MADRID, NM

REGIONAL TRANSPORTATION SAFETY PLAN

September 2021

NMDOT

SANTA FE COUNTY

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INTRODUCTION

Transportation safety planning became a priority of transportation planning with the passing of the Transportation Equity Act for the 21st Century (TEA-21) and continues to be a priority in subsequent federal transportation authorization legislation. Transportation safety planning is multidisciplinary, community-wide, multimodal, proactive, and most importantly, collaborative. The process encourages and relies on local stakeholders and public engagement. This approach allows local stakeholders and residents to prioritize opportunities to improve transportation safety based on observations from their community. The resulting safety plan can help direct efforts and resources toward achieving a shared safety vision. Federal law requires the transportation planning process to be consistent with each state's Strategic Highway Safety Plan (SHSP), a Highway Safety Improvement Program (HSIP) requirement. HSIP is the core federal-aid program supporting efforts to significantly reduce crash-related fatalities and serious injuries on all public roads using a data-driven, strategic approach. HSIP not only funds the safety planning process but may also support the implementation of practical and effective countermeasures identified during the process.

PURPOSE OF THE MADRID TRANSPORTATION SAFETY PLAN

New Mexico has the highest rate of pedestrian fatalities nationally and has been amongst the top five states for pedestrian fatalities over the last nine years[1]. Moreover, New Mexico has been in the top quartile for 18 out of 26 years for vehicular fatalities between 1994-2019[2]. Between 2015 and 2019, over one thousand people annually experienced a serious injury resulting from a crash on New Mexico Public roads[3]. Mitigating these challenges is the driving force behind helping New Mexico communities address transportation safety issues. The NMDOT views Transportation Safety Plans as foundations for communities to pursue funding opportunities at the federal, state, regional, and local levels to address the significant transportation safety challenges impacting New Mexicans.

The NMDOT's Planning Division, Santa Fe County, and Lee Engineering partnered to develop this safety plan. The planning process provided a forum for the Village of Madrid and local stakeholders to provide context, input, and feedback to guide the Plan's development. Other collaborators included NMDOT District 5, NMDOT Environmental Bureau, Santa Fe County Transportation Advisory Committee, Santa Fe County Sheriff's Office, and NM Energy Minerals and Natural Resources Department (EMNRD). This multidisciplinary and inclusive collaboration identified Madrid's primary safety concerns and countermeasures to enhance safety for pedestrians, bicyclists, and motorists. The community envisions improved roadway safety for residents and visitors through increased vehicle speed limit compliance, suitable pedestrian facilities, ample parking and signage, and minimal roadway congestion. The countermeasures detailed in this safety plan enhance transportation safety by calming traffic, improving pedestrian accessibility, and increasing awareness of dedicated parking areas.

STUDY AREA

Madrid is a census-designated place and unincorporated community located in the Ortiz Mountains of Santa Fe County, New Mexico. Once a bustling coal-mining town, Madrid was given new life in the seventies by an eclectic group of artists and creative thinkers. Today, it is a popular tourist destination because of its unique history and collection of shops, restaurants, galleries, and events. The local economy relies on tourists making the scenic drive on the Turquoise Trail National Scenic Byway, New Mexico State Highway 14 (NM-14). NM-14 acts as "Main Street" as it passes through the town's vibrant downtown.

[1] National Highway Traffic Safety Administration, “Traffic Safety Facts Annual Report Tables.”
[2] New Mexico Department of Transportation, Traffic Safety Division, “FARS Encyclopedia: States - Fatalities and Fatality Rates 1994-2019.”
[3] New Mexico Department of Transportation, Traffic Safety Division, “New Mexico Traffic Crash Annual Report 2019.”

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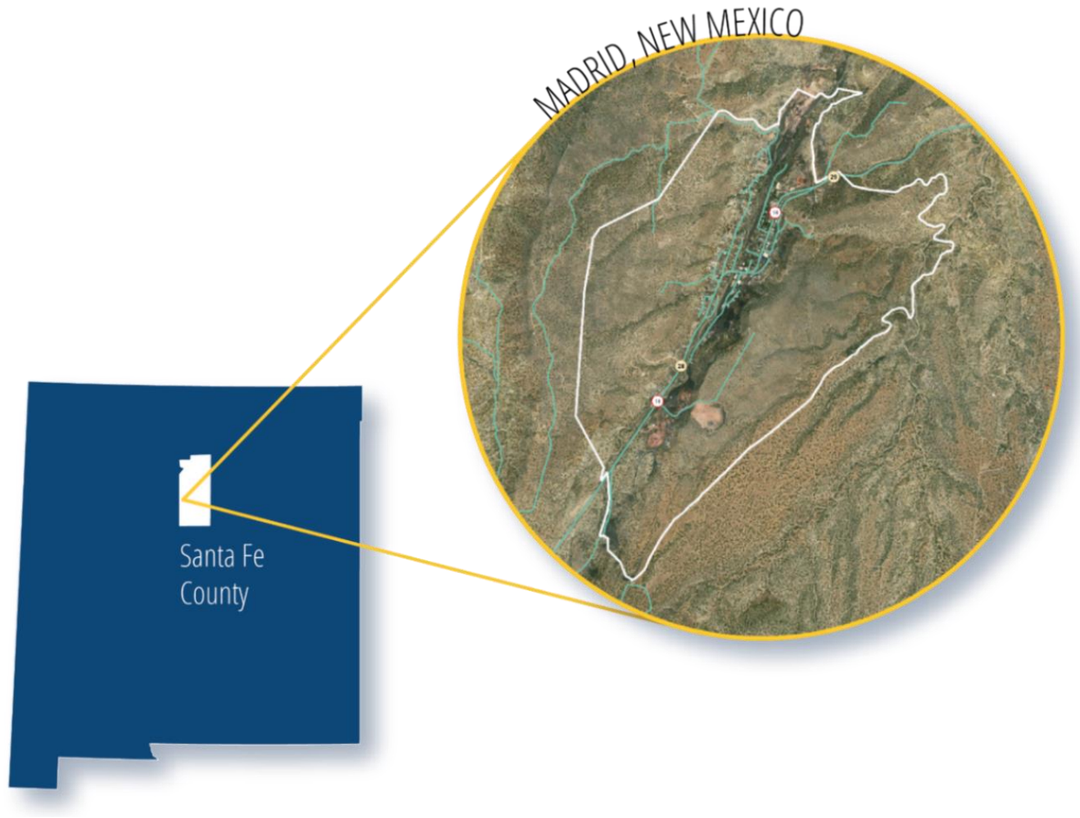

Figure 1: Study Area - Madrid, New Mexico

EXISTING CONDITIONS

TRANSPORTATION SYSTEM

NM-14 connects Interstate 40 in Tijeras to US 84/US 285 in Santa Fe and provides access to Madrid. The highway's available asphalt is 24-feet wide, with two 11-foot wide driving lanes and unpaved shoulders. NM-14's functional road classification is minor arterial, and it has a speed limit of 55 miles per hour (MPH).

The study corridor is 1.5-miles long, encompassing the north and south approaches to Madrid and the segment of NM-14 bisecting downtown. In the approach segments, motorists experience a reduction in the speed limit to 20 MPH. When approaching Madrid from the south, roadway users encounter intersections at Tipple Way, S. Arroyo, Peaceful Way, and Harvey Road. Traffic accessing NM-14 from S. Arroyo Road is managed with a stop sign. All other intersections in the study corridor are uncontrolled, meaning there are no stop signs or signals. On the west side of the highway, Back Road intersects with NM-14 as the roadway enters an S-shaped curve, or reverse curve, just beyond Harvey Road. On the road segment between the two curve curves of the reverse curve, three more intersections exist at Opera House Road, Firehouse Lane, and Old Hospital Road.

The roadway straightens for approximately a quarter-mile. This area is a significant hub of the community where the density of local businesses increases and all transportation modes interact. As northbound travelers continue, they pass Madrid's transit stop, accessible parking, and public restrooms on the east. On-street parking is available along this segment, primarily on the east side of NM-14. On-street parking on the westside of NM-14 is restricted by flowerpots, railroad ties, and mailboxes, preventing vehicles from using this side of the street for parking. Despite the multimodal usage of this segment of highway, the available infrastructure is designed for motorists exclusively. Continuing north through downtown, Bridge Road and Cave Road create T-intersections with NM-14 from the west and Ice House Road from the east.

On the north end of town, the road bends eastward into a simple horizontal curve as the town's northern boundary nears. Before exiting Madrid, NM-14 intersects with Ice House Road on the east and Old Goat Road on the west. Southbound travelers approaching Madrid from the north experience a speed limit reduction to 20 MPH, similar to the southern approach.

The project team conducted field visits in Madrid on February 27th and March 9th of 2021 to understand the context of the community and conduct a transportation asset inventory of the study corridor.

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Figure 2: Traffic Sign Inventory

Safety Treatments

Safety concerns in this corridor are not a new phenomenon, and NMDOT District 5 has made considerable efforts to calm traffic and enhance transportation safety are evident. Previous efforts included additional safety treatments, including the installation of Dynamic Speed Feedback Signs, 20 MPH speed limit pavement markings, and signage for speed reduction zones at the northern and southern approaches. Furthermore, additional safety treatments included milled transverse rumble strips at the south end of town to alert northbound travelers to the 20 MPH speed limit and the installation of barriers on either side of NM-14 to prevent roadway departures into the Madrid Arroyo.

PREVIOUS AND CONCURRENT STUDIES AND PLANS

New Mexico 2016 Strategic Highway Safety Plan (SHSP) - The SHSP is the overarching transportation safety plan for the state. The Plan establishes a vision of "Safe Mobility for Everyone." The SHSP identifies 10 High-Priority Emphasis Areas, including impaired driving, speeding, pedestrians, and motorcycles. These areas are determined by the frequency each factor contributes to fatal and serious injury crashes. The SHSP also details 10 Priority Emphasis Areas, including bicycles, heavy vehicles, and transit. For these Emphasis Areas, the SHSP recommends several strategies using the 4Es; engineering, education, enforcement, and emergency medical services (EMS).

New Mexico Prioritized Statewide Bicycle Network Plan (2018) - The New Mexico Prioritized Statewide Bicycle Network Plan outlines a statewide bicycle network utilizing the state's existing highway network. This Plan classifies New Mexico's highways by tiers indicating each segment's benefit level from bicycle infrastructure and the preferred bicycle infrastructure treatments. New Mexico Prioritized Statewide Bicycle Network Plan prioritizes NM-14 as a Tier 1 route. A Tier 1 route may exhibit high existing or latent demand for bicycling or demonstrate high potential for tourism or recreation.

NMDOT Statewide Pedestrian Safety Action Plan (PSAP) (2021) - The PSAP provides a five-year framework of actions to reduce the number of pedestrian-involved injuries and fatalities in New Mexico.

Madrid Stormwater & Erosion Control Project (2020) – This project, administered by the New Mexico Energy, Minerals, and Natural Resources Department, focuses on mitigating stormwater, sedimentation, and flooding issues resulting from crumbling stormwater infrastructure and coal waste from the mining days of Madrid.

NM-14 Truck and Curve Analysis (2020) – This study analyzed the impacts of large truck traffic passing through Marid. The evaluation focused on trucks navigating the S-curve near Back Road and Old Hospital Road. The findings determined WB-67 tractor-trailers cannot navigate the S-curve safely and provided recommendations to restrict tractor-trailers on NM-14.

Rio Grande Trail Master Plan (2021) –The Rio Grande Trail is New Mexico's vision for a cross-state, recreational trail for hiking, bicycling, and horseback riding along the Rio Grande. The 500-mile route utilizes NM-14 as it passes through Madrid.

Town of Madrid Community Plan (2008) – The community of Madrid, preparing for the inevitable change that the future brings, developed a shared vision for their community. The Town of Madrid Community Plan outlines goals regarding traffic and parking, including eliminating vehicular and pedestrian congestion, safe streets for all users, ample parking and signage, as well as safe pedestrian facilities.

TRAFFIC CONDITIONS AND SAFETY ASSESSMENT

To understand the existing conditions that affect multimodal safety in Madrid, the project team conducted pneumatic tube counts and collected video data to quantify the multimodal traffic activity on NM-14. The pneumatic tube deployment yielded motor vehicle classifications, volumes, and speeds. In addition, video data were collected at four locations in the study corridor and provided insight into pedestrian and bicycle activity in the study area. The video cameras and pneumatic tubes were deployed in late February 2021 at the locations shown in Figure 3. The video cameras and pneumatic tube deployment were completed in late February 2021. Since data collection occurred during the winter amid the COVID-19 pandemic, the project team acknowledges that the collected data does not reflect typical traffic activity during non-pandemic times or peak tourism season in Madrid. However, important traffic data trends were observed that guided the Plan. The following sections detail the observations made from the collected data.

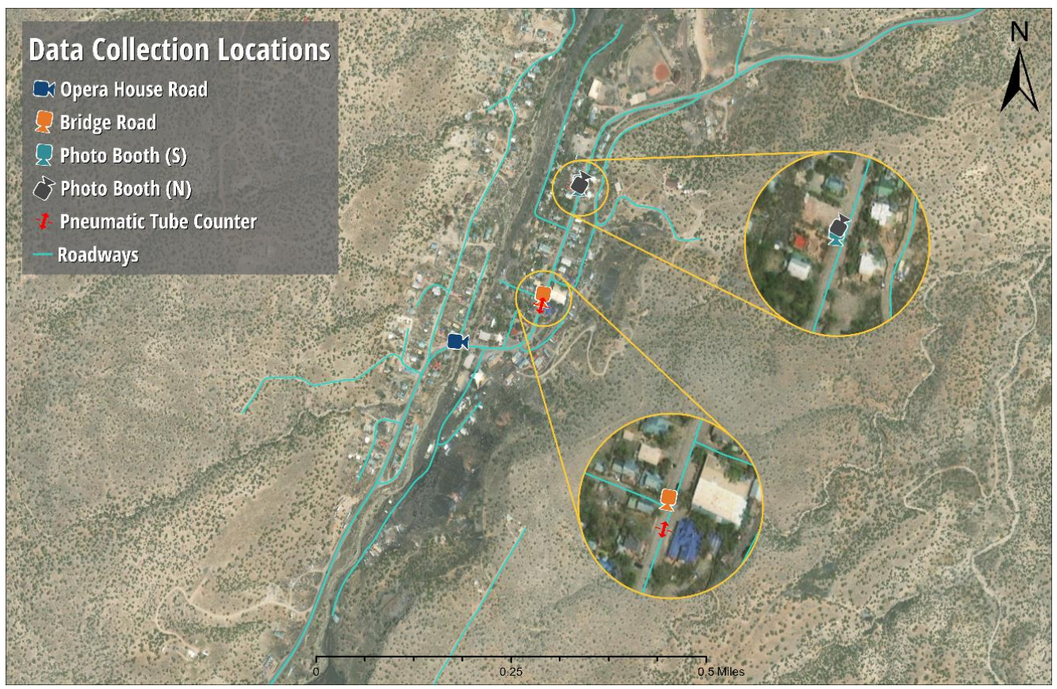

Figure 3: Video camera and pneumatic tube deployment locations in Madrid, NM.

TRAFFIC VOLUMES

The project team obtained Annual Average Daily Traffic (AADT) data from NMDOT Traffic Data Management System. The reported AADT for 2020 on NM-14 north of Madrid was 2,383 and 1,053 south of Madrid. AADT data from these two counters were available for 2009 through 2020. The AADT data showed growth in traffic volumes of nearly one percent (0.76%) per year. Independent of this historical data, the project team collected vehicle volumes, vehicle classifications, and speed profiles of vehicles traveling on NM-14 through Madrid. A pneumatic tube counter was deployed on NM-14 near Bridge Road between February 23, 2021, and February 25, 2021. The bidirectional vehicle volume profile displayed in Figure 4 shows that morning traffic builds up to a peak at 11:00 AM. The traffic volume continues to increase until an evening peak hour at 4:00 PM.

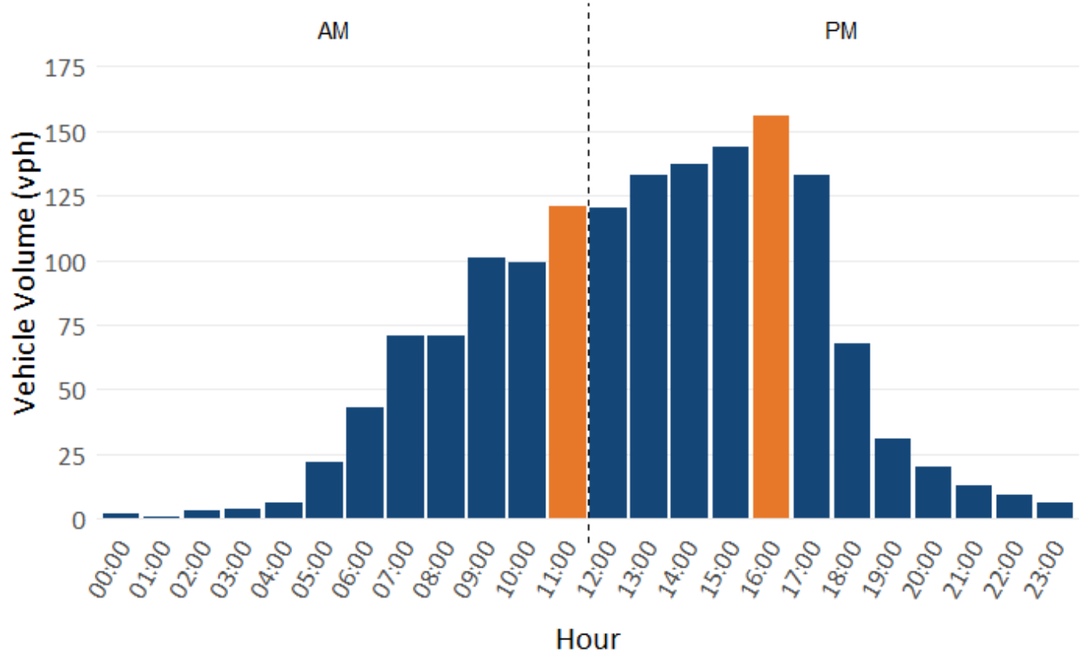

Figure 4: Average daily vehicle volumes by hour.

