Initial Alignment Study Report

NM 41
Clark Hill to US 285 (MP 46.1 to MP 62.1)

Santa Fe County, New Mexico
Project No. TPA-1502(20)46, CN U500010

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APPENDIX A

Roadway Profiles
1.0 INTRODUCTION AND BACKGROUND

This report summarizes and documents the investigations, analyses, and findings for the first phase of the NM 41 Alignment Study between Clark Hill (milepost [MP] 46) and the US 285 Junction (MP 62.1). The study is being conducted by the New Mexico Department of Transportation (NMDOT) in cooperation with the Federal Highway Administration (FHWA). The primary objective of the alignment study is to evaluate the conditions that may require improvements to the existing highway and to identify and evaluate improvement options. The study area covers a distance of approximately 16.1 miles. The general project location and termini are illustrated in Figure 1-1 on the following page.

The alignment study is being conducted following the NMDOT Location Study Procedures. These procedures include a comprehensive identification and evaluation process to determine transportation problems and identify and evaluate potential improvement alternatives. The Location Study Procedures process is consistent with the environmental regulations of the Federal Highway Administration as mandated by the National Environmental Policy Act of 1966, as amended (NEPA). Coordination and consultation with federal, state, and local agencies, highway users, study area residents, and others having an interest in the highway and/or resources within the proposed project area is a key component of the study process.

This report provides an initial assessment of primary transportation problems on NM 41 that have been identified to date and other factors pertaining to why this highway may require improvement. In addition, possible improvement alternatives are discussed and evaluated and recommendations are made with regard to the feasibility of each alternative. The findings of the initial alignment study will be used to identify the alternatives that best address the need for improving the existing highway while avoiding and/or minimizing impacts to important environmental and community resources. The second phase of the alignment study will include a more detailed engineering and environmental impact assessment of those alternatives determined to warrant continued consideration. If the second phase of the study results in a recommendation for highway improvements, an environmental document will be prepared.

While the corridor study is intended to achieve numerous objectives, the primary objective is to evaluate geometric improvements to both the highway and the two historic bridge structures. Deficiencies with both contribute to potential safety threats to users, including drivers, bicyclists, and pedestrians. However, the resolution of these deficiencies is of major community concern due to the potential for increased truck use and travel speeds. Thus, an overarching objective of the study is to identify and evaluate highway improvements that serve the safety needs of highway users and that are in balance and harmony with the communities and the environment through which the highway passes.

The current study is a follow-up to a previous study conducted by the NMDOT in 2007. The previous study was limited to proposed improvements to the two bridges: Galisteo Creek Bridge (#1782) near MP 56.1 and San Cristobal Arroyo Bridge (#1814) at MP 55.6. Both of these bridges have structural deficiencies and are in need of extensive repair or replacement. During the course of the investigations and community involvement process for the proposed bridge project, the NMDOT determined that other highway improvements may be needed to mitigate community concerns that were beyond the limits of the bridge project. Of particular interest were concerns with travel speeds, safety, and preservation of the cultural, environmental, and historic character of the area beyond the bridges. In addition, the segment of NM 41 south of Clark Hill was previously improved. In contrast, the 16-mile segment of NM 41 north of Clark Hill is in poor condition and has several deficiencies. For these reasons, the NMDOT decided to
Figure 1-1: Project Vicinity and Location
truncate the bridge study before a decision was made on how the bridges would be reconstructed and evaluate a larger segment of NM 41 that included the area from Clark Hill to US 285.

1.1 Project Setting

NM 41 is classified as a rural major collector highway on the New Mexico State Highway System. It begins at US 60 south of Estancia and extends north for 62 miles through the Estancia and Galisteo basins. The highway ends at its junction with US 285, about 15 miles southeast of Santa Fe.

Between I-40 and MP 46 (the beginning of the proposed improvements), the highway section has been improved and includes two 12-foot lanes with 8- to 10-foot shoulders. From MP 46 to MP 62 (the junction of NM 41 and US 285 and the end of the project), the highway section consists of two 12-foot travel lanes without shoulders, except in a few isolated locations that include Clark Hill and the approach to the US 285 junction, where auxiliary lanes for climbing and turning exist. The project limits do not include any locations where traffic on NM 41 stops for intersecting roadways, with the exception of the termini of NM 41 at US 285.

Two other north-south highways traverse the Galisteo Basin between I-40 and I-25: NM 14 to the west of NM 41 and US 285 to the east. NM 14 is approximately 20 miles west of NM 41 at I-40 and about 8 miles west of Galisteo. This highway follows the east slopes of the Sandia Mountains and passes through the Ortiz Mountains. The first 6 miles of this route consist of a 4-lane highway section. It transitions to a 2-lane route at San Antonito and continues this section until it intersects NM 599 just south of Santa Fe. While NM 14 is parallel to NM 41, it serves a different area, including the communities of Cedar Crest, San Antonito, Golden, Madrid, and Los Cerrillos, and is used by commuters traveling between the Albuquerque East Mountain area and Santa Fe. County Road 42 (about 9 miles long and newly paved from its crossing of Arroyo de los Angeles to the west) connects NM 14 to NM 41.

US 285 is approximately 22 miles east of NM 41 at I-40 and converges with NM 41 approximately 6 miles northeast of Galisteo. This highway is the principal north-south arterial highway serving southeast and north-central New Mexico and connects the communities within southeast New Mexico to Santa Fe. It is a 2-lane highway from I-40 to its junction with NM 41. At that point, it transitions to a 4-lane highway and continues north to its intersection with I-25. US 285 is the designated route for low-level radioactive waste shipments between I-25 and the Waste Isolation Pilot Project (WIPP) near Carlsbad in southeast New Mexico.

Primary users of NM 41 include the residents and ranchers living within the NM 41 corridor, commuters traveling between Santa Fe and the Moriarty area, trucks and other commercial traffic that originate from Moriarty and destined to locations within and north of the project area, and tourist traffic. Observations made during the collection of traffic counts also indicate use by school buses and governmental entities from communities in northeast and south-central New Mexico, suggesting that this route is used to travel between these areas of the state.

Traffic volumes are consistent with a rural collector highway. Counts collected in October of 2009 show average daily traffic volumes of approximately 1,200 vehicles south of Galisteo and 1,400 north of Galisteo. Large trucks account for approximately 9% of the total traffic volume. Traffic projections do not show that volumes are expected to rise significantly; thus, additional capacity is not a primary consideration for this project.
Several small communities exist along NM 41 including Estancia, Moriarty, Stanley, and Galisteo. The highway intersects two major east-west routes including US 60 and I-40 and connects to I-25 via US 285. Several smaller state routes and major county roads also intersect NM 41 including NM 542 south of Estancia, NM 55 in Estancia, NM 333 in Moriarty, NM 472 in Stanley, and County Road 42 in Galisteo. With the exception of the two small urbanized areas of Estancia and Moriarty, the lands along NM 41 are primarily agricultural farm lands and ranch lands. Farmlands are generally located near Estancia, Moriarty, and Stanley. Cattle and horse ranches occur throughout the highway corridor.

Only one community is located within the project limits. Galisteo is a small, unincorporated village consisting of approximately 265 residents. The village is located at the junction of NM 41 and County Road 42, which connects to NM 14 to the west. The village of Galisteo was founded in 1816 and, like many of the small rural communities near Santa Fe, includes families who have resided in the area for many decades and others who have relocated there within the last several years. Most of the structures adjacent to the highway have been in place for many years, including the Iglesia Nuestra Senora de Los Remedios church which was established in 1884, La Tienda de Anaya (an historic store that currently does not operate, but is being renovated for potential reopening in the near future), and several older adobe and rock residences. In contrast, a mixture of older and newer structures and homes are found away from the highway. The community of Galisteo considers its boundaries to include the bridges south of town and the prominent ridgeline north of town.

Galisteo is considered a Traditional Community by Santa Fe County. Traditional communities are small settlements that have been shaped by their cultural and historic origins and have been continuously settled since at least 1925. They exhibit an historic pattern of diverse and mixed community land uses which have carried through to the present and include historic structures and village centers. The “Traditional Community” concept was developed to recognize areas in Santa Fe County which had already been settled at higher densities than the Santa Fe County General Plan would allow, where there was a long history of family settlement, and where the opportunity existed to provide or improve water and sewer systems.

The Sustainable Land Development Plan (SLDP) replaced/updated the Santa Fe County General Plan. The SLDP includes an entire section on Galisteo and the context of the community. As of this writing, the Galisteo Community Plan has not been adopted by Santa Fe County and thus, is not considered an amendment to county growth management plans.

1.2 Project Purpose and Need Overview

A major element of the NM 41 Alignment Study is the evaluation of the conditions that affect the need for improvements to the highway and bridges. A detailed discussion of the geometric condition, pavement and structural condition, traffic operations, crash data, and other factors found within the project area is provided and discussed in Section 2 of this document. A summary of the key factors that comprise the need for highway improvement is provided below.

The design and condition of the existing highway is a fundamental element of the need for improvements. Geometric problems with the existing highway include:

- Limited sight distance caused by the alignment of the roadway – The portion of the existing highway between Clark Hill and the community of Galisteo passes through rolling terrain and has several locations with short crest and sag curves. A total of nine vertical curves exist in this
segment with a stopping sight distance substantially below (10 mph to 30 mph) the criteria for a posted speed of 55 miles per hour (mph). Of these nine locations, six are crest curves and three are sag curves.

Two horizontal curves are also problematic. Two back-to-back horizontal curves near MP 46 have curve radii that are shorter than the design guidelines for the posted speed of 55 mph.

- Lack of shoulders – Except in isolated locations, the existing highway does not have shoulders. The absence of shoulders limits the maneuverability of drivers who encounter other vehicles, animals, or other objects in the roadway. In addition, the absence of shoulders prevents the use of rumble strips that serve to alert drivers that they have left the lane.

![Example of vertical curves and the lack of shoulders.](image)

The alignment and geometric problems noted above contribute to crashes. Crash data for the years 2002 through 2007 show 28 reported accidents on NM 41 within the proposed project limits. Almost one-half (46%) of all reported crashes resulted in vehicles overturning — an indication that roadway geometry and roadside clear zones are a significant contributor. Countermeasures to reduce vehicle overturning when vehicles leave the roadway should be identified as part of the project design process.

For comparison purposes, crashes on the segment of NM 41 south of the project area (I-40 to MP 46) were reviewed for the same 6-year period. Even though the traffic volumes are essentially equal and the posted speed is 10-mph higher, fewer crashes occurred south of Clark Hill, and only 19% resulted in a vehicle over-turning (19 crashes during the 6-year period with 3 resulting in a vehicle over-turning). This section of road has 8-foot paved shoulders with rumble strips and wide roadside clear zones. It is assumed that the safer roadside environment has contributed to the much lower over-turning crash rate on NM 41 south of the study area.
In addition to the geometric conditions of the highway, the general condition of other roadway features are in poor repair and are inconsistent with current design guidelines for collector highways. Notable problem areas include:

- **Poor Pavement Condition** – In general, the existing pavement throughout the project area is in poor condition. Longitudinal and transverse cracking occurs throughout. In addition, pavement rutting and settling is evident in several locations indicating subgrade failures. Maintenance efforts by the NMDOT have been made with skin patches placed in several locations. Overall, the need for major rehabilitation or reconstruction of the pavement sections is indicated.

  ![Example of longitudinal and transverse pavement cracking and general poor pavement condition.](image)

- **Guardrail** – Guardrail is installed at 36 locations within the 16-mile length from Clark Hill to US 285. Of the 72 end treatments, 64 of them do not meet current design criteria and should be replaced. Depending on modifications to the roadway geometry and roadside clear zone, this number could change.

- **Drainage** – Forty-two drainage structures cross NM 41 within the project limits. Of these, seven are large concrete box culverts or large oval pipe. The remaining are corrugated metal pipes ranging from 24 inches in diameter to 84 inches in diameter. Of these, about 25% have ends that are in poor condition and would need replacement if the roadway is reconstructed. Thirteen of the CBCs and CMPs indicate insufficient grade for proper drainage.
Three bridges exist within the project limits. These include bridge structures over the Arroyo de la Jara (bridge #8368 at MP 53.5), San Cristobal Arroyo (bridge #1814 at MP 55.6), and Galisteo Creek (bridge #1782 at MP 56.1). Of these three structures, the bridges over Galisteo Creek and San Cristobal Arroyo are in poor condition. The structure over Arroyo de la Jara was constructed in 1981 and is in good condition both structurally and geometrically. In contrast, bridges #1782 and #1814 were constructed in the 1930s and both are “structurally and geometrically deficient” according to current design guidelines.

The “structurally deficient” classification is due to the condition of major bridge elements, which are mostly in poor condition, especially around deck joints, due to long-term water damage. Major structural problems of both bridges include:
• Bridge Decks – The bridge decks exhibit severe cracking, especially near deck joints and have been previously repaired in many areas. Advanced deterioration, cracking, discoloration, and staining are evident on the deck underside, particularly near deck joints. Cracking and discoloration are also present away from joints, but it is generally less severe.

• Bridge Beams – The steel bridge beams exhibit moderate to heavy rusting near joints. Further from the joints, the beams exhibit light to moderate rusting.

• Abutments and Piers – Bridge abutments and pier cap beams have extensive cracking and concrete separation. The concrete reinforcement is exposed in some locations and shows corrosion. The pier walls have extensive cracking in areas, vertical longitudinal cracks, and some areas of section loss.

• Safety Railing – The railings are in poor condition throughout with major concrete deterioration, extensive concrete loss, and heavy corrosion of reinforcing steel.

The load capacity of the existing bridges at the time of original construction was 30,000 pounds (15 tons). Deterioration of bridge elements has likely reduced the load-carrying capacity below the original design load.

The geometric configuration of the Galisteo Creek Bridge is adequate for two 12-foot driving lanes. However, because it does not include shoulders, it does not meet current design criteria for modern bridges. Thus, bicyclists crossing the bridge must use the existing travel lanes. While sidewalks are included on the bridge deck, they are substandard in dimension and design. In addition, access to the sidewalks is blocked by the guardrail attachments.

The geometric configuration of the San Cristobal Arroyo Bridge provides two 12-foot driving lanes. Neither shoulders nor sidewalks are present. Bicyclists and pedestrians crossing the bridge must use the driving lanes. The deck width is substantially less than the minimum width required for new and rehabilitated bridges. Additional information about the existing bridges is provided in Section 2.4.

1.3 Agency Coordination and Public Involvement

An agency coordination and public involvement program (PIP) for the NM 41 Corridor Study was developed at the onset of the project. Due to the location of the project in an area known for its history and rural character, a Context Sensitive Solutions (CSS) Plan was also developed for this project. Stakeholders for this project include, but are not limited to: federal and state resource agencies having jurisdiction over the resources potentially affected by roadway improvements; residents, businesses, and other landowners that use and are served by the highway; and other users of the highway, such as commercial shippers, tourists, and other travelers. Details of the public involvement and agency coordination activities are described further below.

The purpose of the PIP is to establish the goals and objectives of the public involvement activities and the specific methods that will be used to inform and involve the public, consulting agencies, and other stakeholders during the corridor study. The goals and objectives of the PIP include:

• Providing ample opportunities for project stakeholders to participate in the study, including activities focused on issues identification, alternatives development, identification of evaluation criteria, and the assessment of alternatives.
• Providing opportunities to discuss project issues in open forums that include representation from all stakeholder groups.
• Giving full consideration to input received from all stakeholders.
• Ensuring the public outreach/involvement process and agency coordination meets the requirements of all pertinent state and federal stakeholders.
• Balancing conflicting issues to achieve positions and solutions that are acceptable to all stakeholder groups.

Stakeholders and groups that will be contacted regarding the NM 41 Corridor Study are discussed in the PIP.

The purpose of the NM 41 CSS Plan is to establish the approach to be followed for incorporating context sensitivity into the conceptual design phase. CSS is an approach that considers the total context within which a transportation improvement project will exist. CSS principles include the employment of early, continuous, and meaningful involvement of the public and all stakeholders throughout the project development process.

The main principles of context sensitive solutions include:
• Striving towards shared stakeholder visions to provide a basis for decisions.
• Demonstrating a comprehensive understanding of context in the project area.
• Fostering continuing communication and collaboration to achieve consensus.
• Exercising flexibility and creativity to shape effective transportation solutions, while preserving and enhancing community and natural environments.

The NM 41 CSS Plan includes the following discussion elements:
• Project description
• Project context
• Design approach for the NM 41 corridor
• How the design process will include stakeholder collaboration
• Multi-modal needs that need to be addressed
• Methods to address sustainability issues
• Opportunities to reflect local values
• How to scale the solution to the problems

The concept of sustainability goes hand-in-hand with CSS, as both focus less on using national standards to address problems, and focus more on context when developing design criteria. A general definition of a sustainable highway is one that meets long-term functional requirements while practicing environmental stewardship. The NM 41 Corridor Study is being undertaken by a multi-disciplinary project team with experience in creating solutions appropriate to the unique context of a highway through the Galisteo Basin. The CSS Plan also discusses the activities and opportunities to consider and integrate local values into project decisions.

1.3.1 Public Meetings and Comments
Two public meetings were held during the development of the Initial Analysis Report. Notice of the meetings was provided using advertisements placed in Santa Fe and local newspapers and by portable
message boards placed within the project area. In addition, letters and flyers were mailed to about 250 residents, businesses, governmental agencies, elected officials, and special interest groups with a potential interest in the proposed project and/or project area. Email notices were also distributed to a smaller list of individuals, mostly residents within the community of Galisteo.

Public Meeting #1

The first public information meeting for the NM 41 Corridor Study was held on November 17, 2009 at the Galisteo Community Center. Thirty-seven individuals attended the meeting including area residents, business owners, commuters who use the corridor, bicyclists, and representatives from the New Mexico Motor Transportation Department. The meeting began about 6:00 pm and ended about 8:00 pm. The objective of this meeting was to inform the public that the NM 41 Corridor Study was underway and to obtain community input on issues and factors to consider during the study.

Displays were available for review which presented information including:

- Information about the Galisteo Basin and archaeological and historic sites within the project area.
- Information about environmental issues including wetlands, surface water, and threatened and endangered species.
- Information about traffic volumes and accidents along NM 41 between Clark Hill and US 285.

The meeting began with a presentation that covered the following topics:

- The purpose of the meeting.
- An introduction to the project team.
- Background information about previous studies.
- An overview of the project.
- An explanation of why the NM 41 study is being advanced.
- A review of traffic and accident data for the project area.

