NM 500 Rio Bravo Bridge Replacement

M.P. 8.80 to M.P. 10.50

Phase IA/B Alignment Study Report

Bernalillo County, New Mexico

Control No. A301000

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NM 500 Rio Bravo Bridge Replacement

M.P. 8.80 to M.P. 10.50

NMDOT CN A301000
Bernalillo County, New Mexico

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Introduction and Background

The NM 500/Rio Bravo Boulevard Bridge Replacement project is located along NM 500/Rio Bravo Boulevard between Isleta Boulevard/NM 314 and 2nd Street/NM 303. The project limits include the two bridges carrying Rio Bravo Boulevard over the Rio Grande and the two bridges carrying Rio Bravo Boulevard over the Middle Rio Grande Conservancy District (MRGCD) Albuquerque Riverside Drain east of the Rio Grande. The proposed roadway improvements will tie into the intersections of Rio Bravo Boulevard and Isleta Boulevard and Rio Bravo Boulevard and 2nd Street; improvements to these intersections are not included in this project. Completion of these projects will result in a six-lane, multi-modal arterial from Isleta Boulevard to I-25.

Project Purpose and Need

The purpose of the proposed improvements is to address structural deficiencies of the existing bridges over the Rio Grande and Albuquerque Riverside Drain, to reduce congestion, and to improve multi-modal transportation system connectivity within the project limits. Rio Bravo Boulevard is a critical east-west route in Albuquerque's South Valley and is one of seven crossings of the Rio Grande in the Albuquerque metro area.

Public and Agency Coordination

The Phase IA/B study process included agency and stakeholder coordination to identify needs and key issues so they could be addressed in the collaborative development of the proposed improvements. The Federal Highway Administration (FHWA) is the lead agency for National Environmental Policy Act (NEPA) compliance, with NMDOT as the project proponent acting on behalf of FHWA. Coordination was undertaken with other federal, state, and local agencies with jurisdiction and/or responsibility for lands and resources within the project area as well as members of the local community.

The project team held a public involvement meeting on Wednesday, December 9, 2020. The structure and content of the public meeting was a virtual meeting platform scaled to the context of the local community and the project purpose and need. In addition, the project team conducted interviews with eight property owners in June 2021 to discuss the project with those adjacent to the Rio Bravo Boulevard corridor. Common concerns centered around noise from traffic and trucks along the corridor, impacts from construction traffic through local neighborhoods, drainage and flooding concerns, Dean Road and Rio Bravo Blvd intersection safety, impacts to properties, safety of the nearby properties and crime, pedestrian and bicycle access, and continued notifications of public meetings and project updates to the local property owners.

Bridge Alignment Alternatives

During the initial screening of alternatives, which focused on the bridges, a variety of different bridge alignments for Rio Bravo over the Rio Grande were considered. Nine alignments were compared qualitatively to arrive at a final, recommended alignment. These Rio Grande Bridge alignment alternatives consisted of the following:

- Alternative 0 - No Build
- Alternative 1 - Replace the Eastbound Bridge and Rehabilitate the Westbound Bridge
- Alternative 2 - In-Line Replacement
- Alternative 3 - North New Alignment
- Alternative 4 - Split Bridge
- Alternative 5 - North Curved Offset
- Alternative 6 - North Straight Offset
- Alternative 7 - South Curved Offset
- Alternative 8 - Bridge Rehabilitation

After comparing factors such as consistency with project purpose and need, initial construction costs, life cycle costs, constructability and MOT, ROW impacts, Environmental considerations, utility phasing, multi-modal considerations, drainage requirements, roadway geometry and public and stakeholder input, Alternative 6, which replaces the current bridges with straight bridges offset to the north by half of the roadway width, was chosen as the recommended alignment to advance for more detailed alternatives evaluation.

Improvements to Advance to Phase IC and Phase ID

The recommended improvement alternatives proposed for advancement to Phase IC and ID of the project are summarized below. In addition to this, retaining walls and pedestrian access were also reviewed, though a formal comparison was not performed for those alternatives.

Number and Continuity of Bridges

One bridge crossing the Rio Grande and one bridge crossing the Albuquerque Drain is the recommended alternative, instead of building one continuous bridge, or separating directions of traffic on parallel bridges.

