

Draft

Phase I-A/B Study
NM 22 BIA 88 Interchange
Milepost 3.8 to 4.4
CN/PN A301343

Prepared for
New Mexico Department of Transportation



June 2020

Prepared by
Parametrix

Phase I-A/B Study NM 22 BIA 88 Interchange Milepost 3.8 to 4.4 CN/PN A301343

Prepared for

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CERTIFICATION

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ACRONYMS

100M VMT	100 million vehicle miles traveled
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ARMS	Archaeological Records Management Section
BIA	Bureau of Indian Affairs
BNSF	Burlington Northern & Santa Fe
CE	Categorical Exclusion
cfs	cubic feet per second
CRD	NMDOT Crash Records Database
DCP	Designated Census Place
District 3	NMDOT District Three Office
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
LOS	Level Of Service
mph	miles per hour
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NMDOT	New Mexico Department of Transportation
NMRX	New Mexico Rail Runner Express
NRHP	National Register of Historic Places
PEL	Planning and Environment Linkages
PROWAG	Public Right-of-Way Access Guidelines
Pueblo	Santo Domingo Pueblo
RICWS	Rural Intersection Conflict Warning System
SP 88	Southern Pueblos 88
SUE	subsurface utility engineering
vpd	vehicles per day

EXECUTIVE SUMMARY

Introduction and Background

The NM 22 BIA 88 Interchange is located in Sandoval County within the Santo Domingo Pueblo. BIA 88 is referred to locally and in this study as Southern Pueblos 88 (SP 88). The project is located approximately 4 miles northwest of the I-25 and NM 22 Interchange (Exit 259). NM 22 provides access to communities and recreational destinations within the region, including Santo Domingo Pueblo, Peña Blanca, Cochiti Pueblo, Cochiti Lake, and Cochiti Golf Course. The interchange is located near the east boundary of the Santo Domingo Pueblo (Pueblo). The interchange provides access to the Villages of Santo Domingo Pueblo and Domingo, and to the New Mexico Rail Runner Express (NMRX) Kewa Station located along SP 88.

Methodology

This study follows the process described in the New Mexico Department of Transportation (NMDOT) *Location Study Procedures* (2015). The procedures are consistent with all National Environmental Policy Act (NEPA) legislative requirements and the Federal Highway Administration (FHWA) Planning and Environment Linkages (PEL) policy.

Public and Agency Coordination

Outreach is guided by the Context Sensitive Public Involvement Plan for the project and is designed to be proactive, comprehensive, and continuous through the project development process. Stakeholder outreach efforts involve coordination with the Pueblo of Santo Domingo Pueblo and the general public, and various design team meetings.

Purpose and Need

The specific needs for the project are based on several existing deficiencies within the project area. The existing box clear height is posted at 13 feet-10 inches. This is below the maximum legal vehicle height of 14-feet-0 inches, so vehicles too tall for that clearance must make a detour. The shortest all-weather detour is 19 miles long through Cochiti via NM 22 and SP 85. The box culvert is also narrow, with 11-foot-wide lanes and narrow shoulders (less than 1 foot wide). The narrow width causes traffic issues, with the box effectively being a one-way road when large trucks pass through it.

In addition to the access issues with the existing SP 88 underpass, the record and rate of left-turn crashes at the NM 22/loop ramp intersection indicates a safety concern. While the number of crashes is relatively low in absolute terms, the crashes primarily involved left turns at the intersection, and the rate is higher than the statewide average for similar locations. Another potential safety issue is the substandard lengths of the existing acceleration and deceleration lanes in the interchange.

The project purpose is to improve access and safety for traffic using the NM 22/SP 88 interchange, while maintaining current pedestrian access. Based on the existing interchange deficiencies, the needs are to: increase the SP 88 underpass clearance and width to meet current standards; improve safety for traffic at the NM 22/loop ramp intersection, particularly for left turns to and from NM 22; and provide adequate length acceleration and deceleration lanes on NM 22 and SP 88. This purpose and need statement was used as the basis for developing the project alternatives described below. In addition, it

has also been developed to satisfy NEPA requirements and will be considered during Phase C of the project.

Alternatives Evaluation and Recommendation

Four build alternatives for the NM 22/SP 88 interchange were identified and developed to a conceptual level of detail. The alternatives identified in coordination with the Project Team were:

- Alternative 1: Three-Leg Roundabout
- Alternative 2: Four-Leg Roundabout
- Alternative 3: Right-In/Right-Out Ramps
- Alternative 4: West Diagonal Ramps

The alternatives were evaluated by comparing major engineering, environmental, and community factors. The goal of the evaluation was to identify notable differences between the alternatives that would affect their feasibility and practicality.

Based on the evaluation, **Alternative 2, the four-leg roundabout, is the recommended alternative.** This alternative addresses the purpose and need for the project, improving access and safety by replacing the existing SP 88 underpass with a larger structure and eliminating left-turn conflicts on NM 22. The cost of this alternative would be reasonable compared to the other alternatives. Right-of-way easement acquisition would affect vacant, previously disturbed property near the existing interchange and would require a federal land transfer, in coordination with the Pueblo and the Bureau of Indian Affairs (BIA). Alternative 2 would operate acceptably from a traffic standpoint. Utility impacts would be minor. Alternative 2 would have minor railroad and constructability impacts. Drainage and maintenance aspects are similar for all alternatives and would be addressed during design.

Alternative 2 would provide benefits to the community in terms of the drivability of the interchange. The west loop ramp would provide a more direct connection from SP 88 to NM 22 than exists today. The elimination of left turns would improve safety and convenience for drivers.

Alternative 2 will be advanced into Phase C, NEPA documentation, to evaluate potential effects of the proposed project to the environment. Based on the project scope and expected level of environmental impact, a Categorical Exclusion (CE) is the recommended level of NEPA documentation for the proposed improvements. Consultation with the Santo Domingo Tribal Planning Department and Natural Resources Department is anticipated; as is consultation with the US Army Corps of Engineers concerning any drainage structure modifications.

Concurrence with the Executive Summary:

J. Don Martinez, FHWA
Division Administrator

Date

1. INTRODUCTION

This proposed project is located in Sandoval County within the Santo Domingo Pueblo on NM 22 at its interchange with BIA 88, referred to locally and in this study as Southern Pueblos 88 (SP 88). The project is located approximately 4 miles northwest of the I-25 and NM 22 Interchange (Exit 259). NM 22 provides access to communities and recreational destinations within the region, including Santo Domingo Pueblo, Peña Blanca, Cochiti Pueblo, Cochiti Lake, and Cochiti Golf Course. The interchange is located near the east boundary of the Santo Domingo Pueblo (Pueblo). The interchange provides access to the Villages of Santo Domingo Pueblo and Domingo, and to the New Mexico Rail Runner Express (NMRX) Kewa Station located along SP 88. The vicinity map is shown in Figure 1-1.

The goal of this study is to propose solutions to issues with the existing interchange. The primary concerns are the geometry of the SP 88 underpass and the crash history at the interchange. SP 88 passes below NM 22 through a concrete box culvert, which has deficient clearance and width. NM 22 intersects with a two-lane, two-way loop ramp that connects to SP 88. The record of left-turn crashes at this intersection indicates a safety issue.

This study follows the process described in the New Mexico Department of Transportation (NMDOT) *Location Study Procedures* (2015). The procedures are consistent with all National Environmental Policy Act (NEPA) legislative requirements and the Federal Highway Administration (FHWA) Planning and Environment Linkages (PEL) policy. The PEL policy outlines a collaborative approach to corridor-level transportation planning that considers environmental, community, and economic goals early in the planning process and uses the information developed during planning to inform the environmental review process.

This report begins with a description of the existing conditions at the interchange. The agency coordination and public involvement process are summarized. The purpose and need for the project are presented, and the alternatives developed to address the purpose and need are described. The alternatives are evaluated, and recommendations are made for implementation.



Figure 1-1. Project Area Map

2. EXISTING CONDITIONS

Existing conditions in and around the NM 22/SP 88 interchange were investigated to identify issues of concern and features that will influence the planning and design of improvements. The investigations included roadway and traffic, structures, geotechnical and pavement, drainage, utilities, right-of-way, and environmental and community conditions.

2.1 Roadway and Traffic

2.1.1 NM 22/SP 88 Interchange

NM 22 consists of a two-lane, north-south roadway with 12-foot-wide lanes and 8-foot shoulders. Travelling from south to north through the project area, NM 22 crosses the NMRX railroad tracks, SP 88, and Galisteo Creek. The NM 22/SP 88/NMRX overpass is referred to as the Mateo Overpass. The posted speed limit is 45 miles per hour (mph) through the interchange. NM 22 is classified as a Major Rural Collector.

SP 88 runs east-west and is a two-lane roadway with 12-foot lanes and 2-foot shoulders. West of NM 22, SP 88 has curb and gutter and a 5-foot-wide sidewalk on the south side. East of NM 22, the sidewalk transitions to a 10-foot-wide multi-use trail. The speed limit is 25 mph through the interchange. SP 88 is classified as a Minor Rural Collector.

The NM 22/SP 88 Interchange was constructed in 1968, with SP 88 grade separated below NM 22. A two-lane loop ramp in the northeast quadrant forms a basic interchange layout, with T intersections at the intersecting roadways. Photograph 2-1 shows the NM 22/loop ramp intersection. The interchange serves as the primary access from NM 22 to the Pueblo for commuters, school buses, commercial vehicles (with height restrictions), and emergency responders. It also provides access to the Kewa Rail Runner station, the community of Domingo, and sports fields to the east. Currently, westbound vehicles that are taller than the existing SP 88 underpass clearance of 13 feet-10 inches must be rerouted. The shortest all-weather detour is 19-miles through Cochiti via NM 22 and SP 85, or drivers may take other paved or unpaved routes. The existing underpass is discussed further below.



Photograph 2-1. NM 22/SP 88 interchange, looking south along NM 22

SP 88 crosses below NM 22 via a 29 feet-4-inches-wide by 13 feet-10-inches-high concrete box culvert, with wingwalls at both ends. Because of its size, the box culvert is classified as Bridge #7079 in the state bridge inventory. Concrete wall barrier was placed along the edge of the eastbound lane to provide a narrow pedestrian path along the south side of the underpass. The driving lanes in the underpass are approximately 11 feet wide with minimal shoulders that are less than 1 foot wide. See Photograph 2-2. The 13 feet-10-inches vertical clearance is substandard (the legal maximum vehicle height is 14 feet-0 inches), and damage to the headwalls and roof slab from vehicles is visible.



Photograph 2-2. Existing SP 88 Underpass Box, looking west

Acceleration and deceleration lanes have been constructed at the intersections within the interchange. The lengths of the auxiliary lanes and tapers do not meet current American Association of State Highway and Transportation Officials (AASHTO) *Green Book* (2018) design standards for the posted speeds. An example is shown in Photograph 2-3.



Photograph 2-3. Short Merge Taper on Westbound SP 88, looking east

2.1.2 Pedestrian Access

Pedestrians walk along SP 88 from the Pueblo west of NM 22 to the Rail Runner station and other destinations east of NM 22. A pedestrian route has been constructed along the south side of SP 88. West of NM 22, this route consists of curb and gutter and a 5-foot wide sidewalk along the south side of the roadway, constructed in 2013 (see Photograph 2-4, below). East of NM 22, a 10-foot wide paved path was added in 2018, parallel to SP 88 along the south side of the road. Bollard lighting is located along the path.



Photograph 2-4. SP 88 Sidewalk, looking east

2.1.3 Traffic

2.1.3.1 Traffic Volumes

Based on NMDOT traffic count data, the 2015 Average Annual Daily Traffic (AADT) on NM 22 between I-25 to the south and Peña Blanca to the north (MP 0.000 and 9.421) is 3,353 vehicles per day. This AADT is based on a NMDOT projection of 2013 data. The NMDOT District Three Office (District 3) completed an intersection traffic count on October 24, 2017. The count indicated the heaviest movements at the NM 22/loop ramp intersection are the right turns from northbound NM 22 to the loop ramp, and left turns from the loop ramp to southbound NM 22. The next heaviest volumes were the NM 22 north- and southbound through volumes. Overall, 71 percent of the traffic at the NM 22/loop ramp intersection turned on or off the loop ramp. Photograph 2-5 illustrates school buses turning left from the loop ramp onto southbound NM 22.