The floor was opened to questions and comments at the end of the presentation. At the start of the comment session, a representative of the Galisteo community presented a consolidated set of comments developed during a recent community meeting. After the statement by the community representative, the meeting facilitator identified several specific topics and asked for meeting participants to provide comments and input relating to these topics. The topics were those raised at previous meetings between the NMDOT and the residents of Galisteo. Comments and questions for each of the topics, as well as other topics identified by the group, were recorded on flip charts. A summary of the public meeting is on file at the NMDOT District Offices in Santa Fe and on the NMDOT website. The summary includes copies of the presentation, display boards, comments made at the meeting, and written comments received during a 3-week comment period after the meeting. While numerous comments were made, the primary points of concern raised by meeting participants included:

- Several comments related to the safety of bicyclists who use NM 41 for recreational rides and the Santa Fe Century were received. The addition of bike lanes or shoulders for bicycle use were suggested.
- Numerous comments related to truck traffic including safety concerns, speeding, and careless driving were received. Some comments stated that truck traffic is damaging the historic buildings.
and two historic bridges within Galisteo. Requests were made to restrict truck traffic by weight and size or routed to US 285.

- Comments were made suggesting that the vertical alignment of the roadway remain as is and that improvements to bridges be limited to designs that preserve the historic integrity of the bridges.
- Comments were made stating that the residential area of the corridor be defined as the area from the San Cristobal Arroyo bridge to the hogback ridge north of Galisteo.
- A comment suggested that radar speed detection be used to discourage speeding and to ticket offenders.
- A comment supporting the creation of a bypass east of Galisteo.
- A comment suggesting that signage should be placed before Clark Hill warning drivers of curvy and hilly terrain, and rerouting all through-traffic to US 285.
- A comment requesting that the project team collaborate with the Santa Fe County Planning Department and Wildlife Habitat for New Mexico.

In addition to the above, a representative of the village of Galisteo provided the NMDOT with a list of requests that were developed during a community meeting specific to traffic calming and safety. The suggestions included:

- Partnering with NMDOT to designate NM 41 as a Scenic Byway from Clark Hill to NM 285.
- Constructing a well-marked crossing area from the church to "La Tienda de Anaya" using textured pavement (cobble stones or other appropriate paving material).
- Reclassifying NM 41 as a minor arterial roadway in order to limit heavy traffic.
- A request to not widen NM 41.
- Increase enforcement of speed limits through Galisteo.
- Lower speed limits in the village to 25 miles per hour.
- Explore the use of rumble strips north and south of the village to indicate the beginning or ending of the village.
- Keep NM 41 as 2 lanes (status quo).
- Create a bus stop located near church.
- Keep driver feedback signs at each end of the village.

Public Meeting #2

The second public information meeting for the NM 41 Corridor Study was held on April 7, 2010 at the Galisteo Community Center. Forty-two individuals attended the meeting including area residents, business owners, and commuters who use the corridor. Project team representatives were also present, and included members of the consultant team and NMDOT archaeologists, project managers, District Engineers, and Environmental Program members. The meeting began about 6:30 pm and ended about 8:30 pm. The objective of this meeting was to update the public on the progress of the study, to present the alternatives currently under consideration, and to obtain feedback from the community and other stakeholders.

Displays were available for review which presented project information including:
• A description of the project area and how it is divided. The project area is divided into three segments, including two rural segments and the community area generally within Galisteo. Alternatives were presented that addressed the conditions and needs for each segment.

• A description and illustrations of the alternatives under consideration for the community core segment, including 12-foot driving lanes with 1.5-foot concrete rolled curb or estate curb, and 12-foot driving lanes with 4-foot paved shoulders. Both alternatives included an optional pedestrian trail and pedestrian crossings.

• A discussion of traffic calming strategies that could be implemented within the community core segment.

The meeting began with a general overview of the project, a brief discussion of the study process, and an explanation of how public input is used to develop alternatives and identify issues for consideration during the study. The remainder of the meeting was divided into three sessions, each consisting of a presentation period and a discussion period. These sessions were divided by topic as described below.

The first session was devoted to the community segment of the project area. This is the segment of NM 41 that is generally within Galisteo and defined as the area beginning at the rodeo grounds (approximate MP 55.5) and extending north to MP 57.5. The presentation included:

• A summary of public input relating to the community segment received prior to the meeting.
• An explanation of the project team’s approach to the development of alternatives for the community core segment.
• A definition of the community area, which includes the areas of transition from the rural segments to the community core.
• A discussion of the alternatives that had been developed for the community area, including a community bypass and two roadway alternatives.
• A discussion of traffic calming strategies that could be used within the community segment.
• A discussion of project team recommendations.

The second session was devoted to the rural segments of the project. These segments are defined as the portion of NM 41 beginning at Clark Hill and extending north to the rodeo grounds (approximate MP 55.5), and the portion of NM 41 beginning at MP 57.5 and extending north to the intersection of NM 41 and US 285. The presentation included:

• A summary of public input relating to the rural segments received prior to the meeting.
• An explanation of the project team’s approach to the development of alternatives for the rural segments.
• A discussion of the features and needs of the rural segments.
• A presentation of the proposed typical sections.
• A discussion of project team recommendations.

The third session was devoted to the historic bridges within the community segment. Both bridges are eligible for inclusion in the National Register of Historic Properties and were constructed as WPA projects in the 1930s. The Galisteo Creek Bridge is within the Galisteo Historic District. The San Cristobal Arroyo...
Bridge is outside of the Galisteo Historic District, but is considered to be a contributing element. The presentation included:

- An explanation of the approach to the assessment of and concept development for the bridges.
- A list and definitions of bridge structure terminology.
- A presentation of photographs illustrating the current condition of the bridges and the existing structural deficiencies and geometric constraints.
- A discussion of factors considered in the development of bridge alternatives, including historic preservation, structural requirements, and pedestrian and bicycle accessibility.
- A discussion of five possible alternatives, including the no-build alternative, minor rehabilitation, major rehabilitation, reconstruction, and a bridge bypass, and the anticipated results of each alternative.
- A discussion of the next steps in the study process.

Following each presentation session, the floor was opened for questions and comments. Comments provided at the meeting are summarized below.

- Concern over speed limits – people will speed, so set the posted limit lower than it currently is.
- Questions about inclusion and maintenance of pathways, medians, plantings, and irrigation.
- Concerns about the intersection of CR 42 and NM 41.
- Support for and opposition to roundabouts.
- Concern for preservation of community.
- Questions about proposed lane and shoulder widths; concern over 8-foot shoulders.
- Statements of support for narrower lanes and shoulders and preservation of vertical curves.
- Statements of concern over impacts to cultural and aesthetic resources.
- Concerns about the intersection of US 285 and NM 41.
- Questions about rerouting trucks and suggesting alternate routes.
- Support for retaining the historic eligibility of the bridges.
- No support for the bridge bypass.
- Mention of context sensitive design and its application on other projects (NM 14, NM 300, CR 42, and Route 66).
- Santa Fe County’s goals for the Galisteo area, as presented in the Sustainable Land Development Plan (SLDP).
- Concern for wildlife crossings, archaeological sites, reconstruction costs, etc.
- Questions about how to lower speed limits and prohibit engine brake use.

A total of 24 written comments were received within the 2-week period after the meeting. The written comments generally covered the following points:

- Several comments expressed a desire for wider shoulders that could be used by bicyclists and for improved safety.
- Several comments suggested the use of 11-foot lanes and 6-foot shoulders in the rural segments.
- Several comments stated a desire for 10-foot lanes and 1.5-foot shoulders through the community core.
Comments pertaining to the bridge alternatives included several supporting the minor rehabilitation alternative and several supporting reconstruction that retains the historic character.

One comment supported the Community Bypass Alternative, as nothing will effectively slow traffic through the village.

A summary of the public meeting is on file at the NMDOT District Offices in Santa Fe and on the NMDOT website. The summary includes copies of the presentation, display boards, comments at the meeting, and written comments received during the 3-week comment period after the meeting.

1.3.2 Agency Coordination

Agency coordination conducted during the initial alignment study was limited to notices sent to stakeholder agencies and, in some instances, meetings with agency representatives. Agencies notified included:

- US Army Corps of Engineers
- US Forest Service
- National Park Service Rivers, Trails, and Conservation Assistance
- New Mexico State Land Office
- New Mexico Environment Department
- New Mexico Game & Fish Department
- New Mexico Historic Preservation Division
- New Mexico Mines, Minerals, and Natural Resources Department
- New Mexico State Police
- Santa Fe County Sheriff’s Department
- Santa Fe County Planning and Development
- Santa Fe County Public Works Division
- Santa Fe Public Schools
- Moriarty-Edgewood School District
- Santa Fe County Commission

A meeting was held with the New Mexico Historic Preservation Division (HPD) on February 16, 2010. The purpose of the meeting was to discuss the proposed project with HPD staff and to begin the pre-consultation process. Formal consultation has not yet been initiated. Issues discussed with HPD include the need for the proposed project, the initial alternatives under consideration, and future coordination and consultation needs to meet the requirements of Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act of 1966.

In addition, telephone discussions were held with representatives of the US Army Corps of Engineers and the New Mexico Game & Fish Department. The meeting with the US Army Corps of Engineers was to discuss the approach to identifying and assessing jurisdictional waters and wetlands. The meeting with the NM Game & Fish Department was to discuss issues associated with wildlife crossings. Formal consultation and coordination with these and all other stakeholder agencies will occur during the next study phase (Phase 1-B of the Location Study Procedures).
2.0 EXISTING CONDITIONS ASSESSMENT

As an early work activity of the Initial Alignment Study, the conditions that exist within the project area were identified, reviewed, and assessed. The primary objectives of the existing conditions assessment were to: (1) identify the existing physical and operational conditions of the roadway to determine the factors that may affect the need for potential improvement; and (2) identify the critical environmental, cultural, and community conditions that exist and that warrant consideration as alternatives are developed and evaluated. Existing conditions were identified based on field reconnaissance, a review of existing data and records, and initial analyses and are separated into engineering factors and environmental/cultural factors. The findings of the existing conditions assessment are summarized in this section.

Engineering Conditions

2.1 Traffic

As a rural major collector highway, NM 41 primarily serves traffic originating from or destined to locations within a relatively large area, including the Galisteo Basin and Estancia Valley. Because the population of the communities within this area is generally low, traffic volumes are also relatively low and are consistent with the volumes typically found on rural collector highways. The assessment of traffic conditions and traffic-related factors on NM 41 was based on traffic count data including daily counts and peak-hour counts at intersections. A technical report — *NM 41 Traffic Report*, May 2009, Harwick Transportation Group — with the complete traffic data has been prepared and is on file with the NMDOT.

Traffic Counts

Existing traffic flows on NM 41 were collected using automated vehicle counts at five locations along NM 41. Four of those locations were within the project limits, i.e., between Clark Hill and US 285. The fifth location was south of the project area in the community of Stanley and south of NM 472. The counts were collected using road tubes and included three coverage and two classification counts. The count data were collected for a 7-day period from October 12, 2009 through October 19, 2009. Average weekday and average daily volumes were calculated. The results of the traffic counts are shown in Table 2-1 below.

<table>
<thead>
<tr>
<th>Location</th>
<th>AAWDT</th>
<th>AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM 41 @ MP 39 (Stanley just south of NM 472)</td>
<td>1299</td>
<td>1323</td>
</tr>
<tr>
<td>NM 41 S of San Cristobal Arroyo Bridge</td>
<td>1213</td>
<td>1259</td>
</tr>
<tr>
<td>NM 41 S of Galisteo Creek Bridge</td>
<td>1200</td>
<td>1278</td>
</tr>
<tr>
<td>NM 41 S of La Vega</td>
<td>1348</td>
<td>1548</td>
</tr>
<tr>
<td>NM 41 @ MP 57</td>
<td>1399</td>
<td>1595</td>
</tr>
</tbody>
</table>

1. AAWDT is average annual weekday traffic. AAWDT uses a seasonal adjustment factor to adjust count data to represent seasonal variations in traffic flow
2. AADT is annual average daily traffic and represents average traffic volumes over the weekdays and weekend.

The count data show that volumes are relatively uniform throughout the NM 41 corridor with a slight increase in volumes north of Galisteo. This suggests that traffic originating within the Galisteo area
accounts for about 17% of the total daily traffic volumes. For the dates counted, weekend traffic volumes were higher than weekday traffic. However, the Galisteo Studio Tour was held on October 17 and 18 and may have resulted in higher than typical weekend traffic flows.

The capacity of a 2-lane collector highway is typically about 7,800 vehicles per day before congestion occurs. With a daily volume of less than 1,500 vehicles, NM 41 is well within the capacity of the existing 2-lane highway.

**Intersection Counts**

Turning movement counts were collected at three NM 41 intersections in Galisteo on October 13 and 14, 2009. The counts were collected at Avenida Vieja, Via la Puente, and La Vega. Each count was conducted for 9 hours, from 7:00 am to 10:00 am, 11:00 am to 2:00 pm, and from 3:00 pm to 6:00 pm. This resulted in three peak periods. Data for the morning and evening peak hours are listed in Table 2-2.

<table>
<thead>
<tr>
<th>Table 2-2: NM 41 Intersection Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Morning Peak Hour</td>
</tr>
<tr>
<td>NM 41 @ Avenida Vieja</td>
</tr>
<tr>
<td>NM 41 @ CR 42</td>
</tr>
<tr>
<td>NM 41 @ La Vega</td>
</tr>
<tr>
<td>Evening Peak Hour</td>
</tr>
<tr>
<td>NM 41 @ Avenida Vieja</td>
</tr>
<tr>
<td>NM 41 @ CR 42</td>
</tr>
<tr>
<td>NM 41 @ La Vega</td>
</tr>
</tbody>
</table>

The turning movement counts reflect low volumes at each intersection during each period. Observation of intersection operations during the count periods indicated that vehicle delays were minimal and the intersections operate at high levels of service.

**Functional Classification**

Because of the concern of some residents with large truck traffic, classification count data were also collected to assess the volume of heavy vehicles using NM 41. Heavy vehicles were defined as all vehicles that are not passenger sedans, pickup trucks, or motorcycles. They included passenger vehicles towing trailers, recreational vehicles, buses, and both light and heavy duty trucks. Most of the vehicles counted had three or more axles. A total of 289 heavy vehicles was counted during the 3-day count period from Monday through Wednesday.

Based upon the weekday data, heavy vehicles represented 13.3% of the average weekday traffic. Using the 7-day counts, the average heavy vehicle percentage was 10.0%. An anomaly was noted in the heavy vehicle count data — the number of large trucks mid-day on Thursday and Friday of the count period was two to four times higher than Monday through Wednesday. County Road (CR) 42 was being reconstructed during the count period, and paving operations were being conducted those two days, leading to the unusually high number of trucks (asphalt trucks observed on NM 41 during these two days arrived from and departed to the south). When these two days of data are removed, the weekday truck percentage is reduced to 8.7%, and the 7-day percentage reduced to 5.7%.
The heavy vehicles were also tallied by the hour of day. Because of the anomaly cited above, the hour-of-day data were limited to Monday through Wednesday. Overall, 90% of the heavy vehicles counted on NM 41 during the count days were recorded between the hours of 6:00 am through 7:00 pm. Of the 289 vehicles counted, only 30 (10%) were traveling between the 7:00 pm through 6:00 am time period.

An observation count was conducted of the trucks and buses along NM 41 during the turning movement count data collection for approximately 10 hours per day for two days. The types of vehicles and number of axles were noted, and whenever possible the business was identified. Large recreational vehicles and pickup trucks with large horse trailers or trailers hauling heavy equipment were included as heavy trucks because they have ‘truck-like’ acceleration and deceleration characteristics. A summary of the heavy vehicle observation study is noted in Table 2-3.

<table>
<thead>
<tr>
<th>Truck</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Average/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic Tanker Truck</td>
<td>11</td>
<td>16</td>
<td>13.5</td>
</tr>
<tr>
<td>Southwestern Oil</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alta Tanker Truck</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Polk Oil Tanker</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Honstein Oil Tanker</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Generic Semi-Truck</td>
<td>8</td>
<td>9</td>
<td>8.5</td>
</tr>
<tr>
<td>Landstar Semi-Truck</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Family Dollar Semi-Truck</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Target Semi-Truck</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Fill Haul Truck</td>
<td>2</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Dump Truck</td>
<td>3</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Heavy Equipment</td>
<td>6</td>
<td>13</td>
<td>9.5</td>
</tr>
<tr>
<td>Delivery Truck (SU-30)</td>
<td>2</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Small Water Tank Truck</td>
<td>3</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Sod Truck</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Small Utility Truck</td>
<td>2</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Concrete Truck</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pickup with Trailer and Heavy Equipment</td>
<td>11</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>Large RV (Bus Size)</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Small Flatbed</td>
<td>0</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Pickup w/ Large Travel Trailer</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>King's Butane</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>82</strong></td>
<td><strong>70.5</strong></td>
</tr>
</tbody>
</table>

**Travel Speeds**

Speed data were also derived from the classification data collection. Speed data were evaluated for the count location near the radar-reader board installed by the NMDOT south of Galisteo Creek. The data were collected for a 7-day period and include all vehicle types. The results of the speed study indicate that average travel speeds along NM 41 are above the posted speed limit. It should be noted that the posted speed at this location is 35 mph northbound and 45 mph southbound. The average observed speed was 40.4 mph northbound and 47.5 mph southbound. The observed 85th percentile speeds were...
48.4 mph northbound and 57.1 mph southbound. The percentage of vehicles exceeding the posted speeds was 80% in the northbound direction and 60% southbound.

Speed data collected by the NMDOT in 2007 before the radar-reader boards were installed indicate that there has been a significant reduction in speed entering Galisteo from the south during the past two years. Average speeds are approximately 10-mph lower today than in 2007. The data indicate that the radar-reader boards are an effective traffic calming measure entering Galisteo.

The traffic count and classification data, along with historic traffic data, were used to prepare traffic forecasts. Historic traffic volumes from 1988 through 2009 were evaluated, and growth rates were generated based upon 5-, 10-, 15-, and 20-year evaluation periods. The rates for each period are:

- 20-Year Growth Rate – 5.36% per year
- 15-Year Growth Rate – 1.83% per year
- 10-Year Growth Rate – 1.70% per year
- 5-Year Growth Rate – (1.50%) per year

The 20-year growth rate is influenced by very low volumes prior to 1995 — approximately 500 vehicles per day which increased to almost 900 vehicles in 1995. The most recent growth rate is negative — it is unlikely that a negative growth rate will be sustained into the future. The most representative growth rate therefore appears to be the 10-year rate of 1.7% growth annually. A 1.7% annual growth rate results in a growth factor of 1.425 for 21 years of growth between 2009 and 2030. Based upon the most recent growth trend, this rate should be considered conservative for the 20-year design period.

