

WIDER EDGE LINES

Edge lines are the pavement markings at the edge of travel lanes and are designed to help drivers clearly identify the road alignment ahead. To improve safety, designers increase edge lines from the minimum normal line width of 4 inches to the maximum normal width of 6 inches. Wider edge lines enhance the visibility of travel lane boundaries compared to traditional edge lines. Oklahoma City Traffic Services Division has previously updated the pavement marking details to include 6" edge lines and center lines. **Wider edge lines can reduce crashes by up to 22% for fatal and injury crashes on rural freeways.**

FIGURE 37: WIDER EDGE LINES



Source: FHWA

FIGURE 38: YELLOW LIGHT AT SIGNAL



Source: Adobe Stock

YELLOW CLEARANCE INTERVALS

The yellow clearance interval is the time the yellow signal indication is displayed following a green light signal indication. Red-light running is a leading cause of crashes and fatalities at intersections, so timing the signal allows drivers to both stop safely without inviting accelerating through a yellow to red-light transition. A well-timed yellow clearance interval helps reduce crashes, indicating green has passed and red is following next. This leads to appropriate speeds and speed management at signalized intersections. **Safety benefits include a 36-50% reduction in red-light running when timed appropriately.**

TARGETED COUNTERMEASURES

In-field observations were made to understand the existing conditions impact on crash history. Observations were made through walking and driving each corridor and collected through the ArcGIS Field Maps app. These field-observations are grouped into corridor-wide and intersection-focused and used to select projects and recommendations that would improve traffic safety in each corridor, as well as Citywide.

STUDY CORRIDORS AND INTERSECTIONS

Seven road segments on the High-Injury Network (HIN) were selected for study corridors. These study corridors are examined on a deeper level to make targeted recommendations that will improve traffic safety on the city's most unsafe corridors. These corridors are selected by priority level, with input from the City Staff. Scoring criteria included equity, engagement, and feasibility. Data for each of the criteria was gathered through:

EQUITY

- Disadvantaged Areas (USDOT ETC Explorer)
- Transportation Disadvantaged Areas (USDOT ETC Explorer)

ENGAGEMENT

- Social Pinpoint Map Survey Comments
- Review Committee Study Area Comments (from Meeting 2)
- Review Committee Priority Selection (from Meeting 3)

FEASIBILITY

- Current City Projects
- ODOT On/Off System

In coordination with Oklahoma City Staff and the Vision Zero Advisory Board (VZAB), seven study corridors were selected to have targeted recommendations and countermeasures found. The study corridors add up to 14.89 miles of roadway, capturing 281 KAB crashes within their limits (**Table 21**). Each corridor spans between multiple land use contexts across various parts of Oklahoma City.

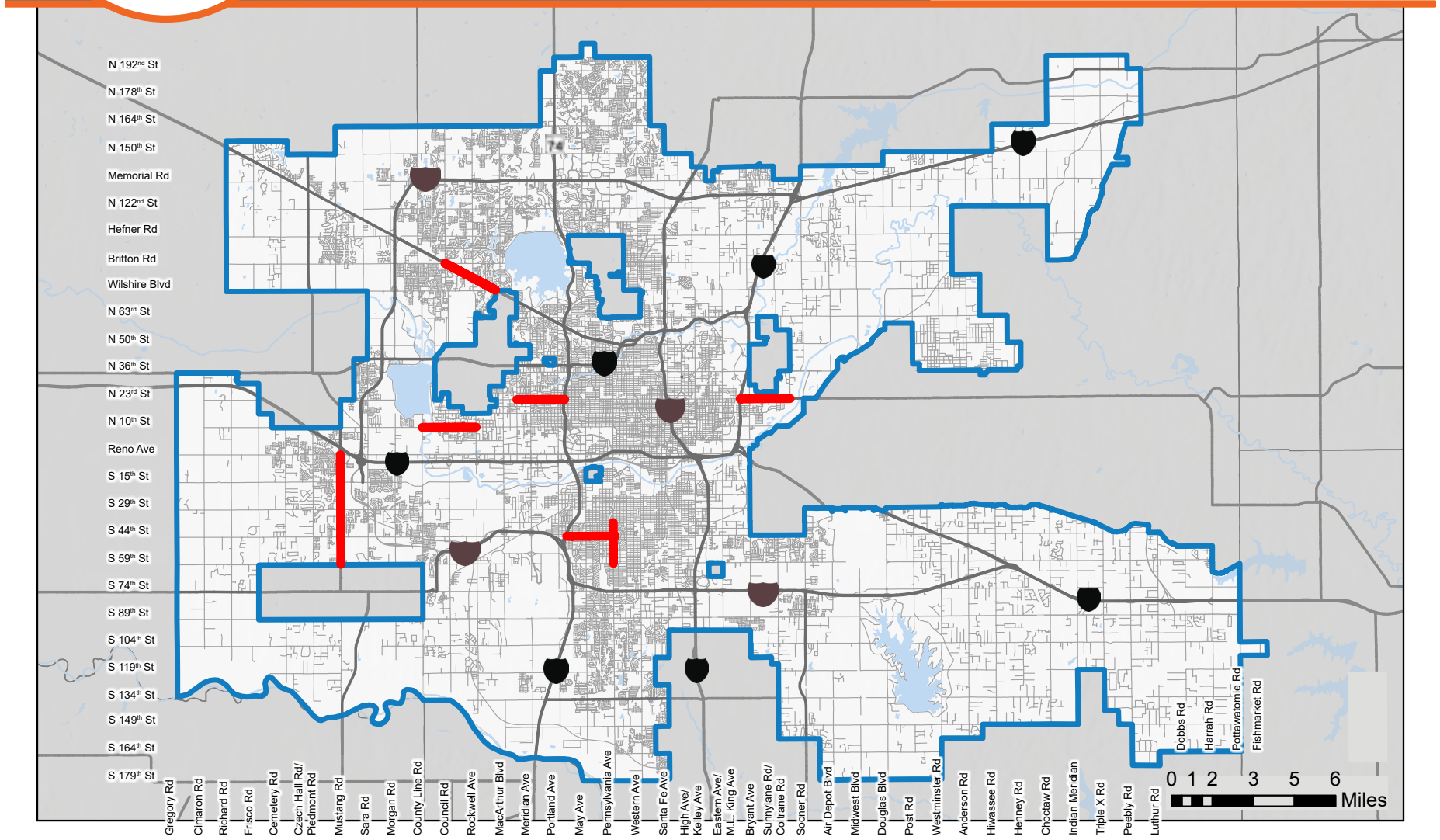
Crash reports and in-field observations were studied to understand existing conditions and crash locations on the study corridors. These observations were the initial step in understanding the state of safety on the seven study corridors and led to the targeted countermeasures.

TABLE 21: STUDY CORRIDORS

Study Corridors								
Study Corridor	**Limits**		**Length (mi)**	**Crashes (2017-2021)**				**Daily Volume**
	From	**To**		**K**	**A**	**B**	**Total KABs**	
1. NE 23rd Street	I 35	N Bartell Rd	1.82	8	5	23	36	15,136
2. NW 23rd Street	N Ann Arbor Ave	N I 44 Hwy	1.75	3	6	27	36	15,132
3. Mustang Road	Reno Ave	SW 59th St	4	7	10	50	67	24,425
4. SW 44th Street	I-44 NBFR	Johnston Dr	1.77	3	9	32	44	10,705
5. S Pennsylvania Avenue	SW Grand Blvd	SW 59th St	1.49	3	3	25	31	12,415
6. NW 10th Street	County Line Rd	N Rockwell Ave	1.96	3	6	16	25	8,689
7. NW Expressway	N Council Rd	N Wilshire Blvd	2.1	0	12	30	42	18,006
		Total	***14.89***	***27***	***51***	***203***	***281***	***14,930***

EXHIBIT 20: STUDY CORRIDORS

City of Oklahoma City Vision Zero Action Plan



GLOBAL RECOMMENDATIONS

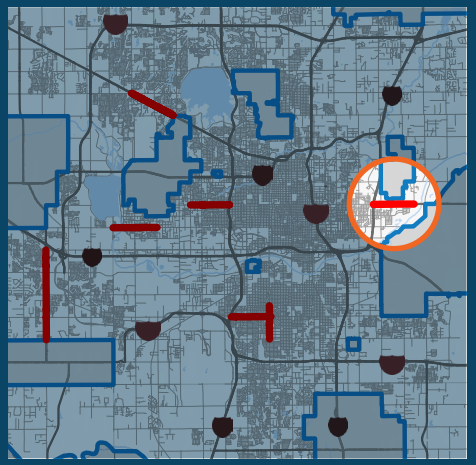
Through walking and driving the various study corridors several traffic safety concerns have been identified for Citywide recommendations to be implemented throughout all study corridors. Pedestrian infrastructure was often observed to be insufficient. Crosswalk markings at signalized intersections were often observed to be either missing or fading and hard to differentiate from the surrounding pavement. Some intersections with pedestrian crossings also did not have pedestrian signals or push button assemblies. It is recommended to restripe or add high-visibility pedestrian crosswalks and signals at all signalized intersections. It was also observed that some traffic signal equipment along the study corridor was outdated or missing, including pedestrian signal heads, crossing signs, push buttons, radar detection, and reflective backplates at signal heads. A few intersections had pedestrian signal equipment but did not have safe crossings for vulnerable road users.

It is recommended that all signalized intersections have installed or be upgraded to include pedestrian signal heads and crossing signs, which are accompanied by push buttons to make safe crossings. Retroreflective backplates for traffic signal heads are also recommended to increase drivers' visibility. Finally, vehicle detection systems should be reviewed to identify malfunctioning detector hardware or upgraded to optimize traffic flow and improve safety (e.g., dilemma zone detection). These recommendations should be considered for implementation throughout each study corridor.

FIGURE 39: MISSING PEDESTRIAN INFRASTRUCTURE ON MUSTANG ROAD AND NORTHWEST EXPRESSWAY







CORRIDOR 1: NE 23RD STREET

Context

The NE 23rd Street Corridor (Corridor 1), also known as US-62, from IH-35 to N Bartell Road that is 1.82 miles in length. Corridor 1 is located just to the east of the Oklahoma State Capitol between primarily single family residential and community commercial zoning districts it also has moderate industrial zoning scattered along the corridor and a small section zoned for agricultural. This section of NE 23rd Street is primarily a 4-lane undivided roadway with a volume of 15,100 vehicles per day. IH-35 intersection and N Bryant intersection have slightly different configurations, IH-35 intersection has a painted median as well as designated turning lanes and N Bryant intersection has a designated center turn lane from east and west approach. Speed limits vary on this corridor from 40 miles per hour (MPH) to 45 MPH.

Crash History

There were 146 total crashes on this section of NE 23rd Street between 2017-2021. Of these total crashes, 36 were KABs. Key takeaways for crash trends along Corridor 1 were the following:

39.5%

of KAB crashes were intersection-related

34.2%

The top manner of collision was rear-end crashes accounting for 50 of 146 total crashes

28.1%

Top contributing factor was “Failed to Yield or Stop”, accounting for 41 of the 146 total crashes

Corridor Wide Recommendations

It is recommended to install countermeasures throughout Corridor 1 that will improve driver visibility. Lack of visibility is a concern throughout the corridor due to overgrown vegetation and the vertical crest of the road. To mitigate this safety concern, it is recommended to trim overgrown vegetation and install longitudinal rumble strips to the center striping of NE 23rd.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

N Bryant Avenue Intersection

- Close the first driveway east of N Bryant Avenue in the southeast corner of the intersection

N Ray Avenue Intersection

- Install a concrete bus pad

N Coltrane Road Intersection

- Construct left-turn bays at this intersection along NE 23rd Street
- Once left-turn lanes are constructed traffic signals will need to be replaced as well as length of current traffic signal mast arms be reevaluated for the new intersection geometry
- Upgrade vehicle detection system to ensure dilemma zone detection is provided

TABLE 22: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR NE 23RD STREET

Countermeasure Crash Modification Factors for Corridor 1					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
1.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
1.2	Corridor	Trim Vegetation	1024	Remove or relocate fixed objects outside of clear zone	0.62
1.3	Corridor	Longitudinal Rumble Strips	3346	Install centerline rumble strips	0.91
1.A.1	N Bryant Avenue	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
1.B.1	N Ray Avenue	Concrete Bus Pad	N/A	Install a concrete bus pad	N/A
1.C.1	N Coltrane Road	Left Turn Bays	3948	Install left-turn lane	0.79
1.C.2	N Coltrane Road	Upgrade Vehicle Detection System	4854	Installation of an actuated advance warning dilemma zone protection system at high-speed signalized intersections	0.564

Table 22 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 40** summarizes all recommendations and countermeasures along NE 23rd Street.

FIGURE 40: NE 23RD STREET RECOMMENDATIONS

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CORRIDOR 1: NE 23RD STREET
FROM I 35 TO N BARTELL RD



Driveway Consolidation

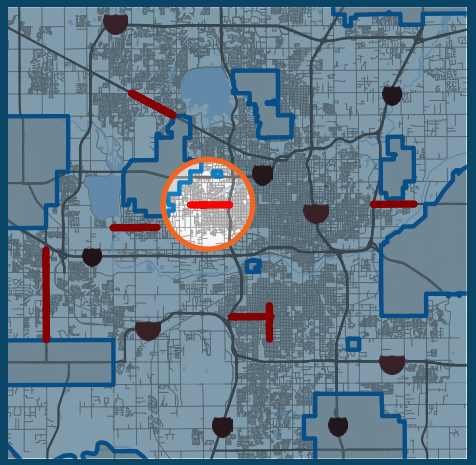
Concrete Bus Pad

Left Turn Lane

Upgrade Vehicle Detection System

CORRIDOR WIDE

- **Retroreflective Backplates**
- **Trim Vegetation**
- **Longitudinal Rumble Strips**



CORRIDOR 2: NW 23RD STREET

Context

The NW 23rd Street Corridor (Corridor 2) is the section from N Ann Arbor Ave to N IH-44 that is 1.75 miles in length. This corridor is surrounded by mainly single-family residential with some commercial and higher density residential zones. This section of NW 23rd Street starts is a 4 lane undivided switches to a 5-lane undivided with a center turn lane and then back into a 4-lane undivided. N Ann Arbor Ave, N Meridian Ave, and N Portland Ave intersections have designated left turn lanes. Between Ridgecrest Dr and U.S. Bicycle Route 66 there is a raised median. This corridor experiences daily road volumes of 15,100, and has speed limits between 35 and 40 MPH.

