

LONG RANGE TRANSPORTATION SYSTEM GUIDE

June 2026



Table of Contents

PREFACE	4
Chapter 1 INTRODUCTION	5
1.1 Guiding Principles.....	7
1.2 Implementation Opportunities.....	10
1.3 LRTS Process Adoption	11
Chapter 2 LONG RANGE TRANSPORTATION SYSTEM	12
2.1 Long Range Transportation System Planning	14
2.2 Long Range Roadway System (LRRS).....	15
2.3 Planned and Potential Transit Service (PPTS)	16
2.4 Long Range Bikeway System (LRBS).....	18
2.5 Pedestrian Level of Traffic Stress (PLTS).....	20
2.6 Network Connectivity.....	21
Chapter 3 LAND USE CONTEXT	29
3.1 Adjacent Land Use.....	30
3.2 Regional Scale Land Use Typologies.....	31
3.3 LRTS Land Use Typologies	33
3.4 Land Use and Roadway Connectivity	36

Chapter 4 INTEGRATING LAND USE AND TRANSPORTATION	37
4.1 Regional Principal Arterial Design Matrix	39
4.2 Community Principal Arterial Design Matrix.....	41
4.3 Minor Arterial Design Matrix.....	43
4.4 Major Collector Design Matrix	45
4.5 Minor Collector Design Matrix	47
4.6 Right of Way Considerations	49
4.7 Special Streets	50
Chapter 5 NATIONAL BEST PRACTICES	53
5.1 Roadway Elements	55
5.2 Intersection Elements	58
5.3 Transit Infrastructure	62
5.4 Bicycle and Trail Infrastructure	63
5.5 Pedestrian Infrastructure	66
5.6 Green Streets	69

Chapter 6 RETROFITTING AND ENHANCING ROADWAYS	74
6.1 Evaluating Retrofit Projects.....	76
6.2 Road Diets	78
6.3 Safety Priorities	80
6.4 Evaluating Roadway Enhancements.....	81
 A P P E N D I X	 85
References.....	85
Complete Streets Checklist.....	88
Implementation Opportunities.....	92

FIGURES AND TABLES

Table 2.1: NACTO Most Desirable Facility	18
Table 2.2: PLTS Descriptions	20
Table 2.3: City of Albuquerque Network Characteristics by Location	23
Figure 3.1: Regional Scale Land Use Typologies in the United States	31
Table 3.1: LRTS Land Use Measures	32
Table 3.2: LRTS Land Use Typologies	33
Figure 3.2: Connectivity Standards for Different Land Use Typologies ...	35
Table 4.1: REGIONAL PRINCIPAL ARTERIAL MATRIX	39
Table 4.2: COMMUNITY PRINCIPAL ARTERIAL MATRIX	41
Table 4.3: MINOR ARTERIAL MATRIX	43
Table 4.4: MAJOR COLLECTOR MATRIX	45
Table 4.5: MINOR COLLECTOR MATRIX	47
Table 4.6: Right-of-Way Ranges	48
Table 5.1 Travel Lane Width	54
Table 5.2: Recommended Median Widths	55
Table 5.3: Minimum Dimensions for Angled Parking	56
Figure 5.1: Traffic Calming Measures	56
Figure 5.2: FHWA Selecting Countermeasures	58
Figure 5.3: Comfort Typology of Bicyclists	62
Table 6.1: Types of Before and After Studies	80

PREFACE

The 2026 Long Range Transportation System (LRTS) Guide is the Third Edition of the LRTS Guide. The central theme of the LRTS Guide is the need to integrate land use planning into transportation planning with the goal of maximizing the efficiency and safety of the transportation system. Importantly, the LRTS Guide emphasizes planning for multimodal networks and implementing Complete Streets principles into roadway design to better accommodate all users of the transportation system.

History of the Guide

The LRTS Guide builds upon an over 50-year history of long range transportation system planning efforts in the Albuquerque Metropolitan Planning Area (AMPA). In 1965, the Long Range Major Street Plan laid out a gridded connected network of long range major route improvements. This map eventually became the Long Range Roadway System as part of the Future Albuquerque Area Bikeways and Streets (FAABS) document. In 2015, the first LRTS Guide was developed to replace the FAABS. The initial LRTS Guide was developed in part as a response to scenario planning efforts presented in the 2035 MTP, which showed that additional roadway capacity would not be sufficient to meet anticipated future travel demand, and that the region would need to approach future congestion using multiple strategies. Then, the LRTS Guide was updated in 2020 with new content from the 2040 Connections MTP and expanded information related to green streets infrastructure.

Member Agency Survey

Since the LRTS Guide was first released by MRMPO, a great deal of innovation and progress has been made in the production and implementation of local and national design guidance that integrates transportation and land use. Therefore, in advance of the 2026 update to the LRTS Guide, MRMPO surveyed agency staff to better understand local needs when it comes to the utility of the LRTS Guide. This document integrates the feedback of MRMPO member agencies and includes the following updates:

Agency staff reported unanimously that the LRTS Guide continued to serve a need to align local and regional planning efforts, and there was consensus that long range transportation system maps are important planning tools.

Long Range Transportation System Maps

Long range transportation system maps have been updated in consultation with member agencies and based on public feedback. The 2045 Transitions MTP was adopted in April 2025 with a notation that the Long Range Roadway System (LRRS), Long Range Bicycle System (LRBS), and Planned and Potential Transit Service (PPTS) maps were provisionally adopted pending updates provided in this LRTS Guide. Once approved by the Metropolitan Transportation Board (MTB), these maps will be amended into the 2045 MTP.

National Best Practices

Design standards and “best practices” have been updated to ensure that users are directed to the most up to date guidance. Many local agencies have updated or created new local design standards. Further, professional references such as those produced by National Association of City Transportation Officials (NACTO) or American Association of State Highway and Transportation Officials (AASHTO) have been updated. In some cases, this update provides links to such resources for reference rather than reproducing them.

ADA and PROWAG Guidelines

New material related to transportation accessibility for vulnerable road users is included in this guide. In particular, the requirements of the Americans with Disabilities Act (ADA) are reviewed with respect to federally required planning and procedure for local agencies. ADA best practices and Public Right of Way Accessibility Guidelines (PROWAG) design standards are also highlighted.



Chapter 1

INTRODUCTION

Chapter 1

Introduction

The Mid-Region Metropolitan Planning Organization (MRMPO) developed the Long Range Transportation System Guide (LRTS Guide) to respond to the need for transportation networks to balance competing demands, such as alleviating traffic congestion, providing multimodal options for all users, supporting economic development, increasing safety, and improving public health. This Guide is a companion document to the Transitions 2045 Metropolitan Transportation Plan (2045 MTP), which is the approved 20-year transportation plan for the Albuquerque Metropolitan Planning Area (AMPA). While the MTP serves as a financially constrained plan for identifying regional goals and transportation programs and projects that help to achieve them, **the LRTS Guide is not tied to funding or time constraints and offers a set of recommendations and best practices for creating an integrated transportation and land use system over the next 20 years and beyond.** Below is a quick synopsis of the information contained in this document.

Guiding Principles and Implementation Opportunities

With the goal of assisting with proactive planning for future transportation investments, this document begins by presenting guiding principles and implementation opportunities for enhancing the region's transportation system.

Long Range Transportation System

Then, long range aspirational transportation networks are presented for roadways, transit, pedestrian and bicycle facilities. Roadway connectivity recommendations are also provided.

Land Use Context

Next, regional land use typologies are defined and described that help inform the development and rehabilitation of the current and future roadway design and transportation networks to best meet the demands of current and future growth.

Integrating Land Use and Transportation

The culmination of the first three chapters is contained in a chapter that provides roadway design matrices, where the roadway character and land use typology meet, to suggest a range of design options for that location.

National Best Practices

Best practices for various roadway and streetside elements are expanded upon with more detailed multimodal design standards provided.

Retrofitting and Enhancing Roadways

The remainder of the guide emphasizes ways to enhance an existing roadway using roadway reconfigurations, before and after studies, demonstration projects, and safety analyses.

1.1 GUIDING PRINCIPLES

The LRTS Guide has five main guiding principles that should be considered when developing and enhancing transportation systems:

- A. Integrate Transportation and Land Use Planning
- B. Build Complete Streets
- C. Promote Connectivity
- D. Support Regional Plans and Policies
- E. Support Local Plans and Policies

A. INTEGRATE TRANSPORTATION AND LAND USE PLANNING

Integrating land use and transportation involves understanding how different land uses affect travel demand and then providing multimodal networks and roadway designs that are appropriate for the surrounding land use context.

Anticipated traffic volumes are only one element of planning and designing quality transportation infrastructure. The LRTS Guide uses both the land use context and the intended roadway function to provide guidance on conceptual roadway design and right-of-way width needs.

Balancing Travel Needs

The goal of this LRTS Guide is to ensure that roadways and adjacent land uses are supportive of each other in addition to facilitating efficient and safe regional travel. The intent is to avoid creating situations where incompatible land uses and roadway types are paired together. For example, connecting a high number of popular local destinations with a single high-speed roadway may result in unsafe traveling conditions for pedestrians, cyclists, and transit riders.

Historic Development Patterns

Much of the AMPA's development occurred after WWII when development patterns favored automobile travel and the separation of land uses. This has led to roadways that primarily support automobile traffic (85 percent of all trips in the AMPA are completed in a passenger vehicle)¹.

Short Trips

There are many factors that support mitigating this trend. **Of all the trips made by passenger vehicles, 11 percent are under a mile¹.** These short auto trips suggest that there is an opportunity to potentially service some of these trips with other modes like transit, walking, or biking. However, this transition is only likely to take place if the transportation facilities are designed to safely and

reliably accommodate other modes in addition to automobiles.

Economic and Public Health Benefits

Providing transportation systems that encourage walking, cycling, scooters, and other modes not only has the potential to reduce the number of short auto trips, but can also boost new investment, foster quality public spaces, improve public health with increased physical activity, and decrease vehicle emissions.

B. BUILD COMPLETE STREETS

The MPO passed a resolution in 2011 that supports the integration of Complete Streets into all MPO plans and reports.

A Complete Street means that people of all ages and abilities can travel safely along a roadway and access destinations. The development of Complete Streets allows for continuous and comfortable networks for all transportation modes. The practice of Complete Streets is not limited to design, but involves planning, programming, operating, and maintaining transportation systems.

Building Complete Streets also involves relating to the surrounding land use by finding the appropriate means of accommodation for the setting. A "complete" rural street will look and feel different than a "complete" urban one.

¹ Mid-Region Travel Survey, 2014
LRTS GUIDE 2026

Opportunities for Building Complete Streets

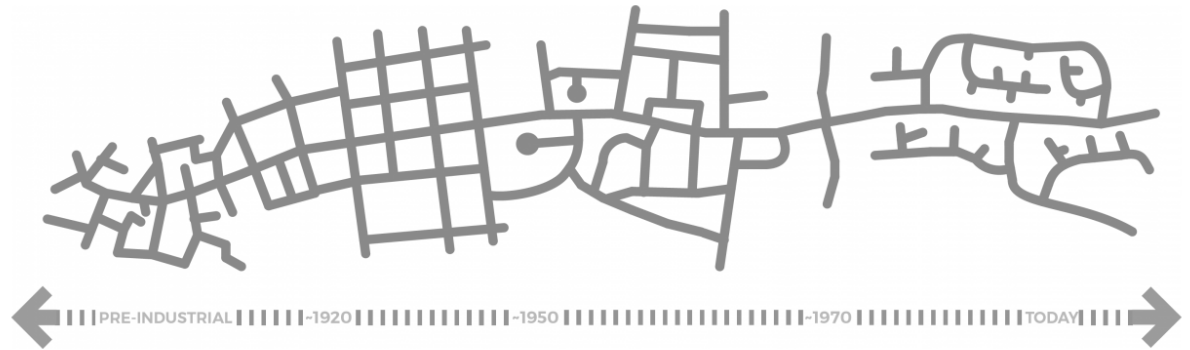
On existing roads and within developed areas there are sometimes right-of-way limits that can make a complete street cross section challenging or cost prohibitive. However, there are often creative opportunities to provide multimodal options that lead to a transportation network that works better for more people.

Considerations vary between new roads and existing roads. For this reason, the LRTS Guide recommends recognizing Complete Streets opportunities in all phases of roadway development from planning, design, engineering, construction, reconstruction, and maintenance.



C. PROMOTE CONNECTIVITY

It can be a challenge for a single roadway to accommodate freight movement, transit use, vehicle traffic, and pedestrian and bicyclist needs at the same time. **An important means of addressing multiple needs simultaneously is through creating “connected networks” that are specific to individual modes.**



Evolution of street networks in America. Adopted from Stephen Marshall.

Source: <https://www.cnu.org/our-projects/street-networks/street-networks-101>

This means designing transportation facilities that allow people to reach their desired destination without gaps in service (e.g., the bike lane that ends abruptly, the transit line that doesn’t connect to a business center). To further illustrate this concept, perhaps not every street can accommodate a bicycle facility, but bicyclists should have a comfortable connected bike network that allows them to safely travel and reach destinations across the region.

Benefits of Connectivity

Creating better connected networks for all modes of travel reduces the potential conflict between different users and modes. Connectivity benefits include:

1. Low stress routes
2. Improved safety
3. More direct trips
4. Reduced congestion
5. Increased emergency routes

Providing low-stress routes for pedestrians and bicyclists improves accessibility by allowing people who are concerned about safety from vehicular traffic to comfortably reach destinations. Finally, improving connectivity improves efficiency by making trips more direct, and by providing multiple routes to destinations, which can both reduce congestion and improve options in an emergency.

D. SUPPORT REGIONAL PLANS AND POLICIES

It is important that MRMPO’s long range planning documents are aligned and consistent. The LRTS Guide is designed to support two regional plans in particular, the Metropolitan Transportation Plan (MTP) and the Regional Transportation Safety Action Plan (RTSAP).

Transitions 2045 MTP

The LRTS Guide is a companion document to the Transitions 2045 MTP. The LRTS Guide is updated every five years following the adoption of the most recent MTP, ensuring consistency and alignment between the two documents. The LRTS Guide is intended to support the goals of the 2045 MTP—Mobility, Economic Vitality, Active Transportation, Healthy Environment, and Equity.

Regional Transportation Safety Action Plan

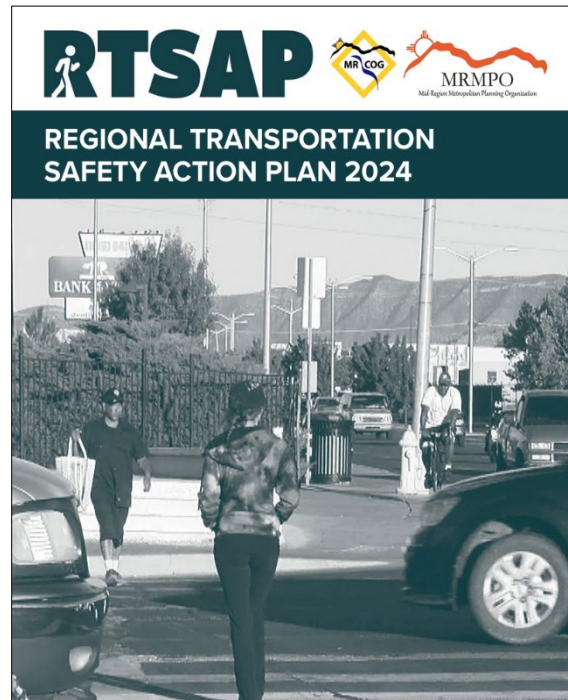
Due to an unacceptable number of traffic deaths in the region, MRMPO's policy board, the Metropolitan Transportation Board (MTB), adopted a resolution in 2022 (R-22-o8 MTB) to prioritize safety in the region.



The Regional Transportation Safety Plan (RTSAP) was approved by the MTB in 2024. The RTSAP provides agencies with a regional plan for improving safety with the eventual goal of zero traffic fatalities by 2040.

This action plan also includes a comprehensive list of safety countermeasures based on the best local and national practices, safety profiles for locations outside the metro area, and crash analyses that highlight the most dangerous roadways and intersections in the region.

The LRTS Guide is a companion document to the RTSAP which provides a more comprehensive and detailed look at transportation safety throughout the region.



Public Outreach

The MTP and the RTSAP included extensive public involvement and outreach including surveys, event tabling, information sessions, workshops, and a formal public comment period. While the LRTS Guide is not federally required, MRMPO has sought public feedback on this plan at committee meetings, through the MRMPO website, in newsletter announcements, and through a publicly advertised formal comment period.

E. SUPPORT LOCAL PLANS AND POLICIES

MRMPO strongly supports local agencies and their efforts towards implementing their own plans. One way to connect the LRTS to local plans is by reference in their local design manuals. Fortunately, throughout the region local plans and policies include Complete Streets principles, focus on improving roadway safety, and incorporate multi-modal roadway design guidelines. Some local plans also include support for coordinated land use and transportation planning with provisions for mixed-use and higher density residential development (and redevelopment) supported by multi-modal facilities and public transit.

Albuquerque Comprehensive Plan

The comprehensive plan for the City of Albuquerque, for example, identifies roadway types by looking at the current and future land use context. Their Centers and Corridors concept encourages growth in existing centers connected by corridors and aims to provide improved access and safer multimodal mobility.

According to the plan, the corridor types are “intended to balance the street system by identifying different streets that prioritize bicycling, walking, or transit use in and between Centers.” As a corridor moves through different land use contexts the design needs to change. The Development Procedures Manual (DPM) specifies street design standards specific to corridor and center classifications.

The LRTS Guide supports putting these land use and transportation concepts into practice. In addition, this guide may be particularly useful to member agencies with limited locally adopted plans and policies related to multimodal transportation design guidelines.

1.2 IMPLEMENTATION OPPORTUNITIES

Much of the motivation behind the development of this guide is to align local and regional long range transportation planning efforts. The LRTS Guide builds upon MPO adopted resolutions and plans, long range planning networks, and best practices for design. In turn, the LRTS Guide or elements of the LRTS Guide are referenced in local plans including the City of Albuquerque’s Development Process Manual and Bernalillo County’s Technical Standards.

LRTS updates occur with close coordination from member agencies to ensure consistency.

Roadway Construction and Rehabilitation

One intention of the LRTS Guide is to support local implementation when it comes to enhancing or constructing transportation infrastructure. There are opportunities to implement the recommendations whenever there is new roadway construction in developing areas, as well as when there are rehabilitation projects on existing roadways.

New roadways offer the most flexibility in rights-of-way requirements, but it is also important to ensure adequate connectivity during the development phase. Projects on roadways with fully developed land uses offer the least flexibility but often have the highest need for multimodal accommodation in the near term.

Local Plans and Studies

The LRTS Guide can be applied to a wide range of plans, studies, and projects. Developing a master plan for an area with no infrastructure to resurfacing an existing roadway, all provide opportunities to support surrounding land use, increase safety, and accommodate different transportation modes. However, the most appropriate type of implementation varies with each opportunity. For example, preserving network connectivity and right-of-way is critical in master plans for undeveloped areas, but evaluating a wide range of detailed roadway designs might not be as important.

More information on local plan implementation opportunities can be found in the Appendix.

Connectivity Recommendations

When proposing new development plans it is vital that proposed roadways and trail systems are well connected within the development, but also to adjacent developments and the regional transportation system so as not to overload the arterials system. **It is critical to balance neighborhood transportation needs alongside regional needs.** This sort of route redundancy is preferable because travelers are better able to navigate potential hazards or unforeseen traffic incidents safely by using an alternative route, and traffic is spread out rather than funneled onto arterials adding to congestion.

Roadway Resurfacing and Retrofitting

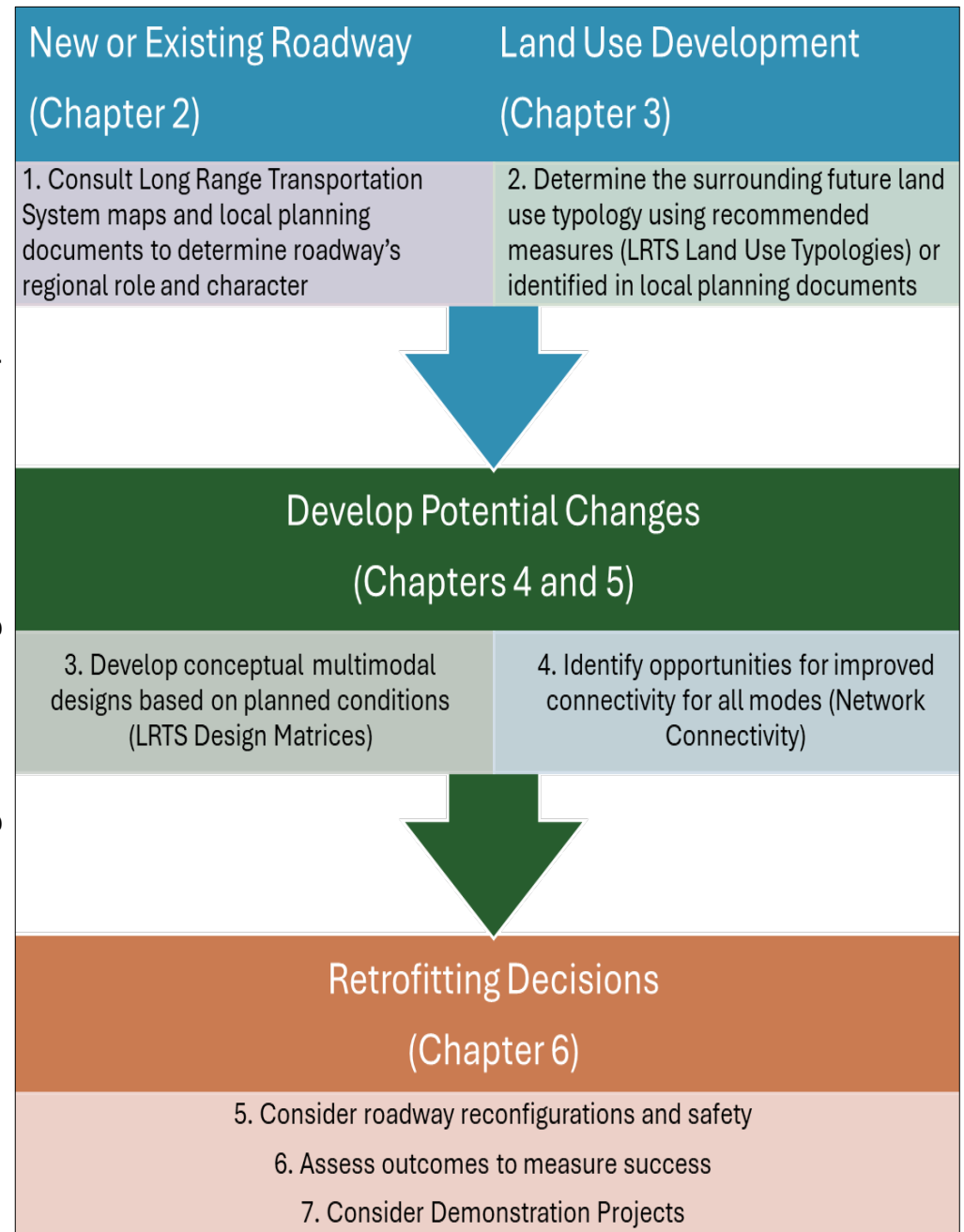
For roadway resurfacing maintenance, pursuing additional right-of-way is not possible, but evaluating the land use, the roadway type, and if excess lane width could be reconfigured to improve shoulders or accommodate the addition of bicycle lanes, parking, or transit lanes is important. Guidance is provided in this document on retrofitting roadways through evaluating the various benefits and tradeoffs involved with different roadway configurations such as road diets.

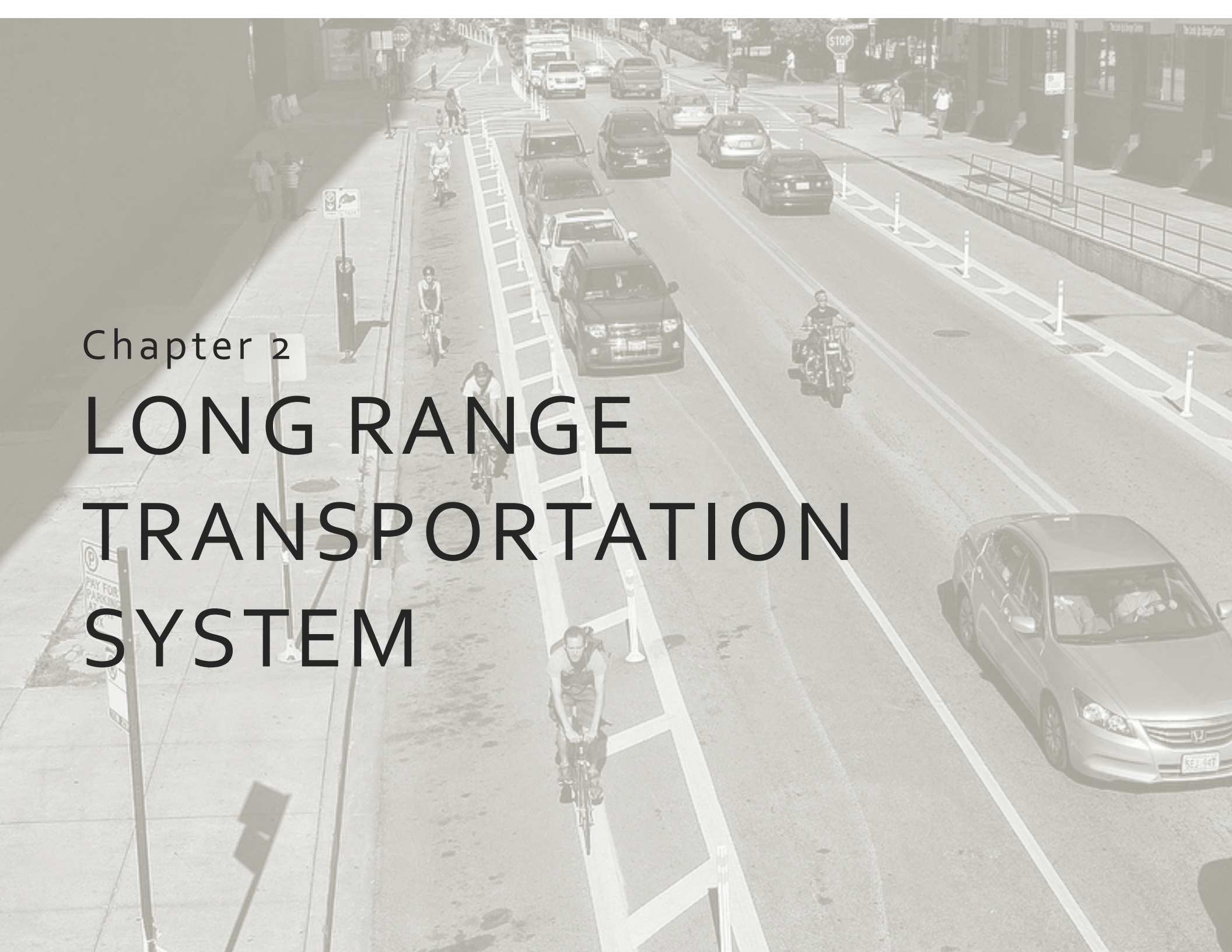
1.3 LRTS PROCESS ADOPTION

Member agencies are encouraged to formally adopt the LRTS Guide planning processes, or part of it, or refer to the Long Range maps and LRTS Guide recommendations in their policy and regulatory frameworks. The adjacent graphic illustrates the LRTS Guide planning process. This process provides the steps for integrating land use and multimodal transportation, increasing network connectivity, and making decisions about roadway design and retrofitting. Below is a list of some specific actions that can be taken by agencies to incorporate LRTS elements:

1. Reference the LRTS process or individual LRTS maps in local plans and development review.
2. Use the LRTS Guide as a design standards reference when your agency has not already adopted guidance or it is out of date.
3. Refer to the latest best practices in Chapter 5 to enhance existing design standards.
4. Review resurfacing and restriping projects for the opportunity to add more multimodal options such as shoulders, bicycle lanes, parking, or transit lanes.
5. Review roadways and consult the MPO Road Diet Candidates map to see about the potential of a roadway reconfiguration or road diet.
6. Reference the High Fatal and Injury Network (HFIN) to see where safety improvements may be needed most.
7. Ensure connectivity is being maintained or improved with any new development plan with respect to internal streets, adjacent developments, and the regional transportation system.
8. Adopt Complete Streets principles and update design standards accordingly.
9. Adopt a set of broad design principles for all new and retrofit projects.