Traffic volumes through Galisteo vary north and south of CR 42, or Camino los Abuelos. For this reason, annual average daily traffic (AADT) forecasts were developed for NM 41 both north and south of CR 42 using the 2009 data as the base year. The 2009 volumes and 2030 forecasts are shown in Table 2-4.

### Table 2-4: Traffic Forecasts for Year 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>North of CR 42</th>
<th>South of CR 42</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1,550</td>
<td>1,280</td>
</tr>
<tr>
<td>2030</td>
<td>2,210</td>
<td>1,820</td>
</tr>
</tbody>
</table>

Forecasts were not generated for turning movement counts. The growth rate (1.7%/yr) and growth factor (1.425) can be uniformly applied to the turning movements if future year analyses are required. It should be noted that this growth rate application assumes that no significant development(s) will occur that would affect the growth rate used herein. If a major development is planned in the future along the NM 41 corridor, growth rates should be adjusted accordingly. Based on a minimum capacity of a 2-lane rural highway, the forecasted traffic flows for NM 41 are well within the capacity of a 2-lane facility. Additional lane capacity is not needed based on the current analysis.

### 2.2 Crash Data and Safety

Traffic crashes were reviewed within the NM 41 corridor between mileposts 46 and 62 for the years 2002 through 2007 to determine if specific safety issues are present within the study area. The crash data reviewed were those maintained by the NMDOT for the years 2003 through 2007 and data from the University of New Mexico Division of Government Research (UNM-DGR) for 2002 through 2007. The two data sources were correlated to ensure all crashes were evaluated.
Based on the crash data, a series of critical analysis factors were identified and evaluated. These analysis factors included:

- Severity Indices
- Daytime vs. Nighttime Crash Percentages
- Location (Intersection v. Non-intersection)
- Crash Types
- Primary Crash Factors

Table 2-5 summarizes the crash data for NM 41 for the years 2002 through 2007. Figure 2-1 illustrates the approximate location of each crash. Review of the data indicates that only two of the 28 reported crashes during the study period involved two or more vehicles. The remaining 26 crashes were single vehicle crashes. The data were also reviewed to identify crashes involving large trucks within the corridor. Four semi-truck crashes were identified. These are discussed further at the end of this section.

The 2002 through 2007 data yielded 15 injury and fatal crashes out of 28 reported crashes, resulting in a severity index (SI) of 54. Severity index is a measure of the percentage of all crashes that result in personal injury or death and is the sum of the injury and fatal crashes divided by the total number of crashes multiplied times 100, i.e., (injuries + fatalities)/total crashes (100). The severity index for NM 41 was compared to the Santa Fe County and New Mexico averages for 2002 through 2007 to determine if the severity is higher, similar, or lower than the average rates for those areas. The comparison is much higher than the SI for both Santa Fe County and the State of New Mexico, with SI's of 37 and 34 respectively. Data for Santa Fe County were only available for rural road crashes, and the resultant severity index was 40, substantially below the SI of 54 for this segment of NM 41. This finding suggests that safety enhancement countermeasures should be investigated to lower the NM 41 corridor’s severity index.

NMDOT historic traffic volume records were collected to generate the 2002 through 2007 crash rate for the corridor. The average daily traffic for the years 2002 through 2007 was 1,336 vehicles per day. The study corridor is 16 miles in length and the resultant crash rate was 0.60 crashes per million vehicle miles (C/MVM) traveled. Santa Fe County had an average rate of 2.83 C/MVM and the state of New Mexico had an average rate of 2.09 C/MVM during the same 6-year period. This indicates that the NM 41 crash rate is much lower than the county and statewide averages, and somewhat offsets concerns indicated by the higher than anticipated severity index.

The data were also examined to differentiate crashes that occurred at intersections or driveways, as opposed to crashes referenced to roadway segments. The 28 crashes that occurred from 2002 through 2007 were all referenced as non-intersection crashes.
Figure 2-1: Location of Crashes within the Project Limits
Daylight versus nighttime crashes were investigated to determine the percentages that occurred during each period. NM 41 has no illumination within the study area. The results show that 65% of the crashes occurred during daylight hours (including dawn and dusk). The nighttime crash rate is slightly higher than the statewide average of 28%, with 36% of the crashes occurring during the hours of darkness. A note of concern is that two crashes were coded as dark but illuminated, though there is no illumination within the corridor. The two crash locations were field reviewed, MP 51.0 and MP 58.4, and luminaires are not present at either location. Given that there were no identified intersection crashes, and intersections are typically illuminated to enhance safety, the lack of illumination does not appear to be a source cause of crashes or a safety concern.

Crash types throughout the corridor were identified and are summarized in Table 2-6. As shown in this table, 46% of all crashes resulted in a vehicle overturning. A high incidence of run-off-the-road crashes is typical for a rural roadway section, though the high percentage of overturning crashes is a concern. With nearly half of the crashes resulting in vehicles overturning, design factors such as roadway geometry and roadside clear zones should be thoroughly examined as part of a roadway redesign process. The incidence of vehicle overturning is reflected in the higher than average severity index for the corridor. The overturn crash locations are shown in Figure 2-1. Countermeasures to reduce vehicle overturning when vehicles leave the roadway should be identified as part of the project design process.

For comparison purposes, NM 41 crashes for the segment of highway between Clark Hill and Interstate 40 (milepost 28 to milepost 46) were reviewed for the same 6-year period. The database for that segment showed 19 crashes during the same 6-year period, 3 of which (16%) resulted in a vehicle overturning. This section of road has a 10-mph higher posted speed limit (65 mph) than the project study area, and it has 8-foot or wider shoulders with wide roadside clear zones. It is assumed that the safer roadside environment has contributed to the much lower overturning crash rate on NM 41 south of the study area.

The primary crash factors within the project area were summarized and reviewed. No identified error was listed for 25% of all crashes. Excessive speed was the primary contributing factor for 35% of all crashes. Driver inattention and avoiding an object in the road were contributing factors at 11% each. All other contributing factors including alcohol were 4% or less.

The above data include two unusual statistics. First, excessive speed was cited as the primary crash factor in 35% of crashes. The statewide average for this factor in 2006 was 8%. Second, 25% of the crashes cited no error as the primary cause. These crashes represented less than 1.3% of 2006

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>SUM</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear End</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Overturn</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>13</td>
<td>46%</td>
</tr>
<tr>
<td>Cyclist</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Fixed Object - Guardrail</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Fixed Object – Other</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Animal – Cow</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Animal - Deer</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>
statewide crashes. The factors cited indicate that a safer roadway environment should be created to help reduce the number of crashes within the corridor.

Crashes involving heavy vehicles, specifically semi-trucks, were also evaluated. Four crashes were reported as involving semi-trucks between 2002 and 2007. Three of these four crashes involved northbound trucks cresting Clark Hill with crashes referenced from MP 46.7 to MP 47.0. Each of these three involved an overturned vehicle, one resulting in a fatality, one with minor injuries, and one with property damage only. The NM 41 alignment at Clark Hill has both horizontal and vertical curvature. The remaining truck crash occurred approximately 2½ miles north of Galisteo near MP 58.9, where a truck ran off the road and struck a fence.

The overall number of crashes and crash rate within the NM 41 corridor do not indicate significantly unsafe conditions. However, the high incidence of overturning crashes coupled with a high severity index indicates issues associated with the roadway geometry and roadside clear zone. Corridor improvement alternatives should specifically include counter-measures to mitigate these problems.

2.3 Existing Roadway

The existing roadway was reviewed to assess its design features and condition. The assessment included the typical section, alignment, pavement condition, bridges, drainage structures, and right-of-way.

Roadway Typical Section

The existing configuration of NM 41 generally consists of two undivided travel lanes without shoulders. Shoulders are present in two locations, including the northern end of the project area from US 285 south for 0.3 miles and at the Arroyo de la Jara Bridge at MP 53.5. The roadway segment at US 285 includes 8-foot shoulders. Shoulders across the Arroyo de la Jara Bridge are 6-feet wide.

At Clark Hill, the 2-lane section transitions to a 3-lane section that includes a southbound climbing lane as the highway ascends Clark Hill. The climbing lane begins at MP 46.6 and ends at the top of Clark Hill at MP 46.5. The existing typical section by milepost is summarized in Table 2-7. The highway typical section at several locations within the project area is shown in the photos on the following page.

Right-of-way varies throughout the project area. In the southern portion

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Posted Speed</th>
<th>Typical Section Lanes / Shoulders</th>
<th>Right-of-Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>100 - 174 ft.</td>
</tr>
<tr>
<td>47</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>110 – 120 ft.</td>
</tr>
<tr>
<td>48</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>115 – 120 ft.</td>
</tr>
<tr>
<td>49</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>120 ft.</td>
</tr>
<tr>
<td>50</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>120 ft.</td>
</tr>
<tr>
<td>51</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>115 - 120 ft.</td>
</tr>
<tr>
<td>52</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>115 – 125 ft.</td>
</tr>
<tr>
<td>53</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>105 - 120 ft.</td>
</tr>
<tr>
<td>54</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>115 – 120 ft.</td>
</tr>
<tr>
<td>55</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>100 - 120 ft.</td>
</tr>
<tr>
<td>56</td>
<td>35 – 45 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>70 – 200 ft.</td>
</tr>
<tr>
<td>57</td>
<td>35 – 45 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>145 – 200 ft.</td>
</tr>
<tr>
<td>58</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>200 ft.</td>
</tr>
<tr>
<td>59</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>200 ft.</td>
</tr>
<tr>
<td>60</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>200 ft.</td>
</tr>
<tr>
<td>61</td>
<td>55 mph</td>
<td>2 12-ft. 0 ft.</td>
<td>200 ft.</td>
</tr>
</tbody>
</table>
of the project area, the right-of-way width is approximately 120 feet. This increases to 200 feet north of Galisteo. The roadway is generally centered within the right-of-way. The right-of-way narrows through the community of Galisteo, where it varies from about 70 feet to 200 feet.

Right-of-way fencing varies and consists of 4-strand barbed wire with wooden posts in and around Galisteo and north to US 285. The condition of the fencing in this area varies from good to poor. Steel-posts and 5-strand barbed-wire in good condition exists south of Galisteo. Several box culverts with gates at the right-of-way line exist and can be used for livestock crossings across the highway right-of-way. Most of these box culverts are in poor condition with sediment build-up and some scour that reduces their use for livestock crossings. The apparent right-of-way for the existing roadway is summarized by milepost in Table 2-7.

### Pavement Condition

In general, the existing pavement throughout the project area is in poor condition. Longitudinal and transverse cracking occurs throughout the project area. Pavement rutting and settling is evident in several locations indicating subgrade failures. Maintenance efforts by the NMDOT have been made with skin patches placed in several locations, most of which are in poor condition. Table 2-8 summarizes the observed pavement condition by milepost. Examples of the pavement condition at several locations within the project area are shown in the photos on the following page. Overall, the need for major rehabilitation or reconstruction of the pavement sections is indicated.

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Pavement Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Longitudinal / Transverse (L/T) Cracking</td>
</tr>
<tr>
<td>47</td>
<td>L/T Cracking, Alligator cracking</td>
</tr>
<tr>
<td>48</td>
<td>L/Transverse Cracking, Rutting</td>
</tr>
<tr>
<td>49</td>
<td>Longitudinal / Transverse Cracking</td>
</tr>
<tr>
<td>50</td>
<td>Rutting</td>
</tr>
<tr>
<td>51</td>
<td>Skin patches</td>
</tr>
<tr>
<td>52</td>
<td>Skin patches and settlement problems</td>
</tr>
<tr>
<td>53</td>
<td>Longitudinal cracking and skin patching</td>
</tr>
<tr>
<td>54</td>
<td>L/T Cracking, Alligator cracking</td>
</tr>
<tr>
<td>55</td>
<td>Skin patches</td>
</tr>
<tr>
<td>56</td>
<td>Skin patches</td>
</tr>
<tr>
<td>57</td>
<td>Longitudinal / Transverse Cracking</td>
</tr>
<tr>
<td>58</td>
<td>L/T Cracking, Pavement raveling</td>
</tr>
<tr>
<td>59</td>
<td>L/T Cracking, Alligator cracking</td>
</tr>
<tr>
<td>60</td>
<td>L/T Cracking, skin patches</td>
</tr>
<tr>
<td>61</td>
<td>Longitudinal / Transverse Cracking</td>
</tr>
</tbody>
</table>

Example of longitudinal cracking and subsidence

Example of transverse cracking and patching
Roadway typical section at Clark Hill near MP 46

Roadway typical section near MP 52

Roadway typical section near MP 58

Roadway typical section at US 285 Junction

R/W fence condition north segment

R/W fence condition south segment
Roadway Alignment

The alignment of NM 41 includes several locations with short vertical and sharp horizontal curves, several of which appear to be less than desirable for posted speeds of 55 mph. The vertical alignment of the highway was evaluated against the existing posted speed of 55 mph and assumed a design speed of 60 mph. The criteria used were from the design guidelines specified in the document *A Policy on Geometric Design of Highways and Streets, 5th Edition*, American Association of State Highway and Transportation Officials (AASHTO), 2006, referred to as the “Green Book.” Exhibit 3-72 of the AASHTO Green Book lists a stopping sight distance of 570 feet for a 60-mph design speed for both crest and sag curves. The rate of vertical curve (K value) listed in Exhibit 3-72 is 151 for crest curves and 136 for sag curves.

The vertical curve analysis identified nine vertical curves with an existing K-value less than that specified by AASHTO. These nine curves include six crest curves and three sag curves. Table 2-9 lists the location, length, and existing K-value for each of these curves. As shown in this table, all of the problem curves have a design speed that is significantly less than that required for a posted speed of 55 mph.

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Type</th>
<th>Length</th>
<th>K-Value</th>
<th>Design Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Crest</td>
<td>200</td>
<td>39.52</td>
<td>35</td>
</tr>
<tr>
<td>51</td>
<td>Crest</td>
<td>250</td>
<td>71.65</td>
<td>45</td>
</tr>
<tr>
<td>51</td>
<td>Sag</td>
<td>200</td>
<td>59.10</td>
<td>35</td>
</tr>
<tr>
<td>51</td>
<td>Crest</td>
<td>150</td>
<td>30.49</td>
<td>35</td>
</tr>
<tr>
<td>52</td>
<td>Crest</td>
<td>360</td>
<td>45.69</td>
<td>40</td>
</tr>
<tr>
<td>52</td>
<td>Sag</td>
<td>275</td>
<td>42.47</td>
<td>30</td>
</tr>
<tr>
<td>52</td>
<td>Crest</td>
<td>300</td>
<td>63.43</td>
<td>45</td>
</tr>
<tr>
<td>53</td>
<td>Sag</td>
<td>200</td>
<td>49.12</td>
<td>35</td>
</tr>
<tr>
<td>54</td>
<td>Crest</td>
<td>150</td>
<td>36.73</td>
<td>35</td>
</tr>
</tbody>
</table>

In contrast, most of the existing alignment of NM 41 meets AASHTO design criteria for horizontal curvature. Analysis of the horizontal alignment identified two locations where the design speed does not meet criteria for the posted speed. These two curves are located near MP 46 where the highway ascends/descends Clark Hill. AASHTO specifies a minimum curve radius of 1,330 feet for a 60-mph design speed and an $e_{\text{max}}$ of 6%, although a larger radius is needed if the super-elevation is 4% or less. The radius of both of these existing curves is 860 feet.

2.4 Existing Bridges

Three bridges exist within the project limits. These include bridge structures over the Arroyo de la Jara (bridge #8368 at MP 53.5), San Cristobal Arroyo (bridge #1814 at MP 55.6), and Galisteo Creek (bridge #1782 at MP 56). Of these three structures, the bridges over Galisteo Creek and San Cristobal Arroyo are in poor condition. The structure over Arroyo de la Jara was constructed in 1981 and is in good condition, both structurally and geometrically. In contrast, bridges #1782 and #1814 were constructed in the 1930s, and both are “structurally deficient” according to current design guidelines. Information specific to each of these structures is provided below.

**Galisteo Creek Bridge (Bridge #1782)**

The existing bridge structure over Galisteo Creek consists of a 4-span steel beam bridge with concrete abutments, solid-wall piers, and concrete footings. This structure was constructed in 1936 as part of the Work Projects Administration (WPA) program created by President Franklin D. Roosevelt as part of the Emergency Relief Appropriations Act of 1935. This bridge is a contributing element to the Galisteo Historic which was listed to the State Register of Cultural Properties in 1969. The bridge was also
determined eligible for inclusion in the National Register of Historic Places (NHRP) by the statewide historic bridge survey conducted in 2003.

The existing bridge has a total bridge length of approximately 241 feet comprised of four spans of 50 feet each. The bridge width is 33 feet 3 inches, which includes two 12-foot driving lanes for a 24-foot clear width, and sidewalk/curbs of approximately 3.5 feet each. The remaining 3 feet is occupied by concrete railing.

The Galisteo Creek Bridge is classified as a “structurally deficient” bridge according to FHWA criteria. This classification is due to the condition of major bridge elements, which are mostly in poor condition — especially around deck joints due to long-term water damage. A summary of the condition of major bridge elements is as follows. Photos that illustrate the condition of the bridge structure are shown on the following page.

- **Bridge Deck** – The bridge deck exhibits severe cracking, especially near deck joints, and has been previously repaired in many areas. Advanced deterioration, cracking, discoloration, and staining are evident on the deck underside, particularly near deck joints. Cracking and discoloration are also present away from joints, but it is generally less severe.

- **Bridge Beams** – The steel bridge beams exhibit moderate to heavy rusting near joints. Further from the joints, the beams exhibit light to moderate rusting.

- **Abutments and Piers** – Bridge abutments and pier cap beams have extensive cracking and concrete separation. The concrete reinforcement is exposed in some locations and shows corrosion. The pier walls have extensive cracking in areas, vertical longitudinal cracks, and some areas of section loss.

- **Safety Railing** – The railing is in poor condition throughout with major concrete deterioration, extensive concrete loss, and heavy corrosion of reinforcing steel.
Section 2: Existing Conditions

Abutment foundation damage

Bridge abutment condition and damage

Condition of bridge piers

Bridge pier damage at joints

Condition of bridge railing

Water damage on deck underside
The load capacity of the existing bridge at the time of original construction was 30,000 pounds (15 tons). Deterioration of bridge elements has likely reduced the load carrying capacity below the original design load.