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The pneumatic tube counter also provided insight into the types of vehicles traveling on the NM-14 corridor through Madrid. Vehicle classifications are identified by vehicle axle spacing. Figure 5 is a summary of the vehicle classifications revealed by the pneumatic tube counter. Most of the vehicles were passenger vehicles; this class includes passenger cars and trucks. The next sizeable class was single unit two-axle trucks. Vehicles in this class include delivery trucks, flatbeds, small public transit vans, recreational vehicles, and dual rear wheel passenger trucks (dually trucks). Larger trucks with three axles or more, such as semi-trucks and cement trucks, accounted for near two percent of the vehicular traffic in Madrid. Finally, a small percentage of motorcycles and buses were observed traveling through the study corridor.

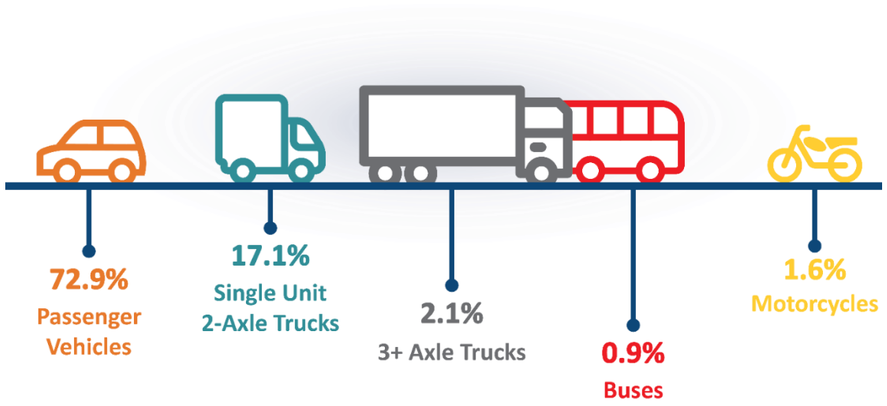

Figure 5: Percentage of vehicle classifications on NM-14 in Madrid.

The project team developed a speed profile of the vehicles traveling in the study corridor from the tube counter data. Figure 6 is the density distribution of observed vehicle speeds. This chart also shows that the 50th percentile speed was 20 MPH and the 85th percentile speed was 25 MPH. These observations indicate that half of the observed traffic was compliant with the posted speed limit of 20 MPH. However, this also shows that fifty percent of vehicles traveled at speeds over 20 MPH, and fifteen percent exceeded the speed limit by 5 MPH or more. Accordingly, the project team identified non-compliance to the posted 20 MPH speed limit as an issue of concern.

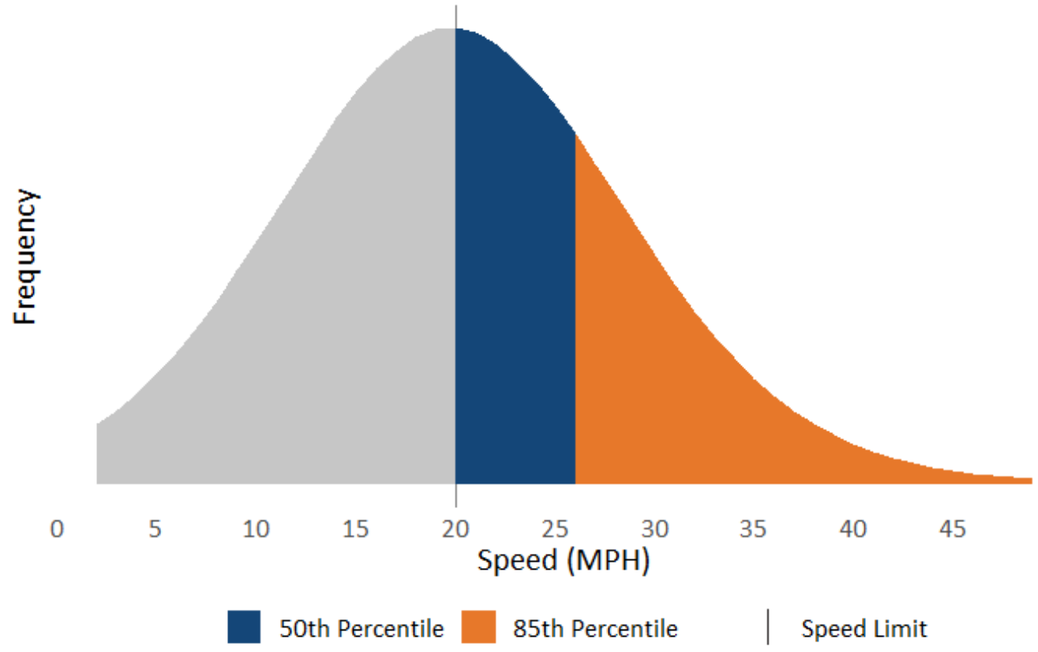

Figure 6: Speed Profile Distribution of motor vehicles.

Multimodal Activity

The project team deployed video cameras to observe pedestrian and bicyclist activity at four locations throughout the study corridor. The southernmost camera was deployed on NM-14 at Opera House Road; this camera faced east toward the arroyo. Moving further north on NM-14, another camera was deployed on the westside of NM-14 at Bridge road and facing south. Finally, two cameras were deployed on the westside of NM-14 near Connie's Photo Park on the north end of town. One camera faced south while the other

faced north. Cameras were programmed to record data between 6:00 AM and 6:00 PM; these hours were chosen due to available daylight during the winter.

The observed pedestrian and bicycle activity data were collected days after a snowstorm in February 2021 during the COVID-19 pandemic. The project team believes pedestrian bicycle activity is underrepresented by this data and expects increased pedestrian bicycle volumes during the non-winter months. NM-14 is a frequently used route by road bicyclists, with Madrid being a popular stopover during seasons with more pleasant weather. During non-pandemic times, February is outside the typical bicycle season. The project team recommends follow-up pedestrian and bicycle counts during the non-winter months, especially during the weekends, to better understand the multimodal activity in Madrid.

Pedestrian Activity

The camera observations captured high foot traffic throughout the corridor with increased activity on the weekend. Table 1 summarizes the observed pedestrian activity. As expected, the camera at Bridge Road, located in the heart of the Madrid business district, recorded the highest volumes of pedestrian activity of the four cameras. Moderate pedestrian volumes were observed on the north end of town. Connie's Photo Park and the adjacent parking lot, Old Boarding House Mercantile, Trading Bird Gallery, and the parking lot at the baseball field are all pedestrian traffic generators. The south-facing camera experienced a battery malfunction and stopped recording at 11:41 AM on February 20, 2021.

Table 1: Pedestrian volumes by day and location.

Camera Site	Thursday (2/18/2021)	Friday (2/19/2021)	Saturday (2/20/2021)	Sunday (2/21/2021)
Opera House Road	27	37	97	77
Bridge Road	328	293	691	404
Photo Booth (S)	70	75	41*	0*
Photo Booth (N)	80	102	290	170

*incomplete data

Further analysis of the pedestrian activity in the study corridor aided in understanding how pedestrians move through this space. Table 2 shows the pedestrian observation data disaggregated by the side of NM-14 the pedestrians walked on (west or east) and were observed to be walking (in the road or on the shoulder). Sixty-four percent of the observed pedestrians used the westside of NM-14. Of the observed pedestrians walking on NM-14, seventy-three percent walked in the roadway instead of the shoulder.

Table 2: Pedestrian activity by the side of NM-14 and location.

		Side of NM-14		Location	
Camera Site	**Pedestrians**	**West**	**East**	**Road**	**Shoulder**
Back Road	**Observed**	125	111	203	35
	Percentage	53.0%	47.0%	85.3%	14.7%
Bridge Road	**Observed**	764	582	1425	291
	Percentage	56.8%	43.2%	83.0%	17.0%
Photobooth (S)*	**Observed**	134	36	146	40
	Percentage	78.8%	21.2%	78.5%	21.5%
Photobooth (N)	**Observed**	476	116	243	399
	Percentage	80.4%	19.6%	37.9%	62.1%
All Locations	**Observed**	1499	845	2017	765
	Percentage	**64.0%**	36.0%	**72.5%**	27.5%

*incomplete data

Delving into this data even further, the project team found more pedestrians walked in the road on the eastside of NM-14 than on the westside. Table 3 summarizes the differences in pedestrians using the west or east side of the road and walking in the roadway or on the shoulder. For example, when looking at the pedestrian activity at Bridge Road, the percentage of pedestrians walking on the westside of NM-14 on the shoulder was more than double the number of pedestrians walking on the shoulder on the eastside. Overall, the rate of pedestrians walking on the shoulder when using the westside of NM-14 was nearly four

times greater than pedestrians using the shoulder on the eastside. This data suggests pedestrians prefer walking on the westside of NM-14. Additionally, the data further identifies a need to provide off-roadway walking space and the public's willingness to use it.

Table 3: Pedestrian activity by side of NM-14 and location.

Camera Site	Westside of NM-14 Road	Westside of NM-14 Shoulder	Eastside of NM-14 Road	Eastside of NM-14 Shoulder
Back Road	77.6%	22.4%	93.7%	6.3%
Bridge Road	80.5%	19.5%	92.6%	7.4%
Photobooth (S)*	70.1%	29.9%	100.0%	0.0%
Photobooth (N)	25.8%	74.2%	69.8%	30.2%
All Locations	62.0%	**38.0%**	89.9%	**10.1%**

*incomplete data

Bicycle Activity

As shown in Table 4, bicycle activity was highest on Thursday but still lower than the corridor's pedestrian activity. The project team reviewed Thursday's data and found that the bicycle activity was attributable to a cyclist traveling within the corridor throughout the day. Bicycle activity throughout the corridor on Friday, Saturday, and Sunday was significantly lower than Thursday. This decrease in activity may indicate that cyclists in Madrid feel safer when vehicular and pedestrian activity is lower and less congestion is present on weekdays instead of weekends. However, the pneumatic tube deployment collected vehicle volumes during the week and not on the weekends; therefore, any association between vehicle and bicycle activity is not based on observed data.

Table 4: Bicycle volumes by day and location.

Camera Site	Thursday (2/18/2021)	Friday (2/19/2021)	Saturday (2/20/2021)	Sunday (2/21/2021)
Opera House Road	2	0	3	1
Bridge Road	17	1	3	2
Photo Booth (S)	12	0	1*	0*
Photo Booth (N)	24	0	2	1

*incomplete data

Crash Data Summary

This study analyzed seven years of crashes occurring in the study corridor between 2013 and 2019 provided by The University of New Mexico, Geospatial and Population Studies, Traffic Research Unit. This crash dataset, the most recent available at the time of this study, contained sixteen crashes. Crash data provided is from reported crashes to law enforcement, and this data often fails to capture other minor crashes, unreported crashes, or near-misses. Crash data is extracted from crash reports filed by law enforcement officers. The following injury codes identify crash severity in New Mexico:

- K – Killed (Fatal)
- A – Incapacitated (Serious Injury)
- B – Visible Injury
- C – Complaint of Injury (Suspected Injury)
- O – No Apparent Injury or Property Damage Only

Of the reported crashes, two crashes were fatal, and one resulted in a serious injury. Furthermore, two minor injury crashes involved pedestrians, and none involved bicycles or transit vehicles. Figure 7 shows the locations of sixteen reported crashes by their crash severity and pedestrian involvement.

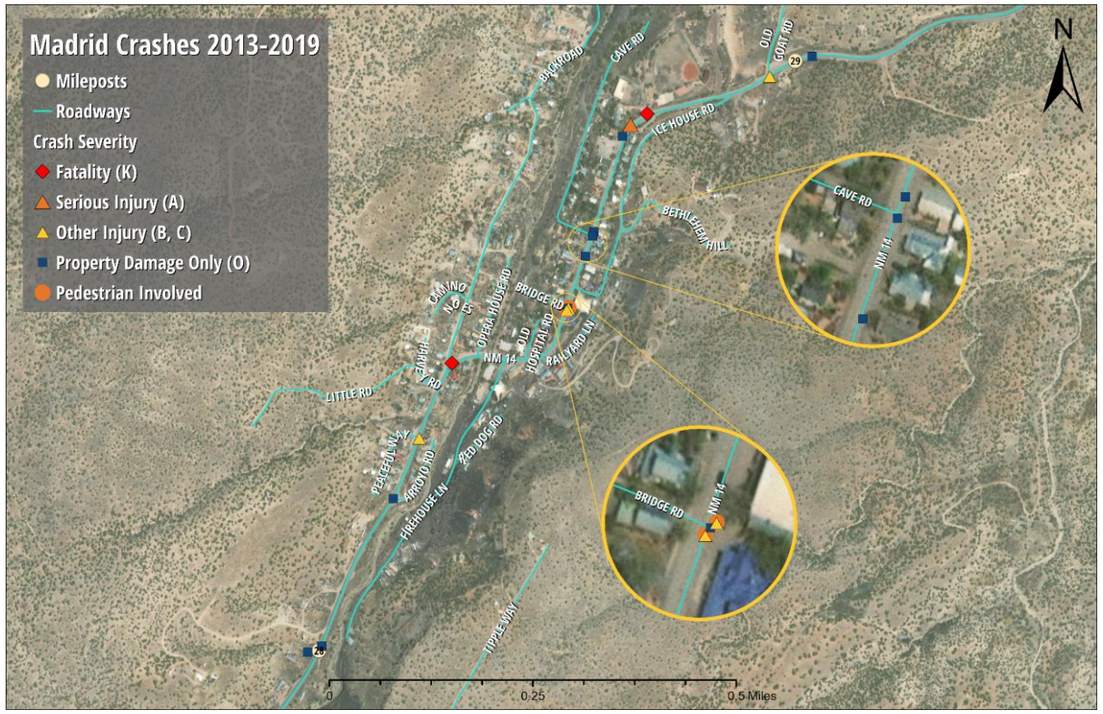

Figure 7: Madrid crashes by severity (N=16), 2013-2019 - Source: UNM, Geospatial, and Population Studies, Traffic Research Unit

Crash Data Analysis

The project team evaluated the available crash data from various perspectives; crashes by severity, crashes by top contributing factors, crash severity by day and time of day, crash severity by month, and crash severity by lighting conditions. This section discusses the observations made from these analyses. Table 5 summarizes the crash severity for the analyzed crashes. Three crashes were reported as Fatal or Serious Injury and accounted for almost nineteen percent of all crashes. In comparison, crashes in which the severities were reported as Visible or Suspected Injuries, and Property Damage Only were responsible for the remaining crashes in the study corridor.

Table 5: Crashes by severity. - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

Crash Severity	Crashes	Percentage
Fatal (K)	2	12.5%
Serious Injury (A)	1	6.3%
Visible Injury (B)	2	12.5%
Suspected Injury (C)	2	12.5%
Property Damage Only (O)	9	56.3%
Total	16	100.00%

Fortunately, most crashes were not reported as Fatal or Serious Injury. However, the rate of less severe crashes should not be ignored. In addition to the more severe crashes, the less severe crashes signal a safety challenge and present an opportunity to address their top contributing factors to proactively reduce the possibility of crashes resulting in fatalities or serious injuries. Table 6 is a summary of the top contributing factors for crashes occurring within the study area. Behavioral factors, including excessive speed in addition to alcohol and drugs, contributed to the two Fatal crashes.

Moreover, alcohol and drugs were the top contributing factors in twenty-five percent of all crashes in Madrid between 2013 and 2019. Other factors contributing to Visible Injury, Suspected Injury, and Property Damage Only crashes included improper driving, driver inattention, excessive speed, driver inattention, driving left of center, following too closely, improper backing, and inadequate brakes. Generally, inappropriate driving behavior contributed to Visible Injury, Suspected Injury, and Property Damage Only crashes.

Table 6: Crashes by top contributing factor and severity - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

Top Contributing Factor	Fatal (K)	Serious Injury (A)	Visible Injury (B)	Suspected Injury (C)	Property Damage Only (O)	Total
Alcohol/Drug Involved	1	1	0	0	2	4
Other Improper Driving	0	0	0	0	2	3
Excessive Speed	1	0	0	0	0	2
Driver Inattention	0	0	1	0	1	1
Drove Left of Center	0	0	0	0	1	1
Failed to Yield Right of Way	0	0	0	0	1	1
Following Too Closely	0	0	0	0	1	1
Improper Backing	0	0	1	0	1	1
Inadequate Brakes	0	0	0	1	0	1
Missing Data	0	0	0	1	0	1
Total	2	1	2	2	9	16

Figure 8 shows a cluster of crashes during the mid-day hours (11:00 AM to 3:00 PM) and during the PM peak period (5:00 PM to 6:00 PM). Both fatal crashes occurred outside observed peak traffic hours. Some temporal association appears between crashes resulting in an injury and days at the end of the week. Figure 9 shows that crashes involving injuries occurred on days between Thursday and Sunday. Also, Figure 10 shows that crashes occur more frequently during fall and winter. Furthermore, Figure 11 shows some association between crashes resulting in a fatality or serious injury and dark or low-light conditions.

