



New Mexico Prioritized Statewide Bicycle Network Plan

DECEMBER 2018



New Mexico DEPARTMENT OF
TRANSPORTATION
MOBILITY FOR EVERYONE

New Mexico

Prioritized Statewide

Bicycle Network Plan

December 2018

NM Bike Plan Acknowledgements

We would like to acknowledge the help of the following New Mexico Department of Transportation staff in helping to create this plan, as well as the organizations that supported the development of the plan through participation in coordinating meetings, public meetings, and feedback. NMDOT would like to thank the engaged residents of New Mexico and beyond who provided valuable public comment and input throughout the planning process.

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December 2018

I am pleased to formally adopt the Statewide Prioritized Bicycle Network Plan (NM Bike Plan) on behalf of the New Mexico Department of Transportation (NMDOT). The NM Bike Plan furthers NMDOT's goal of mobility for everyone, by creating a sustainable framework within existing roadway reconstruction and major rehabilitation processes to incorporate bicycle infrastructure on state roadways. Bicycle infrastructure not only improves mobility, quality of life and recreational options for New Mexicans and visitors to our state, but also contributes greatly to New Mexico's economy. The NM Bike Plan looks to the future by providing a map of critical connections between where people live, work and play.

NMDOT understands that improved multimodal choices invigorate our economy, connect people in small towns and cities, and facilitate transportation of goods and people to other states and nations. The NM Bike Plan incorporates the goals of our long-range transportation plan, the New Mexico 2040 Plan, through the identification of priority tier bike routes along with a framework for identifying context sensitive infrastructure improvements. The result will be improved access to multimodal transportation options and connectivity for communities across the state.

I appreciate and would like to recognize the members of the public, NMDOT staff, Metropolitan and Regional Transportation Planning Organizations, and other stakeholders for their dedication towards developing New Mexico's first statewide bicycle plan.

Please refer to the NM Bike Plan in its entirety to learn more about our state's commitment to developing bicycle facilities for the people of New Mexico and its visitors.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Church".

Tom Church
Cabinet Secretary

Susana Martinez
Governor

Tom Church
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TABLE OF CONTENTS

I. Introduction	11
Key Products	12
Organization of the NM Bike Plan	12
II. Vision and Goals	15
Goals & Action Items	15
III. Public and Stakeholder Outreach	19
In-Person Outreach	19
Online Outreach	19
IV. Benefits of Bicycling and Bicycle Planning	33
Planning for Bicycling	33
Benefits of Bicycling.....	33
Complete Streets	36
V. Bicycle Planning in New Mexico	39
Legal Rights and Responsibilities of Bicyclists	39
Bicycle Behavior and Trends	39
State Planning Context and Supporting Documents	41
Designated and Proposed Bicycling Routes	46
VI. Development of the Priority Network	51
Quantitative Evaluation	51
Qualitative Review	61
VII. Priority Network	63
Priority Tier Definitions.....	63
Tier 2 Basic Facilities	76
NM Highways and Locations with Special Considerations	77
VIII. Design Guidelines.....	81
Roadway Context and Design Guidance	81
Bikeway Facility Types	89
Incorporating Bicycle Infrastructure into Roadway Design	95
Maintenance Strategies	100
National and State Design References	102
IX. Implementation and Recommendations.....	105

Implementation	105
Recommendations.....	109

FIGURES

Figure 1 NM Statewide Prioritized Bicycle Network	13
Figure 2 Types of Bicyclists – NM State Bike Plan Survey.....	21
Figure 3 Types of U.S. Bicyclists	21
Figure 4 Online Survey Results Summary, part 1	22
Figure 5 Online Survey Results Summary, part 2	23
Figure 6 Online Survey Results Summary, part 3	24
Figure 7 Online Input Map – Feedback Summary.....	25
Figure 8 Online Input Map	26
Figure 9 Interpreting the Online Input Maps.....	27
Figure 10 State Roadway I Like to Bike	28
Figure 11 State Roadway I Bike, But Could be Improved	29
Figure 12 State Roadway I'd Like to Use, But Needs Improvement.....	30
Figure 13 Difficult Bicycling Locations.....	31
Figure 14 Priority Tier Levels by Mode, New Mexico 2040 Plan	42
Figure 15 Typical Road Diet Reconfiguration.....	45
Figure 16 Demand Analysis Composite Results in Small Towns and Rural Areas.....	56
Figure 17 Composite Demand in Urban Areas	57
Figure 18 Composite Equity Map.....	60
Figure 19 Priority Network – Statewide.....	65
Figure 20 Priority Network – District 1.....	66
Figure 21 Priority Network – District 2.....	67
Figure 22 Priority Network – District 3.....	68
Figure 23 Priority Network – District 4.....	69
Figure 24 Priority Network – District 5.....	70
Figure 25 Priority Network – District 6.....	71
Figure 26 Priority Network – Albuquerque Area.....	72
Figure 27 Priority Network – Las Cruces Area	73
Figure 28 Priority Network – Santa Fe Area.....	74

Figure 29 Priority Network – Farmington Area	75
Figure 30 Bikeway Improvement Selection Guide.....	83
Figure 31 Urban Tier 1 and Tier 2 Routes – Facility Selection Chart.....	84
Figure 32 Rural Tier 1 Routes – Facility Selection Chart.....	86
Figure 33 Rural Tier 2 Routes – Facility Selection Chart.....	86

TABLES

Table 1 Bicycle Commuting Share, 2016 American Community Survey, 1-Year Estimates.....	40
Table 2 Bicyclist-Involved Vehicular Crashes in New Mexico, 2012-2016.....	40
Table 3 Criteria and Scoring Values Used in the Development of the Priority Network.....	53
Table 4 New Mexico Bicycle Activity Demand Model Inputs.....	54
Table 5 Indicators Used in the Equity Analysis	59
Table 6 Tier Definitions	63
Table 7 Tier 2 Basic Facilities.....	76
Table 8 Interstate Segments on the Proposed USBR System	77
Table 9 Design Interventions for Constrained Corridors.....	98
Table 10 Design Interventions for Constrained Corridors, Cont.	99
Table 11 Design Interventions for Constrained Corridors, Cont.	100
Table 12 Maintenance Strategies	101

APPENDIX

APPENDIX A | TABLE OF NM HIGHWAYS

I. INTRODUCTION

Interest in bicycling is growing across New Mexico, and with that interest comes demand for additional infrastructure where bicyclists can ride safely and comfortably. Addressing needs across the state requires an equitable and consistent methodology for the installation of bikeway facilities. The New Mexico Prioritized Statewide Bicycle Network Plan (NM Bike Plan) considers how to best provide both residents and visitors with a safe and connected bicycle network at the statewide level by: 1) identifying locations where bikeway infrastructure would be most beneficial, and 2) providing design guidance that indicates the appropriate types of infrastructure by roadway context.

The NM Bike Plan focuses on the right-of-way owned and maintained by the New Mexico Department of Transportation (NMDOT). The facilities within the scope of this Plan include all State and US highways (referred to collectively as NM highways). Interstates and most frontage roads, though also owned and maintained by NMDOT, are not included. By focusing on NM highways, the Plan takes advantage of existing infrastructure to provide connections to major sites and destinations. The NM Bike Plan also supports and builds upon other NMDOT planning efforts, including the New Mexico 2040 Plan, the long-range statewide transportation plan for the management of transportation infrastructure. Among the recommendations of the New Mexico 2040 Plan is the development of a prioritized statewide bicycle network to guide investments.

The NM Bike Plan addresses bikeway improvements through the integration of infrastructure into the roadway redesign and reconstruction process, as well as during routine maintenance projects, where possible. Consideration of bikeway facilities and the NM Bike Plan should occur early in the project design process. However, the NMDOT has limited financial resources available to maintain the state roadway network – the agency manages over 30,000 lanes miles – and resources need to be thoughtfully prioritized. The installation of bikeway facilities as part of regularly-scheduled roadway improvements on a prioritized set of roadways is a means of utilizing NMDOT resources as effectively as possible and doing so through existing processes.

NMDOT also recognizes that bikeway improvements need to be focused in areas likely to provide benefits in terms of equal opportunities and access to bicycling, the safety of existing bicyclists, as well as locations where improvements could contribute to increased overall rates of bicycling. The NM Bike Plan enables NMDOT to apply a standard methodology for the selection of sites and implementation of bikeway facilities, with specific infrastructure decisions made during the roadway redesign process. The ultimate goal is to create a realistic network that NMDOT can build and maintain over time.

To complete the NM Bike Plan, NMDOT contracted with Bohannon Huston, Inc. (BHI), an Albuquerque-based engineering and planning consulting firm, and Alta Planning + Design, a nationally-recognized firm specializing in active transportation. In the development of the NM Bike Plan, the Project Team – comprised of consultants and staff from the NMDOT Statewide Planning Bureau – conducted a range of public outreach activities and worked with NMDOT

staff, local agencies, and other stakeholders to ensure the Plan complements existing programs and addresses statewide needs.

KEY PRODUCTS

To facilitate investments, the NM Bike Plan is organized around two key products: a **priority bicycle infrastructure network** (see Figure 1) and **design guidelines**. For the priority network, each NM highway is assigned a tier level, ranging from 1 to 3, indicating the locations where bikeway infrastructure would be most beneficial and the desired robustness of that infrastructure. It is important to note that the priority tier levels do not indicate the order in which improvements will be implemented. The design guidelines indicate the appropriate type and dimensions for bikeway infrastructure along roadway facilities owned and maintained by NMDOT. The design guidance for the NM Bike Plan is organized by priority tier and by roadway context, and generally applies to on-street bikeway facilities. Treatments range from dedicated bicycle lanes and shoulders to shared use paths, as well as other interventions to increase awareness that bicyclists may be present. The intent of making these improvements is primarily to make bicycling along NM highways safer, which benefits existing bicyclists and may encourage more people to ride.

The prioritized statewide bicycle network applies tier levels to all NM highways indicating the locations where bikeway infrastructure would be most beneficial and the desired quality of that infrastructure.

The NM Bike Plan constitutes the first comprehensive statewide effort to develop a broad set of bikeway infrastructure and reflects an increased emphasis by NMDOT on multi-modal planning and transportation safety. Over time, the implementation of the NM Bike Plan will increase travel options along state-owned facilities, create an equitable distribution of facilities throughout the state, and serve the needs of New Mexico residents and visitors, whether they are riding for transportation or recreational purposes.

ORGANIZATION OF THE NM BIKE PLAN

Chapter II contains Vision, Goals, and Actions Items that guide the structure of the NM Bike Plan and inform the implementation measures. The public and stakeholder outreach efforts that served as the foundation of the NM Bike Plan can be found in **Chapter III**.

Chapter IV offers the purpose and benefits of improving bikeway infrastructure and implementing the NM Bike Plan, while **Chapter V** describes the current bicycle-related planning efforts and opportunities that the Plan builds upon.

Chapter VI documents the process used to develop the statewide priority network, while the network itself is presented in **Chapter VII**. The design guidelines that inform the implementation of bikeways along the priority network are detailed in **Chapter VIII**. Finally, implementation measures and recommendations for further action are discussed in **Chapter IX**.

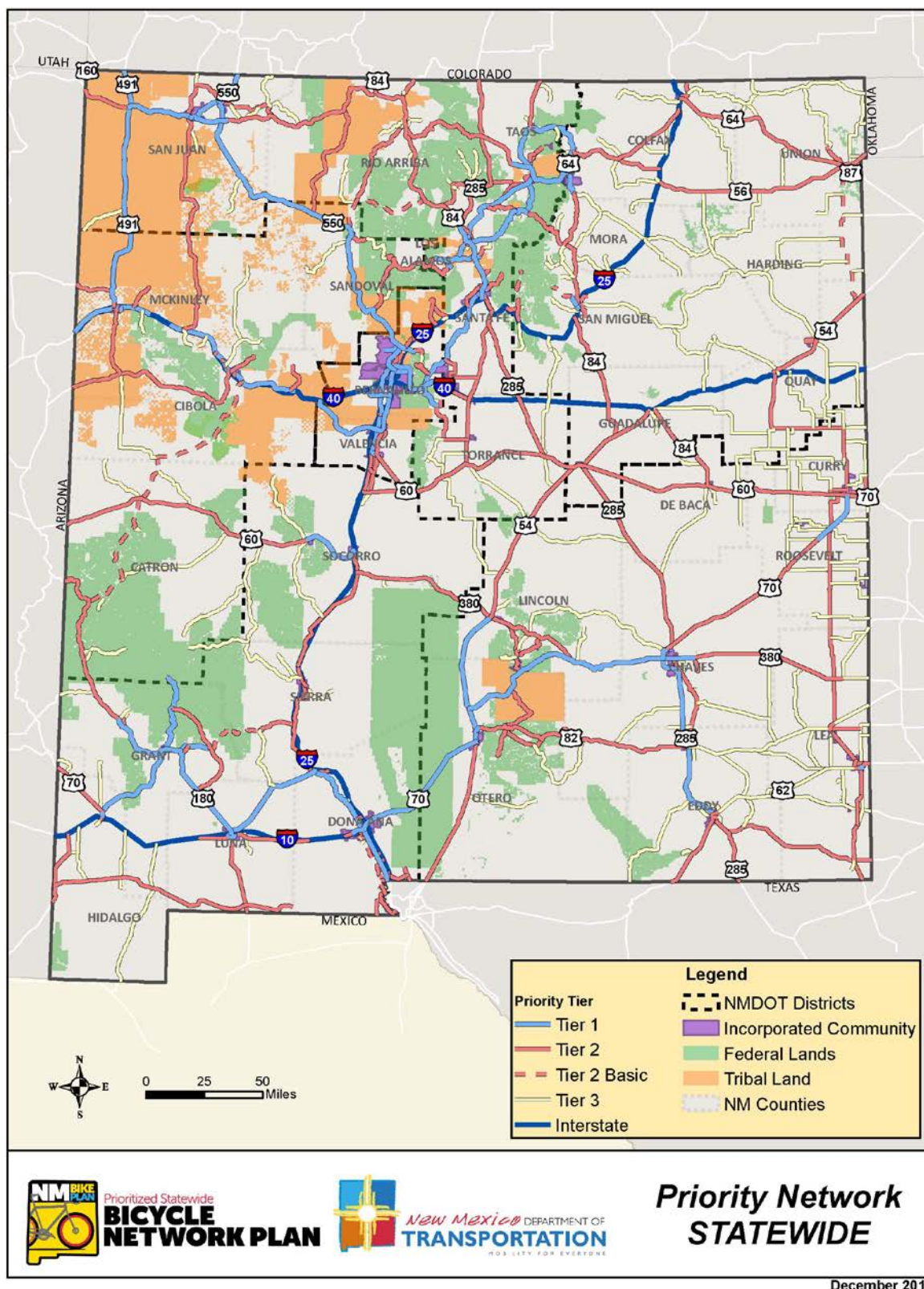


Figure 1 | NM Statewide Prioritized Bicycle Network

II. VISION AND GOALS

The vision and goals of the NM Bike Plan are informed by public outreach and agency feedback, as well as the NMDOT's long-range New Mexico 2040 Plan. The **vision statement** outlines the future conditions for bicycling that NMDOT would like to provide and serves as a source of inspiration to guide implementation of the NM Bike Plan. The **goals** of the NM Bike Plan are supported by **action items** that are either directly addressed through the NM Bike Plan or considered for future action in the Recommendations section of Chapter IX.

Vision Statement

A safe, sustainable, and well-connected bicycle network that increases access to statewide destinations, stimulates and supports economic development, fosters healthy communities, and equitably serves New Mexican residents and visitors.

GOALS & ACTION ITEMS

The following goals will guide the State towards implementing the NM Bike Plan. Under each goal, a series of action items are provided to guide NMDOT towards achieving that particular goal.

Goal I. Prioritized Statewide Bicycle Network – Develop a tiered system of New Mexico owned and maintained roadways (NM highways) to inform statewide investments in bikeway infrastructure.

Action Items

- Develop New Mexico-specific criteria for determining where bikeway improvements would be most beneficial, including identification of key bicyclist destinations, first-/last-mile connections to transit, established bicycling routes, existing infrastructure, employment centers, and others.
- Establish a tiered route system to identify the appropriate locations for bikeway infrastructure investments on NM highways based on existing or latent demand for bicycling.
- Ensure adequate investment of funds on Tier 1 and Tier 2 roadways to achieve minimum standards for design, maintenance, and efficient operations of bikeway facilities.

Goal II. Safety and Comfort – Improve bicyclist safety by designing and implementing quality bikeways to make bicycling a more comfortable and attractive mode of transportation.¹

Action Items

- Create and utilize design guidelines to ensure high-quality routes are available for bicycle travel for New Mexico residents.
- Reduce fatalities and serious injuries of bicyclists on NM highways through implementation of crash reduction measures (e.g., installing dedicated bicycling facilities, providing wide shoulders on bicycling routes, and improving intersection crossing conditions for bicyclists).
- Combine infrastructure improvements with signage and pavement markings to enhance the visibility of bicyclists and improve awareness on the part of motorists.
- Bolster existing NMDOT public outreach campaigns, such as the "Look for Me" campaign, to increase education and outreach regarding bicyclist safety and awareness.

Goal III. Public Health – Improve health outcomes by providing increased transportation options and making bicycling an attractive and accessible option for recreational activities.

Action Items

- Invest in facilities that provide connections to parks and recreational sites, linking assets to support positive physical and mental health outcomes.
- Increase physical activity and improve long-term health outcomes of New Mexico residents by making bicycling a more desirable mode of transportation, and increasing the number of bicycling trips.
- Improve air quality and reduce emissions through a higher statewide bicycling mode share.

¹ Bicyclist user types and comfort levels are an important consideration in the design of bicycle facilities. See the Design Guidelines chapter for additional information.

Goal IV. Connectivity and Access – Expand transportation and recreation choices by making bicycling for all trip types easy, safe, and efficient, and by connecting local and regional bicycle networks.

Action Items

- Improve access to goods, services, and employment opportunities by implementing a statewide bicycle network that connects people to destinations within communities, provides connections between major cities, and provides connections between rural and urban communities.
- Invest in facilities that improve connections to transit stops and stations and regional and local bicycle networks.
- Invest in facilities that connect to critical/high demand destinations, including activity centers and employment sites, cultural and tourist attractions, and educational institutions.
- Reduce single-occupancy vehicle (SOV) commute trips, the number of vehicle trips, and total vehicle miles traveled (VMT) by improving access for bicyclists to employment centers located along NM highways and creating practical alternatives to using a private vehicle.

Goal V. Economic Development and Tourism – Promote bicycling as driver of statewide economic development.

Action Items

- Make New Mexico a go-to bicycling destination by developing a high-quality statewide bicycle network that improves the experience of long-distance bicyclists.
- Invest in facilities that connect to regional attractions, such as New Mexico's state and federal lands, as well as rural/small town communities with tourism potential, to promote and support recreational bicycle tourism.
- Work with organizers of bike races to address safety and maintenance issues for events on NM highways.

Goal VI. Equity – Make bicycling a reliable and convenient mode of transportation for historically underserved populations in New Mexico.

Action Items

- Identify and invest in areas in New Mexico where there are concentrations of historically underserved populations who may disproportionately rely more on walking, bicycling, and transit to complete their trips.

- Invest in first- and last-mile connections to transit stations and to employment centers that facilitate journey-to-work trips for historically underserved populations.
- Pursue equitable investment in bikeway infrastructure across the state of New Mexico by balancing investments in utilitarian and recreational bicycling routes.

VII. Inter- and Intra-Agency Coordination – Work with agencies at all levels of government to create a statewide bicycle network that is well-integrated with local and regional networks and to facilitate efficient Plan implementation.

Action Items

- Encourage integration of the NM Bike Plan with local and regional bike planning efforts.
- Integrate the statewide bicycle network with local and regional networks to improve bicycle travel across communities, regardless of jurisdictions or infrastructure ownership.
- Leverage, where possible, funding decisions and investments for bicycling via local, regional, and state coordination.
- Develop an internal process where the NM Bike Plan and associated design guidelines are referenced during preliminary planning and design phases for all roadway projects led by NMDOT.
- Utilize opportunities during rehabilitation and reconstruction projects to implement bikeway infrastructure on NM highways.

III. PUBLIC AND STAKEHOLDER OUTREACH

The NM Bike Plan planning process incorporated a series of outreach techniques to solicit input and guide the development of the prioritized statewide network and Plan recommendations. Outreach efforts included a combination of public meetings, workshops, online tools, and presentations to public agencies and bicycle advisory committees. The outreach process occurred in two phases:

- **Phase 1** generated awareness of the project, introduced the planning process, articulated the benefits of having a Prioritized Statewide Bicycle Network Plan, and solicited input on the most critical considerations for a network of bikeway facilities across the state.
- **Phase 2** provided opportunities for comments and feedback on draft Plan products.

This section summarizes the techniques used and the feedback collected during the information gathering components of the public outreach process (i.e. Phase 1).

IN-PERSON OUTREACH

In-person public outreach targeted more heavily populated areas of the state, with meetings held in Albuquerque, Farmington, Las Cruces, and Santa Fe. These meetings provided attendees the opportunity to provide direct input on plan goals and objectives, as well as preferred bikeway infrastructure types based on level of comfort as bicyclists.

Additional outreach targeted agencies that participate in transportation planning activities across New Mexico. The Project Team provided presentations and conducted outreach to each of the six NMDOT districts, as well as the state's metropolitan planning organizations (MPOs) and regional transportation planning organizations (RTPOs). MPOs and RTPOs contributed to the process by disseminating information among their member agencies and public contacts. The Project Team also held sessions with bicycle technical advisory committees in Albuquerque, Las Cruces, and Santa Fe to solicit input on bikeway infrastructure, safety, and other issues that should be addressed in the Plan. Attendees and participants in each of these agency and committee meetings were encouraged to participate further using the online engagement tools.

ONLINE OUTREACH

Online outreach efforts ensured that information about the NM Bike Plan and opportunities to participate were accessible to residents across the state. The primary online public engagement tools included a **survey** asking respondents questions about bicycling habits, and an **interactive public input map** that allowed respondents to indicate and comment on bicycling experiences for specific roadways and locations. These tools and other materials were made available on the project website.

Online Survey Results

The survey, available on the project webpage from October to December 2017, was completed by 593 people. Respondents answered a range of questions about their bicycling habits, including how frequently, for what purposes, and where they regularly bicycle. Respondents also indicated how comfortable they would be bicycling on different types of NM highways and provided answers to questions related to economic development, such as their general spending habits while on recreational rides. Finally, the survey offered respondents an opportunity to share thoughts on plan priorities and potential goals. Respondents to the survey were self-selecting and heavily skewed toward avid bicyclists.

Profile of Respondents

Respondents to the NM Bike Plan survey were disproportionately male (63 percent), between the ages of 35 and 64 (67 percent), and urban residents (64 percent). A large majority of respondents (84 percent) also reported that they ride a bicycle frequently, compared to 12 percent who ride infrequently and four percent who rarely or never ride a bicycle.² Nevertheless, the survey provides important insights into the types of issues that bicyclists confront in New Mexico and the improvements that could lead to increased cycling. (See the Equity Analysis section in Chapter VI for discussion on efforts to consider all populations across New Mexico as part of the planning process.)

National research demonstrates that most Americans can be grouped into four categories regarding their perceptions around bicycling: “Strong and Fearless,” “Enthused and Confident,” “Interested but Concerned,” and “No Way No How.”³ The majority of the US population falls into the “Interested but Concerned” category, while nearly a third indicate they will not ride a bicycle under any circumstances. Nationwide, only about 13 percent of the population falls into the “Strong and Fearless” or “Enthused and Confident” categories. By contrast, a combined 80 percent of respondents to the NM Bike Plan survey fall into those two categories of avid bicyclists.

FOUR TYPES OF BICYCLISTS:

- **Strong and Fearless** riders typically will ride despite challenging traffic conditions.
- **Enthused and Confident** riders will ride in most traffic condition but prefer dedicated bikeway facilities.
- **Interested but Concerned** individuals will ride only if comfortable bikeway facilities are provided.
- **No Way No How** individuals will never ride a bicycle for personal or physical reasons.

² Out of respondents who bicycle frequently, 52 percent bike one or more times per week and 32 percent bike every day. Of those who bicycle infrequently, six percent bike once a month and six percent bike a few times a year.

³ Dill, J., McNeil, N. Four Types of Bicyclists? Examination of Typology for Better Understand of Bicycling Behavior and Potential. Transportation Research Record, 2014.

GENERAL CATEGORIES - U.S.

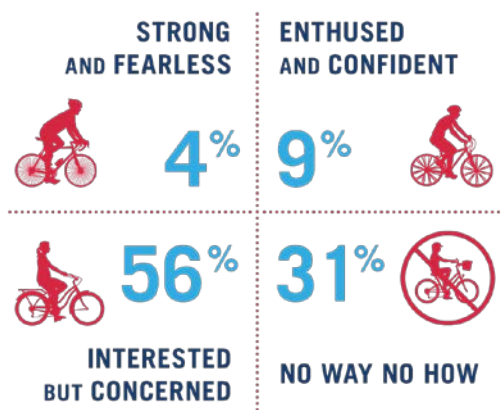


Figure 3 | Types of U.S. Bicyclists

NM SURVEY RESPONDENTS

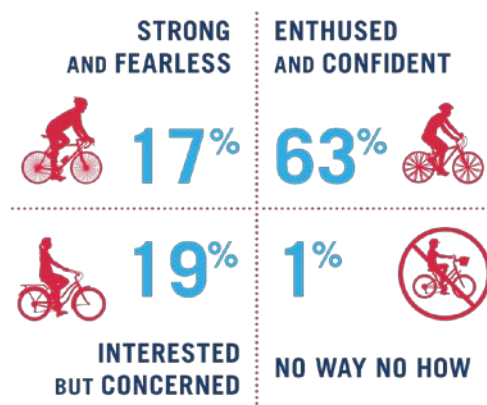


Figure 2 | Types of Bicyclists – NM State Bike Plan Survey

Key Findings

Survey respondents indicated their comfort level riding on example roadways with varying infrastructure, posted speed limits, contexts (urban or rural), and traffic volumes (see Figure 5). In general, the presence of shoulders is the factor that most consistently influences bicyclist comfort. When asked to identify the top three factors that influence a decision to take a particular bicycle route, 75 percent of respondents chose the presence of a bikeway facility, such as a bike lane or shoulder, followed by low to moderate traffic volumes (68 percent), smooth pavement (39 percent), low traffic speeds (29 percent), and shortest distance (21 percent).

Despite the fact that most respondents were more likely to be experienced and confident bicyclists than the US population at-large, respondents indicated preferences for the types of improvements and infrastructure that are critical for attracting less confident bicyclists. In particular, the most consistent conclusion from the online survey is a need for improved bicyclist safety on NM highways with bike lanes and wider shoulders as the preferred action to improve bicyclist safety, particularly as vehicle speeds and volumes increase. The survey, therefore, provides important insights when considering on-street bicycle improvements, with increased separation between motorists and bicyclists highly desirable.

Overall, most respondents indicated that they bicycle primarily for exercise or recreation. Transportation to work and for other purposes, such as running errands or to shop, were also among the reasons why people bike. Of particular interest, given New Mexico's potential as an adventure tourism and long-distance bicycling destination, is the extent to which respondents engaged in all-day or multi-day rides (80 percent of survey participants). For those who reported that they participate in these rides, 85 percent also reported that they spend money on food, supplies, or transportation, with the average respondent spending \$59 per person per day. The figures below summarize the survey results.

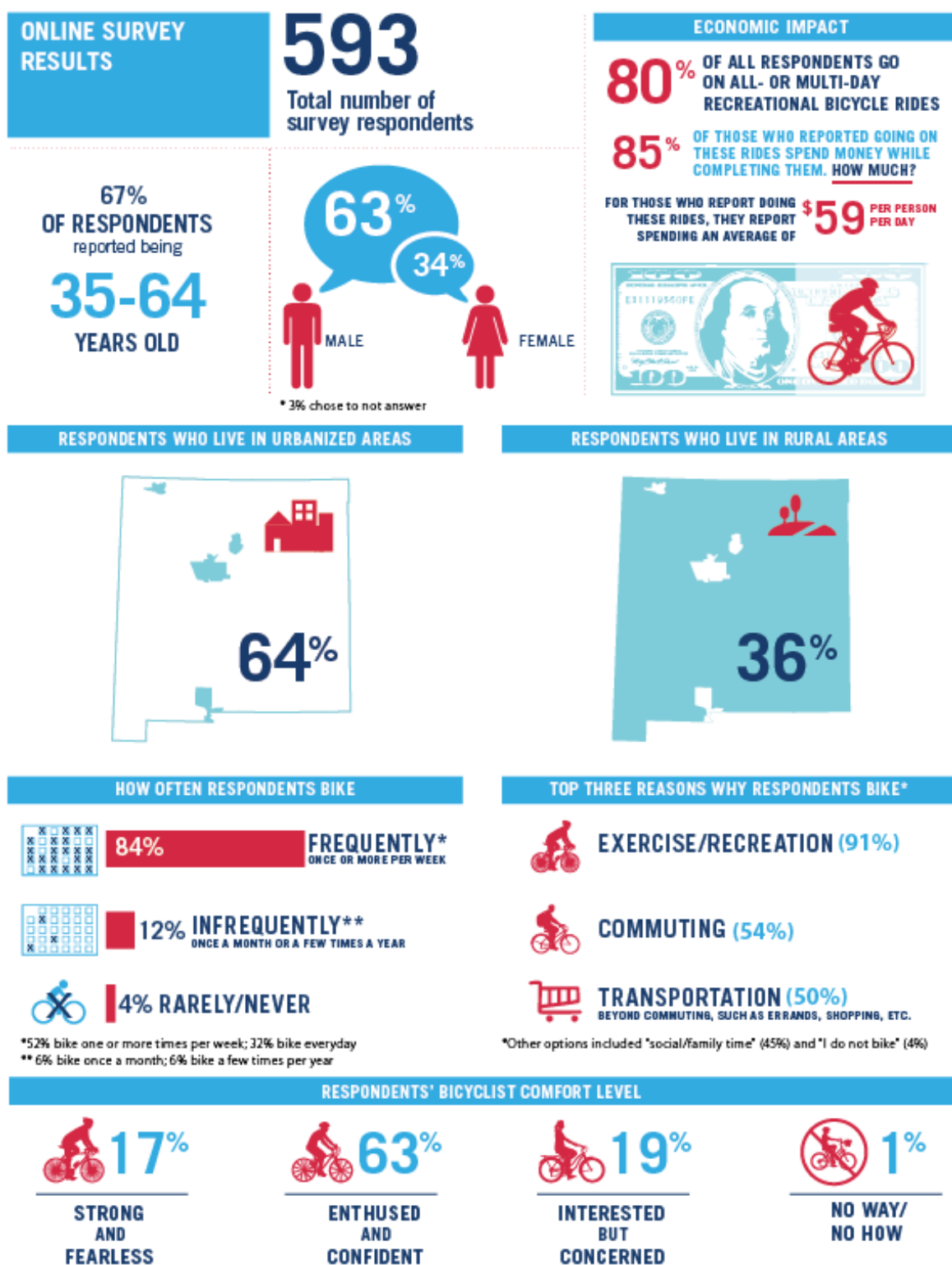


Figure 4 | Online Survey Results Summary, part 1

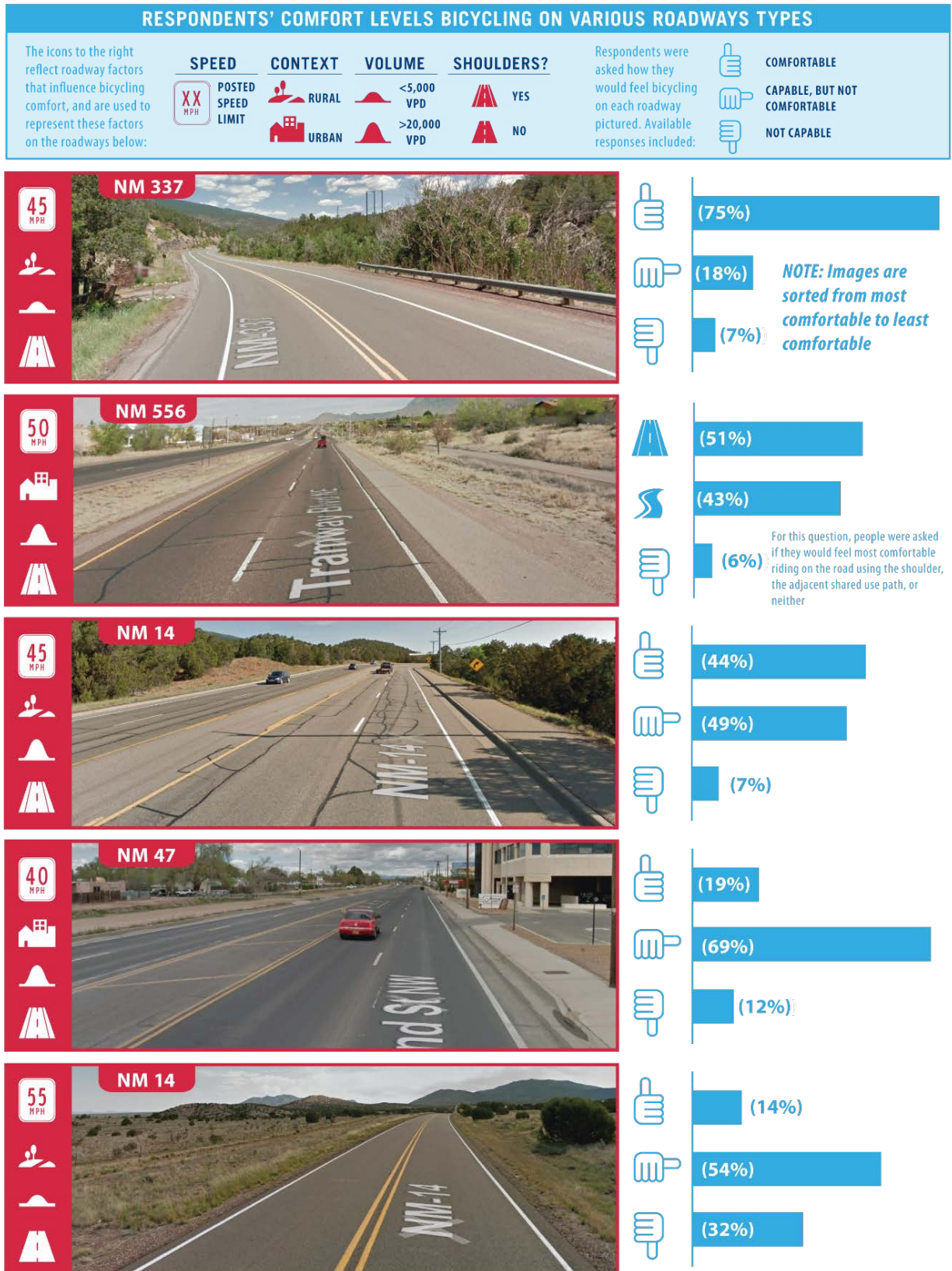


Figure 5 | Online Survey Results Summary, part 2

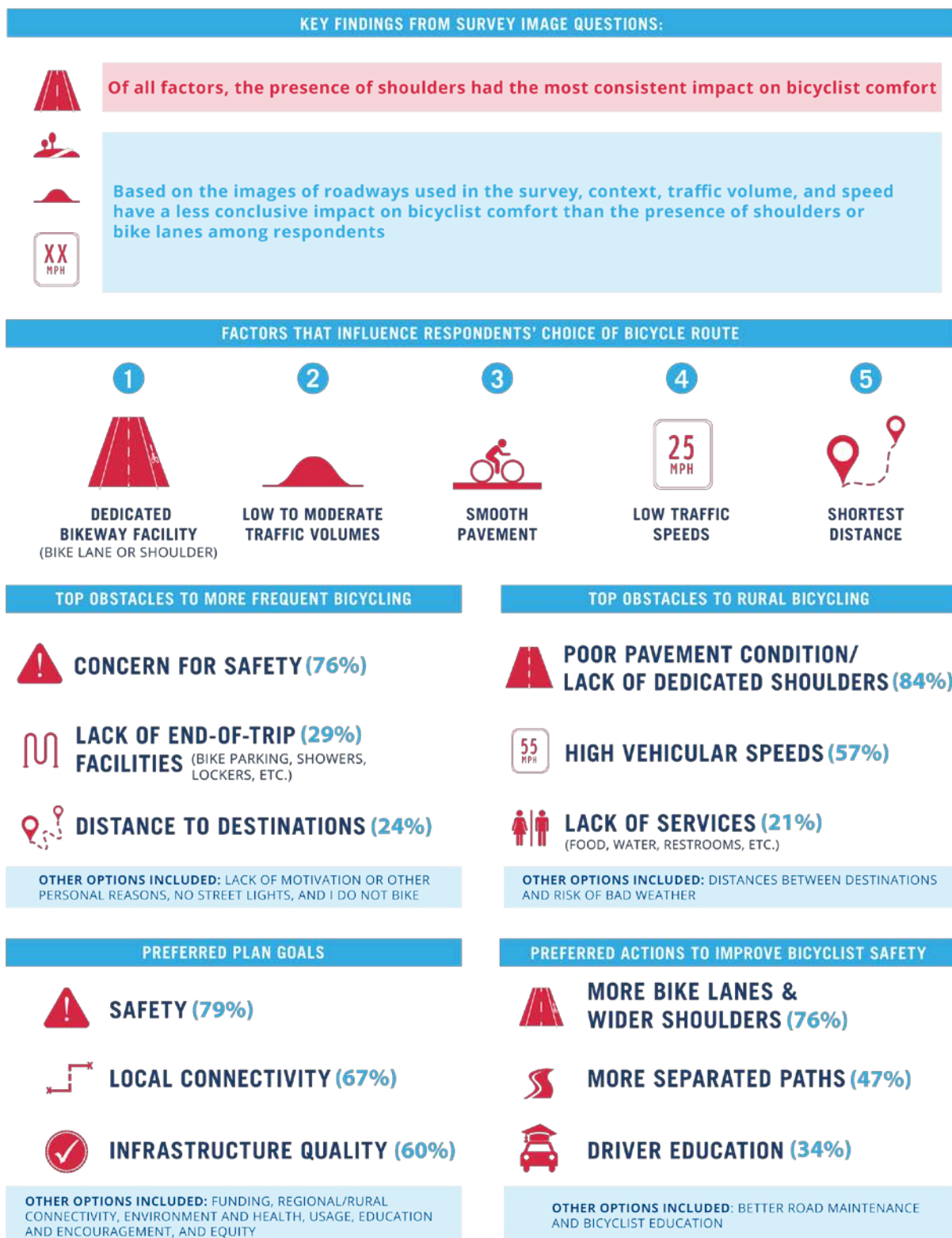


Figure 6 | Online Survey Results Summary, part 3

Online Map Results

The online interactive map, posted on the project website and open for public input from October to December 2017, helped identify locations where improvements should be focused. The map allowed users to draw lines and drop points within the map, as well as add comments and votes to other people's input. In total, the map recorded over 2,330 interactions, including lines drawn, points placed, and people commenting on and liking lines and points drawn by others.

