

NM 109, Jarales Road Grade Separation

Combined Phase I-A/B

Detailed Evaluation of Alternatives

FINAL

April, 2020

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BNSF Railway Inc.



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NM 109, Jarales Road Grade Separation

PHASE I – A/B COMBINED DETAILED EVALUATION OF ALTERNATIVES

April 2020

Prepared for:

BNSF Railway Inc.




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April 28, 2020
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Executive Summary

Project Background and Limits

A Combined Phase I-A/B Detailed Evaluation of Alternatives for the development of a grade separated intersection to replace the existing at-grade rail crossing of NM 109 and the BNSF Railway's tracks at the east end of BNSF Railway's Belen Yard has been developed and is summarized herein.

Project Purpose and Need

The purpose of the project is:

- To provide a safe, uninterrupted route for pedestrian, bicycle, and vehicular traffic across the railroad corridor that accommodates current and future rail operations.

The project is needed to address several critical conditions identified for the current at-grade crossings. These conditions include physical deficiencies, safety, travel congestion, and system connectivity.

These needs are addressed with the introduction of a grade-separated intersection.

Alternatives Evaluated

Seven alternatives were identified for evaluation, six considered a grade-separation incorporating an overhead bridge structure while the seventh represented the no-build option. All of the grade separation alternatives utilized a common cross-section and design speed. The primary element defining the differences between the various alternatives was the alignment considered.

The following alternatives were evaluated:

- A. 70 ft. west of in-place NM 109. The 70 ft. alignment offset was selected to minimize NM 109 traffic disruptions during construction. This alternative was screened out during the Phase I A evaluation of alternatives as it requires relocation of in-place overhead power lines located along the west side of NM 109, requires a and moderate number of property relocations, and offers not advantages over Alternative C.
- B. In-line with in-place NM 109. In-line construction was considered for evaluation to minimize adjacent property impacts. However, since access to a large number of adjacent properties is provided directly off NM 109, introduction of the grade separation eliminates entrances resulting in a high number of property relocations. Furthermore, the in-line alignment requires closure of NM 109 for the duration of the construction process. As such, this alternative was also screened out of the process during the Phase I A evaluation.
- C. 70 ft. east of in-place NM 109. Similar to Alternative A, the 70 ft. alignment offset was selected to minimize NM 109 traffic disruptions during construction. The alignment does not engage the overhead power lines located along the west side of NM 109.
- D. 750 ft. west of in-place NM 109. The alignment offset was selected to reduce residential property impacts required for the new grade separation. Although the resulting geometry does result in the fewest number of property relocations, the configuration requires the largest and most complex bridge structure and has the largest impact to current railroad operations.
- E. 500 ft. east of in-place NM 109. This alternative follows the in-place Trujillo Road alignment to the greatest extent possible. Although traffic disruptions on NM 109 are minimized with this approach, the impact to Trujillo Road are considerable. Alternative E also has the highest anticipated construction cost of those considered.

- F. 600 ft. west of in-place NM 109 on extended realignment. Alternative F mimics Alternative D but places the northern terminus of the project much further from the in-place at-grade crossing. This alternative was suggested for consideration by the local community at the public open house meeting. Alternative F was screened out during the Phase I A evaluation of alternatives due to its large right-of-way requirement, and impacts to future railroad operations. Furthermore, the alternative offers no advantages in terms of impacts to residences or relocations when compared to Alternative D.
- G. No build

Underpass bridge configurations (railroad over NM 109) were not considered as feasible given the high water table at the project site and the need to maintain rail service through the corridor during construction.

Alternative Evaluation and Ranking

The following criteria were used for evaluation of the alternatives:

- Responsiveness to the Purpose and Need
- Structure Maintenance and Inspection
- Right-of-way Feasibility
- Structure Impacts
- Utility Impacts
- Drainage Impacts
- Impacts to NM 109 and Other Local Roads
- Impacts to the Environment and Community
- Access Impacts
- Impacts to Rail Service
- Public Input
- Construction Cost

Ranking of the alternatives according to these metrics was conducted in a two phase process according to the 2015 NMDOT Location Studies procedures. The initial ranking and subsequent screening utilized a primarily qualitative analysis to identify those alternatives that were either not feasible or less desirable than others. This exercise eliminated Alternates A, B, and F from consideration. Alternatives C, D, E and G were progressed for detailed engineering and environmental evaluation considering both qualitative and quantitative metrics. The final ranking determined according to this process was summarized in the refined evaluation matrix identify and identifies the preferred alternative.

Preferred Alternative

The Preferred Alternative for the NM 109, Jarales Road Grade Separation project is Alternative C. This alternative meets the Project's Purpose and Need and provides the best solution when assessed according to the evaluation metrics considered. Specifically, Alternative C limits the utility, drainage, right of way, and railroad impacts required for the project. Although this alternate requires a greater number of property relocations compared to Alternates D and E, it has received the highest number of supporting comments from the public. The anticipated construction cost is estimated at \$27M.

Agency Coordination and Public Involvement

During the preparation of the Phase IA/B Report, a study team consisting of the BNSF Railway, NMDOT staff, and consultants TKDA, P3planning, and Ecosphere Environmental Services, Inc. met periodically and held regular

conference calls to discuss and coordinate on the progress of the project. A Context Sensitive Public Involvement Plan (CSPIP) was prepared for the project to establish the project context and identify major issues; to identify stakeholders, methods to inform and involve them, and approaches to resolve issues and conflicts that may arise; and to develop an appropriate decision-making process. During the Phase I A /B analysis process, one public information meeting was held on June 11, 2019 to present information and gather public input on the project. In addition to the general public, local elected officials, agency representatives, and other community organizations were invited to attend, and many participated in the meeting. Approximately 100 individuals attended the meeting and provided input on a range of topics including support for the project, concerns about existing railroad-related delays, preference or opposition to certain alignment alternatives, specific design questions, and other topics. The study team provided verbal responses to comments during the meeting and accommodated follow-up requests for additional information.

Environmental Investigations and Recommendations

Existing environmental conditions were documented in the initial evaluation of alternatives and overall potential environmental impacts were assessed for each of the alternatives considered in the refined analysis. Analysis of potential environmental impacts primarily considered factors such as residential relocations, changes in access and property utilization, increased noise, visual impacts, and cultural resources. Because of the developed condition of the project area, natural resource impacts are anticipated to be relatively minor for all the alternatives. None of the alternatives are expected to affect threatened or endangered species, critical habitat, wetlands, or riparian areas, although all would require removing trees and vegetation that potentially provide nesting sites for migratory birds. All the alternatives cross irrigation ditches, but irrigation flows, operation of the ditches, and access would be accommodated. All of the alternatives could require de-watering of groundwater during construction, which would be regulated under the National Pollutant Discharge Elimination (NPDES) program of the Clean Water Act (CWA). Cultural resource issues include potential impacts to the setting and feeling of historic properties such as portion of the Camino Real, the Sanchez Drain, Arroyos Ditch, Waste Ditch, and the Belen Cutoff of the AT&SF Railway.

Next Phase

Following the NMDOT Location Study procedures, the next phases of the project are:

- Phase I-C, environmental
- Phase I-D, preliminary design and engineering

I. Introduction and Project Background

The following document consists of an initial and detailed evaluation of alternative concepts for the construction of a grade separation for New Mexico State Highway 109 (NM 109, Jarales Road) and the BNSF Railway's (BNSF) existing and proposed future tracks between the Cities of Belen and Jarales New Mexico. This evaluation, and conclusion with a preferred alternative, have been progressed based upon meetings and coordination with the New Mexico Department of Transportation (NMDOT) and BNSF during the development of alternatives. Based on public safety concerns for access and emergency service response times, closing the crossing indefinitely was determined to be infeasible. Six alternative configurations for a roadway/rail grade separation structure were initially proposed and evaluated as part of the preliminary screening of alternatives. Determinations were made for three of the alternatives to be carried forward for detailed analysis according to the Phase I A/B process. This Detailed Evaluation of Alternatives documents the in-depth studies of the three alignment alternatives, and corresponding structure requirements, considered for implementation of the grade separation. Evaluation of a No-Build alternative is also considered in this analysis. Descriptions and discussion of the three alternatives that were not progressed to detailed evaluation are also provided.

Project Setting

Located at the east end of BNSF Railway's Belen Yard, NM 109 currently crosses three BNSF tracks as an undivided at-grade signalized crossing. The BNSF intends to construct six additional tracks with an allowance for two future tracks through the corridor to add capacity for railway's yard operations. Due to concerns for public safety regarding increased vehicular and rail traffic volumes, public access, and emergency service response times, the BNSF and NMDOT have agreed that a grade separated crossing is required.

Project Scope and Objective

The project scope entails development of a combined Phase I A/B Detailed Evaluation of Alternatives report according to the 2015 edition of the NMDOT Location Study Procedures for a new grade separation of NM 109 and the BNSF tracks in Belen, New Mexico.

The Project's objective is identification of a preferred alternative for advancement to Phase I C.

Project Team

The Phase I A/B alignment study was developed by the following project team:

- BNSF
- NMDOT
- TKDA
- P3planning
- Ecosphere Environmental Services, Inc.



Figure 1.1-1 Location Map

Study Process

The alignment study was prepared following the 2015 edition of the NMDOT Location Study Procedures. The Location Study Procedures outlines a structured process for the preparation of alignment and corridor studies. Alignment studies typically include three distinct phases; A, B, and C. The first two phases serve to develop, evaluate, and refine the range of possible alternatives to achieve the need for the proposed action. The third phase involves the preparation of an environmental document and subsequent processing for the selected alternative in accordance with the National Environmental Policy Act of 1969 (NEPA), Section 106 of the National Historic Preservation Act of 1966 (NHPA), and other federal and state regulations.

The Initial Evaluation of Alternative phase is used to identify alternatives that best address needed operational and safety improvements for the existing corridor, and to determine the general alignment location for the proposed project. Alternatives are developed to address project needs, while avoiding or minimizing environmental and community impacts and addressing the issues identified by the major stakeholders.

For this project, the project limits include a relatively short segment of NM 109 (approximately 1.1 miles) to evaluate and consider improvement alternatives that focus on implementation of a grade separation. Therefore, there is no need to consider other locations for the rail crossing other than those represented by the alignment alternatives described herein (as opposed to location alternatives on a broader scale). Therefore, a true Phase I A Location Study is unnecessary and the following analysis has been developed as a combined Phase I A/B Alignment study.

Various alternatives have been proposed and initially considered as part of an Initial Evaluation of Alternatives process including several options to realign both on the existing corridor, as well as to the east and west. Seven alternatives were originally considered, including a no-build option. The seven alignments are:

- Alignment A – shift approximately 70 feet (ft.) west. Allows the new grade separation to be built totally off-line while utilizing the existing crossing to maintain traffic during construction.
- Alignment B – rebuild on existing alignment. Requires full closure and detour of NM 109 during construction.
- Alignment C – shift approximately 70 ft. east. Allows the new grade separation to be built totally off-line while utilizing the existing crossing to maintain traffic during construction.
- Alignment D – shift approximately 750 ft. west. Allows the new grade separation to be built totally off-line while utilizing the existing crossing to maintain traffic during construction. Intended to reduce residential property impacts.
- Alignment E – shift approximately 500 ft. east. Allows the new grade separation to be built totally off-line while utilizing the existing crossing to maintain traffic during construction. Intended to reduce residential property impacts.
- Alignment F – shift approximately 600 ft. west and extended through BNSF property. Allows the new grade separation to be built totally off-line while utilizing the existing crossing to maintain traffic during construction. Intended to further reduce residential property impacts.
- Alignment G – No Build Option

The initial five build alignments (A-E) and the no-build alignment were presented during a public open house meeting held on June 11, 2019. Alignment F was developed following the meeting based on input received from the local community.

The initial screening of alternatives using qualitative metrics eliminated Alternates A, B and F as viable options. Alternate A was removed because of negative public support, impacts to in-place overhead power, and moderate number of property relocations. In addition, Alternate A offers no advantages over Alternate C. Alternative B was

not recommended for further evaluation because it required NM 109 to be closed during construction and generated the maximum number of property relocations. Alternative F was not recommended for further evaluation because of the large amount of right-of-way acquisition and corresponding impacts to future BNSF operations and considerable length compared to other Alternatives. Furthermore, Alternate F offers no advantages over Alternate D in terms of impacts to residences and relocations.

The Detailed Evaluation of Alternatives process described herein will further develop and evaluate the alternatives advanced from the Initial Evaluation of Alternatives and will provide for a detailed assessment of the engineering and environmental factors associated with those alternatives.

Phase I C, the Environmental Documentation phase, will involve preparation of the environmental documentation and the subsequent processing for the selected alternative. The successful completion of the Alignment Study process will allow for the selected alternative to be advanced to the Preliminary Design phase.

Planning Period

Development of the Phase I A/B evaluation by the project team began in the summer of 2018 with completion scheduled for May 2020. Subsequent planning and development will occur on a schedule that places the new grade separation in service by the fall of 2021.

II. Public Involvement and Agency Coordination

Public involvement and agency coordination are important elements of the Phase I A/B analysis for gathering feedback and input during the study process. Community and agency representatives, members of the public, affected stakeholders, and study team members all play an important role in communicating information and issues about the study. The goal of this process is to produce transportation projects that fit the context of a community and respond to the needs of the public who use this transportation resource.

Public Involvement and Context Sensitive Solutions Plan

A Context Sensitive Public Involvement Plan (CSPIP) was prepared for the project. The CSPIP combines the public involvement and context sensitive solutions plan mandated by the NMDOT and Federal Highway Administration (FHWA). Public involvement and consideration of the project setting and context are fundamental components of the Location Study Procedures—the policy document followed by the NMDOT to comply with federal transportation planning rules and regulations and the NEPA process (NMDOT 2015). The goals of the CSPIP for the project are as follows:

1. To establish the project context and identify major issues
2. To identify the project stakeholders, the methods to inform and involve them, and the approaches to resolve issues, concerns, and conflicts that may arise
3. To develop a decision-making process that is sensitive to the project context, involves stakeholders in a meaningful way, and leads to the development of a preferred alternative that is consistent with the transportation, environmental, cultural, community, land use, and economic contexts of the project area

Specific methods, such as public and individual meetings, are identified in the CSPIP to inform and involve stakeholders, gather input, and identify and resolve issues or concerns that may arise during the study process. The CSPIP is a dynamic document evolves as the project progresses; it is expected that new issues will be identified as stakeholders become involved in the process. Methods to involve stakeholders may change to maximize outreach and provide the best opportunities for input.

Stakeholders for this project were generally divided into three categories: (1) those directly affected by the project, (2) those indirectly affected by the project, and (3) agencies with jurisdictional authority over the infrastructure or land use within the project area. The stakeholder groups are identified below:

1. Directly Impacted Stakeholders
 - Those with properties located directly adjacent to any of the project alternatives
 - Owners of adjoining properties that may be affected by the project through changes in access and the visual or auditory environment, or other factors
 - Those who frequently travel through the project area, including bicyclists and pedestrians
 - Residents of Jarales, Belen, and other local communities
 - Commuters (local, metro, regional)
 - Goods transporters, including truck drivers from the local diaries
 - Belen School District (school bus operators)
 - Police, fire, and emergency services providers
 - BNSF Railway

- Utilities in the project corridor
- Jarales Community Center users

2. Indirectly Impacted Stakeholders

- Chamber of Commerce
- Local citizens' groups
- Elected officials
- Community groups/neighborhood associations

3. Government Agencies

- City of Belen
- Middle Rio Grande Conservancy District (MRGCD)
- Mid-Region Council of Governments (MRCOG)
- New Mexico Office of Cultural Affairs, State Historic Preservation Officer and Historic Preservation Division
- New Mexico Department of Game and Fish
- NMDOT
- New Mexico Environment Department
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service (USFWS)
- Valencia County

Public Involvement and CSPIP Events Completed

During the Phase I A/B analysis process, one public information meeting was held. The meeting occurred during development of the Phase I A analysis to present information and gather public input on the project.

Public Involvement Meeting—June 11, 2019

The first public involvement meeting for the project was held Tuesday, June 11, 2019, from 6:00 to 8:00 PM, at Gil Sanchez Elementary School, 376 Jarales Road/NM 109, in Jarales, New Mexico. The meeting was advertised in the Albuquerque *Journal* on May 26, 2019 and the Valencia County *News-Bulletin* on May 30, 2019. Flyers announcing the meeting were posted at the Jarales and Bosque post offices and at the Jarales Community Center. In addition, approximately 130 notices were mailed to property owners, institutions, businesses, elected officials, agency representatives, and other stakeholders in the project area. The objectives of the meeting were:

- To introduce the project and the study team
- To present work-to-date on various potential design alternatives to the community
- To invite comments regarding the key transportation, safety, and other related issues for the study team to consider during the study

The study team attending the meeting included representatives from NMDOT, BNSF, TKDA, P3planning, and Ecosphere. Approximately 100 members of the public attended the meeting, which began at 6:00 PM. Sign-in sheets from the public meeting are included in Appendix F.

Initially, attendees were given an opportunity to review display boards and discuss the project informally with study team members. At 6:15, a formal presentation was given with PowerPoint slides, including an introduction to the study team, description of the organization and agenda for the meeting, and overview of the project concepts, purpose and need, agency roles, anticipated stakeholders, and issues that have been identified to date. The NMDOT's location study procedures and environmental compliance process were summarized, and the preliminary project alternatives were described. The strengths and weaknesses of each alternative were discussed in terms of preliminary evaluation criteria that include safety, cost, structure impacts, right-of-way needs, NM 109 closure requirements, local road impacts, environmental impacts, railroad constraints, effects on maintenance and operations, utility impacts, schedule, and public support.