Albuquerque Riverside Drain and Bridge

Replacing the bridge with a two-span, prestressed concrete slab girder bridge and replacing the open portion of the drain with a continuous culvert pipe that crosses under Poco Loco Drive, the Rio Bravo Bridge, and Dean Road, is the recommended alternative.

Rio Grande Bridge Replacement

A 14-span bridge with 60" simple span steel plate girders was chosen as the recommended alternative.

Atrisco Riverside Drain and West Abutment Location

The recommended alternative includes locating the west abutment behind the west levee, placing the first pier in line with the levee, leaving the Atrisco Riverside Drain culvert in place and extending it to the north, demolishing the existing CBC, and aligning the access road under the first bridge span.

Environmental Clearance Level of Effort

During Phase IC, an environmental clearance document evaluating the preferred alternative and its impact on the human and natural environment will be prepared. This documentation and associated analysis will comply with the NEPA as well as the requirements of 23 CFR Part 771, Federal Highway Administration (FHWA) Technical Advisory T6640.8A, the current NMDOT Location Study Procedures, and other applicable guidelines and regulations. The NEPA analysis will be supported by research and environmental resource investigations performed during Phase IA/B and Phase IC to document pertinent environmental conditions within the project limits.

The NMDOT has applied federal funding to this project, which makes FHWA the lead federal agency for meeting all requirements of NEPA. Under the stewardship and oversight agreement between the FHWA and NMDOT, the NMDOT assumes the authority of the FHWA for project responsibilities. Multiple federal and state agencies have regulatory authority or land management responsibilities within or adjacent to the corridor. These agencies have roles as participating agencies and have not been invited to serve as cooperating agencies to carrying out the NEPA process. The recommended alternatives would require acquiring right-of-way. This process would entail a license agreement issued by MRGCD and co-signed by the Bureau of Reclamation (BOR).

Based on an initial review of potential impacts to the human and natural environment during Phase IA/B and input from agencies to date, it is anticipated that the appropriate level of effort for environmental clearance and NEPA compliance would be a Categorical Exclusion document.

Introduction

This report documents the investigations, analyses, and findings for the NM 500/Rio Bravo Boulevard Bridge Replacement Alignment Study performed for CN A301000. The Federal Highway Administration (FHWA) is the lead federal agency for meeting all requirements of National Environmental Policy Act (NEPA). The New Mexico Department of Transportation (NMDOT) is the project proponent and acts on behalf of FHWA. In addition, coordination was undertaken with other federal, state, and local agencies with jurisdiction and/or responsibility for lands and resources within the project area as well as members of the local community.

Project Limits

This project is located along NM 500/Rio Bravo Boulevard between Isleta Boulevard/NM 314 and 2nd Street/NM 303, as shown in the vicinity map, **Exhibit 1-1**. The project limits include the bridges carrying Rio Bravo Boulevard over the Rio Grande and the Middle Rio Grande Conservancy District (MRGCD) Albuquerque Riverside Drain east of the Rio Grande, and the roadway segments on both sides of the bridges. The proposed improvements will tie in east of Isleta Boulevard and west of 2nd Street with no permanent impacts to these intersections; thus, improvements to these intersections are not included in this project.

Exhibit 1-1 illustrates the proposed limits of the permanent improvements. Temporary construction impacts are expected to extend beyond the permanent improvements, which are currently reflected by the west project limit at MP 8.80 and the east project limit at MP 10.50. The formal beginning of project (BOP) and end of project (EOP) limits will be established as part of preliminary and/or final design so that the limits of the proposed action can be appropriately defined to address National Environmental Policy Act (NEPA) requirements. The resulting BOP and EOP limits in the State Transportation Improvement Program (STIP) and the Mid-Region Council of Governments (MRCOG) Transportation Improvement Program (TIP) will also be updated/finalized in final design.