The Project Team designed an online input map to solicit the following information:

- NM highways that bicyclists like to use
- NM highways that bicyclists use but that could be improved
- NM highways that bicyclists would like to ride on but that need improvement

Though participants were prompted to respond to NMDOT-owned facilities, responses were also collected for roadways managed by other agencies across the state. Participants identified 4,387 miles of roadways they currently bike and indicated nearly double that amount in miles of roadways that could use or need improvement for bicycling (8,606 miles total). Users also placed 246 points identifying difficult locations for bicycling across the state.

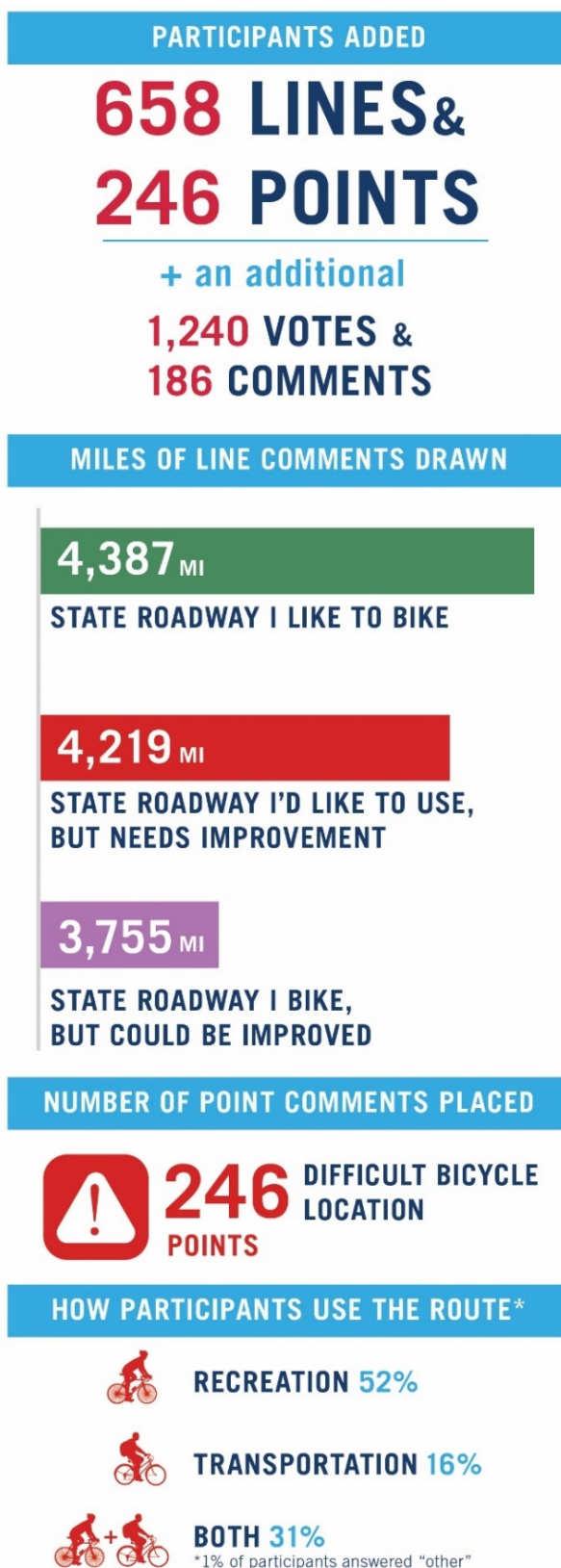


Figure 7 | Online Input Map – Feedback Summary

Respondents provided location-based comments (specific to a single point or a corridor) that reflected their opinions about bicycling on NMDOT roadways through the online interactive map. The data collected informed the development of the priority network.

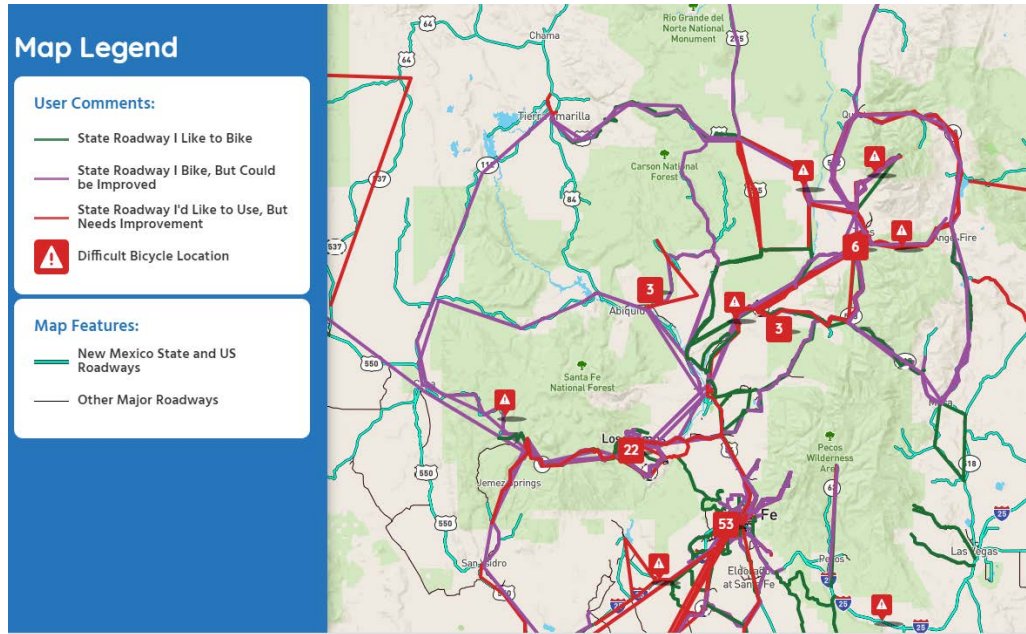


Figure 8 | Online Input Map

After drawing a line, users were asked to identify how they typically use the route, whether for recreation, utilitarian (i.e. commuting, errands, etc.), both, or other purposes. Across all input categories, recreation was the most common category, comprising 52 percent of all lines drawn. Approximately 31 percent of lines were identified for both utilitarian and recreation purposes, while 16 percent were used exclusively for utilitarian purposes. This indicates that half of the identified routes on the map are used for utilitarian purposes at least some of the time. The majority of input was located along roadways in the Albuquerque and Santa Fe metropolitan areas, northern New Mexico including the Enchanted Circle, and southwest New Mexico around Silver City and the Gila National Forest.

Of the responses to the "State Roadway I Like to Bike" option, over 60 percent of entries are used for recreation only, while entries for the other route categories (i.e., those routes needing improvements) were more evenly split between recreation, utilitarian, or both. This suggests that the majority of people who drew lines for roadways they like to bike may be more confident and experienced bicyclists. It is also important to note that there may be more flexibility in choosing a route for a recreational ride compared to utilitarian rides, so recreational bicyclists may select more comfortable routes.

The information contained in the online input map was integrated with other evaluation criteria, including demand and equity analyses, in the development of the statewide priority network. A summary of the data collected is included on the following maps. See Chapter VI for additional information on the priority network development process.

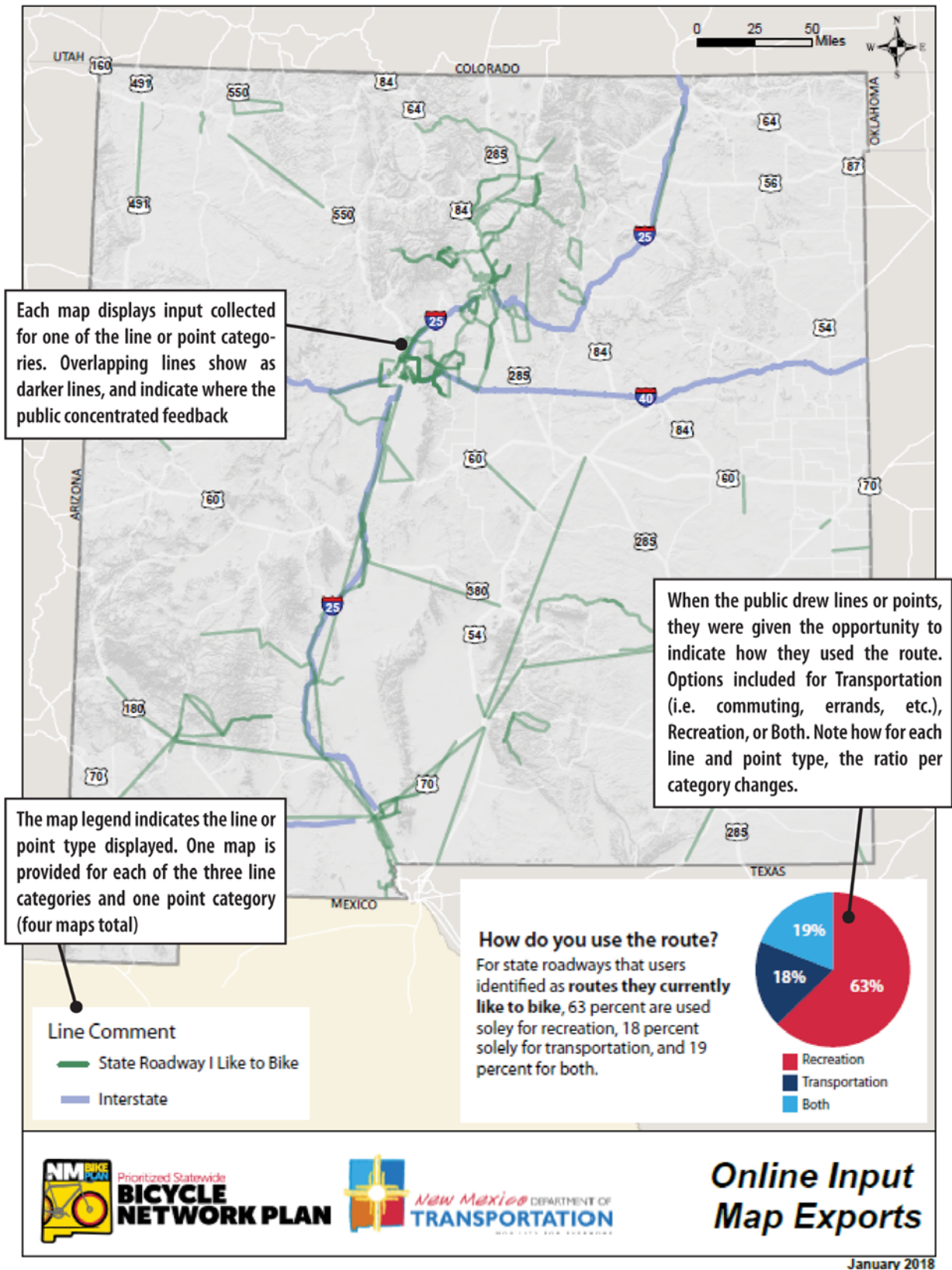


Figure 9 | Interpreting the Online Input Maps

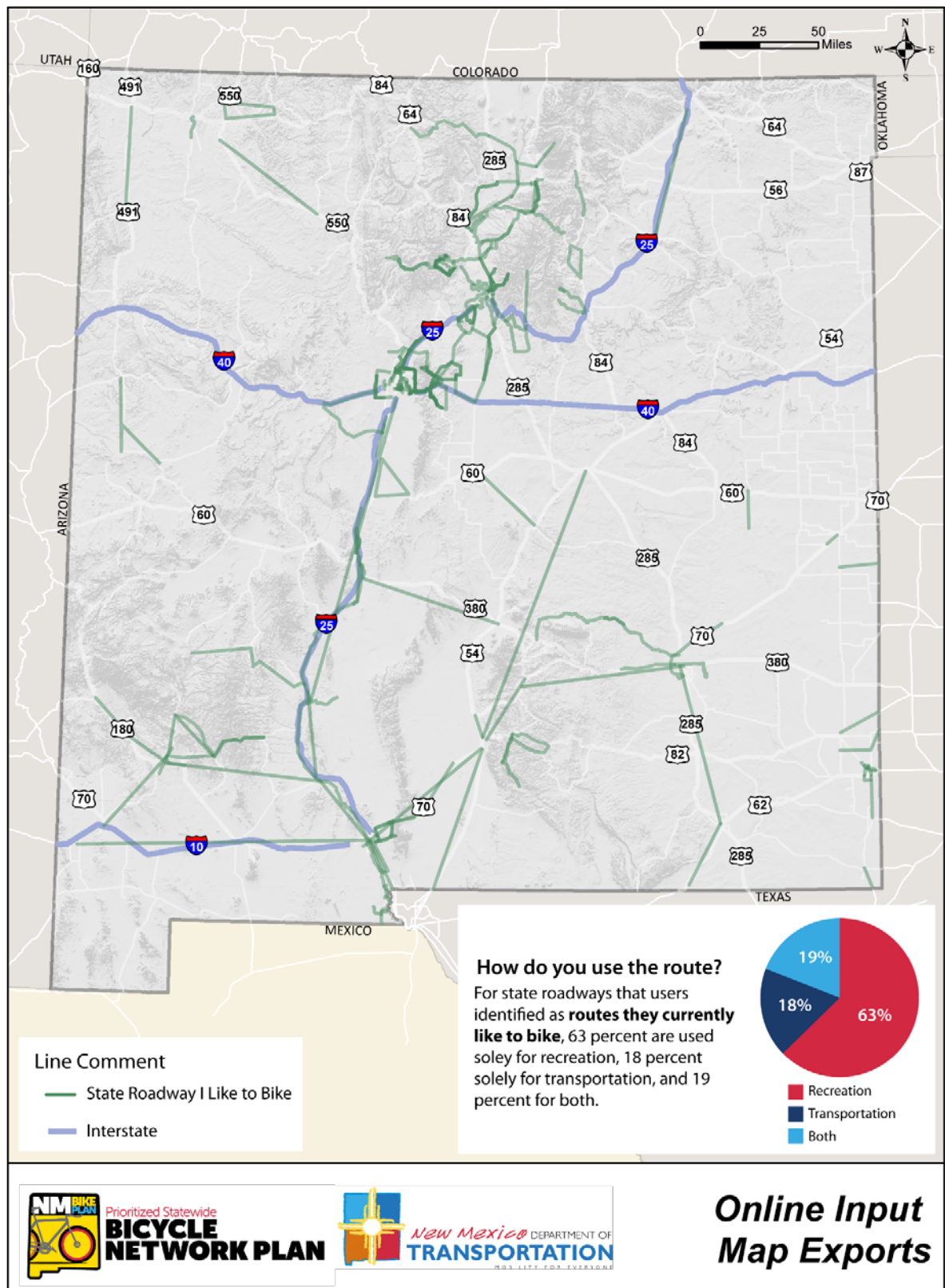


Figure 10 | State Roadway I Like to Bike

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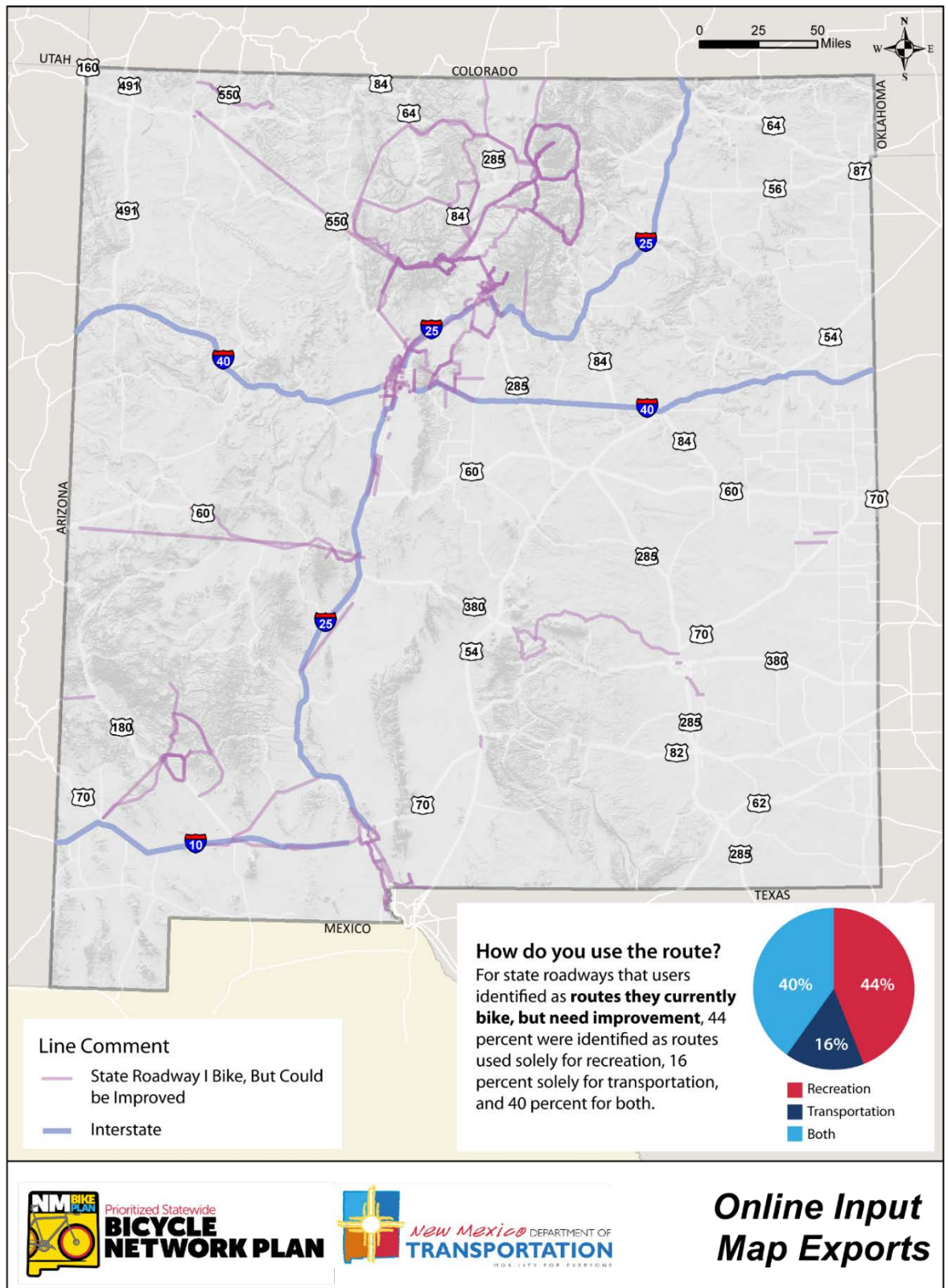
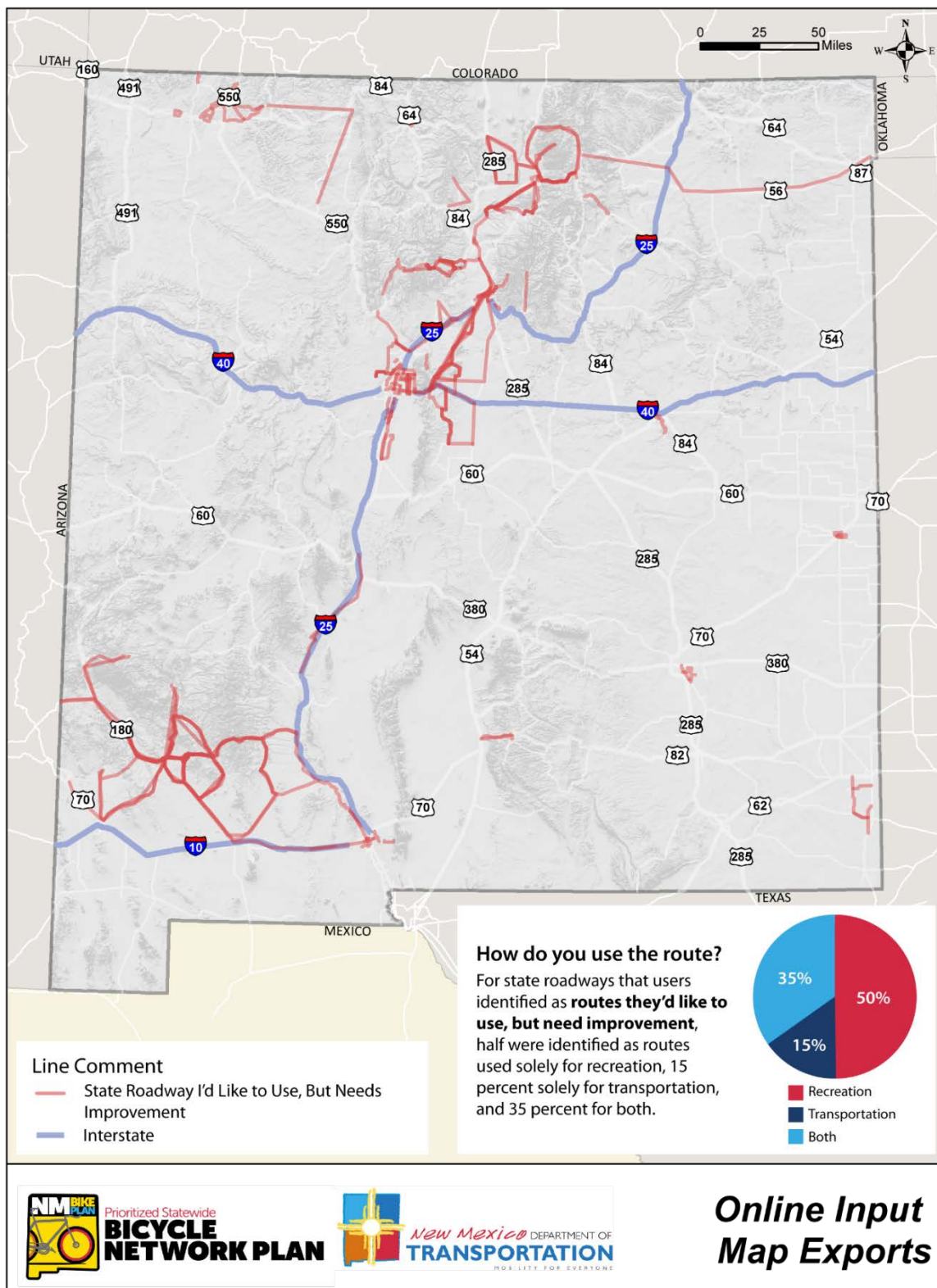


Figure 11 | State Roadway I Bike, But Could be Improved



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Figure 12 | State Roadway I'd Like to Use, But Needs Improvement

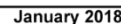


Figure 13 | Difficult Bicycling Locations

IV. BENEFITS OF BICYCLING AND BICYCLE PLANNING

PLANNING FOR BICYCLING

State DOTs across the United States, including NMDOT, are increasingly making investments to improve bicycle infrastructure on state-owned and maintained facilities. These investments are important due to the connections that state highways can provide for bicyclists. In more urbanized areas, bikeway facilities along highways and major roads provide direct routes to employment sites and activity centers. In smaller cities and towns, state highways may also be the 'Main Street' through the community, and in rural areas, they represent desirable routes for recreational bicycling.



Expanding bicycle networks can help to achieve the key goal of making it safer to bicycle on state highways, both in urban and rural contexts. When people perceive bicycling to be a safe activity, research suggests that more people will ride. As more people bicycle, the environmental, health, and economic benefits associated with increased rates of bicycling increase as well.

BENEFITS OF BICYCLING

Investments in bikeway infrastructure on state highways can provide many benefits, both to bicyclists and to the state in general. In particular, a bicycle-friendly New Mexico can help to improve safety, support healthy living, decrease traffic and associated pollution, and stimulate local and regional economic development. This section summarizes how making investments in bicycling infrastructure can provide increased safety, as well as public health, environmental, and economic benefits.

Safety Benefits

Providing dedicated bicycling facilities, such as bike lanes or shoulders, has been found to reduce rates of crashes and injuries among bicyclists, when compared to roadways without bicycle accommodations.⁴ By contrast, when evaluating all fatal traffic injuries, research

⁴ Reynolds, Conor Co, M. Anne Harris, Kay Teschke, Peter A. Cripton, and Meghan Winters. "The Impact of Transportation Infrastructure on Bicycling Injuries and Crashes: A Review of the Literature." *Environmental Health* 8, no. 1 (October 21, 2009).

suggests that bicyclists are 2.3 times more likely to be fatally injured on a given trip compared to passenger vehicle occupants.⁵

There is a clear "safety in numbers" effect with active transportation. When walking and bicycling rates double, the per-mile risk of collisions between motorists and pedestrian or bicyclists has been found to decrease by as much as 34 percent.⁶

Dedicated bikeway facilities, including striped shoulders, improve behavioral predictability among different roadway users by helping to define lane positioning and turning movements more clearly.⁷ This organization of traffic provides benefits to both bicyclists and drivers. One study found that more drivers feel comfortable when driving on a street with a separated bike lane, compared to a street that has no bikeway markings.⁸

Health Benefits

A growing number of studies show that the design of our transportation systems – including connections to the places where people live, learn, work, play, and recreate – impacts people's ability to reach the recommended amounts of moderately intense physical activity. According to the Centers for Disease Control and Prevention (CDC), nearly 40 percent of Americans are obese, resulting in a myriad of physical and mental health problems.⁹ The increased rate of disease associated with inactivity reduces quality of life for individuals and increases medical costs for families, companies, and local governments.

The eight US cities with the highest active transportation mode share have 20 percent lower occurrence rates of obesity and diabetes, when compared to other US cities.¹⁰

⁵ Beck, Laurie, Ann Dellinger, and Mary O'Neil. "Motor Vehicle Crash Injury Rates By Mode Of Travel, United States: Using Exposure-Based Methods To Quantify Differences." *American Journal of Epidemiology* 166, no. 2 (July 15, 2007): 212-18. Accessed April 19, 2018. doi:10.1093/aje/kwm064.

⁶ Jacobsen, P. L. "Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling." *Injury Prevention* 9, no. 3 (October 01, 2003): 205-09. Accessed April 19, 2018. doi:10.1136/ip.9.3.205.

⁷ Ewing, Reid, and Eric Dumbaugh. "The Built Environment and Traffic Safety." *Journal of Planning Literature* 23, no. 4 (May 21, 2009): 347-67.

⁸ Sanders, Rebecca, and Jill Cooper. "Do All Roadway Users Want the Same Things?" *Transportation Research Record: Journal of the Transportation Research Board* 2393 (2013): 155-63.

⁹ *NCHS Data Brief*. Center for Disease Control and Prevention, US Department of Health and Human Services, Number 288, October 2017.

¹⁰ Ogden, C.L. "Childhood Obesity in the United States: The Magnitude of the Problem." Accessed June 2013. <http://www.cdc.gov/cdcgrandrounds/pdf/gr-062010.pdf>.

The CDC determined that creating and improving places to enable more physical activity could result in a 25 percent increase in the number of people who exercise at least three times a week. This is a significant consideration for people who are inactive; the average American is more than 24 pounds heavier today than in 1960, largely due to lower levels of activity. Even small increases in physical activity can bring measurable health benefits. Creating additional transportation options for New Mexico residents by establishing a safe and reliable bicycle network can therefore positively impact the health of local residents. The Rails-to-Trails Conservancy puts it simply: "Individuals must choose to exercise, but communities can make that choice easier."¹¹

Environmental Benefits

Research suggests that a significant portion of the population would consider bicycling if dedicated bikeway facilities were provided.¹² Since the majority of Americans complete their trips by driving alone – even though 40 percent of all trips in the United States are less than 2 miles – a mode shift to bicycling could have meaningful benefits from an environmental perspective. Cities across the country offer proof of this hypothesis; as the total mileage of dedicated bikeway facilities in urban areas has increased across the United States, the percentage of people who bicycle for all types of trips has increased as well.¹³

Transportation activities now represent the greatest source of greenhouse gas emissions in the United States; motor vehicle emissions represent 31 percent of carbon dioxide, 81 percent of carbon monoxide, and 59 percent of nitrogen oxides released in the United States. As more roadways in New Mexico are made safer for bicycling, the total number of people choosing to bicycle for utilitarian and recreational trips could increase. The replacement of vehicle trips with bicycle trips would decrease pollutants released into the atmosphere, helping to improve air quality and reduce other negative externalities associated with air pollution.

Economic Benefits

Making improvements for bicycling in New Mexico can generate numerous economic benefits, both from a transportation-cost perspective and by supporting tourism and economic development. Bikeway connections are also an important means of improving access to employment opportunities, especially for individuals without access to a private vehicle. These connections include the first and last mile to transit service, as well as facilities that provide direct access to employment sites. These concepts and benefits are reflected in the demand and equity analysis described in Chapter VI.

By shifting short trips to bicycling, individuals can gain a significant amount of savings. On average, transportation costs comprise the second largest portion of an individual's income,

¹¹ *Health and Wellness Benefits*. Issue brief. Rails-To-Trails Conservancy. 2006..

¹² Dill, Jennifer, and Nathan McNeil. *Four Types of Bicyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential*. Working paper. Portland State University. August 10, 2010.