Crash History

There were 342 total crashes on this section of NW 23rd Street between 2017-2021. Of these total crashes, 36 were KABs. Key takeaways for crash trends along Corridor 2 were the following:

93.6%

of KAB crashes were intersection-related

40.4%

The top manner of collision was rear-end crashes accounting for 138 of 342 total crashes

25.4%

Top contributing factor was “Failed to Yield or Stop” accounting for 87 of the 342 total crashes

Corridor Wide Recommendations

Access management could be improved throughout the intersection to increase safety as well as to improve access to the corridor. It is recommended that the existing two-way left-turn lanes be converted into a raised median with channelized left-turn bays. To improve pedestrian access to transit it is recommended that the corridor be evaluated for midblock crossings leading to transit stops parking along the north side of the corridor between E Portland Avenue and N Ridgecrest Drive. To improve traffic safety, it is recommended that angled parking be converted to parallel parking and a concrete buffer be installed.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

N Ann Arbor Avenue Intersection

- Install a flashing yellow arrow to signal heads
- Refresh pavement markings

N Sterling Avenue Intersection

- Install a Pedestrian Hybrid Beacon

N Sterling Court Intersection

- Trim overgrown vegetation

N Minnie Lane Intersection

- Install ADA-compliant ramps
- Install pedestrian signals
- Stripe high visibility crosswalks

N Meridian Avenue Intersection

- Install a roundabout
- Close the collector opening at NW 19th Street
- Install lighting
- Install accessible pedestrian signals to pedestrian crossings

N Utah Avenue Intersection

- Refresh pavement markings

N Portland Avenue Intersection

- Stripe high visibility crosswalks on all approaches
- Install a pedestrian-scale luminaire pole on the northwest corner of the intersection
- Replace existing left-turn lane and flush median pavement markings along the east-west approaches with raised medians
- Limit driveway access within these left-turn lanes to right-in/right-out only
- Install entrance-only signage for the driveways along northbound N Portland Avenue just north of the northwest corner
- Install directional arrows in the parking areas

N Grand Boulevard Diamond Interchange

- Install east-west crosswalks on the north and south sides of NW 23rd Street on both sides of the interchange
- Install ADA-compliant curb ramps and pedestrian signals at both proposed crosswalks
- Straighten the current Bicycle Route 66 trail where it crosses NW 23rd Street on the west side of the N Grand Boulevard Interchange
- Remove the current trail crosswalk and the traffic island on the southwest corner of the interchange
- Extend the existing median along the west approach to provide a pedestrian refuge
- Shorten the curb radius for the existing eastbound right-turn lane so that the traffic signal would control the right-turn lane

TABLE 23: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR NW 23RD STREET

Countermeasure Crash Modification Factors for Corridor 2					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
2.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
2.2	Corridor	Left Turn Bays	279	Introduce raised/curb left-turn channelization	0.87
2.3	Corridor	Parking	163	Convert angle parking to parallel parking	0.65
2.4	Corridor	Midblock Crossing	11181	Presence of a pedestrian crosswalk at midblock locations	0.82
2.A.1	N Ann Arbor Ave	Pavement Markings	11280	Install contrast pavement markings	0.84
2.A.2	N Ann Arbor Ave	Flashing Yellow Arrow	7730	Install left turn flashing yellow arrow signals and supplemental traffic signs	0.857
2.B.1	N Sterling Ct	Trim Vegetation	1024	Remove or relocate fixed objects outside of clear zone	0.62
2.B.2	N Sterling Ave	Midblock Crossing	11181	Presence of a pedestrian crosswalk at midblock locations	0.82
2.B.3	N Sterling Ave	Pedestrian Hybrid Beacon	10585	Install a pedestrian hybrid beacon (PHB or HAWK)	0.883
2.C.1	N Minnie Lane	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
2.D.1	N Meridian Ave	Close Collector	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
2.D.2	N Meridian Ave	Roundabout (RAB)	4868	Conversion of intersection to roundabout	0.583
2.D.3	N Meridian Ave	Illumination	7776	Install lighting	0.68
2.D.4	N Meridian Ave	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
2.E.1	N Utah Ave	Pavement Markings	11280	Install contrast pavement markings	0.84

TABLE 23: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR NW 23RD STREET (CONTINUED)

Countermeasure Crash Modification Factors for Corridor 2					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
2.F.1	N Portland Ave	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
2.F.2	N Portland Ave	Pedestrian Scale Luminaire	7776	Install lighting	0.68
2.F.3	N Portland Ave	Right In Right Out	9821	Install right-in-right-out (RIRO) operations at stop-controlled intersections	0.55
2.F.4	N Portland Ave	Raised Medians	2219	Install raised median	0.29
2.F.5	N Portland Ave	Entrance Only Signage	–	–	–
2.G.1	N Grand Blvd	Crosswalks	4123	Install high-visibility crosswalk	0.6
2.G.2	N Grand Blvd	Pedestrian Refuge	9120	Median treatment for ped/bike safety	0.86
2.G.3	N Grand Blvd	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
2.G.4	N Grand Blvd	Road Alignment	N/A	Adjust alignment to accommodate added RAB	N/A
2.G.5	N Grand Blvd	Curb Modifications	N/A	Adjust curbs to accommodate added RAB	N/A

Table 23 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 41** summarizes all recommendations and countermeasures along NW 23rd Street.

FIGURE 41: NW 23RD STREET RECOMMENDATIONS

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OKLAHOMA CITY

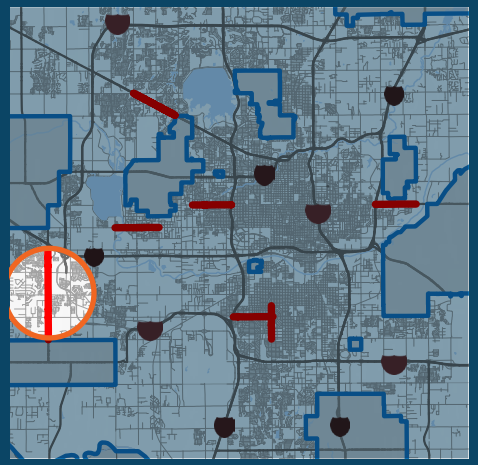
CORRIDOR 2: NW 23RD STREET
FROM N ANN ARBOR AVE TO N I-44 HWY



- Pavement Markings
- Flashing Yellow Arrow
- Trim Vegetation
- Midblock Crossing
- Pedestrian Hybrid Beacon
- Pedestrian Improvements
- ADA Compliance
- Driveway Consolidation
- Roundabout
- Illumination
- Pedestrian Improvements
- Pavement Markings
- Raised Medians
- Driveway Consolidation
- Right In Right Out (ONLY)
- Curb Modifications
- Pedestrian Improvements
- Road Alignment
- Pedestrian Improvements
- ADA Compliance

CORRIDOR WIDE

- Two-Way Left-Turn Lane
- Retroreflective Backplates
- P — Parking and Driveways



CORRIDOR 3: S MUSTANG ROAD

Context

The S Mustang Road Corridor (Corridor 3) includes the segment between Reno Ave and SW 59th Street, that is 4 miles in length. Corridor 3 is located between a variety of different land use zones such as residential commercial, planned unit development, and agricultural. This section of S Mustang Road is primarily a 4-lane undivided with center turn lanes at various intersections and average daily traffic of 24,400. Speed limits for this corridor range from 45 MPH to 55 MPH.

Crash History

There were 561 total crashes on this section of S Mustang Road between 2017-2021. Of these total crashes, 67 were KABs. Key takeaways for crash trends along Corridor 3 were the following:

50.7%

of KAB crashes were intersection-related

48.6%

The top manner of collision was rear-end crashes accounting for 270 of 561 total crashes

30.5%

Top contributing factor was "Failed to Yield or Stop" accounting for 171 of the 561 total crashes

Corridor Wide Recommendations

The current cross-section along S Mustang Road is a four-lane undivided with narrow double-yellow centerline markings. To slow traffic, reduce lane departure, and increase overall safety throughout the corridor it is recommended to reduce lane widths by six inches to allow for wide (6-inch) double-yellow centerline markings with a center rumble strip.

W Reno Avenue Intersection

- Update pedestrian signals
- Stripe high visibility crosswalk
- Install ADA-compliant ramps

SW 5th Street Intersection

- Widen current intersection to provide dedicated left-turn lanes for northbound and southbound traffic
- Install a traffic signal
- Relocate the driveway for the current AAMCO business to align with the existing westbound SW 5th Street (implement after the intersection is signalized)

SW 15th Street Intersection

- Update pedestrian signals
- Stripe high-visibility crosswalks
- Install ADA-compliant curb ramps
- Base pedestrian clearance intervals on Institute of Transportation Engineers (ITE)-recommended best practices

SW 44th Street Intersection

- Refurbish lane markings at the SW 44th intersection
- Stripe high-contrast lane markings extending 500 feet from the intersection on north and south approaches
- Install lighting
- Update or replace traffic signals where necessary

TABLE 24: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR S MUSTANG ROAD

Countermeasure Crash Modification Factors for Corridor 3					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
3.1	Corridor	Pavement Striping	11280	Install contrast pavement markings	0.84
3.A.1	W Reno Ave	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
3.A.2	W Reno Ave	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
3.B.1	SW 5th St	Traffic Signal Improvements	316	Install a traffic signal	0.86
3.B.2	SW 5th St	Dedicated Left Turn Lanes	3948	Install left-turn lane	0.79
3.B.3	SW 5th St	Driveway Relocation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
3.C.1	SW 15th St	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
3.C.2	SW 15th St	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
3.C.3	SW 15th St	Pedestrian Clearance Intervals	5252	Increase length of signal phases to allow for pedestrians more crossing time	0.49
3.D.1	SW 44th Street	High Contrast Lane Markings	11280	Install contrast pavement markings	0.84
3.D.2	SW 44th Street	Traffic Signal Improvements	316	Install a traffic signal	0.86
3.D.3	SW 44th Street	Illumination	7776	Install lighting	0.68

Table 24 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 42** summarizes all recommendations and countermeasures along S Mustang Road.

FIGURE 42: S MUSTANG ROAD RECOMMENDATIONS

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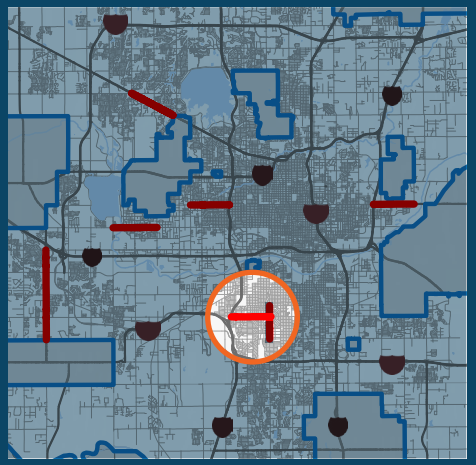
CORRIDOR 3: MUSTANG ROAD
FROM W RENO AVE TO SW 59TH ST



- **A – w Reno Avenue**
  - Pedestrian Improvements
  - ADA Compliance
- **B – SW 5th Street**
  - Traffic Signal
  - Roadway Improvements
  - Dedicated Left & Right Turn
- **C – SW 15th Street**
  - Pedestrian Improvements
  - ADA Compliance
- **D – SW 44th Street**
  - High-Contrast Lane Markings
  - Traffic Signal
  - Lighting Improvements

CORRIDOR WIDE

- Pavement Striping



CORRIDOR 4: SW 44TH STREET

Context

The SW 44th Street Corridor (Corridor 4) includes the segment between I 44 Northbound Frontage Road and Johnston Dr that is 1.77 miles in length and had daily traffic volumes of 10,700. This corridor is located between residential, commercial, and office land uses. This section of SW 44th Street has a speed limit of 40 MPH and is a 4-lane undivided road with designated left turn lanes at major intersections.

Crash History

There were 188 total crashes on this section of SW 44th Street between 2017-2021. Of these total crashes, 44 were KABs. Key takeaways for crash trends along Corridor 4 were the following:

100%

of KAB crashes were intersection-related

33.0%

The top manner of collision was rear-end crashes accounting for 62 of 188 total crashes

36.7%

Top contributing factor was "Failed to Yield or Stop" accounting for 69 of the 188 total crashes

Corridor Wide Recommendations

Due to the volume of traffic along this corridor it is recommended that the road be reconfigured from a four-lane undivided to a three lane – two through lanes with a center two-way left turn lane. This corridor's pedestrian and bicycle accessibility should be improved by installing a sidewalk on the south side of the corridor from S Agnew Street to S Pennsylvania Street. To improve visibility throughout the corridor it is recommended that updated lighting be installed, and high-contrast lane markings be striped along the corridor from S Ross Avenue to S Miller Avenue. Access management should also be addressed, driveways along the corridor from S May Avenue to S Ross Avenue need to be consolidated – priority given to those closest to the intersections.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

I-44 Northbound Frontage Road Intersection

- Install a center turn lane to mitigate the lack of visibility due to the crest of the vertical curve at this intersection

S Independence Avenue Intersection

- Install additional lighting in the northeast corner
- Refresh pavement markings to improve visibility
- Update traffic signals to include a flashing yellow arrow
- Consolidate driveways near the intersection to reduce collision risk
- Install pedestrian bump-outs

S Land Avenue Intersection

- Install a midblock crossing

S May Avenue Intersection

- Update pedestrian signals
- Stripe high-visibility crosswalks
- Install ADA-compliant curb ramps

S Agnew Avenue Intersection

- Update existing left-turn yield on green ball symbol sign
- Close driveways closest to the intersection wherever possible

TABLE 25: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR SW 44TH STREET

Countermeasure Crash Modification Factors for Corridor 4					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
4.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
4.2	Corridor	Illumination	7776	Install lighting	0.68
4.3	Corridor	Sidewalks	11246	Install sidewalk	0.598
4.4	Corridor	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
4.5	Corridor	Roadway Reconfiguration	2337	Install TWLTL (two way left turn lane) on two lane road	0.775
4.6	Corridor	High-Contrast Lane Markings	11280	Install contrast pavement markings	0.84
4.A.1	I-44 Frontage Rd	Center Turn Lane	2337	Install TWLTL (two way left turn lane) on two lane road	0.775
4.B.1	S Independence Rd	Flashing Yellow Arrow	7730	Install left turn flashing yellow arrow signals and supplemental traffic signs	0.857
4.B.2	S Independence Rd	Illumination	7776	Install lighting	0.68
4.B.3	S Independence Rd	Pedestrian Bump Outs	9120	Median treatment for ped/bike safety	0.86
4.B.4	S Independence Rd	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
4.B.5	S Independence Rd	Pavement Markings	11208	Install contrast pavement markings	0.84
4.C.1	S Land Ave	Midblock Crossing	11181	Presence of a pedestrian crosswalk at midblock locations	0.82
4.D.1	S May Ave	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
4.D.2	S May Ave	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
4.E.1	S Agnew Ave	Traffic Signal Updates	4115	Increase cycle length for pedestrian crossing	0.5
4.E.2	S Agnew Ave	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93

Table 25 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 43** summarizes all recommendations and countermeasures along SW 44th Street.