Adjacent Projects

Bernalillo County Public Works is currently developing two projects immediately east of this project as follows:

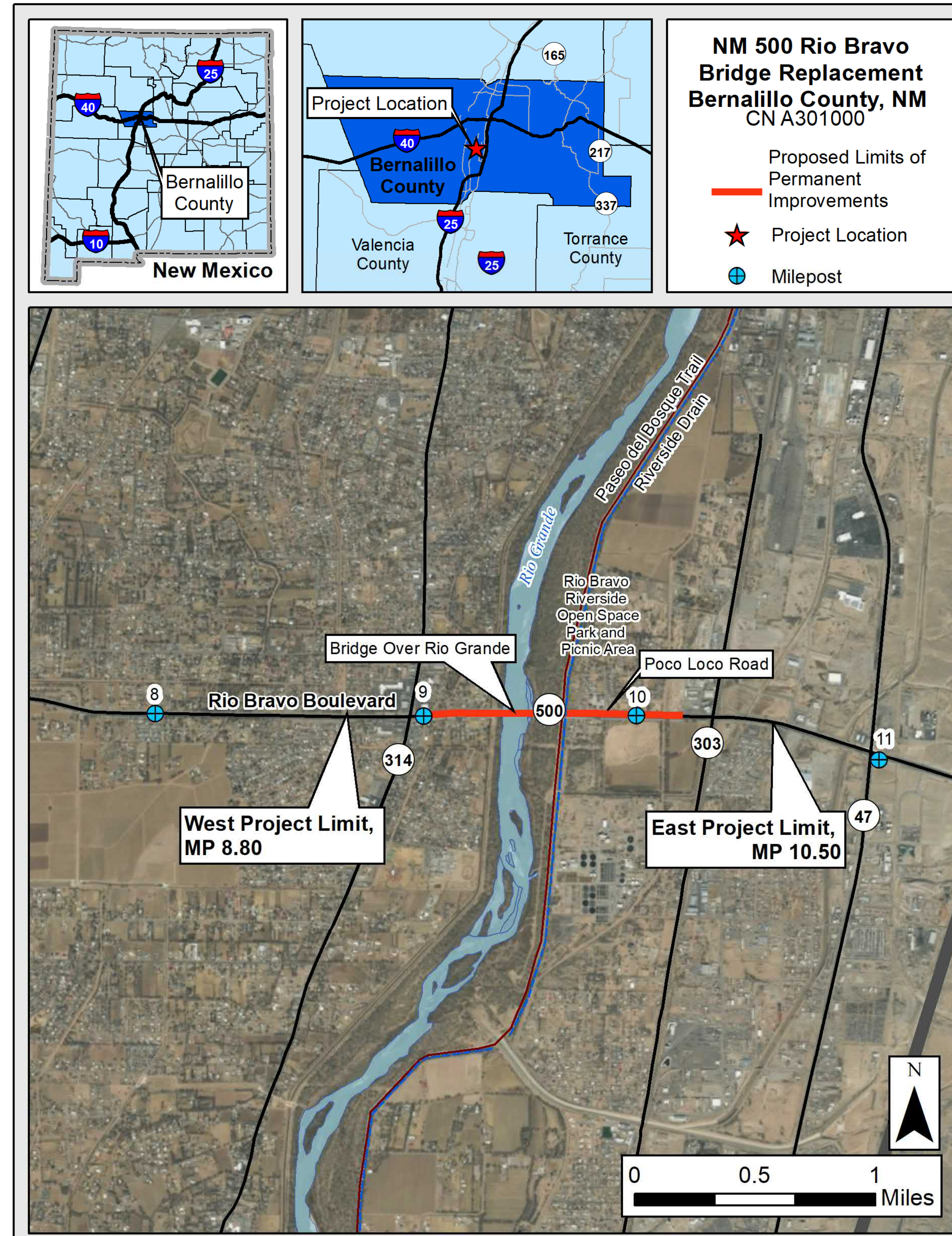
- CN A300942, NM 500 Rio Bravo Boulevard and 2nd Street Improvements. This project involves intersection improvements to widen NM 500 to three lanes in each direction along with additional turn lanes, traffic signal and lighting improvements, and pedestrian and bicycle facilities. It is currently programmed in fiscal year (FY) 2022.
- CN A300945, NM 500 Rio Bravo Gap Widening Improvements – This project extends from 2nd Street to the South Diversion Channel and includes design and construction of two additional travel lanes (4 to 6 lanes), multi-use trail connections, sidewalks, bike lanes, lighting, and traffic signal upgrades. It is currently programmed in FY 2023.

Completion of the NMDOT and Bernalillo County projects will result in a six-lane, multi-modal arterial from Isleta Boulevard to I-25.