The geometric configuration of the Galisteo Creek Bridge is adequate for two 12-foot driving lanes. However, because it does not include shoulders, it does not meet current design criteria for modern bridges. Thus, bicyclists crossing the bridge must use the existing travel lanes. While sidewalks are included on the bridge deck, they are substandard in dimension and design. In addition, access to the sidewalks is blocked by the guardrail attachments.

The Galisteo Creek channel cuts transverse to the upstream face of Pier No. 3. The waterway is well vegetated with cottonwood, Russian olive, and other smaller stature trees and shrubs. There is no visible evidence of scour at any of the bridge footings.

San Cristobal Arroyo Bridge (Bridge #1814)
The existing bridge structure over San Cristobal Arroyo consists of a 3-span steel beam bridge with concrete abutments and solid-wall piers. In contrast to the Galisteo Bridge, which has concrete foundations, the San Cristobal Arroyo Bridge uses timber pile foundations. It was constructed in 1939 as a WPA project. It is not part of the Galisteo Historic District but was determined eligible for inclusion in the NHRP by the 2003 statewide historic bridge survey.

The bridge length is approximately 210 feet comprised of three 70-foot spans. The bridge width is 29 feet, which includes two 12-foot driving lanes for a 24-foot clear width. Neither sidewalks nor shoulders are present.
classified as “scour critical,” its vulnerability to scour is dependent on the condition of the timber piles which is unknown. A summary of the condition of major bridge elements is as follows:

- **Bridge Deck** – The deck has been repaired in many areas. Deck deterioration is evident along the deck underside with the most severe damage located near deck joints. In these areas, numerous cracks and section loss exist, which is indicative of reinforcing steel corrosion. The damage is less severe away from joints; however there is cracking along with leaching throughout.

- **Bridge Beams** – The steel bridge beams exhibit moderate to heavy rusting near joints. Further from the joints, the beams exhibit light to moderate rusting.

- **Abutments and piers** – The abutment and pier cap beams and bearing areas that support the beams have extensive and severe damage. This is a result of years of water intrusion and leaking deck joints. There is extensive concrete and steel degradation as evidenced by advanced cracking and section loss in most cap areas. Abutment and pier walls have numerous areas of advanced damage such as concrete cracking and section loss, and exposed and corroded reinforcing steel.
• Foundation – The foundations of the San Cristobal Bridge are timber piles. Because they are subsurface, their condition is unknown. Methods to test timber piles are available. These include pulse and echo impact techniques. Because the top of the timber piles are imbedded in concrete, the ability to obtain accurate results using echo testing methods is limited. In general, the NMDOT considers timber piles to be substandard.

• Safety Railing – Bridge safety railing is in poor condition throughout, with major concrete deterioration, extensive concrete loss, and heavy reinforcing steel corrosion.

The load capacity of the existing bridge at the time of original construction was 30,000 pounds (15 tons). Deterioration of bridge elements has likely reduced the load carrying capacity below the original design load.

The geometric configuration of the San Cristobal Arroyo Bridge provides two 12-foot driving lanes. Neither shoulders nor sidewalks are present. Bicyclists and pedestrians crossing the bridge must use the driving lanes. The deck width is substantially less than the minimum width required for new and rehabilitated bridges. San Cristobal Arroyo is an intermittent stream with significant water flows at certain times of the year and during major storm events. Evidence of major scour was not noted during field reconnaissance; however, due to uncertainties with the timber piles and the estimated scour depths, vulnerability to scour is a concern.

Arroyo de la Jara Bridge (Bridge #8368)
The existing bridge structure over Arroyo de la Jara is a 3-span prestressed concrete girder structure, with integral abutments on steel piles and steel pile-type piers. This bridge was constructed in 1981 and has a bridge length of approximately 151 feet and a width of 43 feet. The deck includes two 12-foot driving lanes and 8-foot shoulders for a 40-foot clear width. Bridge railing consists of the NMDOT Type A metal bridge railing and is 2.5-feet high.

The overall condition of the Arroyo de la Jara bridge is satisfactory to good, and the level of service provided by the bridge’s design features is considered “better than present minimum criteria.” The sufficiency rating is 94.8. Several minor defects were noted during the field review, including:

• Bridge railing paint is deteriorated at many locations along the bridge; some of the exposed steel piles have moderate to heavy rust and paint damage near ground level.
• Asphalt/bridge overlay and joints are damaged at the abutment and approach slab joints.
• The southeast wingwall has extensive concrete cracking and efflorescence staining.
• Drainage devices, located at both north bridge ends, are filled with dirt and may not be performing properly.

2.5 Drainage
The project area is located in the Galisteo Basin watershed (see Figure 2-2) — a sub-basin within the Rio Grande Basin that covers an area of about 730 square miles. Galisteo Creek is the primary surface water feature in the basin and joins the Rio Grande near Santo Domingo Pueblo. Galisteo Creek is ephemeral but occasionally carries high flows. About 70 percent of the annual flows occur during the spring runoff period. Galisteo Creek gains inflow as ground water levels rise to the land surface in the alluvial
sediments – thus, ground water levels are directly related to precipitation. While Galisteo Creek crosses NM 41 near MP 56, it is parallel to the highway north of the community and encroaches into the highway right-of-way near MP 57. Bank stabilization and reinforcement has been constructed at this location.

San Cristobal Arroyo flows into Galisteo Creek just south of the community of Galisteo near MP 55.6. It is an ephemeral waterway, but has considerable riparian habitat along its banks where it passes through the project area. Other surface waters within the project area include:

- Arroyo de la Jara, which crosses NM 41 near MP 53.6 (bridge)
- Gaviso Arroyo, which crosses NM 41 near MP 50.7 (box culvert)
- Arroyo Puertacito de los Salado begins west of the highway at Clark Hill and is fed by many small arroyos that cross NM 41 between mileposts 46.5 – 49.5

In addition to the three bridges, the inventory of NM 41 identified 42 drainage structures crossing the highway. Of these, seven are concrete box culverts (CBC) and the remainder are corrugated metal pipe (CMP). Most of the CMPs range in size from 24 inches to 54 inches, although one large oval pipe (16.5 feet x 26 feet) exists near MP 50. Table 2-10 lists information about the drainage structures within the project limits.
As shown in Table 2-10, many of the existing drainage structure ends are in poor condition and/or do not function properly. Of the 42 structures identified, 17 may warrant end replacement due to their condition. The preliminary hydrologic and hydraulic analyses, as will be conducted in Phase B, may identify additional structures that require replacement if the highway is improved.

Several of the concrete box culverts also function as livestock crossings. However, sediment buildup in some of these boxes limits their use as livestock undercrossings. One property owner has requested that additional livestock crossings be considered if the highway is improved.

### 2.6 Property Ownership

Property ownership within the project area is a mixture of federal, state, and private owners, with the vast majority of lands privately owned. Major landowners are shown in Figure 2-3 on the following page. Federal lands, managed by the US Bureau of Land Management, exist at one location near MP 47 where a section corner abuts the highway right-of-way. No other federal lands are within the project area in a location that would be affected directly or indirectly by improvements to the highway. Likewise, lands owned by the State of New Mexico exist within the project area, but are not in proximity to the highway.

Private lands adjacent to the highway are generally part of large ranches or other entities, except within the village of Galisteo, where smaller privately owned parcels exist. Lands on both sides of the highway approximately from MP 47 to MP 55 are owned by a single entity — San Cristobal Ranch.
Figure 2-3: Major Land Ownership
2.7 Utilities

Few utilities occur within or immediately adjacent to the NM 41 highway right-of-way. Those present include overhead power and telephone, buried telephone cable, and a fiber optic line. Overhead electric and phone utilities are inside the highway right-of-way and immediately outside of the right-of-way in the corridor from Galisteo north to US 285. These lines cross the highway at four locations. Evidence of buried phone and fiber optic lines was also noted during field reconnaissance. These too were limited to the area north of Galisteo. Both the overhead electric and buried phone/fiber optic cable end south of the San Cristobal Arroyo bridge.

Domestic utilities such as water, LP gas lines, and leach fields for septic systems may occur within the Galisteo area but the actual presence and location of these utilities are not currently known. Additional investigations for utilities will occur during Phase B, as needed.

Community, Environmental, and Cultural Conditions

The project area is located within the Galisteo Basin, an area recognized for its long and varied history and natural resources. The Galisteo watershed and several mountain ranges define the basin — the Sangre de Cristos to the north, the Ortiz Mountains to the west, and the Sandia Mountains to the south. Due to its location, it has long been a migration corridor for traders, explorers, and wildlife. Based on the results of the preliminary analysis, the primary issues of importance are include: (1) land use and communities within the project limits; (2) natural resources including wetlands and riparian habitat associated with perennial stream crossings, water quality, and wildlife; and (3) cultural resources associated with the built environment and prehistoric sites, including visual impacts to these resources. Noise and air quality are also issues of concern to area residents. Other environmental issues will be investigated and considered as the study progresses through Phases B and C.

2.8 Land Use and Development

Land use within the study area varies from large cattle ranches with associated residences to residential properties within the community of Galisteo. Various community facilities exist within Galisteo including a Catholic church (Iglesia Nuestra Senora de Los Remedios), fire station, community center, museum, and rodeo grounds.

Parcel data from Santa Fe County show that most of the property in the project area is either coded as SRES (Single Family residential) or VAC (vacant). Other types of land use in the project area include:

- LOTR (residential) – two lots with manufactured homes
- COMM (commercial) – two parcels total – both in Galisteo; one large parcel between MPs 57-58 on the east side of the highway
- SFCO (Santa Fe County) – one parcel, the Community Center and Fire Station, owned by the county
- NM (New Mexico) – two parcels owned by the state
- unclassified lands – some of which are owned by the BLM but are away from the highway

Several large developments exist in the northern portion of the corridor. These include resorts, retreats, equestrian stables, and other similar uses. In addition, a large residential subdivision was recently approved by Santa Fe County near the intersection of NM 41 and US 285. A large subdivision is also
present at the southern terminus of the NM 41 project. In general, the major land uses within the project area are low-density developments.

The Sustainable Land Development Plan (SLDP) is a revision and update of the Santa Fe County General Plan. The SLDP is a statement of the county’s vision for its own future and a guide to achieving that vision. Galisteo is one of four Growth Management Areas (GMAs), which were areas delineated for growth management purposes based on criteria such as topography and hydrography, existing community planning areas, political and parcel boundaries, and cultural and open space boundaries. One of the primary themes of the SLDP is a focus on preservation of the historic, cultural, and natural environment in the face of increasing population growth.

Several of the goals listed in the SLDP that relate to the NM 41 project include:

- Establishing a Community Action Group for each GMA to address non-land use planning issues and providing county staff support for the community action groups
- Working with state departments and non-governmental organizations about limiting pollution (air, noise, water, light), preserving cultural/archaeological sites, establishing a wildlife corridor from the Ortiz to the Sangre de Cristo Mountains, and placing emphasis on the welfare of the entire Galisteo Basin
- Supporting improved road and bridge infrastructure that maintains rural character
- Maintaining historic bridges
- Implementing context sensitive designs to preserve the rural character
- Cooperating with NMDOT to explore the possibility of downgrading Level of Service along some state routes and/or changing the functional classification of state routes as they pass through communities
- Ensuring adequate roadway design that includes shoulders, grading, and sidewalks wherever possible

Coordination with the Santa Fe County Planning Department will be undertaken during subsequent environmental investigations to determine whether the proposed improvements are consistent with the SLDP. Other applicable land use planning documents will be reviewed and summarized in subsequent environmental investigations.

### 2.9 Community Resources

The project area is decidedly rural, even though the metropolitan areas of Santa Fe and Albuquerque are about 20 and 40 miles away, respectively. The project area is within the Galisteo Basin, which has been continuously occupied by diverse groups of people since prehistoric times. The Atchison, Topeka, and Santa Fe railroad arrived in the area in the 1880s, and by this time, the effects of grazing were becoming apparent on the grasslands of the basin. By 1900, ranches were being established in the basin.

The village of Galisteo was founded in 1816 and is the only community located within the project area. NM 41 bisects the community, which lies at the junction of County Road 42 and NM 41. Galisteo, like many of the small rural communities near Santa Fe, includes families who have resided in the area for many decades and others who have relocated there within the last several years. Most of the structures adjacent to the highway have been in place for many years, including the Iglesia Nuestra Senora de Los
Remedios church which was established in 1884, La Tienda de Anaya (an historic store that currently does not operate, but is being reopened), and several older adobe and rock residences. In contrast, a mixture of older and newer structures and homes are found away from the highway. The community of Galisteo considers its boundaries to include the bridges south of town and the hogback ridge north of town.

Lamy is north of US 285 and north of the project terminus. The Village of Lamy was established as a passenger terminal for Santa Fe and the surrounding area in the 1880s with the arrival of the ATSF railroad. Lamy is a Census Designated Place (CDP) that covers about one square mile along County Road 33 and the railroad tracks. As of the 2000 Census, the population of Lamy was 137 persons.

The Galisteo Basin Preserve occupies 13,522 acres within the Galisteo Basin. It is a land-conservation and community-development initiative of Commonwealth Conservancy, a Santa Fe-based nonprofit organization, which is dedicated to preserving the views and wildlife habitat, cultural history, and natural resource values while promoting a new model of resource-efficient and stewardship-based community building in Santa Fe County. The Galisteo Basin Preserve is located 13 miles south of Santa Fe and includes large-scale protected open space, public recreation trails, private conservation properties, and a proposed village development.

Stanley lies south of the beginning of the project area and includes a church and a post office. There are several residences located along side streets just off the highway, but most residents live on large holdings and are engaged in farming or ranching activities. There are no services in Stanley, such as grocery or convenience stores or gas stations.

There are no schools along the project corridor — the project area is served by the Santa Fe and Moriarty school districts. The Galisteo Community Center is located east of NM 41 and the Galisteo Volunteer Fire Department/EMS is located beside the community center. These facilities, along with the church, are the only community facilities within the project area.

**Demographic Profile**

The demographic characteristics of the project area population were reviewed to identify the presence of groups that may require special consideration (consistent with Title VI and EO 12898) for public notification and involvement and in the assessment of project impacts. Data from the US Census Bureau’s 2000 Decennial Census were analyzed to determine the demographic characteristics of the project area. While the Census data are nearly 10 years old, they are thought to still be representative of the project area as it has undergone little substantive change since 2000. Any discrepancies with the 2000 Census data would likely be that it indicates lower income levels than currently exist. Population characteristics for the stakeholder communities are summarized in Table 2-11 on the next page.

Galisteo is a Census Designated Place for which the US Census Bureau produces demographic data specific to the place boundary (this boundary is not the same as the Galisteo Historic District). The demographic profile of Galisteo shows that the total population of the village area is 265 persons. According to Census Bureau data, 80.4% of the population of Galisteo is classified as white; 35.5% of the population is of Hispanic origin. The median age is 46.6 years. Only five persons are listed as under the age of 5 years, which reflects the low number of young children residing within the village.
Table 2-11: Demographic Characteristics of the NM 41 Project Area

<table>
<thead>
<tr>
<th>Geography</th>
<th>New Mexico</th>
<th>Santa Fe County</th>
<th>Tract 103.06 BG1</th>
<th>Tract 103.06 BG2</th>
<th>Tract 106 BG4</th>
<th>Tract 107 BG3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1,819,046</td>
<td>129,292</td>
<td>1,062</td>
<td>2,689</td>
<td>1,943</td>
<td>1,931</td>
</tr>
<tr>
<td>Black or African American</td>
<td>1.9%</td>
<td>0.6%</td>
<td>0.1%</td>
<td>0.4%</td>
<td>0.8%</td>
<td>0.5%</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>9.5%</td>
<td>3.1%</td>
<td>1.8%</td>
<td>1.2%</td>
<td>1.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Asian/Pacific</td>
<td>1.1%</td>
<td>0.9%</td>
<td>0.6%</td>
<td>0.7%</td>
<td>0.6%</td>
<td>1.2%</td>
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<tr>
<td>Some other race</td>
<td>17.0%</td>
<td>17.7%</td>
<td>14.3%</td>
<td>6.9%</td>
<td>17.0%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Two or more races</td>
<td>3.6%</td>
<td>4.1%</td>
<td>4.7%</td>
<td>3.9%</td>
<td>3.6%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>42.1%</td>
<td>49.0%</td>
<td>34.3%</td>
<td>19.8%</td>
<td>45.7%</td>
<td>16.9%</td>
</tr>
<tr>
<td>under 5</td>
<td>7.2%</td>
<td>6.2%</td>
<td>5.1%</td>
<td>4.4%</td>
<td>6.5%</td>
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<tr>
<td>5-17</td>
<td>20.8%</td>
<td>17.9%</td>
<td>17.7%</td>
<td>21.5%</td>
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<td>18.7%</td>
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<td>9.8%</td>
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<td>5.9%</td>
<td>4.4%</td>
<td>6.3%</td>
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<td>25-39</td>
<td>20.6%</td>
<td>21.3%</td>
<td>20.0%</td>
<td>18.4%</td>
<td>19.5%</td>
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<td>40-64</td>
<td>30.0%</td>
<td>35.7%</td>
<td>42.7%</td>
<td>42.6%</td>
<td>40.7%</td>
<td>47.8%</td>
</tr>
<tr>
<td>65 and over</td>
<td>11.7%</td>
<td>10.8%</td>
<td>8.6%</td>
<td>8.6%</td>
<td>5.0%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

Demographic data for the Census Block Groups that surround the area are generally similar to those for Galisteo. One block group (Tract 106 BG4), which is located north of the project area (and north of the railroad tracks) and closer to Santa Fe, has higher percentages of persons of Hispanic origin and persons living below poverty level. Other than this block group, which is separated from the NM 41 corridor by the railroad tracks, there are no identifiable environmental justice populations within the project area. Census block group boundaries are shown in Figure 2-4.

In the community of Galisteo, approximately 81% of the population is in the workforce, and unemployment is lower than state or county averages. The mean travel time to work is 31.7 minutes, which indicates most residents commute to Santa Fe or Moriarty/Edgewood for work. Median and per capita incomes are higher than or are equal to those of the United States, which are generally much higher than the same statistics for the state. Only 3.6% of the population is living below poverty level.

Businesses
There is very little commercial activity and no industrial activity within the project area. The few businesses in operation near Galisteo include equestrian stables, an art gallery, a spa and resort, and a
small museum. A large movie set is present south of Galisteo and, during production, generates considerable traffic from large trucks delivering props, trailers, and other equipment.

