COMPREHENSIVE ROADWAY SAFETY ACTION PLAN

DOÑA ANA COUNTY

APPENDICES

A - H

APPENDIX A *(page 4)*

SS4A Action Plan Self-Certification Checklist

Includes a Self-Certification Worksheet demonstrating that Doña Ana County has developed an eligible Safety Action Plan and may apply for Safe Streets for All (SS4A) Implementation or Supplemental Planning/Demonstration grants.

APPENDIX B *(page 7)*

Relevant Plans and Policies

Summarizes key takeaways from relevant recent plans at the state, regional, and local levels related to transportation and/or road safety. The summaries includes each plan's safety-related goals and priorities, strategies and actions, projects, and policies.

APPENDIX C *(page 27)*

Descriptive Safety Analysis

Summarizes the findings of a descriptive crash analysis for Doña Ana County focusing on killed and serious injury (KSI) traffic crashes over the most recent five-year period (2018-2022) for which data is available. Key findings include crash type, severity, and road users involved.

APPENDIX D *(page 39)*

High-Injury Network Crash Analyses Methodologies

Presents the components of the Doña Ana County High Injury Network (HIN) which identifies locations with high rates of observed fatal and serious injury crashes. The document includes summary maps, crash data sources, and methodologies for development of the HIN for each mode (auto, bicycle, and pedestrian).

High-Risk Network Crash Analyses Methodologies

Presents the process for developing and analyzing the High Risk Network (HRN) which aims to identify roadways with the greatest potential for safety improvements by identifying combinations of roadway attributes and socioeconomic factors across Doña Ana County that are associated with elevated fatal and injury crash rates.

The HIN and HRN are both inputs to the Doña Ana County Priority Safety Network.

APPENDIX E (page 74)

Phase I Outreach – Engagement Summary

Summarizes the stakeholder and outreach events that took place over a three-day period in August 2024 throughout Doña Ana County. The document includes the visual materials that supported the outreach process, as well as a summary with highlights and key takeaways from each of the events.

Phase I Outreach – Map Survey Summary

Presents the overview and findings of the online map survey which was used to gather feedback from residents across the communities of Doña Ana County.

APPENDIX F (page 105)

Systemic Treatment Typologies Inventory

Presents an overview of common safety challenges and typical treatments or countermeasures to treat them, as well as maps and summary tables of locations along the Priority Safety Network for improvements.

APPENDIX G (page 133)

Safety Educational Materials

Presents a series of educational materials developed as part of the Safety Action Plan to spread awareness about the need to invest in roadway safety improvements and to engage in safe behavior while traveling around Doña Ana County.

APPENDIX H (page 138)

Safety Countermeasures Toolkit

Presents countermeasures that can be applied in different Doña Ana County contexts to reduce fatal and serious injury crashes. The toolkit includes the following information about each countermeasure: safety benefits, location guidance, road user targets, expected crash reduction, cost range, and resources for additional information.

APPENDIX A

SS4A SELF-CERTIFICATION ELGIBIILITY WORKSHEET

Safe Streets and Roads for All

Self-Certification Eligibility Worksheet

This worksheet is not meant to replace the NOFO. Applicants should follow the instructions in the NOFO to correctly apply for a grant. See the SS4A website for more information: https://www.transportation.gov/SS4A

Instructions: This content is from Table 2 in the NOFO. The purpose of the worksheet is to determine whether or not an applicant's existing plan(s) is substantially similar to an Action Plan.

For each question below, answer "yes" or "no." If "yes," cite the specific page in your existing Action Plan or other plan(s) that corroborate your response, or cite and provide other supporting documentation separately.

An applicant is eligible to apply for an Action Plan Grant that funds supplemental action plan activities, or an Implementation Grant, only if the following two conditions are met:

- **Answer "yes" to Questions 3 7 9**
- **Answer "yes" to at least four of the six remaining Questions 1 2 4 5 6 8**

If both conditions are *not met*, an applicant is still eligible to apply for an Action Plan Grant that funds creation of a new action plan.

Lead Applicant: **UEI:**

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1 Are both of the following true?

- Did a high-ranking official and/or governing body in the jurisdiction publicly commit to an eventual goal of zero roadway fatalities and serious injuries?
- Did the commitment include either setting a target date to reach zero, OR setting one or more targets to achieve significant declines in roadway fatalities and serious injuries by a specific date?

☒ YES ☐ NO

If yes, provide documentation:

Adopting NMDOT Target

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2 To develop the Action Plan, was a committee, task force, implementation group, or similar body established and charged with the plan's development, implementation, and monitoring?

☒ YES ☐ NO

If yes, provide documentation:

Stakeholder Engagement

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3 Does the Action Plan include all of the following?

- Analysis of existing conditions and historical trends to baseline the level of crashes involving fatalities and serious injuries across a jurisdiction, locality, Tribe, or region;
- Analysis of the location where there are crashes, the severity, as well as contributing factors and crash types;
- Analysis of systemic and specific safety needs is also performed, as needed (e.g., high risk road features, specific safety needs of relevant road users; and,
- A geospatial identification (geographic or locational data using maps) of higher risk locations.

☒ YES ☐ NO

If yes, provide documentation:

Roadway Safety Context

Safe Streets and Roads for All

Self-Certification Eligibility Worksheet

4 **Did the Action Plan development include all of the following activities?**

- Engagement with the public and relevant stakeholders, including the private sector and community groups;
- Incorporation of information received from the engagement and collaboration into the plan; and
- Coordination that included inter- and intra-governmental cooperation and collaboration, as appropriate.

☒ YES ☐ NO

If yes, provide documentation:

Community & Stakeholder

5 **Did the Action Plan development include all of the following?**

- Considerations of equity using inclusive and representative processes;
- The identification of underserved communities through data; and
- Equity analysis, in collaboration with appropriate partners, focused on initial equity impact assessments of the proposed projects and strategies, and population characteristics.

☐ YES ☒ NO

If yes, provide documentation:

6 **Are both of the following true?**

- The plan development included an assessment of current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize safety; and
- The plan discusses implementation through the adoption of revised or new policies, guidelines, and/or standards.

☒ YES ☐ NO

If yes, provide documentation:

Plan and Policy Review (p.

7 **Does the plan identify a comprehensive set of projects and strategies to address the safety problems in the Action Plan, time ranges when projects and strategies will be deployed, and explain project prioritization criteria?**

☒ YES ☐ NO

If yes, provide documentation:

Recommendations

8 **Does the plan include all of the following?**

- A description of how progress will be measured over time that includes, at a minimum, outcome data.
- The plan is posted publicly online.

☒ YES ☐ NO

If yes, provide documentation:

Programs & Policy

9 **Was the plan finalized and/or last updated between 2017 and 2022?**

☒ YES ☐ NO

If yes, provide documentation:

APPENDIX B

SUMMARY OF RELEVANT PLANS AND POLICY DOCUMENTS

Overview

The purpose of this document is to assess how traffic safety (referred to in this document as "safety") has been included in state, regional, and local planning efforts over the last decade to ensure that the current Doña Ana County Safety Action Plan builds on previous work.

Table 1 summarizes key takeaways from relevant recent plans and indicates whether each plan includes safety goals (or priorities), strategies (or actions), projects, and/or policies. Policies, strategies and projects from local and regional plans may be considered for inclusion in this Safety Action Plan, while statewide plans may serve as key data sources and references or guides.

Table 1: Summary of Plans

Plan	Key Takeaways
Chapparal Community Plan (No Date)	Safety is a critical issue for community members, especially the interactions among bicyclists, pedestrians, and trucks.
El Camino Real Corridor Enhancement Plan (2015)	One goal of the Plan is to improve safety for all corridor users. One major project identified is installing striped bike lanes along the corridor.
Plan 2040 Doña Ana County Comprehensive Plan (2015)	Recommends using safety as a criterion for determining whether to accept new roads in the County.
Rio Grande Trail Master Plan (2018)	The trail aims to create a continuous path across New Mexico that prioritizes non-motorized users. It invites exploration of the state's natural beauty, history, and community, all while ensuring a safe and easily navigable experience.
Mesilla Valley MPO Mobility 2045 (2020)	Bicycle/pedestrian safety is integral to this document. Many strategies and policies are recommended to address safety.
New Mexico 2045 Plan (2021)	The Plan aims to guide future transportation investments while assessing current assets and safety performance. It identifies key trends and proposes strategies that incorporate Complete Streets principles and envisions a future with a greater emphasis on active and shared transportation modes.
Pedestrian Safety Action Plan (2021)	The Plan's purpose is to address the high pedestrian crash rate across New Mexico. Strategies and policies are recommended to reduce fatal and severe pedestrian crash outcomes at the state level.
Strategic Highway Safety Plan (2021)	The Plan focuses on strategies for reducing fatal and serious injuries for all transportation modes. Strategies to address pedestrian, bicyclist, and intersection-related safety are provided.
El Paso MPO Metropolitan Transportation Plan 2022 (RMS 2050)	The Plan provides a multimodal network evaluation based on network gaps and high pedestrian, bicycle, and transit demand corridors, and identifies pedestrian and bicycle injury areas.
Vulnerable Road User Safety Assessment (2023)	Includes assessment of crashes involving non-motorized modes and a map of the High Injury Network. It also provides a guide for countermeasure selection based on road context.

Plan	Key Takeaways
NMDOT Highway Safety Plan (2023)	The Plan documents crash trends across all modes and compares trends to performance targets. Strategies include behavioral and enforcement programs.
Complete Streets Strategic Plan (2024)	This in-progress Plan will provide state-level guidance for implementing Complete Streets to improve safety for all transportation modes.
Town of Mesilla Comprehensive Plan (2017)	The Plan provides a clear and detailed understanding of the current conditions, goals, and community desires for enhancing walkability, increasing bicycle facilities, and improving roadway conditions.
Sunland Park 2040 Community Master Plan (2018)	Several locations in Sunland Park are identified as places to invest in infrastructure to improve safety for all roadway users.
Las Cruces Safe Routes to School Master Plan 2019-2024 (2019)	The Plan has the goals of improving traffic safety and access to schools. Key recommendations include both educational and engineering actions.
Paseo del Sol Trail: City of Sunland Park Trails Master Plan (2021)	The Plan seeks to expand multi-use trail network through Sunland Park, including specific safety enhancements for pedestrians and bicyclists along McNutt Drive.
Complete Streets Policies	There are three Complete Streets initiatives in the region. These policies aim to accommodate all roadway users by enhancing safety and incorporating elements that support walking, biking, and transit use, in addition to traditional vehicular traffic.

Viva Doña Ana Initiative

The Viva Doña Ana Initiative regional project, supported by the Camino Real Consortium and financed by a $2 million grant from the Partnership for Sustainable Communities in 2012, is a transformative initiative aimed at enhancing the region's overall well-being. The project considers housing, land use, economic and workforce development, transportation, and infrastructure improvements to create a unified strategy that promotes job creation, economic growth, and an elevated quality of life for present and future generations. The initiative resulted in several plans, including the Doña Ana County Comprehensive Plan and subarea plans and corridor studies.

A core principle of the ***Initiative*** is to expand transportation options. The Viva Doña Ana Initiative states that enhanced transportation choices lead to more time with family, cleaner air, and healthier communities. Doña Ana County is dedicated to developing safe, reliable, and affordable transportation solutions that reduce household expenses, lower energy use, diminish reliance on non-domestic resources, improve air quality, cut greenhouse gas emissions, and support public health. The transportation goals of this Initiative are detailed in 26 specific objectives that touch these critical areas.

Plan 2040 Doña Ana County Comprehensive Plan (2015)

Plan's Purpose

This comprehensive long-range plan for Doña Ana County focuses on meeting the needs of a growing population through six livability principles: supporting existing communities, preserving heritage, transportation choice, community affordability, economic opportunity, and policies and investment.

Relevant Considerations

Safety is considered a goal as part of the transportation choice section, as well as a metric for deciding which new roads to include in the transportation network.

Goals

The goal of the transportation choice section as a livability principle is to promote "safe, reliable, and affordable transportation choices to decrease household transportation costs, improve air quality, reduce greenhouse gas emissions, and promote public health." This goal is supported by four potential measurements of success: share of workers not driving alone to work, vehicle miles traveled (VMT) per household, transit connectivity index, and metric tons of carbon dioxide from household driving. There are no explicit metrics for improving or ensuring safety among Doña Ana County roadway users.

Strategies

A stated goal is to limit new roads accepted into the County's network. Major considerations in determining whether to accept a road is its impact to safety as well as economic development potential and the potential for a roadway to increase or reduce overall vehicle miles traveled (VMT).

In this context, improving access to the Spaceport and Ports of Entry (POE) would greatly benefit both workers and the County. The Border Area Economic Development Strategy (BAEDS) highlighted concerns about the number of roads in the area that Doña Ana County must maintain. As the overweight truck corridor along Pete Domenici Blvd is expected to see more traffic, the secondary roads weren't built to handle the increased weight of larger trucks. This Plan proposes an additional north/south route from the proposed commercial POE to connect with Highway 478 at the Anthony gap.

El Camino Real Corridor Enhancement Plan (2015)

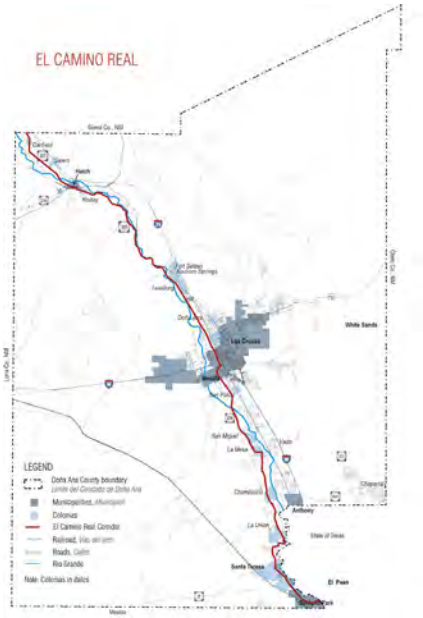
Plan's Purpose

This Plan proposes improvements along El Camino Real Road, a 92-mile network of roadways as part of an emphasis in the Viva Doña Ana Initiative to make the County more livable and economically competitive. The Plan provides branding ideas, agriculture projects, community revitalization ideas, and improvements to the roadways to incorporate bicycle and pedestrian facilities.

Relevant Considerations

Corridor enhancements are intended to expand transportation options for recreational and day-to-day users along important roadways, and a major goal of the project is to improve safety for all corridor users. The Plan notes that there are currently no reported pedestrian and bicyclist crashes along the corridor; however, at the time of writing, most of the corridor had unpaved shoulders along the roadway and no dedicated bicycle or pedestrian facilities. Proposed projects include:

- Striped bike lanes along the El Camino Real corridor.
- Crosswalks at McNutt Road and Racetrack Drive (completed).



Chapparal Community Plan (no date)

Plan's Purpose

This Plan was developed to address the specific needs of Chapparal, a fast-growing area with a high share of low-income and limited English-speaking households. Many residents of Chaparral, including urban workers and military families, commute daily to El Paso, TX and other destinations in Doña Ana County for work, retail, and service needs, resulting in high levels of traffic. Chaparral also features limited places to walk safely. The transportation section of the Plan emphasizes the importance of maintaining local roadways and enhancing traffic safety for pedestrians, vehicles, and commercial trucks. The Plan also explores opportunities to secure federal and state funding for transportation studies aimed at developing targeted recommendations and projects to improve roadway safety and establish designated truck routes.

Relevant Considerations

Traffic safety was identified by residents as an issue, particularly the mixing of commercial trucks, automobiles, and pedestrians. The Plan recommends leveraging federal and state funding to:

- Conduct transportation studies.
- Develop designated truck routes.
- Fund safety-related projects at the following locations:
    - **McCombs Road:** Develop conceptual plans to include traffic calming at intersection of McCombs Road and State Line Drive, conduct a road safety audit, install natural/permeable pedestrian pathway (no limits specified).
    - **Lisa Road:** Install multi-use pathway (no limits specified).
    - **County Line Drive**: corridor improvements, including intersection improvements at Luna Azul Road.

County and Regional Plans

Rio Grande Trail Master Plan (2018)

Plan's Purpose

The Plan identifies an alignment that stretches over 500 miles through New Mexico from Colorado to Texas. This route runs directly through Doña Ana County, connecting notable sites such as Leasburg Dam State Park, the City of Las Cruces' La Llorona Trail, and Mesilla Valley Bosque State Park. The trail envisions a continuous alignment across New Mexico, focusing on non-motorized users and inviting exploration of diverse natural habitats, rich history, and vibrant communities all while ensuring a safe and easily navigable experience.

In Doña Ana County, the trail extends for 100.5 miles, characterized by a diverse range of terrains such as lush agricultural fields and rugged, arid desert landscapes, all framed by views of distant, jagged peaks. The preferred trail alignment features a combination of urban and semi-urban shared paths, on-levee trails, and backcountry routes. This section provides access to the Jornada del Muerto and the historic Route 66, as well as the town of Hatch, known as the center of chile production in New Mexico. The trail culminates at the junction of the borders of New Mexico, Texas, and Mexico at Mount Cristo Rey.

Throughout Doña Ana County, the trail features:

- 7.0 miles backcountry trail
- 11.8 miles on-levee
- 58.0 miles shared use path
- 16.8 miles sidepath
- 6.9 miles unpaved multi-use roadway

Relevant Considerations

The Plan identifies two key funding sources for improving safety along the trail, aiming to enhance user protection and promote a secure recreational environment. These funding opportunities support infrastructure improvements and safety initiatives that contribute to a safer experience for all trail users:

- **Building Initiative for Low-Emissions Development (BUILD) Grant**: This grant aims to create long-term benefits for transportation facilities and systems, enhance economic opportunities, improve quality of life, promote environmental sustainability, and bolster safety.
- **Highway Safety Improvement Program (HSIP):** This program focuses on reducing fatalities and serious injuries on public roads through targeted infrastructure improvements and safety initiatives.

Certain portions of Doña Ana County are classified as non-attainment areas, meaning they do not meet the U.S. Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS) for clean air. To address this issue, the Plan identifies the Congestion Mitigation and Air

Quality Improvement Program (CMAQ) as a potential funding source for transportation projects aimed at improving air quality. CMAQ also offers flexible funding that can be utilized outside of non-attainment or maintenance areas, provided the projects are likely to enhance air quality. This funding could be utilized to implement safety enhancements along the trail, ensuring a safer experience for all users while also contributing to improved air quality.

The concept of Safety is included as one of the six evaluation criteria for trail alignment, including features that promote a safe experience for users. These include:

- Proximity to roads and vehicular traffic
- Visibility/perceived sense of isolation
- Potential physical hazards
- Ease of access by emergency responders

A strategy for creating a safe and courteous trail environment includes posted signage saying, “Please travel at a safe speed.” Instead of “Don’t speed” as many studies found that positive messaging achieves better overall compliance from road and trail users.



Mesilla Valley MPO Mobility 2045 (2020)

Plan's Purpose

This is the long-range transportation plan for the greater Mesilla Valley Metropolitan Planning Area, which includes large portions of unincorporated Doña Ana County from Mesquite to Radium Springs, the City of Las Cruces, and the Town of Mesilla. The Plan was developed by the Mesilla Valley Metropolitan Planning Organization (MPO) and addresses one of the core MPO requirements by identifying long-range transportation needs, priority projects, and available funds. Key goals for the Mobility 2045 are to foster mobility and access for people and goods, provide efficient system performance, preserve the existing system, and contribute to the region's quality of life.

Relevant Considerations

Strategies

Safety is essential in assessing current conditions and future scenarios throughout this Plan. Safety is referenced as:

- A top priority for all agencies (whether federal, state, or local) in constructing transportation facilities.
- Integral to NMDOT planning efforts.
- Part of MVMPO's crash data monitoring program and Annual Safety Report.

The core vision of this document includes prioritizing safety for all users, especially the most vulnerable modes (pedestrians, bicyclists). Strategies for addressing safety include studying intersections with the highest crash rates and securing funding to implement countermeasures at these locations and implementing context-sensitive design and investments in enhanced active transportation facilities.

Policies

- All new thoroughfares should be constructed with on-road bicycle facilities.
- All projects included in the Transportation Improvement Program (TIP) must mention how they will address the adopted Safety Targets. (The MPO has adopted the state's Safety Targets for rates of fatalities, serious injuries, and non-motorized serious injuries.)

El Paso MPO – Regional Mobility Strategy 2050 (2022 (No Date)

Plan's Purpose

The El Paso Metropolitan Planning Organization (MPO) includes portions of Doña Ana County and Otero County and is involving NMDOT planning initiatives. Though El Paso MPO does not have a dedicated Complete Streets plan or active transportation plan, Complete Streets related analyses are included in the metropolitan transportation plan and recommends that Complete Streets design principles be applied prior to investing in roadway capacity improvements.

The most recent update, the Regional Mobility Strategy (RMS) 2050,features multimodal network evaluation based on network gaps and high pedestrian, bicycle, and transit demand corridors, and

identifies pedestrian and bicycle injury areas, though none of the areas in RMS 2050 are in New Mexico. Bicycle and pedestrian safety issues include various bicycle lane gaps in the Sunland Park area.

Relevant Considerations

Strategies

Safety was frequently highlighted as a concern during community engagement and is woven throughout various aspects of the plan. In particular, Complete Streets identified as both a congestion mitigation and a strategy in the RMS 2050. Based in part on the emphasis on safety in the RMS 2050, El Paso MPO received a SS4A planning grant to pursue a regional safety action plan and is expected to begin work in 2024 or early 2025. Since the safety action plan will cover the extent of the MPO planning area, analysis will include portions of Doña Ana County.

Policies

Relevant priority policies that were identified during listening sessions with stakeholders include bicycle and pedestrian-friendly infrastructure as a required component of design of projects and projects that improve quality of life. Specific policies identified in the RMS 2050 include:

- Vision Zero Resolution – August 19, 2022
- Commit to ending traffic fatalities by 2050
- Pursue a Comprehensive Safety Action Plan

Municipal and Community-Level Plans

Town of Mesilla Comprehensive Plan (2017)

Plan's Purpose

The Town of Mesilla Comprehensive Plan aims to preserve Mesilla's cultural heritage, support local businesses, promote sustainable tourism, and improve infrastructure to ensure a high quality of life for its residents. The plan addresses critical transportation elements, including roadway conditions, traffic management, parking, walkability, bicycle infrastructure, and transit options.

Relevant Considerations

The Plan identifies several transportation priorities, many of which relate to creating safe options for people to walk and bike. Specifically, the Plan highlights a desire for bicycle facilities, including a bike share program, as well as improved sidewalks and safer walking conditions. Although Mesilla's narrow streets help manage traffic speeds, residents often find it necessary to use a vehicle for most errands since some areas lack sidewalks, which hampers pedestrian access, particularly for individuals with disabilities. A 2011 suitability study conducted by the MPO identified potential locations for bicycle lanes along the main thoroughfares within and around Mesilla.

Sunland Park 2040 Community Master Plan (2018)

Plan's Purpose

The Plan is intended to manage the high levels of anticipated growth in Sunland Park and to guide investment projects in Sunland Park over a 20+ year horizon. In particular the Plan highlights the community's position on the border with Texas and Mexico and the transportation investments needed to support economic development opportunities and increased levels of cross-border travel over time.

Relevant Considerations

Safe and comfortable accommodation of multiple transportation modes (automobiles, trucks, transit, bicyclists, and pedestrians) is an objective of this plan. The following locations are noted as places to address safety deficiencies, such as lack of roadway shoulder, pavement drop-off, and limited space between roadway and multiuse path:

- Sunland Park Drive, from NM 273 to State Line Drive
- Racetrack Drive and Futurity Drive
- NM 273, north of Memorial Pines intersection
- NM 273 and Airport Road
- County Club Road, from Teresa Paseo Drive to County Line Drive

Other potential safety improvements include pedestrian crossings along McNutt Road between Santo Domingo Drive and Rio Grande Drive and opportunities for traffic calming along:

- Mount Cristo Rey Boulevard
- Roads parallel to McNutt Road
- Roads adjacent to schools

Las Cruces Safe Routes to School Master Plan 2019-2024 (2019)

Plan's Purpose

Safe Routes to School (SRTS) is an international movement to make it safe, convenient, and fun for students and families to travel to school using active modes. This cooperative planning effort among the City of Las Cruces, the Town of Mesilla, and Doña Ana County resulted in a list of actions intended to increase biking and walking to school, enhance safety, decrease congestion, and improve health.

Relevant Considerations

One of the major outcomes of the Plan (and SRTS is general) is to increase traffic safety in and around schools and protect vulnerable populations. The Plan identifies many educational and engineering actions to create safer conditions for school into schools, including:

- Create and pilot in-classroom walking and biking safety education programs for 1st and 5th grade students.
- Create after-school/weekend bicycle safety classes/bike club for middle school students.

- Offer bicycle and pedestrian safety training to parents, staff, community members, local businesses, and agencies.
- Share the SRTS toolkit developed by the SRTS Action Plan committee.
- Create outdoor banners and indoor posters to educate students, families and the community on safe commuting practices and encourage active transportation.
- Review and update maps for elementary schools that show walking school bus routes and other preferred routes for safe walking and biking, crossing guard locations and safe crossing locations within each school zone.
- Work with local and state agencies to keep crosswalks painted.
- Work with Doña Ana County and Town of Mesilla Planning and Development Departments during the school siting process to ensure new or redeveloped schools prioritize active transportation access.
- Create prioritization criteria that ranks all schools for infrastructure opportunities based on collision data, race and ethnicity data, and existing infrastructure condition.
- Conduct walk audits to identify infrastructure issues, and evaluate and address issues.

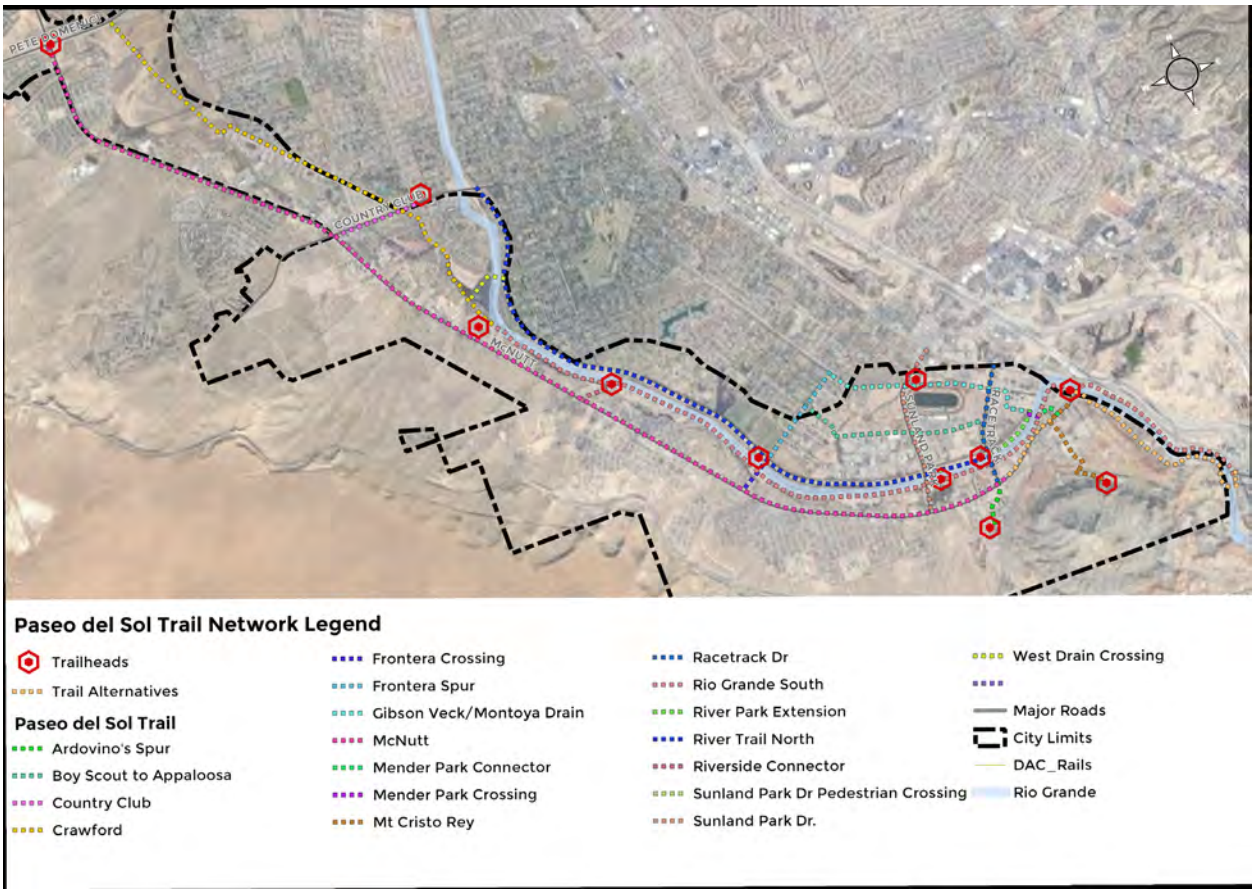
Paseo del Sol Trail: City of Sunland Park Trails Master Plan (2021)

Plan's Purpose

The Plan outlines a vision for the Paseo del Sol Trail, an expansive trail network planned throughout Sunland Park and along the Rio Grande. The trail primarily runs along McNutt Road and has major crossings along Racetrack Road, Sunland Park Drive, and Country Club Road. The trail network reconfigures streets originally designed for vehicular traffic, with narrow roadside paths next to traffic, into safe and comfortable pedestrian facilities by adding a buffer parkway space and trees between vehicles and the trail.

Relevant Considerations

The Paseo del Sol Trail alignment along McNutt Drive is intended to address existing safety issues. In particular, the sidepath that currently runs adjacent to fast vehicle traffic on McNutt Drive, will be intervened to feature a substantial buffer between the road and trail.



Complete Streets Policies

The adoption of Complete Streets policies represents a significant commitment by jurisdictions towards creating safer, more accessible, and inclusive transportation networks. These policies are designed to accommodate all users of the roadway—regardless of their mode of transportation, age, or ability—by integrating various elements that support walking, biking, and transit use alongside vehicular traffic. There are three Complete Streets initiatives in the region, including policies from the Mesilla Valley Metropolitan Planning Organization, Doña Ana County, and the Town of Mesilla.

Agency	Preamble
Mesilla Valley MPO	The adoption of a Complete Streets policy, states guiding principles and practices so that transportation improvements are planned, designed, constructed, and maintained to integrate walking, bicycling and transit use while promoting safe and efficient operations for all users. This resolution also encourages the City of Las Cruces, Town of Mesilla, Doña Ana County, New Mexico State University, and the New Mexico Department of Transportation to adopt a Complete Streets policy.

Doña Ana County	The adoption of Complete Streets guiding principles so that transportation ir and maintained to integrate walking, bicycling, transit, and motor-vehicle us
Town of Mesilla	Adoption of a Complete Streets policy establishing practices regarding the design, construction and maintenance of transportation improvements so that walking, bicycling, transit and motor vehicle use are integrated in a safe and efficient transportation network for all users.

NMDOT Planning Efforts

It is important to understand and consider the planning efforts taken by NMDOT since many roads with high rates of crashes across Doña Ana County are state and US highways. The section below summarizes key plans, relevant safety-related strategies, and their implications for the Doña Ana County Safety Action Plan.

New Mexico 2045 Plan (2021)

Plan's Purpose

The New Mexico 2045 Plan is the policy document that is intended to guide NMDOT's future transportation investments. The Plan evaluates current state-owned transportation assets and transportation system performance – including asset management, safety, travel time reliability, and emissions – and utilizes a scenario planning approach to consider how the state should grow.

The Plan presents trends and issues affecting the transportation system and identifies a series of implementation strategies, including items that relate directly to the integration of Complete Streets design principles into overall project development (see **Table 2**). Noteworthy trends related to Complete Streets include a high concentration of population growth in urban areas and an increase in non-motorized fatalities and serious injury crashes since 2013. Public and stakeholder engagement revealed a preference for the "Steady Cities, Diverse Economy" scenario, which envisions a future with greater reliance on active and shared transportation modes.

Relevant Considerations

- Implement recommendations from the NM Bike Plan for reconstruction and rehabilitation projects to increase safety for local and tourist cyclists and reduce VMT.
- Implement recommendations from the NMDOT Pedestrian Safety Action Plan.

Pedestrian Safety Action Plan (2021)

Plan's Purpose

The Pedestrian Safety Action Plan (PSAP) provides an overview of crashes involving people walking, outlines current NMDOT policies that support walkable environments, and identifies a series of action items to decrease pedestrian fatalities and serious injuries on state-owned highways. The

rising pedestrian crash rate in New Mexico is one of the driving forces behind this plan that seeks to improve pedestrian safety. The Plan sets forth a framework for tracking and reporting crashes, as well as actions to reduce pedestrian fatalities and serious injuries.

Relevant Considerations

Strategies

To improve pedestrian safety, the Plan includes a comprehensive set of actions within the following categories related to data collection, analysis, and evaluation; driver education, pedestrian outreach programs, highway and traffic engineering improvements, enforcement and emergency services, planning, and legislation.

Policies

The Plan recommends a suite of policies within the Planning and Legislation action list. While most of these are geared towards state-level planning and legislation, two are relevant to countywide planning:

- Adopt a statewide Towards Zero Deaths policy.
- Revisit speed limit setting policies and speed limit design tables.

Implications for Doña Ana County

- In addition to general policy support, the PSAP highlights many elements of the Safe Systems Approach, which is applied in the Doña Ana County Safety Action Plan.
- Specific strategies identified in the NMDOT plan, such as enhanced crossings, are part of the Doña Ana County Safety Countermeasures Toolkit.

NMDOT Strategic Highway Safety Plan (2021)

Plan's Purpose

The NMDOT Strategic Highway Safety Plan (SHSP) establishes safety goals, objectives, strategies, and performance metrics to reduce fatal and severe injury crashes. The Plan is organized around the "4Es of transportation planning" – engineering, education, enforcement, and emergency medical services – and fulfills federal requirements to develop, implement, and evaluate a highway safety improvement program.

The SHSP is updated every five years and is a prerequisite for accessing federal Highway Safety Improvement Program (HSIP) funding. An update to the SHSP is planned for 2026 and will include takeaways and recommendations from the Vulnerable Road User Safety Assessment.

Relevant Considerations

Relevant Pedestrian-Related Strategies

- Explicitly include the safety of all road users in the design of transportation projects, including maintenance projects and plans. Use national best practices and bicycle, pedestrian, and equestrian (BPE) recommendations as a guide.

- Develop guidelines and policies that include safe interaction and connectivity of transit, pedestrian, and bicycle modes in planning, design, and construction of transportation facilities.
- Maintain a robust Road Safety Audit (RSA) program for state/local/tribal entities.
- Continue improving the collection and analysis of pedestrian crash data (whether or not a motor vehicle was involved). Facilitate development of an integrated database that includes all data collected at the state, MPO, RTPO, and tribal levels.
- Identify hotspots, as well as potential safety issues, and evaluate countermeasures.
- Provide Americans with Disabilities Act (ADA)-compliant sidewalks/walkways/trails, crosswalks, and curb ramps at locations with identified needs.
- Install traffic calming for road sections and intersections, such as road diets.
- Encourage state and local siting policies and decisions that facilitate safe walking and bicycling to school.
- Develop and fund pedestrian skills and safety education for all ages.

Relevant Bicycle-Related Strategies

- Develop and adopt safety planning, design, and construction guidelines and policies for transportation projects (including maintenance projects and best practices) that include safe interaction of all users and connectivity of transit, pedestrian, and bicycle modes in facility planning and design. Use the national best practices and bicycle, pedestrian, and equestrian (BPE) recommendations as a guide.
- Resurfacing and maintenance projects should explicitly consider bicycle usage and safety on shoulders and review associated guidelines regarding the need for and ideal placement of rumble strips for safety of all users.
- Develop and implement clear, consistent, and context-sensitive, targeted outreach and communication strategies about bicyclist safety to all roadway users.
- Promote inclusion of proven safety strategies to improve bicyclist safety in roadway design and
- maintenance.
- Establish a culture of safety among young people and their families by expanding existing and developing new safe routes to school education programs including how to be a safe pedestrian and bicyclist.
- Maintain a robust road safety audit program Maintain a robust Road Safety Audit (RSA) program for state/ local/tribal entities.

Relevant Intersection-Related Strategies

- Reduce the frequency and severity of crashes at signalized and unsignalized intersections by implementing traffic control and operational improvements.
- Reduce the frequency and severity of crashes at signalized intersections by implementing geometric improvements.
- Improve visibility of the intersection by installing roadway lighting.
- Improve visibility of intersections and traffic control devices (signs and signals) by installing enhanced signage and delineation.

- Improve access management near signalized intersections.
- Clear sight triangles or redesign intersection approaches.

Implications for Doña Ana County

- The SHSP provides policy support for the inclusion of safety countermeasures and multimodal facilities as part of improvements along US and NM highways, including through Doña Ana County.
- Projects identified through the Doña Ana County Safety Action Plan are eligible for HSIP and other federal funds.

NMDOT Highway Safety Plan (2023)

Plan's Purpose

The Highway Safety Plan (HSP) is a triennial plan from the NMDOT Traffic Safety Division that focuses on behavioral and enforcement strategies to reduce crashes, fatalities, and injuries on NMDOT-owned highways. The HSP includes an overview of the highway safety planning process, crash data overview, a performance report, a performance plan, program area problem identification, countermeasure strategies, identified projects, and potential funding sources.

Relevant Considerations

The Highway Safety Plan highlights the NMDOT Pedestrian Safety Action Plan (PSAP), implemented in 2021, as a key strategy. The PSAP aims to reduce pedestrian fatalities and injuries on roads managed by NMDOT and identifies strategies for enhancing data collection and analysis, improving roadway design, increasing education for both pedestrians and drivers, and supporting law enforcement training. Countermeasure for the Pedestrian and Bicyclist Safety Program are based on evidence from NHTSA's latest guidelines and the Transportation Research Board's research. This evidence-based strategy focuses on public education and outreach. The following strategy aligns with Safety Emphasis Areas detailed in NMDOT's Strategic Highway Safety Plan.

Relevant Education Strategies

- Working with local communities, schools, universities and media to provide pedestrian/bicyclist safety education to populations at higher risk of pedestrian/bicyclist injuries and fatalities.
- Providing updated information on pedestrian/bicyclist safety events and resources via the University of New Mexico Center for Injury Prevention Research and Education website.
- Distributing 'Look for Me' bookmarks and 'Rules of the Road' cards with pedestrian/bicyclist safety tips and related laws to law enforcement, universities and schools, including driver education, driver safety and DWI schools; and conducting education and awareness media about crosswalk and roadway modifications designed to increase public safety.

Relevant Planning Strategies

- Continuing to participate in the implementation of the NMDOT 2021-2026 Pedestrian Action Plan strategies to reduce pedestrian fatalities and injures.
- Helping plan community-based projects, particularly in identified high-risk areas, focused on working with community members and pedestrian/bicyclist injury stakeholders to identify and address specific local problems/issues to reduce overall pedestrian/bicyclist deaths and injuries.

Relevant Law Enforcement Strategies

- Providing training to law enforcement on pedestrian crash investigations; working with New Mexico State Police to develop training on New Mexico pedestrian laws.
- Working with Safer New Mexico Now to provide pedestrian/bicyclist safety statute information to officers at the annual Law Enforcement Coordinators' Symposium (LECS).
- Working with local law enforcement, shelters and clinics in high-risk communities to increase awareness of pedestrian/bicyclist safety laws, and increase awareness of high-risk activities and factors that contribute to pedestrian/bicyclist crashes, including alcohol/drug impairment.

Implications for Doña Ana County

Enforcement and education, key strategies in the HSP, are elements of the Safe System Approach that depend heavily on actions at the state level. This makes the HSP complementary to the design-focused efforts of the Doña Ana County Safety Action Plan.

Vulnerable Road User Safety Assessment (2023)

Plan's Purpose

The Vulnerable Road User Safety Assessment (VRUSA), completed in fall 2023, is an effort by NMDOT to evaluate locations with safety concerns and risks experienced by transportation system users. The assessment is required as part of the Infrastructure Investment and Jobs Act (IIJA) and defines vulnerable road users as those who walk, bike, or take other non-motorized modes. The assessment is based on data-driven analysis and includes the following steps:

- Identifying crash hot spots.
- Developing a statewide High Injury Network (HIN).
- Integrating stakeholder input.
- Generating strategies to reduce crashes and crash severity for vulnerable users.

This assessment was undertaken to evaluate the safety of non-motorized transportation users and map a high-injury network to inform safety strategies. The results are to be incorporated into the next update to the NMDOT Strategic Highway Safety Plan, which is due every five years. Per the IIJA, if the fatality rate for vulnerable road users is greater than 15% of fatalities, then the state DOT must spend at least 15% of its HSIP funds on projects that serve vulnerable users. Based on the share of fatal crashes that involve bicyclists and pedestrians, this rule applies to NMDOT.

Key findings include nearly half of crashes involving VRUs occurred between 5 PM and 9 PM, more than one-fifth (21%) of VRUs involved in crashes were Native American, and men comprise higher shares of pedestrians and bicyclists killed, respectively, 72% and 83%.

Relevant Considerations

Strategies

The Assessment contains two main types of recommendations, prioritized infrastructure recommendations and program, policy, and procedure recommendations. The *prioritized infrastructure recommendations* are categorized using a typology system to describe different location contexts and suggest appropriate safety measures.

Given the extensive number of corridor segments and intersections identified along the High-Injury Network (HIN), a typology framework was utilized to match safety countermeasures and project opportunities effectively. Roadway typology considers factors such as the surrounding land use, road capacity, speed limits, traffic volume and type, and physical characteristics. For each typology, this section offers a preliminary list of safety countermeasures tailored to address the specific issues identified in the historical crash analysis for those locations.

Safety countermeasures are defined as targeted actions or physical improvements aimed at reducing the risk of crashes, injuries, and fatalities on roadways. These measures are crucial for enhancing safety for all road users, including drivers, pedestrians, cyclists, and transit passengers. Effective countermeasures address known hazards and improve overall safety performance.

Examples of recommended safety countermeasures include the installation of roundabouts, high-visibility crosswalks, raised crosswalks, median refuge islands, sidewalks, shoulder rumble strips, road diets, and enhanced bike lanes..

Implications for Doña Ana County

- The assessment identifies various strategies that are consistent with the Safety Countermeasures Guide for Doña Ana County.
- Statewide HIN routes in Doña Ana County – excluding the Interstates and the City of Las Cruces – include:
    - NM 136 west of NM 273
    - NM 273 (McNutt Rd) near the Texas border
    - NM 192/228 through the Mesquite area
- The intersection of NM 478 and Harding Rd is considered a top priority intersection for improvement.

Complete Streets Strategic Plan (2024)

Plan's Purpose

This in-progress plan will identify state-level actions that can be taken to better implement Complete Streets elements at the project level. The Plan is specifically focused on ensuring consistent and thorough analysis of safety needs and appropriate facilities for bicyclists and

pedestrians, and identifies ways to incorporate those analyses and improvements into a range of project types.

Relevant Considerations

Complete Streets ensure that dedicated facilities are in place for all roadway users, thereby promoting safety for all modes. Key recommendations includes guidance on conducting safety analysis for individual project locations. Concurrent to the Strategic Plan, NMDOT is also developing a Quick Build Guide that features techniques for improving safety and enhancing facilities for bicyclists and pedestrians along US and NM highways. The guide is intended for use by both NMDOT and local agencies, such as Doña Ana County.

Implications for Doña Ana County

- The Complete Streets Strategic Plan encourages more context-specific analysis for projects through urbanized areas and greater consideration of the needs of bicyclists and pedestrians.
- Key considerations include the need for maintenance agreements where Doña Ana County assumes maintenance responsibilities for trails and other multimodal infrastructure that may be completed as part of an NMDOT project.
- Doña Ana County may use the Quick Build Guide to develop recommendations for project ideas along US and NM highways and for use on County Roads.

APPENDIX C

DESCRIPTIVE CRASH ANALYSIS

Introduction

Purpose

This document outlines the findings of the descriptive crash analysis (the analysis) conducted for the Doña Ana County Comprehensive Safety Action Plan. The analysis provides a data-driven basis for understanding the scope of killed and serious injury (KSI) traffic crashes that occurred in Doña Ana County over the most recent five-year period for which data is available (2018-2022), including country-wide trends and general areas of concern. Serious injuries are defined as any non-fatal injuries that prevents a person from walking, driving, or participating in activities they were capable of prior to the crash. These crashes, combined with fatal injuries, are the focus of the crash analysis in this document. This information can be used to identify potential opportunities to reduce KSI crashes through a range of proven strategies.

Study Area

The analysis summarizes crash data at the county-level, though the analysis focuses primarily on the study area for the Safety Action Plan (SAP): **non-Interstate roads and highways outside of the municipal boundaries for the City of Las Cruces.** Of the 4,343 crashes in the study area from 2018-2022, 2,280 (52.5%) took place on non-NMDOT roads (i.e., County roads and roads maintained by local jurisdictions), while 2,063 (47.5%) occurred on NMDOT roads (i.e., US and NM highways).