At 7:00 PM, the meeting was opened to public comment. Thirteen verbal comments were received at the meeting and an additional 13 written or email comments were received following the meeting. The comments are summarized by topic below, and the full meeting minutes are included in Appendix F.

Clarification of Project Design Concepts or Alternatives

- With seven tracks going east, how will the rail line cross the river?
- How many structures are impacted by Alternative D?
- I understand BNSF has plans to expand their tracks. The information provided does not cover the expansion of the tracks nor the location. I was told the expansion will be 4 additional tracks north of the main line. North from what point, the River or Jarales Road, the bend to Jarales Road? There could be several locations along the tracks between the Rio Grande River Bridge and the Jarales Road crossover. Can you tell me the location of this expansion?

New Alternative that Extends North of Alternative D

- The team should consider a new alternative that extends Alternative D onto BNSF property and intersects NM 109 further north. This would avoid impacts to residences on NM 109.
- The option to the north seems better. Although it's longer, there are fewer impacts.
- The north alignment seems to be best, with the least impacts.
- Option D as amended by persons at the meeting to use BNSF property looks good.

Support for the Project

- I live here in Jarales. We have had meetings for the past 2½ or 3 years in support of this project and it is moving forward because of a collaborative process between elected officials, community members, and the railroad. The BNSF provides 500 jobs to the community and is our friend. This is a needed project. We have a petition with 3,000 signatures supporting the project.
- I'm a city councilor in Belen. This is a needed project to accommodate safety, emergency vehicles, and school buses. Look at the Aragon Road project. Someone may be impacted by the project, but safety and progress need to go forward. Let's get going with the project.
- Community concerns made this project happen and we appreciate the progress. Trust is an issue. This project became the County's number one priority, but money is an issue. Even with all the work, the money may not show up. This meeting is a positive step.
- The no-build option is not an option.
- The no-build option is not an option. A bridge of some sort must be built.
- The bridge is long overdue for community safety and noise reduction.

Trains Blocking Existing Roadway

- I understand that trains are currently 2-miles long and some may be 3-miles long in the future. I've had to wait for very long trains to pass. Has the existing fueling facility become obsolete?
- Do the railroad's needs or community's needs come first? My mother had a heart attack and the emergency vehicles were delay by trains stopped on the track. We live in an area that is surrounded by pipelines and the tracks. We are trapped if there is a fire. We should not lose any lives. What are you going to do for our safety?
- Trains on the tracks have blocked my access to irrigation gates in the past. The project would be a good thing to eliminate these kinds of delays.
- The trains that block the tracks are often not responsive to the needs of crossing motorists.
- The existing rail line crossing has negatively impacted my family several times as it is. My wife's mother may have died because the ambulance was not able to get to her in time to get her to the hospital and save her life.
- Safety is an important concern for this project, for ambulances, etc. It's a hassle to go all the way around and takes 45 minutes.
- Because of increased length in the trains over the years, the wait for trains crossing right now is extremely long as it is, and this project will only make those waits even longer also delaying farm and emergency traffic. Years ago, the railroad used to provide a person to cut / break the train to allow passage. I suggest that this is a solution if the trains are going to block the path for any longer than a standard wait which I believe is 15 minutes. The wait is not realistic now and a break is maybe more practical. The break of trains would help during the project and even now in the other crossing at Castiillo Road.

Environmental Concerns

- Past fuel spills have contaminated the environment and the water tastes bad.
- Historically, there have been fuel spills from accidents in the area. Impacts that affect me include piles of dirt on my property and dust from the fueling yard. According to the Environmental Protection Agency, there are contamination plumes in the area's soil and/or groundwater. Do you intend to do anything about the dust as part of this project, for example put down asphalt on the unpaved areas causing the dust?
- I'm concerned about noise and diesel fuel spills.

Changes In the Community

- It's important to follow the money. Once the project is done, the NMDOT is responsible for paying maintenance costs forever. This project benefits the railroad. This is a low-income, minority area. We will pay the maintenance costs through our taxes.
- I have a lot of family here. I'm concerned that the land inside the tear-shaped track will become a new rail yard, which will impact our adobe culture. I'm not against progress but it has to be sensitive to the community

Timing of Construction

- What is the time frame to start construction? How long will construction last?
- What can be done to expedite this process and accelerate the construction process? It seems that Valencia County, Belen City, and NM State are eager to move forward with this project, what are the current obstacles that need to be addressed in order to move this forward expeditiously?

Right-of-Way and Relocation Concerns

- How will home/land value be determined?
- Does BNSF have eminent domain pertaining to Jarales RR Bridge?
- Do home/land owners have leverage in bridge options and concessions on land?

Additional Meetings

- May I suggest that you schedule a meeting with only the home/land owners directly affected, without professional lobbyists and politicians. Local voices, with the red x through their homes, need to be heard. Maybe a certified letter would be appropriate.

Access to Property

- We are concerned about viable access for oversized agricultural equipment for farming our property. Please provide a map, or source of the map, concerning the upcoming project that illustrates the irrigation facilities within the proposed work area.
- Please consider in your design for the project, the least loss of agricultural property and safety concerns during the project as to emergency vehicles such as ambulances and fire rescue departments. The other concern during construction and completed project is to consider that farmers have to travel through to farm and harvest crops. Most equipment today is going to need at least 18 ft. width to do so during the project and once it's complete. Perhaps a road on the side of the project can be provided once the easements have been identified to allow farm equipment and emergency vehicles to pass.

Preference/Opposition for Alternatives

- Of the five plans discussed at the recent meeting, my family prefers Alternative A or B. On behalf of my family, we strongly oppose Alternative E. Alternative E would take the road directly through the property that has been the homelands of my family for no less than six generations. The map does not even recognize it as a taking, as indicated by no "x" on the map just to the north of the bridge and where the yellow and blue roadway indicators indicate the road will be repositioned pursuant to that Alternative. Also, since we have not been informed of any specific plans for the rail line expansion or the rail yard expansion, we are proceeding with our land management as though those plans do not affect us. If the BNSF plans to expand into our lands or nearer our lands I would hope you would include interested landowners in the planning process.

I currently live on the east side of Jarales Road. My neighbors and I have been speaking, and we are in consensus that a bridge through the east side of Jarales Road would be a good thing. We are all willing to sell for a fair replacement costs for our homes. I'm talking about the homes on the south side of the tracks all the way to 529 Jarales Road.

I am only telling you this because we feel you should have all the facts. Of course, I cannot speak for my neighbors on the west side of Jarales road. But from previous conversations with some of them, they do not wish to leave the land that has been in their families for over a hundred years. They are proud farmers and good people.

Plan C is the best plan for the Jarales Bridge.

I was reviewing the different plans for the Jarales Bridge and I would like to suggest that Plan "C" would benefit the people of Jarales. It's the only one that would help with all emergency situations and help the families of Jarales!

Helloplan C is the better plan for the Jarales Bridge.

Meeting Notification

- Why wasn't the Middle Rio Grande Conservancy District included in the list of agency stakeholders?
- We are concerned that the first notice we received was through the newspaper, rather than by mail. Please send all correspondence to me at my home address.

Access to the Presentation

- I would like to have access to the meeting presentation.
- Is this information available on a website? If not, when do you think it will be?
- Please send project maps.
- Would like copies of projected maps.
- Please send pdf of presentation.
- Communication for post meeting follow up has been very positive. Mr. Tom Brunton requested providing additional comment and I am providing him with your contact information for that purpose. I did explain that on an informal basis while you are in the process of completing your reports that you encourage those comments. Tom also requested that if at all possible could a copy of the enlarged planned options displayed at the meeting be made available for posting at our local Community Center in Jarales. If that is available please let us know and we will make arrangements to pick them up. I think that to be an extremely positive manner of maintaining community based engagement.

Responses to Public Involvement

The study team provided verbal responses to comments during the public meeting. Requests for hard copies or digital versions of project maps or materials were accommodated and provided to the relevant members of the public by the study team. One individual asked the study team to evaluate another alternative that would be located farther to the northwest than the build alternatives (Alternatives A-E) presented at the public meeting. In response to this comment, the study team developed the Alternative F, which is analyzed herein. Further comments from the public were also incorporated into the analysis of this Phase I A/B report.

III. Existing Conditions

Roadway and Rail Crossing

Existing NM 109 is an undivided, two-lane, major collector that runs north/south from Jarales to the City of Belen. It is the primary connection between the two communities. Intersecting roads include Castillo Road, Serafin Road, and local streets. There are two undivided, at-grade signalized rail crossings. One consists of three railroad tracks and is 0.8 miles north of Castillo Road. The other consists of one railroad track and is 0.6 miles south of Serafin Road. The land use is residential and agricultural. Access to properties adjacent to the corridor is provided off NM 109. The posted speed limit is 40 miles per hour (MPH). Reference Figure 3.1-1 for a location map,

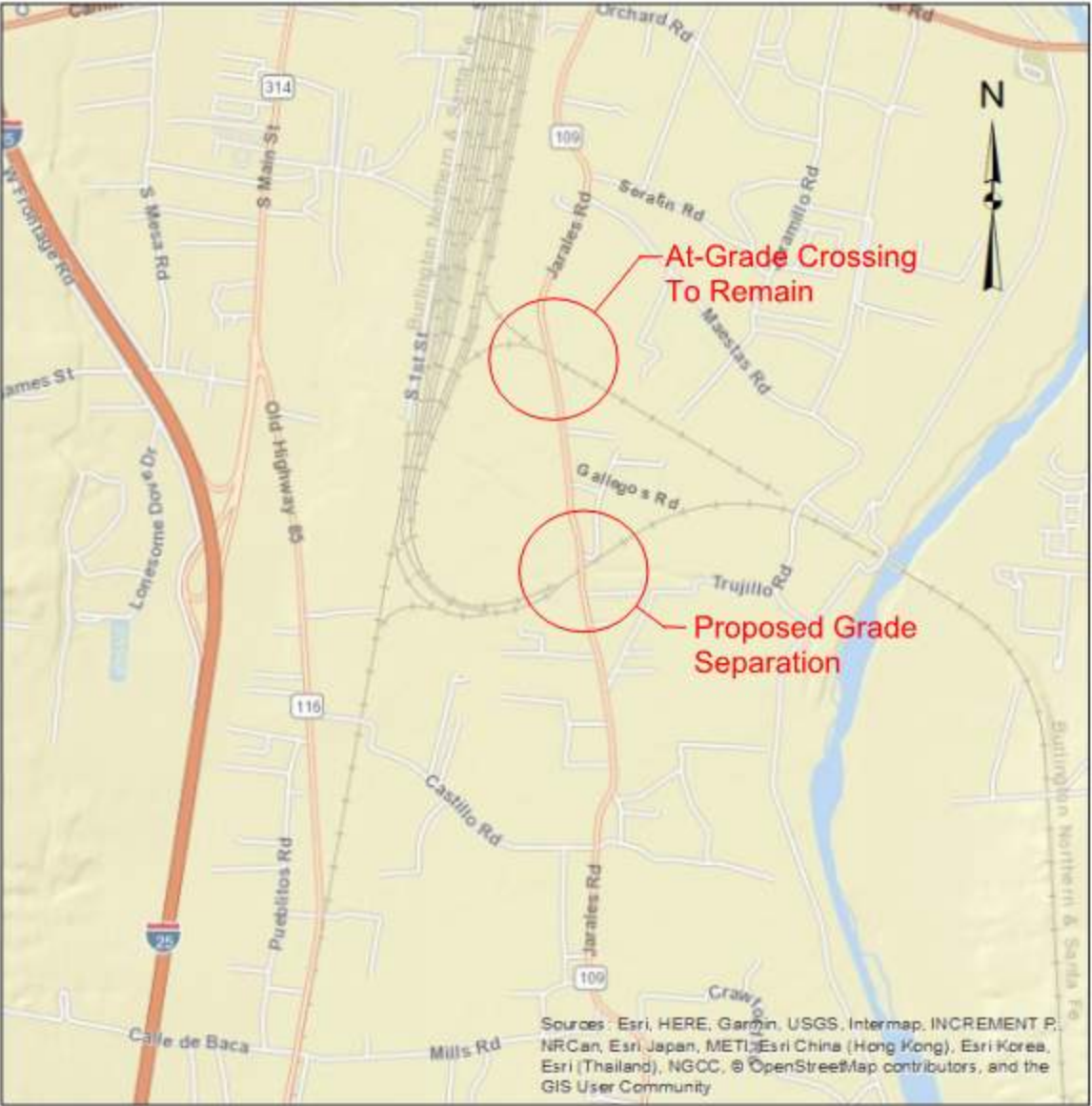


Figure 3.1-1 Location Map

Roadway Geometry

Horizontal Geometry

The existing horizontal alignment consists of a winding roadway alignment. A topographic survey was used to recreate an approximate existing roadway centerline. Between Castillo Road and Serafin Road, there are 11 horizontal curves. These curves meet American Association of State Highway and Transportation Officials (AASHTO) horizontal curve criteria for a 40 MPH facility. Several of the curves are configured as reverse curves. In this configuration, there is a minimum horizontal tangent between curves to allow for superelevation to transition. Several locations do not meet this minimum tangent distance.

Vertical Geometry

The existing vertical geometry is level except for vertical grade raises at both at-grade rail crossings. The topography survey was used to recreate an approximate existing roadway profile. The maximum grade of the roadway is 4.5%, which meets AASHTO criteria.

Refer to Table 3.1-1 for a summary of existing and minimum/desirable design roadway geometry.

Table 3.1-1 Existing and Minimum/Desirable Design Roadway Geometry

Roadway Element	Existing Condition	Minimum/Desirable Design Criteria (Proposed Roadway)
Design Speed	40 MPH	40 MPH
Posted Speed	40 MPH	40 MPH
Stopping Sight Distance		305 ft.
Minimum Horizontal Curve Radius	550 ft.	485 ft.
Maximum Grade	4.5%	5.0%
Maximum Superelevation Rate	6.0%	6.0%

Typical Sections

The existing roadway typical section consists of two 11 ft. travel lanes with 1-2 ft. shoulders. The existing cross slopes vary from 1.5% to 3.5% across both travel lanes. Figure 3.1-2 depicts the existing typical section. Table 3.1-2 refers to existing typical section and minimum/desirable design conditions.

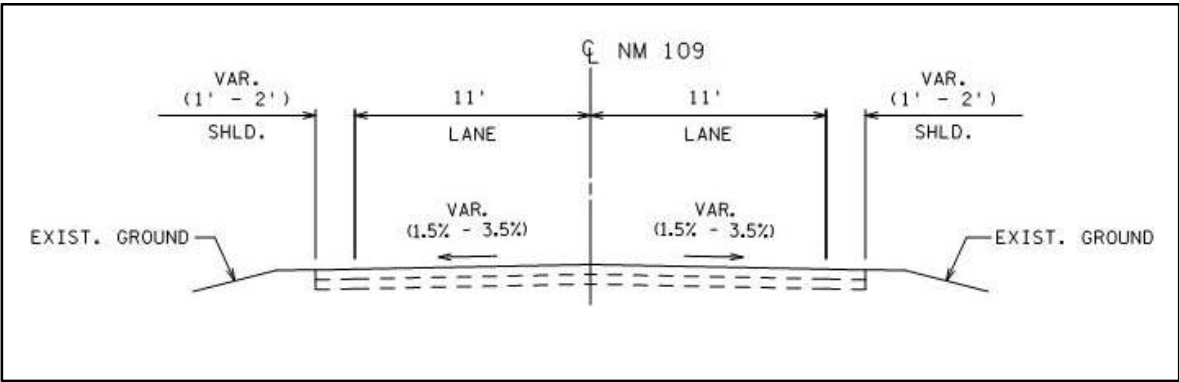


Figure 3.1-2 Existing Typical Section

Table 3.1-2 Existing and Minimum/Desirable Design Cross Section Criteria

Roadway Element	Existing Condition	Minimum/Desirable Design Criteria (Proposed Roadway)
Lane Width	11 ft.	12 ft.
Shoulder Width	1 ft. - 2 ft.	5 ft.
Cross Slope	Variable (1.5% - 3.5%)	2.0%

Pavement Condition

Existing pavements exhibit longitudinal and transverse cracking, weathering, raveling, and oxidation.

Pedestrian and Multimodal

The existing narrow shoulders on NM 109 do not provide adequate space for pedestrians and multimodal transportation. AASHTO recommends a 4 ft. minimum shoulder width.

Traffic

Traffic and Train Counts

Existing traffic volume counts were taken on site in January 2020, over a 2-day period beginning Tuesday, January 14, 2020. During that period, traffic volumes on NM 109 and on Trujillo Road in both directions were counted independently using tube type vehicle counters located north and east of the intersection of NM 109 at Trujillo Road. Trujillo Road was included as it represents the crossroad located within the end limits of studied alternatives with the highest traffic volume. Data collected at the two tube count locations included volume, speed, and FHWA vehicle classification.

Video cameras were used to capture pedestrian, bicycle, car, and truck turning movement volumes at the intersection of NM 109 at Trujillo Road. The counts were collected from 6:00 AM to 6:00 PM on Tuesday, January 14, 2020. One northbound bicycle and one southbound bicycle entered the intersection during the 12-hour count. No pedestrians entered the intersection.

The reports generated from the counting effort are included in Appendix D. The existing Average Daily Traffic (ADT) volume on NM 109 based on the counts is 860 vehicles per day (vpd). The associated morning AM peak traffic volume is 85 vehicles per hour (vph). The afternoon PM peak traffic volume is 93 vph. On Trujillo Road, the ADT based on counts is 110 vpd, with 13 vph during the AM peak hour and 22 vph during the PM peak hour. Existing train counts average 90 trains per day per BNSF provided information.