The business community outside of Galisteo includes large ranches primarily engaged in cattle and horse operations. Goods and services used by project area residents are generally found in Santa Fe and Moriarty. Santa Fe is less than 18 miles north of the intersection of NM 41 and US 285, and Moriarty is about 20 miles south of Clark Hill. No motels, gas stations, stores, or restaurants exist within the project area.

**Ranching Activities**

Several large ranches exist along the study corridor. San Cristobal Ranch owns the land along both sides of NM 41 between mileposts 47-55. At least two other large ranches exist on the west side of NM 41 south of Galisteo, and it is likely that smaller ranching operations operate in the project vicinity.

**2.10 Surface Water and Wetlands**

NM 41 crosses numerous ephemeral drainages within the project limits (see Figure 2-5). Primary arroyos include:

- Galisteo Creek, which is an ephemeral arroyo that crosses the highway near MP 56.
- San Cristobal Arroyo flows into Galisteo Creek just south of the community of Galisteo near milepost 55.6. San Cristobal Arroyo is also an ephemeral waterway, but it includes riparian habitat within the project area.
- Arroyo de la Jara, which crosses NM 41 near milepost 53.6.
- Gaviso Arroyo, which crosses NM 41 near milepost 50.7.
- Arroyo Puertacito de los Salado begins west of the highway at Clark Hill and is fed by many small arroyos that cross NM 41 between mileposts 46.5 – 49.5.
Figure 2-5: Surface Water and Wetlands
As all of these surface water features are tributary to Galisteo Creek, they are considered waters of the US and, therefore, are regulated by the US Army Corps of Engineers. Any construction or disturbance within the Ordinary High Water Mark (OHWM) of these arroyos will require coordination and a permit under the Clean Water Act.

Wetland habitat along Galisteo Creek and San Cristobal Arroyo was identified by a survey conducted by the NMDOT in 2008. Wetlands may also exist within some of the other arroyos, although surveys have not yet been completed for these locations. Field surveys to identify additional resources and better define existing resources with respect to their effect on or by the project will be performed as part of the detailed investigations phase.

According to data from the Office of the State Engineer (OSE), domestic, stock, and shared household water wells are the most common type of water wells within the basin. Centralized water supply systems serve the community of Galisteo, Madrid, Cerrillos, El Dorado, Lamy, and several subdivisions. Ground water moves from the highlands toward Galisteo Creek; flows then proceed down gradient to the Rio Grande, although it should not be assumed that there is one continuous flow within deeper geological formations. The majority of the wells in the basin are less than 500-feet deep.

### 2.11 Floodplains

Floodplains within the project area were determined using the Digital Flood Insurance Rate Map Database (DFIRM) prepared by FEMA. A review of the DFIRM data indicates that there are two floodplain zones within the project vicinity (see Figure 2-6). One of these zones is considered a Special Flood Hazard Area (SFHA), which are areas subject to water inundation once every 100 years by the base flood (aka 100-year flood). Zone A includes lands that are subject to flooding during the 100-year flood event, but do not have base flood elevations determined. The remainder of the project area lies in Zone X. Zone X includes lands outside the 0.2% annual chance flood (500-year flood) and is not considered a SFHA.

The majority of the NM 41 corridor lies within Zone X, which is not considered to be a Special Flood Hazard Area (SFHA). Zone A floodplains include:

- Gaviso Arroyo, which crosses NM 41 near MP 50.7.
- Arroyo de la Jara, which crosses NM 41 near MP 53.6.
- San Cristobal Arroyo, which crosses NM 41 near MP 55.6.
- Galisteo Creek, which crosses NM 41 near MP 56.1. Just north of MP 57, which is where the creek encroaches on NM 41 ROW, the Zone A floodplain lies within 75 feet of the highway; the Zone A floodplain also lies within 75 feet of the highway near the intersection of NM 41 and US 285.

### 2.12 Wildlife and Habitat

The project area is located within a rural area. Although the project area lies less than 18 miles south of Santa Fe, the atmosphere is more outlying and isolated. Development extends south from Santa Fe, but the majority of this is residential developments which end north of the NM 41/US 285 intersection. With the exception of the village of Galisteo, the project area is characterized by vacant lands used for ranching and grazing with widely dispersed residential use.
Figure 2-6: Floodplains
NM 41 crosses numerous drainages within the project area, and several areas include wetlands that provide habitat for endangered species. Much of the project area is classified as piñon-juniper grasslands, but the northern end of the project area near Lamy enters piñon-juniper woodlands. The project area, being rural and largely undeveloped, also supports wildlife with deer and antelope present along most of the route. However, the density of these large mammals is low.

Review of crash data does not indicate that animal-vehicle collisions are an immediate concern along NM 41. Public involvement has indicated concern about wildlife crossings. Field reconnaissance conducted to-date has not identified locations where large animal carcasses are present, which would provide information about animal movement and specific corridor locations.

### 2.13 Threatened and Endangered Species

The Endangered Species Act of 1973, as amended (ESA), mandates that federal actions do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy critical habitat for these species. In addition to the ESA, the State of New Mexico identifies other plant and animal species protected by state laws. Migratory birds are protected under the Migratory Bird Treaty Act of 1918 (MBTA), which includes nearly all species of birds as well as their eggs and nests.

Preliminary investigations indicate that habitat is present for up to 14 protected species. However, only about six of these species are expected to occur in the study area and include western burrowing owl, gray vireo, southwestern willow flycatcher, yellow-billed cuckoo, New Mexico meadow jumping mouse, and Santa Fe cholla.

Fields surveys conducted in 2008 and 2009 did not find southwestern willow flycatcher or yellow-billed cuckoo within the project area. Surveys performed in 2010 identified the presence of one southwestern willow flycatcher. The follow-up surveys have not yet been completed to determine whether the bird found was nesting or in transition. A Biological Survey Report will be prepared to document impacts to wildlife, habitat, and threatened and endangered species in the project area.

### 2.14 Cultural Resources

Cultural resources within the Galisteo Basin are protected under the Galisteo Basin Archaeological Sites Protection Act (Public Law 108-208). More than 3,000 archaeological sites and about 160 historic structures have been recorded in the Galisteo Basin, but these represent a small portion of the resources that are expected in the area. Only about 25 sites or districts are listed in the National Register of Historic Places (NRHP) or the New Mexico State Register of Cultural Properties (SRCP).

Previous archaeological investigations in the project area have primarily been associated with improvements to NM 41 and utility installations within the highway right-of-way. Archaeological sites identified in the project area include both late prehistoric (Pueblo III-IV) and historic components. Two late Pueblo sites in the project have been determined eligible for inclusion in the NRHP. Approximately 8% of the area within the project vicinity has been surveyed.

It is anticipated that improvements to NM 41 will impact archaeological sites as well as historic buildings. While there has been relatively little survey activity in the area around Galisteo, any new alignment would likely encounter as yet undocumented archaeological sites, as Galisteo Creek was likely a preferred resource exploitation and/or residential location in the past. Field surveys to identify additional resources
and better define existing resources with respect to their effect on or by the project will be performed as part of the detailed investigations phase.

Records
The preliminary identification of cultural resources within the project area was determined from a review of the state-maintained database – the New Mexico Cultural Resource Information System (NMCRIS) – and listings of the NRHP and the SRCP. These searches were performed to: 1) identify any previous surveys and previously recorded cultural properties in the project area; 2) develop expectations for the number and type of sites likely to be found in the project area; and 3) determine the presence of any listed historic properties in the project area. Both the project area and a 500-meter buffer around the project area (termed the “project vicinity”) were investigated for previously recorded sites, properties, and surveys.

Historic Districts
One property within the project area is listed in the SRCP - the Galisteo Historic District (HPD 129). No other listed properties were identified within the project area or vicinity. The listed Pueblos of Galisteo and She are outside of the project vicinity as it has been defined, but are in the general area. There are numerous historic buildings adjacent to NM 41 within the community of Galisteo.

Bridges
Two historic bridges, #1782 and #1814, are part of the existing NM 41 alignment. Bridge #1782 was constructed in 1936 and Bridge #1814 was constructed in 1939 as part of the Work Projects Administration (WPA) agency efforts. Both of these bridges were determined eligible for inclusion in the NRHP by the 2003 statewide historic bridge survey. The Galisteo Creek bridge (#1782) is a contributing element to the Galisteo Historic District. This District was listed to the State Register of Cultural Properties in 1969.

2.15 Air Quality
Air quality regulations pertinent to transportation projects are found in the Clean Air Act Amendments of 1990 (CAA) and the Final Transportation Conformity Rule (40 CFR Parts 51 and 93). The CAA required the US Environmental Protection Agency (EPA) to develop National Ambient Air Quality Standards (NAAQS) for several major air pollutants. These pollutants, known as criteria pollutants, are: carbon monoxide, nitrogen dioxide (usually referenced as oxides of nitrogen (NOx)), ozone, particulate matter (PM10 and PM2.5), sulfur dioxide and lead. The State of New Mexico has also established ambient air

Figure 2-7: Galisteo Historic District and Bridges
quality standards that, in some cases, are more stringent than the corresponding federal standards. The area surrounding the NM 41 corridor is classified by EPA as being in attainment of the NAAQS for all criteria pollutants. It is a rural area without any major point or area sources of air pollutants.

Because of the rural nature of the study area and the lack of major sources of air pollution, the Air Quality Bureau of the New Mexico Environment Department (NMED) does not perform ambient air quality monitoring in the study area. The nearest air quality monitoring stations operated by the NMED are located in Santa Fe, an area with a much higher traffic volumes and other sources of air pollutants. Based on the data from these monitor locations, air pollutant concentrations in the study area are likely to be well below the maximum thresholds established by the EPA. None of these monitors have recorded violations of ambient air quality standards in recent years, and the city and surrounding areas (El Dorado and Galisteo) are in attainment of national ambient air quality standards.

2.16 Noise

Noise levels within the project area are primarily a result of traffic traveling on NM 41, CR 42, and local streets. The predominant traffic noise sources are from a mixture of automobiles and large trucks. Sporadic train noise is also present in the last few miles of the project area where train tracks parallel the highway. No industrial noise or other major noise sources occur within the project area.

Field measurements were used to determine existing noise conditions within the NM 41 corridor. Noise measurement locations were selected to represent houses and other buildings within the village of Galisteo that are likely to have the greatest exposure to noise due to their proximity to traffic traveling on NM 41. In addition, a fifth site was selected to represent noise receiver locations adjacent to the highway but in the area where the posted speed is 45 mph. Noise data were collected in the late afternoon (4 pm to 6 pm) to coincide with the evening peak traffic period. A Larson Davis Model 831 Sound Level Meter was used to collect noise data in 15-minute increments at each of the five sites. Traffic data were collected concurrent with the noise data to correlate traffic volumes and vehicle types with variations in the measured noise level.

The collected data are shown in Table 2-12. The data collected showed existing noise levels that ranged from a low of 54 dB(A) to a high of 67 dB(A). In general, the measured noise levels are low and are consistent with a rural, low-volume highway. The higher measured noise levels are due to the close proximity of residences and other buildings to the highway and a higher number of large trucks that passed by the SLM during the measurement period. The data at site 3 was also influenced by traffic entering the highway from CR 42. Because noise is directly related to travel speed, especially at lower speeds, changes in travel speeds through the community will affect noise levels. A noise model of the highway will be prepared in Phase B and used to assess the effects of alternatives and speed changes on traffic noise levels.

<table>
<thead>
<tr>
<th>Measurement Location</th>
<th>Distance from NM 41</th>
<th>Measured Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1: East of highway and south of Galisteo Bridge</td>
<td>108 feet</td>
<td>53.7 dB(A)</td>
</tr>
<tr>
<td>Site 2: West of NM 41 and south of El Tanque Viejo</td>
<td>151 feet</td>
<td>54.9 dB(A)</td>
</tr>
<tr>
<td>Site 3: SW corner of NM 41 and CR 42</td>
<td>29 feet</td>
<td>67.4 dB(A)</td>
</tr>
<tr>
<td>Site 4: Residence west of NM 41, 275’ north of CR 42</td>
<td>26 feet</td>
<td>62.2 dB(A)</td>
</tr>
<tr>
<td>Site 5: North of Galisteo near MP 57.1</td>
<td>24 feet</td>
<td>59.8 dB(A)</td>
</tr>
</tbody>
</table>
3.0 PROJECT ALTERNATIVES

Potential improvement concepts (alternatives) for NM 41 were developed and evaluated as part of the NM 41 Initial Alignment Study. The development of alternatives considered and balanced numerous factors including traffic and safety needs, engineering design criteria and guidelines, and the setting and use of NM 41 within an area of important historic and environmental resources. Of particular importance in the development of alternatives was the inclusion of highway design features to improve the safety of travel on NM 41. The NMDOT is responsible for providing safe highways for use by the traveling public. For this reason, safety is a primary and overarching objective of the NMDOT when considering improvements to existing highways.

The NMDOT also places high priority on highway design that is compatible and consistent with the communities along highway routes and that avoids and/or minimizes impacts to the natural and cultural environment. Consequently, potential highway improvement alternatives were developed in consideration of the historic setting of the Galisteo Basin area, the historic resources within the community of Galisteo, and the natural resources within the project area.

In addition to the above safety and local context considerations, the desires and requests of the public were a major consideration in the development of alternatives. Input from persons living within the project area generally emphasized the need for community safety, historic preservation, and environmental protection. In addition to the extensive input from area residents, considerable input was received from bicycle advocates. Because of the low traffic volumes, scenic qualities, and rolling terrain, NM 41 is used for major and minor bicycling events. The input received from this advocacy group emphasized the need for highway shoulders to safely accommodate bicyclists.

The needs of NM 41 within the project area vary by location. Within the rural segments of the highway, i.e., both north and south of Galisteo, the highway improvement needs are generally tied to minor changes in the vertical alignment of the highway and its cross section to provide for the needs of drivers. In contrast, the issues within Galisteo are focused less on drivers and more on community safety. A primary objective within Galisteo is the development of a highway section that emphasizes the presence of the community so that drivers are aware that they are entering and traveling through a residential area. A third consideration within the project area is the improvement needs of the two historic bridges at the southern edge of Galisteo. While the geometric design and structural needs of these two bridges are straightforward from a highway design perspective, they are complicated by the need to preserve their historic integrity and eligibility.

In consideration of the three different driving forces within the NM 41 corridor as described above, the project area was divided into two subareas for the purposes of developing potential improvement alternatives. The subareas are defined as follows and are illustrated in Figure 3-1.

- Subarea 1: Rural Subarea – this subarea includes the two rural segments of NM 41 within the project area. The first segment is the area from Clark Hill north to the approach to the San Cristobal Bridge (MP 46.2 to MP 55.5). The second segment includes the area north of Galisteo from MP 57.5 to the end of the project at US 285 (MP 62).
- Subarea 2: Community Subarea – this subarea consists of the area within and approaching the community of Galisteo (see Figure 3-2). The subarea is defined as beginning at MP 55.5 (near the Galisteo Rodeo Grounds) and ending at MP 57.5 approximately one-quarter mile north of a
Figure 3-1: NM 41 Project Subareas
Figure 3-2: Community Subarea
large ridgeline that crosses the NM 41 corridor north of the community. The community subarea is further separated into three segments:

- The community transition areas entering and leaving Galisteo (see Figure 3-2). The transition areas are from MP 55.5 to MP 56.1 on the south end of Galisteo and from MP 56.75 north to MP 57.5 on the north end of Galisteo. These milepost locations are approximate; the actual transition points may vary depending on the terrain, roadside development, and other factors.
- The community core area which includes the area of the highest development concentration. For the purposes of this study, the community core includes the area from the Galisteo Creek Bridge north for approximately ¾ miles.
- This roadway including and between the San Cristobal Arroyo Bridge and Galisteo Creek Bridge. The Galisteo Creek Bridge is within the Galisteo Historic District. San Cristobal Arroyo Bridge is a contributing element to the historic district but is not physically within its boundaries.

3.1 Roadway Alternatives – Rural Subarea

As noted above, the rural subarea includes the portions of NM 41 both north and south of Galisteo (see Figure 3-1). Primary considerations in the development of alternatives for the rural segments included:

- Correcting sight-distance limitations at deficient vertical curves. As discussed in Section 2 of this report, all of the vertical curves that require improvement are located within the area from Clark Hill north to about MP 54.
- Improving the alignment at Clark Hill. This would include flattening the horizontal curve and extending the climbing lanes.
- Providing shoulders for use by bicyclists and as a counter-measure for roll-over crashes.
- Avoiding the acquisition of private property for highway right-of-way.

The posted speed of the existing highway is 55 mph. To minimize impacts to areas adjacent to the highway consistent with the public input, the NMDOT agreed to use design criteria consistent with the current 55-mph posted speed. Three alternative sections were considered and include:

1. No-Action Alternative – The No-Action Alternative assumes the roadway would not be improved except for routine maintenance. The existing typical sections for NM 41 are shown in Figures 3-3A and 3-3B.

2. Rural Roadway Alternative 1 – This alternative includes a typical section with two 12-foot lanes plus 8-foot shoulders. With this alternative, the highway would follow the existing alignment except in locations where vertical and horizontal curves would be flattened to allow for a safe posted speed of 55 mph. At Clark Hill, the typical section would expand to include an additional 12-foot-wide climbing lane. Shoulders in this section would remain at 8 feet. This section is shown in Figure 3-3C. The profile of this alternative is provided in Appendix A. Rural Roadway Alternative 2 – This alternative is similar to Alternative 1 and uses the same criteria for a 55-mph posted speed (see Appendix A for profile). The difference is that the shoulders would be narrowed to 5-to 6-feet. While the 5-foot shoulders would narrow the overall
Figure 3-3A: NM 41 Existing Typical Section

Figure 3-3B: NM 41 Existing Typical Section at Clark Hill

Figure 3-3C: NM 41 Proposed Typical Section – Rural Alternative 1

Figure 3-3D: NM 41 Proposed Typical Section – Rural Alternative 2
roadway section, they would leave less room for use by bicyclists (a usable width of 4 feet after rumble strips are constructed). Figure 3-3D illustrates this alternative.

3.2 Roadway Alternatives – Community Subarea

The community subarea includes the portion of NM 41 beginning at MP 55.5 and extending north to MP 57.5 (approximately, see Figure 3-2). This area includes ‘transition zones’ at the north and south ends of the segment to transition the higher speed travel on the rural segments of NM 41 to the Galisteo residential area. Primary considerations in the development of alternatives for this area included:

- The use of a narrower highway section to provide a visual cue to drivers that they are entering a community;
- The use of other traffic calming strategies to achieve and maintain slower travel speeds as vehicles travel through the community.
- Facilities to accommodate pedestrian travel along the highway and crossing the highway.