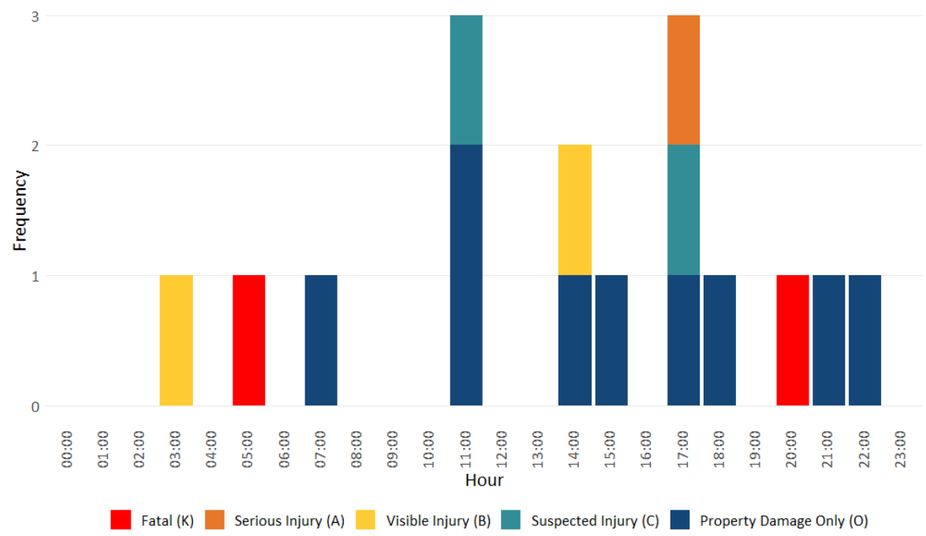

Figure 8: Crash severity by the time of day. - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

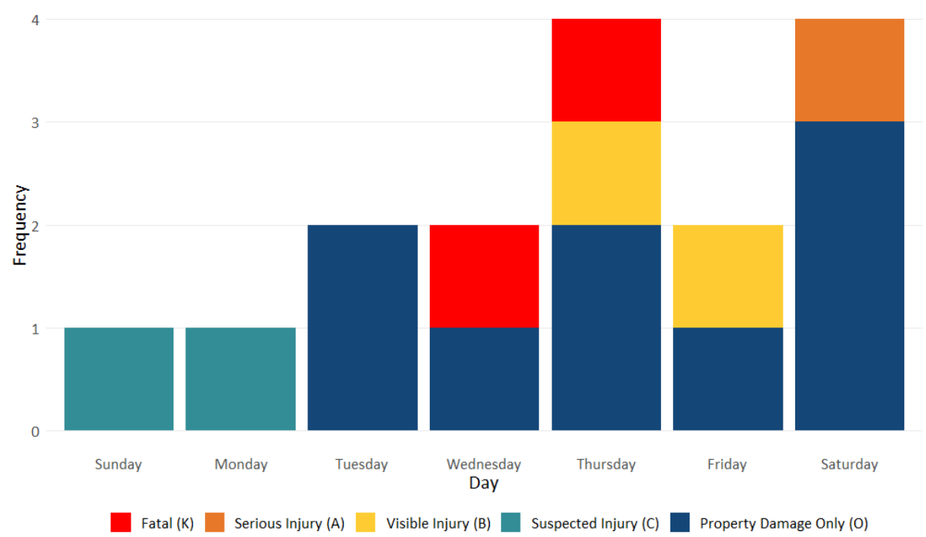

Figure 9: Crash severity by day. - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

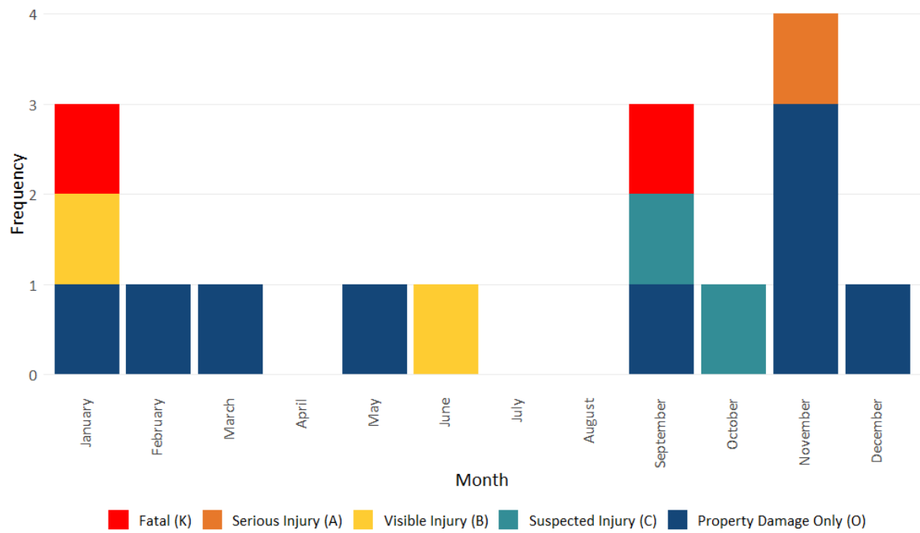

Figure 10: Crash severity by month. - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

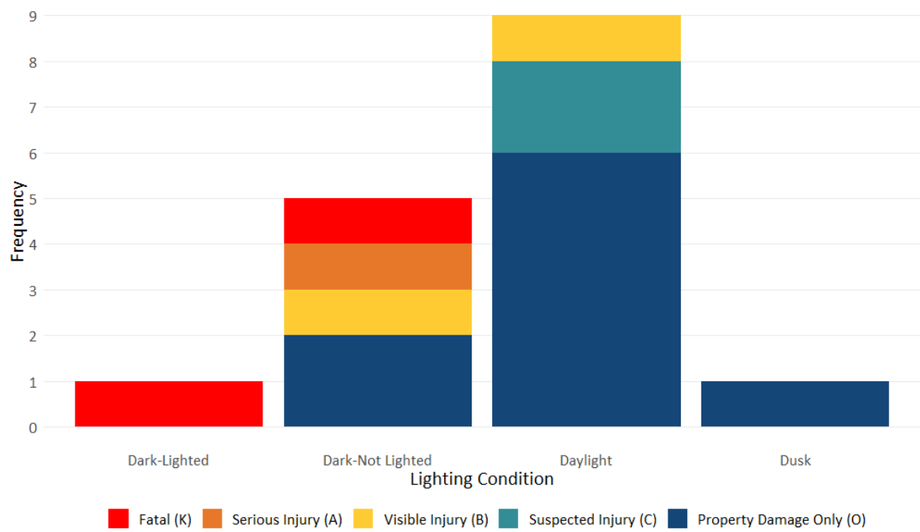

Figure 11: Crash severity by lighting condition. - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

Multimodal Crashes

Transportation safety becomes more of a concern when modes of transportation other than motor vehicles are involved; a greater danger is posed to pedestrians, bicyclists, and other active transportation modes when colliding with a motor vehicle. Fortunately, reported crashes in Madrid that occurred during our analysis period did not involve bicyclists. However, two crashes involved pedestrians. The severities of these crashes were reported as Visible Injury and Suspected Injury. Table 7 summarizes crashes involving pedestrians and bicyclists.

Table 7: Pedestrian and Bicycle Involved crashes by severity - Source: UNM, Geospatial and Population Studies, Traffic Research Unit

Severity	Pedestrian Involved	Bicyclist Involved
Fatal (K)	0	0
Serious Injury (A)	0	0
Visible Injury (B)	1	0
Suspected Injury (C)	1	0
Property Damage Only (O)	0	0

Public Involvement Process

Madrid is a tight-knit community with a shared transportation safety vision for the town. Stakeholders and the public shared their thoughts, concerns, and feedback through multiple avenues throughout the planning process. The community members expressed their concerns during virtual meetings, via email correspondence, and by commenting on the virtual meeting registration pages. As seen in Figure 12, the project schedule demonstrates the planning process and community engagement.

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Figure 12: Schedule for Madrid Transportation Safety Plan

The COVID-19 pandemic and related restrictions required stakeholder and public meetings to be held virtually via Microsoft Teams. Despite this challenge, the community members of Madrid participated in the Plan's development. Table 8 lists the participants in the planning process.

Table 8: Madrid Transportation Safety Plan Participants

PARTICIPANT	AFFILIATION
Johnsons of Madrid	Business Owner
Yeny Maestas	Energy Minerals and Natural Resources Department
Meghan McDonald	Energy Minerals and Natural Resources Department
Will Floyd	KMRD-LP 96.9 FM
Michael Lancaster	Madrid Art & History Walk
Carl Hansen	Madrid Fire Department
Rebecca Nafey	Madrid Landowners Association
Lori Lindsey	Mine Shaft Tavern
Paul Brasher	NMDOT District 5
Javier Martinez	NMDOT District 5
James Mexia	NMDOT District 5
Jim Murray	NMDOT District 5 Public Information Officer
Jennifer Mullins	NMDOT Environmental Bureau
Franklin Garcia	NMDOT Modal Division
Joseph Moriarty	NMDOT Multimodal Planning and Programs Bureau
Shannon Glendenning	NMDOT Multimodal Planning and Programs Bureau
Debra Hudson	NMDOT Multimodal Planning and Programs Bureau
Lesah Sedillo	North Central NM Economic District
Emma Polhemus	North Central Regional Transit District
Carla Coletti	Resident of Madrid
Robert Redus	Resident of Madrid
Marissa Dorais	Resident of Madrid
Philip Undercuffler	Resident of Madrid
Connie Mayhew	Resident of Madrid
Leslie	Resident of Madrid
Andrea Fiegel	Resident of Madrid
Clinton Anderson	Resident of Madrid
Brett Clavio	Santa Fe County
Alex Fitzgerald	Santa Fe County
Paul Olafson	Santa Fe County
Robert Griego	Santa Fe County
Nate Crail	Santa Fe County
Olivia Romos	Santa Fe County
Ivan Trujillo	Santa Fe County
Rudy Garcia	Santa Fe County Commissioner
Major Gabe Gonzales	Santa Fe County Sheriff's Office

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Two rounds of meetings occurred as part of the planning process. The first round took place at the end of May after the project team collected and analyzed data from the area. During this initial round of meetings, the project team shared the collected data and elicited feedback regarding the project team's observations. Community members offered input not observed through the data collection process and helped the project team understand the community's perceptions of transportation safety in Madrid. Some of the feedback is presented below:

Participant feedback and input:

- "I am hopeful that a sidewalk plan could be worked out. We especially need sidewalks near the ballpark and to the parking area. We need sidewalks to cross over the arroyo on the bridge. Having buses on the weekend would alleviate some car traffic. Bring back the rail to Madrid and establish a commuter rail to Santa Fe or Albuquerque via Waldo"
- "I sent advance information regarding updates and improvemnts [*sic*] as well as expansions to the historic boardwalk taking it all the way to the free public parking area above the ballpark. The idea would be to have a history walk as well as the possibility of being an artwalk with sculptures by local artists. This is a great safety concern as the narrow shoulder is the only access from town to the parking area."
- "I totally second Mike Lancaster's comments on the access to the ballpark - it's becoming the default open parking area and there's much pedestrian traffic to the park that is forced to walk in the traffic lanes on a hard corner"
- "The corridor in downtown needs to be looked at there is often crowding due to poor parking. Semi Trucks also can be a problem going through Madrid."
- "Drivers going too fast, pedestrians who have no-where to walk."
- "Pedestrian safety while walking on Highway 14 especially from the ballfield and playground into town or vice versa. The road is very narrow and it's very dangerous for pedestrians. There is an historic boardwalk along the shoulder on the other side of the guard rail that needs to be restored so people can walk safely."
- "People driving too fast."
- A resident describing roadway congestion during peak-season "… it's like if they let cars in Disneyland."
- "One thing I wanted to add to the notes was the idea of street art as one low-cost strategy for traffic safety that would also fit Madrid as a community. More and more cities around the country are employing painted asphalt as a strategy to beautify spaces while also having the happy side effect of calming traffic. I think this would be a great addition to any traffic safety plan for our town as it really fit with our artistic reputation while meeting our need for slowing traffic."

These initial meetings aided the project team in understanding the safety vision of the community. They envision providing safety of residents and visitors to Madrid by addressing the following safety challenges:

- Motor vehicle speed compliance
- Pedestrian safety
- Lack of pedestrian infrastructure
- Limited parking
- Roadway congestion

Combining this qualitative information with the empirical data and national best practices, the project team identified an initial set of countermeasures and mitigation strategies. The second round of meetings took place in May, where stakeholders shared their initial feedback on the recommended countermeasures. The project team took this feedback and further developed the countermeasures. In addition, the project team discussed the plan and the recommended countermeasures with the Santa Fe County Transportation Advisory Committee on May 19 and August 18, 2021, to solicit their comments and input. On June 16, 2021, the project team held a final public meeting with the community to share and obtain feedback on recommended countermeasures.

Community Impacts of Crashes

Traffic crashes require the attention of law enforcement, who may need to travel up to an hour or more to respond to an incident in Madrid. In some instances, a traffic crash may require emergency services such as medical professionals or fire and rescue staff. The remote location of Madrid can put a strain on these services and the community.

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Unsafe traffic conditions can impact a community even when a community member is not directly involved or injured. Property damage only crashes can affect residents if they experience damage to their property resulting from a crash. Crashes resulting in a fatality, serious injury, or even near-miss crashes can contribute to residents not feeling safe living in their community. A local gallery owner recounts a near-miss she recently witnessed:

> *"Speaking of close calls, I witnessed a very close call this morning, as a dry cement hauler, like the one that crashed here almost 5 years ago, came around the corner at the south end of town. As he came around the corner and crossed the double yellow lines into oncoming traffic, as they always do, a non-commercial pick-up truck, headed south, came around the corner at the exact same time. I watched helplessly from my gallery at what could very easily have been another tragic accident. Fortunately, they were able to avoid a collision, but it was the perfect storm. The timing was perfect for disaster, had either one of the drivers been the least bit distracted, or their reflexes were slightly slower."*

Traffic crashes typically occupy a driving lane on the road until local authorities and emergency services can respond. In the narrow corridor of NM-14 through Madrid, this can result in slowed traffic from congestion. This congestion can result in traffic delays and adversely impact local air quality from slow-moving or idling vehicles. Moreover, Madrid's economy depends heavily on tourists patronizing their local businesses. Local businesses may lose profits due to a car crash and the necessary emergency service vehicles blocking their storefront. These combined impacts, the input from the community, and the collected data guided the following countermeasures recommended for Madrid.

COUNTERMEASURES AND STRATEGIES

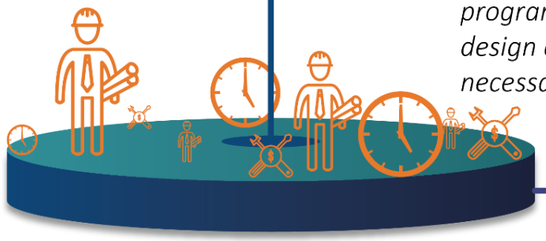
This section discusses the Plan's recommended countermeasures. These countermeasures are not prescriptive, nor a package, but rather a toolbox of strategies to address the observed challenges. The recommended countermeasures are tiered, with each increasing tier reflecting increasing cost, complexity, and amount of time to implement. All countermeasures are contingent on funding and program priorities. Assuming funding is available and a countermeasure is programmed, the Tiers are:

TIER 1

Near-term (6 mos. – 2 yrs.):
limited coordination, projects part of the maintenance cycle, low cost.

TIER 2

Mid-term (2 – 5 yrs.):
Some coordination between two or more entities, requires a dedicated programmed funding source, some design and/or certifications necessary, moderate cost.



TIER 3

Long Term (5+ yrs.):
Extensive coordination, design, and engineering required, likely requires environmental, right-of-way, and utility clearances, utilizes multiple and competitive funding sources, multiple requests for bids possible, high cost.

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The countermeasures may be additive or standalone. When combined with a gateway feature, some countermeasures, such as the recommended median island, may have a synergistic effect on enhancing overall transportation safety. For example, median islands alone may reduce the 85th percentile speed by 1 MPH. However, the 85th percentile speed may be decreased by 6 MPH when a median island is implemented with a gateway feature. Others such as the recommended signs may only be effective for a brief period; therefore, these countermeasures should be judicious to ensure their effectiveness.

Based on the observed safety challenges, a recurring theme of the following countermeasures is to reduce adverse pedestrian and motor vehicle conflicts by focusing on speed limit compliance. Studies have found an association between vehicle speed and the likelihood of pedestrian fatality in the event of a crash[4]. Figure 13 shows that this association is not linear but exponential, indicating pedestrian safety is a function of motor vehicle speed. The study corridor has a speed limit of 20 MPH. However, the collected data suggest that fifteen percent of traffic exceeds the speed limit by 5 MPH or more, thus increasing the likelihood of a pedestrian fatality. Fortunately, the crash data did not reveal any pedestrian fatalities and only a few pedestrian-involved crashes. This safety plan seeks to proactively prevent pedestrian fatalities and injuries.