FIGURE 43: SW 44TH STREET RECOMMENDATIONS

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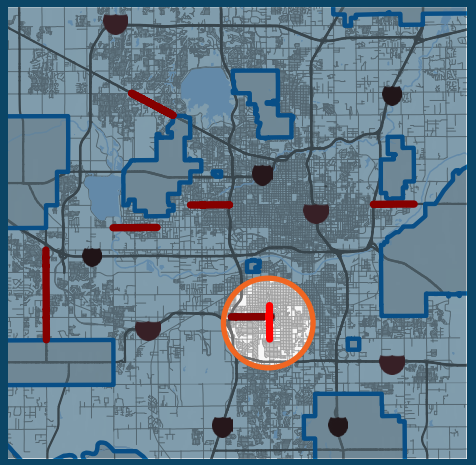
CORRIDOR 4: SW 44TH STREET
FROM I-35 FRONTAGE RD TO JOHNSTON DR



- **A – I-44 Frontage Rd.**
  - Center Turn Lane
- **B – S Independence Rd.**
  - Traffic Signal Updates
  - Illumination
  - Pedestrian Improvements
  - Driveway Consolidation
  - Pavement Markings
- **C – S Land Ave.**
  - Midblock Crossing
- **D – S May Ave.**
  - Pedestrian Improvements
  - ADA Compliance
- **E – S. Agnew Ave.**
  - Traffic Signal Updates
  - Driveway Consolidation
- Roadway Reconfiguration

CORRIDOR WIDE

- Illumination
- Retroreflective Backplates
- Sidewalks
- Driveway Consolidation
- Roadway Improvements



CORRIDOR 5: S PENNSYLVANIA AVENUE

Context

The S Pennsylvania Avenue Corridor (Corridor 5) includes the segment from SW Grand Blvd to SW 59th St that is 1.49 miles in length. Corridor 5 is located between commercial and residential land uses. This section of S Pennsylvania is primarily a 4-lane undivided, but does have a median at SW Grand and a median with a center turn lane from one approach at both SW 59th and SW 44th St This corridor experiences traffic volumes of 12,400 with a speed limit of 40 MPH.

Crash History

There were 229 total crashes on this section of S Pennsylvania Avenue between 2017-2021. Of these total crashes, 31 were KABs. Key takeaways for crash trends along Corridor 5 were the following:

100%

of KAB crashes were intersection-related

33.6%

The top manner of collision was rear-end crashes accounting for 77 of 229 total crashes

34.9%

Top contributing factor was "Failed to Yield or Stop" accounting for 80 of the 229 total crashes

Corridor Wide Recommendations

It is recommended that driveways be consolidated along the entire corridor, prioritizing closure of driveways closest to intersections. Reducing the number of potential points of conflict at an intersection by closing driveways will allow for drivers to better navigate intersections improving safety.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

SW Grand Boulevard Intersection

- Install updated lighting
- Update pedestrian pavement markings
- Place medians leading to and within this intersection
- Installation of a “peanut-shaped” roundabout should be considered

SW 44th Street Intersection

- Update or replace traffic signals
- Review the yellow and all-red signal clearance intervals
- Replace the visor on the rightmost signal head

Entrance to U.S. Grant High School

- Expand the pedestrian traffic signal to include the driveway leading to U.S. Grant High School

SW 51st Street Intersection

- Realign the east approach to create a four-leg intersection

SW 59th Street Intersection

- Update pedestrian signals
- Stripe high-visibility crosswalks
- Install ADA-compliant curb ramps
- Install widened sidewalks or bike lanes

TABLE 26: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR S PENNSYLVANIA AVENUE

Countermeasure Crash Modification Factors for Corridor 5					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
5.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
5.2	Corridor	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
5.A.1	SW Grand Blvd	Illumination	7776	Install lighting	0.68
5.A.2	SW Grand Blvd	Pedestrian Pavement Markings	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
5.A.3	SW Grand Blvd	Medians	2219	Install raised median	0.29
5.A.4	SW Grand Blvd	Roundabout	4868	Conversion of intersection to roundabout	0.583
5.B.1	SW 44th St	Traffic Signal Updates	316	Install a traffic signal	0.86
5.C.1	U.S. Grant HS	Pedestrian Traffic Signal	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
5.D.1	SW 51st St	Road Alignment	N/A	Adjust road alignment	N/A
5.E.1	SW 59th St	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
5.E.2	SW 59th St	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
5.E.3	SW 59th St	Widened Sidewalks	2197	Change sidewalk width from 4 to 6 feet (bike crashes)	–

Table 26 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 44** summarizes all recommendations and countermeasures along S Pennsylvania Avenue.

FIGURE 44: S PENNSYLVANIA AVENUE RECOMMENDATIONS

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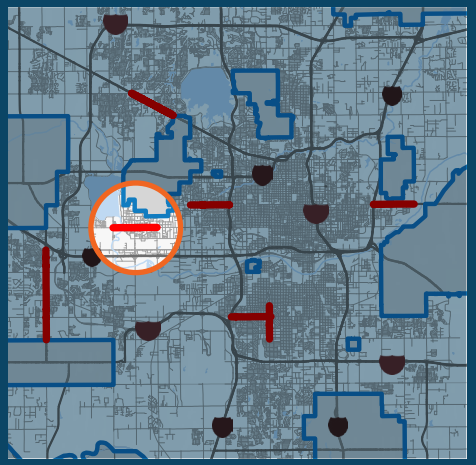
CORRIDOR 5: S PENNSYLVANIA AVENUE
FROM SW GRAND BLVD TO SW 59TH ST



- **A – SW Grand Blvd.**
  - Illumination
  - Pavement Markings
  - Pedestrian Improvements
  - Roundabout
- **B – SW 44th Street**
  - Traffic Signal Updates
- **C – US Grant HS**
  - Pedestrian Improvements
- **D – SW 51st St.**
  - Road Alignment
- **E – SW 59th St.**
  - Pedestrian Improvements
  - ADA Compliance

CORRIDOR WIDE

- Retroreflective Backplates
- Access Management



CORRIDOR 6: NW 10TH STREET

Context

The NW 10th Street corridor (Corridor 6) includes the segment from County Line Rd to N Rockwell Ave that is 1.96 miles in length. This corridor is located between a variety of different land use zones. Zones include varying densities of residential, agricultural, planned unit development, and industrial. This section of NW 10th Street is a four-lane undivided road with center turn lanes at N Rockwell Ave, N Council Rd, and County Line Rd intersections. This corridor has a speed limit of 40 MPH and 45 MPH and average daily traffic volumes of 8,700.

Crash History

There were 180 total crashes on this section of NW 10th Street between 2017-2021. Of these total crashes, 25 were KABs. Key takeaways for crash trends along Corridor 6 were the following:

100%

of KAB crashes were intersection-related

38.3%

The top manner of collision was rear-end crashes accounting for 69 of 180 total crashes

22.8%

Top contributing factor was "Failed to Yield or Stop" accounting for 41 of the 180 total crashes

Corridor Wide Recommendations

This corridor is lacking sufficient access, it is recommended that the roadway be reconfigured from a four-lane undivided to a three-lane with a designated turning lane. Speed control is also a concern throughout this intersection; to mitigate this concern it is recommended to install speed management measures. Lastly, the corridor would benefit from installing updated lighting to improve visibility and safety.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

County Line Road Intersection

- Consolidate driveways, focusing on closing driveways nearest to the intersection whenever possible
- Install high-contrast lane markings
- Implement measures to improve visibility for the right-turn lane
- Roadway reconfiguration to three lanes with a center turn lane and designated bike lanes

North Canadian River Bridge Intersection

- Widen existing sidewalk on the bridge

N Eagle Lane Intersection

- Stripe high-visibility crosswalks

N Council Road Intersection

- Upgrade street lighting
- Install sidewalks extending past the intersection
- Consolidate or relocate driveways wherever possible giving priority to driveways closest to the intersection

Driveways West of Glade Avenue Intersection

- Remove obstructing wall

Glade Avenue Intersection

- Install pavement markings to reduce dangers of limited vertical sight distance
- Install signage to reduce dangers of limited vertical sight distance
- Remove obstructions
- Install a pedestrian crosswalk
- Install stop bars

N Rockwell Avenue Intersection

- Install signal lighting
- Stripe high-visibility crosswalks

TABLE 27: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR NW 10TH STREET

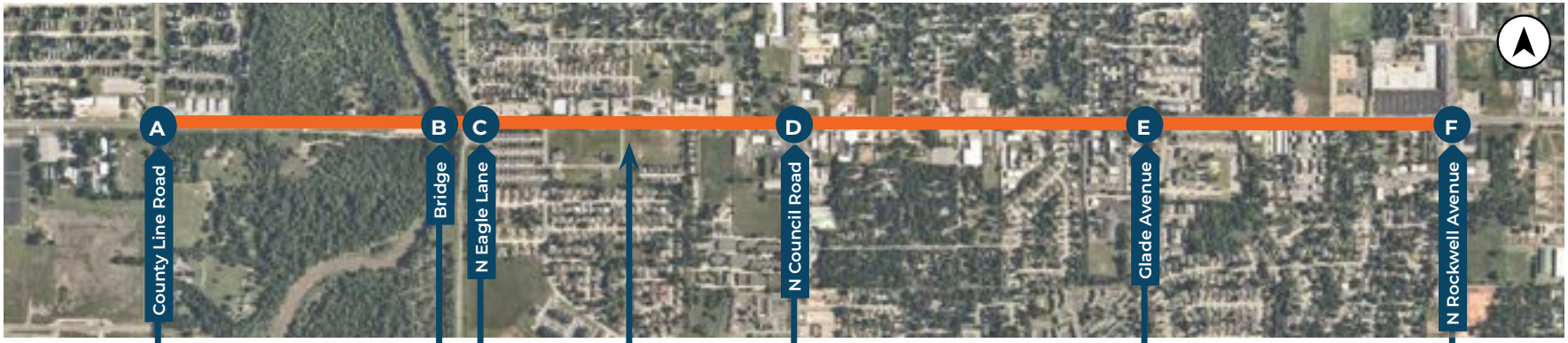
Countermeasure Crash Modification Factors for Corridor 6					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
6.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
6.2	Corridor	Roadway Reconfiguration	2337	Install TWLTL (two way left turn lane) on two lane road	0.775
6.3	Corridor	Speed Management	6885	Install dynamic speed feedback sign	0.95
6.4	Corridor	Illumination	7776	Install lighting	0.68
6.A.1	County Line Rd	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
6.A.2	County Line Rd	High Contrast Lane Markings	11280	Install contrast pavement markings	0.84
6.A.3	County Line Rd	Roadway Reconfiguration	2337	Install TWLTL (two way left turn lane) on two lane road	0.775
6.B.1	North Canadian River Bridge	Widen Sidewalk	2197	Change sidewalk width from 4–6 meters (bike crashes)	–
6.C.1	N Eagle Ln	High Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
6.D.1	N Council Rd	Driveway Consolidation	442	Closure or complete relocation of all driveways from functional area of intersection	0.93
6.D.2	N Council Rd	Illumination	7776	Install lighting	0.68
6.D.3	N Council Rd	Install Sidewalks	11246	Install sidewalk	0.598
6.E.1	Glade Ave	Remove Obstructing Wall	1024	Remove or relocate fixed objects outside of clear zone	0.62
6.E.2	Glade Ave	Crosswalk and Stop Bars	4123	Install high-visibility crosswalk	0.6
6.E.3	Glade Ave	Improved Vertical Sight Distance	720	Flatten crest vertical curve	0.8
6.F.1	N Rockwell Ave	Signal Lighting	316	Install a traffic signal	0.86
6.F.2	N Rockwell Ave	High Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6

Table 27 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 45** summarizes all recommendations and countermeasures along NW 10th Street.

FIGURE 45: NW 10TH STREET RECOMMENDATIONS

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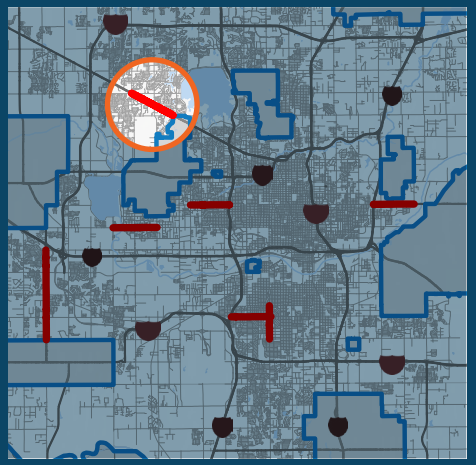
CORRIDOR 6: NW 10TH STREET
FROM COUNTY LINE RD TO N ROCKWELL AVE



- Driveway Consolidation
- High Contrast Lane Markings
- Improve Visibility
- Sidewalk Improvements
- High Visibility Crosswalks
- Roadway Reconfiguration
- Driveway Consolidation
- Illumination
- Install Sidewalks
- Remove Obstructing Wall
- Pedestrian Improvements
- Signal Lighting
- High Visibility Crosswalks

CORRIDOR WIDE

- Retroreflective Backplates
- Access Management



CORRIDOR 7: NW EXPRESSWAY

Context

The NW Expressway corridor (Corridor 7) includes the segment from N Council Rd to N Wilshire Blvd that is 2.1 miles long. This corridor is between commercial, industrial, residential, and planned unit development land use zones. This section of NW Expressway ranges between a six-lane divided and an eight-lane divided, six total through lanes and designated turn lanes. This corridor has average daily traffic of 18,000 and speed limits between 45 MPH and 50 MPH.

Crash History

There were 635 total crashes on this section of NW Expressway between 2017-2021. Of these total crashes, 42 were KABs. Key takeaways for crash trends along Corridor 7 were the following:

61.5%

of KAB crashes were intersection-related

49.0%

The top manner of collision was rear-end crashes accounting for 311 of 635 total crashes

27.9%

Top contributing factor was “Followed Too Close” accounting for 177 of the 635 total crashes

Corridor Wide Recommendations

This corridor was observed to have insufficient roadway accessibility, pedestrian infrastructure, and lighting. To increase roadway accessibility and traffic safety it is recommended to install medians with left-turn offsets as well as dedicated right turn lanes. To ensure safe travel for pedestrians it is recommended to install sidewalks and curbs. It is also recommended to install updated lighting throughout the entire corridor.

It is recommended to install retroreflective backplates to all traffic signals. Retroreflective backplates will improve traffic signal visibility for drivers allowing for a safer flow of traffic.

N Council Road Intersection

- Install a left turn lane
- Install updated pedestrian signals
- Stripe high-visibility crosswalks
- Install ADA-complaint curb ramps
- Upgrade drainage to accommodate pedestrian facilities

NW Passage Intersection

- Install updated pedestrian signals
- Stripe high-visibility crosswalks
- Install ADA-compliant curbs ramps
- Consider the installation of a no-right-turn-on-red sign
- Install a bus pad

Silver Crossing Intersection

- Explore lane reduction methods for this intersection.