The legal speed through Galisteo is currently posted at 35 mph. While community comments suggested lowering the posted speed, the NMDOT proposes to maintain the existing posted speed of 35 mph but will reevaluate the posted speed after traffic calming measures have been implemented. The typical section alternatives for the community transition and community core areas include:

1. No-Action Alternative – The No-Action alternative assumes the roadway would not be improved except for routine maintenance. The existing typical sections for NM 41 within the community subarea are shown in Figure 3-4A.

2. Community Alternative 1 – This alternative is specific to the two transition areas within Galisteo. The transition alternative consists of a roadway typical section with two 11- to 12-foot lanes plus 4-foot shoulders.

3. Community Alternative 2 – Alternative 2 is specific to the community core area. It would continue the same roadway section as described for Community Alternative 1 (two 11- to 12-foot lanes plus 4-foot shoulders) but would include a multi-purpose path on either side of the highway though the community. Due to the narrow shoulders and slower speeds, no rumble strips would be used. The path may not extend the full length of the community core, depending on the pedestrian provisions included on the Galisteo Creek Bridge. The path would be 6 to 10 feet in width, depending on community input. The typical section for this alternative is shown in Figure 3-4B on the following page.

4. Community Alternative 3 – The second alternative has the same features as Community Alternative 2 except that the shoulders would be 1.5-foot-wide flush concrete. As an option, rolled concrete curbs could be used in lieu of the flush concrete. In either case, the concrete could be colored to blend with the roadside to enhance the visual perception of a narrow roadway. The optional path would be the same as discussed under Alternative 2. Figure 3-4C illustrates the dimensions for this alternative.

5. Community Alternative 4 – This alternative would construct a bypass of the community subarea. The bypass would leave the existing NM 41 alignment south of the rodeo grounds near MP 55.5 and extend to the north and east of the existing highway. The bypass would lie about 0.5 miles east of the community center and would connect to NM 41 north of the hog back ridge on the
north edge of town near MP 57.7. The bypass would be about 2.4 to 3.1 miles in length, depending on the location of its tie back to NM 41. The bypass would include the construction of new bridges over the Galisteo Creek and San Cristobal Arroyo. Figure 3-5 illustrates the general alignment for the community bypass alternative.

3.3 Traffic Calming Alternatives – Community Subarea

In addition to the narrow roadway sections, traffic calming strategies have been identified to further slow traffic traveling through the community subarea. The strategies considered are shown in Figure 3-6A through 3-6E and include:
Figure 3-5: Community Alternative 4 – Bypass
Figure 3-6A: Radar-Reader Board

Figure 3-6B: Roundabout Examples
Figure 3-6C: Median Example

Figure 3-6D: Traffic Chicane Examples (above and below)

Figure 3-6E: Choker Example
1. **Traffic Calming Strategy 1 (Radar-Reader Boards)** – Radar-reader speed displays (see Figure 3-6A) are currently in use in the study corridor and have proven to be effective in slowing traffic. The use of radar-reader boards would continue although they may be relocated, depending on the other traffic calming strategies used. Community input suggested consideration of transverse rumble strips prior to the radar-reader boards to provide a tactile cue for drivers.

2. **Traffic Calming Strategy 2 (Roundabouts)** – This strategy would use roundabouts at the community entry points. Roundabouts would be a transition strategy that forces traffic to slow as the horizontal curve is negotiated. Roundabouts would also provide a visual cue to traffic of the upcoming community area by including plantings and signs in the center of the roundabout. Figure 3-6B illustrates this strategy.

3. **Traffic Calming Strategy 3 (Medians)** – This strategy is similar to roundabouts but would use roadway medians to slow traffic. The medians would have rolled concrete curbs and would be 12 feet wide or wider (see Figure 3-6C). Medians could be used in both the transition zones and the community core area.

4. **Traffic Calming Strategy 4 (Chicanes)** – Chicanes use roadside and median obstacles to create a sharp S-curve in the highway to slow traffic (see Figure 3-6D). The use of this strategy would be limited to the community core area.

5. **Traffic Calming Strategy 5 (Chokers)** – Chokers use roadside obstacles to create a narrow roadway section (see Figure 3-6E). The use of this strategy would be limited to the community core area.

### 3.4 Bridge Alternatives – Community Subarea

Two bridges would be affected by the proposed project. These include the Galisteo Creek Bridge and the San Cristobal Arroyo Bridge. Both bridges are eligible for listing in the National Register of Historic Places and are contributing elements to the Galisteo Historic District. The third bridge within the project area — Arroyo de la Jara Bridge — is located within the rural subarea at MP 53.5 and is in good condition. Changes to this bridge, if any, will be limited to minor maintenance only. For this reason, it is not discussed further in this section.

Bridge alternatives were developed considering several factors, including bridge condition and safety, historic preservation, aesthetic design, and impacts to nearby natural resources. Five alternatives were identified and include:

1. **No-Action Alternative** – The No-Action Alternative assumes the bridges would remain in their existing state. While routine maintenance would be provided, their remaining life span is unknown, and ultimately both bridges could require emergency repair or replacement. The existing typical sections for the two bridges are shown in Figures 3-7 and 3-8. The width of the existing Galisteo Creek Bridge is 33 feet 3 inches and includes two 12-foot lanes plus 4 feet 7 inches on each side for barrier curb, sidewalk, and bridge railing. The San Cristobal Arroyo Bridge deck is 29-feet wide and includes two 12-foot lanes plus 2 feet 6 inches on each side for barrier curb and railing.

2. **Bridge Alternative 1 (Minor Rehabilitation Alternative)** – This alternative would remove and replace the bridge deck and railings. Bridge girders (beams) would be replaced or reinforced to restore and/or improve the bridge load capacity. The bridge abutments, piers, and foundation
would be repaired/patched. With this alternative, the bridge typical sections would be maintained in their current geometric configuration.

3. Bridge Alternative 2 (Major Rehabilitation Alternative) – This alternative would replace the bridge deck, railings, and girders. Bridge piers, abutments, and foundations would also be replaced and/or widened and repaired as feasible. The aesthetic design would be very similar to the existing structures. The bridge typical sections could vary in width. A narrow section could be constructed that is limited to two 11-foot driving lanes plus 6-foot shoulders. If sidewalks are desired, the typical section would be widened to include sidewalks on one or both sides of the deck. The inclusion of sidewalks would add a minimum of 4 feet if added on one side only and 8 feet or more if they are included on both sides. The resulting deck width would vary from a minimum of 37 feet up to 45 feet. The typical sections for each bridge are shown in Figures 3-9A and 3-9B.

4. Bridge Alternative 3 (Reconstruction Alternative) – The Reconstruction Alternative would entirely replace the two bridges including the bridge super-structure and substructure. The aesthetic design would be very similar to the existing structures to retain the historic character. The typical section would be the same as described for the major rehabilitation alternative (see Figures 3-9A and 3-9B).

5. Bridge Alternative 4 (Bridge Bypass) – As an alternative to the rehabilitation or reconstruction of the two bridges, a bridge bypass could be constructed. The bypass alternative assumes that new bridges and connecting roadway is constructed parallel to the existing bridges. The offset from the existing structures could vary from a few feet up to 150 feet. With this alternative, the bypass would be left (west) of the Galisteo Creek Bridge and either left or right of the San Cristobal Arroyo Bridge. The typical section would be the same as described for the major rehabilitation and reconstruction alternatives. However, a much narrower section could be used if the new bridge was limited to a single direction of travel and the existing bridges are used for the opposite travel direction. Under this scenario, minor rehabilitation (as described for Bridge Alternative 1) would still be needed to the existing bridge. The alignment for this alternative is shown in Figure 3-10.

![Figure 3-7: Galisteo Creek Bridge Existing Typical Section](image-url)
Figure 3-8: San Cristobal Arroyo Bridge Existing Typical Section

Figure 3-9A: Typical Section Option Assuming Shoulders But No Sidewalks

Figure 3-9B: Typical Section Option Assuming Shoulders and Sidewalks
Alternative 3-10: Bridge Bypass Alternative
4.0 INITIAL EVALUATION OF ALTERNATIVES

Each of the alternatives described in Section 3 of this document was evaluated by the NM 41 Project Team using a screening process based on simple qualitative and quantitative analysis techniques. The objectives of the screening evaluation were to identify major differences between the alternatives and to assess their consistency with the project purpose and need and performance objectives. The screening evaluation was used to select the alternatives for further consideration and to eliminate those that are not reasonable or practical. Alternatives that are advanced from the initial evaluation phase (Phase A) will be developed in greater engineering detail and assessed further as part of the detailed evaluation phase (Phase B). Because the No-Action Alternative will be carried forward through Phase B and the environmental document, it cannot be eliminated by the screening analysis and therefore, is not included in the discussion of initial evaluation findings.

The primary factors considered for the initial evaluation included: (1) safety; (2) right-of-way acquisition; (3) traffic calming characteristics; (4) consistency with the cultural character of the study area; and (5) impacts to the natural environment, community resources, and cultural resources. While cost estimates were prepared for the overall route alternatives, cost was not used to differentiate alternatives for this phase of the alignment study. The findings of the screening evaluation are summarized in this section.

4.1 Roadway Alternatives – Rural Segments

Two build alternatives were evaluated for the rural segments of the project area. These include Alternative 1 (12-foot lanes with 8-foot shoulders) and Alternative 2 (11-foot lanes with 6 foot shoulders and the option of 12-foot lanes with 5-foot shoulders). The findings for each alternative are as follows.

Rural Alternative 1 (12-foot lanes with 8-foot shoulders)

- **Safety** – The typical section assumed for this alternative would meet AASHTO criteria for a rural collector highway. The 12-foot travel lanes are consistent with modern design criteria and provide adequate shy-distance between opposing travel lanes. The 8-foot shoulders provide room for the addition of rumble strips and for use by bicyclists. They also provide adequate width to accommodate vehicles that must stop outside of the travel lanes for repairs or mechanical breakdowns, as well as added room for avoidance maneuvers (e.g., to avoid animals on the highway).

  The design criteria would correct vertical curves that do not meet currently stopping sight distance for rural highway speeds of 55 mph. Design criteria for horizontal curves would also be achieved by this alternative. Overall, this alternative would achieve the primary safety needs within the rural segments of the project area.

- **Right-of-Way** – Right-of-way acquisition with Alternative 1 would be minimal. The use of a 60 mph design speed limits the amount of vertical modifications required. Consequently, this alternative could be constructed within the existing right-of-way, although constructed slopes may need to be steepened to 2:1 in 4 locations where the cut/fill depth is greater than 8 feet. Temporary construction permits (TCPs) and/or construction maintenance easements (CMEs) may be needed at several locations where box culverts and drainage pipes cross the highway.

- **Traffic Calming** – The traffic calming features of this alternative are limited. In general, the combination of 12-foot lanes and 8-foot shoulders would likely result in slightly higher travel speeds than the existing highway configuration. However, the terrain and relatively short vertical
curves would still constrain speeds as compared to the conditions along NM 41 south of the project area. In addition, the wider shoulders would provide a safe area for state and local law enforcement officers to safely stop and cite speeders.

- **Consistency with Cultural Character** – Alternative 1 would represent a change from the existing highway alignment and typical section. The overall pavement width would increase approximately 66% (24 feet to 40 feet). While this increase is small when considered in the overall visual element of the corridor, it would be a noticeable change. The change in vertical alignment would be apparent to drivers but would not have a substantive change in the overall visual aspect of the corridor. In the vast majority of the corridor, the change in vertical alignment would be 2-feet or less, although several locations could require a vertical change of 8-feet or more. The total length of locations where vertical curves would be changed by 8-feet or more is approximately 2% of the overall route length.

- **Impacts to Natural, Cultural, and Social Resources** – The primary impacts that would result from this alternative are limited to the loss of roadside vegetation and habitat. The additional 16 feet in paved area would result in the permanent loss of approximately 23 acres of roadside habitat. Wetland habitat, if any, would be minimal within the rural subarea of the project (wetlands are found in the community subarea). Archaeological records and preliminary survey findings indicate that 11 archaeological sites exist within or adjacent to the highway right-of-way. It is likely that these sites can be avoided by minor shifts in the roadway centerline, as needed. Substantive impacts to driveways and other roadside features are not anticipated. Because Galisteo is not included in the rural segments, community impacts are not a major consequence of this alternative.

**Rural Alternative 2** (12-foot lanes with 5- to 6-foot shoulders)

- **Safety** – Like Alternative 1, the typical section assumed for this alternative would meet AASHTO criteria for a rural collector highway. The use of 5-foot shoulders is allowed, but may require a design exception from FHWA standard practices. Twelve-foot lanes provide adequate shy-distance between opposing travel lanes although the separation is minimally acceptable for highways used by large trucks. The 6-foot shoulders can accommodate rumble strips and still have adequate width for use by bicyclists. The use of 5-foot shoulders would be marginal for bicycle use after the width required for rumble strips is considered. The narrower shoulders are not adequate to accommodate vehicles that must stop outside of the travel lanes for repairs or mechanical breakdowns, although stopped vehicles can use the shoulders and surfacing tapers if needed. The shoulders provide room for avoidance maneuvers as well as added visibility to see animals crossing the highway.

  The design speed and profile of this alternative is the same as described for Alternative 1. Overall, this alternative would achieve the primary safety needs within the rural segments of the project area.

- **Right-of-Way** – Right-of-way acquisition with Alternative 2 would generally be the same as described for Alternative 1. However, due to the narrower 6-foot shoulder width, the need for TCPs and CMEs would be less.

- **Traffic Calming** – Alternative 2 would have better traffic calming characteristics than Alternative 1. The combination of narrower lanes and shoulders, together with a design speed of 60 mph, would likely result in slower speeds than Alternative 1.
• **Consistency with Cultural Character** – Alternative 2 would represent a change from the existing highway alignment and typical section. The overall pavement width would increase approximately 42% (24 feet to 34 feet). While this increase is small when considered in the overall visual element of the corridor, it would be a noticeable change. The change in vertical alignment would be the same as described for Alternative 1.

• **Impacts to Natural, Cultural, and Social Resources** – The primary impacts that would result from this alternative are similar to that as described for Alternative 1. The additional 10 feet in paved area would result in the permanent loss of approximately 14.5 acres of roadside habitat. All other impacts that would result from this alternative would be the same as for Alternative 1.

### 4.2 Roadway Alternatives – Community Subarea

Four build alternatives were evaluated for the community subarea. These include Community Alternative 1 (Transition Zone: 11-foot lanes with 4-foot shoulders), Community Alternative 2 (Community Core: 11 foot lanes with 4-foot shoulders and a parallel pedestrian pathway), Community Alternative 3 (11-foot lanes with 1.5-foot shoulders), and Community Alternative 4 (community bypass). The findings for each alternative are as follows.

**Community Alternative 1** (Transition zones; 11- to 12-foot lanes with 4-foot shoulders)

- **Safety** – This alternative would be used in the areas that transition between the rural highway segments and the community. Posted speeds would be 45 mph or less. The lane width assumed for Community Alternative 1 would meet AASHTO criteria for a rural collector highway and would provide adequate separation of opposing traffic. However, the 4-foot shoulders would require a design exception. The 4-foot shoulders would be usable by bicyclists assuming a rumble strip is not constructed. Because this alternative would be used in areas with posted speeds of 45 mph or less and in terrain that is relatively flat, the restricted room for vehicle maneuvers and roadside stops would not present excessive safety concerns.

  No vertical or horizontal curves exist within this segment that require correction. Overall, this alternative would achieve the primary safety needs within the community segment of the project area.

- **Right-of-Way** – The need for right-of-way acquisition with Community Alternative 1 is not anticipated.

- **Traffic Calming** – The narrow travel lanes combined with 4-foot shoulders would provide traffic calming benefits as vehicles transition from the wider highway sections. Traffic calming would be further enhanced by specific traffic calming strategies included in this segment (see Section 4.3).

- **Consistency with Cultural Character** – Community Alternative 1 would represent a minor change from the existing highway typical section. Changes in vertical alignment would be negligible. The overall pavement width would increase by 6 feet (24 feet to 30 feet). The increased width is minor and would not be expected to alter the visual character of the area and would not detract from the historic district setting or character.

- **Impacts to Natural, Cultural, and Social Resources** – The area adjacent to the existing highway through the transition areas has scant vegetation. Thus, this alternative would not result in the loss of vegetation or habitat (Note: the habitat associated with the two bridges within the
Community Alternative 2 (Community Core area: 11-foot lanes with 4-foot shoulders)

- **Safety** – This alternative would be used within the community core area. Posted speeds would be 35 mph or less. Because the lane and shoulder widths assumed for Community Alternative 2 would be the same as described for Community Alternative 1, the safety effects would also be the same. The parallel pathway would provide pedestrians a safe place to walk away from the highway. Because this alternative would be used in areas with posted speeds of 35 mph or less and in terrain that is generally flat, the restricted room for vehicle maneuvers and roadside stops would not present excessive safety concerns.

No vertical or horizontal curves exist within this segment that requires correction. Overall, this alternative would achieve the primary safety needs within the community segment of the project area.

- **Right-of-Way** – The proposed roadway and pathway improvements included with this alternative could be constructed within the existing right-of-way.

- **Traffic Calming** – The narrow travel lanes combined with 4-foot shoulders would provide traffic calming benefits. Traffic calming would be further enhanced by specific traffic calming strategies included in this segment (see Section 4.3).

- **Consistency with Cultural Character** – Community Alternative 2 would represent a minor change from the existing highway typical section. No changes in vertical or horizontal alignment would occur. The pavement width increase of 6 feet would not be expected to alter the visual character of the area and would not detract from the historic district setting or character.

- **Impacts to Natural, Cultural, and Social Resources** – The area adjacent to the existing highway through the community area has scant vegetation. Thus, this alternative would not result in the loss of vegetation or habitat. Decorative mailboxes and a sign for Galisteo and nearby places of interest are adjacent to the roadway in the area just north of CR 42. These may have to be removed during construction; however, they can be replaced after construction is complete. No other community, cultural, or natural resources would be affected.

Community Alternative 3 (Community Core area: 11-foot lanes with 1.5-foot shoulders)

- **Safety** – The safety consequences of this alternative would generally be the same as described for Community Alternative 2 with one exception. Under this option, bicyclists would share the lane with traffic through the community. Overall, this alternative would achieve the primary safety needs within the community segment by slowing traffic. However, conflicts between bicyclists and vehicles would occur, especially in the northbound direction where bicycle travel is slowed by the rising grade.