Evaluate alternative designs and weigh multimodal options.





Chapter 2

LONG RANGE TRANSPORTATION SYSTEM

Chapter 2

Long Range Transportation System

Roadways play many roles *from* carrying freight traffic long distances *to* supporting different types of transit *to* inviting pedestrians to frequent sidewalk cafes. It is difficult for a single roadway to play all these roles well at the same time. However, a well-connected system of vehicular traffic lanes, transit, and active transportation options can meet this challenge by evaluating and determining the different priorities of the region's roadways. For example, some roadways may prioritize reliable transit services and therefore also excellent pedestrian infrastructure. Determining these priorities is based in part on evaluating the current and future land use context, and in part, by planning aspirational future multimodal transportation networks that are compatible with current and future growth.

In this chapter, the multimodal networks, called the Long Range Transportation System maps, are described. These networks are “conceptual” in the sense that they may not have an identified funding source and their anticipated need may extend beyond the 20-year planning horizon of the MTP. They include facilities for motorized and non-motorized travel, and transit services.

Ensuring future networks are well connected is an essential part of determining a transportation system's overall efficiency. Hence, this chapter concludes with the importance of making roadway connections that allow people to easily travel between destinations, and the opportunities available to make these connections.

The transportation system maps in this chapter depict transportation networks that are included within and extend beyond the 2045 MTP project list.

2.1 LONG RANGE TRANSPORTATION SYSTEM PLANNING

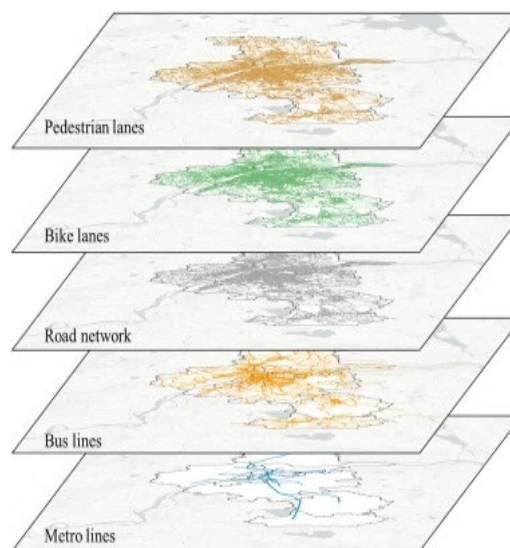
Identifying Long Range Transportation System networks is an essential part of ensuring informed local and regional planning decisions. The networks provided herein should be considered prior to reconstructing or building new roadways in the region because they may help guide design, connectivity, and alignment decisions. They should also be consulted when retrofitting roadways to identify multimodal priorities and Complete Streets elements.

LONG RANGE TRANSPORTATION SYSTEM MAPS

The following maps are described in this chapter and are part of the MPO's regional long range transportation system:

- Long Range Roadway System (LRRS)
- Planned and Potential Transit Service (PPTS)
- Long Range Bikeway System (LRBS)
- Pedestrian Level of Traffic Stress

The MPO long range maps provide specific networks for each mode developed in consultation with agencies that own the roadways, bike facilities, pedestrian infrastructure, and operate transit. Each map identifies current and potential future connections that support travel by different modes between major destinations.



Source: <https://doi.org/10.1016/j.trc.2025.105305>

Development Opportunities

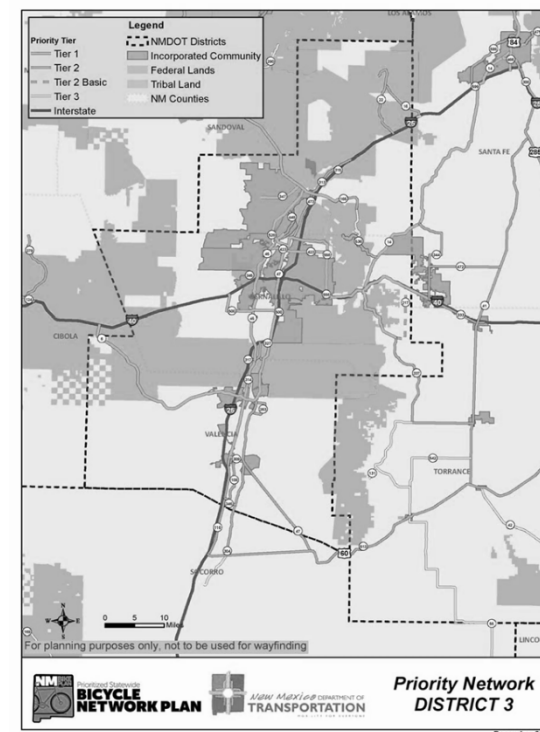
The Long Range Transportation System maps provide a foundation for layered network connectivity; however, smaller opportunities for connections also exist such as providing a walking path at the end of a cul-de-sac. Often these smaller connections are very effective for people traveling by foot, wheelchair, or bicycle.

Additionally, the region still has opportunities with new larger developments to establish and preserve a gridded street network and preserve connections from one development to the next.

Filling the Gaps

The maps communicate to the wide variety of stakeholders where there is an opportunity to make future connections on the region's multi-modal networks. This helps ensure that important network links and existing gaps are not overlooked as transportation projects are proposed. **Ensuring transportation networks and services in new areas are well connected may be the single most important thing we can do as a region to help decrease congestion and make our transportation system safer for everyone.**

Integrated into the LRBS is the bicycle priority network developed by NMDOT District 3.



2.2 LONG RANGE ROADWAY SYSTEM (LRRS)

The LRRS provides a basic, minimal future network of arterials and collectors that demonstrates how the region's roadway network is envisioned to function, with some roadways closer to their desired functionality than others.

Including roadways beyond the scope of the 2045 MTP provides a means to identify opportunities to create important regional connections. As new areas develop, additional connectivity needs should be assessed further.

Functional Classification versus LRRS

The functional classification system is a framework used to categorize roadways based on their current role and function within a transportation network. In addition, functional classification determines eligibility for federal funding.

In contrast, the LRRS roadway type builds upon and moves beyond functional classification by considering the surrounding land use character of the roadway and the role the roadway plays in the regional system. Capacity, connectivity, and purpose are characteristics that can affect how a roadway is classified in the LRRS.

LONG RANGE ROADWAY SYSTEM TYPES

Whereas the Functional Classification system only has one type of Principal Arterial, the LRTS Guide divides the Principal Arterials into two different types; a *Regional* Principal Arterial and a *Community* Principal Arterial creating the following classifications: Regional Principal Arterial, Community Principal Arterial, Minor Arterial, Major Collector, and Minor Collector.

Regional Principal Arterial

Trips on regional principal arterials are primarily for traveling longer distances across the region. Regional principal arterials prioritize passenger vehicles and freight. In general, there are not usually as many destinations along regional principal arterials. These roadways generally have high levels of access management, and many are currently included in the region's access management policy. Regional principal arterials tend to have higher speeds and more lanes. For these reasons, regional principal arterials should only be planned along the edges of activity centers and not through them. Unfortunately, there are some developed activity centers that are bisected by regional principal arterials. In these cases, modal priorities along these roads need to be balanced.

Community Principal Arterial

Although these roadways are given the functional classification of principal arterial, these corridors include many destinations with direct access from the arterial. Travel on community principal arterials tends to be over shorter distances than regional arterials and to destinations with access directly on that arterial.

Community principal arterials usually do not prioritize one mode over another; instead, they serve to achieve a balance through several strategies that can include slowing down motorized traffic or improving walking and bicycling facilities. Higher levels of congestion on community principal arterials are acceptable compared to regional principal arterials since community principal arterials bring people *to* areas and regional principal arterials take people *through* areas.

Minor Arterial

Minor arterials provide the connectivity of principal arterials, but they prioritize slower moving traffic, including bicyclists and pedestrians, to allow these modes additional options to reach destinations without needing to be on a principal arterial.

Major Collector

Major collectors provide additional connectivity between destinations on arterials and neighborhoods. They prioritize bicyclists and pedestrians. Bicyclists should be able to use collectors for long segments of their trips while motorists primarily use them for short segments. This means that major collectors should have comfortable and safe bicycle facilities and sidewalks.

Minor Collector

Minor collectors provide additional connectivity between destinations on arterials and through neighborhoods. They prioritize bicyclists and pedestrians.

2.3 PLANNED AND POTENTIAL TRANSIT SERVICE (PPTS)

A well-designed transit system can contribute to increased mobility, environmental benefits, a stronger economy, and healthier and more equitable communities. The most effective transit systems tend to be well integrated with land use planning to ensure alignment of potential demand with future service.

Roadway design should be considered when planning transit to ensure efficient access and circulation. Pedestrian, bicycle, and other on-street facilities are especially important to provide safe and comfortable access to transit.

This section presents transit service that is identified in adopted transit plans, as well as areas that may warrant consideration for future transit service.

LOCAL TRANSIT SERVICE

There are two agencies primarily responsible for transit service in the region: the City of Albuquerque Transit Department (ABQ RIDE) and the Rio Metro Regional Transit District (RMRTD). ABQ RIDE operates in the Albuquerque area and the RMRTD serves Bernalillo, Sandoval and Valencia counties, including the operation of the New Mexico Rail Runner Express (NMRX).

The types of transit service operating in the region are as follows:

Commuter Rail

Rio Metro operates the Rail Runner Express (NMRX), a commuter train that operates on 97 miles of track and connects several communities between Belen and Santa Fe.

Bus Rapid Transit

BRT routes are generally operated on dedicated lanes. The longer travel distances with less frequent stops result in more reliable travel times. ABQ RIDE operates two BRT routes as part of the Albuquerque Rapid Transit (ART) service.

Fixed Route Service

Fixed service generally operates along scheduled routes in mixed traffic. ABQ RIDE provides fixed route service during both peak and midday hours. Rio Metro provides fixed route commuter service on nine routes in Sandoval, Valencia and Bernalillo Counties.

Demand Response

Both ABQ RIDE and Rio Metro provide demand response services. ABQ RIDE's Sun Van paratransit provides door to door service in Albuquerque, the Village of Los Ranchos de Albuquerque, and portions of Bernalillo County for riders who have disabilities that prevent them from using fixed route bus service. Rio Metro provides Dial-a-Ride transit to persons traveling within most of Valencia County and to seniors or disabled residents in Rio Rancho.

Microtransit

Microtransit is a type of on-demand, door-to-door service available to the general public. It is generally used to fill a gap in service hours or service areas that do not have regular fixed route service. ABQ RIDE initiated an app-based Microtransit pilot program in 2024 called ABQ RIDE Connect, which provides connections to transit centers and bus stops within two zones in Albuquerque.

PLANNED AND POTENTIAL TRANSIT SERVICE

The PPTS map shows the locations where transit service is expected with the highest degree of certainty (the Planned Transit Network), as well as areas that may warrant additional study for potential new service or service changes.

Planned Transit Service

The PPTS map shows the existing service areas for Rio Metro along with the adopted ABQ RIDE Forward network plan. The ABQ RIDE Forward network was developed through an extensive planning process, which brought in experts in the fields of transit planning and public engagement to help identify the most effective transit strategies to meet community needs and priorities. This effort resulted in the ABQ RIDE Forward network, which was adopted by the Albuquerque City Council in June 2025. Although this proposed plan will still face challenges related to funding and staffing, it is a realistic plan for future service.

Rio Metro is prioritizing service improvements within its existing service areas and has recently initiated a planning process to identify potential enhancements. However, Rio Metro is not currently anticipating the addition of new routes. For this reason, the Planned Transit Service shows existing Rio Metro routes and service areas.

Potential Transit Service

The identified *Transit Study Areas* reflect locations within the region where strong interest and/or potential for future transit has been indicated by planners, community leaders, or other stakeholders. These areas may warrant further engagement, planning, and analysis to determine transit types and viability with respect to demand, funding, and other conditions.

LAND USE PLANNING

An early and essential step in considering new transit service is to assess potential passenger demand. Land use types and densities are probably the most impactful factors that generate transit demand.

The types and density of housing with respect to employment, education, or other major destinations help determine the overall travel demand and travel patterns for an area.

Several land use characteristics that might be evaluated - or included in planning for future transit - were summarized in the ABQ RIDE's Transit Existing Conditions Report (2022).² These include:

Density - Where there are many residents, jobs and activities in an area, there are many attractions for potential riders near each bus stop.

Walkability - If people can reach bus stops with a short and safe walk, that makes their transit trips quicker and more appealing.

Linearity - Direct paths between many destinations are faster and cheaper for a transit provider to serve, which means more frequent service can be afforded.

Proximity - When there are large, undeveloped gaps between destinations, agencies must spend a lot of time and money driving buses past places with no riders.

Mix of Uses - Mixed-use corridors tend to be very productive, because people ride in both directions many times of the day. This means transit agencies can serve more people and trips for any given level of investment.

ADDITIONAL CONSIDERATIONS

New transit service requires substantial funding for initial capital and, more significantly, the on-going operating costs. A financial analysis should be conducted at the earliest stage of planning to gauge project viability. In addition to significant planning and analysis, experience has shown that successful efforts to expand transit require strong collaboration among transit service agencies, local officials, community leaders, and the broader public.



² ABQ Ride, Ride Forward Network Plan, Transit Existing Conditions Report, Albuquerque NM 2022.

2.4 LONG RANGE BIKEWAY SYSTEM (LRBS)

The Long Range Bikeway System (LRBS) includes both existing and proposed bikeways and trails. Proposed facilities include projects beyond the 2045 timeframe. Since the last rendition of the Long Range Bikeway System map, the identification of the types of bicycle facilities includes a **stronger focus on creating a network based on encouraging users of all ages and abilities and expanding safer on-road bicycle facilities** such as protected bicycle lanes. This new system looks beyond our car-centric environment and imagines a future where bicycling is a viable way to get around our region. Also, adding a bicycle facility could provide an opportunity to narrow the travel lane and slow down traffic speed, as well as improve the level of comfort for pedestrians on adjacent sidewalks.

BIKEWAY FACILITY TYPE GUIDANCE

The MRMPO Active Transportation Committee reviewed the LRBS and included additional facilities based, in part, on guidance around existing speeds and traffic volumes of roadways.

This guidance, shown in the following Most Desirable Facility Chart, was based on the National Association for City Transportation Officials (NACTO) guide for Designing for All Ages and Abilities.

Table 2.1: Most Desirable Facility based off NACTO's Designing for All Ages and Abilities

*Frequent buses, high vehicular congestion, or turning conflicts should first consider a Protected Bike Lane

Motor Vehicle Speed	Motor Vehicle Volume (ADT)	Key Operational Considerations	Bicycle Facility Proposed
Less than or equal to 25 mph	Less than 6,000 ADT	Low curbside activity*	Buffered Bike Lane, Bike Boulevard, Bike Lane
Greater than 25 mph	6,000 ADT to 10,000 ADT	Low curbside activity*	Protected Bike Lane, Buffered Bike Lane, Bike Lane
	10,000 ADT or greater	Low curbside activity*	Protected Bike Lane, Buffered Bike Lane
High speed limited access roadways, natural corridors, or limited conflicts such as geographic edge	Not applicable	High pedestrian volumes	Bike Path with separate Walkway or Protected Bike Lane
		Low pedestrian volumes	Shared Use Path or Protected Bike Lane

This chart is meant to serve as a guide for creating a connected, "premium," and all ages and abilities bicycle network. Note that bicycle routes are not on this chart and are de-emphasized on the LRBS since typically in the region they only include a sign to designate them as such with no other infrastructure or traffic calming features included.

The LRBS and the Most Desirable Facility Chart should be used with the understanding that the most comfortable bikeway type for the roadway is being recommended.

This table shows the most desirable bikeway design at the top with additional options below depending on street context, right of way, funding support, and other considerations.

For each category, it is recommended to implement the safest bicycle facility possible if right of way is available. Integrating the safest bicycle facility possible could encourage more riders of different ages, genders, and different levels of ability.

In general, it is *not* recommended to remove existing bicycle facilities. There are exceptions such as when there is a clear and consistent conflict with access to commercial destinations or if the street experiences low volumes of traffic and slow vehicular traffic.

BICYCLE FACILITY TYPES

The LRBS identifies locations of existing bicycle facilities and locations for proposed bicycle facilities including a typical bicycle lane but also differentiates between buffered and protected bicycle lanes.

Bicycle Boulevards (usually along local roads), Multiuse trails (off the roadway network), wide shoulders, and bike routes are also identified.

BICYCLE LANES

Bicycle lanes range in width but should not be less than five feet (not including curb and gutter). Bicycle buffered lanes provide additional pavement markings, creating a wider lane and a clear delineation between the bicycle lane and traffic lane. A protected bicycle lane will have physical barriers that line the bicycle lane adjacent to the vehicular traffic.

Note that protected bike lanes are the preferred bike facility type from a safety and comfort perspective, with buffered bike lanes being the next preferred bike facility.

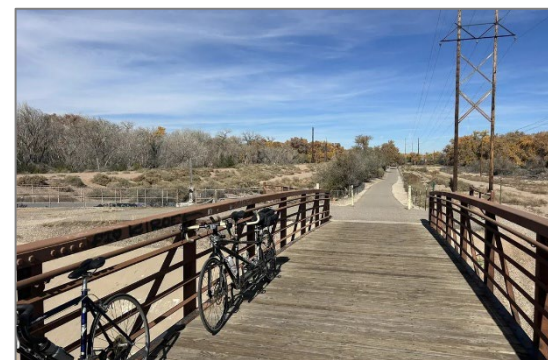


BICYCLE BOULEVARDS

Bicycle boulevards are mostly local roadways that prioritize bicycle travel over vehicle travel and include design features to slow and calm vehicle traffic to make it more comfortable for bicyclists. An example of a Bicycle Boulevard is Silver Avenue in Albuquerque near UNM and Nob Hill.

MULTIUSE TRAILS

Multiuse trails are also identified. They are off-street facilities in their own right-of-way often adjacent to the river or drainage channels. Multiuse trails should be at least 10 feet wide³ and paved for both pedestrian and bicyclist travel, as well as ADA-compliant.



A paved multiuse trail located in the public street right of way but outside the curb is a sidepath. (Note that sidepaths are not called out separately in the LRBS and if they are found in the region are classified as multiuse trails in the LRBS.)

BIKE ROUTES

The LRBS includes existing bike routes (also known as shared lanes). In the past, these were intended to illustrate good alternative routes for bicyclists to use for travel. The LRTS Guide does not recommend the designation of new bike routes and instead recommends bicycle boulevard design treatments.

³ AASHTO Guide for the Development of Bicycle Facilities Fifth Edition, 2024.

2.5 PEDESTRIAN LEVEL OF TRAFFIC STRESS (PLTS)

Because of the high pedestrian fatality rates in the region, it is imperative that the region work on bringing different methods, data, partners, and approaches together to ensure the pedestrian network—and pedestrian safety—improves over time.

Priorities for improving the pedestrian network and pedestrian facilities in the region must focus on developing walkable centers and safer conditions for pedestrians, including those using mobility aids.

Focusing on areas such as activity centers, schools, parks, transit stops, and where higher concentrations of populations that are reliant on transit or walking live will help target locations that could benefit most from improvements to the safety and comfort of pedestrian infrastructure.

PLTS Network

The Pedestrian Level of Traffic Stress (PLTS) presents as a network where various factors related to the existing roadway and roadside conditions are assessed to identify the level of comfort, or traffic stress for pedestrians.

Although the PLTS does not propose new facilities, it is still considered a long range system map because it captures where pedestrian facilities do not currently exist, or are insufficient, and locations that have the most uncomfortable conditions. To that end, it can be used to help determine locations that need future pedestrian improvements.

Only recently did the MPO have access to data for sidewalk conditions. Newly available data allows for a better determination of where future facilities are needed. The PLTS methodology was developed by researchers at the University of Wisconsin-Milwaukee with support from the Center for Pedestrian and Bicyclist Safety (CPBS). To develop consistent evaluations, four levels of PLTS are defined by the researchers. These are as follows:

Table 2.2: PLTS Descriptions

PLTS 1: Little to no stress	Generally comfortable for all users Children and people with mobility and sensory limitations face few challenges using these facilities
PLTS 2: Low stress	Generally comfortable for children over 10 years old and adults Children and people with mobility and sensory limitations may experience some challenges using these facilities
PLTS 3: Moderate stress	Somewhat uncomfortable for able-bodied adults Children and people with mobility and sensory limitations may experience significant challenges using these facilities
PLTS 4: High stress	Uncomfortable for most users Children and people with mobility and sensory limitations will typically want to avoid these facilities

A PLTS ranks factors along the roadway. In some cases, a PLTS will also evaluate intersections and marked mid-block crossings. This rendition of the PLTS is a modified version due to available data. As more data becomes available the MPO can expand upon these factors.

- For this PLTS, only the roadway segments are evaluated, and the following factors are included:
1. Traffic volumes
 2. Number of through lanes
 3. Free flow speeds
 4. Sidewalk widths
 5. Existing bicycle facilities

2.6 NETWORK CONNECTIVITY

Ensuring high levels of connectivity through careful network planning has numerous benefits. **A gridded network of connected roadways is the best way of achieving high levels of connectivity and addressing the variety of needs of the regional transportation system.**⁴

In general, good connectivity:

Offers direct routes decreasing travel time and vehicle miles traveled (VMT).

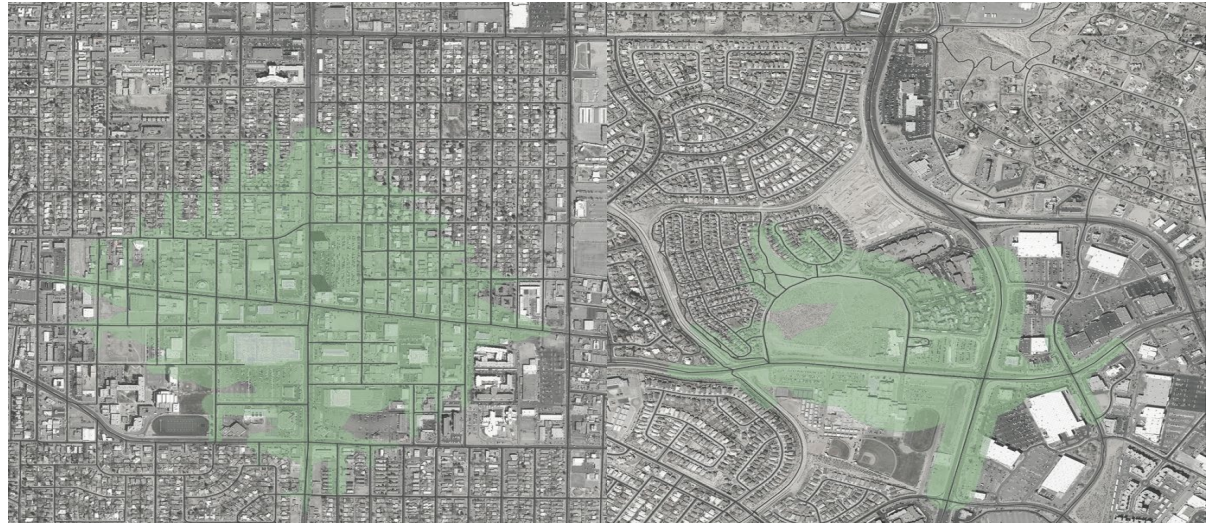
Improves air quality and health outcomes by reducing VMT and congestion.

Reduces congestion by allowing surrounding roadways to absorb excess traffic from other routes.

Encourages safer walking and bicycling by creating shorter, more direct routes.

Increases direct access to businesses and residences.⁵

Although large areas of the region have missed the opportunity to have a gridded roadway network, there are still many ways listed in the following pages to improve connectivity and network efficiency.



COMPARISON OF A 15 MINUTE WALK FROM A BUS STOP IN WITH A TRADITIONAL, GRIDDED NETWORK (LEFT) AND A CONVENTIONAL NETWORK (RIGHT)

New Developments

One area where the benefits of connected systems can be realized is in the planning and construction of new developments. Site plans for new residential and commercial projects often focus on the internal circulation of a single development without taking into consideration opportunities to connect with the broader regional transportation network.

Unfortunately, the consequence is often a disconnected roadway system that funnels the majority of traffic onto major arterials, which increases traffic delays and congestion. However, by evaluating options to tie internal roadways into the surrounding local roads, collectors, and minor arterials, new developments can help to better disperse traffic while facilitating

smoother operation of the broader transportation network.

Route Redundancy

Route redundancy means that users of the transportation system can reach their destination using their choice of multiple pathways or routes. Multiple connections and roadway redundancy helps to achieve a more gridded transportation system. **In a grid pattern, regularly spaced roadways offer better opportunities for signal synchronization which also increases network efficiency and travel times.** This is preferable especially for pedestrians and bicyclists because they are better able to navigate traffic conflicts safely by using an alternative route to reach their destination.

⁴ Ewing, 59

⁵ ITE. Planning Urban Roadway Systems; Ewing, Pedestrian- and Transit-Oriented Design, 59-60

Route redundancy is also beneficial to motorists in circumventing recurring congestion and unforeseen traffic incidents. Finally, a system of small blocks allows for compact development that fosters greater accessibility by all modes.

Consult Long Range System Maps

Consult the Long Range Transportation System maps included in this chapter for future planned roadways, bikeways, pedestrian needs, and transit corridors, and their recommended connections and priorities.

The Long Range Roadway System provides basic minimal connections. As new areas develop, additional connectivity needs to be assessed based on the planned land use and anticipated residential densities.

Often rural areas develop into suburban areas and in some cases suburban areas develop into urban areas. In areas with this potential, roadway connections within the area and to surrounding areas need to be preserved and developed in conjunction with land use development.

Internal and External Connections

When proposing new development plans, developers should demonstrate how all proposed roadways and trail systems will contribute to the transportation system as a whole.

Connecting approved roadways between arterials to neighborhoods before land is developed to essential to preserving future connectivity.

Also vital is providing routes that allow people to travel not only within the proposed development but also that connect to adjacent developments and the regional transportation system—including access to transit services and trails.

It is critical to balance neighborhood transportation needs alongside regional needs.

In many cases, local road networks are planned to only serve the people who live on them; however, neighborhood streets can provide excellent pedestrian and bicycle routes due to slower speeds and low traffic volumes. Providing more ways for people to travel through the neighborhood allows for the traffic burden to be shared and allows for pedestrian and bicyclist connectivity. Another important consideration is to assess drainage and utility easements as possible trails or local roads.



The Cabezon neighborhood in Rio Rancho took advantage of every existing connection and preserved three connections with the neighborhood to the north of it.



This image shows easements in dotted yellow along Central Ave near Coors Blvd. The easements represent additional routes that can connect homes to the SW Transit Center and to shopping. These easements should be preserved and developed into trails or local roadways.



This dead-end street was originally intended to access Unser Blvd. However, the connection was not made early in the development. As the lot to the north develops into retail new access requests need to be made that could serve both the neighborhood and the new development.

Transit and Trail Access

When transit is easily accessible by biking or walking directly from neighborhoods the use of the transit services can increase. One way to do this is by removing barriers like walls along bordering neighborhoods or using drainage facilities to create direct paths to transit stops or multi-use trails. These connections ensure that neighborhoods surrounded by high-speed and high-volume roadways are not cut off from key destinations by walking, biking, or taking transit.

This break in the wall allows the neighborhood access to a trail that makes regional connections along Unser Blvd in Rio Rancho.



The *City of Albuquerque Bicycle and Trail Crossings Guide* provides guidance for the design and location of bicycle and pedestrian crossings, which could be helpful as a reference for other jurisdictions in the region as well.

Crossing the Street

Regional crash analyses done in MRMP's Regional Transportation Action Plan (RTSAP) show a high number of pedestrian fatalities are on wide arterials, so the safety benefits of mid-block crossing and where major trails or bike boulevards meet regional roadways are considerable. In some cases, a new crossing can provide a key connection to a school, transit stop, or park. This type of direct connection improves safety, encourages non-motorized transportation, and decreases congestion particularly in the case where the user may have otherwise driven through their neighborhood to an adjacent arterial to reach their location.