Summary of Key Findings

This section highlights key findings from the analysis, including data by crash type, severity, and whether crashes involved bicyclists and/or pedestrians.

Table 2: Key Findings from Crash Data Analysis

	Doña Ana County	City of Las Cruces (non-Interstates)	Interstates and Frontage Roads	SAP Study Area
Total Crashes	21,468	15,125	2,000	**4,343**
Fatal Crashes	100	39	19	**42**
Serious Injury Crashes	297	148	42	**107**
Killed and Serious Injury (KSI) Crashes	397	187	61	**149**
Non-Fatal Injury Crashes	6,413	4,473	596	**1,344**
Non-Injury Crashes	14,955	10,613	1,385	**2,957**
Pedestrian-Involved Crashes	227	175	16	**36**
Bicyclist-Involved Crashes	153	140	0	**13**

Key findings for the ***Doña Ana County study area*** include**:**

- **Crashes by Year**: The total number of KSI crashes fluctuated from 2018-2022, from a low of 24 total KSI crashes in 2019 to a high of 39 KSI crashes in 2021.
- **Injury Severity**: On average, 8.4 crashes per year in the study area resulted in a fatality and 21.4 crashes per year resulted in a serious injury.
- **KSI Crashes by Mode**:
    - Pedestrians: Pedestrian-involved crashes accounted for less than 1% of total crashes, but for 5% of all serious injury crashes and 14% of all fatal crashes. Over the five-year period from 2018 to 2022, there were 36 pedestrian-involved crashes, including six that resulted in a fatality and five that resulted in a serious injury, meaning 30% of pedestrian-involved crashes can be classified as KSI.
    - Bicyclists: Bicyclist-involved crashes accounted for under 0.5% of total crashes, but for 2% of all serious injury crashes and 5% of all fatal crashes. There were 13 bicyclist-involved crashes in the years analyzed, two of which resulted in a fatality and two that resulted in a serious injury, meaning 15% of bicycle-involved crashes can be classified as KSI.
    - Motor Vehicles: Motor vehicle crashes accounted for 98.9% of all crashes and 89.9% of all KSI crashes. From 2018 to 2022, there were 4,294 motor vehicle-only crashes, including 34 fatal crashes and 100 serious injury crashes, meaning 3% of vehicle-only crashes can be classified as KSI.

Leading KSI Collision Type: Collision with motor vehicle crashes were the harmful event type that produced the highest number of KSI crashes in Doña Ana County, accounting for 34.9% of all KSI crashes. Non-collision crashes (e.g., crashes that involved vehicles overturning or rolling over) were the second highest collision type, comprising 24.8% of all KSI crashes.

Environmental Characteristics:

- **Weather and Road Conditions:** The vast majority (90.8%) of KSI crashes occurred in clear conditions. This does not indicate that weather and road conditions do not contribute to KSI crashes. Rather, this trend reflects the fact that most vehicle travel occurs in clear conditions.
- **Hour of the Day:** KSI crashes in Doña Ana County increase after noon, peaking at 2 PM and remained high from 2 PM to 8 PM, with another peak at 7 PM during the evening commute. There was an uptick in KSI crashes again at 2 AM.
- **Lighting Conditions:** Though most vehicle trips across Doña Ana County take place during daylight hours, only about half of KSI crashes occurred during these times. By contrast, a substantial percent of KSI crashes occurred in dark conditions (38.3%). More than half (55.6%) of pedestrian-involved and half (50%) of bicyclist-involved KSI crashes occurred at nighttime, while 43.1% of vehicle-only KSI crashes occurred at nighttime.

Descriptive Crash Analysis Methodology

This report provides planners, engineers, and decision-makers with high-level data to help respond to historical crash patterns and determine which crash factors tend to produce the most KSI crashes across the roadway system. The high-level summary tables and charts in this section illustrate the relationships between crash data factors and various attributes and provide insights into which variables deserve further examination. This analysis can also inform the development of new behavioral safety programs, policy modifications, and safety-focused engineering countermeasures.

Crash Data Overview

Crash data for this analysis was provided by the New Mexico Department of Transportation (NMDOT). The dataset includes all crashes in the five-year period from 2018 through 2022. For this report, crash data on interstates and in the city of Las Cruces were quantified and documented but are not included in the detailed analysis.

This document focuses primarily on KSI crashes, defined as crashes that involved a fatality or serious injury. Fatal crashes are known as “K” severity crashes on the KABCO scale. Serious injury crashes, known as “A” severity crashes on the KABCO scale, are any non-fatal injury crashes that prevent a person from walking, driving, or participating in activities they were capable of prior to the crash.

Study Limitations

Exposure Data

The analyses reported in this document do not adjust for motor vehicle, pedestrian, or bicyclist exposure rates based on volumes for these modes. Therefore, results show crash events but not frequency of crashes normalized by level of traffic or pedestrian and bicycle volumes.

Demographic Data

There was no demographic data, such as age, gender, or race in the crash data, and therefore no comparisons can be made between crash data and demographic data.

Descriptive Crash Analysis

General Crash Trends

KSI Crashes by Year

Figure 1 shows the number of KSI crashes in the Doña Ana County study area from 2018 to 2022. Both fatal crashes and serious injury crashes increased slightly over the study period.

Figure 1: KSI Crashes by Year, 2018-2022

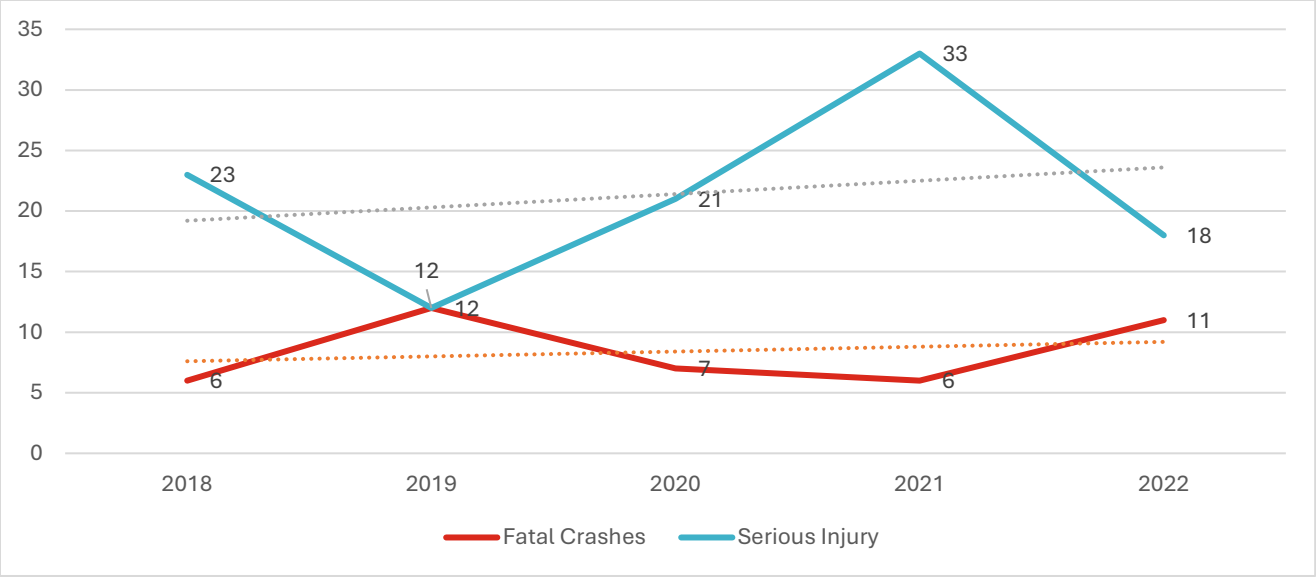
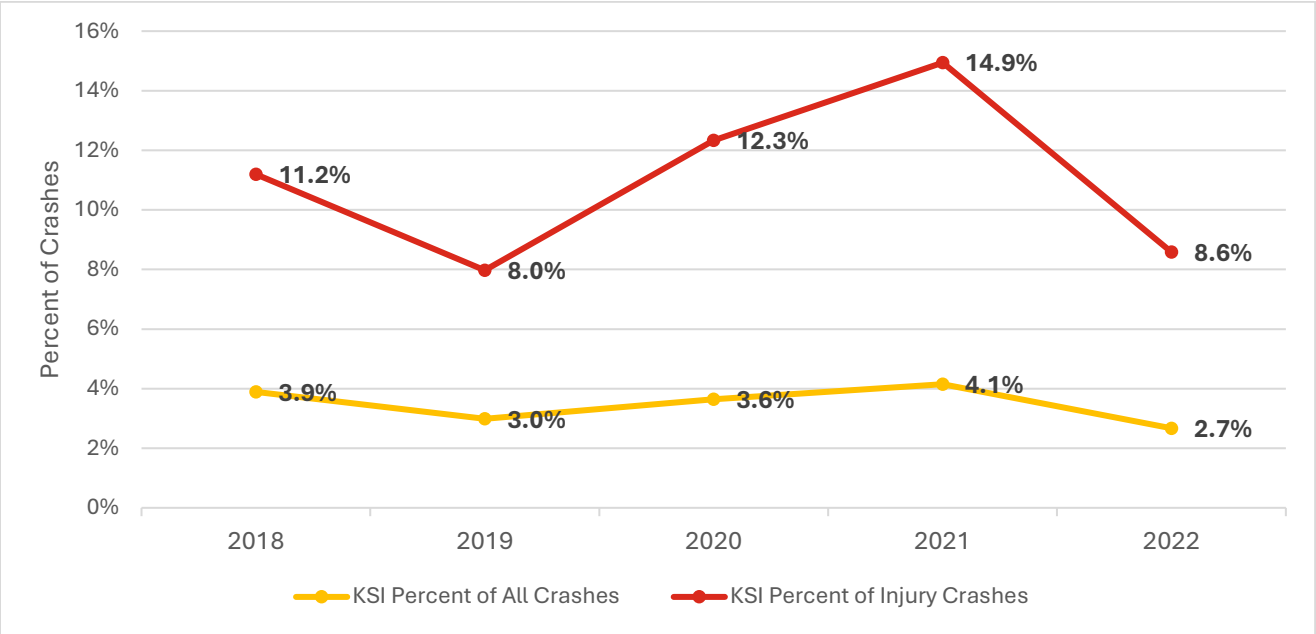


Figure 2 compares KSI crashes as a percentage of total crashes and KSI crashes as a percentage of all injury or fatal crashes. From 2018 to 2021, KSI crashes as a percentage of total injury and fatal crashes increased by about 4 percentage points. KSI crashes as a percentage of all crashes were relatively steady over the five-year study period. Notably, in 2022, KSI crashes as a percent of injury crashes and KSI crashes as a percent of all crashes both decreased, with KSI crashes as a percentage of injury crashes decreasing at a significantly higher rate. Additional years of data will be needed to determine if this reduction in severe crashes constitutes the beginning of a trend or a positive but short-lived anomaly.

Figure 2: KSI Crashes as Percentage of Total Crashes and Injury Crashes, 2018-2022



Crashes by Mode

Table 2 shows KSI crashes by mode of travel. Overall, crashes involving only vehicles account for 98.9% of all crashes and 89.9% of all KSI crashes. Pedestrian and bicyclist involved crashes are overrepresented in KSI crashes. Pedestrian-involved crashes account for 0.8% of total crashes, but 14.3% of all fatal crashes and 4.8% of all serious injury crashes. Bicycle-involved crashes account for 0.3% of total crashes, but 4.8% of all fatal crashes and 1.9% of all serious injury crashes.

Table 3: KSI Crashes by Mode of Travel and Severity, 2018-2022

	Total Crashes	Share of Total Crashes	Fatal Crashes	Share of Fatal Crashes	Serious Injury Crashes	Share of Serious Injury Crashes
Bicyclist-involved	13	0.3%	2	4.8%	2	1.9%
Pedestrian-involved	36	0.8%	6	14.3%	5	4.7%
Vehicle-involved only	4,294	98.9%	34	80.9%	100	93.5%
All crashes	4,343	100%	42	100%	107	100%

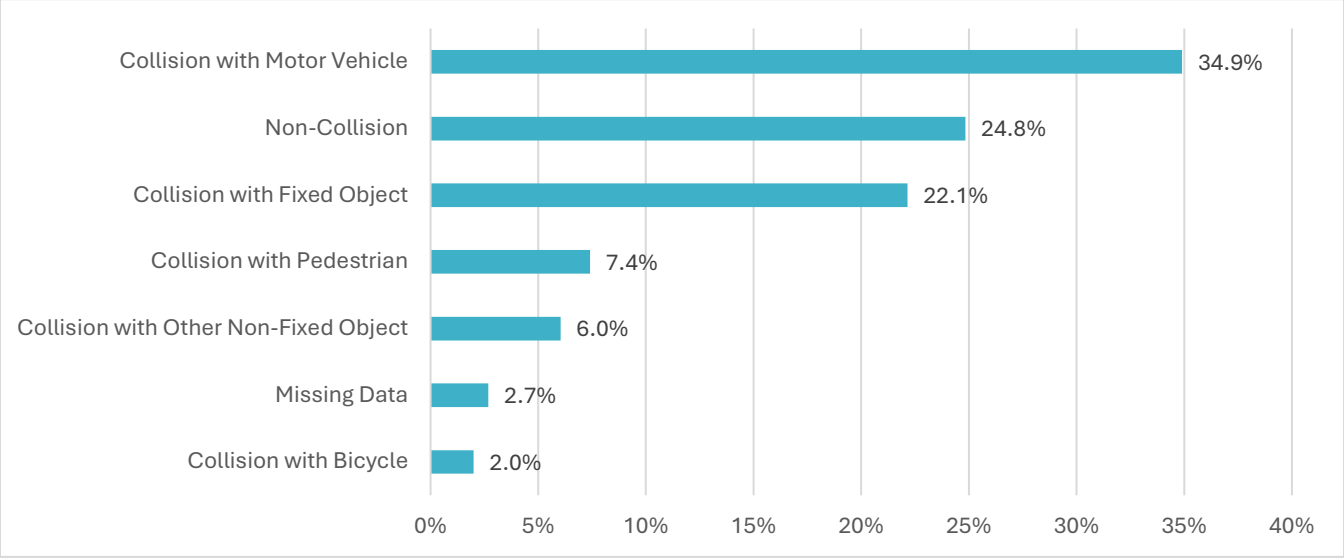
Crash Types and Contributing Factors

Crash Types (First Harmful Event)

Figure 3 summarizes KSI crashes by the first harmful event, as identified in the reported crash data. Collision with a motor vehicle was the leading collision type, observed in 34.9% of KSI

crashes. Non-collision (roadway departure) was the next most common crash type, which includes crashes that involved vehicles overturning or rolling over.

Figure 3: KSI Crashes by Crash Type (First Harmful Event), 2018-2022



Contributing Factors

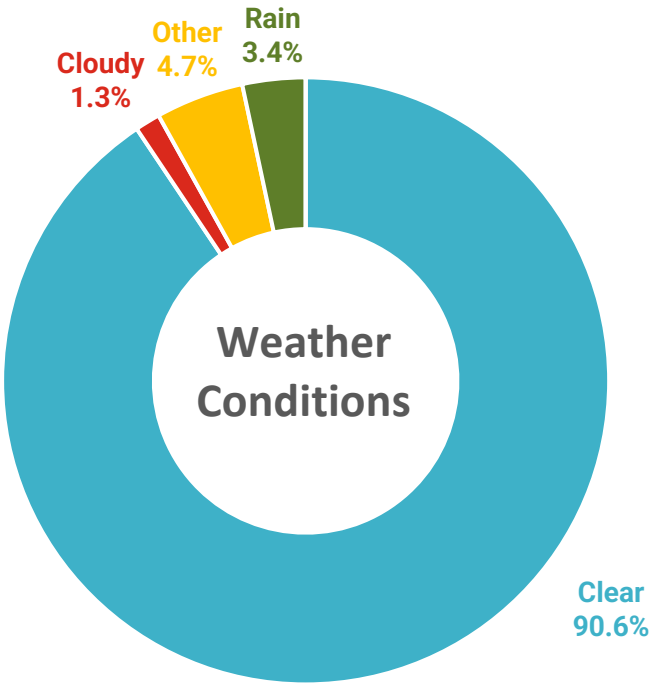
Common contributing factors that lead to crashes include speeding, driver distraction, and use of drugs and alcohol. NMDOT crash data did not include comprehensive data on crash contributing factor, though involvement of alcohol and drugs was noted. Of these two contributing factors, the most common was involvement of alcohol, which was listed for 26.9% of KSI crashes. Additionally, drugs were noted to be involved in 8.6% of all KSI crashes. Taken together, 35.4% of KSI crashes involved the presence of drugs or alcohol.

Environmental Characteristics

Weather Conditions

The majority of KSI crashes (90.6%) occurred in clear weather conditions (see **Figure 4**). It is important to note that most driving, especially in southern New Mexico, occurs in clear conditions. This analysis was not weighted based on traffic volume and should not be interpreted as indicating that poor weather does not contribute to KSI crashes. Further analysis can be conducted to identify areas where inclement weather may contribute to severe crashes.

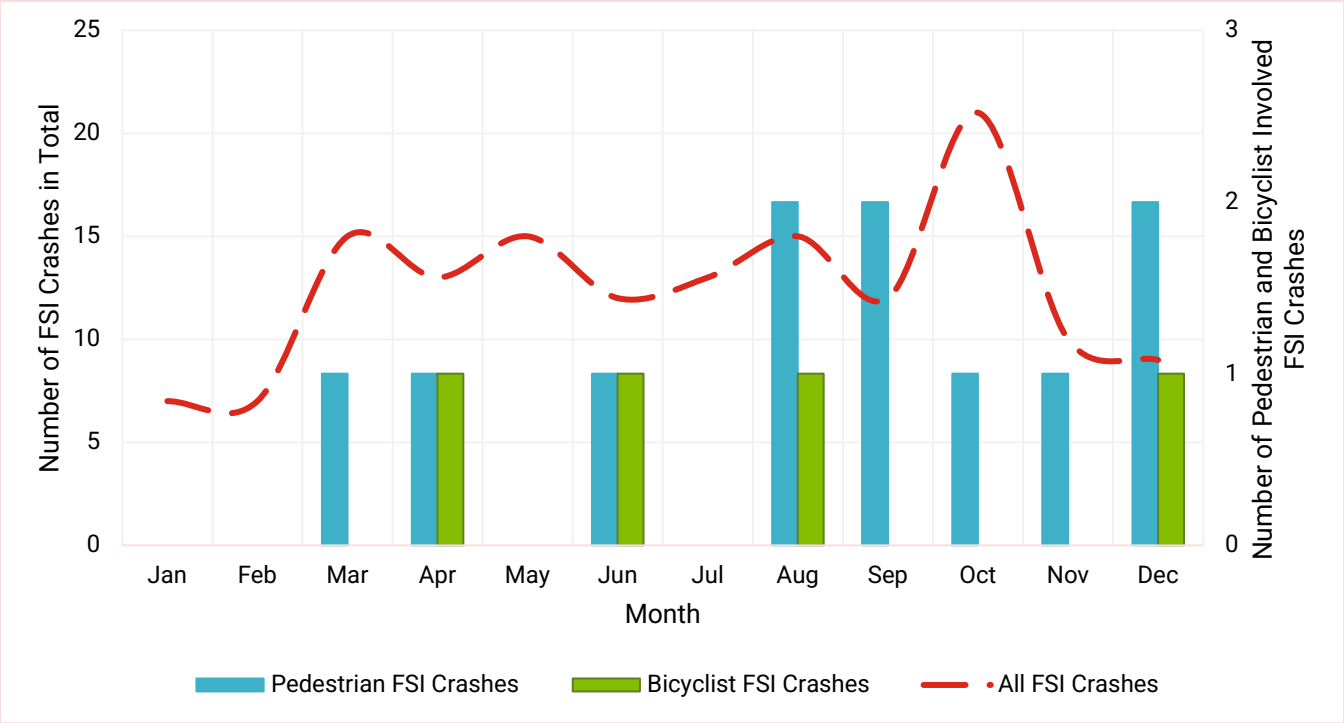
Figure 4: All KSI Crashes by Weather Conditions, 2018-2022



KSI Crashes by Time of Year

Figure 5 summarizes KSI crashes by month of the year. Overall, the highest number of KSI crashes occurred in October (21), with the lowest number of KSI crashes taking place in the winter months from December to February. The highest number of KSI crashes that involved pedestrians occurred in August, September, and December. KSI crashes that involved bicyclists tended to occur in late spring and summer months, which may correspond with increased bicycling in Doña Ana County.

Figure 5: KSI Total, Pedestrian, and Bicyclist Crashes by Month of Year, 2018-2022



KSI Crashes by Time of Day and Mode

Figure 6 summarizes the number of KSI crashes by mode throughout the course of the 24-hour day period. Total KSI crashes tended to increase starting at 1 PM, peaking at 2 PM and again at 6 PM. KSI crashes remained relatively high from 2 PM to 8 PM during the evening commute. There were upticks in KSI crashes again around 2 AM and 6 AM, but generally KSI crashes were lower throughout the night and morning than during afternoon hours. Traffic volumes are generally higher in the afternoon hours, which could contribute to the higher number of KSI crashes in afternoon hours. A spike in KSI crashes between 1 AM and 3 AM could be related to impaired drivers. Pedestrian-involved KSI crashes peaked at 3 PM, with a sustained presence of crashes between the hours of 5 PM and 9 PM. Bicyclist-involved KSI crashes occurred in the morning at 6 AM and 9 AM and in the evening at 7 PM and 8 PM.

Figure 6: KSI Total, Pedestrian, and Bicyclist Crashes by Hour of Day, 2018-2022

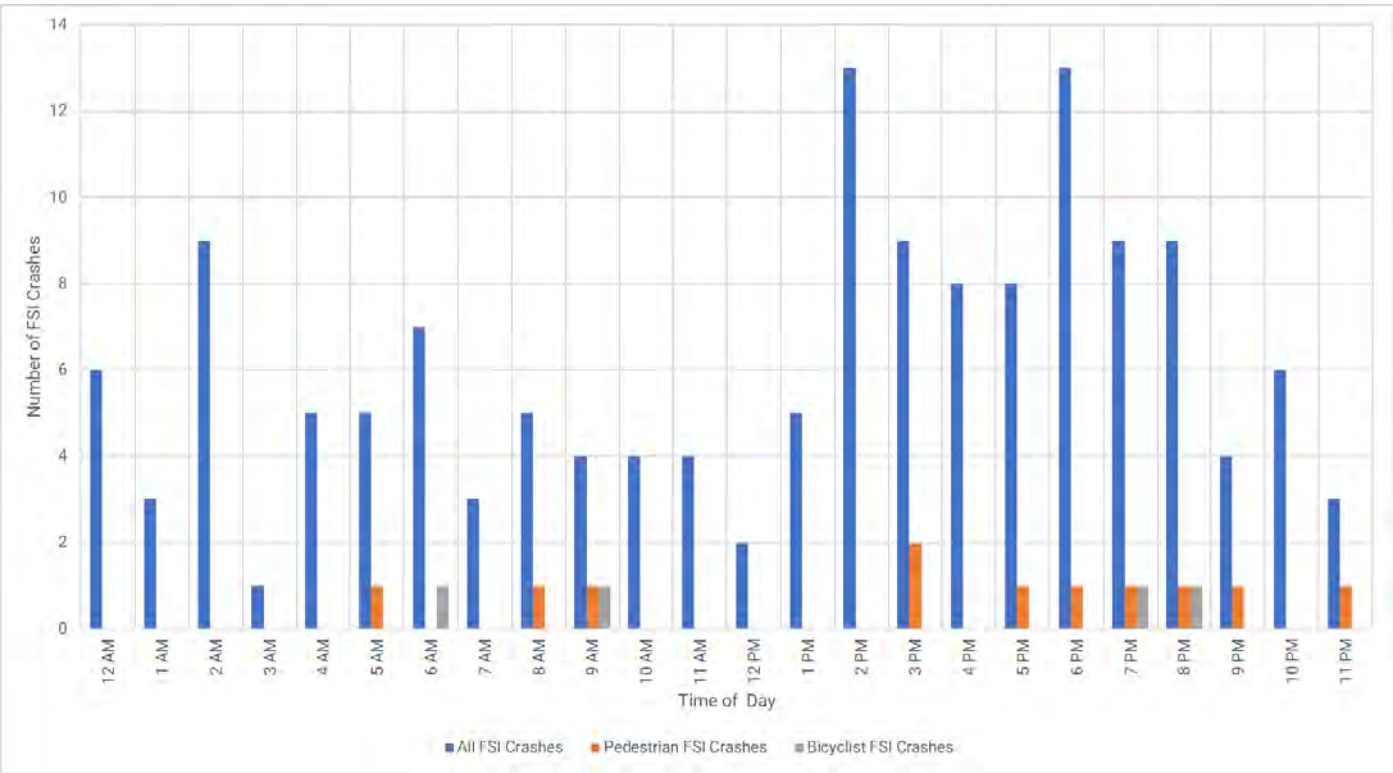


Table 3 shows crashes by time of day and day of week. The time of day with the highest KSI crashes was from 6 PM to 9 PM, when lighting conditions are more likely to be dark and there are still relatively high rates of exposure. Overall, most KSI crashes occur on Saturdays and Sundays and during the hours of 6 PM to 9 PM. Crashes during these times could be related to impaired driving. This high rate of KSI crashes on Saturday nights carried over into the early morning hours of Sunday morning between 12 AM and 3 AM.

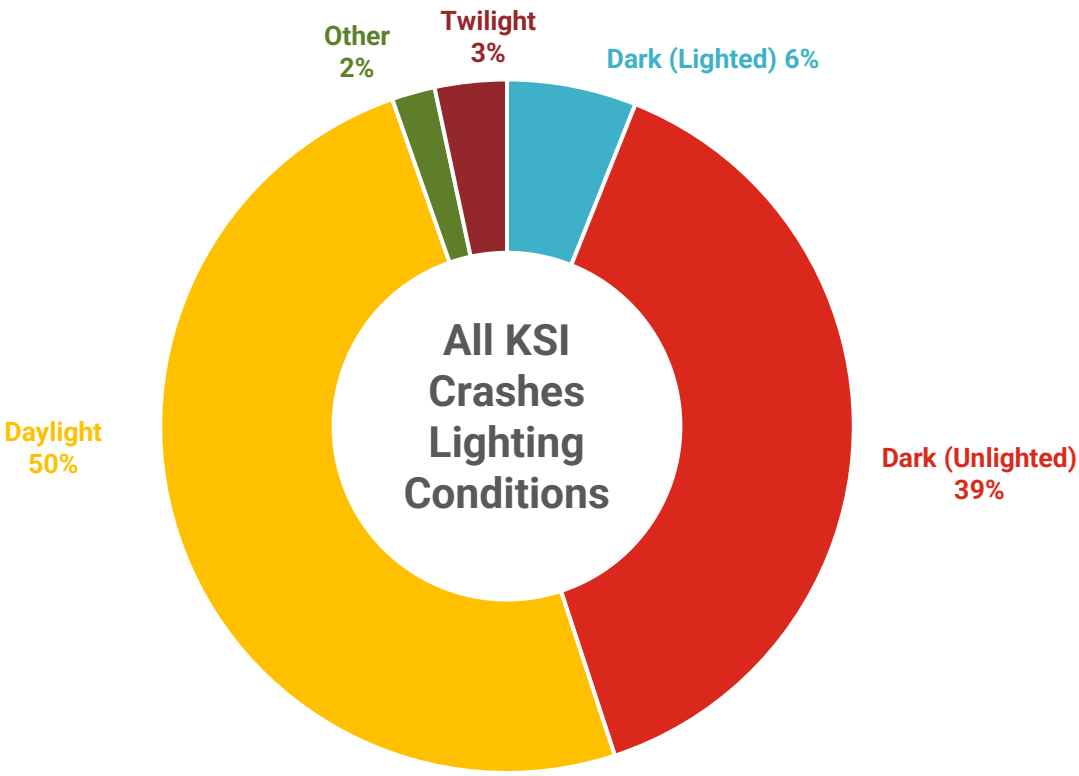
Table 4: KSI Crashes by Time of Day and Day of Week, 2018-2022

	12 AM - 3 AM	3 AM - 6 AM	6 AM - 9 AM	9 AM - 12 PM	12 PM - 3 PM	3 PM - 6 PM	6 PM - 9 PM	9 PM - 12 AM	Grand Total
Sun	**8**	**0**	**2**	**1**	**3**	**6**	**5**	**2**	**27**
Mon	2	1	1	2	4	5	**2**	1	18
Tue	1	1	2	2	4	5	**1**	0	16
Wed	0	2	2	1	1	1	**4**	1	12
Thu	2	1	2	1	4	1	**2**	4	17
Fri	1	1	1	3	3	2	**5**	0	16
Sat	**4**	**4**	**5**	**2**	**1**	**6**	**12**	**9**	**43**
Total	*18*	*10*	*15*	*12*	*20*	*26*	***31***	*17*	*149*

Lighting

Lighting refers to whether a crash occurred during daytime or nighttime hours and whether the crash occurred in an area with streetlights. Proper lighting can increase visibility for all road users, while dark, unlit conditions can be associated with low visibility and more severe crashes. **Figure 7** summarizes the lighting conditions for KSI crashes. While 39% of all KSI crashes occurred in dark and unlit conditions, 50% of bicyclist-involved KSI crashes and 63% of the pedestrian-involved KSI crashes occurred in dark and unlit conditions. Though the number of pedestrian and bicycle KSI crashes is relatively small, the disproportionate share of crashes in dark or unlit conditions speaks to the potential for lighting as a targeted countermeasure.

Figure 7: KSI Crashes by Lighting Conditions, 2018-2022



APPENDIX D

LOCATION-BASED CRASH ANALYSES

HIGH INJURY NETWORK OVERVIEW AND METHODOLOGY

HIGH RISK NETWORK OVERVIEW AND METHODOLOGY

High Injury Network Overview and Methodology

Introduction

The development of a High Injury Network (HIN) is a key element of a safety plan that helps identify where fatal and serious injury crashes have occurred at the greatest density over a period of time. The HIN development process involves counting fatal and serious injury crashes along each corridor throughout the region, calculating severity-weighted crash density scores for each corridor, and identifying roadway segments that meet an established score threshold for each transportation mode. The HIN for the Doña Ana County Safety Action Plan is an input to the countywide Priority Safety Network, which is used to prioritize the selection of safety improvement projects. This memorandum describes the crash data sources, methodologies, and thresholds for the development of an HIN for Doña Ana County.

Crash Data Sources and Study Area

Crash data for the 5-year period of 2018-2022 was acquired from the New Mexico Department of Transportation (NMDOT) for the Safety Action Plan study area, which includes non-Interstate roads and highways outside of the municipal boundaries for the City of Las Cruces. The HIN maps use fatal and injury crash data and include a composite conditions map and individual maps by mode of transportation.

High Injury Network Analysis Methodology

The process of defining scoring thresholds and examining the segments that should be included in the HIN utilizes the following steps:

1. Map the sliding window analysis results for all modes collectively and each mode individually.
2. For each mode, determine the threshold score required to be included in the HIN for that mode. This step eliminates streets that have a lower severity-weighted crash density, prioritizing segments that have higher frequencies of severe crashes.
3. Produce maps that show the segments that meet the threshold for all modes collectively and each mode individually.

Sliding Window Analysis: The HIN was developed using a sliding window analysis, which helps safety professionals better understand and quantify safety performance along a transportation network, identifying segments with the highest densities of severe crashes. The analysis works by determining the number and severity of crashes along a roadway segment (i.e., the window) and sliding that window along the network at set intervals. In this approach, the window is moved along a corridor, counting the number of crashes by density and severity by mode that occurred within each successive segment.

Segmentation: To perform this HIN analysis, all roads were split based on road segments and then combined into corridors based on name and functional class. The analysis segment windows extended 0.5 miles in length and slid along the network at 0.1-mile increments. A lateral buffer of 25 feet on either side of the segment was used to capture crashes that may not be precisely aligned within the roadway.

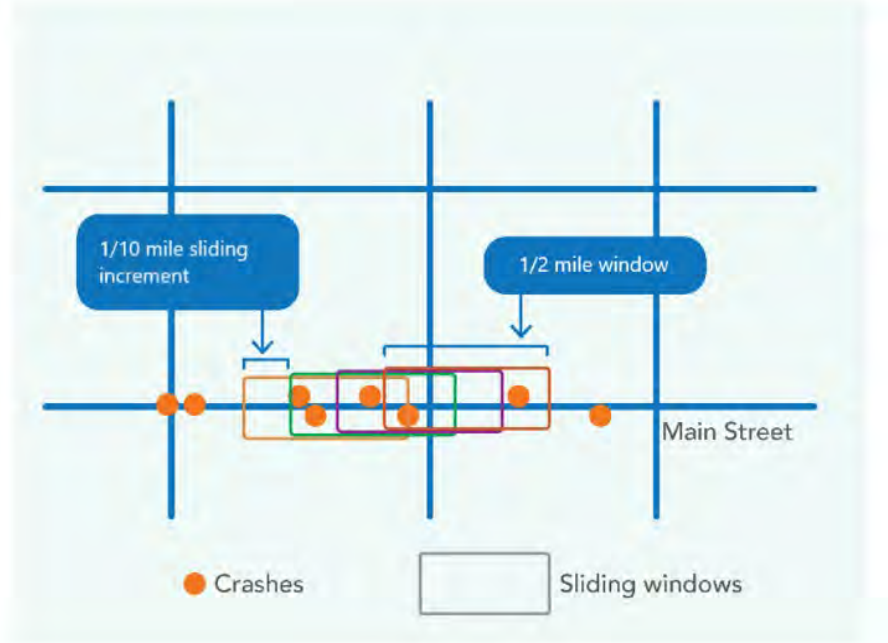


Figure 8: Example of Slide Window Analysis

Both intersection and segment crashes were included in this evaluation, as the focus was on overall corridor conditions. Crash events occurring within the bounds of an intersection were counted on both corridors for the purposes of identifying the HIN. An example of a sliding windows analysis is shown in **Figure 1**. The sliding windows analysis was conducted for transportation modes that include bicycle, pedestrian, motorcycle, and motor vehicle. For crashes involving multiple modes, a crash was assigned to a single mode, the most vulnerable mode involved. For example, a crash between a motor vehicle and a bicyclist would be classified as a bicycle crash and would not be included in the "motor vehicles only" HIN analysis.

Scoring and Evaluation Process: A score for each window was determined based on the frequency and severity of crashes by mode using the KABCO injury classification scale. Fatal and serious injury (K+A) crashes were given a weight of 3, other visible injury (B) a weight of 1, complaint of pain (C) crashes a weight of zero, and property damage only (PDO) (O) crashes a weight of zero. Once the weights are established and applied to the crashes, the number of crashes is aggregated to each window, incorporating the crash severity weighting.

For example, if a segment had one K crash, two A crashes, zero B crashes, two C crashes, and five O crashes, it would receive a score of 9; (1x3) + (2x3) + (0x1) + (2x0) + (5x0). This method of weighting places a greater focus on fatal and serious injury crashes.

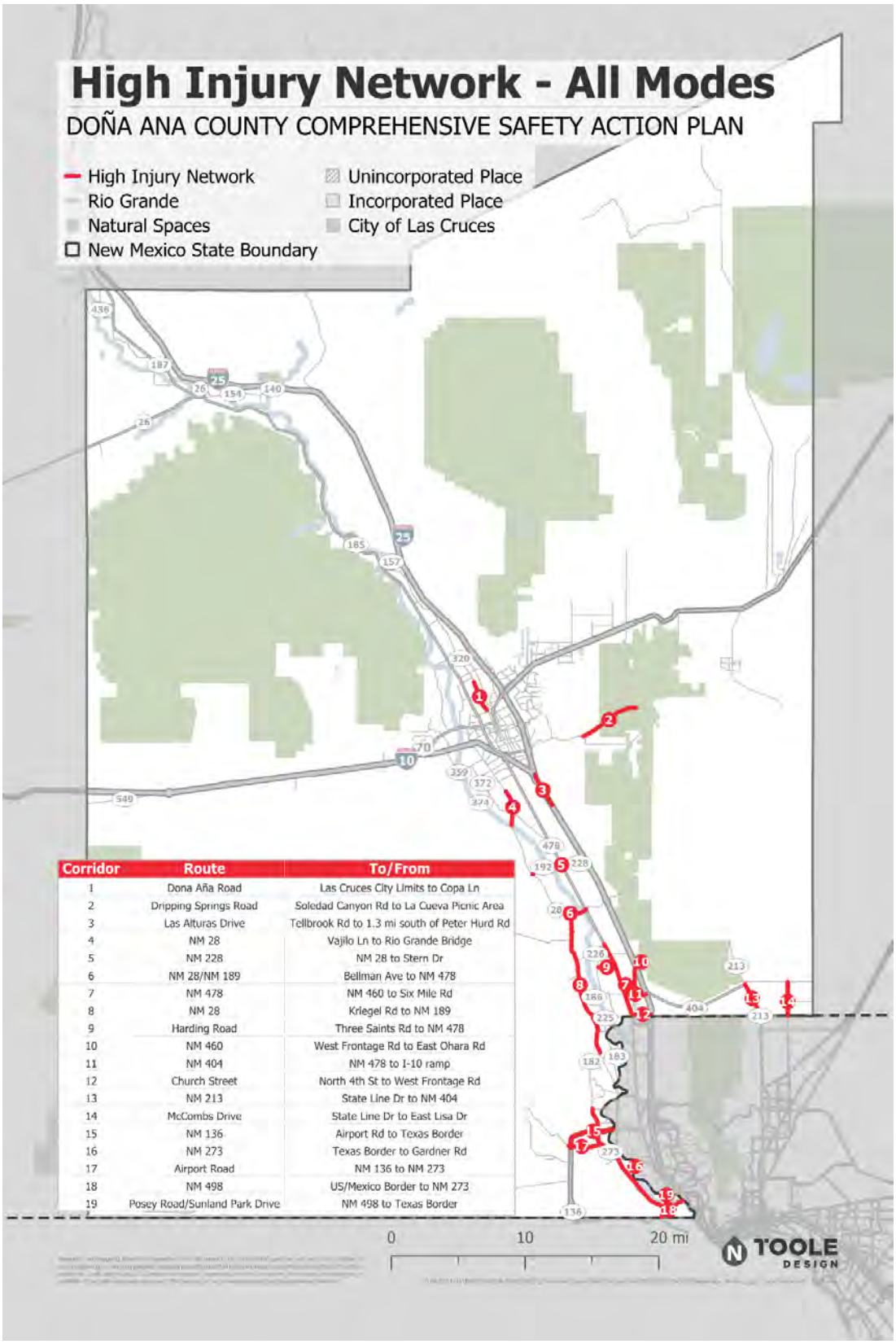
High Injury Network Thresholds: Setting the sliding windows score threshold for each mode will determine which corridors are selected for inclusion in the HIN. These scores may differ by transportation mode. For example, a score of 3 may be high for the bicycle network, but relatively low for a motor vehicle network since there are generally more motor vehicle crashes than bicycle crashes. A segment that meets or exceeds the score threshold for that mode will be included in that mode's HIN. **The HIN for all modes contains 28% of the fatal and injury crashes on just 3% of the County's roadway miles.** The threshold scores used for the Doña Ana County SAP are listed below.

Table 5: HIN Threshold Score by Mode

Mode	Threshold Score
All Modes	8
Pedestrian	3
Bicycle	3
Motorcycle	5
Motor Vehicle Only	7

HIN Network Maps

Figure 2 to **Figure 6** show the HINs for all crashes, pedestrian, bicycle, motorcycle, and motor vehicle modes, respectively, within the Safety Action Plan study area.