Since traffic counts for one average day do not represent the average annual daily traffic (AADT) volume on a roadway segment, data was obtained from the NMDOT Traffic Monitoring Division. Reported data indicates 2018 AADT on NM 109 in the project vicinity is 1708 vehicles per day (vpd). 10 year forecast AADT is 1963 vpd. Straight line interpolation results in a 2020 existing year AADT of 1759 vpd. Heavy commercial truck volume is 6%, resulting in 105 trucks per day in 2020.

Vehicle Classification Traffic data collected in January included categorization of traffic according to the FHWA classification categories. These classifications are based on the overall vehicle size, weights and intended purposes. It is important to acknowledge the limitations of the tube counter based classification. The limitations include limited lane coverage and understanding the tube can be displaced or dislodged. However, as used under the

project site conditions, it provides some insight to the type of traffic which can be expected on NM 109 at this location.

Classification categories 1, 2 and 3, which include motorcycles, cars and pickup trucks, make up the highest percentage of road users at 95%, which is consistent with the rural residential and agricultural nature of the land along NM 109 in and near the project study area. The combined total of 2-axle and 3-axle, Single Unit Truck vehicles represents 3.6% of the total vehicles. The combined total of 4, 5, and 6 axle trucks represents 1.4% of the total vehicles. Since classification counts for one average day do not represent the average annual percentage of daily truck volume, data was obtained from the NMDOT Traffic Monitoring Division. Reported truck percentage on NM 109 in the project area is 6%.

For Trujillo Road, classification categories 1, 2, and 3 represent 99% of the total vehicles. Category 5, 2-axle single unit trucks, represents 1% of total vehicles.

A brief description of the common vehicle classes is included below. The full listing of the classifications and descriptions is included in Appendix D.

- Class 1: Motorcycles
- Class 2: Passenger cars, includes all cars, cars with one or two-axle trailers.
- Class 3: Other two-axle, 4-tire single unit vehicles, includes pick-up trucks and vans with or without one or two-axle trailers.
- Class 5: Two-axle, six-tire single-unit trucks.

Existing Road/Rail Traffic Conditions

NM 109 is currently classified as a Major Collector on NMDOT’s FHWA Approved Functional Classification Map (NMDOT 2015) and MRCOG’s Future 2040 Metropolitan Transportation Plan (MTP) Long Range Roadway System Map (MRCOG 2015). The roadway is designated as an Existing Bicycle Route on the MTP 2040 Long Range Bicycle System Map (MRCOG 2015). The distance between the grade crossing signals for the three-existing railroad tracks is approximately 110 ft.

When trains cross NM 109, existing delays may be substantial. Current train lengths are approximately 10,000 ft. If BNSF operations staff are aware that the crossing will be occupied for an extended period of time they contact Valencia County emergency dispatch; however, interference with local traffic and emergency services have been a cause of community concern in the past.

During traffic counts conducted on Tuesday and Wednesday, January 14 and 15, 2020, northbound traffic was delayed when a train was stopped and blocked the railroad crossing. For the brief period during the counts, some of the northbound traffic was observed to make a u-turn and travel south on NM 109. A local resident commented that trains can block the NM 109 crossing for long periods of time.

Another observation made occurred at the intersection of NM 109 and Trujillo Road. Two school buses use the vacant area between the two Trujillo Road connections to NM 109 as a bus stop. They travel NB on NM 109, then turn right at the north connector and pull off to make pick up/drop off. They then make a u-turn and travel south on NM 109. Two parent vehicles also used the vacant area for parking before and after the school bus stops.

Projected Roadway/Rail Crossing Operations

The BNSF Railway intends to construct six additional tracks with an allowance for two future tracks through the corridor for a potential total of 11 tracks, to add capacity for the fueling facility in the railway’s adjacent Belen Yard.

In addition, the BNSF Railway intends to introduce 16,000 ft. long trains in lieu of the currently used 10,000 ft. long trains. These additional tracks and longer trains would cause additional delay at the NM 109 crossing for private and commercial vehicles, emergency vehicles, bicycles and pedestrians. The current study is intended to directly address these projected operational issues.

Safety

Crash data was made available for this study for the years 2014, 2015, 2016, 2017, and 2018 from the NMDOT Planning and Safety Division. Overall along NM 109 between the south connection with Amigos Loop and Cam De Crystal, a distance of 1.0 mile, there were 6 crashes reported as follows:

1. 2015: Improper turn into fixed object – mailbox – property damage (PD) only.
2. 2015: Vehicle 1 backed from parked position into vehicle 2 – PD only.
3. 2015: Vehicle 1 crashed into vehicle 2 from opposite direction – no driver error entered – PD only.
4. 2016: Vehicle 1 crashed into vehicle 2 same direction – driver inattention – Class C possible injury.
5. 2016: Vehicle 1 crashed into vehicle 2 same direction – no driver error entered – Class C possible injury.
6. 2018: Vehicle 1 crashed into vehicle 2 turning right – excessive speed – Class B visible injury.

Note: Crash number 3 occurred at the second set of railroad tracks. The remaining crashes listed above were not located at the railroad crossing.

Three of the six crashes (numbered 4, 5, and 6 above) occurred on a Sunday morning between 9:30 AM and 12 Noon, with clear weather, no driver impairment and local drivers.

Crash data was also made available for this study from the Federal Railroad Administration (FRA) for U.S. DOT-AAR Grade Crossing ID No. 019342H (NM 109). The data included highway-rail grade crossing accident/incident reports as follows:

1. 2014: Rail equipment struck by highway user – property damage only.
2. 2009: Highway user drove around or thru gate and struck rail equipment – assume Class B visible injury.
3. 2007: Highway user drove around or thru gate and struck rail equipment – assume Class B visible injury.
4. 1987: Highway user drove around or thru gate and was struck by rail equipment – property damage only.
5. 1985: Highway user drove around or thru gate and was struck by rail equipment – assume Class B visible injury.

Note: FRA accident/incident reports indicate injury but not injury type.

Crash rates were analyzed for NM 109 between the south connection with Amigos Loop and Cam De Crystal based on the five years of data provided, plus the one FRA crash reported in 2014 listed above. Traffic volumes are based on AADT provided by the NMDOT Traffic Monitoring Division.

The calculated crash rate is 218 crashes per 100 million vehicle miles traveled. The 2018 State Wide Crash Rate for All Highways is 171 crashes per 100 million vehicle miles traveled. The crash rate indicates a somewhat higher number of crashes occur on this one mile stretch of roadway compared to statewide averages. However, if two marginal property damage only crashes are removed from the calculation (back into parked car, and run into mailbox), the resulting crash rate is only 156 crashes per 100 million vehicle miles traveled which indicates traffic safety does not appear to be an issue of significant concern through the project study area.

Utilities

Both buried and overhead utilities exist along the NM 109 corridor. These utilities frequently cross the roadway to provide service to adjacent properties. If additional right-of-way is required for the reconfiguration of NM 109, it is possible that additional existing utilities and utility owners would be impacted. Utility owner information is summarized in Table 3.1-3.

Table 3.1-3 Existing Utility Owner Information

Utility	Owner
Communication	Comcast
Communication	Centurylink
Electric	Public Service Company of New Mexico
Gas	New Mexico Gas Company

Right-of-Way

Existing right-of-way is variable through the NM 109 corridor and is divided into three sections. Table 3.1-4 summarizes the right-of-way width of these locations. The Valencia County Parcel Map was used as a reference for right-of-way locations.

Table 3.1-4 Right-of-Way Summary

Region	Location	Average Right-of-Way Width
1	Trujillo Rd to the South Rail Crossing	50 ft.
2	South Rail Crossing to Gallegos Rd	30 ft.
3	Gallegos Rd to the North Rail Crossing	50 ft.

Geotechnical

Regional Geology

The project area occupies a portion of the Central Rio Grande Valley. The Rio Grande Valley is a small portion 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 region contains mesas to the west of the project site with north-south normal faults and volcanic deposits. The project area is characterized by flat topography and floodplain deposits. In between the floodplain and mesas, the geology is characterized by Holocene eolian deposits. The main channel of the Rio Grande is about 0.8 miles east of the project site.

Site Geology

Site geologic conditions at the project site are consistent with the regional geology. The surficial geologic formations found at and near the project site are depicted in Figure 3.1-3 and are described as follows:

- **Qfp:** Historic floodplain of the Rio Grande between valley margins and artificial barriers such as levees and irrigation ditches. The soils consist predominantly of sand, silt, and clay with varying amounts of gravel. Up to about 100 ft. in thickness. Interfingers with and is overlain by Qae at valley margins.

- **Qae:** Holocene and Late Pleistocene sandy and pebbly alluvium and local eolian sand sheets in generally low relief aprons and arroyo channels along valley margins. Up to 25 ft. in thickness. Interfingers with and overlies Qfp.

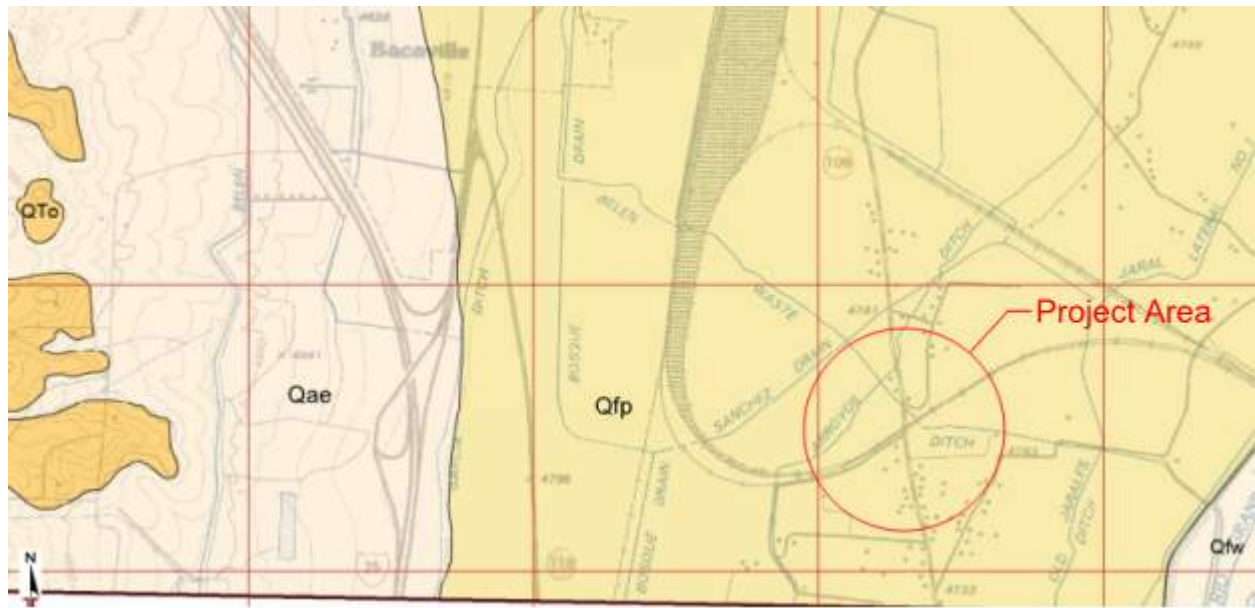


Figure 3.1-3 Geologic Map

Social, Cultural, Environmental Conditions

General Environmental Setting

The project area is located within the Rio Grande Rift physiographic province, in the Albuquerque basin, one of a series of structural basins between Colorado and Texas that arose during the formation of the Rio Grande Rift (Kelley 1952). The proposed project is situated on the historic floodplain in the Middle Rio Grande Valley, roughly 21 miles above the San Acacia constriction (Rawlings 2003). The geology of the project area is dominated by Quaternary age alluvium and Santa Fe group sediments and is correlative to the Los Padillas formation (Rawlings 2003). The Los Padillas formation experienced its last entrenching during the late Pleistocene and was backfilled with alluvium to its current state during the mid-Holocene (Connell, Love, and Dunbar 2007).

The proposed project area includes a 1.1-mile stretch of Jarales Road that services residences, and farms. Irrigation ditches in the project area include the Lower Arroyos Acequia, Belen Waste Ditch, and Sanchez Drain. The elevation in the project area remains relatively static throughout the project area, at approximately 4,800 ft. above mean sea level (amsl).

The area has a semi-arid climate. The summer months (June through August) experience average temperature highs of 92-95 degrees Fahrenheit (F) and average lows of 54-62 degrees F. In the winter months (December through February), average temperature highs are 50-58 degrees F and average lows are 18-23 degrees F. Average yearly precipitation is 7.6 inches, of which 4.8 inches accumulates as snowfall. Almost half of the mean annual precipitation falls during the North American monsoon in the months of July through September (Western Regional Climate Center 2020).

Natural Resources

Geology and Soils

Within the project area, the surface geology is comprised entirely of historic Rio Grande floodplain alluvium consisting of sand, silt, and clay (Rawlings 2003). The project area is comprised of a dynamic mosaic of eleven soil types ranging from 1 to 29 percent of the project area (U. S. Department of Agriculture, Natural Resource Conservation Service 2019). All eleven of the soil types found in the project area are derived from alluvial parent material. At 28.6 percent of the project area, Gila loam, 0 to 1 percent slopes MLRA 42-1 is the most abundant type of soil. At 0.5 percent of the project area, Brazito sandy clay loam with a thick surface is the least abundant soil type. See Table 3.1-5 for a complete list of soils and percent compositions – along with their unique features.

Table 3.1-5. Project Area Soils

Soil Type	% of Project Area	Parent Material	Hydrologic Soil Group	Hydric Soil (Y/N)	Unique Feature
Agua loam	5.3	Mixed alluvium	B	No	Farmland of statewide importance
Belen clay loam	1.9	Clayey alluvium	D	No	Farmland of statewide importance
Belen clay loam, moderately alkali	4.9	Clayey alluvium	B	No	Farmland of statewide importance
Brazito sandy clay loam, thick surface	0.5	Mixed alluvium	C	No	Farmland of statewide importance
Gila loamy fine sand	9.8	Recent alluvium	C	No	Farmland of statewide importance
Gila loam, 0 to 1 percent slopes MLRA 42-1	28.6	Coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	B	No	Farmland of statewide importance
Gila loam, slightly saline	8.7	Recent alluvium	C	No	Farmland of statewide importance
Gila loam, strongly saline and alkali	5.8	Recent alluvium	C	No	Not prime farmland
Vinton loamy fine sand, slightly saline	12.7	Alluvium derived from igneous, metamorphic and sedimentary rock	B	No	Farmland of statewide importance

Soil Type	% of Project Area	Parent Material	Hydrologic Soil Group	Hydric Soil (Y/N)	Unique Feature
Vinton loam	12.4	Alluvium derived from igneous, metamorphic and sedimentary rock	B	No	Farmland of statewide importance
Vinton loam, loamy subsoil variant MLRA 42	9.4	Alluvium derived from igneous, metamorphic and sedimentary rock	C	No	Farmland of statewide importance

Vegetation

The project area is semi-rural, characterized by agricultural fields and housing developments; the historic Rio Grande floodplain is situated between artificial barriers including levees and irrigation ditches. Although the entire project area occupies historic floodplain riparian habitat (Dick-Peddie 1993), it is currently composed of a mosaic of housing developments, agricultural farmland, alkali sinks, and early successional floodplain riparian habitat. Woodland areas are dominated by plains cottonwood (*Populus deltoides*), saltcedar (*Tamarix chinensis*), and Siberian elm (*Ulmus pumila*). Large patches of alkali sinks exist within this recent floodplain riparian area as well.

The New Mexico Department of Agriculture lists certain species as noxious weeds. “Noxious” in this context means plants not native to New Mexico, which are targeted for management and control, and have a negative impact on the economy or environment. Class C listed weeds are common, widespread species that are fairly well established within the state. Class B weeds are considered common, but not widespread within certain regions of the state. Class A weeds have limited distributions within the state. Given the disturbed nature of the project area, particularly along the early successional floodplain riparian areas, it is likely that noxious weeds occur in the project area.

Wildlife

Reptiles that occur regularly in the vicinity of the proposed project include eastern fence lizards (*Sceloporus undulatus*), New Mexico whiptails (*Aspidoscelis neomexicanas*), garter snakes (*Thamnophis* spp.), gopher snakes (also known as bullsnakes; *Pituophis catenifer*), ornate box turtle (*Terrapene ornata*), coachwhip snakes (*Masticophis flagellum*), and western diamondback rattlesnakes (*Crotalus atrox*). Mammals that are likely to occur near the project area include muskrat striped skunk (*Mephitis mephitis*), gray fox (*Urocyon cinereoargenteus*), pocket gopher (*Thomomys* species), and raccoon (*Procyon lotor*). Coyote (*Canis latrans*), common muskrat (*Ondatra zibethicus*), and rock squirrels (*Spermophilus variegatus*) are also commonly encountered in the area during the warmer months. Migratory birds (including waterfowl, shorebirds, and songbirds) are quite abundant along the adjacent Rio Grande and commonly feed in the agricultural fields and ditches occupying the project area. The river valley and surrounding uplands support several raptors, including American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and bald eagle (*Haliaeetus leucocephalus*). Many of these birds, as well as some other types of terrestrial wildlife, are supported by a diversity of insect life that occurs along the Middle Rio Grande, including native bees and wasps, dozens of species of butterflies, and dragonflies.

Threatened, Endangered, and Sensitive Species

The USFWS has responsibility for implementing the Endangered Species Act, including listing species as threatened or endangered, and protecting these species. The State of New Mexico lists wildlife species as endangered, threatened, or sensitive. The New Mexico Energy, Minerals, and Natural Resources Department Forestry Division has statutory responsibility for the State Endangered Plant Species List.

A list of protected plant and animal species was compiled from the USFWS (USFWS 2020a) and the New Mexico Department of Game and Fish Biota Information System of New Mexico (BISON-M 2020) websites. This list was developed by identifying species listed for Valencia County.