A process to prioritize where to locate crossing improvements to improve connectivity, benefits users of the transportation system and provides clear guidelines for engineers, decision makers and the public.

Albuquerque's 2022 Development Process Manual (DPM) includes crossing spacing recommendations that are expected to be carried forward with the new 2026 update. These guidelines are based on the type of land use context that the roadway traverses, providing a strong example of the integration of land use and transportation planning. See table below.

Table 2.3: City of Albuquerque Network Characteristics by Location

Location	Major Road Spacing	Block Length	Signalized Pedestrian Crossing	Designated Pedestrian Crossing
Downtown	1,320 ft. - 2,640 ft. (¼ to ½ mile)	200 ft. - 400 ft.	≤660 ft. (⅓ mile)	≤400 ft.
Urban Center	1,320 ft. - 2,640 ft. (¼ to ½ mile)	300 ft. - 400 ft.	≤660 ft. (⅓ mile)	≤400 ft.
Activity Center	1,320 ft. - 2,640 ft. (¼ to ½ mile)	400 ft. - 600 ft.	≤1,320 ft. (¼ mile)	≤600 ft.
Employment Center	≤2,640 ft. (½ mile)	≤800 ft.	≤2,640 ft. (½ mile)	As appropriate*
Village Center	1,320 ft. - 2,640 ft. (¼ to ½ mile)	400 ft. - 600 ft.	≤1,320 (¼ mile)	≤600 ft.
Other Areas / Local Streets	≤2,640 ft. (½ mile)	≤600 ft.	≤2,640ft. (½ mile)	As appropriate*
Main Street Corridor	1,320 ft. - 2,640 ft. (¼ to ½ mile)	300 ft. - 400 ft.	≤660 ft. (⅓ mile)	≤400 ft.



Long Range Roadway System (LRRS)

Long Range Roadway System

Roadway Classification

- Interstate
- Regional Principal Arterial
- Community Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Unpaved

Proposed* Classification

- - - Proposed Regional Principal Arterial
- - - Proposed Community Principal Arterial
- - - Proposed Minor Arterial
- - - Proposed Major Collector
- - - Proposed Minor Collector

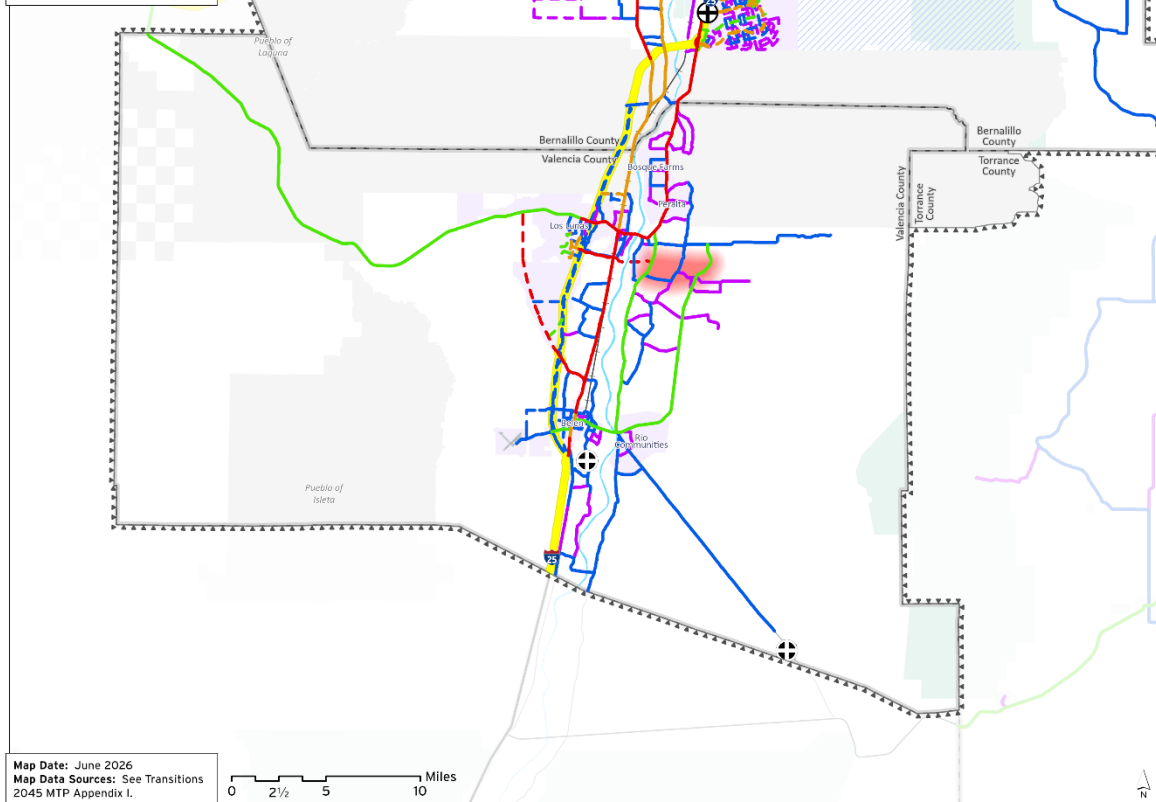
Interchanges and Overpasses

- Proposed Interchange
- Proposed Overpass

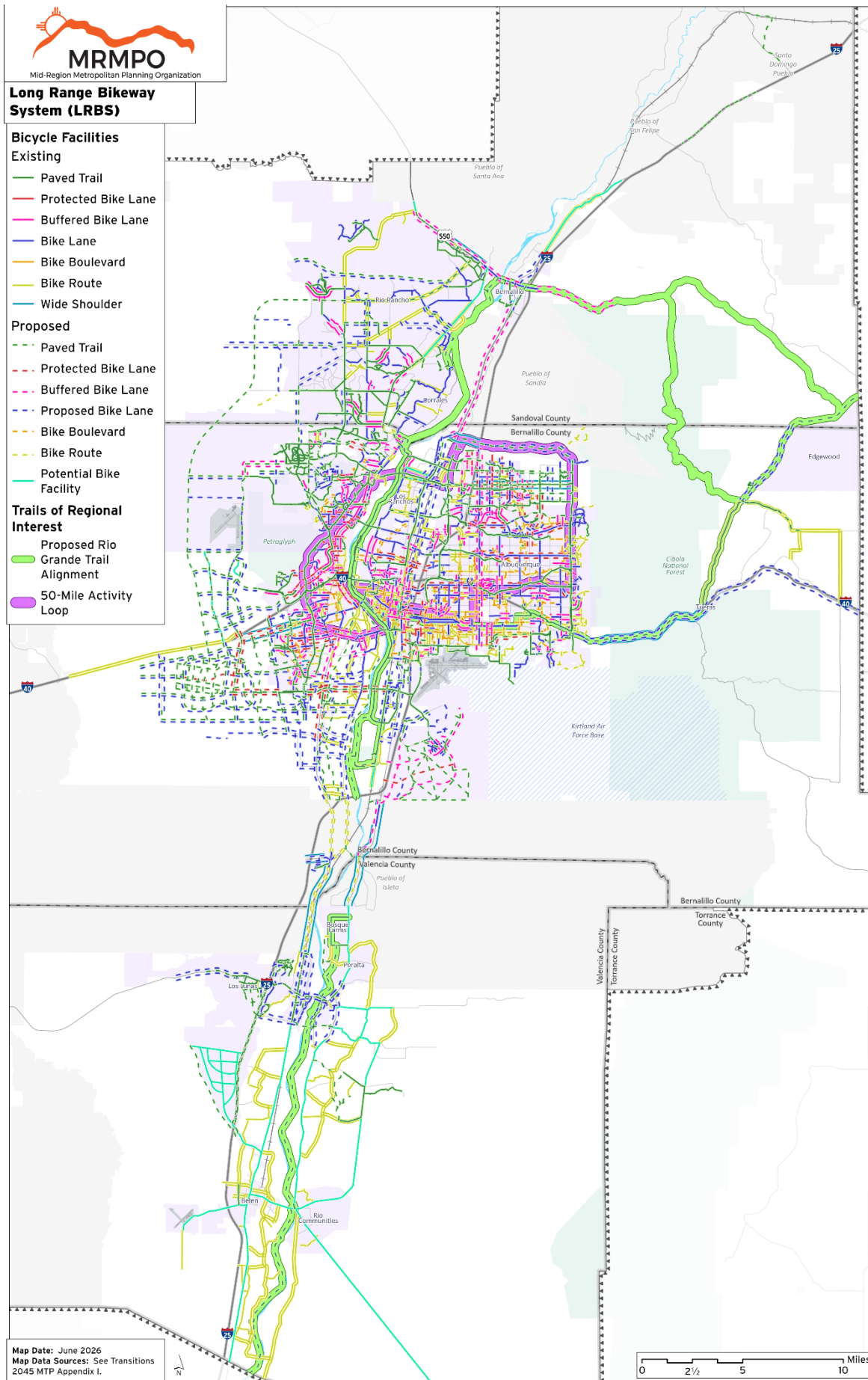
Corridor Study Area

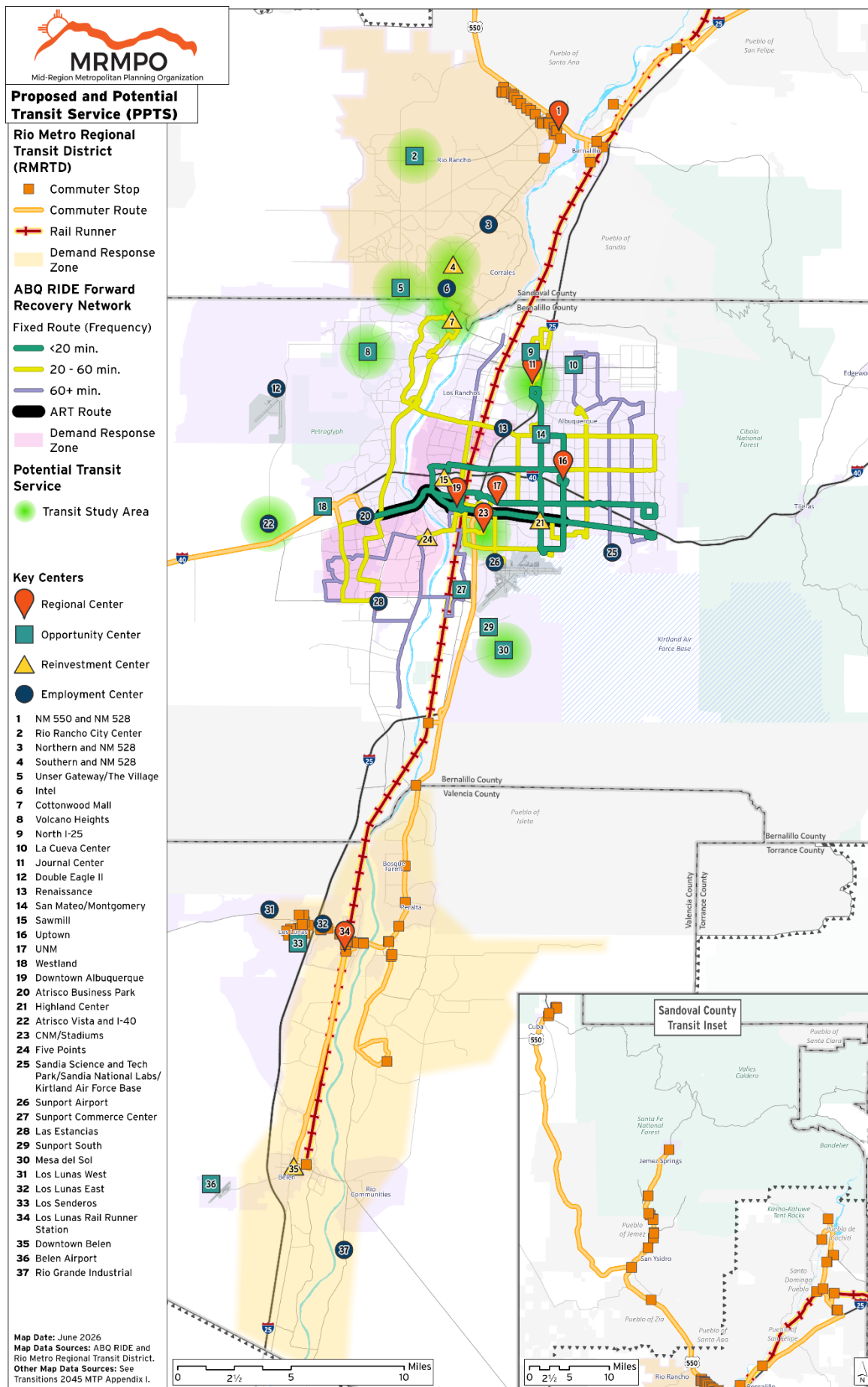
- Corridor Study Area

* Proposals are financially unconstrained and their development may extend beyond the 2045 horizon year.



Map Date: June 2026
Map Data Sources: See Transitions 2045 MTP Appendix I.





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An aerial photograph of a suburban neighborhood, showing a grid of streets, rows of houses, and some green spaces. A prominent road runs diagonally from the top right towards the bottom center. The image is in grayscale and serves as a background for the text.

Chapter 3

LAND USE CONTEXT

Chapter 3

Land Use Context

Evaluating the land uses that are adjacent to transportation facilities is a critical aspect of the LRTS process. Existing land uses and planned growth opportunities greatly impact how our transportation systems function and have the potential to both support and challenge mobility. The design and operation of the roadway contribute as much to the quality of an area as the buildings, parks, and other uses alongside it. For this reason, it is important to have a clear idea of the intended character of the area surrounding a roadway and then balance transportation demand with the critical need for a roadway to support multimodal facilities and the activities taking place on the adjacent land.

3.1 ADJACENT LAND USE

This chapter describes land use typologies commonly used to help integrate land use with the transportation system that serves it. Transportation professionals are faced with the challenge of incorporating land use context adjacent to roadways into decisions about the most appropriate transportation investments in a given location. Furthermore, comprehensive land use assessment must ensure the *future* land use context is considered, not just the current surroundings, since a roadway must serve the built environment that surrounds it for many decades.

Among the many inputs to determining future land use are historical development patterns, current land use regulations, and the local community vision. Local plans and development proposals provide key information about potential future growth.

However, predicting future land uses often is difficult, as local governments have a wide range of uses that fit a given zoning designation and may allow variances upon request. In addition, development plans are subject to variability in terms of population growth and market demand. Nevertheless, these sources are the most accurate and up to date information available and can provide a starting point for developing land use typologies.

Land use context is most accurately determined by local agencies.

Land use in Los Lunas, NM



3.2 REGIONAL SCALE LAND USE TYPOLOGIES

When planning for multimodal networks that connect key regional destinations, or go through an activity center, land use context can be determined at a regional scale. Developing land use typologies to inform roadway construction is becoming increasingly more common and is integral to developing context sensitive roadway designs.

LRTS Land Use Typologies

This use of general land use typologies can be helpful in simplifying current and future land uses on a regional scale. For this document, MPO staff developed five different land use typologies based on analyses of existing land uses and future land use plans that can be used to support decision making around roadway design and connectivity.

This LRTS Guide aggregates a broad range of potential land uses into five commonly used typologies:

- 1) Activity Centers
- 2) Urban
- 3) Suburban
- 4) Rural
- 5) Rural Main Streets

2045 Transitions MTP Key Centers

REGIONAL ACTIVITY CENTERS

People across the region travel to regional activity centers to access jobs, education, and other services. These centers include mixed-use development and have the potential to support transit.

REINVESTMENT CENTERS

Reinvestment centers are currently targeted for re-development. They often have connections to transit and some mixed-use elements. In some cases, these areas include major destination hubs in the past.

OPPORTUNITY CENTERS

Opportunity centers are identified as areas that have room for additional development and the potential to become mixed-use destinations. Nearly all these locations involve incubating local mixed-use centers with high levels of employment so that nearby residents do not need to travel across the river or traverse other barriers for daily needs.

EMPLOYMENT CENTERS

Unlike the other types of activity centers, employment centers consist of a single large employer or business center with no plans for housing, and they are not targeted future land use changes.

DOWNTOWN ALBUQUERQUE

Downtown Albuquerque functions as the urban core for the region and remains the region's most dense job center. It is both a regional activity center and re-investment center. Increased investment in Downtown's pedestrian amenities, bicycle infrastructure, and civic spaces could catalyze further private investment and redevelopment of Downtown's vacant and/or underutilized infrastructure.

Clarification Regarding Activity Centers

The 2045 Transitions MTP has identified regional activity centers called Key Centers. These centers were developed with member agency planners and approved by the Metropolitan Transportation Board (MTB). Activity Centers in this document are primarily defined by regional key centers but could describe local centers as well. Activity centers identified in local plans should be taken into consideration when evaluating transportation systems and design.

Clarification Regarding Rural Areas

The term *rural* in this document refers to *rural* areas within the AMPA. Rural areas have low residential densities, and they are interspersed with agriculture and rangeland. Two examples of rural character areas are the Village of Corrales and the Village of Tijeras.

National Examples

The graphic on the following page from Identification of AASHTO Context Classification (2022) shows the variety of ways that national organizations, states, and local jurisdictions describe land use in their area to better design their roadways to meet the needs of regional travel patterns. Land use context, which in this case are called "context classification schemes," vary from Rural to Urban, along with some special districts. In many cases, there are six or seven different typologies that change as a roadway travels through areas with a range of population densities and a variety of land use types.

Figure 3.1: Regional Scale Land Use Typologies in the United States (Source: <https://doi.org/10.1177/03611981221112397>)



Green Book 1-6	Rural			Urban						
SmartCode (2003)/ ITE/CNU (2010)	Natural	Rural		Suburban			General Urban	Urban Center	Urban Core	Special District
Massachusetts (2006)	Rural Natural	Rural Developed	Rural Village	Low Density	Town Center	High Density	Urban Residential	Urban Park	Commercial Business District	
Pennsylvania/New Jersey (2008)	Rural			Suburban Neighborhood	Suburban Corridor	Suburban Center	Town/Village Neighborhood	Town/Village Center	Urban Core	
California (2016)	Natural	Developing	Rural Main Street	Suburban Low Density		Suburban High Density	Urban Low Density		Urban High Density	
Florida (2017)	Natural	Rural	Rural Town	Suburban Residential		Suburban Commercial	Urban General	Urban Center	Urban Core	Special District
Minnesota (2018)	Natural	Rural	Rural Crossroad	Suburban Residential		Suburban Commercial	Urban Residential	Urban Commercial	Urban Core	Industrial Warehouse
Green Book 7/ NCHRP 855 (2018)	Rural		Rural Town	Suburban			Urban		Urban Core	
Oregon (2019)			Rural Community	Suburban Fringe	Suburban Residential Corridor	Suburban Commercial Corridor	Urban Mix		Downtown/ Commercial Business District	
Washington (2019)	Rural			Suburban			Urban		Urban Core	
AASHTO TCGD (2019)	Rural & Natural Areas		Rural Town	Suburban			Urban		Urban Core	Industrial, Warehouse, or Port
Maryland (2019)	Rural		Traditional Town Center	Suburban		Suburban Activity Center	Urban Center		Urban Core	
Pennsylvania (2020)	Rural		Rural Town	Suburban			Urban		Urban Core	
NCHRP 15-72 (2021)	Rural		Rural Town	Suburban			Urban		Urban Core	Special Context

3.3 LRTS LAND USE TYPOLOGIES

The land use typologies on the next page include a description of each of the five LRTS land use typologies along with information about how each of these typologies fit into the following table describing the quantitative measures of Land Use Mix, Net Residential Density, and Activity Density Score. These measures helped to create these land use typologies and also provide guidance to local jurisdictions should they endeavor in creating their own land use typologies.

Table 3.1: LRTS Land Use Measures

Land Use Mix	Net Residential Density	Activity Density Score
Land use is a common criterion for characterizing existing development. Common land uses include: (1) single family residential, (2) multi-family residential, (3) commercial retail, (4) commercial services, (5) public/institutional, and (6) parks/open space. In the development of land use mix, each of the six categories above are assigned a share of total land use within a census block group. For example, if a block group dedicated one-sixth of its total area to each land use, the score would be 1. In practice, this does not happen, but it provides a starting point for the analysis.	Net residential density is another way to help characterize development. This is the number of dwelling units per residentially zoned acre. In addition to being able to determine ranges or density in a region that belongs in a more urban, suburban, or rural area, residential density is also important because it has a direct connection with the type of transit services that might be supported. A simple benchmark derived from the data shows that the net residential density for activity centers is 12 dwelling units per acre.	Activity density is a measure of combined residential and commercial activity. It supplements the net residential density with employment activity to get a more comprehensive perspective of activity in a given location. MRMPO uses activity density in its development of socioeconomic forecasts and in the project evaluation process for scoring TIP projects. The calculation is based on total population plus employment divided by acreage within each data analysis subzone (small units of geography used by the MPO travel and land use models).

Table 3.2: LRTS Land Use Typologies

ACTIVITY CENTERS

Existing and proposed activity centers are designated in the 2045 MTP and other local comprehensive plans. Activity centers exist in urban, suburban, and rural areas. Characteristics include increased pedestrian traffic, retail activity, and concentrated jobs. The priority for activity centers is accessibility for all modes, with an increased emphasis on pedestrian comfort.

Land Use Mix: Activity Centers often have all of the following land uses: multi-family, retail, services, parks (includes plazas), public buildings (includes schools), and often nearby single-family units. (LU mix score > 0.22)

Planned Net Residential Density: > 12 dwelling units per acre

Future Activity Density Score: ≥ 25

Examples: Uptown (shown), Downtown Albuquerque, UNM area, Nob Hill, Cottonwood, and Journal Center



GENERAL URBAN

Urban areas generally do not have as high of residential and employment densities as activity centers, but they have a fairly high number of different land uses within short distances.

Land Use Mix: Urban areas often have at least four of the following land uses: single family, multi-family, retail, services, parks, and public/institutional buildings such as schools. (LU mix score > 0.16)

Planned Net Residential Density: ≥ 8 dwelling units per acre

Future Activity Density Score: ≥ 12

Examples: San Mateo & Lomas area (shown), Wyoming Blvd & Montgomery Blvd



GENERAL SUBURBAN

Suburban areas primarily contain single family residential land use with scattered commercial use that support these residences. Future suburban areas should provide for pedestrian and bicycle access to commercial areas, schools, parks, and transit.

Land Use Mix: The predominant single-family land use in suburban areas often include two or three of the following other land uses: multi-family, retail, services, parks, and public/institutional buildings such as schools. (LU mix score > 0.10)

Planned Net Residential Density: < 8 dwelling units per acre

Future Activity Density Score: < 12

Examples: Coors Blvd, Southern Blvd, Unser Blvd, Harper Rd



RURAL

The primary characteristic of rural areas is very low residential densities. Often rural areas develop into suburban areas. If an area is determined to be rural in the future, there should be evidence that measures are in place to preserve low residential density.

Land Use Mix: Rural areas have very low residential densities and often include agricultural land, and/or open space. (LU mix score < 0.10)

Planned Net Residential Density: ≤ 3 dwelling units per acre

Future Activity Density Score: < 7

Examples: Isleta Blvd (shown), Rio Grande Blvd



RURAL MAIN STREETS

Main streets, like downtown streets, are places that traditionally support retail businesses and pedestrian activity. They often function as the heart of historic towns, or as the "living room" of a neighborhood where people come to shop, eat, and congregate. For this reason, special care needs to be taken to preserve pedestrian comfort and safety.

(Also see *Special Streets in Chapter 4*)

Examples: NM 313 in Bernalillo (shown), Corrales Rd, 4th St at Guadalupe Plaza in Los Ranchos, NM 333 in Tijeras



3.4 LAND USE AND ROADWAY CONNECTIVITY

Each of these land use typologies have different connectivity standards that further cement the important link between land use context and complete transportation networks.

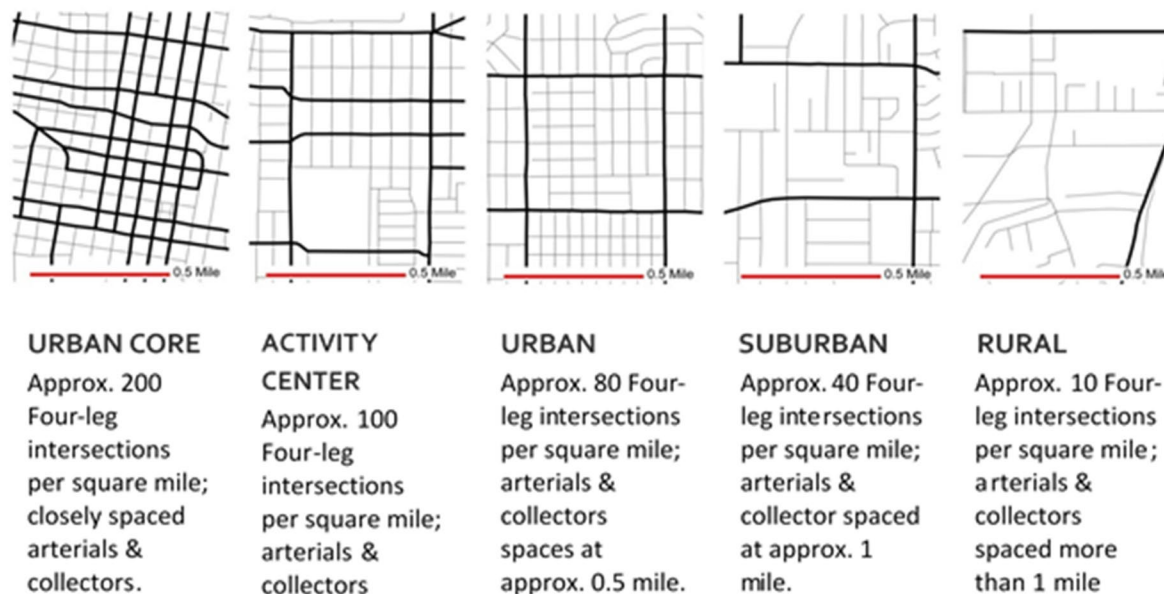
Roadway Spacing

Local examples of these recommendations are provided here and show that in some cases the spacing of roadways, even Arterials and Collectors, need to be closer to better serve the more populated and active centers in both urban and rural areas.

The following recommendations are based on two ITE documents: *Designing Urban Thoroughfares* and *Planning Urban Roadway Systems* and analysis of future travel demand. Albuquerque's urban core is unique in the region. The adjacent figure shows downtown Albuquerque (Urban Core) in comparison to other networks.

Dead-end streets and cul-de-sacs should not be allowed in neighborhoods without at minimum connections for non-motorized transportation and only when connections are physically infeasible.

Figure 3.2: Connectivity Standards for Different Land Use Typologies



Activity Centers

Arterial and collector spacing less than a half mile apart with a maximum 400' block length with over 90 four-leg intersections per square mile (UNM area shown on graphic).

Urban

Arterial and collector spacing at a half mile apart with a maximum 600' block length and over 50 four-leg intersections per square mile (NE Albuquerque shown on graphic).

Suburban

Arterial and collector spacing is approximately a mile apart (but preferably less than a mile apart) with a maximum 800' block length and over 10 four-leg intersections per square mile (NE Albuquerque shown on graphic).

Rural

Arterial and collector spacing is often more than a mile apart with approximately 10 or less four-leg intersections per square mile (South Valley shown on graphic).



Chapter 4

INTEGRATING LAND USE AND TRANSPORTATION

Chapter 4

Integrating Land Use and Transportation

The Transitions 2045 MTP acknowledges a core concept that has been carried through from previous MTPs: that transportation and land use are integrally linked and essential for planning for the future. This means the way in which our transportation systems function is interconnected with the fabric and intensity of land uses found across the region. For example, a roadway may primarily support through vehicle movement, but in some locations, it is vital that there are multimodal facilities providing access to adjacent land uses. A well-designed roadway can support increased safety, efficient operations, robust transit, and attract development, which can in turn spur an increase in foot traffic and catalyze economic activity. Once a roadway's future role has been identified and the surrounding land use typologies determined, the next step is to determine the conceptual design.

This chapter clarifies how the Long Range Transportation System relates to the five land use typologies described for the region. Roadway types included are the same as the types identified in the Long Range Roadway System (LRRS).

This relationship culminates into Roadway Design Matrices that have roadway type on one axis and land use context on the other, with a range of right-of-way options to select from.