Corridor	Route	To/From
1	Dona Aña Road	Las Cruces City Limits to Copa Ln
2	Dripping Springs Road	Soledad Canyon Rd to La Cueva Picnic Area
3	Las Alturas Drive	Tellbrook Rd to 1.3 mi south of Peter Hurd Rd
4	NM 28	Vajilo Ln to Rio Grande Bridge
5	NM 228	NM 28 to Stern Dr
6	NM 28/NM 189	Bellman Ave to NM 478
7	NM 478	NM 460 to Six Mile Rd
8	NM 28	Kriegel Rd to NM 189
9	Harding Road	Three Saints Rd to NM 478
10	NM 460	West Frontage Rd to East Ohara Rd
11	NM 404	NM 478 to I-10 ramp
12	Church Street	North 4th St to West Frontage Rd
13	NM 213	State Line Dr to NM 404
14	McCombs Drive	State Line Dr to East Lisa Dr
15	NM 136	Airport Rd to Texas Border
16	NM 273	Texas Border to Gardner Rd
17	Airport Road	NM 136 to NM 273
18	NM 498	US/Mexico Border to NM 273
19	Posey Road/Sunland Park Drive	NM 498 to Texas Border

Figure 9: High Injury Network – All Modes

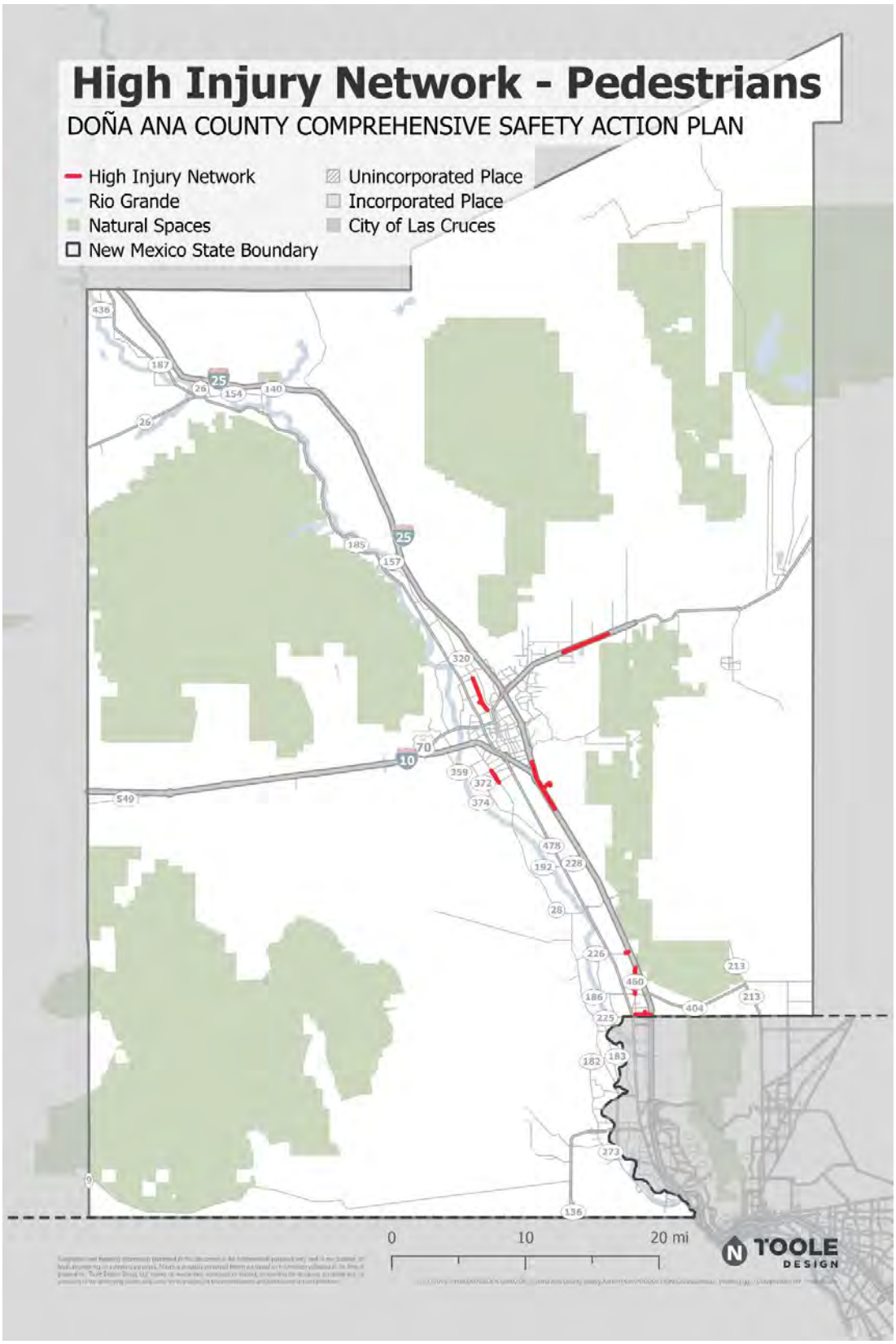


Figure 10: High Injury Network – Pedestrians



Figure 11: High Injury Network – Bicyclists

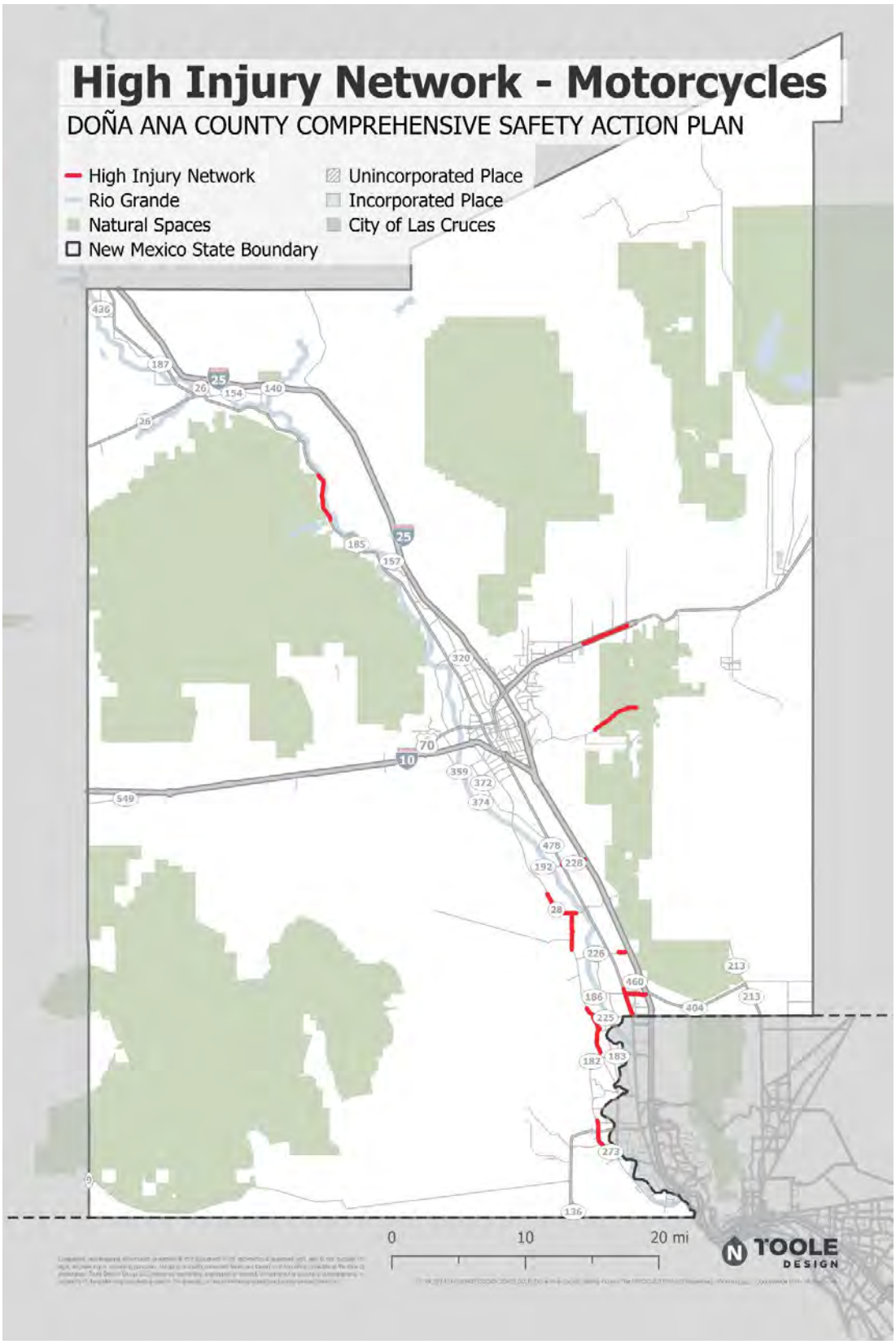


Figure 12: High Injury Network – Motorcycles

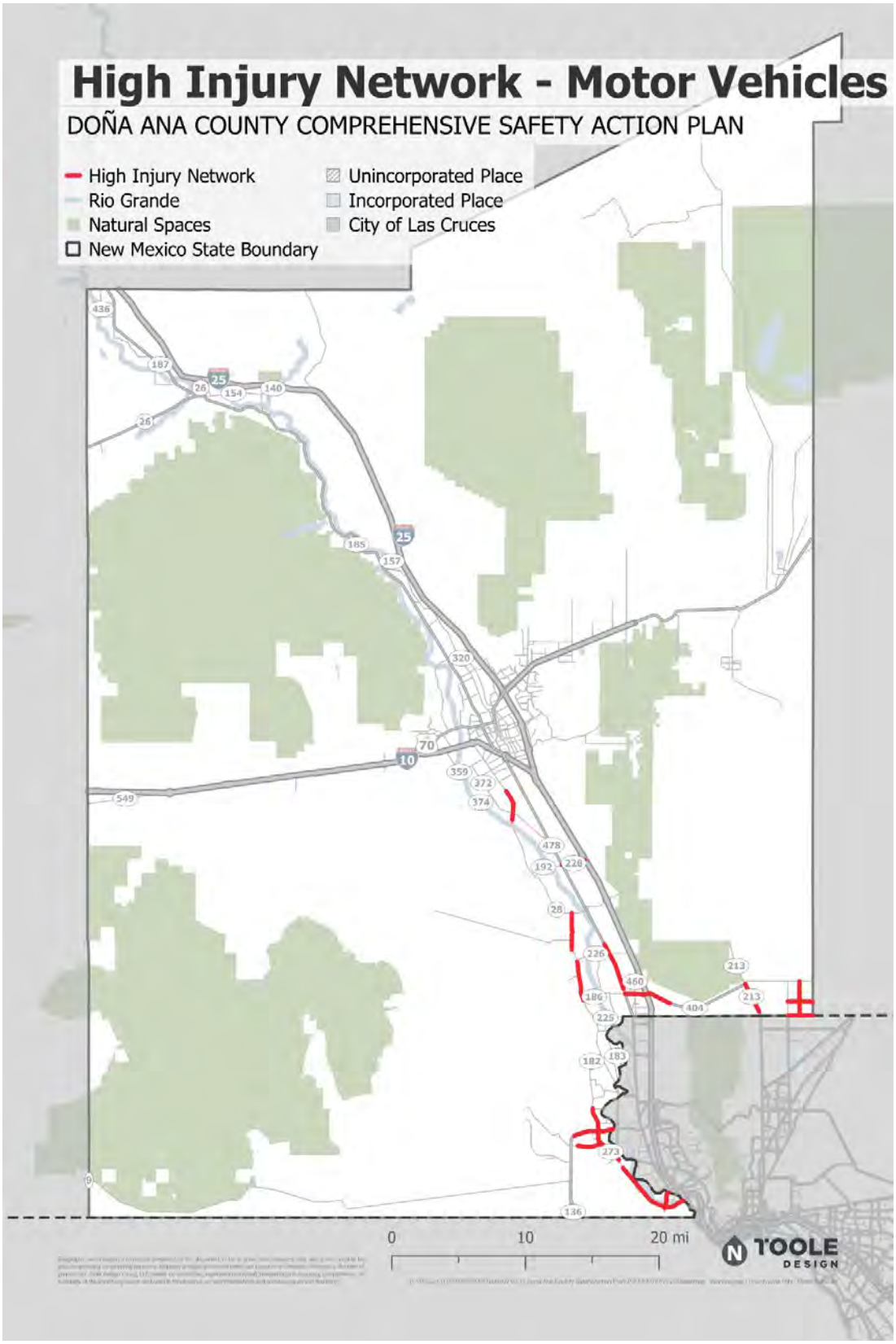


Figure 13: High Injury Network – Motor Vehicles

High Risk Network Overview and Methodology

Purpose of Developing a High Risk Network

This memorandum documents the process for developing and analyzing the High Risk Network (HRN) for the Doña Ana County Comprehensive Roadway Safety Action Plan . The purpose of the HRN is to identify roadways with the greatest potential for safety improvements by identifying combinations of roadway attributes and socioeconomic factors across Doña Ana County that are associated with elevated fatal and injury crash rates. The HRN complements the High Injury Network and is an input to the countywide Priority Safety Network. The screening factors and facility profile tiers established through systemic analysis can be used to identify high risk roadways throughout the Safety Action Plan study area. The general process for developing and applying the HRN is outlined in **Table 1**.

Table 6: Steps in the Development and Application of High Risk Network Development Process

Step	Description
1. Screening Factors	• Identify potential screening factors, including roadway characteristics and socioeconomic factors for populations along a roadway.
2. Evaluate the Roadway System	• Establish the level of correlation among screening factors and rates of crashes for roadways across Doña Ana County. • Define facility profile tiers for each mode of transportation.
3. Develop the High Risk Network	• Assign facility profile tiers to all Doña Ana County roadways for each mode. • Create High Risk Networks based on Critical and High tier roadways for each mode.
4. Identify Safety Improvements	• Consider potential improvements to Critical and High tier roadways as part of the overall Comprehensive Roadway Safety Action Plan.

Systemic Screening Factors

One of the key outcomes of the HRN analysis process is the identification of roadway attributes and socioeconomic considerations, known as systemic screening factors or correlating factors, that are associated with high rates of fatal and injury crashes. Locations where combinations of these factors are present typically have elevated crash risks and indicate that further analysis and consideration of safety needs should be prioritized. However, it is important to note that the presence of systemic screening factors does not necessarily indicate a causal relationship, nor that individual factors should necessarily be the target of treatments. For example, the presence of nearby pedestrian generators may be correlated with elevated pedestrian crash frequencies;

however, this does not mean that these generators should be removed. Instead, facilities near such generators may require additional investments that promote safety for vulnerable users.

Table 2 describes roadway segment attributes and socioeconomic data that were identified as candidate screening factors for consideration in the HRN analysis. Factors considered in the analysis were informed by data quality and availability and customized based on the demographic characteristics of Doña Ana County.

Table 7: Factors Screened for Systemic Analysis

Screening Factor	Description/Categories
Functional Class	High = Major arterials and state routes Medium = Minor arterials and collector roads Low = Local and residential roads
Speed Limit Ranges (MPH)	≤30 35-45 50+
Roadway Setting	Urban Rural >based on Doña Ana County land use data.
Annual Average Daily Traffic (AADT) Volume Ranges	0-1,000 1,001-10,000 10,000+
Percent of Households without Access to a Motor Vehicle (Census Data, 2022)	Percentage of households with no vehicles in the census block group adjacent to the roadway. Derived from 2018-2022 five-year American Community Survey (ACS) data.
Unemployment Rate (Census Data, 2022)	Unemployment rate in the Census block group adjacent to the roadway. Derived from 2018-2022 ACS data.
Percent of Population with Incomes below Two Times the Poverty Line (Census Data, 2022)	Percentage of population with incomes two times below the poverty line in the census block groups adjacent to the roadway. Derived from 2018-2022 ACS data.
Percent of Households with Limited English Proficiency (Census Data, 2022)	Percentage of households with Limited English proficiency in the census block groups adjacent to the roadway. Derived from 2018-2022 ACS data.

Systemic Analysis Process

The systemic analysis process was used to define several facility profiles – essentially a description of risk ranging from minimal to critical – by analyzing the correlation between each screening factor and/or combination of factors shown in **Table 2** with the crash densities on Doña Ana County roadways. Crash data for the 5-year period of 2018-2022 was acquired from the New Mexico Department of Transportation (NMDOT) and analyzed for the Safety Action Plan study area (i.e., non-Interstate roads and highways outside of the municipal boundaries for the City of Las Cruces).

The systemic analysis screening process is based on a decision tree machine learning algorithm where each factor is screened individually to determine whether there are observed differences in the screening factors between locations with relatively high and low average crash densities per mile. For categorical factors such as functional classification, speed limit, traffic volumes, and census data categories, the algorithm considers each unique classification individually. The algorithm screens all factors recursively to identify the most correlated factor and continues until a set of factors is identified as a facility profile. **Figure 1** illustrates the decision tree algorithm where three correlated factors define a facility profile.

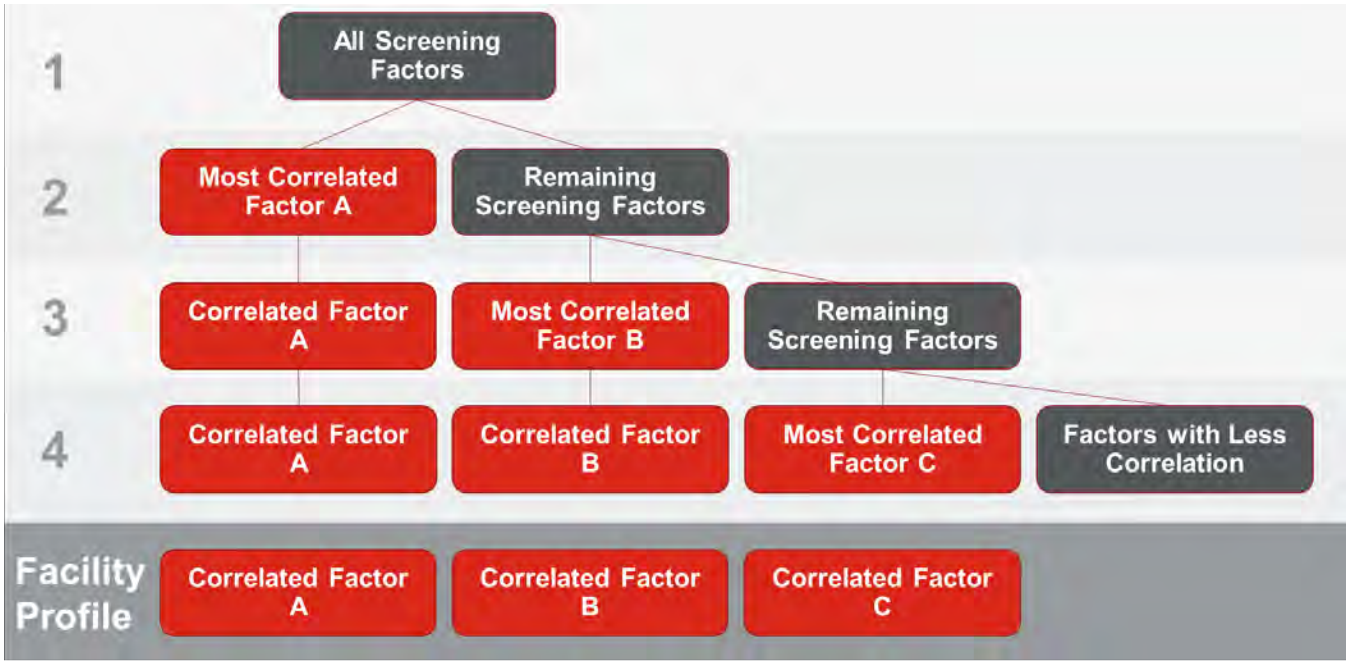


Figure 14: Illustration of Decision Tree Screening Process to Establish Facility Profiles

Analysis Results

The following sections define the facility profile tiers and outline the systemic analysis results by mode of transportation, including the screening factors with the highest correlation to fatal and injury crashes. Based on observed roadway conditions and the facility profile tiers by mode, roadway segments across Doña Ana County that are associated with higher levels of crash risks for each mode were identified for inclusion in the HRN.

Figures in this section represent results for all modes (i.e., motorists, pedestrians, and bicyclists) within the study area. The analysis was conducted using fatal and injury crashes only.

All Modes

Table 3 indicates the screening factors *most highly correlated* with elevated fatal and injury crash rates for all modes. These include:

- Functional classification
- Roadway setting
- Unemployment rate
- Percent of population below 2x the poverty line

Other factors are important when considering overall roadway safety but are *not highly correlated* with elevated crash frequency for *all modes* in Doña Ana County. These include:

- Speed limit
- Traffic volume
- Percent of households without access to a vehicle
- Percent of households with Limited English Proficiency

Table 8: Facility Profile Definitions for Crashes - All Modes

Facility Profile Tier	Functional Class	Roadway Setting	Unemployment Rate	Percent of population below 2x poverty line
Critical	Medium to High	Urban	<4.5%	>35%
High	Medium to High	Rural	>3.5 or <6.5%	-
	Medium to High	Urban	>4.5%	>35%
Medium	Medium to High	Rural	<3.5%	>35%
	Medium to High	Rural	>6.5%	-
	Low	Urban	-	>55%
Low	Medium to High	Rural	<3.5%	<35%
Minimal	Medium to High	Urban	-	<35%
	Low	Urban	-	<55%
	Low	Rural	-	-

Note: Cells that are blank indicate there is not a significant correlation between the screening factor and elevated crash rates.

The results of the facility profile analysis in **Table 3** show that roadways can be considered "Critical" for *all modes* when they are collector or arterial streets in urban areas with unemployment rates of less than 4.5% and more than 35% of the population with incomes below two times the poverty line.

As shown in **Table 4** and **Figure 2**, more than half (74%) of fatal and injury crashes in the study area are on Critical, High, and Medium tier roadways, while these facilities only represent 10% of the total roadway miles in the study area.

The corridors identified as 'Critical', 'High', and 'Medium' in the facility profile analysis for *all modes* are shown in **Figure 3**. Versions of these maps focused on population centers can be found in the **Supplementary Maps** section**.** Corridors in these tiers include NM 213, NM 273, NM 478, and NM 320.

Table 9. Facility Profile Metrics for Crashes - All Modes

Facility Profile Tier	Facility Profile Metrics				
	Average Crashes per Mile	Miles	Crashes	Miles Share	Crashes Share
Critical	3.88	62.4	242.0	1.2%	20.8%
High	2.32	113.6	264.0	2.1%	22.7%
Medium	0.98	350.6	344.0	6.6%	29.6%
Low	0.43	194.0	83.0	3.7%	7.1%
Minimal	0.05	4,569.8	228.0	86.4%	19.6%

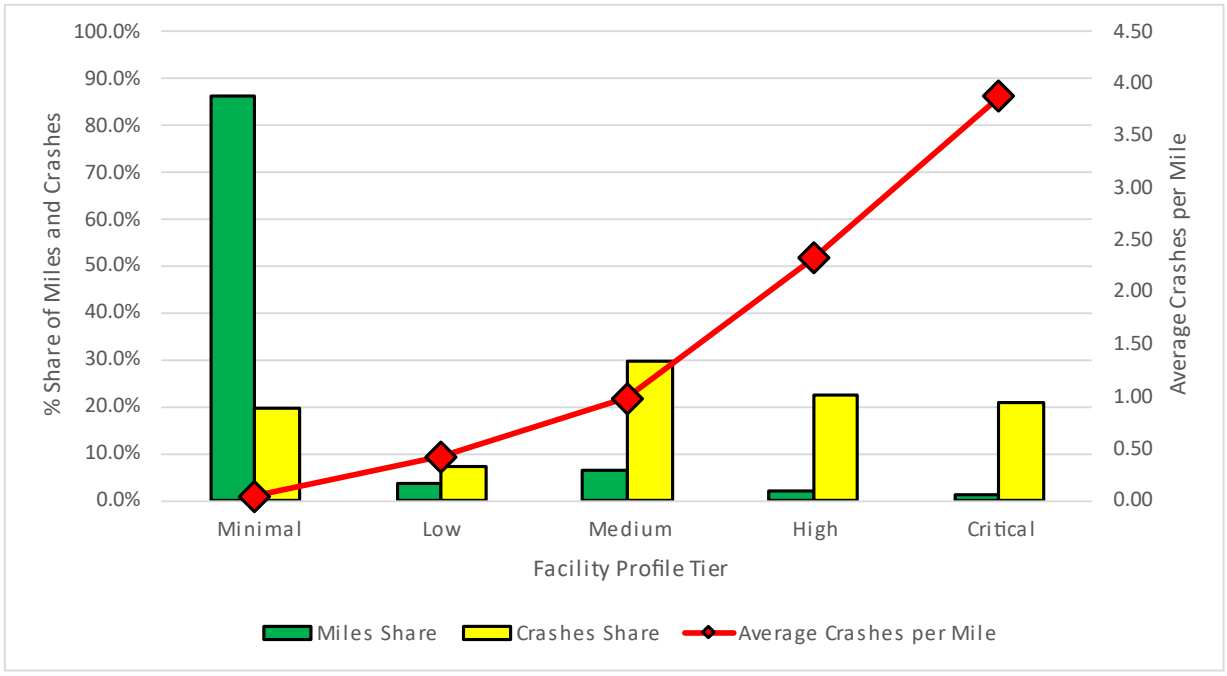


Figure 15: Facility Profile Tier Metrics for Crashes - All Modes

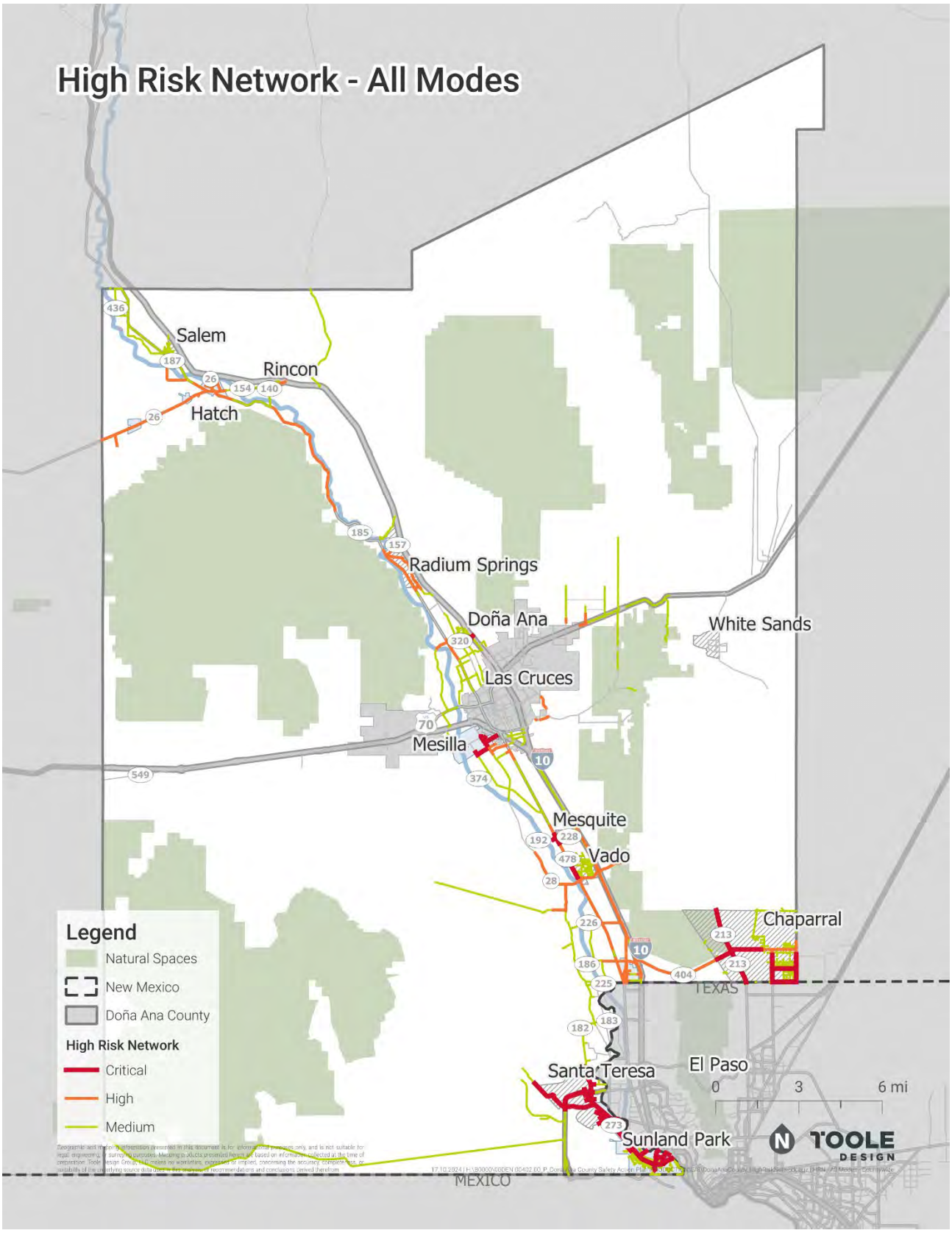


Figure 16. High Risk Network - All modes

Motorists

Figures in this section represent results for crashes that only involved motorists within the study area. The analysis was conducted using fatal and injury crashes.

Table 5 indicates the screening factors most *highly correlated* with elevated rates for fatal and injury motorists-only crashes (facilities in Critical, High, and Medium tiers). These factors include:

- Functional classification
- Roadway setting
- Unemployment rate
- Percent of population below 2x the poverty line
  -

Factors that are *not highly correlated* with elevated frequency for motorist-only crashes in Doña Ana County include:

- Speed limit
- Traffic volume
- Percent of households without access to a vehicle
- Percent of households with limited English proficiency
  -

Table 10: Facility Profile Definitions for Motorists - Only Crashes

Facility Profile Tier	Functional Class	Roadway Setting	Unemployment Rate	Percent of population below 2x poverty line
Critical	Medium to High	Urban	-	>65%
High	Medium to High	Urban	-	35-65%
	Medium to High	Rural	3.5-6.5%	-
Medium	Medium to High	Rural	>6.5%	-
	Medium to High	Rural	<3.5%	>35%
	Low	Urban	-	>55%
Low	Medium to High	Rural	<3.5%	<35%
Minimal	Medium to High	Urban	-	<35%
	Low	Urban	-	<55%
	Low	Rural	-	-

The results of the facility profile analysis in **Table 5** show that roadways can be considered "Critical" for *motorist-only crashes* when they are collector or arterial streets in urban areas and where the household income for 65% or more of the surrounding population is at or below two times the poverty line.

As shown in **Table 6** and **Figure 4**, about 75% of fatal and injury crashes in the study area are on Critical, High, and Medium tier facilities, while these facilities only represent 10% of the total roadway miles in the study area. The corridors identified as 'Critical', 'High', and 'Medium' in the facility profile analysis for *motorist-only* crashes are shown in **Figure 5**. Versions of these maps focused on population centers can be found in the **Supplementary Maps** section**.** Critical corridors include Vado Road, Lisa Road, McCombs Road, and NM 273.

Table 11. Facility Profile Metrics - Motorists Crashes

Facility Profile Tier	Facility Profile Metrics				
	Average Crashes per Mile	Miles	Crashes	Miles Share	Crashes Share
Critical	4.17	23.3	97.0	0.4%	10.4%
High	2.20	152.7	336.0	2.9%	35.9%
Medium	0.76	350.6	268.0	6.6%	28.6%
Low	0.36	194.0	69.0	3.7%	7.4%
Minimal	0.04	4,569.8	166.0	86.4%	17.7%

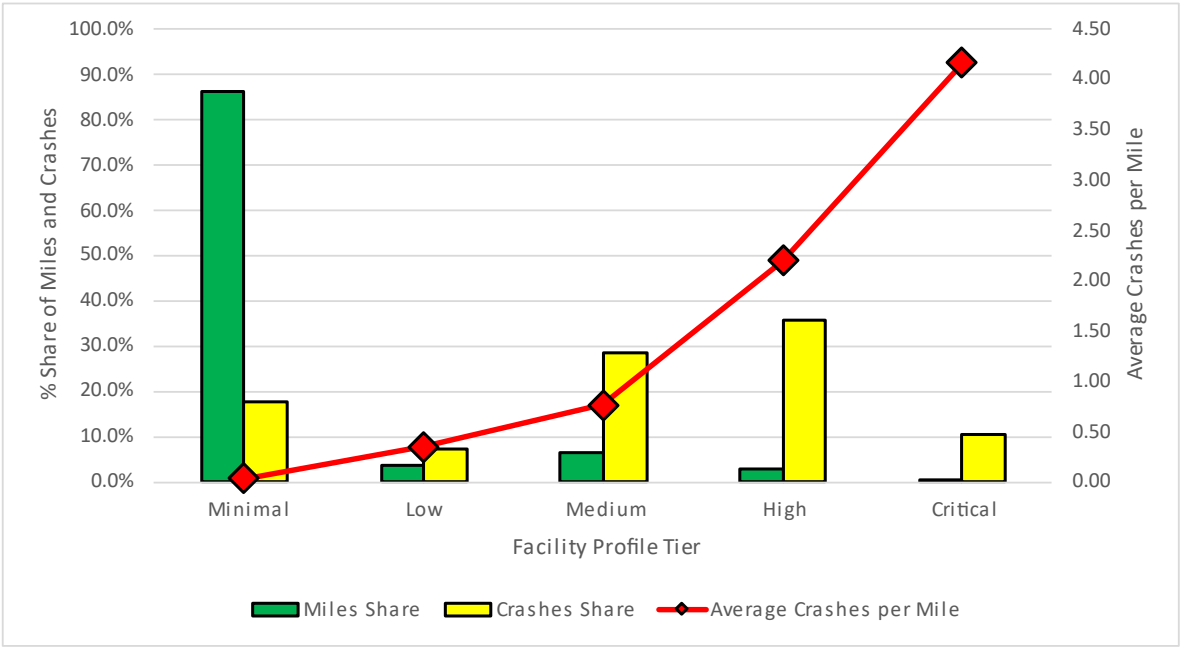


Figure 17. Facility Profile Tier Metrics - Motorists Crashes

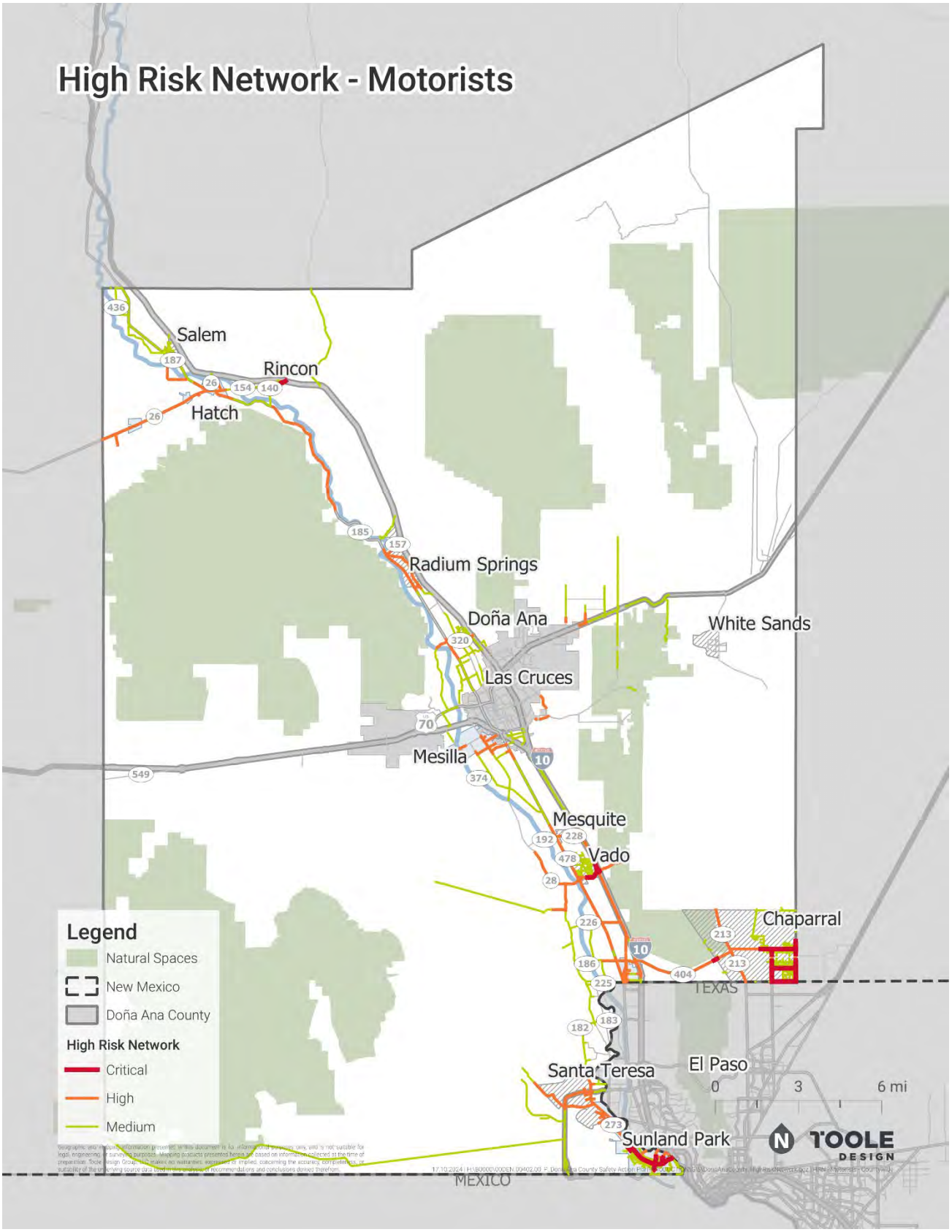


Figure 18: High Risk Network – Motorists Crashes

Vulnerable Road Users (VRU)

In contrast with other modes, the screening factors that are most highly correlated with elevated rates of fatal and injury crashes for vulnerable road users are primarily socioeconomic, rather than related to the conditions of the roadways. **Table 6** indicates the screening factors that are most *highly correlated* with elevated crash rates involving vulnerable road users (i.e. pedestrian and bicyclists). Highly correlated factors include:

- Functional class
- Percent of households without access to a vehicle
- Unemployment rate
- Percent of population below 2x poverty line
-

Factors that are *not highly correlated* with elevated rates of fatal and injury crashes for vulnerable road users include:

- Speed limit (MPH)
- Roadway setting
- Traffic volume (AADT)
- Percent of households with limited English proficiency
-

Table 12: Facility Profile Definitions for Crashes - Vulnerable Road Users

Facility Profile Tier	Functional Class	Percent of households without access to a vehicle	Unemployment Rate	Percent of population below 2x poverty line
Critical	Medium to High	≤5%	>1.5%	>55%
High	Medium to High	>5%	-	>55%
Medium	Medium to High	-	-	≤55%
Low	Low	-	-	>55%
Minimal	Low	-	-	≤55%
	Medium to High	≤5%	≤1.5%	>55%

The results of the facility profile analysis in **Table 6** show that roadways with elevated fatal and injury crashes for *vulnerable road users* are defined as Critical on medium to arterial and collector streets in areas with less than 5% of households without access to a vehicle, greater than 1.5% unemployment rate, and greater than 55% of population below two times the poverty line.

As shown in **Table 7** and **Figure 6**, about half (53%) of VRU injury crashes in the study area are on Critical, High, and Medium tier facilities, while these facilities only represent 11% of the total roadway miles in the study area. The corridors identified as 'Critical', 'High', and 'Medium' in the

Facility Profile Analysis of VRU crashes are shown in **Figure 7**. Versions of these maps focused on population centers can be found in the **Supplementary Maps** section**.** Critical corridors include Vado Road, Lisa Dr, NM 28, and NM 478.

Table 13: Facility Profile Metrics - Vulnerable Road User Srashes

Facility Profile Tier	Facility Profile Metrics				
	Average Crashes per Mile	Miles	Crashes	Miles Share	Crashes Share
Critical	0.14	48.7	7.0	0.9%	19.4%
High	0.04	73.4	3.0	1.4%	8.3%
Medium	0.02	489.3	9.0	9.2%	25.0%
Low	0.02	816.7	14.0	15.4%	38.9%
Minimal	0.00	3,862.4	3.0	73.0%	8.3%