Traffic on NM 22 is projected to increase to 4,360 vehicles per day (vpd) average by 2036.



Photograph 2-5. NM 22/loop ramp intersection, looking north

2.1.3.2 Traffic Operations

Mainlines

Based on the low traffic volumes on both NM 22 and SP 88, the mainlines of these two routes are currently operating a Level of Service (LOS) B (Souder Miller 2018). LOS is a measure of roadway congestion, with a range of categories with A representing free-flowing traffic, and F representing a traffic backup. Both roadways will continue to operate at an acceptable LOS in the design year of 2036.

Intersection Operations

The analysis of the intersection of NM 22 and the loop ramp reflects current operation at a LOS B in the A.M. and P.M. peak hours, and the intersection of SP 88 and the loop ramp is operating at a LOS B during the A.M. and P.M. peak hours (Souder Miller 2018). Based on the design-year volumes, the intersections will continue to operate at an acceptable LOS.

Signal Warrants

The existing traffic volumes are relatively low, and the NM 22/loop ramp intersection does not currently warrant a traffic signal.

2.1.3.3 Crash Data and Safety

District 3 conducted a crash records review for this location along NM 22 for the most recent 3 years available in the NMDOT Crash Records Database (CRD). A review of the NMDOT CRD resulted in no crash records being located. District 3 subsequently requested crash record information from Bureau of Indian Affairs (BIA), and the BIA provided a 3-year crash summary including the calendar years 2015-2017 for this location of NM 22 as well as SP 88. A total of six crashes were recorded near the project study area.

A review of the BIA Crash Reports showed that of the six crashes, four occurred at the intersection of NM 22 and the ramp junction, one occurred along NM 22 near the NM 22/SP 88 interchange, and one occurred on SP 88 about 1,900 feet west of the interchange. Of the four crashes that occurred at the NM 22 and ramp junction, all involved a vehicle making a turning maneuver in front of an oncoming vehicle (see Figure 2-1). Three were southbound vehicles turning left in front of northbound vehicles. One was a westbound vehicle that made a left turn into the path of a northbound vehicle. Of the six reported crashes, none had fatalities, two involved injuries, and the rest had property damage only. The crash rate for NM 22 near the loop ramp intersection is 54.6 crashes per 100 million vehicle miles traveled (100M VMT). While the number of crashes is small, this is still 41 percent higher than the average rate for rural highways in New Mexico, at 38.8 crashes/100M VMT. Along with the relatively high crash rate, the prevalence of left-turn crashes indicates a safety concern at the NM 22/loop ramp intersection.



Figure 2-1. Crash Locations 2015-2017

2.2 Structures

2.2.1 SP 88 Underpass

The SP 88 underpass below NM 22, Bridge #7079, is a 29-foot-4-inch span by 14-feet rise reinforced concrete box culvert, built in 1968. Because of its size, this box is classified as a bridge. NMDOT inspects the box regularly and uses a database to track the condition. The inspection report dated March 29, 2017, noted condition issues with concrete cracks, traffic damage, spalling, delamination, and leaching through the cracks. Photograph 2-6 shows damage to the top slab from vehicles. The inspection report recommends rehabilitation or replacement with a larger structure.



Photograph 2-6. Vehicle damage to the top of the box

The box's clearance is below the maximum legal vehicle height of 14 feet-0 inches, so vehicles too tall for the box must be rerouted. The box is also narrow, with 11-foot-wide lanes and less than 1-foot wide shoulders. The narrow width causes issues with traffic operations, and the box effectively acts as a one-way road when large trucks and other wide vehicles are passing through it. A 4-foot wide pedestrian path along the south side of SP 88, constructed in 2018, is separated from traffic by a concrete barrier through the box. The box does not have lighting for vehicles or pedestrians.

2.2.2 NM 22 over New Mexico Rail Runner Express Tracks

Two hundred fifty feet south of the interchange, NM 22 crosses over the NMRX railroad tracks on Bridge #7011. The bridge was built in 1963 with three spans, an overall width of 43 feet, and a length of 158 feet. The inspection report dated February 9, 2017, rates the condition of the major bridge components. Notably, the inspection report notes the bridge bearings are rusted, and the lead plates that support the bearings have migrated out of position. The inspection report recommends replacement in the long-term. Rehabilitation also could be investigated as an option. The bridge's condition issues are separate from the project needs, so improvements would only be considered as part of the study alternatives.

2.2.3 NM 22 over Galisteo Creek

The NM 22 bridge over the Galisteo Creek, Bridge #7012, is 1,100 feet north of the interchange. It was built in 1954 and has seven spans, overall width of 43 feet, and length of 227 feet. The inspection report dated February 11, 2016, recommends routine maintenance and rehabilitation to keep the bridge in service. While the bridge appears serviceable, any bridge condition issues are separate from the project needs, so improvements would only be considered as part of the study alternatives.

2.3 Geotechnical and Pavement

A preliminary geotechnical report was prepared for the project, under separate cover (Terracon 2019). The geotechnical investigation is important to the location and design of the alternatives, affecting the practicality and cost of the proposed improvements. Existing geotechnical and pavement conditions are described below.

2.3.1 Regional Geology

The site occupies a portion of the Santo Domingo Basin situated between the Española Basin and the Northern Albuquerque Basin as related to the evolution of the Rio Grande Rift. The Rio Grande Rift is a major continental rift system that separates the Colorado Plateau microplate on the west from the stable North American craton underlying the Great Plains on the east. The Santo Domingo Basin is part of an interconnected series of north-south aligned grabens and structural basins which have subsided between mountain and highland uplifts comprising the Rio Grande Rift. This complex structural basin was formed during the Tertiary Period, more than 7 million years ago, when the Sandia-Manzano fault block was uplifted and tilted. The basin is approximately 25 to 30 miles long and varies from about 15 to 20 miles wide.

2.3.2 Site Geology

Geologic conditions at the project site are consistent with the regional geology. The surficial geologic formations at or near the project site are comprised of the following.

- Qal: Alluvium deposited by the Rio Grande Tributaries (Holocene to Upper Pleistocene) – Poorly sorted gravelly sand, sandy gravel, eolian sand
- Qtp₄: Terrace Gravel (Upper Pleistocene) – Deposits consisting gravel and up to 10 to 30 feet in thickness
- QT_{slg}: Gravel deposited by axial river (ancestral Rio Grande Quaternary to Tertiary) – Deposits consisting of quartzite, granitic, metamorphic rocks, and some volcanic gravels

These formations could support the structure foundations needed for interchange improvements.

Review of geologic information from the U.S. Geological Survey and New Mexico Bureau of Mines and Mineral Resources, 1997, Quaternary fault and fold database for the United States, accessed October 26, 2018, from USGS web site: <https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf> indicates that there are three (3) branches of a fault zone (San Francisco Fault) and another fault (Faults of Cochiti Pueblo) passing within 6 miles (10 kilometers) of the project alignment. A branch of the San Francisco Fault Zone passes along the eastern boundary of the project alignment. This fault line is more than 600 feet away from any proposed bridges or structures along NM 22. Faults are typically a concern when they are below or immediately adjacent to structures, so the proposed alternatives should not be affected by potential fault activity.

2.3.3 Soils

The soils along the proposed alignment have been surveyed and classified by the U.S. Soil Conservation Service. The soil survey maps of this report indicate that the soils in the area are as follows:

- Riverwash deposits make up 28 percent of the map unit. Slopes are 0 to 3 percent. This component is located on streams, toe slopes and base slopes. The parent material consists of stream alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer (bedrock) is greater than 80 inches. Depth to water table is more than 80 inches. The natural drainage class is somewhat poorly drained. The AASHTO soil classifications range from A-3 to A-2-4.
- Sedillo Very Fine Gravelly Fine Sandy Loam makes up 72 percent of the map unit. Slopes are 25 to 55 percent. This soil group is located on bajadas, fan remnants, stream terraces, foot slopes, and side slopes. The parent material consists of fan alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer (bedrock) is greater than 80 inches. Depth to water table is more than 80 inches. The natural drainage class is well drained. The AASHTO soil classifications range from A-1-a and A-2-4.

The soils anticipated in the project area should be suitable for construction of interchange improvements. Shallow soils may be susceptible to settlement or expansion when wet. This will be addressed by planning and designing foundations, site grading, and drainage improvements to minimize ponding near roads and structures.

2.3.4 Pavement

Pavement condition is assessed to identify which areas may warrant rehabilitation or reconstruction in the future. The type and extent of pavement work will be a major part of the project cost and will be considered in the alternatives analysis.

2.3.4.1 NM 22

NM 22 has low to moderate severity longitudinal, transverse, and block cracking. It also has low severity weathering, raveling, and oxidation. Pavement rehabilitation or reconstruction could be considered in conjunction with any proposed improvements.

2.3.4.2 SP 88

The SP 88 pavement west of NM 22 is in good condition, with evidence of recent rehabilitation or reconstruction. East of NM 22, the pavement has longitudinal, transverse, and block cracking, patching, weathering, raveling, and oxidation with varying degrees of severity. This pavement may require reconstruction in the future.

2.4 Drainage

The project area generally drains north towards the Galisteo Creek. NM 22 has a center crown and drains east and west off the road. From there, the flows drain north to Galisteo Creek. Flows from the NM 22 loop road drain to the center of the loop through curb pipe rundowns then out through a 30-inch diameter culvert located on the east side of the loop. From there, the flows are conveyed north to Galisteo Creek. Flows from SP 88 drain north or south off the roadway. On the west side of NM 22, flows

from SP 88 drain to an existing earth channel with a concrete energy dissipator that conveys flows north to Galisteo Creek. Interchange improvements may require earthwork and regrading, so existing drainage facilities would need to be reconfigured accordingly.

The site is located on Flood Insurance Rate Map (FIRM) 35043C1475D. Though floodplains probably exist along Galisteo Creek, the area within the Santo Domingo Pueblo is not mapped, so regulatory floodplains have not been delineated near the project area. Regardless of the regulatory status, potential impacts to the Galisteo Creek floodplain from the project alternatives will be considered.

The existing drainage facilities in the area are shown in Figure 2-2.



Figure 2-2. Existing Drainage Facilities

The existing energy dissipator 180 feet west of NM 22 was severely damaged in a recent storm (see Photograph 2-7). Continued erosion of the channel has the potential to damage NM 22 and SP 88 in the near term. Replacement of the energy dissipator will be considered with the proposed alternatives; however, the need to replace it is separate from the need for the proposed project, and work to address the damage will be the responsibility of the owner entity.

The existing 48-inch-diameter pipes that convey flows under SP 88 are partially filled with sediment but are still functioning and should have adequate capacity for the 100-year design flow of 292 cubic feet per second (cfs). The pipes will be affected by changes to the alignment or grade of SP 88.



Photograph 2-7. Existing Energy Dissipator

2.5 Utilities

A Level C and D subsurface utility engineering (SUE) investigation was conducted for the project area. This investigation involved research into utility company records and survey of visible utility features. Along NM 22 north of SP 88, there are buried communication and fiber optic lines along the west side of the road. A 4-inch-diameter gas line is also located near or under the pavement along the west side of NM 22. South of NM SP 88, an underground telephone line continues along the west side of NM 22.

Along SP 88, there are buried communication, fiber optic, and a 4-inch-diameter gas line along the north side of the road. Aboveground gas regulator valves are in a fenced enclosure on the north side of SP 88, east of the storage yard. Overhead lines on poles run parallel to SP 88 to the west, crossing over NM 22. An underground water line crosses SP 88 west of NM 22, between the cell tower and equipment yard.