Purpose of Alignment Study

The primary purpose of this alignment study is to document the process used to identify the proposed improvement approach to addressing the project needs. The alignment study process serves to: (1) identify and evaluate the specific problems and conditions within the project area that may require improvements to the existing bridges, roadways, and drainage systems; (2) identify and evaluate improvement alternatives; and, (3) identify the proposed improvement approach. This process includes agency and stakeholder coordination to identify needs and key issues and address them in the collaborative development of the proposed improvements.

Exhibit 1-1: Vicinity Map and Project Limits

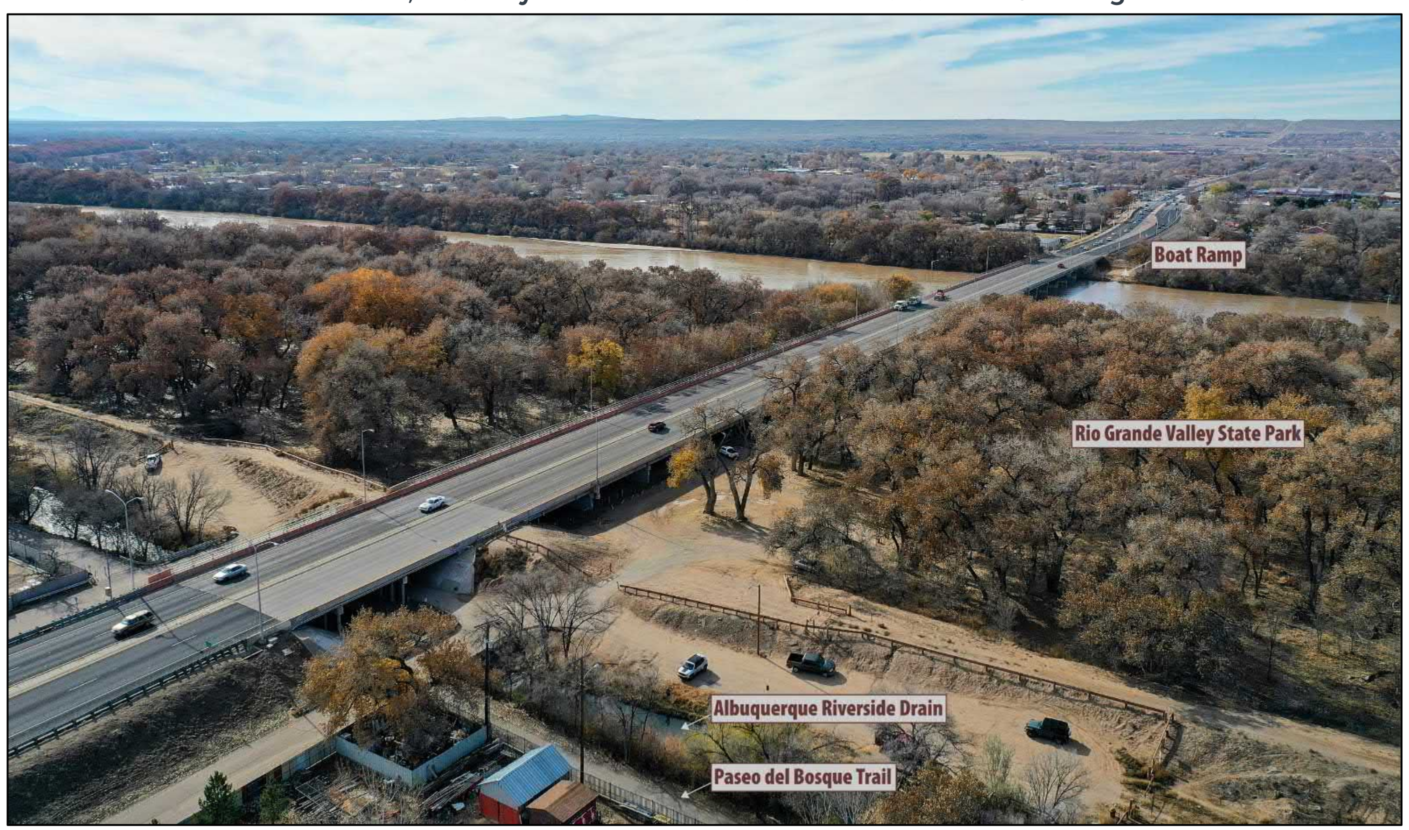


This alignment study was developed per the Phase IA and IB guidelines of the NMDOT *Location Study Procedures* (LSP) — the NMDOT's process for project development from the planning phase through environmental documentation and preliminary design. The LSP process is consistent with the *National Environmental Policy Act* (NEPA) of 1966 (as amended), FHWA's *Environmental Impact and Related Procedures* (23 CFR 771), and federal statewide planning regulations (23 CFR 450, Subpart B). This document is a combined Phase IA/B report.