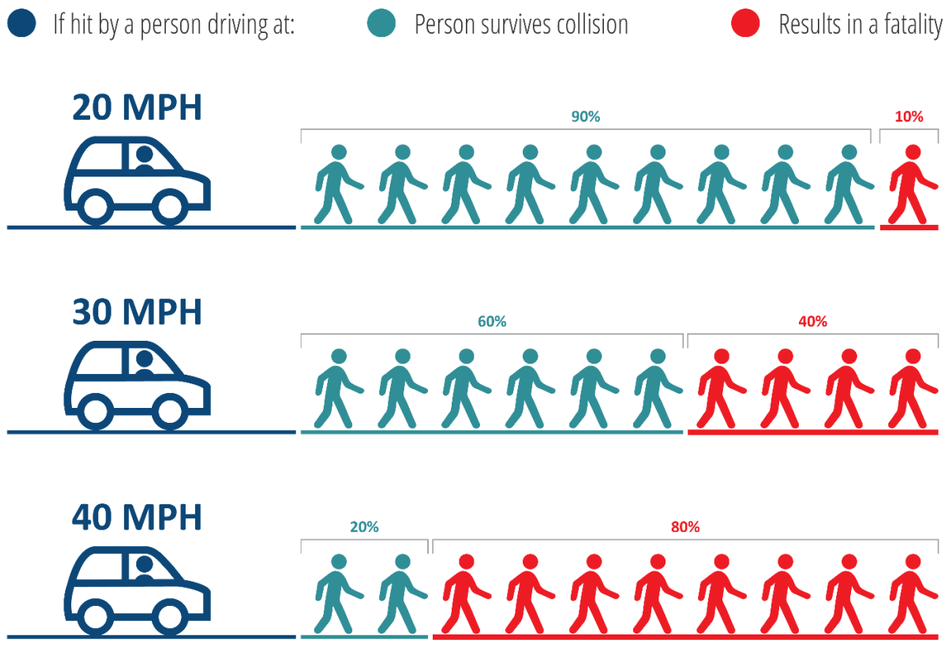

Figure 13: Likelihood of pedestrian fatality by vehicle speed - adapted from San Francisco MTA Vision Zero Action Plan, February 2015

Countermeasure Plan

Part of the appeal of Madrid is its historic charm and unique identity. Its location on a state highway also presents unusual roadway conditions that require a novel approach. The following roadway countermeasures communicate to the driver that they are entering a unique pedestrian-oriented environment, purposely designed for slower vehicular speed. This subtle shift in the design of the roadway conditions promotes slower vehicular speeds. The addition of pedestrian facilities enhances safety for all roadway users, including drivers, pedestrians, and bicyclists.

The recommended countermeasures in this transportation safety plan build upon the previous efforts recently made by NMDOT District-5 as discussed in the Existing Conditions

[4] Pasanen, "Driving Speeds and Pedestrian Safety: A Mathematical Model."

section. The new recommended countermeasures are presented and organized by sections of the study corridor. Each section contains specific challenges and countermeasures within that segment of NM-14. The four sections are shown in Figure 14. The following sections present the northbound countermeasures on NM-14, beginning with Section 1 on Madrid's south end and Section 4 on the north end.

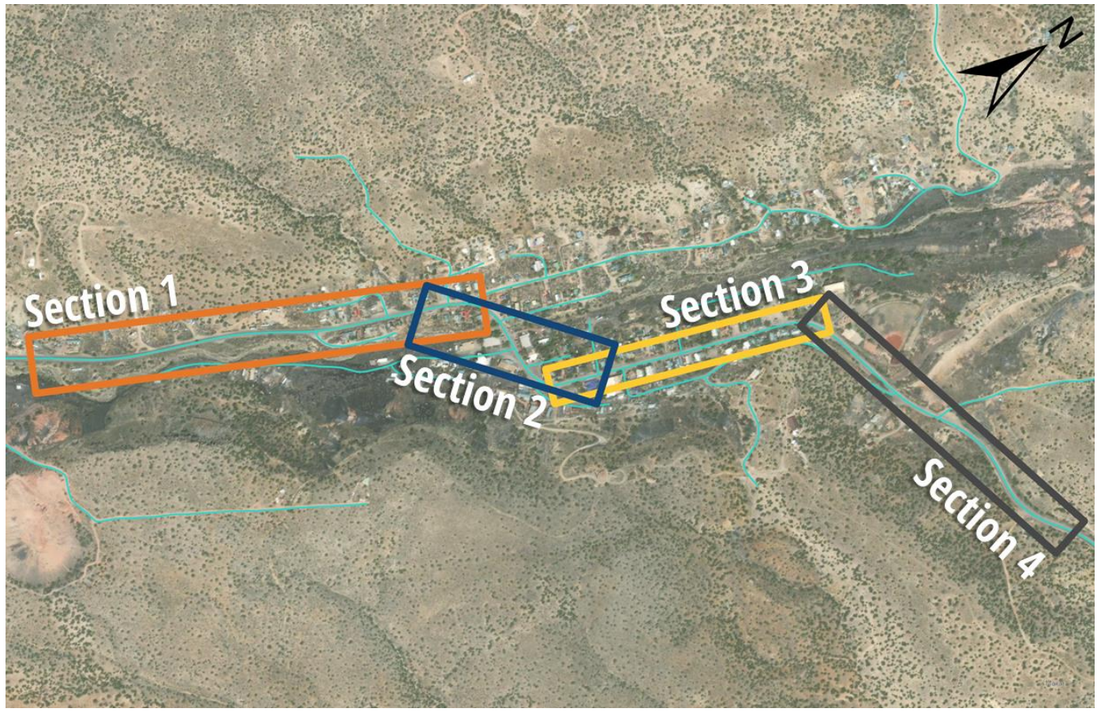

Figure 14: Study corridor sections.

Corridor-Wide Countermeasures

Some countermeasures are recommendations for the entirety of the corridor. Corridor-wide countermeasures include a refresh of the center line and edge line striping. The driving lanes may be narrowed in conjunction with the refresh, with 6-inch wide striping, creating driving lanes 10-feet wide in the 20 MPH speed zone instead of the existing 11.5 feet width. The available asphalt roadway remains the same, but the appearance of a narrower driving lane serves as a traffic calming feature to aid with speed limit compliance. Studies have found a relationship between lane width and vehicle moving speeds. As shown in , narrower lanes tend to reduce vehicle speeds at a rate of 3 MPH for every foot reduction in driving lane width[5]. Details of the narrowed driving lanes are discussed in each of the following sections of the study corridor.

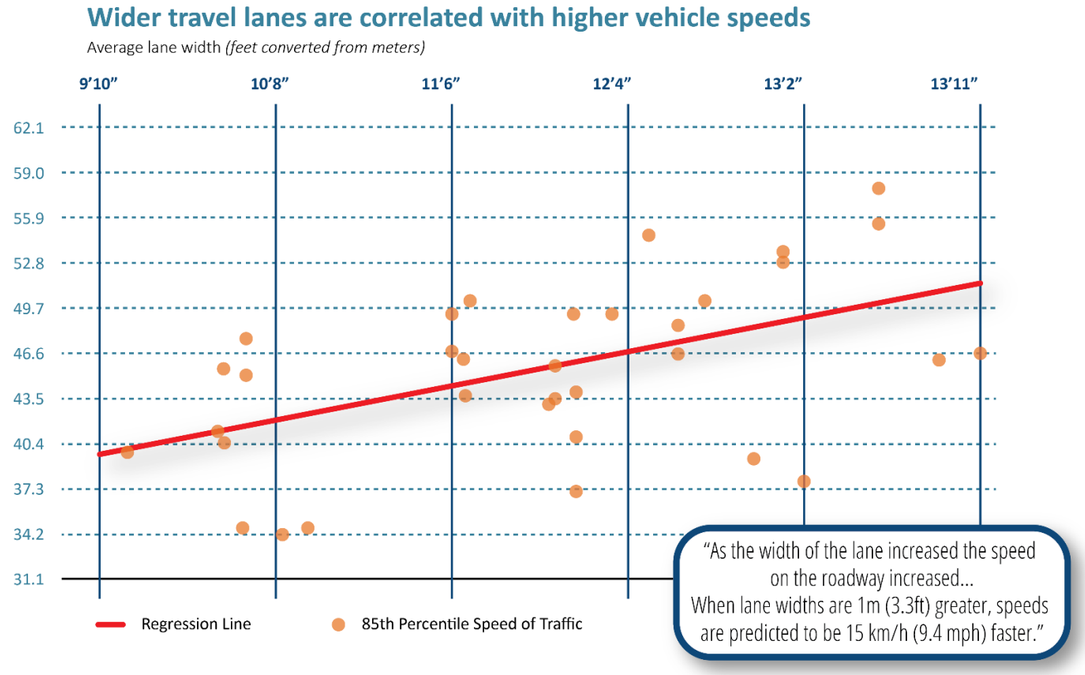

Figure 15: Average lane width by 85th percentile speed – Adapted from: https://nacto.org/wp-content/themes/sink_nacto/views/design-guides/retrofit/urban-street-design-guide/images/lane-width/wider-travel-lanes-graph.png

[5] Fitzpatrick et al., "Design Factors That Affect Driver Speed on Suburban Arterials."

Section 1

This section is approximately 2500 feet of NM-14 approaching Madrid from the south. The safety countermeasures proposed for this segment attempt to transition northbound vehicles on NM-14 from 55 MPH to 20 MPH. The safety countermeasures in this section are designed to improve compliance with the 20 MPH speed limit before northbound travelers go through Madrid.

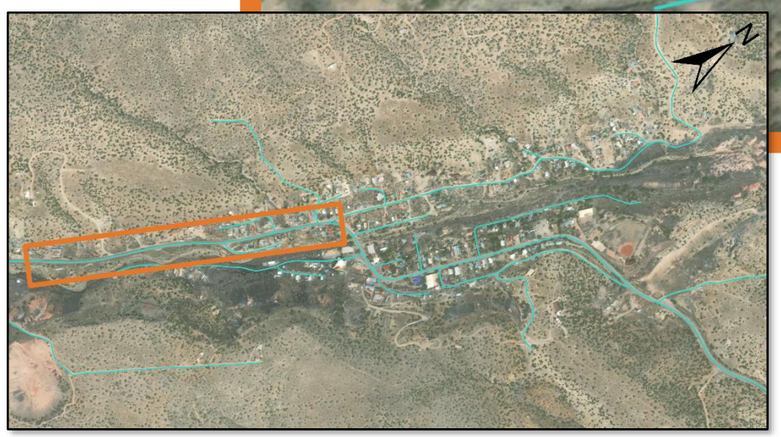

Figure 16: Section 1

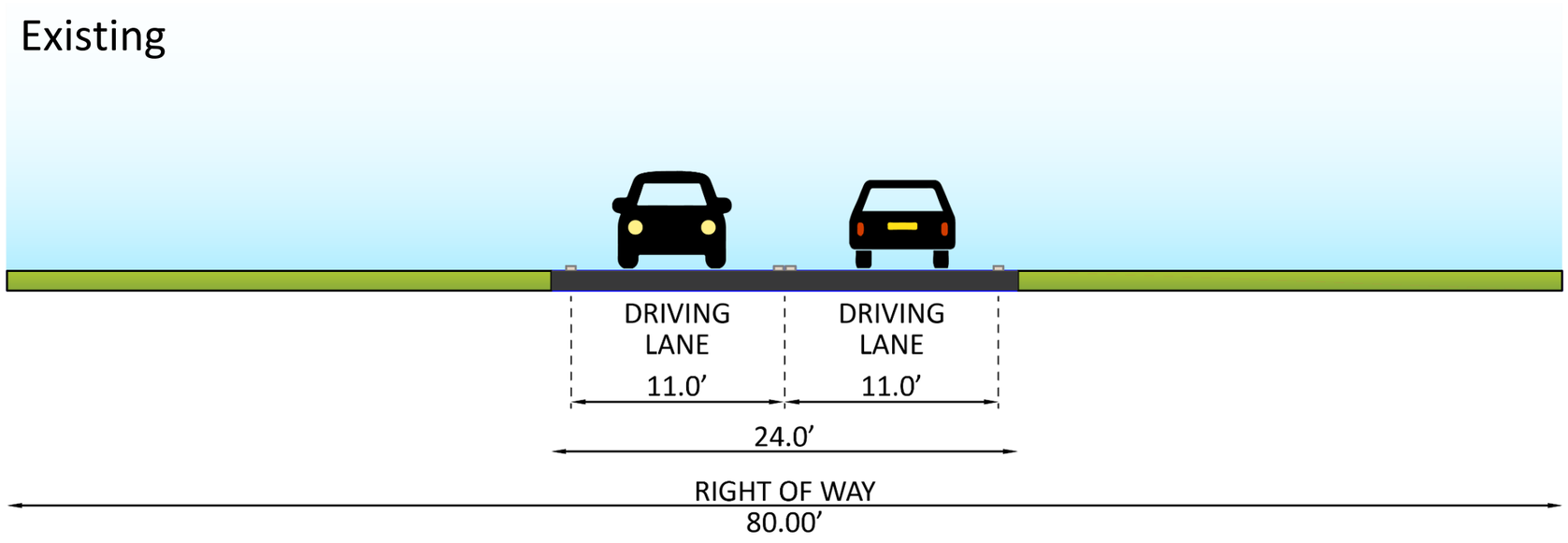

Figure 17: Existing Typical Section, Section 1

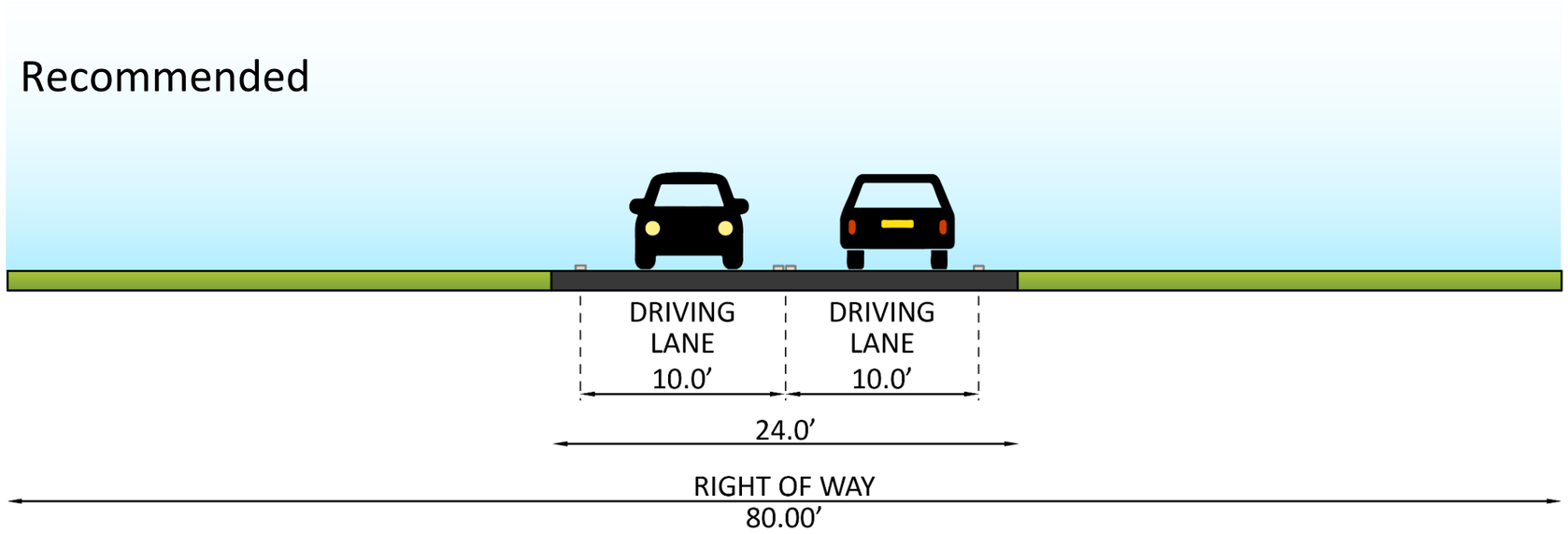

Figure 18: Recommended Typical Section, Section 1

The first countermeasure to improve speed limit compliance in this section is to narrow the driving lane width. The existing roadway typical section in Section 1 is 24-feet wide with two 11-foot-wide driving lanes for vehicles traveling in either direction. Figure 17 shows the NMDOT right-of-way with the existing roadway configuration in Section 1.

The project team recommends narrowing the lanes to 10-feet wide, as shown in Figure 18, at the start of the 20 MPH speed zone. This is a Tier 1 strategy that uses centerline and edge line striping to narrow the lanes but does not impact the available asphalt of the driving lanes needed by larger vehicles to travel safely on NM-14.