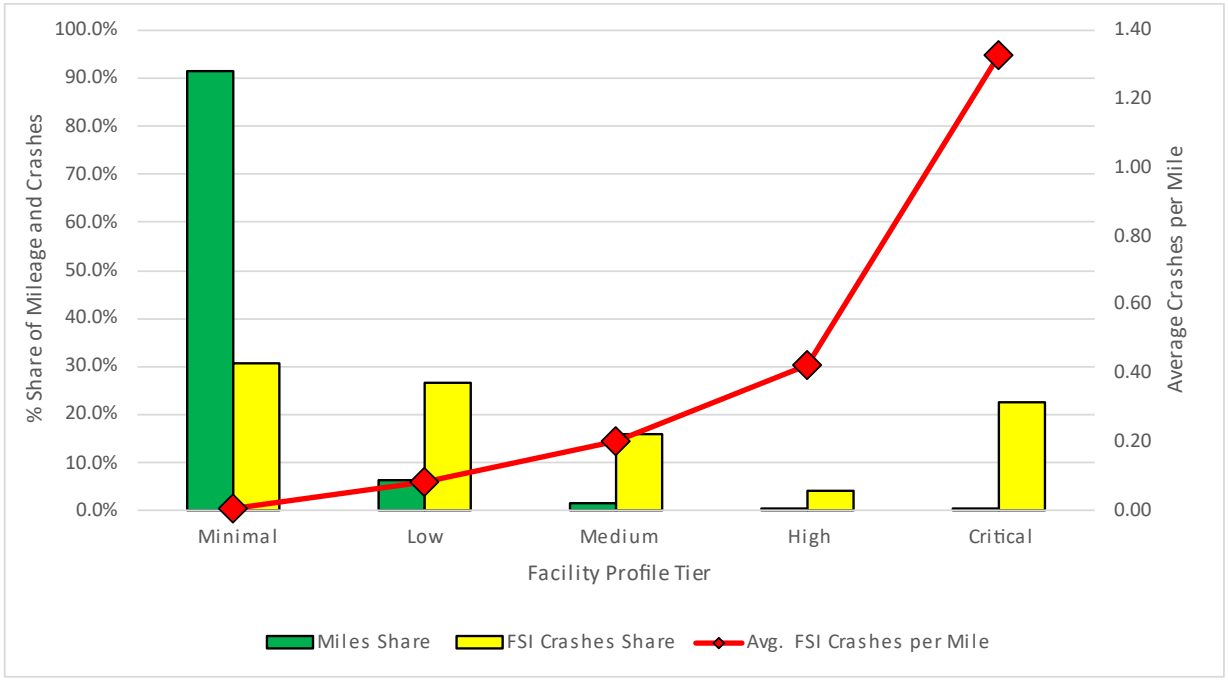


Figure 19: Facility Profile Tier Metrics - Vulnerable Road User Crashes

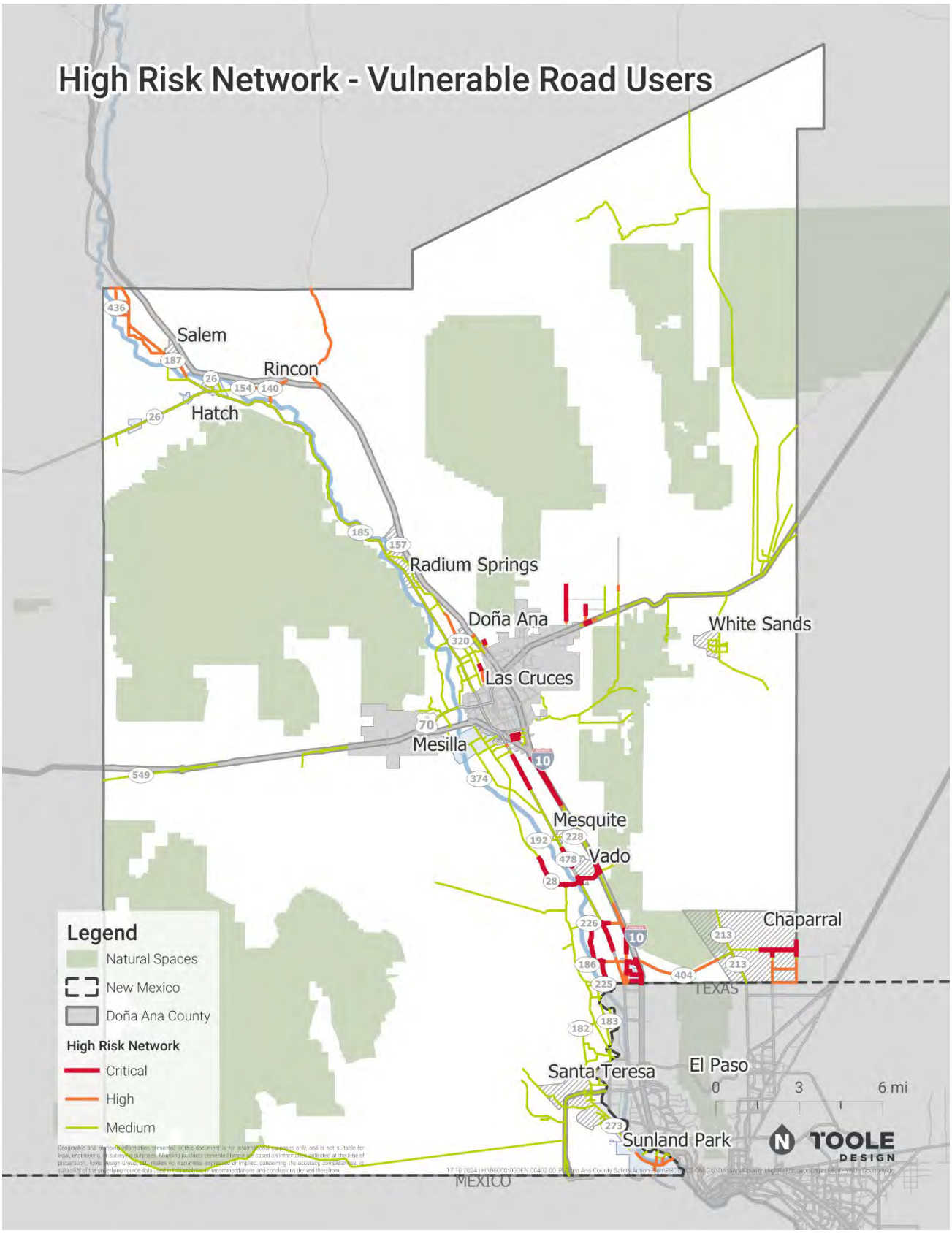


Figure 20: High Risk Network – Vulnerable Road Users Crashes

SUPPLEMENTARY MAPS

HIGH RISK NETWORK MAPS FOCUSED ON POPULATION CENTERS

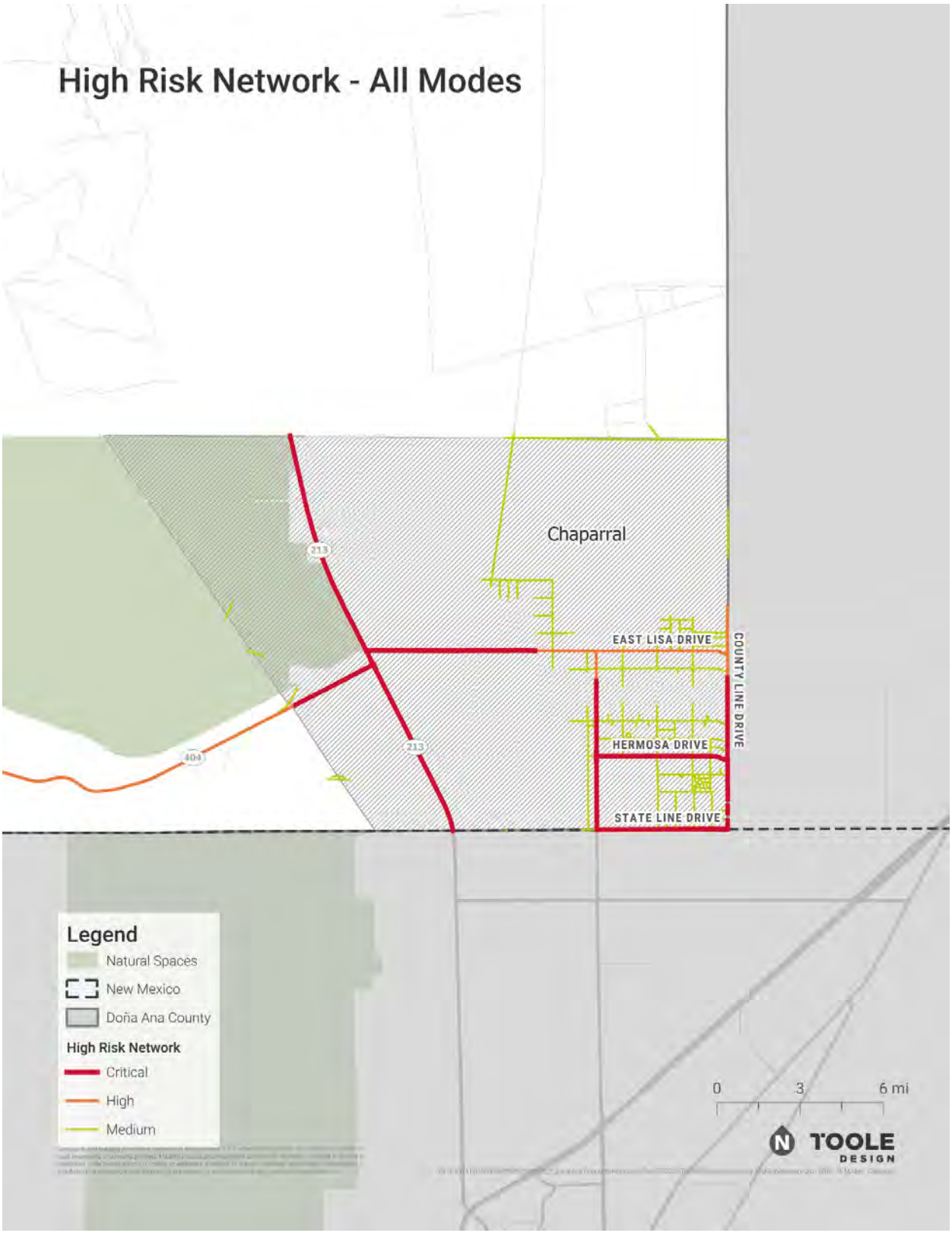


Figure 21: High Risk Network – All Modes – Chaparral Area



Figure 22: High Risk Network – All modes – Hatch Area

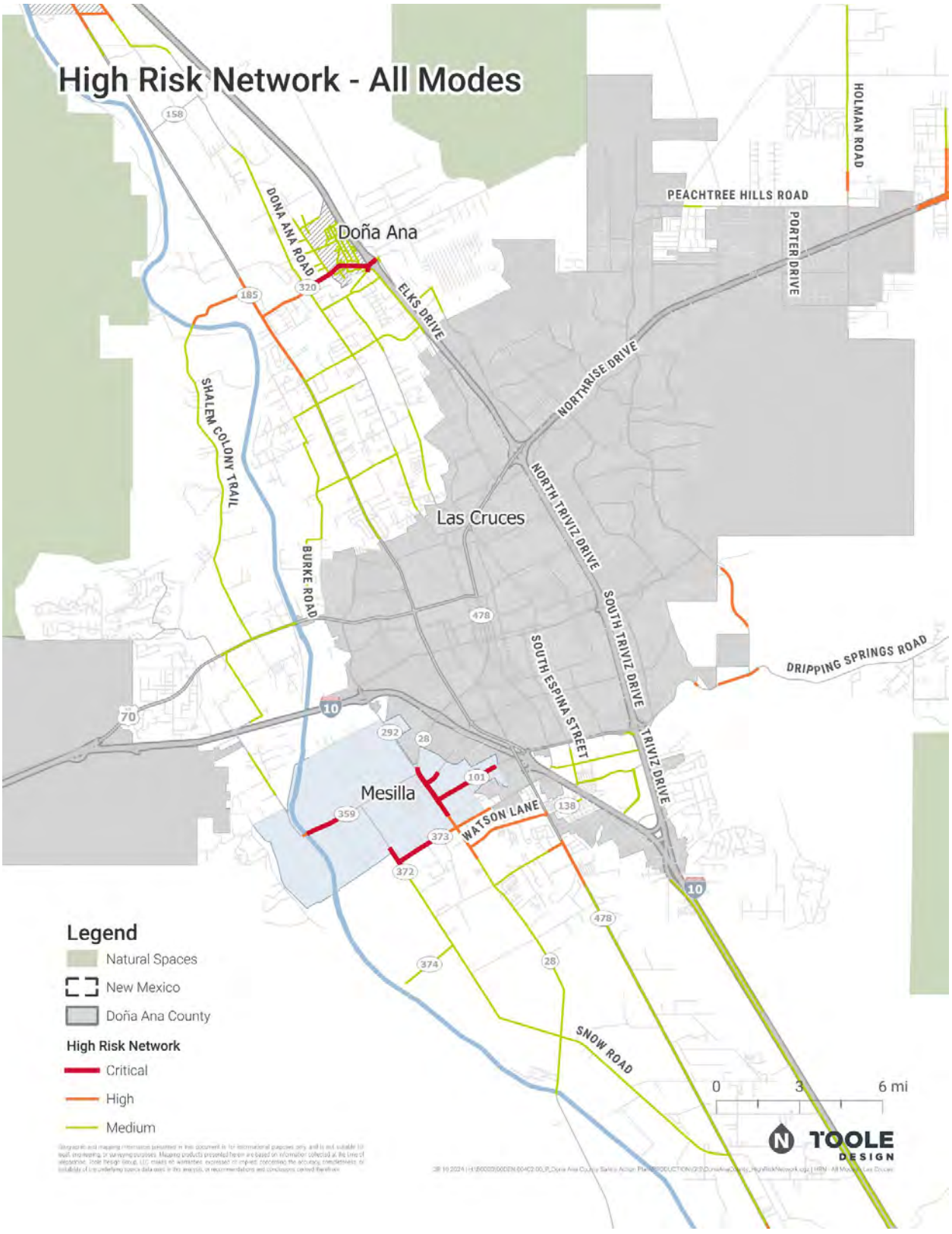


Figure 23: High Risk Network – All Modes – Las Cruces Area

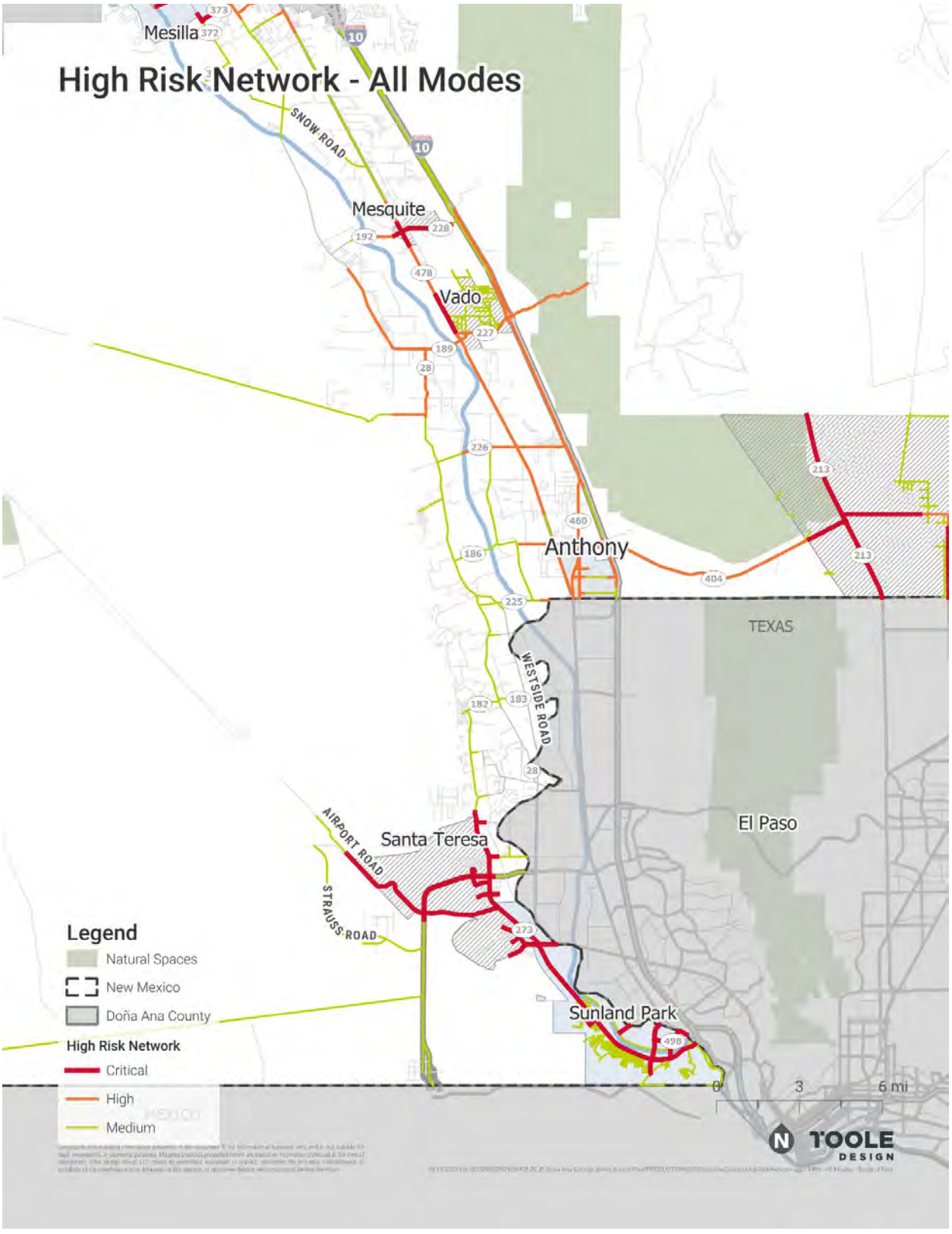


Figure 24: High Risk Network – All Modes – Sunland Park Area

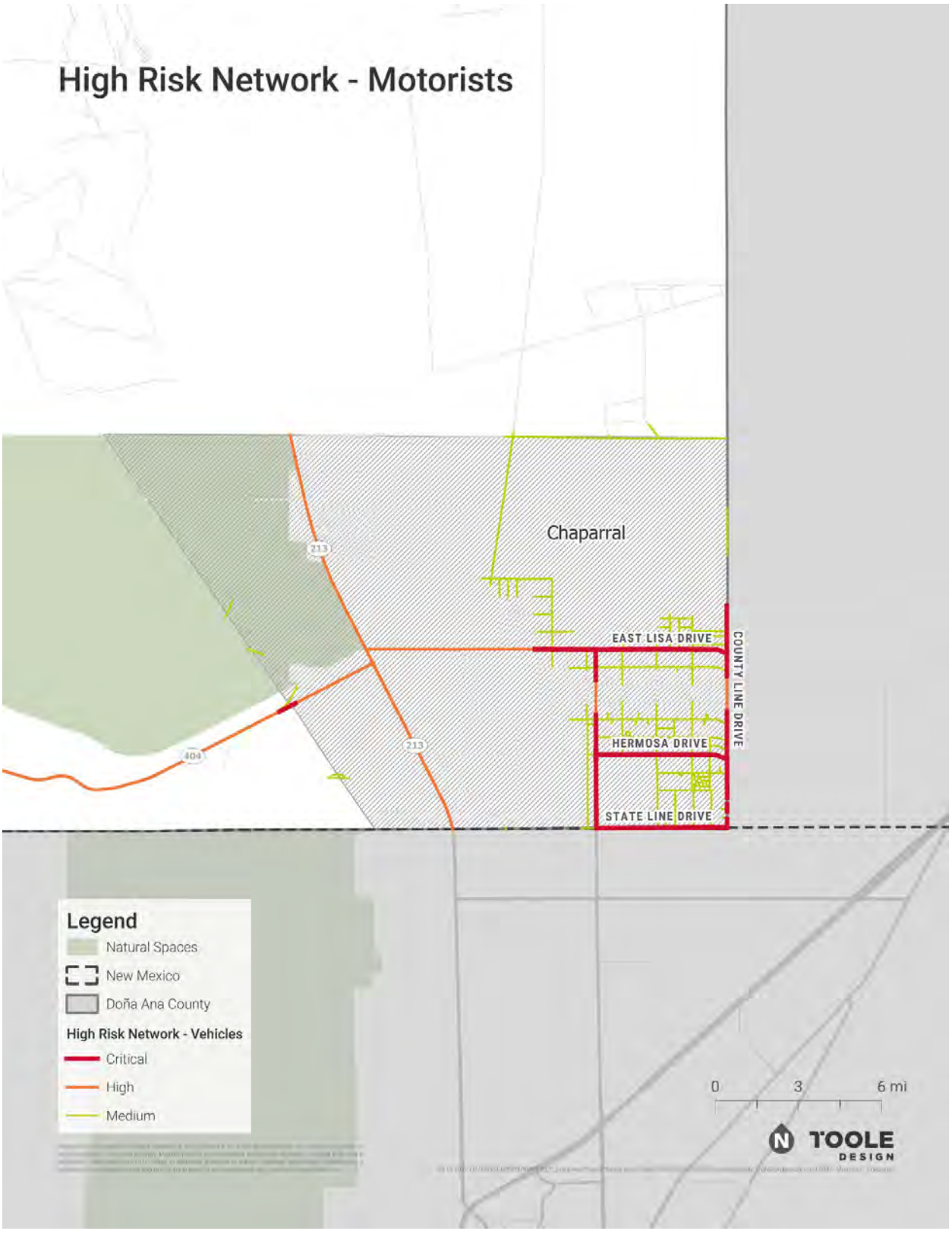


Figure 25: High Risk Network – Motorists – Chaparral Area



Figure 26: High Risk Network – Motorists – Hatch Area

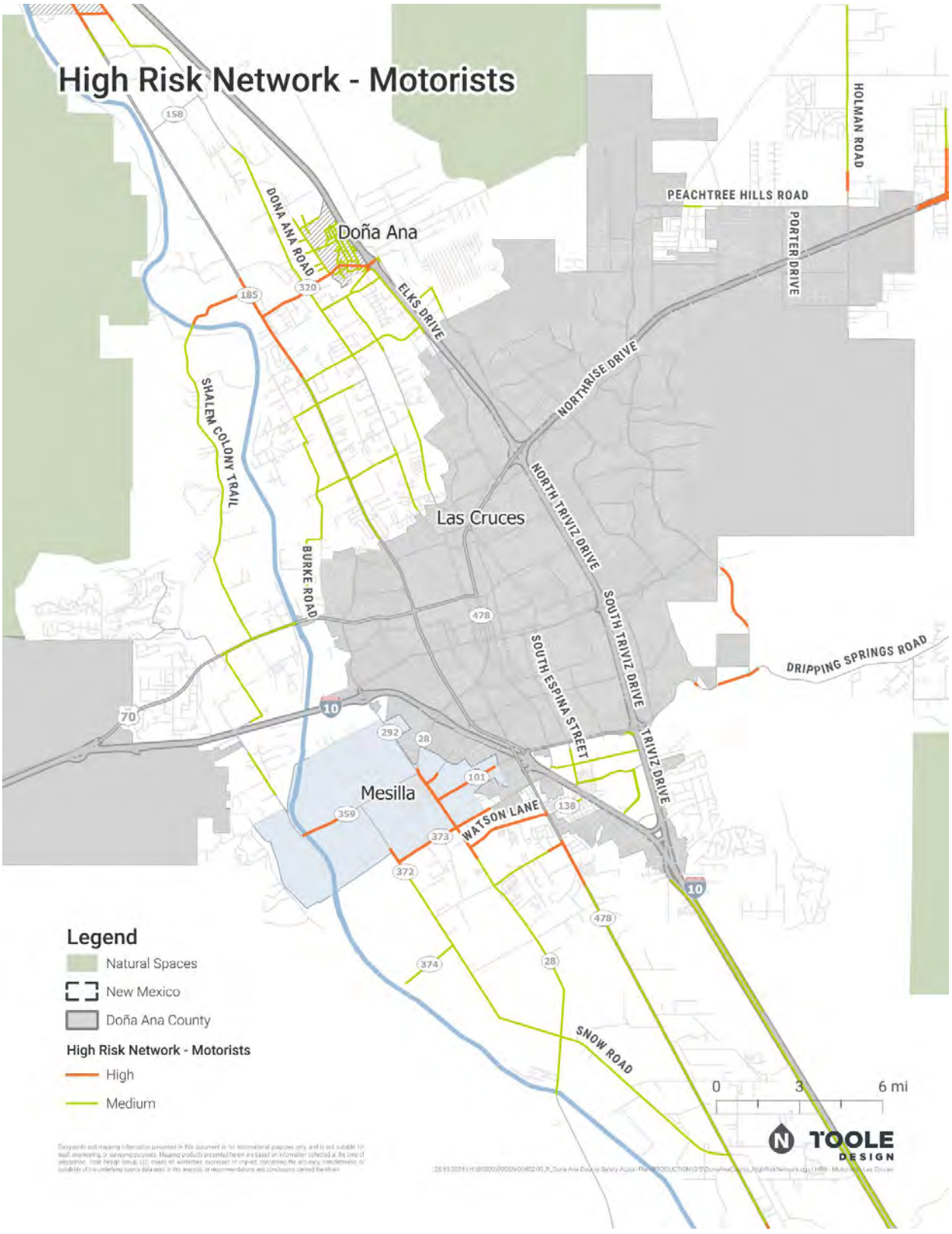


Figure 27: High Risk Network – Motorists– Las Cruces Area

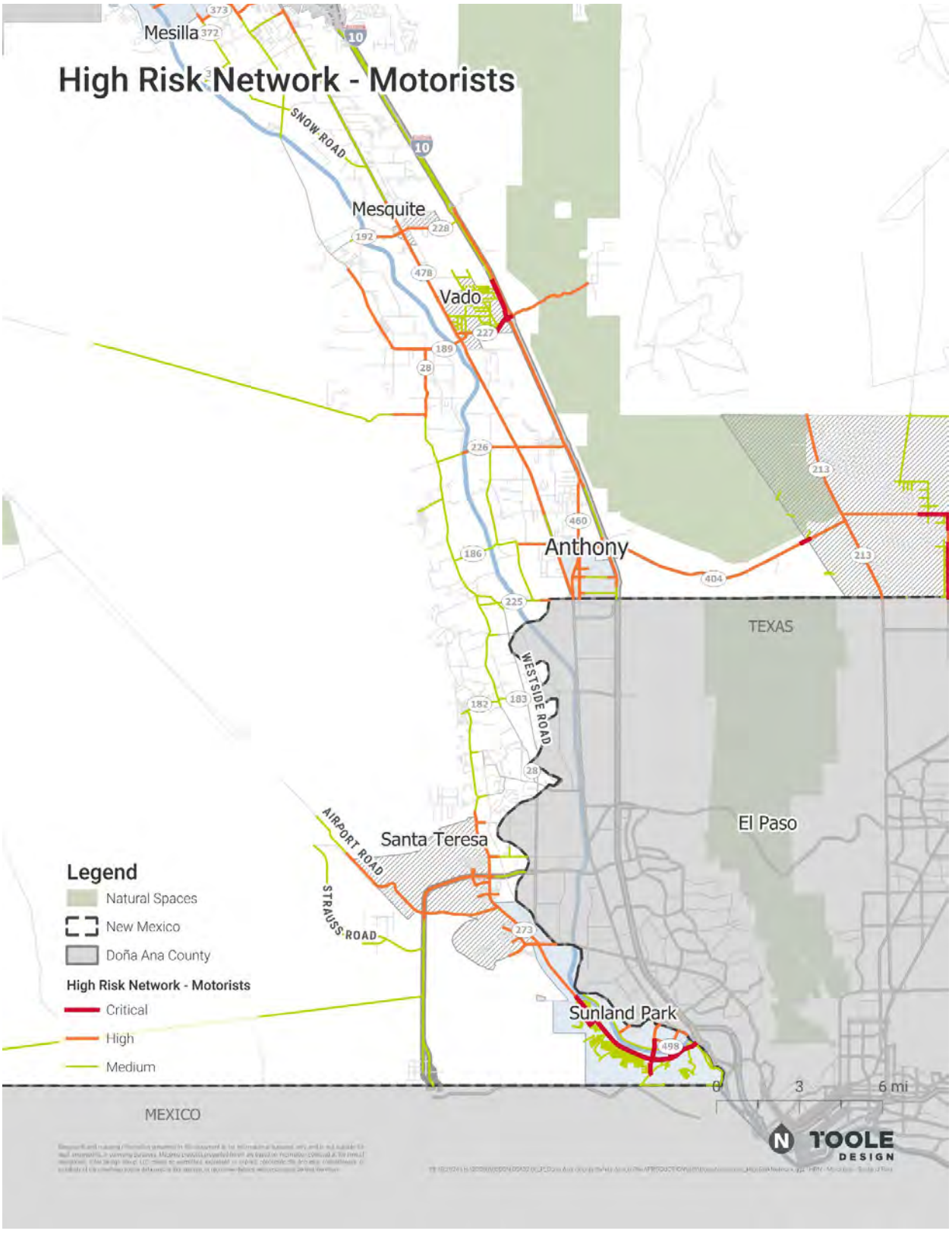


Figure 28: High Risk Network – Motorists – Sunland Park Area



Figure 29. High Risk Network – VRUs – Chaparral Area



Figure 30: High Risk Network – VRUs – Hatch Area

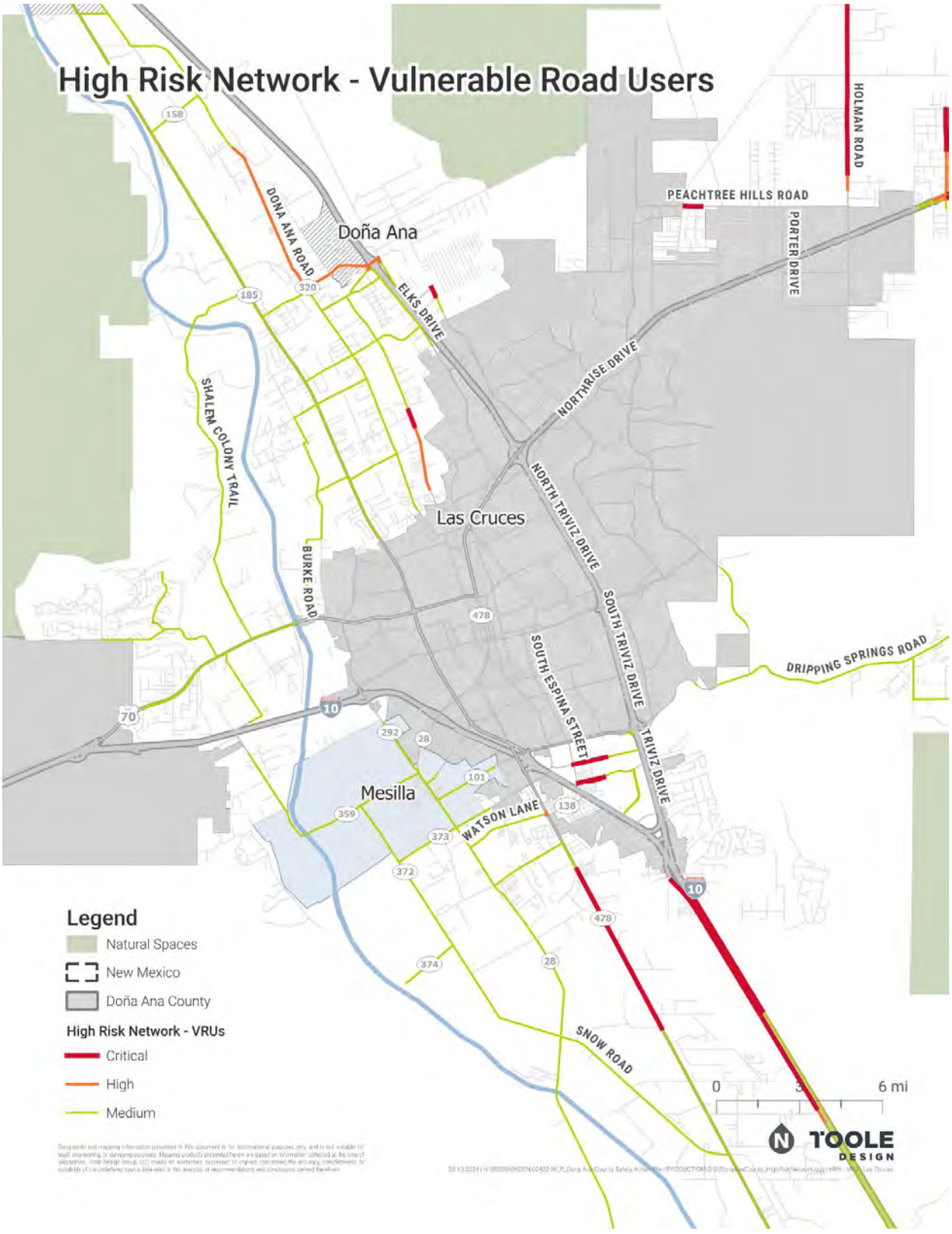


Figure 31: High Risk Network – VRUs – Las Cruces Area

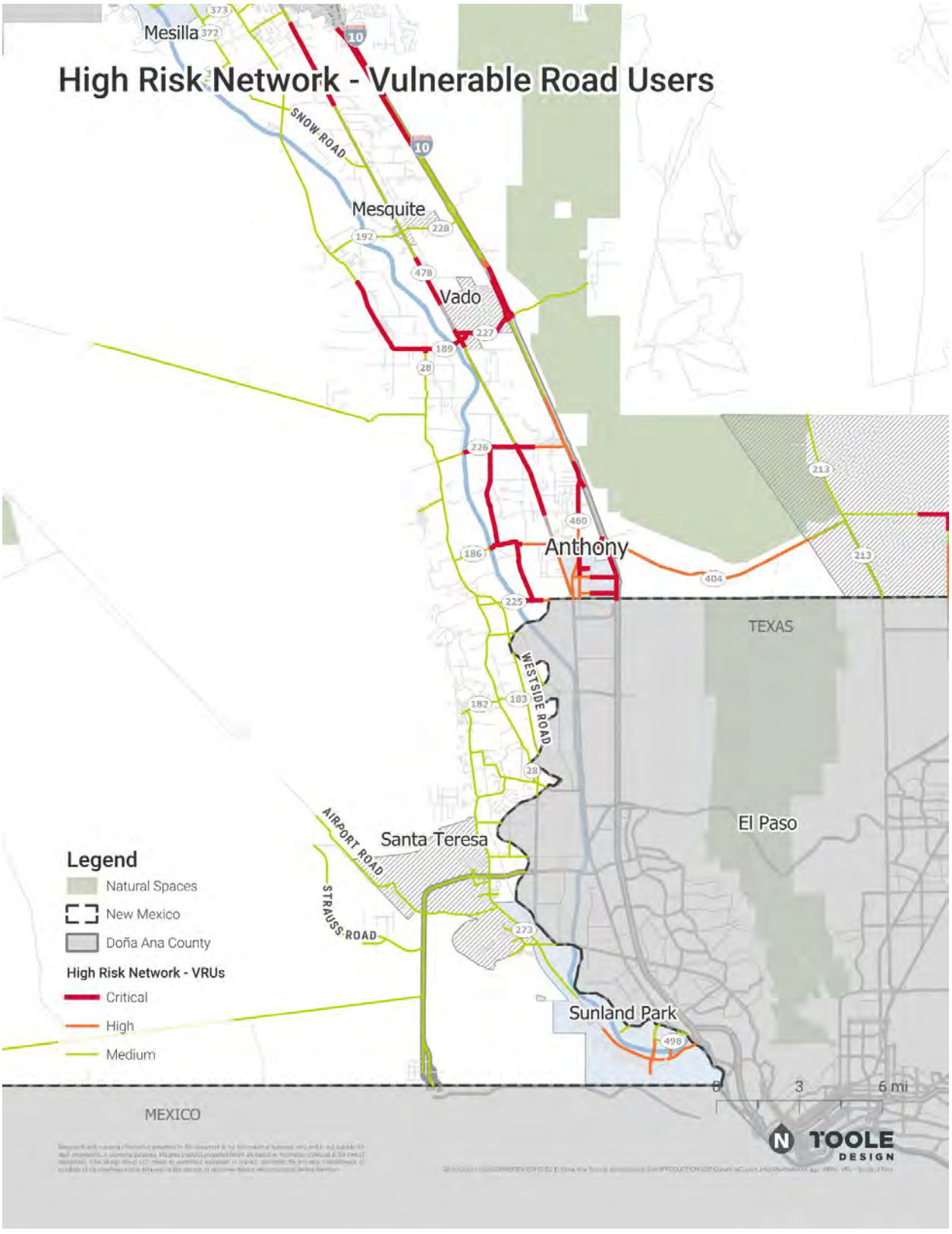


Figure 32: High Risk Network – VRUs – Sunland Park Srea

APPENDIX E

COMMUNITY OUTREACH

SUMMARY OF AUGUST 2024 OUTREACH EVENTS

INTERACTIVE MAP SURVEY SUMMARY

Summary of August 2024 Outreach Events

Overview

Over a three-day period from August 15 through August 17, 2024, the project team engaged in a series of stakeholder and outreach events throughout Doña Ana County. Outreach focused on spreading awareness about the project and identifying locations with perceived safety issues and included both formal open-house meetings and informal pop-up events. Community members were informed of the plan purpose and were encouraged to provide feedback on locations where they feel unsafe driving, walking, or biking by placing color-coded stickers on maps or by participating in the online interactive map. Staff who were fluent in English and Spanish were present at all outreach events.

Advertising and Marketing

The events schedule was publicized extensively in coordination with the County, stakeholders, and local venues. In addition to social media posts and distribution of paper flyers (**Figure 1**), an eNewsletter was sent out via IQ which linked to the outreach event schedule. On August 8, network television announced the plan and featured a listing of outreach events on their news page. The project team and County staff also distributed a bilingual flyer (**Figure 1**) detailing the project's goals and offering ways to participate, including an interactive map of the study area accessible through a QR code. Announcements about the outreach events were made through direct communication to Stakeholder Steering Committee members and interested advocates and community members.



Figure 33: Project Overview Flyer (*Left*) and Outreach Events Promotional Flyer (*Right*)

Information and Desired Input

Project team members displayed bilingual boards (see **Figure 2** through **Figure 5**) at both the formal open house meetings and pop-up events that provided an overview of the project and solicited input on location specific safety concerns. Display boards included:

- **Project Overview**: Plan background, purpose, goals, and timeline.
- **Safety Countermeasures**: Potential design interventions that could be applied as part of roadway safety improvements.
- **Roadway Safety Concerns Input Map**: County Road network map where participants could indicate locations in which they felt unsafe biking, walking, or driving.
- **High Injury Network**: Locations experiencing high rates of severe and fatal injury crashes.
-

In addition, more detailed zoomed-in maps were provided for communities so residents could more easily identify problematic intersections and corridors and provide granular information on safety perceptions.

Events

Thursday, August 15, 2024

Women's Intercultural Resource Center, Anthony

The project team leveraged a previously planned potluck event to provide a presentation in Spanish and ask attendees to identify locations where they feel unsafe, why they feel unsafe in that location, and how they're traveling when they feel unsafe (e.g., walking or driving). Frequent comments (provided on index cards) included concerns about speeding and reckless driving, disregard of traffic laws, poor road conditions, insufficient lighting, and generally feeling unsafe walking or driving, especially on 4th Street near the Elementary School.

Doña Ana County Office Building

A formal open house event took place in the foyer of the County Office Building and attracted a combination of community members who came specifically to the event, individuals who came to the County office building to conduct other business, and County staff who learned about the event and provided input during their breaks. The project team heard a wide range of issues across the entire county; common themes included a desire for additional lighting and identifying locations where people observe excessive speed.



Doña Ana Community College (DACC), East Mesa Campus

The project team set up boards at the Student Commons inside the Student Resource Center at the DACC East Mesa Campus. Attendees included the District 4 Commissioner from Susana Chaparro and staffer Susie Cordero. In addition, District 4 candidate Stacie Durham attended and provided input on road safety in the area, including concerns about bicycle hit and runs on Motel Boulevard, people walking in the street and crossing midblock along Picacho Avenue, careless drivers along Highway 70 from Sonoma Ranch to Butterfield who cross over the center median, and speeding along the road from Alamogordo to Las Cruces, particularly along the curves and downhill stretches.



Other attendees noted that the speedbumps along Parker Road are too low to be effective, incidents of drag racing along Carver, and many crashes near DACC on Sonoma Ranch. There was also interest expressed in an off-street bicycle path from Mesilla to Hatch along the orchards. Though DACC had not yet started for the semester, the project team was able to reach out to and interact with students looking to register for classes and obtain financial aid. In addition, a Boy Scout working on a merit badge attended specifically to learn about the Safety Action Plan.

Friday, August 16, 2024

Doña Ana Community Center, Doña Ana

The pop-up event at the Doña Ana Community Center was scheduled to coincide with a regular senior lunch event. In addition to the three dozen attendees of the lunch, several community members came specifically to the community center to meet with project team staff and provide comments. Project team members gave an informal presentation in both English and Spanish and received input from numerous community members who would not otherwise have known about the project.

The most common source of concern was Thorpe Road (NM 320), including around the intersection with El Camino Real Road where there are high numbers of turning movements in the commercial area near I-25 and along the western portion of the corridor where observed speeds are high, but the roadway is narrow. Other concerns included the lack of infrastructure for bicycling along Doña Ana Road and the general lack of pedestrian facilities in the area.

Mesilla Plaza, Mesilla



The project team set up a pop-up table at the Mesilla Farmers and Crafts Market at the historic plaza. While many of the people who visited the Farmer's Market were tourists and unfamiliar with the area, some people who stopped by the table had seen the flyer and came to the plaza specifically to seek out information on the Safety Action Plan and provide input about unsafe roadway conditions. Stated concerns included safety on NM 28 due to numerous crashes and reckless driving along the corridor, especially at the intersection with Snow Road. Suggestions included the installation of rumble strips and stop signs with flashing lights. Other comments included general concerns about speeding and reckless driving, running red lights, and

stop sign disobedience. Comments included the lack of bike lanes along Dripping Springs Road and dangerous conditions for bicycles along Calle de Norte/Snow Road and along Motel Boulevard. In addition, people who stopped by volunteered to take flyers and post them in their neighborhood centers to inform and get additional feedback.

Thomas Branigan Library, Las Cruces

The project team set up display boards and maps on the second-floor foyer at the Thomas Branigan Library for a formal open house event. A bicycle safety advocate shared concerns about unsafe cycling conditions on roads throughout the county and expressed hope for more protected bikeways and other cycling infrastructure improvements. There was interest expressed in putting a bike path in the median along Sonoma Ranch and Lohman Avenue and approval of the multi-use trail along Picacho Avenue. Another attendee expressed concern that the grading/sloping of residential driveways throughout the county was a safety issue. One attendee noted that there were generally poor conditions on roads throughout the county and the need for more "Children at Play" road signs. This event, perhaps due to its second-floor location, attracted few passersby, but the project team was able to share project information with a few families attending class in a nearby library classroom.

Saturday, August 17, 2024



Village Market, Hatch

The project team held a pop-up event near the entrance to a prominent grocery store in Hatch to interact with community members about regular activities. Interactions took place primarily with community members, including residents of nearby unincorporated communities as well as agricultural workers who were new to the area and working in chile production. Frequent comments included a lack of places to walk, particularly in surrounding communities such as Salem and Placitas, the high level of heavy truck traffic through the center of the community, and speeding near the Hatch public schools along Herrera Road.

9:00am Ardovino's Market, Sunland Park



Passersby at a pop-up table at Ardovino's Desert Crossing Farmer's Market noted safety concerns about the sharp curve on Dyer Street near Chaparral, confusing patterns along roads in the Mesilla area, and intersections throughout Sunland Park where the pavement markers disappear or change across the intersection, such as the intersection near the mall. One attendee expressed interest in more bike lanes, including along NM 28 to Mesilla. While many of the people passing by commented that they were from El Paso and unfamiliar with Doña Ana County roads, some took flyers and expressed interest in visiting the project website.

Tuesday, August 20, 2024

Doña Ana Community College, East Mesa Campus

Interactions at the pop-up table at the Academic Resources Building took place primarily with community members, including residents of nearby communities. Frequent comments and data inputs included feeling unsafe driving in Radium Springs, Mesquite, Vado and areas near Snow Road and Thorpe Road. Other attendees indicated feeling unsafe on a bike in Mesquite, Vado and Anthony, with general areas for feeling unsafe noted in Mesilla and Downtown Las Cruces. One attendee stated they feel unsafe traveling by any mode in the Picacho Hills Community near Fairacres.

Table 14: Community Outreach Events Summary Table

Event Date	Time	Venue Name	Community	Estimated # of Participations
Open House Meetings				
Thursday, 8/15	3:30pm-7pm	Doña County Office Building	Las Cruces	30
Thursday, 8/15	4pm-6pm	East Mesa Doña Ana Community College	Las Cruces	10
Friday. 8/16	3pm-5pm	Thomas Branigan Library	Las Cruces	5-10
Tuesday, 8/20	4pm-6pm	East Mesa Doña Ana Community College	Las Cruces	10
Pop-up Event				
Thursday, 8/15	11:30am-1pm	Women's Intercultural Resource Center	Anthony	40
Friday, 8/16	10am - 12pm	Doña Ana Community Center	Dona Ana	10-15
Friday, 8/16	11am - 2pm	Mesilla Plaza	Mesilla	25
Saturday, 8/17	9am-12pm	Ardovino's Market	Sunland Park	15
Saturday, 8/17	9am-12pm	Village Market	Hatch	15

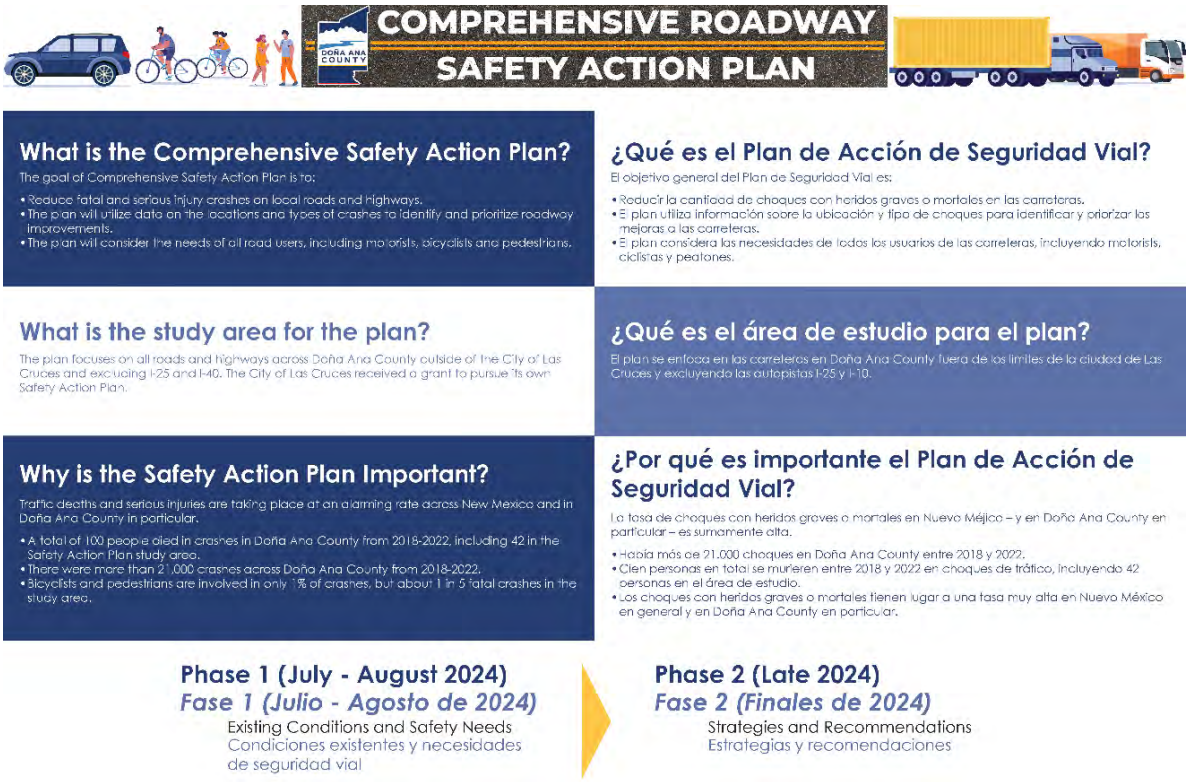


Figure 34: Project Overview Display Board



Figure 35: Safety Countermeasures Informational Board

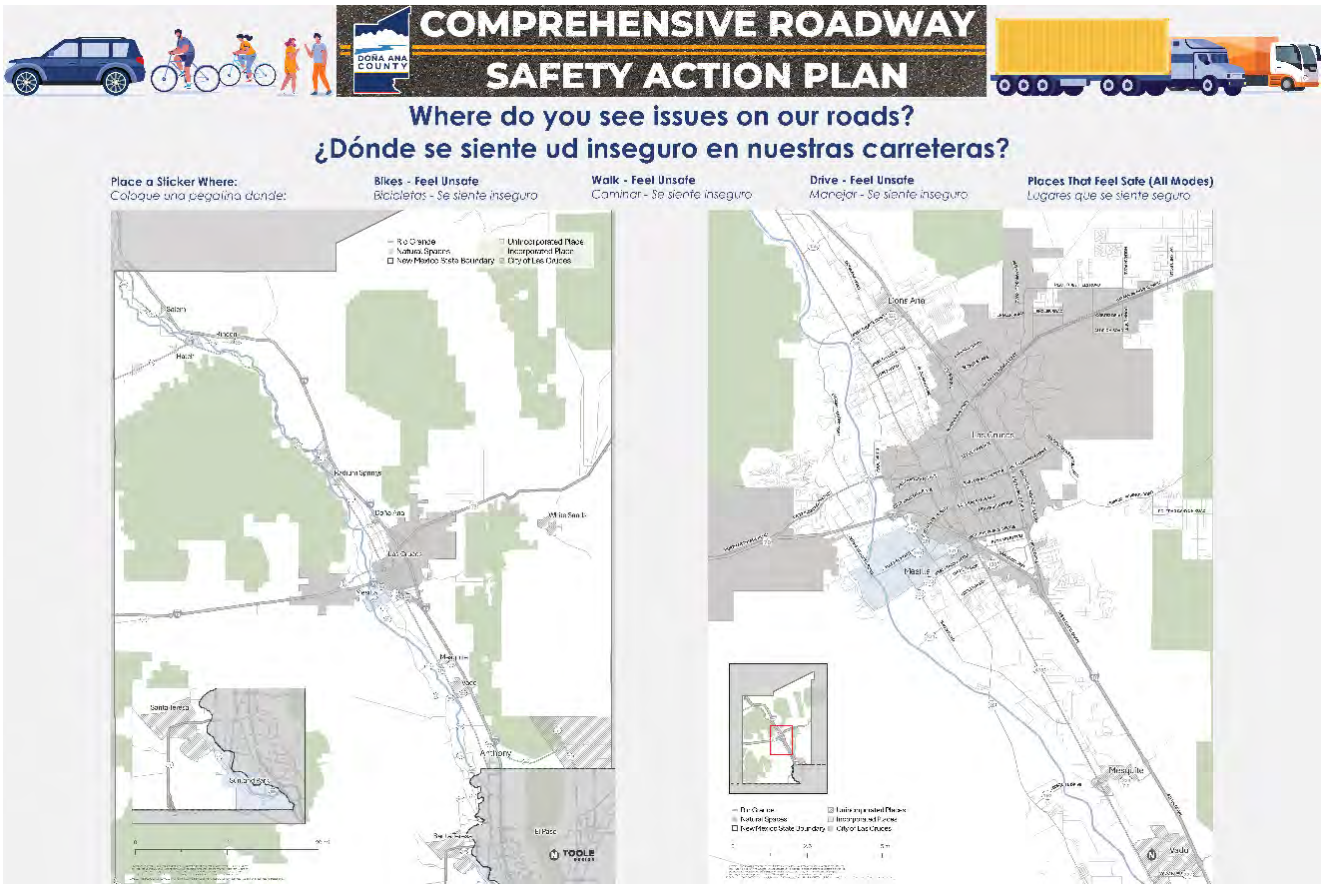


Figure 36: Roadway Safety Concerns Input Board

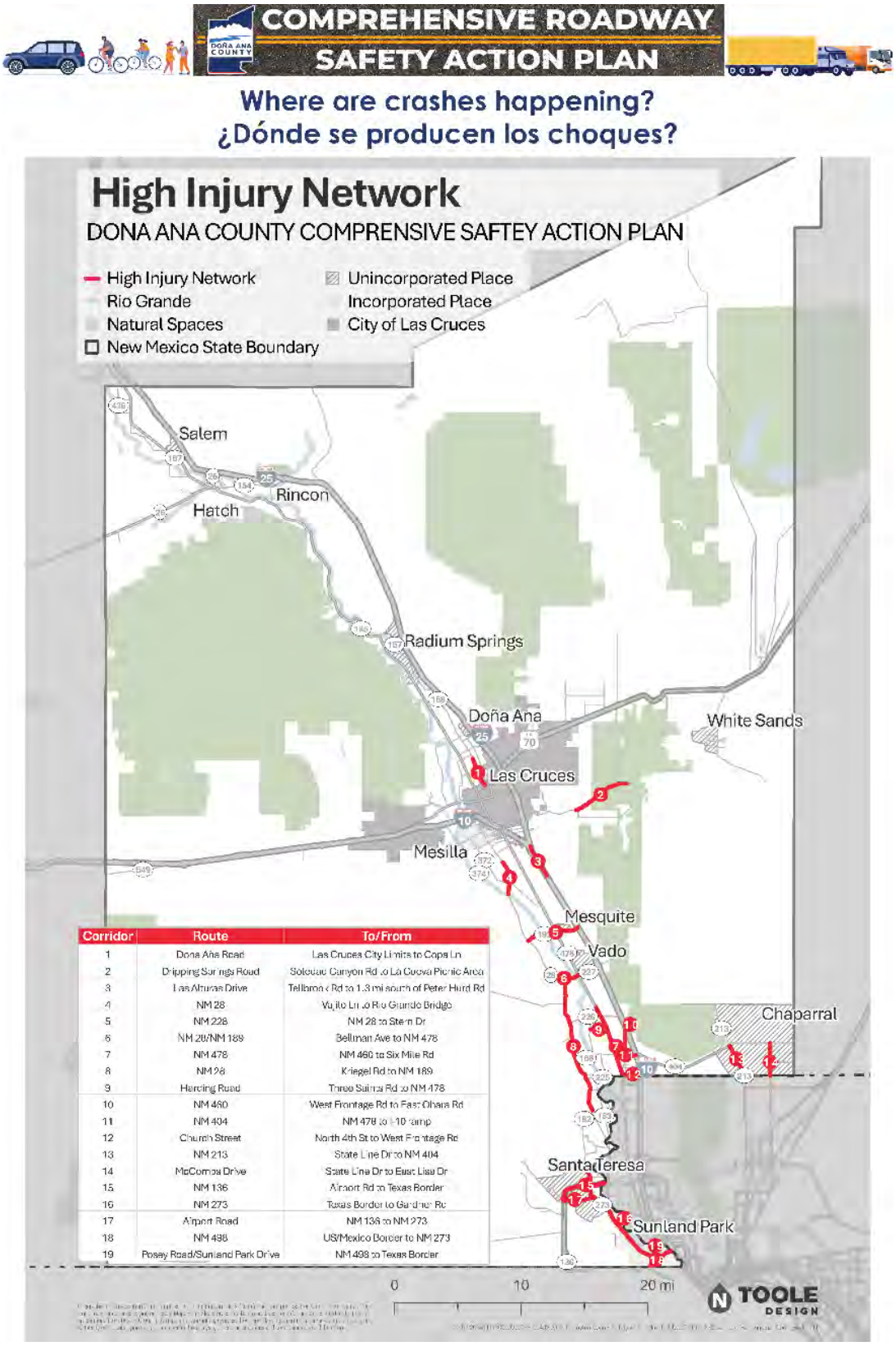


Figure 37: High Injury Network Informational Board

Interactive Map Survey Summary

Introduction

The first round of public involvement for the Dona Ana County Comprehensive Roadway Safety Action Plan (SAP) featured an online map survey that was used to maximize engagement and gather feedback from residents across the vast and diverse communities in Doña Ana County. This platform served as a complement for in-person workshops and pop-up events and enabled the project team to collect input from individuals about conditions in their communities at any time during the outreach period. The map survey was available from July through September 2024 and collected a total of 456 responses.