¹³ Dill, Jennifer, and Theresa Carr. "Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them." *Transportation Research Record: Journal of the Transportation Research Board*, 1828 (2003): 116-23.

and these costs have a disproportionate impact on lower-household incomes.¹⁴ On an annual basis, owning and operating a motor vehicle is estimated to cost \$8,500; in contrast, the annual cost for bicycle ownership and maintenance is less than \$200.¹⁵ Making affordable transportation, such as bicycling, a reliable and feasible option can help to reduce the need for vehicle ownership and relieve the economic burdens associated with high transportation costs.

Outdoor recreation and bicycle tourism play an important role in the New Mexico economy as a large majority of overnight visitors from neighboring states to New Mexico (72 percent) participate in outdoor recreation when visiting. New Mexico also sees more bicycle tourism than the United States as a whole; among overnight visitors, 4.2 percent report bicycling while visiting New Mexico, compared to the US average of 3.5 percent.¹⁶

Though specific economic impact data for bicycle tourism in New Mexico is not currently available, data is available for neighboring Colorado, a state that has prioritized improvements for bicycling on state highways and that has a similar climate and geography to New Mexico. In Colorado, bicycling is estimated to contribute \$1.1 billion annually to the state's economy. Of this total, an estimated \$448 million is contributed by bicycle tourism alone.¹⁷

COMPLETE STREETS

Bikeway infrastructure can be an important component in the development of Complete Streets – streets that are designed and operated to provide safe and equitable access for all forms of transportation. Complete Street improvements include:

- Providing dedicated space for pedestrian and bicyclists
- Providing high-quality transit options and infrastructure
- Developing an attractive and inviting public realm through planting strip and furnishing zone design
- Accommodating the efficient flow of motor vehicles

This type of design is also beneficial for businesses; Complete Streets are shown to generate more economic activity than streets that do not incorporate infrastructure for all types of users.¹⁸

¹⁴ Pennywise, *Pound Fuelish: New Measures of Housing Transportation Affordability*. Report. Center for Neighborhood Technology. March 2010.

¹⁵ "Economic Benefits: Money Facts." Pedestrian and Bicycle Information Center. 2008.

¹⁶ *Companion Report E: Outdoor Recreation in New Mexico Economic Contributions; Viva New Mexico: A Statewide Plan for Outdoor Adventure*. State of New Mexico. December 2015.

¹⁷ *Economic and Health Benefits of Bicycling and Walking*. State of Colorado. October 6, 2016.

¹⁸ *It's a Safe Decision: Complete Streets in California*. Report. National Complete Streets Coalition. February 22, 2012. Accessed April 19, 2018.

The role of Complete Streets in supporting local economic development is consistent with the goals of the New Mexico MainStreet Program. Developing town and village commercial centers as Complete Streets can result in many benefits, including slowing motor vehicle speeds, making roadways easier to cross on foot and by bicycle – both at intersections and mid-block – and providing dedicated space for all forms of transportation. These benefits, when combined, create places that people want to walk, bike, and shop along. Communities that provide a high quality of life with amenities such as bikeways can attract new businesses, industries, and residents.



In 2017, NMDOT installed bike lanes along Boardman Drive (NM 564) in Gallup, NM as part of a road diet that converted the roadway from a four to three-lane cross-section.

V. BICYCLE PLANNING IN NEW MEXICO

LEGAL RIGHTS AND RESPONSIBILITIES OF BICYCLISTS

In New Mexico a person riding a bicycle has all of the rights and responsibilities as a driver of a motor vehicle.¹⁹ Bicyclists are required to ride as near to the right side of the roadway as practicable, exercising due care when passing a standing vehicle or one proceeding in the same direction.²⁰ Bicyclists are allowed to ride on all roadways in New Mexico, unless specifically prohibited. Currently, the only roads owned or maintained by NMDOT that prohibit bicycles are interstate highways within the boundaries of cities with a population of 50,000 or more.²¹

BICYCLE BEHAVIOR AND TRENDS

There is a strong bicycling culture in New Mexico and a growing demand for additional bikeway infrastructure. This demand is exemplified by the range of bicycle advocacy groups and recreational and competitive races across the state. Bicycling events, such as Bike to Work Day, also generate high levels of interest and participation. However, it is also clear that bicyclists in New Mexico today are not representative of the overall population. Participants in a 2014 Bike to Work Day questionnaire in Albuquerque were disproportionately male (71.6%), white (70.3%), and earn a higher income (median household income above \$70,000) than the overall state population.²²

Data on statewide bicycling patterns are somewhat elusive, though it is possible to gain a general sense of bicycling activity from US Census commuting data and local surveys. According to the American Community Survey, bicycling for commuting purposes is more common in the state's largest cities, with a disproportionate share of commuting activity taking place in the Albuquerque area (see Table 1). The Mid-Region Household Survey, conducted across the Albuquerque metropolitan area in 2013/2014, provides data for all trips and all modes among survey participants. The survey indicated that a somewhat higher share of overall trips was taken by bicycle than indicated by US Census commuting trip data; about 2% of overall trips across the metropolitan area were by bicycle (versus 1.6% of commuting trips) for an average distance of 2.8 miles.

¹⁹ NMSA §§ 66-1-4.19(B); 66-3-702

²⁰ NMSA § 66-3-705

²¹ NMAC 18.31.3.8 (B)

²² Rowangould, Gregory M. and Tayarani, Mohammad, *Journal of Urban Planning Development*, 2016, 142(4).

According to the 2014 American Community Survey 1-Year dataset (the time of the Bike to Work Day study), about 39% of the state population was white alone and the median household income in New Mexico was \$44,803.

In a formal study conducted on the results of a 2014 Bike to Work Day questionnaire in Albuquerque, researchers concluded that the provision of bikeway facilities likely caused an increase in the amount of bicycle mode share, while reducing vehicle mode share in the Albuquerque area. The study found that in the absence of bikeway facilities, many trips would not have been taken at all, primarily due to safety concerns.

Table 1 | Bicycle Commuting Share, 2016 American Community Survey, 1-Year Estimates

Place	Share
New Mexico	0.7%
Albuquerque	1.6%
Las Cruces	0.8%
Santa Fe	1.0%

The study also revealed that bike facilities are most important for the least experienced bicyclists, and that the provision of bikeway facilities may play an important role in recruiting new bicyclists to switch transportation modes. These findings are consistent with the feedback obtained from the NM Bike Plan survey, which indicates that the availability of bikeway infrastructure is the most important factor for bicyclists in determining whether or not to ride.²³

Safety, however, is a major concern for bicyclists. In 2016, bicyclists were involved in about 0.8% of crashes but were injured about 85 percent of the time, reflecting the vulnerability of bicyclists in motor vehicle-involved crashes. Nationwide, around 45,000 bicyclists were injured in auto-involved crashes in 2015, including 818 deaths, a 12.2 percent increase from the previous year.²⁴

Table 2 | Bicyclist-Involved Vehicular Crashes in New Mexico, 2012-2016

Injury Type	2012	2013	2014	2015	2016	Share of Total Vehicular Crashes Involving Bicyclists
Fatalities	7	3	4	7	4	1.1%
Suspected Serious Injuries	31	24	26	29	26	7.0%
Suspected Minor / Possible Injuries	240	214	219	262	287	77.4%
No Injuries	116	66	68	66	54	14.6%
Total	394	307	317	364	371	100.0%

²³ Rowangould, Gregory M. and Tayarani, Mohammad, Journal of Urban Planning Development, 2016, 142(4).

²⁴ Traffic Safety Facts 2015. National Highway Traffic Safety Administration

STATE PLANNING CONTEXT AND SUPPORTING DOCUMENTS

Through various efforts over the last decade, NMDOT placed increased emphasis on providing multi-modal transportation options and promoting the safety of residents and travelers across the state. The NM Bike Plan, with specific design guidance and mechanisms for implementation, supports more general NMDOT plans and programs that relate to safety and active transportation. Collectively, these planning efforts facilitate NMDOT's pursuit of a comprehensive set of transportation investments to provide safe and meaningful transportation options for non-motorists. Guidance found in the following documents provide additional context and inform the implementation measures and recommendations made in the NM Bike Plan.

State Law NMSA 67-3-62 requires that provisions for pedestrian, bicycle, and equestrian traffic shall be considered as part of all NMDOT projects.

New Mexico 2040 Plan (2015)

The New Mexico 2040 Plan (2040 Plan) provides guidance to address the long-term needs of New Mexico's transportation system. In particular, the 2040 Plan prioritizes investments among the state-owned transportation facilities and identifies Priority Tiers for the various modes included in the statewide transportation system (see Figure 14). Priority infrastructure are generally organized into tiers with Tier 1 including the highest priority and/or most heavily utilized facilities.







The 2040 Plan places an emphasis on multi-modal transportation as a means of achieving a range of statewide goals and objectives. Among these stated objectives, the 2040 Plan considers the need to "provide multimodal access and connectivity for community prosperity," including making bicycling safer and more feasible on state roads. Important bicycle-related actions in the 2040 Plan include the identification of key bicyclist destinations, such as scenic byways, natural historic trails, and employment centers, among others. Among its bicycle-related action items, the 2040 Plan identifies resurfacing projects as an opportunity to improve or maintain bikeway facilities and calls for a means of prioritizing bikeway facilities along state highways.



NMDOT ACTIONS – BICYCLES (NEW MEXICO 2040 PLAN)

- Develop a state bicycle, pedestrian, equestrian (BPE) plan to refine the strategies set forth in the 2040 Plan and establish priorities for facility development.
- Use routine resurfacing projects as an opportunity to improve or maintain bikeway facilities and connectivity along identified corridors.

The NM Bike Plan fulfills many of these action items. The NM Bike Plan also builds upon the 2040 Plan's framework through the identification of priority corridors and the implementation of bikeway facilities as part of the reconstruction and road improvement process (see Figure 14).

Tier	 Roads	 Freight	 Bus/Rail	 Pedestrian	 Bicycle	 Aviation
1	Interstates	Interstates Transcontinental Railroads	Demand for >35 scheduled trips per week in each direction	Urban highway routes ... with population concentrations	High demand on- system routes	Primary commercial airports (e.g., Sunport)
2	Cities 20k+ Demand > 10k High tourist demand destinations	Remainder of priority truck network High demand shortline railroads	Demand for 20-34 scheduled trips per week in each direction	... with pedestrian generating land use	Medium demand on- system routes	Non primary commercial airports
3	Cities 10k+ Demand > 5k Rest of NHS Tourist destinations	Remainder of active short line railroads, regionally significant freight network	Demand for 5-19 scheduled trips per week in each direction	... all other segments	Low demand on- system routes	Reliever airports
4	All others	Abandoned railroads	Demand for 1-4 trips per week in each direction	Non-urban highways, no ped accommodation	Routes that appropriately prohibit bicycles	General aviation airports

"Gold Standard"
Highest performance targets
 "Silver Standard"
Mid-level performance targets
 "Bronze Standard"
Lowest performance targets
 Not appropriate
for investment

Figure 14 | Priority Tier Levels by Mode, New Mexico 2040 Plan

Bicycle Pedestrian Equestrian Advisory Plan (2009)

The Bicycle Pedestrian Equestrian (BPE) Advisory Plan established an initial set of statewide strategies and recommendations for alternative modes of transportation. Many of these recommendations, including the inclusion of bikeway facilities as a routine part of roadway analysis and design, are addressed more comprehensively in the NM Bike Plan.

From a programmatic perspective, the BPE Advisory Plan provides guidance on the implementation of safety, educational, and enforcement initiatives to promote safer conditions for all transportation modes and to encourage more New Mexico resident to engage in active transportation. The plan also calls for AASHTO guidance related to bicycle design to be implemented on NM highways.

KEY RECOMMENDATIONS AND IMPLEMENTATION STRATEGIES – NMDOT BPE ADVISORY PLAN

- Encourage design appropriate to multi-modal traffic.
- Develop criteria/strategy to effect changes.
- Strengthen State Law requiring BPE provisions.
- Develop criteria for including pedestrian facilities, funded through project budget or otherwise. Use AASHTO guidelines and other guidance, such as the NMDOT School Crossing Guide and the Safe Routes to School program.
- Improve highway construction practices to benefit bicyclists and others:
 - Edge-to-edge overlays
 - Rumble Strip policy
 - Continuous usable shoulder
- For federal-aid projects that contain bicycle and pedestrian features, the NMDOT needs to ensure that its work is AASHTO compliant.
- Partner with other state and local agencies to support educational efforts related to the Helmet Safety Law and pedestrian safety, encouragement of “active transportation” by New Mexico Department of Health and partners, planning efforts favoring the creation of walkable environments.

Strategic Highway Safety Plan (2016)

The Strategic Highway Safety Plan (SHSP) coordinates safety-related programs and strategies for reducing fatal and serious injury crashes on New Mexico roads. New Mexico ranked 4th in 2014 for fatalities in bicycle-related crashes with a rate 45% higher than the national average (3.36 fatalities per million vehicle miles in New Mexico, compared to 2.31 fatalities per million vehicle miles in the US overall in 2012). The SHSP is a requirement for the use of Highway Safety Improvement Program (HSIP) funding and is updated regularly. HSIP funds may be used for projects that address needs and issues identified in the SHSP.

“The New Mexico SHSP is intended to coordinate traffic safety programs across the state, identify priorities and strategies, and provide a common measure and approach in traffic safety efforts for all roadway users.”

In addition to a range of strategies for improving roadway safety, the SHSP identifies bicyclists as an emphasis area and outlines a series of programs and strategies to improve bicyclist safety. Other important safety strategies include establishing programs to fund bicyclist skills and safety education, maintaining a Road Safety Assessment program, and coordinating law enforcement efforts to improve motorist and bicyclist behavior.

The following infrastructure-related strategies are identified in the SHSP to reduce crashes resulting in bicyclist fatalities and serious injuries on NM highways:

- Consider bicycle usage and safety on shoulders for resurfacing and maintenance projects
- Review guidelines regarding the need for and ideal placement of rumble strips for the safety of all users
- Develop guidelines and policies that include safe interaction and connectivity of transit, pedestrian, and bicycle modes in planning and design of transportation facilities

The NM Bike Plan specifically addresses these goals in two ways: 1) through design guidelines that call for bikeway shoulders and bike lanes in rural and urban areas respectively along Tier 1 and 2 NM highways; 2) through guidance for incorporating bikeway infrastructure during reconstruction projects, as well as for accommodating bikeway improvements during resurfacing and other maintenance activities, when possible.

Highway Safety Plan (2017)

The Highway Safety Plan (HSP) reviews safety conditions and crash data across New Mexico and provides data-driven strategies to address the safety issues on NM highways for motorists, bicyclists, and pedestrians, and to reduce crashes resulting in fatalities of those users. The HSP is required by the National Highway Traffic Safety Administration (NHTSA) and enables NMDOT to access funds for safety-related programs.

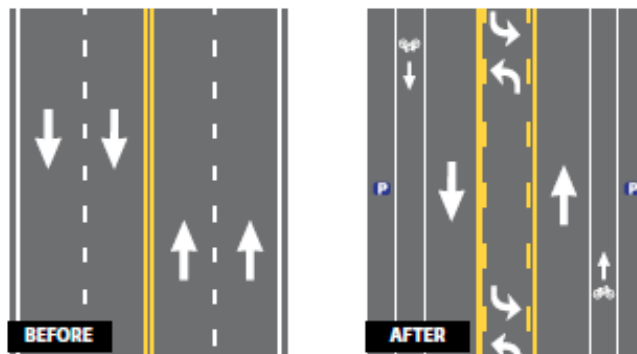
Strategies in the HSP for increasing bicyclist safety include educational efforts to increase safe driving habits and create awareness of the presence of bicyclists. Notable among NMDOT programs and campaigns are the ENDWI and DNTXT initiatives and the Look for Me campaign to raise motorist awareness of pedestrians and bicyclists. To improve bicyclist safety and comfort, the NM Bike Plan recommends the continuation of driver education programs and campaigns that increase awareness of the presence of bicyclists.



NMDOT Road Diet Guide (2016)

The NMDOT Road Diet Guide provides evaluation techniques and design considerations for the potential reallocation of roadway space. A road diet consists of changes to the roadway cross-section in order to reduce speed and improve safety, provide improved options for active transportation modes, and better support surrounding land uses. Road diets typically involve the reduction of travel lanes, such as the conversion of a four-lane roadway to a three-lane

facility with one vehicular through-lane in each direction and a center turn lane. This reallocation of roadway space often allows for the addition of bicycle lanes in each direction. The Guide also enables users to determine if the conditions along a roadway are appropriate for the application of a road diet.



Source: FHWA, https://safety.fhwa.dot.gov/road_diets/case_studies/

Figure 15 | Typical Road Diet Reconfiguration

The Introduction chapter of the Road Diet Guide reflects an emphasis on safety on the part of NMDOT and an approach to incorporate multi-modal transportation options in roadway design, where possible. Though the Road Diet Guide is intended for internal use by NMDOT, local jurisdictions may utilize the principles in the document to identify potential locations where excess capacity exists on local roads or where traffic calming and roadway reconfiguration may be appropriate. As road diets often include the introduction of bikeway facilities, the NM Bike Plan can serve as a complementary reference document to the NM Road Diet Guide during the road evaluation and redesign procedures.

NMDOT Roadway Bicycle Guideline Map

The NMDOT Roadway Bicycle Guideline Map was developed to assist bicyclists in selecting preferred routes through New Mexico based on their personal skill and comfort level. The map includes estimated shoulder width (including presence of rumble strips, guardrails, and other adjacent barriers), traffic volumes, steep inclines, and other features that may impact one's decision to travel by bicycle along a roadway.

The Bicycle Guideline Map is complemented by the NM Bike Plan, which identifies desired bikeway infrastructure levels. The map remains a valuable tool for bicyclists who wish to understand existing conditions along NMDOT roadways.



Information gathered for the Bicycle Guideline Map was incorporated into the statewide priority network contained in the NM Bike Plan. See the Recommendations section of Chapter IX for additional discussion.

DESIGNATED AND PROPOSED BICYCLING ROUTES

Nation-wide bicycling routes have emerged in recent years to promote long-distance recreational bicycle travel and encourage improved infrastructure for bicyclists. Routes designated by the Adventure Cycling Association (ACA) and proposed as part of the US Bicycle Route (USBR) system pass through New Mexico and follow NM highways. The designation of a facility on the proposed USBR system, an ACA route, or a state-designated bicycle route were considerations in the development of the prioritized statewide network.

Adventure Cycling Routes

The ACA Route Network is composed of bicycling routes with low levels of vehicle traffic through rural and scenic portions of the US. ACA routes appeal to long-distance adventure and recreational bicyclists and follow a combination of roads as well as both paved and unpaved trails.

ACA routes are not intended to provide the quickest paths between destinations, but to encourage travelers to utilize scenic routes in cross-country travel. Several ACA routes pass through the state of New Mexico, and portions of these routes are located on NM highways. ACA routes through New Mexico include:

- **Southern Tier Bike Route** – Section 2: Tempe, AZ to El Paso, TX
- **Great Divide Mountain Bike Route** – Section 5 (Platoro, CO to Pie Town, NM) and Section 6 (Pie Town, NM to Antelope Wells, NM)
- **Bicycle Route 66** – Section 4 (Adrian, TX to Gallup, NM) and Section 5 (Gallup, NM to Oatman, AZ)

Note: ACA is a nonprofit organization and its routes are designated without involvement from the jurisdictions which own or maintain the roadways.

US Bicycle Route System

The American Association of State Highway Transportation Officials (AASHTO) and the ACA are leading the development of the USBR system, a network of long-distance bicycle routes that promote bicycle travel across the US. Sections of these national routes must be officially submitted by each state to AASHTO for designation and must meet the criteria outlined in the [AASHTO Purpose and Policy Statement](http://www.adventurecycling.org/default/assets/File/USBR/AASHTOPurposePolicyStatement.pdf).²⁵ The proposed route network includes several alignments through New Mexico:

²⁵ AASHTO USBR “Purpose and Policy Statement” (2009):
<http://www.adventurecycling.org/default/assets/File/USBR/AASHTOPurposePolicyStatement.pdf>

- **USBR 66** follows the general trajectory of the historic Route 66 from Chicago to Los Angeles and traverses New Mexico in an east-west direction
- **USBR 90** follows a coast-to-coast path along the southern part of the US and approximately follows the I-10 corridor through New Mexico
- **USBR 75** follows a north-south alignment that roughly parallels I-25 and the Rio Grande. If officially designated, USBR 75 could utilize portions of the proposed Rio Grande Trail as well as NM highways
- **USBR 84** provides an east-west cross-country route and travels through New Mexico between El Paso and Lubbock, TX

The Arizona Department of Transportation has designated the USBR 90 alignment through Arizona. Some degree of coordination and conformance would be required among agencies to ensure that NM highways designated as part of the network connect to the alignments in surrounding states, such as Arizona.

The planned USBR system was developed independently of the analysis conducted for the NM Bike Plan. The NM Bike Plan serves a broader mission than the USBR, which emphasizes cross-country travel rather than the needs of each state's residents. Nevertheless, there is a significant amount of overlap between locally-identified routes and the proposed USBR network. Though the actual alignments of the proposed USBR routes through New Mexico may change, all portions of the proposed USBR are designated as either Tier 1 or 2 facilities in the NM Bike Plan.

State Route Designations

The former NMDOT Bicycle-Pedestrian-Equestrian (BPE) Advisory Committee designated a series of New Mexico bicycling routes in the 2000s; these routes are mostly located on NM highways that support long-distance bicycling and where wide shoulders exist. Numbered signage indicates the facility is a designated bicycle route. However, the routes do not form a connected network. See the Section IX for additional discussion on state route designations.

Regional and Local Bicycle Planning in New Mexico

Ongoing bicycle planning is conducted at the regional level by each of the state's metropolitan planning organizations (MPOs) and regional transportation planning organizations (RTPOs). In the case of MPOs, these efforts result in either stand-alone plans or network information contained in the long-range metropolitan transportation plans. A growing number of New Mexico communities have developed master bicycle plans to guide the installation of bikeway infrastructure on locally-owned roads. Several cities and MPOs host monthly or ad hoc bicycle technical committees to discuss bicycling issues and guide project development.

The NM Bike Plan complements and supports these regional and local planning efforts by providing guidance on the NM highways where bikeway infrastructure would be most beneficial. The NM Bike Plan can therefore be utilized as a reference in the development of local and regional bicycle networks through its guidance on the type and quality of bikeway infrastructure that may be developed on NM highways over time.

Information on existing and proposed bicycling facilities was collected from local and regional bicycle planning documents as part of the development of the priority network. Each of the state's MPOs were consulted as part of the review of the statewide priority network and to consider the integration of the statewide and regional networks. Ongoing planning and coordination is required to ensure networks are well-connected. Coordination is particularly important for providing connections from Interstate system to local and regional bicycle networks, as well as travel options within the municipal areas with a population more than 50,000 where bicycle travel along the Interstates is prohibited and where Interstates and high-volume NM highways may pose obstacles to bicycle travel.

Recreational Bicycling Events in New Mexico

From local fun rides and charity races to 100-mile tours and regional championships, bicycling events are regularly held throughout the state of New Mexico. In addition to the locally-organized events listed below, USA Cycling regularly sponsors cycling events across New Mexico, with 22 different events listed on their 2018 calendar.

- Started in 1985 by the Sangre De Cristo Bicycle Club, the **Santa Fe Century** began as a way to raise money for the uniforms and entry fees of its members. The race has grown over the past 33 years, featuring a high of 2,900 riders in 2012.
- Organized by local architect Mark Richard in 1987, the **Tour of the Gila** began as a means to promote tourism in Silver City. For 31 years, the race has attracted bicyclists from across the globe, with 123 riders competing in 2018.
- Deemed the "flattest century in New Mexico," the **Tour of the Rio Grande Valley** parallels the Rio Grande, beginning in Albuquerque and traveling through the Isleta Reservation, Los Lunas, Belen and Bernardo. The tour features routes with lengths of 39, 62, 78 and 100 miles in total distance.
- The **Tour de Acoma**, which is entering its 17th year of competition, travels through the Acoma and Laguna Pueblo Reservations to raise money for the Haaku Museum Foundation.
- The **Enchanted Circle Century Bike Tour** follows the Enchanted Circle Scenic Byway from Red River, covering 100 miles of mountain roads and challenging heights up to 9,820 feet.
- Founded in 1973 to promote Los Alamos as a travel destination, the **Tour de Los Alamos** is the oldest running bicycle race in the Southwest.
- Established in 2011, the **Tour de Ocho Millas** covers an eight-mile loop around New Mexico's Bottomless Lakes State Park. The race is located just outside of Roswell and offers several route lengths for riders of all abilities.

NM HIGHWAYS USED IN RECREATIONAL BICYCLING EVENTS

Santa Fe Century

- NM 472
- NM 41
- NM 14
- NM 344
- NM 300
- US 285

Enchanted Circle Century

- NM 522
- NM 38
- NM 434
- US 64

Tour of the Gila

- NM 211
- NM 90
- NM 152
- NM 35
- NM 15
- NM 159
- US 180

Tour de Los Alamos

- NM 501
- NM 502
- NM 4

Tour of the Rio Grande Valley

- NM 45
- NM 314
- NM 109
- NM 346
- NM 304
- NM 309
- NM 500
- US 60

Tour de Acoma

- NM 124
- NM 117

Rio Grande Trail

In 2015, state legislation House Bill 563 solidified New Mexico's vision for a 500-mile cross-state recreational trail paralleling the Rio Grande and established the Rio Grande Trail Commission to oversee its development. Work on a comprehensive master plan began in early 2017, expanding on previous studies for select segments of the state. The Rio Grande Trail Master Plan defines the project vision as follows:

The Rio Grande Trail is New Mexico's cross-state, recreational trail for hiking, biking, and horseback riding along the Rio Grande. Trail users explore, learn about, and connect with a tapestry of diverse natural habitats, rich history, striking landscapes, and vibrant communities. The trail contributes to cultural and environmental awareness, healthy lifestyles, spiritual growth, and economic prosperity for New Mexico and its visitors.

The trail is anticipated to follow the Rio Grande for much of the corridor while connecting four national wildlife refuges, six national monuments, one national heritage area, and six state parks, touching nearly 10 counties and more than 22 cities and towns. The physical characteristics of the trail will vary widely

NM HIGHWAYS ALONG THE PROPOSED RIO GRANDE TRAIL CORRIDOR

- NM 599
- NM 14
- NM 165
- NM 536
- NM 333
- I-40 (existing I-40 East Trail through Albuquerque)
- NM 195
- NM 18
- NM 185

Reference the Rio Grande Trail Master Plan for specific route information.

depending on the context, from natural-surface, single-track trails to paved, shared-use paths to on-street bikeway segments. Much of the trail will be constructed on levees and ditch access roads along the Rio Grande; however, the trail will need to periodically divert from the Rio Grande to navigate a variety of constraints. Segments of the following NM highways are identified as corridors for the proposed preferred alignment of the Rio Grande Trail. (Reference the Rio Grande Trail Master Plan for specific route information, expected to be adopted in late 2018.)

Specific facility improvements along these routes will likely vary to accommodate the proposed Rio Grande Trail alignment. The design guidance recommendations in this Plan can assist with facility selection and design. Additionally, Rio Grande Trail wayfinding signage is recommended on all corridors. More information about the Rio Grande Trail can be found at www.riograndetrailnm.com.



VI. DEVELOPMENT OF THE PRIORITY NETWORK

By identifying locations where improved infrastructure is most beneficial, the statewide priority bicycle network provides a critical reference for roadway designers during the project development process and for NMDOT as it conducts long-term capital planning. This section outlines the evaluation criteria and methodology utilized in the development of the priority network. The priority network is complemented by the design guidelines outlined in Chapter VIII.

The priority network development process included quantitative and qualitative components. The Project Team calculated scores for each highway segment utilizing the evaluative criteria, with each highway segment assigned an initial tier level based on the results of the scoring exercise. The qualitative review process applied by the Project Team ensures consistency for adjacent segments along a corridor, while feedback from agency staff and other stakeholders informed the final tier designations.

As a result of this scoring exercise, a priority infrastructure tier level is assigned to all NM highways, reflecting the level of benefits associated with bikeway infrastructure on a particular route. In general, Tier 1 NM highways represent the locations with the highest current or potential demand for bicycling. Conversely, Tier 3 highways represent the lowest demand routes and are not prioritized for investments to improve bicycling conditions. See Chapter VII for detailed definitions.

Note: The NMDOT roadway ownership and geographic data used to develop the priority network is for general information and planning purposes only. Due to ongoing projects and agreements throughout the state, recent changes may not be reflected in this dataset.

QUANTITATIVE EVALUATION

Evaluation Criteria

The criteria utilized in the quantitative route evaluation process are described below and summarized in Table 3. Quantitative evaluation criteria are based upon best practices and feedback from stakeholder groups. This step of the network development was objective and data-driven, using overlays and proximity analysis in GIS to assign scores for each segment along NM highways. The scores for each criterion are added together to create a composite score. Using this method, NM highways that meet more criteria receive higher overall scores and are assigned to higher priority tier levels. The criteria include:

Public Input

Highways that received comments and input through the online interactive map qualified for points in this criterion. The most frequently identified locations receive the most points. See the Public Outreach section for figures depicting the feedback received through the online interactive map.

State Route Designation

Routes designated by the BPE Advisory Committee in the 2000s receive points in this criterion.

Local/Regional Route Designation

Through bicycle master plans and regional transportation plans, cities, counties, and regional governments have made recommendations to install bikeway facilities within their planning areas and jurisdictions. Highways identified through these local and regional governments planning efforts receive points for this criterion.

Existing Infrastructure

Highways with dedicated bikeway infrastructure (such as a bike lane) or shoulders that are four feet or greater receive points for this criterion.

Transit Access

Improving bicycling connections to transit increases the geographic area served by transit and enables bicyclists to combine trips and travel longer distances. Thoughtful integration of these modes can increase transit and bicycling mode share. Highways that connect to transit stops and stations receive points for this criterion.

Demand

The demand analysis highlights areas with potential to generate more bicycle trips in New Mexico. These areas include parks, major retail areas, employment centers, redevelopment areas, civic centers, etc.). By increasing bicycle accessibility to areas of high demand, more people may choose to bicycle to these places for utilitarian and recreational purposes. Highways that connect to or pass through these areas receive points in this criterion. Further details on the demand analysis methodology are found later in this Chapter.

Equity

The equity analysis conducted for the NM Bike Plan highlights areas that typically have higher rates of utilitarian bicycling trips and may be underserved when it comes to existing infrastructure. The equity analysis considers a combination of data related to age, race, income, educational attainment, Limited English Proficiency (LEP), and access to a private vehicle. Based on this analysis, highways that serve areas with high concentrations of historically-underserved populations receive points in this criterion. Further details on the equity analysis methodology are found later in this chapter.

Table 3 | Criteria and Scoring Values Used in the Development of the Priority Network

Criteria	Score	Description
Demand	4	Highway passes through or connects to areas that receive the highest demand analysis score (5)
	2	Highway passes through or connect to areas that receive medium demand analysis scores (4 or 3)
	0	Highway does not pass through or connect to an area that receive a medium demand analysis score (≥ 3)
Equity	4	Highway passes through block group that score within the top 75 th to 100 th percentile of equity analysis variables
	2	Highway passes through block group that score within the top 50 th to 75 th percentile of equity analysis variables
	0	Highway passes only through census tracts that score less than 50 th percentile of equity analysis variables
Public Input	6	Highway identified by the public as a desirable route (highest frequency)
	4	Highway identified by the public as a desirable route (medium frequency)
	2	Highway identified by the public as a desirable route (lower frequency)
	0	Highway not identified by the public as a desirable route
State Route Designation	2	Highway has a State Route Designation
	0	Highway does not have a State Route Designation
Local/Regional Designation	2	Highway has a Local/Regional Designation
	0	Highway does not have a Local/Regional Designation
Existing Infrastructure	2	Highway has existing dedicated bikeway infrastructure, such as a bike lane or 4-foot shoulder or greater
	0	Highway does not have existing dedicated bikeway infrastructure, or shoulders less than 4 feet
Transit Access	2	Highway connects to a transit station
	1	Highway connects to a transit route
	0	Highway does not connect to a transit station or route

Demand Analysis

A GIS-based bicycle demand analysis model quantifies and visualizes potential demand for bicycle travel statewide based on where people live, work, play, learn, and access transit (see Table 4 for inputs to the demand analysis). The results of the analysis are incorporated into the overall quantitative evaluation process represented in Table 3. The results are also useful as a stand-alone indicator of potential bicycle travel across New Mexico. To ensure that demand in urban areas does not overshadow rural and small-town areas, these geographic areas are assessed separately. All demographic data is assessed at the Census block group level.

Data Inputs

Data inputs for five categories (live, work, play, learn, access to transit) are incorporated into the demand analysis. Table 4 provides details on the data sources and the level at which data is analyzed (i.e. points, corridors, or Census block groups).

Table 4 New Mexico Bicycle Activity Demand Model Inputs		
Data Input	Source	Notes
Live Population Density	ACS 2011-2015 5-Year Estimates	Computed at the Census block group level.
Work Employment Density	2015 Longitudinal Employer-Household Dynamic (LEHD), Work-Area Characteristics	Computed at the Census block group level.
Play Existing Park Facilities Retail Density	National Park Service National Forest Service, NM State Parks; 2015 Longitudinal Employer-Household Dynamic (LEHD), Work-Area Characteristics	This analysis models the demand that parks generate regionally. ²⁶ Computed at the Census block group level.
Learn Schools	New Mexico Public Schools Facilities Authority, university and community college data compiled by Project Team	School types are weighted from highest to lowest as follows: college and universities, public and private elementary schools, and middle and high schools. School features are modeled using points.
Transit Transit Stop Locations	NMDOT Transit Guide 2016, transit service providers	Transit facilities weighted from highest to lowest as follows: station, center, stop, or route. Transit features are modeled using points and lines.

²⁶ Local park data is not included in the model due to the absence of a statewide dataset.

Demand Analysis Composite Results

Demand analysis composite results are calculated by summing all five categories: Live, Work, Play, Learn, and Access to Transit. The results of this process are summarized in Figure 16: Composite Demand in Small Towns and Rural Areas Map, and Figure 17: Composite Demand in Urban Areas Map.