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The purpose of regulatory signs is to notify roadway travelers about pertinent traffic laws and regulations. The existing regulatory speed limit signs in Section 1 are shown in Figure 19. In this section, the speed limit is reduced by 25 MPH within approximately 2000 feet. Vehicles experience a speed limit reduction to 45 MPH as they approach Section 1, alerted to the next speed limit step down to 35 MPH. The 35 MPH speed zone begins about 325 feet into Section 1 before encountering a sign alerting drivers to a 20 MPH speed zone ahead after traveling 500 feet into the 35 MPH zone. Vehicles then enter the 20 MPH speed zone. The 20 MPH speed limit is communicated 400 feet after the speed zone begins via a speed limit sign augmented with a Dynamic Speed Feedback Sign. This Plan emphasizes the 20 MPH speed zone by replacing the existing 20 MPH signs 24" by 30" with oversized 20 MPH signs. This Tier 1 countermeasure recommends 36" by 48" size signs. When drivers reach Madrid, many have been driving on NM-14 for 20 miles and passed numerous standard-sized speed limit signs that are now overlooked and blend in with the scenery. The oversized signs are meant to focus the driver's attention, reinforcing the 20 MPH speed limit.

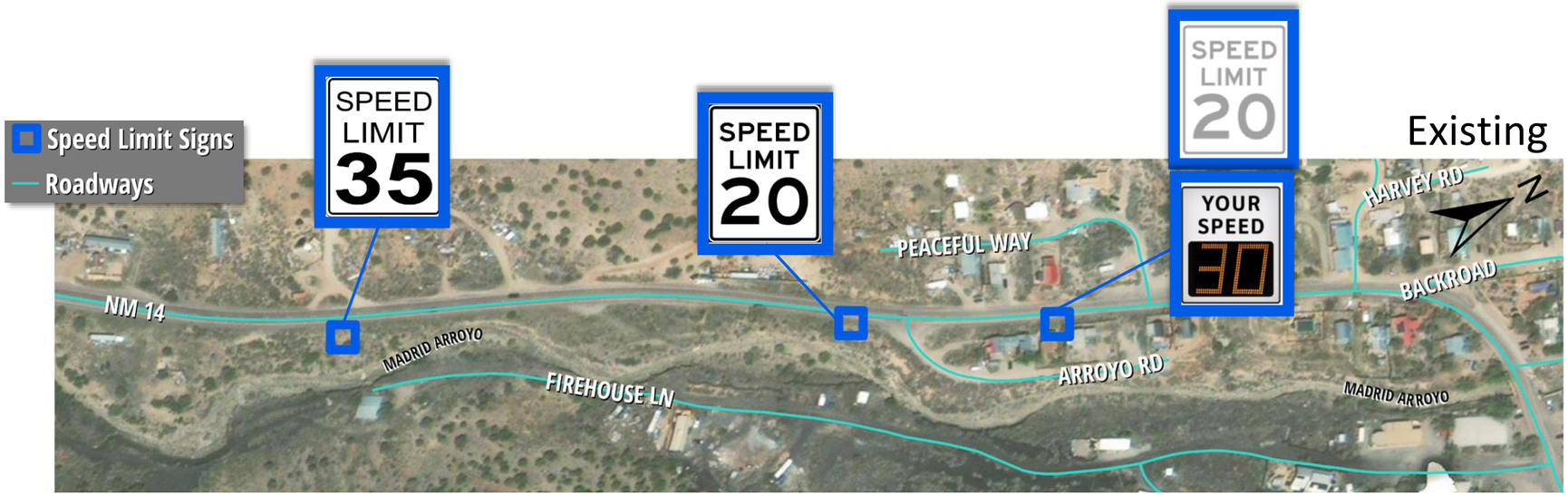

Figure 19: Existing speed limit signs, Section 1

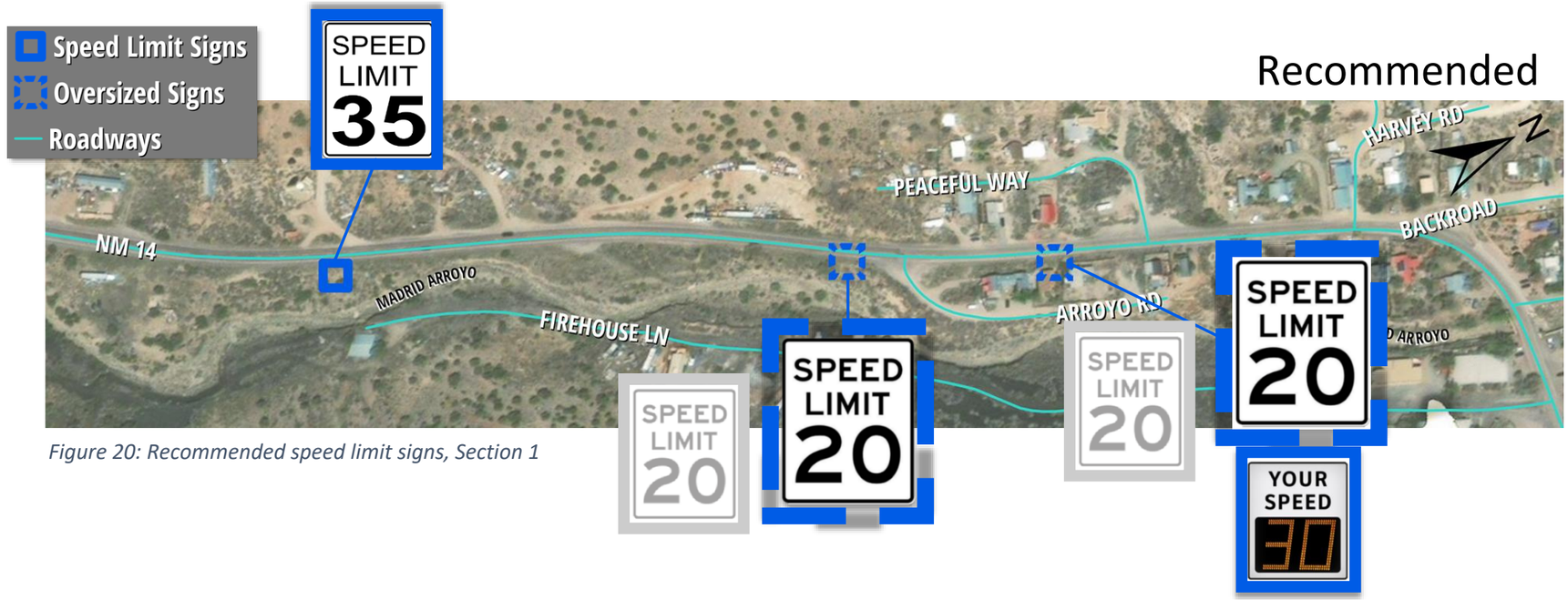

Figure 20: Recommended speed limit signs, Section 1

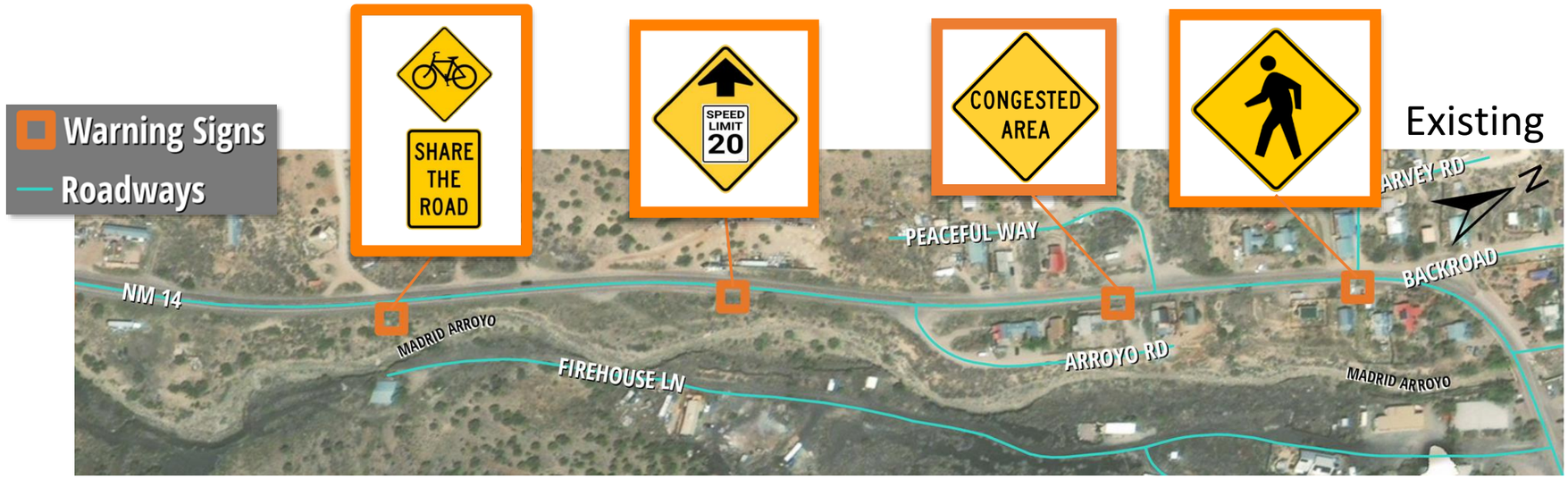

Figure 21: Existing warning signs, Section 1

Figure 22: Recommended warning signs, Section 1

Warning signs alert roadway travelers to unusual or unexpected conditions. As shown in Figure 21, Section 1 contains signs alerting drivers about the 20 MPH zone and anticipating and accommodating bicyclists and pedestrians that may be in the roadway envelope.

The existing warning signs were installed to enhance roadway safety. However, the plan for this section recommends the following Tier 1 countermeasures that replace some of the existing warning signs to augment and enhance the overall signage message.

- The replacement of the existing standard-sized 36" by 36" 20 MPH speed warning sign (shown in gray) with an oversized 48" by 48" 20 MPH speed warning sign. This enlarged warning sign re-emphasizes to drivers the need to reduce speed.
- The replacement of the existing pedestrian traffic warning sign near Harvey Road (shown in gray) with a warning sign alerting motorists to pedestrian and bicyclist traffic ahead.

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Pavement markings, like signs, are used to communicate messages to roadway users. Northbound drivers on the southern approach to Madrid are alerted to the 20 MPH speed limit ahead by two sets of transverse rumble strips. Vehicles roll over the first set of rumble strips 700 feet after passing a warning sign with the message "RUMBLE STRIPS AHEAD." After traveling another 125 feet, drivers encounter the second set of transverse rumble strips. Approximately 400 feet from the second set of rumble strips, drivers are alerted to the 20 MPH speed zone ahead. In addition, pavement markings communicate the 20 MPH speed limit. The project team recommends relocating the transverse rumble strips as a Tier 1 countermeasure. The recommended locations are 200 feet before the 35 MPH speed zone and 100 feet before the 20 MPH speed zone. The relocated rumble strips will call attention to the speed reduction when approaching the 35 MPH speed zone, reinforcing the gradual speed limit reduction. Transverse rumble strips operate by generating noise and vibration to alert drivers to an unusual change in vehicular traffic conditions. However, the noise from the rumble strips near the 20 MPH may pose a nuisance to nearby residents.

Figure 24: Existing pavement treatments, Section 1

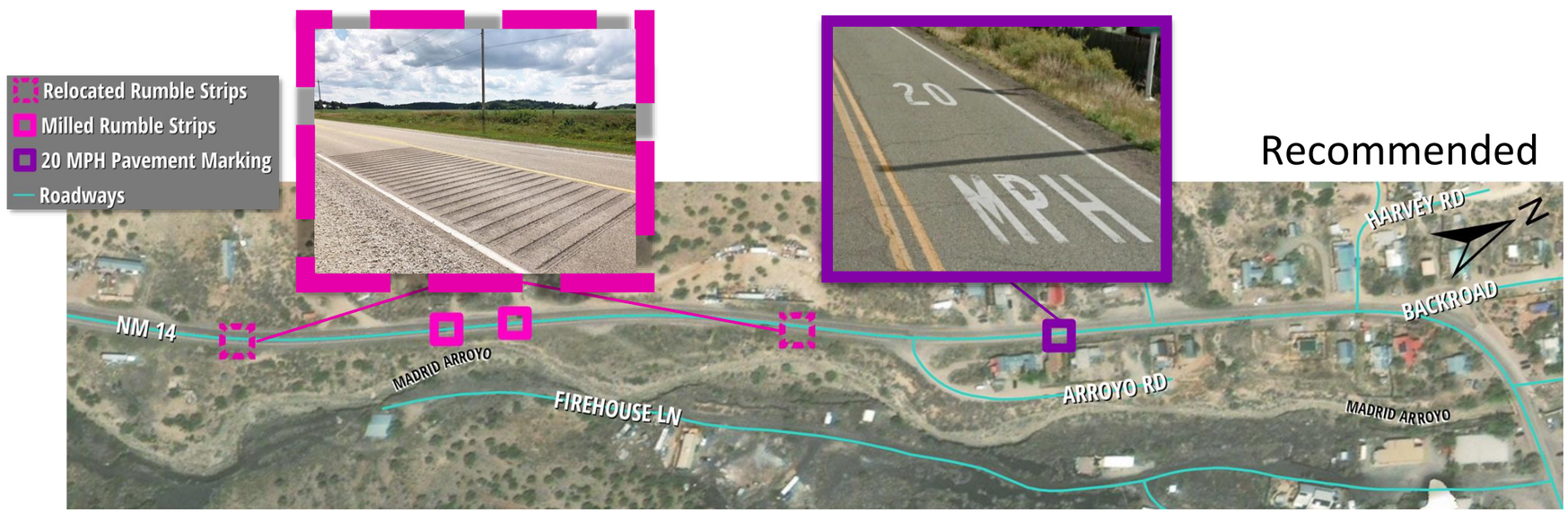

Figure 23: Recommended pavement treatments, Section 1

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The final recommended countermeasure addressing speed limit compliance in Section 1 is the construction of a median island. This Tier 3 treatment creates a horizontal deflection or a horizontal shift in the roadway, requiring drivers to reduce their speed to navigate around the roadway feature safely and comfortably. This treatment aims to reduce travel speeds before reaching the reverse curve in Madrid. Moreover, the median island provides a potential site for the installation of a community gateway feature. A gateway feature enhances the aesthetics of the roadway, communicates the values and identity of the community, and reinforces that the driving environment has changed for roadway users. Median islands and median islands with gateway features are effective countermeasures for reducing motor vehicle speeds[6]. The gateway feature is recommended as an initiative for the community to pursue. However, any gateway feature must conform to the NMDOT guidelines for utilizing transportation gateway features[7].

Figure 26: Community gateway feature, example

Figure 25: Recommended Median Island and Gateway Feature, Section 1

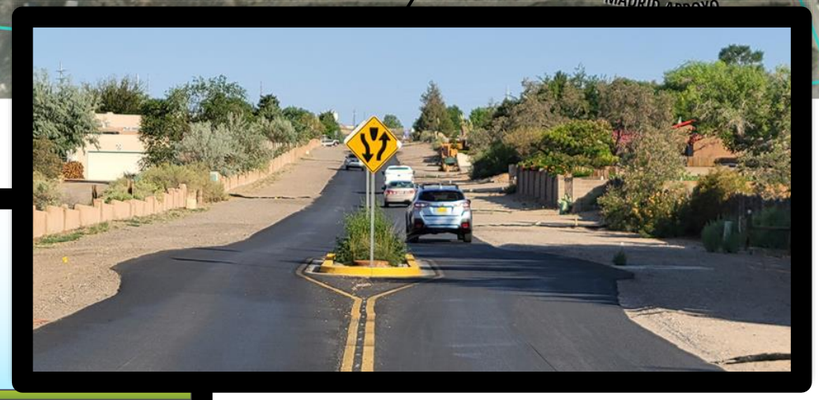

Figure 27: Median island, example

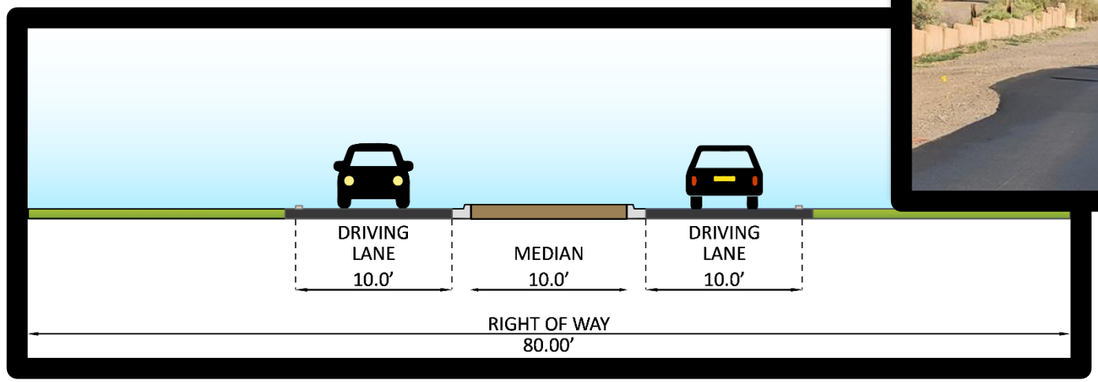

Figure 28: Typical Section with Median Island, Section 1

[6] Dixon et al., "Determining Effective Roadway Design Treatments for Transitioning from Rural Areas to Urban Areas on State Highways."
[7] NMDOT, "New Mexico Department of Transportation Gateway Monument Guidelines."

SECTION 2

In Section 2, the countermeasures establish pedestrian facilities and continue to focus on speed limit compliance. In this section, drivers enter a reverse curve as NM-14 approaches the downtown of Madrid. Between the two curves, drivers traveling north pass over an arroyo before encountering local businesses and parked vehicles adjacent to the roadway. These local businesses also generate pedestrian traffic.