Fourteen threatened or endangered plant and animal species and three designated critical habitats occur or may occur within Valencia County (BISON-M 2020). No designated or proposed critical habitat for federally protected species occurs within the project area (USFWS 2020a). Potential habitat is present in the vicinity of the project for three state-listed species: common ground dove (*Columbina passerina*), broad-billed hummingbird (*Cynanthus latirostris*), and Bell’s vireo (*Vireo bellii*). Other state-listed species may forage in the area or pass through during migration.

Water Resources

Surface Water

Waters of the United States (WUS) are defined by 33 CFR Part 328.3 (b) and are protected by Section 404 of the Clean Water Act (CWA) (33 USC 1344), which is administered and enforced by the U.S. Army Corps of Engineers (USACE). Section 404 of the CWA provides for the protection of WUS through regulation of the discharge of dredged or fill material. Water quality within the project area is regulated through Sections 401 and 402 of the CWA and enforced by the New Mexico Environment Department (NMED), Surface Water Quality Bureau.

Several hydrological features occur within the project area, including the historic Rio Grande floodplain and ditches and drains used to irrigate farmland from the water of the Rio Grande. The surface water in this area is administered by the MRGCD, which diverts water from the Rio Grande at the Isleta diversion. During irrigation season, water from the Rio Grande is diverted into these acequias, irrigations canals, and smaller ditches. The irrigation water that does not recharge the ground water, evaporates or evapotranspires, then enters waste ways or interior drains that return the water to the Rio Grande (Bartolino and Cole 2002). The entire project area falls within the boundary of the Middle Rio Grande Administrative Area. Within the project area are three main hydrological features: (1) Sanchez Interior Drain, (2) New Belen Wasteway, and (3) Lower Arroyos Acequia. Construction activity within the ordinary high-water mark of these drainages would require permitting through the USACE under the CWA. A Section 404 Nationwide Permit would likely apply to the project if the discharge of dredged or fill material does not cause the loss of greater than ½ acre. A permit would also be required from the MRGCD for work within their irrigation facilities.

Groundwater

The proposed project area is in the greater Albuquerque basin (Kelly 1952), also referred to as the Middle Rio Grande basin (Bartolino and Cole 2002). The Albuquerque basin is an asymmetrical and elongated basin that extends from Cochiti damn to the north and the San Acacia Constriction to the South; it is approximately 90 miles long by 30 miles wide (Kelly, 1953). The water in the Albuquerque basin is supplied by the Santa Fe group aquifer system, which is thousands of feet thick and primarily composed of silt and sand with lesser quantities of clay and gravel (Bartolino and Cole 2002). Thirty-one wells occur within the project area with an average depth to ground water of 13 ft. below the ground surface (New Mexico Office of the State Engineer 2020). However, shallower groundwater

conditions should be anticipated at or near MRGCD crossings. The groundwater depth estimates are based on conditions at the time of field exploration and may not be indicative of other times, or other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors. De-watering of groundwater during construction would be regulated under the NPDES program of the CWA.

Wetlands

Wetlands include those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. To be jurisdictional and protected from unauthorized dredge and fill activities under Section 404 of the CWA, a wetland must have a significant connection to a known jurisdictional, navigable waterway. The National Wetlands Inventory Wetlands Mapper (USFWS 2020b) indicates several types of wetlands associated with the seasonally flooded Rio Grande; however, there are none mapped in the proposed project area. The mapper does indicate that the drainage/wasteway/acequias are Excavated Riverine wetlands, indicating that they are man-made.

Historic and Cultural Resources

To identify potential cultural resources and historic properties near the project area, a records review was conducted with the New Mexico Cultural Resources Inventory System (NMCRIIS) managed by the Archaeological Resource Management Section (ARMS) of the New Mexico Historic Preservation Division (HPD). Additionally, a limited field reconnaissance was conducted of the built environment. Results from the NMCRIIS search identified eight previously recorded cultural resources within approximately 1600 ft. of the project area—all of which are considered historic properties or are listed on the State Register of Cultural Properties (SRCP) or the National Register of Historic Places (NRHP). Several of the identified cultural resources were outside of the project area, including a segment of the Old Jarales Acequia (HCPI 45666), which dates to at least 1896 and possibly as early as the 1700s. Additionally, there is a segment of an unnamed lateral of the Old Jarales Acequia (HCPI 45667) and a segment of an unnamed lateral acequia (HCPI 44287) dating to at least 1949.

Cultural resources identified in NMCRIIS within the project area include:

- A portion of the Camino Real de Tierra de Adentro (State Register [SR] 1952) National Historic Trail (NHT), the oldest long-distance trade route in New Mexico, which extended all the way from Mexico City north to the silver districts of Chihuahua and thence to San Gabriel del Yunque by 1598. The Camino Real NHT in the project Area is the alignment of NM 109, although there is also an alternate segment on the east side of the Rio Grande near Jarales.
- The Atchison, Topeka and Santa Railway (AT&SF) Belen Cutoff (HCPI 31896) segment from Madrone to Belen, which was constructed from February 1-11, 1903.
- Segments of three different components of the local irrigation system, including the Sanchez Drain (LA 116045), the Arroyos Ditch (LA 116046), and the Belen Waste Ditch (LA 116047). All these acequias or drains were present in 1935 when the MRGCD acquired the irrigation system.

In addition to the resources identified in NMCRIIS, the reconnaissance survey identified 30 historic buildings greater than 50 years old in the project area. Construction dates for the buildings ranged from the early 1900s to the late 1960s. The most common architectural styles for historic buildings in the project area are the local variant of the New Mexico Vernacular exhibiting corrugated metal-clad gable roofs with lower-pitch than those found further north, Pueblo Revival, Four-Square or Hipped Box, and Ranch. These buildings are all either unmodified but in very poor condition or in better condition with many modifications. None of the historic buildings would likely be considered eligible to the NRHP under any criteria.

Social Resources

Community Resources

Community context includes potential project-related effects on emergency preparedness, residential areas or community facilities, access, community cohesion, and provision of pedestrian and multimodal access.

The project would maintain and enhance the existing connection from Jarales and surrounding rural areas to the center of commerce and employment in Belen as well as emergency services in the surrounding area. Currently, when trains cross NM 109, delays may be substantial. Delays caused by trains blocking NM 109 were one of the major issues identified by the community during an initial public involvement meeting held on June 11, 2019 at the Gil Sanchez Elementary School in Jarales. With continued growth of BNSF Railway's inter-state operations, along with the proposed addition of tracks through the NM 109 crossing, delays are anticipated to increase. For example, under this plan, the width of the crossing would expand, likely affecting adjacent land uses and travel. In addition, the proposed introduction of 16,000 ft. long trains in lieu of the currently used 10,000 ft. long trains would cause additional delays at the NM 109 crossing. These delays on NM 109 can significantly impede response times for emergency response vehicles, which can have severe consequences to patients requiring emergency treatment, or to citizens needing the police or fire department. There are currently no hospitals or trauma centers within Valencia County; therefore, trauma patients must be transported to the closest hospitals located in downtown Albuquerque. As such, the project would enhance response capabilities of police, fire, and emergency medical services.

Community resources in the Jarales area include a U.S. Post Office, Jarales Community Center, Gil Sanchez Elementary School, Jarales Fire Department, Jarales Catholic Church, several businesses, and significant residential development. The Belen area includes basic medical care, police, emergency services, the Belen School District, and other community facilities serving the entire region. The proposed project would improve regional mobility and would not directly affect local public institutions or businesses; however, because of a range of physical, regulatory, and engineering constraints, property acquisition is required for all proposed project alternatives, including rights-of-way for the roadway and parcels impacted due to removal of localized access, and/or structures.

Transportation projects may affect community cohesion; for example, split neighborhoods, isolate portions of neighborhoods or ethnic groups, generate unwanted development, change property values, or separate residents from community facilities. To the south of the crossing there are numerous residences adjacent to the road with direct access from driveways or perpendicular local streets (e.g., Duke Road, Audra Court, Trujillo Road, Amigos Loop, and others). To the north, there are a few adjacent residences and connecting roads (e.g., Lazy Lane, Gallegos Road, and Camino de Crystal), but much of the land is vacant. The proposed project would create a localized barrier for travel across NM 109 for the distance of the bridge structure and retaining walls, which varies from about 3,000 to 4,500 ft. for the various alternatives. Although some localized changes in access to the surrounding neighborhoods would occur with each alternative, the project would maintain overall connection to the existing street system and enhance broader access in Jarales. Based on this, significant disruption to community access or cohesion is not anticipated to result from the project.

Pedestrian, bicycle, and multimodal access is an important consideration in community health and wellbeing. Although only limited count data for bikes and pedestrians are available, NM 109 is designated as an Existing Bicycle Route on the MRCOG's 2040 Metropolitan Transportation Plan: Long Range Bicycle System Map (MRCOG 2015). But existing shoulders on NM 109 are typically less than 2-ft. wide and are currently inadequate for bike and pedestrian use. The addition of tracks without a grade separation would exacerbate the difficulty in crossing the rail line; however, the proposed project would directly address this issue and include facilities for bicycles and pedestrians.

Demographics and Environmental Justice

Community context includes civil rights and environmental justice considerations, which relate to potential disproportionate adverse impacts on minority, low-income, or other special-status populations. Data from the U.S. Census Bureau (2017) were reviewed to characterize economic and demographic information about the project area. The regional context of the project includes the State of New Mexico, Valencia County, and the adjacent City of Belen. The project is contained within two Census Tracts (9709.1 and 9709.2); however, the tract boundaries extend broadly to the north and south and include parts of the City of Belen. The Jarales Census Designated Place (CDP) was considered more representative of the area because its boundaries are consolidated around the project. Table 3.1-6 provides an overview of demographic and economic characteristics. Compared to statewide data, Valencia County, and City of Belen averages, the Jarales CDP area has a higher percentage of Hispanic people. Incomes in the Jarales CDP are comparable to those in Valencia County, higher than the City of Belen, and slightly below the statewide averages. Poverty levels in the Jarales CDP, however, are below those in the State of New Mexico, Valencia County, and City of Belen. Because the project is restricted to a limited area and addresses a specific facility, rather than ranging across a wide spectrum of neighborhoods with significantly different demographic characteristics, it is not expected that any of the project alternatives would have disproportionate adverse impacts on minority, low-income, or other special-status populations.

Table 3.1-6. Comparison of Project Area Demographic Characteristics

	New Mexico		Valencia County		Jarales CDP		City of Belen	
Total Population	2,084,828	100.0%	75,845	100.0%	2,054	100.0%	7,125	100.0%
Race and Ethnicity								
White	1,547,843	74.2%	61,227	80.7%	1,690	82.3%	6,885	82.4%
African American	42,187	2.0%	716	0.9%	91	4.4%	46	0,6%
Native American	197,191	9.5%	3,302	4.4%	0	0.0%	495	6.9%
Asian	29,991	1.4%	586	0.8%	5	0.2%	0	0.0%
Pacific Islander	1,390	0.1%	0	0.0%	0	0.0%	0	0.0%
Some other race	197,944	9.5%	7,743	10.2%	162	7.9%	475	6.7%
Two or more races	68,282	3.3%	2,271	3.0%	106	5.2%	240	3.4%
Hispanic	1,004,103	48.2%	45,505	60.0%	1,482	72.2%	4,271	59.9%
Age (years)								
Under 5	131,062	6.3%	4,488	5.9%	127	6.2%	492	6.9%
5-9	140,361	6.7%	4,750	6.3%	96	4.7%	560	7.9%
10-14	142,616	6.8%	5,917	7.8%	166	8.1%	482	6.8%
15-19	139,735	6.7%	5,321	7.0%	122	5.9%	559	7.8%
20-24	149,424	7.2%	4,805	6.3%	168	8.2%	667	9.4%
25-34	278,395	13.4%	8,917	11.8%	229	11.1%	925	13.0%

	New Mexico		Valencia County		Jarales CDP		City of Belen	
35-44	244,717	11.7%	8,865	11.7%	237	11.5%	538	7.6%
45-54	258,110	12.4%	10,256	13.5%	262	12.8%	924	13.0%
55-59	140,633	6.7%	5,440	7.2%	143	7.0%	310	4.4%
60-64	131,093	6.3%	4,968	6.6%	105	5.1%	482	6.8%
65-74	194,658	9.3%	7,363	9.7%	251	12.2%	672	9.4%
75-84	97,707	4.7%	3,607	4.8%	106	5.2%	304	4.3%
85 and over	36,317	1.7%	1,148	1.5%	42	2.0%	210	2.9%
Income								
Median Household Income	\$46,718	X	\$43,428	X	\$41,061	X	\$29,705	X
Per Capita Income	\$25,257	X	\$20,572	X	\$20,737	X	\$15,947	X
Families Below Poverty	X	15.6%	X	17.5%	X	3.4%	X	26.2%
All People Below Poverty	X	20.6%	X	22.0%	X	5.5%	X	30.8%

Source: U.S. Census Bureau 2017

Economic and Land Use Issues

The largest industries in the Jarales/Belen area are retail trade, health care and social assistance, and accommodation and food services. Transportation is also an important economic sector; the Belen rail yard is one of the largest rail facilities in the state and one of Valencia County's single biggest employers. The proposed project would allow the BNSF Railway to accommodate fueling the larger 16,000 ft. long trains currently being introduced and thus provide more efficient operations. It would also reduce delay and lost time for commuters and other travelers on NM 109. There are no businesses within the area directly impacted by the project.

The proposed project would likely induce land use changes in what is now a rural residential neighborhood along NM 109. The project would result in acquisition and relocation of as many as 18 residences currently located adjacent to the alternative alignments. In addition, some secondary roads that currently intersect NM 109 would require relocation, depending on alternative, which would result in changes in access to surrounding properties. Relocations and right-of-way acquisition would follow state guidelines that ensure fair compensation to property owners; nevertheless, the project is likely to affect the economic and land use character of the surrounding neighborhoods.

Farmlands

The Farmland Protection Policy Act was enacted to minimize the irreversible conversion of farmland to nonagricultural use and to assure that federal programs are administered in a manner that would be compatible with state and local government, and private programs to protect farmland (7 USC 4201 et seq.). Most of the soils (about 95 percent) in the project area are classified as Farmland of Statewide Importance by the Natural Resource Conservation Service (see Table 3.1-5) and some properties in the project area are currently irrigated and used for agricultural production. Because the project alternatives utilize or are adjacent to existing roads or disturbed developed areas, impacts to farmland are expected to be negligible.

Visual Resources

The visual landscape of the project area consists primarily of rural residential and agricultural land uses along NM 109. The Manzano Mountains form a distant background to the east. There are currently no aesthetic treatments or themes that unify the visual character of the corridor. A crossing structure carrying NM 109 over the railroad tracks would be visible from the surrounding land and would likely affect the aesthetic qualities of the area.

Air Quality

The Clean Air Act is intended to prevent air quality impacts that cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS). Air Quality Control Regions are interstate or intrastate areas designated by the Environmental Protection Agency for the attainment and maintenance of the NAAQS. The project area falls within the Albuquerque-Mid Rio Grande Intrastate Air Quality Control Region 152. There are no areas such as national parks or wilderness areas near the project that have been established as mandatory Class I areas under the Clean Air Act. Valencia County is in attainment of all current air quality standards.

Some temporary impacts on air quality may be expected from dust during construction. Standard air quality best management practices would be implemented, including using a water truck to wet exposed soils to minimize generation of dust. Construction equipment would be in good mechanical condition with proper exhaust controls to limit the effects of emissions to local air quality.

The proposed study would constitute a short-term minor increase in the use of fossil fuel and associated greenhouse gas (GHG) emissions during construction. The GHG emissions associated with the proposed project would be limited to short-term use of construction equipment. In the longer term, implementation of the proposed project is not expected to increase traffic along NM 109, rather it would eliminate delays at the railroad crossing and thus reduce higher emission levels from idling vehicles. The project is not expected to contribute appreciably to GHG emissions or to climate change.

Noise

The NMDOT's noise policies and procedures are based on the FHWA Highway Traffic Noise: Analysis and Abatement Guidance (2011) and are described in the NMDOT Infrastructure Design Directive IDD-2011-02, Procedures for Abatement of Highway Traffic Noise and Construction Noise (NMDOT 2011). Under the NMDOT's policy, a noise analysis is required for a "Type I" project. A Type I project involves the construction of a highway on a new location or the physical alteration of an existing highway, which significantly changes either the horizontal or vertical alignment, increases the number of through traffic lanes, or modifies the existing typical section. The proposed project meets the definition of a Type I project.

Noise-sensitive receivers in the project area include single-family residences along NM 109 and in the areas east and west of the proposed bridge facility. Although traffic volumes and speeds are relatively low, raising the elevation of NM 109 at the railroad crossing would project noise outward into the surrounding neighborhoods. Currently, noise from traffic on NM 109 is at least partially abated beyond the first row of properties along the existing roadway by terrain, structures, and other natural features. Noise abatement may be needed where noise levels increase substantially as a result of the project. An analysis of noise impacts, mitigation options, and federal and state noise abatement criteria would be performed as part of project implementation. Public involvement would be part of this process.

Hazardous Materials

A review of several federal and state environmental databases indicated that no documented releases of petroleum products or other hazardous materials have occurred within 1 mile of the project area (GeoSearch 2020). The BNSF fueling facility in Belen operates under discharge permit (DP) 278 issued by the NMED (NMED 2018). After processing in oil/water separators and removal and disposal of contaminated sediment and used oil, DP-278 authorizes BNSF to discharge up to 8,250 gallons per day of wastewater from spilled grease, diesel fuel, wash-down water, and precipitation runoff from three locomotive fueling platforms and the rail tank car fuel offloading area into two synthetically lined evaporative impoundments. These impoundments are located 1.07 miles from the proposed crossing at NM 109. The NMED's online Enviromapper did not indicate any violations or enforcement actions against the facility (NMED 2020). Contamination from hazardous materials was identified as a concern at the public involvement meeting, and this issue will be investigated in greater detail as part of the project development and environmental documentation process.