Project Setting

Rio Bravo Boulevard is a critical east-west route in the Albuquerque's South Valley and is one of seven crossings over the Rio Grande. Over 30,000 vehicles currently use this four-lane segment of Rio Bravo Boulevard daily to commute to work, for goods movement, and to access local businesses and other destinations. There are four bridges within the project limits, over the Rio Grande and MRGCD Albuquerque Riverside Drain, with the eastbound bridges originally built in 1961 and the westbound bridges built in 1985. The Rio Grande bridges span between the U.S. Army Corps of Engineers levees on both sides of the river, which contain the river floodplain. A bird's eye view photo of the Rio Bravo Boulevard river crossing looking toward the southwest is shown in **Exhibit 1-2**.

Exhibit 1-2, Bird's Eye View of Rio Bravo Boulevard River Crossing



This project is located about two miles west of I-25 between mile post (MP) 8.80 and MP 10.50 of Rio Bravo Boulevard. This includes the existing 1,415-foot long bridges over the Rio Grande, the 97.5-foot long bridges over the Albuquerque Riverside Drain, the unsignalized intersection of Rio Bravo Boulevard and Poco Loco Road, and the adjoining segments of Rio Bravo Boulevard.

The posted speed limit for Rio Bravo Boulevard is 45 mph. The existing bridges and roadway carry two 12-foot travel lanes and 10-foot outside shoulders in each direction and are separated by a raised median. A sidewalk is provided on the south side of the bridges, however there are no sidewalk connections on either side of the bridges resulting in discontinuous sidewalk. Corridor lighting is provided. The Paseo del Bosque multi-use trail is located on the east side of the Albuquerque Riverside Drain, which is 16 miles long in its entirety, and a multi-use trail exists on the south side of Rio Bravo Boulevard from the Poco Loco Road intersection east 1.8 miles to University Boulevard.

Rio Bravo Boulevard crosses the Rio Grande Valley State Park, which was established in 1983 and is managed cooperatively by the City of Albuquerque Open Space Division and the MRGCD. The Rio Bravo Riverside Picnic Area, Fishing Pier and Nature Trail is located on the east side of the river, north of Rio Bravo Boulevard. It provides an ADA accessible quarter-mile loop trail, three picnic sites, and an ADA accessible fishing pier. Of note, on the west side of the river, north of Rio Bravo Boulevard, a boat ramp exists for emergency access to the river. Also, on the west side, a twelve-foot wide concrete box culvert provides grade-separated access across Rio Bravo Boulevard for MRGCD maintenance needs.

Parking area for the Rio Bravo Riverside Picnic Area on north side of the bridge

Purpose and Need

The purpose of the proposed improvements is to address structural deficiencies of the existing bridges over the Rio Grande and Albuquerque Riverside Drain, to reduce congestion, and to improve multi-modal transportation system connectivity within the project limits. The following summarizes the conditions within the project limits that demonstrate the need for improvements:

- Physical Deficiencies
  - Bridges over the Rio Grande:
    - Bridge No. 6224 carries the eastbound lanes of Rio Bravo Boulevard over the Rio Grande. This bridge was built in 1961 and widened in 1985 to accommodate the current lane configuration.
    - An emergency rehabilitation project was completed in February 2020 for the eastbound bridge over the Rio Grande. Recently, due to torn expansion joints in the eastbound bridge, delamination below one of the girder bearings was observed and will require repair as shown in the right picture.
    - The most recent inspection report for Bridge No. 6224 gives the deck and substructure a rating of 5 (Fair) and gives the superstructure a rating of 6 (Satisfactory). The rating terms are based on the FHWA Bridge Inspector's Reference Manual and the FHWA Coding Guide. A rating smaller than 5 is considered "Unsatisfactory," a rating number of 5 is

Delamination below one of the girder bearings of the eastbound bridge (photo courtesy of NMDOT)

"Fair," a rating number of 6 is considered "Satisfactory," and a rating number of 7 and higher is considered "Good." The bridge has load ratings indicating that it has adequate strength at both the operating and inventory levels based on current design standards.