- **Right-of-Way** – The proposed roadway and pathway improvements included with this alternative could be constructed within the existing right-of-way.

- **Traffic Calming** – The narrow travel lanes combined with 1.5-foot shoulders would provide the greatest traffic calming benefits of all roadway alternatives under consideration. Traffic calming
would be further enhanced by specific traffic calming strategies included in this segment (see Section 4.3).

- **Consistency with Cultural Character** – Community Alternative 3 would be consistent with the existing highway typical section. The use of colored concrete for the shoulders would blend with the roadside. Consequently, this alternative would not alter the cultural character of the historic district or overall community area.

- **Impacts to Natural, Cultural, and Social Resources** – The consequences of this alternative on natural, cultural, and community resources would generally be the same as described for Community Alternative 2.

Community Alternative 4 (Community Bypass: 11-foot lanes with 6-foot shoulders)

- **Safety** – Because this alternative would be constructed outside of developed areas, the assumed posted speed would be consistent with the rural segments of the project (55 mph). The vertical and horizontal alignment would be established to meet AASHTO design criteria for a 55-mph rural collector highway. This alternative would result in the addition of two new intersections. Because many crashes occur at intersections, an increase in crash rates could occur with this alternative.

- **Right-of-Way** – Assuming a total length of 3 miles and right-of-way width of 150 feet, approximately 55 acres of private land would be acquired for this alternative.

- **Traffic Calming** – Because this option avoids developed areas, traffic calming is not a primary consideration beyond that desired by the community for the overall portion of NM 41 within the Galisteo Basin. The combination of narrower lanes and shoulders together with a design speed of 60 mph would be consistent with the proposed alternatives for the rural roadway segments.

- **Consistency with Cultural Character** – This alternative would add a new visual element that would be visible from within the community area. While it would be constructed away from the historic district, the new alignment would be visible from the surrounding areas and would not be consistent with the travel paths used historically.

- **Impacts to Natural, Cultural, and Social Resources** – The Bypass Alternative would have several impacts to the natural, cultural, and community resources. Because this alternative consists of a new roadway alignment, its construction would result in the loss of approximately 30 acres of vegetation. In addition, the alignment would cross Galisteo Creek and San Cristobal Arroyo and would likely result in the loss of wetland habitat at both of these locations. Impacts to wildlife would also result, including the loss of small animals along the alignment. Large mammals could also be affected by the addition of a new roadway as a result of a second highway that they would have to cross during east-west movements.

Impacts to cultural resources are not known, as survey data for the alignment is not available. Given the density of archaeological sites within the surrounding area and the alignment location that crosses two waterways, it is likely that archaeological sites exist within the new alignment segment.

Land use impacts would also occur as a result of this option. The affected land is currently used for ranching purposes and is part of a large ranching operation. The introduction of a new roadway would result in the loss of ranchlands and could affect access to adjoining parcels.
Community impacts would be related to noise. Traffic would be shifted from the community core to the eastern edge of Galisteo. Residential properties and resort properties along the eastern edge of the community and near the Bypass alignment would be affected by increased noise. Because Galisteo does not currently rely on pass-through traffic to support local businesses, the Bypass alignment would not be expected to result in a loss of business from tourists.

### 4.3 Bridge Alternatives

The evaluation of bridge alternatives considered three criteria: (1) historic character; (2) safety; and environmental impacts.

#### No-Action Alternative

- **Historic Character** – Because no changes would be made to the existing bridges with the No-Action Alternative, the historic character of the bridges would not be immediately impacted. However, with continued deterioration of the structures, the bridge condition will eventually require closure and emergency repair. For this reason, the No-Action Alternative is viable but has a finite life. When the bridge conditions reach a state requiring emergency repair, their historic integrity could be affected, depending on how the bridge is restored.

- **Safety** – The existing bridges currently meet safety criteria with regard to load rating and structural integrity. However, as they continue to deteriorate, their load capacity and general condition will eventually reach a point where they are no longer safe. In addition, the sidewalks on Galisteo Creek Bridge do not meet ADA requirements and are blocked by guard rail attachments. Neither bridge has shoulders; therefore, bicycles must share driving lanes with other traffic.

- **Environmental Impacts** – Maintenance of the bridge structure may require the use of construction equipment within the waterway and riparian areas that could result in temporary impacts to wetland habitat. These impacts would be minimized by Best Management Practices (BMPs) and the implementation of a SWPPP, as needed. Long-term impacts are not anticipated.

#### Bridge Alternative 1 (Minor Rehabilitation Alternative)

- **Historic Character** – Bridge improvements under the minor rehabilitation alternative would be implemented to maintain the existing character of the bridges. However, because the deck and railing would be replaced, the historic character of the existing bridges would be affected. The existing safety railing does not meet crash worthiness and would be replaced using a different railing to meet safety criteria. While the replacement railing would be selected to closely match the existing railing, it cannot be replicated in its current design. For this reason, the historic integrity of the bridges could be affected.

- **Safety** – Improvements to the bridge deck and railings would restore the structural load rating and integrity. Because the width of the bridges would not be increased and the typical sections would remain the same, bridge safety would not be improved. The sidewalks on Galisteo Creek Bridge do not meet ADA requirements and are blocked by guard rail attachments. Neither bridge has shoulders; therefore, bicycles must share driving lanes with other traffic. The impacts to pedestrians and equestrians would be that same as for the No-Action Alternative.
• **Environmental Impacts** – Impacts to the environment would be limited to short-term construction impacts. Improvements to the bridge girders and other structures and deck replacement would likely require the use of heavy construction equipment within the waterway and riparian areas. These activities would likely result in temporary impacts to wetland habitat. Impacts would be minimized by Best Management Practices (BMPs) and the implementation of a SWPPP. Long-term impacts are not anticipated.

Removal of the bridge decks would require construction of temporary bridges to serve traffic on NM 41. While US 285 could be used as a detour for some traffic, especially through trucks, it would not be a reasonable detour for traffic traveling on NM 41 from or to destinations north of Moriarty. Assuming two way traffic is maintained on the detour, the temporary bridges would remove a substantial amount of wetland and riparian habitat.

**Bridge Alternative 2** (Major Rehabilitation Alternative)

• **Historic Character** – The major rehabilitation alternative would replace many of the historic elements of the existing bridges including the bridge deck, railings, and girders. In addition, the piers and abutments may be widened and/or replaced. The replacement railing would closely match the existing railing but would not be a replicate due to the need for crash worthiness. This alternative would also increase the width of the bridge decks. Even though the replacement bridge elements would replicate the existing bridges, the extent of changes would affect their historic integrity.

• **Safety** – Replacement of the bridge structural elements would result in improved load rating and structural integrity, which would extend the lifespan of the bridges. The wider deck would also enhance safety by providing shoulders and/or sidewalks that can be used by bicyclists and pedestrians.

• **Environmental Impacts** – Impacts to the environment would generally be the same as described for Bridge Alternative 1, although replacement and/or repair of the abutments, piers, and foundations would likely cause greater impacts to the areas underneath and adjacent to both bridges due to the need for greater use of heavy equipment. Some loss of wetlands and riparian habitat would occur. Most of these impacts would be short-term and would be mitigated after construction is completed.

The construction of traffic detours would have the same impact to wetlands and riparian habitat as described for Alternative 1.

**Bridge Alternative 3** (Reconstruction Alternative)

• **Historic Character** – The Reconstruction Alternative would entirely replace the two bridges including the bridge super-structure and substructure. The aesthetic design of the piers, abutments, foundations, and girders would replicate the existing structures. The deck would be widened and the railing would closely match the existing design but would have some differences due to crash worthiness requirements. Impacts to the historic character would be the same as described for Alternative 2.

• **Safety** – Reconstruction of the bridges would result in improved load rating and structural integrity. Reconstruction would also include 5- to 6-foot wide shoulders and the option to include sidewalks, which would improve safety for bicyclists, pedestrians, and motorists.
• **Environmental Impacts** – Impacts to the environment would include construction impacts as described for Bridge Alternatives 1 and 2, although they would be greater, as the entire bridge structures would be demolished and replaced. Replacement would involve greater disturbance for the bridge footprint than for the rehabilitation alternatives and would include the loss and temporary disturbance to wetlands and riparian habitat.

Because of the wider bridge deck, it may be possible to construct half of the new bridge before the existing bridge is removed. This approach would allow traffic to be served without the need for a temporary bridge, which would reduce impacts to wetland and riparian habitat.

**Bridge Alternative 4 (Bridge Bypass)**

• **Historic Character** – Because no changes would be made to the existing bridges, their historic character would not be directly affected. However, both bridges would continue to deteriorate and would eventually require improvements that could affect their historic integrity. In addition, the bypass alternative assumes that new bridges and connecting roadway is constructed parallel to the existing bridges. The creation of a bypass would change the view of the historic bridges and could impact other cultural resources found adjacent to the existing roadway.

• **Safety** – The typical section used for the bridge bypass would include 11- to 12-foot driving lanes and 5- to 6-foot shoulders. Sidewalks may also be added depending on public interest. The bridge geometry would enhance safety to motorists, bicyclists, and pedestrians.

• **Environmental Impacts** – The Bridge Bypass Alternative would have impacts to the natural, cultural, and community resources, much the same as described for the community bypass alternative. Because this alternative consists of a new roadway alignment, its construction would result in the loss of up to 6 acres of vegetation and habitat. In addition, the alignment would require new crossings of Galisteo Creek and San Cristobal Arroyo and would result in the loss of wetland habitat and riparian areas at both of these locations. Impacts to wildlife would also result, including the loss of small animals along the alignment.

• Impacts to cultural resources are not known, as survey findings for the alignment are not yet complete. Preliminary findings indicate two archaeological sites exist within the by-pass area, depending on the centerline selected.

Land use impacts, while anticipated, are expected to be slight, as the new alignment is close to the existing highway. The new alignment would not change access to private property, but it would require the acquisition of up to 6 acres of land, depending on which side of the highway the bypass is constructed.

### 4.4 Traffic Calming Strategies

The assessment of traffic calming strategies used different criteria than the evaluation of roadway and bridge alternatives. Because the traffic calming options would be implemented in spot locations only and are a relatively small component of the overall roadway, the primary evaluation factors considered for the initial evaluation of these strategies were limited to three criteria: (1) effectiveness in slowing traffic; (2) consistency with the historic character of the study area; and (3) right-of-way requirements.

**Traffic Calming Strategy 1 (Radar-Reader Boards)** – Radar-reader boards would be implemented within the community transition segments. Because they already exist, they would not result in conflicts with the
historic character of the Galisteo area. They do not require the acquisition of new right-of-way. Speed studies performed by the NMDOT have demonstrated that the existing radar-reader boards are effective in reducing travel speeds.

Traffic Calming Strategy 2 (Roundabouts) – Roundabouts would be implemented in several locations: Their primary application would be in the transition zones between the rural segments and the community core area. They could also be used at the start of the community core segment.

- Roundabouts would be effective at slowing traffic. Because their design does not allow traffic to navigate the roundabout at higher speeds, traffic is forced to slow to speeds of 25 mph or less.
- While roundabouts have been in use for many decades in some US cities and in parts of Europe, they are typically viewed as a modern traffic control strategy for use in cities. For this reason, there is some question of their consistency with the character of the Galisteo historic district. If used in the transition zones only, their visual conflict with the community would be lessened. The use of native shrubs and historic sign materials within the inner core of the roundabout would also help mitigate any inconsistencies with the historic character.
- The use of roundabouts could require the acquisition of additional right-of-way, depending on where they are implemented. The needed right-of-way would be minimal and would not impact adjacent structures.

Traffic Calming Strategy 3 (Medians) – Medians would be implemented in the same locations as roundabouts. They could also be used in combination with roundabouts.

- Medians would be effective at slowing traffic but would not be as effective as roundabouts. While they would be designed for speeds at 30 to 35 mph, their basic design uses a gradual curve that can be navigated at speeds in excess of their intended design. Their traffic calming abilities is achieved by both design and the visual cue provided to motorists.
- The construction of medians within or near the historic district would be a different visual element than has occurred historically within the Galisteo area. However, their features are not starkly inconsistent with the area. Rolled curbs could be constructed using colored concrete that would match the roadside area. Native shrubs and historic sign materials could also be added within the median to blend with the surrounding area.
- The use of medians would not require the acquisition of additional right-of-way, provided that they are not constructed within the center of Galisteo where right-of-way narrows to 75 feet or less.

Traffic Calming Strategy 4 (Chicanes) – Chicanes would be implemented within the community core area. They are not compatible in areas where the sharp speed reductions would occur; therefore, they would not be used within the transition segments.

- The introduction of an S-curve, as created by a chicane, would be effective at slowing traffic. However, due to the lack of street lighting within the community, motorists unfamiliar with NM 41 could miss their presence and collide with the curbs. This conflict is not uncommon with chicanes and is often evidenced by tire marks on the leading curbs. They also present difficulties during snow removal due to the sharp curves they introduce along the roadway.
- The construction of chicanes within or near the historic district would be a different visual element than has occurred historically within the Galisteo area. However, as discussed for medians, they
would be a stark contrast to the adjoin road segments. They could be constructed and landscaped using the same methods as discussed for medians to improve their visual compatibility.

- Chicanes would not require the acquisition of additional right-of-way.

**Traffic Calming Strategy 5 (Chokers)** – Chokers could be implemented in both the transition zones and community core areas.

- Chokers would have similar traffic calming success as medians. As discussed for medians, the traffic calming abilities of a choker is achieved by both design and the visual cue provided to motorists.

- The construction of chokers within or near the historic district would be a minimal visual change. The curbing required for a choker could be constructed using rolled curbs with colored concrete to match the roadside area. Vegetation within the choker could consist of native shrubs and historic sign materials to blend with the surrounding area.

- The use of chokers would not require the acquisition of additional right-of-way.

**Rumble Strips** – In addition to the above traffic calming strategies, public comments received after the first public meeting requested consideration of transverse rumble strips preceding the radar reader boards, roundabouts, and medians. Rumble strips would provide a tactile cue for motorists entering the Galisteo area. While they are an effective strategy to alert motorists to upcoming changes in road conditions, they produce considerable noise. To assess this consequence, noise data was collected near existing rumble strips at other locations. That data determined that the noise produced by a rumble strip can reach 80 decibels at the roadside. At this level, the noise intrusion produced by a rumble strip could extend 700 to 800 hundred feet.
5.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

Findings and recommendations for the initial alignment study for the NM 41 corridor have been developed in consideration of: (1) the data collection, initial investigations, and screening analysis; and, (2) input received from community stakeholders, highway users, and agency stakeholders. The analysis findings and public input will be used to select the alternatives to be evaluated in greater detail in the next study phase, i.e., Detailed Evaluation of Alternatives (Phase 1-B). The findings are also used to identify issues of potential significance that require additional investigation and analysis. The summary of major findings and recommendations are listed below.

1. The condition of the existing roadway and review of crash data support the need to consider improvements to NM 41 from Clark Hill to US 285. The following critical improvement needs were identified.
   - Several short vertical curves and two sharp horizontal curves exist that are substantially below the design criteria for the posted speed of 55 mph.
   - NM 41 is used by bicyclists. Because the existing highway does not have shoulders, conflicts occur between bicycles and motor vehicles. The high speed differential between bicycles and motor vehicles creates an unsafe condition.
   - Crashes on NM 41 include a high percentage of roll-over incidents. The high percentage of roll-over crashes is likely due to the absence of shoulders. The absence of shoulders results in drivers having limited maneuverability to avoid other vehicles, animals, and other objects in the roadway. In addition, because shoulders do not exist, rumble strips cannot be installed to alert motorists when they leave their driving lane.
   - The Galisteo Creek and San Cristobal Arroyo Bridges are in poor condition. The poor physical condition of bridge decking, railing, girders, piers, abutments, and foundations warrant repair and/or replacement. If improvements are made to the bridges, the addition of shoulders should be considered to improve motorist, bicycle, and pedestrian safety. The addition of sidewalks should be considered if public stakeholders desire this addition.

2. Several potential alternatives have been identified. Alternatives were developed based on highway design criteria for a rural collector highway, input from stakeholders, environmental and cultural constraints, and anticipated funding resources. The alternatives identified and the recommendation for each are as follows.
   - **Rural Alternative 1** (12-foot lanes with 8-foot shoulders) – This is a viable alternative. It is not recommended due to community concerns with the potential for this alternative to cause excessive impacts to the historic character of the Galisteo Basin and increase travel speeds.
   - **Rural Alternative 2** (12-foot lanes with 5- to 6-foot shoulders) – This alternative would achieve the essential safety needs within the rural segments of the project area. It would provide minimally acceptable lane and shoulder widths but would have less impact on the environment and cultural character of the project area than Rural Alternative 1. This alternative is recommended for further consideration in Phase 1-B. It is further recommended that the highway profile be designed to safely accommodate a 55-mph posted speed.
• **Community Alternative 1** (Transition zones; 11- to 12-foot lanes with 4-foot shoulders) – This alternative would achieve safety needs within the transition zones of the project area. Eleven-foot lanes would provide a minimally acceptable width but would have less impact on the environment and cultural character of the project area than wider lanes and shoulders. It would also help reduce travel speeds as the highway enters Galisteo. This alternative is recommended for further consideration in Phase 1-B.

• **Community Alternative 2** (Community Core area: 11-foot lanes with 4-foot shoulders) – This alternative would achieve safety needs within the community core segment of the project area. The inclusion of shoulders would provide an area for bicyclists outside of the driving lanes. The combination of 11-foot lanes with 4-foot shoulders would maintain a narrow section as the highway passes through Galisteo. This alternative is recommended for further consideration in Phase 1-B.

• **Community Alternative 3** (Community Core area: 11-foot lanes with 1.5-foot shoulders) – This alternative would achieve safety needs within the community core segment of the project area, although the shoulders would be too narrow to accommodate bicycles. The combination of 11-foot lanes with 1.5-foot shoulders would maintain a narrow section as the highway passes through Galisteo and would maximize traffic calming features of the roadway section. This alternative is recommended for further consideration in Phase 1-B.

• **Community Alternative 4** (Community Bypass: 11-foot lanes with 6-foot shoulders) – This alternative would achieve the identified safety needs within Galisteo by creating a new roadway for though traffic. It is not recommended for further consideration due to its potential to impact the community, the adjoining ranch, cultural resources, and natural resources. It would also have disproportionately higher costs than other alternatives.