Pockets of demand exist in both rural and urban areas throughout the state and providing connections between these pockets of demand is critical to building a statewide bicycle network. Additionally, connecting people via the state route system to transit corridors could also support regional trips that combine bicycling and transit. Establishing rural to urban connections, as well as bicycle networks within urban areas, will also increase connectivity.

The composite demand results for rural and small-town areas reveal pockets of demand located throughout the state. In the eastern portion of New Mexico, these areas include Las Vegas, Alamogordo, Ruidoso, Roswell, Artesia, Carlsbad, Hobbs, Portales, and Clovis. Across western New Mexico, demand is concentrated in communities such as Gallup, Zuni, Grants, the Acoma/Laguna corridor, Lordsburg, Silver City, and Deming. Los Alamos, Española, Taos, and the communities along the Enchanted Circle also display some demand. The corridors highlighted for potential demand in rural areas are generally the result of access to parks and the presence of transit service.

The composite demand results for urban areas indicate corridors and locations within the state's largest cities where bicycling demand is particularly high. Investments in these areas can benefit a large proportion of New Mexico's population and support utilitarian trips, including access to schools and employment sites. Since these areas demonstrate the greatest potential for generating bicycling trips, bikeway investments on NM highways through these areas may yield the greatest impact on bicycling mode share.

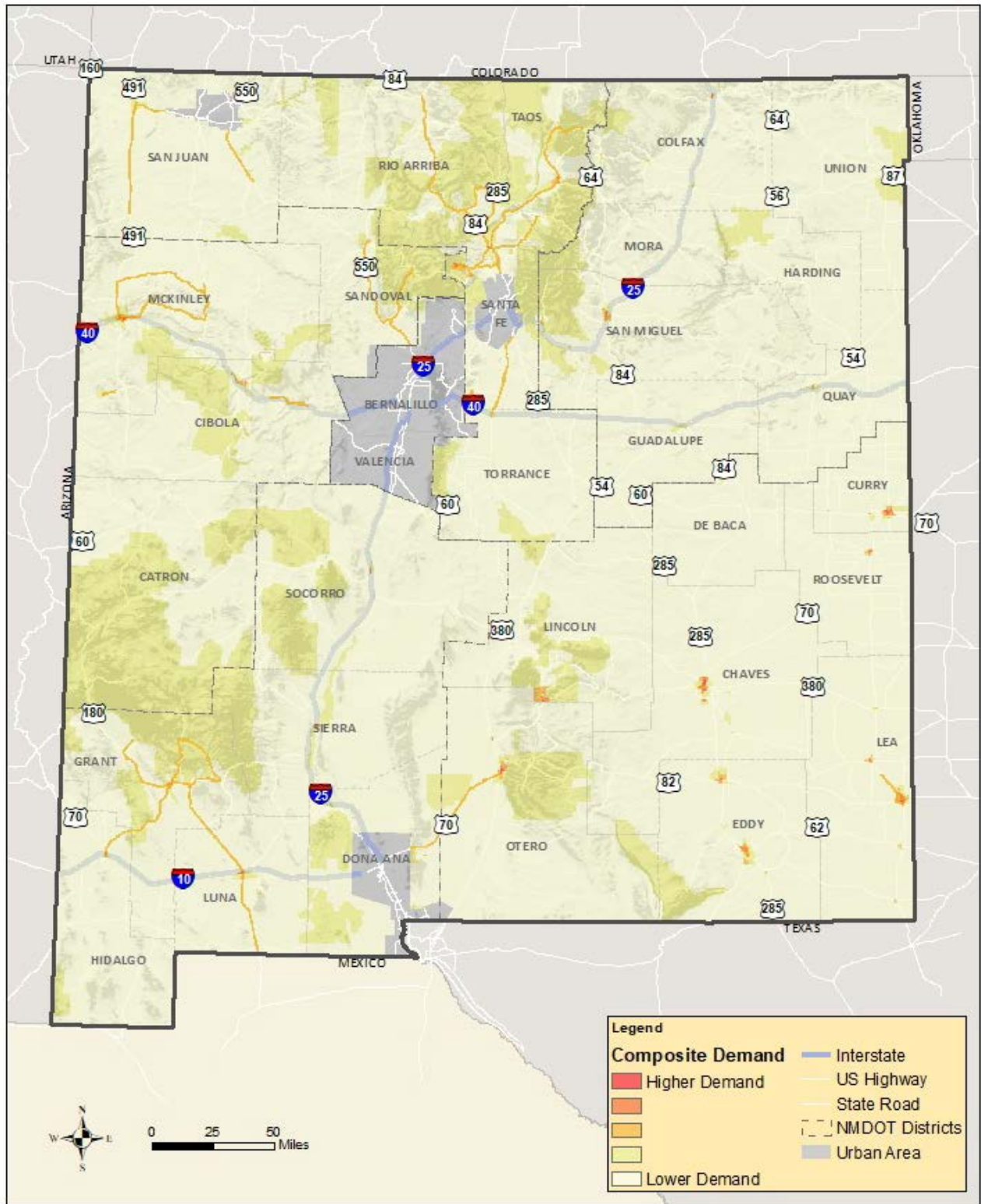


Figure 16 | Demand Analysis Composite Results in Small Towns and Rural Areas

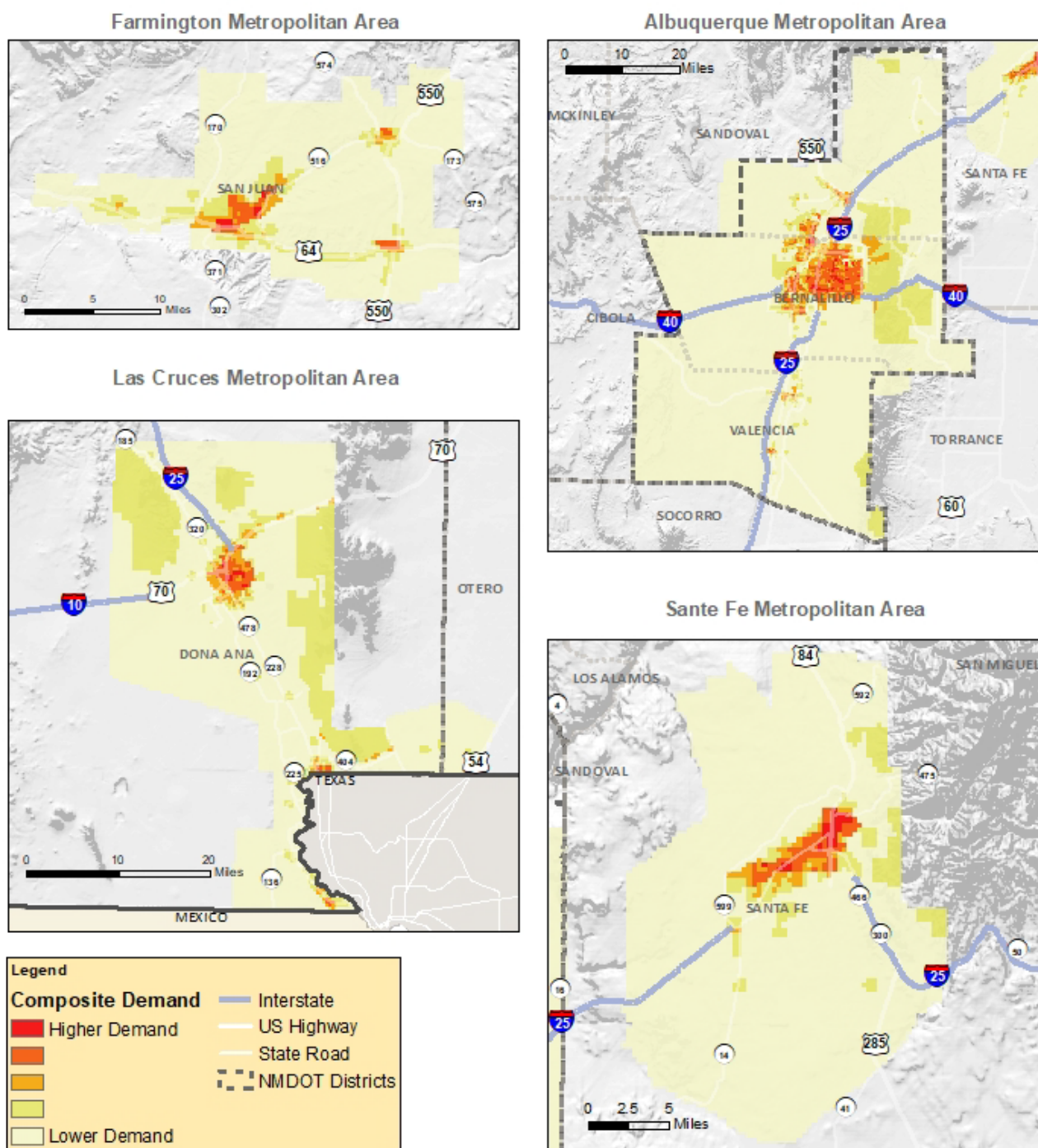


Figure 17 | Composite Demand in Urban Areas

Equity Analysis

For many people, particularly in lower-income households, walking, bicycling, and transit are the only transportation options. The equity analysis used in the NM Bike Plan considers demographic factors that collectively indicate concentrations of historically-vulnerable populations. Active transportation investments in these areas may address a broad range of issues, such as access to jobs, education, and healthcare.

The results of the equity analysis are used in the development of the statewide priority network and are represented in Table 5, with more points awarded to roadways located in areas with high composite equity scores.

Indicators

The equity analysis uses a combination of six socioeconomic indicators from the US Census Bureau, based on best practices as well as an extensive literature review and research, to identify where vulnerable populations are concentrated.²⁷ All data was evaluated at the block group level.

Equity Analysis Composite Results

The equity analysis composite results map (see Figure 18) uses a four-tiered scale to show concentrations of vulnerable populations based on the six indicators described above. The indicators are assigned equal weight in the model; red represents higher concentrations of the combined six characteristics, and green represents lower concentrations. The composite map depicts results for each Census block group compared to all Census block groups within New Mexico.

While this analysis does not directly assess access to existing active transportation facilities, the results identify areas where more facilities may be needed or where access to existing facilities needs improvement. Specifically, the analysis reveals high concentrations of vulnerable populations in the northwest and south-central portions of the state, as well as areas north and south of Taos. Many urbanized areas also exhibit concentrations of vulnerable populations.

²⁷ All data was obtained from the 2011 to 2015 American Community Survey (ACS) 5-year estimates. Analysis was conducted at the Census Block Group level for New Mexico.

Table 5 | Indicators Used in the Equity Analysis

Indicator	Definition	Rationale
Age	People under the age of 18 years of age and over the age of 65 years of age.	The population under 18 and over 65 years of age generally engage in active transportation at higher rates, due in part to less access to motor vehicles.
Income	Households at or below 200% of the Federal Poverty Level.	Poverty is a socioeconomic vulnerability linked with limited access to resources, such as transportation.
Language	Limited English Proficiency (LEP) is measured as percentage of households in which individuals over the age of 5 identify as not speaking English well or at all.	Individuals that meet this indicator tend to rely more on active transportation as their primary means of transportation than the average English speaker.
Race / Ethnicity	Non-white is measured as the percentage of all individuals not identifying as white and not of Hispanic origin. This includes people identifying as Hispanic, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Pacific Islander, or some other race.	Racial or ethnic minorities are more likely to live in areas with poor or limited active transportation facilities and tend to be more dependent on transit and active transportation.
Education	The percentage of the population over 25 years of age without a high school diploma or equivalent.	Nationwide, those without high school diplomas have the highest rates of walking and the second highest rates of bicycling to and from work.
Commuting	Motor vehicle access is based on the American Community Survey question about household access to one or more cars, trucks, or vans.	Households with limited or no access to motor vehicles by necessity use other transportation options, such as walking, bicycling, and transit.

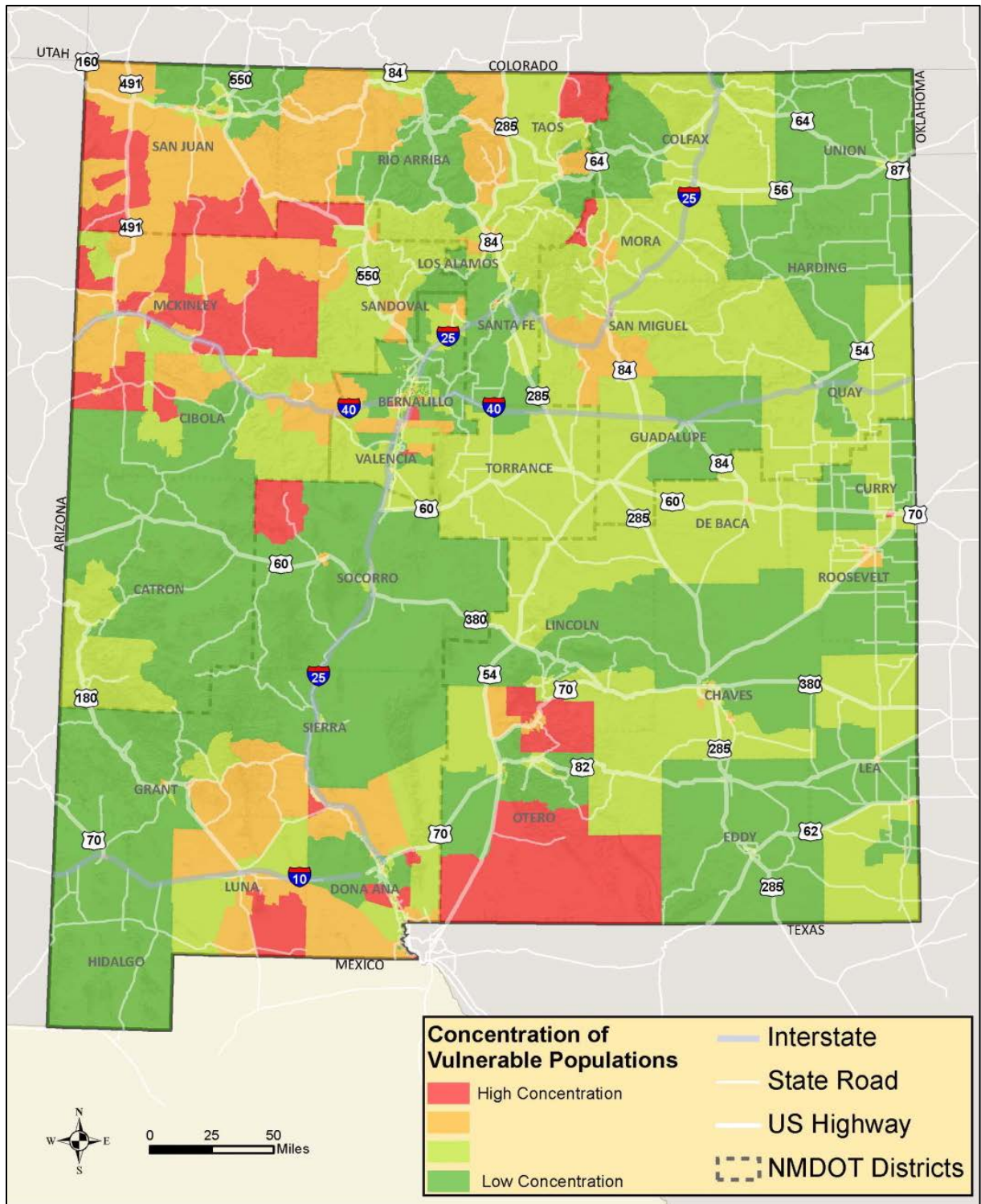


Figure 18 | Composite Equity Map

QUALITATIVE REVIEW

The Project Team applied a qualitative review process to the results of the quantitative analysis described above to ensure the prioritized network across the state of New Mexico is logical, consistent, and reflects a realistic set of roadways for NMDOT to improve and maintain over time. Key stakeholders including NMDOT districts and MPO staff reviewed the network and provided comments during the final phase of public outreach.

The Project Team applied the following qualitative considerations to ensure the statewide priority network is feasible and implementable:

- Roadway conditions, such as presence of high levels of heavy truck travel
- Integration with local and regional bicycle networks
- Statewide connectivity to ensure that long-distance travel across New Mexico can be completed along facilities with some level of bikeway infrastructure
- Review of tier levels among adjacent segments to ensure consistent infrastructure along a corridor
- Whether roadways with low traffic volumes require dedicated bikeways, including if such infrastructure is a worthwhile use of NMDOT funding
- Linking “hot spots,” or high-demand highways, together to improve connectivity of the proposed network
- Alternative bicycling routes that are not part of the NMDOT roadway network
- The preferred highway when network redundancy exists (i.e., two parallel highways that serve similar origins and destinations)
- Known feasibility challenges of improving the highway
- National bicycling route designations, including the USBR system and Adventure Cycling Association routes
- Local knowledge of bicycling patterns in the state
- Geographic distribution of tier assignments, where appropriate
- Comparison of Tier 1 and 2 highways to their functional classification (roads classified as “major collector” and above are eligible for federal funding)

VII. PRIORITY NETWORK

PRIORITY TIER DEFINITIONS

A primary objective of the NM Bike Plan is to categorize NM highways into tiers from 1 to 3 that reflect current and potential demand for bicycling. The purpose of this categorization is to ensure that NMDOT's limited resources are used effectively to improve bicycling conditions where improvements are needed the most, and to meet the goal of creating a connected, statewide network. Priority tier designations were developed based on technical analysis and input from public agencies, technical committees, and the public through the Plan outreach process.

Among all NMDOT facilities, Tier 1 routes have the greatest regional benefit as bikeways. For rural highways a Tier 1 designation also indicates that a more robust level of infrastructure is desired than a Tier 2 route. For urban areas, the appropriate level of infrastructure is a function of the traffic speeds and volumes. See Chapter VIII (Design Guidelines) for additional information. The priority network is depicted in Figures 19 through 29. Note that these maps are for planning purposes only and are not to be used for wayfinding.

The tier designations do not indicate the order in which NM highways may be improved for bicyclists. Rather, the designations indicate the benefits derived from improving conditions for existing and potential bicyclists.

As a best practice, dedicated bikeway facilities should be provided to the greatest extent possible on Tier 1 and 2 routes during rehabilitation or reconstruction projects. If the right-of-way along the corridor is constrained, designers should consult the design interventions for constrained corridors.

Table 6 Tier Definitions		
Tier	Level of Benefit	Desired Infrastructure Quality
1	High	Highest level of dedicated infrastructure among NM highways
2	Medium	Minimum level of dedicated infrastructure for all Tier 2 NM highways; more than minimum level desired if roadway is high-speed and/or high-volume
2 Basic	Medium	No dedicated infrastructure required; signage and motorist awareness techniques desired
3	Low	Bikeway infrastructure not required

Tier 1 Routes

Tier 1 routes are high priority for bikeways that provide critical intra-community and statewide connections between New Mexico's communities and for cross-state travel. Tier 1 routes exhibit high existing or latent demand for bicycling and are highly appropriate for implementation of bikeway facilities. These facilities may appeal to recreational *and* utilitarian bicyclists and demonstrate high tourism potential and recreational demand. Tier 1 routes are typically high-volume and/or high-speed roadways where additional separation between bicyclists and motorists is needed. In urban areas, Tier 1 routes generally provide connections to destinations and activity centers of high regional value.

Tier 2 Routes

Tier 2 routes are medium priority for bikeways as they exhibit existing or latent demand for bicycling and are appropriate for the implementation of bikeway facilities. In rural areas, Tier 2 routes provide long-distance or statewide connections and may appeal to recreational and/or more confident utilitarian bicyclists. Alternative routes to Interstates are typically designated as Tier 2 facilities. In urban areas, Tier 2 routes may provide connections of some regional benefit.

Tier 2 Basic Routes

Tier 2 Basic routes include important bicycle connections and/or popular routes where some level of increased motorist awareness and bicycle treatments are needed, but bikeway improvement opportunities are limited due to right-of-way constraints, environmental considerations, and/or challenging topography. Common Tier 2 Basic routes include spur routes (i.e., roads that dead end and do not connect to other roads) identified as popular and desirable recreational bicycling routes, particularly in mountainous areas and through federal lands in New Mexico. Tier 2 Basic routes generally feature low traffic volumes (e.g., less than 1,000 vehicles per day) that are not a likely candidate for roadway expansion in the form of widened shoulders. Tier 2 Basic designations may also apply to roadways where additional infrastructure is not necessary or financially feasible due to high construction or right-of-way acquisition costs.

TIER 2 VERSUS TIER 2 BASIC

Whereas all Tier 2 routes should follow the design guidance outlined in the NM Bike Plan wherever space allows, a Tier 2 Basic designation indicates that NMDOT considers physical improvements to be impractical or cost-ineffective. Widening of Tier 2 Basic roadway and adding shoulder bikeways or bike lanes should not be expected. Design interventions for constrained corridors should be applied as appropriate.

Tier 3 Routes

Tier 3 routes include NM highways with little to no existing or latent demand for bicycling. Tier 3 routes do not provide critical statewide connections, and the provision of bikeway facilities is not likely to increase demand for bicycling. Bicyclists may travel along Tier 3 routes but should not expect bicycle-specific infrastructure or signage. Many Tier 3 routes in rural areas have low daily traffic volumes, and conditions may be suitable for some bicyclists.