Some guidance on Special Streets, such as multi-way boulevards, are described as well should a local jurisdiction wish to incorporate these unique designs.

ADA Guidelines

Requirements and guidelines for public entities under the American Disabilities Act (ADA) are expanded upon in this chapter. A special section regarding Public Right of Way Accessibility Guidelines (PROWAG) provides information about current federal requirements and best practices for pedestrian accessibility.

Design Matrices

The following design matrices include basic guidance on cross section elements for new streets, and basic roadway specifications such as the number of lanes, driving lane width, sidewalk widths, and bicycling infrastructure. These matrices are a starting point; please refer to applicable design standards and state and national guidance documents for further design decisions.

4.1 REGIONAL PRINCIPAL ARTERIAL DESIGN MATRIX

Regional principal arterials prioritize motor vehicle, transit, and freight movement. They are intended to support longer, regional trips. Generally, they carry a higher volume of traffic (15,000 – 50,000 AWDT), have higher speeds, and have larger right-of-way requirements. For these reasons, regional principal arterials should only be planned along the periphery of activity centers. In the cases where a regional principal arterial bisects an activity center, the roadway should slow down and be designed and operated like a community principal arterial.

DESIGN CONSIDERATIONS

1. These roads may carry high-capacity transit (such as BRT) traveling longer distances. Dedicated transit lanes may be provided.
2. Given their higher speeds and volumes, bikeways should only be included on these roadways if they are a separated or protected facility. Consider parallel routes within 1,000 feet.
3. These streets may be designed as multi-way boulevards if traveling through areas with increased pedestrian traffic.

BICYCLE INFRASTRUCTURE

Option 1: Adjacent multi-use path if sufficient right-of-way.

Option 2: Plan bikeways on parallel roadways within 1,000' of a regional principal arterial, preferably on either side of the arterial.

Option 3: Protected Bicycle Lane (this should only be considered in locations where there is significant land use activity adjacent to the corridor and speeds are lower).

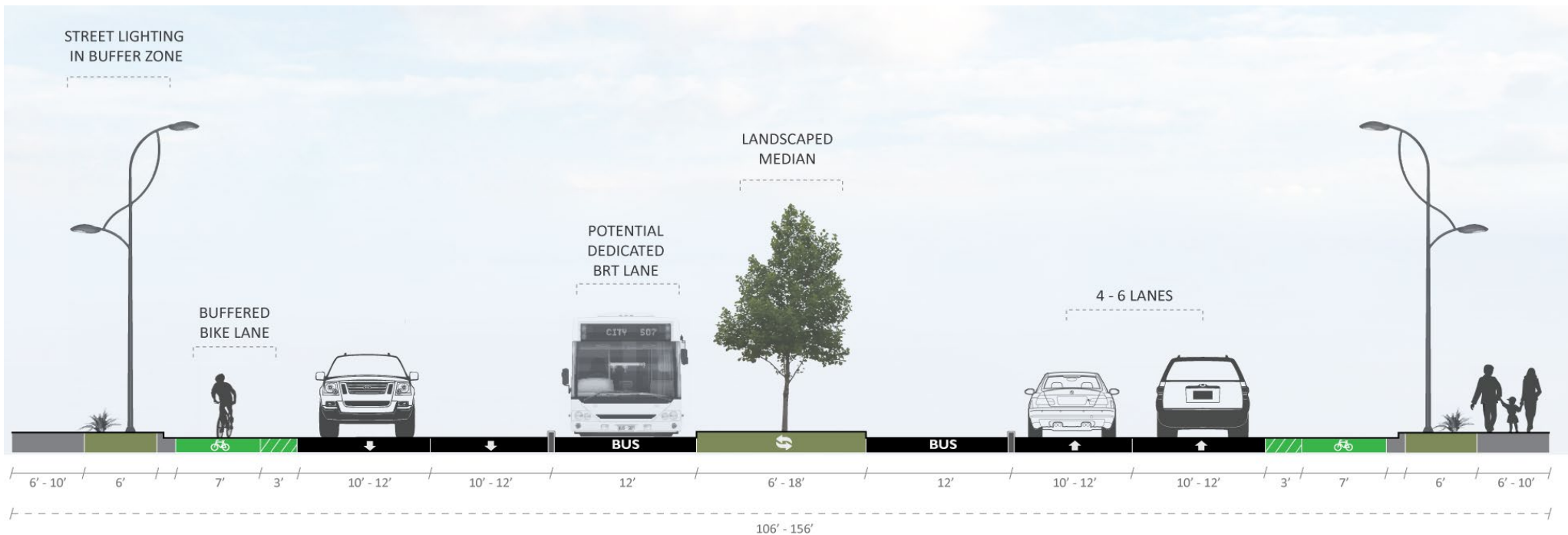


TABLE 4.1: REGIONAL PRINCIPAL ARTERIAL MATRIX				ROW RANGE: 106'-156'	
Land Use Typology	ACTIVITY CENTER	URBAN	SUBURBAN	RURAL	MAIN STREET
Examples	Unser at Rio Rancho City Center	Coors & Montaño	Unser & Montaño	Sen. Dennis Chavez	N/A
PEDESTRIAN REALM (ONE SIDE)					
Landscape buffer	6'	6'	6'	8'-14' paved shoulder (both sides) and/or an 8-10' multi-use trail with a 5' buffer	See Community Principal Arterial Main Street
Clear Sidewalk width	10'	6'	6'		
Building Shy Zone (ingress/egress)*	2'	2'	2'		
Total Width (for one side only)	18'	14'	14'		
BIKEWAYS (ONE SIDE)					
Multi-Use Path	See Long Range Bikeway System			8'-14' paved shoulder (both sides) and/or an 8'-10' multi-use trail with a 5' buffer from the roadway	See Community Principal Arterial Main Street
Multi-Use Path Outside Buffer	5'	5'	5'		
Multi-Use Path Inside Buffer	3'	3'	3'		
Paved Multi-Use Path Width	10'-14'	10'-14'	10'-14'		
Protected Bicycle Lane	See NACTO Urban Bikeway Design Guide for Protected Bike Lanes.				
Bicycle Lane (widths do not include gutter pan)	Posted Speed 25 mph or lower: 5' buffered bicycle lane				
TRANSIT					
Dedicated Bus Lane	See Planned Transit Network: Include 24' for bus rapid transit routes.				N/A
ROADWAY					
Maximum Number of Through Lanes	2-6	4-6	4-6	4-6	See Community Principal Arterial Main Street
Desired Operating Speed	30-35 MPH	30-35 MPH	40-45 MPH	35-50 MPH	
Lane Width	10'-11'	10'-12'	10'-12'	11'-12'	
Outside Lane Width (heavy vehicles)	12'	12'	12'	12'	
Parallel Parking	-	-	-	-	
Median/Center Turn Lane	6'-18'	6'-18'	6'-18'	6'-18'	

*Include 2' if buildings, walls, or other vertical structures are planned adjacent to public ROW.

4.2 COMMUNITY PRINCIPAL ARTERIAL DESIGN MATRIX

Community principal arterials do not prioritize one mode over another; instead, they strive to achieve a balance. Although these roadways are given the functional classification of principal arterial, these corridors include many destinations with direct access from the arterial. Travel on community principal arterials tends to be over shorter distances than other principal arterials. Community principal arterials tend to have lower volumes (10,000 – 30,000 AWDT), lower speeds, and fewer lanes than regional principal arterials. Design options for community principal arterials also include multi-way boulevards, or one-way couplets like Lead/Coal Ave.

DESIGN CONSIDERATIONS

1. These streets may be multi-way boulevards if traveling through areas with increased pedestrian traffic.
2. These routes may carry high-capacity transit (BRT) traveling longer distances. Dedicated transit lanes may be provided.
3. On-street parking may be considered in activity centers or suburban and urban areas with commercial activity, and Rural Main Streets.
4. Depending on volume, fewer lanes may be necessary on these streets. Narrower lanes can be considered.

BICYCLE INFRASTRUCTURE

Option 1: Protected bicycle lane.

Option 2: Bicycle lane with striped buffer for roadways with speeds 25mph or less. A buffer of 2.5-3 feet is typical to create a more comfortable space between bicyclists and motor vehicle traffic.

Option 3: Adjacent multi-use path.

Option 4: Use a gridded network and plan bikeway on parallel roadways within 1,000' of community principal arterial.

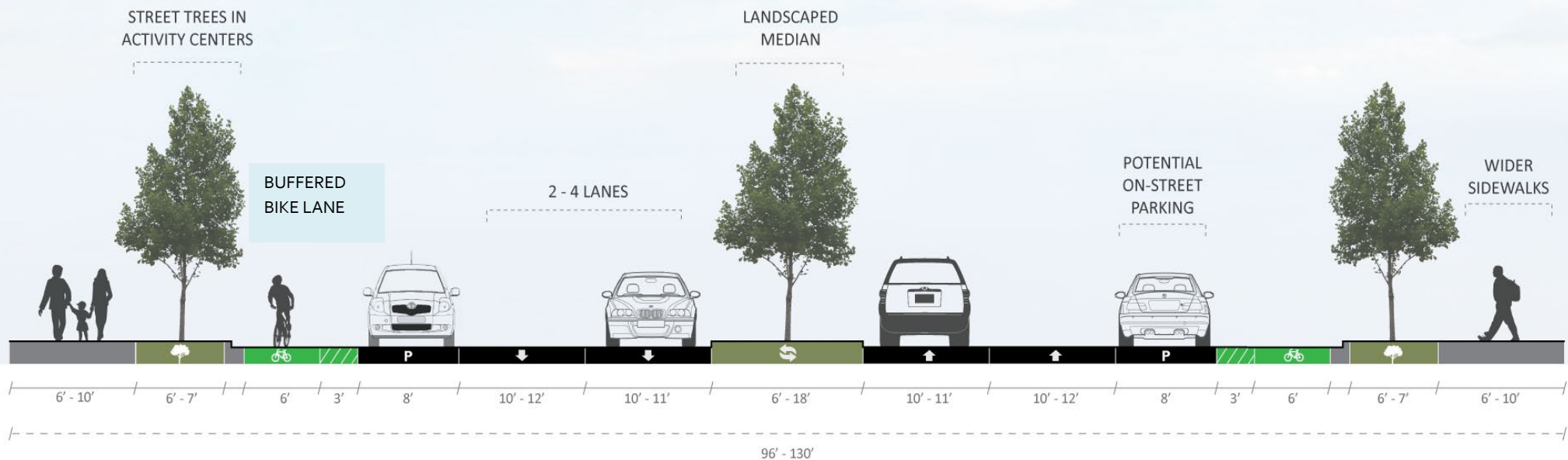


TABLE 4.2: COMMUNITY PRINCIPAL ARTERIAL MATRIX				ROW RANGE: 96'-130'	
Land Use Typology	ACTIVITY CENTER	URBAN	SUBURBAN	RURAL	MAIN STREET
Examples	Central Ave	Osuna & Jefferson	Southern Blvd	Isleta Blvd	4 th St at Guadalupe Plaza
PEDESTRIAN REALM (ONE SIDE)					
Landscape buffer	7' (tree well)	6'	6'	8'-14' paved shoulder (both sides) and/or an 8-10' multi-use trail with a 5' buffer	6' (tree well)
Clear Sidewalk width	10'	10'	6'		6'
Building Shy Zone (ingress/egress)*	2'	2'	2'		-
Total Width (for one side only)	19'	18'	14'		12'
BIKEWAYS (ONE SIDE)					
Multi-Use Path	See Long Range Bikeway System			4' minimum paved shoulder (both sides) with 5' being optimal and/or with 8' multi-use path (one side)	
Multi-Use Path Outside Buffer	N/A	5'	5'		
Multi-Use Path Inside Buffer	N/A	3'	3'		
Paved Multi-Use Path Width	N/A	10'-14'	10'-14'		
Protected Bicycle Lane	Use in areas of high bicycle activity and where speeds are greater than 25mph. See NACTO Urban Bikeway Design Guide for Protected Bike Lanes.				
Bicycle Lane (widths do not include gutter pan)	Posted Speed 25 mph or lower: 5' buffered bicycle lane (min 13' for combined parallel parking and bike lane). Posted Speed higher than 25 mph: 6' protected bicycle lane or buffered bicycle lane.			Source: FHWA Small Town and Rural Multi-modal Networks, 2016	Consider a buffered or protected bicycle lane
TRANSIT					
Dedicated Bus Lane	See Planned Transit Network: Include 24' for bus rapid transit routes.				
ROADWAY					
Maximum Number of Through Lanes	2-4	2-4	4	2-4	2-4
Desired Operating Speed	25-30 MPH	30-35 MPH	35-40 MPH	30-40 MPH	25-30 MPH
Lane Width	10'-11'	10'-11'	10'-12'	10'-12'	10'-11'
Outside Lane Width (heavy vehicles)	12'	12'	12'	12'	12'
Parallel Parking	7'-8'	7'-8'	-	-	7'-8'
Median/Center Turn Lane	6'-18'	6'-18'	6'-18'	6'-18'	6'-18'

*Include 2' if buildings, walls, or other vertical structures are planned adjacent to public ROW.

4.3 MINOR ARTERIAL DESIGN MATRIX

Minor Arterials provide the connectivity of principal arterials, but they prioritize slower moving traffic, bicyclists, and pedestrians to give these modes other safer and more comfortable options to reach destinations. They generally have fewer lanes, lower speeds, and lower volumes (6,000 – 20,000 AWDT) than principal arterials. Given their lower speeds and volume, additional design elements may be worth considering on these streets, such as including on-street parking, bicycle lanes, expanded sidewalks, and landscape improvements, which may include green infrastructure.

DESIGN CONSIDERATIONS

1. On-street parking may be considered in activity centers or urban areas with commercial activity, or Rural Main Streets.
2. Depending on volume, fewer lanes may be necessary on these streets. Narrower lanes can be considered in activity centers with high pedestrian volumes.
3. Two through lanes with a center turn lane, or two through lanes with a protected bicycle lane on both sides may be desirable on these streets.

BICYCLE INFRASTRUCTURE

Option 1: Protected bicycle lane especially in activity centers and/or high traffic areas.

Option 2: Buffered bicycle lane if speeds are less than 25mph.

Option 3: Adjacent multi-use path.

Option 4: Use a gridded network and plan bikeway on parallel roadways within 1,000' of minor arterial.

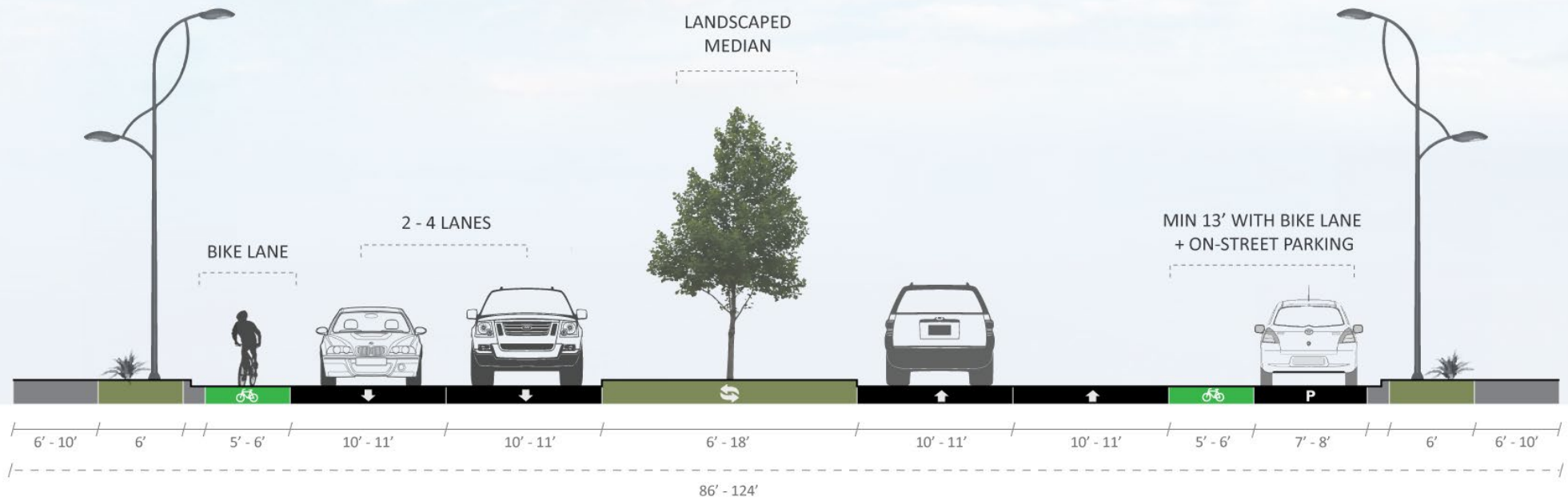


TABLE 4.3: MINOR ARTERIAL MATRIX				ROW RANGE: 86'-124'	
Land Use Typology	ACTIVITY CENTER	URBAN	SUBURBAN	RURAL	MAIN STREET
Examples	Seven Bar Loop in Cottonwood	Candelaria	Harper or Sage	Rio Grande Blvd	Corrales Rd in vil- lage Center
PEDESTRIAN REALM (ONE SIDE)					
Landscape buffer	6' (tree well)	6'	5'	4' paved shoulder (both sides) and/or 5' buffer with 8' multi-use path (one side)	6' (tree well)
Clear Sidewalk width	10'	6'	6'		6'
Building Shy Zone (ingress/egress)*	2'	-	-		-
Total Width (for one side only)	18'	12'	11'		12'
BIKEWAYS (ONE SIDE)					
Multi-Use Path	See Long Range Bikeway System			4' minimum paved shoulder (both sides) with 5' being optimal and/or with 8' multi-use path (one side)	
Multi-Use Path Outside Buffer	N/A	5'	5'		
Multi-Use Path Inside Buffer	N/A	3'	3'		
Paved Multi-Use Path Width	N/A	10'-12'	10'-12'		
Protected Bicycle Lane	Use in areas of high bicycle activity and where speeds are greater than 25mph. See NACTO Urban Bikeway Design Guide for Protected Bike Lanes.			Source: FHWA Small Town and Rural Multi- modal Networks, 2016	Consider a buffered or protected bicycle lane
Bicycle Lane (widths do not include gutter pan)	Posted Speed 25 mph or lower: 5' buffered bicycle lane (min 13' for combined parallel parking and bike lane). Posted Speed higher than 25 mph: 6' protected bicycle lane or buff- ered bicycle lane.				
TRANSIT					
Dedicated Bus Lane	See Planned Transit Network: Include 24' for bus rapid transit routes.				
ROADWAY					
Maximum Number of Through Lanes	2-4	2-4	2-4	2-4	2
Desired Operating Speed	25-30 MPH	30-35 MPH	30-40 MPH	35-40 MPH	25-30 MPH
Lane Width	10'-11'	10'-11'	10'-11'	10'-11'	10'-11'
Outside Lane Width (heavy vehicles)	11-12' if on the Planned Transit Network as a current or future bus route.				
Parallel Parking	7'-8'	7'-8'	-	-	7'-8'
Median/Center Turn Lane	6'-14'	6'-14'	6'-18'	6'-18'	6'-18'

*Include 2' if buildings, walls, or other vertical structures are planned adjacent to public ROW.

4.4 MAJOR COLLECTOR DESIGN MATRIX

Major Collectors provide additional needed connectivity between destinations located on arterials and within neighborhoods. Collectors usually have 2 to 4 lanes, low traffic volumes (3,000 – 12,000 AWDT), and prioritize bicyclists and pedestrians. Bicyclists should be able to use collectors for long segments of their trips, and motorists will generally use them for short segments of their trips. As with minor arterials, additional design considerations include adding on-street parking, bicycle lanes, expanded sidewalks, and landscape improvements, including green infrastructure.

DESIGN CONSIDERATIONS

1. On-street parking may be considered in activity centers, urban areas with commercial activity, and through neighborhoods with higher density multi-family.
2. Fewer lanes may be necessary on these streets. Narrower lanes can be considered in most locations.
3. Two through lanes with a center turn lane, or two through lanes with a protected bicycle lane on both sides may be desirable on these streets.

BICYCLE INFRASTRUCTURE

Option 1: Protected or buffered bike lane depending on speed and volume.

Option 2: Bicycle lane or Bike Boulevard.

Option 3: Adjacent multi-use path.

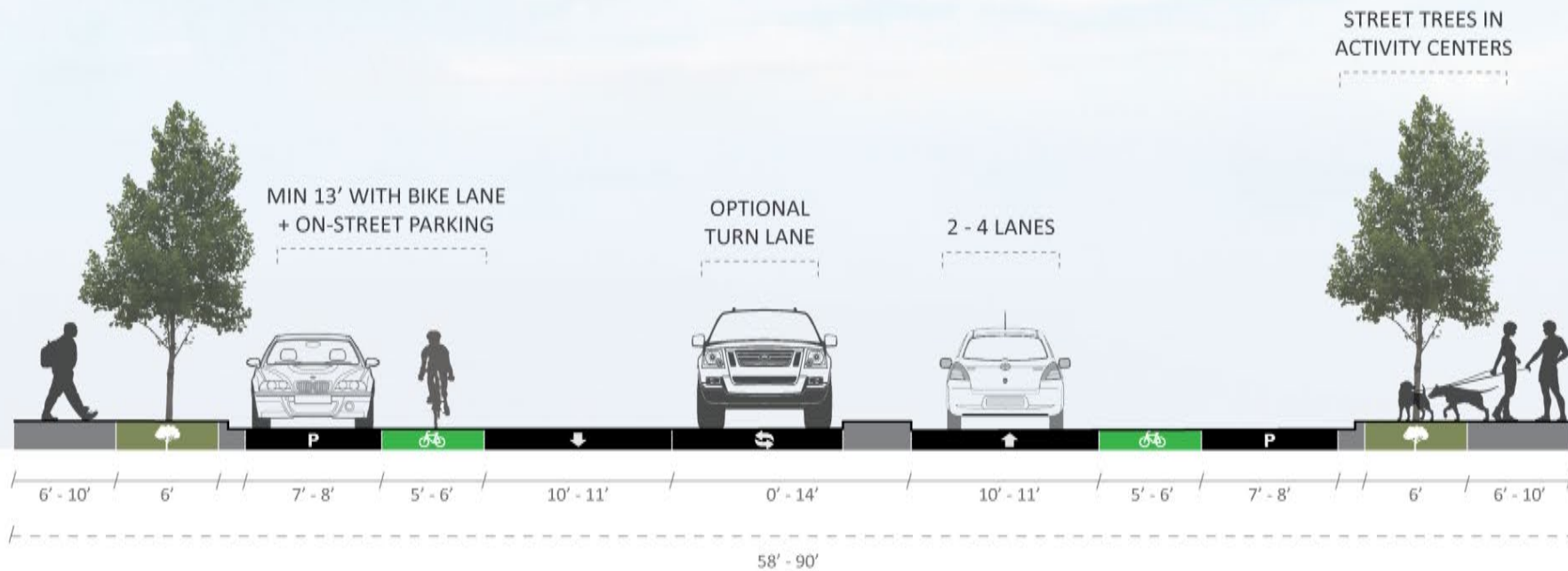


TABLE 4.4: MAJOR COLLECTOR MATRIX				ROW RANGE: 58'-90'	
Land Use Typology	ACTIVITY CENTER	URBAN	SUBURBAN	RURAL	MAIN STREET
Examples	Seven Bar Loop in Cottonwood	Comanche	Meadowlark	Frost Rd	NM 333 in Tijeras
PEDESTRIAN REALM (ONE SIDE)					
Landscape buffer	6' (tree well)	6'	5'	4' paved shoulder (both sides) and/or 5' buffer with 8' multi-use path (one side)	6' (tree well)
Clear Sidewalk width	9'	6'	6'		6'
Building Shy Zone (ingress/egress)*	2'	-	-		-
Total Width (for one side only)	17'	12'	11'		12'
BIKEWAYS (ONE SIDE)					
Multi-Use Path	See Long Range Bikeway System				
Multi-Use Path Outside Buffer	N/A	N/A	5'		
Multi-Use Path Inside Buffer	N/A	N/A	3'		
Paved Multi-Use Path Width	N/A	N/A	10'-12'		
Protected or Buffered Bicycle Lane	Use in areas of high bicycle activity and where speeds are greater than 25mph. See NACTO Urban Bikeway Design Guide.			4' paved shoulder (both sides) and/or 5' buffer with 8' multi-use path (one side)	
Bicycle Lane (widths do not include gutter pan)	Posted Speed 25 mph or lower: 5' bicycle lane or buffered (min 13' for combined parallel parking and bike lane). Posted Speed higher than 25 mph: 6' protected or buffered bicycle lane.				
ROADWAY					
Maximum Number of Through Lanes	2	2-4	2-4	2-4	2
Desired Operating Speed	25-30 MPH	25-35 MPH	30-35 MPH	35-40 MPH	25-30 MPH
Lane Width	10-11'	10'-11'	10'-11'	10'-11'	10'-11'
Outside Lane Width (heavy vehicles)	11-12' if on the Planned Transit Network as a current or future bus route.				
Parallel Parking	7'-8'	7'-8'	7'-8'	-	7'-8'
Median/Center Turn Lane	0'-14'	0'-14'	0'-14'	0'-14'	0'-14'

*Include 2' if buildings, walls, or other vertical structures are planned adjacent to public ROW.

4.5 MINOR COLLECTOR DESIGN MATRIX

Minor collectors provide additional connectivity between destinations located on arterials and within neighborhoods. They typically have low traffic volumes (under 6,000 AWDT) and prioritized access to residential areas and local businesses. In most cases, due to low speeds and low traffic volumes, bicyclists should be able to share the road comfortably using shared lane markings. The streetside environment is like major collectors.

DESIGN CONSIDERATIONS

1. On-street parking may be considered in activity centers or urban areas with commercial activity.
2. Fewer lanes may be necessary on these streets. Narrower lanes can be considered in most locations.

BICYCLE INFRASTRUCTURE

Option 1: Bicycle lane or buffered bike lane depending on vehicle speed and volume.

Option 2: Bicycle Boulevard.

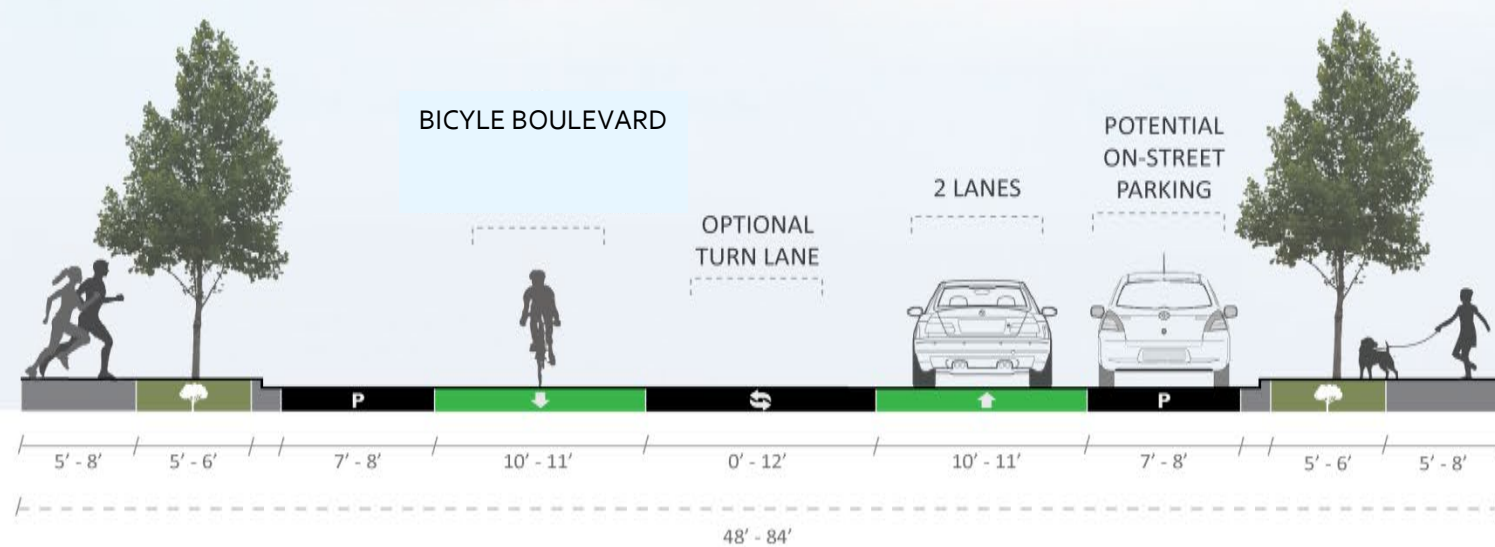


TABLE 4.5: MINOR COLLECTOR MATRIX				ROW RANGE: 48'-84'	
Land Use Typology	ACTIVITY CENTER	URBAN	SUBURBAN	RURAL	MAIN STREET
Examples	Western end of Lead/Coal	Tingley Rd, Cutler Ave	Western Hills	Todos Juntos Rd, Jarales Rd	N/A
PEDESTRIAN REALM (ONE SIDE)					
Landscape buffer	6'	6'	5'	4' paved shoulder (both sides)	N/A
Clear Sidewalk width	8'	6'	5'		
Building Shy Zone (ingress/egress)*	2'	-	-		
Streetside Width (for one side only)	16'	12'	10'		
BIKEWAYS (ONE SIDE)					
Multi-Use Path	N/A			4' paved shoulder (both sides)	N/A
Multi-Use Path Outside Buffer	N/A				
Multi-Use Path Inside Buffer	N/A				
Paved Multi-Use Path Width	N/A				
Protected or Buffered Bicycle Lane	Use in areas of high bicycle activity and where speeds are greater than 25mph. See NACTO Urban Bikeway Design Guide.				
Bicycle Lane (widths do not include gutter pan)	Posted Speed 25 mph or lower: 5' bicycle lane or buffered (min 13' for combined parallel parking and bike lane). Posted Speed higher than 25 mph: 6' protected or buffered bicycle lane.				
ROADWAY					
Maximum Number of Through Lanes	2	2	2	2	N/A
Desired Operating Speed	18-25 MPH	18-30 MPH	18-30 MPH	20-35 MPH	
Lane Width	10'-11'	10'-11'	10'-11'	10'-11'	
Outside Lane Width (heavy vehicles)	11'-12' if on the Planned Transit Network as a current or future bus route.				
Parallel Parking	7'-8'	7'-8'	7'-8'	-	
Center Turn Lane	0'-12'	0'-12'	0'-12'	0'-12'	

*Include 2' if buildings, walls, or other vertical structures are planned adjacent to public ROW.