Section 4(f)

As part of the Section 4(f) requirements, the Federal Highway Administration (FHWA) evaluates projects for impacts on public parks, recreation areas, wildlife and waterfowl refuges, and historic sites. FHWA projects are required to avoid such properties unless there is no prudent and feasible alternative to using a Section 4(f) property. If a 4(f) property is used, the project must take steps to minimize harm to that property. Based on initial review of the project area, the portion of the Camino Real NHT (SR 1952) along NM 109 and the Belen Cutoff (HCPI 31896) segment may be potential Section 4(f) historic properties. Subsequent cultural resource surveys would identify any qualified Section 4(f) historic properties.

Floodplains

The entirety of the project area and the majority of the cities of Belen and Jarales are within Zone A floodplain per the current effective FEMA Flood Insurance Rate Map dated 8/19/2010, as shown in Figure 3.1-4. In the previously effective map dated 7/2/1991, the site was not in the floodplain. Per the Valencia County Floodplain Insurance Study, the floodplain was increased as a result of a FEMA determination that the Rio Grande Levee provided insufficient protection. However, it should be noted that the USACE is currently advancing a project to improve the levee along the river adjacent to the project area. The resulting floodplain spans 2 miles from State Highway 304 east of the river to I-25 west of the river, but has not been studied in detail to determine flood elevations. A comparatively small overpass at the project site in a 2-mile-wide floodplain is unlikely to cause a rise, however any fill may still need to be analyzed to verify a FEMA No-Rise condition.



Figure 3.1-4 FEMA Flood Insurance Rate Map

Constructing a model to demonstrate No-Rise presents a problem, as survey of the river channel and the residential area between the levee and the site is not financially feasible. TKDA coordinated with Valencia County to determine if a floodplain permit could be waived. Valencia County deferred potential floodplain permitting of the site to the State Floodplain Coordinator at the New Mexico Department of Homeland Security and Emergency Management. The State Floodplain Coordinator determined that any fill in the floodplain at the site will require a detailed analysis to demonstrate a No-rise condition, and that compensatory storage for any fill should be provided. To avoid the large financial cost of extensive channel survey, a preliminary approach was agreed upon with the State Floodplain Coordinator to use channel geometry from the upstream detailed study ending at Los Chavez, completed site ditch and topo survey, and available LIDAR to develop a two dimensional model of the Rio Grande, without the need for channel survey. Correspondence regarding this direction is provided in Appendix G.

Drainage

The three main water bodies in the project area are the three drainage/irrigation ditches. All three of the channels occur on MRGCD right-of-way, and all three are controlled by various screw and sluice gates. The MRGCD has Ditchrider, Water Master, and Division Manager estimates of operational flow, which range from 20 to 45 cubic ft. per second (cfs). Several inspection and status reports since 2008 have indicated that these are intermittently abandoned. It is unclear if the MRGCD would require maintenance of these estimated flow rates, or if the ditches are truly abandoned.

IV. Project Purpose and Need

The existing conditions within the project study area have been described in the previous sections. There are many aspects of these conditions that demonstrate the need for improvements and need for the project. The following sections summarize those critical conditions that clearly indicate Project Need.

Physical Deficiencies

The primary physical deficiency identified through the corridor is the limited shoulder space available for pedestrians and multimodal transportation. The narrow shoulders do not provide adequate space for pedestrians or bicyclists to travel.

Safety

Crash history has been reviewed for the area. The crash rate for the area is 2.18 crashes per million vehicle miles (MVM) compared to the statewide average of 1.71 crasher per MVM for all highways (urban included). This rate is considered to be well within the order of magnitude that might be expected with the existing site conditions and traffic volumes. Though the crash rate does suggest some level of safety concern, removal of two marginal property damage only crashes (back into parked car, and run into mailbox) results in a rate of 1.56 crashes per MVM, which does not indicate a significant safety concern through the project study area. The existence of a road/rail at-grade crossing is in of itself, however, a possible safety concern as indicated by the five highway user/rail equipment crashes reported between 1985 and 2014 described in Section III Existing Conditions. Recognizing the possible future configuration with the addition of up to 6 additional tracks, development of a grade separated crossing eliminates any potential safety concerns associated with the interaction of pedestrian, multimodal, vehicular, and rail traffic.

Travel Demand and Congestion

Currently, when trains cross NM 109, delays to vehicular traffic may be substantial and is a cause of community concern. With continued growth of BNSF Railway's inter-state operations, along with the proposed addition of tracks through the NM 109 crossing, delays are anticipated to increase. These delays on NM 109 can significantly impede response times for emergency response vehicles, which can have severe consequences to patients requiring emergency treatment, or to citizens needing the police or fire department. There are currently no hospitals or trauma centers within Valencia County; therefore, trauma patients must be transported to the closest hospitals located in downtown Albuquerque. As such, the project would enhance response capabilities of police, fire, and emergency medical services.

Access

NM 109 in the project area provides access to numerous driveways and several cross streets. NM 109 is a two-lane rural Major Collector posted at 40 mph. Per the NMDOT State Access Management Manual, full access intersections are ideally spaced a minimum of 660 ft. apart, driveways spaced a minimum of 300ft. apart, and driveways spaced no closer than 300ft. to an adjacent intersection. The existing conditions provide less than the suggested 660 ft. intersection spacing between Trujillo Road, Audra Court and Duke Road. There are 30 driveways spaced less than 300 ft. from adjacent driveways. In addition, there are 17 driveways that are spaced less than 300ft. from a nearby intersection. This proposed grade separation project provides an opportunity to consolidate driveways and intersections to better meet Access Management Manual guidelines.

System Connectivity

The current condition in which trains block access for extended periods on an importation major collector route impedes connectivity between Jarales and points south to Belen and points north. There is a need to address this condition to maintain the system connectivity of the existing roadway network.

In addition, NM 109 is designated as an Existing Bicycle Route on the MRCOG's 2040 Metropolitan Transportation Plan: Long Range Bicycle System Map (MRCOG 2015). Currently, the existing shoulders on NM 109 are inadequate and present a serious danger for bicycle and pedestrian use. Moreover, the addition of tracks without a grade separation would exacerbate the difficulty in crossing the rail corridor. Increased delay times may tempt pedestrians to proceed into the crossing either through or between trains, creating a significant safety concern.

Project Purpose

The need for the project has been described based on the physical deficiencies, safety concerns, travel delays, and multi-modal transportation conditions associated with the current crossing. Therefore, the purpose of the proposed project is:

- To provide a safe, uninterrupted route for pedestrian, bicycle, and vehicular traffic across the railroad corridor that accommodates current and future rail operations.

These conditions are addressed by a grade-separated crossing.

V. Description of Alternatives

Seven alternatives were identified using the purpose and need criteria in Section IV. Alternatives A, C, D, E, and F shift the horizontal alignment of NM 109. Alternative B follows the existing roadway alignment. Alternative G is the no build option. Figure 5.1-2 depicts the alternative alignments in plan view. Layouts of each alternative are provided in Appendix A.

The following is a list of the seven project alternatives:

- A. 70 ft. west of in-place NM 109
- B. In-line with in-place NM 109
- C. 70 ft. east of in-place NM 109
- D. 750 ft. west of in-place NM 109
- E. 500 ft. east of in-place NM 109
- F. 600 ft. west of in-place NM 109 on extended realignment
- G. No build

Design Criteria

The design criteria for this project were based on meeting or exceeding the current design standards presented in the current AASHTO *A Policy on Geometric Design of Highways and Streets*.

A proposed 40 MPH design speed was used on NM 109. This matches the existing posted speed.

A standard typical section was used in the development of the alternatives. This includes two 12 ft. travel lanes and 5 ft. shoulders. The crown is 2%. On the bridge approaches, a combination of retaining walls and earthen embankment are used to achieve a vertical grade raise. Figure 5.1-1 depicts the at grade proposed typical section.

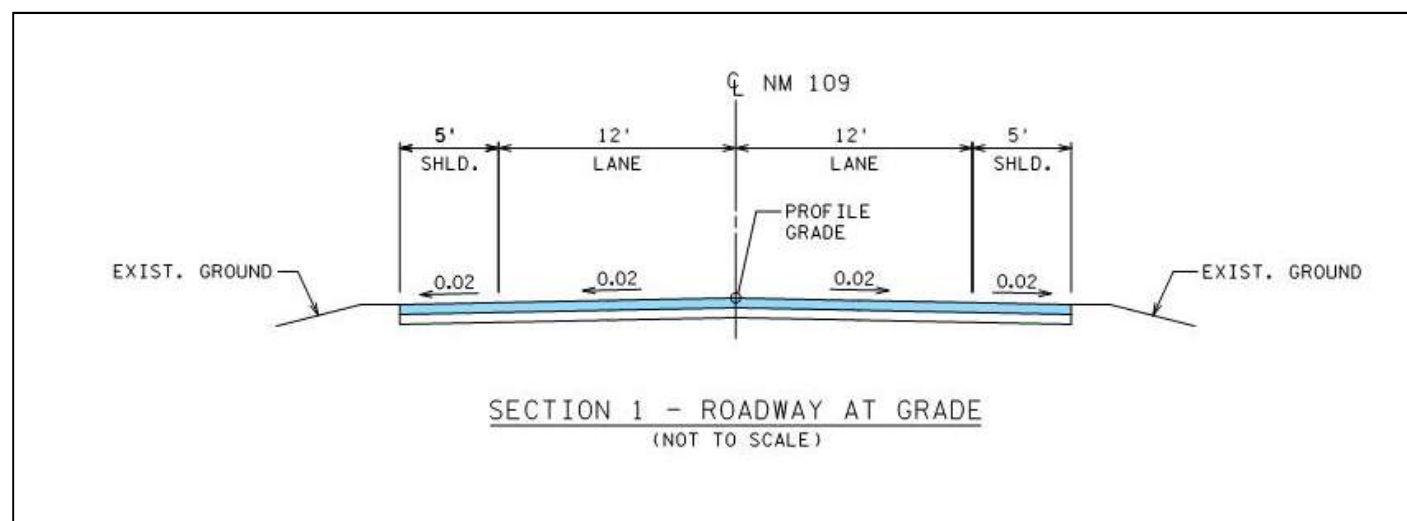


Figure 5.1-1 Typical Section 1 – Roadway at Grade

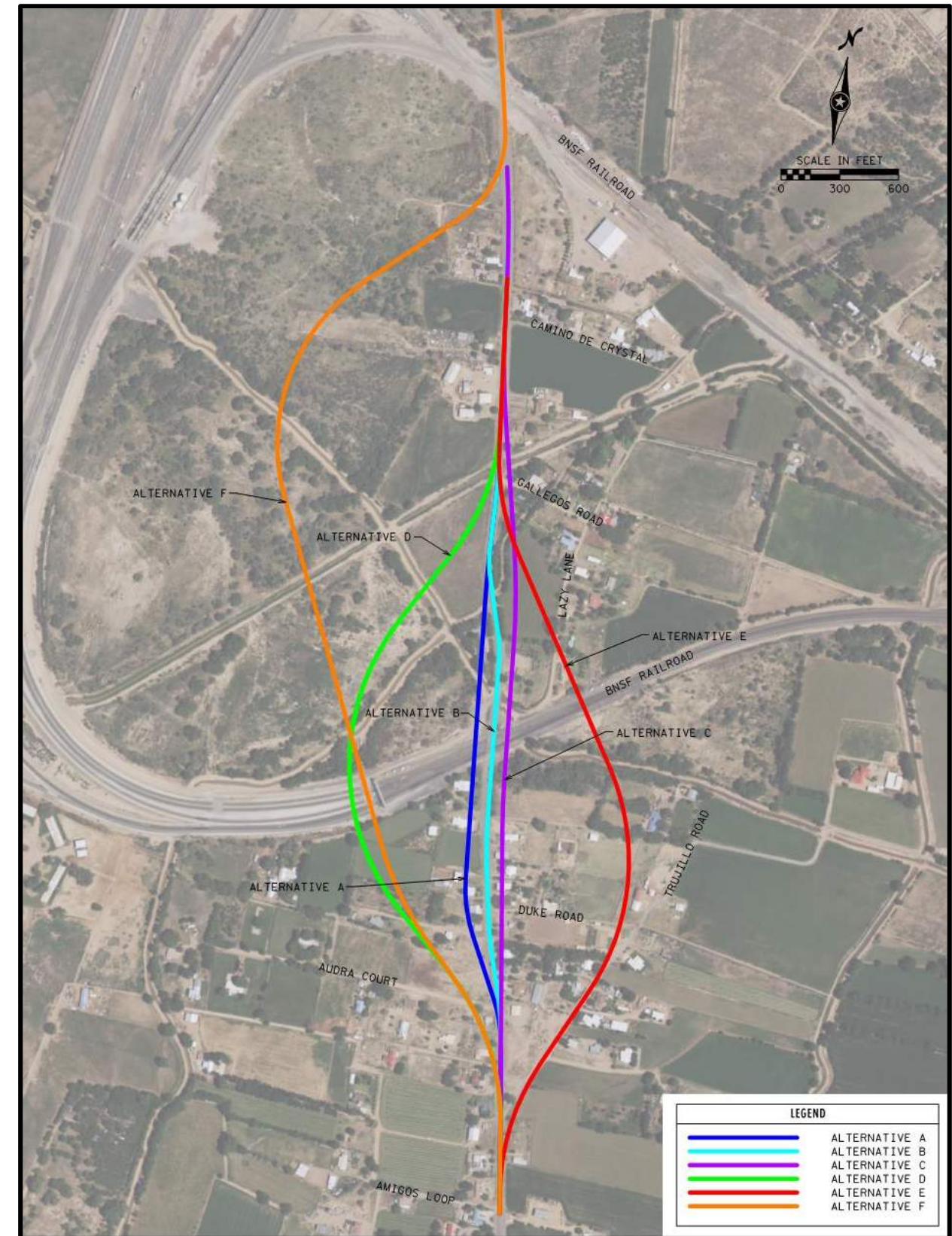


Figure 5.1-2 Alignment Alternatives Plan View Summary

Preliminary Alternatives

Alternative A

Alignment Alternative A consists of the realignment and grade separation of NM 109 approximately 70 ft. west of the in-place NM 109 rail crossing, as shown in Figure 5.1-3. The roadway realignment is approximately 0.6 miles long with termini located 200 ft. north of the Trujillo Road intersection and 100 ft. north of the in-place Gallegos Road intersection. The Audra Court and Gallegos Road intersections are recommended to be reconstructed to tie into the proposed NM 109 alignment. Access to NM 109 is reconfigured southwest, southeast, and northeast of the proposed NM 109 Bridge. In the southwest, access is routed through Audra Court. In the southeast, access is routed off of the old NM 109 alignment and Trujillo Road. In the northeast, access is routed through Lazy Lane and Gallegos Road.

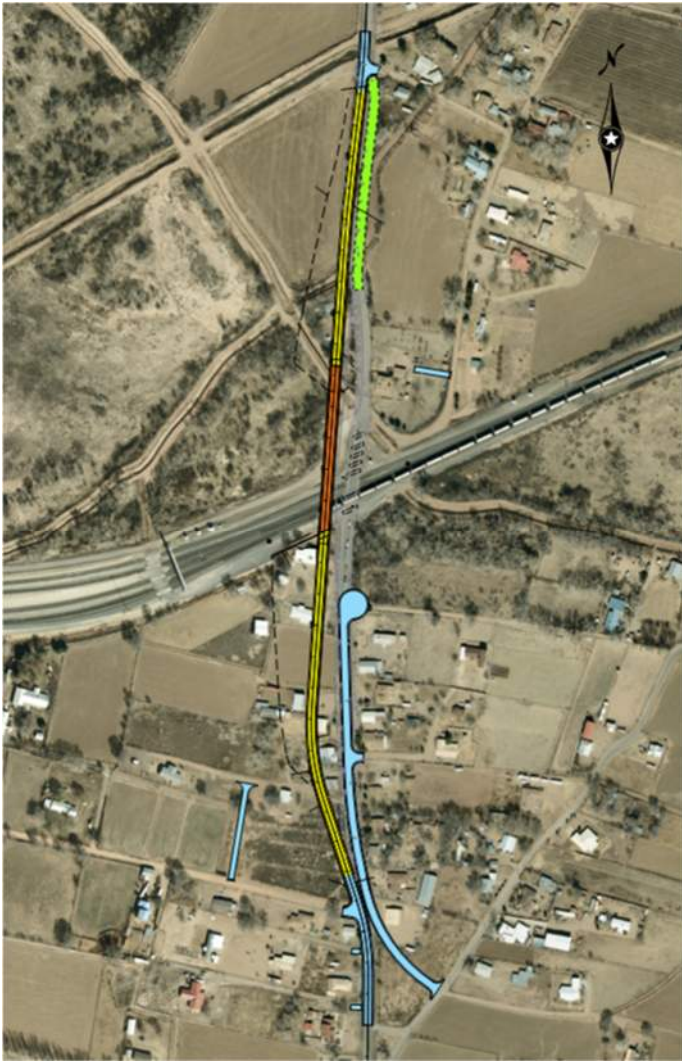


Figure 5.1-3 Alignment Alternative A Plan View

Alternative B

Alignment Alternative B consists of a grade separation in-line with the in-place NM 109 alignment. The alternative is 0.6 miles long with termini located 50 ft. south of Audra Court and 350 ft. south of Camino De Crystal, as shown in

Figure 5.1-4. The Audra Court, Duke Road, and Gallegos Road intersections are recommended to be reconstructed to tie into the proposed NM 109 alignment. Access to NM 109 is reconfigured southwest and southeast of the proposed NM 109 Bridge. In the southwest, access is routed through Audra Court. In the southeast, Duke Road is realigned and the intersection with NM 109 is shifted 300 ft. south of the in-place intersection.