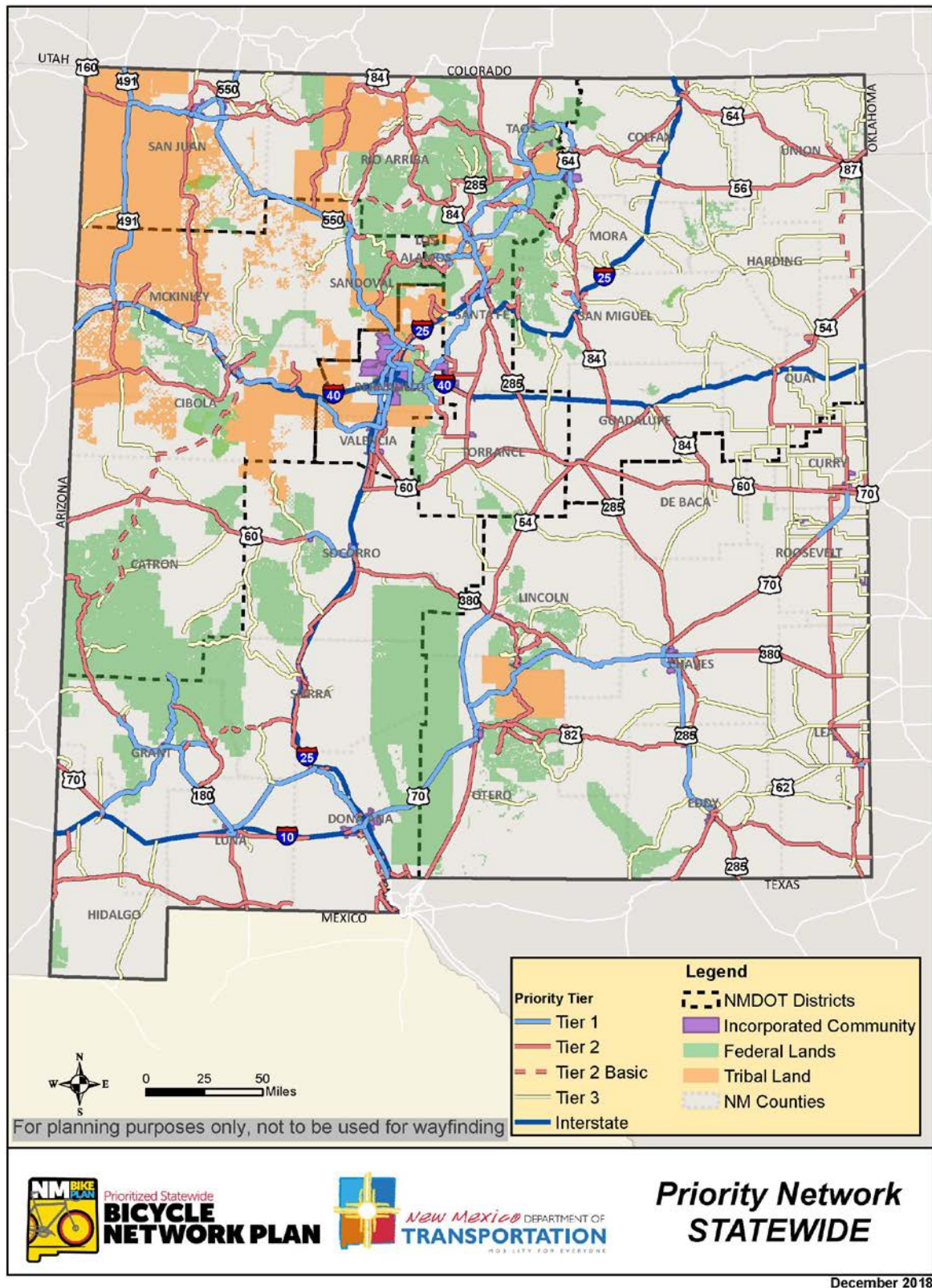


Figure 19 | Priority Network – Statewide

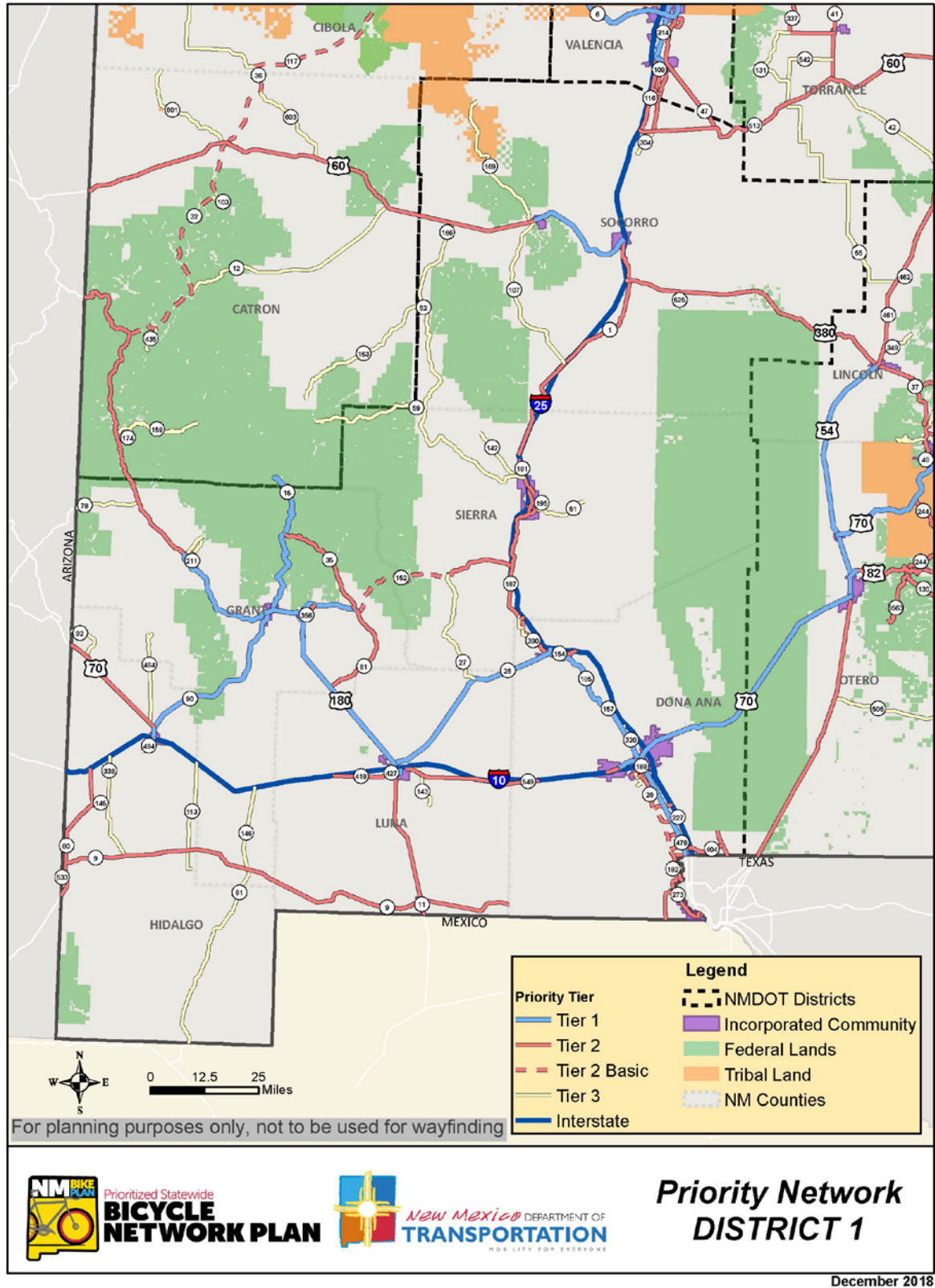


Figure 20 | Priority Network – District 1

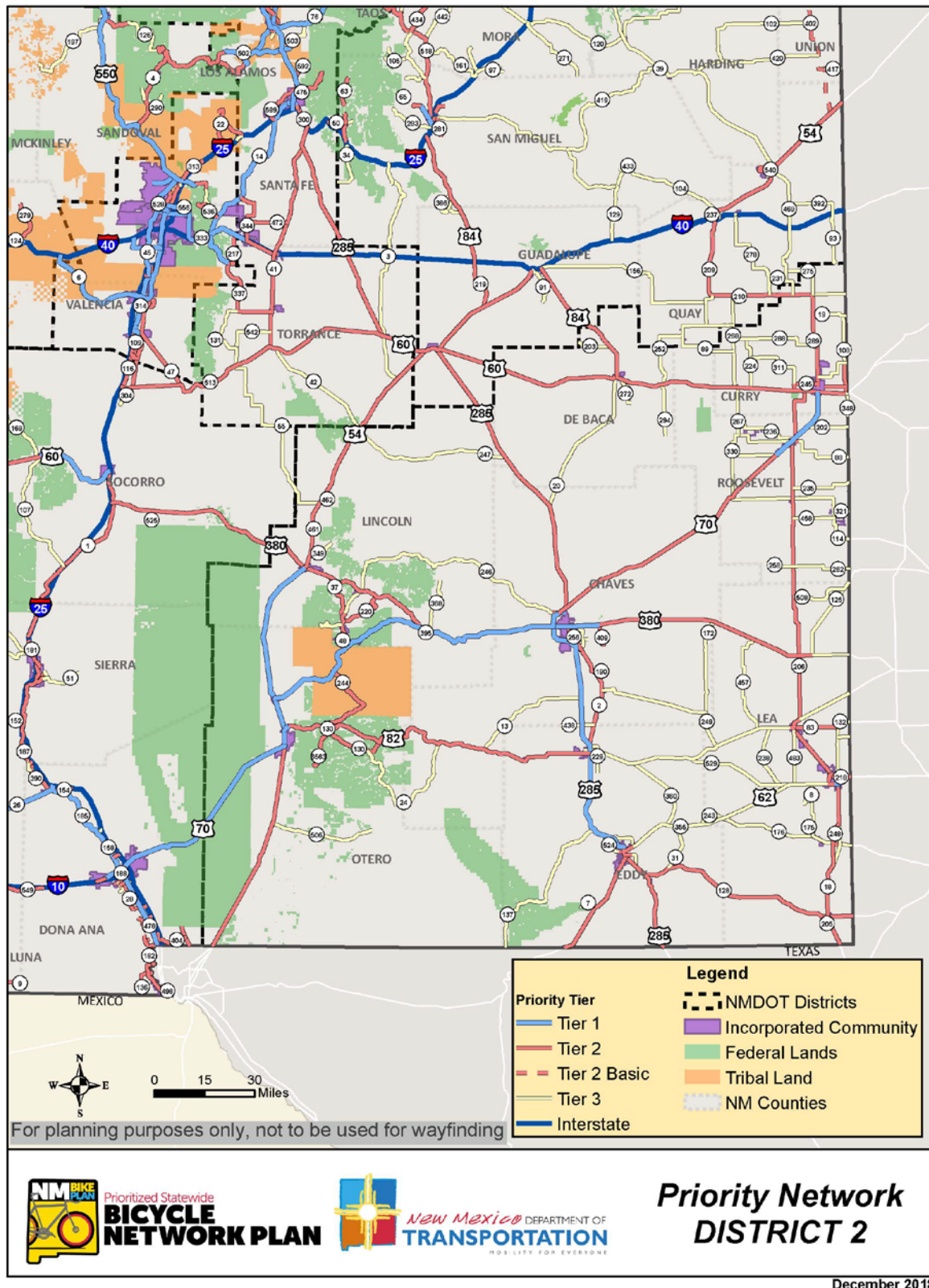


Figure 21 | Priority Network – District 2

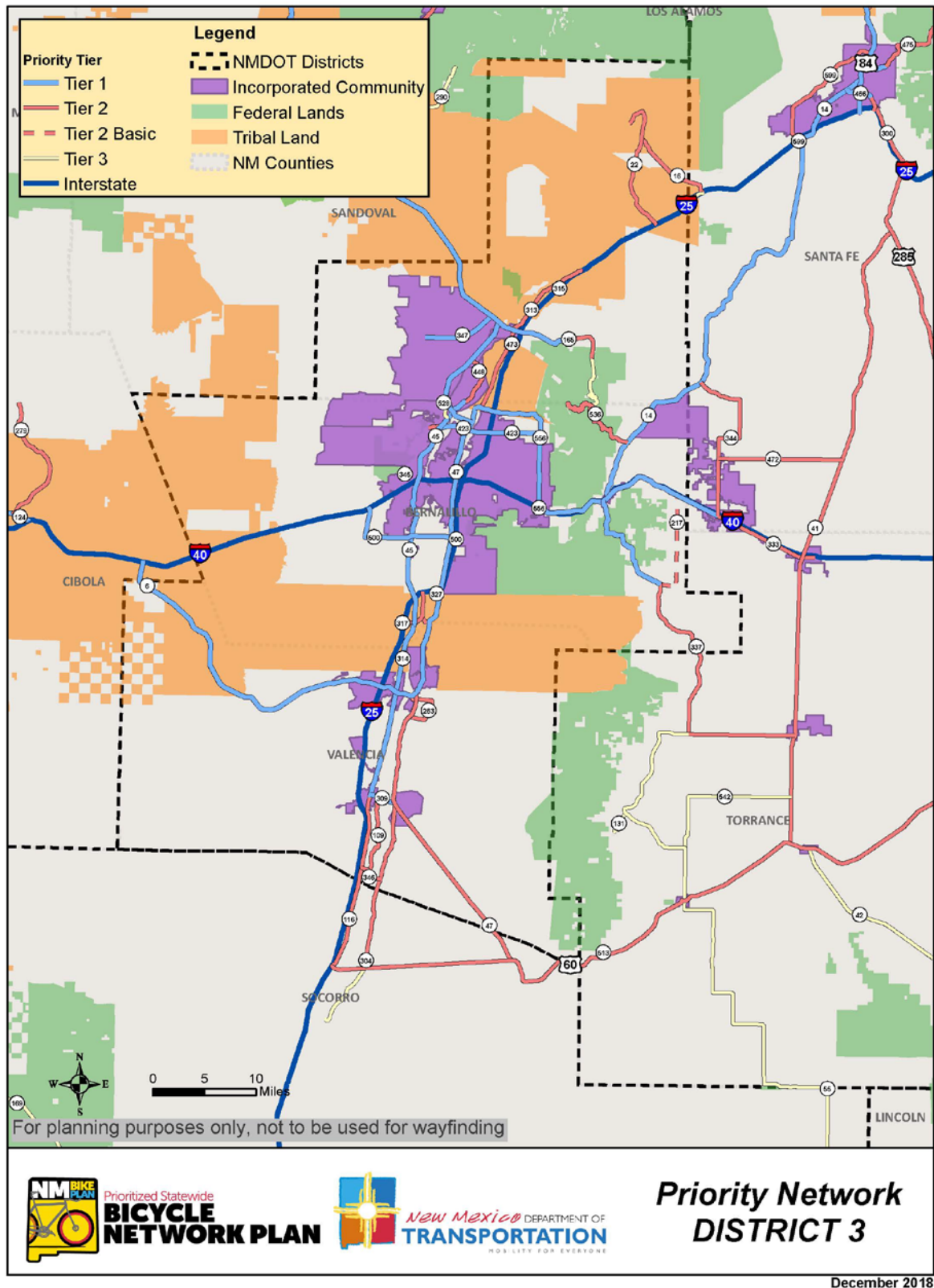


Figure 22 | Priority Network – District 3

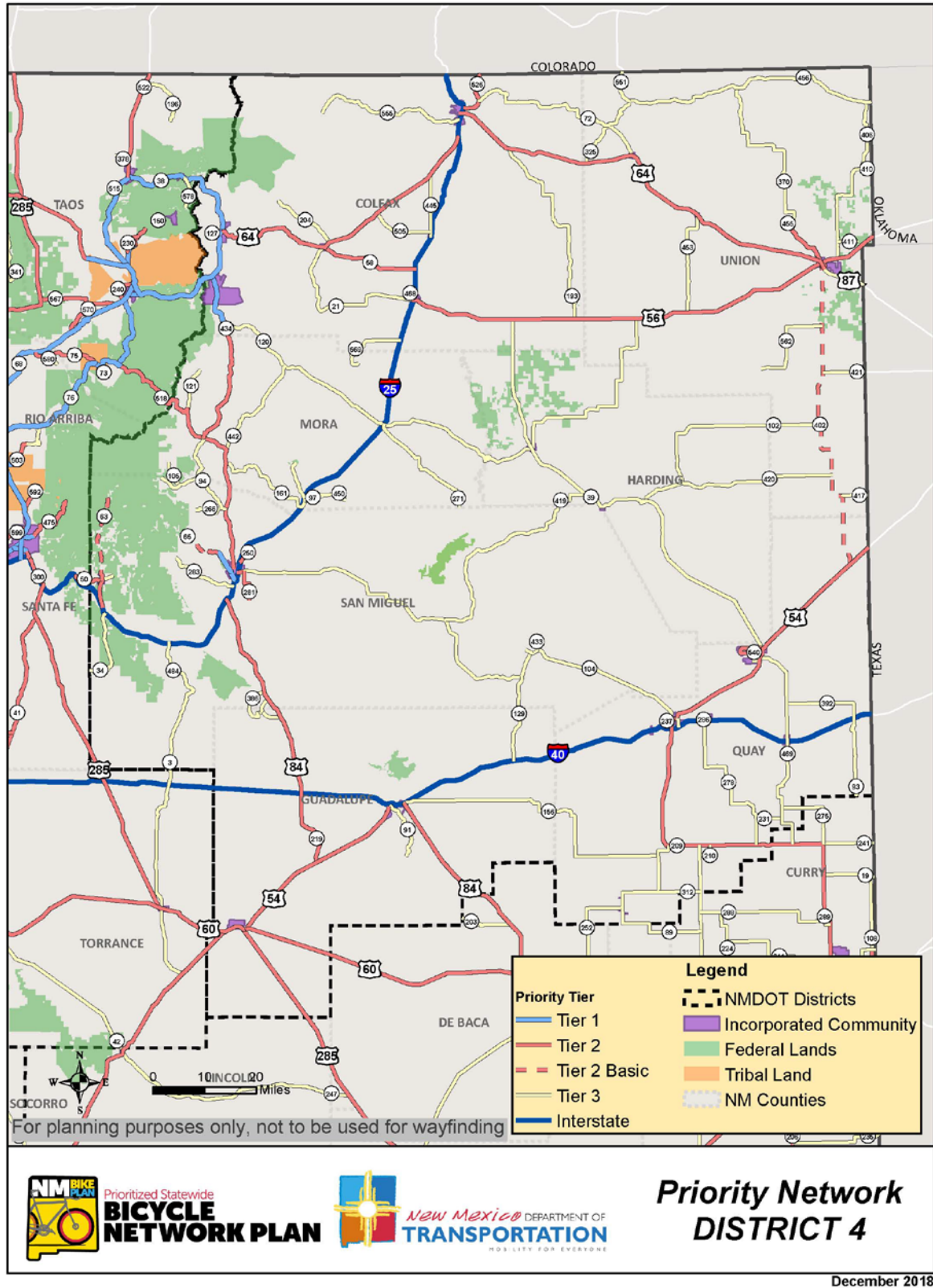


Figure 23 | Priority Network – District 4

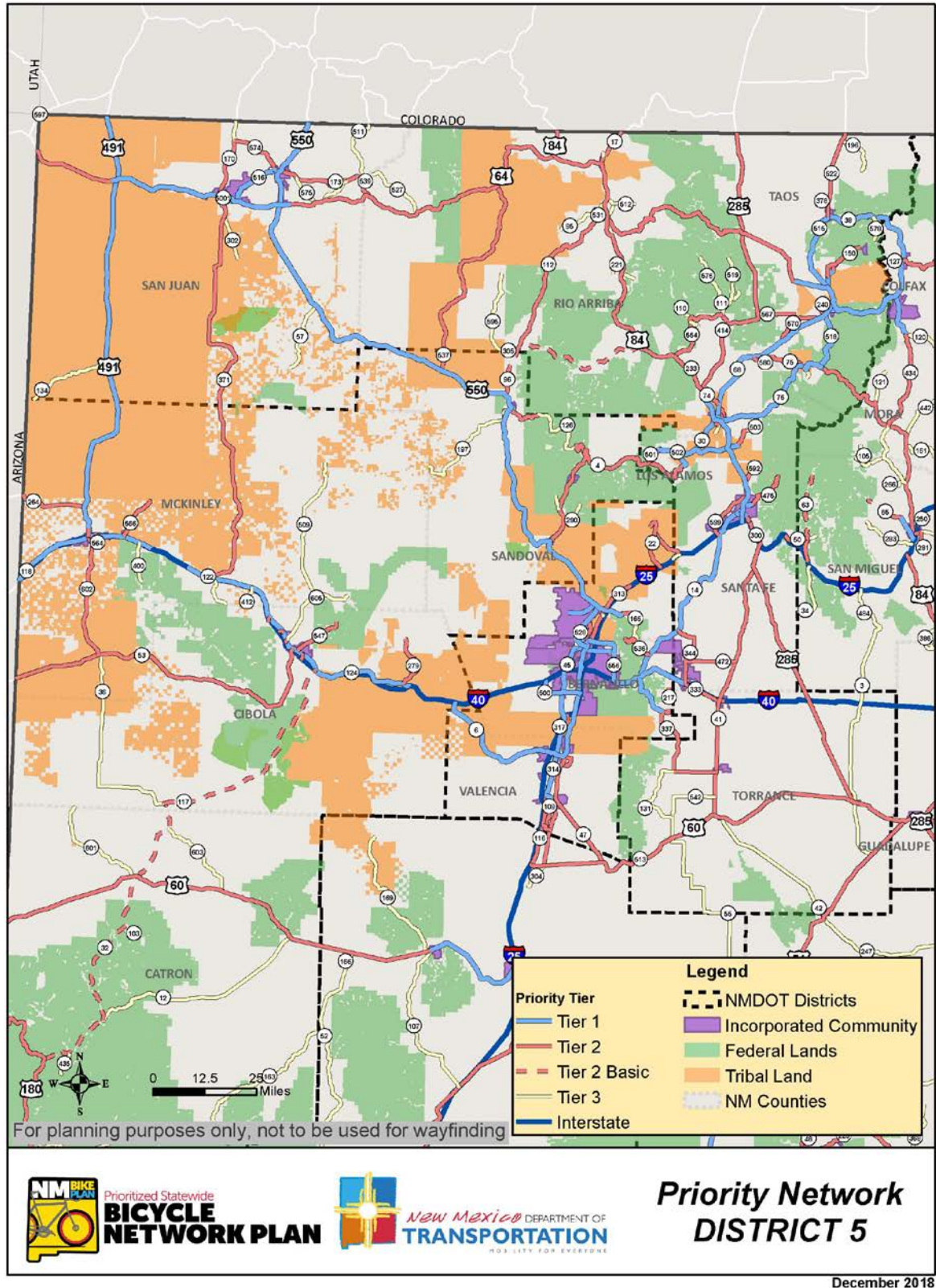


Figure 24 | Priority Network – District 5

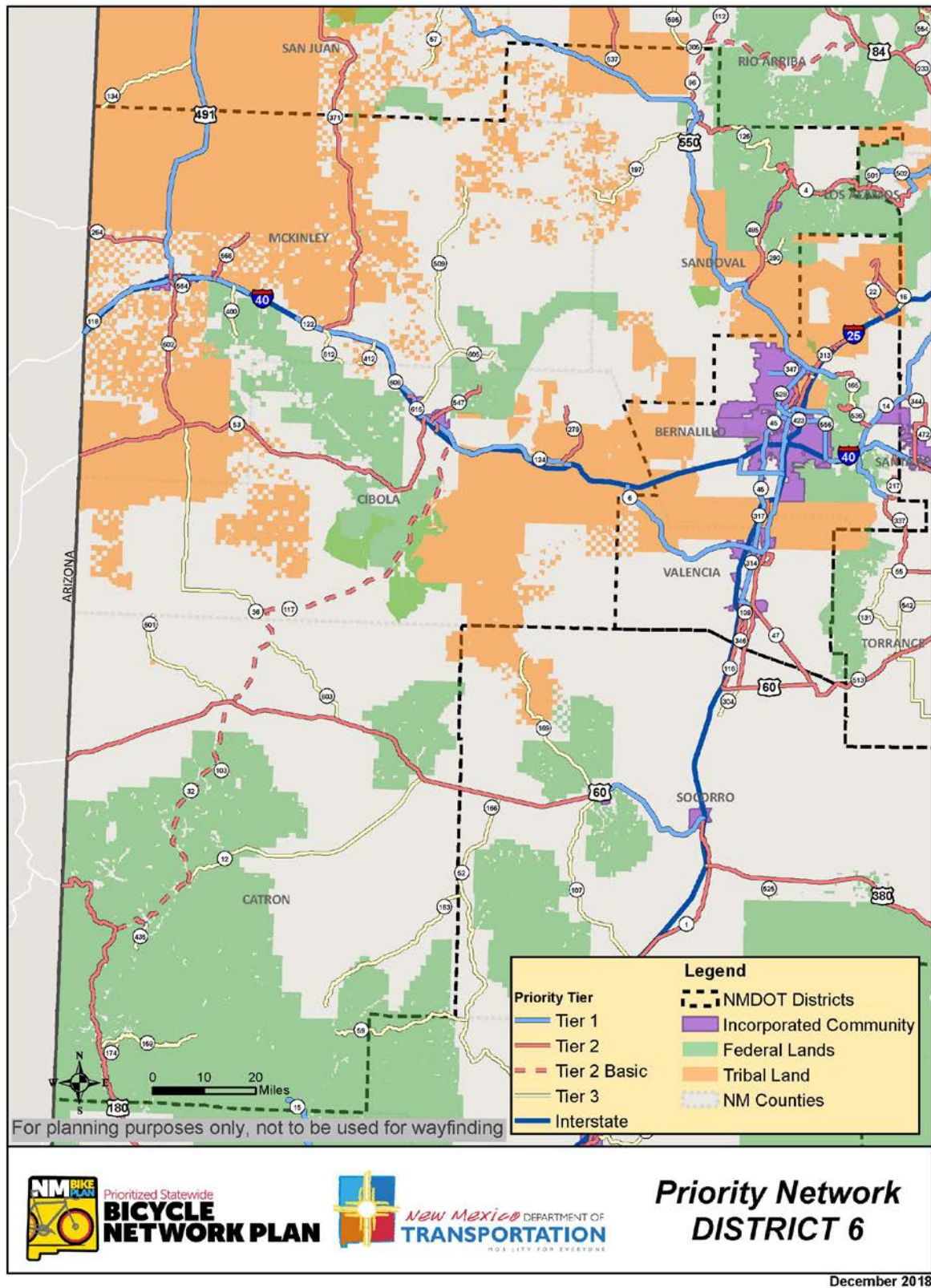


Figure 25 | Priority Network – District 6

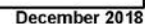


Figure 26 | Priority Network – Albuquerque Area

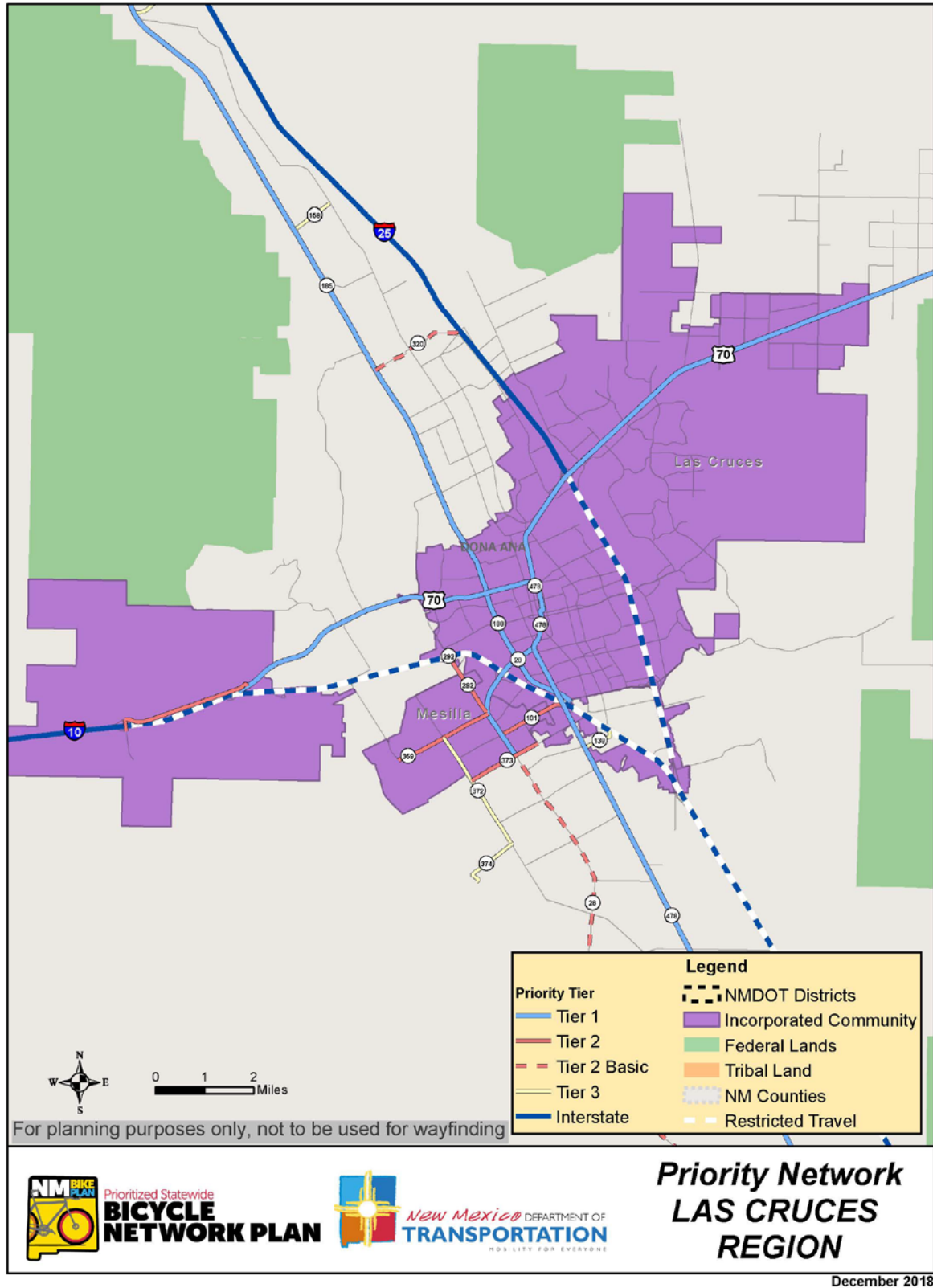


Figure 27 | Priority Network – Las Cruces Area

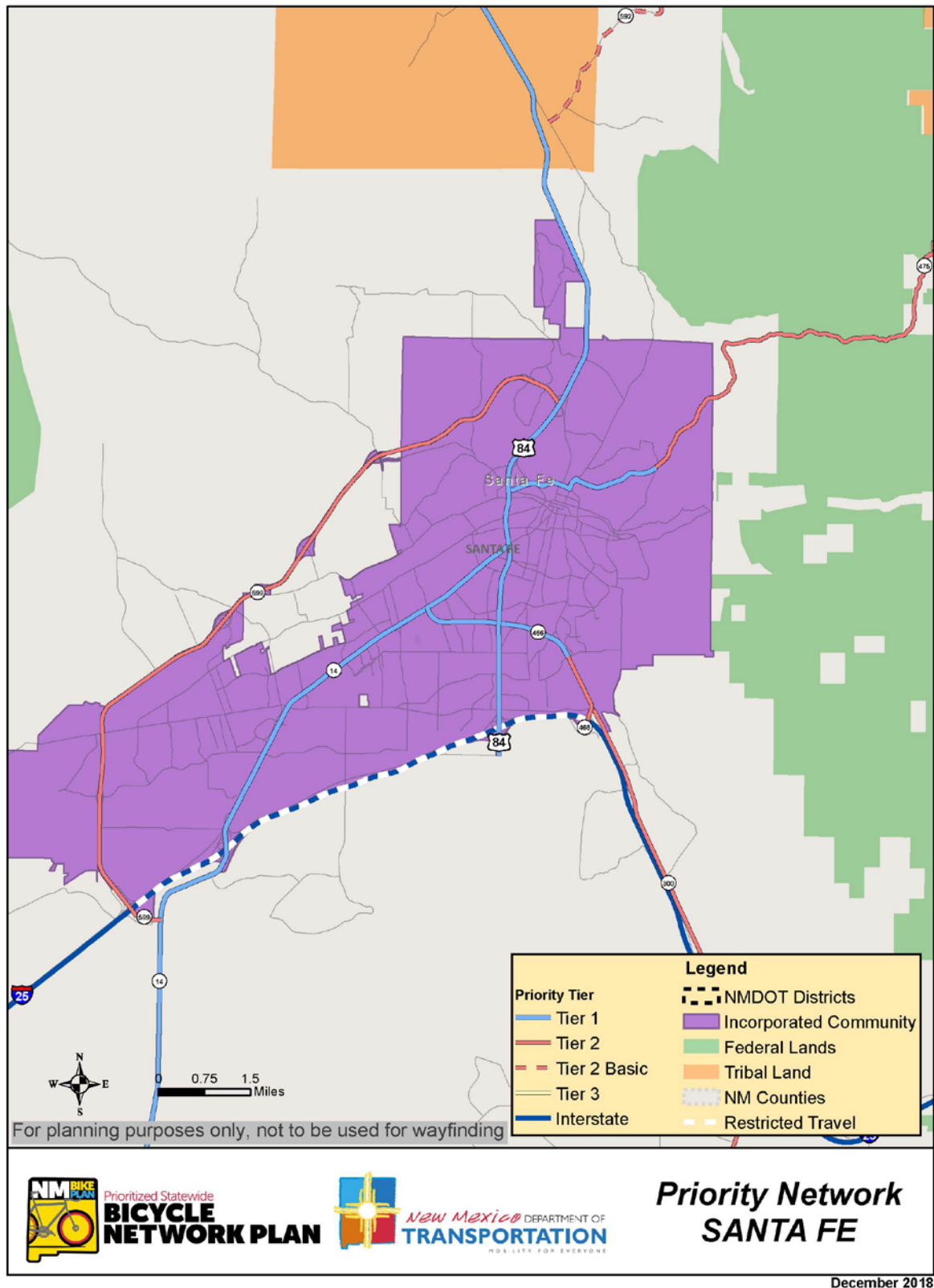


Figure 28 | Priority Network – Santa Fe Area

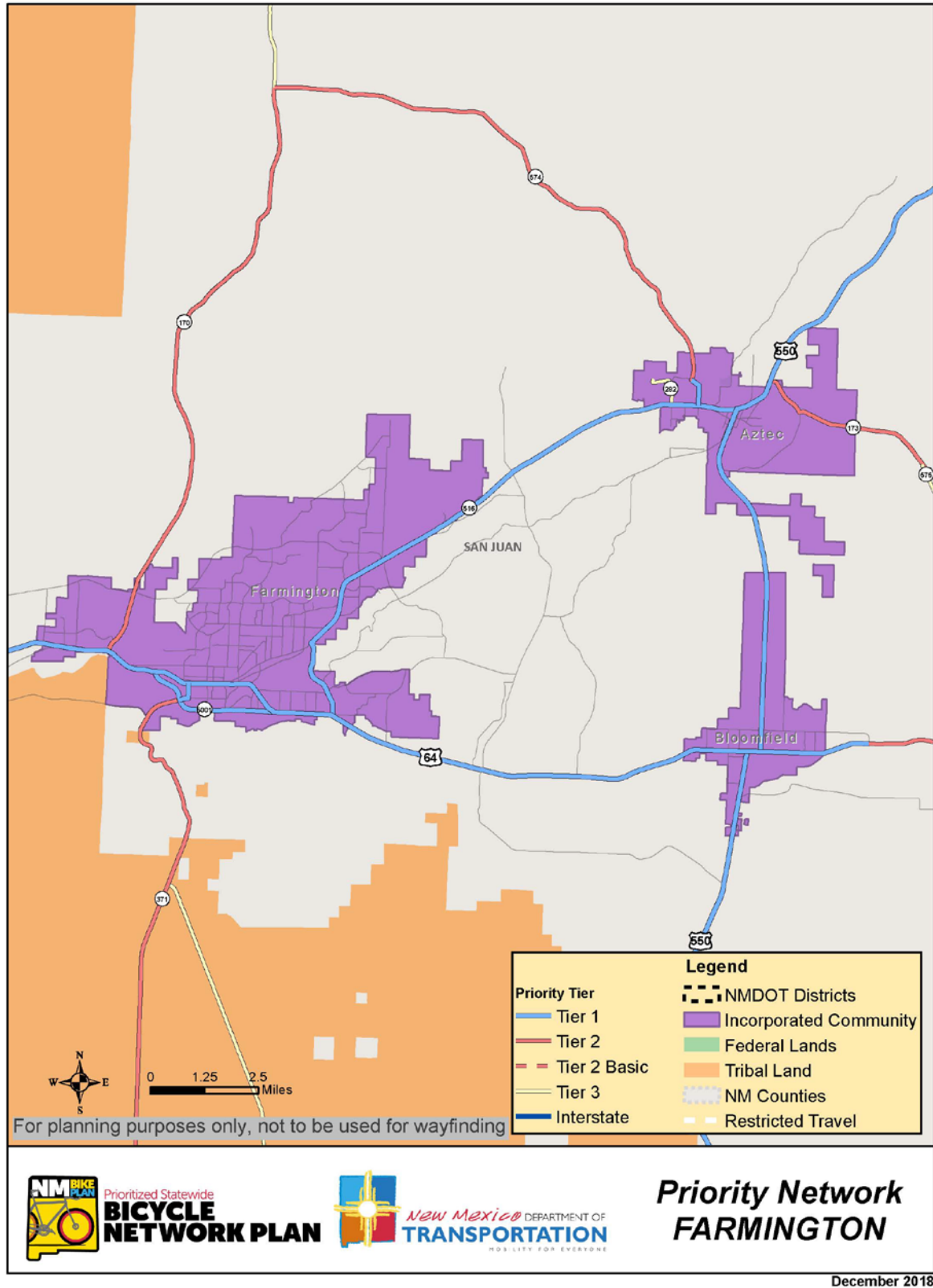


Figure 29 | Priority Network – Farmington Area

TIER 2 BASIC FACILITIES

Table 7 provides the NM highways that are designated as Tier 2 Basic facilities.

Table 7 Tier 2 Basic Facilities					
Highway	Length (miles)	Beginning	Ending	NMDOT District	Notes
NM 12	19.1	US 180	NM 32	District 6	Low-volume, long-distance connector
NM 15	18.5	NM 35	end	District 1	Spur route; access to recreational area
NM 28	27.5	Texas border	NM 373	District 1	Constrained right-of-way
NM 32	41.3	NM 12	US 60	District 6	Low-volume, long-distance connector
NM 36	21.5	US 60	NM 117	District 6	Low-volume, long-distance connector
NM 63	19.0	NM 50	end	District 4	Spur route; access to recreational area
NM 65	11.1	NM 65 (Tier 1)	end	District 4	Spur route; access to recreational area
NM 96	48.9	US 550	US 84	District 4, 5	Low-volume, long-distance connector
NM 117	56.7	NM 36	I-40	District 6	Low-volume, long-distance connector
NM 150	7.6	NM 230	end	District 5	Spur route; access to recreational area
NM 152	33.3	NM 61	NM 27	District 1	Low traffic volume, rugged topography
NM 217	10.6	NM 337	I-40	District 3	Rural recreational riding route
NM 320	2.0	NM 185	I-25	District 1	Constrained right-of-way
NM 402	62.1	US 54	Clovis	District 4	Low-volume, long-distance connector
NM 526	6.2	NM 72	CO border	District 4	Rural recreational riding route
NM 539	8	US 64	NM 511	District 5	Rural recreational riding route
NM 592	5.2	NM 591	end	District 5	Spur route; access to recreational area

NM HIGHWAYS AND LOCATIONS WITH SPECIAL CONSIDERATIONS

This section documents NM highways where special considerations and known constraints apply. Similar challenges are likely to arise along other prioritized roadways not identified here as projects are implemented. It is important to note that dedicated bikeway infrastructure should be incorporated along all Tier 1 and 2 facilities where right-of-way exists, even if some portions of a corridor are constrained. See Chapter VIII (Design Guidelines) for additional information.

Interstates

Bicyclists are permitted to ride on the shoulders of Interstates throughout New Mexico, except within the city limits of Albuquerque, Santa Fe, and Las Cruces (municipalities with populations over 50,000). Interstates through New Mexico are not designated on the priority network because the current design of these facilities includes wide shoulders and rumble strips that provide reasonable separation between motorists and bicyclists.

As with Tier 1 and 2 facilities, additional signage may be appropriate in some places to increase motorist awareness. Shoulders along Interstates should be maintained to support bicycle travel.

Interstates on the Proposed US Bicycle Route System

There are several stretches of the proposed USBR system through New Mexico that follow Interstates. The portions of the proposed USBR system along Interstates are generally located in rural areas where there are no alternative routes. Note that USBR routes have not been designated by the State of New Mexico and alignments are subject to change.

Table 8 | Interstate Segments on the Proposed USBR System

Interstate	USBR	Length (miles)	Beginning	Ending
I-40	US 66	34.4	NM 124 / Laguna Pueblo	Atrisco Vista Blvd (Albuquerque)
I-40	US 66	16.1	US 84	Santa Rosa
I-40	US 66	36.7	Cuervo	Tucumcari
I-10	US 90	16.8	NM 80	NM 494 (Lordsburg)
I-25	US 66	5.00	Old Las Vegas Hwy	Glorieta

Frontage Roads

Frontage roads are generally excluded from the priority network. In some cases, the frontage roads are also NM highways and therefore identified in the priority network and generally designated as Tier 2 routes. Exceptions include the frontage roads along I-40 between Grants

and the Arizona border – including NM 118, NM 122, and NM 124 – which are designated as Tier 1 routes. A noteworthy exception for a Tier 2 route along a frontage road is the stretch along I-10 in west Las Cruces. This frontage road is included in the priority network due to the gap that is created between US 70 and Crawford Boulevard where bicycle travel on I-10 within City of Las Cruces limits is restricted. In these areas, bicyclists are encouraged to use both Tier 1 and Tier 2 facilities to minimize conflicts with heavy truck travel along the Interstate.

Enchanted Circle: Tier 1

The roadways that comprise the Enchanted Circle (NM 522, NM 38, US 64) are highly popular among recreational bicyclists, and portions of this route are designated as a New Mexico state bicycle route. However, topographical and right-of-way constraints make it difficult to build dedicated bikeway infrastructure in some areas. Tier 1 guidance should be followed where space allows, while strategies for constrained conditions should be applied in other areas.

NM 4: Tier 2

Issues with easements and maintenance agreements with federal agencies make improvements along portions of NM 4 particularly challenging. The mountainous topography also provides constraints along many segments of the corridor. However, NM 4 is a popular cycling route and wide shoulder bikeways should be provided where space permits and the option is available to NMDOT.

NM 6: Tier 1

The portion of NM 6 passing through the Village of Los Lunas is designated as a Tier 1 facility to reflect the benefits of east-west bikeway facilities through the community. However, NM 6 is heavily congested during the peak periods and dedicated bikeway facilities through the Village area may not be feasible at this time. There may be opportunities to install bikeway facilities parallel to NM 6 in the future, particularly as travel patterns in the Village of Los Lunas area are likely to change with the construction of the proposed Morris Road river crossing.

NM 28: Tier 2 Basic

NM 28 is included on the ACA network and is a popular recreational bicycling route. However, there are no shoulders to the south of NM 373 and the Town of Mesilla. NMDOT District 1 conducted survey work along the route and determined that NM 28 cannot be widened without extensive right-of-way acquisition and renegotiation of easements.

NM 68: Tier 1

NM 68, which provides the primary access route to the Town of Taos from the south, is located on a Bureau of Land Management (BLM) easement and is constrained by topography and the Rio Grande. NMDOT District 5 evaluated alternate alignments to relocate the highway out of the canyon; however, alternative alignments with greater right-of-way are currently cost prohibitive. Although right-of-way is constrained along much of the corridor, there are

segments where bikeway infrastructure could be improved. Tier 1 guidance should be followed where space allows, while strategies for constrained conditions should be applied in other areas.

NM 124: Tier 1

NM 124/Old Route 66 is identified as a priority project in the Pueblo of Laguna Bike and Pedestrian Route Plan (2012). Though right-of-way along the corridor is not well-documented and may need to be resolved to widen the roadway, the Pueblo of Laguna recognizes the benefits of the facility and the need for improved safety.

NM 152: Tier 2 Basic

Although NM 152 through the Black Range Mountains between Silver City and the community of Hillsboro is identified as a potential USBR route and is an existing ACA route, the highway is curvy with steep grades. NM 152 is designated as a Tier 2 Basic facility due to its appeal to only the most seasoned and confident bicyclists and the fact that dedicated bikeway facilities are not practical along the majority of the route.

NM 475 and NM 536: Tier 2

These mountain access roads are particularly popular among recreational bicyclists and both feature constrained right-of-way over large stretches due to topography. Shoulder bikeways should be provided where space allows. The design guidance for constrained corridors, including uphill shoulder lanes, should be followed in the areas where right-of-way is limited.

US 84/US 285/St. Francis Drive: Tier 1

Referred to as St. Francis Drive through the City of Santa Fe, US 84/285 is a particularly challenging route for bicyclists due to its wide cross-section, narrow vehicular lanes, high traffic volume, and high-speed limit. This stretch of US 84/285 is identified as a Tier 1 facility to ensure long-term consideration of bicycle travel along the corridor. Alternative routes are identified in the Santa Fe MPO Bicycle Master Plan, and coordination with the City is critical during future improvements along this corridor. US 84/285 to the immediate north of Santa Fe is a limited access facility and is also difficult for bicyclists to navigate. Alternative routes may be appropriate along this stretch of highway.

US 285: Tier 1

Although the stretch of US 285 from Artesia to Carlsbad has a high proportion of heavy trucks, the highway has a divided median, wide shoulders, and rumble strips, making conditions safer for bicyclists. US 285 should be maintained as a Tier 1 facility in this critical area as NMDOT District 2 identified safety issues on the parallel route (NM 2).

VIII. DESIGN GUIDELINES

A range of factors, including user comfort and safety, as well as the expected level of bicycle and vehicle traffic along a given roadway segment, should be taken into consideration when selecting the best facility type for a given roadway. In some cases, there is no single correct facility and the selection of an appropriate bikeway improvement must balance traffic conditions, land use context, and implementation cost. The design guidelines for the NM Bike Plan provide guidance for designers and engineers to determine the appropriate types of bikeway infrastructure by location and are organized by priority tier and the roadway context (urban versus rural).