4.6 RIGHT OF WAY CONSIDERATIONS

The minimum ROW widths are recommended in most cases to provide an overall compact design that supports improved safety and ensures adequate space is set aside for pedestrians, bicyclists, transit, and motorists.

The maximum ROW is provided for roadways where additional ROW may be warranted for elements that require significant space such as transit lanes or adjacent trails, although in most cases this maximum ROW is not required.

Table 4.6: Right-of-Way Ranges	
Regional Principal Arterial	106'-156'
Community Principal Arterial	96'-130'
Minor Arterial	82'-124'
Major Collector	58'-90'
Minor Collector	48'-84'

Right-of-Way Flexibility and Exceptions

Right-of-way flexibility helps to manage constraints, speed, and safety concerns. Smaller rights-of-way have the advantage of allowing for more developable land, lowering maintenance and construction costs, and creating shorter pedestrian crossing distances.

However, wider rights-of-way provide more flexibility for multimodal accommodation and allow for medians, which can improve roadway safety and provide space for mid-block crossings for pedestrians. In some cases, exceptions to the standard right-of-way requirements may be acceptable if there are existing constraints or additional considerations. Circumstances where exceptions may be necessary include:

- Environmental considerations
- Disproportionate costs
- ROW constraints on existing roadways
- Explicit preclusion of a certain use along the roadway, such as non-motorized travel
- Additional street design goals as listed in relevant planning documents

REDUCING RIGHT-OF-WAY

In some cases, there may be opportunities to *reduce* the minimum ROW set aside. The following options provide opportunities to reduce ROW or deal with constrained ROW on an existing roadway.

Parallel Routes

Creating a network with multiple routes means roadways can be narrower, carry less traffic individually and support additional modes, while at the same time maintaining overall network efficiency and capacity. If the maximum number of lanes is not sufficient to meet projected demand, creating connected parallel routes is recommended first, instead of adding more lanes beyond the recommended maximum.

Fewer Lanes

Reducing the number of lanes along a roadway may be acceptable given projected or actual traffic volumes. Future roadways, especially those embedded in well-connected networks, do not have to include as many lanes to support the same overall traffic volume.

Narrower Lane Widths

Reducing the width of travel lanes can also reduce the ROW requirements. Generally, lane widths of 10 to 11 feet are recommended along all urban roadways.

Parallel Bikeways

Bicycling infrastructure does not need to be included along every roadway if there are parallel connected routes close by. Providing a bicycle route or boulevard on a lower volume roadway may be a better option than trying to accommodate bicyclists on a principal arterial.

Future Travel Demand

Transitions 2045 MTP anticipates a reduced growth forecast, and the result is reduced expectations for traffic volumes and congestion in the future. A critical consideration when developing future roadways is the number of lanes needed for anticipated travel demand. It is important that transportation engineers use the most up-to-date growth projections and traffic forecasts.

4.7 SPECIAL STREETS

Special streets involve unique design considerations to support specific land uses and users. A few special streets include:

Downtown Streets/Main Streets

These streets often handle higher pedestrian volumes, many turning movements, business deliveries, and higher density developments. For these reasons, special care must be taken to ensure that downtown streets support a safe and attractive environment that accommodates pedestrians and bicyclists while supporting surrounding land uses. Often this means keeping speeds low, installing traffic calming features such as curb extensions, and providing a robust network of bicycle infrastructure.

Specific considerations include creating wider sidewalks, installing street trees, converting one-way streets to two-way streets, adding on-street parking, and creating attractive, clearly visible transit amenities.

Multi-way Boulevards

Provide a design option for wider principal and minor arterial roadways to support more walkable, bicycle-friendly streets. They often support slower traffic, mixed land uses, and an attractive, pedestrian-oriented public realm. Multi-way boulevards include a central median and a central traveled way bordered by landscape buffers that separate the main thoroughfare from parallel access roads.

Access roads often include on-street parking, bikeways, and pedestrian amenities. Street trees and other landscape design features are vital. See figure below of Berkeley, CA from NACTO showing how frontage roads create a parallel low-speed environment.



One-way Street Couplets

Lead and Coal in Albuquerque can function together as a unified corridor for regional travel. These streets, working in concert, can carry a high volume of traffic (from all modes) within a narrower overall right of way without having to squeeze amenities of all modes within a single constrained right-of-way. However, one-way streets can also encourage higher speeds, and it is important to consider the impact to the adjacent neighborhoods when implementing these.

Transit Corridors

These corridors are designed to accommodate high-capacity transit services such as bus rapid transit (BRT) along existing arterial streets. They often have dedicated travel lanes for buses, median transit stations, special signal timing, and expanded pedestrian amenities. Connected sidewalks and safe crossing opportunities are fundamental to transit access.

Because dedicated bus lanes add to the right of way requirements of these streets, these streets can become quite wide, making it challenging to balance the needs of all modes. However, new transit corridors can help catalyze economic development along a corridor by offering expanded mode choices, connecting key job centers, increasing pedestrian traffic, and raising land values. See figure below of the ABQ BRT (ART) from HDR.



4.8 AMERICAN DISABILITY ACT GUIDELINES

Section 504 of the Rehabilitation Act makes it illegal for any federally funded program or entity to discriminate on the basis of disability. Similarly, Title II of the Americans with Disabilities Act (ADA) prohibits all state and local governments from engaging in such discrimination, regardless of federal funding. Therefore, state and local governments must ensure people with disabilities have equal access to any programs, services, or activities they administer, including pedestrian facilities in the public right-of-way.

Title II of the ADA

Title II of the ADA outlines several requirements of public entities such as adopting a grievance procedure and designating at least one employee as an ADA Coordinator.

Title II of the 1991 ADA Standards also requires all public entities to complete self-evaluations of their programs, policies, and procedures. Entities with fifty or more employees must develop transition plans addressing how and when they would bring facilities into compliance. Self-evaluations and transition plans were required to be completed within six months of the effective date of the 1991 Regulation.

An ADA Transition Plan is developed to identify and schedule the removal of physical barriers in pedestrian infrastructure that limit accessibility for people with disabilities.

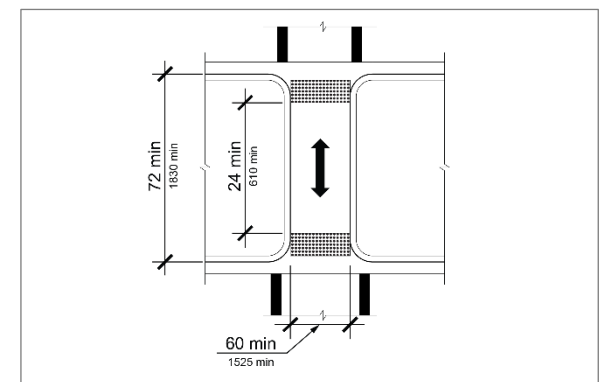
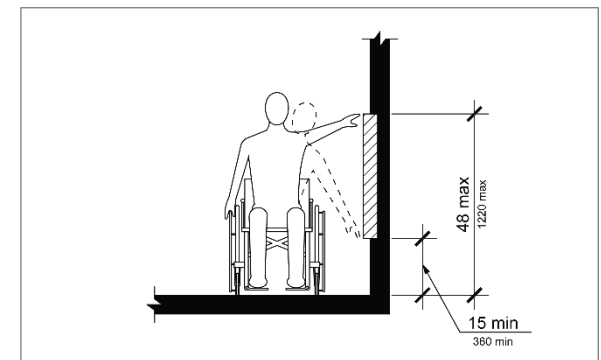
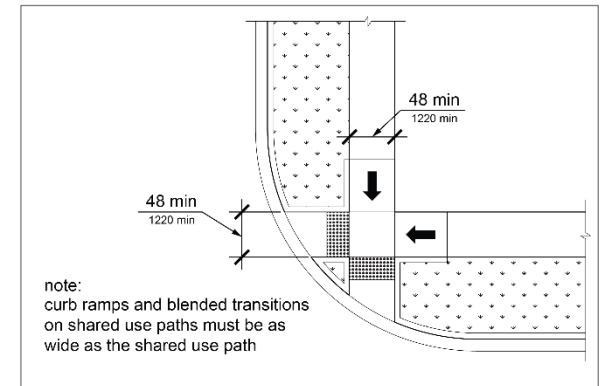
A number of local jurisdictions in the region have completed ADA Transition Plans that include a complete or partial inventory of pedestrian facilities in the public right-of-way and steps to ensure pedestrian facilities comply with the ADA.

While subsequent ADA regulations have not required entities to complete new self-evaluations or update their transition plans, local entities are still encouraged to do so. Small agencies that are not required to develop transition plans are also encouraged to work on ensuring accessibility for all.

Public Right-of-Way Accessibility Guidelines

The most up-to-date set of standards for pedestrian accessibility is the Public Right-of-Way Accessibility Guidelines (PROWAG). Local jurisdictions can design “above and beyond” these standards, but they provide a starting point for minimum recommendations. Developed by the U.S. Access Board, PROWAG provides detailed technical requirements for accessible pedestrian facilities in the public right-of-way.

PROWAG has been adopted by the United States Department of Transportation (USDOT) in 2024 as a guideline for new and upgraded transit stops.



Source: U.S. Access Board

PROWAG describes accessibility standards for pedestrian facilities such as:

- Transit stops and shelters
- Sidewalks
- Curb ramps
- Detectable warning surfaces
- Crosswalks
- Pedestrian signals
- Pedestrian pushbuttons
- 'On-street parking

NMDOT Adoption

PROWAG has been adopted by the New Mexico Department of Transportation as an enforceable standard for the design of all public pedestrian facilities. This means that all federally funded projects must follow or exceed these standards. Currently, PROWAG requirements apply to new facilities and to existing facilities when they are altered. When altering existing facilities, PROWAG compliance is required to the "maximum extent feasible" if strict compliance is technically infeasible due to existing physical constraints.

It is best practice to identify and correct accessibility barriers within existing facilities whenever possible. Many public entities have established prioritization criteria that help them decide which pedestrian accessibility improvement projects to fund first. Criteria vary

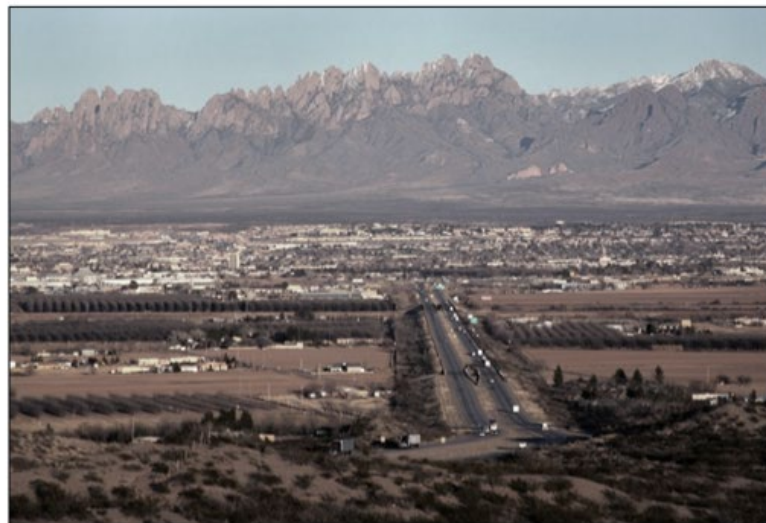
between entities, but often are related to nearby population concentration, land use, severity and concentration of access barriers, access to public transit, and access to public facilities and daily destinations.

The design matrices and basic guidance on right-of-way set asides in this guide are compliant with PROWAG standards in terms of

NMDOT Design Manual adopted PROWAG standards.

sidewalk width but do not contain full technical detail of access standards for ramps, crosswalks, pedestrian signals, and other elements of the pedestrian right-of-way.

For more information about pedestrian accessibility standards for specific projects, see the New Mexico Department of Transportation Design Manual and the PROWAG.



New Mexico Department of Transportation Design Manual



Chapter 5

NATIONAL BEST PRACTICES

Chapter 5

National Best Practices

This chapter provides a detailed description of the Roadway Design Matrices elements in the previous chapter, and the reasoning behind recommendations such as speed limits, certain lane widths, and types of active transportation facilities. Wherever possible, the recommendations are grounded in the latest research of best practices but adapted to the Albuquerque Metropolitan Planning Area's unique context. To develop streets that are multimodal and safe for everyone, local agency design manuals might need to be updated and paired with informational campaigns on how to use new multimodal designs. Although not discussed in this document, it is important to note that pairing advances in vehicle technology with best practices in multimodal design can make a significant difference in managing congestion and increasing safety for all modes simultaneously.

This chapter expands upon the main elements of a roadway including:

1. Roadway Elements
2. Intersection Elements
3. Transit Infrastructure
4. Bicycle and Trail Infrastructure
5. Pedestrian Infrastructure
6. Green Streets

Broad Design Principles

Many jurisdictions in the United States have adopted some form of broad design principles, which they follow with all new projects. A significant impact can be made purely by approaching every project (whether new or retrofitting) with these principles. For example, Chicago's design principles encourage every project to focus on narrow vehicle lanes, short pedestrian crossings, and separate modes of travel.

Design Manuals

Design guides that exemplify the successful integration of land use and transportation systems are listed here:

- AASHTO A Policy on Geometric Design of Highways and Streets, 7th Edition, 2018 (Green Book).
- AASHTO Roadside Design Guide, 4th Edition, update in 2015.
- AASHTO's Guide for the Development of Bicycle Facilities 5th Edition, 2024.
- FHWA Small Town and Rural Multimodal Networks, 2016.
- FHWA Speed Limit Setting Handbook, 2025.
- NACTO Urban Street Design Guide, 3rd Edition.
- NACTO Transit Street Design Guide.
- NACTO's Designing for All Ages & Abilities Contextual Guidance for High-Comfort Bicycle Facilities.
- NACTO's Urban Bikeway Design Guide, 3rd Edition.
- Context Sensitive Solutions (CSS) such as CDOT Roadway Design Guide, 2023.
- Institute of Transportation Engineers (ITE) Implementing Context Sensitive Design on Multimodal Corridors, a Practitioner's Handbook (update to their Walkable Urban Thoroughfares document).
- ITE Noteworthy Speed Management Practices, 2020.
- Safe System Approach for Speed Management, 2023.
- Public Right-of-Way Accessibility Guidelines (PROWAG), officially adopted in 2024 for transit stops and federally managed facilities.

5.1 ROADWAY ELEMENTS

LANE WIDTH

In urban areas, lane widths of 10 to 11 feet provide the same levels of service as wider lanes,⁶ while maintaining or improving overall safety compared to wider lanes.⁷ Narrower lanes also reduce impervious surface coverage, require less construction material, have lower maintenance expenses, and reduce crossing distances for pedestrians.⁸ A standard lane width of 10 to 11 feet is recommended in all urban areas.

NACTO's Urban Street Design Guide primarily recommends 10-foot travel lanes to balance safety, capacity, and speed control in urban settings. Nine-foot lanes are considered acceptable in low-speed contexts focused on improving safety and reducing vehicle speeds.

Multimodal Options

Using narrower lanes provides room for other roadway users. For example, reducing the lane widths from 12 to 11 feet on a six-lane road creates room for a 3-foot bike lane buffer on each

side of the road, increasing bicycle level of service significantly. Lane widths of more than 11 feet may be appropriate on some transit routes, or on roadways with speeds higher than 35 MPH, higher percentages of heavy vehicles (including buses), and in rural contexts.⁹

On slow collectors (30 mph and below) and in constrained environments, where there is not enough space for dedicated bicycle lanes, wider outside lanes improve bicycle level of service. Transit usually requires a minimum of 11-foot lane widths.

Table 5.1 Travel Lane Width

9' in low speed, low traffic urban areas

10'-11' for streets in urban areas

11'-12' for designated truck or transit routes

SPEED MANAGEMENT

Streets should be designed using the target speed, or the speed drivers are intended to go, instead of the operating speed. In other words, the target speed, design speed, and posted speed should all be the same.

FHWA Proven Safety Countermeasure

The FHWA Safe Systems Approach provides a proven safety countermeasure called *Appropriate Speed Limits For All Users* that is an essential part of preventing crashes and improving safety for all roadway users. In fact, even without changing roadway design, research shows that crashes can be reduced with speed limit changes alone. Jurisdictions may have the authority to designate reduced speed zones or set speed limits for an entire urban core area.¹⁰

This can be accomplished by using design strategies including traffic calming, narrower lanes, street trees, and shorter signal lengths. Higher design speeds require more “forgiving” roadway design features: wider lanes, larger turning radii, clear zones, channelized turn lanes, and larger intersection spacing. This in turn reduces the comfort and safety of the street for bicyclists and pedestrians, lowers multimodal level of service scores, and can encourage speeding vehicles.

⁶ Potts, I.B., Harwood, D.W., & Richard, K.R. (2007). Relationship of lane width to safety for urban and suburban arterials. *Geometric design and the effects on traffic operations 2007*, 63-82. Washington, DC: Transportation Research Board

⁷ NACTO Urban Street Design Guide 34; Harwood, D.W. (1990). *Effective utilization of street width on urban arterials* (NCHRP Report 330). Washington, DC: Transportation Research Board

⁸ NACTO, 34

⁹ Highway Safety Manual 2010, 10-24: Lane widths under 12' result in crash modification factors greater than 1.00

¹⁰ Pilkinton, Paul. [Reducing the speed limit to 20 mph in urban areas: Child deaths and injuries would be decreased.](#) BMJ, Published April 29, 2000.

Hu, W. and J. Cicchino (2019). [Lowering the speed limit from 30 to 25 mph in Boston: effects on vehicle speeds.](#) Insurance Institute for Highway Safety.

Setting Speed Limits

Setting appropriate speed limits is crucial for reducing fatalities and injuries. There is a 45 percent chance of killing or seriously injuring a pedestrian hit by a driver traveling at 30mph. Reducing this speed to 20mph decrease that chance by five percent.¹¹ In addition, **higher speeds are associated with more severe crashes, including more fatalities.**¹²

Generally, speeds 35 MPH or below are appropriate in urban areas.¹³ In areas with higher levels of pedestrian or bicycle activity, even lower speeds may be appropriate (30 MPH or lower).

The FHWA encourages the designation of speed limits to be based upon a variety of factors; not just the typical speed and volume observation, but also crash history, intersection and driveway spacing, and roadside conditions.

Some considerations to address when setting speed limits include:

1. Reevaluate the process of setting speed limits. Provide default speed limits in city and town centers.

2. Designate slow/speed zones.

3. Evaluate conflict density and land use context.

4. Use automated enforcement.

5. Redesign roadways.

¹¹<https://highways.dot.gov/safety/pedestrian-bicyclist>
¹² NACTO Urban Street Design Guide 140; ITE Designing Walkable Urban Thoroughfares 111
¹³ITE Designing Walkable Urban Thoroughfares, 108
LRTS GUIDE 2026

MEDIANS

Medians have many benefits. They manage left turns, thus reducing potential conflict points. They can also create pedestrian refuge areas, create an attractive landscape buffer, allow for the installation of street infrastructure (such as lighting), and can increase roadway safety.¹⁴

Table 5.2: Recommended Median Widths for Roadways 35 mph or less¹⁵

Median Type	Recommended Width
Access control	6'
Pedestrian refuge	8' (minimum 6 per NACTO')
Street trees and lighting	10'
Single left turn lane	10'
Collector median	14'
Arterial median	16-18'
Dual left turn lane	22'
Dedicated transit lanes	22-24'

The clear width of pedestrian access routes crossing medians and pedestrian refuge islands shall be 60 inches minimum according to PROWAG standards (see PROWAG for

¹⁴ Highway Safety Manual,
¹⁵ ITE 141
¹⁶ PROWAG (<https://www.access-board.gov/prowag/technical.html>)

additional guidance on pedestrian accessibility for medians)¹⁶.

ON-STREET PARKING

On-street parking supplements the parking demand of nearby businesses and residences. It also increases the comfort of pedestrians by providing an additional buffer between the sidewalk and traffic.

Parked cars not only create a physical shield between pedestrians and the roadway, but also effectively slow traffic, which can enhance a street's walkability.¹⁷ However, there are trade-offs with on-street parking. They can introduce an additional hazard for bicyclists, due to drivers opening their doors into occupied bike lanes ("dooring") or due to motorists entering and exiting parking spaces. In addition, parking that is too close to intersections and crosswalks (less than 20 feet) makes it difficult for people driving to see people in crosswalks. Because of this, "daylighting", or keeping the area next to crosswalks clear of parked vehicles, is recommended.

Parallel Parking

The preferred width of parallel on-street parking is 8 feet wide. A minimum of 13 feet is needed to include both a parallel parking lane and an adjacent bicycle lane. Bike lane markings and buffered bicycle lanes (with the buffer between parked cars and the bicycle lane) are strategies to reduce the risk of "dooring."¹⁸

¹⁷ ITE Designing Walkable Urban Thoroughfares, 109
¹⁸ NACTO Urban Bikeway Design Guide 9, 133

Angled Parking

Angled parking should be considered on wide streets with low speeds and volumes and in activity areas. For safety reasons, back angle parking is recommended for all angled parking and particularly for roadways that also include a bike route or lane.

Table 5.3: Minimum Dimensions for Angled Parking¹⁹

Angle	Stall Length	Minimum Width of Adjacent Lane
45°	17' 8"	12' 8"
50°	18' 3"	13' 3"
55°	18' 8"	13' 8"
60°	19' 0"	14' 6"

Traffic Calming

Efforts should be made to slow down traffic on streets with pedestrian or bicycle activity or with safety issues. This includes minor arterials and collectors. This is important because higher speeds are associated with more severe crashes, as well as higher likelihoods of pedestrian and bicyclist fatalities. There are several active measures that can be taken to reduce speed, some of which are outlined in the following graphic.²⁰

Figure 5.1: Traffic Calming Measures

Source: NACTO's Urban Street Design Guide and ITE's Designing Walkable Urban Thoroughfares.



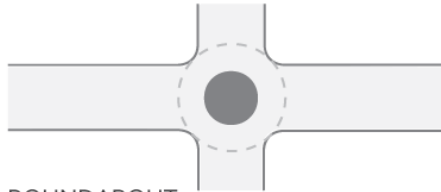
ON-STREET PARKING

On-street parking creates a physical barrier between pedestrians and the roadways. It also visually narrows the roadway for drivers, slowing traffic.



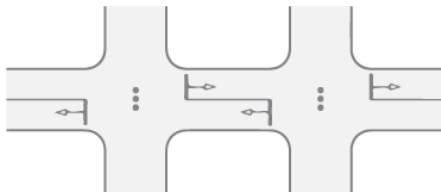
STREET TREES

Like on-street parking, street trees add a visual element to the edge of roadways, perceptually narrowing the roadway for drivers.



ROUNDBOUT

Roundabouts are a proven safety counter-measure for reducing speeds and conflict points at intersections.



SIGNAL PROGRESSION

Signal progression can reduce target speeds along the roadway.



CURB EXTENSIONS

Curb extensions can narrow the roadway, reduce crossing distances for pedestrians, and give a visual indication to drivers to slow down.



MEDIANS

Medians can visually narrow the roadway for drivers, as well as separate opposing lanes of traffic.



ROADWAY NARROWING

Narrowing roadways by reducing the number of lanes, creating narrower travel lanes, and adding streetside design elements can effectively slow traffic.



TWO-WAY TRAFFIC

Two way street traffic can slow traffic by making motorists drive more cautiously through awareness of opposing traffic.

¹⁹ ITE Designing Walkable Urban Thoroughfares 147

²⁰ AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 40-41

5.2 INTERSECTION ELEMENTS

Visibility and predictability are key considerations at intersections: all users should have a clear view of each other so they can safely negotiate the intersection without conflict.

Intersections are often places where otherwise good street design breaks down: bike lanes end to make way for right turn lanes, crosswalks are not provided at logical crossing points, generous curb radii promote high turning speeds and crossing signals do not allow adequate time for slower pedestrians to cross safely.



Resolving Conflicts at Intersections

Designing safe intersections is a challenge because intersections introduce many conflict points between users: motorists are turning, pedestrians of all abilities are crossing the street, buses are unloading passengers, and bicyclists are attempting to negotiate a safe crossing.

Because intersections introduce many conflict points, the safety of the most vulnerable users should be prioritized. Many times, this means providing shorter crossing distances for pedestrians, slowing traffic speeds, and enhancing bicycle and pedestrian visibility. New innovative types of intersections have been developed to meet these challenges of limited right-of-way, improving safety, and providing needed roadway capacity.

PROTECTED INTERSECTIONS

Protected intersection design prioritizes safety for all users and not just motorists. Design treatments include Protected bicycle lane approaches that give cyclists a place to wait out of the flow of vehicle traffic and reduce the turning speed of vehicles; two-stage turns for bicyclists; leading signal priority; and smaller curb radii. Dedicated transit lanes and stations are designed to facilitate better interactions between cyclists, transit vehicles, and transit riders at stop locations. Sidewalks are extended and the curbs provide safe, short distances for crossing. Signalized turn lanes are added. More detailed information on how to best design protected intersections can be found in the AASHTO's Guide for the Development of Bicycle Facilities Fifth Edition and the NACTO Urban Bikeway Design Guide.



Source: NACTO

ROUNDBABOUTS

Roundabouts have been shown to reduce the number of crashes and crash severity at intersections as compared to signal-controlled intersections, and they don't require the cost of implementing signalization. This is achieved by reducing the number of conflict points at intersections and slowing traffic, while keeping traffic flowing, which can also increase overall intersection capacity.

The FHWA has guides in place such as Roundabouts: An Informational Guide and Alternative Intersections/Interchanges.

FHWA Proven Safety Countermeasure

The FHWA identified roundabouts as a proven safety countermeasure with the potential for an 82 percent reduction in severe crashes (for a two-way stop-controlled intersection converted to a roundabout) and a 78 percent reduction in severe crashes (signalized intersection to a roundabout).

Marked and Unmarked Crosswalks

Highly visible marked crosswalks are essential elements of safe crossings and must be considered or provided at all approaches of signalized intersections (depending on the set of conditions at an intersection) and should be provided at unsignalized intersections where pedestrian traffic is anticipated and encouraged. FHWA research clearly indicates that roadways with more than 10,000 AADT and that have multiple lanes are not adequately served by a marked crosswalk alone but should include other types of signal enhancements.