Figure 5.1-4 Alignment Alternative B Plan View

Alternative C

Alignment Alternative C consists of the realignment and grade separation of NM 109 approximately 70 ft. east of in-place NM 109 rail crossing. The roadway realignment is 0.7 miles long with termini located 200 ft. south of Audra Court and at Camino De Crystal, as shown in Figure 5.1-5. The Audra Court, Duke Road and Gallegos Road intersections are recommended to be reconstructed to tie into the proposed NM 109 alignment. Access to NM 109 is reconfigured southwest, southeast, and northwest of the proposed NM 109 Bridge. In the southwest, access is routed through the old NM 109 alignment and Audra Court. In the Southeast, Duke Road is realigned and the intersection with NM 109 moved 300 ft. south of the in-place intersection. In the northwest, access is routed through the old NM 109 alignment.

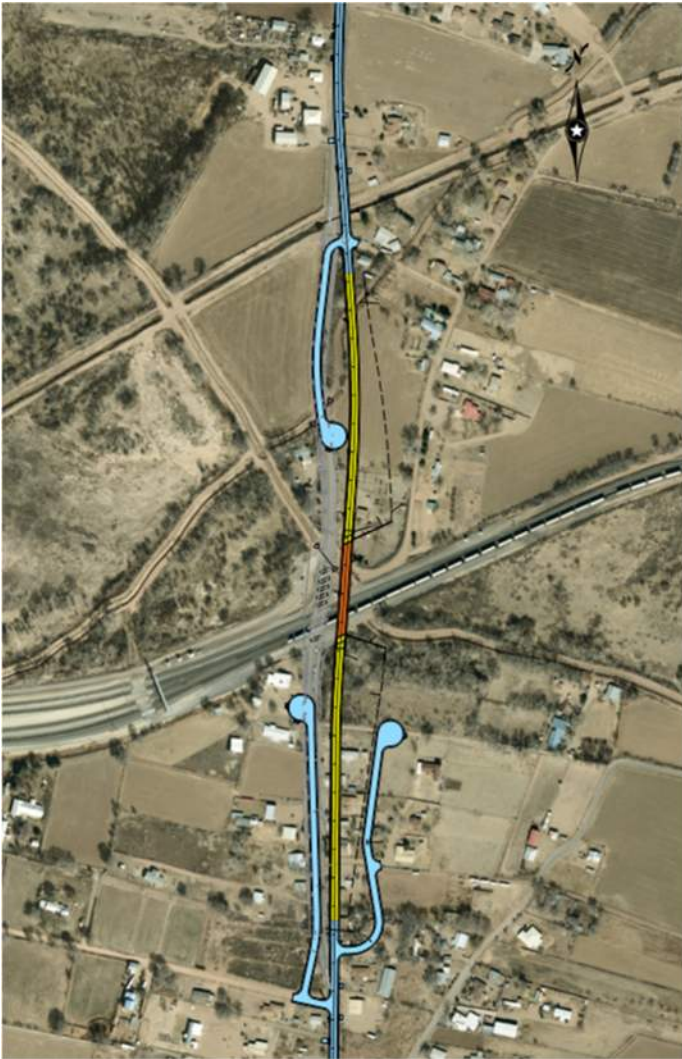


Figure 5.1-5 Alignment Alternative C Plan View

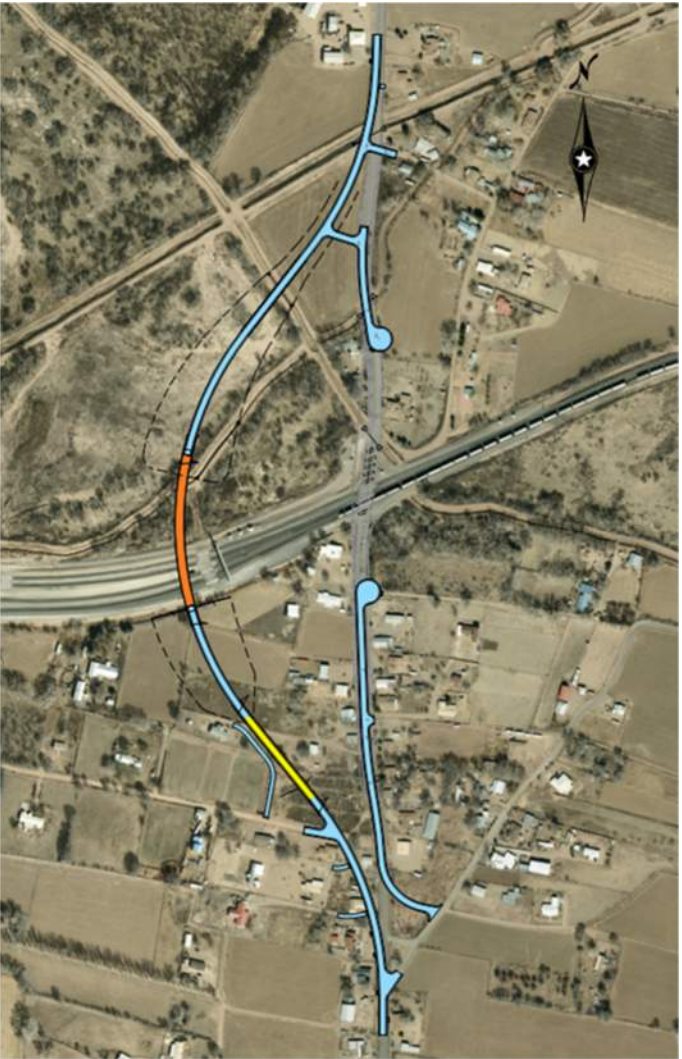


Figure 5.1-6 Alignment Alternative D Plan View

Alternative D

Alignment Alternative D consists of the realignment and grade separation of NM 109 approximately 750 ft. west of in-place NM 109 rail crossing. The roadway realignment is 0.8 miles long with termini located 180 ft. south of Trujillo Road and 400 ft. south of Camino De Crystal, as shown in Figure 5.1-6. The Trujillo Road, Audra Court, and Gallegos Road intersections are recommended to be reconstructed to tie into the proposed NM 109 alignment. Access to NM 109 is reconfigured southeast and northeast of the proposed NM 109 Bridge. In the southeast, access is routed through the old NM 109 alignment and Trujillo Road. In the northeast, access is routed through the old NM 109 alignment or Gallegos Road.

Alternative E

Alignment Alternative E consists of the realignment and grade separation of NM 109 approximately 500 ft. east of in-place NM 109 rail crossing and follows the in-place Trujillo Road alignment for the first 0.3 miles. The roadway realignment is 0.9 miles long with termini located at Amigos Loop and 400 ft. south of Camino De Crystal, as shown in Figure 5.1-7. Trujillo Road and Gallegos Road intersections are recommended to be reconstructed to tie into the proposed NM 109 alignment. Access to NM 109 is reconfigured southwest, southeast, and northwest of the proposed NM 109 Bridge. In the southwest, access for Audra Court and Duke Road is routed through the old NM 109 alignment. In the southeast, Trujillo Road is widened and realigned, and the intersection with NM 109 is moved 900 ft. north. In the northwest, access is routed along the old NM 109 alignment.

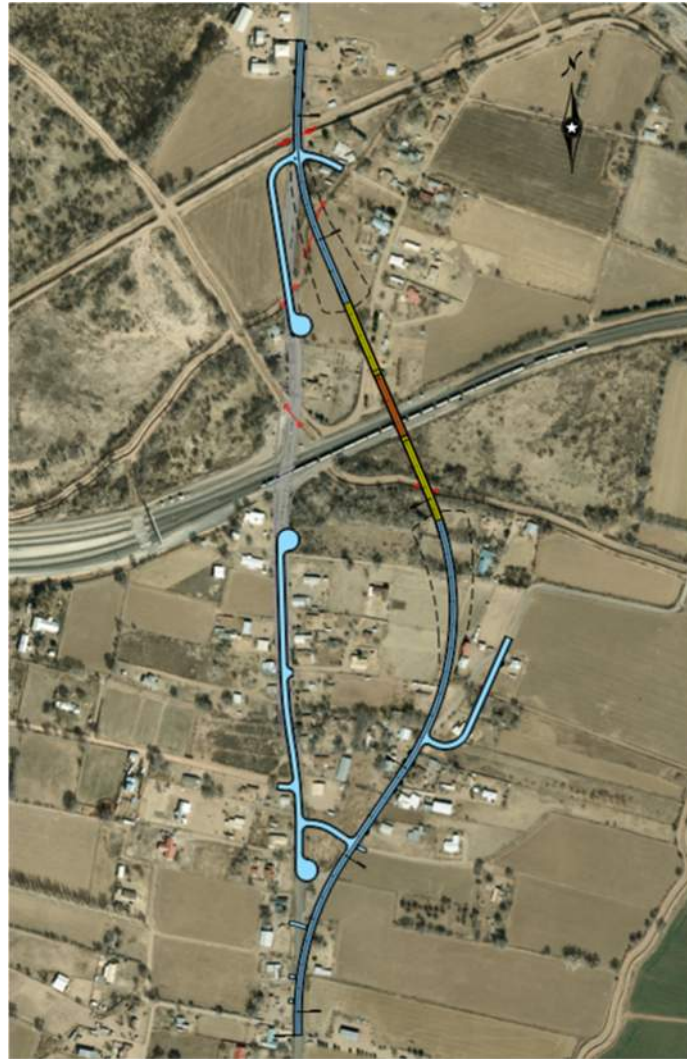


Figure 5.1-7 Alignment Alternative E Plan View

Alternative F

Alignment Alternative F consists of the realignment and grade separation of NM 109 approximately 675 ft. west of in-place NM 109 rail crossing. The roadway realignment is 1.2 miles long with termini 120 ft. north of Amigos Loop and at the North NM 109 Rail Crossing, as shown in Figure 5.1-8. The Trujillo Road and Audra Court intersections are recommended to be reconstructed to tie into the proposed NM 109 Alignment. Access to NM 109 is reconfigured southeast and northeast of the proposed NM 109 Bridge. In the southeast, access from Duke Road is routed through Trujillo Road. In the northeast, access from Gallegos Road was routed along the old NM 109 alignment.

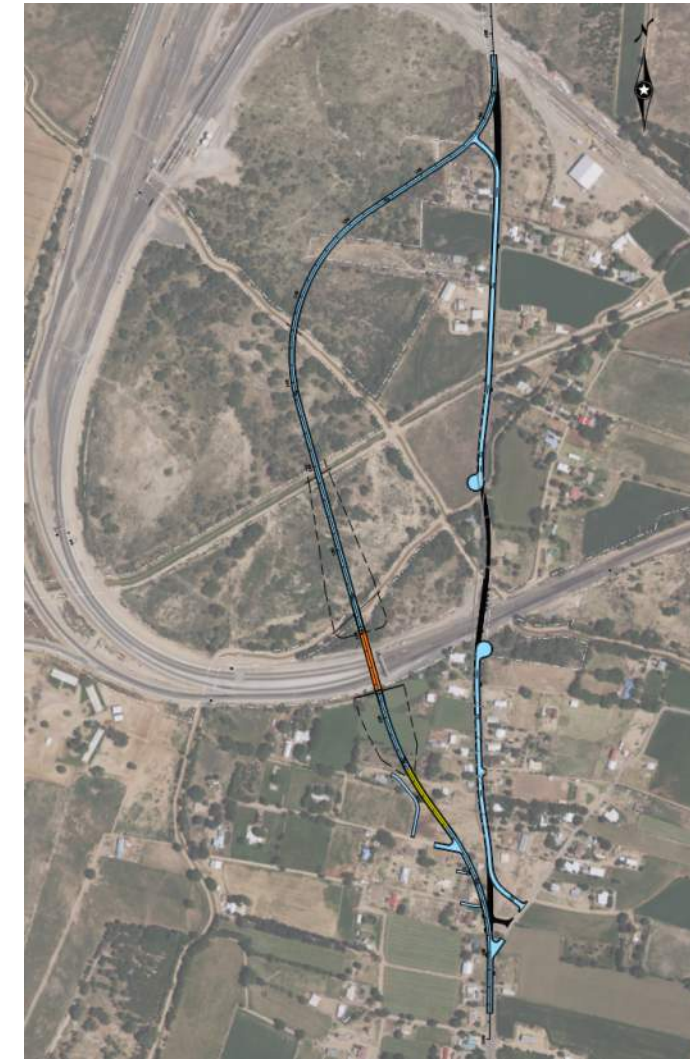


Figure 5.1-8 Alignment Alternative F Plan View

Alternative G – No Build

Alternative G involves leaving the rail crossing and NM 109 in-place.

Initial Evaluation Criteria

An initial, screening-level evaluation was completed to eliminate alternatives that were clearly not feasible or inferior to other alternatives. The objective of the Initial Evaluation of Alternatives was to review the major differences between the alternatives on a qualitative level; therefore, detailed evaluations were not performed during this phase. The following is a list of the screening metrics and criteria:

- Responsiveness to the Purpose and Need
- Structure Impacts
- Utility Impacts
- Drainage Impacts
- Impacts to NM 109 and Other Local Roads
- Impacts to Rail Service and Yard Operations
- Public Input

In the evaluation, a rating was applied for each metric or criteria. Table 5.1-2 summarizes the rating system. Based on these ratings, alternatives were eliminated or advanced for consideration. Table 5.1-3 summarizes the evaluation results. Detailed assessments of the alternatives that advanced from Phase I A were completed in Phase I B and were documented in future sections of this report.

Alternatives Analysis

Responsiveness to the Purpose and Need

The purpose and need were established in Section IV. This metric addressed the degree that the alternative meets the purpose and need. If the alternative did not meet the purpose and need, it was considered “fatally flawed” and was eliminated from consideration. Alternative G, the no-build alternative, did not meet the purpose and need because it left the at-grade rail crossing in-place. All other alternatives satisfied the purpose and need because they provided grade separation between the railroad and the roadway.

Structure Impacts

Structure impacts associated with each of the Alternates are identified on the layouts provided in Appendix A. On the layouts, structures within the finished construction footprint that require relocation as part of the Project are identified by a red “X” with a description added identifying the type of structure engaged. Structure types are classified as Residences, Garages, Barns, Sheds, or Trailers. For evaluation, only those structures identified as Residences or Trailers were quantified for consideration. Ranking the Alternates in Table 5.1-3 is provided according to the combined total of impacted Residences and Trailers associated with each Alternate.

Utility Impacts

Utility impacts were considered where there were conflicts between in-place utilities and the alternative footprint. Alternatives A and B have conflicts with overhead power lines and were rated as having negative effects. All others had minor utility impacts and were rated as having negligible effects.

Drainage Impacts

For purposes of alternative analysis, it is assumed that any crossing of the water bodies described previously will require a culvert to maintain the estimated flowrates of existing conditions. Some potential proposed crossings are at the same location as existing crossings. These crossings labeled as “Maintain” in the table below are assumed to not require any modification to the culverts currently onsite. Alternatives with maintained crossings will be the

lowest cost and most ideal as they will likely only require erosion control during construction. Some potential proposed crossings are within 20 ft. of existing crossing locations, and will require culvert extensions. These locations are labeled as “Extend” in the table below and are likely to be a moderate construction cost, as the length of extension will be relatively small. The third and most expensive likelihood at crossings with the three major water bodies is Alternatives which must cross at a “New” location. These will be the most expensive and least ideal options as they will require the most fill volume and lengths of new culvert construction. In addition to crossings with the major water bodies, some of the alignments cross control gates which would need to be reconstructed or relocated, and minor laterals which will need smaller culverts installed. The cost of these additional minor adjustments is assumed to be much less than the major crossings but is still a factor worth considering. The drainage impacts are summarized in Table 5.1-1. Scoring the major crossing options and minor adjustments in order of construction complexity yields the Drainage Impact Evaluation rankings found in table 5.1-3

Table 5.1-1. Drainage Impacts

Alternative	Sanchez Interior Drain Crossing	New Belen Wasteway Crossing	Arroyo Acequia Crossing	Additional Minor Lateral Crossings	Gate Relocations/ Rebuilds
A	Maintain	Extend	New	-	-
B	Maintain	Maintain	Maintain	-	-
C	Extend	Extend	New	-	-
D	Extend	New	New	Yes	Yes
E	Maintain	New	New	Yes	-
F	New	New	New	Yes	Yes

Impacts to NM 109 and Other Local Roads

Impacts to NM 109 and other local roads considered whether access was restricted during or after construction. Other than Alternative G, there will be temporary closures to tie-in the existing roadway to the new roadway during construction. In those cases, the impact was considered neutral. Impacts to locations where right-of-way property acquisitions took place were also considered neutral. Alternate B was rated as having very negative effects because it involved the closure of NM 109 during construction. Alternate G was rated as neutral because it is the no-build option. Alternative E was rating as having a negative effect as it requires reconstruction and widening of Trujillo Road to be feasible. All other alternatives were rated as providing positive effects because they involved a grade separation between the railroad and the roadway.

Impacts to Rail Service and Yard Operations

Impacts to rail service considered impacts to rail operations during and after construction. Alternative D was rated as providing a negative impact because it requires railroad closures for the relocation of the in-place railroad signal bridge. Alternative F was rated as providing a very negative impact as it requires railroad closure for the relocation of the in-place railroad signal bridge and requires allocation of a significant segment of BNSF property that may be utilized for future capital projects. All other options were considered neutral because the positive impacts of the grade separation cancelled out the impacts from track protection during construction.