The online map survey was designed to capture residents' observations and concerns about specific safety issues throughout Doña Ana County. Participants could identify locations by placing pins on the map that indicated whether they felt unsafe biking, walking, or driving in those areas, and if they felt safe, or if they had other comments to share. Each pin allowed for additional commentary by enabling participants to explain their experiences and observations at those locations. The platform also let users 'like' others' comments and markers and helped the project team gauge the significance of various safety concerns.

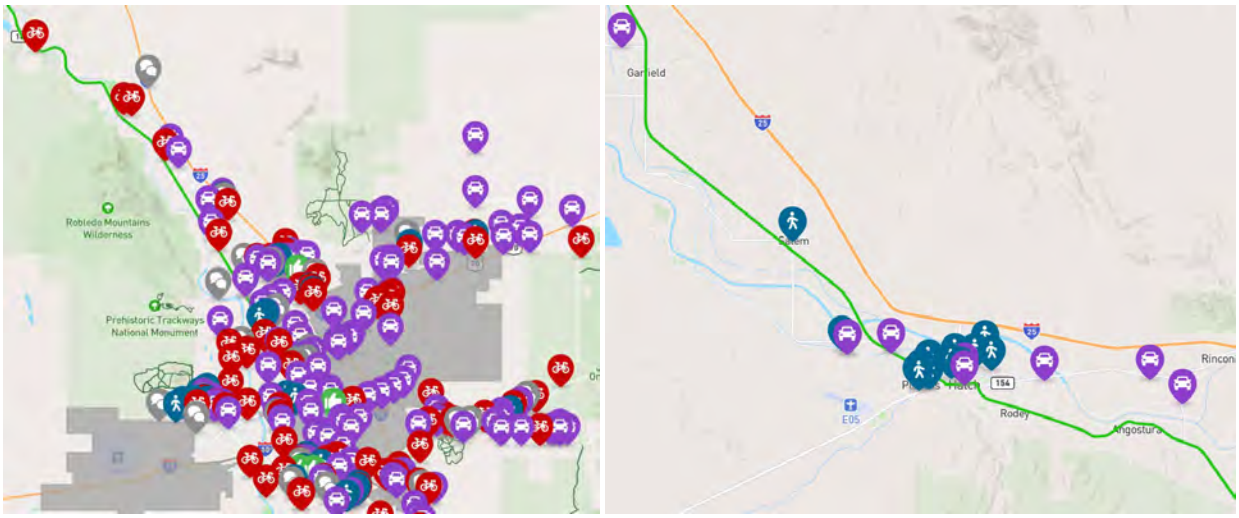


Figure 38: Screenshots from interactive map survey

In addition to the online platform, visitors were able to complete the same mapping exercise in-person at a series of pop-up events and open house events by placing stickers on large-scale paper maps. The project team then manually entered these comments into the online platform, ensuring that all community members could easily access the full range of feedback and insights. While spreading project awareness was a crucial aspect of Phase 1 of engagement, the online platform enabled the project team to collect quantifiable and tangible data on the issues faced by

community members. This data allowed the project team to identify necessary countermeasures, determine their optimal locations, and assess where funding would need to be allocated.

This document includes maps showing the locations of pins (i.e., comments) across Doña Ana County, tables summarizing the distribution and quantity of pins, and key findings and recurring comments from the map survey. The document begins with an overview of county-wide findings, followed by highlights of key corridors, findings from subareas, and insights by County Commission District.

Overview - County Comments and Map Survey Results

Comments by Area

Although participants were allowed to add pins throughout the entirety of Doña Ana County, the geographic distribution of comments was concentrated in the towns and communities along the Mesilla Valley. The highest concentration of pins was located in the most populated portions of the County, including areas surrounding the City of Las Cruces such as the unincorporated community of Doña Ana and around the Town of Mesilla. Other areas with large concentrations of comments include Chaparral and the greater Hatch area. See the **Key Locations of Safety Concern** section below for additional discussion.

Comments by Type

The majority of comments (226 entries) highlighted feelings of unsafety while driving (see **Table 1**). Additionally, 91 respondents identified locations where they feel unsafe biking, 78 reported unsafe walking areas, and 56 provided comments indicating they feel safe or shared other feedback. The distribution of comments by type highlights that there were safety concerns across all modes.

Table 15: Input type received through the map survey

Input Type	# of Comments	Share of Comments
Unsafe Driving	226	49.6%
Unsafe Biking	91	20.0%
Unsafe Walking	83	18.2%
Other	49	10.7%
Feel Safe	7	1.5%
Total	**456**	**100%**

Common Safety Issues

To synthesize the comments, the project team categorized them based on major issues, including speeding and unsafe driving behavior, insufficient sight distances, lack of bike facilities, lack of sidewalks, improvements to traffic control, and other significant concerns. Speeding and insufficient sight distances were the most frequently mentioned tags (see **Table 2)**, aligning with the high number of participants who reported feeling unsafe while driving. The lack of bicycle and walking facilities corresponds with the number of participants expressing feeling unsafe while biking and walking.

Table 16: Major issues within Doña Ana County

Major Issue	Number of Comments	Share of Total
Speeding/unsafe driving behavior	145	31.8%
Lack of bicycle facilities	93	20.4%
Other	88	19.3%
Lack of sidewalk/shoulder	81	17.8%
Improvements to traffic control	51	11.2%
Insufficient view/sight distance	35	7.7%
Lighting/visibility	20	4.4%
Crosswalk/crossing improvements	18	3.9%
Total comments	**456**	

Note: Some comments identified multiple issues. As such, the sum of the number of issues (531) is greater than the total number of comments provided (456).

Other takeaways include the emphasis on safety issues at intersections and the need for traffic control improvements. Many respondents observed confusion among motorists at intersections regarding who holds the right of way, along with instances of motorists running stop signs and traffic lights, resulting in severe and fatal crashes. “Other” comments included location-specific concerns such as narrow roads, hairpin turns, nearby open water facilities, regular flooding, concerns about road striping, heavy truck traffic, pavement issues (e.g., potholes), curvy roads, and an overarching feeling of unsafety.

Key Locations of Safety Concerns

Comment Hotspots

Table 3 identifies the general areas with the highest number of publicly identified safety concerns. These perceived hotspots include either small areas (spread across multiple streets) or specific intersections and streets, and were primarily concentrated in unincorporated areas near the City of Las Cruces. Despite concerted outreach efforts in these areas, there were no identified hotspots in the southern portion of the County. The top 10 corridors received between 9 and 34 pins each (see **Table 3**).

Table 17: Corridors and areas with the highest concentration of comments

	Location	Key Corridors & Areas	Number of Pins
1	South of San Pablo	Intersection of Snow Road and NM 28	34
2	Fairacres	Via Norte and Picacho Hill Drive	30
3	Vado	NM 189, Vado Road, and surrounding streets	29
4	East of Las Cruces	Dipping Springs Road and surrounding streets	21
5	Doña Ana	Thorpe Road	19
6	Town of Mesilla	Calle De San Guadalupe and surrounding streets	17
7	Mesilla Area	Carver Road and surrounding streets	14
8	Hatch/Placitas	Central Hatch and general Placitas area	11
9	Chaparral	McCombs Drive and El Paseo Real Drive	9
10	Doña Ana	Doña Ana Road and surrounding streets	9

Among these hotspots, the corridors with the highest number of comments include:

- **NM 28 and Snow Road**: Comments were provided along the extent of the NM 28 corridor, with clusters of comments between San Pablo and Santo Tomas and through Mesilla. Major concerns included unsafe driving behavior, lack of visibility, and lack of bikeways.
- **Via Norte:** Located adjacent west of the City of Las Cruces, many survey responses highlight concerns about speeding in this area.
- **NM 189 and Vado Road:** Located in the Vado area, the most frequent concerns were lack of bicycle facilities and other comments. Other comments consisted of worries about narrow roads, heavy truck traffic, and irrigation facilities near the road.
- **Dripping Springs Road:** Located east of the City of Las Cruces, reports of speeding were the most common concern.
- **Thorpe Road:** Located in the Doña Ana are, the major issues here were speeding, the configuration around El Camino Real Road, and narrow right-of-way west of Abeyta Street.

Speeding is a common concern among these corridors, which comprise a wide variety of locations and context. Addressing this challenge, along with other concerns such as lack of biking and walking infrastructure and poor visibility, will be essential for enhancing community safety. These findings serve as a critical foundation for developing targeted countermeasures aimed at reducing speeding and improving overall safety.

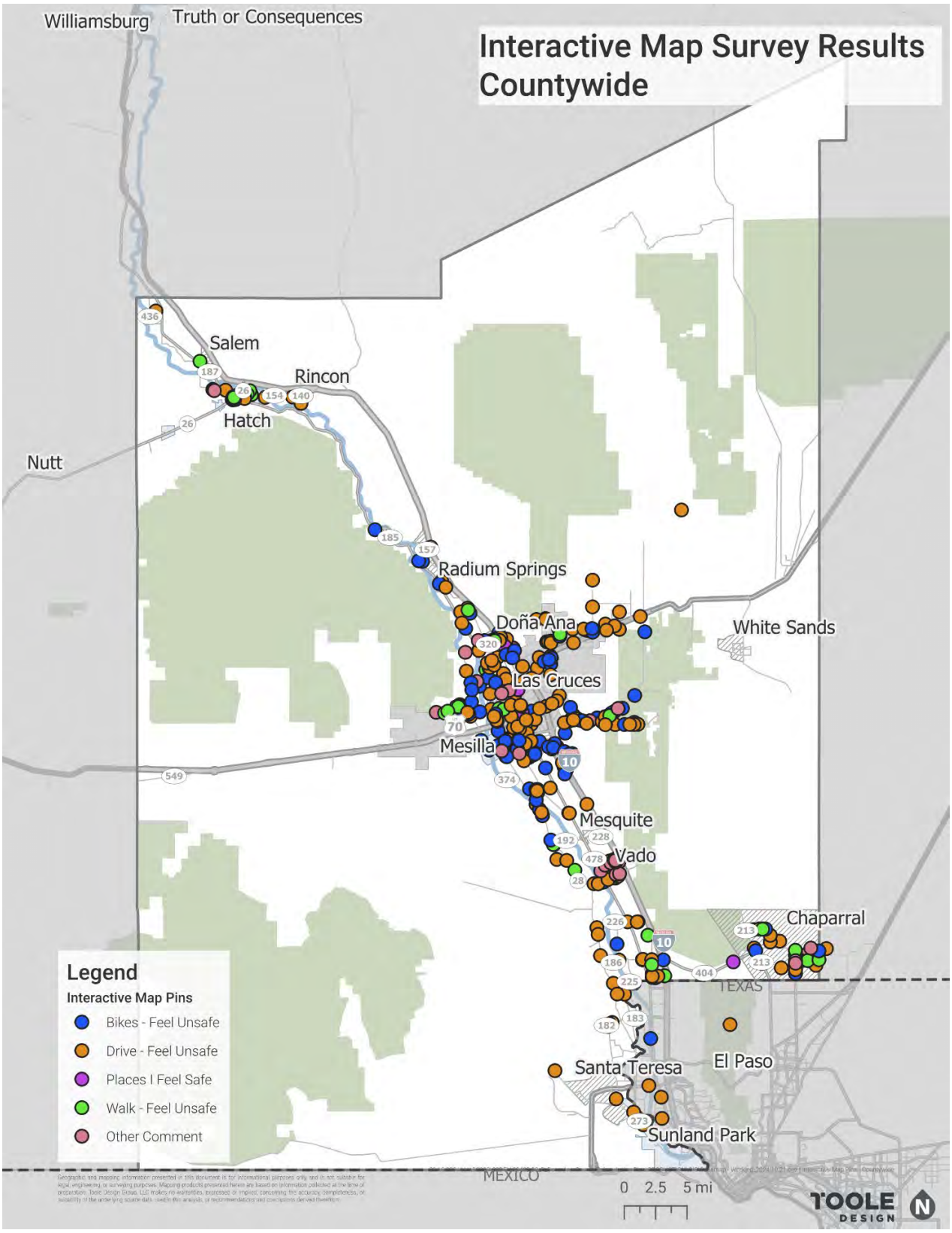


Figure 39: Countywide map pins

Issues by Subarea

This section presents an overview of the safety concerns identified in Doña Ana County, organized by subareas that received high numbers of comments: Chaparral, City of Las Cruces, Hatch and surrounding areas, and southern Doña Ana County. An assessment of comments by subarea reflects both common safety concerns as well as distinct issues and specific challenges faced by communities across Doña Ana County. Examining the concerns in these subareas allows for a better understanding of the overall safety landscape and more nuanced interventions tailored to the unique needs of different parts of the County.

Table 18: Subarea summary table

	Hatch and Surrounding Area	Chaparral	City of Las Cruces	Outside of Las Cruces	Southern Doña Ana County
Unsafe Driving	4	2	43	76	45
Unsafe Biking	0	4	9	33	17
Unsafe Walking	17	8	4	29	11
I Feel Safe	0	0	2	2	0
Other	1	2	2	17	20
Total Pins	22	16	60	157	93
Common Concerns	• Lighting • Lack of sidewalks • Speeding	• Flooding • Lack of sidewalks • Speeding • Inadequate bike paths	• Traffic controls and intersections • Lack of sidewalks • Speeding • Narrow road • Flooding	• Traffic controls and intersections • Speeding • Limited sight distance • Lack of sidewalks	• General safety • Lighting • Traffic control and intersections • Speeding • Lack of sidewalks • Lack of bike paths • Narrow roads

Village of Hatch & Surrounding Area

Community members provided more than two dozen comments in and near the Village of Hatch with concerns centered around lighting, a lack of sidewalks, and speeding. Key areas emerged from this activity:

- **Along/near Red Hills Road**: Half of the pins indicated feelings of being unsafe while driving, while the other half related to walking and other concerns. Participants feel unsafe driving due to semi-trailer trucks speeding in the area, and unsafe walking due to excessive speeding and vehicles failing to yield.
- **Placitas Area**: Comments focused entirely on feeling unsafe walking due to insufficient street lighting, the absence of designated walking paths, and concerns about personal security.
- **Central Hatch Area**: Multiple participants express safety concerns while driving along Franklin Street, while other indicated they felt unsafe walking near schools due to high vehicle speeds and lack of walking paths.

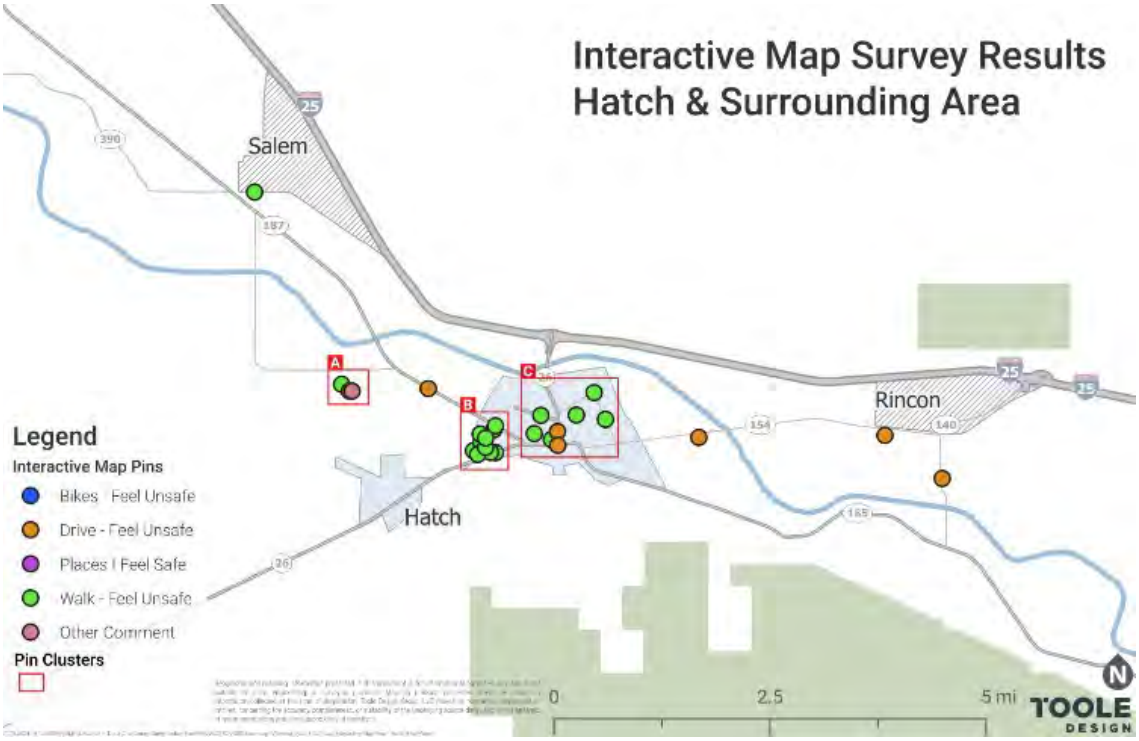


Figure 40: Hatch and surrounding area map pins

Chaparral

The unincorporated community of Chaparral received approximately 35 comments, with concerns centered around flooding, a lack of sidewalks, speeding, and inadequate bike paths. Roadways with significant safety concerns included:

- **Desert Aire Drive**: The majority of comments indicated feelings of being unsafe while walking, with the remaining related to biking. Participants report feeling unsafe walking and biking, primarily due to speeding in the area and recurring flooding issues.
- **McCombs Road**: Participants indicted that McCombs Road was unsafe for walking, biking, and driving, and other. Respondents feel unsafe walking and biking due to the lack of dedicated pedestrian and bike paths in the area. Additionally, drivers report feeling unsafe because of poor visibility at night and high volumes of cross-traffic during peak hours.
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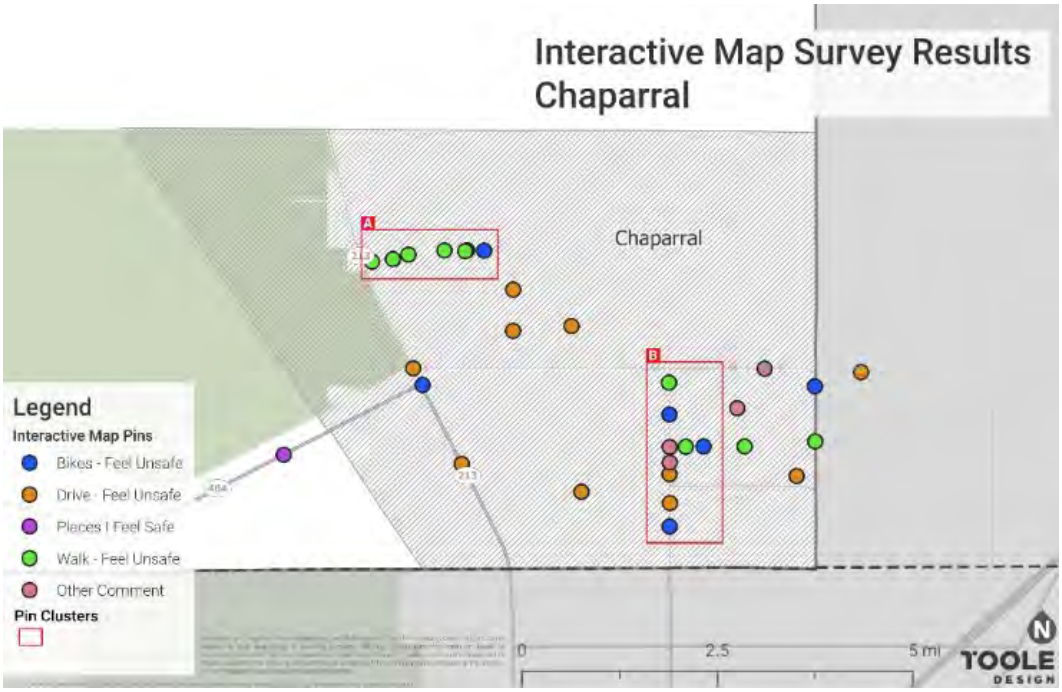


Figure 41: Chaparral area map pins

City of Las Cruces

Although this Safety Action Plan does not include the City of Las Cruces, since it is conducting its own Safety Action Plan, participants provided approximately 60 comments within municipal limits. Overall, the primary safety concerns within the City were related to feeling unsafe while driving and biking. Specific concerns centered around traffic controls/intersections, a lack of sidewalks, speeding, narrow road, and flooding. Several streets within the City of Las Cruces, though not highly concentrated, received multiple pins. These locations include:

- Lohman Avenue

- Batan Memorial West
- South Valley Drive

Outside of Las Cruces

Multiple areas in central Doña Ana County (within the study area) received a high number of comments. The majority of concerns were about feeling unsafe while driving. However, numerous pins also indicate that respondents feel unsafe while biking and walking. Hotspots and comments from participants included:

- **Doña Ana:** The majority of pins were concentrated along Thorpe Road (NM 320), with additional pins scattered across several nearby roads. Respondents reported a high number of pins related to feeling unsafe while driving, along with many pins noting feeling unsafe biking and walking. Participants feel unsafe biking due to unrestrained animals and a lack of biking-related signage. They feel unsafe driving because of poor pavement conditions, narrow roads, motorists failing to stop at intersections, and speeding. Additionally, they feel unsafe walking due to the absence of designated walking paths and a lack of pedestrian crossings.
- **Southern Doña Ana Area:** Pins were scattered across various roads in Doña Ana, along the border of the City of Las Cruces. The majority of pins express feeling of unsafe for other reasons. However, participants also report feeling unsafe while driving, walking, and biking due to high traffic volumes, difficulty crossing the street, and motorists failing to stop at intersections.
- **Fairacres Area:** On the western side of Las Cruces, the majority of pins were located on Via Norte, with additional pins on Picacho Hill Drive. Comments primarily reflect concerns about feeling unsafe while walking and driving, with several responses also mentioning feeling unsafe biking and other factors. Respondents feel unsafe biking and walking due to the lack of designated paths and speeding. When driving, they feel unsafe because of limited sight distance, speeding, motorists failing to stop at intersections, and obstacles in the roadway.
- **Dripping Springs Road:** While most comments were focused on Dripping Springs Road, there were also concerns reported for nearby streets. The feedback primarily highlights feelings of unsafe while driving and biking in the area. Participants feel unsafe biking due to reckless driving behaviors and the lack of bike paths, while they feel unsafe driving because of hairpin turns, motorists failing to stop at intersections, limited sight distance, speeding, and faded road markings.
- **Mesilla Area:** Comments were concentrated along several corridors, including Carver Road, Snow Road, Calle del Norte, and Calle De San Guadalupe. For each of these corridors, comments primarily focused on unsafe walking and biking conditions, citing issues such as a lack of sidewalks or shoulders, speeding, motorists failing to stop at intersections (due to faded striping), and limited sight distance.
- **South of Mesilla:** Pins were placed on several roads, with the majority along Carver Road, and a few on Snow Road and West Side Road. Comments reflect nearly equal concerns about biking, walking, and driving in the area. Respondents feel unsafe biking due to the lack of bike paths. They also feel unsafe walking because of speeding, unsafe driving

behaviors, and poor visibility of stop signs (traffic control issues). Additionally, many feel unsafe walking due to the lack of walking paths.

A. **Near New Mexico State University:** Pins were concentrated primarily along Triviz Drive and Cholla Road. Comments reflect concerns about feeling unsafe both while driving and biking. Participants feel unsafe due to high-speed limits, limited sight distance, and dangerous turning maneuvers.
B. **South of Las Cruces:** Pins are located on various roads, including Stern Drive, Las Alturas Drive, Remington Road, Redman Road, and Superstition Drive. Comments focused on concerns about feeling unsafe while biking and driving. Respondents feel unsafe biking due to the lack of bike paths, stop signs being obstructed, and motorists failing to stop at intersections. Drivers also feel unsafe due to motorists failing to stop at intersections, speeding, and narrow roads.
C. **NM 28 Corridor:** Participants provided comments along the extent of the corridor, with a high number of pins at the intersection of Snow Road and NM 28. Comments in the southern portions of the County were primarily related to feeling unsafe while driving. Participants identified unsafe walking and biking conditions along portions of NM 28 in San Miguel and north of Santo Tomas. Respondents indicated they feel unsafe driving due to speeding, vehicles failing to yield, and a high number of accidents in the area. Similarly, respondents indicated they feel unsafe walking and biking because of a lack of designated paths, motorists failing to stop at intersections, and speeding.

The majority of comments were related to feeling unsafe while driving (see **Table 5**), with many other pins indicating concerns about safety while walking.

Table 19: Greater Las Cruces area corridor highlights

	Location	Total Pins	Unsafe Driving	Unsafe Biking	Unsafe Walking	I Feel Safe	Other
A	Doña Ana	19	12	3	3	0	1
B	Southern Doña Ana Area	8	2	1	1	0	4
C	Fairacres	30	9	4	13	0	4
D	East of the City of Las Cruces	21	11	7	1	0	2
E	Mesilla	17	7	2	5	2	1
F	South of Mesilla	14	4	3	5	0	2
G	Near New Mexico State University	6	3	3	0	0	0
H	South of Las Cruces	8	4	3	0	0	1
I	South of Mesilla/NM 28	34	24	7	1	0	2

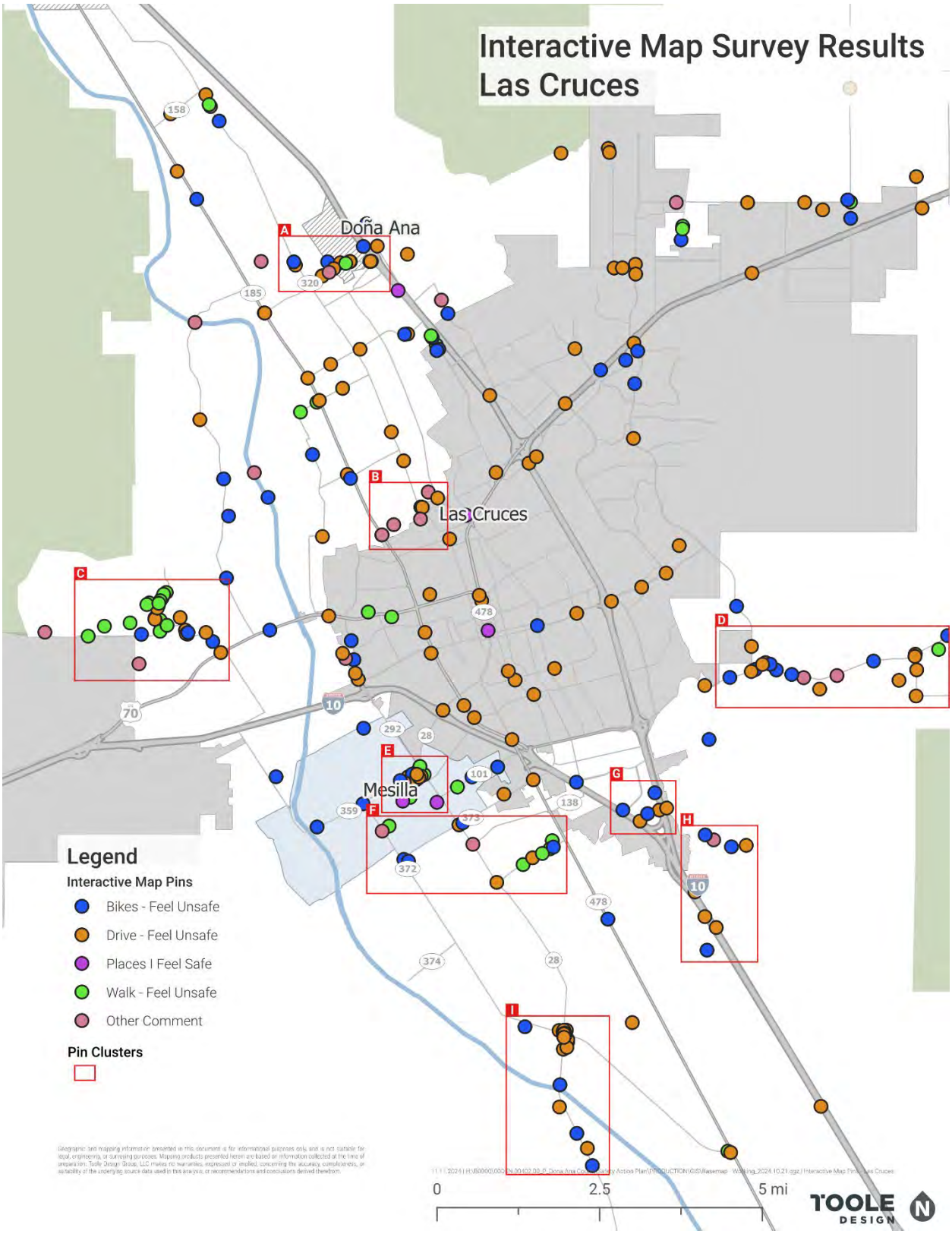


Figure 42: Greater Las Cruces area map pins

Southern Doña Ana County

Comments across the portion of Doña Ana County to the south of the City of Las Cruces were clustered in several communities and along a few major corridors (see **Figure 6**).

- **Vado**: The majority of pins were categorized as "Other Comments," with the second most common concern being feelings of unsafety while driving. There were a high number of comments requesting lighting; some more specific concerns included access to the community center off La Fe Avenue, heavy truck traffic, and a lack of sidewalks.
- **Anthony**: A cluster of comments were provided for 4th Street, with participants expressing concerns about feeling unsafe while driving due to vehicles failing to yield, speeding, unsafe driving behaviors, and poor visibility at night.

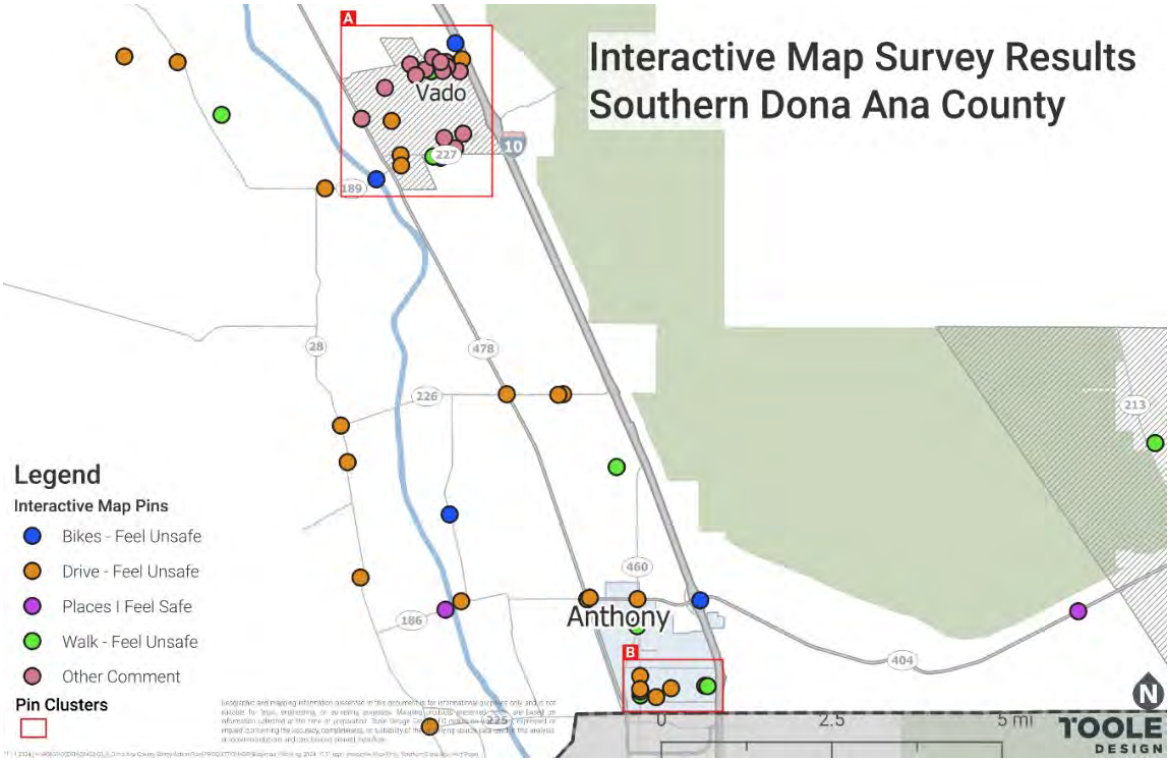


Figure 43: Southern Doña Ana County map pins (Vado and Anthony)

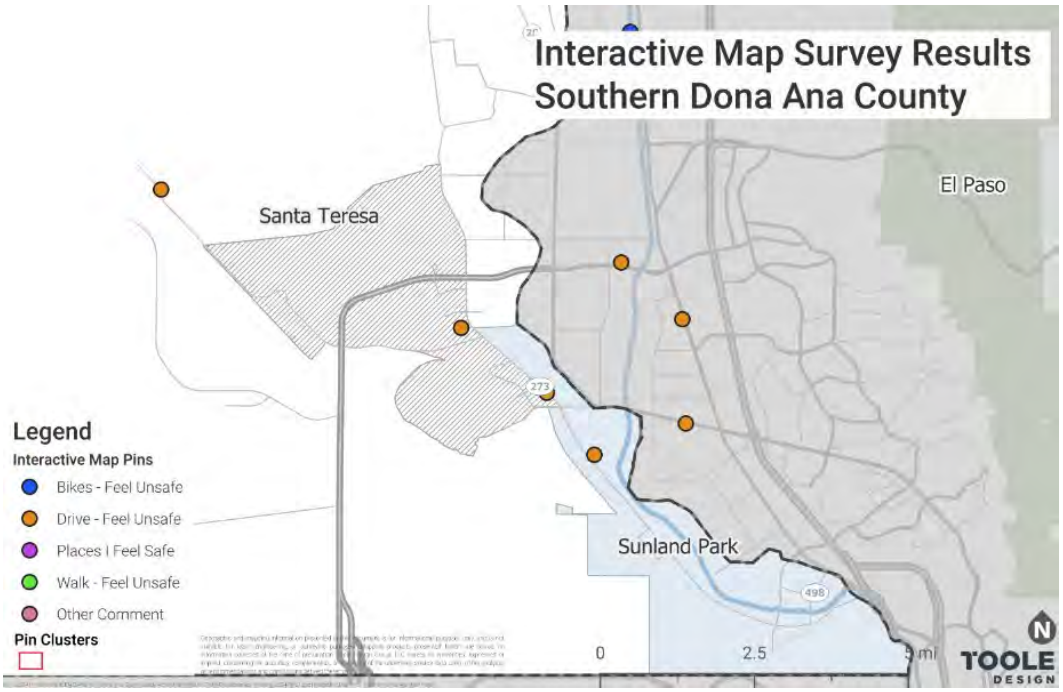


Figure 44: Southern Doña Ana County map pins (Santa Teresa and Sunland Park)

County Commission Districts

The Board of County Commissioners establishes policies for governing Doña Ana County, which is divided into five County Commission Districts. Each district has its own unique character, population, and specific safety concerns and needs. **Table 6** shows the total number of comments received by district, along with a description of the area each district covers, while **Table 7** highlights the top two hotspots or corridors for each County Commission District.

Table 20: Responses per County Commission District

Commission District	Areas Covered	Comments Received
District 1	Central region of Doña Ana County, including the Town of Mesilla, the unincorporated areas of Picacho, San Miguel, La Mesa, and Mesquite, as well as parts of the City of Las Cruces.	149
District 2	Southern portion of the county, including the City of Anthony, the City of Sunland Park, and the unincorporated communities of Chamberino, La Union, and Santa Teresa.	64
District 3	Eastern side of the county, which includes the unincorporated communities of Chaparral and White Sands, as well as parts of the City of Las Cruces.	96
District 4	The northeastern portion of the county, including parts of the City of Las Cruces, San Andres National Wildlife Refuge, and White Sands National Park.	33
District 5	Northwestern portion of Doña Ana County, encompassing the Village of Hatch, unincorporated communities such as Garfield, Salem, Rincon, Radium Springs, and Doña Ana, as well as parts of Las Cruces.	102

Table 21: Major hotspots by County Commission District

Commission District	Location	Tags
District 1	Via Norte	• Speeding
	Intersection of NM 28 and Snow Road (NM 372)	• Unsafe driving behavior • Insufficient view/sight distance
District 2	NM 189 and Vado Road	• Lack of bicycle facilities • Other comments
	Anthony	• Unsafe driving behavior • Lack of traffic control • Speeding
District 3	Dripping Springs Road	• Speeding
	McCombs Drive & Surrounding Area	• Lack of walking paths
District 4	Las Cruces: Near Sirocco Avenue	• Lack of walking paths • Insufficient view/sight distance
	Las Cruces: Near NM 70	• Lack of bike paths • Other comments
District 5	Thorpe Road	• Speeding • Narrow roadways
	Central Hatch & Placitas Area	• Lighting/visibility • Lack of sidewalks • Speeding

To provide a deeper understanding of the safety issues in each County Commission District, the following maps **(Figure 8** through **Figure 12)** and summary matrix **(Table 8)** display and outline the pins submitted by participants for each district.