Glade Avenue Intersection

- Install a dedicated right-turn lane

W Wilshire Boulevard Intersection

- Update the high-visibility crosswalk
- Increase signal crossing time

N Wilshire Boulevard Intersection

- Close the access point to NW Expressway just east of the traffic signal and pedestrian bridge at NW Wilshire Boulevard

TABLE 28: COUNTERMEASURE CRASH MODIFICATION FACTORS FOR NW EXPRESSWAY

Countermeasure Crash Modification Factors for Corridor 7					
ID	**Location**	**Recommendation**	**CMF ID**	**Countermeasure**	**CMF**
7.1	Corridor	Retroreflective Backplates	1410	Add 3-inch yellow retroreflective sheeting to signal backplates	0.85
7.2	Corridor	Medians with left-turn offsets	279	Introduce raised/curb left-turn channelization	0.87
7.3	Corridor	Right -turn lanes	5650	Install right-turn lane	0.7
7.4	Corridor	Sidewalks	11246	Install sidewalk	0.598
7.5	Corridor	Curbs	2375	Install curb and gutter	0.89
7.6	Corridor	Illumination	7776	Install lighting	0.68
7.A.1	N Council Rd	Left Turn Lane	3948	Install left-turn lane	0.79
7.A.2	N Council Rd	Drainage Updates	2375	Install curb and gutter	0.89
7.A.3	N Council Rd	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
7.A.4	N Council Rd	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
7.B.1	NW Passage	Pedestrian Signals	8967	Implement systemic signing and visibility improvements at signalized intersections	0.732
7.B.2	NW Passage	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
7.B.3	NW Passage	No Right-on-Red Signage	5194	Prohibit right-turn-on-red	–
7.B.4	NW Passage	Bus Pad	N/A	Install concrete bus pad	N/A
7.C.1	Silver Crossing	Road Reconfiguration	2841	–	0.53
7.D.1	Glade Ave	Right Turn Lane	5650	Install right-turn lane	0.7
7.E.1	W Wilshire Blvd	High-Visibility Crosswalks	4123	Install high-visibility crosswalk	0.6
7.E.2	W Wilshire Blvd	Increased Pedestrian Crossing Time	5252	Increase length of signal phases to allow for pedestrians more crossing time	0.49
7.F.1	N Wilshire Blvd	Access Management	442	Closure or complete relocation of all driveways from functional area of intersection	0.93

Table 28 summarizes the suggested countermeasures and crash modification factors (CMF). **Figure 46** summarizes all recommendations and countermeasures along NW Expressway.

FIGURE 46: NW EXPRESSWAY RECOMMENDATIONS

Vision Zero Action Plan
OKLAHOMA CITY

CORRIDOR 7: NW EXPRESSWAY
FROM N COUNCIL RD TO N WILSHIRE BLVD



- A — N Council Rd.
  - Left Turn Lane
    - Drainage Updates
      - Pedestrian Improvements
      - ADA Compliance
- B — NW Passage
  - Pedestrian Improvements
    - ADA Compliance
- C — Silver Crossing
  - Lane Reduction
    - No Right-on-Red Signage
- D — Glade Ave.
  - Right Turn Lane
    - Bus Pad Installed
- E — W Wilshire Blvd.
  - Pedestrian Improvements
- F — N Wilshire Blvd.
  - Access Management

CORRIDOR WIDE

- Retroreflective Backplates
- Access Management

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COUNTERMEASURE EXHIBITS

NE 23RD ST & N COLTRANE RD – SIGNALIZED INTERSECTION

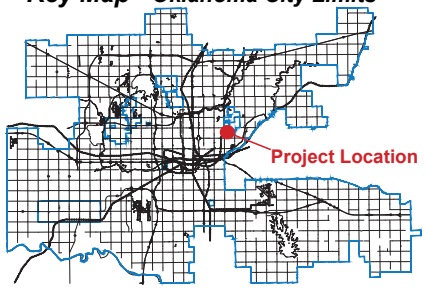
A redesigned signalized intersection is necessary to provide adequate roadway and pedestrian safety at this intersection. Since this intersection and the roadway leading to this intersection has been the location of numerous KAB crashes, it is pertinent to improve the geometry and pedestrian facilities at this intersection. Removal of channelized turn islands on the north side of the intersection will aide in current sight-distance issues for drivers. Widening the intersection to add left-turn lanes and a westbound right-turn will allow drivers to safely decelerate and move out of thru-traffic lanes to make a turning movement. Addition of pedestrian facilities, including new pavement markings, ADA-compliant curb ramps, and pedestrian signals, will allow pedestrians to safely cross all sides of this intersection. An upgraded vehicle detection system will ensure dilemma zone detection.

SAFETY COUNTERMEASURES

NE 23rd St & N Coltrane Rd - Signalized Intersection

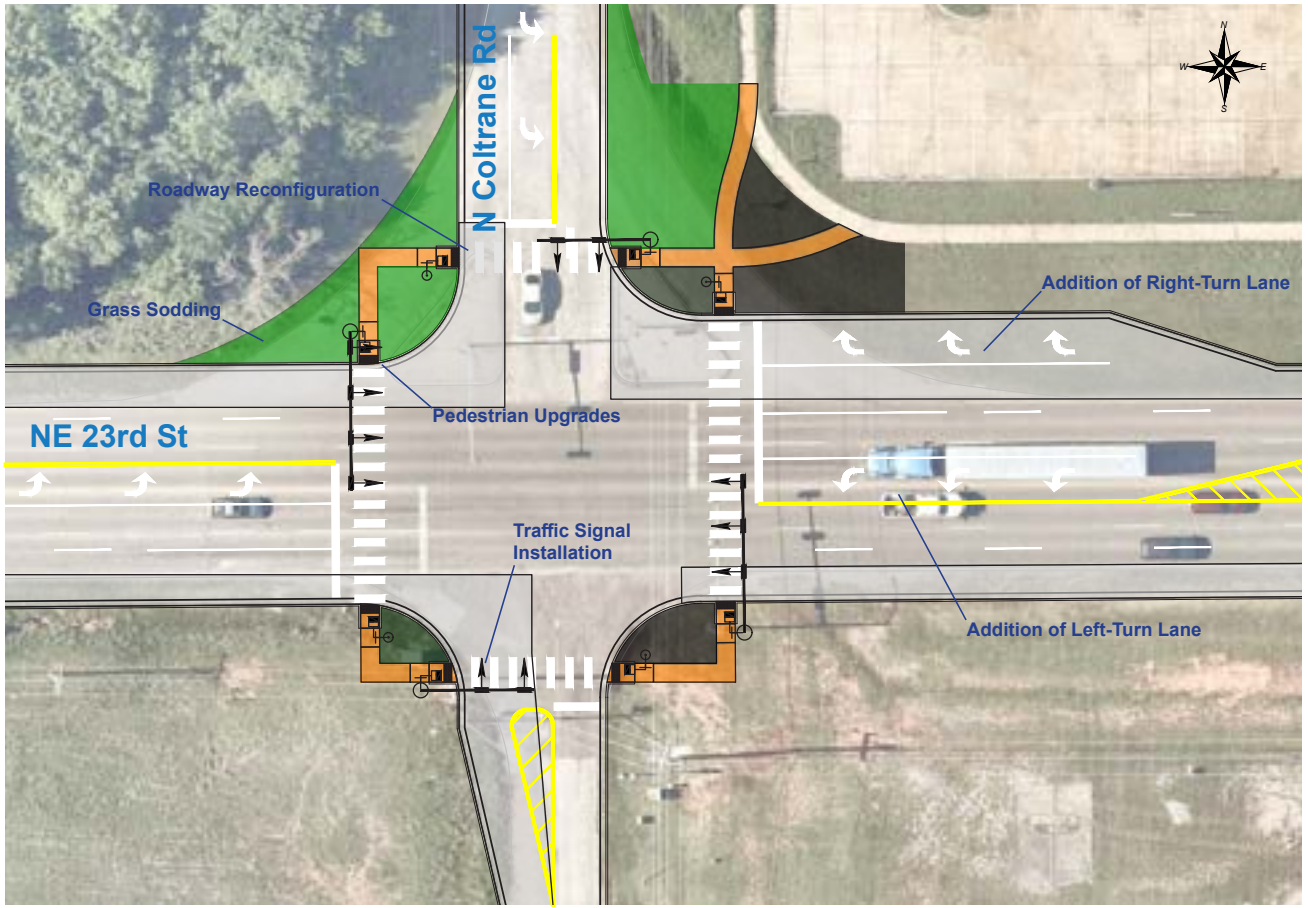
Vision Zero Action Plan
OKLAHOMA CITY

Key Map - Oklahoma City Limits



Legend

- Concrete Pavement
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- Ground Mounted Sign



NW 23RD ST & N STERLING AVE – PHB PEDESTRIAN CROSSING

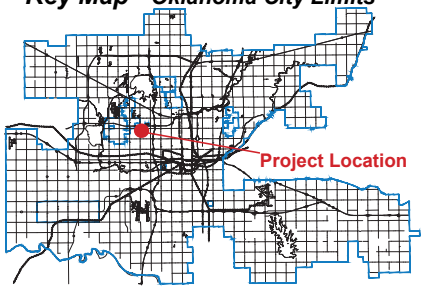
The location of public bus stop across the street from desired locations, including apartments, laundromats, and retail, has resulted in many pedestrians crossing NW 23rd St at unmarked crossing points. These unsafe movements have resulted in both fatal and serious injury crashes involving pedestrians. Installation of Pedestrian Hybrid Beacon (PHB) at a midblock location near these bus stops will provide pedestrians a safe and accessible street crossing. This midblock crossing will also improve pedestrian facilities by ensuring sidewalks and curb ramps are ADA compliant. The type of pedestrian signal, either a PHB or RRFB (Rectangular Rapid Flashing Beacon), depends on roadway characteristics and posted speed limit. With a posted speed limit of 40 mph, a PHB signal is the most appropriate choice at this location. If the signal system along this corridor is coordinated, the PHB should be property coordinated within the system.

SAFETY COUNTERMEASURES

NW 23rd St & N Sterling Ave - RRFB Pedestrian Crossing

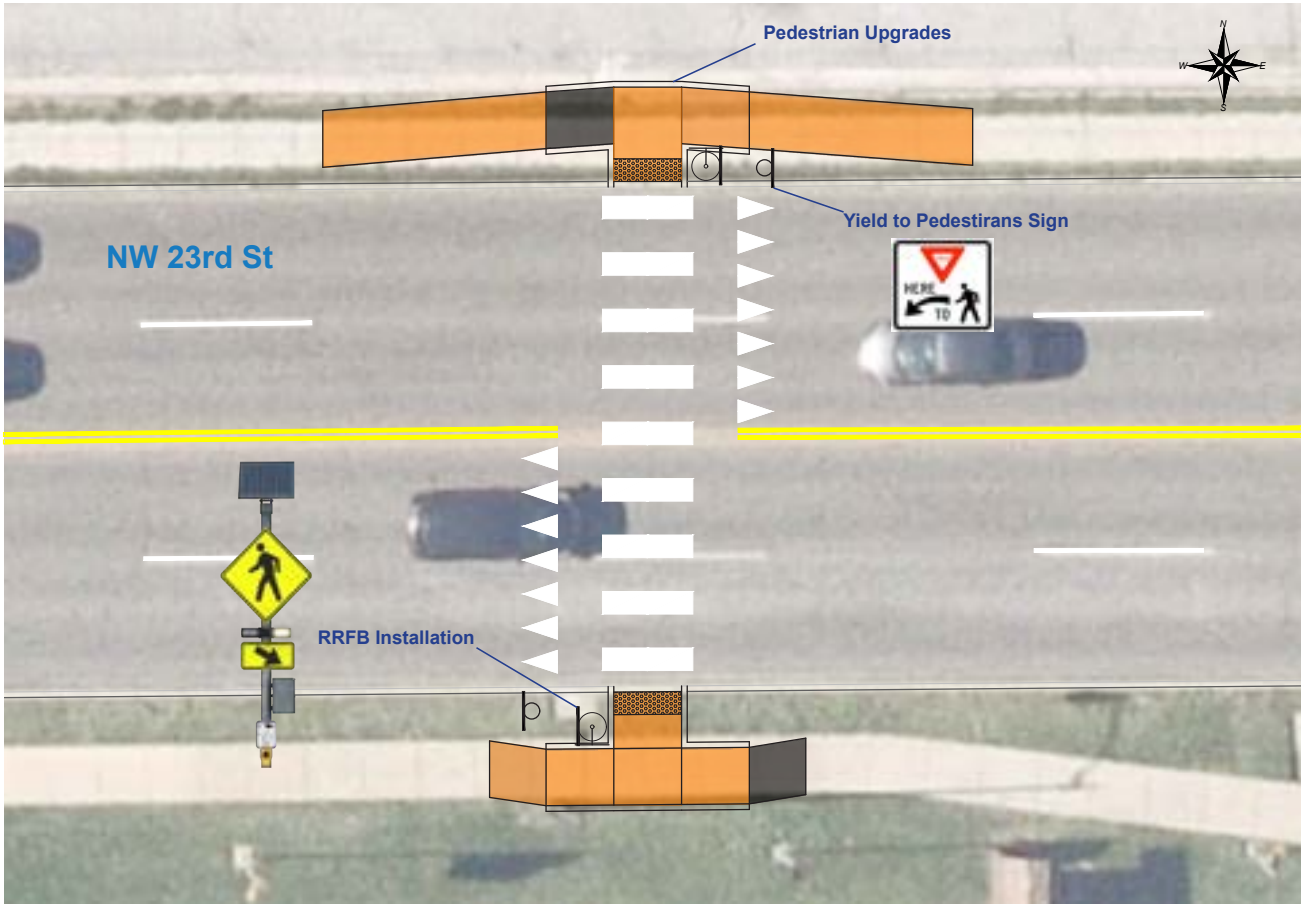
Vision Zero Action Plan
OKLAHOMA CITY

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N MERIDIAN AVE & NW 23RD ST – ROUNDABOUT

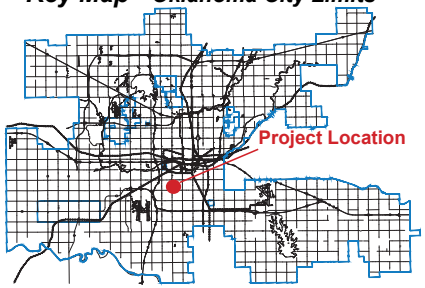
It is recommended to redesign of this intersection into a multi-lane roundabout. This new roundabout will increase traffic safety by safely slowing traffic, as well as increasing pedestrian safety. This intersection location is an ideal candidate for a roundabout due to the small amount of ROW procurement necessary to construct the design. The southeast corner of the intersection, owned by the City of Oklahoma City, provides flexibility to adjust the design, minimizing the need to encroach on significant portions of privately owned land. This roundabout design will close two openings to NW 19th St on the southeast side of the intersection to mitigate vehicle conflicts. RRFB signals will be installed at all pedestrian crossing to ensure that pedestrian crossing safety is the highest possible.