Public Input

As described above, a public information meeting was held on June 11, 2019 at Gil Sanchez Elementary School in Jarales, New Mexico. At this meeting the alternatives were introduced, and public comments received. Table 5.1-3 summarizes the positive and negative comments received following the public meeting.

Initial Evaluation Matrix

Table 5.1-2 Rating Criteria

Rating	Description
↑↑	Very Positive Effects
↑	Positive Effects
↔	Negligible or No Effects
↓	Negative Effects
↓↓	Very Negative Effects

Table 5.1-3 Alternative Initial Evaluation Summary

Criteria	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G (No Build)
Responsiveness to the Purpose and Need	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↓↓ (At-grade Crossing)
Structure Impacts	↔ (8 Relocations)	↓↓ (18 Relocations)	↓ (13 Relocations)	↑↑ (4 Relocations)	↔ (8 Relocations)	↑↑ (3 Relocations)	(None)
Utility Impacts	↓ (OH Power Relocation)	↓ (OH Power Relocation)	↔ (None)	↔ (None)	↔ (None)	↔ (None)	(None)
Drainage Impacts	↑	↑↑	↔	↓	↔	↓↓	(None)
Impacts to NM 109 and Other Local Roads	↑ (Temp. at Limits)	↓↓ (Closed for Duration)	↑ (Temp. at Limits)	↑ (Temp. at Limits)	↓ (Temp. at Limits) (Trujillo Road Impacts)	↑ (Temp. at Limits)	(None)
Impacts to Rail Service and Yard Operations	↔ (Track Protection)	↔ (Track Protection)	↔ (Track Protection)	↓ (Track Protection) (Track Closure) (OH Signal Relocation)	↔ (Track Protection)	↓↓ (Track Protection) (Track Closure) (OH Signal Relocation) (Property Acquisition)	(None)
Public Input	↔ (1 Positive) (0 Negative)	↔ (1 Positive) (0 Negative)	↑↑ (4 Positive) (0 Negative)	↔ (1 Positive) (0 Negative)	↓ (1 Positive) (1 Negative)	↑ (3 Positive) (0 Negative)	(0 Positive) (3 Negative)

Phase I A Recommendations

The findings compiled in Phase I A have verified the need for a grade separation at the existing at-grade rail crossing on NM 109. Based on the preliminary assessment and taking public and agency input into account, the following recommendations were made as part of the Initial Evaluation of Alternatives:

The following alternatives are ***recommended to be advanced*** for further consideration in the Detailed Evaluation of Alternatives phase:

- Alternative C: Grade separation 70 ft. east of in-place NM 109
- Alternative D: Grade separation 750 ft. west of in-place NM 109.
- Alternative E: Grade separation 500 ft. east of in-place NM 109.

The following alternatives are ***not recommended for further evaluation***:

- Alternative A: Grade separation 70 ft. west of in-place NM 109. This alternative was not recommended for further evaluation because of negative public support, impacts to in-place overhead power, and moderate number of property relocations. In addition, Alternate A offers no advantages over Alternate C.
- Alternative B: Grade separation in-line with in-place NM 109. This alternative was not recommended for further evaluation because it required NM 109 to be closed during construction and generated the maximum number of property relocations.
- Alternative F: Grade separation 600 ft. west of in-place NM 109 and extended realignment on the north end of the project. This alternative was not recommended for further evaluation because of its considerable length compared to other Alternates resulting in a large right-of-way acquisition requirement that impacts future BNSF operations. Furthermore, Alternate F offers no advantages over Alternative D in terms of impacts to residences and relocations.

VI. Refined Analysis

Conceptual Roadway and Structure Plans

Concept level roadway and bridge plans for Alternatives C, D, and E are provided in the Appendices B and C. The concept plans were developed in accordance with AASHTO, AREMA, and NMDOT guidelines to provide a minimum vertical clearance through the railroad corridor of 23'-6" and a design speed of 40 MPH. Concept roadway plans identify the basic elements of the proposed configuration for development of quantitative evaluation metrics. The basic elements include:

- NM109 alignment and profile
- Bridge length
- Approach embankment and retaining wall limits
- Drainage features
- Local roadway connections
- Existing roadway removals
- Property impacts

To help identify the various elements, a color coding system has been used to define regions of the proposed configuration. For each plan, new roadway sections supported on existing grade or new earthen embankments are identified by blue shaded regions; new roadway sections utilizing retaining walls to develop the new embankment are identified by yellow shaded regions; and bridge locations are identified by orange regions. Embankment limits and retaining wall locations, where needed, associated with the new roadway sections constructed on fill are identified. Similarly, existing features to be removed are noted by black cross-hatching.

Using the alignment, profile, and cross section information, a concept bridge general plan and elevation sheet has been developed for each alternative. The general plan and elevation shows the basic geometric layout required for each bridge crossing and identifies the anticipated material and component configurations for the specific bridge elements.

Geotechnical Considerations

As each of the alternatives requires construction of earthen approach embankments and a bridge structure, development of the concept level plans is based on preliminary geotechnical recommendations specific to the project site. The recommendations are based on geological literature study, site reconnaissance, review of existing geotechnical reports and data, and experience from other work near the project site.

For the approach embankments, fill slopes on the order of 25 ft. to 35 ft. are required. Based on the relatively low strength characteristics of the subsurface soils, and cohesive nature of some soils, long-term consolidation of the new embankment materials on the underlying native foundations soils will be a component of the design. Surcharging or preloading is anticipated to reduce long-term settlement.

Embankments may be constructed using permanent slopes or retaining walls. In general, permanent slopes are preferred as they reduce construction cost and require limited long-term maintenance. Retaining walls are utilized to limit the construction footprint and minimize right-of-way or other project impacts.

At the project location, permanent fill slopes to achieve the desired embankment heights depend on the soils used for construction and may range from 2.1Horizontal (H):1Vertical (V) to 3H:1V. To establish project footprints and associated construction costs, the 3H:1V embankment slope has been assumed.

In regions where embankment limits encounter other project constraints such as right-of-way boundaries or the railroad corridor, retaining walls are used to restrain the construction limits. Wall systems considered for the site are Mechanically Stabilized Earth (MSE) and Cast-In-Place (CIP) concrete. In accordance with railroad guidelines, CIP walls are used adjacent to the railroad corridor and MSE walls may be considered elsewhere. Typically, MSE walls are supported on shallow foundations. For this site, the underlying soil and groundwater conditions are susceptible to a behavior known as liquefaction. Liquefaction is the temporary loss of support in saturated granular materials during seismic events. It is anticipated that the liquefaction potential is moderate to high depending on the magnitude of the earthquake considered, with a moderate to high probability for lateral ground spreading and soil settlement occurring along the project alignment. To mitigate this phenomena, CIP walls supported on deep foundations are used throughout.

Similar to the CIP walls, each bridge substructure will be supported on a deep foundation for liquefaction mitigation. Deep foundation types considered are driven piling and drilled shafts. Based on existing groundwater conditions and soil types expected to be encountered during deep foundation installation, the driven piling system has less construction risk than the drilled shafts. However, the construction footprint associated with a driven pile foundation is too great to be feasible within the railroad corridor. Therefore, drilled shaft foundations are incorporated into bridge substructures located within the railroad corridor and driven pile foundations are used elsewhere. For both foundation types, the design dimensions, required embedment lengths, and number of foundation elements will be a function of the structural loading conditions.

For driven piling, a round steel section is anticipated based on the site geology with pile diameters ranging of 16 to 24 inches. To provide the structural resistance, an embedment depth in the range of 80 ft. to 100 ft. below existing grade is required. Alternately, drilled shaft diameters between 5 ft. and 8 ft. are anticipated with embedment lengths in the range of 60 ft. to 80 ft. below existing grade. For the concept bridge and roadway plans, assumed supports for pier foundations within the rail corridor are 75 ft. long 5 ft. diameter drilled shafts. Pier, abutment, and wall foundations outside of the rail corridor are assumed to be supported on mats of 95 ft. long 20 inch diameter driven piles.

Refined Development of Phase I B Alternatives

Alternative C

Alternative C represents an off-line overhead grade separation to be constructed east of the in-place NM 109 crossing. The proposed alignment is offset from the in-place alignment to keep the crossing open to the public throughout construction of the overhead structure and roadway approaches.

Roadway typical section geometry is provided in Appendix B. Both roadway approaches will employ a concrete paving section and incorporate a cast-in-place retaining wall system along the west side of the roadway alignment to minimize right-of-way impacts.

North of the BNSF corridor, the causeway spans over an in-place culvert conveying an irrigation channel. The existing culvert will need to be extended, and will require analysis for additional loading from the causeway fill and may require strengthening or replacement. Extending and / or replacing two other culverts north of the railroad corridor may be required for the new NM 109 alignment and proposed access road.

Access roads north and south of the railroad corridor will be constructed for adjacent property owners. To the South, access to the old NM 109 will be constructed off of Audra Court. Access to Duke Road and Benavidez Road will be provided off the proposed NM 109. North of the railroad, access to the old NM 109 will be gained at the Gallegos Road intersection. All access roads will include two 12 ft. lanes with two 4 ft. shoulders.

The proposed bridge for Alternative C is a 3-span precast, prestressed concrete beam bridge with a cast-in-place concrete deck to span the BNSF corridor and existing irrigation channel. To provide lateral clearance through the rail corridor, individual span lengths of 128 ft., 115 ft. and 80 ft. are anticipated. Each span is configured with five-lines of 72 inch deep prestressed concrete beams. The bridge deck surface width is 34ft. and consists of two 12 ft. driving lanes and two 5 ft. shoulders. Confining the driving lanes and shoulders on the deck are two 42 inch tall concrete barrier railings, each incorporating a wire fence compatible with railroad guidelines.

Construction of the bridge deck is assumed to utilize stay-in-place decking forms as a method of accelerated bridge construction (ABC). Eliminating the removal of conventional timber decking forms from above in-service tracks would save time and could provide cost savings for the project.

Foundation units supporting the superstructure components are assumed as cast-in-place concrete pier frames and cast-in-place concrete abutments. Drilled shaft deep foundations are used as support for the pier frames and driven piles are used at the abutments. Each substructure incorporates a 27 degree skew angle to accommodate the roadway and rail alignments and each pier will incorporate a crash-strut for rail impact protection.

Alternative D

Alternative D represents an off-line overhead grade separation to be constructed west of the in-place NM 109 crossing. For this alternative, the proposed NM 109 alignment is offset from the in-place alignment approximately 750 ft. This proposed alignment is designed to potentially minimize impacts to dwellings adjacent to the railroad corridor.

Alternate D will employ the same typical section geometry as Alternate C. Also similar to Alternate C, both roadway approaches will employ a concrete paving section and incorporate a cast-in-place retaining wall system to minimize right-of-way impacts. The retaining walls are located along the east side of the roadway alignment for Alternate D.

North of the BNSF corridor, construction of new culverts will be required to convey in-place irrigation channels through the proposed embankment. Precast concrete box culverts are assumed for this purpose. Extension of an in-place culvert will be required where the proposed alignment ties back into the existing roadway. An in-kind extension is anticipated at this location.

Access roads north and south of the railroad corridor will be constructed for adjacent property owners utilizing the in-place NM 109. To the South, access to existing NM 109 will be constructed off of Trujillo Road. Access to Duke Road and Benavidez Road will be provided off the proposed NM 109. North of the railroad, access to Gallegos Road and the in-place NM 109 will be provided from the new alignment. All access roads will include two 12 ft. lanes with two 4 ft. shoulders.

The proposed bridge for Alternative D is a 6-span precast, prestressed concrete beam bridge with a cast-in-place concrete deck to span the railroad corridor and an existing irrigation channel. The geometry requires the entire bridge section to be located within a horizontal curve section of the alignment. To provide lateral clearance through the rail corridor, individual span lengths measured along the centerline alignment of 128 ft., 71 ft., 105 ft., 110 ft., 110 ft., and 60 ft. are anticipated; however, individual beam lengths and foundation skews will vary resulting in a complicated superstructure geometry. Each span is configured with five-lines of 72 inch deep prestressed concrete beams. The bridge deck surface width is 34 ft. and consists of two 12 ft. driving lanes and two 5 ft. shoulders. Confining the driving lanes and shoulders on the deck are two 42 inch tall concrete barrier railings, each

incorporating a wire fence compatible with railroad guidelines. ABC techniques for bridge deck construction identified for Alternate C are included.

Foundation units supporting the superstructure components are assumed as cast-in-place concrete pier frames and cast-in-place concrete abutments. Drilled shaft deep foundations are used as support for the pier frames 2, 3, and 4 through the rail corridor. These piers also incorporate a crash-strut for rail impact protection. For consistency, and to limit the foundation footprint adjacent to the existing irrigation channel, drilled shaft deep foundations will be used at piers 5 and 6 as well. Crash-strut pier protection will not be required at these locations however. Driven pile deep foundations are used at the abutments. Piers 1, 2, and 3 incorporate skew angles to accommodate the rail alignments while the remaining foundations are positioned radially to the roadway alignment.

Alternative E

Alternative E represents an off-line overhead grade separation to be constructed east of the in-place NM 109 crossing. For this alternative, the proposed NM 109 alignment is offset from the in-place alignment approximately 500 ft. This proposed alignment is intended to limit the overall project impacts by following Trujillo Road to the greatest extent possible.

Alternate E will employ the same typical section geometry as Alternates C and D. Both roadway approaches will employ a bituminous paving section within the slope supported embankment region and a concrete paving section within the cast-in-place retaining wall region. To minimize right-of-way impacts, retaining walls are located along the east and west sides of the roadway alignment, north of the rail corridor.

North and south of the BNSF corridor, construction of new culverts will be required to convey in-place irrigation channels through the proposed embankment. Precast concrete box culverts are assumed for this purpose. Extension of an in-place culvert may be required where the proposed alignment ties back into the existing roadway north of the railroad corridor. An in-kind extension is anticipated at this location.

Access roads north and south of the railroad corridor will be constructed for adjacent property owners by utilizing the in-place NM 109 alignment. To the South, access to existing NM 109 and Trujillo Road east of the proposed bridge will be constructed off the proposed NM 109 alignment. North of the railroad, access to Gallegos Road and the in-place NM 109 will be provided from the new alignment. All access roads will include two 12 ft. lanes with two 4 ft. shoulders.

The proposed bridge for Alternative E is a 3-span precast, prestressed concrete beam bridge with a cast-in-place concrete deck to span the railroad corridor and an existing irrigation channel. The geometry is the simplest of the three Alternates with individual span lengths of approximately 104 ft., 102 ft. and 72 ft. anticipated. Each span is configured with five-lines of 72 inch deep prestressed concrete beams. The bridge deck surface width is 34 ft. and consists of two 12 ft. driving lanes and two 5 ft. shoulders. Confining the driving lanes and shoulders on the deck are two 42 inch tall concrete barrier railings, each incorporating a wire fence compatible with railroad guidelines. ABC techniques for bridge deck construction identified for Alternate C are included.

Foundation units supporting the superstructure components are assumed as cast-in-place concrete pier frames and cast-in-place concrete abutments. Drilled shaft deep foundations are used as support for the pier frames and driven piles are used at the abutments. Each substructure is square to the roadway alignment and each pier will incorporate a crash-strut for rail impact protection.

Alternative G – No Build

The No-Build alternative assumes that improvements to address the identified transportation needs would not be implemented. Traffic delays due to rail operations through the at-grade crossing would continue and increased disruptions would be anticipated following installation of additional tracks proposed with the planned expansion of the rail facility.

VII. Engineering and Environmental Evaluation of Alternatives

Design Year Traffic Forecasts

Design year traffic forecasts on NM 109 within the study area were obtained from the NMDOT Traffic Monitoring Division. The existing 2020 AADT volume on NM 109 is 1759 vpd. Design year 2040 AADT volume is forecast to be 2323 vpd. This represents a growth rate of approximately 1.4% per year. Truck volume is reported at 6% of AADT, or 105 vpd in 2020 and 139 vpd in 2040. Conversely, cars represent 1654 vpd in 2020, and 2184 vpd in 2040.

The design year 2040 AADT volume of 2323 vpd is well within the 2,800 vpd capacity of a two-lane rural highway per the Highway Capacity Manual.

Access Analysis

NM 109 in the project area provides access to numerous driveways and several cross streets. NM 109 is a two-lane rural Major Collector posted at 40 mph. Per the NMDOT State Access Management Manual, full access intersections are ideally spaced a minimum of 660 ft. apart, driveways spaced a minimum of 300 ft. apart, and driveways spaced no closer than 300 ft. to an adjacent intersection. Alternatives C, D, and E all exhibit access management improvements compared to the existing condition to varying degrees.

Alternative C:

- 3 intersections are spaced less than 660 ft. apart (200 ft., 350 ft., 500 ft.).
- 8 driveways are spaced less than 300 ft. apart.
- 4 driveways are spaced less than 300 ft. from an adjacent intersection.

Alternative D:

- 4 intersections are spaced less than 660 ft. apart (640 ft. & 370 ft.)
- 7 driveways are spaced less than 300 ft. apart.
- 3 driveways are spaced less than 300 ft. from an adjacent intersection.

Alternative E:

- 2 intersections are spaced less than 660 ft. apart (600 ft.)
- 13 driveways are spaced less than 300 ft. apart.
- 4 driveways are spaced less than 300 ft. from an adjacent intersection.

The possible need for left and right turn lanes on NM 109 for Alternatives C, D and E was evaluated as part of the study and was determined turn lanes were not warranted up through the 2040 time frame based on the criteria as outlined in the NMDOT State Access Management Manual. Less than an average of 21 vph turn left, and less than 31 vph turn right from either SB or NB NM 109 in Alternatives C, D, or E.

Structure Maintenance and Inspection (M&I)

Structure maintenance and inspection involved the annual inspection and future maintenance of the bridge structures and retaining wall systems during their respective lifespans. The metric used to assign a rating is the length of bridge structure. Longer bridges are anticipated to require greater effort to inspect and maintain and are rated accordingly.