- Bridge No. 8568 was built in 1985 and carries the westbound lanes of Rio Bravo Boulevard over the Rio Grande.
- The most recent inspection report for Bridge No. 8568 gives the deck and superstructure a rating of 6 (Satisfactory) and gives the substructure a rating of 7 (Good). The bridge load ratings indicate the bridge does not have adequate strength based on current design standards.
- The need for additional vehicular capacity crossing the Rio Grande is discussed below. Based on the existing substructure design of Bridge No. 8568, the bridge cannot be widened while meeting seismic requirements and must be replaced rather than rehabilitated.

– Bridges over the Albuquerque Riverside Drain

- Bridge No. 6225 carries the eastbound lanes of Rio Bravo Boulevard over the riverside drain. It was constructed in 1961 and widened in 1985. Bridge No. 8569 carries the westbound lanes of Rio Bravo Boulevard over the riverside drain and was constructed in 1985.
- The vertical clearance between the service road adjacent to the riverside drain and the bridges does not meet current standards and the bridges display signs of impact.
- The most recent inspection report for Bridge No. 6225 documents the deck, superstructure, and substructure condition to be Fair. The bridge load ratings indicate that the bridge does not have adequate strength based on current design standards.
- The most recent inspection report for Bridge No. 8569 documents the deck, superstructure, and substructure condition to be Fair. The bridge load ratings indicate that the bridge has adequate strength based on current design standards.

The vertical clearance of the Albuquerque Riverside Drain Bridge is less than 12 feet

- Travel Demand and Congestion
  – The vehicular transportation capacity across the Rio Grande is deficient in the Albuquerque Metro area, which is documented in the *Connections 2040 Metropolitan Transportation Plan* prepared by the Mid Region Council of Governments (MRCOG). River crossing capacity is a major issue.
  – While the intersections of Rio Bravo Boulevard with Isleta Boulevard and with 2nd Street are not included in this project, capacity improvements to Rio Bravo Boulevard between these intersections are needed to facilitate improved intersection operations and to provide lane continuity from Isleta Boulevard east to I-25.

Sidewalks are narrow and discontinuous on the eastbound bridges

- System Connectivity
  – Multi-modal improvements for pedestrians and bicyclists are needed to address the lack of continuous sidewalks on both sides of Rio Bravo Boulevard, ADA compliance, and connectivity to existing trails.

Report Organization

The remainder of this report summarizes the key elements of the data, analysis, and decision process used to identify and evaluate potential alternatives to improve Rio Bravo Boulevard and to select a proposed alternative to advance to Phase IC and Phase ID. The report is organized as follows:

- **Chapter 2** discusses the activities used to inform and involve project stakeholders such as residents of the local community, elected officials and various government agencies. This chapter also provides a summary of comments and input from stakeholders.
- **Chapter 3** summarizes the existing conditions within the corridor including:
  – Existing roadway, right-of-way, bridges, geotechnical, drainage, utilities, traffic, and safety information
  – Demographic and socioeconomic data
  – Environmental, biological, and cultural resources within the study area
- **Chapter 4** summarizes the screening evaluation of bridge alignment alternatives, key structural design elements, 3D photo simulations of the proposed alignment, and the Risk Workshop. A long list of bridge alignment alternatives was evaluated to identify viable scenarios for which conceptual engineering of associated roadway and drainage improvement alternatives can be developed and evaluated.
- **Chapter 5** summarizes the detailed alternatives analysis based on the improvement alternatives advanced from Chapter 4. Evaluation criteria considered include bridge and roadway construction costs, future maintenance, construction feasibility and traffic control costs, highway safety manual evaluation, hydrologic and hydraulic considerations, impacts to the vertical profile, design-year traffic conditions, environmental factors, and stakeholder input.
- **Chapter 6** summarizes the recommended improvement strategy to advance to Phase IC and Phase ID.
- The attached **Appendix** consists of the plan sheets developed for the proposed alternatives.

In addition, there are supplemental project materials that were developed for this Phase IA/B Alignment Study that are part of the electronic record and documentation. While this report is comprehensive, refer to the ***electronic appendices*** for additional information as this report summarizes and identifies the engineering and environmental efforts performed for the study.