Fiber optic lines run parallel to the NMRX tracks. The lines run on the north side of the tracks west of NM 22, then they transition to the south side near the underpass.

The existing utility lines provide service to the Santo Domingo Pueblo and other communities. Changes to the alignment or grades of roadways may conflict with the existing lines. These conflicts will be considered during the alternatives analysis and design. If relocations are necessary, short-term service disruptions may occur. Depending on the status of utility easements, the project may be required to reimburse utility owners for the cost of line relocations, potentially adding to the project cost.

2.6 Right-of-Way

The existing NMDOT right-of-way crosses the Santo Domingo Pueblo Grant. The Pueblo retains ownership of the underlying property, and right-of-way typically would be obtained via easement through the federal land transfer process. All right-of-way related activities would be in accordance with

policies and regulations under part 169, Right of Way over Indian Lands (Chapter 1, Title 25 of the Code of Federal Regulations), in coordination with the Pueblo, BIA, NMDOT, and FHWA.

Available right-of-way mapping information included a Final Right-of-Way Map, dated April 29, 1968. Based on this map, the NMDOT right-of-way for NM 22 varies from 150 feet to 175 feet for the NM 22 mainline; 60 feet to 150 feet for SP 88; and 125 feet along the outside of the interchange loop from NM 22 to SP 88. The current NMDOT maintained portion of SP 88 within the interchange is identified by two cattle guards located on the east and west sides of the NM 22 at the interchange. The NMRX right-of-way is 100 feet on each side of the centerline of the railroad tracks. Work within NMRX right-of-way will require coordination with NMDOT, the Middle Rio Grande Council of Governments, FHWA, and other railroad entities. This coordination would add to the complexity and review time needed for the project.

2.7 Environmental and Community Conditions

Existing environmental and community conditions were identified based on a review of existing data and supplemental field survey. Organized into cultural, natural, and community resources, this overview describes some of the existing environmental conditions and constraints to be considered throughout project development and identifies issues of concern for evaluating alternatives.

2.7.1 Cultural Resources

A review of files from the Archaeological Records Management Section (ARMS) in Santa Fe indicated one historic building, the historic Burlington Northern & Santa Fe (BNSF) railroad (now operated by the NMRX), two acequias, and a historic archaeological site in the vicinity of the project area. Additionally, as described above, the bridge over the Galisteo Creek, the NMRX, and SP 88 are also of historic age (over 45 years old). Given the project area's location relative to Santo Domingo Pueblo, the Pueblo may also be aware of the traditional value of other locations throughout the project area and broader landscape.

Of the previously documented properties identified through the ARMS search, only the railroad and two of the bridges are in direct proximity to the project area. The bridges (Bridge #7011 and #7079) are both common designs (a prestressed concrete stringer bridge and concrete box culvert, respectively) and have no unique elements such as distinctive railings or masonry work. As such, the bridges are not expected to be eligible for listing on the National Register of Historic Places (NRHP). The adjacent railroad is eligible to the NRHP but is outside the area anticipated to be affected by the project. The remaining historic properties are located farther outside of the study area. Therefore, the study team is not aware of cultural resources that would affect the alternatives analysis.

2.7.2 Natural Resources

The project area is located along the eastern edge of the Rio Grande Valley, adjacent to the eastern edge of Santo Domingo Pueblo. The east-west oriented Galisteo Creek is located at the northern end of the project area. The Galisteo is an intermittent stream that drains directly into the Rio Grande, 1.6 miles west of NM 22. Much of the existing interchange right-of-way is disturbed from regular use and maintenance of the roadways.

Biological investigations of the area found evidence of several mammals (Botta's pocket gopher, cottontail rabbits, coyotes, kangaroo rats, and rock squirrels), reptiles (desert grassland whiptail, New

Mexico whiptail, western coachwhip), and birds (American crow, cliff swallow, house finch, mockingbird, mourning dove, and white-winged dove). Vegetation in the project area includes sagebrush, juniper, piñon pine, and numerous grasses. Four class C Noxious weeds — cheat grass, Siberian elm, Russian olive, and Tamarisk — are in the project area, as are two unnamed drainages that drain into Galisteo Creek. No wetlands or critical habitat for threatened or endangered species were noted, so they will not affect the alternatives analysis.

2.7.3 Community Resources

Residential properties are located within 400 feet of the intersections within the interchange, and nearby community resources include schools, emergency responders, and government services. Additionally, NM 22 connects to other nearby communities and recreational destinations, and the NM 22/SP 88 interchange is the primary access point to the Santo Domingo Pueblo. Continued access to these services and locations is expected to be a concern for the general public and the Pueblo.

Data from the US Census Bureau's 2013-2017 American Community Survey was used to review the economic and demographic background of the Santo Domingo Pueblo Designated Census Place (DCP). Key aspects of the Santo Domingo DCP are presented below:

- Total population of the DCP was 2,596.
- 91.5 percent of the population identified as American Indian or Alaska Native.
- 4.5 percent had limited English language proficiency.
- The unemployment rate was 8.4 percent.
- 33.8 percent of families were below the poverty level.
- 28 percent were below the age of 18 while 13.6 percent were over age 65.

Based on these statistics, the project area includes minority and low-income populations to be considered under the Environmental Justice Executive Order (Executive Order 12898). However, as no residential relocations are anticipated, access to local communities and services will be maintained and enhanced, and the community will be engaged throughout the project development process. Disproportionate impacts due to the project are not anticipated and Environmental Justice will not be a differentiator among the alternatives.

Santo Domingo Pueblo residents are the stakeholders most affected by the project. The project Public Involvement Plan will be developed with the community in mind. Outreach methods will include public meetings on the Pueblo and update briefings to the Pueblo Council. Community concerns will be addressed in the alternatives analysis and through the public involvement process.

2.7.4 Hazardous Materials

NMDOT conducted a review of potential hazardous materials sources in the study area. No potential hazardous materials were identified.

3. AGENCY COORDINATION AND PUBLIC INVOLVEMENT

This section summarizes the stakeholder involvement and agency coordination efforts being performed during the Phase I-A/B evaluation of alternatives. Outreach is guided by the Context Sensitive Public Involvement Plan and is designed to be proactive, comprehensive, and continuous through the project development process. Stakeholder outreach efforts involve coordination with the Pueblo of Santo Domingo Pueblo and the general public, and various design team meetings. A summary of the outreach efforts to date is provided below.

3.1 Stakeholder Coordination

On July 12, 2019, Project Team representatives met with the Santo Domingo Pueblo Council. The meeting purpose was to provide project information and obtain input from these stakeholders. Project staff gave an overview of the project, which included discussion of existing conditions in the project area, alternatives being considered, and the overall project process and anticipated coordination efforts.

The Pueblo Council provided the following comments at the meeting:

- The Project Team should coordinate with the Governor of the Santo Domingo Tribe through his representatives.
- The Pueblo Land Task Force may be involved.
- The NM 22 overpass and interchange should be considered from the broader perspective of its function as the main Pueblo entrance.
- The Project Team should consider a flyover-type ramp from eastbound SP 88 to southbound NM 22.
- NM 22 traffic to and from Peña Blanca travels at unsafe speeds, and reducing speed should be considered.
- Peña Blanca and Cochiti traffic should be detoured to NM 16 during construction.
- Lighting options should be considered.
- The SP 88 underpass should be kept open to facilitate Pueblo access to cultural events and the Rail Runner Station.

3.2 Public Meeting

To be completed after the public meeting.

3.3 How Stakeholder Input was Used

Stakeholder input was a guiding factor for various elements of the project design and was used as a metric for evaluating alternatives and described in Section 6. A public meeting was held on June 25, 2020, to gather input on the project purpose and need, alternatives, and the preliminary alternatives analysis. Stakeholders expressed a preference for Alternative X (or did not express a strong preference for any one alternative) and identified the following topics of concern:

- To be completed after the public meeting.

4. PURPOSE AND NEED

Documenting the purpose and need of a proposed project is an important step in the study process as it serves as the basis for the development and analysis of alternatives. The project purpose is typically a broad statement of the overall objectives to be achieved by a proposed project. The project need refers to the specific problems or deficiencies that a proposed project will address. The project purpose and need are supported by observations noted in the existing conditions analysis presented in Section 3 of this report.

NM 22 provides an important north-south route for commuters, commercial traffic, and recreational vehicles. SP 88 provides local east-west access, and the NM 22/SP 88 Interchange serves as the primary access to the Santo Domingo Pueblo. Currently, the only all-weather connection from NM 22 and SP 88 west to the main Pueblo is through the existing concrete box culvert for SP 88 under NM 22.

The specific needs for the project are based on several existing deficiencies within the project area. The existing box clear height is posted at 13 feet-10 inches. This is below the maximum legal vehicle height of 14 feet-0 inches, so vehicles too tall for that clearance must make a detour. The shortest all-weather detour is 19 miles long through Cochiti via NM 22 and SP 85. The box culvert is also narrow, with 11-foot-wide lanes and narrow shoulders (less than 1 foot wide). The narrow width causes traffic issues, with the box effectively being a one-way road when large trucks pass through it.

In addition to the access issues with the existing SP 88 underpass, the record and rate of left-turn crashes at the NM 22/loop ramp intersection indicates a safety concern. While the number of crashes is relatively low in absolute terms, the crashes primarily involved left turns at the intersection, and the rate is higher than the statewide average for similar locations. Another potential safety issue is the substandard lengths of the existing acceleration and deceleration lanes in the interchange.

The project purpose is to improve access and safety for traffic using the NM 22/SP 88 interchange, while maintaining current pedestrian access. Based on the existing interchange deficiencies, the needs are to: increase the SP 88 underpass clearance and width to meet current standards; improve safety for traffic at the NM 22/loop ramp intersection, particularly for left turns to and from NM 22; and provide adequate length acceleration and deceleration lanes on NM 22 and SP 88. This purpose and need statement was used as the basis for developing the build alternatives described in Section 5 below. In addition, it has also been developed to satisfy NEPA requirements and will be considered during Phase C of the project.

5. EVALUATION OF ALTERNATIVES

5.1 Design Criteria and Analysis Cross Sections

5.1.1 Design Criteria

For the build alternatives, sources of design criteria include the American Association of State Highway Transportation Officials *Green Book* and the NMDOT *State Access Management Manual*. For all the proposed alternatives, the existing and proposed design speed of NM 22 is 50 mph, and the posted speed is 45 mph. The existing and proposed design speed of SP 88 is 30 mph, and the posted speed is 25 mph.

5.1.2 Analysis Cross Sections

NM 22 and SP 88 would continue to have one through lane in each direction, and the typical sections would not change appreciably except through the SP 88 underpass below NM 22. The cross sections used for the analysis are shown in Figure 5-1 through Figure 5-3.