Structure maintenance and inspection ratings are presented in Table 7.1-2.

Drainage Analysis

Drainage impacts developed in the Phase I A evaluation are presented. Refined analysis of this metric was not warranted.

Constructability Analysis

Each of the three Alternatives is configured such that NM 109 may remain largely open through construction with limited disruptions anticipated for transitioning between the existing and proposed works. Accordingly, the constructability metric is not a differentiating component of the Alternatives, at least as it pertains to NM 109.

Impacts to the local roadway system, however, do vary between the Alternatives, and the demands placed on Trujillo Road warrant discussion. Currently, the cross-section of Trujillo Road will not accommodate the design speed of 40MPH; thus, a widening of the section is required. Construction of the widening will require partial closure of Trujillo Road with access to local residences to remain disrupted by the activity. As such, a Negative Impact is assigned to Alternate E for this metric while the other two are assigned a neutral designation.

Right-of-Way Requirements

For each alternative considered, approximate ROW requirements were determined using parcel boundaries recovered from the Valencia County GIS database. For each alternative, the construction limits were compared against the parcel map and impacted properties identified. If any portion of the project's finished footprint engaged an in-place structure, the entire parcel was identified for acquisition. If the finished footprint engaged a portion of private property without engaging a structure, a portion of the parcel was identified for acquisition by adding a buffer to the construction limit. Determination of the overall ROW take requirement was estimated by summing the total area of each individual impacted property.

Utility Impacts

Utility impacts developed in the Phase I-A evaluation are presented. Refined analysis of this metric was not warranted.

Construction Costs

A cost was determined for each alternative with ratings assigned based on the calculated amount. Using the concept plans developed for each alternative, quantities for standard NMDOT bridge and roadway construction pay items were calculated. Overall construction costs were generated using reported average unit pricing values from 2019.

Construction costs also include estimates for property acquisitions where required. To develop, a common unit price of \$50,000 per acre, \$200,000 per residence were used.

See Table 7.1-2 for the cost ratings. Construction cost calculations are provided in Appendix E and include a 20% allowance for taxes and contingencies.

Environmental Analysis

Analysis of potential environmental impacts primarily considers factors such as residential relocations, changes in access and property utilization, increased noise, visual impacts, and cultural resources. Because of the developed condition of the project area, natural resource impacts are anticipated to be relatively minor for all the alternatives. None of the alternatives are expected to affect threatened or endangered species, critical habitat, wetlands, or riparian areas, although all would require removing trees and vegetation that potentially provide nesting sites for migratory birds. All the alternatives cross irrigation ditches, but irrigation flows, operation of the ditches, and access would be accommodated with appropriate crossing structures. All of the alternatives could require de-watering of

groundwater during construction, which would be regulated under the NPDES program of the CWA. Cultural resource issues include potential impacts to the setting and feeling of historic properties such as portion of the Camino Real, the Sanchez Drain, Arroyos Ditch, Waste Ditch, and the Belen Cutoff of the AT&SF Railway. Potential environmental impacts for each of the alternatives are discussed below.

Alternative C:

- **Relocations:** This alternative would require taking up to 13 residences and four outbuildings on the east side of NM 109 and acquiring 13 acres of land. The relocations would disrupt the lives of those affected; however, some owners have indicated a desire to have their properties purchased. Acquisitions would follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, which ensures fair compensation to property owners. Specific investigations for hazardous materials such as asbestos would be required for the structures acquired.
- **Access:** South of the railroad tracks, access to the residential properties on the west side of NM 109 would be maintained by providing a connection from Audra Court to existing NM 109, which would be cul-de-saced at the railroad tracks. The residences east of those taken would be provided access via a new road that would connect to NM 109 and terminate at a cul-de-sac south of the railroad tracks. On the north side of the railroad, existing NM 109 would be maintained to provide access and would connect to a new intersection on the west side at Gallegos Road. This section of NM 109 would extend to a cul-de-sac on the north side of the tracks. Overall, adequate access to properties that are not acquired would be maintained and unusable remnant properties would not be created.
- **Noise:** Raising the elevation of NM 109 at the railroad crossing would project noise outward into the surrounding neighborhoods, which could impact adjacent residences that are now buffered from roadway noise. Although traffic volumes and speeds are expected to remain relatively low on NM 109, noise abatement may be needed if noise levels increase substantially as a result of the project. Railroad noise would continue with all of the alternatives and likely increase with the expanded number of tracks.
- **Visual:** The project would result in a large structure visible in the surrounding area. The NM 109 overpass would block views for residence on both sides of the roadway and create shadow areas during some parts of the day.
- **Natural Resources:** This alternative would require removing numerous trees along the Belen Waste Ditch and Arroyos Ditch. New crossings of the Arroyos Ditch and Sanchez Drain would also be needed.
- **Cultural Resources:** This alternative could impact 24 buildings or structures that are greater than 50 years old; including physical impacts of up to 13 residences and four outbuildings on the east side of NM 109, with additional buildings or structures in the project area that could include visual, auditory or vibration impacts. None of these buildings, however, retain sufficient integrity to be considered historic properties. The proposed overpass on NM 109 over the railroad would modify the alignment of this portion of the Camino Real (SR 1952); however, the setting and feeling for this portion of the Camino Real has already been impacted with modifications to the historic buildings, acequias and railroad in the area, therefore it is unlikely that this alternative would be considered an adverse effect to the likely eligibility of this portion of the Camino Real under Criterion A. There are three acequias (Sanchez Drain [LA 116045], Arroyos Ditch [LA 116046], and Belen Waste Ditch [LA 116047]) that would be impacted, although the impacts would be limited to placing minor portions of the acequias in culverts, which is unlikely to have an adverse effect on their overall historic integrity and likely NRHP eligibility under Criteria A and C. The AT&SF segment

(HCPI 31896) segment from Madrone to Belen, has already been modified extensively with multiple tracks added in the last 120 years, therefore this alternative and the proposed overpass would not likely be an adverse effect to the railroad's setting, feeling, and likely NRHP eligibility under Criterion A.

- **Overall Environmental Rating:** Alternative C would have moderately high overall environmental impacts due to the high number of relocations. Construction of the bridge structure adjacent to numerous existing residences would have visual impacts and change the character of the area. Alternative C would have the advantage of maintaining NM 109 along its existing alignment rather than intruding into rural-residential neighborhoods that are currently buffered from the roadway's traffic, noise and activity. This alternative is expected to have relatively minor natural or cultural resource impacts.

Alternative D:

- **Relocations:** Alternative D would require relocation of up to four residences and one outbuilding on the west side of NM 109, and acquisition of 30 acres of land. Acquisitions would follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Specific investigations for hazardous materials such as asbestos would be required for the structures acquired.
- **Access:** South of the railroad, existing NM 109 would be reconnected to Trujillo Road and terminated at a cul-de-sac south of the tracks; access would remain unchanged for the properties along NM 109. Access to other properties south of the tracks would be provided with connections to the new NM 109 alignment or a new access route connecting to Audra Court. Because the new alignment of NM 109 would cut diagonally across existing properties, it would create several remnant parcels that may be unusable and subject to acquisition as part of the project. On the north side of the tracks, the new NM 109 alignment would cross vacant land. Existing NM 109 would connect to the new alignment via a new intersection and end north of the tracks in a cul-de-sac. Much of the new NM 109 alignment north of the tracks would be built on a fill section, which would limit access to adjacent property. The BNSF Railway owns most of the property affected in this area, but one apparent private parcel in agricultural use would be bisected and acquired as part of the project.
- **Noise:** Potential noise impacts from Alternative D would be similar to Alternative C, except that the surrounding area likely experiences less traffic noise from NM 109 under current conditions.
- **Visual:** Alternative D would introduce a large structure visible in the surrounding area, similar to the other alternatives. However, this alternative would be immediately adjacent to fewer existing residences, thus it would have less impact on views and a shadow effect.
- **Community Character:** Alternative D would remove 3 residences and likely render some vacant property unusable. It would result in a large structure within a rural residential area; however, much of the land on the north side of the tracks is vacant.
- **Natural Resources:** This alternative would require removing trees and vegetation on private property and would affect several properties in current agricultural use. New crossings of the Arroyos Ditch, Belen Waste Ditch, and Sanchez Drain would be needed.
- **Cultural Resources:** Alternative D This alternative could impact 18 buildings or structures that are greater than 50 years old; including physical impacts of up to four residences and one outbuilding, with additional buildings or structures in the project area that could include visual, auditory or vibration impacts. None of

these buildings, however, retain sufficient integrity to be considered historic properties. The proposed overpass of the railroad west of NM 109 would change the visual setting for this portion of the Camino Real (SR 1952) and modify the alignment by creating a cul-de-sac north and south of the railroad. The setting and feeling for this portion of the Camino Real, however, has already been impacted with modifications to the historic buildings, acequias and railroad in the area, therefore it is unlikely that this alternative would be considered an adverse effect to the likely eligibility of this portion of the Camino Real under Criterion A. Potential impacts to the three acequias (Sanchez Drain [LA 116045], Arroyos Ditch [LA 116046], and Belen Waste Ditch [LA 116047]) and AT&SF segment (HCPI 31896) would be the same as under Alternative C.

- **Overall Environmental Rating:** Alternative D would have relatively low environmental impacts compared to the other alternatives due to the low number of relocations. Construction of the bridge structure would occur on rural-residential land that is currently buffered from existing NM 109, which would have visual impacts and change the character of the area. However, this area is relatively low density and vacant on the north side of the railroad tracks. Alternative D is expected to have relatively minor natural or cultural resource impacts.

Alternative E:

- **Relocations:** Alternative E would require taking eight residences and two outbuildings, and acquiring 20 acres of land. Most of the residential relocations are along Trujillo Road, which is too narrow to accommodate the proposed cross section of the new NM 109 alignment. As with the other alternatives, acquisitions would follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and require investigations for hazardous materials.
- **Access:** On the south side of the tracks, existing NM 109 and the northern end of Trujillo Road would be reconnected to the new alignment via new intersections. Remnant properties along existing Trujillo Road would presumably have access to the new NM 109 alignment; however, several properties adjacent to the fill section south of the tracks may be rendered unusable or acquired as part of the project. On the north side of the railroad, the old alignment of NM 109 would be reconnected to the new roadway at Gallegos Road and terminated in a cul-de-sac north of the tracks. The south end of Lazy Hollow Lane would be cut off. Several properties around the fill section on the north side of the tracks would be rendered unusable and acquired as part of the project.
- **Noise:** Potential noise impacts from Alternative E would be similar to Alternative D; the surrounding area likely experiences less traffic noise from NM 109 under current conditions.
- **Visual:** Alternative E would introduce a large structure visible in the surrounding area, similar to the other alternatives. This alternative is adjacent to numerous existing residences.
- **Community Character:** Alternative E would remove 8 residences and 2 outbuildings, include many along Trujillo Road, and likely render some vacant property unusable. It would result in a large structure within the residential neighborhood that remains along Trujillo Road and the neighborhood along Lazy Hollow Lane.
- **Natural Resources:** This alternative would require removing trees and vegetation along the Belen Waste Ditch and Arroyos Ditch and would affect several properties in current agricultural use. New crossings of the Arroyos Ditch and Belen Waste Ditch would be needed.

- **Cultural Resources:** Alternative E could impact 18 buildings or structures that are greater than 50 years old; including physical impacts of up to eight residences and two outbuildings, with additional buildings or structures in the project area that could include visual, auditory or vibration impacts. None of these buildings, however, retain sufficient integrity to be considered historic properties. The proposed overpass of the railroad east of NM 109 would change the visual setting for this portion of the Camino Real (SR 1952) and modify the alignment by creating a cul-de-sac north and south of the railroad. The setting and feeling for this portion of the Camino Real, however, has already been impacted with modifications to the historic buildings, acequias and railroad in the area, therefore it is unlikely that this alternative would be considered an adverse effect to the likely eligibility of this portion of the Camino Real under Criterion A. Potential impacts to the three acequias (Sanchez Drain [LA 116045], Arroyos Ditch [LA 116046], and Belen Waste Ditch [LA 116047]) and AT&SF segment (HCPI 31896) would be the same as under Alternative C.
- **Overall Environmental Rating:** Alternative E would have high environmental impacts due to the number of relocations and construction of the bridge structure within the residential areas that remains along Trujillo Road and Lazy Hollow Lane. These are relatively buffered neighborhoods and the project would have visual impacts and change the character of the area. Alternative E is expected to have relatively minor natural or cultural resource impacts.

VIII. Refined Evaluation Matrix and Phase B Recommendations

[Refined Evaluation Matrix](#)

Table 7.1-1 Rating Criteria

Rating	Value	Description
↑↑	+2	Very Positive Effects
↑	+1	Positive Effects
↔	0	Negligible or No Effects
↓	-1	Negative Effects
↓↓	-2	Very Negative Effects

Table 7.1-2 Refined Evaluation Matrix

Criteria	Alternative C	Alternative D	Alternative E	Alternative G (No Build)
Responsiveness to the Purpose and Need	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↑↑ (Grade Separation)	↓↓ (At-grade Crossing)
Structure Inspection and Maintenance	↔ (330 ft. bridge)	↓↓ (584 ft. Bridge) (Curved Alignment)	↑ (284 ft. Bridge)	(None)
Right-of-Way Feasibility	↑ (13 Acres)	↓ (30 Acres)	↔ (20 Acres)	(None)
Structure Impacts	↓ (13 Relocations)	↑↑ (4 Relocations)	↔ (8 Relocations)	(None)
Utility Impacts	↔ (None)	↔ (None)	↔ (None)	(None)
Drainage Impacts	↔	↓	↔	(None)
Impacts to NM 109 and Other Local Roads	↑ (Temp. at Limits)	↑ (Temp. at Limits)	↓ (Temp. at Limits) (Trujillo Road Impacts)	(None)
Impacts to Environment/Community	↓↓	↔	↓↓	(None)
Access Impacts	↑ (15 Impacts)	↑↑ (14 Impacts)	↔ (19 Impacts)	↓↓ (50 Impacts)

Table 7.1-2 Refined Evaluation Matrix, Continued

Criteria	Alternative C	Alternative D	Alternative E	Alternative G (No Build)
Impacts to Rail Service	↔ (Track Protection)	↓ (Track Protection) (Track Closure) (OH Signal Relocation)	↔ (Track Protection)	(None)
Public Input	↑↑ (4 Positive) (0 Negative)	↔ (1 Positive) (0 Negative)	↓ (1 Positive) (1 Negative)	(0 Positive) (3 Negative)
Cost	↔ (\$27.0 Million)	↑ (\$26.6 Million)	↓ (\$30.2 Million)	\$0.0 Million
Total	+4	+3	-1	

Conclusions and Phase B Recommendations

Preferred Alternative

Using the analysis presented herein, and the rating of Alternatives according to the evaluation metrics summarized in the Refined Evaluation Matrix, the Preferred Alternative for the NM 109, Jarales Road Grade Separation project is Alternative C. This alternative meets the Project's Purpose and Need and provides the best solution when assessed according to the evaluation metrics considered. Specifically, Alternative C has the following favorable characteristics associated with the defining metrics:

Structure Maintenance and Inspection

The bridge length associated with Alternate C is 330 ft. which is approximately 16% longer than the Alternative E Bridge at 284 ft.; thus constituting the preferred ranking of Alternate E over Alternate C. Both bridges are three-span structures, so consideration of substructure units is neutral, even though the substructures of Alternate C incorporate a skew. When compared to the Alternate D Bridge, however, Alternative C and E structures are preferred as the overall length required to cross the railroad corridor and corresponding complexity of building a bridge on a curved alignment yield the greatest anticipated maintenance and inspection requirements.

Right-of-Way Feasibility

The anticipated Right-of-Way required to construct Alternative C is 13 acres. This is approximately 43% of that required for Alternative D and 65% of that required for Alternative E.

Drainage Impacts

Drainage impacts associated with Alternate C require extension of two existing culvert crossings and construction of one new culvert. These impacts are less than those associated with Alternate D which requires extension of one culvert and construction of two new culverts, and Alternate E which requires construction of two new culverts.

Impacts to NM 109 and Other Local Roads

Alternatives C and D may both be largely constructed off-line while traffic is maintained on the existing NM 109 alignment. As such, the impacts to the NM 109 and the adjacent local roads is not a defining feature for these two. When compared to Alternate E, however, Alternates C and D are preferred as reconstruction of Trujillo Road is necessary for this Alternate to be feasible.

Impacts to Rail Service

The Alternative D alignment requires construction of the NM 109 Bridge at a location that interferes with an existing signal bridge within the rail yard. For Alternative D to be feasible, this signal bridge would have to be relocated, creating a problematic condition for maintenance of rail operation. In addition, the pier locations associated with Alternatives C and E allow the substructure construction to occur outside of the existing track alignments. The widened railroad corridor at the Alternative D crossing location, however, requires one of the new piers to be constructed between existing active tracks. This condition requires additional track closures and disruptions to rail operations when compared to the other Alternatives and is therefore considered significantly inferior.

Public Input

In general, comments received following the public meeting indicate strong support for construction of a new grade separated crossing. The responses indicate a mix of preferences between the various Alternatives considered. Alternative C, however, stood out as having the highest number of positive comments.

Recommended Level of Environmental Documentation

The preferred alternative would have some community impacts and possible cultural and natural resource impacts pending further detailed investigations; however, there appears to be widespread public support for the project because of the need for enhanced safety, emergency responsiveness, access and mobility, and transportation system connectivity. Based on current NMDOT and FHWA practices, the recommended level of effort for the environmental documentation is a categorical exclusion with supporting natural and cultural resource reports and environmental studies.