Figure 29: Section 2

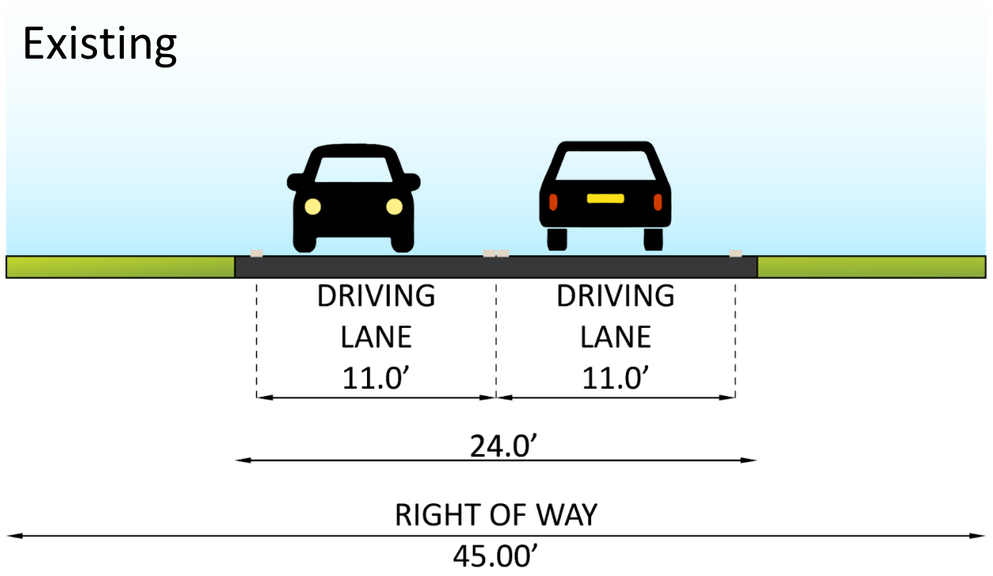

Figure 30: Existing typical section, Section 2

Similar to Section 1, the existing asphalt roadway is 24-feet wide with two 11-foot driving lanes for vehicles traveling in either direction. However, in Section 2, NMDOT's existing right-of-way is limited to 45 feet; Figure 30 shows a typical section of this segment of NM-14.

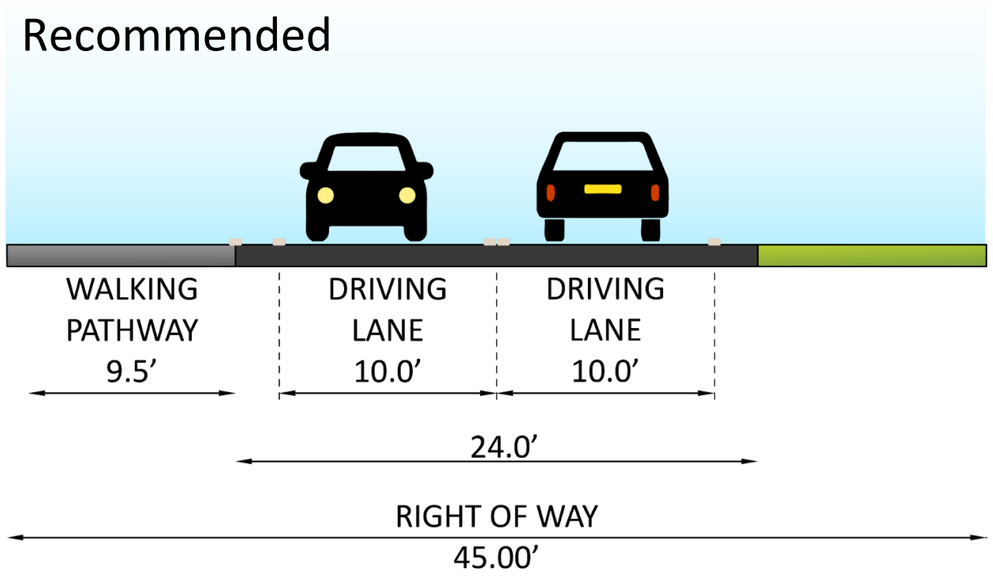

Figure 31: Recommended typical section, Section 2

The initial recommended countermeasure is to narrow the driving lanes to 10-feet wide, as shown in Figure 31. This Tier 1 strategy uses 6-inch centerline and edge line striping to narrow the lanes without impacting the available asphalt of the driving lanes needed by larger vehicles to navigate the reverse curve safely. In addition, an asphalt pedestrian pathway is recommended for the westside of NM-14. Details of the pedestrian pathway are discussed below.

Figure 32: Recommended Walking Pathway, Section 2

Figure 33: Colored asphalt walkway with lighted bollards

Figure 32 shows a recommended 9.5-foot wide walking pathway. This is a Tier 3 countermeasure as it will require multiple funding sources and some design work. The recommended surface is asphalt keeping the walkway at grade with the roadway. The project team recommends installing lighted bollards to separate the walking path from the road to further enhance pedestrian safety. The bollards should be spaced wide enough to be ADA accessible but not so wide as to allow vehicles to fit between the bollards. Lighted bollards are recommended for increased safety and visibility after the sun sets. Another recommendation to further define the pedestrian space is colored asphalt that creates a visible contrast with the roadway.

In Section 2, pedestrian activity increases due to limited public parking and the public-facing businesses at the south end of Madrid's downtown. The limited parking in this area necessitates that pedestrians walk on the available roadway shoulder or in the roadway to access the adjacent business in Section 2. In other words, pedestrians do not have suitable facilities to use when walking through the corridor or crossing the street. The safety plan recommends establishing a crosswalk in this section. Figure 35 shows one possibility for the crosswalk's location. However, a study to determine a safe and convenient crossing location should optimize its efficacy and utilization. Once a site is determined, this Plan recommends several tiered treatments for the crosswalk. Figure 34 shows a continental crosswalk with advance yield markings, a Tier 1 countermeasure. Figure 36 shows a crosswalk with an R1-6 pedestrian gateway treatment. The in-street pedestrian sign creates a vertical presence to alert motorists to yield to pedestrians. The R1-6 signs are installed on the centerline and edge line of the driving lanes. Studies have shown that these combined treatments have high compliance rates for reducing motor vehicle speeds and yielding to and stopping for pedestrians[8].

Figure 34: Continental crosswalk with advanced yield markings

Figure 35: Recommended crosswalk and possible location, Section 2

Figure 36: R1-6 Pedestrian gateway treatment

[8] Van Houten and Hochmuth, "Evaluation of R1-6 Gateway Treatment Alternatives For Pedestrian Crossings"; Van Houten and Hochmuth, "Evaluation of R1-6 Gateway Treatment Alternatives For Pedestrian Crossings: Follow Up Report."

Figure 37: Rectangular Rapid Flashing Beacon (RRFB)

Figure 38: Speed Table with in-street pedestrian sign

Figure 37 shows a Rectangular Rapid-Flashing Beacon (RRFB) crosswalk treatment. RRFBs are push-button-operated LED lights that flash with high frequency to alert drivers to pedestrians crossing the street. This Tier 2 countermeasure can be an additive treatment with the Tier 1 crosswalk countermeasures. Previous studies have found that RRFBs can reduce pedestrian crashes by nearly fifty percent[9]. Figure 38 shows a raised crosswalk or speed table. This Tier 3 recommendation creates a vertical deflection by temporarily altering the roadway's height, requiring motorists to reduce their speed to navigate the feature comfortably. Additionally, the raised crosswalk surface enhances pedestrian safety by increasing pedestrian visibility. The purpose of this vertical deflection is twofold, to increase pedestrian visibility and calm traffic.

The implementation of a crosswalk in Madrid must accommodate all persons, regardless of their capabilities. Upon implementing any crosswalk treatment, curb ramps and landings will need to be constructed on either side of NM-14 at a minimum. Construction of the walking pathway before or in conjunction with the crosswalk treatments will optimize ADA accessibility within the given constraints.

[9] Zegeer et al., *Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments*.

A community initiative in Section 2 is to renew or resolve the existing Public Restroom Facility Easement agreement with Santa Fe County. This easement contains the only accessible parking, public restrooms, and the bus stop for the North Central Regional Transit District's Turquoise Line, which serves Madrid. This renewed agreement would be an opportunity to define maintenance roles and responsibilities clearly.

Figure 39: Public Restroom Facility Easement, Section 2

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SECTION 3

In this section, roadway users exit the reverse curve and continue through Madrid's downtown. Pedestrian volumes are at their highest since the density of Madrid's attractions increases. Limited on-street parking exists on the east side of NM-14. Also, Bridge Road and Cave Road intersect with NM-14 in this section. These two intersections are notable due to the elevated crash occurrences in their vicinity. The project team identified additional safety concerns in this section, including parking, speed limit compliance, lack of pedestrian facilities, and traffic congestion. Therefore, the goals of the countermeasures are also expanded to address these safety concerns.

Figure 40: Section 3

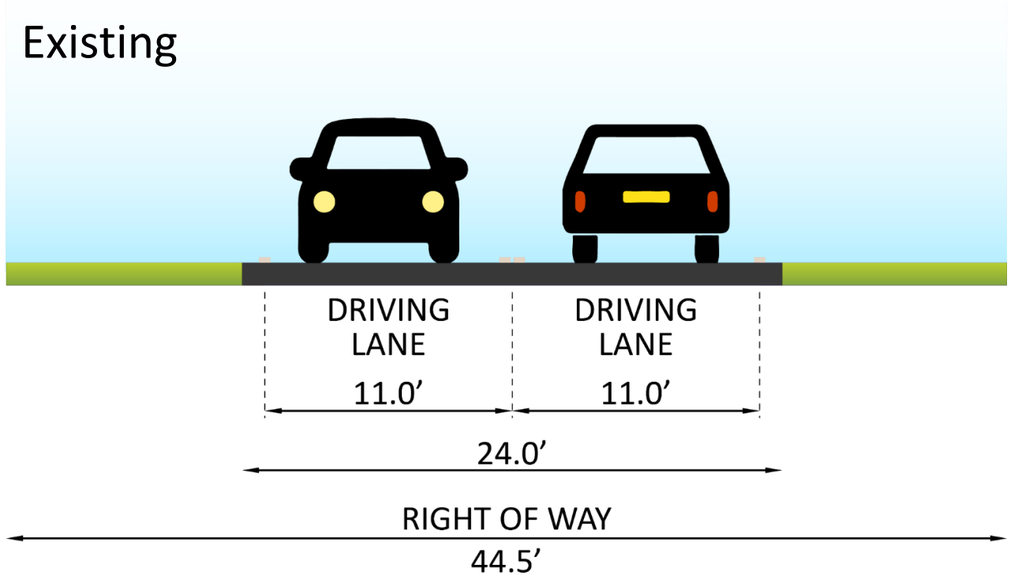

Figure 41: Existing typical section, Section 3

Section 3 is similar to Section 2. The existing asphalt roadway is 24-feet wide with two 11-foot driving lanes for vehicles traveling in either direction, which comprises almost half of the right-of-way. The right-of-way in Section 3 narrows from the 45-foot width in Section 2 as the roadway extends north. Figure 41 shows a typical section of this segment of NM-14.

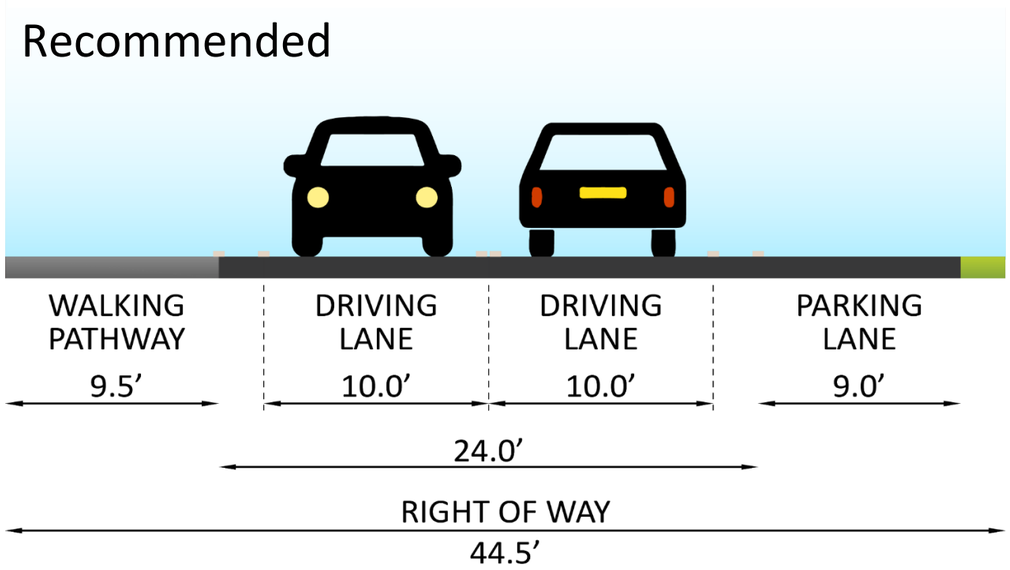

Figure 42: Recommended typical section, Section 3

As in previous sections, the initial recommended countermeasure is to narrow the driving lanes to 10-feet, as shown in Figure 42. This Tier 1 strategy uses 6-inch centerline and edge line striping to narrow the lanes without impacting the available asphalt of the driving lanes needed by larger vehicles to safely navigate the corridor. A walking pathway may be added to the westside of NM-14 and dedicated parking lanes on the eastside, as seen in Figure 42 and as described below.

Figure 44: Colored asphalt walkway with lighted bollards

Figure 43: Recommended Walking Pathway and historic boardwalk restoration, Section 3

Figure 45: Madrid Historic Boardwalk

Pedestrian activity is highest in Section 3 because of the number of businesses in downtown Madrid. Parking in this section is on-street and primarily on the east side of NM-14, and the limited parking requires visitors to park elsewhere and walk through town. As a result of the limited parking and lack of pedestrian facilities, pedestrians walk on the available roadway shoulder space or in the roadway. As shown in the typical section drawing for Section 3, Figure 43 shows a continuation of the recommended 9.5-foot wide walking pathway. This Tier 3 countermeasure extends the colored walkway surface and lighted bollard treatment through Madrid, ending at the historic boardwalk, which abuts the curve on the westside of NM-14, in Section 3. A complimentary community initiative is the proposed Madrid Art and History Walk. This initiative also proposes the partial restoration of the historic boardwalk. The Madrid Art and History Walk, coupled with the completion of the recommended walking pathway adjacent to NM-14, would provide a continuous pedestrian walkway from the public parking lots at the baseball field to the central area of Madrid.

Figure 46: Continental crosswalks with advanced yield markings

This safety plan recommends the placement of two crosswalks in this section. Figure 47 shows two possible locations for the crosswalk locations. As in Section 2, a study to determine safe and convenient crossing locations should be performed. After selecting the most appropriate sites, this Plan recommends several Tiered treatments for the crosswalks. Figure 46 show two continental crosswalks with yield markings in advance, Tier 1 countermeasures. Figure 48 shows an in-street pedestrian sign, part of an R1-6 pedestrian gateway treatment described in Section 2.

Figure 47: Recommended crosswalks and possible locations, Section 3

Figure 48: R1-6 Pedestrian Gateway Treatment

Figure 49: Rectangular Rapid Flashing Beacon (RRFB)

Figure 50: Speed Table with in-street pedestrian sign

Figure 49 shows a Rectangular Rapid-Flashing Beacon (RRFB) crosswalk treatment. This Tier 2 recommendation enhances pedestrian safety at marked mid-block crossing locations. Figure 50 shows a raised pedestrian crossing or speed table, a Tier 3 recommended countermeasure. Pedestrian crossings must accommodate all persons, regardless of their capabilities. Curb ramps and landings are required on either side of NM-14 at a minimum for all crosswalk treatments. Moving forward with the walking pathway before or with the crosswalk treatments will ensure ADA accessibility.

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SECTION 4

As drivers approach the north end of Madrid, they encounter a tight right curve before leaving the town. For Southbound drivers, this section is approximately 2000 feet of NM-14 approaching Madrid from the North. Similar to Section 1, the traffic signs in this road segment communicate a speed reduction on NM-14 from 55 MPH to 20 MPH as vehicles approach Madrid. Approximately 800 feet north of mile marker 29, a warning sign alerts motorists to the next speed limit, 35 MPH; the 35 MPH speed zone begins 250 feet later. Approximately 300 feet into the 35 MPH speed zone, drivers encounter a warning sign alerting them to a 20 MPH speed zone ahead. Then, 250 feet later, the 20 MPH speed zone begins. The 20 MPH speed limit is communicated 400 feet later via a speed limit sign with Dynamic Speed Feedback Sign and "*20 MPH*" marked on the roadway. The goal of countermeasures recommended in this section is to improve speed limit compliance as vehicles enter Madrid from the north.