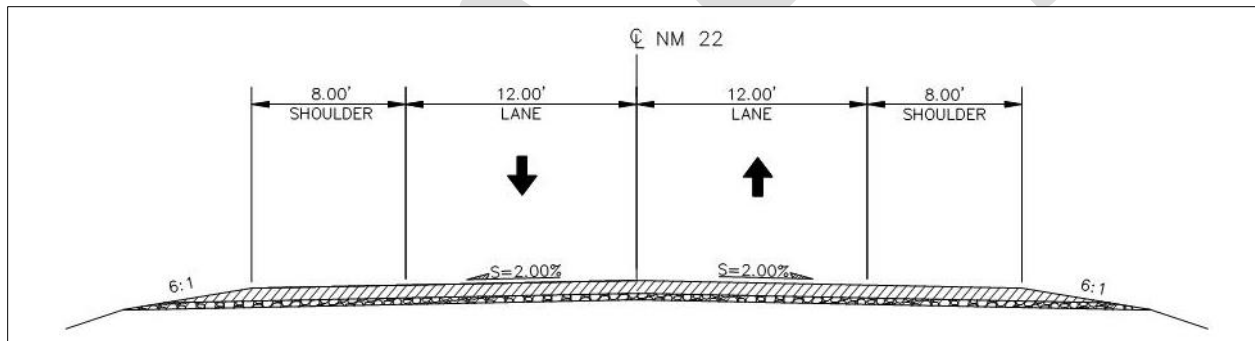


Figure 5-1. NM 22 Existing/Proposed Cross Section

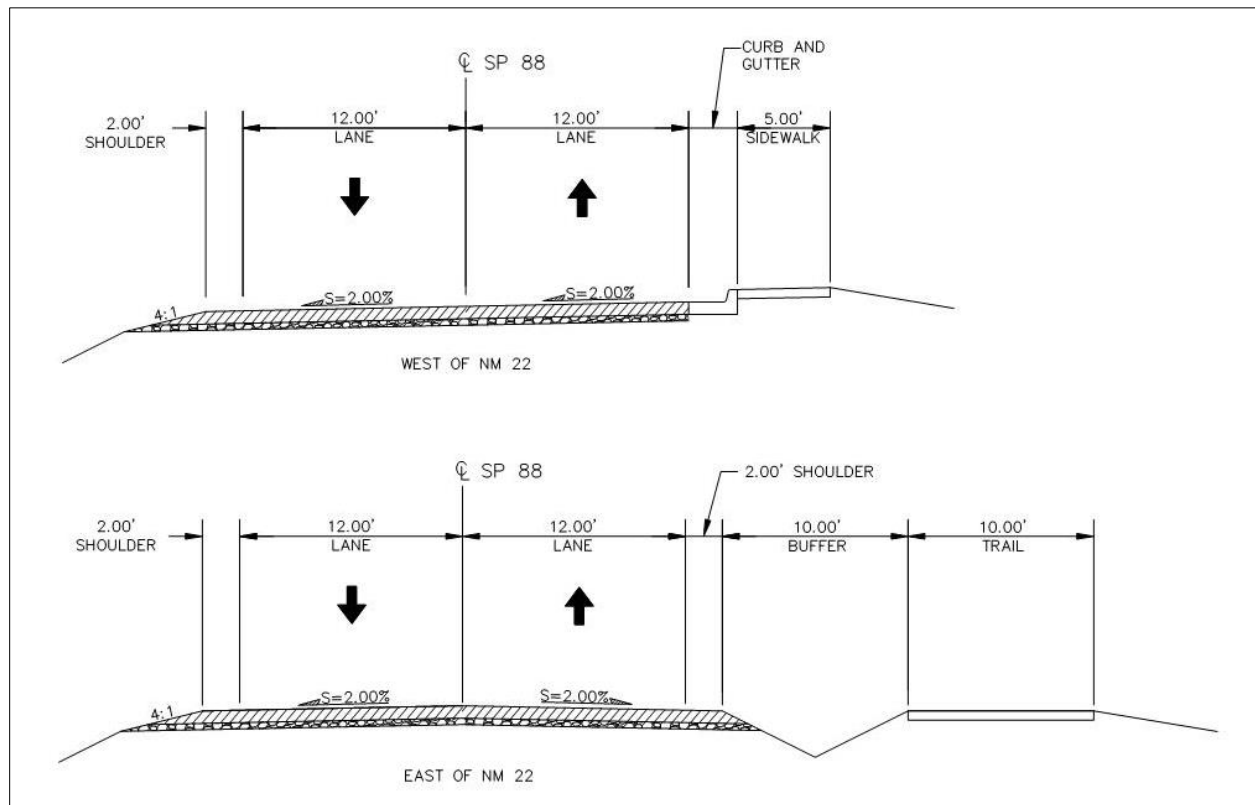


Figure 5-2. SP 88 Existing/Proposed Cross Sections, looking east

The proposed SP 88 underpass cross section below NM 22 would have two lanes plus a sidewalk/trail on the south side and a shoulder on the north side. The proposed cross section is shown in Figure 5-3.

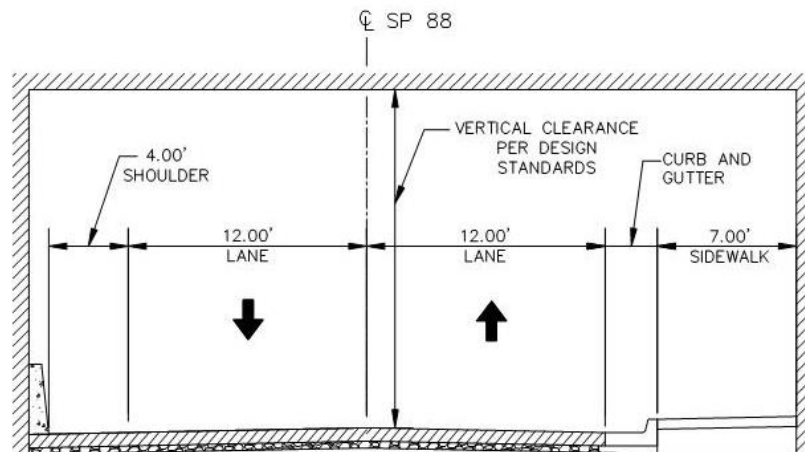


Figure 5-3. Proposed Cross Section of SP 88 Underpass Below NM 22, looking east

No pavement data near the interchange was available, so pavement thickness was estimated based on core data for NM 22 just west of I-25. For the initial cost estimates, the assumed asphalt thickness was 6 inches with an assumed base course thickness of 8 inches.

5.2 Interchange Alternatives

Based on discussions with the project team, several alternatives were developed and considered to address the project purpose. The no-build alternative is always included as a baseline for comparison as part of the Location Study Procedures. The build alternatives are:

- Alternative 1: Three-Leg Roundabout
- Alternative 2: Four-Leg Roundabout
- Alternative 3: Right-In/Right-Out Ramps
- Alternative 4: West Diagonal Ramps

The alternatives and options for minor modifications to the alternatives are described below.

5.2.1 No-Build

For the no-build alternative, the interchange would continue to operate in its current configuration. The existing box culvert would be repaired and maintained to keep it in service, but it would not be enlarged. Access would not be improved.

Safety improvements such as signage could be considered as part of the no-build alternative. This could include implementation of a Rural Intersection Conflict Warning System (RICWS). The intent of the RICWS would be to provide supplemental warnings to drivers of other vehicles approaching the intersection. The system would include signing, vehicle detection loops, and dynamic warning beacons.

5.2.2 Alternative 1: Three-Leg Roundabout

Alternative 1 would build a 3-leg, single-lane roundabout at the intersection of NM 22 and the loop ramp (see Figure 5-4). The roundabout would be designed to reduce vehicle speeds and conflicts and to operate smoothly for large vehicles such as buses, medium-sized semis, and recreational vehicles. Occasional mobile home transports or other oversize loads would be accommodated by a concrete apron in the center of the roundabout, possibly using temporary lane closures. The grade along NM 22 would be flattened to approximately 4 percent at the roundabout. Earth fill would be placed on the west side of the roundabout. Right-of-way would be required near the roundabout on the east and west sides of NM 22.

The existing intersection of the loop ramp and SP 88 would be reconfigured to eliminate the free right turn lanes. This would eliminate the need for acceleration and deceleration lanes on SP 88, improving safety.

This alternative would not encroach on the damaged energy dissipator west of NM 22, so improvements to it were not included.



**Figure 5-4. Alternative 1
3-Leg Roundabout**

5.2.2.1 SP 88 Underpass Options

The existing SP 88 underpass does not allow for the safe passage of cars and large vehicles. To build a structure with a larger opening, there is not enough cover over the existing underpass. Therefore, horizontal and vertical alignment options were considered.

Underpass Option A would replace the existing box culvert on the existing SP 88 horizontal alignment. The cross section of SP 88 would be as shown in Figure 5-3. Vertical clearance of 17 feet-0 inches would be desirable to accommodate trucks, since the underpass is the primary access from NM 22 to the main Pueblo. NM 22 would have two lanes, shoulders, and sidewalk along the south side (see Figure 5-1). There is not enough earth fill on top of the existing box to raise the top of the structure without changing the grade of NM 22. However, the profile of NM 22 is already steep, with a maximum slope of 5.75 percent. In addition, the NM 22 Bridge over the NMRX is only 250 feet south of SP 88. If NM 22 is raised significantly, replacement of that bridge would be needed. Therefore, lowering the grade of SP 88 instead would be more cost effective and practical. To build a conventional bridge, SP 88 would need to be lowered 5 to 6 feet. This could be done without replacing the culverts west of NM 22. See Figure 5-5 for a plan of the options.

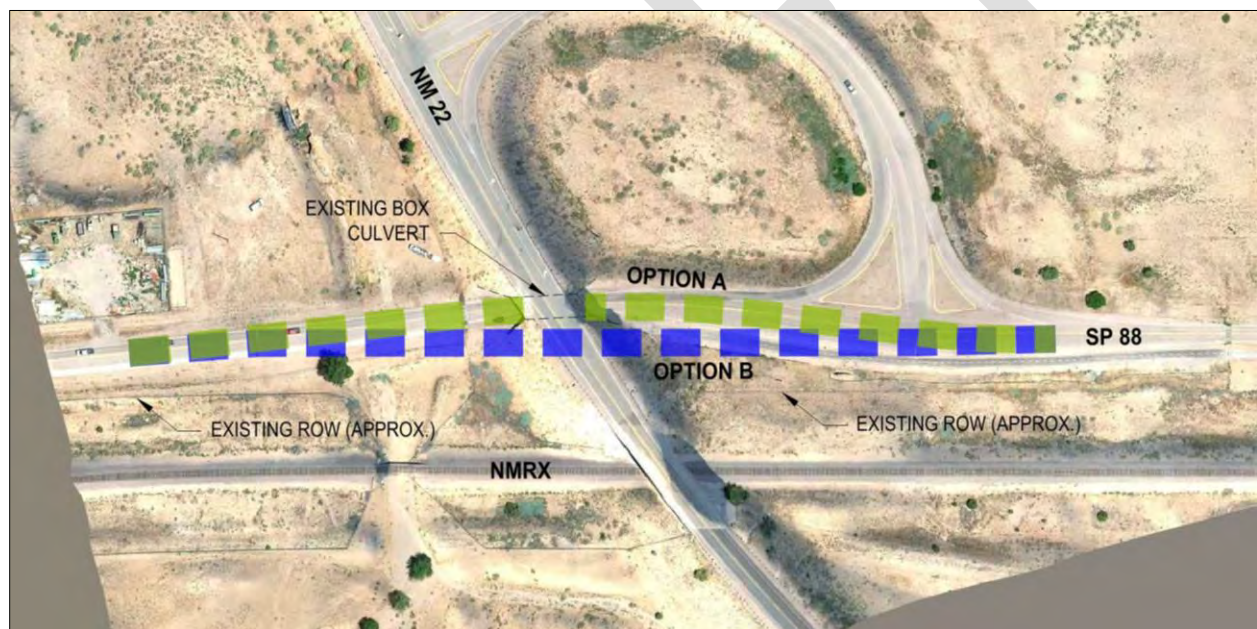


Figure 5-5. SP 88 Underpass Options

Underpass Option B would replace the existing box by realigning and straightening SP 88 to the south of the existing alignment (see Figure 5-5). The cross sections of SP 88 and NM 22 would be the same as for Option A. Because NM 22 climbs toward the south, about 3 more feet of clearance would be available. Assuming a conventional bridge, SP 88 would need to be lowered 2 to 3 feet below the existing grade. The cut slope on the south side of SP 88 would encroach into the NMRX right-of-way. The culverts under SP 88 west of NM 22 would need to be extended.

Options A and B would be similar in costs and impacts. The structure type will be determined following the Phase I-A/B study, but both options would require SP 88 to be lowered.

Option B would have advantages for construction traffic control for this alternative. It would allow traffic to use the existing SP 88 underpass while the new bridge was built, avoiding the need for a detour. Work within the NMRX right-of-way would be required, but it would be far enough from the tracks to avoid disruptions to rail traffic. Therefore, underpass Option B is recommended with Alternative 1.