The guidelines provided in the NM Bike Plan relate to the selection and desired width of on-street bicycle facilities that could be constructed within the public right-of-way. Designers should also refer to national and state design manuals for additional information on the application of the bikeway infrastructure, including roadway geometry and best practices for bikeway infrastructure at intersections and alongside turn lanes.

In addition to definitions of bikeway infrastructure types and appropriateness by location, this chapter discusses opportunities for introducing bikeway infrastructure during roadway improvements, appropriate techniques for corridors with constrained conditions or limited right-of-way, as well as the national and state design manuals to utilize in the roadway design process.

ROADWAY CONTEXT AND DESIGN GUIDANCE

The selection of appropriate design treatments depends on the roadway tier, established through the NM Bike Plan, and the roadway's context (urban versus rural) as different design treatments are appropriate in different locations. Figure 30 provides a flow-chart of how the design guidance is used to select appropriate bikeway improvements.

Roadway Context: Urban versus Rural

The applicable bicycle-related design guidance varies depending on whether the NM highway segment in question is located within an urban or rural context.

Urban design guidance applies to the following situations:

- Roadways within the four designated metropolitan planning areas – Mid-Region (Albuquerque), Farmington, Mesilla Valley (Las Cruces), and Santa Fe – plus the portion of the El Paso (TX) metropolitan planning area located in southern New Mexico
- Roadways located within incorporated municipal limits
- Other locations at the discretion of the responsible NMDOT District Engineer

Rural design guidance is applicable to all NM highway segments outside of the locations described above. Designers may use discretion as to whether urban or rural design guidance should be applied on NMDOT facilities within small incorporated communities (i.e., less than 1,000 residents) with low traffic volumes (i.e., less than 2,000 vehicles per day).

UTILITARIAN AND RECREATIONAL BICYCLISTS

The appropriate design is influenced by the types of bicyclists expected to use the facilities.

Utilitarian bicyclists are defined as those who use a bicycle to reach a particular destination, such as work, a business, or a park. Utilitarian trips are primarily concentrated in urban areas, including suburban and small village/town centers, where destinations are grouped more closely together and where the distance between a person's origin and destination is relatively close. Most utilitarian bicycle trips are less than 2.5 miles on average (2009 National Household Travel Survey). Utilitarian bicyclists represent a range of age and skill levels.

Recreational bicyclists are defined as those who ride long distances for exercise, training, and/or general enjoyment. Recreational bicyclists are typically confident riders who travel long distances and tend to have a higher tolerance for stress when riding adjacent to motor vehicle traffic. As destinations in rural areas are more spread out and population density is much lower, rural roads attract primarily recreational bicyclists. Shoulders on rural roadways typically provide sufficient accommodation for recreational bicyclists, though greater spatial separation from motor vehicles should be provided as speeds and volumes increase.

Utilitarian and recreational riders exist on a continuum; utilitarian riders can also be recreational riders, and some recreational riders may be less experienced bicyclists. These general definitions are intended to capture the primary types of bicyclists that are expected to be riding on NM highways in different contexts, and the categories provide a useful planning tool to guide the selection of bikeway improvements in different areas of the state.

INTENDED USERS: URBAN VERSUS RURAL BIKEWAYS

Roads in urban areas where utilitarian bicycle trips are concentrated should be designed to be comfortable for a range of bicyclists, including novice riders.

Rural bicycle roadway facilities are generally designed with recreational riders as intended users.

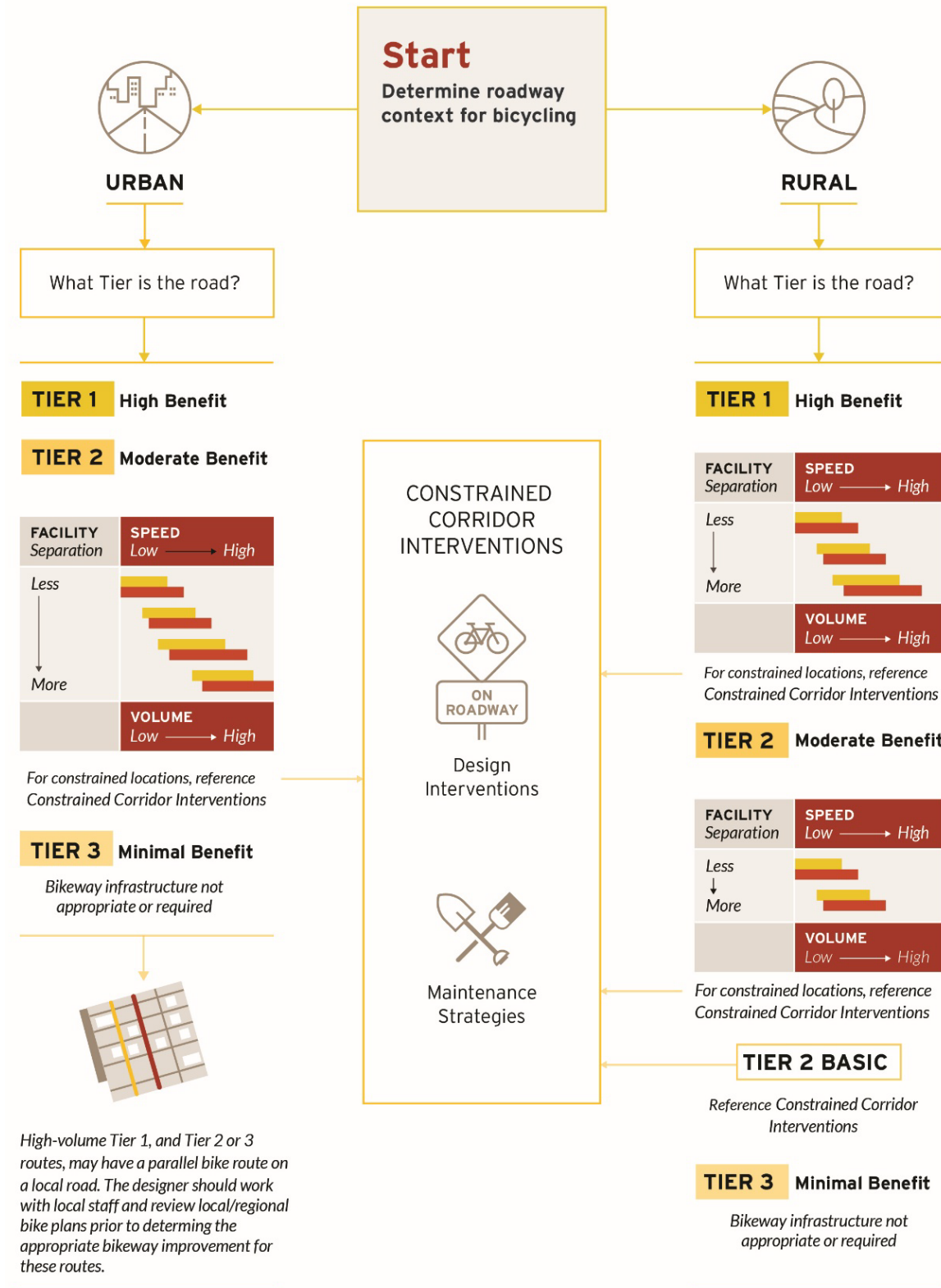


Figure 30 | Bikeway Improvement Selection Guide

Urban Bikeway Design Guidance

The primary type of recommended bikeway infrastructure along NM highways in urban areas is **bike lanes**, with design variations based on the traffic volume and speed of the roadway. See Figure 31 for bikeway infrastructure options for Tier 1 and 2 routes that pass through urban areas in New Mexico, including large cities, suburban areas, and small town/village centers. The intent of the bikeway improvements listed in Figure 31 is to provide a high level of comfort to bicyclists of different ability levels as speeds and volumes increase. Descriptions of the bikeway facility options are provided later in this chapter.

In some circumstances, a NM highway may not be appropriate for bicycle traffic due to high traffic volumes, speeds, number of travel lanes, and limited right-of-way. These conditions are most prevalent in urban areas where NM highways are major arterials and transport high levels of traffic through a city or town. For arterial NM highways in urban areas, designers should work with local agency and MPO or RTPO staff to review the local bicycle network prior to determining the appropriate improvement. Many municipalities in New Mexico have bicycle plans, and these plans may identify a parallel local route that provides better opportunities for bikeway infrastructure adjacent to the NM highway. The designer should review these plans, if they exist, and meet with local planning staff to discuss options prior to finalizing the recommended bikeway improvement on the NM highway.

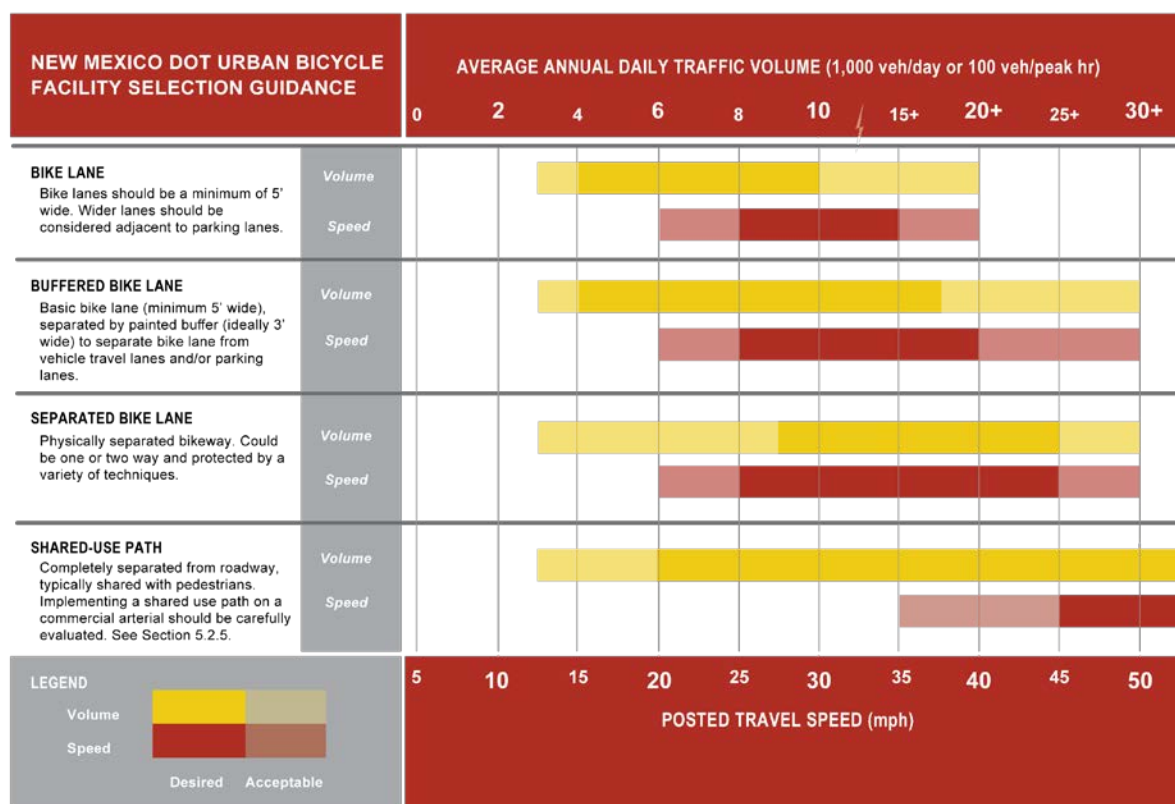


Figure 31 | Urban Tier 1 and Tier 2 Routes – Facility Selection Chart

Rural Bikeway Design Guidance

The primary design intervention for rural Tier 1 and 2 roadways is the provision of a dedicated shoulder, also referred to as a **shoulder bikeway**. In rural areas, paved shoulder bikeways are similar to bike lanes in urban areas, providing a dedicated space for bicyclists to ride adjacent to motor vehicle traffic. The intent of shoulder bikeways is to provide a comfortable bicycling experience with the most robust infrastructure design on Tier 1 facilities, and increased widths for shoulder bikeways on Tier 1 and Tier 2 routes as speeds and volumes increase. Shared-use paths may also be considered, though such facilities may not be cost effective over long distances.

Per the AASHTO Guide for the Development of Bikeway Facilities, 4th Ed., the minimum operational shoulder width, or effective width, shall be at least four feet of clear space. Paved shoulder widths greater than five feet are desirable on higher-speed/higher volume roadways, as well as on roadways where the average daily traffic volumes exceed 1,500 vehicles per day AND the percentage of truck traffic is greater than or equal to 10% of the traffic stream. Design options for Tier 1 and Tier 2 facilities, presented in Figure 32 and Figure 33 respectively, are described later in Chapter VIII.

Rumble strips may be installed on bike routes as warranted to address safety concerns but should not be considered part of the effective width of the shoulder. See the Rumble Strip Design Guidelines for Shoulder Bikeways section of Chapter VIII for additional information.

Note on Rural Tier 3 Facilities

Tier 3 routes exhibit little or no existing or latent demand for bicycling, and traffic volumes on these facilities are often low. As a result, investing in bikeway improvements is likely not the best use of NMDOT resources. In limited situations, designers may choose to improve the roadway for bicycling, in which case designers may consider the installation of shoulders as described in Figure 33 (related to Tier 2 routes) or consider strategies for constrained corridors (discussed later in Chapter VIII). An example of when designers may add bikeways to a Tier 3 road is if residents of a local community express support for bikeways during the public engagement process for a project.

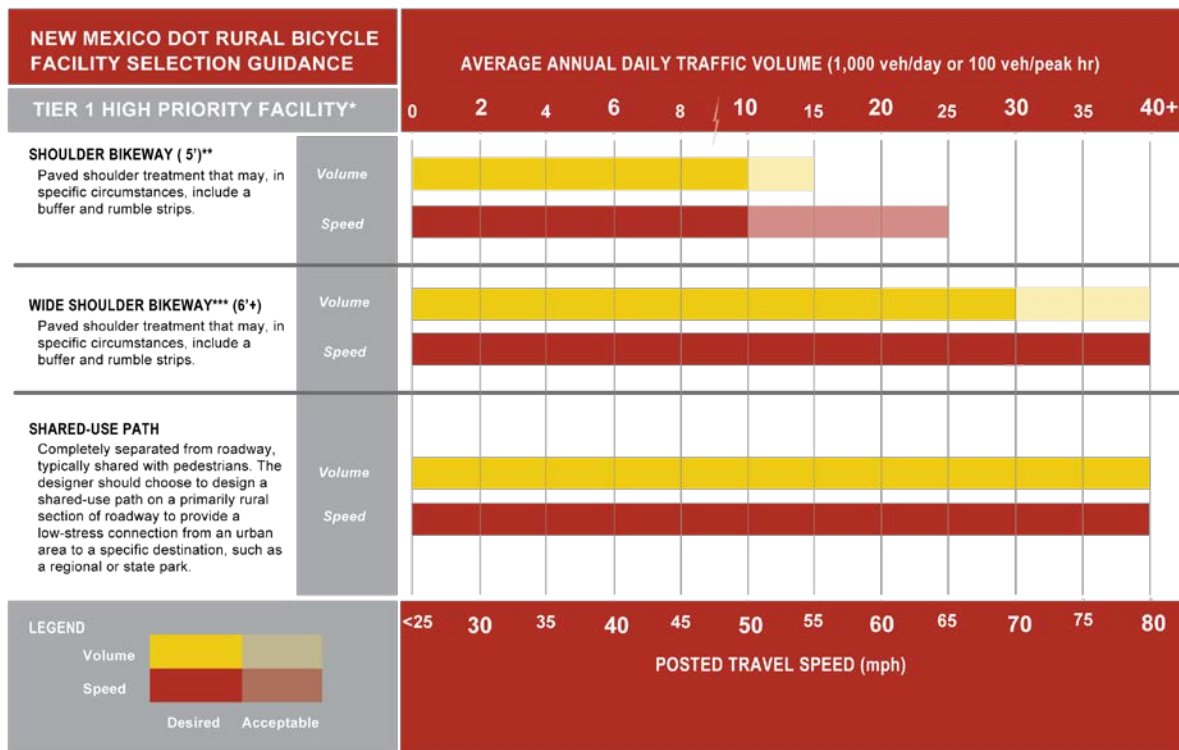
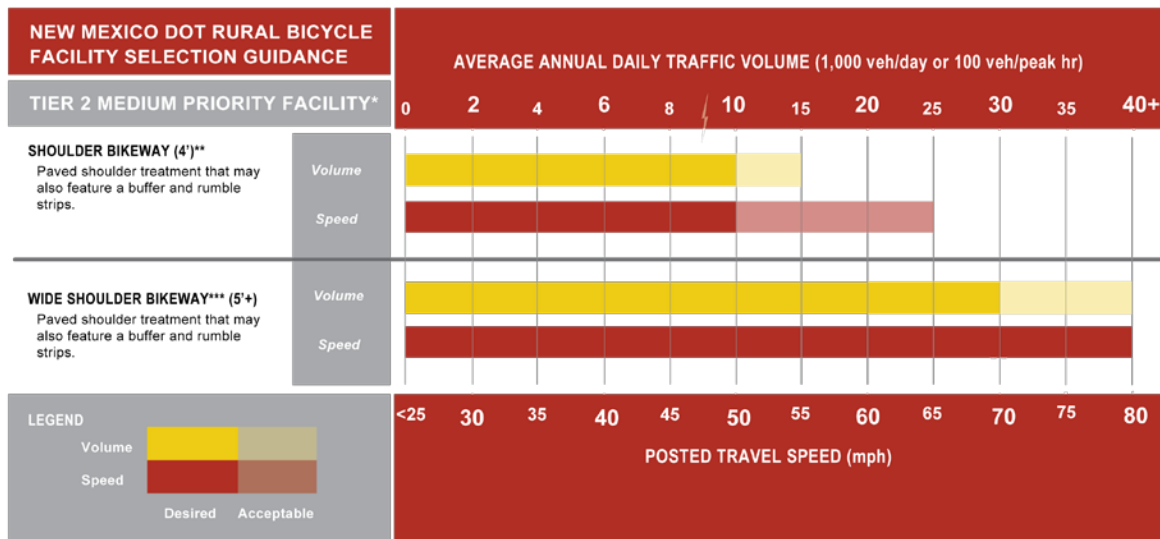


Figure 32 | Rural Tier 1 Routes – Facility Selection Chart



*Tier 1 level design elements may be installed on a Tier 2 Facility.

Figure 33 | Rural Tier 2 Routes – Facility Selection Chart

DISCUSSION ON SHOULDER BIKEWAY WIDTH FOR RURAL ROADWAYS

The AASHTO *Guide for the Development of Bikeway Facilities*, 4th Ed., specifies the minimum effective width of the paved shoulder should be at least four feet to safely accommodate bicyclists. The effective width of the shoulder does not include the rumble strip, if present. AASHTO states that shoulders wider than four feet are desirable if higher bicycle usage is expected or if motor vehicle speeds exceed 50 miles per hour; if use by heavy trucks, buses, or recreational vehicles is considerable; and/or if static obstructions exist at the right side of the roadway (e.g. guardrail). Shoulders wider than this minimum provide numerous benefits to both bicyclists and motor vehicles. **To the greatest extent possible, wide shoulder bikeways should exceed the minimum design width for the following reasons:**

- **Safety:** A large portion of bicycle-vehicle crashes on rural roadways occur when a vehicle attempts to overtake a bicyclist on a roadway with no or little available paved shoulder width. As traffic volumes increase, overtaking conflicts increase as well.¹ 29 states, not including New Mexico, have laws that require motorists to provide bicyclists a minimum three-foot berth when passing.² Providing this dedicated space can also reduce motorist stress when passing bicyclists at high rates of speed.
- **Comfort:** Wider shoulders provide more dedicated space for bicyclists to ride and maneuver separately from motor vehicles, which improves the comfort of bicyclists on rural roadways.³ Additionally, wider shoulders lessen the impact of wind-blast caused by passing vehicles, especially trucks passing at high rates of speed.
- **Maintenance:** Roadways deteriorate from the roadway edge first, and this deterioration reduces the effective width of the shoulder for bicycling. As the shoulder deteriorates, the cyclist may need to ride closer to the travel lane, and as the effective width of the shoulder narrows, drivers may have to exit their lane to provide the three-foot effective berth. Providing wide shoulder bikeway represents a proactive method that may minimize the need for vehicles to exit their lanes as pavement deteriorates overtime.

¹ *Analysis Procedures Manual, Chapter 14 Multimodal Analysis. Oregon Department of Transportation (ODOT) December 2012*

² *The League of American Bicyclists. Stake Bike Laws. <https://bikeleague.org/StateBikeLaws>*

³ *Respondents to the NM Bike Plan survey indicated shoulders are the #1 factor that influence why they select a particular bicycle route. A series of images was presented to the survey respondents with different roadway characteristics. Of all characteristics, the presence of shoulders had the most consistent impact on cyclist comfort. The #1 obstacle to rural bicycling was found to be poor pavement condition/lack of dedicated shoulders.*

BIKE LANES AND SHOULDERS – BENEFITS TO OTHER USERS

Bike lanes and shoulders provide benefits for roadway users beyond providing a dedicated space for bicyclists to ride. These benefits are grouped into three categories: Safety, Capacity, and Maintenance. When determining the feasibility of installing bike lanes or shoulders, these additional benefits can be considered by the designer.

Safety – highways with paved shoulders have reduced crash rates, as paved shoulders:

- Provide space to make evasive maneuvers
- Accommodate driver error
- Add a recovery area to regain control of a vehicle and reduce rates of run-off the-road (or road departure) crashes
- Provide space for disabled vehicles
- Provide increased sight distance for through-vehicles and for vehicles entering the roadway (in brushy, rural areas and in urban areas with many sight obstructions)
- Provide lateral clearance to roadside objects such as guardrail, signs, and poles
- Contribute to driving ease and reduced driver strain
- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians
- Make crossing pedestrians more visible to motorists
- Provide for stormwater discharge farther from the travel lanes, reducing hydroplaning; removing standing water also reduces splash and spray to following vehicles and nearby pedestrians and bicyclists

Capacity – highways with paved shoulders can carry more traffic, as paved shoulders:

- Provide greater intersection and stopping sight distance
- Facilitate exiting from travel lanes to side streets and roads (also a safety benefit)
- Provide a more effective turning radius for trucks
- Provide space for off-tracking of trucks' rear wheels in curved sections
- Provide space for disabled vehicles, mail delivery, and bus stops
- Provide space for bicyclists to ride at their own pace
- Provide space between motor vehicles and pedestrians, increasing pedestrians' level of comfort

Maintenance – highways with paved shoulders are easier to maintain, as paved shoulders:

- Provide structural support to the pavement
- Discharge water further from the travel lanes, preserving the base and subgrade
- Provide space for maintenance operations
- Provide space for portable maintenance signs

BIKEWAY FACILITY TYPES

Bikeway facilities provide a dedicated space for bicyclists to ride. Due to the range of roadway conditions in New Mexico, different bikeway improvements are available for designers to consider. In general, as traffic volumes and speeds increase, more separation from motor vehicle traffic is necessary to maintain comfort levels for bicyclists. The most basic forms of bikeway infrastructure are conventional bike lanes and shoulder bikeways. It is important to note that bikeway facilities, once implemented, can evolve into more robust facilities over time. As an example, a conventional bike lane or buffered lane can be installed in an urban area through lane narrowing and reallocation of roadway space. If additional interventions and improvements are desired, buffered bike lanes can be upgraded to separated bike lanes during roadway reconstruction or as a stand-alone project.

This section presents an overview of bikeway facility types that are listed in the urban and rural bikeway design guidance sections of this chapter. The bikeway facility types include:

- Conventional Bike Lane
- Buffered Bike Lane
- Separated Bike Lane
- Shoulder Bikeway
- Shared Use Path

Conventional Bike Lanes

Description

Bike lanes are portions of the roadway designated by striping, signing, and pavement markings for preferential and exclusive use by bicyclists. Bike lanes are typically located on both sides of the road and carry bicyclists in the same direction as adjacent motor vehicle traffic. Bike lanes should be five feet wide, not including the gutter pan. If a bike lane is adjacent to on-street parking, the combined width of the parking space and bike lane should be at least 13 feet. Bike lanes are most appropriate in urban areas.



Additional Design Guidance

- See NACTO Urban Bikeway Design Guide, 2014, 2nd Ed. – Conventional Bike Lanes
- See AASHTO Guide for the Development of Bikeway Facilities, 2012, 4th Ed. Typical Bike Lane Cross Sections

Buffered Bike Lanes

Description

Buffered bike lanes are conventional bike lanes paired with a designated buffer space, separating the bike lanes from the adjacent motor vehicle travel lanes and/or parking lanes. Buffered bike lanes are designed to increase the space between bike lanes and the travel lanes and/or parked cars, providing more comfortable conditions for bicyclists. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speeds, adjacent to parking lanes, or with a high volume of truck or oversized vehicle traffic. The minimum buffer width is 18 inches, with a recommended width of three feet. If the buffer is three feet or wider, the buffer area should include interior diagonal cross hatching or chevron markings.



Additional Design Guidance

- See NACTO Urban Bikeway Design Guide, 2014, 2nd Ed.- Buffered Bike Lanes
- See Manual of Uniform Traffic Control Devices 2009, 3D.02

Separated Bike Lanes

Description

Of all on-street bikeway facilities, separated bike lanes (SBLs) offer bicyclists the most protection and separation from adjacent motor vehicle traffic. SBLs are bikeway facilities physically separated from motor vehicle traffic by a painted buffer and physical barriers such as flexible delineators, curbs, or planters. Parking lanes can also be used for separation if there is a buffer space between the bike lane and the parking lane. SBLs are ideally placed on streets with few driveways or mid-block access points for motor vehicles. SBLs can be one or two-way facilities and are most appropriate in urban areas.



The standard width for a one-directional separated bike lane is seven feet to allow safe passing behavior. For bi-directional bike lanes, a width of 12 feet is desired, with 8-10 feet acceptable for short segments in constrained corridors. The separation width for directional

and bi-directional SBLs depends on physical separation method.²⁸ The minimum separation width next to on-street parking is three feet to accommodate opening doors. Pavement markings, symbols, and/or arrows are placed at the beginning of the SBL and at intervals along the facility, based on engineering judgment, to define the bike direction. In the long-term, roadways can be reconstructed to include grade-separated bikeways. These bikeways can either be at the same grade as the sidewalk, or at an intermediate grade between the roadway and sidewalk.

Additional Design Guidance

- See NACTO Urban Bikeway Design Guide, 2014, 2nd Ed. – Cycle Tracks
- See FHWA Separated Bike Lane Guide, 2015

Shoulder Bikeways

Description

Shoulder bikeways provide a dedicated, though generally unmarked, space on the edge of a road wide enough for bicycle travel. Shoulder bikeways are most appropriate for application in rural areas. The AASHTO *Guide for the Development of Bikeway Facilities*, 4th Edition, specifies the minimum effective width of a shoulder bikeway, the unobstructed usable space for bicyclists, to be four feet, with a minimum effective width of five feet when vertical obstructions exist immediately adjacent to the roadway, such as a curb or guardrail.



The effective width of the shoulder bikeway is measured from the edge line to the edge of pavement, or from the edge of the rumble strip (if present) to the edge of pavement. The AASHTO guide specifies the following situations when the effective width of a shoulder bikeway should be wider than the minimum four-foot width:

- Where higher bicycle usage is expected
- When motor vehicle speeds exceed 50 MPH
- If use by heavy trucks, buses, or recreational vehicles is considerable
- If static obstructions exist at the right side of the roadway

²⁸ To simplify operation concerns, bi-directional separated bike lanes function best on the left side of one-way streets. An evaluation of turning movements should be conducted to understand potential conflicts.

Wider shoulders, in general, are recommended on Tier 1 roadways since higher bicycle usage is expected on these roads. For both Tier 1 and 2 roads, wide shoulder bikeways are recommended where vehicle speeds exceed 50 MPH and where heavy vehicles exceed 10 percent of the overall traffic flow.

SHOULDER BIKEWAYS vs BIKE LANES

Shoulder bikeways and conventional bike lanes are distinct bikeway facilities.

The primary differences between the two relate to the following:

Exclusivity: Bike lanes are dedicated lanes for the exclusive use of bicyclists. Motor vehicles are prohibited from loading, parking, or blocking the bike lane. Conversely, shoulder bikeways do not provide exclusive space for bicycling. Shoulder bikeways may be temporarily blocked by motor vehicles, such as when a vehicle is disabled.

Pavement Markings: Bike lanes are marked by pavement markings that communicate the lane is for the exclusive use of bicyclists. Shoulder bikeways do not include bicycle-specific pavement markings.

Intersection Design: Bike lanes and related buffered and separated bike lanes typically incorporate a range of intersection treatments that provide clarity for bicyclists and motorists moving through intersections. These designs can include pavement markings, vertical delineation and dedicated bicycle signals. Shoulder bikeways typically do not include intersection treatments with the exception being the provision of a through shoulder lane at locations where a dedicated right-turn lane is present.

Rumble Strip Design Guidance for Shoulder Bikeways

Rumble strips are an FHWA Proven Safety Countermeasure for reducing roadway departure crashes and can improve bicyclist safety by creating separation between motorists and bicyclists traveling in the shoulder. However, AASHTO, FHWA, and state-level guidance recognize that rumble strips may also negatively impact bicycle travel if they are not designed with bicycle travel in mind. Designers should reference NMDOT's forthcoming rumble strip policy, under development at the time of this Plan's finalization.



Increasingly, State DOTs are modifying rumble strip design practices to both effectively prevent run-off-the-road crashes and better accommodate bicyclists. In this example, a narrow rumble strip is used to provide a more effective width for bicyclists to ride in the shoulder.

Best practices for rumble strip design that better accommodate bicyclists include:

- Placing the rumble strip as close to the travel lane as feasible to maximize the space from the edge of the rumbles to the edge of pavement (the effective width). Rumble strips may also be placed on the roadway edge line (called rumble stripes), which has the added benefit of making the striping more visible at night.
- Maintaining a minimum of four feet of clear, rideable surface between the edge of the rumble strip and the pavement edge, if space allows.²⁹
- Maintaining a minimum effective shoulder width of five feet where a curb and gutter, guardrail, concrete wall barrier, or another roadside obstacle exists.
- Following FHWA guidance where rumble strips are desired on bicycle routes: 12" spacing center to center, 6-8" long perpendicular to roadway, and 6" wide measured parallel to roadway.
- Installing a bicycle-friendly gap pattern. NMDOT's Standard Drawing 631 displays a rumble strip gap pattern consistent with best practices. The gap pattern consists of a 12-foot clear gap followed by 48-feet of rumble strips. These gaps allow the bicyclist to maneuver into and out of the shoulder area. The designer should consider longer or more frequent gaps where bicycle speeds increase, such as down hills.
- NMDOT Standard Drawing 631 specifies a 16" offset from the center of the edge line to the edge of rumble strip. This 16" offset is compatible with bicyclist accommodation when at least four feet or more of effective shoulder width is provided outside of the rumble strip. In constrained situations, the designer should consider reducing the width of the rumble strip to provide the minimum effective-width. In reducing rumble strip widths, trade-offs for vehicular performance should be considered.

Additional Design Guidance

- See AASHTO Guide for the Development of Bikeway facilities, 2012, Paved Shoulders (4-7), Rumble Strips (4-9)
- See FHWA Small Town and Rural Multimodal Networks, 2016, Paved Shoulder (3-5), Rumble Strips (3-6)

²⁹ AASHTO Guide for the Development of Bikeway facilities, 4th Edition, 2012

Shared Use Path

Description

Shared use paths, or multi-use trails, allow for two-way, off-street use by multiple non-motorized users, including bicyclists. These facilities are frequently found in parks; along independent alignments such as rivers, railroads, or utility corridors where there are few conflicts with motorized vehicles; as well as parallel to roadways. To enable two-way travel, shared use paths should be a minimum 10 feet, with wider paths (e.g. 12 feet) encouraged where user volumes are moderate or high. In constrained circumstances, a width of 8 feet may be acceptable. In high-volume areas, delineating space for bicycles and pedestrians is recommended. This separation can be achieved through pavement markings, textural differences in surface material, or physical buffers between the bicyclist and pedestrian zones, such as a planting strip.



When placed along urban and suburban streets with numerous access points and intersections, shared use paths create operational challenges and increased conflicts between bicyclists and motorists. If the designer chooses to implement a shared use path within the roadway right-of-way, it must be designed to enhance safety and minimize conflict with motor vehicles, particularly at unsignalized intersections and other motor vehicle crossings.

Additional Design Guidance

- See AASHTO Guide for the Development of Bikeway Facilities, 2012, 4th Ed., Design of Shared Use Paths, Chapter 5
- See FHWA Small Town and Rural Multimodal Networks, 2016, Shared Use Path, 4-3

INCORPORATING BICYCLE INFRASTRUCTURE INTO ROADWAY DESIGN

Designers may use a variety of techniques to provide dedicated bikeway facilities. Where NM highways already have dedicated bikeway facilities, most commonly in the form of paved shoulders, the existing roadway cross-section should be maintained. Techniques listed in the Maintenance Strategies section of the Design Guidelines should be reviewed during rehabilitation and reconstruction activities to ensure that the shoulder remains suitable for bicycle travel. In other instances, there may be opportunities to retrofit existing highways to add bikeways without widening the roadway. Roadway retrofits involve reallocating existing pavement width through striping modifications or removing travel lanes to provide additional width for dedicated bikeways. Bikeways can also be provided by widening the roadway during reconstruction projects to provide the width necessary to install dedicated bikeways.

TECHNIQUES FOR ACCOMMODATING BICYCLISTS

1. Lane Narrowing
2. Lane Reconfiguration (Road Diets)
3. Roadway Widening During Reconstruction

If the recommended bikeway facilities cannot be installed due to corridor constraints, interventions to improve bicycling conditions can still be made. These Constrained Corridor Interventions are described below.

Roadway Reconstruction and Widening

Roadway reconstruction is an optimal time to widen roadways to accommodate desired shoulder widths or bicycle lanes. As part of the project development process for roadway reconstruction efforts, the designer should reference the recommended bikeway facilities for the roadway tier and context. If undertaking a corridor study, the selected options outlined in this document should be refined based upon public and stakeholder involvement, as well as the specific roadway context.