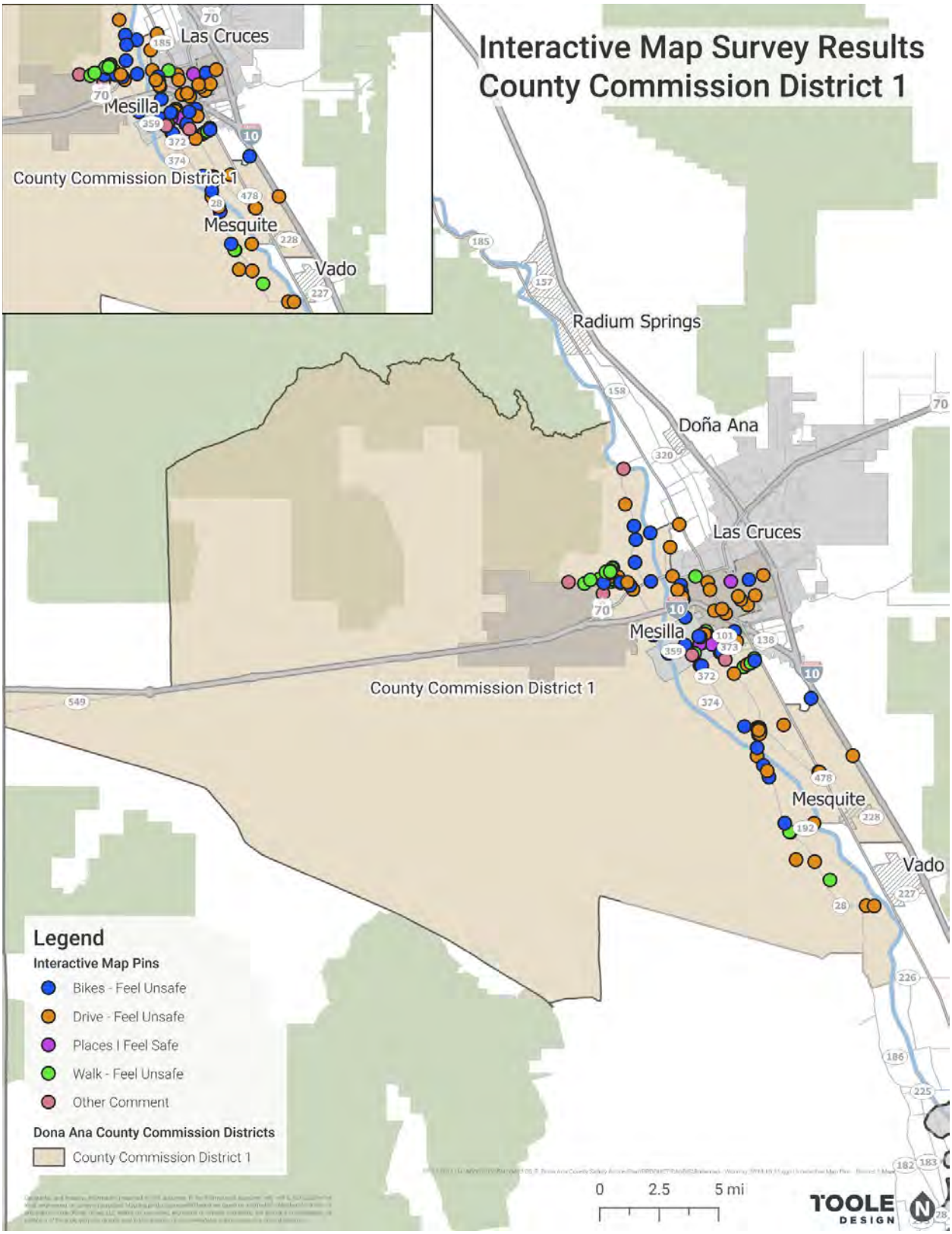


Figure 45: County Commission District 1 map pins

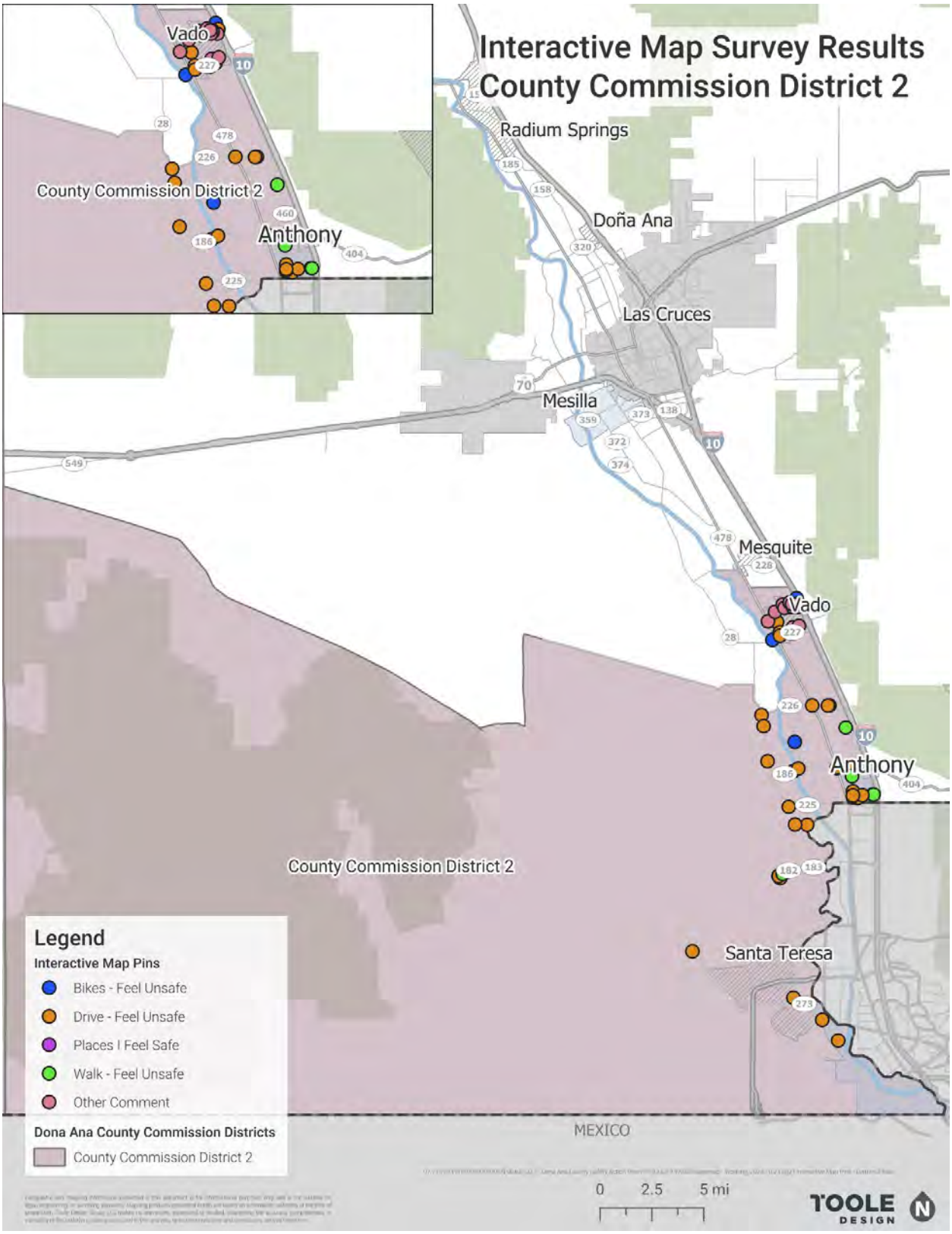


Figure 46: County Commission District 2 map pins

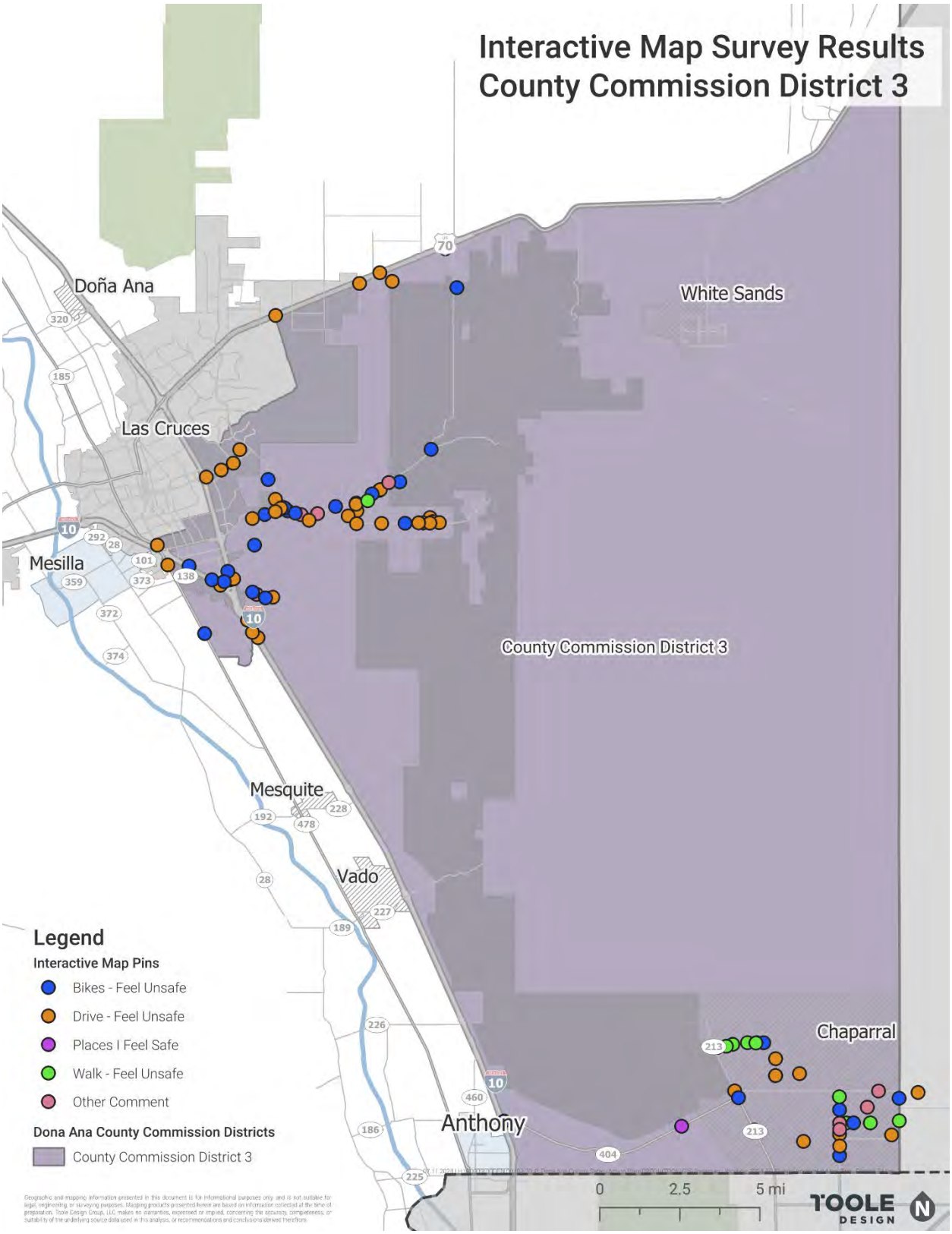


Figure 47: County Commission District 3 map pins

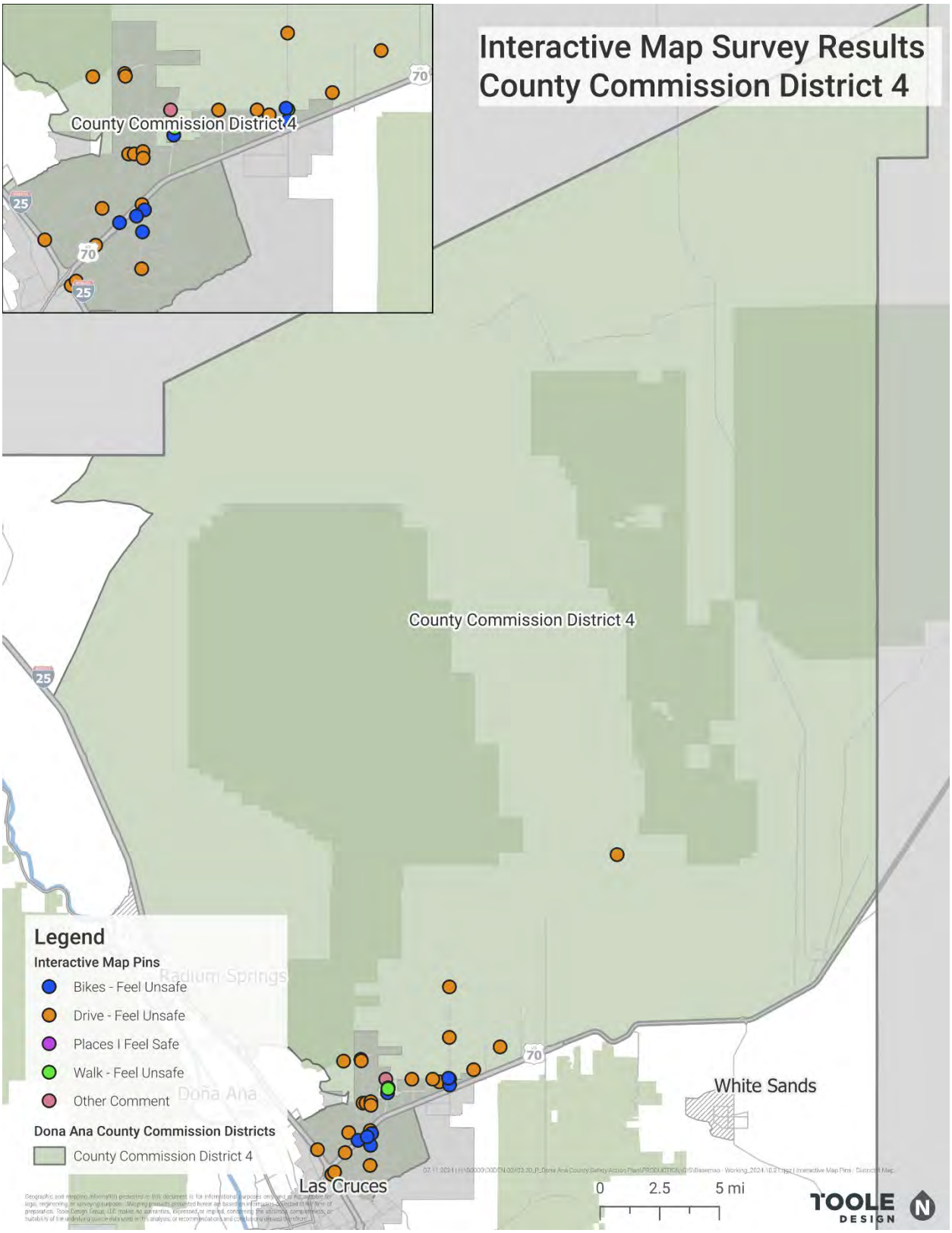


Figure 48: County Commission District 4 map pins

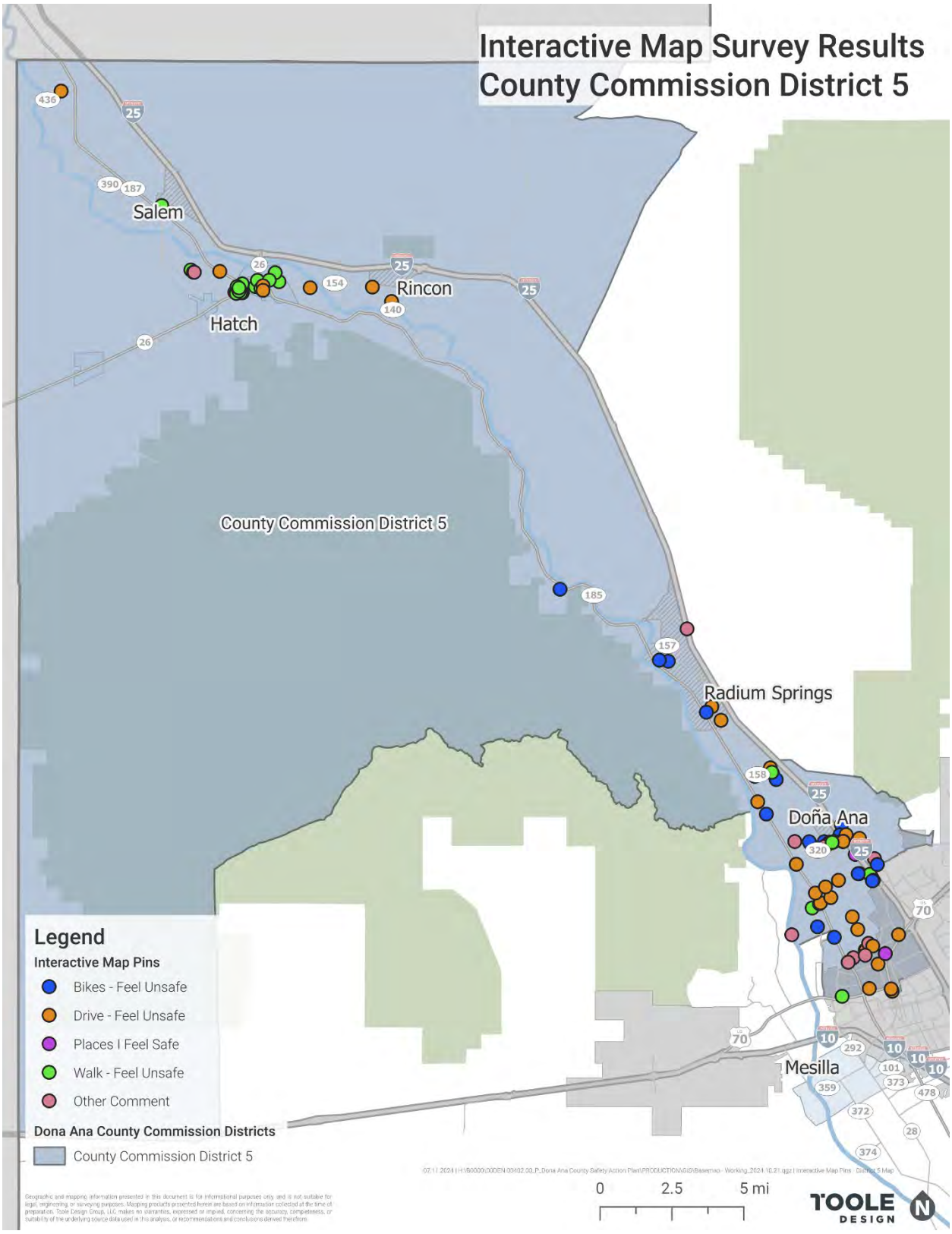


Figure 49: County Commission District 5 map pins

Table 22: County Commissioner District summary matrix

	Participants	Participants Feel					Tags								Notes
	Participants	Unsafe driving	Unsafe walking	Unsafe biking	I feel safe	Other	Speeding/unsafe driving behavior	Lighting/visibility	Insufficient view/sight distance	Crosswalk/crossing improvements	Lack of sidewalk/shoulder	Lack of bicycle facilities	Improvements to traffic control	Other	
District 1	149	71	30	33	3	12	49	3	20	7	24	30	21	28	Areas with hotspots (high concentrations of pins) include the unincorporated area of Mesilla, the unincorporated area of Fairacres, Via Norte, and the intersection of NM 28 and Snow Road (NM 372).
District 2	64	35	8	5	1	15	21	5	3	3	10	6	6	14	Areas with hotspots (high concentrations of pins) include the unincorporated areas of Anthony and Vado.
District 3	96	49	11	27	1	8	31	4	8	2	22	23	9	25	Areas with hotspots (high concentrations of pins) include Dripping Springs Road and the unincorporated area of Chaparral.
District 4	33	22	3	7	0	1	10	3	2	0	5	5	0	2	Areas of concern lie within the City of Las Cruces, near NM70 and Sirocco Avenue. No hotspots within the study area were identified in the map survey.
District 5	102	44	25	18	2	13	25	4	0	4	19	21	10	15	Areas with hotspots (high concentrations of pins) include the Village of Hatch and the unincorporated areas of Doña Ana.

COMPREHENSIVE ROADWAY SAFETY ACTION PLAN

DOÑA ANA COUNTY

APPENDIX F

SYSTEMIC TREATMENT TYPOLOGIES INVENTORY

Rural Highway Intersections: T-Intersections

Description

- Rural highway dead-ends into another rural highway.
- Additional safety treatments are most critical at locations where the highway that dead ends is classified as a collector or arterial features higher volumes.



Figure 50: Example: NM 28 and Berino Road (NM 226)



Figure 51: Example: NM 28 and Ohara Road (NM 186)

Common Issues

- Broadside/T-bone crashes
- Run-off road or overturned crashes
- Speeding on the approach that dead ends

Table 23: Common Treatments

Treatment Name	Cost	Issues Addressed	Expected Crash Reduction
Stop Control Visibility	$	Intersection crashes, visibility-related crashes	13 - 25%
Guardrail	$$-$$$$	Roadway departure crashes	8 – 24%
Reflective Pavement Markings	$	Lane departure crashes, intersection-related crashes, lighting conditions-related crashes	10-24%
Dead End Sign Assembly	$	Rear-end crashes, intersection crashes	N/A
Lighting	$$$-$$$$	Nighttime crashes	38-48% (nighttime crashes)

Application Locations

Figure 3 shows the locations of the T-intersections along the Priority Safety Network. These intersections were reviewed to identify potential treatments. **Table 2** shows the intersection name, intersection type, and identifies which treatments can be implemented at each intersection. The intersections are sorted by the number of fatal and injury crashes that occurred within 250 feet of

the intersection between 2018 and 2022. These locations are concentrated along corridors such as NM 28, NM 273, NM 228, Doña Ana Road, and Lisa Drive.

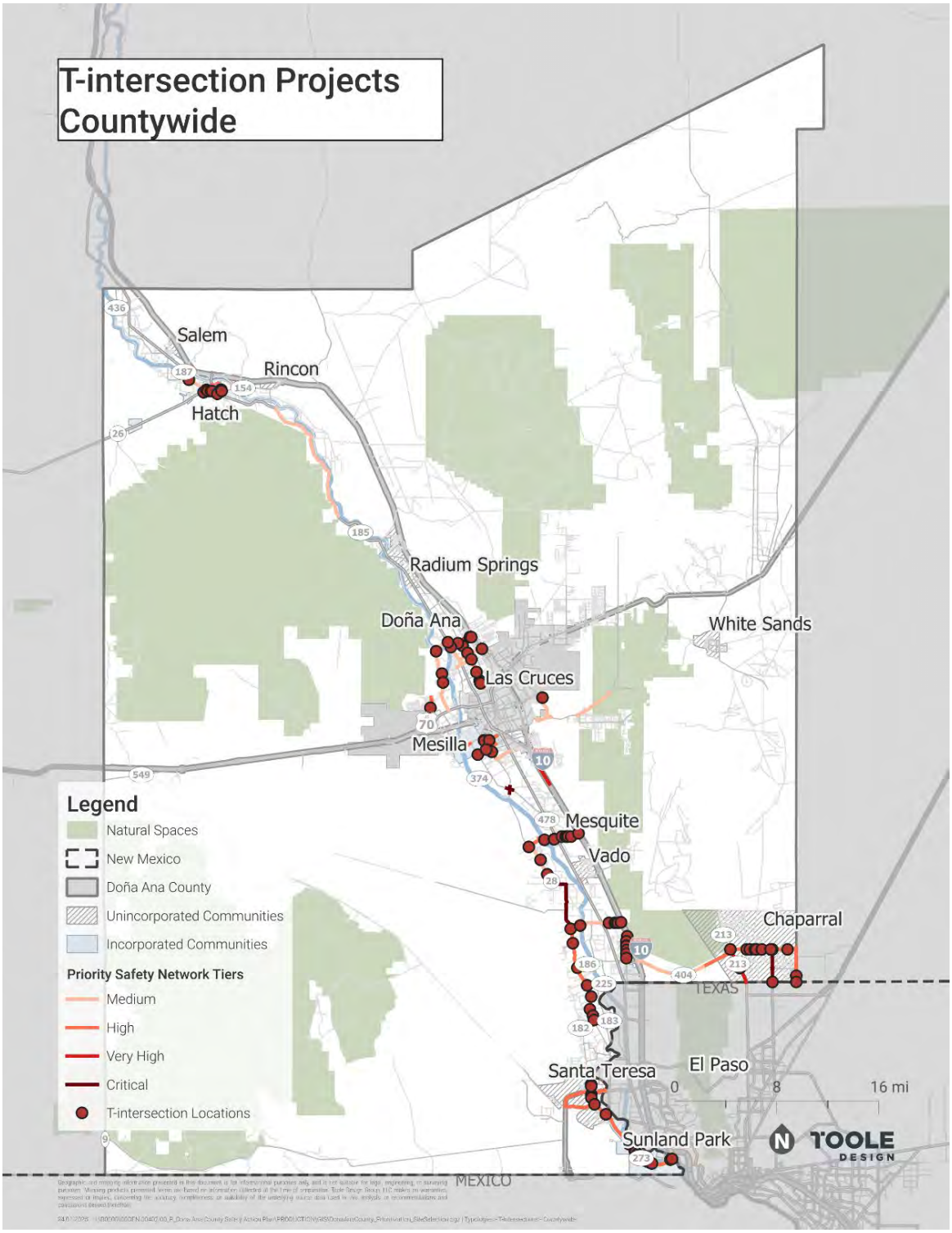


Figure 52: T-Intersections

Table 24: Potential Treatments at T-Intersection Locations

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 273 and Airport Rd	One-Way	X	X	X		X	X	X		2	12
NM 478 and Carver Rd	All-Way		X	X		X		X	X	1	8
NM 28 and Castillo Rd	One-Way	X	X	X		X	X	X	X	1	4
NM 28 and San Jacinto Rd	One-Way	X	X	X	X	X		X	X	1	3
NM 28 and NM 226	One-Way	X	X	X	X	X	X	X		1	2
Dona Ana Rd and Kristin Dr	One-Way	X	X	X	X	X	X	X	X	1	2
NM 228 and Las Parcelas Loop	One-Way	X	X	X	X	X			X	1	1
NM 101 and Camino Castillo	One-Way	X	X	X	X	X	X		X	1	1
NM 460 and Montana Vista Ave	One-Way	X	X	X	X	X	X	X	X	1	1
NM 320 and Joe Gutierrez St	One-Way	X	X	X	X	X	X	X	X	0	7
NM 213 and W Lisa Dr	One-Way	X		X	X	X	X	X		0	7
NM 273 and Mimbre Dr	One-Way		X	X	X	X		X	X	0	7
E Lisa Dr and McCombs Rd	All-Way	X	X	X		X		X		0	5
NM 273 and Loma Vista Dr	One-Way		X	X	X	X		X	X	0	5
NM 273 and Luna Dr	One-Way		X	X	X	X		X	X	0	5

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 273 and Comerciantes Blvd	One-Way			X	X	X	X	X	X	0	4
NM 273 and 5th St	One-Way		X	X	X	X		X	X	0	4
NM 273 and 4th St	One-Way		X	X	X	X		X	X	0	4
McCombs Rd and State Line Dr	One-Way	X	X	X	X	X	X	X	X	0	3
NM 273 and Rio Grande Dr	One-Way	X	X	X	X	X		X	X	0	3
NM 273 and Ross St	One-Way	X	X	X	X	X		X	X	0	3
NM 273 and Camino Real Dr	One-Way	X	X	X	X	X		X	X	0	3
NM 273 and Antone St	One-Way		X	X	X	X		X	X	0	3
Sonoma Ranch Blvd and Canyon Point Rd	One-Way	X	X	X	X	X	X	X	X	0	3
NM 192 and Sequoia Rd	One-Way	X	X	X	X	X			X	0	2
NM 192 and John Grisham Dr	One-Way	X	X	X	X	X			X	0	2
NM 228 and Firehouse Rd	One-Way	X	X	X	X	X		X	X	0	2
NM 228 and Stern Dr	One-Way		X	X		X	X	X		0	2
E Berino Rd and Bluestem Dr	One-Way	X	X	X	X	X		X	X	0	2
NM 460 and Shrode Rd	One-Way	X	X	X		X	X	X	X	0	2
NM 460 and Roadrunner Rd	One-Way	X	X	X	X	X	X	X	X	0	2

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 460 and Honeysuckle Ln	One-Way	X	X	X	X	X	X	X	X	0	2
E Lisa Dr and Moon View Rd	One-Way		X	X	X	X		X	X	0	2
NM 273 and Leeds Dr	One-Way			X	X	X	X	X	X	0	2
NM 273 and Edgewood Blvd	One-Way		X	X	X	X		X	X	0	2
NM 28 and Washington St	All-Way			X		X	X	X		0	1
NM 228 and Lost Dutchman Dr	One-Way	X	X	X	X	X	X		X	0	1
NM 28 and NM 186	One-Way		X	X	X	X	X	X		0	1
NM 28 and Haase Rd	One-Way	X	X	X	X	X	X	X	X	0	1
NM 187 and NM 26	One-Way		X	X		X		X		0	1
NM 26 and Jefferson St	One-Way		X	X	X	X		X	X	0	1
County Road E027 and NM 154	One-Way	X	X	X	X	X	X	X	X	0	1
Dona Ana Rd and Dona Ana School Rd	One-Way	X	X	X	X	X		X	X	0	1
Dona Ana Rd and Adobe Ln	One-Way	X	X	X	X	X	X	X	X	0	1
Dona Ana Rd and Carlton Rd	One-Way	X	X	X	X	X		X	X	0	1
NM 320 and Vanegas Dr	One-Way	X	X	X	X	X	X	X	X	0	1
NM 320 and Shenandoah Trl	One-Way	X	X	X	X	X	X	X	X	0	1

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 320 and NM 185	One-Way	X	X	X		X	X	X	X	0	1
Shalem Colony Trl and Rocky Acres Trl	One-Way	X	X	X	X	X	X	X	X	0	1
Shalem Colony Trl and Co Rd D109	One-Way	X	X	X	X	X	X	X	X	0	1
Shalem Colony Trl and Pantera Cir	One-Way	X	X	X	X	X	X	X	X	0	1
Picacho Hills Dr and Las Casitas	One-Way	X	X	X	X	X	X	X	X	0	1
NM 373 and NM 372	One-Way	X	X	X		X	X	X		0	1
NM 228 and 3 Sons Rd	One-Way	X	X	X	X	X	X		X	0	1
Berino Rd and Vistoso Loop	One-Way	X	X	X	X	X	X	X	X	0	1
Berino Rd and Anthony Dr	One-Way			X	X	X		X	X	0	1
NM 460 and Stern Dr	One-Way	X		X		X	X	X		0	1
NM 460 and Lipps Rd	One-Way	X	X	X	X	X		X	X	0	1
NM 213 and A74	One-Way	X	X	X	X	X	X	X	X	0	1
W Lisa Dr and Tumbleweed Trl	One-Way	X	X	X	X	X	X	X	X	0	1
W Lisa Dr and Sunny Sands Rd	One-Way	X	X	X	X	X	X	X	X	0	1
E Lisa Dr and Chaparral Dr	One-Way	X	X	X	X	X	X	X	X	0	1
County Line Dr and State Line Dr	One-Way	X	X	X		X	X	X	X	0	1

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 273 and Borderland Rd	One-Way	X	X	X	X	X	X	X	X	0	1
NM 273 and Sea Pines Dr	One-Way	X	X	X	X	X		X	X	0	1
NM 273 and Santa Demingo Dr	One-Way		X	X	X	X		X	X	0	1
NM 273 and First St	One-Way		X	X	X	X		X	X	0	1
NM 273 and Calle Carrosel	One-Way	X	X	X	X	X		X	X	0	1
NM 273 and Calle Morroco	One-Way	X	X	X	X	X		X	X	0	1
Birch Ln and NM 187	One-Way		X	X		X	X	X	X	0	0
NM 26 and Trujillo St	One-Way	X	X	X	X	X	X	X	X	0	0
NM 26 and Carr St	One-Way		X	X	X	X		X	X	0	0
NM 26 and Adams St	One-Way		X	X	X	X		X	X	0	0
NM 28 and School St	One-Way		X	X	X	X		X	X	0	0
NM 28 and NM 192	One-Way			X		X		X		0	0
NM 192 and County Rd B43	One-Way	X	X	X	X	X		X		0	0
NM 28 and Little Rd	One-Way	X	X	X	X	X		X	X	0	0
NM 28 and Kriegel Rd	One-Way	X	X	X	X	X	X	X	X	0	0
NM 28 and Calle Delphia	One-Way	X	X	X	X	X	X	X	X	0	0

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
NM 187 and Archer St	One-Way	X	X	X	X	X		X	X	0	0
NM 26 and Wilson St	One-Way		X	X	X	X		X	X	0	0
NM 185 and Elm St	One-Way	X	X	X	X	X		X	X	0	0
County Road E027 and Canal Rd	One-Way	X	X	X	X	X	X		X	0	0
Dona Ana Rd and King Edward Ave	One-Way	X	X	X	X	X	X	X	X	0	0
Dona Ana Rd and Lopez Rd	One-Way	X	X	X	X	X		X		0	0
East Taylor Rd and Elks Dr	One-Way	X	X	X		X		X	X	0	0
Shalem Colony Trl and NM 185	One-Way	X	X	X	X	X	X	X	X	0	0
Dona Ana Rd and Olde Country Rd	One-Way	X	X	X	X	X		X	X	0	0
NM 28 and Calle De Colon	One-Way	X	X	X	X	X		X	X	0	0
NM 28 and Calle De Cura	One-Way	X	X	X	X	X		X	X	0	0
NM 28 and Watson Ln	One-Way	X	X	X		X	X	X		0	0
NM 373 and Valdes Rd	One-Way	X	X	X	X	X	X	X	X	0	0
NM 228 and Homestake Rd	One-Way	X	X	X	X	X	X	X	X	0	0
NM 28 and Chimuri St	One-Way	X	X	X	X	X		X	X	0	0
NM 28 and Montes Rd	One-Way	X	X	X	X	X	X	X	X	0	0

Intersection Details		Stop Control Visibility Treatments					Other Treatments			Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	Guardrail	Dead End Sign Assembly	Number of KSI Crashes	Number of Total Injury Crashes
E Berino Rd and Salt Brush Dr	One-Way	X	X	X	X	X	X	X	X	0	0
Berino Rd and Mogollon St	One-Way	X	X	X	X	X		X	X	0	0
NM 460 and Starlight Ln	One-Way	X	X	X	X	X	X	X	X	0	0
W Lisa Dr and Sagewood Rd	One-Way	X	X	X	X	X		X	X	0	0
W Lisa Dr and Golden Eagle Trl	One-Way	X	X	X	X	X	X	X	X	0	0
E Lisa Dr and Greenwood Rd	One-Way	X	X	X	X	X	X	X	X	0	0
County Line Dr and Broadmoor Dr	One-Way	X	X	X	X	X	X	X	X	0	0
NM 273 and Casas Lindas Ln	One-Way		X	X	X	X	X	X	X	0	0
NM 273 and Hondo Dr	One-Way	X	X	X	X	X		X	X	0	0
NM 273 and Bronze Hill Ave	One-Way	X	X	X	X	X	X	X	X	0	0

Rural Highway Intersections: 4-Way Stop Controlled Intersections

Description

- Four-way rural highways intersections that are either two-way stop or all-way stops.
- Additional safety treatments are most critical at locations where the volumes between the two intersecting roadways are similar or where there are few gaps in traffic flow.



Figure 53: NM 192 and Santa Barbara St (Mesquite)



Figure 54: McCombs Drive and Hermosa Drive (Chaparral)

Common Issues

- Broadside/T-bone crashes
- Run-off road or overturned crashes
- Drivers running stop signs

Table 25: Common Treatments

Treatment Name	Cost	Issues Addressed	Expected Crash Reduction
Stop Control Visibility	$	Intersection crashes, visibility-related crashes	13 - 25%
Lighting	$$$-$$$$	Nighttime crashes	38-48% (nighttime crashes)

Application Locations

Figure 6 shows the locations of the 4-way intersections along the Priority Safety Network. These intersections were reviewed to identify potential treatments. **Table 4** shows the intersection name, intersection type, and identifies which treatments can be implemented at each intersection. The intersections are sorted by the number of fatal and injury crashes that occurred within 250 feet of the intersection between 2018-2022. These locations are concentrated along corridors such as NM 28, NM 228, Doña Ana Road, and McCombs Drive.

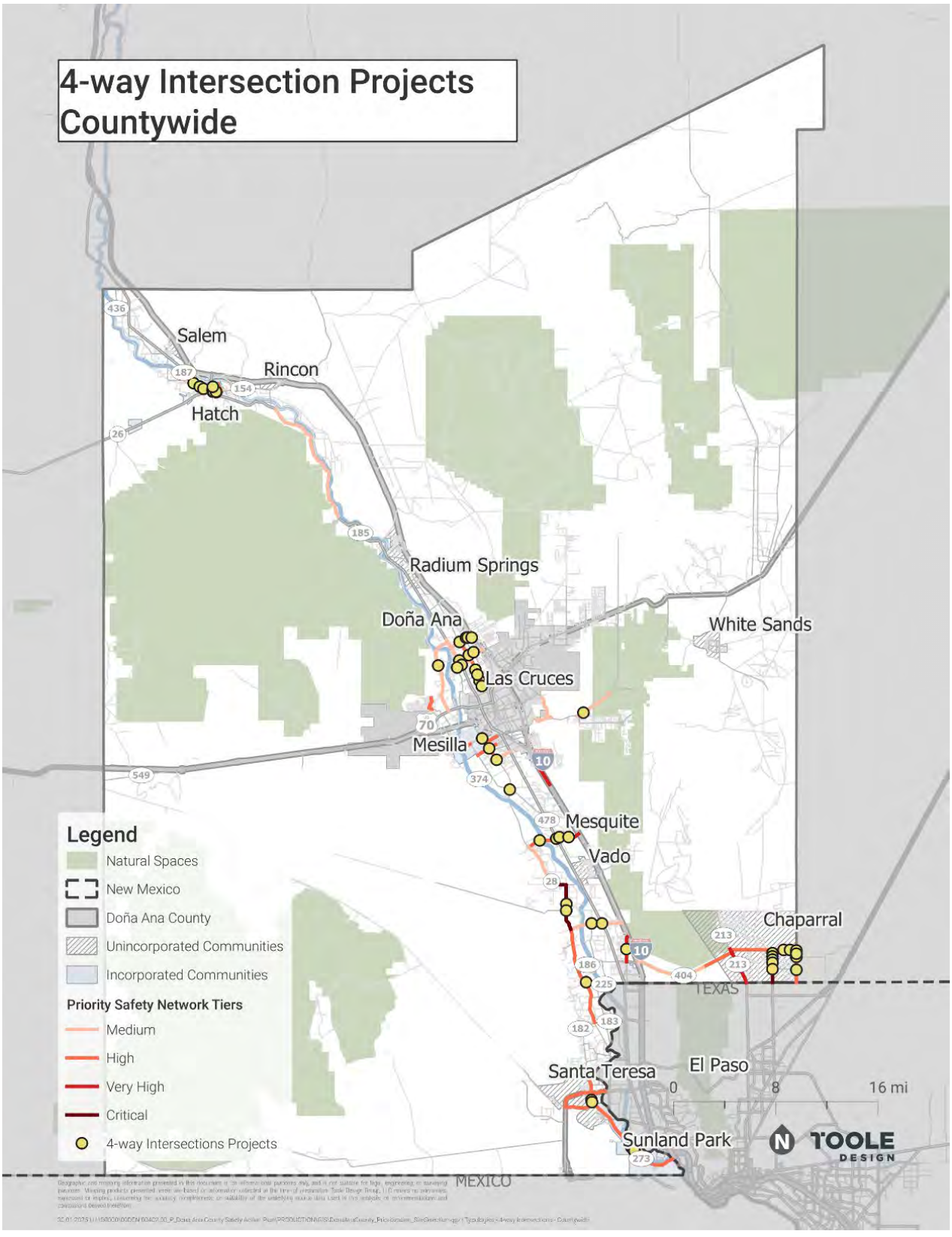


Figure 55: 4-Way Intersection Projects

Table 26: Potential Treatments at Four-Way Stop-Controlled Intersection Locations

Intersection Details		Stop Control Visibility Treatments					Other Treatments	Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	No. of Fatal and Serious Injury Crashes	No. of Total Injury Crashes
NM 192 and Santa Barbara St	Two-Way Stop	X	X	X		X		2	12
W Union Ave and Avenida de Mesilla	Two-Way Stop		X	X		X		1	6
NM 28 and NM 372	Two-Way Stop	X		X		X	X	1	6
NM 226 and NM 478	Two-Way Stop	X	X	X	X	X		1	6
Lopez Rd and NM 185	Two-Way Stop	X	X	X	X	X	X	1	3
McCombs Rd and Hermosa Dr	All-Way Stop		X	X	X	X		1	2
McCombs Rd and Luna Azul Rd	Two-Way Stop	X	X	X	X	X	X	1	2
NM 192 and County Rd B-042	Two-Way Stop	X	X	X		X		1	2
Dona Ana Rd and Armstrong Rd/Engler Rd	All-Way Stop		X	X		X		0	10
NM 320 and El Camino Real Rd	Two-Way Stop	X	X	X	X	X	X	0	7
NM 28 and Carver Rd	Two-Way Stop	X	X	X		X		0	5
Dona Ana Rd and County Rd 243 W	All-Way Stop	X		X		X		0	4
County Rd 243 W and NM 185	Two-Way Stop	X	X	X		X		0	4
S County Line Dr and Hermosa Dr	Two-Way Stop	X	X	X	X	X		0	4

Intersection Details		Stop Control Visibility Treatments					Other Treatments	Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	No. of Fatal and Serious Injury Crashes	No. of Total Injury Crashes
NM 273 and Sabine Dr	Two-Way Stop	X	X	X	X	X		0	4
E Lisa Dr and County Line Dr	All-Way Stop	X	X	X		X		0	3
NM 187 and Castaneda Rd	Two-Way Stop	X	X	X		X	X	0	3
McCombs Rd and Paseo Real Dr	Two-Way Stop	X	X	X	X	X		0	3
Dona Ana Rd and San Ysidro Rd	Two-Way Stop	X	X	X	X	X		0	3
NM 228 and Tres Caballos Pl	Two-Way Stop	X	X	X	X	X		0	3
E Lisa Dr and Amparo Rd	Two-Way Stop		X	X	X	X		0	3
Dona Ana Rd and NM 320	All-Way Stop	X		X		X		0	2
NM 185 and NM 154	Two-Way Stop	X		X		X		0	2
Dona Ana Rd and Dalrymple Rd	Two-Way Stop	X	X	X	X	X		0	2
NM 460 and E Joy Dr	Two-Way Stop	X	X	X	X	X	X	0	2
S County Line Dr and Luna Azul Dr	Two-Way Stop	X	X	X	X	X	X	0	2
County Line Dr and Mesilla View Dr	Two-Way Stop	X	X	X	X	X		0	2
NM 185 and Halsell Ave	Two-Way Stop	X	X	X	X	X	X	0	2

Intersection Details		Stop Control Visibility Treatments					Other Treatments	Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	No. of Fatal and Serious Injury Crashes	No. of Total Injury Crashes
E Taylor Rd and El Camino Real Rd	All-Way Stop	X		X		X		0	1
Westwind Rd and Northwind Rd	All-Way Stop	X	X	X		X		0	1
NM 28 and E Sloan Rd	Two-Way Stop	X	X	X	X	X	X	0	1
NM 28 and Afton Rd	Two-Way Stop	X	X	X		X	X	0	1
McCombs Rd and Paloma Blanca Dr	Two-Way Stop	X	X	X	X	X		0	1
NM 187 and Chile Capital Ln	Two-Way Stop	X	X	X	X	X		0	1
NM 26 and West Canal Rd	Two-Way Stop	X	X	X	X	X		0	1
Dona Ana Rd and Jackson Ln	Two-Way Stop	X	X	X	X	X	X	0	1
NM 320 and Abeyta St	Two-Way Stop	X	X	X	X	X	X	0	1
NM 320 and Ledesma Dr	Two-Way Stop	X	X	X	X	X	X	0	1
Shalem Colony Trl and Skyline Dr	Two-Way Stop	X	X	X	X	X	X	0	1
NM 185 and Foster St	Two-Way Stop		X	X	X	X		0	1
Dripping Springs Rd and Desert Mirage Dr	Two-Way Stop	X	X	X	X	X	X	0	1
E Lisa Dr and Prescott Anthony Dr	Two-Way Stop		X	X	X	X		0	1

Intersection Details		Stop Control Visibility Treatments					Other Treatments	Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	No. of Fatal and Serious Injury Crashes	No. of Total Injury Crashes
NM 273 and Edgemont Rd	Two-Way Stop	X		X	X	X		0	1
NM 273 and Killdeer Rd	Two-Way Stop			X	X	X		0	1
NM 185 and Price St	Two-Way Stop		X	X	X	X		0	1
NM 26 and Herrera Rd	Two-Way Stop		X	X	X	X		0	1
NM 187 and Red Hills Rd	Two-Way Stop		X	X	X	X	X	0	0
NM 228 and East Side Rd	Two-Way Stop	X	X	X	X	X	X	0	0
McCombs Rd and mesilla View Dr	Two-Way Stop	X	X	X	X	X	X	0	0
NM 28 and Westside Rd	Two-Way Stop		X	X		X	X	0	0
West Canal Rd and Davis St	Two-Way Stop		X	X	X	X		0	0
West Canal Rd and W Hill St	Two-Way Stop	X	X	X	X	X		0	0
West Canal Rd and Reed St	Two-Way Stop		X	X	X	X		0	0
West Canal Rd and Canal St	Two-Way Stop		X	X	X	X		0	0
NM 28 and Calle De Medanos	Two-Way Stop	X	X	X	X	X		0	0
NM 228 and Three Saints Rd	Two-Way Stop	X	X	X	X	X	X	0	0

Intersection Details		Stop Control Visibility Treatments					Other Treatments	Crash Data	
Intersection Name	Stop Control Type	Stop Bar	Oversized Stop Sign	Stop Sign Beacon	Advanced Stop Warning Sign	Advanced Stop Warning Beacon	Lighting	No. of Fatal and Serious Injury Crashes	No. of Total Injury Crashes
NM 278 and Gila Dr	Two-Way Stop	X	X	X	X	X		0	0
NM 273 and Spruce Dr	Two-Way Stop	X	X	X	X	X		0	0

Rural Developed Areas

Description

- Developed population centers in rural areas along the roads in the Priority Safety Networks.
- These include small towns, 'colonias', and areas near schools.



Figure 56: NM 228 near Mesquite Elementary School

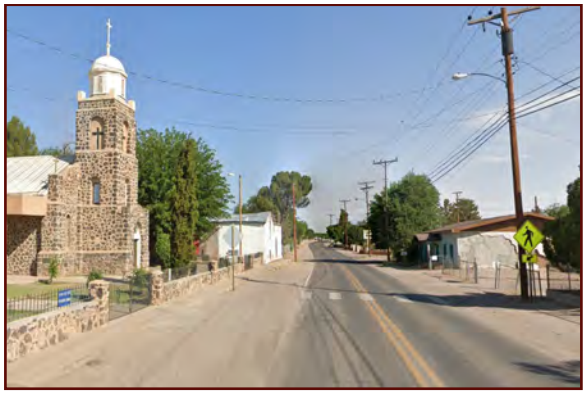


Figure 57: NM 28 in San Miguel

Common Issues

- Speeding
- Pedestrian and bicyclist safety
- Rear-end crashes
- Broadside crashes

Table 27: Common Treatments

Treatment Name	Cost	Issues Addressed	Expected Crash Reduction
Enhanced Crossings	$$ -$$$$	Pedestrian and bicyclist-related crashes	25-47%
Corner Redesign	$ - $$	Speeding-related and pedestrian-related crashes	Variable
Speed Management	$-$$$$	Speeding-related crashes	Variable
Lighting	$$$-$$$$	Nighttime crashes	38-42%
High Visibility Pavement Markings	$	Lane departure crashes, Nighttime crashes	10-24%
Signage	$-$$$	Speeding-related crashes, rear-end crashes, broadside crashes	Variable
Gateway Treatments	$-$$	Speeding-related crashes, pedestrian and bicyclist-related crashes	32%

Application Locations

Figure 9 shows the locations of the developed areas along the Priority Safety Network. These locations were reviewed to identify potential treatments. **Table 6** shows the location name and location type, intersection type, and identifies which treatments can be implemented at each location. The locations are sorted by the number of fatal and injury crashes that occurred within 500 feet of the locations between 2018-2022.