Unmarked crosswalks along Candelaria.

An unmarked crosswalk is defined as an assumed crosswalk that exists at every intersection and across every leg at that intersection. By law, pedestrians have the same right-of-way in a marked and an unmarked crosswalk. Therefore, not all crosswalks are marked, but it is important that there are marked crosswalks near large pedestrian generators such as schools, high volume transit stops, and commercial areas.

Figure 5.2: FHWA Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	① 2 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑨
3 lanes with raised median (1 lane in each direction)	① 2 3 4 5 7 9	① ③ 5 7 9	① ③ 5 ⑦ ⑨	① ③ 4 5 7 9	① ③ 5 ⑦ ⑨	① ③ 5 ⑦ ⑨	① ③ 4 5 7 9	① ③ 5 ⑦ ⑨	① ③ 5 ⑨
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	① 2 3 4 5 6 7 9	① ③ 5 6 7 9	① ③ 5 6 ⑨	① ③ 4 5 6 7 9	① ③ 5 6 ⑦ ⑨	① ③ 5 6 ⑨	① ③ 4 5 6 7 9	① ③ 5 6 ⑨	① ③ 5 6 ⑨
4+ lanes with raised median (2 or more lanes in each direction)	① ③ 5 7 8 9	① ③ 5 7 8 9	① ③ 5 8 ⑨	① ③ 5 7 8 9	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 8 ⑨
4+ lanes w/o raised median (2 or more lanes in each direction)	① ③ 5 6 7 8 9	① ③ 5 6 7 8 9	① ③ 5 6 8 ⑨	① ③ 5 6 7 8 9	① ③ 5 6 ⑦ 8 ⑨	① ③ 5 6 8 ⑨	① ③ 5 6 ⑦ 8 ⑨	① ③ 5 6 8 ⑨	① ③ 5 6 8 ⑨
Given the set of conditions in a cell, # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location. ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location. ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.* The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.						1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs 2 Raised crosswalk 3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line 4 In-Street Pedestrian Crossing sign 5 Curb extension 6 Pedestrian refuge island 7 Rectangular Rapid-Flashing Beacon (RRFB)** 8 Road Diet 9 Pedestrian Hybrid Beacon (PHB)**			

For locations without existing signals, FHWA's *Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations* helps agencies select pedestrian crash countermeasures.

This FHWA guide includes ways to determine and apply a specific set of countermeasure design options to crash types. See graphic above from this resource.

FHWA Proven Safety Countermeasure

According to FHWA's proven safety countermeasure Crosswalk Visibility Enhancements there are three main crosswalk visibility enhancements. They are 1) high-visibility crosswalks, 2) lighting, and 3) signing and pavement markings that can be implemented together. Studies show that high-visibility crosswalks can reduce pedestrian injury crashes up to 40 percent, lighting can reduce pedestrian crashes up to 42 percent, and advance yield or stop markings and signs can reduce crashes up to 25 percent.²¹

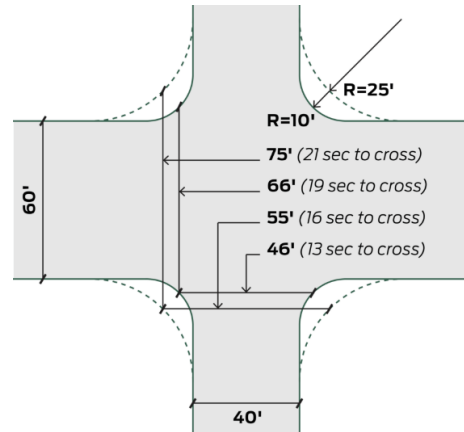
CURB DESIGN

Curb design at intersections is important because it demarcates the transition zone between pedestrians and motorists.



²¹ Chen, L., C. Chen, and R. Ewing. *The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections - Lessons from a New York City Experience*. (2012)

Turning movements are one of the top causes of pedestrian crashes at intersections.²² Often this can be attributed to higher turning speeds and reduced visibility.



Curb Radii

According to NACTO design guides, standard curb radii are 10–15 feet, however many cities use corner radii as small as 2 feet. In urban settings it is especially important that smaller corner radii are used and NACTO recommends that exceeding 15 feet should be the exception.

Large curb radii encourage higher speed turns and increase pedestrian crossing distances. Smaller curb radii can be used to slow vehicles making right turns.

²² Elvik, R. and Vaa, T. *Handbook of Road Safety Measures*. Oxford, United Kingdom, Elsevier, (2004)

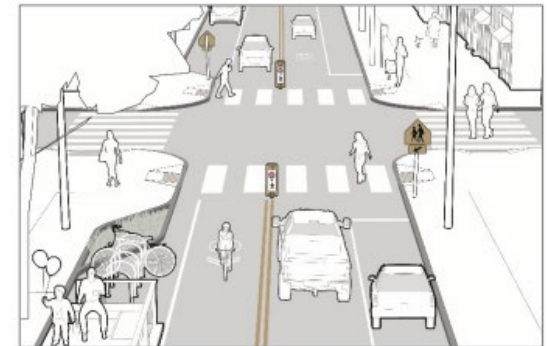
²³ Zeeger et al. *Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments*, FHWA, (2017)

Additionally, channelized right turn lanes (also known as slip lanes) reduce driver visibility and introduce additional conflict points and are not considered best practice. This creates an unsafe environment for pedestrians.

Curb Extensions

One way to slow traffic at intersections is to use curb extensions to extend the line of the curb into the street. This slows traffic and makes crossing distances shorter.²³

Curb extensions also provide a larger waiting area for pedestrians and room for more accessible, perpendicular curb ramps. Curb extensions can be considered at intersections of streets with on-street parking, as well as at midblock crossings. They can also provide a space for transit shelters.



Crosswalks with signs and high-visibility markings.
Source: Arlington County, Virginia

²² Ewing, *Pedestrian- and Transit-Oriented Design* 43

²³ ITE *Designing Walkable Urban Thoroughfares* 195

SIGNALS AND SIGNAL TIMING

Modifications to signal timing can be used to better accommodate pedestrians, transit vehicles, or bicyclists. For example, walk signal times can be changed to allow slower walkers, including the elderly, people with disabilities, and people with small children, to cross the street in one cycle. Planning for these users requires calculating walk times based on an average pedestrian speed of 3.0 – 3.5 MPH. Waiting times can also be reduced in high volume pedestrian areas.

Leading Bike and Pedestrian Intervals

Another signal design tool that would provide added safety and protection at signalized intersection crossings is leading bike and pedestrian intervals (LBIs and LPIs). LBIs and LPIs essentially give bicyclists and pedestrians a head start before cars enter an intersection. It gives a pedestrian an opportunity to get into the crosswalk prior to right-turning vehicles entering the crossing area.

Proven Safety Countermeasure

LPIs are considered an FHWA Proven Safety Countermeasure. Studies have shown that they provide a 13 percent reduction in pedestrian-vehicle crashes.²⁴

²⁴ (CMF ID: 9918) Goughnour, E., D. Carter, C. Lyon, B. Persaud, B. Lan, P. Chun, I. Hamilton, and K. Signor. "Safety Evaluation of Protected Left-Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety." LRTS GUIDE 2026

No Right Turn On Red (No RTOR)

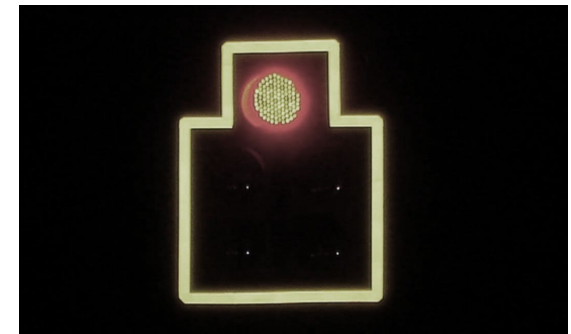
LPIs can further be augmented by a right-turn arrow, which would restrict right-turns on red to minimize vehicle-pedestrian conflicts. The leading pedestrian interval essentially provides pedestrian visibility for those dangerous right-turn/pedestrian conflicts at signalized intersections. This effort is relatively inexpensive and should be deployed at signalized locations with heavy pedestrian crossing demands. According to FHWA, LPIs should be implemented in conjunction with No RTOR. Other strategies include part-time No RTOR during busiest times of day with high pedestrian volumes.

According to a Transportation Research Board study, Safety Effectiveness of Leading Pedestrian Intervals by a Before-After Study with Comparison Groups, it has been shown that LPI's with No RTOR have reduced pedestrian-vehicle crashes by as much as 60 percent. (FHWA 2017).



Report No. FHWA-HRT-18-044. Federal Highway Administration. (October 2018)

Other types of signals are discussed in the bicycle and pedestrian sections of this chapter. These include Proven Safety Countermeasures of retroflective backplates on signal heads, flashing yellow arrows for permissive left turns, Rectangular Rapid-Flashing Beacons (RRFB), and Pedestrian Hybrid Beacons (PHB).



A variety of intelligent technological improvements can also be made with the proper base infrastructure such as adaptive signal timing and real time traffic information. Intelligent Transportation Systems (ITS) interventions are discussed in the AMPA's Regional ITS Architecture document, which establishes a regional framework for coordinated ITS projects.

5.3 TRANSIT INFRASTRUCTURE

Transit users are pedestrians before they board and when they arrive at their destination, meaning the provision of quality pedestrian facilities between transit stops and nearby destinations is critical to support higher transit levels of service.

TRANSIT STOPS

At a minimum, transit stops should provide a quality place for passengers to sit. Higher levels of service can be achieved by providing comfortable bus shelters (i.e., shaded and sheltered), real-time service updates, and improved pedestrian facilities and crossings. If there is on street parking a bus bulb out can provide improved access for pedestrians. See NACTO image below.



²⁵ NACTO Transit Street Design Guide.

DEDICATED TRANSIT LANES

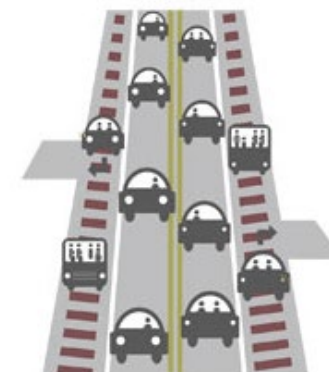
Although transit in general does not require dedicated transit lanes, dedicated space at intersections for queue jumps may be recommended as well as additional dedicated space at transit stops.

Dedicated transit lanes should be considered along major transit routes where congestion may increase headways and reduce transit level of service. Base signal timing and operational traffic improvements are essential to creating reliable timing that is competitive with driving. Generally, dedicated bus lanes are 10-12 feet wide depending on available right-of-way, pedestrian or bicycle needs, and if it is adjacent to the curb or the median, with 11 feet considered to be optimal.²⁵

Business Access Transit (BAT)

A BAT lane can also be used along corridors with frequent transit service and to provide increased transit reliability and improved access to businesses. The outside lane is used for transit and business access. In other words, vehicles and bicyclists can only use the lane for right turns into driveways and at intersections. Dashed lines indicate where to merge into the BAT lane.

²⁶ Bicycle Commuting and Facilities in Major U.S. Cities TRB 2003



Bus Rapid Transit

Bus rapid transit generally requires dedicated lanes, at grade boarding platforms, signal prioritization, and off-board fare collection. Routes can use median or curbside transit platforms. The recommended added width for transit platforms is 10 feet for each side platform and 30 feet for median or center platforms.²⁶

NACTO design guidelines underscore the benefits of center-running lanes to avoid conflicts with curbside traffic and improve reliability. A well-implemented BRT should achieve considerably faster service during rush hours. Transit signal priority should be implemented wherever feasible to reduce transit delays. Red colored paint accentuates the lane to deter drivers from using it.

5.4 BICYCLE AND TRAIL INFRASTRUCTURE

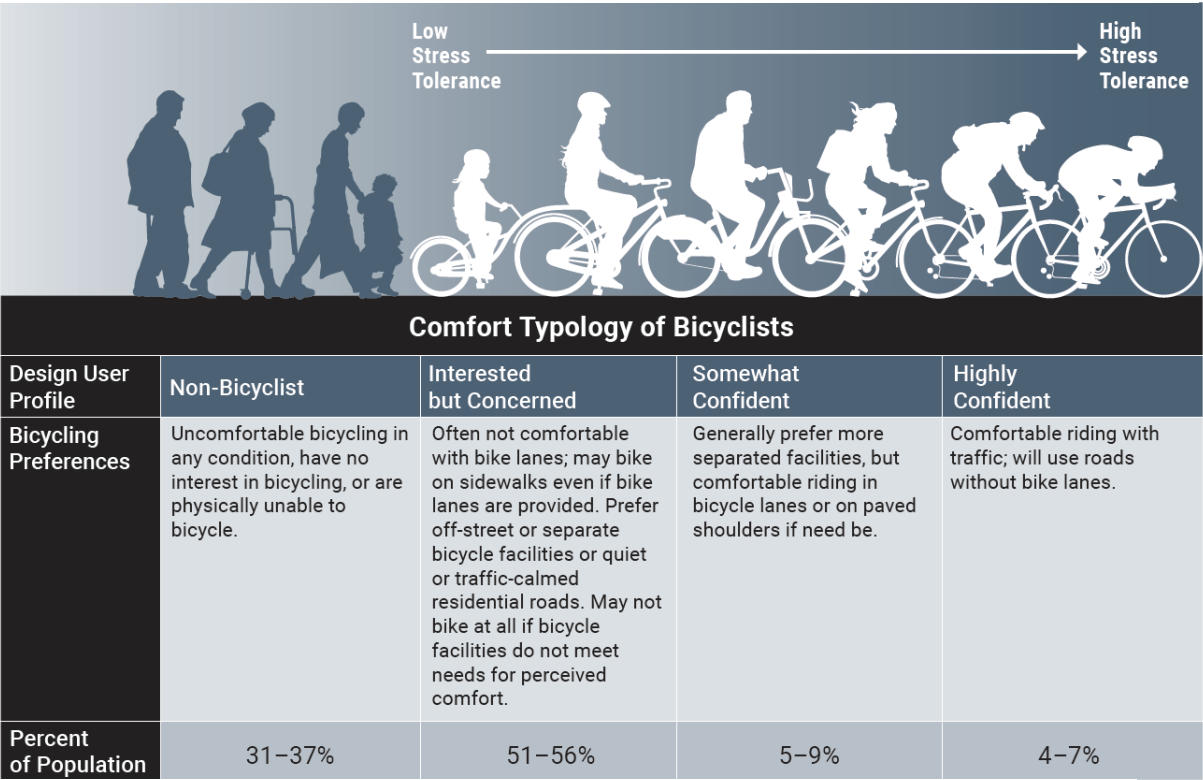
Providing safe and well-connected bicycling infrastructure is crucial to encouraging more bicycling. However, constructing bicycling infrastructure that is safe and accessible to bicyclists of all abilities is often challenging, especially within a constrained right-of-way.

Fortunately, AASHTO’s *Guide for the Development of Bicycling Facilities 2024 Edition* and NACTO’s *Urban Bicycling Design Guide 3rd Edition* provide excellent guidance on current best practices. According to these documents, more communities are demanding street designs that support all modes of travel, and bicyclist facilities that are separated from motor vehicle lanes.

Because of this, the AASHTO guide includes a now widespread acceptance of bikeway designs for people of all ages and abilities, which means more innovative options that are designed for the “Interested but Concerned” design user profile (see graphic adjacent).

Bicycle infrastructure creates benefits for both bicyclists and motorists: they provide lateral separation between cyclists and traffic, which increases bicyclist comfort and safety; they enable bicyclists to travel at comfortable speeds without worrying about traffic; and they provide more predictability to both users in regard to positioning and interaction.

Figure 5.3: Comfort Typology of Bicyclists



Source: AASHTO Guide for the Development of Bicycle Facilities, 2024

BICYCLE LANES

Bicycle lanes provide an exclusive travel lane for use within the roadway. They are generally included on minor arterials and collectors. AASHTO’s *Guide for the Development of Bicycle Facilities* recommends a standard bike lane width of 5 feet from the face of a curb or guard-rail. Buffered or protected lanes are preferred. The Guide recommends buffered bike lanes for roads with posted and operating speeds of 25 miles per hour or less and with fewer than 6,000 vehicles per day.

On roadways with high speeds, physical separation is recommended either through the use of protected bike lanes or separated multiuse paths. In addition, on streets with on-street parking, wider bike lanes may be appropriate to protect bicyclists from accidental “dooring.”

There is a direct correlation between the amount and quality of bicycling infrastructure that is built and the number of people who choose to bike.

PROTECTED BICYCLE LANES

In the case of regional principal arterials and community principal arterials, as well as in areas of higher bicycle traffic, high vehicle speeds or volumes, protected bicycle lanes may be appropriate and are encouraged.

Protected bicycle lanes increase the lateral separation between motorists and bicyclists by including a buffer/barrier area between the outside of the bicycle lane and the outside vehicle lane. This area is usually three feet and includes some type of physical barrier such as a divider bollard, curb, or other. Protected bike lanes can also be considered in areas with on-street parking where the bicycle lane is between the parked cars and the curb.



BICYCLE BOULEVARDS & SHARED LANE MARKING (SHARROWS)

Sharrows and Bicycle Boulevards are used for lower volume roadways and to provide better connectivity in the overall bikeway system.

Bicycle Boulevards

Bicycle boulevards are streets that are designated to prioritize bicycle traffic. They utilize treatments such as lower traffic speeds, traffic calming, unique signage, and pavement markings. Bicycle boulevards running parallel to major streets can increase the accessibility for riders who are less comfortable riding on major roadways.



They also provide a secondary option to create connected routes between primary bicycling routes and the full bicycling network.

Sharrows

Sharrows are on-street markings that indicate a shared lane between motorists and bicycles. They remind both users to expect the presence of bicyclists, without having to add an exclusive bike lane because it is not always feasible in a constrained right-of-way.



The latest AASHTO guidelines recommend sharrows only on very low volume and low speed roadways, preferring that other types of bicycle facilities are used in most situations.²⁷ For example, sharrows could be coupled with bicycle boulevards to create connecting, parallel routes for bicycle traffic away from higher volume roadways.

MULTIUSE PATHS

The region's multiuse paths are very popular, and several new trails are planned along regional principal arterials. However, there are many considerations in the development of trails alongside roadways. Trails along roadways (also known as sidepaths) involve significant safety considerations,²⁸ and they require a substantial amount of right-of-way. For example, trails are usually at least 10 feet wide and set back and therefore introduce more potential conflicts when there are multiple driveways or entrances along the roadway.



²⁷ AASHTO Guidebook for the Development of Bicycle Facilities, 5th Edition, 2024
LRTS GUIDE 2026

Trails may be substituted with protected bike lanes and sidewalks with buffers in areas where this configuration is vetted as a reasonable alternative. However, it is important to maintain comfort and safety when investigating options that require less space.

BIKEWAY INTERSECTION MARKINGS & SIGNAL DETECTION

Like crosswalks, bicycle intersection markings indicate to motorists the intended path (and implied presence) of cyclists. They also guide cyclists through intersections with additional conflict points or high levels of activity. This helps increase safety, especially where there is the potential conflict for cyclists and motorists making right hand turns.²⁹

Bike Boxes



Source: NACTO

²⁸ AASHTO Guide for the Development of Bicycle Facilities, 5-8

Installing bike boxes at intersections with high volumes of traffic is another option. These allow bicyclists to queue at the front of the intersection, between the crosswalk and cars, which increases their visibility to motorists. They can also facilitate safer left turns by bicyclists.³⁰

Signal Detection Benefits

Often bikeways are on roadways that do not have signal priority or that require a motor vehicle to be detected for the signal to change. Bicycle detection at signalized intersections enhances the safety and accommodation of bicyclists at intersections.

Bicyclist detection can also be used to improve the intersection's safety by providing adequate time for the bicyclist to cross the intersection.



²⁹ NACTO Urban Bikeway Design Guide, 50

³⁰ NACTO Urban Bikeway Design Guide, 50

5.5 PEDESTRIAN INFRASTRUCTURE

The following section describes pedestrian elements of the street, additional considerations for making walking safe, comfortable, and interesting. Pedestrian facility design must adhere to PROWAG standards (either for new infrastructure or retrofitted infrastructure) so that people of all abilities can safely and comfortably travel throughout their community.

PEDESTRIAN REALM ENHANCEMENTS

The section of the roadway extending from the edge of private property to the face of the curb is considered the pedestrian realm or sometimes called the streetside. Often considered non-essential or important, design elements should be seen as crucial parts of the public right-of-way as they can lead to increased pedestrian activity.



Source: NACTO



For urban and suburban land use typologies there are three basic elements for pedestrian realm: the sidewalk, the building shy-zone, and the landscape buffer.

Sidewalks

Sidewalks are an essential component to providing pedestrian access to businesses, residences, and public spaces. Sidewalks are part of transportation networks and should be included in all urban and suburban roads.

The City of Albuquerque's Development Process Manual requires 6-foot sidewalk widths. This is a comfortable width for two people to walk side by side.

Larger sidewalk widths should be included in areas of higher pedestrian traffic, such as activity centers, retail streets, active transit stops, and nearby schools.

Sidewalks should be designed in a way that helps to facilitate an even walking surface which allows for comfortable travel for pedestrians of all ages and abilities. For example, multiple curb cuts along a street should be consolidated whenever possible. This has the benefit of reducing the number of conflict points between entering and exiting vehicles and pedestrians while also creating a more even walking surface.

FHWA Proven Safety Countermeasure

Sidewalks or Walkways are a proven strategy to improve safety. The FHWA guidance has shown a 65-89 percent reduction in crashes involving pedestrians walking along roadways with sidewalks. In addition, there is a 71 percent reduction in crashes involving pedestrians walking along roadways in rural areas with paved shoulders.

Building Shy Zones

The building shy zone refers to area where buildings or walls adjoin the pedestrian clear sidewalk zone. The conceptual design matrices include two additional feet to the Pedestrian Realm width as a countermeasure to reduce conflicts from people exiting buildings and address the effect of people shying away from walls or other vertical structures, which effectively reduces the clear sidewalk area.

Activity centers and urban areas are most likely to have buildings that abut sidewalks. Walls alongside sidewalks are very common in the region. If buildings and walls are setback or if the clear sidewalk area abuts flat landscaping such as a lawn, then the extra two feet of width is not necessary.

Landscape Buffers

Buffers along sidewalks increase pedestrian comfort by increasing the lateral separation between pedestrians and fast-moving cars. These buffers can and preferably should be landscaped and include street trees, green infrastructure, street infrastructure such as lighting or utility poles, and transit stops.

They also facilitate level walking surfaces by providing space for driveway pads while allowing the sidewalk to remain level, therefore making a sidewalk safer and easier for people in wheelchairs and with strollers and walkers.



Wide Shoulders in Rural Areas

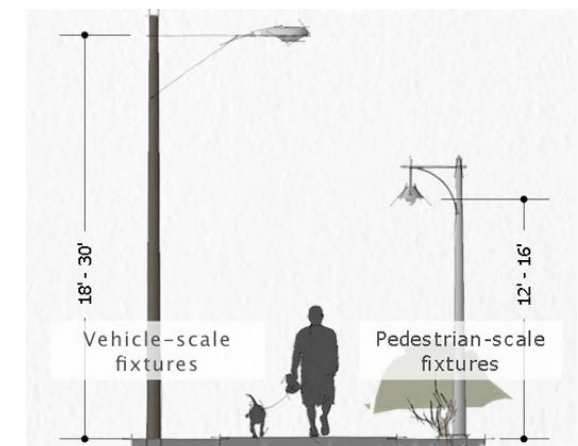
Although not usually a Pedestrian Realm element, a wide shoulder can be beneficial for bicyclists and pedestrians (as well as slow moving tractors) along low volume rural roads where there is not usually a sidewalk. In growing rural areas, sidewalks should be considered, or right-of-way can be preserved and set aside for future sidewalks, if development progresses.

FHWA Proven Safety Countermeasure

Lighting can reduce crashes up to 42 percent for nighttime injury pedestrian crashes at intersections, 33-38 percent for nighttime crashes at rural and urban intersection, and 28 percent for nighttime injury crashes on rural and urban highways. Pedestrian scale lighting and lighting at crosswalks should be prioritized over lighting for vehicles.

STREET FURNITURE AND LIGHTING

Including ample spaces for people to stop, sit, wait, and rest should be provided along streets with higher levels of pedestrian activity. Street furniture can encourage increased activity and interaction along the street, while increasing the comfort level of pedestrians. This in turn can encourage more walking. Walkway lighting adds to safety and visibility at night.



Source: Spokane, Washington

SAFE CROSSINGS

Mid-Block Crossings

Pedestrian fatalities occur more often at non-intersection locations. Midblock crossings are effective in areas with long block lengths, areas with a high level of pedestrian activity, and in places where many pedestrians currently cross due to efficiency.³¹ Midblock crossings are generally not necessary where block lengths are short or in areas with little pedestrian activity (unless that pedestrian activity has been deterred by the roadway design). Like intersection crossings, midblock crossings should emphasize slower speeds, visibility, and safety and should be made accessible to all. There is ample guidance on selected locations for mid-block crossings, which must be done with care. On some roadways, only marking a crosswalk is insufficient.³² However, there are additional elements that have been found to be effective when used in conjunction with a marked crosswalk.



FHWA Proven Safety Countermeasures

Studies show that a median with a marked crosswalk in urban and suburban areas can reduce pedestrian crashes by 46 percent, and a pedestrian refuge island can reduce pedestrian crashes by 56 percent.

Studies on RRFBs show that they can reduce pedestrian crashes by up to 47 percent, and that they can increase motorist yielding rates by up to 98 percent, but that this varies by speed limit, number of lanes, crossing distance, and time of day.

Studies on PHBs have shown that they can reduce pedestrian crashes by 55 percent, total crashes by 29 percent, and serious injury fatal crashes by 15 percent.

Pedestrian Crossing Islands or Refuges

Pedestrian crossing islands should be considered on multi-lane arterials and collectors with medians.³³ These islands allow pedestrians to cross the street in two stages and worry about one direction of traffic at a time. Medians can also be extended into the intersection to slow drivers making left turns.

Rectangular Rapid Flashing Beacon (RRFB)

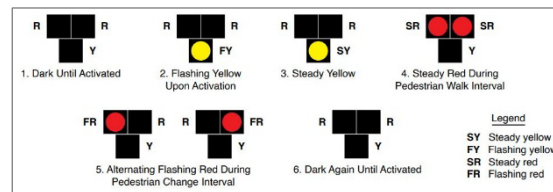
For uncontrolled marked crosswalks on roads with speed limits less than 40 miles per hour, RRFBs can improve safety for pedestrians crossing³⁴. RRFBs flash with an alternating high frequency when activated to improve visibility of



pedestrians crossing to drivers. They are best suited for low-volume, low-speed two-lane roads or four-lane roads paired with a refuge island.

Pedestrian Hybrid Beacons (PHB)

PHBs (also known as HAWK signals) are considered an intermediate option between a flashing beacon and a full pedestrian signal because they allocate right-of-way and require a complete stop by drivers, while also allowing them to proceed once the pedestrian has cleared their travel lane, reducing vehicle delay. PHBs have been shown to decrease the number of crashes at midblock crossings and can be considered on faster and multi-lane roadways.³⁵



Source: MUTCD 2023 Edition, Chapter 4J, FHWA

³¹ NACTO Urban Streets Design Guide, 115

³² Federal Highway Administration, Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations, 2005

³³ Federal Highway Administration Proven Safety Countermeasures <http://safety.fhwa.dot.gov/provencountermeasures/>

³⁴ "Rectangular Rapid Flash Beacon" in PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System. FHWA, (2013).

³⁵ Federal Highway Administration Proven Safety Countermeasures.

5.6 GREEN STREETS

During storm events, pedestrians, bicyclists, and people using transit are the first to encounter barriers and lose access to the streets and are the last to regain it³⁶. “Green street” design tools, which integrate stormwater control and management within the right-of-way, are a critical component of complete street design, ensuring the street remains usable and safe for all people during storm events, regardless of mode.