SAFETY COUNTERMEASURES

N Meridian Ave & NW 23rd St - Roundabout

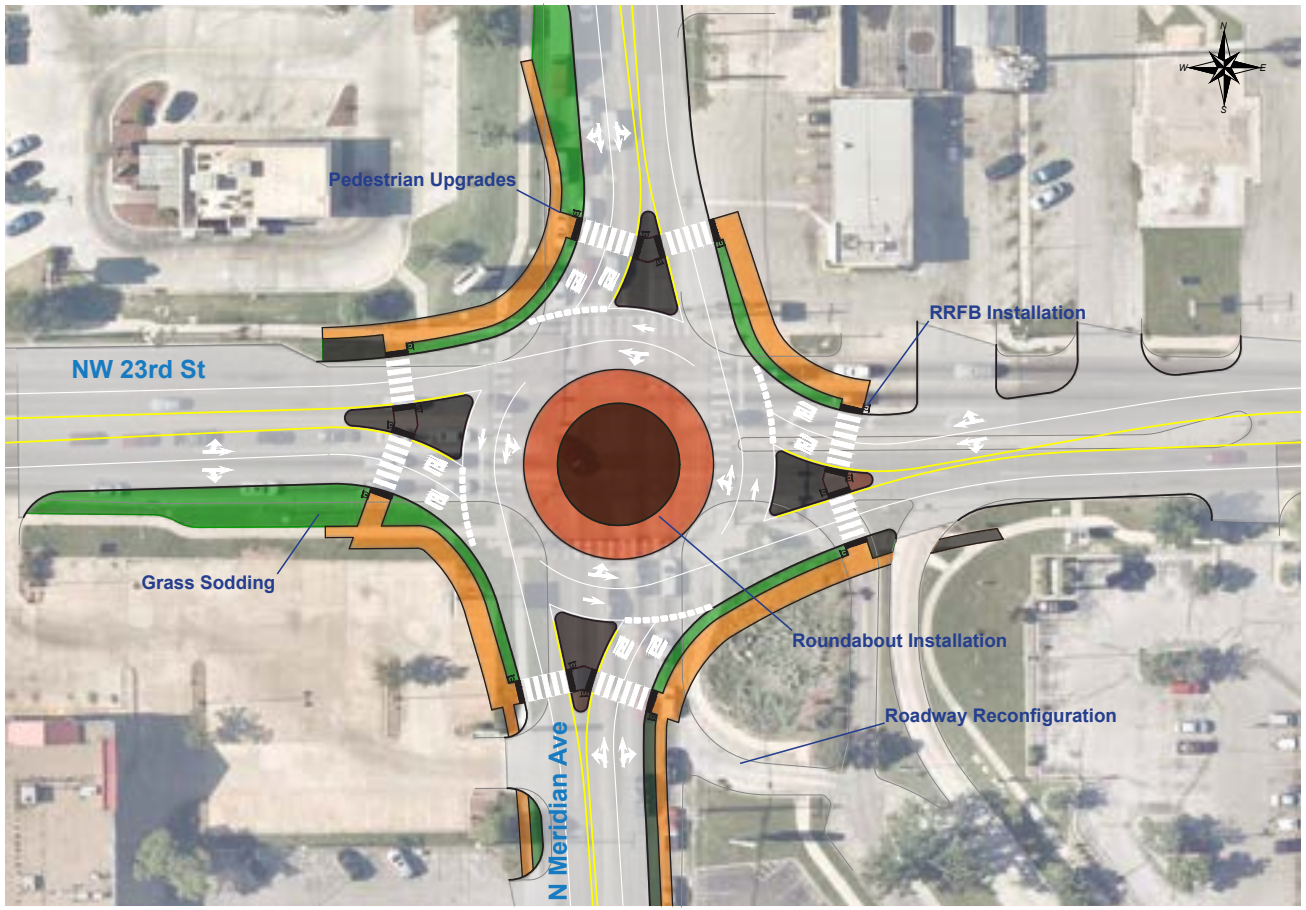
Vision Zero Action Plan
OKLAHOMA CITY

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NW 23RD ST – ACCESS MANAGEMENT

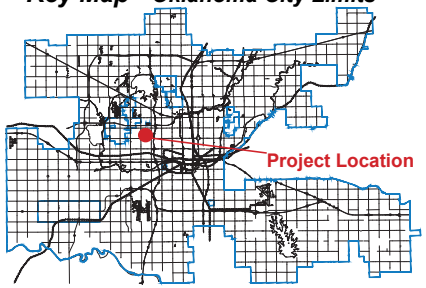
Introduction of access management along NW 23rd St will reduce dangerous driving maneuvers by drivers attempting to enter and exist driveways, as well as improving traffic flow by limiting turning options along the corridor. The type of access management that is recommended includes consolidating and relocating existing driveways. Driveways that are near intersections should be either be shrunk or relocated. Cross-access agreements between current and future developments with shared driveways is recommended. The installation of a raised center median that restricts the turning movements around the existing left-turn lane is recommended. This median installation will limit driveway access to right-in/right-out only. Additionally, entrance-only signs should be installed for the driveway along northbound N Portland Ave and directional pavement marking arrows to be installed.

SAFETY COUNTERMEASURES

NW 23rd St - Access Management

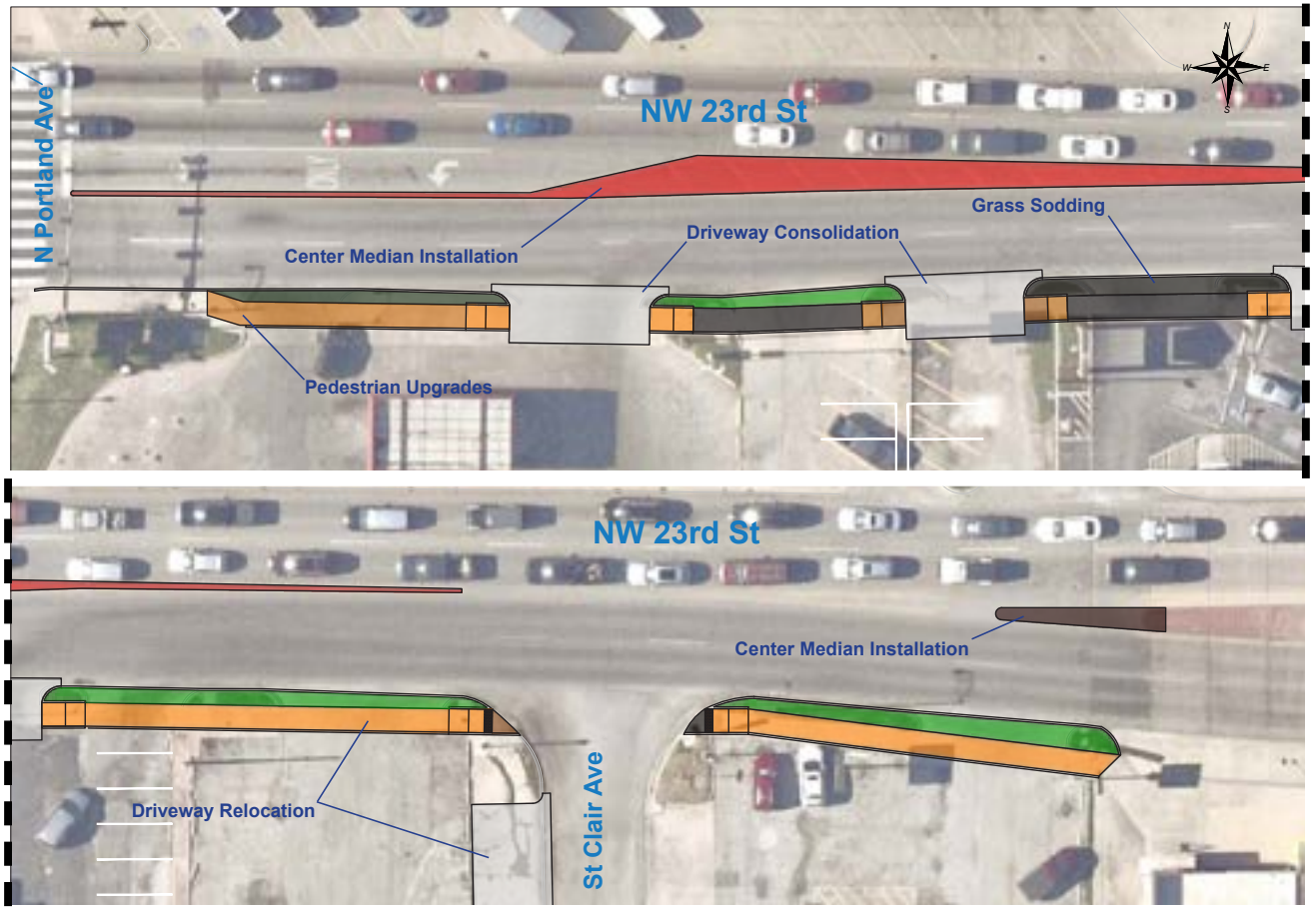
Vision Zero Action Plan
OKLAHOMA CITY

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S MUSTANG RD & SW 5TH ST – SIGNALIZED INTERSECTION

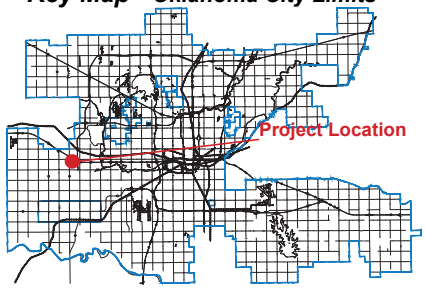
A new signalized intersection, targeted roadway improvements, and pedestrian improvements are recommended at the intersection of S Mustang Rd & SW 5th St. This new signalized intersection will include roadway widening to accommodate the addition of dedicated left-turn lanes for northbound and southbound traffic. The addition of curb medians for the northbound and southbound turn lanes will add additional safety for drivers and control turning access. Aligning the existing AAMCO driveway with SW 5th St allows this to be a proper four-leg intersection. Addition of pedestrian facilities, including new pavement markings, ADA compliant curb ramps, and pedestrian signals will provide safe pedestrian crossings at all sides of this intersection.

SAFETY COUNTERMEASURES

S Mustang Rd & SW 5th St - Signalized Intersection

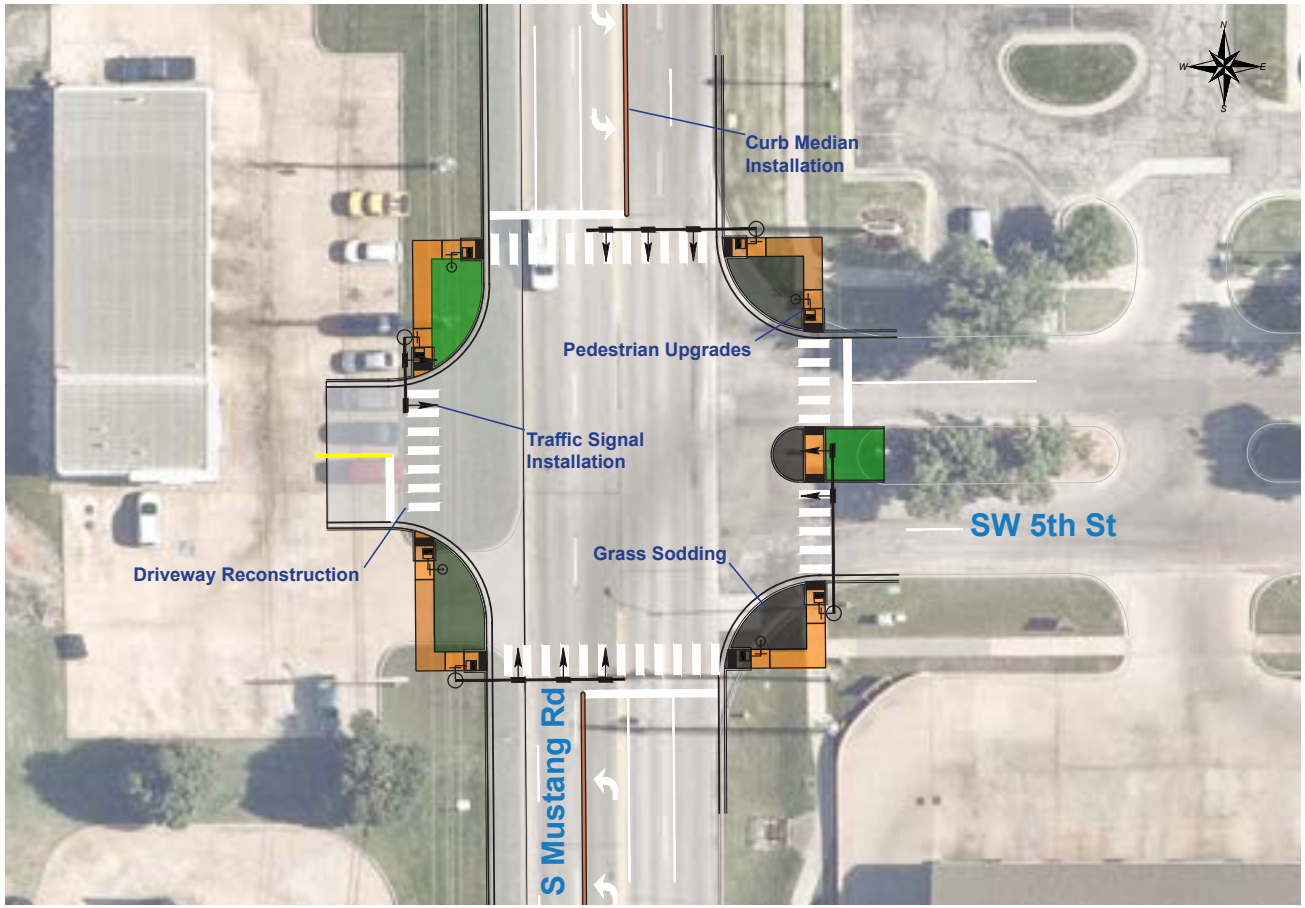
Vision Zero Action Plan
OKLAHOMA CITY

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S PENNSYLVANIA AVE & SW GRAND BLVD/SW 36TH ST – ROUNDABOUT

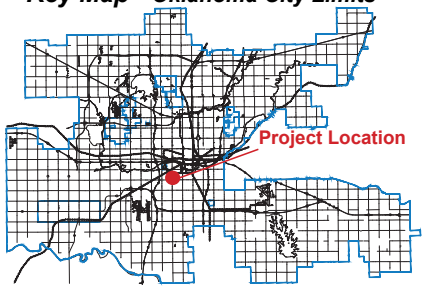
It is recommended to redesign of this intersection into a multi-lane, “peanut-shaped” roundabout. This new roundabout will increase traffic safety by safely slowing traffic, as well as increasing pedestrian safety. This location is ideal for a roundabout due to the current two-signal set-up for the north and south terminals of the intersection. The current configuration of the S Grand Blvd trail bisecting the two signals with little marking or warning provides a confusing and unsafe crossing locations for drivers, pedestrians, and cyclists. The recommended trail configurations routes users around the exterior of the roundabout with RRFB signals installed at all pedestrian crossings to provide safe crossing locations.