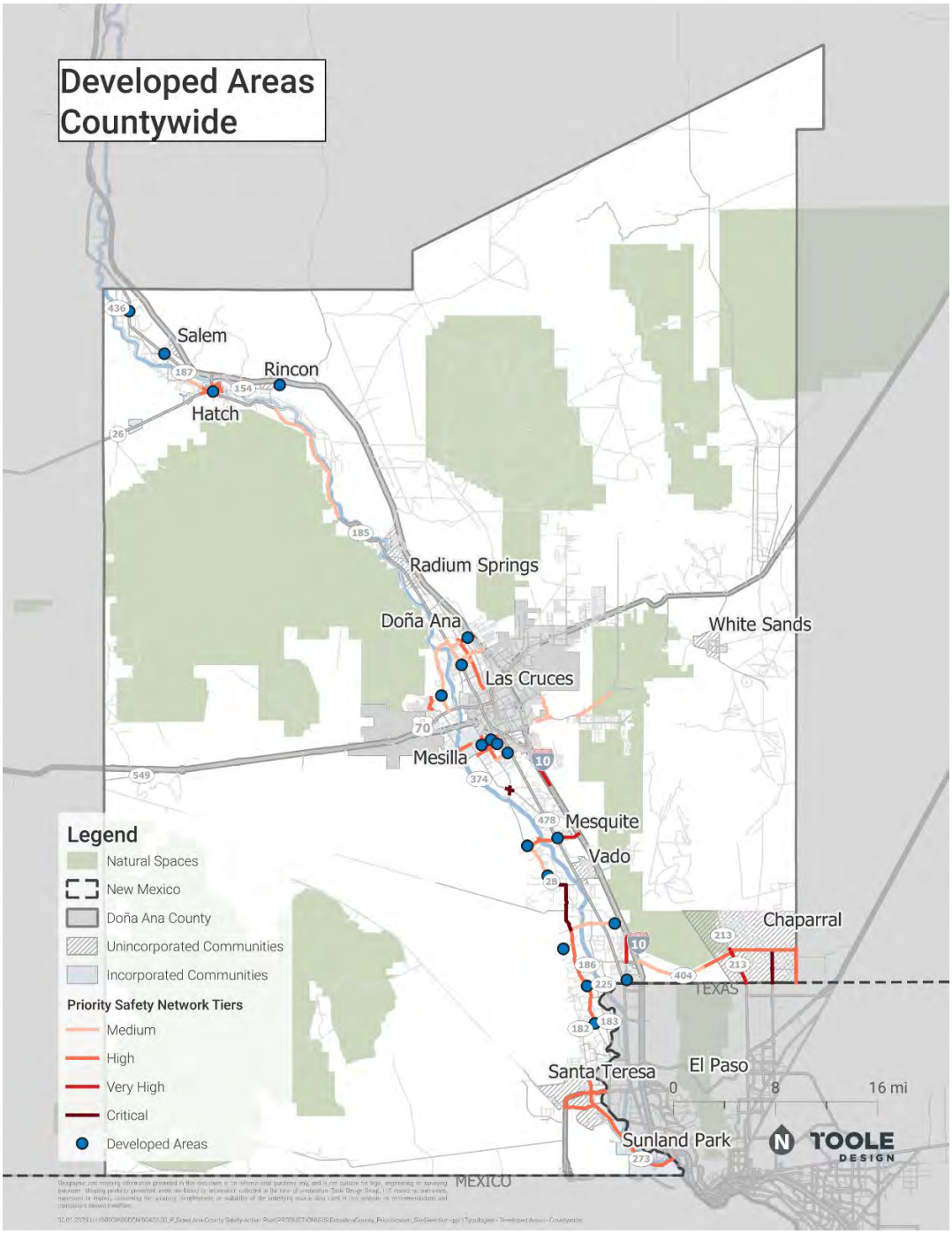


Figure 58: Developed Areas Countywide

Table 28: Potential Treatments at Rural Developed Areas in Doña Ana County

Location Details		Potential Treatments							Crash Data	
Location Name	Location Type	Enhanced Crossings	Corner Redesign	Speed Management	Lighting	High Visibility Pavement Markings	Signage	Gateway Treatments	Number of KSI Crashes	Number of Injury Crashes
Mesquite/Mesquite Elementary School - NM 228 & Post St	Two-Way Stop Intersection	X		X	X	X		X	11	2
East Picacho Elementary School - Valley Dr & Westwind Rd	Two-Way Stop Intersection	X	X	X		X	X		3	1
Hatch - NM 26/Hall St & Canal Rd	Two-way Stop Intersection	X	X			X			2	0
Doña Ana - NM 320/Thorpe Rd & Ledesma Dr	Two-way Stop Intersection	X	X	X	X			X	2	0
Anthony Elementary School - 4th St & Lopez Rd	Two-Way Stop Intersection	X	X			X	X		2	0
NM 28 between NM 183 (Vinton Rd) and NM 182 (La Union St)	Two Lane Road	X				X		X	2	0
Berino Rd through Berino	Two Lane Road	X				X	X	X	1	1
Salem - NM 187 & Salem St	Two-way Stop Intersection	X	X	X					1	1

Location Details		Potential Treatments							Crash Data	
Location Name	Location Type	Enhanced Crossings	Corner Redesign	Speed Management	Lighting	High Visibility Pavement Markings	Signage	Gateway Treatments	Number of KSI Crashes	Number of Injury Crashes
Gadsden High School	All-Way Stop Intersection	X	X	X		X			1	0
Mesilla Park Elementary School - NM 373/Union Ave & Apple Cross Pl	One-Way Stop T-intersection	X		X		X			1	0
Picacho - Shalem Colony Trail & Old Picacho Rd	One-Way Stop T-Intersection		X	X	X	X	X		0	0
Zia Middle School - NM 101/University Ave & McDowell Rd	One-Way Stop T-Intersection	X	X	X	X	X	X		0	0
Mesilla Elementary School - Calle del Sur & Calle Tercera	One-Way Stop T-Intersection	X		X		X			0	0
Tombaugh Elementary School - Carver Road and Willow Glen Dr	One-way Stop T-Intersection	X		X	X	X			0	0
Garfield Elementary School - NM 187	Two Lane Road	X		X		X	X	X	0	0
San Miguel - NM 28 near Savannah Rd	Two Lane Road	X				X	X	X	0	0

Location Details		Potential Treatments							Crash Data	
Location Name	Location Type	Enhanced Crossings	Corner Redesign	Speed Management	Lighting	High Visibility Pavement Markings	Signage	Gateway Treatments	Number of KSI Crashes	Number of Injury Crashes
La Mesa - NM 28 near San Miguel St	Two Lane Road	X				X	X	X	0	0
Chamberino - near Medina Ave & San Jacinto Rd	One-Way Stop T-Intersection	X	X			X			0	0
La Union - Mercenantil Ave & Alvarez Rd	Two-Way Stop Intersection	X	X			X	X		0	0
Rincon - NM 140/Rincon Rd & Corea St	One-way Stop T-Intersection	X		X	X			X	0	0

Rural Curves

Description

- Curves along roads in the Priority Safety Networks.



Figure 59: NM 28 between Rusty Spur Ln and E Sloan Road



Figure 60: NM 28 at Vinton Road

Common Issues

- Speeding
- Run-off road crashes
- Overturned/roll-over crashes
- Hit object crashes
- Head-on crashes

Table 29: Common Treatments

Treatment Name	Cost	Issues Addressed	Expected Crash Reduction
Curve Warning Signs	$	Run-off road, overturned, hit object crashes	16-30%
Curve Warning Beacons	$$	Run-off road, overturned, hit object crashes	n/a
Oversized Chevron Signs	$	Run-off road, overturned, hit object crashes	16-30%
Speed Limit Signs	$	Speeding	N/A
Centerline and Shoulder Rumble Strips	$-$$$	Run-off road, overturned, hit object, head-on crashes	23-44%

Application Locations

Figure 12 shows the locations of curves along the Priority Safety Network. These locations were reviewed to identify potential treatments. **Table 8** shows the location name and identifies which treatments can be implemented at each location. The intersections are sorted by the number of

fatal and injury crashes that occurred within 500 feet of the intersection between 2018-2022. These locations are concentrated along corridors such as NM 28, Shalom Colony Trail, and NM 228.

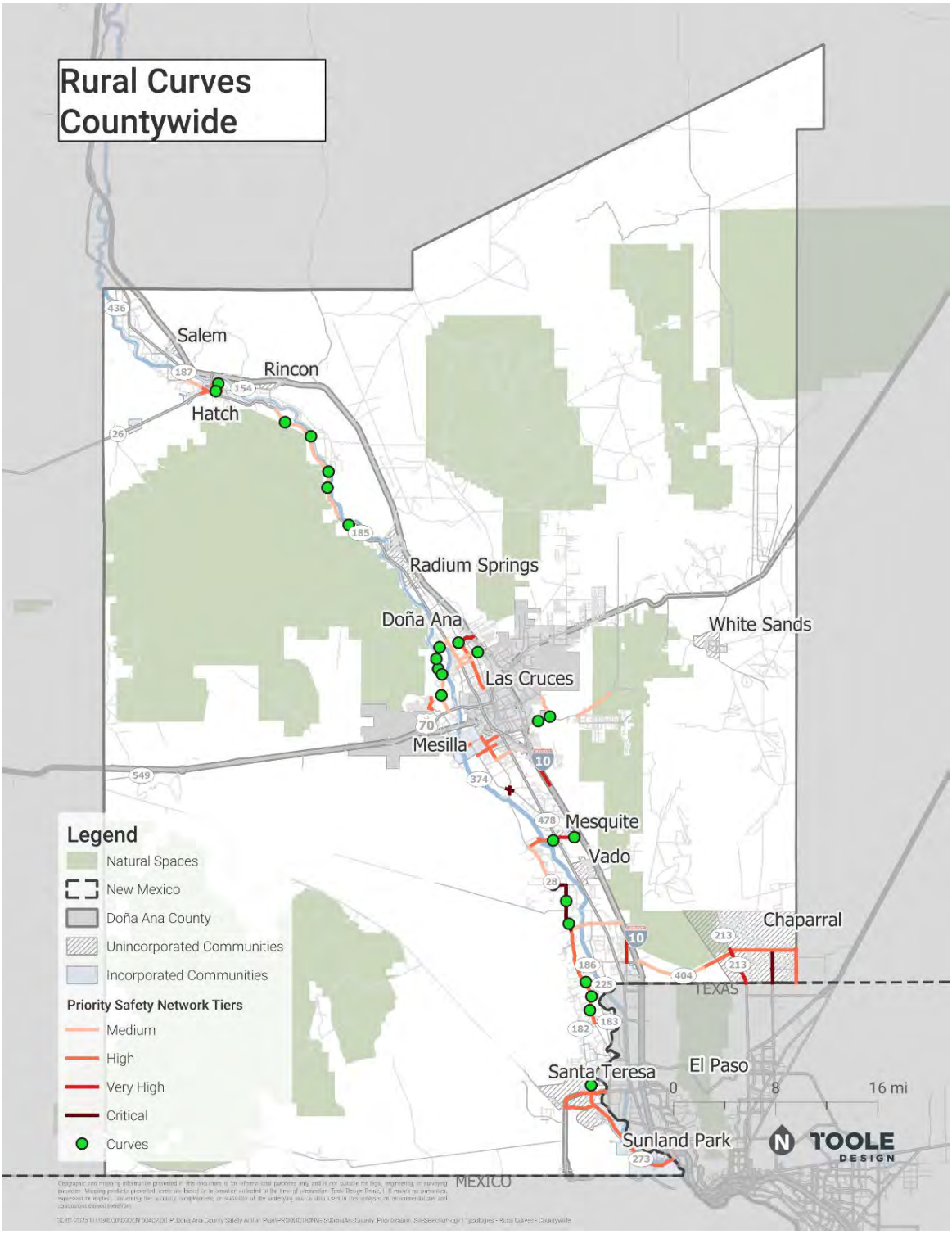


Figure 61: Rural Curves

Table 30: Potential Treatments at Rural Curves in Doña Ana County

Location Details	Potential Treatments						Crash Data	
Location Name	Curve Warning Sign	Curve Warning Beacon	Oversized Chevron Sign	Speed Limit Sign	Centerline Rumble Strip	Shoulder Rumble Strip	Number of KSI Crashes	Number of Injury Crashes
NM 28 at San Jose Rd		X	X		X	X	2	6
NM 28 and North Vinton Rd	X	X	X	X	X	X	1	11
NM 185 500-feet south of Martinez Arena Radium Springs		X	X		X	X	1	4
NM 28 between Rusty Spur Ln and E Sloan Rd		X	X	X	X	X	1	1
Dripping Springs Rd west of Aggie Rodeo Dr	X	X	X	X	X	X	0	6
NM 185/Hall St east of Foster St	X	X	X	X	X	X	0	3
NM 185/Valley Dr at 16909 N Valley Dr		X	X	X	X	X	0	1
Shalem Colony Trl (D052) 600 feet south of Canary Ct		X	X	X	X	X	0	1

Location Details	Potential Treatments						Crash Data	
Location Name	Curve Warning Sign	Curve Warning Beacon	Oversized Chevron Sign	Speed Limit Sign	Centerline Rumble Strip	Shoulder Rumble Strip	Number of KSI Crashes	Number of Injury Crashes
Shalem Colony Trl (D052) north of Simpson Farm Rd	X	X	X	X	X	X	0	1
Thorpe Rd (NM 320) east of Dona Ana Rd		X	X	X	X	X	0	1
Shalem Colony Trl (D052) north of Valley Verde Ct	X	X	X	X	X	X	0	1
NM 192 west of Sequoia Rd	X	X	X	X	X	X	0	1
NM 28 and Haase Rd	X	X	X	X	X	X	0	1
NM 273 and Borderland Rd	X	X	X	X	X	X	0	1
Herrera Rd and Country Rd E027	X	X	X	X	X	X	0	0
NM 185/Hall St east of Polvadera Rd	X	X	X	X	X	X	0	0
NM 185/Valley Dr/Hall St		X	X		X	X	0	0

Location Details	Potential Treatments						Crash Data	
Location Name	Curve Warning Sign	Curve Warning Beacon	Oversized Chevron Sign	Speed Limit Sign	Centerline Rumble Strip	Shoulder Rumble Strip	Number of KSI Crashes	Number of Injury Crashes
NM 185 1 mile north of Martinez Arena Radium Springs		X	X		X	X	0	0
Shalem Colony Trl (D052) at Fletcher Farms		X	X	X	X	X	0	0
Shalem Colony Trl (D052) at Old Picacho Rd		X	X	X	X	X	0	0
Taylor Rd east of El Camino Real Rd		X	X	X	X	X	0	0
Dripping Springs east of Sonoma Ranch Blvd	X	X	X		X	X	0	0
NM 228 between 3 Sons Rd and Stern Dr	X	X	X	X	X	X	0	0
NM 28 north of Berino Rd		X	X		X	X	0	0
NM 28 and Westside Rd		X	X	X	X	X	0	0

APPENDIX G

SAFETY EDUCATIONAL MATERIALS


COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN
WHEN YOU SPEED
YOU PUT
GRANDMA AT RISK
SPEEDING REDUCES THE TIME IT TAKES TO SAFELY BRAKE FOR PEDESTRIANS, AND INCREASES THE LIKELIHOOD OF A FATAL COLLISION. KEEP OUR GRANDMAS SAFE BY DRIVING SLOWER TODAY.


WHEN YOU
SPEED
WE'LL BE
WATCHING
COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN
SPEEDING ISN'T JUST ILLEGAL, IT'S DANGEROUS. DRIVING TOO FAST MAKES YOU MORE LIKELY TO HIT ANOTHER CAR OR PEDESTRIAN, GIVES YOU LESS CONTROL WHILE DRIVING, AND INCREASES THE SEVERITY OF ANY RESULTING COLLISION.


COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN
JUST 5 SECONDS
OF DISTRACTED DRIVING
CAN COST YOU
A LIFETIME
ALWAYS KEEP YOUR EYES ON THE ROAD. NEVER TEXT AND DRIVE.


JUST 5 SECONDS
OF DISTRACTED DRIVING
CAN COST YOU A LIFETIME
COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN
ALWAYS KEEP YOUR EYES ON THE ROAD. NEVER TEXT AND DRIVE.





COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN

DON'T LET YOUR ROAD RAGE GO VIRAL

AGRESSIVE DRIVING AND ROAD RAGE ISN'T JUST EMBARRASSING, IT'S ALSO ILLEGAL. A FREAKOUT BEHIND THE WHEEL WON'T JUST MAKE YOU INTERNET FAMOUS, IT CAN ALSO PUT YOU IN JAIL.


COMPREHENSIVE ROADWAY
SAFETY ACTION PLAN
DON'T BE
THAT GUY
AGRESSIVE DRIVING AND ROAD RAGE PUTS EVERYONE
ON THE ROAD AT RISK, AND CAN PUT YOU IN JAIL.



PEDESTRIAN SAFETY

Distracted driving puts pedestrians at risk and could result in a deadly collision. Always keep your eyes on the road, and never text and drive.



AGGRESSIVE DRIVING

Aggressive driving and road rage puts everyone on the road at risk, and can put you in jail.



BICYCLE SAFETY

Being aware and considerate of cyclists on the road ensures the safety of all roadway users.



SPEEDING

Speeding isn't just illegal, it's dangerous. Driving too fast makes you more likely to hit another car or pedestrian, gives you less control while driving, and increases the severity of any resulting collision.

WHAT IS THE SAFETY ACTION PLAN?

The Dona Ana Safety Action Plan:

- Is a **roadmap** to identify critical investments, policies, and strategies to improve safety in the County;
- Is aimed at **reducing and eliminating fatal and serious-injury crashes;**
- Uses **data analysis and public engagement** to characterize roadway safety problems and identify most significant risks;
- **Evaluates conditions and needs** along major roads in Doña Ana County;
- **Provides recommendations** for infrastructure improvements and County programs that address safety;
- **Creates a qualifying plan** for Doña Ana County and smaller incorporated jurisdictions for SS4A Implementation grants.

DOÑA ANA COUNTY

DOÑA ANA COUNTY SAFETY ACTION PLAN

LEARN MORE ABOUT THE SAFETY ACTION PLAN



DOÑA ANA COUNTY SAFETY ACTION PLAN (SAP)

Doña Ana County developed a Safety Action Plan (SAP) to reduce crashes on local roads and highways. The SAP analyzed years of crash data, gathered feedback through an online interactive map and in-person community events, listened to stakeholders, and drove the streets with traffic engineers and transportation planners to identify and observe safety issues. As a result of this effort, maps were developed to show the high injury and high risk roads and recommendations were made on how to respond to crash risks and prioritize resources.

IMPROVING INFRASTRUCTURE

A sustainable way to address the identified safety issues is through changes to the roadway design in ways that create safer speeds and more alert drivers and expand transportation options.

For more details on how the SAP process identified infrastructure investments to improve safety, see the back flap. Projects won't happen all at once; recommendations will be implemented as funding becomes available.

Transforming roads takes time, money, and usually means construction. While these changes may cause delays and inconvenience, they'll make our roads safer, leading to fewer crashes and lives saved.

BECOME A PART OF THE SOLUTION

Infrastructure improvements can only get us so far. The choices you make while you drive, bike, or walk can also make a difference. Crash analysis and outreach completed during the SAP indicates that Dona Ana County residents are most concerned about these safety issues:

- Aggressive Driving
- Pedestrian Safety
- Speeding
- Bicycle Needs

Additional resources about these issues are available. Visi the DACSAP website or request them at DACSAP email. **Remember, we all just want to arrive safely at our destination.**

APPENDIX H

SAFETY COUNTERMEASURES TOOLKIT

Doña Ana County

SAFETY COUNTERMEASURES TOOLKIT



FEBRUARY 2025

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INTRODUCTION

PURPOSE OF SAFETY COUNTERMEASURES TOOLKIT

The Safety Countermeasures Toolkit outlines a series of techniques and design treatments aimed at mitigating road safety issues and preventing severe and fatal crashes in different contexts across Doña Ana County. The Toolkit supports the strategies and recommendations of the Safety Action Plan, though the Toolkit may also be used by partner agencies in the development of roadway safety improvement projects. In particular, the Toolkit provides evidence-based solutions for a particular road safety problem, risk, type of street and/or type of crash. These solutions can include infrastructure upgrades, traffic calming measures, better signage or modifications to signals.

SAFETY COUNTERMEASURES

The Toolkit is comprised of 29 countermeasures listed under six categories that are specifically intended to reduce likelihood or severity of crashes. It is important to note the countermeasures are organized around the primary applications and benefits, though some techniques cut across multiple categories.

The Toolkit also offers guidance on cost-effectiveness, appropriateness for different contexts, and anticipated safety benefits, including reducing speeds and separating roadway users in space and time.

I. INTERSECTIONS AND CROSSINGS

1. Corner Redesign
2. Crosswalk Visibility Enhancements
3. Enhanced Crossings
4. Convert Minor Road Stop Control to All-Way Stop Control
5. Roundabouts

II. CORRIDORS AND TRAVEL LANES

6. Medians
7. Narrow Travel Lanes
8. Road Diet
9. Guardrail
10. Multi-Use Trail

III. SPEED MANAGEMENT

11. Horizontal and Vertical Deflections
12. Context-Sensitive Speed Limits
13. Dynamic Speed Limit Signs
14. Automated Speed Enforcement
15. Roadside Design Improvements at Curves
16. Speed Signage and Markings
17. Optical Speed Bars

IV. SIGNS AND SIGNALS

18. Signage Improvements at Curves
19. Signal Phasing Improvements
20. Stop Control Visibility
21. Gateway Treatments at Transition Zones
22. Dead-End Sign Assembly

V. ROAD SURFACE TREATMENTS

23. Wider Edge Lines
24. Rumble Strips
25. Pavement Friction
26. Enhanced Shoulders
27. SafetyEdge^{SM}

VI. VISIBILITY

28. Lighting
29. High Visibility Pavement Markings
30. Retroreflective Traffic Signal Backplates

HOW TO USE THE TOOLKIT

The Toolkit indicates the purpose and provides a description for each countermeasure, outlines safety benefits, identifies applicable street types and contexts, lists consideration for implementation, identifies target crash types and primary user groups, summarizes expected crash reduction, lists the range of cost and expected life span, and references where more information about the countermeasure can be found. The Toolkit is organized under the following structure:

[COUNTERMEASURE]

Purpose

Indicates the countermeasure's main safety objective.

Description

Provides a brief depiction of the measure or measures.

Safety Benefits

Lists all the safety benefits that the implementation of the countermeasure could provide.

Street Types and Context

Lists all the applicable street types for the countermeasure and provides guidance on which context they should be implemented.

Considerations for Implementation

Suggests situations, actions, and elements that should be weighed or added when implementing the countermeasure.

Target Crash Types

Identifies crash types the countermeasure relates to, including:

- Speeding-related – Occurs when a driver is traveling above the posted speed limit or too fast for the particular road and/or vehicle conditions.
- Head-on – Occurs when two drivers traveling in opposite directions crash front to front.
- Rear end – Occurs when one driver crashes with the back of another vehicle.
- Intersection-related – Occurs at or near an intersection, often involving drivers turning, failing to yield, or running through red lights.
- Side impact – Occurs when a driver crashes into the side of another vehicle.
- Roadway or lane departure – Occurs when a driver swerves out of the travel lane and crashes with an object, another vehicle, or leaves the roadway.
- Lighting conditions-related – Occurs when the weather or lighting conditions affect the visibility of road, leading to a crash.
- Pedestrian-related and/or bicyclist-related – Occurs when there is a pedestrian or a bicyclist involved in a crash.

Primary User Groups

Refers to the main road users that the countermeasure will be assisting. The users are represented in the Toolkit by icons.



Pedestrians



Bicyclists / Scooters



Cars and sport utility vehicles (SUVS)



Motorcyles



Freight vehicles

Expected Crash Reduction

Refers to the anticipated decrease in the number of crashes resulting from the implementation of the countermeasure. This number is based on research, historical data, and analysis of past interventions. The Toolkit primarily refers to Crash Modification Factors (CMF) used by the Federal Highway Administration (FHWA) to provide a quantitative measure of the expected safety impact of a specific countermeasure. CMFs are often derived from specific contexts and may not be transferable to all locations or conditions.

Cost

Indicates the magnitude of cost for the countermeasure's implementation, taking into account the regular need for maintenance. The cost is represented as a graphic scale from low to high by shading the icons to indicate where the countermeasure falls within the scale. If more than one icon is shaded it means that the cost falls within a range depending on factors such as number of elements and frequency of maintenance.



Expected Life Span

Provides a range of years for the utility of the countermeasure before needing to be updated or requiring major maintenance.

References

These include federal publications and manuals, research papers, and national design guidelines. Links to the relevant documents are included in each countermeasure section in case there is a need for more information and deeper understanding of the safety treatment.


Hall St
Franklin St
BREWERY
DRUG
26

I. INTERSECTIONS AND CROSSINGS

Intersections and pedestrian crossings are critical points in road safety as conflicts between different road users – including motorists, bicyclists, and pedestrians – are most frequent due to the number of movements, interactions, and decision points in the area.

Countermeasures under this category focus on infrastructure redesign, sign additions, and signal modifications/implementations. The application of these countermeasures can improve the readability of vehicle movements and right-of-way, visibility, and speed management, and help provide safe, clear, and accessible paths.

The following countermeasures present a range of effort, cost, and impacts that can be applied to different intersection and crossing contexts, from small town intersections to rural highways. Whether retrofitting existing infrastructure or designing new intersections, these countermeasures help ensure that roads are safer, more efficient, and equitable for all users.

1. CORNER REDESIGN

Redesigning the corners shortens the crossing distance for people walking, reduces turning speeds, and improves sight distance between drivers and people crossing.

2. CROSSWALK VISIBILITY ENHANCEMENTS

Enhancing crosswalks improves visibility of people in crosswalks for approaching drivers and indicates preferred crossing locations for pedestrians.

3. ENHANCED CROSSINGS

Enhancing crossings increases driver yielding to pedestrians and bicyclists at uncontrolled crossings and improves access to key destinations.

4. CONVERT MINOR WAY STOP CONTROL TO ALL WAY STOP CONTROL

Converting the intersections organizes right of way at intersections and reduces conflicts.

5. ROUNDABOUTS

Implementing roundabouts reduces vehicle speeds and conflicts associated with left turns at intersections.

1. CORNER REDESIGN

PURPOSE

Shorten the crossing distance for people walking, reduce turning speeds, and improve sight distance between drivers and people crossing.

DESCRIPTION

Treatments that narrow the intersection and reduce the radii of corners all contribute to tightening the intersection.

Curb extensions extend the sidewalk into the roadway at intersections.

Corner wedges use pre-cast curbs or flexible delineators and pavement markings on both sides of a crosswalk at an intersection to achieve a similar effect.

When these options are not possible, **reducing corner radii** helps tighten the intersection slightly and is effective to reduce turning speeds.

SAFETY BENEFITS

- Reduce vehicle speeds through visual narrowing and sharper turns
- Shorten pedestrian crossing distances
- Increase pedestrian waiting areas at corners
- Improve sight distances and visibility

STREET TYPES AND CONTEXT

Applicable Street Types

Arterials, major and minor collector roads, and urban and rural local roads

Location Guidance

Curb extensions are appropriate at intersections and can also be installed mid-block to reduce crossing distance and traveling speed. They are usually implemented in developed/higher density areas.

CONSIDERATIONS FOR IMPLEMENTATION

- Consider the turning needs of design vehicles. Corner radii should be as small as practicable, considering the effective radius of the turning vehicles.
- Road diets, daylighting efforts, and road functional class changes all present opportunities to tighten intersections.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian-related crashes
- Speeding-related crashes



EXPECTED CRASH REDUCTION

A crash reduction factor has not yet been associated with curb extensions and turn wedges, though research indicates a reduction in crash severity associated with tighter corner radii.

COST

Treatments that narrow the intersection and reduce the radii of corners all contribute to tightening the intersection.



EXPECTED LIFE SPAN

10-20 years

REFERENCES

- FHWA Traffic Calming ePrimer, Module 3, Part 2 https://mutcd.fhwa.dot.gov/
- http://www.pedbikesafe.org/PEDSAFE/



Curb Extension (Source: Toole Design)



Corner Wedges (Source: Toole Design)



Reduced corner radii (Source: Toole Design)

2. CROSSWALK VISIBILITY ENHANCEMENTS

PURPOSE

Improve visibility of people in crosswalks for approaching drivers and indicate preferred crossing locations for pedestrians.

DESCRIPTION

Multiple methods can be used to increase the visibility of crosswalks. **High-visibility crosswalk markings** (e.g. continental or ladder patterns) are more visible to all road users from father away compared to transverse line crosswalks. Reflective and durable materials such as thermoplastic tape should be used.

In-street signing (R1-6) can be added to enhance typical **crossing signs** (W11-2, W16-7P).

SAFETY BENEFITS

- Increase predictability of pedestrian crossing locations for drivers
- Increase visibility of crossing locations for drivers

STREET TYPES AND CONTEXT

Applicable Street Types

Arterials and major and minor collectors

Location Guidance

Follow the Manual on Uniform Traffic Control Devices (MUTCD) guidance for placement of all signs and markings. In-street signs are appropriate on streets with a speed limit of 30 miles per hour or less and 2-3 lanes.

CONSIDERATIONS FOR IMPLEMENTATION

- In-street signs are most appropriate at mid-block locations.
- Typical signs and marking are appropriate both mid-block and at intersections, particularly where the volume of pedestrians is high.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian-involved crashes



EXPECTED CRASH REDUCTION

40% reduction in pedestrian injury crashes when implementing high-visibility crosswalks | CMF ID 4123.

42% reduction in pedestrian crashes when implementing advance yield or stop markings and signs | CMF ID 9017.

COST

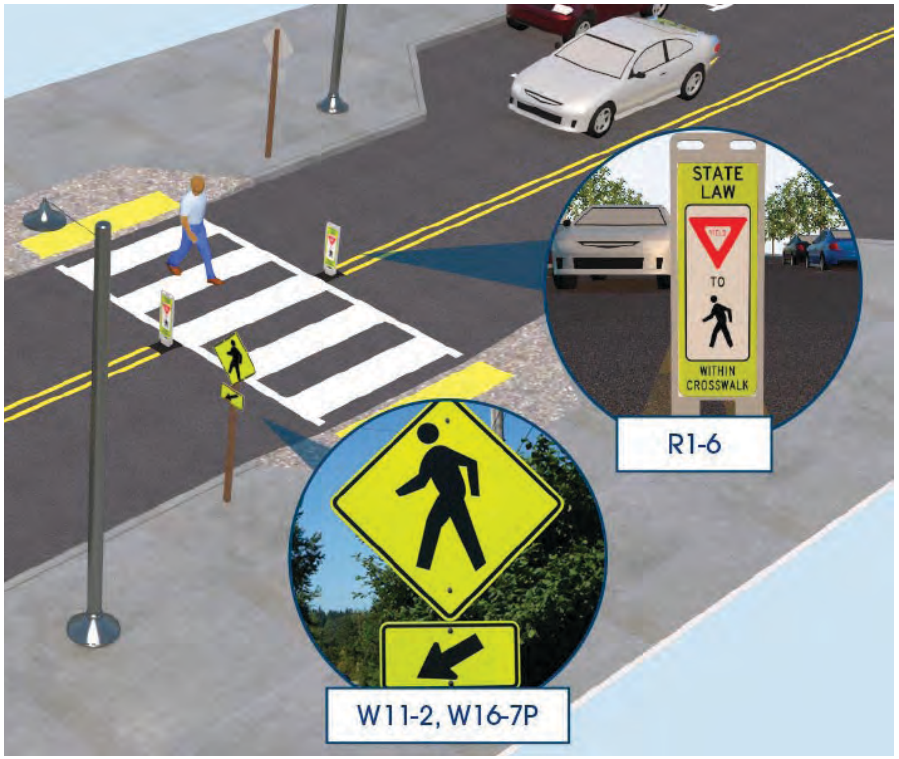
$ $$ $$$ $$$$

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- Manual of Uniform Traffic Control Devices
- http://www.pedbikesafe.org/PEDSAFE/



High-visibility crosswalk on roadside and in-street signs (Source: FHWA)

3. ENHANCED CROSSINGS

PURPOSE

Increase driver yielding to pedestrians and bicyclists at uncontrolled crossings and improve access to key destinations.

DESCRIPTION

Enhanced crossings include **rectangular rapid flashing beacons (RRFBs)** and **pedestrian hybrid beacons (PHBs)**. RRFBs are irregularly flashing LEDs mounted with pedestrian crossing signs at uncontrolled crossings. PHBs are mast arm-mounted beacons that, when activated, turn yellow and then red to give people walking, rolling, and biking the right of way. RRFBs can be solar powered or hard-wired to the electricity grid while PHBs can only be hard-wired. Both are controlled by a user-activated pushbutton or by a passive detection system that alerts drivers that a person is trying to cross.

Enhanced crossings are typically accompanied by high-visibility crosswalk pavement markings, and can be further enhanced with **advance stop bars or yield markings** placed 20-50 feet in advance of a marked crosswalk.

Additional features that enhance crossings include **pedestrian refuge islands**, which allow people to cross one direction of traffic at a time and stop in the median space.

SAFETY BENEFITS

- Increase driver yielding
- Provide safer opportunities for people to cross busy roads
- Increase pedestrian/bicycle visibility
- Reduce the risk of multiple-threat crashes at crossings on multi-lane road

STREET TYPES AND CONTEXT

Applicable Street Types

RRFBs: Arterials and collectors with modest posted speed (35 mph or lower) and traffic volumes.

PHBs: Highways and arterials acting as village or town main streets.

Advance stop/yield markings and pedestrian refuge islands: All street types where a crossing exists.

Location Guidance

These measures are commonly placed at midblock locations. They are most applicable where there is demand for crossing (e.g., important destinations on either side of the road, at a trail crossing, etc.). PHBs can be placed where a warrant for traffic signals is not met.

PHBs can be implemented at locations with high vehicle speeds or in roads with multiple lanes where it is challenging for pedestrians to cross safely. These crossings are also applicable when multi-use trails intersect with streets, especially at points with high pedestrian or bicyclist flows.

CONSIDERATIONS FOR IMPLEMENTATION

- PHBs are not common in southern New Mexico; consider outreach efforts when implementing PHBs to educate drivers, pedestrians, and bicyclists.
- Other treatments like advance warning signs, refuge islands, or rectangular rapid flashing beacons may be more appropriate in locations with sight distance constraints.
- In more densely populated areas (e.g. town centers), safe crossing opportunities, including enhanced crossings and controlled intersections, should be provided close together (i.e., as frequently as every 200 feet).

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian-related crashes
- Bicyclist-related crashes, particularly at trail crossings



EXPECTED CRASH REDUCTION

RRFBs: 47% reduction in pedestrian crashes | CMF ID 9024.

PHBs: 55% reduction in pedestrian crashes | CMF ID 9020.

Advance stop lines: 25% reduction in vehicle/pedestrian crashes | CMF ID 9017.

Pedestrian refuge islands: 32% reduction in pedestrian crashes | CMF ID 8799.

COST

Costs are higher for PHBs compared to RRFBs and vary by site complexity. Advance stop lines are inexpensive and pedestrian refuge island cost can be low if temporary materials are used, or higher for permanent installations.



EXPECTED LIFE SPAN

20 years for permanent pedestrian refuge island; 10 years for all others

REFERENCES

- FHWA Proven Safety Countermeasures
- Manual of Uniform Traffic Control Devices
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations
- National Cooperative Highway Research Program (NCHRP) 562 & Transit Cooperative Research Program (TCRP) 112: Improving Pedestrian Safety at Unsignalized Intersections
- http://www.pedbikesafe.org/PEDSAFE/



Pedestrian Hybrid Beacons (PHB) (Source: City of San Luis Obispo)



Rectangular rapid flashing beacons (RRFBs) and Pedestrian Refuge Island (Source: Toole Design)

4. CONVERT MINOR ROAD STOP CONTROL TO ALL-WAY STOP CONTROL

PURPOSE

Organize right of way at intersections and reduce conflicts between drivers.

DESCRIPTION

Converting a minor road stop control to an all-way stop control involves changing an intersection where only the minor road is stopped to one where drivers from all approaching directions must stop. The measure includes installing stop signs on all approaches and adding pavement markings and warning signs where necessary.

SAFETY BENEFITS

- Reduce side-impact crashes
- Improve pedestrian safety

STREET TYPES AND CONTEXT

Applicable Street Types

Local rural and urban streets

Location Guidance

The control conversion can be applied on roads near schools, parks, or commercial areas or with overall high pedestrian volumes. Intersections with irregular designs can also benefit from an all-way stop control.

CONSIDERATIONS FOR IMPLEMENTATION

- Follow MUTCD guidance for implementation guidelines.
- An all-way stop-controlled intersection can increase delays for some users at intersections.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Side-impact crashes
- Pedestrian and cyclist related crashes



EXPECTED CRASH REDUCTION

54% reduction in overall crashes | CMF ID 10524.

COST

$ $$ $$$ $$$$

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- Manual of Uniform Traffic Control Devices



All way stop intersection (Source: Tim Fischer Midland Reporter-Telegram)

5. ROUNDABOUTS

PURPOSE

Reduce drivers' speeds and conflicts associated with left turns at intersections.

DESCRIPTION

A roundabout is a form of intersection with a circular design that helps traffic flow smoothly. Drivers entering the roundabout must yield to traffic already inside.

SAFETY BENEFITS

- Reduce vehicle speeds
- Reduce points of conflict
- Improve safety for pedestrians crossing

STREET TYPES AND CONTEXT

Applicable Street Types

Arterial, collector, and urban and residential local streets

Location Guidance

Roundabouts can replace intersections controlled by signals, two-way stops, or all way stops in both urban and rural settings. They can also be used at transitions from high-speed environments to low-speed roads.

CONSIDERATIONS FOR IMPLEMENTATION

- Implementation of roundabouts at existing intersections may require additional right-of-way.
- Pedestrian crosswalks should be pulled back from the intersection for a safer crossing.
- Destination signage should accompany the entry and exit points.
- Curb radii design should accommodate all vehicles.
- Design should be accompanied by splitter islands or markings at the entry to the roundabout to clarify movements.
- Roundabouts are not intuitive for pedestrians with a visual impairment. This can be addressed through alternative crosswalk placement, sound treatments, or other technologies to alert visually impaired pedestrians when it is safe to cross.
- Roundabouts can feel risky for bicyclists. Where possible provide them with the option to share the lane with drivers or share the sidewalk with pedestrians.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Side-impact crashes
- Pedestrian-related crashes



EXPECTED CRASH REDUCTION

68% reduction in crashes | CMF ID 4697. When converting a high-speed rural intersection (4-leg) to roundabout.

36% reduction in crashes from conversion of stop and signal-controlled intersections into roundabouts | CMF 10084.

COST

$ $$ $$$ $$$$

The cost depends on the type of reconfiguration, construction, and drainage.

EXPECTED LIFE SPAN

20-30 years, depending on the materials

REFERENCES

- NCHRP Roundabouts: An Informational Guide
- FHWA Roundabouts with Pedestrians and Bicycles
- http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=25
- FHWA Proven Safety Countermeasures



Roundabout City of Carmel, Indiana (Source: Curbed)



The configuration of a roadway and the design of travel lanes plays a crucial role in determining safety, traffic flow, and the user experience. Poorly designed or wide travel lanes can promote higher vehicle speeds, contribute to uncertainty of movements, and increase the risk of crashes. Conversely, optimized travel lane design can enhance safety by encouraging appropriate speeds, reducing the likelihood of conflicts, and providing sufficient space for different road users.

Countermeasures focused on travel lanes and the configuration of the roadway aim to improve safety and efficiency by recalibrating lane widths, reconfiguring lane layouts, and implementing medians and other measures that guide drivers effectively. By ensuring that travel lanes are designed with all users in mind, this group of countermeasures help create safer, more balanced roadways that reduce crash risks.

6. MEDIANS

Medians organize opposing traffic and/or road users, determine access points, manage U-turns, and provide refuge for pedestrians crossing.

7. NARROW TRAVEL LANES

Narrowing the lanes encourages drivers to reduce their speed.

8. ROAD DIET

Incorporating road diets reduces traffic speeds, organizes maneuvers, shortens pedestrian crossings, and/or reallocates space to other road users.

9. GUARDRAIL

Incorporating guardrails prevents vehicles from leaving the roadway and colliding with objects or natural features.

10. MULTI-USE TRAIL

Promote the safe interaction of pedestrians, bicyclists, and other non-motorized users between them and motorized vehicle users.

6. MEDIANS

PURPOSE

Organize opposing traffic and/or road users, determine access points, manage U-turns, and provide refuge for pedestrians crossing.

DESCRIPTION

Medians are longitudinal barriers that divide opposing traffic; they can be at road level or raised. Medians can visually break up long stretches of road and provide a sense of narrower lanes, encouraging slower driving. There are various measures that can separate opposing lanes.

A **hardened centerline** is a raised or textured strip running at the center of the road.

A **median barrier** is vertical physical structure designed to redirect vehicles that strike it from either side. Barriers can be cabled, metal-beamed, or concrete.

SAFETY BENEFITS

- Reduce vehicle speeds when turning
- Reduce the impact force and redirect vehicles that bump into the median
- Reduce head-on crashes and/or lane departures
- Reduce pedestrian crash rates on multi-lane intersections and mid-block locations where there is a median refuge

STREET TYPES AND CONTEXT

Applicable Street Types

Urban and rural highways, arterial roads, and collectors

Location Guidance

Medians are usually implemented on roads with high traffic volumes, higher speeds, and areas with a history of head-on collisions or left-turn crashes. They are also effective in urban and suburban areas that can benefit from better access management and organization of traffic flows and pedestrian crossings.

CONSIDERATIONS FOR IMPLEMENTATION

- Consider access and flow management (i.e. turning movements and driveways access).
- Consider road width and accessibility for emergency vehicles.
- Consider accessibility and road legibility for pedestrians at intersections.
- Medians can be complemented by landscaping and lighting to make roads safer and more enjoyable.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Lane departure crashes
- Side impact crashes



EXPECTED CRASH REDUCTION

97% reduction in cross-median crashes on rural four-lane highways where median barriers were implemented | CMF ID 7040 and **8%** reduction in all fatalities due to head-on crashes (Fatality Analysis Reporting System).

39% reduction in all crashes where a raised median was implemented | CMF ID 3034.

COST



EXPECTED LIFE SPAN

10-40 years depending on measure, the material, environmental conditions, and maintenance

REFERENCES

- FHWA Proven Safety Countermeasures
- Hardened Centerlines and Turn Wedges – Official Website of Arlington County Virginia Government (arlingtonva.us)



Raised Median (Source: UTAH DOT)

7. NARROW TRAVEL LANES

PURPOSE

Encourage drivers to reduce their speed.

DESCRIPTION

Reducing the width of travel lanes makes drivers feel more constrained, causing them to slow down and drive more cautiously. This can be achieved through paint or by implementing vertical elements. By narrowing lanes, additional space can be created for other measures that accommodate other road users or infrastructure needs.

SAFETY BENEFITS

- Reduce drivers' speeds
- Reduce severity of crashes
- Reduce crossing exposure for pedestrians at intersections
- Allocate space for other road users

STREET TYPES AND CONTEXT

Applicable Street Types

Urban and rural collector, and local streets

Location Guidance

Narrow lanes are appropriate on roads with lanes that are too wide, or on roads with lower posted speed limits and on multi-lane roads with less traffic flow. Narrower lanes are an important strategy in areas with a high volume of pedestrians and bicyclists.

CONSIDERATIONS FOR IMPLEMENTATION

- Lanes narrower than 11 feet are not recommended for streets with regular transit service and/or high volumes of truck freight.
- Lane widths must align with local ordinances or regulations.
- Narrower lanes can be implemented as part of regular resurfacing and restriping.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes
- Pedestrian and cyclist related crashes



EXPECTED CRASH REDUCTION

42% reduction in all crashes when converting 12ft lanes to 10ft | CMF ID 7827.

24% reduction in all crashes when converting 12ft lanes to 11ft | CMF ID 7825.

COST

$ $$ $$$ $$$$

The cost of the countermeasure varies depending on the approach taken for the narrowing (paint, implementation of median or sidewalk extension).

EXPECTED LIFE SPAN

5-20 years depending on if the approach pertains to road markings or rigid elements such as medians and/or curbs

REFERENCES

- FHWA Countermeasures
- NACTO Urban Street Design Guide
- SRTS Guide



Traffic Calming on Main Roads through Rural Communities (Source: FHWA)

8. ROAD DIET

PURPOSE

Reduce traffic speeds, organize maneuvers, shorten pedestrian crossings, and/or reallocate space to other road users.

DESCRIPTION

A road diet entails narrowing or removing one or more travel lanes from a road to make the section more compact and/or multimodal. The reconfiguration aims to have a road that is easier to navigate and that safely accommodates flows and more road users.

SAFETY BENEFITS

- Reduce drivers' speeds
- Reduce conflict points and crashes derived from them
- Reduce crossing exposure for pedestrians at intersections

STREET TYPES AND CONTEXT

Applicable Street Types

Arterial, collector and main streets

Location Guidance

Road diets can be applied to multi-lane roads where there is excess roadway capacity and where there is a demand for pedestrian and bicyclist infrastructure. Road diets can also be located on roads that might benefit from dedicated left-turn lanes.

CONSIDERATIONS FOR IMPLEMENTATION

- Accepted thresholds to determine how travel may be affected on the road and along parallel alternatives routes.
- NMDOT recommends road diets primarily for roads with four general purpose lanes and an average daily traffic of 10,000.
- Ensure that public transportation can still be accommodated.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Rear end crashes
- Intersection-related crashes



EXPECTED CRASH REDUCTION

37% reduction in all crash types when converting a 4-lane undivided road to 2-lanes plus a turning lane | CMF ID 11231.

47% reduction in all crash types when converting a 4-lane road to 3 lanes plus a center turn lane | CMF ID 2841.

COST

$ $$ $$$ $$$$

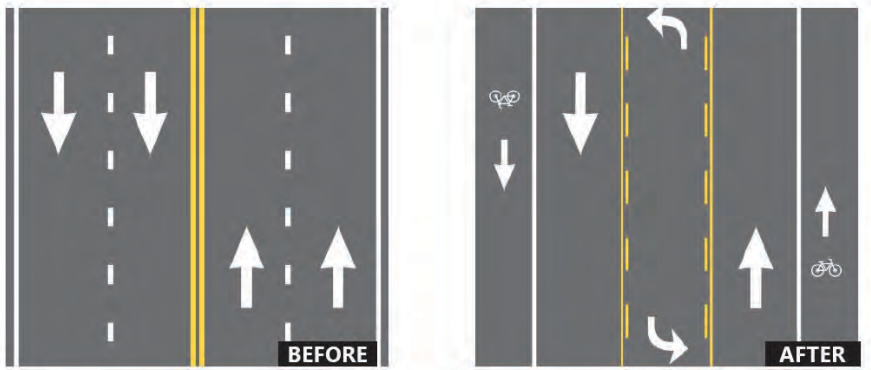
Costs vary depending on the approach taken and the length of the section.

EXPECTED LIFE SPAN

Up to 20 years, depending on the approach

REFERENCES

- FHWA Road Diet Desk Reference
- FHWA Proven Safety Countermeasures
- Pedestrian Safety Guide and Countermeasure Selection System
- NMDOT Design Manual 1250 Road Diet Guide



Road diet diagram (Source: FHWA)

9. GUARDRAILS

PURPOSE

Prevent vehicles from leaving the roadway and colliding with objects or natural features.

DESCRIPTION

A guardrail is a safety barrier that is placed along roadways to guide traffic and prevent vehicles from leaving the lane. Guardrails can be made of steel, wood, or concrete and are designed to absorb the impact of a vehicle if it happens to collide with it.

SAFETY BENEFITS

- Prevent roadway departures
- Minimize crash severity
- Protect vulnerable road users
- Enhance driver guidance

STREET TYPES AND CONTEXT

Applicable Street Types

Highways, freeways, arterials, and rural roads

Location Guidance

Guardrails are commonly placed along sharp curves, roadside areas without shoulders or recovery spaces, bridges and embankments with drop-offs. They should be installed in high-risk areas where vehicles are likely to depart from the roadway.