5.2.3 Alternative 2: Four-Leg Roundabout

Alternative 2 would build a 4-leg, single-lane roundabout at the intersection of NM 22 and the loop ramp. See Figure 5-6. The roundabout would be designed to reduce vehicle speeds and conflicts and to operate smoothly for large vehicles such as buses, medium-sized semis, and recreational vehicles. This alternative would reduce left-turning maneuvers through the roundabout. Occasional mobile home transports or other oversize loads would be accommodated by a concrete apron in the center of the roundabout, possibly using temporary lane closures. The grade along NM 22 would be flattened to about 4 percent at the roundabout. The new leg and loop ramp on the west side of NM 22 would require earthwork and drainage improvements, along with additional right-of-way.

The existing intersection of the east loop ramp and SP 88 would be reconfigured to eliminate the free right-turn lanes to and from the ramp. This would eliminate the need for acceleration and deceleration lanes on SP 88, which should improve safety with a negligible impact to traffic.

5.2.3.1 SP 88 Underpass Options

Leaving the existing box in place and limiting truck access along SP 88 at NM 22 was considered as a potential way to reduce construction costs. Trucks and tall vehicles could be prohibited from using the underpass and rerouted through the new roundabout. However, the existing box culvert for SP 88 below NM 22 has reached the end of its design life. It eventually will require major rehabilitation or replacement. Leaving it in place would not save money significantly over the long term, so this option was not considered further.

Other options would involve replacement of the existing box with a new structure with adequate horizontal and vertical clearance. SP 88 Underpass Option A, replacement of the existing box on the existing alignment, and Option B, realignment of SP 88 at the undercrossing, would be the same as the options considered for Alternative 1. Refer to Section 5.2.2.1 for a discussion of these options. Because trucks could be rerouted through the new roundabout, the underpass vertical clearance could be reduced slightly to meet the local road standard of 15 feet-3 inches as a potential cost savings option.

For Alternative 2, the existing box could be closed to traffic for reconstruction once the west ramp was built. Option A would not require extension of the drainage structures west of NM 22, and it would avoid work within the railroad right-of-way. Therefore, SP 88 Underpass Option A is recommended with Alternative 2.



**Figure 5-6. Alternative 2
4-Leg Roundabout**

5.2.4 Alternative 3: Right-In/Right-Out Ramps

Alternative 3 would build a new loop type ramp on the west side of the interchange, across from the existing ramp intersection. See Figure 5-7. This would provide right-in/right-out access to NM 22, eliminating left turns to improve safety. Raised islands in the triangular gore areas and/or along the NM 22 median would be constructed to prevent left turns. The new ramp would require fill material, a drainage culvert, and a new drop structure. New acceleration and deceleration lanes would be constructed along NM 22, also requiring fill along both sides of the roadway. Additional right-of-way would be required.

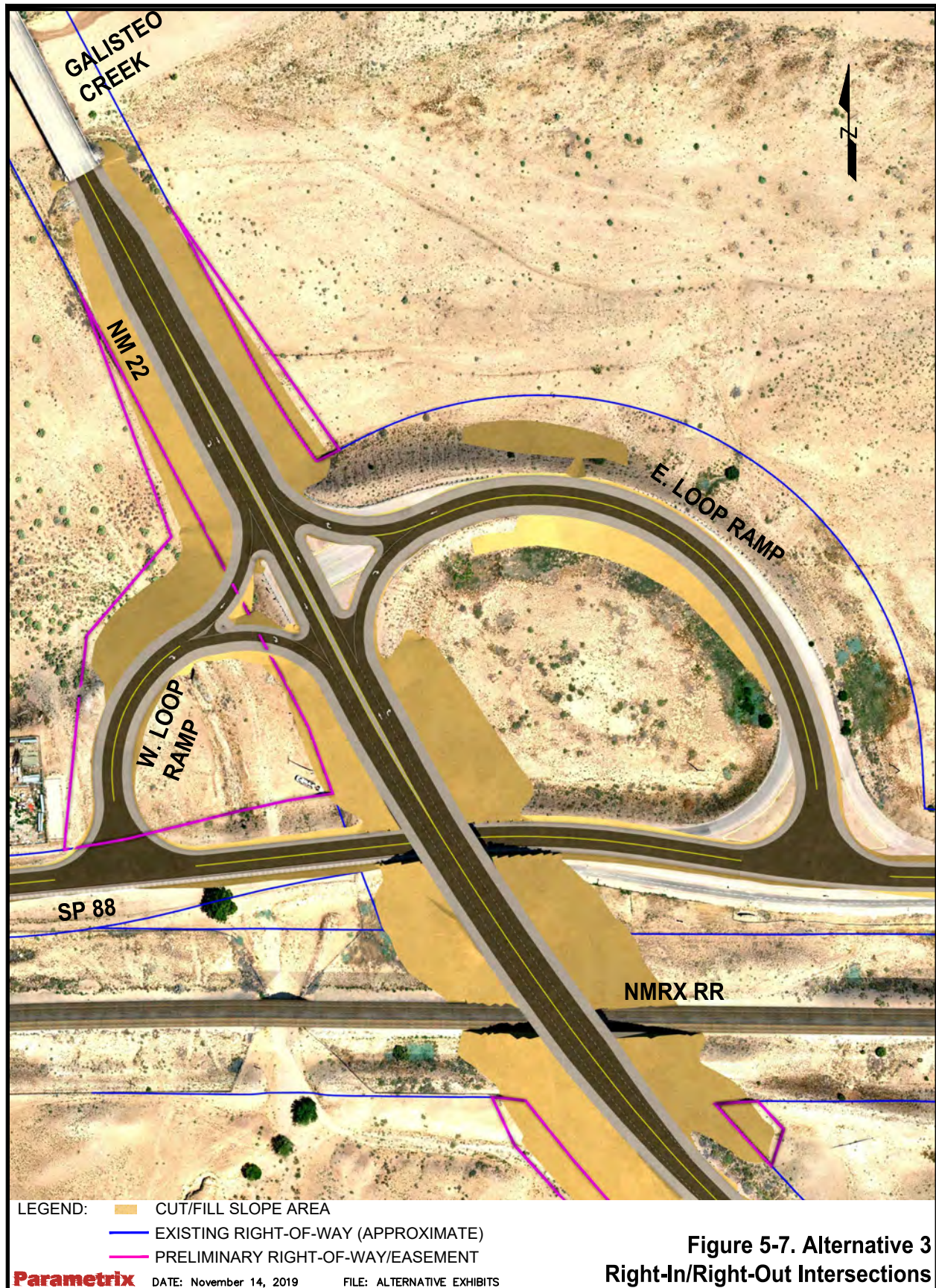
Alternative 3 would also require replacement of the existing NM 22 bridge over the NMRX railroad to widen the roadway for acceleration and deceleration lanes.

The distance between the NM 22 ramp intersections and the NM 22/Galisteo Creek Bridge to the north is slightly shorter than needed for the northbound acceleration tapers to meet *Green Book* and NMDOT *State Access Management Manual* criteria. With a 360-foot-long acceleration lane, the design taper length is 170 feet, which is shorter than the 95 feet available. For this analysis, it was assumed a portion of the taper could be located on the existing bridge shoulder.

Shifting the west ramp to the north along NM 22 was considered to avoid the need to widen the NM 22/NMRX Bridge. However, widening the NMRX bridge still would be needed for the northbound deceleration lane. Also, the southbound deceleration lane would be shifted north, which would require widening the NM 22/Galisteo Creek Bridge. Because this would impact both existing bridges, it would have higher construction costs. It also could impact the Galisteo Creek floodplain. Therefore, shifting the west ramp would not provide an advantage.

5.2.4.1 SP 88 Underpass Options

The SP 88 underpass would be replaced with a new structure with adequate horizontal and vertical clearances. Underpass Option A, replacing the existing box on the same alignment, and Underpass Option B, realigning SP 88, would be similar to the options considered for Alternatives 1 and 2. The difference is that NM 22 would have four lanes (two through and two accel/decel) instead of two. Refer to Section 5.2.2.1 for additional discussion. For Alternative 3, Underpass Option A would provide advantages. It would not require extension of the drainage culverts west of NM 22, and it would reduce encroachment into the NMRX right-of-way. Therefore, Underpass Option A is recommended with Alternative 3.



5.2.5 Alternative 4: West Diagonal Ramps

Alternative 4 would construct new diagonal exit and entrance ramps west of NM 22, providing more direct access for the heavy east to south movement, and it would eliminate left turns at the existing NM 22/loop ramp intersection. See Figure 5-8. It would require realignment of SP 88 west of the interchange, shifting it north of the existing underpass. Because of space constraints, the NM 22 southbound on-ramp would climb at a slope of approximately 7 percent. This on-ramp would connect to NM 22 north of the NMRX Bridge, avoiding the need for a second bridge over the railroad. The NM 22/NMRX Bridge would need to be replaced to provide the additional roadway width. Extensive grading and drainage improvements would be required for the new ramps and intersections. Right-of-way also would be required.

Similar to Alternative 3, the distance between the ramp termini and the Galisteo Creek Bridge to the north is shorter than the length needed for the northbound acceleration lane and taper per the *Green Book* and *SAMM*. For this analysis, it was assumed that a portion of the taper could be located on the existing bridge shoulder.

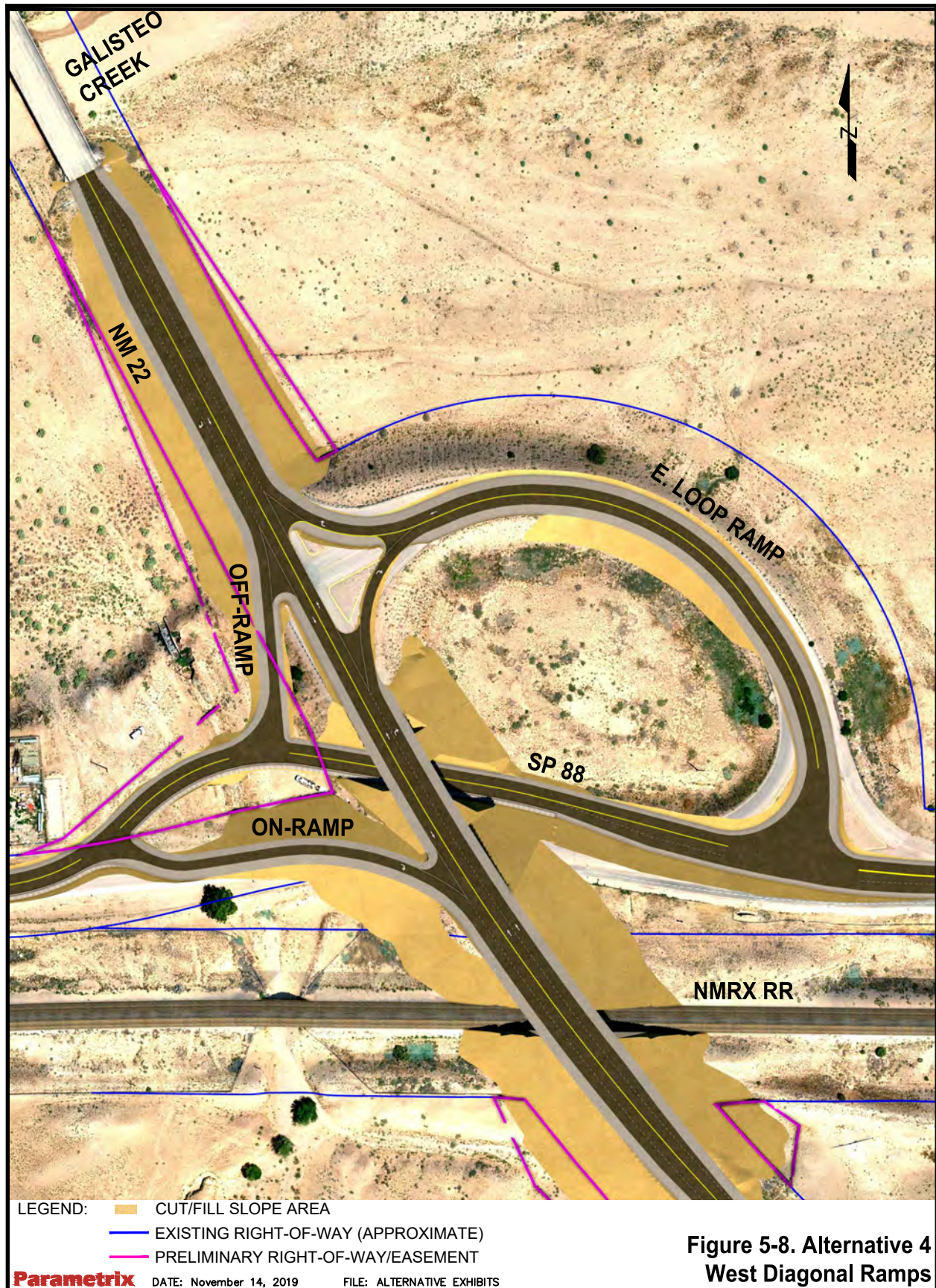
A new SP 88 underpass would be constructed north of the existing underpass. A conventional bridge was assumed for the initial cost estimates. The structure type will be investigated following the Phase I-A/B study.