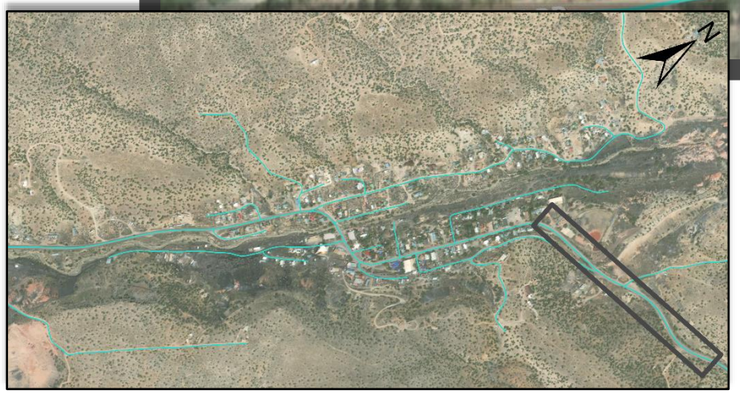

Figure 51: Section 4

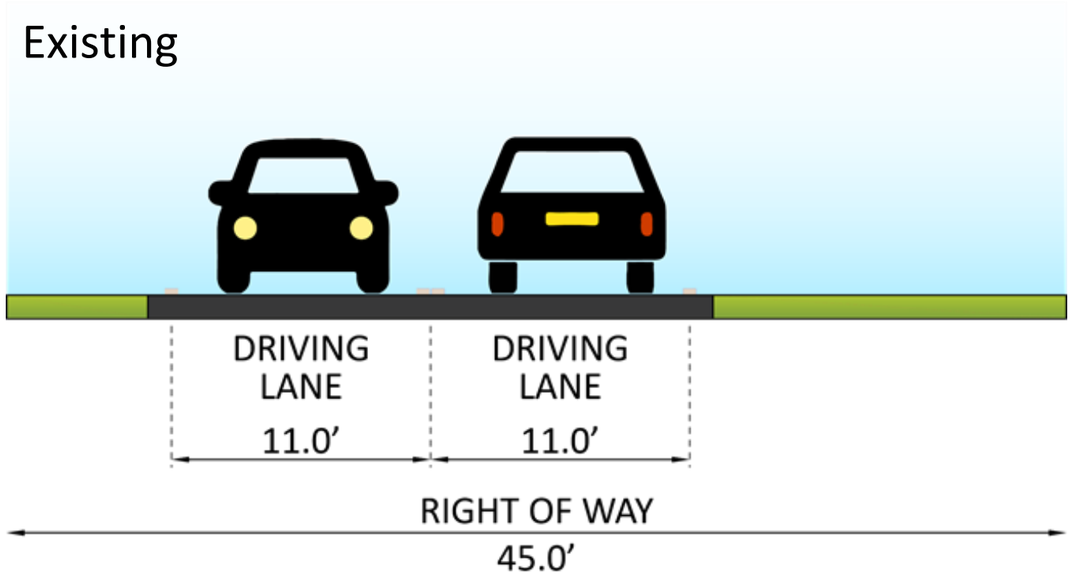

Figure 52: Existing typical section, Section 4

Figure 52 shows the roadway configuration within the NMDOT's 45-foot-wide right-of-way. Section 4 maintains the 24-feet of paved roadway striped for two 11-foot driving lanes. As in Section 1, countermeasures in Section 4 aim to improve speed limit compliance for southbound vehicles arriving in Madrid from the North.

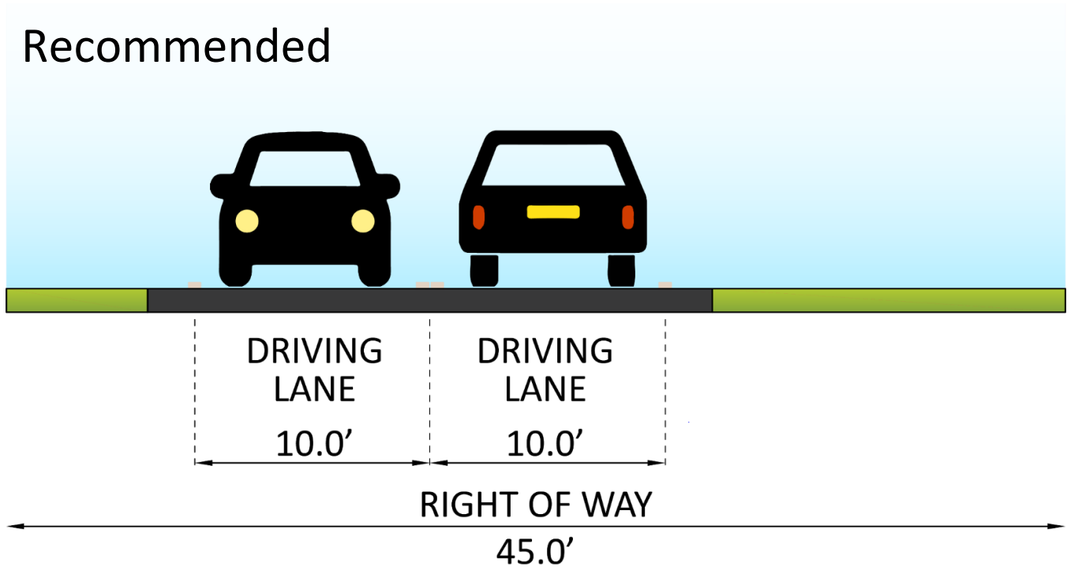

Figure 53: Recommended typical section, Section 4

The project team recommends narrowing the driving lanes to 10-feet wide, as shown in Figure 53, at the beginning of the 20 MPH speed zone for southbound vehicles. This is a Tier 1 strategy that uses 6-inch centerline and edge line striping to narrow the lanes without impacting the available asphalt of the driving lanes needed by larger vehicles to navigate the upcoming curve near the baseball field safely.

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The existing regulatory speed limit signs in Section 4 are shown in Figure 54. In this section, the speed limit is reduced by 25 MPH. Drivers experience a speed limit reduction to 45 MPH when approaching Section 4 traveling north to south and are also alerted to the next speed limit step down to 35 MPH. The 35 MPH speed zone begins 375 feet into Section 4, and the 20 MPH speed zone begins 450 feet later for southbound travelers. The 20 MPH speed limit is posted 400 feet after the speed zone begins via a speed limit sign augmented with a Dynamic Speed Feedback Sign.

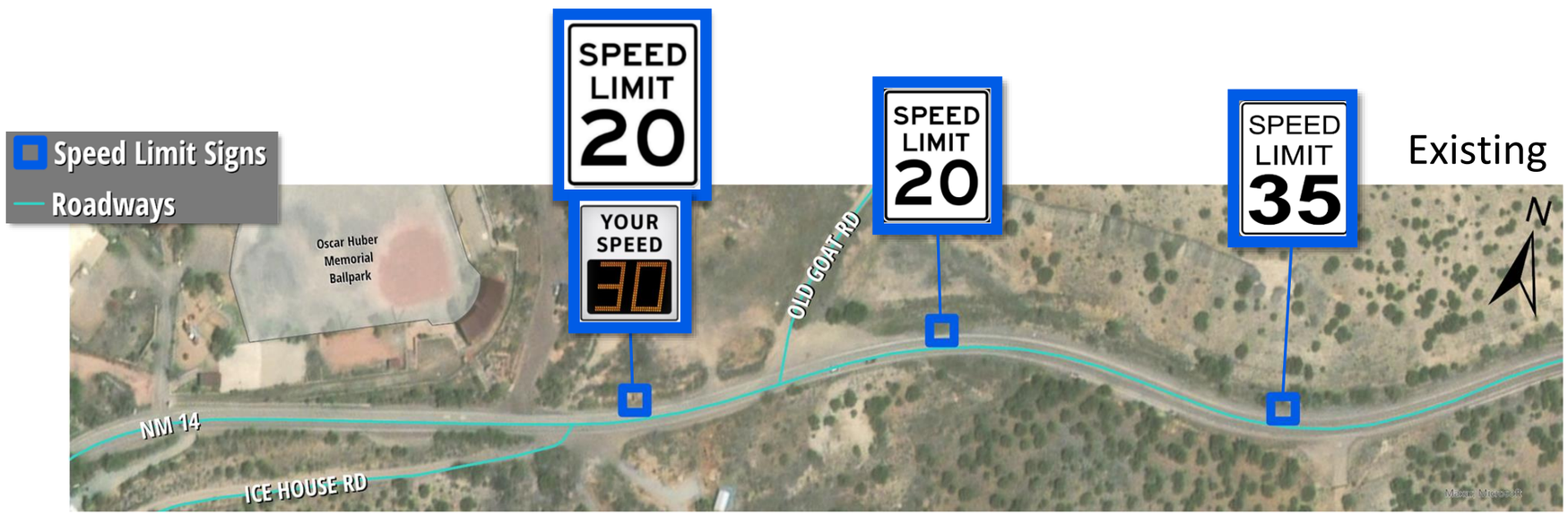


Figure 54: Existing speed limit signs, Section 4

By the time drivers reach Madrid, many have been driving on NM-14 for around 16 miles and passed numerous standard-sized speed limit signs that they now overlook and blend in with the scenery. This plan proposes to highlight the 20 MPH speed zone by oversizing the existing 24" by 30" 20 MPH signs with 36" by 48" signs. The oversized signs are meant to focus the driver's attention and reinforce the 20 MPH speed limit.

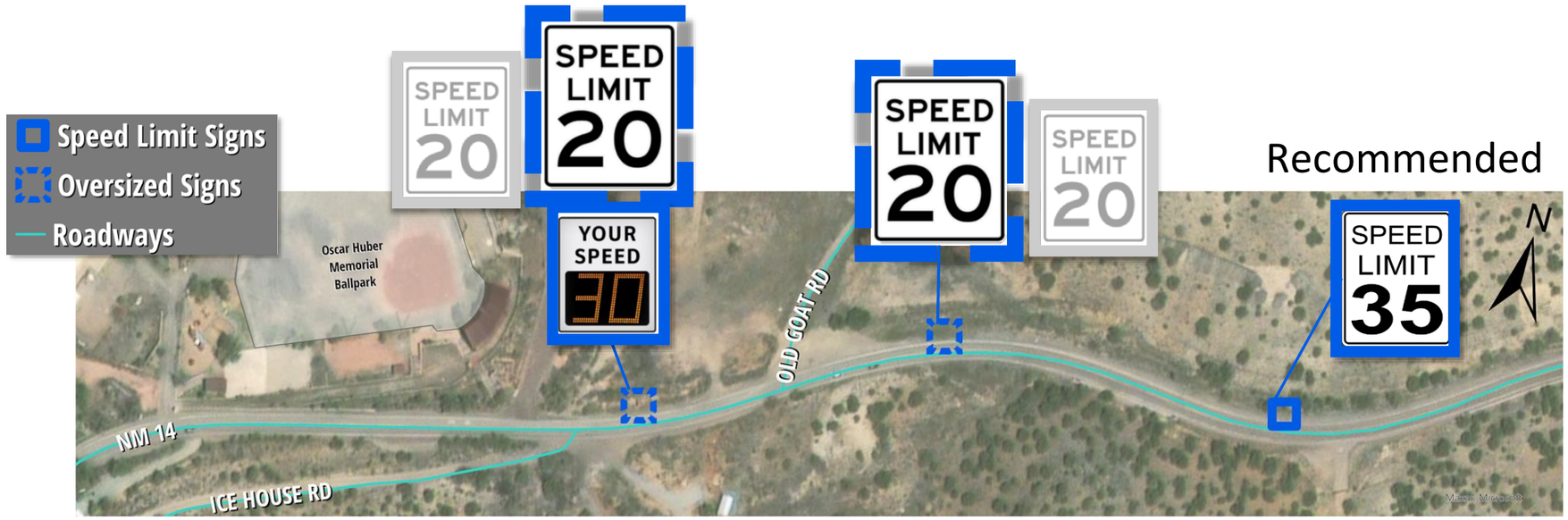


Figure 55: Recommended speed limit signs, Section 4

Figure 56: Existing warning signs, Section 4

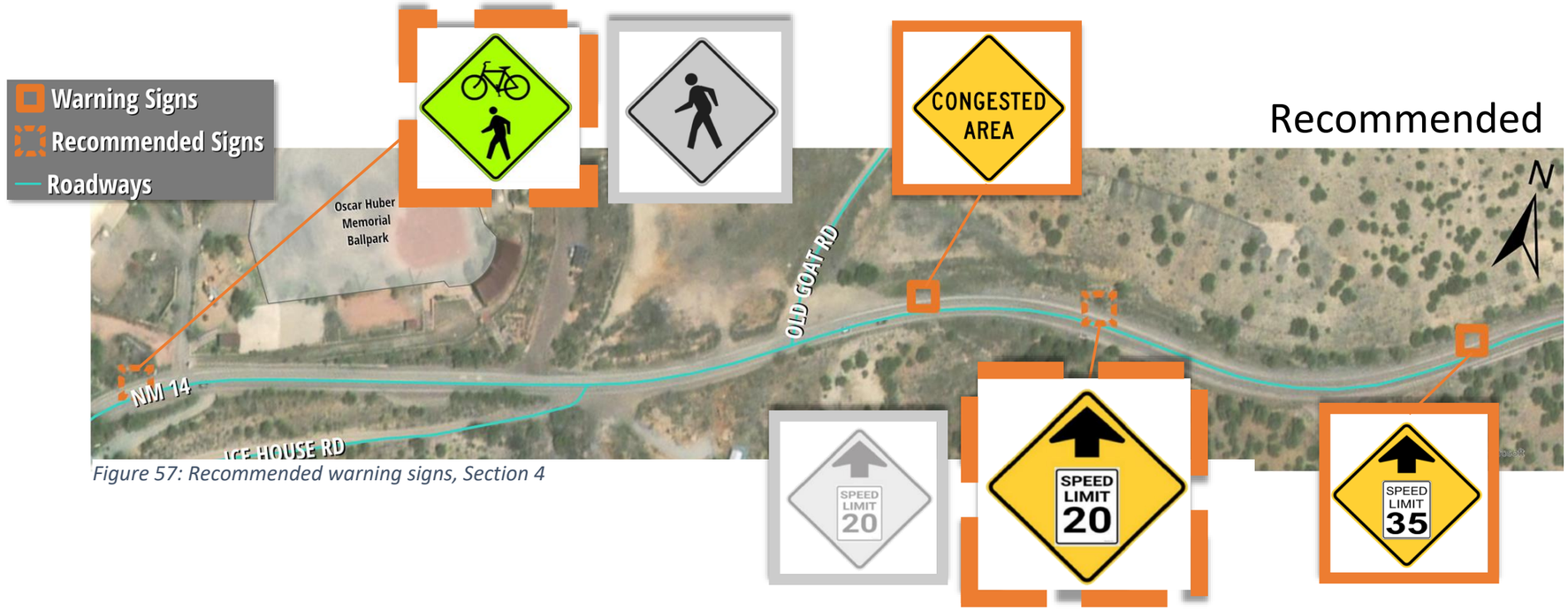


Figure 57: Recommended warning signs, Section 4

As shown in Figure 56, Section 4 contains numerous signs alerting drivers to reduced speed zones, expect and accommodate pedestrians, and the roadway ahead may be congested.

Similar to Section 1, the existing warning signs in Section 4 enhance roadway safety. To enhance their messages, several Tier 1 countermeasures related to traffic warning signs are recommended for Section 4:

- The replacement of the existing standard-sized 36" by 36" 20 MPH speed warning sign (shown in gray) with an oversized 48" by 48" 20 MPH speed warning sign. This enlarged warning sign re-emphasizes to drivers the need to reduce speed.
- Another countermeasure is the replacement of the existing pedestrian-only traffic warning sign near the northern curve (shown in gray) with a new warning sign alerting motorists to pedestrian and bicyclist traffic ahead.

Southbound drivers on the northern approach to Madrid are reminded about the 20 MPH speed limit by "20 MPH" pavement marking. Unlike Section 1, there are no transverse rumble strips for drivers heading southbound into Madrid.

The project team recommends relocating the "20 MPH" pavement marking 250 feet north of its current location as a Tier 1 countermeasure. The recommended locations are 200 feet before the 35 MPH speed zone and 100 feet before the 20 MPH speed zone. Another Tier 1 recommendation is to mill two sets of transverse rumble strips that alert southbound roadway users to the speed zone reductions as they approach Madrid from the north. The rumble strips call attention to the speed reduction when approaching the 35 MPH speed zone, reinforcing the gradual speed limit reduction.