CONSIDERATIONS FOR IMPLEMENTATION

- Placement should be informed by high-speed and/or high-volume roads.
- Placement should prioritize locations with frequent roadway departures.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes



EXPECTED CRASH REDUCTION

8% reduction in all crash types when installing a w-beam guardrail or concrete barrier in principal arterials or freeways | CMF ID 8365.

24% reduction in all crash types when installing a guardrail at a bridge | CMF ID 557.

COST

$ $$ $$$ $$$$

Costs vary depending on the material selection and the length of the guardrail.

EXPECTED LIFE SPAN

20-30 years

REFERENCES

- FHWA Proven Safety Countermeasures
- The Handbook of Road Safety Measures



Guardrail on bridge (Source: Short Span Steel Bridge Alliance)

10. MULTI-USE TRAIL

PURPOSE

Promote the safe travel of pedestrians, bicyclists, and other non-motorized users by creating dedicated facilities that are separate from motorized vehicle users.

DESCRIPTION

A multi-use trail is a dedicated, shared pathway that accommodates non-motorized users, providing continuous and accessible routes. Multi-use trails, also referred to as sidepaths when located adjacent to a roadway, are separated from motor vehicle traffic through spatial and/or vertical barriers.

- High-visibility crosswalks
- Advance warning signs
- Trail user priority signage
- Crossing signals
- Curb extensions and/or refuge islands
- Traffic calming approaching the intersection
- Lighting and clear sightlines

SAFETY BENEFITS

- Minimize conflicts between users
- Protect vulnerable road users

STREET TYPES AND CONTEXT

Applicable Street Types

Arterials, collectors, and rural highways

Location Guidance

Safety countermeasures should be placed both along the trail and at intersections. On the trail, proper signage, pavement markings, and lighting should be installed at entry points, along curves, and at steep grades. At intersections, advance warning signs and high-visibility crosswalks can alert both drivers and users about crossing points.

CONSIDERATIONS FOR IMPLEMENTATION

- Trail design should comply with ADA standards, incorporating tactile warning strips and accessible crossing features.
- Design should incorporate comfort elements such as lighting, smooth pavement surfaces, shade, and water stations.
- The traffic conditions related to speed, volume, and frequency of vehicles should inform the type of trail crossing treatment.
- Amenities such as landscaping and drinking fountains can increase the usability of trails.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian-related and/or bicyclist-related



EXPECTED CRASH REDUCTION

A crash reduction factor has not yet been associated with multi-use trails.

59% reduction in all crash resulting in injuries when installing cycle tracks, bike lanes, or on-street cycling | CMF ID 4102.

COST



Costs vary depending on the material selection and the types of amenities included along the trail.

EXPECTED LIFE SPAN

7-10 years

REFERENCES

- FHWA Evaluation of Safety, Design and Operation of Shared-Use Paths
- Albuquerque Bikeways & Trails System Vision, Goals, and Policies



Sidepath along NM 404, Anthony, NM (Source: Toole Design)



Rural Sidepath, Kirtland, NM (Source: Toole Design)


YOUR SPEED
13
SPEED
LIMIT
30

Speed management is one of the most critical aspects of road safety, as excessive speeds significantly increase the likelihood and severity of crashes. The design and operation of a roadway has a direct influence on driver speeds; targeted speed management countermeasures can bring appropriate speeds that match the surrounding environment and road user needs.

The countermeasures under this category encompass a wide array of techniques, from physical interventions to regulatory measures. By introducing design elements that encourage drivers to slow down, and pairing these with appropriate signage, markings, and enforcement, roads become safer and traffic becomes more predictable. Slower speeds not only reduce the frequency of crashes but also mitigate the severity of collisions when they do occur, making streets safer for all road users.

11. HORIZONTAL AND VERTICAL DEFLECTIONS

Having deflections forces drivers to slow down and go at safer speeds.

12. CONTEXT SENSITIVE SPEED LIMITS

Adapting speed limits to their context reduces the risk of fatalities and serious injuries given the roadway type, users present, and the context.

13. DYNAMIC SPEED LIMIT SIGNS

Implementing dynamic speed limit signs helps communicate safe driving speeds to drivers given the current roadway conditions and provides feedback to adjust their speed.

14. AUTOMATED SPEED ENFORCEMENT

Implementing automated speed enforcement elements increase road safety and reduce serious injuries and fatalities caused by speeding.

15. ROADSIDE DESIGN IMPROVEMENTS AT CURVES

Improving roadside design at curves reduces drivers' speeds, enhances safety and visibility at curves, and prevents collisions.

16. SPEED SIGNAGE AND MARKINGS

Having speed signs and markings increases driver awareness of the posted speed limit.

17. OPTICAL SPEED BARS

Having optical speed bars encourages drivers to reduce their speed.

11. HORIZONTAL AND VERTICAL DEFLECTIONS

PURPOSE

Force drivers to slow down and go at safer speeds.

DESCRIPTION

Various traffic calming measures create **horizontal deflections** that guide drivers to make lateral movements.

Pinch points are created by adding curb extensions on opposite sides of a street, creating a yield condition between vehicles mid-block.

Chicanes are introduced by offsetting curb extensions mid-block, introducing a shift in the travel lane.

Traffic circles are small, roundabout-like features installed at unsignalized intersections.

Vertical deflections include **speed humps** and speed tables, which are both raised pavement areas. A speed hump has a dome shape while a speed table has a flat top to limit disturbances to larger vehicles. Large yield triangles are marked on the sloped areas of both vertical deflection types to provide a visual warning for users.

SAFETY BENEFITS

- Reduce drivers' speeds and create a calmer traffic environment
- May improve driver attention as they must navigate shifts in the travel lane
- May reduce the frequency and severity of crashes for all road users
- May improve driver yielding to other road users and provide a more comfortable environment for bicyclists and pedestrians due to reduced speeds

STREET TYPES AND CONTEXT

Applicable Street Types

Local streets

Location Guidance

Horizontal deflections should generally be avoided on truck routes and where there is more than one lane of travel in each direction. Traffic circles can replace stop-controlled intersections and can be useful for transitioning traffic from high to lower speeds.

Vertical deflections are best used on streets with lower vehicle speeds (25 mph and under) and volumes where traffic calming is needed, such as near pedestrian and bicycle activity generators (i.e., schools, parks, trail crossings). They should not be placed on sharp curves.

CONSIDERATIONS FOR IMPLEMENTATION

- Drainage may be an issue at pinch points and chicanes. Curb extensions can be built as islands with a 1–2-foot gap from the curb to facilitate drainage flows.
- The space created by horizontal deflection devices can be planted (e.g., inside traffic circle and extensions) to beautify neighborhoods.
- If the location where a vertical deflection is considered carries frequent emergency or heavy vehicles, speed cushions can be considered. This variation has wheel cutouts to allow large vehicles to pass through unaffected. However, this design may reduce the effectiveness of the countermeasure for other vehicles.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- *Speeding-related crashes*



EXPECTED CRASH REDUCTION

A definitive crash reduction estimate has not been established for speed humps and tables. Research suggests speed humps reduce crash severity | CMF ID 132.

A CMF has not been developed for horizontal deflections, but initial research indicates crashes may be reduced.

COST



EXPECTED LIFE SPAN

10-20 years

REFERENCES

- *NACTO Urban Street Design Guide*
- *FHWA Mini-Roundabouts Technical Summary*
- *https://pedbikesafe.org/PEDSAFE/*
- *ITE, A Guide to Vertical Deflection Speed Reduction Techniques*



Pinch points (Source: Toole Design)



Chicanes (Source: Toole Design)



Speed hump (Source: Toole Design)

12. CONTEXT SENSITIVE SPEED LIMITS

PURPOSE

Reduce the risk of fatalities and serious injuries given the roadway type, users present, and the context.

DESCRIPTION

Speed is a fundamental factor in determining the outcomes of a crash, particularly if vulnerable road users are present. Jurisdictions should set appropriate speed limits (which may be different than the statutory speed limit) to reduce the significant risk associated with crashes at higher speeds. The MUTCD no longer requires the 85th percentile speed and supports context sensitive speed limits. Several tools exist to aid in setting appropriate speed limits, including USLIMITS2, the NCHRP 966 report and the Safe System Approach.

SAFETY BENEFITS

- Reduced speed limits (appropriate to the context) can lead to measurable declines in speeds and crashes

STREET TYPES AND CONTEXT

Applicable Street Types

All street types

Location Guidance

Follow MUTCD guidance for placement of all speed limit signs and to conduct a compliant engineering study.

CONSIDERATIONS FOR IMPLEMENTATION

- Coordination with NMDOT is needed for any proposed speed limit reductions along US and NM highways.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian and cyclist-involved crashes
- Speeding-related crashes



EXPECTED CRASH REDUCTION

40% reduction in fatal and serious injury crashes on rural roads when setting the speed limit to 5 mph below the engineering study recommendation | CMF ID 10249.

COST

$ **$$** $$$ $$$$

EXPECTED LIFE SPAN

20 years

REFERENCES

- FHWA Proven Safety Countermeasures
- FHWA USLIMITS2
- NCHRP 966: Posted Speed Limit Setting Procedure and Tool
- FHWA Safe System Approach for Speed Management
- http://www.pedbikesafe.org/PEDSAFE/



School Zone Speed Limit (Source: Drivers Education USA)

13. DYNAMIC SPEED LIMIT SIGNS

PURPOSE

Communicate safe driving speeds to drivers given the current roadway conditions and provide feedback to adjust their speed.

DESCRIPTION

Variable speed limit signs use current information on the roadway conditions, like traffic speed, volumes, weather, and road surface conditions, to determine appropriate speed limits and display them to drivers in real-time using electronic signs.

Speed feedback indicator signs measure speed and display feedback to drivers going above the posted speed through a digital messaging sign. Numbers typically flash on the screen if the current driver's speed is faster than the speed limit.

SAFETY BENEFITS

- Modify the speed limit to reflect safe driving speeds for current conditions
- Increase driver awareness of the speed limit and of their own traveling speed

STREET TYPES AND CONTEXT

Applicable Street Types

Variable speed limit signs are appropriate on highways and high-speed arterials with posted speed limits over 40 mph.

Feedback signs are appropriate on all street types.

Location Guidance

Variable speed limit signs are particularly valuable where there is congestion, where there is a history of crashes, in work zones, and on road segments prone to inclement weather.

Speed feedback indicator signs should be placed where speeding issues have been identified.

CONSIDERATIONS FOR IMPLEMENTATION

- Variable speed limit signs can be implemented as a regulatory or an advisory system, whereas feedback signs are regulatory.
- Variable speed limit signs can be incorporated into existing Road Weather Information Systems and Active Traffic Management Plans.
- Feedback signs can be permanently installed or portable.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes



EXPECTED CRASH REDUCTION

Variable speed limit signs: 51% reduction in fatal and serious injury crashes for variable speed limit signs | CMF ID 11003.

Feedback indicator signs: 7% reduction in all crashes when implemented at high-crash curve sites | CMF ID 6886.

COST

$ $$ $$$ $$$$

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- NHTSA Countermeasures That Work
- http://www.pedbikesafe.org/PEDSAFE/



Variable Speed Limit Signs (Source: Toole Design)



Speed Feedback Indicator Sign (Source: FHWA)

14. AUTOMATED SPEED ENFORCEMENT

PURPOSE

Communicate safe driving speeds to drivers given the current roadway conditions and provide feedback to adjust their speed.

DESCRIPTION

Speed cameras are a type of automated enforcement technology that detects and records images of vehicles traveling faster than the posted speed limit. Tickets can then be issued to offending vehicle drivers. Several types of enforcement units exist:

- Fixed units are a camera permanently installed at a single location.
- Point-to-point units use multiple cameras to measure the average speed along a stretch of road.
- Mobile units are portable cameras installed in a vehicle or trailer.

The applicability and value of each type of automated enforcement is described in FHWA's *Proven Safety Countermeasures*.

SAFETY BENEFITS

- Reduce speeding
- Reduce speeding-related crashes
- Replace speed enforcement by physical policing and can be more equitable with careful consideration of location choice
- Operate 24/7

STREET TYPES AND CONTEXT

Applicable Street Types

Highways, arterials, and school zones

Location Guidance

Different units are suitable for different location types. Crash, speed, and citation data can help identify if issues are present network-wide (mobile enforcement preferred) or are site-specific (non-mobile preferred).

CONSIDERATIONS FOR IMPLEMENTATION

- Install signage warning drivers in advance of speed cameras.
- Equity impacts of the choice of locations should be reviewed before implementation.
- Automated speed enforcement can be complemented with police enforcement for greater safety outcomes, encouraging speed compliance beyond the location of automated enforcement.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes



EXPECTED CRASH REDUCTION

15-35% reduction in fatal and injury crashes depending on the number of cameras in the enforcement zone | CMF ID 10648 and 10654.

COST

$ $$ $$$ $$$$

EXPECTED LIFE SPAN

10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- NHTSA and FHWA Speed Safety Camera Program Planning and Operations Guide
- http://www.pedbikesafe.org/PEDSAFE/



Automated enforcement warning signage (Source: TrafficSign.com)



Speed Cameras in Bernalillo County (Source: KRQE)

15. ROADSIDE DESIGN IMPROVEMENTS AT CURVES

PURPOSE

Reduces drivers' speeds, enhances safety and visibility at curves, and prevents collisions.

DESCRIPTION

Crash cushions soften the impact of a vehicle that crashes into it. They are usually placed at ends of guardrails and/or by stationary objects.

Slope flattening decreases the steepness of the embankments, allowing for drivers to have better control of their vehicles and avoid obstacles.

Clear zones are areas alongside the road that are unobstructed where drivers can safely stop or regain control if lost.

Roadside barriers are structures designed to shield objects and/or prevent vehicles from leaving the roadway. These can be cabled, metal-beamed or concreted.

Delineators are reflective posts or signs placed along the road to enhance visibility, define boundaries, and indicate road alignment changes. Rumble stripes on edge lines add sensational feedback on road delimitation to drivers. The delineators provide clear navigation guidance to drivers

SAFETY BENEFITS

- Help recover vehicle control during runoffs
- Reduce collisions and rollover accidents
- Reduce collision severity by impact mitigation
- Increase visibility by eliminating obstacles and improve decision-making and road navigation

STREET TYPES AND CONTEXT

Applicable Street Types

Highways and rural roads

Location Guidance

These measures can be applied to roads with significant elevation changes and on segments that need speed management. They should also be implemented on curved approaches to intersections to lower speeds and enhance visibility. Environments prone to adverse weather conditions that decrease visibility can also benefit from these measures.

CONSIDERATIONS FOR IMPLEMENTATION

- Ensure proper placement of measures to effectively guide drivers; take into consideration sight distances and surrounding environment.
- Adding reflective materials can support visibility in low-light conditions.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure, rollover, and side-impact crashes



EXPECTED CRASH REDUCTION

10% reduction in single-vehicle crashes when flattening side slopes from 1V:2H to 1V:4H | CMF ID 4623.

22% reduction in crashes increasing the distance to roadside features from 3.3ft to 16.7ft (Elvik, R., and Vaa).

44% reduction in crashes increasing the distance to roadside features from 16ft to 30ft (Elvik, R., and Vaa).

COST

$ $$ $$$ $$$$

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- The Handbook of Road Safety Measures



Roadside barrier (Source: SCLTAP)

16. SPEED SIGNAGE AND MARKINGS

PURPOSE

Increase driver awareness of the posted speed limit.

DESCRIPTION

In-road **pavement markings** indicating the speed limit supplement the **speed limit signs** to serve as reminders for drivers to travel at the posted speed limit.

SAFETY BENEFITS

- May reduce drivers' speeds, which can reduce the severity of crashes when they occur

STREET TYPES AND CONTEXT

Applicable Street Types

Highways, arterials, collectors and local streets

Location Guidance

Follow MUTCD guidance for placement of all signs and markings.

Speed pavement markings supplement speed limit signs and should be placed where speeding issues have been identified, particularly if the speed signage visibility may be limited (e.g. seasonally, overgrown vegetation).

CONSIDERATIONS FOR IMPLEMENTATION

- Adding speed pavement markings may be particularly effective at reminding users of the speed limit when a change in speed limit occurs, such as in transition zones.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes



EXPECTED CRASH REDUCTION

A crash reduction factor has not yet been associated with in-road speed pavement markings or static speed limit signs.

COST

$ $$ $$$ $$$$

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- Speed Management: A manual for Local Rural Road Owners
- http://www.pedbikesafe.org/PEDSAFE/



Speed Limit Pavement Marking (Source: FHWA)

17. OPTICAL SPEED BARS

PURPOSE

Encourage drivers to reduce their speed.

DESCRIPTION

Optical speed bars serve as a visual aid to increase drivers' perceived speed. These bars consist of a series of lines placed perpendicular to the direction of travel, with the spacing between them progressively reduced across the area where reduced speeding is desired.

SAFETY BENEFITS

- Reduce drivers' speeds
- Reduce rear-end crashes
- Prevent loss-of-control crashes

STREET TYPES AND CONTEXT

Applicable Street Types

Highways, arterials, collectors, and local rural streets

Location Guidance

Follow MUTCD guidance for placement of markings. Optical speed bars should be located where speed control is critical (i.e., approaching intersections, curves, or urban environments). They should not be used where there are no lane lines.

CONSIDERATIONS FOR IMPLEMENTATION

- Optical speed bars work best when accompanied by a vertical deflection countermeasure.
- They are usually 2 inches to 4 inches wide.
- The overuse of optical speed bars can reduce their effectiveness.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes



EXPECTED CRASH REDUCTION

A crash reduction factor has not yet been established for optical speed bars.

COST

$ $$ $$$ $$$$

Low-cost implementation but requires regular maintenance

EXPECTED LIFE SPAN

3-6 years with regular maintenance required

REFERENCES

- FHWA Low Cost Treatments for Horizontal Curve Safety
- NCHRP Speed Reduction Techniques for Rural High-to-Low Speed Transitions
- Manual on Uniform Traffic Control Devices (MUTCD)



Optical Speed Bars, Maryland (Source: Toole)


AHEAD

IV. SIGNS AND SIGNALS

Traffic signs and signals are key for regulating road user behavior, conveying critical information, and ensuring an organized movement of drivers, bicyclists, and pedestrians. Properly designed and maintained signs and signals help reduce confusion, clarify right-of-way, and improve overall safety at intersections and along corridors.

Countermeasures within the category focus on optimizing their visibility and effectiveness to improve road safety. These interventions involve upgrading traffic signal phasing for better coordination and flow and enhancing signs and markings to support speed regulation.

This section of the toolkit presents a variety of strategies aimed at improving the function and effectiveness of signs and signals. By guiding road users more effectively and ensuring compliance with traffic rules, these countermeasures help reduce crashes and enhance the predictability of road interactions.

18. SIGNAGE IMPROVEMENTS AT CURVES

Implementing signs at curves increases driver awareness of horizontal curves, including the direction and sharpness.

19. SIGNAL PHASING IMPROVEMENTS

Modifying signal operations improves safety and efficiency of intersections for vehicles and pedestrians and reduces conflicts between road users.

20. STOP CONTROL VISIBILITY

Enhancing stop control visibility reduces the likelihood of stop sign violations and improves traffic control at intersections.

21. GATEWAY TREATMENTS AT TRANSITION ZONES

Having gateways helps adjust driver behavior and lower speeds as they transition to a new road environment.

22. DEAD-END SIGN ASSEMBLY

Placing a dead-end sign assembly prevents potential crashes or departures from drivers mistakenly continuing down a dead end.

18. SIGNAGE IMPROVEMENT AT CURVES

PURPOSE

Increase driver awareness of curves, including the direction and sharpness.

DESCRIPTION

Signage that alerts drivers to the presence of curves such as advance **curve warning signs** and **chevrons**. Additional signage can include **advisory speed signs**.

SAFETY BENEFITS

- Increase driver awareness of upcoming curves
- Provide visual cue of curve edge
- Increase visibility of curve in dark conditions

STREET TYPES AND CONTEXT

Applicable Street Types

Collectors, arterials, and rural highways with curves

Location Guidance

Follow MUTCD guidance for placement of all signs.

CONSIDERATIONS FOR IMPLEMENTATION

- Oversized chevron signs and LED lights outlining the chevron symbol can be used to increase the conspicuity of signs.
- For greater visibility and crash reduction, use dynamic curve warning signs that light up in sequence as vehicles approach.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes



EXPECTED CRASH REDUCTION

16-30% reduction in fatal and injury crashes | CMF ID 2438 and CMF ID 71.

COST

$ $$ $$$ $$$$

Low-cost implementation but requires regular maintenance

EXPECTED LIFE SPAN

5-10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- Manual of Uniform Traffic Control Devices
- http://www.pedbikesafe.org/PEDSAFE/



Chevron Signs at a Horizontal Curve (Source: National Barricade and Sign)

19. SIGNAL PHASING IMPROVEMENTS

PURPOSE

Improve safety and efficiency of intersections for vehicles and pedestrians and reduce conflicts between road users.

DESCRIPTION

Signal phasing modifications can improve the operational function of a street or intersection, making the traffic flow smoother and potentially reducing hazardous behaviors and conflicting movements.

Left turn phase improvements modify traffic signals at intersections to enhance safety and flow of left-turning vehicles.

Flashing yellow arrows (FYA) replace the solid green circles and signalize a permissive left turn, where drivers must yield to oncoming traffic and pedestrians.

Protected turn signals provide a separate phase for turning traffic. This removes any conflicts with pedestrians or other vehicular traffic.

SAFETY BENEFITS

- Reduce movement conflicts
- Reduce speeds of turning vehicles
- Reduce crashes related to turning maneuvers
- Reduce rear-end collisions
- Enhance pedestrian safety by better managing turning vehicles
- Reduce conflicts between different road users
- Reduce potential collisions caused by high-risk behaviors stemming from frustration due to queuing and delay

STREET TYPES AND CONTEXT

Applicable Street Types

All street types with signalized intersections

Location Guidance

Signal phasing modifications should address safety or operational corridor needs. They can be implemented at intersections with a history of left-turn related crashes and/or queuing.

Signal phasing modifications can be used at intersections with a heavy flow of pedestrians and/or bicyclists.

FYA can be implemented when traffic conditions in the oncoming traffic present gaps allowing drivers to make left turns. They should also be implemented where pedestrian flows are low to moderate.

Protected signal phasing is usually applied to major road approaches, two-way multi-lane roads, roads with a high number of left-turning vehicles and to roads with a history of turning-related crashes.

CONSIDERATIONS FOR IMPLEMENTATION

- Follow MUTCD guidance for implementation.
- The road geometry should be able to accommodate an exclusive left turn lane.
- Implementation may reduce intersection vehicle capacity.
- Signal timing changes at one intersection may impact other intersections along a corridor and should be considered holistically.
- Consider driver's knowledge and understanding of FYAs. If these are new to the urban or rural context, it is recommended to accompany them by a "Left Turn Yield" sign.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Intersection-related crashes
- Rear-end crashes
- Side-impact crashes



EXPECTED CRASH REDUCTION

14% reduction in crashes when installing left turn flashing arrow signals and supplemental traffic signs | CMF ID 7730.

35% reduction in crashes when changing left turn phasing from protected-permissive to flashing yellow arrow | CMF 11333.

42% reduction in left turn crashes when changing from permitted to protected only left turn signals during special time-of-day | CMF ID 2108.

14% reduction in overall crashes when changing permissive left-turn

COST



Low-cost implementation but requires regular maintenance

EXPECTED LIFE SPAN

15-20 years depending on environmental conditions, maintenance, and technology

REFERENCES

- FHWA Signalized Intersections Informational Guide
- FHWA Proven Safety Countermeasures
- Manual on Uniform Traffic Control Devices for Streets and Highways
- www.pedbikesafe.org/PEDSAFE
- NHTSA Countermeasures that Work



Signal Phasing Improvements (Source; Unknown)

20. STOP CONTROL VISIBILITY

PURPOSE

Reduce the likelihood of stop sign violations and improve traffic control at intersections.

DESCRIPTION

Enhancing stop control visibility helps drivers clearly see stop signs or signals by making them more noticeable. Measures include:

Stop lines are horizontal road markings that indicate the point where a driver must stop.

Oversized stop signs are signs that are larger than the standard recommended size.

Stop sign beacons are red flashing lights that are attached to stop signs.

Advanced stop warning signs and beacons are placed ahead of an intersection to alert drivers of the upcoming stop.

SAFETY BENEFITS

- Reduce crashes at intersections
- Improve driver compliance
- Increase pedestrian/bicycle safety
- Reduce stop control violations

STREET TYPES AND CONTEXT

Applicable Street Types

Rural roads, local/residential streets

Location Guidance

These measures are commonly placed on roads where drivers may not expect to stop or at intersections with limited visibility.

They can be placed on intersections with complex layouts.

They should be placed at approaching intersections with a railroad crossing.

CONSIDERATIONS FOR IMPLEMENTATION

- Stop control visibility measures work best on lower-traffic streets. Along streets with high traffic volumes, signalized intersections are preferred.
- When installing these measures, assess how the visibility of the signs might be affected by time of day or weather conditions.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Intersection crashes
- Visibility-related crashes



EXPECTED CRASH REDUCTION

Stop sign beacons:13% reduction in all crash types | CMF ID 457.

Advance stop lines: 25% reduction in vehicle/pedestrian crashes | CMF ID 9017.

COST



The cost of installation of signs and road markings is low, and the implementation cost of beacons is higher.

EXPECTED LIFE SPAN

5 - 10 years.

REFERENCES

- FHWA Proven Safety Countermeasures
- MUTCD



Stop Sign with Flashing Beacon (Source: 13 Wham)

21. GATEWAY TREATMENTS AT TRANSITION ZONES

PURPOSE

Adjust driver behavior and lower speeds as they transition to a new road environment.

DESCRIPTION

A gateway is a physical and visual cue that marks the transition between different zones. The transition is usually from higher speed roads to lower speed roads. The gateway can be a combination of signs, markings, landscape, or narrowing of the road section.

SAFETY BENEFITS

- Improve driver awareness of the surrounding environment
- Reduce vehicle speeds
- Reduce rear-end crashes due to sudden stops

STREET TYPES AND CONTEXT

Applicable Street Types

Main roads in towns, and urban, suburban and rural streets

Location Guidance

Gateways should be placed at key entry points to lower-speed zones, including areas where pedestrians and bicyclists are present, and to historically significant districts.

They can be placed on intersections with complex layouts.

They should be placed at approaching intersections with a railroad crossing.

CONSIDERATIONS FOR IMPLEMENTATION

- The gateway should be noticeable to drivers.
- The treatment should be tailored in accordance with the needs and/or character of the area.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Speeding-related crashes
- Pedestrian and cyclist related crashes



EXPECTED CRASH REDUCTION

32% reduction in overall crashes | CMF ID 2430.

COST

$ $$ $$$ $$$$

Costs vary depending on the approach taken and the length of the section.

EXPECTED LIFE SPAN

10-20 years depending on the approach and materials

REFERENCES

- NACTO Urban Street Design
- NCHRP Speed Reduction Techniques for Rural High-to-Low Speed Transitions



Gateway (Source: City of Troutdale, Oregon)

22. DEAD-END SIGN ASSEMBLY

PURPOSE

Prevent potential vehicle crashes or departures from drivers mistakenly continuing down a dead end.

DESCRIPTION

A dead-end sign assembly is a set of signs working together to indicate the termination of a roadway where there is no through route. The assembly of signs usually includes a dead-end sign, street name signs, warning signs, turn signs, and reflective markers.

SAFETY BENEFITS

- Reduce risk of crashes
- Improve driver awareness
- Prevent unintended maneuver

STREET TYPES AND CONTEXT

Applicable Street Types

Rural roads and local/residential streets

Location Guidance

Dead-end sign assemblies should be placed near the termination point and at the intersection.

CONSIDERATIONS FOR IMPLEMENTATION

- Signs should be placed at both sides of the road in multi-lane traffic to ensure visibility.
- Signs should be placed at the entrance of private road with dead ends.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Rear-end crashes
- Intersection crashes



EXPECTED CRASH REDUCTION

A crash reduction factor has not yet been associated with dead-end sign assemblies.

COST



EXPECTED LIFE SPAN

5-10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- MUTCD



Dead-end sign (Source: Toole Design)


The Chocolate Lady
Fine Hand Dipped Chocolates and Home Made Ice Cream
WILD WEST
EXPRESS-O
La Posta

V. ROAD SURFACE TREATMENTS

Road surface treatments, in addition to maintaining performance and longevity of pavement, enhance road safety as the features and condition of the road surface affects vehicle handling and braking.

Countermeasures focused on road surface treatments are designed to correct the course of vehicles that may be drifting out of their lane, enhance grip for vehicles, and reduce the likelihood of skidding or loss of control. Treatments that improve traction are particularly important during adverse weather conditions.

This section of the toolkit outlines effective road surface treatment strategies that help create safer driving conditions, reduce crash risk, and provide a more reliable and comfortable experience for all road users.

23. WIDER EDGE LINES

Having wider edge lines improves visibility of travel lane boundaries.

24. RUMBLE STRIPS

Longitudinal rumble strips alert drivers who have drifted from their lane due to distraction, drowsiness, or inattentiveness. Transverse rumble strips enhance drivers' decision-making and encourage them to lower their speeds.

25. PAVEMENT FRICTION

Creating friction on pavement creates better adherence between the vehicle tires and the roadway.

26. ENHANCED SHOULDERS

Enhanced shoulders create a space for non-motorized users where a fully separated facility is not possible.

27. SAFETYEDGE

Implementing SafetyEdge minimizes potential drop-off of vehicles at pavement edges.

23. WIDER EDGE LINES

PURPOSE

Improve visibility of travel lane boundaries.

DESCRIPTION

Six-inch edge lines, rather than the minimum four-inch edge lines, can be applied to indicate the edge of the travel lane.

SAFETY BENEFITS

- Increase the visibility the travel lane boundary
- Reduce the risk of roadway departure

STREET TYPES AND CONTEXT

Applicable Street Types

Multilane divided and undivided highways, two-lane highways and roads.

Location Guidance

Wider edge lines can be applied everywhere edge lines are required.

CONSIDERATIONS FOR IMPLEMENTATION

- Can be implemented in conjunction with other road surface improvements.
- Can be installed over rumble strips to improve marking longevity.
- Reflective markings will increase effectiveness in wet and dark conditions.
- Six inches is the maximum normal line width per FHWA regulations.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes



EXPECTED CRASH REDUCTION

37% reduction in fatal and injury crashes on rural two-lane roads | CMF ID 4737.

COST



The cost of the countermeasure is low and can be lowered by integrating its implementation with ongoing marking maintenance and other resurfacing projects.

EXPECTED LIFE SPAN

1-5 years depending on the marking type

REFERENCES

- FHWA Proven Safety Countermeasures



Wider Edge Line (Source: Texas Transportation Institute)

24. RUMBLE STRIPS

PURPOSE

Alert drivers who have drifted from their lane due to distraction, drowsiness, or inattentiveness, enhance drivers' decision-making, and encourage them to lower their speeds.

DESCRIPTION

Rumble strips are milled or raised elements on the pavement. **Longitudinal rumble strips** are placed along the shoulder, the edge line, or at the center line of an undivided highway. Vibration and sound are created when rolled on with a vehicle that alerts the driver their vehicle has left the travel lane.

Transverse rumble strips are placed across the roadway, perpendicular to the direction of travel. They offer audible and tactile speed feedback to drivers approaching a decision or conflict point further down the road.

SAFETY BENEFITS

- Enhance drivers' awareness
- Reduce lane departure crashes
- Reduce risk of encroachment into bike lanes
- Reduce vehicle speeds

STREET TYPES AND CONTEXT

Applicable Street Types

Rural highways. Center line rumble strips are appropriate on undivided facilities.

Location Guidance

Rumble strips can be co-located with pavement markings. They are most effective when systematically applied. If systemic application is not immediately possible, a crash analysis should inform priority locations.

CONSIDERATIONS FOR IMPLEMENTATION

- In locations where bicyclists are expected, gaps between segments of rumble strips allow safe crossing of the edge line.
- Studies indicate no particular maintenance practices are required.
- In snowy environments, add signage to alert snowplow operators about the presence of strips.
- If the strips are white, instead of the pavement color, they should not be placed in locations where they can be confused with other road markings.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes (edge line)
- Head-on crashes (center line)
- Speed-related crashes
- Intersection and decision points-related crashes



EXPECTED CRASH REDUCTION

23-44% reduction in fatal and injury crashes on 2-lane rural roads when installing a centerline and shoulder strips | CMF ID 6851 and 6946.

COST

$ $$ $$$ $$$$

Rumble strips are a low-cost countermeasure that can be applied along with other corridor safety improvements and as part of reconstruction or resurfacing projects.

EXPECTED LIFE SPAN

10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- FHWA Decision Support Guide for the Installation of Shoulder and Center Line Rumble Strips on Non-Freeways
- FHWA Factors Influencing Operating Speeds and Safety on Rural and Suburban Roads



Longitudinal Rumble Strips (Source: FHWA)



Transverse Rumble Strips (Source: Safe Systems Solutions)

25. PAVEMENT FRICTION

PURPOSE

Increase the friction of the pavement for better adherence between the vehicle tires and the roadway.

DESCRIPTION

Pavement friction treatments, such as **High Friction Surface Treatment (HFST)**, can increase friction and skid resistance by applying a layer of durable, anti-abrasion, and polish-resistant aggregate.

Pavement frictions should be measured, monitored and maintained over time.

SAFETY BENEFITS

- Improves tire contact with roadway
- Addresses various types of crashes, acting as a cross-cutting measure

STREET TYPES AND CONTEXT

Applicable Street Types

All street types

Location Guidance

The most critical locations for enhanced friction and monitoring are where drivers are frequently turning, slowing, and stopping. Horizontal curves, interchange ramps, and approaches to intersections and crossings should be the primary targets.

CONSIDERATIONS FOR IMPLEMENTATION

- HFST is applied on existing pavement, which should therefore be structurally stable to ensure longevity of the treatment.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes
- Pedestrian-related crashes



EXPECTED CRASH REDUCTION

49% reduction in injury crashes along horizontal curves | CMF ID 10333.

COST



EXPECTED LIFE SPAN

10 years

REFERENCES

- FHWA Proven Safety Countermeasures
- http://www.pedbikesafe.org/PEDSAFE/



High Friction Surface Treatment (Source: FHWA)

26. ENHANCED SHOULDERS

PURPOSE

Create a space for non-motorized users where a fully separated facility is not possible.

DESCRIPTION

A **paved shoulder** on the edge of a roadway enhanced with paint **markings** to serve as a dedicated space for people walking and biking in rural environments. The recommended minimum clear width varies from 5 feet to 8 feet depending on the posted speed and traffic volume. The shoulder can be defined with an additional **buffer** space (18 inches to >4 feet), **rumble strips**, or **colored/stamped pavement**.

SAFETY BENEFITS

- Designates a space for non-motorized users, reducing crashes where pedestrians and bicyclists are struck from behind on rural roadways

STREET TYPES AND CONTEXT

Applicable Street Types

Principal arterials to minor collectors and rural highways

Location Guidance

Use where a rural cross-section currently exists and fully separated facilities (such as a shared use path or sidewalk) are not practical or possible due to current constraints.

CONSIDERATIONS FOR IMPLEMENTATION

- Paint must not obstruct visibility or interfere with traffic control devises, or be confused with lane markings/
- Markings should not interfere with the intended function of the shoulder.

If the shoulder is meant to accommodate bicyclists, additional considerations exist:

- Edge line markings may be extended through intersections and major driveways to bring additional awareness to the presence of pedestrians and bicyclists.
- If rumble strips are used, ensure a gap pattern is introduced to allow safe access into and out of the shoulder.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Pedestrian and cyclist-involved crashes



EXPECTED CRASH REDUCTION

Adding shoulders and rumble strips are both Proven Safety Countermeasures for vehicle crashes. No conclusive evidence exists yet of the crash reduction for pedestrians and bicyclists specifically.

COST



EXPECTED LIFE SPAN

20 years (shoulder) 10 years (markings)

REFERENCES

- FHWA Proven Safety Countermeasures
- http://www.pedbikesafe.org/PEDSAFE/



Enhanced Shoulder with Buffer (Source: Alta Planning + Design)



Stamped Colored Pavement (Source: Alta Planning + Design)

27. SAFETYEDGE[SM]

PURPOSE

Minimizes potential drop-off of vehicles at pavement edges.

DESCRIPTION

SafetyEdge[SM] is a pavement technique used to create a 30 degree slope at the edge of the road. This eliminates the sharp vertical drop-off, creating a smoother transition between the off-road and the road.

SAFETY BENEFITS

- Helps drivers recover control of vehicles and returning to the road if they accidentally departed from it
- Reduce lane departure crashes
- Reduce fatalities derived from edge drop-offs

STREET TYPES AND CONTEXT

Applicable Street Types

Highways and rural arterial streets

Location Guidance

The SafetyEdge[SM] technology should be implemented on roads without curbs or guardrails. It is recommended to apply a systemic approach on rural roads undergoing resurfacing.

CONSIDERATIONS FOR IMPLEMENTATION

- Implement on new asphalt paving and with resurfacing projects.
- Should have regular maintenance.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Roadway departure crashes



EXPECTED CRASH REDUCTION

11% reduction in all severe crashes on rural roads | CMF ID 9205.

COST

$ $$ $$$ $$$$

SafetyEdge^{SM} is a low-cost countermeasure when included with resurfacing projects

EXPECTED LIFE SPAN

10-15 years

REFERENCES

- FHWA Small Town and Rural Multimodal Networks
- FHWA Center for Accelerating Innovation



SafetyEdge^{SM} (Source: Wisconsin Department of Transportation)


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VI. VISIBILITY

Visibility influences how well road users can see and respond to the road's layout and configuration and to other road users. Poor visibility resulting from weather conditions, poor lighting, low contrast markings, or obstructed sightlines can lead to delayed reactions from road users, increasing crash risk.

Countermeasures in this section are designed to enhance how road users perceive and navigate the streets and their surroundings. The measures range from improving lighting to enhancing road markings and signs. These techniques enhance guidance and awareness, especially during adverse weather conditions or nighttime, making interactions on the road safer.

28. LIGHTING

More and better lighting increases visibility on the roadway for all users, particularly at crossings and intersections.

29. HIGH VISIBILITY PAVEMENT MARKINGS

Implementing markings improves guidance information by enhancing the visibility of lane markings and striping.

30. RETROREFLECTIVE TRAFFIC SIGNAL BACKPLATES

Implementing retroreflective backplates improves visibility of traffic signals.

28. LIGHTING

PURPOSE

Increasing visibility on the roadway for all users, particularly at crossings and intersections.

DESCRIPTION

Rural **highway lighting** increases the visibility of potential hazards or other users along roadway segments. **Intersection lighting** illuminates spot locations at intersections or pedestrian crossings and can increase personal safety in addition to increasing visibility.

SAFETY BENEFITS

- Increase the visibility of road users and hazards within the lighting coverage area

STREET TYPES AND CONTEXT

Applicable Street Types

All street types

Location Guidance

Light posts must be placed outside of the clear zone on high-speed roadways to reduce the risk of fixed-object crashes. Light posts within the clear zone should be equipped with breakaway features or shields.

Lighting is most important at intersections and crossings where users make decisions and have a higher degree of interaction. When illuminating crosswalks, place luminaries in a forward position to avoid back-lighting pedestrians and creating a silhouette effect.

CONSIDERATIONS FOR IMPLEMENTATION

- Consider engaging with underserved communities to identify locations where lighting would most advance wider community goals, such as personal safety or increasing access to destinations.
- Evaluate electrical connections and utilities needs and options for solar lighting.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Lighting conditions-related crashes



EXPECTED CRASH REDUCTION

42% reduction in pedestrian injury and fatal crashes | CMF ID 436.

38% reduction in nighttime injury crashes at intersections | CMF ID 433.

COST

$ $$ $$$ $$$$

The cost of the countermeasure is low and can be lowered by integrating its implementation with ongoing marking maintenance and other resurfacing projects.

EXPECTED LIFE SPAN

15 years

REFERENCES

- FHWA Proven Safety Countermeasures



Lighting (Source: Toole Design)

29. HIGH VISIBILITY PAVEMENT MARKINGS

PURPOSE

Improve guidance information by enhancing visibility of lane delimitations and markings.

DESCRIPTION

Reflective pavement markings are a type of road marking that is more durable than regular paint. The markings are bright and reflective, improving the visibility for road users, and provide a rumble effect when drivers deviate from their lane.

Raised pavement markers (RMPs) are small, often reflective devices used to mark lane boundaries and other areas that need to be highlighted.

SAFETY BENEFITS

- Reduce risk of crashes caused by poor visibility by facilitating navigation at nighttime and in adverse weather conditions
- Moderately reduce vehicle speeds on curves
- Reduce crashes by roadway departure

STREET TYPES AND CONTEXT

Applicable Street Types

Highways, arterials, expressways, rural roads, and school zones

Location Guidance

Follow MUTCD guidance for placement of road markings. RMPs should be placed on roads with poor light, with a history of crashes, and on curves, and should supplement centerlines and edge lines.

CONSIDERATIONS FOR IMPLEMENTATION

- Visibility markings require regular maintenance to remain visible.
- RMPs should match the color of the lines.
- Spacing between RPMs varies based on street type and speed limit.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Lane departure crashes
- Intersection-related crashes
- Lighting conditions-related crashes



EXPECTED CRASH REDUCTION

24% reduction in nighttime crashes on rural areas where RMPs were implemented | CMF ID 5502.

10% reduction in crashes where thermoplastic markings were applied | CMF ID 9812.

COST



The cost of the implementation of the countermeasure is low, but the cost of maintenance adds up over time

EXPECTED LIFE SPAN

15 years

REFERENCES

- FHWA Guidelines for the Use of Raised Pavement Markers
- Manual of Uniform Traffic Control Devices



Raised pavement markers (Source: Transline Industries)

30. RETROREFLECTIVE TRAFFIC SIGNAL BACKPLATES

PURPOSE

Improve visibility of traffic signals.

DESCRIPTION

A retroreflective backplate creates a yellow border (1 to 3 inches wide) on the signal's backplate to enhance the visibility for drivers.

SAFETY BENEFITS

- Improve visibility of signals at night and/or in adverse weather conditions
- Makes signals more visible at a distance, giving drivers more time to react
- Reduce crashes at intersections

STREET TYPES AND CONTEXT

Applicable Street Types

All streets with signalized intersections

Location Guidance

Retroreflective traffic signal backplates are most effective in low-light environments, high-speed roads, and at intersections with high crash rates.

CONSIDERATIONS FOR IMPLEMENTATION

- This measure is most effective as part of a comprehensive approach to safety improvements.
- Not all signal structures support the implementation of the retroreflective border.

TARGET CRASH TYPES AND PRIMARY USER GROUPS

- Lighting conditions-related crashes



EXPECTED CRASH REDUCTION

15% reduction in all crashes | CMF ID 1410.

COST

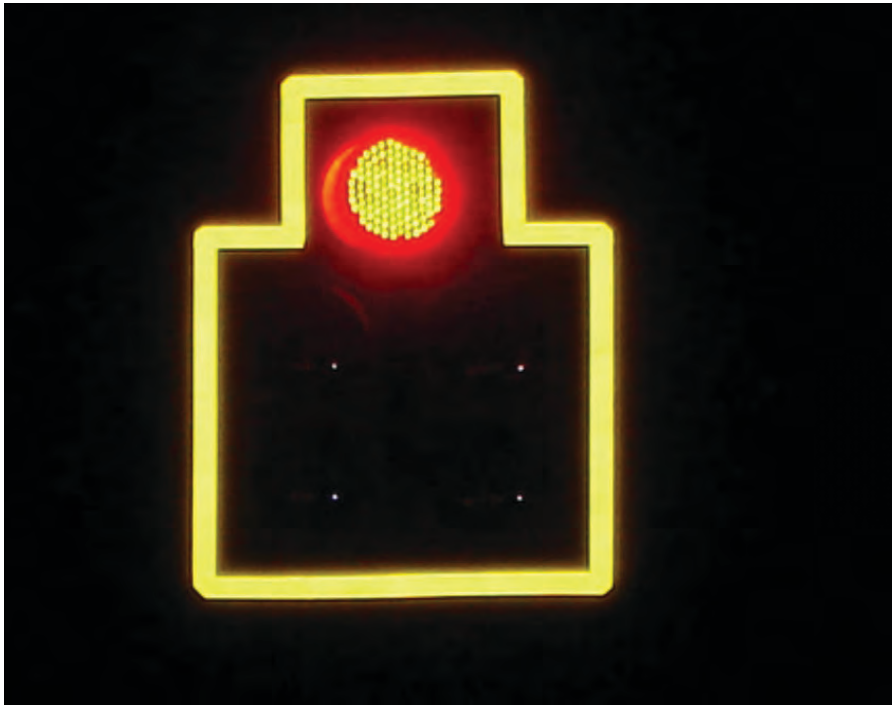
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EXPECTED LIFE SPAN

15 years

REFERENCES

- FHWA Proven Safety Countermeasures



Retroreflective backplate at night (Source: FHWA)