SAFETY COUNTERMEASURES

S Pennsylvania Ave & SW Grand Blvd/SW 36th St - Roundabout

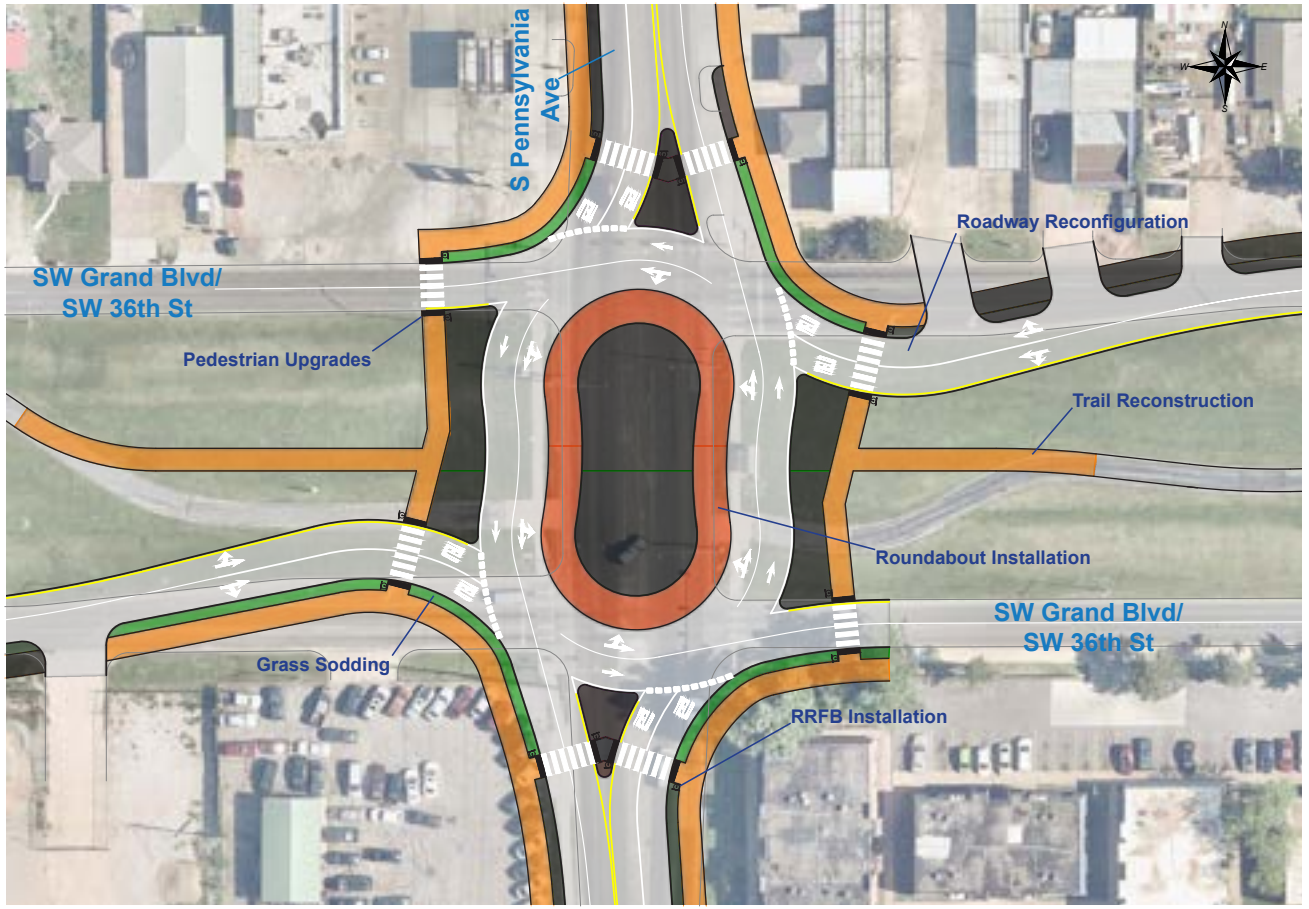
Vision Zero Action Plan
OKLAHOMA CITY

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S PENNSYLVANIA AVE & U.S. GRANT HIGH SCHOOL – SIGNALIZED INTERSECTION

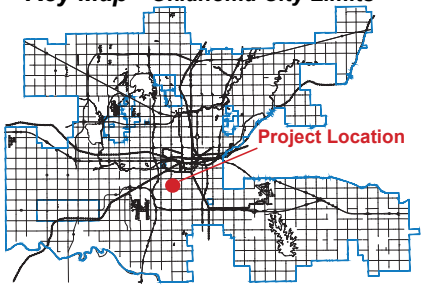
The upgrade of the current pedestrian signal to a fully signalized intersection is recommended. Currently, a pedestrian signal is active approximately 30’ north of a main entrance to U.S. Grant High School. Signalizing this entrance to the school will maintain a safe pedestrian crossing locations, as well as providing drivers attempting to enter and exit this entrance with signal protected movements. Relocating the commercial driveway across the street to align with the U.S. Grant High School entrance is necessary to create a proper 4-leg intersection. Upgrades of all pedestrian facilities, including new pavement markings, ADA compliant curb ramps, and pedestrian signals will provide safe pedestrian movements at all sides of this new intersection.

SAFETY COUNTERMEASURES

S Pennsylvania Ave & U.S. Grant High School - Signalized Intersection

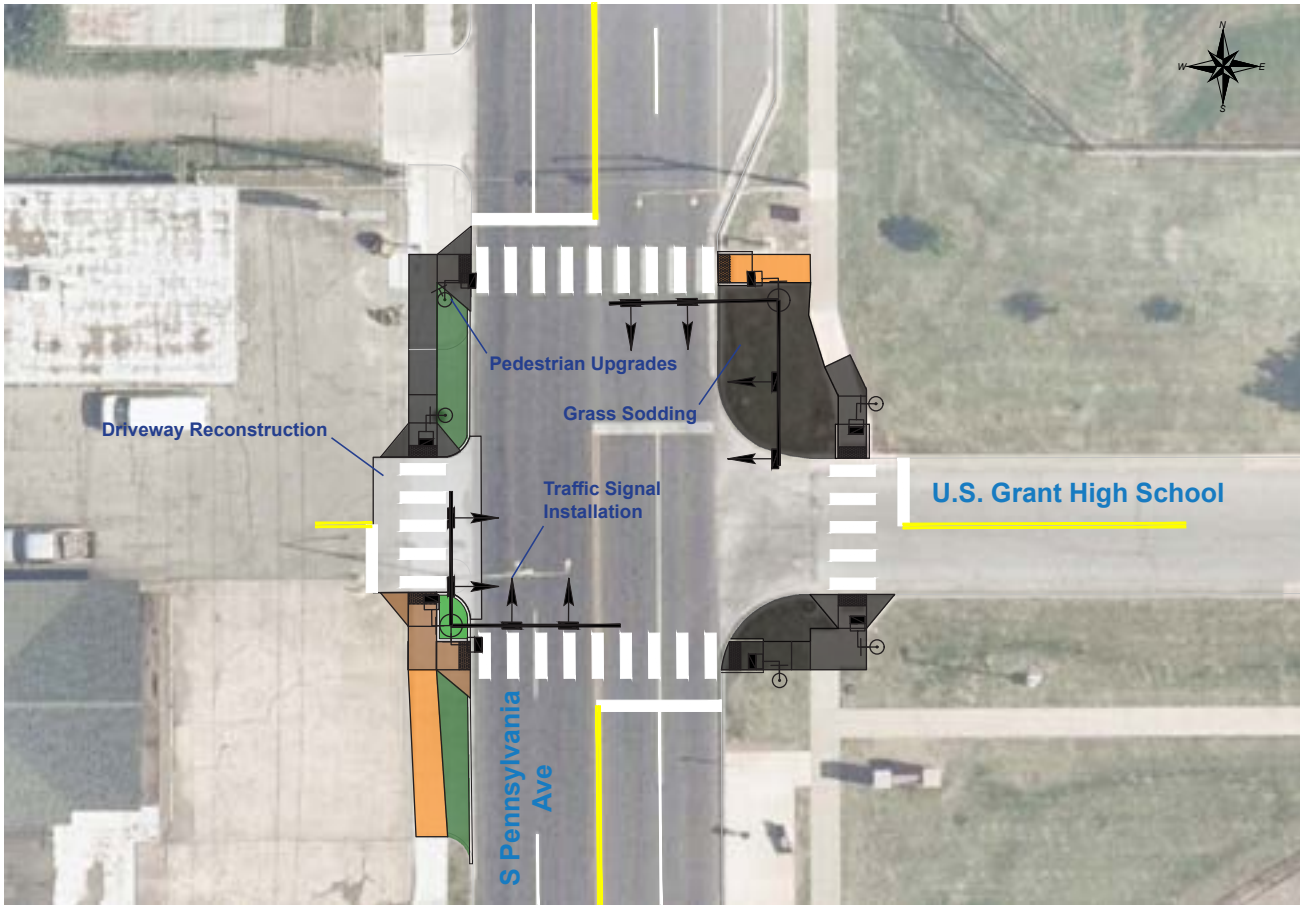
Vision Zero Action Plan
OKLAHOMA CITY

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S PENNSYLVANIA AVE & SW 51ST ST – SIGNALIZED INTERSECTION

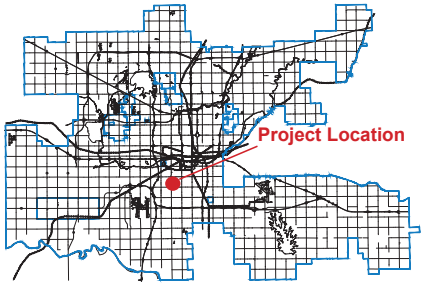
The realignment of the east-west approach along SW 51st St and the creation of a signalized intersection will improve the operations and safety at this location. The current roadway configuration results in several conflicting traffic patterns, including drivers attempting to travel east-west along SW 51st St and drivers attempting to turn left on to SW 51st St from S Pennsylvania Ave. The realignment and reconstruction of SW 51st east of S Pennsylvania Ave will utilize the vacant land currently owned by Oklahoma City Public Schools. This reconstruction will extend the yards and driveways of the homeowners along the south and construct new sidewalk on both sides of the street. This intersection is also a location where the closest pedestrian crossing across S Pennsylvania Ave is over 500 ft away, and where fatal crashes including drivers, pedestrians, and cyclist have occurred. Providing a realigned, signalized intersection with new pedestrian facilities, including pavement markings, ADA-compliant curb ramps, and pedestrian signals, will provide a much safer and accessible intersection for all users.

SAFETY COUNTERMEASURES

S Pennsylvania Ave & SW 51st St - Signalized Intersection (1 of 2)

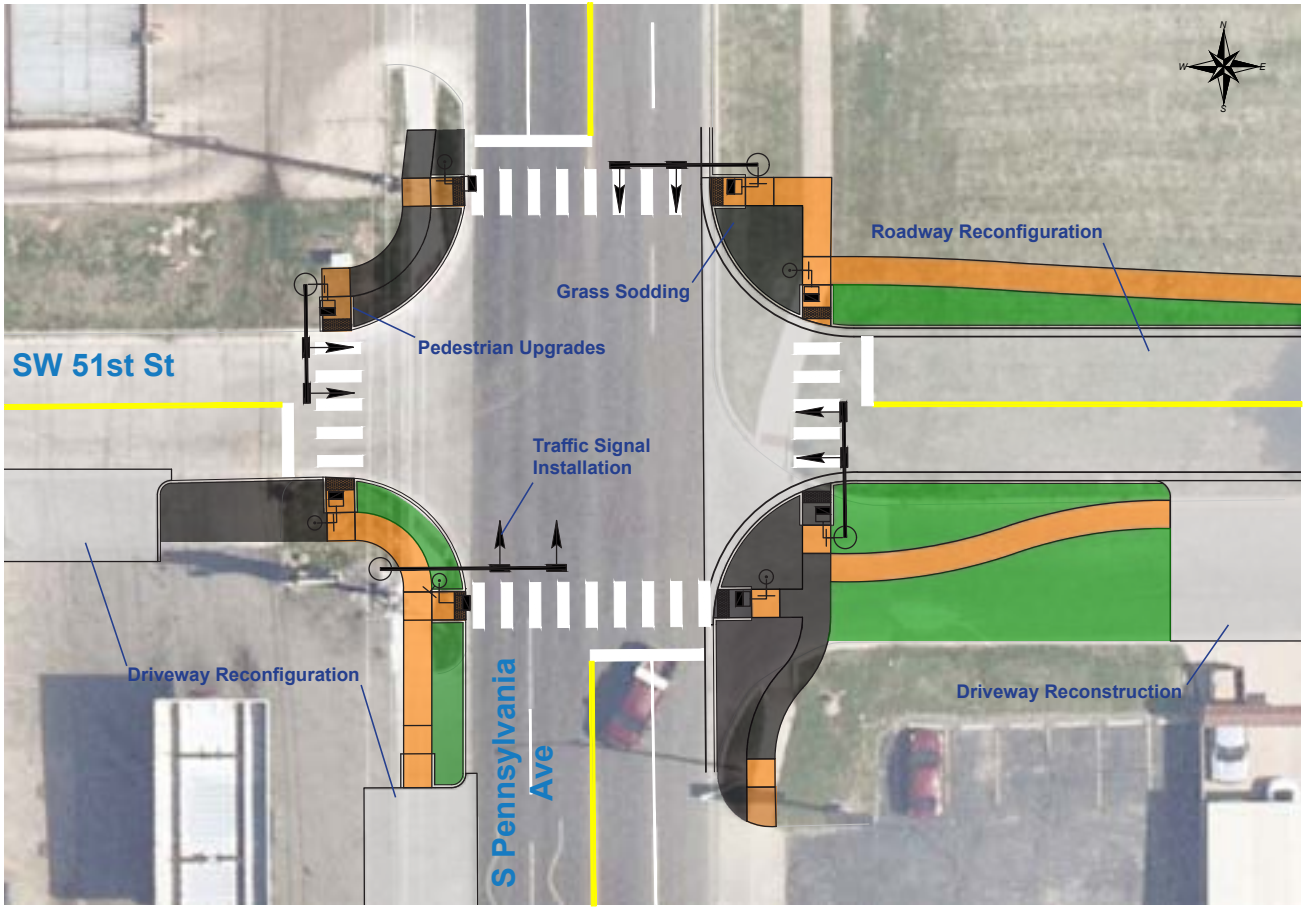
Vision Zero Action Plan
OKLAHOMA CITY

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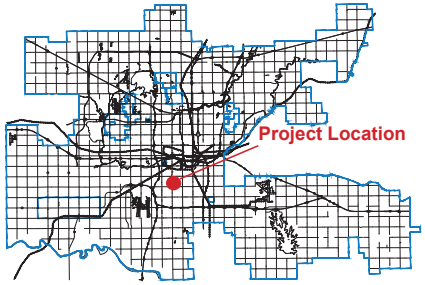


SAFETY COUNTERMEASURES

S Pennsylvania Ave & SW 51st St - Signalized Intersection (2 of 2)