5.3 Alternatives Analysis

The alternatives analysis was conducted in compliance with the procedures outlined in the NMDOT *Location Studies Procedures* (2015). These procedures are designed to be consistent with the FHWA PEL policy and will allow for planning-level analysis and recommendations to be incorporated by reference into the future NEPA analysis. The alternatives were analyzed based on qualitative and quantitative criteria. The criteria fell into general categories of consistency with the project purpose and need, and engineering, environmental, and community factors. The goal of the evaluation was to assess the alternatives' feasibility and practicality, compare their pros and cons, and ultimately identify which one to recommend for implementation and development in greater engineering detail.

The evaluation factors were:

- Consistency with the Purpose and Need
- Traffic Operations
- Drainage
- Utilities
- Right-of-Way
- Railroad Aspects
- Constructability
- Maintenance
- Preliminary Cost, Funding, and Implementation
- Community Aspects
- Environmental Aspects



5.3.1 Consistency with the Purpose and Need

The purpose and need for the project are to improve access and safety for NM 22/SP 88 interchange users. The no-build alternative would not improve access, so it would not be consistent with the project purpose. In general, all the proposed build alternatives would improve access and safety. Common to all the build alternatives, access will be improved by replacement of the existing SP 88 underpass structure with a larger structure that will accommodate trucks and oversize vehicles. Safety will be improved by eliminating left-turn conflicts on NM 22, by lengthening acceleration and deceleration lanes on NM 22 as needed, and by eliminating substandard auxiliary lanes on SP 88.

Alternatives 1 and 2 both construct roundabout intersections. Roundabouts improve safety by reducing vehicle speeds and the number of potential conflict points within the intersection. The intersection geometry, created with curbs and pavement treatments, requires vehicles to slow to a low speed, typically 15 to 25 mph, to navigate the roundabout. The number of potential conflict points at a roundabout are lower compared to conventional intersections, so the number and severity of crashes are reduced. Roundabouts have been shown to reduce crash frequency along rural, high-speed highways (NCHRP 2010, page 3-31).

The roundabouts would be designed for regular use by a range of vehicles, including cars, buses, recreational vehicles, delivery trucks, and mid-sized semis. They also would be designed for occasional large semis and other oversize loads, such as mobile home transports.

Alternatives 3 and 4 would improve safety by providing new, more direct connections between NM 22 and SP 88. These would eliminate left turns at NM 22. Raised curb in the gores and/or along the median would help direct vehicles and prevent left turns onto NM 22. The longer acceleration/deceleration lanes along NM 22 would allow cars to merge with through traffic.

All alternatives would reconstruct the pedestrian route along SP 88 through the interchange. The pedestrian path will be designed in accordance with the Americans with Disabilities Act (ADA) and Federal Highway Administration (FHWA) Public Right-of-Way Access Guidelines (PROWAG). Alternative 4 would realign SP 88, creating a slightly longer route. The path would also cross the south leg of the SP 88/southbound on-ramp intersection. All alternatives would provide adequate pedestrian access along SP 88.

5.3.2 Traffic Operations

Traffic operations refers to how well the interchange functions with the projected traffic volumes. It is assessed based on measures such as traffic capacity, speed, and congestion. Traffic on NM 22 is projected to increase to 4,360 vpd average by 2036. The projected traffic volumes are relatively low, and all the proposed alternatives would operate at an acceptable level of service.

Providing more direct ramp connections would help improve traffic operations, particularly for the heaviest traffic movements. Although improving the ramps would not have a major effect on the level of service, it would improve safety by eliminating left turns, and it would increase convenience for drivers by increasing speeds and reducing travel times. Alternative 1 would provide a semidirect connection between NM 22 and SP 88 with a roundabout at NM 22. Alternatives 2 and 3 would provide a new semidirect west loop ramp for traffic on SP 88 west of NM 22. Alternative 4 also would provide more direct ramps for that traffic. The east loop ramp would continue to operate like it does today.

As an added benefit, all alternatives would reduce delays for traffic that currently stops at the NM 22/loop road intersection. For Alternatives 1 and 2, north- and southbound through traffic would reduce speed through the roundabout. The resulting delays would be negligible. Alternatives 3 and 4 would minimize delays for all traffic directions by providing free-flowing right turns onto NM 22.

For Alternatives 1 and 2, large semi-trucks, mobile home transports, and other oversize loads using the roundabout could cause traffic delays when passing through the intersection. Delays would be temporary, short-duration, and minor.

5.3.3 Drainage

Alternative 1 would have a minimal impact to the existing drainage patterns. The pavement area would be similar, and drainage flows would continue in the current pattern. Culvert cleaning and extensions would be necessary for the existing crossing structures under NM 22 and SP 88. The damaged energy dissipator west of NM 22 would not be replaced as part of the project.

Alternative 2 would affect the existing channel and energy dissipator west of NM 22. A crossing structure would need to be designed to convey the channel flows under the new west loop ramp. The energy dissipator would be moved north to accommodate roadway grading. Currently, there is 292 cfs during a 100-year storm that crosses under NM 22 through three 48-inch-diameter culverts. The new crossing structure would consist of a similar capacity structure. No major changes are anticipated to drainage on the east side of NM 22.

Alternative 3 would have similar impacts to the existing drainage as Alternative 2; the new west ramps would cross the existing channel, and a crossing structure would be required. No changes are anticipated to drainage patterns on the east side of NM 22.

Alternative 4 would have new roadways on the west side of NM 22 that would have similar impacts to the existing drainage as Alternatives 2 and 3. The new roadways west of NM 22 would cross the existing channel, and a crossing structure would be required. No changes are anticipated to drainage patterns on the east side of NM 22.

The interchange is at the south edge of the Galisteo Creek floodplain. The alternatives would be more than 500 feet from the main channel. Although earth embankment would be placed along the edge of the floodplain, the additional fill would be negligible relative to the width of the floodplain, so it would not affect flood flows. The slopes would be revegetated or otherwise protected to resist erosion.

5.3.4 Utilities

Based on preliminary information, buried and overhead utility lines are located along NM 22, SP 88, and the NMRX tracks. The lines could be affected by proposed changes to grades, construction of new or widened roadways, or by new structure foundations. Alternatives 1, 2, and 3 would at most have minor impacts to existing utilities. Alternative 4 would realign SP 88 along the path of the existing east-west utilities, so more extensive utility relocations would be required. Utility relocations could result in short-term disruptions to utility service and increased costs to the project.

5.3.5 Right-of-Way

All alternatives would require new right-of-way easement for construction and/or future maintenance of the proposed improvements. The acreage needed for acquisition is relatively small. In general terms,

Alternative 1 would have the smallest right-of-way footprint. Alternatives 2, 3, and 4 would have larger right-of-way footprints. Preliminary right-of-way needs are shown in Table 5-1.

Table 5-1. Right-of-Way Needs

Alternative	Right-of-Way Area
Alternative 1	0.67 acres
Alternative 2	2.26 acres
Alternative 3	2.54 acres
Alternative 4	1.84 acres

5.3.6 Railroad Aspects

Work within railroad right-of-way must follow state and federal regulations to maintain safety and allow the movement of freight and passengers. Alternatives 1 and 2 would not require major construction work within NMRX right-of-way. Alternatives 3 and 4 would replace the existing NM 22 bridge over the NMRX tracks. Construction and traffic control would be coordinated with rail operators to avoid or minimize disruptions to rail traffic, which would add to the difficulty and cost of the project.

5.3.7 Constructability

Constructability includes consideration of traffic control, detours, materials, equipment, methods, and schedule. Traffic control will be designed to minimize disruptions to roadway, pedestrian, and rail traffic, and to maintain access. The most significant traffic impacts would occur during construction of the proposed bridges. All alternatives include a new SP 88 underpass bridge, and Alternatives 3 and 4 include a new bridge over the NMRX tracks. Bridges could be constructed with either a full closure of NM 22, or by reducing NM 22 to one lane during construction and building the bridges in halves. With a full NM 22 closure, access would be maintained using SP 88 and NM 16. Detours would be provided for SP 88 at NM 22 during replacement of the underpass. Traffic control and detour requirements are similar for all alternatives.

5.3.8 Maintenance

All the alternatives will be designed for maintenance using standard agency resources. For Alternatives 1 and 2, snow removal at the new roundabouts will be important to consider during design. Roundabout design should allow for snowplow access and provide places to safely stockpile accumulated snow.

5.3.9 Preliminary Cost, Funding, and Implementation

Major project costs include construction, construction oversight, and right-of-way acquisition. Construction costs depend on the amount of roadway being built, the volume of earthwork, and major items such as bridges and drainage structures. Right-of-way costs on tribal land are undetermined. The other major costs are summarized below (Table 5-2). Given the conceptual level of the Phase I-A/B analysis, the costs are preliminary and will continue to be refined as the project proceeds.

Table 5-2. Preliminary Costs

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Roadway	\$1,554,714	\$1,704,207	\$2,451,832	\$2,634,869
Bridge	\$840,000	\$840,000	\$4,250,000	\$4,070,000
Drainage	\$21,600	\$148,150	\$148,150	\$212,350
Construction Items	\$585,000	\$621,000	\$1,374,000	\$1,390,000
Subtotal	\$2,996,314	\$3,313,357	\$8,223,982	\$8,307,219
Contingencies (30%)	\$898,894	\$994,007	\$2,467,194	\$2,492,166
Construction Oversight (12%)	\$359,558	\$397,603	\$986,878	\$996,866
Subtotal	\$4,254,765	\$4,704,967	\$11,678,054	\$11,796,251
New Mexico Gross Receipts Tax (8%)	\$340,381	\$376,397	\$934,244	\$943,700
Total	\$4,595,147	\$5,081,364	\$12,612,298	\$12,739,952

Factors important to the cost of the alternatives include:

- Alternative 1 has the least area of roadway and the lowest cost of the alternatives.
- Alternative 2 would cost 11 percent more than Alternative 1 due to the new west loop ramp and associated drainage structures.
- Alternative 3 roadway costs are higher than Alternatives 1 and 2 due to the NM 22 auxiliary lanes. Bridge costs are higher than Alternatives 1 and 2 due to the wider structure over SP 88 and a replacement NM 22 Bridge over the NMRX railroad.
- Alternative 4 has similar roadway costs to Alternative 3. It also includes a wider bridge over SP 88 and a replacement NM 22 Bridge over the NMRX railroad.

Overall, Alternatives 1 and 2 are less than half the cost of Alternatives 3 and 4. Given current budgets, Alternatives 1 and 2 could be constructed in the near term. Alternatives 3 and 4 would require additional funds, so they could be constructed in phases over a long period.