Green Streets Benefits

- Clean and reduce the amount of storm water runoff
- Replenish ground-water supplies
- Capture CO₂ and produce fresh clean air
- Shade, cool, and beautify streets
- Increase property values
- Support mental health and reduce violence
- Create wildlife habitat
- Conserve water and save money by using passive irrigation to water native vegetation and street trees

While a significant source of runoff, roads are also a part of the flood control system conveying stormwater along gutters to in-lets and the buried pipe network.



Curb cut and bioretention swale on Cherry Avenue, Tucson by Watershed Management Group

Quickly draining and moving stormwater away has been the design priority in the past, but this approach sends pollutants from the streets directly into the river and essentially wastes water that could be put to more beneficial use.

Green streets function to clean and conserve this precious resource, protecting the Rio Grande and our community.

This approach includes minimizing impervious surface coverage and maximizing the ability of landscaped areas to capture, slow, infiltrate, and filter runoff.

Integrating natural systems with the built environment, green streets leverage the freely provided “ecosystem services” of nature to produce multiple benefits.

³⁶ Colwell, Shanti, et al. “Complete Streets are Green Streets.” *Urban Street Stormwater Guide*. NACTO LRTS GUIDE 2026

National Association of City Transportation Officials, 2017, pp. 8-9

Flood Control

Although originally developed for climates in the Northwest and Northeast, the flood control and water conservation benefits of green infrastructure have led to increasing implementation in the Southwest. In our arid environment, seasonal monsoons combine with hardened soils to produce flash floods, and groundwater is in high demand, making Green Streets an even more beneficial application. Most green infrastructure is designed to supplement existing stormwater systems. Systems can be designed to handle rainfall events up to a specific threshold, then additional overflow water enters the existing storm-water system normally. Additional performance criteria can be used to ensure adequate drainage and infiltration occur, even after heavy rainfall.

Water Quality and MS₄ Permit

In 2014, the Environmental Protection Agency issued a watershed-based Municipal Separate Storm Sewer System (MS₄) Permit for stormwater in the Middle Rio Grande Watershed. This permit requires all new development and redevelopment projects that disturb greater than or equal to one-acre (including projects less than one acre that are part of a larger common plan of development or sale), to evaluate opportunities for the use of Green Infrastructure/Low Impact Development (GI/LID) techniques in site design.



Source: Arid LID Coalition

Guidelines for these practices have been developed for Bernalillo County and the City of Albuquerque, such as the Bernalillo County Water Conservation Guidelines and the Design Process Manual (DPM), in which several new standard details for Green Stormwater Infrastructure (GSI and LID) were created. These documents provide detailed background information, implementation, and maintenance guidance for construction of low impact development projects and water conservation techniques.

An abbreviated version of these documents with lots of useful, regionally specific information is the recent publication, *Bernalillo County Green Stormwater Infrastructure: Low Impact Design Strategies for Desert Communities*³⁷.

Arid LID Coalition

Another local resource, the multi-disciplinary professionals of the Arid LID Coalition work to provide guidance and education specific to designing GSI and LID interventions in our high desert environment. They also facilitate communication and collaboration and support high-quality demonstration and research projects.

They have produced an online map and book showcasing a growing collection of successful regional examples (see aridlidcoalition.org).

DESIGN ELEMENTS OF GREEN STREETS

When building a new street or streets, the layout and street network should be planned to respect the existing hydrologic functions of the land (preserving wetlands, buffers, high-permeability soil, etc.) and to minimize the impervious surface area.

If retrofitting or redeveloping a street, opportunities to eliminate unnecessary impervious areas should be explored.

³⁷ Prepared for Bernalillo County by Weston Solutions Inc & Sites Southwest, 2017. <https://www.bernco.gov>
LRTS GUIDE 2026

CURB CUT DESIGN

Curb design alternatives can be used to channel stormwater into bioretention basins, infiltration planters, rain gardens, stormwater bump outs, and street trees.³⁸ Green Street infrastructure can often be integrated with existing traffic calming devices and landscape buffers.

The width and number of inlets determine the stormwater inflow and outflow capacity. Inlets should be wide enough to accommodate the expected stormwater volume, but their minimum size is usually related to the type of maintenance equipment that will be used to clean the curb cut (for example, the minimum width of a shovel). Inlets are typically 8–12 inches wide, but inlets up to 24 inches wide are not uncommon³⁹.

The accumulation of garbage, debris, or sediment at the inlet will prevent runoff from entering the bioretention cell, eliminating its value for flood prevention and runoff capture. Inlets should be designed to resist blockage and simplify maintenance. One example is inclusion of a designated pre-settling zone (such as at the inlet for the first cell in a series) for collecting debris and sediment and allowing cleaning efforts to focus on a small space within each project.

BIORETENTION SWALES

Swales are open, vegetated channels or depressions with sloped sides, designed to accept sheet flow runoff and convey it in broad, shallow flows which allow it to infiltrate the soil and be treated as it moves downstream. The intent of swales is to reduce stormwater volume, improve water quality through vegetative and soil filtration, and reduce flow velocities by increasing channel roughness.

More runoff can be detained as the flat bottom area is widened, or as the side slopes are made steeper. A minimum 12-inch bottom width is generally necessary but may vary depending upon the bottom slope of the cell and the available space. In some cases, a minimum average bottom width of 18 inches might be a more appropriate criterion.⁴⁰



Source: Tucson, Arizona

Swales are most applicable in lower density or lower traffic contexts, as they can have relatively large footprints and little or no vertical separation from the sidewalk and street. Swales are most commonly able to be implemented in areas where more space is available within the planting strip or a curb bulb-out along the street, such as in residential areas, along shared-use paths, medians, roundabouts, or other unused right-of-way areas. Beyond the simplest roadside grassed form, additional benefits can be attained through the addition of amended or bioretention soils, gravel storage areas, underdrains, weirs, and dense, diverse vegetation.

Swales can support a wide range of plantings to increase beneficial habitat and green scape. Swales also provide flexibility for planting a variety of street trees on the bottom, on side slopes, or at raised berms between cells.

Plant Species List

Plants are a common concern of municipal staff, whether it is maintenance, salt tolerance, or plant height for safety and security. Cities actively implementing LID practices in public spaces maintain lists of plants which fit the vegetated stormwater management practice niche. These are plants that flourish in the regional climate conditions, are adapted to periodic flooding, are low maintenance, and, if in cold climates, salt tolerant.

³⁸ MacAdam, James. (2010). Green Infrastructure for Southwestern Neighborhoods

³⁹ Colwell, Shanti, et al. "Inlet Design." *Urban Street Stormwater Guide*. NACTO National Association of City Transportation Officials, 2017, p. 106

⁴⁰ Colwell, Shanti, et al. "Bioretention Swale." *Urban Street Stormwater Guide*. NACTO National Association of City Transportation Officials, 2017, pp. 82-83

A municipal plant list should be kept and periodically updated based on maintenance experience, and vegetation health surveys. Most often these plants are natives, but some-times an approved non-native will best fit necessary criteria.

PERMEABLE PAVEMENTS

Permeable pavement comes in four forms: permeable concrete, permeable asphalt, interlocking concrete pavers, and grid pavers. Permeable concrete and asphalt are like their impervious counterparts but are open graded, or have reduced fines, and typically have a special binder added. Methods for pouring, setting, and curing permeable pavements also differ.

Concrete and Grid Pavers

These are modular permeable pavement systems, where concrete pavers are installed with gaps between them that allow water to pass through to the base. Grid pavers are typically a durable plastic matrix that can be filled with gravel or vegetation.⁴¹ All such systems have an aggregate base in common which provides structural support, runoff storage, and pollutant removal through filtering and absorption.

Aside from a somewhat rougher, unfinished surface, permeable concrete and asphalt look very similar to their impervious versions. Permeable concrete and asphalt and certain pavers are also

ADA compliant. A well-designed permeable pavement structure will always drain and never freeze solid.



STREET TREES AND TREE BOXES

From reducing the urban heat island effect and reducing stormwater runoff to improving the urban aesthetic and air quality, street trees provide many benefits. Street trees are even good for the economy. Studies have shown customers are willing to spend 9-12 percent more in shops on streets lined with trees than on those without trees.⁴²

Some research suggests that trees may also improve driving safety. One study found a 46 percent decrease in crash rates across urban arterial and highway sites after landscape improvements were installed.⁴³

Root Space for Trees

Unfortunately, street trees are often planted in inhospitable environments, without enough space to grow to their full potential. The soil

Another study found that placing trees and planters in urban arterial roadsides reduced mid-block crashes by five percent to 20 percent.

around street trees is often compacted during the construction of paved surfaces and minimized as underground utilities encroach on root space.

If tree roots are deprived of air and water this way, their growth will be stunted, their health will decline, and their expected life span will be cut short. By providing adequate soil volume and uncompacted soil mixture, the benefits of a mature tree, such as shade and air quality improvements, are reached sooner than for a tree with confined root space.



Source: Southwest Region Planning Commission

⁴¹ Lukes, Robb, and Christopher Kloss. "Managing Wet Weather with Green Infrastructure: Municipal Handbook, Green Streets." *EPA.gov*. Low Impact Development Center, Dec. 2008. Web.

⁴² Wolf, K.L. 2005. Business District Streetscapes, Trees and Consumer Response. *Journal of Forestry* 103, 8:396-400.

⁴³ Naderi, J.R. 2003. Landscape Design in the Clear Zone: Effect of Landscape Variables on Pedestrian Health and Driver Safety. *Transportation Research Record* 1851:119-130

To obtain a healthy soil volume, trees should be provided larger tree boxes, with structural soils, root paths, or “silva cells” installed under paved areas to effectively expand root zones.

Silva cells are plastic milk crate-like frames fit together to act as a supporting structure for a sidewalk while leaving room for uncompacted soil and roots inside the frame. Root paths can also be used to increase available tree root volume by connecting a smaller root space with a larger subsurface volume nearby. A tunnel-like system extends the growing area underneath the sidewalk by connecting to open space on the other side.



Source: Santa Clara Valley Urban Runoff Pollution Prevention Program and Southwest Regional Planning Commission.

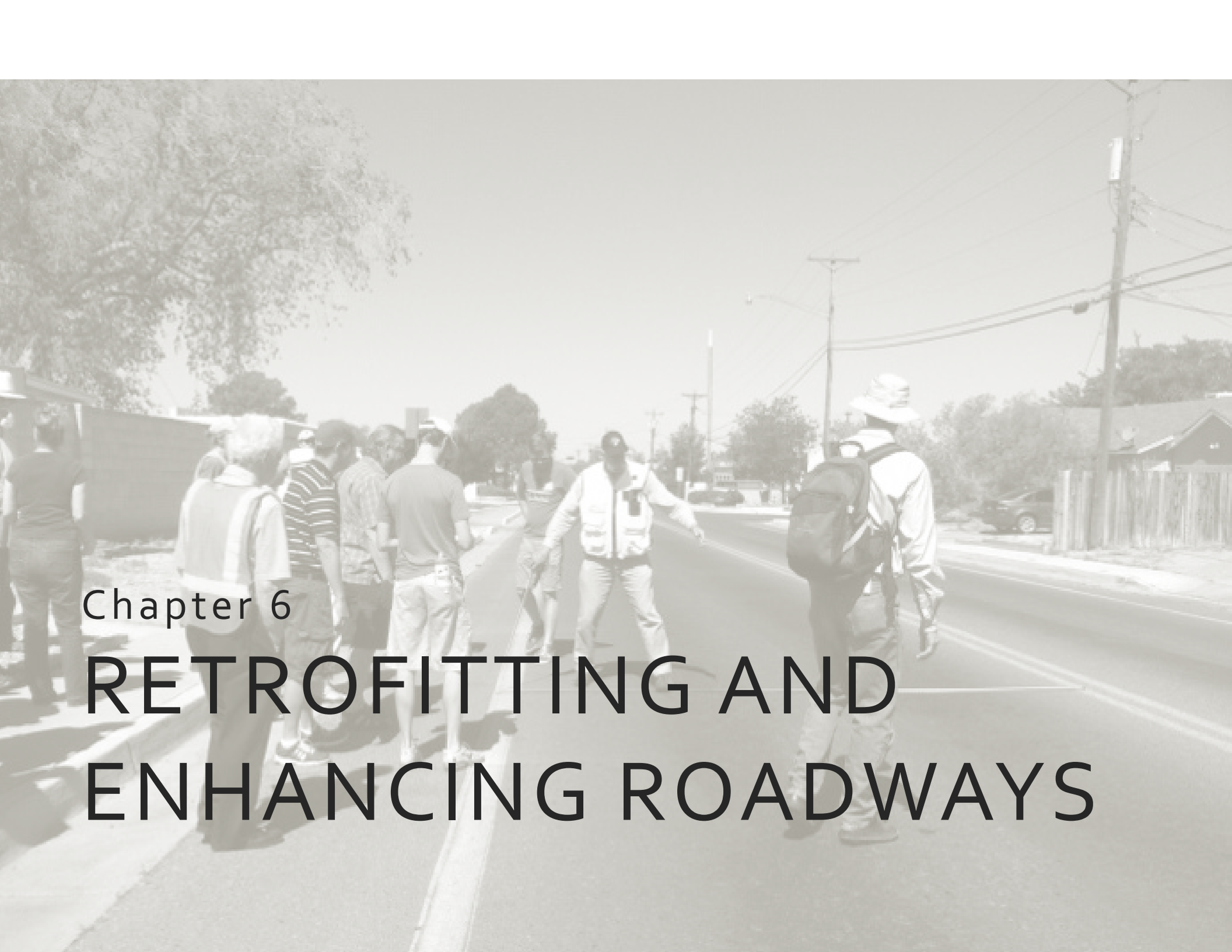
Permeable Pavement Sidewalks

Permeable pavement sidewalks are another enhancement to the root space. They provide moisture and air to roots under sidewalks. Soils under permeable pavements can still become compacted, however; so structural soils are a good companion tree planting practice. When planting a tree in structural soils an adequate tree root volume is excavated and filled with a mix of stone and soil that provides void space for healthy roots and allows for sidewalks, plazas, or other paved surfaces to be constructed over them.

More detailed examples of green street design elements can be found in the previously mentioned guide commissioned for Bernalillo County, and well as in the resources section of the Arid LID Coalition website.



Source: Landscape Architecture Foundation



Chapter 6

RETROFITTING AND ENHANCING ROADWAYS

Chapter 6

Retrofitting and Enhancing Roadways

Sometimes retrofit projects are controversial because they involve a change in the status quo and can impact existing travel patterns. Many people may have a hard time envisioning a new configuration for the street, especially if they believe it will increase their travel times or contribute to congestion. However, projects from around the country and locally have shown that street retrofits, including road diets or other roadway reconfigurations, can lead to noteworthy improvements including addressing identified safety concerns.⁴⁴ Choosing designs that balance the multimodal needs of roadway users is paramount to ensuring street retrofits are successful. Funding transportation projects that will lead to the most benefit for investment dollars spent means thinking strategically and boldly about where and how improvements are implemented.

This chapter contains recommendations for how to evaluate a variety of reconfiguration options when doing a project on an existing roadway, often with limited right-of-way.

Opportunities for road diets are identified to support the development of complete multimodal streets and improve safety. Therefore, this chapter also highlights the importance of the High Fatal and Injury Network (HFIN) that

the MPO developed and updates to identify corridors and intersection locations with highest fatalities and injuries in the region.

This chapter culminates in an example for evaluating roadway enhancements, exploring different types of before and after studies, and the value of testing designs through demonstration projects.

The combination of the Road Diet Candidates and the HFIN maps is a planning level tool and a powerful way to visualize desirable locations for future projects on existing roadways, where safety improvements can have the greatest benefit.

⁴⁴ *Rethinking Streets*, University of Oregon
LRTS GUIDE 2026

6.1 EVALUATING RETROFIT PROJECTS

Beyond pavement maintenance, the impetus for retrofitting or enhancing a roadway might be because of high crash risk, the need for speed management, or to improve multimodal facilities. Projects, for example, are often undertaken for the purpose of providing room for transit, parking, bicycle facilities, and providing more protection for pedestrians. An agency might also want to retrofit or enhance a roadway to spur or support infill development or just enhance the built environment in an area of need. This chapter expands upon roadway reconfigurations like road diets and Business Access Transit lanes.

Retrofitting a roadway can take many forms from adding parking or landscaping, to restriping a roadway, to a more involved reconstruction where sidewalks are widened. Some items already discussed include traffic calming applications and parking arrangements.

Inherent Trade-offs

In many cases, retrofit projects have inherent tradeoffs, and redesigning an existing roadway to accommodate all modes can be challenging. Allocating space for new users can mean reducing space for others. Fortunately, quality designs can lead to an overall improvement in roadway performance while maintaining vehicle throughput.⁴⁵



4th Street Improvements

Determining trade-offs require prioritizing the needs of various users and evaluating based on performance objectives and measures of success such as service metrics, crash statistics, and connectivity. Other evaluation tools, such as walk audits, are also used to determine how well the street currently meets the needs of users with different abilities and for all modes of travel.

Analyses may find that some roads include too many lanes, could have lower posted speeds, or do not support existing or future land uses. Roadway design choices have a direct effect on the safety of specific roadway users that should be balanced with the goals for the overall street network.

Evaluating Alternative Designs

Before settling on a final conceptual roadway design, alternatives should be evaluated to see how well each meets specific performance objectives. One way to review alternatives is to develop a matrix to compare the strengths and weaknesses of different roadway design alternatives. This can include an appraisal of expected performance for various modes or can be tied to projected performance measures such as multimodal level of service or level of traffic stress. To work through these tradeoffs and demonstrate how performance measures can be used, an example for San Pedro Road Diet is shown on the following page.

⁴⁵ ITE, Planning Urban Roadway Systems, 38
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SAN PEDRO ROAD DIET

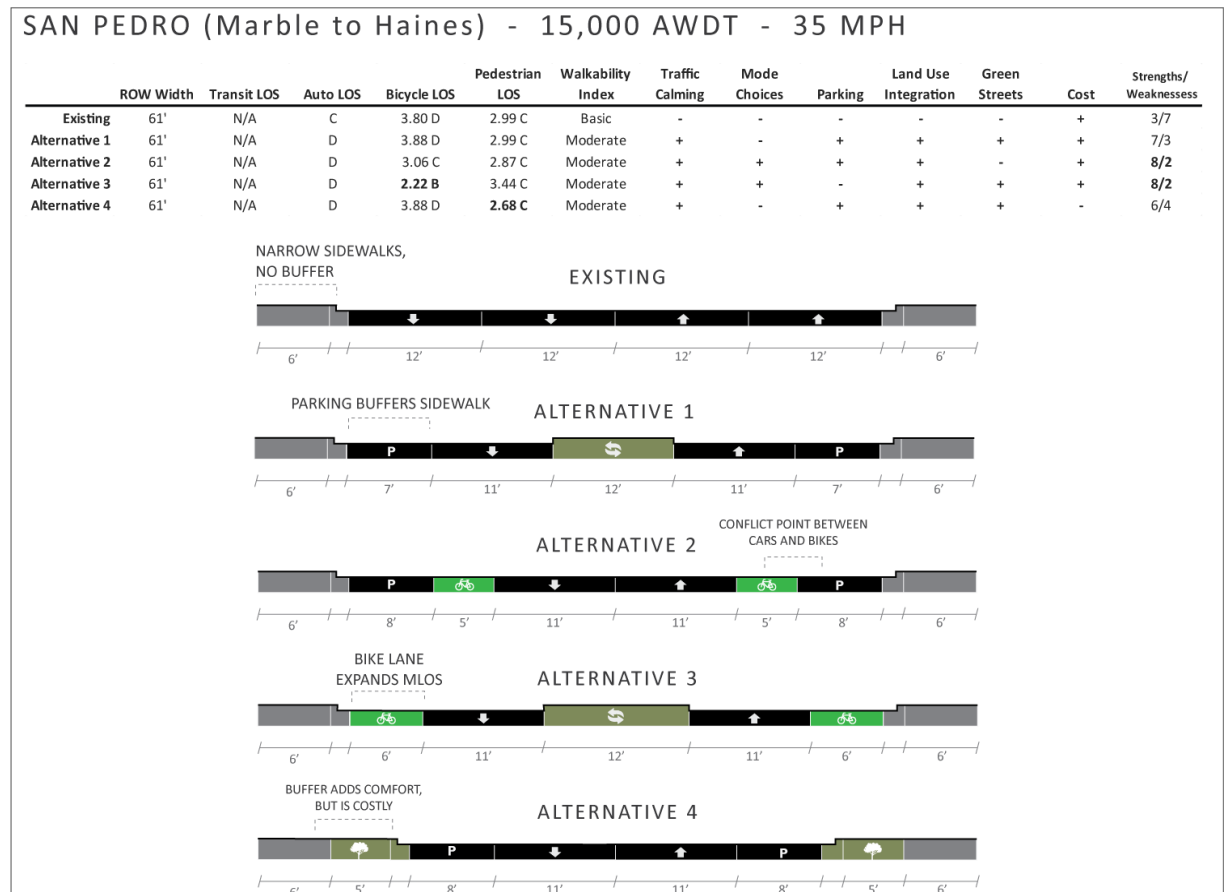
San Pedro, a minor arterial with 15,000 AWDT, was evaluated as a candidate for a road diet. In this scenario, the roadway was reduced from four through lanes to two lanes and a center turn lane from Lomas to just south of I-40. This roadway reconstruction project creates opportunities to improve traffic flows (by including a central turn lane), expand mode choices, include on-street parking, and introduce traffic calming measures.

1. **Existing:** 4 travel lanes, no median, 6 ft side-walks. This configuration did not provide multi-modal options.
2. **Alternative 1:** 2 travel lanes, central turn lane and median, on-street parking, lower speeds. This option adds on-street parking, which will help with traffic calming and improve access to businesses. It may also improve traffic flow with the introduction of a dedicated left turn lane.
3. **Alternative 2:** 2 travel lanes, no median, on-street parking, bike lane. This configuration adds a bicycle lane and parking to the street. Although this option provides the most multi-modal options, it also introduces potential conflicts between users. Not including a dedicated left turn lane may affect traffic flow.

4. **Alternative 3:** 2 travel lanes, central turn lane and median, bike lane. This option prioritizes biking over on-street parking. It may also improve traffic flow with the introduction of a dedicated left turn lane.

5. **Alternative 4:** 2 travel lanes, no median, on-street parking, and sidewalk buffers with green infrastructure. Expands sidewalk buffers with green infrastructure to increase storm water runoff capture. Provides the best pedestrian improvements but not including a dedicated left turn lane may affect traffic flow.

Figure 5.4: San Pedro Road Diet Alternatives



6.2 ROAD DIETS

A road diet is one way to retrofit a roadway that has shown to have significant safety benefits. It is essentially a reallocation of roadway space for modes other than the automobile. Road diets are usually achieved by restriping an existing roadway to improve safety for everyone and provide infrastructure for more vulnerable road users but can also include new construction elements.

Typical Road Diet Configuration

The most common type of road diet takes an undivided four-lane roadway and reconfigures it into a three-lane roadway, with one travel lane in each direction and a two-way left turn lane in the center. This reconfiguration decreases conflict points and provides space for bicycle lanes and/or parking spaces in each direction of travel or wider sidewalks. The bike and/or parking lane also provides pedestrians with a traffic buffer increasing their comfort on the road.

State and Federal Guidance

Road Diet guidance has been published to support local governments in successfully implementing road diets. In 2014, the FHWA released its *Road Diet Informational Guide*, followed by the New Mexico Department of Transportation's *Road Diet Guide* in 2016.

This guidance and interest spurred MRMPO to further investigate how this strategy could be used in the AMPA, and as a result the MPO developed their Road Diet Candidates map discussed in more detail later in this chapter.

Other benefits of road diets include an increase in bicycle and pedestrian traffic. This is because road diets allocate space for biking and walking and slow vehicle speeds, making biking and walking more inviting. The addition of bike lanes and crossing islands also increase safety for bicyclists and pedestrians.

FHWA Proven Safety Countermeasure

According to the USDOT, road diets can reduce traffic crashes to a very large degree. In small urban areas with populations around 17,000 and roadways with traffic volumes up to 12,000 (daily volume), post-road-diet crashes dropped about 47%. In larger metropolitan areas with populations around 269,000 and roadways with traffic up to 24,000 (daily volume), the crash reduction was roughly 19 percent. The combined estimate from all the best studies predicts that accidents will decline an average of 29 percent after a four-to-three-lane road diet.

Vehicular Speeds and Volumes

Post-road-diet vehicle speeds can decline. This is especially true for speeders going more than five miles per hour over the limit. Traffic volumes, meanwhile, typically stay even in post-road diet situations: some drivers are diverted to other parts of the street network.

Road Diets and Bike Facilities

Albuquerque has more than 400 miles of bikeways and trails, but many do not connect. On-street bicycle lanes often end abruptly, forcing bicyclists to mix with vehicular traffic. This creates dangerous conditions and discourages people on bike from using them and makes driving uncomfortable as well. Investing in connected and protected or separated bicycling infrastructure increases people's comfort level with this mode of transportation. A national survey of the largest metros found that about 51 percent of participants are interested in biking, but not confident enough to do so⁴⁶.

Road Diet Costs

The types of changes involved in road diets generally are lower when compared to other transportation infrastructure investments. Furthermore, they can be timed with regular road maintenance and re-paving.

⁴⁶ Jennifer Dill and Nathan McNeil, "Revisiting the Four Types of Cyclists: Findings from a National Survey," LRTS GUIDE 2026

Transportation Research Record: Journal of the Transportation Research Board, 2587: 90-99, 2016.

SELECTING ROAD DIET CANDIDATES

One reason why communities may be hesitant to implement road diets is that caution is suggested for road diets along corridors that carry more than 20,000 cars a day. But even though some major urban roads can't slim down overnight without creating traffic problems, road diets have been successful in the United States on roadways with over 30,000 daily traffic trips. **It's critical to review each potential road diet candidate and not deploy a one-size fits all application.**

Road Diet Candidates Map

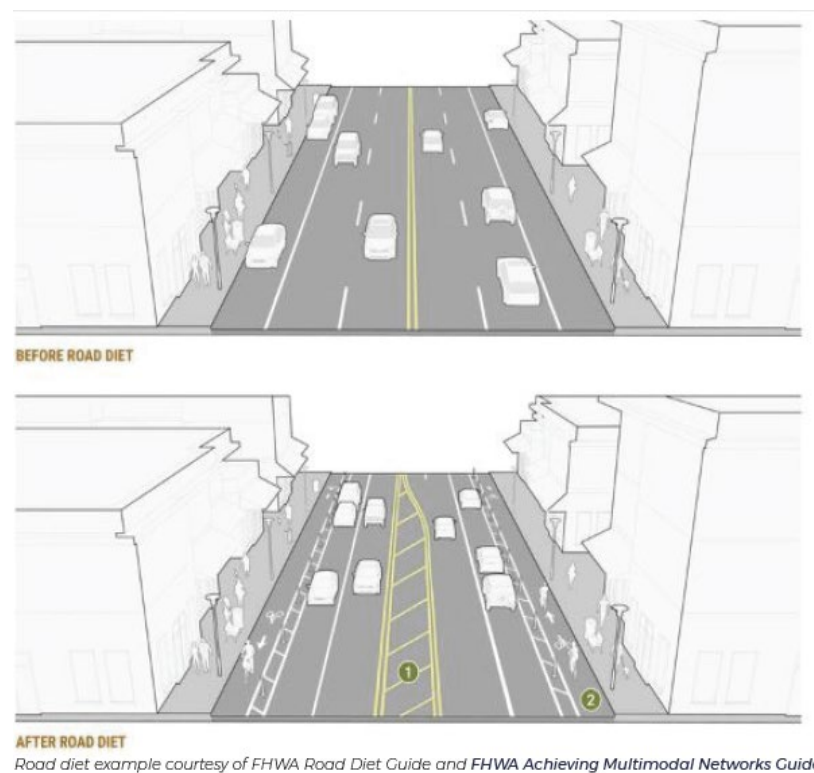
The preliminary determination of good road diet candidates is based on a data driven process that considers traffic volumes and number of lanes on all major roads in the region. This process is used to develop MRMPO's Road Diet Candidates map that illustrates locations that may be ripe for roadway reconfigurations.

This does not mean that a road diet should absolutely be implemented but rather that it is a good location to further investigate for reconfiguration. In some cases, there may be opportunities for lane widths to be narrowed as not every reconfiguration has to include decreasing the number of lanes.