Lane Narrowing

Where lane width exceeds minimum standards prescribed in NMDOT's Design Manual, narrowing lanes can allow existing roadway space to be reallocated for bike lanes or shoulder bikeways. In New Mexico, the standard travel lane width is 11 feet wide in urban areas and 12 feet on rural and high speed and/or high-volume roadways. Where lanes are wider than these typical lane widths, opportunities exist to reallocate additional roadway width to shoulders to provide dedicated space for bicyclists. This reallocation of pavement space typically occurs during resurfacing and restriping activities.

It is typically much less costly to install bikeway improvements as part of a resurfacing project compared to implementing improvements as a stand-alone project.³⁰ When preparing to implement resurfacing projects, the designer should reference the NM Bike Plan for the tier

³⁰ Incorporating On-Road Bicycle Networks into Resurfacing Projects. FHWA. March 2016.

level of the roadway and appropriate facility types, as well as the FHWA's *Incorporating On-Road Bicycle Networks into Resurfacing Projects* (2016) guidebook to determine if adding bikeway facilities to the project is appropriate.

If target shoulder widths specified in the Design Guidelines cannot be achieved, lane narrowing is still an effective interim strategy to provide some level of bikeway accommodation prior to a larger reconstruction project. Providing a shoulder, even a narrow one, can help improve the comfort and safety of bicycling on a rural road.³¹

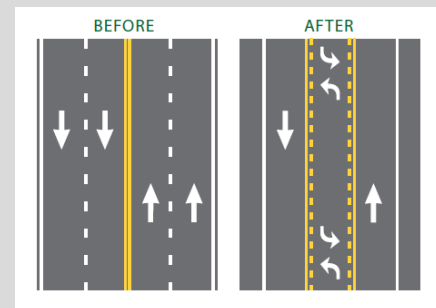
Lane Reconfiguration (Road Diets)

Roadways with excess vehicle capacity provide opportunities for the reconfiguration of the roadway and provision of bikeway facilities. Lane reconfiguration, including road diets that remove one or more vehicular travel lanes, generally provide sufficient space for bike facilities on both sides of the roadway. Depending on the street's existing configuration, traffic operations, user needs, and safety concerns, various lane reduction configurations may be appropriate. Prior to implementing this measure, a traffic analysis may be necessary to identify potential impacts. For projects where turn lanes can be provided, such as the four-lane to three-lane conversions, substantial safety benefits may be realized.

Lane reconfiguration can be implemented during repaving and reconstruction projects, provided the public and applicable local entity is engaged as part of the decision-making process. Designers should reference the NMDOT Road Diet Guide for additional guidance on lane reconfigurations.

LANE RECONFIGURATION

A four-lane street (with two vehicular travel lanes in each direction) could be modified to provide one vehicular travel lane in each direction and a two-way left-turn lane, with space remaining for bikeway facilities.



Source: FHWA Safety Program

³¹ The ODOT Analysis and Procedures Manual – Chapter 14 Multimodal Analysis states: “The occurrence of bike crashes is highest on higher volume rural facilities with little or no paved shoulders, poorly placed rumble strips, or deteriorated shoulder pavement conditions.” Source: ODOT.

Designing for Constrained Corridors

The techniques to accommodate bicyclists may not be feasible in some circumstances due to right-of-way constraints. In these instances, designers have tools available to improve bicycling conditions in constrained situations that do not require substantial roadway modification.

The first option is to choose an alternative route where a dedicated bikeway facility or low-stress bikeway can be installed. If the most appropriate alternative route is along a non-NMDOT facility, coordination with the local jurisdiction(s) is required.

If no alternative route exists, the second option is to apply design interventions for constrained corridors, as listed in Tables 9-11, and to use engineering judgment to select the intervention(s) that will have the greatest impact on improving the constrained roadway for bicycling. The designer should also review Table 12: Maintenance Strategies to determine if any of these strategies can be used to improve bicycling conditions.

Interim Design Treatments

While the goal of the NM Bike Plan is ultimately to provide dedicated space for bicyclists, constraints may exist that prevent such space from being provided in the near-term. The treatments listed in Tables 9-11 can also be applied during routine maintenance efforts as interim design treatments to improve bicycling conditions until dedicated bikeway infrastructure can be installed.

These interim design treatments are particularly appropriate if resources are not available to install dedicated bikeways during maintenance activities or if bikeway improvements are desired in the near-term. On Tier 1 and Tier 2 routes, the use of interim design treatments should be considered the first step toward bicycle accommodation.

OPTIONS FOR IMPROVING CONSTRAINED CORRIDORS

1. Seek parallel route for bikeway facilities
2. Apply design interventions for constrained corridors


CONSIDERATIONS FOR TIER 2 BASIC FACILITIES

Design interventions for constrained corridors should be applied to NM highways designated as Tier 2 Basic routes.

Table 9 | Design Interventions for Constrained Corridors

Design Feature	Best Practices & Guidance	Appropriateness
Shared Lane Marking 	<p>Shared lane markings are pavement markings that direct motorists and bicyclists to operate in the same travel lane. Roadways with shared lane markings typically serve as a connection between other bikeways (usually bike lanes) or as preferred routes through high-demand corridors.</p>	<p>Urban: Shared lane markings are appropriate on local streets with low motorized traffic volumes and speeds. Roads should have maximum posted speeds of 25 MPH³² and, ideally, less than 1,500 vehicles per day, but no more than 3,000 vehicles per day.</p>
Advisory Lane 	<p>Advisory lanes act as paved shoulders or bike lanes that can also accommodate encroachment by motorists when vehicles in opposing directions converge. Advisory bike lanes require an approved FHWA Request to Experiment. Additional guidance for this type of facility can be found in the FHWA Small Town and Rural Multimodal Networks (Chapter 2 – p. 17–24).</p>	<p>Urban or Rural: This design treatment can be considered on lower-speed (i.e. less than 35 MPH), lower-volume (i.e. less than 3,000 vehicles per day) roadways that are constrained, and where the roadway cannot be widened to accommodate a dedicated bikeway facility. Advisory lanes should be avoided on curvy roadways with poor sight lines.</p>
Uphill Shoulder Lane 	<p>If a dedicated shoulder cannot be provided in both directions to right-of-way constraints, the designer may consider installing an uphill shoulder lane (i.e. a lane that can be used by bicyclists to climb the hill). Uphill shoulder lanes can be achieved through restriping the existing roadway cross-section or reconstructing the roadway on the uphill side of the road.</p> <p>Uphill shoulder lanes should follow the general design guidance for shoulder bikeways provided in the NM Bike Plan. Additional guidance for this type of facility is provided in the AASHTO Guide for the Development of Bikeway Facilities, 4th Ed.</p>	<p>Urban or Rural: The speed difference between a bicyclist travelling uphill and a vehicle travelling uphill is much greater than the speed difference between a bicyclist travelling downhill and a vehicle travelling downhill. Due to this disparity in speeds, it may be advantageous to provide an uphill shoulder lane. This strategy is most appropriate on roadways with consistent grade increase, such as roadways through mountainous areas.</p>



Table 10 | Design Interventions for Constrained Corridors, Cont.

Design Feature	Best Practices and Guidance	Appropriateness
<p>Flashing Beacons</p>  <p><i>Source: Jonathon Maus, Bike Portland</i></p>	<p>On constrained roadways where a shoulder bikeway cannot be provided, a potential safety enhancement is the addition of flashing activated warning beacons to the MUTCD compliant W11-1. Warning beacons are passively activated by bicyclists riding by a sensor. The warning beacon displays a flashing pattern to alert motorists of the presence of a bicyclist and indicates the need to adjust their speed and passing behavior accordingly.³³</p> <p>Activated flashing beacons are preferred over continuous warning beacons. Engineering judgment should be used when considering installation.</p>	<p>Urban or Rural: Flashing beacons should only be used at specific "pinch-point" locations, such as a tunnel, bridge, narrow roadway section, or at locations where sight distance is limited, such as sharp turns. This limited use provides a specific and clear signal to motorists to be aware of bicyclists through the pinch-point. Flashing beacons are not an appropriate intervention for long stretches of roadway.</p>
<p>Regulatory Signage – Urban Areas</p> 	<p>Signage helps to alert motorists to the presence of bicyclists and may be used in combination with shared lane markings. The MUTCD Compliant "Bicycles May Use Full Lane" regulatory sign (R4-11) can be used in urban contexts. Engineering judgment should be used to determine appropriate placement intervals.</p>	<p>Urban: Regulatory signage should be installed along urban roadways where the posted speed is 30 MPH or less and providing a dedicated bikeway facility is not feasible.</p>

³² The MUTCD allows sharrows in areas with posted speed limits up to 35 MPH. This Plan recommends sharrows only in areas with posted speed limits up to 25 MPH, which is consistent with NACTO guidance. Sharrows in areas with posted speeds of more than 25 MPH negatively impact the comfort of bicyclists.

³³ Note that the effectiveness of this strategy has not been studied extensively.

Table 11 | Design Interventions for Constrained Corridors, Cont.

Design Feature	Best Practices & Guidance	Appropriateness
Warning Signage – Rural Areas – Option A 	<p>On high-speed rural roadways, best practices suggest using the MUTCD compliant W11-1 with a custom legend plaque reading "ON ROADWAY." This sign should be used on roadways with no shoulder or where the shoulder effective width is less than four feet. Engineering judgment should be used to determine appropriate placement intervals.</p>	<p>Rural: Warning signage may be installed along Tier 2 Basic routes and along roadways where providing the target shoulder bikeway is not feasible and where posted speeds are <i>greater than</i> 30 MPH.</p>
Warning Signage – Rural Areas – Option B 	<p>An alternative option for rural roadway advisory signage is MUTCD compliant W11-1 with custom plaque reading: "IN LANE". Delaware DOT has adopted this sign assembly as the standard sign for rural bike route application. Engineering judgment should be used to determine appropriate placement. NMDOT would need to formally adopt the alternative "IN LANE" plaque.</p>	<p>Rural: Warning signage may be installed along Tier 2 Basic routes and along roadways where providing the target shoulder bikeway is not feasible and where posted speeds are <i>greater than</i> 30 MPH.</p>

NOTE: The "Share the Road" (W11-1/W16-1P) assembly is not recommended for application on NM highways. This sign's usefulness is questionable based on arguments that it is ambiguous, imprecise, and frequently misinterpreted.^{34 35}

MAINTENANCE STRATEGIES

Table 12 below lists strategies that can be employed during maintenance activities on a roadway so that the roadway is more suitable for bicycle traffic. Maintenance of NMDOT

³⁴ Bike Delaware (2014) Why "Share the Road" is gone in Delaware. Available: <http://www.bikede.org/2014/04/07/why-share-the-road-is-gone/>.

³⁵ Pein W (2012a) The Share the Road Sign. Available: <http://bicyclingmatters.files.wordpress.com/2008/04/the-share-the-road-sign3.pdf>.

roadways is ongoing; therefore, utilizing these techniques is a strategy to implement the NM Bike Plan and support statewide bicycle travel.

Table 12 | Maintenance Strategies

Consideration	Best Practices
Rumble Strip Placement Design	<p>Review rumble strip design and placement to make certain it is compatible with bicycle usage and designed to maximize space available to bicyclists if opportunities exist. The designer should consider the following when designing rumble strips along bike routes:</p> <ul style="list-style-type: none"> • history of run-off-road crashes along corridor • placement of the rumble strips • dimensions of the rumble strips <p>See the discussion on rumble strips in the Bikeway Facility Types section for additional guidance, as well as the forthcoming NMDOT Rumble Strip Design Policy.</p>
Preservation (Major)³⁶	<p>Provide pavement to the edge of the roadway during resurfacing projects to avoid creating a seam/lip in the rideable shoulder area. Preservation major includes activities such as pavement resurfacing, hot in-place recycling, and Stone Matrix Asphalt (SMA) mill and inlay.</p>
Preservation (Minor)	<p>Ensure all surfacing work spans the full width of the existing paved surface to avoid creating a seam/lip in rideable shoulder area. Alternatively, apply the treatment in the driving lanes only to the edge line if the shoulder is in good condition. Treatments should not create a seam in the bicycle facility. Preservation Minor includes activities such as chip seal, open-graded friction course (OGFC) paving, and micro surfacing.</p>
Preventative Repairs	<p>Include shoulders when crack sealing or fog sealing a roadway. When applied on shoulders, the seal should be installed in such a manner as to create as smooth a surface as possible.</p>
Sweeping	<p>Conduct regular street sweeping on high priority routes. For scheduled events, organizers may request the appropriate NMDOT District Office to sweep prior to the event.</p>
Snow Removal	<p>NMDOT District Offices should plow bicycle lanes in urban areas and the shoulders in rural areas along popular bicycling routes. Snow should not be stored on shoulders along popular bicycling routes unless no other option exists.</p>
Guard Rails	<p>Install new or replacement guardrails installed to maximize the effective shoulder width to the greatest extent possible.</p>
Drainage Gates	<p>Ensure drainage gates are bicycle safe in order to prevent bicycle wheels from falling into a slot in the grate. Gates should be flush with the road surface or, if that is not possible, the pavement should taper into drainage inlets so they do not cause an abrupt edge at the inlet.</p>

³⁶ NMDOT Agile Assets Pavement Management System Engineering Configuration Guide; Version 1.2; Table 4.1.1 (p. 21); June 13, 2013. This guide also defines Preservation (Minor) and Preventative Repairs.

NATIONAL AND STATE DESIGN REFERENCES

The NM Bike Plan focuses on the appropriateness of bikeway infrastructure for NM highways in urban and rural areas and provides basic guidance on infrastructure types. The NM Bike Plan may be complemented by national design manuals that offer guidance on the specific application of these infrastructure types, as well as technical roadway specifications and geometric design.

National and state design manuals that are referred to in the design guidance included for the NM Bike Plan, or that are relevant for bikeway facility design, are described below. All guidance in the NM Bike Plan is consistent with the guidance contained in national design manuals.

National Design Guidance

The Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)* defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* (current version, 2012) provides guidance on dimensions, use, and layout of specific bikeway facilities. This guide is particularly relevant for the design of shoulder bikeways on rural roadways.

The National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* (current version, 2014) offers guidance on the current state of practice in the design of bikeway facilities in urban areas.

The AASHTO *A Policy on Geometric Design of Highways and Streets* (current version, 2011) commonly referred to as the "Green Book," contains the current best practices for roadway geometric design. The Green Book should be referenced by designers for roadway technical specifications and in conjunction with the NM Bike Plan, the AASHTO *Guide for the Development of Bicycle Facilities*, and the NACTO Urban Bikeway Design Guide.

FHWA's *Separated Bike Lane Planning and Design Guide* (2015) offers guidance on separated bike lanes (also known as protected bike lanes or cycle tracks). The guide includes information on design and implementation of facilities including intersection treatments and interactions with parking, transit, and loading. This may be a useful reference where separated bike lanes are identified as a design option.

FHWA's *Small Town and Rural Multimodal Networks* (2016) document is a design resource and idea book to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities. NMDOT may consider this guide in conjunction with the technical guidance found in the AASHTO Green Book.

State Design Guidance

The *NMDOT Design Manual* (2016) provides policies, standard practices, criteria, guidance, and references approved by NMODT for the design of state-owned roadways. The manual allows for flexibility from location to location to accommodate unique design considerations. Guidance from the NM Bike Plan is complementary to the NMDOT Design Manual.

The *NMDOT Rumble Strip Policy* is under revision as of the writing of the NM Bike Plan. The updated policy will provide guidance on the design and placement of rumble strips.

The *NMDOT Signing and Striping Manual* (2008) outlines the traffic control devices utilized to manage roadway travel and promote highway safety by notifying users of regulations, warnings of potential hazards, and nearby destinations.

The *NMDOT Guide to Context Sensitive Solutions* (2006) calls for the application of context sensitive solutions methodologies in the planning, design, construction, and maintenance of NMDOT facilities. Bicycle considerations are encouraged as part of the stakeholder outreach process.

The *NMDOT Road Diet Guide* (2016) provides evaluation techniques and design considerations for the potential reallocation of roadway space. The guide also enables users to determine if the conditions along a roadway are appropriate for the application of a road diet. Additional discussion on the NMDOT Road Diet Guide and connections to the NM Bike Plan are described in the State Planning Context and Supporting Documents section of Chapter V.

The *NMDOT Agile Assets Pavement Management System Engineering Configuration Guide* (Version 1.2 2013) provides guidance on pavement preservation and maintenance techniques.

IX. IMPLEMENTATION AND RECOMMENDATIONS

IMPLEMENTATION

The primary means of implementing the NM Bike Plan is through the inclusion of bikeway facilities during reconstruction and major rehabilitation activities on NM highways identified as Tier 1 or Tier 2 on the prioritized statewide network. Bikeways may also be incorporated during routine maintenance efforts, where possible. To ensure bikeway facilities are considered for inclusion during these efforts, usage of the NM Bike Plan design guidelines should occur as part of the roadway design/redesign process. As NMDOT staff refine the processes and practices included in the NM Bike Plan, the Statewide Planning Bureau intends to work with appropriate NMDOT staff to incorporate the NM Bike Plan into the NMDOT Design Manual.

NMDOT Roadway Reconstruction Activities

The integration of bikeway infrastructure planning into roadway reconstruction and major rehabilitation processes constitutes a sustainable means of implementing bikeway infrastructure over time. Bikeway facilities may also be installed as part of stand-alone roadway improvement projects, though NMDOT currently does not have a funding source dedicated to this outcome.

Consideration of the NM Bike Plan in NMDOT Processes

The intent of the NM Bike Plan is to ensure that consideration of bikeway facilities occurs early in the project development process. In particular, specific reference to the NM Bike Plan should be conducted in the Project Definition Phase, Project Scoping Report, and/or during a Location Study (e.g., corridor study, alignment study, or Context-Sensitive Public Involvement Plan). All pre-application and project scoping processes should include consultation with the NM Bike Plan to determine the priority tier for the roadway in addition to scoping of potential design considerations to identify engineering, environmental, or public involvement factors that may need to be addressed as part of the project development process.

During reconstruction and major rehabilitation, and when federal funds are utilized, NMDOT must follow the process outlined in the Location Study Procedures (2015) to ensure that established transportation performance goals are met within the context of broader community needs, expectations, plans and environmental settings. All new highway construction projects

and highway reconstruction projects require evaluation of multi-modal infrastructure options and should include coordination with NMDOT's Bicycle-Pedestrian-Equestrian (BPE) Coordinator. Because coordination with regional and statewide plans and policies is required under the National Environmental Policy Act (NEPA), consideration of the NM Bike Plan, including the priority tier and appropriate bikeway facilities, should occur in this early stage before a project advances to the design phase.

If, as the project is developed and extenuating circumstances limit or prevent the inclusion of bikeway facilities, NMDOT may seek alternate facility designs. Efforts will be made to safely accommodate all roadway users.

NMDOT District-Led Projects on NM Highways

This Plan provides recommendations to NMDOT Districts to program adequate funding for the inclusion of bikeway facilities during reconstruction or major rehabilitation efforts on Tier 1 or Tier 2 roadways. with adequate funding for the inclusion of bikeway facilities. Bikeway facilities are eligible as part of the National Highway Performance Program (NHPP)³⁷ and the Surface Transportation Block Grant (STBG) Program.³⁸

NMDOT Districts may also choose to pursue additional funding to either specifically build bikeway infrastructure or supplement other funding sources as part of a larger project. The Congestion Mitigation and Air Quality Improvement (CMAQ) Program (non-mandatory) is a competitive, application-based program to which NMDOT Districts (and Tribal/Local Public Agencies [T/LPAs]) can apply for funding through the NMDOT Statewide Planning Bureau. Project applications that align with the NM Bike Plan receive points as part of the application rating and ranking. Districts should reference the NMDOT CMAQ Non-Mandatory Program Guide for additional information.

If a NMDOT District identifies a high-crash area for fatal and/or serious injury crashes, the District may be able to apply for Highway Safety Improvement Program (HSIP) funding. Districts may be able to realize numerous safety benefits for high-crash areas with the addition or widening of shoulders. In addition to providing bikeways for bicyclists, shoulders also

DEFINITIONS

Reconstruction refers to full-depth pavement replacement, adding lanes adjacent to an existing alignment, or changing the fundamental character of the roadway.

Major rehabilitation refers to structural improvements to pavements for extending service life or an increase in load-carrying capacity.

Refer to NMDOT Agile Assets Pavement Management System Engineering Configuration Guide for NMDOT repair categories.

Definition source: FHWA

³⁷ 23 USC § 119.d.2.H

³⁸ 23 USC § 133.b.6

reduce the likelihood of run-off-the-road crashes by providing a driver recovery area. Districts should consult with the NMDOT HSIP Coordinator to discuss options for high-crash areas.

T/LPA Projects on NM Highways

T/LPAs may also partner with NMDOT and contribute funding for the installation of bikeways and the improvement of NMDOT facilities. T/LPA staff can consult with the NMDOT Statewide Planning Bureau for guidance and procedures on pursuing a transportation project on an NMDOT roadway utilizing local funding. T/LPAs may also apply through NMDOT for federal funding sources, such as the Transportation Alternatives Program, to install bikeway facilities along NM highways. See the NMDOT Active Transportation and Recreational Programs Guide, NMDOT CMAQ Guide, and the NMDOT T/LPA Handbook for additional information.

Other Considerations

For NMDOT projects that may entail a change to the roadway cross-section and/or capacity, NMDOT generally undertakes a public input process. This public process provides an opportunity for additional input on the bikeway infrastructure needs for specific locations.

NMDOT Project Development Engineers (or NMDOT-hired consultants) may consult with the NMDOT BPE Coordinator (or other Statewide Planning Bureau staff) for additional guidance and reference sources on design questions, such as the appropriateness of different bicycle facility options, coordination with local jurisdictions and linkages to bikeway infrastructure on non-NMDOT facilities, or how to complement the guidance provided in national design manuals (e.g. AASHTO) with the information provided in the NM Bike Plan.

NMDOT Maintenance Activities

Routine roadway maintenance activities represent potential opportunities to add dedicated bikeway infrastructure as well as maintain existing bikeway facilities. NMDOT will explore opportunities to implement bikeway infrastructure through maintenance projects. Maintenance activities include various pavement overlay and sealing activities, as well as mill-and-overlay operations that result in a new pavement surface. These maintenance activities generally fall into one of three categories in the NMDOT Pavement Management System Configuration Guide: Preservation (Minor), Preservation (Major), or Rehabilitation (Minor).³⁹

Potential Techniques

In some situations, bikeway facilities may be added without dramatically changing the cross-section of the road by narrowing vehicular lanes and repurposing the excess space as a bike lane or wider shoulder. This is most feasible if the existing vehicular lane widths exceed 11 or 12 feet. In other situations, the roadway lane configuration may be modified, such as road diets that reduce a four-lane cross-section to a three-lane cross-section (two through vehicular lanes with a two-way left-turn lane). The excess space can then be repurposed as a bike lane

³⁹ NMDOT Agile Assets Pavement Management System Engineering Configuration Guide; Version 1.2; Table 4.1.1 (p. 21); June 13, 2013.

or shoulder. The NMDOT Road Diet Guide (Infrastructure Design Directive 2018-16) provides guidance on assessing whether certain roadways are appropriate locations for these types of lane reductions.

Other opportunities to provide more space, or preserve existing space, for bicyclists include paving the roadway to the existing edge of pavement and adjusting rumble strip designs and placement to create a wider effective shoulder width. If dedicated space for bicyclists cannot be provided through maintenance activities, bicycle-specific improvements may still be implemented, such as the installation of regulatory and warning signage (see the section on Designing for Constrained Corridors in Chapter VIII).

Opportunities to Incorporate Bikeway Facilities

Regardless of the improvements selected, the integration of bikeway facilities into maintenance activities should be determined early in the development process. When a road is programmed for resurfacing, signing and striping plans for the bikeway improvements should be included in the plan set, if deemed feasible and appropriate by the designer. Consideration of the NM Bike Plan should be included during the environmental review process for maintenance projects and projects that do not require consideration of alternatives, addition of lanes, or major changes to roadway geometry. Exclusion from the location study process does not exempt projects from complying with NEPA, which requires coordination with regional and statewide plans and policies.

When undertaking maintenance activities on Tier 1 or Tier 2 roadways, District staff should take measures to preserve the effective width of the existing shoulder. This may be achieved by resurfacing the full width of the roadway to the outside shoulder edge. Alternatively, if the shoulders are in good condition, the project may leave the shoulders in their existing state and only overlay or resurface to the edge line. The goal is to keep the shoulder free of pavement or overlay edges that decrease the effective shoulder width.

Maintenance-at-a-Glance Programs

NMDOT districts maintain Maintenance-at-a-Glance (MAG) programs, four- to five-year maintenance plans for each district that are primarily focused on pavement preservation activities. These activities seek to extend the lifespan of the pavement surface and frequently result in a new pavement, seal, or overlay surface. Districts develop the MAG plans based on assumed funding availability, which is historically constrained in New Mexico. Given the limited resources, NMDOT districts, in coordination with the NMDOT BPE Coordinator, could identify opportunities where bikeway facilities, such as a bike lane or shoulder, can be integrated with other roadway improvements scheduled through the MAG program. This may include opportunities to install signage during other signage installation or replacement projects.

Internal Outreach & Education

Internal outreach and education on the NM Bike Plan is integral to its implementation and ultimate success. NMDOT Statewide Planning Bureau staff, including the BPE Coordinator, will develop strategies that includes targeted outreach, training, and education to District Engineers and staff, Project Development Engineers at the Regional Design Centers, the Environmental Bureau, and coordination with the BPE Technical Committee members. The goal of these activities is to ensure the consideration of the NM Bike Plan as a part of established design and review processes and practices

RECOMMENDATIONS

In addition to improving bikeway infrastructure, the state can advance other programs and practices to encourage more New Mexico residents and visitors to ride and to increase the awareness of bicycling in New Mexico. This multi-faceted approach is important, as combining infrastructure and programmatic activities is typically the most effective means of addressing safety and creating bicycle-friendly communities.

The following section contains planning, programmatic, and “best practice” recommendations that NMDOT can consider to further support bicycling activity on NM highways. The intent of these recommendations is to provide suggestions for how existing practices can be modified or continued in order to achieve the vision and goals of NMDOT as articulated in this and other planning documents.

Plans and Programs for Achieving Safety Goals

A central theme of various NMDOT planning documents is to provide a safe, equitable, and efficient transportation network in New Mexico. (See the State Planning Context and Supporting Documents section for additional information on these NMDOT documents.) A primary goal of the NM Bike Plan, in particular, is to improve safety for all system users, including the reduction of fatalities and injuries to bicyclists and pedestrians. Safety considerations are further supported through ongoing practices, intra-agency coordination, and plan integration. NMDOT can ensure that emphasis is consistently placed on the safety of all roadway users, including bicyclists.

Various efforts are documented in the Highway Safety Plan and the Strategic Highway Safety Plan, and important opportunities exist to expand on these plans and existing programs, including motorist and bicyclist education programs. In particular, the scope of the Traffic Safety Division’s educational programs can promote greater awareness of the fact that bicyclists are travelling on NM highways and can lead to safer interactions between bicyclists and motorists. NMDOT currently uses its “Look For Me” educational campaign to increase motorist awareness of bicycles (and pedestrians) on roadways in New Mexico. The NM Bike Plan recommends continuing, and potentially expanding upon, this or a similar program.



Bicyclists and pedestrians are disproportionately represented among those killed as a result of traffic incidents.⁴⁰ Implementing investments on state highways per the guidance in the NM Bike Plan is, therefore, a proactive choice; an expansion of the statewide network of bikeway facilities could help decrease bicycle-vehicle crash rates, help New Mexico achieve the safety goals specified in NMDOT plans, and help NMDOT achieve annual safety targets for non-motorized fatalities and serious injuries, as well as total fatalities and serious injuries.

State Performance and Benchmarking Activities

In recent years, many state DOTs have developed Toward Zero Deaths (TZD) or Vision Zero strategies and other safety benchmarks. TZD and Vision Zero strategies are rooted in the idea that one transportation-related death is too many, and that all such injuries and fatalities can be prevented through roadway design, education, enforcement, and other efforts. Ultimately, TZD goals are aspirational and aimed at reducing the total number of transportation-related deaths and serious injuries as much as possible.

The 2016 SHSP includes information about the TZD strategy and notes that NMDOT is considering adopting the TZD concept for future safety initiatives. Many of the elements of the TZD approach are integrated into NMDOT's safety programs. Specifically, the Highway Safety Improvement Program (HSIP) analyzes statewide fatal and serious injury crash data for all modes, identifies high crash areas, and focuses planning efforts and investments in those locations.

⁴⁰ Beck, Laurie, Ann Dellinger, and Mary O'Neil. "Motor Vehicle Crash Injury Rates By Mode Of Travel, United States: Using Exposure-Based Methods To Quantify Differences." *American Journal of Epidemiology* 166, no. 2 (July 15, 2007): 212-18. Accessed April 19, 2018. doi:10.1093/aje/kwm064.

Additionally, NMDOT sets annual safety targets (posted on the NMDOT website) in the performance categories listed below and spends its HSIP funding toward achieving targets in these categories:

1. Total Traffic Fatalities,
2. Total Serious Injuries,
3. Rate of Fatalities,
4. Rate of Serious Injuries, and
5. Non-Motorized Fatalities and Serious Injuries.

The NM Bike Plan supports the continued development and implementation of NMDOT's safety programs to ensure that safety remains at the forefront of NMDOT project development. Improved bicycle safety can also be incorporated into ongoing NMDOT planning efforts. In particular, TZD can be expanded as a goal in future iterations of the SHSP, and consideration of bicycle-related issues can continue to be a core feature of area-specific Transportation Safety Plans and other safety initiatives.

Data Collection and Evaluation of Existing Conditions

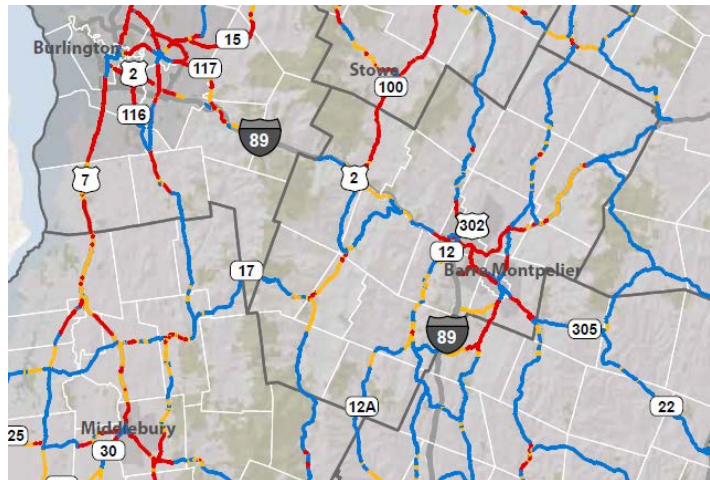
In addition to tracking the number of crashes, many states maintain inventories of dedicated bikeway facilities on state highways, as well as other data known to influence bicycling behavior and comfort levels. Expanded data collection efforts, including an inventory of roadways that meet desired bicycling infrastructure guidelines, provides two primary benefits. The first is that NMDOT and other stakeholders can understand the extent of the existing bicycle network. The second is that NMDOT can track improvements, potentially including year-over-year growth of the network and changes in funding levels. This data can then be used to set goals and evaluate the extent of network expansion over time.

NMDOT has an inventory of conditions statewide that affect bicyclists, featuring information on shoulder width, rumble strips, and roadway traffic volume information. NMDOT may be able to expand on this effort in the future through an enhanced and recurring data collection program, including targeted bicycle traffic volume data collection, to determine patterns in bicycling behavior across the state.

CONNECTION TO ASSET MANAGEMENT

Enhanced data collection efforts could be complementary to NMDOT's emerging Transportation Asset Management (TAM) program. The TAM currently collects and will continue to collect shoulder type, shoulder width, and rumble strip data. The TAM program could be expanded to include additional information that specifically affects bicyclists, including the presence of bikeway facilities.

In the future, NMDOT may consider further analyzing the bicycle-related data to assess the comfort of roadways for bicycling. Several methodologies, including bicycle level of service or bicycle level of stress tests, could be developed for a New Mexico context and used to compare existing bikeway accommodations (such as a bike lane or dedicated shoulder) to traffic data known to influence bicyclist comfort (such as the number of travel lanes, traffic volumes, travel speeds, and percentage of truck traffic). NMDOT could also use this analysis to compare demand for bicycling on NM highways, as indicated by the priority network, to existing bicycling conditions along these routes.



Bicycle level of stress model used by Vermont Agency of Transportation. Image source: VTrans On-Road Bicycle Plan – Phase II, 2018.

Acquiring and processing the data required to implement such a tool may be time and resource intensive, but the product can help NMDOT track progress on improving the statewide network and implementing this plan over time.

Update Bicycle Guideline Map

The Bicycle Guideline Map will be updated regularly, approximately every four to five years, to reflect changing traffic volumes and other roadway characteristics over time, and to provide up-to-date information to the public. Depending on what is included in an update, future efforts may require an expanded bicycle data collection program. One such effort may be to add state bicycle route designations to the Guideline Map to increase public awareness of these routes.

Update State Bicycle Route Designations

State bicycle routes were identified throughout the 2000s by the BPE Advisory Committee. The current state bicycle routes follow a discrete set of NM highways (and sometimes local routes) that often feature wide shoulders, as well as route signage and route numbers. The NM Bike Plan identifies an infrastructure network that NMDOT can use to update the state bicycle routes as the infrastructure is built out over time. In addition, the state bicycle route network can benefit from comprehensive and standardized signage and wayfinding programs.

Bicycle route signage is green, indicating that it is used for wayfinding. This is distinct from the regulatory signage (black and white) used to inform motorists that bicyclists have a legal right to ride on the roadway, as well as advisory signage (yellow) that indicates a bicycle may be riding on the road and warns drivers to proceed with caution. The existing signage system can be expanded to include a statewide wayfinding system that contains destination

information, including directions and distance and is supported by standard guidance on signage placement and contents. If established, NMDOT will need to consistently implement the signage and wayfinding system along designated bike routes in the state.