5.3.10 Community Aspects

The community that uses the interchange and that would be affected by construction includes the Santo Domingo Pueblo, traffic on NM 22, and nearby residents. Issues of importance to the community are expected to include:

- Right-of-way impacts – no relocations would be required. Alternative 1 would minimize the right-of-way needed. Although Alternatives 2, 3, and 4 require more right-of-way, the improvements would be in the vacant area between NM 22 and the storage yard to the west, which is bisected by an arroyo that limits its potential usefulness.
- Drivability – the Alternatives will improve safety at the interchange and access to SP 88. They will improve convenience for drivers using SP 88 south of NM 22, where most of the traffic originates. NM 22 also provides an important route for local and tourist traffic. Alternatives 1

and 2 would require through traffic on NM 22 to slow down at the roundabout, improving intersection safety with a negligible increase in travel time.

- Pedestrian access – all alternatives will provide safe pedestrian access through the interchange. The sidewalk will be widened through the underpass and lighting will be installed, providing a safer and more comfortable route.
- Roundabouts – roundabouts have been successfully implemented on similar rural, high-speed highways in New Mexico. Public education may help improve driver comfort and acceptance.
- Winter driving – the existing grade of NM 22 is relatively steep, and the intersection requires maintenance during winter conditions. While these issues may be concerns to the community, the proposed alternatives would be designed for conventional maintenance and would not affect winter driving conditions.
- Access to tribal land – except for the necessary access and safety improvements, the alternatives will not appreciably change access to SP 88.
- Temporary construction impacts – construction will be more than 400 feet from the nearest residence. NMDOT and the project contractor will work with the community to minimize disruptions and nuisances during construction.

These issues and others important to the community will be discussed during public and stakeholder meetings.

5.3.11 Environmental Aspects

The alternatives were evaluated in terms of their potential impacts to the environment, specifically natural and cultural resources. A cultural resources survey of the area has been completed and identified the historic railroad and NM 22 overpass over the railroad (Bridge # 7011) and the NM 22 overpass over SP 88 (Bridge # 7079) as historic properties. However, none of the alternatives would impact the historic railroad tracks, and the two structures are not expected to be eligible to the National Register of Historic Places (NRHP). As such, consideration of cultural resources is not a differentiator between alternatives.

No wetlands or critical habitat for threatened or endangered species were found during field investigation, so this consideration is not a differentiator. All the alternatives would impact vegetation and habitat near the interchange. The impacts would depend on the footprint of the proposed improvements. Alternative 1 would have the smallest footprint. Alternatives 2, 3, and 4 would have larger footprints. However, the affected areas would be insignificant relative to the overall habitat in the area.

Potential impacts to water quality were considered. SP 88 crosses two unnamed arroyos west of the interchange. These arroyos may qualify as jurisdictional waterways under US Army Corps of Engineers criteria. As such, improvements that affect these waterways could require a 404 Permit prior to construction. The alternatives include work on the SP 88 culverts, new culverts under the proposed ramps, along with erosion protection and a new energy dissipator. The disturbed area will be small, so water quality is not a differentiator between alternatives.

6. SUMMARY AND RECOMMENDATIONS

Four build alternatives for the NM 22/SP 88 interchange were identified and developed to a conceptual level of detail. The alternatives identified in coordination with the Project Team were:

- Alternative 1: Three-Leg Roundabout
- Alternative 2: Four-Leg Roundabout
- Alternative 3: Right-In/Right-Out Ramps
- Alternative 4: West Diagonal Ramps

The alternatives were evaluated by comparing major engineering, environmental, and community factors. The goal of the evaluation was to identify notable differences between the alternatives that would affect their feasibility and practicality. The evaluation results are summarized in the matrix in Table 6-1.

Both Alternatives 1 and 2 best address the purpose and need for the project, improving access and safety by replacing the existing SP 88 underpass with a larger structure and eliminating left-turn conflicts on NM 22. The costs of these alternatives would be less than half the cost of Alternatives 3 and 4. Right-of-way acquisition would affect vacant, previously disturbed property near the existing interchange. While Alternative 4 would provide more direct access, all the alternatives would operate acceptably. Utility impacts would be minor. Alternatives 1 and 2 would have fewer railroad and constructability impacts. Drainage, maintenance, and environmental aspects are not differentiators.

Table 6-1. Evaluation Matrix

Evaluation Criteria	No Build Alternative	Alternative 1 3-Leg Roundabout	Alternative 2 4-Leg Roundabout	Alternative 3 Right-In/Right-Out Ramps	Alternative 4 West Diagonal Ramps
Consistency with Purpose and Need	- Makes minor safety improvements but does not eliminate left-turn conflicts - Does not improve access through the SP 88 underpass	◦ Meets project purpose by improving access and safety for users + Improves safety by reducing speeds on NM 22	◦ Meets project purpose by improving access and safety for users + Improves safety by reducing speeds on NM 22	◦ Meets project purpose by improving access and safety for users	◦ Meets project purpose by improving access and safety for users
Traffic Operations	- Does not address SP 88 underpass operational issues	◦ Operates acceptably for projected traffic ◦ Negligible added delays for NM 22 thru traffic	◦ Operates acceptably for projected traffic ◦ Negligible added delays for NM 22 thru traffic ◦ More direct ramp connections to SP 88	◦ Operates acceptably for projected traffic ◦ More direct ramp connections to SP 88	◦ Operates acceptably for projected traffic ◦ Most direct ramp connections to SP 88
Drainage	◦ No drainage improvements	◦ Minor drainage improvements required	◦ Drainage improvements required	◦ Drainage improvements required	◦ Drainage improvements required
Utilities	◦ No utility work	◦ Minor impacts to existing utilities	◦ Minor impacts to existing utilities	◦ Minor impacts to existing utilities	◦ Utility relocations required
Right-of-Way Acquisition	◦ No additional Right-of-Way	+ 0.67 acres	2.26 acres	2.54 acres	1.84 acres
Railroad Aspects	◦ No work within railroad Right-of-Way	+ No major construction within RR Right-of-Way	+ No major construction within RR Right-of-Way	- Requires reconstruction of railroad bridge	- Requires reconstruction of railroad bridge
Constructability	◦ No construction impacts	◦ NM 22 lane closures/detour during underpass construction	◦ NM 22 lane closures/detour during underpass construction	◦ NM 22 lane closures/detour during underpass construction	◦ NM 22 lane closures/detour during underpass construction
Maintenance	- Age of existing SP 88 underpass will result in increased long-term maintenance	◦ Standard highway maintenance ◦ Roundabout will be designed for snowplow access	◦ Standard highway maintenance ◦ Roundabout will be designed for snowplow access	◦ Standard highway maintenance	◦ Standard highway maintenance
Preliminary Cost, Funding, and Implementation	◦ No construction or right-of-way costs	+ \$4,595,147 + Project can be implemented in the near-term	+ \$5,081,364 + Project can be implemented in the near-term	◦ \$12,612,298 ◦ Project would be phased over the long-term	◦ \$12,739,952 ◦ Project would be phased over the long-term
Community Aspects	- Does not address community concerns with the existing interchange	+ Designed to slow down traffic ◦ Winter driving conditions would be similar to the existing inter-section	+ New ramp west of NM 22 enhances drivability + Designed to slow down traffic ◦ Winter driving conditions would be similar to the existing intersection	+ New ramp west of NM 22 enhances drivability + Conventional intersection layout ◦ Winter driving conditions would be similar to the existing intersection	+ New ramps west of NM 22 enhance drivability + Conventional intersection layout - Southbound on-ramp would be steep ◦ Winter driving conditions would be similar to existing
Environmental Aspects	◦ Does not affect environmental resources	◦ Environmental aspects are not a differentiator	◦ Environmental aspects are not a differentiator	◦ Environmental aspects are not a differentiator	◦ Environmental aspects are not a differentiator

Legend

+ Better performance compared to other alternatives

◦ Similar performance to other alternatives

- Lower performance compared to other alternatives

Alternatives 1 and 2 share many similarities, but Alternative 2 would provide greater benefits to the community in terms of the drivability of the interchange. The Alternative 2 west loop ramp would provide a more direct connection from SP 88 to NM 22 than exists today, without left turns, which would improve safety and convenience for drivers. The cost difference between Alternatives 1 and 2 is minor relative to the overall project cost. **Therefore, Alternative 2, the four-leg roundabout, is the recommended alternative.**

The roundabout will have the safety benefit of slowing down traffic on NM 22. The roundabout approaches will be designed to enhance visibility and reduce vehicle speeds gradually approaching the intersection. Lighting will make the roundabout more visible at night. The National Cooperative Highway Research Program (NCHRP) suggested several treatment options to slow traffic at roundabouts on rural, high-speed roadways. Options include providing visibility, curbs, splitter islands, and chicanes (reverse curves) on the approaches. An example of a chicane is shown in Figure 6-1.



Figure 6-1. Chicane at Roundabout Approach

Alternative 2 will be advanced into Phase C, NEPA documentation, to evaluate potential effects of the proposed project to the environment. The No-build Alternative will also be considered during Phase C and will serve as the basis for assessing the potential impacts of the proposed project. Based on the project scope and expected level of environmental impact, a Categorical Exclusion (CE) is the recommended level of NEPA documentation for the proposed improvements. Consultation with the Santo Domingo Tribal Planning Department and Natural Resources Department is anticipated, as is consultation with the US Army Corps of Engineers concerning any drainage structure modifications.

In summary, the Phase I-A/B study established the purpose and need for the proposed project, identified and evaluated various project alternatives, recommended an alternative, and developed conceptual engineering designs used to estimate preliminary costs and assess project impacts. Federal funding will be budgeted for project construction. The next steps in the project implementation will be:

1. Hold a public meeting to receive input.
2. Prepare preliminary design plans.
3. Prepare an environmental document in coordination with FHWA.
4. Prepare Plans, Specifications, and Estimate.
5. Prepare Right-of-Way Maps.
6. Construction.

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Appendix A

Preliminary Cost Estimates



NM 22/SP 88 Interchange
Alternative 1: 3-Leg Roundabout
Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Amount
Roadway					
	Length				
	NM 22	ft.	1100		
	SP 88	ft.	1540		
	East Loop Ramp	ft.	970		
	Removal of Surfacing	sq. ft.	164422		
		sq. yds.	18269	\$ 6.00	\$ 109,614.61
	HMA Pavement	sq. ft.	164422		
		sq. yds.	18269	\$ 47.00	\$ 858,647.80
	Concrete Pavement - 8" (roundabout)	sq. ft.	3167		
		sq. yds.	352	\$ 120.00	\$ 42,223.01
	Curb	ft.	1185	\$ 22.00	\$ 26,070.00
	Sidewalk	sq. ft.	5832		
		sq. yds.	648	\$ 50.00	\$ 32,398.28
	Guardrail	ft.	4140	\$ 40.00	\$ 165,600.00
	End Terminal	each	2	\$ 3,300.00	\$ 6,600.00
	Earthwork				
	Cut	cu. yds.	14660	\$ 10.00	\$ 146,600.00
	Fill	cu. yds.	14190		
	Net (+ borrow/- waste)	cu. yds.	-470		\$ -
	Removal of Structures and Obstructions	lump sum			\$ 15,000.00
	Clearing and Grubbing	lump sum			\$ 15,000.00
	Barbed Wire Fence 4'	ft.	5280	\$ 7.00	\$ 36,960.00
	Cattleguard	each	2	\$ 20,000.00	\$ 40,000.00
	Signing and Striping	lump sum			\$ 35,000.00
	Intersection and Underpass Lighting	lump sum			\$ 25,000.00
	Roadway Subtotal				\$ 1,554,713.70
Bridges					
	NM 22 over SP 88				
	Remove existing box	lump sum	1	\$ 150,000.00	\$ 150,000.00
	New Bridge				
	L		60		
	W		46		
	A	sq. ft.	2760	\$ 250.00	\$ 690,000.00
	Bridge Subtotal				\$ 840,000.00