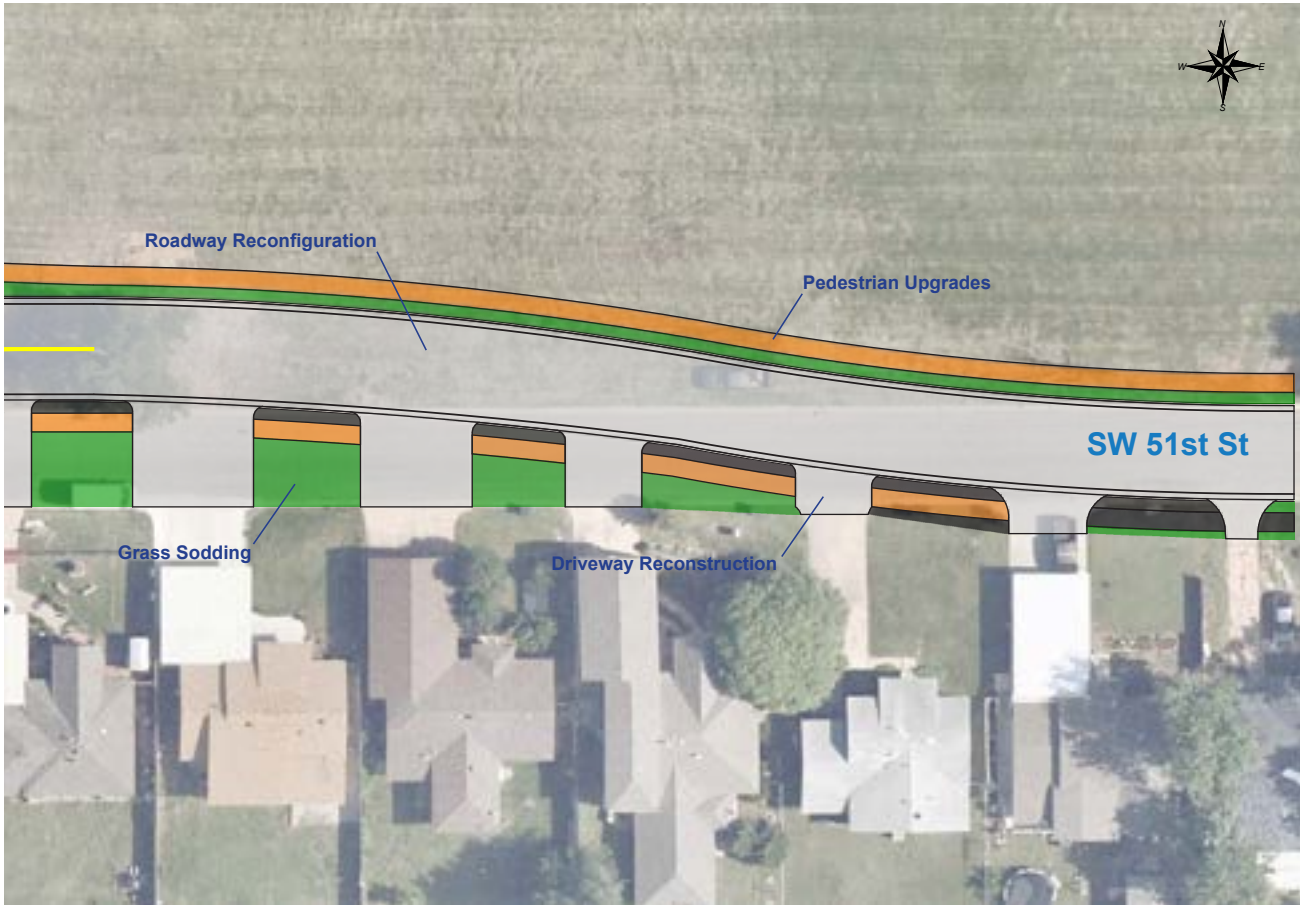
Vision Zero Action Plan OKLAHOMA CITY

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NW 10TH ST – TRAIL & ROAD RECONFIGURATION

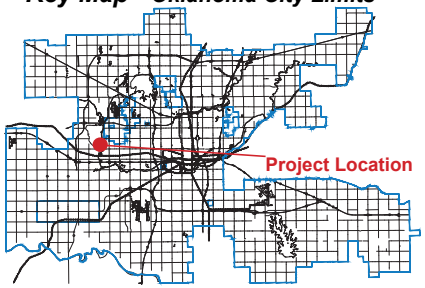
Reconfiguration of the road on NW 10th St between County Line Rd and N Council Rd will provide better pedestrian and cyclist access along the corridor, while also helping mitigate the current high speeds of the corridor. The West River Trail is a popular bicycle trail that crosses NW 10th St at N Eagle Ln, just east of the Canadian River. The current pedestrian accommodations on the crossing the Canadian River is a narrow, approximately 3.5’ wide sidewalk. It is recommended that a 12’ multi-use path be installed between County Line Rd and N Eagle Ln on the north side of NW 10th St; this will include the removal of one eastbound lane and the installation of a parapet wall to provide protection for trail users. Driveway consolidation and reconstruction will aid in access control for properties along this corridor. A road diet between N Eagle Ln and N Council Rd with protected bike lanes and a center two-way left-turn lane will provide additional bicycle connection and speed mitigation for the corridor.

SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (1 of 6)

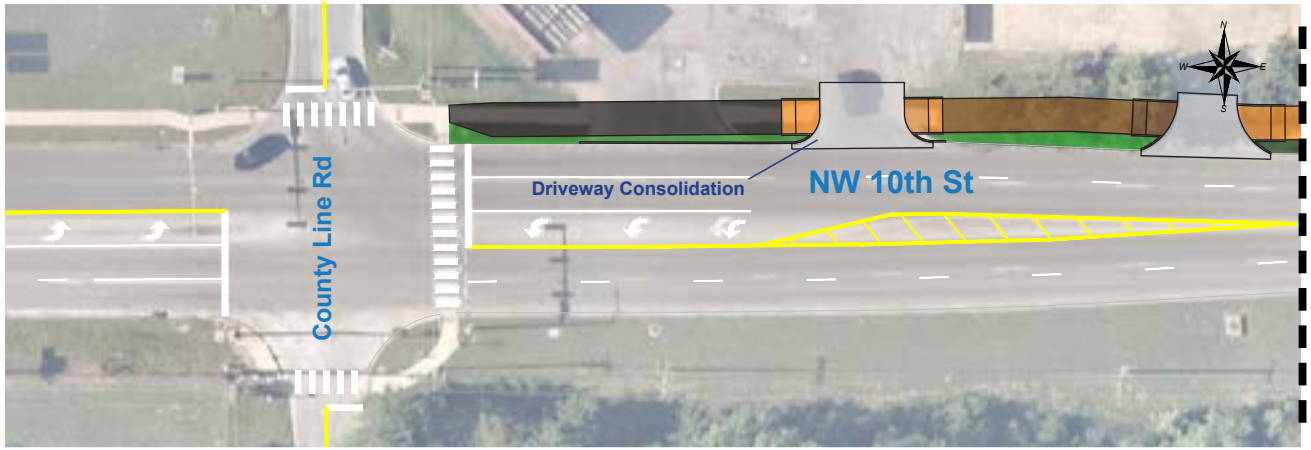
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OKLAHOMA CITY

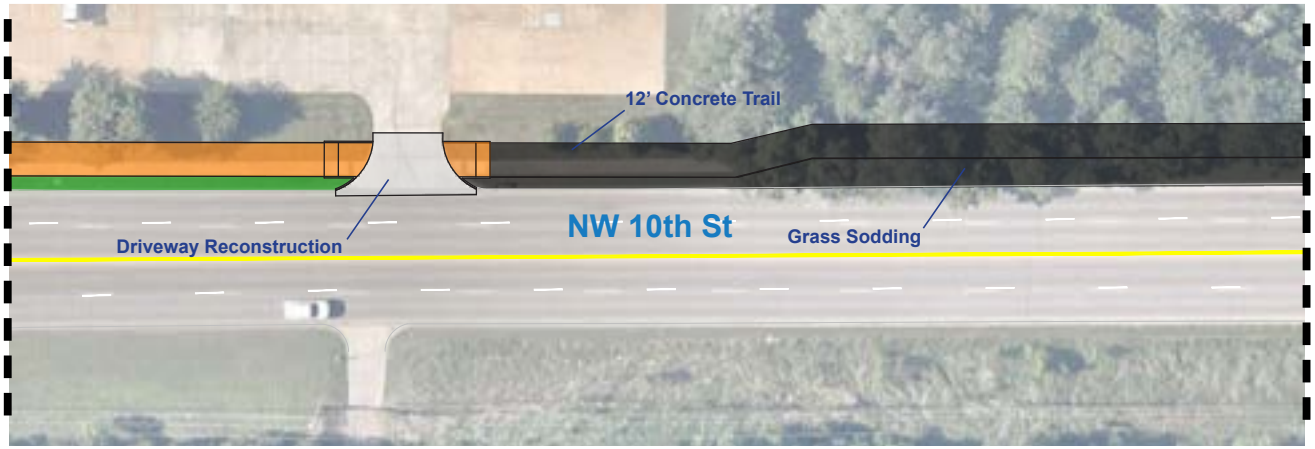
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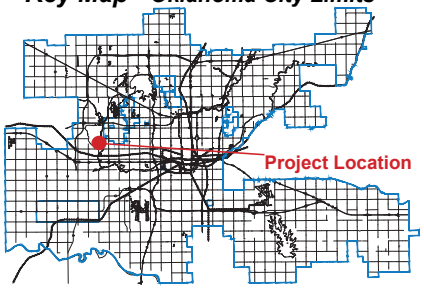


SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (2 of 6)

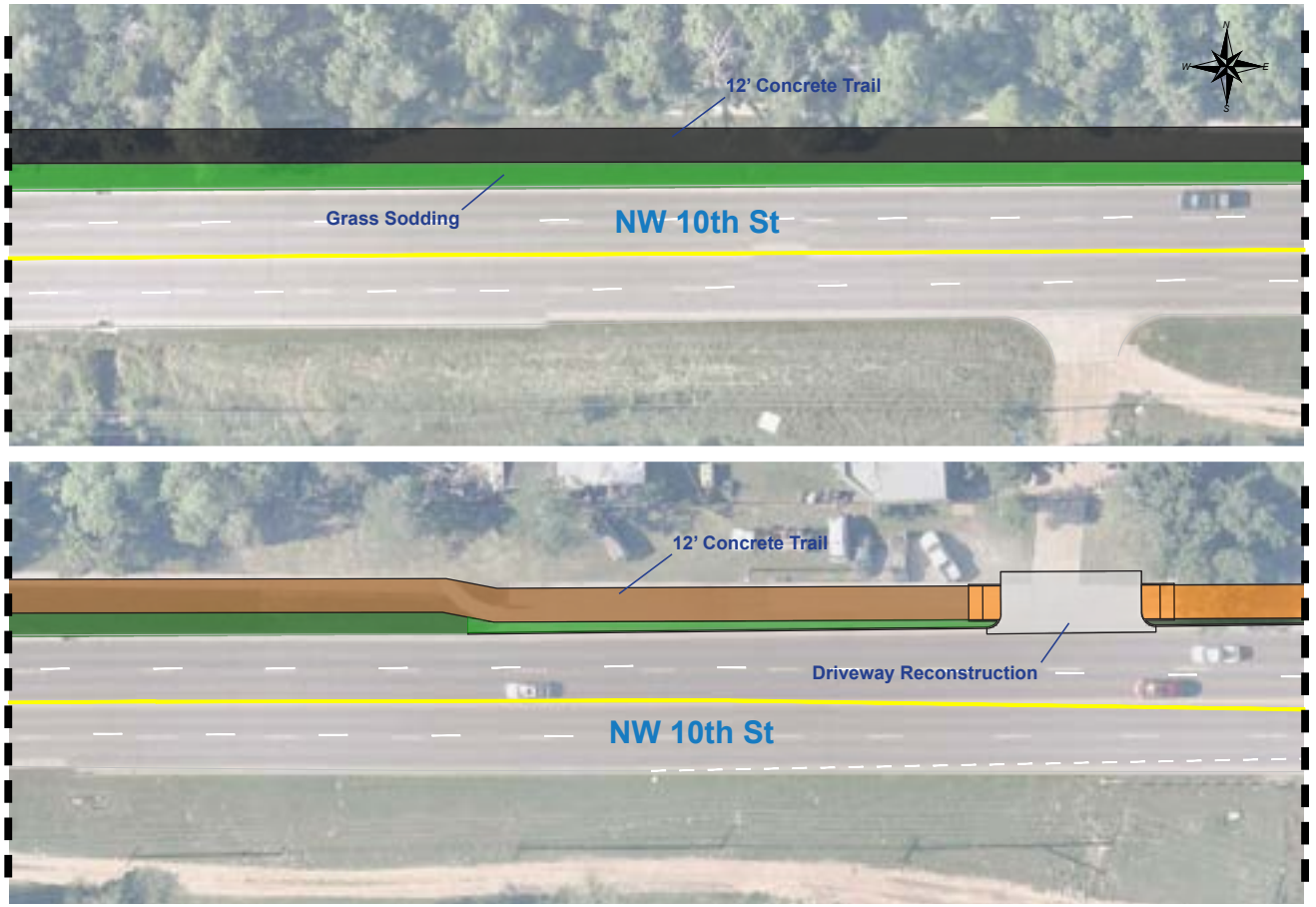
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OKLAHOMA CITY

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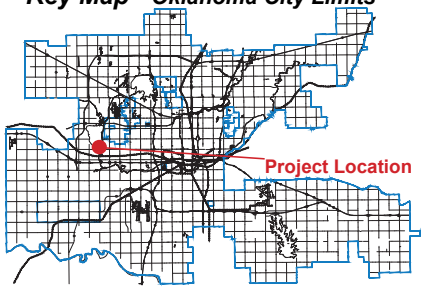


SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (3 of 6)

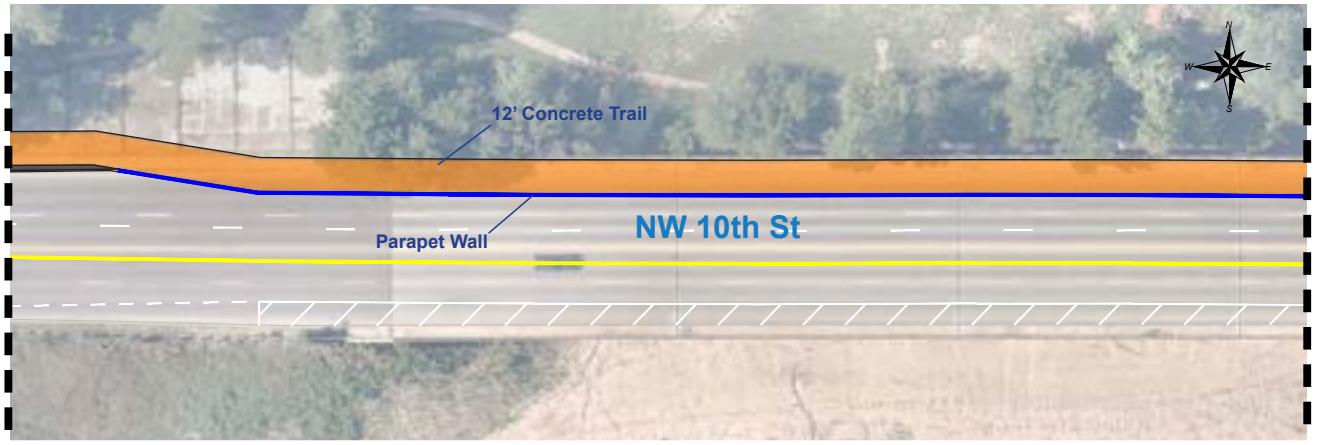
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OKLAHOMA CITY