In addition to a wayfinding signage system, NMDOT can also adopt a consistent and logical numbering system. This will ensure that all future state bike routes build upon the existing system and provide clear information to users.

US Bicycle Route Designations

The Priority Network considers proposed alignments for USBRs 66 and 90, and all NM highways included in the proposed alignments are either Tier 1 or Tier 2. As bikeway infrastructure on these roads is built and NMDOT meets the requirements outlined in the AASHTO Purpose and Policy Statement,⁴¹ NMDOT may consider applying to AASHTO for USBR designations. Coordination with other states is necessary to ensure the USBR alignments in New Mexico serve local needs while connecting appropriately to infrastructure in surrounding states.

Bicycling Tourism Campaign and Promotional Efforts

Bicycling in New Mexico is an economic development opportunity, and events such as the Tour of the Gila currently attract world-class bicyclists to the state each year. New Mexico has the ingredients to become an attractive recreational cycling destination: identified Adventure Cycling routes, national attractions, excellent weather, and a variety of terrain and landscape that appeal to a range of bicyclists. State and local tourism organizations can and do promote these assets to engage in bicycle-travel-related marking campaigns and specifically appeal to out-of-state travelers and bicyclists.

STATE BICYCLE ROUTE CONSIDERATIONS

The NM Bike Plan recommends that state bicycle routes be designated only if the desired level of bikeway infrastructure exists.

With the establishment of the Priority Network, it may be desirable to work with Adventure Cycling and other national organizations to update the designated cycling routes that pass-through New Mexico.



State bicycle route signage along US 180 near Silver City.

⁴¹ <http://www.adventurecycling.org/default/assets/File/USBRs/AASHTOPurposePolicyStatement.pdf>

These marketing efforts can be supported by an updated interactive map and high-quality website. NMDOT will continue to distribute print versions of the maps, working with stakeholders that include local bike shops, advocacy organizations, chambers of commerce, tourism bureaus, and other agencies.

Agency Coordination

Integration of Bikeway Infrastructure and Transit Services

NMDOT will continue to partner with transit providers to encourage the use of combined bicycle and transit trips, allowing visitors and New Mexico residents greater overall transportation options. Opportunities include offering bicycle parking at major stops and station areas as well as ensuring adequate bicycle racks are present on transit vehicles. NMDOT may also coordinate with transit providers to make maps and other information available on bikeway infrastructure available to transit users.

Integration of Bikeway Infrastructure and Regional Planning Efforts

Several municipalities across New Mexico have undertaken city-level bicycle master plans, while regional bicycling planning is conducted regularly by MPOs, either as stand-alone efforts or as part of updates to metropolitan transportation plans (MTPs) and regional transportation plans (RTPs). Updates to these local and regional plans can reference and integrate the NM Bike Plan to support implementation of the statewide priority network and promote a connected network along state and local roadways. Coordination at the state, regional, and local levels can also consider the desired timing of improvements and evaluate needed connections and alternative or parallel facilities that may be more conducive to bicycling than some NM highways, which are often arterial roadways characterized by high speeds and traffic volumes.

NMDOT staff actively participates in the MTP and RTP update processes and is available to coordinate with local and regional agencies so that they are aware of the NM Bike Plan and the priority network.

Regular Updates to NM Bike Plan

The NM Bike Plan is the state's first comprehensive planning document to guide the implementation and design of bikeway facilities on NM highways. As policies and demographics change, and as demand for bicycling infrastructure continues to grow, NMDOT will update the NM Bike Plan on a regular cycle, such as every five years, or as deemed necessary. Future updates may include the following:

- Review the Tier Designations – Bicycle trip patterns may evolve as the state grows and develops. Additionally, as NMDOT and the District Engineers implement the NM Bike Plan recommendations, users may identify opportunities to revise the designations. The update should review the designations and make modifications to them as needed.

- Review Design Guidance – The state of the practice for bikeway design is constantly evolving. The design guidance portion of the NM Bike Plan should therefore be reviewed and updated to remain consistent with the current state of the practice.
- Incorporate Frontage Roads – The current NM Bike Plan does not include frontage roads in the priority network. Updates to the plan may consider these roadways as a beneficial component of the statewide network.
- Track Progress – The updates to the NM Bike Plan should include a section that evaluates progress toward improving bikeway conditions on NM highways. To complete this evaluation, NMDOT will strive to track the miles of roadway that include improvements meeting the NM Bike Plan design guidance, given a roadway's location (urban or rural) and tier.
- Integrate Programs – The current NM Bike Plan focuses exclusively on infrastructure improvements. Updates to the plan may consider opportunities to expand programs that support or encourage bicycling and/or bicycling education.

APPENDIX A | TABLE OF NM HIGHWAYS

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 1	2	61.34	NB I-25 Exit 92	Socorro, NM
NM 2	2	32.85	US 285, Roswell	US 285, Artesia
NM 3	3	72.38	US 54	FR 2116
NM 4	1	4.74	FL 1506	NM 502
NM 4	2	62.90	US 550	FL 1506
NM 6	1	36.46	I-40 Exit 126	NM 47
NM 7	3	7.28	US 62	Carlsbad Caverns NP
NM 8	3	15.70	NM 176	US 62
NM 9	2	109.27	NM 80	NM 136
NM 11	2	34.15	NM 427	Mexico Border
NM 12	3	55.08	NM 32	US 60
NM 12	Tier 2 Basic	19.14	US 180	NM 32
NM 13	3	35.93	US 82	US 285
NM 14	1	53.64	NM 333	US 84
NM 15	1	43.66	US 180	End of Road
NM 16	2	8.29	NM 22	I-25 Exit 264
NM 16	3	2.20	I-25 Exit 264	End of Road
NM 17	2	9.57	US 64	Colorado Border
NM 18	1	3.01	NM 248	NM 207
NM 18	2	25.20	US 82	NM 132
NM 18	2	11.08	FL 1082	NM 248
NM 18	2	20.39	NM 207	Texas Border
NM 18	3	12.37	NM 218	FL 1082
NM 19	3	10.26	NM 209	Texas Border
NM 20	3	45.71	US 285	US 60
NM 21	2	0.53	FR 2164	US 56
NM 21	3	33.65	US 64	FR 2164
NM 22	2	13.93	I-25 Exit 259	BIA SD0092
NM 24	3	49.72	NM 130	US 82
NM 26	1	47.90	US 180	I-25 Exit 41
NM 27	3	29.72	NM 26	NM 152
NM 28	1	2.76	NM 373	NM 478
NM 28	Tier 2 Basic	27.60	NM 373	Texas Border
NM 29	3	1.07	NM 17	End of Road
NM 30	1	8.53	NM 502	US 84
NM 31	2	7.72	US 285	NM 128
NM 31	3	14.89	NM 128	US 62
NM 32	Tier 2 Basic	41.32	NM 12	US 60
NM 34	3	15.33	FR 2116	County Rd. 51

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 35	2	27.47	NM 15	NM 152
NM 36	3	50.67	NM 117	NM 53
NM 36	Tier 2 Basic	21.53	US 60	NM 117
NM 37	2	14.15	US 380	NM 48
NM 38	1	29.21	NM 522	US 64
NM 39	3	93.28	US 56	US 54
NM 41	2	61.94	US 60	US 285
NM 42	3	35.51	US 60	US 54
NM 45	1	21.35	NM 314	NM 448
NM 45	3	1.55	NM 448	NM 528
NM 47	1	29.19	NM 47	NM 556
NM 47	2	30.34	US 60	NM 47
NM 48	2	12.88	US 70	NM 37
NM 48	3	9.15	NM 37	US 380
NM 50	2	5.99	I-25 Exit 299	NM 63
NM 51	2	2.48	N. Date St, T or C	NM 179
NM 51	3	13.47	NM 179	County Rd. A013
NM 52	3	87.91	US 60	NM 181
NM 53	2	86.02	NM 122	Arizona Border
NM 55	2	10.28	NM 337	NM 41
NM 55	3	86.73	US 54	NM 337
NM 57	3	17.99	US 550	End of Road
NM 58	2	19.03	US 64	I-25 Exit 419
NM 59	3	31.05	NM 61	NM 52
NM 61	2	25.00	US 180	NM 152
NM 63	2	5.63	I-25 Exit 307	NM 50
NM 63	Tier 2 Basic	19.03	NM 50	End of Road
NM 65	1	4.56	NM 329	Montezuma
NM 65	Tier 2 Basic	11.11	Montezuma	FS 156
NM 68	1	45.46	US 84	US 64
NM 72	2	3.84	I-25 Exit 452	NM 526
NM 72	3	31.87	NM 526	NM 456
NM 73	3	2.64	NM 75	End of Road
NM 74	2	4.65	US 84	NM 68
NM 75	1	6.91	NM 76	NM 518
NM 75	2	13.57	NM 68	NM 76
NM 76	1	29.66	NM 68	NM 75
NM 77	3	12.55	NM 209	Texas Border

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 78	3	15.23	US 180	Arizona Border
NM 80	2	32.22	I-10 Exit 5	Arizona Border
NM 81	3	45.26	NM 9	Mexico Border
NM 83	2	12.92	US 82	NM 132
NM 88	2	1.98	E. 1st St, Portales	S. Roosevelt Rd, Portales
NM 88	3	19.47	S. Roosevelt Rd, Portales	Texas Border
NM 89	3	19.81	NM 252	NM 268
NM 90	1	42.62	US 70	US 180
NM 91	3	12.58	NM 156	US 84
NM 92	3	10.70	US 70	Arizona Border
NM 93	3	16.33	I-40 Exit 369	Bellview, NM
NM 94	3	18.39	NM 518	NM 518
NM 95	3	14.02	US 64	El Vado Lake SP
NM 96	Tier 2 Basic	48.91	US 550	US 84
NM 97	3	9.54	NM 161	Cherry Valley Lake
NM 101	2	1.40	NM 28	NM 478
NM 102	3	46.27	NM 39	NM 402
NM 103	3	3.96	NM 32	End of Road
NM 104	2	1.59	Las Vegas	NM 281
NM 104	2	0.76	Tucumcari	NM 209
NM 104	3	104.41	NM 281	Tucumcari
NM 105	3	8.95	NM 94	End of Road
NM 106	2	0.83	US 84	NM 76
NM 107	2	0.12	NM 1	I-25 Exit 115
NM 107	3	41.16	SB I-25 Exit 115	US 60
NM 108	2	9.19	US 60	NM 77
NM 108	3	14.20	NM 77	NM 19
NM 109	2	7.75	NM 346	NM 309
NM 110	3	3.80	NM 554	End of Road
NM 111	2	3.07	US 285	NM 554
NM 111	3	16.42	NM 554	US 64
NM 112	2	44.63	NM 96	US 64
NM 113	3	26.08	WB I-10 Exit 34	Playas
NM 114	3	47.05	US 70	Texas Border
NM 115	3	3.44	US 84	End of Road
NM 116	2	15.72	US 60	BL 13
NM 117	1	5.34	NM 122	I-40
NM 117	Tier 2 Basic	56.73	I-40	NM 36
NM 118	1	36.69	WB I-40 Exit 36	Arizona Border

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 119	3	5.07	NM 386	US 84
NM 120	3	118.66	NM 434	US 56
NM 121	3	8.53	NM 518	End of Road
NM 122	1	38.79	West of Thoreau	San Rafael
NM 124	1	25.52	NM 117	I-40 Exit 114
NM 125	3	25.42	US 380	Texas Border
NM 126	1	1.24	US 550	NM 126
NM 126	2	8.69	NM 126	NM 126
NM 126	2	6.79	NM 126	NM 4
NM 126	3	21.62	NM 126	NM 126
NM 127	3	3.02	US 64	End of Road
NM 128	2	60.17	NM 31	Texas Border
NM 129	3	17.42	FR 4104	NM 104
NM 130	2	21.70	US 82	US 82
NM 131	3	2.41	Red Canyon Rd.	NM 55
NM 132	2	0.99	NM 218	FL 1107
NM 132	3	18.98	FL 1107	Texas Border
NM 133	3	3.64	NM 132	Texas Border
NM 134	3	22.38	US 491	End of Road
NM 136	2	9.17	Sundland Park	Mexico Border
NM 137	3	54.88	US 285	Texas Border
NM 138	3	0.66	NM 478	FR 1035
NM 140	2	2.82	NM 185	End of Road
NM 142	3	13.52	NM 52	End of Road
NM 143	3	6.15	NM 549	Rockhound SP
NM 144	3	0.33	NM 65	End of Road
NM 145	3	3.47	NM 80	NM 338
NM 146	3	19.18	NM 9	I-10 Exit 49
NM 147	2	1.10	NM 314	NM 47
NM 150	1	4.76	US 64	Arroyo Seco
NM 150	2	2.12	Arroyo Seco	NM 230
NM 150	Tier 2 Basic	7.59	NM 230	End of Road
NM 152	1	15.11	US 180	NM 61
NM 152	2	17.22	NM 27	NM 187
NM 152	Tier 2 Basic	33.32	NM 61	NM 27
NM 153	3	3.84	NM 211	End of Road
NM 154	2	4.20	NM 185	NM 140
NM 156	3	60.04	US 84	NM 252

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 157	3	1.74	NM 185	End of Road
NM 158	3	0.91	NM 185	FL 1230
NM 159	3	26.16	US 180	FS 28
NM 161	3	31.09	NM 518	End of Road
NM 162	3	2.58	US 84	US 84
NM 163	3	39.66	NM 163	NM 159
NM 165	1	4.40	I-25 Exit 242	Placitas
NM 165	2	4.98	Placitas	Placitas
NM 165	3	7.05	South of Placitas	NM 536
NM 166	3	1.65	NM 52	End of NM Highway
NM 169	3	36.25	US 60	Indian Rte 54
NM 170	2	14.49	US 64	NM 574
NM 170	3	5.01	NM 574	Colorado Border
NM 172	3	28.17	NM 249	US 380
NM 173	2	18.13	US 550	NM 511
NM 174	3	4.83	US 180	End of Road
NM 175	3	1.53	NM 8	Gulf Rd, Eunice
NM 176	2	2.50	NM 248	NM 18
NM 176	3	35.01	US 62	NM 248
NM 176	3	3.48	NM 18	Texas Border
NM 177	3	0.83	NM 51	NM 51
NM 179	2	2.06	NM 51	NM 195
NM 181	2	11.86	BL 11	End of Road
NM 182	2	1.40	NM 28	FL 1719
NM 183	3	1.25	NM 28	Texas Border
NM 184	2	0.56	NM 273	Texas Border
NM 185	1	35.42	US 70	NM 26
NM 186	2	1.23	NM 28	Texas Border
NM 187	2	36.30	NM 26	BL 11
NM 188	1	2.92	US 70	I-25 Exit 142
NM 189	2	1.16	NM 28	NM 478
NM 190	3	2.10	NM 2	End of Road
NM 192	2	2.37	NM 28	NM 478
NM 193	3	41.86	US 56	US 64
NM 195	2	2.05	NM 181	Elephant Butte
NM 195	3	2.56	NM 177	End of Road
NM 196	3	12.04	NM 522	End of Road
NM 197	3	30.70	US 550	Indian Service Rte 9
NM 198	3	2.66	NM 143	Rockhound SP

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 200	3	8.43	US 285	US 62
NM 202	3	12.40	US 70	Texas Border
NM 203	3	10.42	US 84	End of Road
NM 204	3	13.60	US 64	End of Road
NM 205	3	4.17	NM 128	Texas Border
NM 206	1	0.48	NM 206	W 1st St, Portales
NM 206	2	83.17	US 82	NM 206, Portales
NM 207	2	6.10	NM 18	NM 176
NM 208	2	3.48	US 62	NM 18
NM 209	2	82.95	Clovis, NM	NM 104
NM 210	3	4.00	NM 268	NM 209
NM 211	2	6.39	US 180	US 180
NM 212	3	4.11	NM 272	US 60
NM 213	2	6.11	FL 1366	DD 213
NM 215	3	3.04	NM 554	End of Road
NM 216	2	1.96	NM 216	US 62
NM 216	3	4.51	US 285	NM 216
NM 217	Tier 2 Basic	10.57	NM 337	NM 333
NM 218	2	1.71	NM 18	US 62
NM 219	2	15.15	US 54	I-40 Exit 256
NM 220	2	16.00	NM 48	US 380
NM 221	3	4.62	US 84	End of Road
NM 223	3	2.19	NM 63	County Rd B64
NM 224	3	15.72	US 60	NM 288
NM 225	2	2.15	NM 28	Texas Border
NM 226	2	2.52	NM 28	NM 478
NM 227	2	1.94	NM 478	I-10 Exit 155
NM 228	2	1.81	NM 478	FR 1035
NM 229	3	10.26	US 285	End of Road
NM 230	2	4.81	NM 150	NM 150
NM 231	3	5.00	NM 278	NM 469
NM 233	3	0.85	US 84	FL 1769
NM 235	3	17.88	NM 206	Texas Border
NM 236	2	0.95	NM 236	NM 267
NM 236	3	19.85	NM 267	NM 236
NM 237	2	2.40	BL 36	US 54
NM 238	3	19.30	NM 529	US 82
NM 240	2	6.16	NM 68	NM 68

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 241	3	9.87	NM 209	Texas Border
NM 243	3	8.21	US 62	US 62
NM 244	2	29.15	US 82	US 70
NM 245	2	7.03	NM 311	NM 209
NM 246	1	1.71	US 70	Roswell, NM
NM 246	2	2.01	NM 246	US 70
NM 246	3	76.18	US 380	NM 246
NM 247	3	48.36	US 54	US 285
NM 248	2	6.33	NM 176	NM 18
NM 249	3	44.07	NM 2	US 82
NM 250	2	4.16	I-25 Exit 347	End of Road
NM 252	3	43.01	US 60	NM 209
NM 253	3	3.81	NM 256	End of Road
NM 254	3	4.33	NM 256	US 380
NM 255	3	3.11	NM 256	NM 253
NM 256	2	8.32	US 380	NM 2
NM 258	3	8.97	NM 206	End of Road
NM 261	3	4.56	NM 254	NM 253
NM 262	3	17.53	NM 206	Texas Border
NM 263	2	5.73	NM 6	NM 47
NM 264	2	16.46	US 491	Arizona Border
NM 266	3	6.55	NM 94	End of Road
NM 267	2	0.93	US 70	FL 4639
NM 267	3	31.20	FL 4639	US 60
NM 268	3	27.67	US 60	NM 209
NM 271	3	24.14	NM 120	End of Road
NM 272	3	9.31	US 60	Pat Garrett Dr, Ft. Sumner
NM 273	2	14.00	NM 28	Texas Border
NM 275	3	15.10	NM 469	NM 209
NM 276	3	4.78	NM 105	End of Road
NM 278	3	33.43	FR 4118	NM 209
NM 279	2	13.86	NM 124	Seboyeta, NM
NM 281	2	6.69	NM 104	End of Road
NM 282	3	1.05	NM 516	End of Road
NM 283	3	13.83	FR 2137	End of Road
NM 286	3	0.57	I-40 Exit 339	End of Road
NM 288	3	27.46	NM 268	NM 209
NM 289	3	1.83	NM 288	NM 209
NM 290	3	6.86	NM 4	End of Road

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 291	2	3.61	NM 68	NM 583
NM 292	2	1.39	I-10 Exit 139	NM 28
NM 293	3	4.93	NM 211	End of Road
NM 294	3	15.75	US 60	County Rd. 2-25
NM 300	2	6.38	US 285	NM 466
NM 302	3	10.44	NM 371	End of Road
NM 304	2	16.48	US 60	NM 47
NM 304	3	6.65	US 60	La Jolla, NM
NM 305	3	0.51	NM 595	End of Road
NM 309	1	2.43	BL 13	NM 47
NM 311	2	1.99	NM 245	US 60
NM 311	3	20.86	NM 244	NM 245
NM 312	3	8.08	NM 252	NM 268
NM 313	2	17.39	NM 556	End of Road
NM 314	1	15.02	BL 13	NM 45
NM 314	2	3.54	NM 45	I-25 Exit 213
NM 315	2	0.49	I-25 Exit 248	NM 313
NM 317	2	1.26	FR 2066	NM 45
NM 320	Tier 2 Basic	2.10	NM 185	I-25 Exit 9
NM 321	3	4.60	NM 114	Texas Border
NM 322	3	3.15	NM 8	End of Road
NM 325	3	16.66	US 64	US 64
NM 329	1	1.88	NM 65	BL 15
NM 330	3	20.35	US 70	NM 267
NM 333	1	19.74	NM 556	NM 344
NM 333	2	7.99	NM 344	US 66
NM 337	1	11.85	NM 217	I-40 Exit 175
NM 337	2	17.33	NM 55	NM 217
NM 338	3	24.32	NM 9	I-10 Exit 11
NM 341	3	3.32	NM 519	End of Road
NM 344	2	17.46	NM 333	NM 14
NM 346	2	2.68	NM 116	NM 304
NM 347	1	7.15	FL 4081	US 550
NM 348	3	7.00	US 60	Texas Border
NM 349	3	8.50	US 54	White Oaks, NM
NM 355	3	1.06	US 62	End of Road
NM 356	2	4.96	US 180	NM 152
NM 357	3	4.00	FL 5647	NM 229

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 359	2	2.04	FL 1242	NM 28
NM 360	3	25.01	US 62	US 82
NM 368	3	17.50	US 70	Arabela, NM
NM 369	2	2.31	US 84	US 84
NM 370	2	10.37	US 64	NM 455
NM 370	3	37.14	NM 455	NM 456
NM 371	1	0.53	US 64 Bypass	US 64/Broadway
NM 371	2	106.13	NM 122	US 64 Bypass
NM 372	3	2.57	NM 359	NM 374
NM 373	2	1.54	NM 372	FL 5518
NM 374	3	1.24	NM 372	Rio Grande
NM 377	3	1.88	NM 549	End of Road
NM 378	3	3.44	NM 522	End of Road
NM 386	3	8.88	US 84	End of Road
NM 390	3	4.28	NM 187	NM 187
NM 392	3	15.80	NM 469	I-40 Exit 369
NM 395	3	0.50	US 70	End of Road
NM 399	2	1.00	NM 581	US 84
NM 399	3	2.20	NM 581	La Mesilla
NM 400	3	10.66	FS 50	NM 118
NM 402	2	0.75	W Spruce St, Clayton	US 56
NM 402	Tier 2 Basic	62.11	US 54	W Spruce St, Clayton
NM 404	2	8.93	NM 460	NM 213
NM 406	3	35.20	US 56	US 456
NM 409	2	10.95	US 380	Bottomless Lakes SP
NM 410	3	1.94	NM 406	Oklahoma Border
NM 411	3	3.96	NM 406	End of Road
NM 412	3	6.15	NM 122	Bluewater Lake SP
NM 414	3	0.40	US 285	End of Road
NM 417	3	4.85	NM 402	Texas Border
NM 418	1	1.23	NM 427	W. Spruce St, Deming
NM 418	2	12.80	FR 1019	NM 427
NM 419	3	47.30	NM 104	NM 39
NM 420	3	30.46	NM 102	NM 402
NM 421	3	8.10	NM 402	Texas Border
NM 423	1	9.99	Coors Blvd. On/Off Ramp	NM 556
NM 423	2	1.00	Golf Course Rd	Coors Blvd. On/Off Ramp
NM 427	1	3.88	NM 418	E. Pine St., Deming
NM 432	3	1.37	NM 104	End of Road

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 433	3	2.85	NM 104	Conchas Lake SP
NM 434	1	10.81	NM 120	US 64
NM 434	2	25.79	NM 518	NM 120
NM 435	3	5.89	NM 12	National Forest Entrance
NM 436	3	3.53	NM 187	NM 187
NM 438	3	10.01	NM 2	End of Road
NM 442	3	21.35	NM 518	NM 120
NM 445	3	12.19	I-25 Exit 426	US 64
NM 446	3	0.26	NM 97	End of Road
NM 448	1	2.53	NM 45	W. Meadowlark Ln, Corr.
NM 448	2	5.11	W. Meadowlark Ln, Corr.	NM 528
NM 450	3	0.46	NM 97	End of Road
NM 451	3	3.08	NM 119	US 84
NM 453	3	21.00	US 56	US 64
NM 455	2	1.47	NM 370	Clayton Lake State Park
NM 456	3	58.89	NM 325	Oklahoma Border
NM 457	3	31.85	US 82	US 380
NM 458	3	12.05	NM 206	NM 114
NM 460	2	3.66	FR 1035	Texas Border
NM 461	3	0.51	US 54	End of Road
NM 462	3	2.71	US 54	End of Road
NM 464	3	21.81	US 70	Redrock
NM 466	1	2.60	NM 14	E. Zia Rd., Santa Fe
NM 466	2	1.38	E. Zia Rd., Santa Fe	I-25 On/Off Ramp
NM 467	2	16.79	US 70	US 60
NM 468	3	2.13	Railroad Ave, Springer	End of Road
NM 469	3	43.32	NM 209	US 54
NM 472	2	11.97	NM 344	NM 41
NM 473	3	0.56	NM 313	I-25 Exit 240
NM 475	1	2.67	US 84	Gonzales Rd, Santa Fe
NM 475	2	13.16	Gonzales Rd, Santa Fe	End of Road
NM 478	1	24.15	US 70	NM 460
NM 480	3	13.05	NM 330	US 70
NM 483	3	16.24	US 62	NM 18
NM 484	3	0.93	NM 3	End of Road
NM 485	3	3.83	NM 4	FS 376
NM 494	1	0.59	E. Motel Dr, Lordsburg	I-10 Exit 22
NM 494	2	0.70	I-10 Exit 22	NM 494

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 494	3	3.67	NM 494	End of Road
NM 498	2	0.90	NM 273	Texas Border
NM 500	1	11.82	I-40 Exit 149	I-25 Exit 220
NM 501	1	0.36	NM 502	Los Alamos
NM 501	2	5.15	NM 4	NM 502
NM 502	1	18.18	NM 501	FR 8401
NM 503	1	3.17	US 84	NM 503
NM 503	2	4.38	NM 503	Juan Medina Rd.
NM 503	3	6.99	Juan Medina Rd.	NM 76
NM 505	3	12.00	US 64	NM 445
NM 506	3	31.86	US 54	End of Road
NM 508	3	17.21	NM 206	NM 125
NM 509	3	35.54	NM 605	Navajo Service Rt. 9
NM 511	2	5.65	NM 173	NM 539
NM 511	3	8.10	US 64	NM 173
NM 511	3	18.41	NM 539	Colorado Border
NM 512	3	7.44	US 64	End of Road
NM 513	3	0.71	US 60	End of Road
NM 514	3	1.48	NM 112	US 64
NM 515	3	1.87	NM 522	End of Road
NM 516	1	13.82	US 64	US 550
NM 518	1	15.78	NM 75	NM 68
NM 518	2	56.85	Las Vegas	NM 75
NM 519	3	14.95	NM 111	End of Road
NM 522	1	20.06	US 64	NM 38
NM 522	2	20.90	NM 38	Colorado Border
NM 523	2	6.26	Clovis	NM 108
NM 524	2	1.52	S. 6th St, Carlsbad	US 62
NM 524	3	6.96	US 285	S. 6th St, Carlsbad
NM 525	3	3.90	US 380	End of Road
NM 526	Tier 2 Basic	6.25	NM 72	Colorado Border
NM 527	3	16.89	US 64	Navajo Lake SP
NM 528	1	13.38	NM 47	US 550
NM 529	3	31.14	US 82	US 62
NM 531	3	3.17	NM 162	End of Road
NM 532	3	11.97	NM 48	End of Road
NM 533	3	0.79	NM 80	Arizona Border
NM 536	2	13.37	NM 14	End of Road
NM 537	2	55.55	US 550	US 64

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 538	2	1.52	US 87	US 56
NM 539	Tier 2 Basic	5.76	US 64	NM 511
NM 540	2	9.35	US 54	NM 39
NM 542	3	15.06	NM 55	NM 41
NM 546	2	0.72	NM 187	I-25 Exit 51
NM 547	2	13.17	NM 117	FS Rd. 239
NM 549	2	31.51	Deming	I-10 Exit 116
NM 551	3	6.43	NM 456	Colorado Border
NM 552	3	1.67	US 54	Ute Lake SP
NM 554	2	21.02	US 84	NM 111
NM 555	3	31.79	Raton	End of Road
NM 556	1	15.39	NM 47	NM 333
NM 562	3	19.53	NM 402	End of Road
NM 564	1	1.46	NM 564	NM 118
NM 564	2	1.83	NM 610	NM 564
NM 566	2	11.62	NM 118	End of Road
NM 567	2	11.67	US 285	NM 570
NM 568	2	1.26	FS 180	NM 122
NM 569	3	14.84	I-25 Exit 404	End of Road
NM 570	2	12.29	NM 68	NM 68
NM 571	3	1.91	NM 554	NM 215
NM 572	3	0.79	NM 95	End of Road
NM 573	3	2.32	NM 162	NM 512
NM 574	1	0.67	US 550	McWilliams Rd
NM 574	2	13.37	NM 170	NM 516
NM 575	3	7.88	McWilliams Rd	US 64
NM 576	3	1.14	NM 111	End of Road
NM 578	3	6.43	NM 38	End of Road
NM 580	3	2.06	NM 75	End of Road
NM 581	2	0.64	NM 369	NM 399
NM 583	2	1.97	NM 68	NM 76
NM 584	1	1.28	US 84	NM 68
NM 585	1	2.19	NM 68	US 64
NM 592	Tier 2 Basic	5.18	FL 1490	End of Road
NM 595	3	25.28	NM 96	End of Road
NM 597	2	0.41	US 160	End of Road
NM 599	2	13.77	NM 14	US 84
NM 601	3	27.03	US 60	End of Road

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
NM 602	2	30.73	NM 53	US 491
NM 603	3	22.84	NM 36	US 60
NM 605	3	22.26	NM 122	End of Road
NM 606	2	1.25	NM 122	End of Road
NM 608	1	1.98	US 491	NM 609
NM 609	1	0.58	NM 608	NM 610
NM 609	2	1.73	NM 610	NM 118
NM 610	1	0.87	NM 609	Park Ave, Gallup
NM 610	2	1.15	Park Ave, Gallup	NM 564
NM 612	3	9.03	NM 122	Bluewater Lake SP
NM 615	2	0.47	NM 122	FR 4021
NM 5001	1	3.21	US 64	US 64
NM 6563	2	15.01	NM 130	Sunspot, NM
US 54	1	59.69	US 70	US 380
US 54	2	64.29	Texas Border	US 70
US 54	2	119.12	US 380	Route 66
US 54	2	51.05	NM 237	Texas Border
US 54	3	1.97	I-40 Exit 333	NM 237
US 56	2	94.02	NM 21	Oklahoma Border
US 60	1	26.98	NM 107	California St., Socorro
US 60	2	112.09	Arizona Border	NM 107
US 60	2	226.89	I-25 Exit 175	Texas Border
US 62	1	2.39	S. Grimes St, Hobbs	E. Sanger St, Hobbs
US 62	2	38.81	Texas Border	NM 200
US 62	2	2.02	NM 208	S. Grimes St, Hobbs
US 62	2	3.21	E. Sanger St, Hobbs	Texas Border
US 62	3	63.27	NM 200	NM 208
US 64	1	45.96	US 491	Co. Road 4800, Bloomfield
US 64	1	42.95	Rio Grande Gorge	NM 38
US 64	2	20.84	Arizona Border	Shiprock, NM
US 64	2	174.79	Co. Road 4800, Bloomfield	Rio Grande Gorge
US 64	2	58.82	NM 38	I-25 Exit 446
US 64	2	81.68	S. 2nd St, Raton	US 56
US 70	1	2.21	NM 90	W. Motel Dr, Lordsburg
US 70	1	71.73	I-10 Exit 135	US 54
US 70	1	105.18	US 54	NM 246
US 70	1	24.64	NM 480	US 60
US 70	2	27.12	Arizona Border	NM 90
US 70	2	81.51	NM 246	NM 480

Highway	Tier	Length (Miles)	Beginning (S/W)	Ending (N/E)
US 82	1	1.88	US 54	La Luz Rd, La Luz
US 82	2	104.99	La Luz Rd, La Luz	US 285
US 82	2	4.58	S 17th St, Lovington	NM 206
US 82	3	63.11	US 285	S 17th St, Lovington
US 82	3	16.60	NM 206	Texas Border
US 84	1	36.80	I-25 Exit 282	US 285
US 84	2	41.76	US 60	I-40 Exit 277
US 84	2	41.63	I-40 Exit 256	FR 2116
US 84	2	57.57	US 285	US 64
US 84	2	6.23	US 64	Colorado Border
US 87	2	1.30	US 56	NM 538
US 87	3	8.18	NM 538	Texas Border
US 160	2	0.87	Arizona Border	Colorado Border
US 180	1	80.80	NM 211	W. Pine St, Deming
US 180	2	82.91	Arizona Border	NM 211
US 285	1	79.51	US 62	US 70
US 285	2	31.31	Texas Border	US 62
US 285	2	89.34	US 70	US 54
US 285	2	68.19	US 60	NM 300
US 285	2	71.99	US 84	Colorado Border
US 380	1	13.84	US 70	NM 409
US 380	2	107.50	I-25 Exit 139	US 70
US 380	2	66.03	NM 409	NM 125
US 380	3	10.99	NM 125	Texas Border
US 491	1	89.29	NM 608	US 64
US 491	1	15.29	US 64	Colorado Border
US 491	2	2.02	NM 602	NM 608
US 550	1	174.55	NM 165	Colorado Border
BL 34 - Moriarty	2	0.21	NM 333/I-40	I-40 East Exit
BL 11 -TorC	2	3.20	I-25 Williamsburg	I-25 T or C
BL 13 - Belen	1	0.14	Belen	NM 314
BL 13 - Belen	2	0.45	NM 116	Belen
FL 5606	2	0.23	I-10 / Crawford Blvd	I-10 / Crawford Blvd
FR 1031	2	2.67	I-10 Crawford Blvd Exit	US 70
I-10	Int	132.39	Arizona Border	I-25
I-25	Int	432.56	Texas Border	Colorado Border
I-40	Int	358.04	Arizona Border	Texas Border

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