Item	Description	Unit	Quantity	Unit Cost	Amount
Drainage					
	48" Culvert	ft.	75	\$ 200.00	\$ 15,000.00
	48" End Section	each	3	\$ 2,200.00	\$ 6,600.00
	Energy Dissipator				
	No work				
	Drainage Subtotal				\$ 21,600.00
	Roadway, Bridge, and Drainage Subtotal				\$ 2,416,313.70
Construction Items					
	Traffic Control Management	lump sum	3.0%		\$ 73,000.00
	Public Awareness	lump sum			\$ 10,000.00
	Mobilization	lump sum	10.0%		\$ 250,000.00
	Field Office and Laboratory	lump sum			\$ 125,000.00
	Traffic Control Devices for Construction	lump sum	3.0%		\$ 73,000.00
	Construction Staking	lump sum	2.0%		\$ 49,000.00
	Construction Items Subtotal				\$ 580,000.00
	Subtotal				\$ 2,996,313.70
	Contingencies		30%		\$ 898,894.11
	Construction Management		12%		\$ 359,557.64
	Subtotal				\$ 4,254,765.46
	NMGRT		8%		\$ 340,381.24
	Alternative 1 Total				\$ 4,595,146.69

NM 22/SP 88 Interchange
Alternative 2: 4-Leg Roundabout
Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Amount
Roadway					
	Length				
	NM 22	ft.	580		
	SP 88	ft.	1550		
	East Loop Ramp	ft.	960		
	West Loop Ramp	ft.	480		
	Removal of Surfacing	sq. ft.	164422		
		sq. yds.	18269	\$ 6.00	\$ 109,614.61
	HMA Pavement	sq. ft.	187273		
		sq. yds.	20808	\$ 47.00	\$ 977,981.22
	Concrete Pavement - 8" (roundabout)	sq. ft.	3167		
		sq. yds.	352	\$ 120.00	\$ 42,223.01
	Curb	ft.	1185	\$ 22.00	\$ 26,070.00
	Sidewalk	sq. ft.	5832		
		sq. yds.	648	\$ 50.00	\$ 32,398.28
	Guardrail	ft.	4040	\$ 40.00	\$ 161,600.00
	End Terminal	each	4	\$ 3,300.00	\$ 13,200.00
	Earthwork				
	Cut	cu. yds.	14610	\$ 10.00	\$ 146,100.00
	Fill	cu. yds.	18130		
	Net (+ borrow/- waste)	cu. yds.	3520	\$ 10.00	\$ 35,200.00
	Removal of Structures and Obstructions	lump sum			\$ 15,000.00
	Clearing and Grubbing	lump sum			\$ 15,000.00
	Barbed Wire Fence 4'	ft.	4260	\$ 7.00	\$ 29,820.00
	Cattleguard	each	2	\$ 20,000.00	\$ 40,000.00
	Signing and Striping	lump sum			\$ 35,000.00
	Intersection and Underpass Lighting	lump sum			\$ 25,000.00
	Roadway Subtotal				\$ 1,704,207.12
Bridges					
	NM 22 over SP 88				
	Remove existing box	lump sum	1	\$ 150,000.00	\$ 150,000.00
	New Bridge				
	L		60		
	W		46		
	A	sq. ft.	2760	\$ 250.00	\$ 690,000.00
	Bridge Subtotal				\$ 840,000.00

Item	Description	Unit	Quantity	Unit Cost	Amount
Drainage					
	48" Culvert	ft.	330	\$ 200.00	\$ 66,000.00
	48" End Section	each	6	\$ 2,200.00	\$ 13,200.00
	Energy Dissipator				
	Concrete	cu. yds.	53	\$ 650.00	\$ 34,450.00
	Rebar	lbs.	18000	\$ 1.50	\$ 27,000.00
	Riprap Class A	cu. yds.	30	\$ 250.00	\$ 7,500.00
	Drainage Subtotal				\$ 148,150.00
	Roadway, Bridge, and Drainage Subtotal				\$ 2,692,357.12
Construction Items					
	Traffic Control Management	lump sum	3.0%		\$ 81,000.00
	Public Awareness	lump sum			\$ 10,000.00
	Mobilization	lump sum	10.0%		\$ 270,000.00
	Field Office and Laboratory	lump sum			\$ 125,000.00
	Traffic Control Devices for Construction	lump sum	3.0%		\$ 81,000.00
	Construction Staking	lump sum	2.0%		\$ 54,000.00
	Construction Items Subtotal				\$ 621,000.00
	Subtotal				\$ 3,313,357.12
	Contingencies		30%		\$ 994,007.14
	Construction Management		12%		\$ 397,602.85
	Subtotal				\$ 4,704,967.11
	NMGRT		8%		\$ 376,397.37
	Alternative 2 Total				\$ 5,081,364.48

NM 22/SP 88 Interchange
Alternative 3: Right-In/Right-Out Ramps
Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Amount
Roadway					
	Length				
	NM 22	ft.	1600		
	SP 88	ft.	1560		
	East Loop Ramp	ft.	1070		
	West Loop Ramp	ft.	600		
	Removal of Surfacing	sq. ft.	164422		
		sq. yds.	18269	\$ 6.00	\$ 109,614.61
	HMA Pavement	sq. ft.	246264		
		sq. yds.	27363	\$ 47.00	\$ 1,286,045.75
	Curb	ft.	1505	\$ 22.00	\$ 33,115.50
	Sidewalk	sq. ft.	3963		
		sq. yds.	440	\$ 50.00	\$ 22,015.72
	Guardrail	ft.	6540	\$ 40.00	\$ 261,600.00
	End Terminal	each	4	\$ 3,300.00	\$ 13,200.00
	Earthwork				
	Cut	cu. yds.	18670	\$ 10.00	\$ 186,700.00
	Fill	cu. yds.	47700		
	Net (+ borrow/- waste)	cu. yds.	29030	\$ 10.00	\$ 290,300.00
	Removal of Structures and Obstructions	lump sum			\$ 35,000.00
	Clearing and Grubbing	lump sum			\$ 35,000.00
	Barbed Wire Fence 4'	ft.	6320	\$ 7.00	\$ 44,240.00
	Cattleguard	each	2	\$ 20,000.00	\$ 40,000.00
	Signing and Striping	lump sum			\$ 70,000.00
	Intersection and Underpass Lighting	lump sum			\$ 25,000.00
	Roadway Subtotal				\$ 2,451,831.59
Bridges					
	NM 22 over SP 88				
	Remove existing box	lump sum	1	\$ 150,000.00	\$ 150,000.00
	New Bridge				
	L		60		
	W		70		
	A	sq. ft.	4200	\$ 250.00	\$ 1,050,000.00
	NM 22 over NMRX				
	Remove existing bridge	lump sum	1	\$ 250,000.00	\$ 250,000.00
	New Bridge				
	L		160		
	W		70		

Item	Description	Unit	Quantity	Unit Cost	Amount
	A	sq. ft.	11200	\$ 250.00	\$ 2,800,000.00
	Bridge Subtotal				\$ 4,250,000.00
Drainage					
	48" Culvert	ft.	330	\$ 200.00	\$ 66,000.00
	48" End Section	each	6	\$ 2,200.00	\$ 13,200.00
	Energy Dissipator				
	Concrete	cu. yds.	53	\$ 650.00	\$ 34,450.00
	Rebar	lbs.	18000	\$ 1.50	\$ 27,000.00
	Riprap Class A	cu. yds.	30	\$ 250.00	\$ 7,500.00
	Drainage Subtotal				\$ 148,150.00
	Roadway, Bridge, and Drainage Subtotal				\$ 6,849,981.59
Construction Items					
	Traffic Control Management	lump sum	3.0%		\$ 206,000.00
	Public Awareness	lump sum			\$ 10,000.00
	Mobilization	lump sum	10.0%		\$ 690,000.00
	Field Office and Laboratory	lump sum			\$ 125,000.00
	Traffic Control Devices for Construction	lump sum	3.0%		\$ 206,000.00
	Construction Staking	lump sum	2.0%		\$ 137,000.00
	Construction Items Subtotal				\$ 1,374,000.00
	Subtotal				\$ 8,223,981.59
	Contingencies		30%		\$ 2,467,194.48
	Construction Management		12%		\$ 986,877.79
	Subtotal				\$ 11,678,053.85
	NMGRT		8%		\$ 934,244.31
	Alternative 3 Total				\$ 12,612,298.16

NM 22/SP 88 Interchange
Alternative 4: West Diagonal Ramps
Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Amount
Roadway					
	Length				
	NM 22	ft.	2110		
	SP 88	ft.	1610		
	East Loop Ramp	ft.	1130		
	Southbound Off-Ramp	ft.	550		
	Southbound On-Ramp	ft.	580		
	Removal of Surfacing	sq. ft.	164422		
		sq. yds.	18269	\$ 6.00	\$ 109,614.61
	HMA Pavement	sq. ft.	264051		
		sq. yds.	29339	\$ 47.00	\$ 1,378,930.75
	Curb	ft.	872	\$ 22.00	\$ 19,192.58
	Sidewalk	sq. ft.	4293		
		sq. yds.	477	\$ 50.00	\$ 23,851.39
	Guardrail	ft.	7440	\$ 40.00	\$ 297,600.00
	End Terminal	each	6	\$ 3,300.00	\$ 19,800.00
	Earthwork				
	Cut	cu. yds.	28440	\$ 10.00	\$ 284,400.00
	Fill	cu. yds.	52880		
	Net (+ borrow/- waste)	cu. yds.	24440	\$ 10.00	\$ 244,400.00
	Removal of Structures and Obstructions	lump sum			\$ 35,000.00
	Clearing and Grubbing	lump sum			\$ 35,000.00
	Barbed Wire Fence 4'	ft.	7440	\$ 7.00	\$ 52,080.00
	Cattleguard	each	2	\$ 20,000.00	\$ 40,000.00
	Signing and Striping	lump sum			\$ 70,000.00
	Intersection and Underpass Lighting	lump sum			\$ 25,000.00
	Roadway Subtotal				\$ 2,634,869.34
Bridges					
	NM 22 over SP 88				
	Remove existing box	lump sum	1	\$ 150,000.00	\$ 150,000.00
	New Bridge				
	L		60		
	W		58		
	A	sq. ft.	3480	\$ 250.00	\$ 870,000.00
	NM 22 over NMRX				
	Remove existing bridge	lump sum	1	\$ 250,000.00	\$ 250,000.00
	New Bridge				
	L		160		

Item	Description	Unit	Quantity	Unit Cost	Amount
	W		70		
	A	sq. ft.	11200	\$ 250.00	\$ 2,800,000.00
	Bridge Subtotal				\$ 4,070,000.00
Drainage					
	48" Culvert	ft.	585	\$ 200.00	\$ 117,000.00
	48" End Section	each	12	\$ 2,200.00	\$ 26,400.00
	Energy Dissipator				
	Concrete	cu. yds.	53	\$ 650.00	\$ 34,450.00
	Rebar	lbs.	18000	\$ 1.50	\$ 27,000.00
	Riprap Class A	cu. yds.	30	\$ 250.00	\$ 7,500.00
	Drainage Subtotal				\$ 212,350.00
	Roadway, Bridge, and Drainage Subtotal				\$ 6,917,219.34
Construction Items					
	Traffic Control Management	lump sum	3.0%		\$ 208,000.00
	Public Awareness	lump sum			\$ 10,000.00
	Mobilization	lump sum	10.0%		\$ 700,000.00
	Field Office and Laboratory	lump sum			\$ 125,000.00
	Traffic Control Devices for Construction	lump sum	3.0%		\$ 208,000.00
	Construction Staking	lump sum	2.0%		\$ 139,000.00
	Construction Items Subtotal				\$ 1,390,000.00
	Subtotal				\$ 8,307,219.34
	Contingencies		30%		\$ 2,492,165.80
	Construction Management		12%		\$ 996,866.32
	Subtotal				\$ 11,796,251.46
	NMGRT (%)		8%		\$ 943,700.12
	Alternative 4 Total				\$ 12,739,951.57