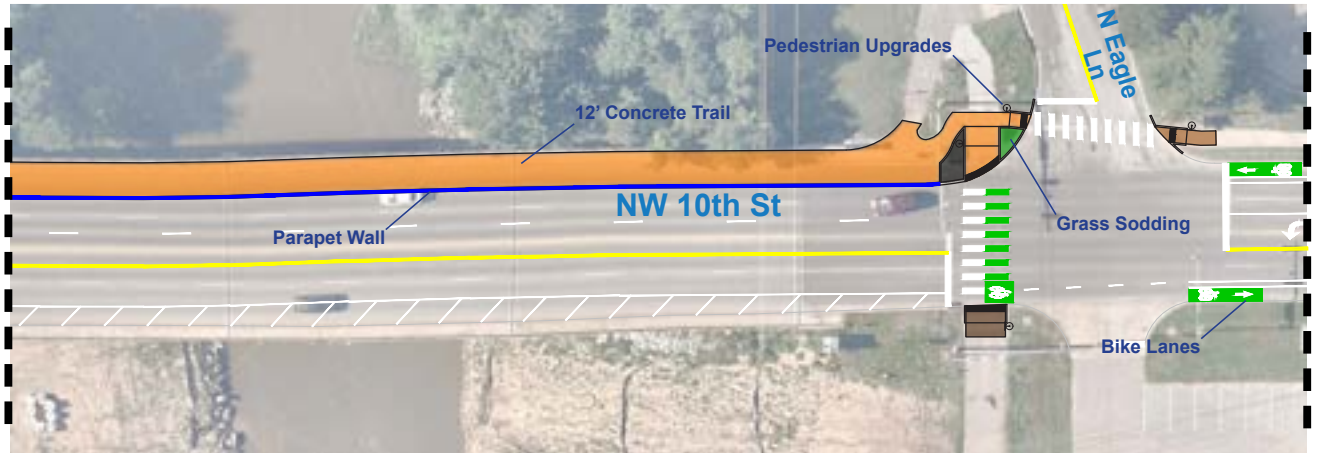
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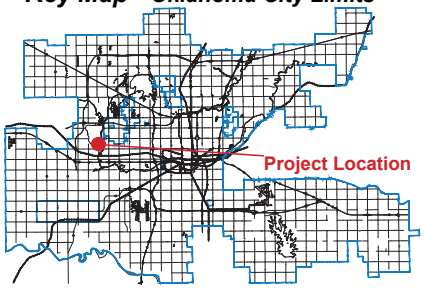


SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (4 of 6)

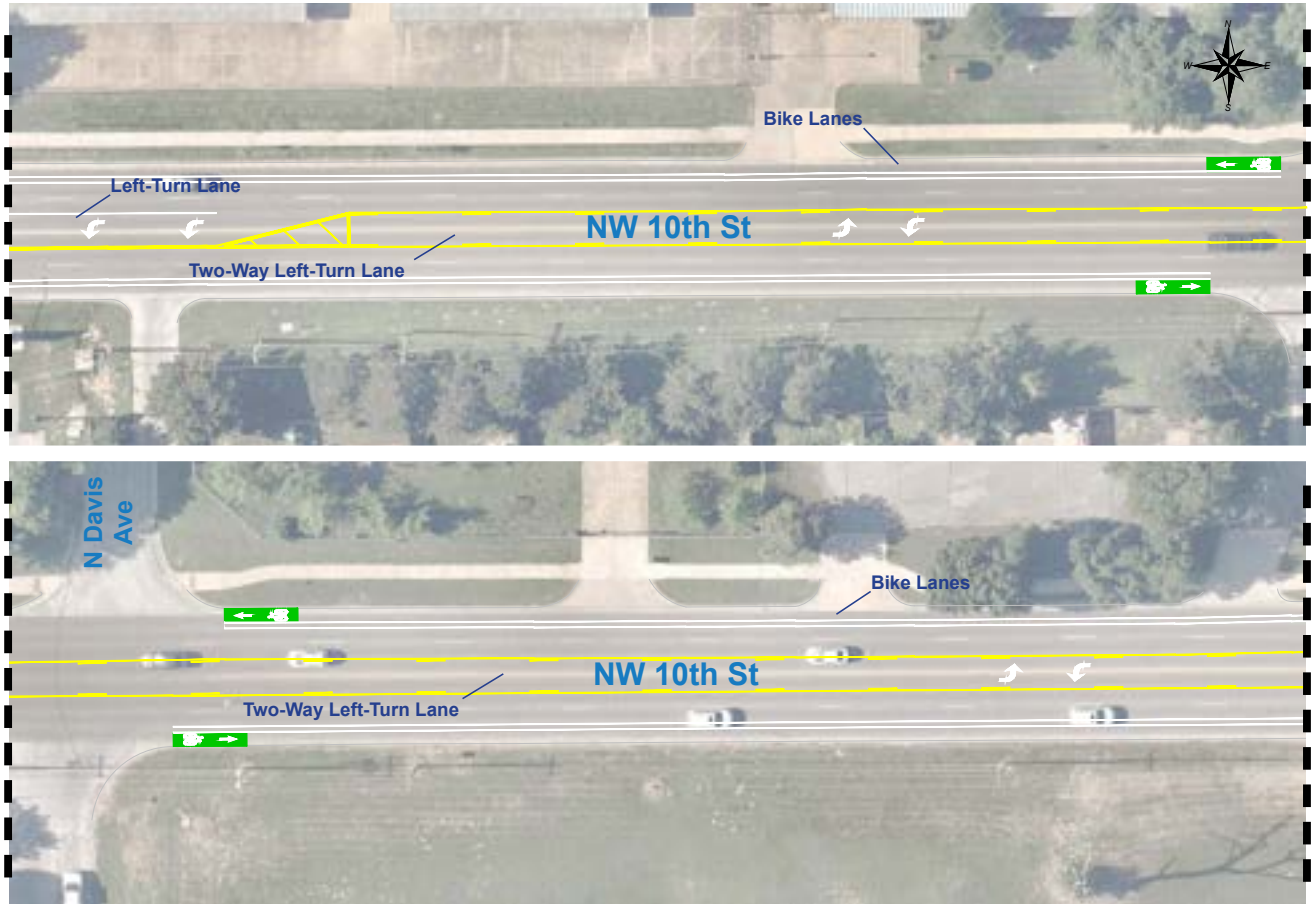
Vision Zero Action Plan
OKLAHOMA CITY

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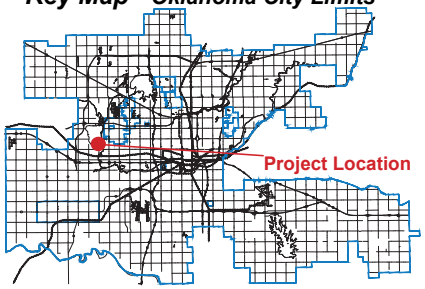


SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (5 of 6)

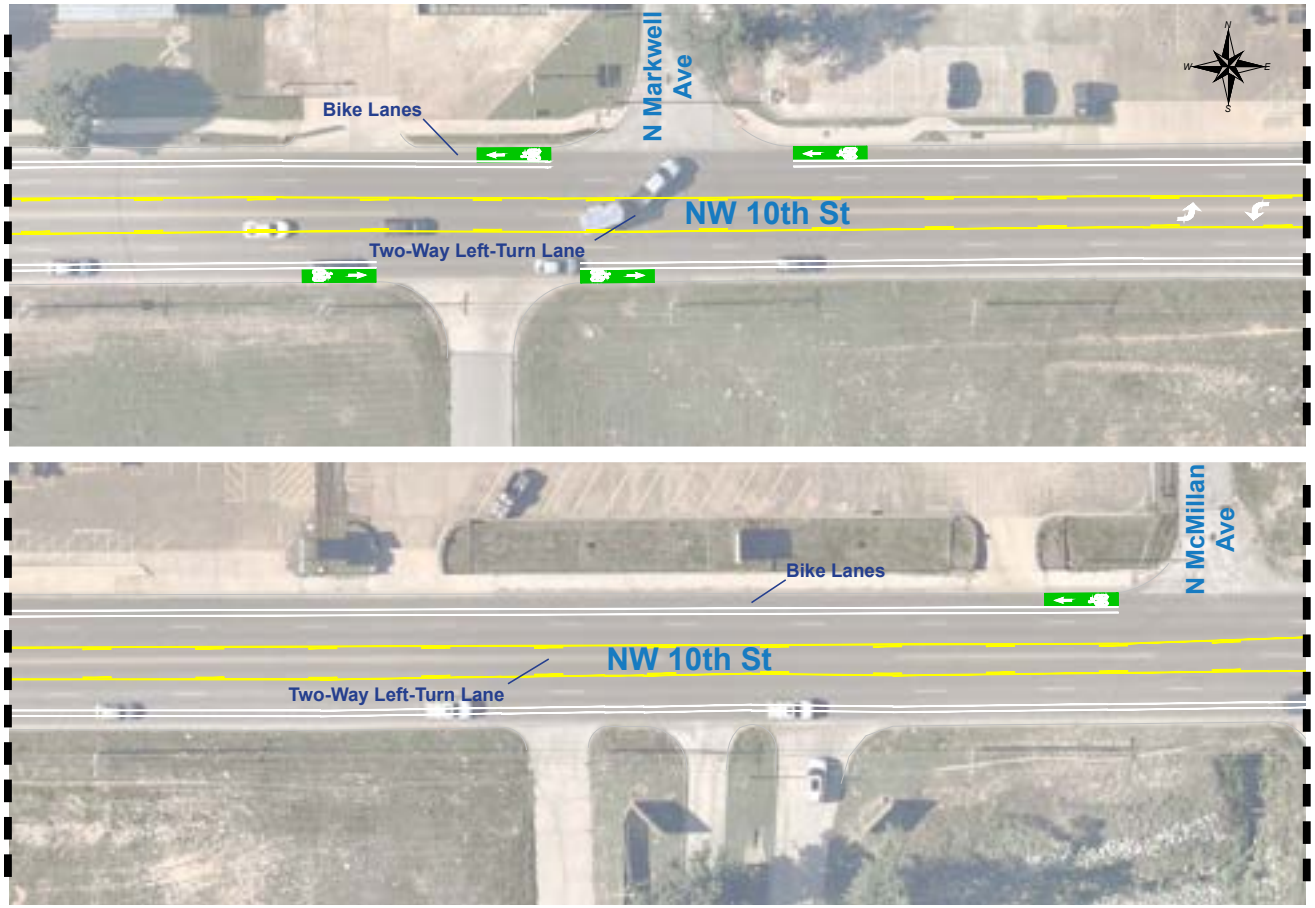
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OKLAHOMA CITY

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- Pavement Markings
- Bike Lane Marking
- Tactile Warning Device
- Pedestrian Signal Pole
- Traffic Signal Pole
- Rectangular Rapid Flashing Beacon
- Ground Mounted Sign

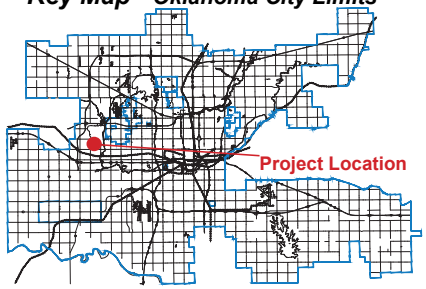


SAFETY COUNTERMEASURES

NW 10th St - Trail & Road Reconfiguration (6 of 6)

Vision Zero Action Plan
OKLAHOMA CITY

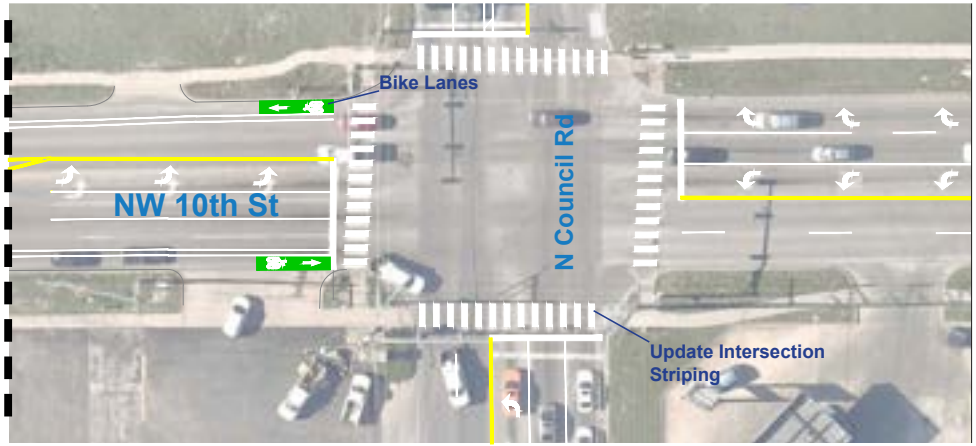
Key Map - Oklahoma City Limits



Legend

- Concrete Pavement
- Sidewalk
- Landscaping (Sod)
- Median
- Pavement Markings
- Bike Lane Marking
- Tactile Warning Device
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NW EXPRESSWAY & N COUNCIL RD – SIGNALIZED INTERSECTION

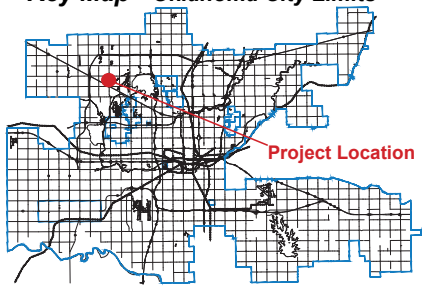
Targeted improvements to this signalized is necessary to improve vehicle and pedestrian safety. Due to the current geometry of the intersection, channelized right-turning on to NW Expressway have difficult sight lines to safely yield and merge onto the main roadway. Installing right-turn acceleration lanes for both northbound and southbound movements will allow drivers to merge onto NW Expressway safer. With the current intersection lacking adequate pedestrian facilities, it is recommended to add new pedestrian facilities, including new pavement markings, ADA compliant curb ramps, and pedestrian signals. These improvements will provide safe pedestrian movements at all sides of this intersection.

SAFETY COUNTERMEASURES

NW Expressway & N Council Rd - Signalized Intersection

Vision Zero Action Plan
OKLAHOMA CITY

Key Map - Oklahoma City Limits



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