Average weekday traffic (AWDT) is the first step in determining locations for possible road diets. The Federal Highway Administration (FHWA) suggests that roadways with 20,000 vehicles per day or less are good candidates for road diets from four (4) lanes to three (3) lanes.

Agencies across the country have different thresholds that they find acceptable. MRMPO adopted the FHWA suggestion of 20,000 Average Weekday Traffic (AWDT) as the upper limit for four-to-three-lane changes.

The FHWA does not have guidance on AWDT thresholds for converting six-lane or larger roadways to five-lanes (two lanes in each direction and a center turn lane). However, analysis done in the region found that many four lane roads in the region support over 35,000 vehicles a day, and many are also underused. This means that roadways with more than 4 lanes and daily traffic under 35,000 vehicles a day may be suitable for reconfigurations from, for example, six-to-five-lanes or five-to-four-lanes.



If a roadway is both suitable for retrofitting with a Road Diet and has a high number of fatal and injury crashes it should be considered a higher priority for reconstruction or restriping.

Other considerations are the land use context, whether there is on-street parking, heavy transit use along the roadway, or if the project might fill a gap in the bike network. All these considerations will affect whether a road diet is suitable or not.

6.3 SAFETY PRIORITIES

There are a variety of ways to evaluate crash statistics along a roadway to better understand where crashes occur and what type of crashes are most common. The most appropriate safety design strategies can be employed to improve the roadway conditions based on the frequency and types of crashes. MRMPO analyzes crash data received from the NMDOT that is geocoded by the University of New Mexico Geospatial and Populations Studies department. Crash data can be investigated based on not just the location but also the type of vehicular movement, what may have contributed to the crash such as speeding, and whether a bicyclist or pedestrian was involved.

HIGH FATAL AND INJURY NETWORK (HFIN)

The High Fatal and Injury Network (HFIN) produced by the MRMPO is a map of the most dangerous corridors and intersections in the region based on the latest five years of available crash data. The HFIN looks at different modes of travel when identifying the most dangerous streets and intersections and concentrates efforts on the right locations ensuring we get the biggest bang for our “safety buck.” MRMPO developed this network analysis as a planning tool in 2018 and updates the HFIN as new crash data become available.

The high crash rates along these roadways and at intersections point to a need to understand potential design or operating issues that have contributed to lower user safety.

Vision Zero

Following in the footsteps of Vision Zero efforts, this type of crash analysis and map visualization has become a common way throughout the United States to present crash data to help prioritize locations that contain the most fatal and injury crashes. The HFIN analysis suggests locations that warrant further investigation based on a high amount of fatal and injury crashes. Engineering review and analysis is needed to determine if the location is appropriate for specific types of safety improvements.

For roadways, the HFIN features a per mile calculation for fatalities and injuries using the latest five years of available crash data. The roadway network consists of major roads (collectors and arterials). Local roads and Interstates are not included in the analysis.

For intersections, the HFIN features a rate using five years of crash data and a five-year average of approaching traffic volumes. The intersections include those where two major roadways intersect. An average rate for both intersections and roadways are calculated for the region.

The HFIN is updated every one to two years, which provides insight into changes over time. Hence, the HFIN helps identify recurring patterns and can indicate why crashes are happening. Having some insight into the location and mode of crash can also be insightful for education and enforcement strategies. However, a deeper dive into characteristics of the roadway and the crash data reports is usually necessary for selecting the most beneficial safety strategies.

Targeted Approach

The following statistics make it clear as to why a targeted approach of improving the most dangerous roadways and intersections is recommended and the HFIN is one of the most strategic tools to enhance roadway safety in the region.

The HFIN roadway segments with a score two times the regional mean or higher make up only 2.5 percent of the major roadway network but contain 26 percent of the fatalities and 40 percent of the injury crashes.

The HFIN roadway segments with a score simply above the regional mean make up only 8 percent of the major roadways but contain 47 percent of the fatal crashes and 64 percent of the injury crashes.

6.4 EVALUATING ROADWAY ENHANCEMENTS

When applying designs that are new to the region, particularly large projects, it is helpful to track project performance to illustrate what kind of impact the changes have on factors such as operating speeds and crash outcomes.

Therefore, before an agency puts additional money into new designs, post project evaluations can show the impacts that support or don't support subsequent similar projects, and/or how well the project was designed for the context in the first place. This kind of evaluation can help refine a project's design or be used to inform future projects.

There are other policy and communication benefits gained from post-evaluation such as:

- Pinpoint specific areas for improvement
- Communicate impacts to the public and decision makers
- Share findings with transportation professionals in the region to reduce doubling efforts
- Support the use of design treatments in other locations with similar context
- Add to continued research on proven safety countermeasures
- Refine and standardize the design process for future projects

BEFORE AND AFTER STUDIES

Tracking performances measures before and after a project provides the best insight to inform future policies and projects. Following is a list of specific types of evaluations recommended by Arlington Virginia's Vision Zero Action Plan, 2021.

Table 6.1: Types of Before and After Studies

Location-Based Before/After Studies
Assessment of crash rates before/after quick-build improvements or other hot spot improvements were installed at a location.
Pilot Safety Project Before/After Studies
Evaluation of the impact that a pilot safety project had on addressing the identified safety issue.
Speed Management Before/After Studies
Assessment of before/after speeds along corridors with recent speed management treatments.
High-Injury Network Before/After Studies
Assessment of before/after crash data and action item completion on corridors that underwent High-Injury Network Safety Audits.

These types of evaluations are incredibly valuable for communicating benefits to the public and decision makers, and for tailoring future projects to the region to better ensure their success.

CENTRAL AVENUE BRT EVALUATION

The New Mexico Department of Transportation (NMDOT) with support from the University of New Mexico (UNM) did a follow up evaluation of the Bus Rapid Transit (BRT) on Central Avenue focused on what sort of changes in safety occurred with respect to motor vehicle speeds and crashes. The BRT project is essentially a road diet and includes other safety countermeasures such as a HAWK signal.

The study found that following the implementation of BRT, vehicle operating speeds were reduced by 11.5 percent compared to 5.8 percent on non-BRT control segments. Serious and fatal injuries were reduced by 65.2 percent on BRT segments compared to 18.6 percent on non-BRT control segments.

For pedestrians, the increase in fatalities and injuries was 21 percent lower than on the controlled segments. These reductions were consistent across signalized and unsignalized intersections, and midblock locations.

The HAWK signal did not show significant improvements, but pedestrians were more likely to cross at that location. There are some concerns about the HAWK signal not being used properly or perhaps being used in a different context.⁴⁷

General conclusions are that physical changes that incorporate traffic calming and reduce conflicts to an entire corridor in the form of a road diet and more multimodal facilities can improve traffic safety outcomes for both pedestrians and motor vehicle occupants.



⁴⁷ Countermeasures to Improve Pedestrian Safety on Arterials: Lessons Learned from Central Avenue in Albuquerque, LRTS GUIDE 2026

2024, NMDOT Research Bureau, Nicholas N. Ferenchak, PhD, PE, University of New Mexico

DEMONSTRATION PROJECTS

Demonstration projects allow an agency to test design concepts with temporary applications. This method supports the application of new designs being done right the first time by allowing for more time to test the concept in a particular location or context.

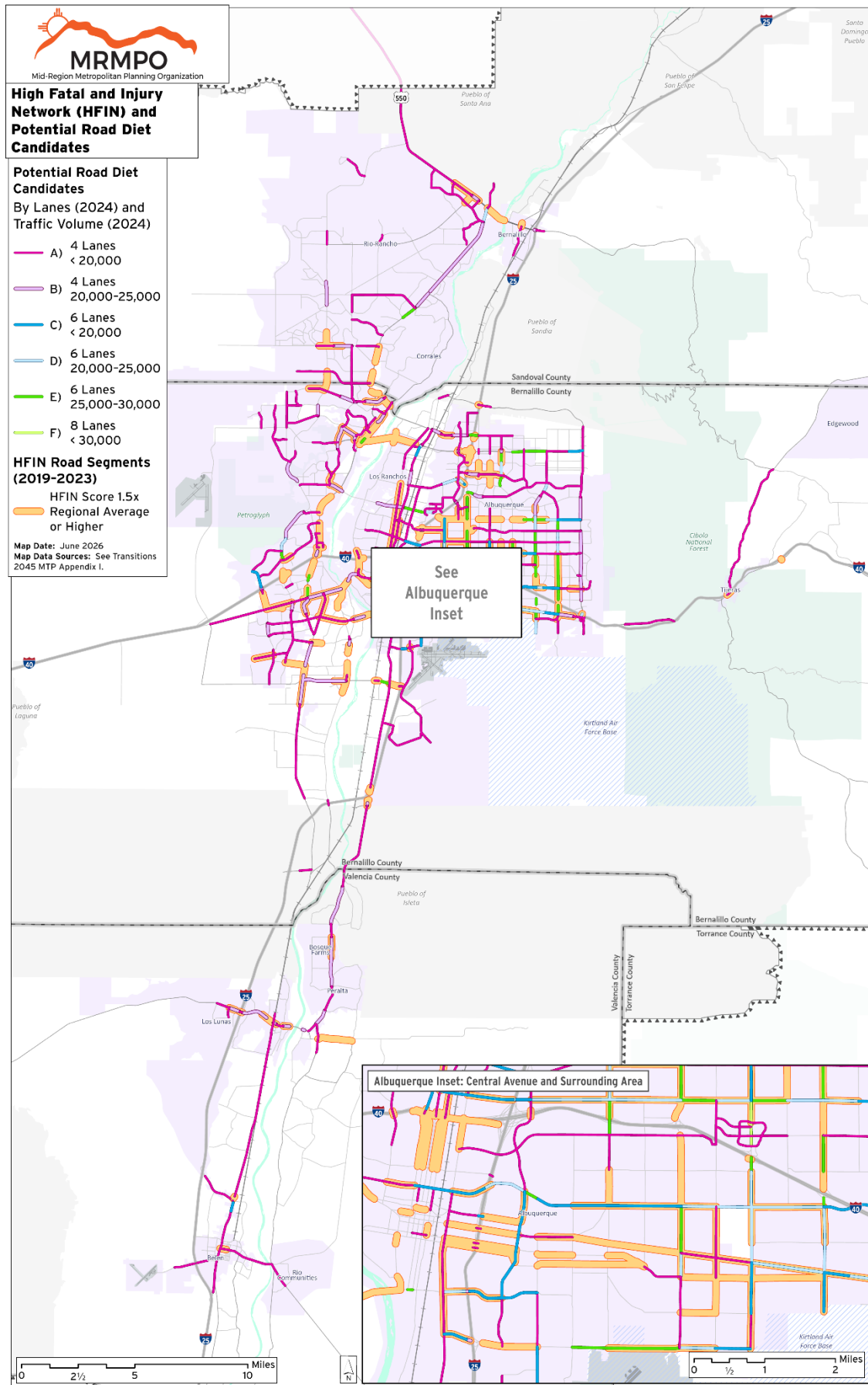
Funding is available from the Safe Systems Approach federal initiative to test the feasibility of these applications. Safe Streets and Roads For All (SS4A) grants are available for roadway configurations like road diets or curb extensions. However, projects can simply include items like paint, plastic delineator posts, water-filled plastic barriers, planters, traffic cones, and temporary speed hump/bumps.

The grants are intended to test project and strategy approaches, so studies and programs are also included such as setting city-wide speed limits or community outreach. The FHWA does require before and after measures and significant project management.

These types of projects can be implemented for relatively low cost by member agencies to ensure the ultimate long-term construction of roadway designs in the appropriate locations and pave the way for learning from them for future projects.



Source: Transportation for America



APPENDIX

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COMPLETE STREETS CHECKLIST

To help facilitate an improved transportation planning process, MRMPo has developed the *Complete Streets Checklist* to provide a baseline analysis of existing conditions, constraints, and opportunities along existing roadways. This checklist (1) establishes a baseline inventory of existing conditions along the roadway such as traffic counts and existing cross-sections; (2) identifies possible Complete Streets considerations and priorities; (3) identifies possible constraints; and (4) identifies possible design opportunities.

The goal is that the checklist can be used to generate clear conceptual design priorities that can lead to the best overall multimodal configuration.⁴⁸ The checklist includes the following sections.

EXISTING CONDITIONS

The checklist includes basic project information, such as project name, location, responsible agency, goals, and development phases. This section includes existing conditions, such as land use context, transportation context, future travel demand projections, the roadway's role and existing levels of service. The checklist includes a section where existing cross section elements and traffic counts can be recorded. The intent is to collect a baseline inventory of existing data and identify the roadway's regional context.

PRIORITY CONSIDERATIONS

To help facilitate roadway projects⁴⁹ that will provide the most benefits, this section outlines various priority areas that may be important to consider. Each priority consideration addresses one component of Complete Streets. By selecting initial considerations to explore further, MRMPo and member agencies can begin to identify issues along the roadway such as pedestrian safety, walkability, and congestion.

1. **Expanded Choices and Community Involvement:** Would a reconfigured street have the opportunity to expand mode choices available to residents? Would the addition of bike lanes, or transit service be beneficial to the neighborhood? Would the project improve accessibility to jobs, especially for low income residents? Who will be involved in the

design process and whose interests should be considered? What are some ways to increase involvement in the design process?

2. **Land Use Integration:** Does the street support a diverse range of land uses, activities, and users? Does the street run through an existing activity center? If so, does the street support the activity center's users? Would a reconfigured roadway potentially catalyze increased business investment along the street? Is community involvement a priority?
3. **Congestion and Efficiency:** Is addressing congestion a priority? Is the efficiency of the roadway a concern?
4. **Community Health:** Is improving community health outcomes a priority? Does the design encourage active transportation options? Does the project address environmental justice issues in the community, for example, gaps in the neighborhood's sidewalk, transit, or bicycle networks?
5. **Parking:** Is expanded on-street parking a priority?
6. **Walkability:** Does the street encourage and enable walkability? Can pedestrian needs be better accommodated with expanded sidewalks, safer crossings, landscape buffers, street trees, traffic calming, or other amenities?
7. **Bicycling:** Does the street enable safe bicycling? Are there gaps in the current bicycling infrastructure, such as impassible intersections or other barriers that could be fixed?
8. **Transit:** Does the street support high quality transit? For example, are comfortable transit shelters provided within walking distance of pedestrian catchment areas?
9. **Traffic Calming:** Is traffic safety an issue? How many crashes occur along the street? Are crashes attributable to design features of the street such as high speeds, low visibility, or lack of traffic calming features?
10. **Green Streets:** How well does the street handle stormwater runoff and water quality? Are there ways to incorporate green infrastructure within the roadway?

⁴⁸ The checklist is not a prioritization process, but a way to evaluate alternative design options.

⁴⁹ Roadway projects may include TIP projects, projects outlined in the MTP, or roadway projects and plans developed by member agencies.

11. **Connectivity:** Does the street's configuration support the goals of creating complete networks? Does the corridor link activity centers efficiently? Does the current configuration introduce barriers to travel for certain users? Would the project expand connections between anchor institutions or job centers?
12. **Freight:** Is facilitating freight travel a priority for the roadway?

POSSIBLE CONSTRAINTS

It also provides a way to understand existing constraints that limit the ability of a project to address identified needs. A few constraints may include: (1) constrained right-of-way; (2) conflicting plans and policies; (3) balancing user needs; (4) preservation of existing infrastructure; (5) environmental considerations.

DESIGN OPPORTUNITIES

After gathering information on existing conditions and understanding the project's priority considerations and constraints, the checklist provides a list of conceptual design ideas that are linked to specific considerations. For example, if traffic calming has been identified as a priority along the roadway, several strategies are listed that may help achieve this goal. Selecting initial strategies can guide the planning process as it evolves. A few sample retrofit strategies for existing streets include:

Narrow Travel Lanes: restriping travel lanes from 12 feet to 11 or 10 feet can free up additional space for bike lanes or expanded pedestrian amenities. Medians can be reduced to add more space to the pedestrian sidewalks and surrounding area.

Lane Reduction: Reducing the number of travel lanes ("road diets") often involves reassigning space for traffic calming, expanded mode choices, and potentially better land use integration. For instance, reducing the number of lanes on an arterial from 6 to 4 lanes (4 to 3 lanes, with central turn lane on collectors) can free space to add protected bike lanes, on-street parking, and wider sidewalks. Road diets from 4-3 lanes can be considered on roadways with maximum volumes of 15,000 to 20,000 AWDT, as well as streets with safety concerns.⁵⁰

⁵⁰ Peak hour volumes should also be considered. (Proven Safety Countermeasures, "Road Diet", Federal Highway Administration, Office of Safety, FHWA-SA-12-013, 2012.)

Sidewalk and landscaping easements: Private landowners can provide easements with the incentive that local government will install and, in some cases, maintain landscaping. This can expand the ROW space for pedestrian amenities. When a road does not experience above-average crashes, implementing a road diet may still be a good decision because of the many benefits that may be provided, including the potential to add facilities for bicyclists and buffers for pedestrians and improved safety. Indian School is an example of a roadway that provides an important link on the bike system network, which might make it a good candidate for a road diet even though it doesn't have the highest safety risk ranking.



COMPLETE STREETS CHECKLIST

To help facilitate an improved transportation planning process, MRMPO has developed the Complete Streets Checklist to provide a baseline analysis of existing conditions, constraints, and opportunities along existing roadways. The goal is that the checklist can be used to generate clear conceptual design priorities that can lead to the best overall multimodal configuration.

PROJECT NAME _____ RESPONSIBLE AGENCY(S) _____

LOCATION _____ CHARACTER AREA _____

ROADWAY CLASSIFICATION _____ POSTED SPEED _____

DEVELOPMENT PHASE

- ☐ Sector Plan, Area Plans, and Master Plans
- ☐ Corridor Plans & Studies
- ☐ Engineering & Feasibility Studies
- ☐ New Road Construction
- ☐ Redevelopment and Reconstruction Projects
- ☐ Roadway Resurfacing Maintenance

PROJECT MODE PRIORITIES

- ☐ Transit
- ☐ Bicyclists
- ☐ Pedestrians
- ☐ Freight
- ☐ Motor Vehicles

PROJECT DESCRIPTION

CROSS SECTION ELEMENTS

ELEMENT	DESCRIPTION	WIDTH
THROUGH DRIVE LANES		
MEDIAN		
PARKING		
BICYCLE INFRASTRUCTURE		
SIDEWALK BUFFERS		
SIDEWALKS		
SHOULDERS		
TOTAL		

EXISTING CONDITIONS

LAND USE	CURRENT		2040 PROJECTION	
	PRIMARY LAND USES			
	LAND USE MIX			
	DU/ACRE			
	ACTIVITY DENSITY			
	PED COMPOSITE INDEX			
TRAFFIC	COUNT		2040 PROJECTION	MODE SHARE %
	AWDT			
	PEDESTRIANS			
	BICYCLISTS			
	FREIGHT			
NETWORKS	EXISTING	FUTURE	DESCRIPTION/CONDITION	
	TRANSIT ROUTE			
	FREIGHT ROUTE			
	SIDEWALKS			
	BICYCLE ROUTE			
TRANSIT	WEEKDAY		WEEKEND	RIDERSHIP
	FREQUENCY			
	HOURS OF OPERATION			
CRASHES	CRASHES (LAST 5 YEARS)		FATAL	RATE
	AUTO			
	BICYCLES			
	PEDESTRIAN			
PERFORMANCE	SCORE		SCORE	
	AUTO LOS		TRAVEL DELAY	
	TRANSIT LOS		BICYCLE LOS	
	PEDESTRIAN LOS		WALKABILITY INDEX	

ADDITIONAL EXISTING CONDITIONS

PRIORITY CONSIDERATIONS

PRIORITY	CONSIDERATION	YES/NO
EXPANDED CHOICES & INVOLVEMENT	Is there an opportunity to expand mode choices along the roadway?	
	Is community involvement a priority?	
	Are there existing plans that should be consulted?	
LAND USE INTEGRATION	Is economic development along the street a priority?	
	Does the street support a diverse range of land uses, activities, and users?	
	Does the street support the realization of the 2040 preferred scenario?	
CONGESTION & EFFICIENCY	Is addressing existing or future congestion a priority?	
	Is the efficiency of the roadway a concern?	
	Are roadway pavement conditions a concern?	
COMMUNITY HEALTH	Is improving community health outcomes a priority?	
	Does the design encourage active transportation options?	
	Are there gaps in the neighborhood's sidewalk, transit, or bicycle networks?	
PARKING	Does the project improve accessibility to jobs, especially for low income residents?	
	Is expanded parking a priority?	
	Is on-street parking a possibility?	
WALKABILITY	Are the area's sidewalks ADA Compliant?	
	Are crosswalks provided?	
	Are additional pedestrian amenities a priority?	
BICYCLING	Does the street enable safe bicycling?	
	Are there gaps in the current bicycling infrastructure, such as impassible intersections or other barriers?	
	Is bicycle safety a concern?	
TRANSIT	Is expanded transit service a priority?	
	Are improved transit amenities a priority?	
	Is traffic calming a priority?	
TRAFFIC CALMING	Are crash rates higher than other areas?	
	Is intersection crossing safety a concern?	
	How well does the street handle storm water runoff and water quality?	
GREEN STREETS	Are there ways to incorporate green infrastructure within the roadway?	
	Does the street's configuration support the goals of creating complete networks?	
	Would the project expand connections between anchor institutions or job centers?	
CONNECTIVITY	Does the current configuration introduce barriers to travel for certain users?	
	Is freight movement a priority along this roadway?	
	Is this a major freight route?	

COMPLETE STREETS GAPS

ADDITIONAL CONSTRAINTS

IMPLEMENTATION OPPORTUNITIES

PRIORITY	POTENTIAL STRATEGIES		FEASIBILITY
LAND USE INTEGRATION & DEVELOPMENT	☐ Walkability Improvements	☐ Zoning Changes	
	☐ Façade Upgrades	☐ Establish BID, Main Street District, etc.	
	☐ Infill Strategies	☐ Maintenance Plan	
CONGESTION & EFFICIENCY	☐ Lane Restriping	☐ Travel Demand Management	
	☐ Roundabouts	☐ ITS Solutions	
	☐ Access Management	☐ Signals and Signal Timing	
COMMUNITY HEALTH	☐ Trail Connections	☐ Additional Lanes	
	☐ Bike infrastructure improvements	☐ Fill in Sidewalks	
PARKING	☐ On-street Parking	☐ Active Public Spaces	
WALKABILITY & URBAN DESIGN	☐ Wider Sidewalks	☐ Street Furniture	
	☐ Expanded Landscape Buffers	☐ Active Public/Open Spaces	
	☐ Street Trees	☐ Improved Street Lighting	
	☐ Improved Crosswalks	☐ Public Art	
	☐ Reduce Curb Cuts	☐ Unique Paving Materials	
BICYCLING	☐ Bike Lanes	☐ Bicycle Boulevards	
	☐ Buffered Bike Lanes (Cycle Tracks)	☐ Intersection Markings	
	☐ Multi-use paths	☐ Parallel Bike Route	
TRANSIT	☐ Bus Rapid Transit	☐ Improved Transit Stop Amenities	
	☐ Expanded Service		
TRAFFIC CALMING	☐ Lower Design/Posted Speed	☐ Roundabouts	
	☐ Narrower Lanes	☐ Signals and Signal Timing	
	☐ Lane Reduction	☐ Pedestrian Beacons	
	☐ Median Improvements	☐ Improved Signage and Lighting	
		☐ Shoulder Changes	
GREEN STREETS	☐ Street Trees	☐ Infiltration Planters	
	☐ Pervious Surfaces	☐ Rain Gardens	
	☐ Bioretention Basins	☐ Median Design	
CONNECTIVITY	☐ Denser, grid like network	☐ Limit cul-de-sacs and Dead Ends	
	☐ Side Street Improvements	☐ Use shorter block lengths	
	☐ Parallel Routes	☐ Pedestrian Connections to Adjacent Land Uses	
	☐ Improved Trail Connections		
FREIGHT	☐ Truck Route Signage	☐ Designated Truck Route	

ADDITIONAL OPPORTUNITIES

IMPLEMENTATION OPPORTUNITIES

IMPLEMENTATION OPPORTUNITIES & TYPES

IMPLEMENTATION OPPORTUNITY	IMPLEMENTATION TYPE
Sector Plans, Area Plans, Master Plans, Facility Plans These plans address large areas and provide a blueprint for roadways, trails and other facilities. Nearly all of these plans include future land use designations.	1. Identify & coordinate with planned land use. <i>What are the future land use designations from local plans?</i> 2. Identify and preserve roadway and trail network connectivity. <i>Is there sufficient access to planned land uses?</i> <i>Could a denser network of narrower roads be used instead of a sparse network of wider roads?</i> <i>Does the layout of the roadway and trail network support future land use designations?</i> <i>Does the network allow for pedestrians and bicyclists to take alternative roadways?</i> <i>Does the network meet recommended connectivity measures and are there opportunities for improved connectivity?</i> 3. Develop conceptual roadway designs. <i>Does the conceptual design and network work together to accommodate all roadway users?</i>
Corridor Plans, Engineering & Feasibility Studies These efforts tend to focus on a segment of roadway and sometimes include a limited area that includes paralleling roadways.	1. Identify & coordinate with planned land use. <i>What are the future land use designations from local plans?</i> 2. Identify and preserve connectivity through easements and parallel routes. <i>Is there sufficient access to planned land uses?</i> <i>Can parallel routes improve access to adjacent land use and better accommodate pedestrians and bicyclists?</i> <i>Are there any easements or other opportunities to improve pedestrian and bicyclist access and mobility?</i> 3. Develop conceptual roadway designs. <i>Does the conceptual roadway design and parallel roadways work together to accommodate all roadway users (although not necessarily on the same road)?</i> 4. Identify corridor issues and considerations. <i>How is the roadway currently performing?</i> <i>Are there additional opportunities to address issues?</i>
New Roadway Construction New roadways are typically built in phases. Each phase should provide multimodal options and support the land use developing around it.	1. Identify & coordinate with planned land use. <i>What are the future land use designations from and local plans?</i> 2. Identify and preserve roadway and trail network connectivity. <i>Is there sufficient access to planned land uses?</i> <i>Are approved access points being built along with the development of homes and businesses?</i> 3. Develop conceptual roadway design. <i>Does the design allow for all roadway users to be accommodated through each phase of the roadway being built?</i> 4. Identify corridor issues and considerations.

	• <i>What are the long-term and short-term goals of the roadway?</i> • <i>Are there additional opportunities to address issues?</i> • <i>What are the performance measures to evaluate changes to the roadway?</i>
Roadway Redevelopment & Reconstruction These efforts involve changing an existing roadway or intersection. Typically, a corridor or feasibility study precedes these projects. Given that these roadways are already in use, this is also an opportunity to test out design alternatives with temporary features.	1. Identify & coordinate with planned land use. • <i>What are the future land use designations from local plans?</i> 2. Identify and preserve roadway and trail network connectivity. • <i>Does this roadway provide an important connection between or within activity centers?</i> • <i>Are there any small opportunities to improve access to adjacent land use?</i> 3. Develop conceptual roadway design. • <i>Which modes are prioritized based on the land use and roadway type?</i> • <i>Are there opportunities to improve accommodation for prioritized modes?</i> 4. Identify corridor issues and considerations. • <i>How is the roadway currently performing?</i> • <i>Are there additional opportunities to address issues?</i> • <i>What are the performance measures to evaluate changes to the roadway?</i>
Roadway Resurfacing Maintenance Although these projects are limited and should not become full reconstruction projects, they provide unique opportunities to capitalize on small improvements that can make large impacts at much lower costs than a reconstruction project.	1. Identify & coordinate with planned land use. • <i>What are the future land use designations from local plans?</i> 2. Identify and preserve roadway and trail network connectivity. • <i>Does this roadway provide an important connection between or within activity centers?</i> • <i>Are there any small opportunities to improve access to adjacent land use?</i> 3. Develop conceptual roadway design. • <i>Which modes are prioritized based on the land use and roadway type?</i> • <i>Are there opportunities to improve accommodation for pedestrians and bicyclists by reducing driving lane widths?</i> • <i>Are shoulders being improved along with the rest of the roadway?</i> • <i>Are there missing sidewalks that can be filled in or other ADA deficiencies?</i> 4. Identify corridor issues and considerations. • <i>How is the roadway currently performing?</i>