Figure 58: Existing 20 MPH pavement marking location

Figure 59: Existing pavement treatments, Section 4

Figure 61: Recommended 20 MPH pavement marking location

Figure 62: Recommended transverse rumble strips locations

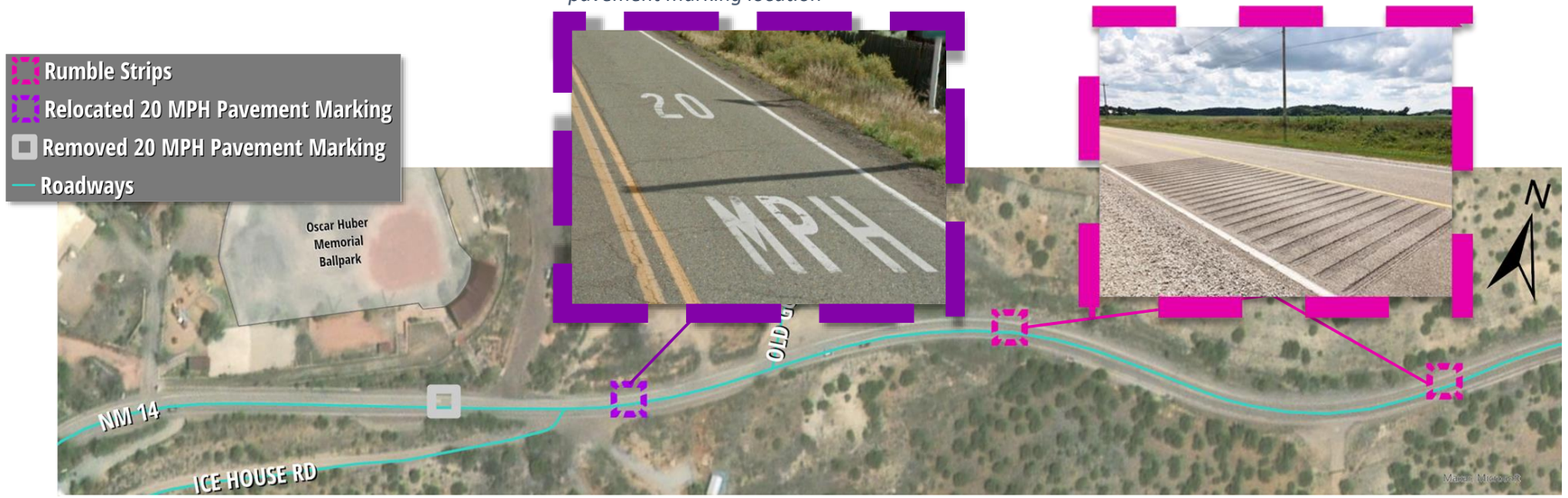
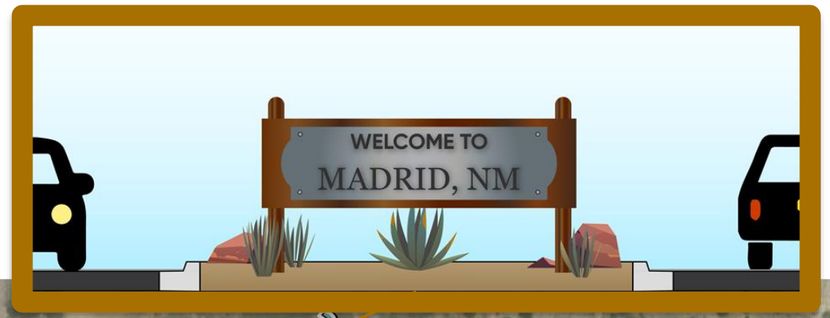
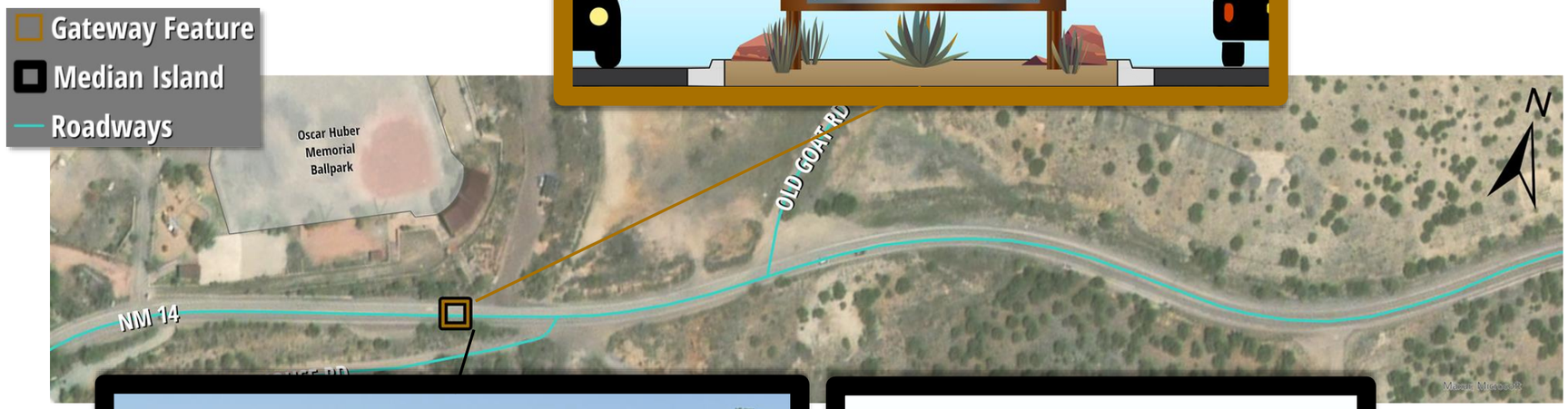


Figure 60: Recommended pavement treatments, Section 4

Figure 65: Community gateway feature example





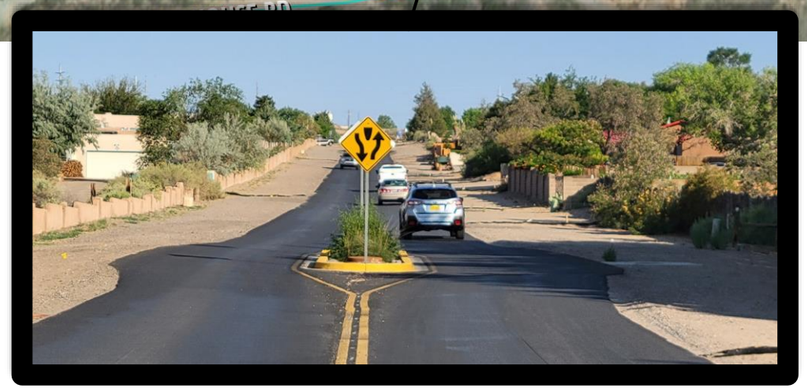


Figure 63: Median island, example

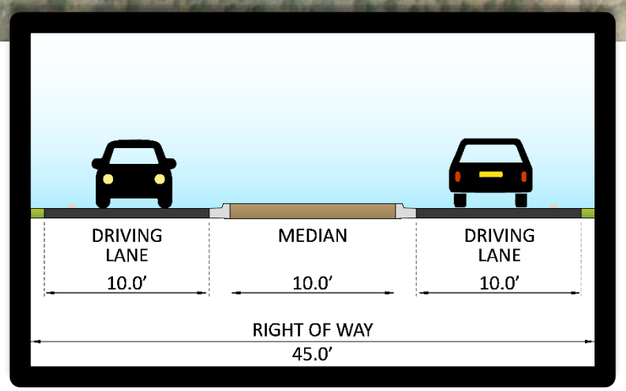


Figure 64: Recommended typical section, Section 4

The final safety recommendation in Section 4 is a median island. Similar to Section 1, this is a Tier 3 countermeasure to calm traffic before entering downtown Madrid by creating a horizontal deflection. This horizontal deflection or shift in the roadway results in drivers reducing their speed so that they can safely and comfortably navigate around the median island. This median island also provides a potential site for installing a community gateway feature on the north end of Madrid. This gateway feature can enhance the aesthetics of the roadway and communicates the community's values and identity for southbound travelers to Madrid. More importantly, this gateway feature reinforces the concept that the roadway conditions are changing ahead to a pedestrian-oriented environment with corresponding slower speeds for approaching motorists. The gateway signage feature is a potential initiative for the community to pursue.

Within Section 4 is Madrid's largest off-street public parking area, located just north of the Oscar Huber Memorial Ballpark. This parking area can accommodate both passenger vehicles and recreational vehicles. One of the challenges of this location is that visitors arriving in Madrid are not aware of this parking area. Also, large recreational vehicles which utilize the public parking area designated for them must navigate a narrow opening to access parking, often causing roadway congestion while doing so. A recommended community initiative to address this challenge is to provide a wider access point for recreational vehicles. Installing wayfinding and parking signage to alert and guide visitors to the ballpark parking area is an additional community initiative that may help mitigate congestion from motorists circling for open parking. Figure 66 shows two examples of MUTCD parking guidance signs.

Figure 67: Proposed Art and History Walk with Boardwalk and Parking, Section 4

Figure 66: MUTCD parking guidance signs

Another challenge of the ballpark parking location is the perceived distance from the attractions in the central district of Madrid. To help meet this challenge, the Madrid community is pursuing a Madrid Art and History Walk, which includes restoring part of the historic boardwalk. The proposed Madrid Art and History Walk would link the ballpark and ballpark parking areas with the central area of Madrid. Restoring portions of the historic boardwalk is also part of this initiative. In addition to a cultural attraction, the proposed Madrid Art and History would provide a safer and more convenient pedestrian connection between the ballpark parking area and the attractions located in the central district of Madrid. Another community initiative is implementing an

intra-community shuttle to transport visitors from the ballpark parking area to Madrid's central district, especially during peak season. Both strategies would attract and divert roadway users to park in the designated public ballpark parking areas, potentially reducing parking congestion closer to the downtown area.

Additional community initiatives recommended by this Plan are:

- Resolving any right-of-way discrepancies
- Investigate the potential of a consolidated airspace agreement with Santa Fe County to allow and better manage the on-street parking in the NMDOT right-of-way.
- Enhance the Madrid transit stop facility by coordinating with NCRTD
- Promote the Turquoise Trail route as an alternate way to travel to Madrid
- Explore more frequent transit service during the peak seasons by coordinating with NCRTD

In combination, these strategies would help relieve vehicular congestion and lessen the strain on parking capacity in the central area of Madrid.

Designating NM-14 as a Safety Corridor should be explored as a community initiative as well.

Figure 68: NCRTD Blue Bus

Figure 69: NCRTD transit shelter

PLAN TO MEASURE PROGRESS

The purpose of the safety countermeasures presented in the Madrid Transportation Safety Plan is to address and mitigate the high rate of pedestrian and vehicular fatalities and injuries on New Mexico public roads. On a statewide scale, NMDOT is required to set annual targets for five performance measures:

- Number of Total Fatalities
- Number of Serious Injuries
- Fatalities per 100 million vehicle miles traveled (VMT) or fatality rate
- Serious Injuries per 100 million VMT or serious injury rate
- Number of Non-motorized Fatalities and Serious Injuries

The intent of the Madrid Transportation Safety Plan is to help the State of New Mexico meet these safety targets by reducing the following: number of total fatalities, number of serious injuries, fatalities per 100 VMT traveled, serious injuries per 100 million VMT, and the number of non-motorized fatalities and serious injuries on all public roads in New Mexico. The recommended safety countermeasures in Madrid are designed to enhance transportation safety by calming traffic, improving pedestrian accessibility, and reducing roadway congestion by increasing awareness of dedicated parking areas. Ensuring vehicle speed limit compliance can reduce the likelihood of a crash and, most importantly, the possibility of a crash resulting in a fatality or serious injury. Moreover, the recommended countermeasures create a safer environment for pedestrians and bicyclists. To measure the progress of transportation safety at the local level, the project team recommends comparing the baseline traffic and crash data collected in this plan to traffic and crash data corresponding to the completion of recommended countermeasures.

CONCLUSION

Table 9: Summary of countermeasures and trade-offs

Countermeasures	Tier	Section				Challenges Addressed			Opinion of Probable Cost*	Considerations and Trade-offs
		1	2	3	4	Speed Limit Compliance	Multimodal Accessibility	Parking		
Refresh pavement striping	1	X	X	X	X	X			$9,500	Enhances visibility of pavement markings, will need future and on-going maintenance.
Narrow driving lanes to 10'	1	X	X	X	X	X			$9,500	Does not remove available asphalt for larger vehicles, encourages traffic calming.
Oversized 20 MPH signs	1	X			X	X			$1,700	Emphasizes the change in roadway context and conditions on NM-14, acts as an understated gateway. Siting of the signs need to consider impacts on pedestrian traffic as signs require two posts, instead of one.
Oversized warning signs	1	X			X	X			$1,700	Alerts drivers to a change in roadway context and conditions, underscores the importance of gradual speed reduction before 20 MPH zone, drivers may experience sign fatigue.
Update pedestrian traffic signs	1	X			X		X		$800	Communicates a multimodal message for a frequented bicycling route.
Relocate transverse rumble strips	1	X				X			$2,000/location	Noise from rumble strips may be a nuisance for nearby residents.
Install transverse rumble strips	1				X	X			$2,000/location	Noise from rumble strips may be a nuisance for nearby residents.
Marked crosswalks	1		X	X		X	X		$3,000/location	ADA compliance is a consideration. Crosswalks must be located at convenient and safe locations. In addition, these Tier 1 crosswalks would not be fully ADA compliant until connecting accessible pathways are constructed on either side of NM-14. This would likely trigger future costs and disruptions to provide these connecting ADA compliant pathways. Another trade-off is that the construction of an ADA pathway, especially on the east side of the roadway would reduce on-street parking.
R1-6 Gateway Treatments	2		X	X		X	X		$2,500/location	Not a standalone countermeasure, enhances established crosswalks, easy to remove for snow removal, may need regular replacement if vehicles damage their structural integrity.
RRFBs	2		X	X			X		$22,000/location	ADA compliance, needs power, requires maintenance, flashing lights may be a nuisance to the community, may not be necessary at all recommended crosswalk locations.
Raised crosswalks	3		X	X		X	X		$30,000/location	ADA compliance, maintenance and snow plowing concerns, may impact drainage
Walking Pathway	3		X	X			X	X	$430,000/mile	Eliminates parking on the westside of NM-14, recommended walking path will help make the existing parking at the ballpark more accessible eliminating the need for parking on the roadway shoulder, may create pedestrian/vehicle conflicts at Old Hospital, Bridge, and Cave Road intersections.
Lighted Bollards	3		X	X			X		$170,000	Provides primarily pedestrian lighting and limited roadway lighting. Lighted bollards require electrical power and regular maintenance. They will need to be crash-rated and will add to the existing ambient light footprint. A lighting agreement for continued maintenance with the county is likely required.
Median Islands	3	X			X	X			$30,000/location	May impact drainage, landscaping should not adversely impact visibility.

*Costs may vary if incorporated into planned roadway improvements or utility work.

Table 10: Summary of community initiatives and trade-offs

Community Initiatives	Section				Challenges Addressed			Considerations and Trade-offs
	1	2	3	4	Speed Limit Compliance	Multimodal Accessibility	Parking	
Madrid Art and History Walk w/Historic Boardwalk Restoration			X	X		X	X	Provides a safe and comfortable space for pedestrians, provides connectivity between ballpark parking lots and the recommended walking pathway on the westside of NM-14 and other connecting pedestrian facilities. Will require substantial coordination with adjacent landowners, NM State Historic Preservation Office (SHPO), NM Energy, Minerals, and Natural Resource Department (EMNRD). It must comply with American with Disability Act (ADA) standards and other applicable regulations if federally or state-funded. New Mexico Main Streets support will help identify feasibility, constraints, and implementation strategies for this countermeasure.
Gateway Features	X			X	X			Should not impact visibility, must comply with NMDOT guidelines
Parking Signage	X	X	X	X			X	Conspicuous signing communicates to visitors where parking exists, may reduce congestion from less traffic circulation looking for parking, encourage visitors to stop in Madrid. Would require coordination with NMDOT D-5 regarding the posting of signage on NMDOT right-of-way.
Transit Facility		X				X		ADA Compliance, Easement Agreement
Consolidated airspace agreement for on-street parking							X	May require a right-of-way study
Promote Turquoise Trail						X		Coordination with NCRTD
More frequent transit service						X		Coordination with NCRTD, source of funding for extra service
Intra-Community Shuttle							X	Source of funding for service, vehicles and operators, licensing and insurance, accessibility required
Safety Corridor Designation					X			Coordination with NMDOT D-5 and New Mexico Transportation Commission

NEXT STEPS

This Transportation Safety Plan serves as the foundation for Madrid and is intended to assist the community with addressing transportation safety issues and pursue funding opportunities. Potential funding programs for the recommended safety countermeasures are described below:

- Highway Safety Improvement Program (HSIP) – HSIP is a core Federal-aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land.
- Transportation Alternatives Program (TAP) - This federal program provides bicycle and pedestrian infrastructure and activities funding.
- Recreational Trails Program (RTP) – This federal program provides funding to develop and maintain recreational trails and trail-related facilities for non-motorized and motorized uses.
- Congestion Mitigation and Air Quality (CMAQ) Improvement Program - This flexible federal funding source provides funding for projects to improve air quality and reduce congestion.
- Local Government Road Fund (LGRF) – This state funding program is available to New Mexico Tribal and Local Governments for project development, construction, reconstruction, improvement, maintenance or repair of public highways, streets, and public school parking lots, acquisition of right-of-way, and in place material for construction or improvement
- Capital Outlay - This state funding supports projects to build, improve, or equip physical property that the public will use.
- Transportation Project Fund – This state funding program supports planning, design, construction, and maintenance of transportation infrastructure on publicly owned facilities, specifically non-State-owned roads and roads on tribal land.
- Community Development Block Grant Programs (CDBG) – The federal funding source supports activities that may address needs such as infrastructure, economic development projects, public facilities installation, community centers, housing rehabilitation, public services, clearance/acquisition, microenterprise assistance, code enforcement, homeowner assistance, etc.
- Federal Transit Administration (FTA) – Federal funding through the FTA supports projects for rail and bus and other transit projects and facilities that utilize highway systems.
- New Mexico Main Street Program - The New Mexico Main Street Program supports local affiliated organizations with revitalizing their economies while preserving cultural and historic resources.
- Great Blocks on MainStreet - Great Blocks assists rural New Mexico communities to compete for and secure financing for public placemaking, wayfinding, lighting/signage, gateway features, and street/pedestrian enhancements.