• **Bridge Alternative 1** (Minor Rehabilitation Alternative) – This alternative would provide for improvements to the Galisteo Creek and San Cristobal Arroyo Bridges to enhance their structural integrity and extend their service lives. This alternative does not improve safety for pedestrians or bicyclists. This alternative is recommended for further consideration in Phase 1-B.

• **Bridge Alternative 2** (Major Rehabilitation Alternative) – This alternative would provide for improvements to the Galisteo Creek and San Cristobal Arroyo Bridges to enhance their structural integrity and extend their service lives. This alternative would also improve safety for pedestrians or bicyclists. Because this alternative would have similar impacts and costs as the reconstruction alternative (Bridge Alternative 3) but would not have any additional benefits, it is recommended that it be dropped from further consideration.

• **Bridge Alternative 3** (Reconstruction Alternative) – This alternative would provide for improvements to the Galisteo Creek and San Cristobal Arroyo Bridges to enhance their structural integrity and provide a maximum service life. This alternative would also improve safety for pedestrians or bicyclists. It is recommended for further consideration in lieu of Bridge Alternative 2.

• **Bridge Alternative 4** (Bridge Bypass Alternative) – This alternative would provide new safe bridges on a new alignment for use by motorists, bicyclists, and pedestrians. While it would have the greatest impacts to natural resources and right-of-way, it preserves the
historic integrity of the existing bridges. For this reason, it is recommended for further consideration in Phase 1-B.

- **Traffic Calming Strategies** – Radar-reader boards, roundabouts, medians, and chokers are recommended for further consideration during Phase 1-B of the alignment study. Each of these strategies, either singularly or in combination, could be effective in helping to reduce travel speeds though the community of Galisteo. While chicanes would also be effective, they would create road maintenance and snow removal problems and are therefore not recommended for further evaluation. Transverse rumble strips are also not recommended due to their potential for noise impact at nearby residents.

3. Investigations conducted during the initial alignment study included a review of environmental and cultural records and existing data, field reconnaissance, and early coordination with stakeholder agencies. Input from highway users and residents was obtained from two public involvement meetings. Environmental and cultural resource issues identified that necessitate additional investigation and consideration during Phase B include the following topics.

- Important natural resources within the project area include wetland, riparian, piñon-juniper, and mesa-grassland habitats, federal and state listed endangered plant and animal species, and wildlife. Avoidance of these resources to the extent practical and feasible will be necessary.

- The Galisteo area has numerous cultural resources that are important from a resource protection and community identity perspective. Eleven archaeological sites have been identified within the highway right-of-way. Other resources include the Galisteo Historic District and the numerous buildings, structures, and bridge (Galisteo Creek Bridge) found within the District. The San Cristobal Arroyo Bridge is also present and is eligible for inclusion in the NRHP. The historic district and bridge are a Section 4(f) resource that will necessitate the preparation of a 4(f) document in addition to the Section 106 investigations and report.

- Primary interests from the community involvement process include the desire for reduced truck traffic, slower travel speeds in both the community and rural areas of the project, and preservation of natural resources and the cultural character of the Galisteo Basin. Concerns with noise and the ability for pedestrian travel in the historic plaza area were also identified as critical issues. Livestock and wildlife crossings are desired and may also be warranted, depending on the analysis findings conducted during Phase B.

4. Primary evaluation criteria for the evaluation of alternatives during Phase 1-B will emphasize the following:

- Safety and efficiency for highway users including drivers, bicyclists, and pedestrians
- Traffic calming effectiveness
- Cost
- Minimization of disturbance to the roadside and avoidance of property acquisition for highway right-of-way
- Avoidance and minimization of impacts to natural resources
- Consistency with federal and state highway design guidelines
- Reasonable and prudent alternatives in accordance with Section 4(f) guidance
5. Based on the findings of the initial analysis, the proposed project could be authorized with either an environmental assessment (EA) or an environmental impact statement (EIS). The magnitude and context of potential impacts after mitigation is considered are marginal in terms of significance and could be adequately evaluated by an EA. However, given the presence of some public controversy, an EIS may be prudent to assure adequate vetting of issues, alternatives, and mitigation measures. Based on this, a notice of intent and formal scoping should be initiated as part of Phase 1-B.
### Table 5-1. Engineering Aspects:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Safety</th>
<th>Right-of-Way Acquisition</th>
<th>Meets Current Design Criteria</th>
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<td><strong>Rural Segments: MP 46.2 to MP 55.5 and MP 57.5 to 62.1</strong></td>
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<td>No-Action</td>
<td>Do Nothing</td>
<td>9 vertical curves with inadequate sight distance for 55 mph or &gt;; Absence of shoulders limits maneuverability and limits recovery</td>
<td>Not Applicable</td>
<td>Does not meet design guidelines for geometry or alignment</td>
<td>Narrow roadway has some calming effect</td>
</tr>
<tr>
<td>Rural Roadway Alternative 1</td>
<td>Two 12’ lanes plus 6’ shoulders</td>
<td>All curves meet sight distance criteria for 55-mph posted speed; roadside meets criteria for driver recovery; wider shoulders improve driver maneuverability</td>
<td>Can likely be constructed in existing R/W; CMEs may be needed at some drainages</td>
<td>Yes</td>
<td>No traffic calming effect</td>
</tr>
<tr>
<td>Rural Roadway Alternative 2</td>
<td>Two 11’ lanes plus 6’ shoulders</td>
<td>All curves meet sight distance criteria for 55-mph posted speed; roadside meets criteria for driver recovery; narrow shoulders decrease maneuverability</td>
<td>Can likely be constructed in existing R/W; CMEs may be needed at some drainages</td>
<td>Section south of CR 42 would meet criteria because of traffic &lt; 2000 pd. Segment north of CR 42 may require an exception due higher traffic volumes.</td>
<td>Limited traffic calming effect</td>
</tr>
<tr>
<td><strong>Community Segment: MP 55.5 to MP 57.5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-Action</td>
<td>Do Nothing</td>
<td>No safety improvements</td>
<td>None Anticipated</td>
<td>Does not meet design guidelines for geometry or alignment</td>
<td>No traffic calming effect</td>
</tr>
<tr>
<td>Community Alternative 1</td>
<td>Two 11’-12’ foot lanes plus 4’ shoulder</td>
<td>Achieves primary safety needs within community</td>
<td>None Anticipated</td>
<td>Meets AASHTO criteria and provides adequate separation of opposing traffic</td>
<td>Narrower roadway (than wider rural segments) has some calming effect</td>
</tr>
<tr>
<td>Community Alternative 2</td>
<td>Two 11’-12’ foot lanes plus 4’ shoulder plus Multi-Use Path</td>
<td>Achieves primary safety needs within community; provides separate path for pedestrians</td>
<td>None Anticipated</td>
<td>Meets AASHTO criteria and provides adequate separation of opposing traffic</td>
<td>Narrower roadway (than wider rural segments) has some calming effect</td>
</tr>
<tr>
<td>Community Alternative 3</td>
<td>Two 11’-12’ foot lanes plus 1.5’ flush concrete shoulder</td>
<td>Achieves primary safety needs within community, but bicyclists must share lane with traffic</td>
<td>None Anticipated</td>
<td>Meets AASHTO criteria and provides adequate separation of opposing traffic, but estate curb would require design exception</td>
<td>Narrow roadways and shoulders provide traffic calming effects</td>
</tr>
<tr>
<td>Community Alternative 4</td>
<td>Bypass Alternative - 2.4-3.1 miles east of Galisteo</td>
<td>Safety within community would be improved, although introduction of intersections into project area may result in more crashes</td>
<td>Would require acquisition of approximately 55 acres</td>
<td>Typical section would be established to meet AASHTO design criteria</td>
<td>Does not pass through residential area, so need for traffic calming effect is lessened</td>
</tr>
</tbody>
</table>
### Table 5-2. Bridge Alternatives:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>No-Action Alternative</th>
<th>Bridge Alternative 1 - Minor Rehabilitation</th>
<th>Bridge Alternative 2 - Major Rehabilitation</th>
<th>Bridge Alternative 3 - Reconstruction</th>
<th>Bridge Alternative 4 - Bridge Bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Expectancy</td>
<td>Relatively short; unknown</td>
<td>Moderate</td>
<td>Extended</td>
<td>50+ years</td>
<td>50+ years</td>
</tr>
<tr>
<td>Cost</td>
<td>Low cost but recurring</td>
<td>$</td>
<td>$$$</td>
<td>$$$</td>
<td>$$$$$</td>
</tr>
<tr>
<td>Safety</td>
<td>Structures approaching unsafe condition; railing does not meet standards of crash-worthiness</td>
<td>Deficient geometry reduces safety for pedestrians and bicyclists</td>
<td>Meets geometry and load requirements</td>
<td>Meets geometry and load requirements</td>
<td>Meets geometry and load requirements</td>
</tr>
<tr>
<td>Right-of-Way Needs</td>
<td>None</td>
<td>TCP or CME needed for construction detour</td>
<td>None</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Meets FHWA Design Criteria</td>
<td>Deficient load bearing and geometry</td>
<td>Deficient geometry</td>
<td>Meets geometric and load criteria</td>
<td>Meets geometric and load criteria</td>
<td>Meets geometric and load criteria</td>
</tr>
<tr>
<td>Bicycle Use</td>
<td>Must use travel lanes</td>
<td>Must use travel lanes</td>
<td>Shoulders available for bicycles</td>
<td>Shoulders available for bicycles</td>
<td>Shoulders available for bicycles</td>
</tr>
<tr>
<td>Pedestrian Use</td>
<td>Deficient sidewalk; cannot be used by disabled</td>
<td>Deficient sidewalk; cannot be used by disabled</td>
<td>Shoulders and/or sidewalks provided</td>
<td>Shoulders and/or sidewalks provided</td>
<td>Shoulders and/or sidewalks provided</td>
</tr>
<tr>
<td>Traffic Calming</td>
<td>Provides narrowing effect</td>
<td>Provides narrowing effect</td>
<td>Minimal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Construction Issues</td>
<td>Temporary closures during maintenance</td>
<td>Requires closure and detour</td>
<td>Can be constructed under traffic</td>
<td>Can be constructed under traffic</td>
<td>Can be constructed under traffic</td>
</tr>
<tr>
<td>Consistent with Historic Context</td>
<td>Yes</td>
<td>Architectural design of deck and railing will be consistent with setting</td>
<td>Architectural design of piers and super-structure will be consistent with setting</td>
<td>Architectural design of piers and super-structure will be consistent with setting</td>
<td>Architectural design of new bridges will be consistent with setting</td>
</tr>
<tr>
<td>Impacts to Wetlands</td>
<td>Maintenance and other repairs may impact wetlands</td>
<td>Scour protection and detour will impact wetland and riparian habitat</td>
<td>Temporary losses</td>
<td>Temporary losses</td>
<td>High impacts</td>
</tr>
<tr>
<td>Strategy</td>
<td>Radar-Reader Boards</td>
<td>Rumble Strips</td>
<td>Widened Medians</td>
<td>Roundabouts</td>
<td>Chicanes</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>----------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>Visual cue and reminder for driver information</td>
<td>Physical and auditory cue for drivers</td>
<td>Introduces curve and narrows roadway; can act as gateway</td>
<td>Introduces curve in roadway; can act as gateway; helps traffic control at intersections</td>
<td>SLOWS traffic by introducing an S-curve or a short narrow section</td>
</tr>
<tr>
<td><strong>Applicability</strong></td>
<td>Suitable for highway applications; already in use within corridor</td>
<td>Suitable for highway applications</td>
<td>Suitable for highway applications; usually associated with intersections</td>
<td>Typically used on residential streets in urban/suburban areas</td>
<td>Typically used on residential streets in urban/suburban areas</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Used at transition between rural segments and community subarea</td>
<td>Used at transition between rural segments and community zone</td>
<td>Can be used in transition zones and community core</td>
<td>Can be used in transition zones and community core</td>
<td>Not compatible with higher speed facilities; use would be restricted to locations within the community core only, not in transition zones</td>
</tr>
<tr>
<td><strong>Right-of-Way</strong></td>
<td>Can fit in existing right-of-way</td>
<td>Can fit in existing right-of-way</td>
<td>Can fit in existing right-of-way</td>
<td>Would require additional right-of-way</td>
<td>Can fit in existing right-of-way</td>
</tr>
<tr>
<td><strong>Bicycle Use</strong></td>
<td>Compatible with bicycle use on shoulders</td>
<td>Not a problem if shoulders are available. Otherwise, are difficult for bicyclists to cross.</td>
<td>Compatible with bicycle use on shoulders</td>
<td>Can be navigated by bicycles, but requires bicyclists to ride in driving lanes</td>
<td>Generally not compatible with shoulders used by bicyclists; requires separate bicycle pathway</td>
</tr>
<tr>
<td><strong>Pedestrian Use</strong></td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Fully compatible; can be used as pedestrian refuge area.</td>
<td>Fully compatible; can be used as pedestrian refuge area</td>
<td>Compatible</td>
</tr>
<tr>
<td><strong>Community Context</strong></td>
<td>Existing condition; would not negatively affect community aesthetics or circulation</td>
<td>Would increase noise impacts to nearby residents</td>
<td>Would not negatively affect community aesthetics</td>
<td>May not fit in with the historic or cultural nature of community</td>
<td>Would not negatively affect community aesthetics</td>
</tr>
<tr>
<td><strong>Effect on Historic District</strong></td>
<td>Would not negatively affect or change aesthetics of Historic District</td>
<td>Would not negatively affect or change aesthetics of Historic District</td>
<td>Would not negatively affect or change aesthetics of Historic District</td>
<td>May not fit in with the aesthetics of Historic District</td>
<td>Would not negatively affect or change aesthetics of Historic District</td>
</tr>
<tr>
<td><strong>Other Considerations</strong></td>
<td>None - already in use and have been proven effective in slowing traffic entering Galisteo</td>
<td>None</td>
<td>Would contribute to development of gateway; provides a visible cue to drivers</td>
<td>Requires space to allow room for large truck tracking through curves</td>
<td>Creates maintenance issues (snowplows, etc., have trouble navigating)</td>
</tr>
</tbody>
</table>
Table 5-4: Environmental Aspects:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Bicycle Use</th>
<th>Community Context</th>
<th>Cultural Resources</th>
<th>4(f) Impacts</th>
<th>Wetlands</th>
<th>Habitat</th>
<th>Wildlife Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural Segments: MP 46.2 to MP 55.5 and MP 57.5 to MP 62.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-Action</td>
<td>Do Nothing</td>
<td>Bicycles share driving lanes with cars and trucks</td>
<td>Consistent with rural character of corridor</td>
<td>Does not affect cultural resource sites</td>
<td>No 4(f) resources within project segment</td>
<td>None anticipated</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Rural Roadway Alternative 1</td>
<td>Two 12' lanes plus 8' shoulders</td>
<td>Shoulders available for bicycle use</td>
<td>Wider roadway (66%) would present a noticeable change</td>
<td>Archaeological sites within r/w, but are likely to be avoided.</td>
<td>No 4(f) resources within project segment</td>
<td>None anticipated</td>
<td>Will result in the loss of up to 23 acres of roadside habitat</td>
<td>No adverse effect; Will increase motorist ability to see and avoid large animals</td>
</tr>
<tr>
<td>Rural Roadway Alternative 2</td>
<td>Two 11' lanes plus 6' shoulders</td>
<td>Shoulders available for bicycle use</td>
<td>Wider roadway (42%) would present a noticeable change</td>
<td>Archaeological sites within r/w, but are likely to be avoided.</td>
<td>No 4(f) resources within project segment</td>
<td>None anticipated</td>
<td>Will result in the loss of up to 14.5 acres of roadside habitat</td>
<td>No adverse effect; Will increase motorist ability to see and avoid large animals</td>
</tr>
<tr>
<td><strong>Community Segment: MP 55.5 to MP 57.5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-Action</td>
<td>Do Nothing</td>
<td>Bicycles share driving lanes with cars and trucks</td>
<td>Status Quo</td>
<td>None Anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
</tr>
<tr>
<td>Community Alternative 1</td>
<td>Two 11'-12' foot lanes plus 4' shoulder</td>
<td>Shoulders available for bicycle use</td>
<td>Would not substantially alter the visual character of area</td>
<td>No direct takings of cultural sites or historic buildings; proximity impacts could result</td>
<td>To be determined</td>
<td>None anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
</tr>
<tr>
<td>Community Alternative 2</td>
<td>Two 11'-12' foot lanes plus 4' shoulder plus Multi-Use Path available for bicycle use</td>
<td>Shoulders and Multi-Use Path available for bicycle use</td>
<td>Would not substantially alter the visual character of area</td>
<td>No direct takings of cultural sites or historic buildings; proximity impacts could result</td>
<td>To be determined</td>
<td>None anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
</tr>
<tr>
<td>Community Alternative 3</td>
<td>Two 11'-12' foot lanes plus 1.5' flush concrete shoulder</td>
<td>Bicycles share driving lanes with cars and trucks</td>
<td>Would not substantially alter the visual character of area</td>
<td>No direct takings of cultural sites or historic buildings; proximity impacts could result</td>
<td>To be determined</td>
<td>None anticipated</td>
<td>None anticipated</td>
<td>None anticipated</td>
</tr>
<tr>
<td>Community Alternative 4</td>
<td>Bypass Alternative - 2.4-3.1 miles east of Galisteo</td>
<td>Shoulders available; also provides an alternate route for bicyclists</td>
<td>Removes through and heavy truck traffic from the community core, but may cause increased noise impacts to eastern edge of village</td>
<td>Likely to result in impacts to archaeological sites</td>
<td>None anticipated</td>
<td>Would require two new bridge crossings, which is likely to impact wetlands</td>
<td>Will result in the loss of up to 30 acres of vegetation/previously open habitat</td>
<td>May result in impacts to locations where wildlife currently crosses the highway</td>
</tr>
</tbody>
</table>
APPENDIX A
Roadway Profiles
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile  ——— Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile  —— Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - Existing roadway profile

- - Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile

--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

---

- - - Existing roadway profile  
--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.
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This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile
----- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile

--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis.
This results in the vertical scale being 10x the horizontal scale.

Existing roadway profile
Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

--- Existing roadway profile

--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

--- Existing roadway profile

--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - Existing roadway profile

- - Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis.
This results in the vertical scale being 10x the horizontal scale.

- - Existing roadway profile
- - Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - Existing roadway profile  
- - Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - Existing roadway profile

- - Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile
--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile  
--- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.

- - - Existing roadway profile
----- Proposed roadway profile for 55 mph
Note: Gridline dimensions are 100 ft on the horizontal axis and 5 ft on the vertical axis. This results in the vertical scale being 10x the horizontal scale.
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