Introduction

This chapter summarizes the public involvement and agency coordination efforts performed during Phase IA/B for the NM 500/Rio Bravo Bridge Replacement project. The process for public outreach is being guided by the NMDOT *Location Study Procedures*. The project team prioritized public outreach early in the study process by developing a comprehensive communications strategy and identifying the anticipated activities to involve and engage stakeholders and the public.

The study area serves a broad and diverse set of stakeholders including federal and state resources agencies, county and local agencies, community residents, commuters, area businesses, elected officials, and other users of the project area in the South Valley of the Albuquerque Metro area. Input from these groups and others is being used to identify issues of interest and concern and to develop, evaluate, and refine project alternatives. The list of stakeholders and engagement methods will be updated as the project progresses and more is learned about the issues and desires of the public.

Public and Stakeholder Involvement

A project stakeholder list has been developed to identify relevant and important issues of interest and concern so that project alternatives can be developed, evaluated, and refined. The team has compiled, and continues to update, a comprehensive mailing list to be used for communicating project information with interested individuals, business representatives, and agency or local municipality representatives. The following stakeholders were identified by researching the community governments and agencies having jurisdiction or resource management authority within the study limits. Contact is ongoing and will continue to be made through a combination of email, USPS mail, telephone calls, meeting advertisements, and social media platforms.

Community

- Residents within and adjacent to the study corridor
- Commuters
- Recreation stakeholders
- Local businesses
- Local schools
- Local medical clinic (First Choice Community Health care)
- Emergency services providers
- Local community centers
- Neighborhood associations

Elected Officials

- New Mexico Senator Michael Padilla
- Albuquerque City Councilor Klarissa Peña
- Albuquerque City Councilor Pat Davis
- Albuquerque City Councilor Isaac Benton
- Bernalillo County Commissioner Steven Michael Quezada
- Bernalillo County Commissioner James Collie
- Pueblo of Isleta Governor Max Zuni
- New Mexico House of Representatives Miguel Garcia, District 14
- New Mexico House of Representatives Andrés Romero, District 10
- New Mexico House of Representatives Gail Chasey, District 18
- New Mexico House of Representatives Javier Martínez, District 11
- New Mexico House of Representatives Antonio Maestas, District 16
- NMDOT Transportation Commissioner Hilma Chynoweth

Agency Stakeholders

Coordination with stakeholder agencies conducted to date has consisted of email notifications, telephone discussions, and project team meetings. A virtual Agency Stakeholder Coordination Kick-Off Meeting was held on October 19, 2020. The agencies with potential interest in the project and notified of the project include:

- Bureau of Reclamation (BOR)
- Middle Rio Grande Conservancy District (MRGCD)
- US Army Corps of Engineers (USACE), Regulatory
- US Army Corps of Engineers, Section 408
- US Fish and Wildlife Service, New Mexico Ecological Services Field Office
- New Mexico Environment Department
- New Mexico Interstream Commission
- Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)
- Mid-Region Council of Governments (MRCOG)
- Bernalillo County Public Works Departments
- Bernalillo County Fire Department Search and Rescue
- Bernalillo County Planning and Development Services
- Albuquerque Open Space
- Bernalillo County Lands Management
- Bernalillo County Parks and Recreation
- Rio Metro Regional Transit District (RMRTD)
- City of Albuquerque Transit Department (ABQ Ride)
- Valle de Oro National Wildlife Refuge

Recurring coordination meetings between the NMDOT and specific agency stakeholders will be scheduled as needed to present alternatives and engineering concepts, provide updates on the project, and request input to help the NMDOT advance the project development process.

Outreach Activities

Virtual Public Meeting

Due to the COVID-19 pandemic, in-person community and stakeholder engagement was not feasible for the Phase IA/B Study efforts, which necessitated development of a virtual engagement strategy to reach a wide audience and seek effective tools for public participation. At this time, the FHWA approves of using alternative measures for achieving public input due diligence. Accordingly, the project team held a virtual public involvement meeting during the study phase on Wednesday, December 9, 2020 from 6:00 to 7:30 p.m.

The structure and content of the public meeting, which was reviewed and approved by the NMDOT, was a virtual meeting platform scaled to the context of the local community and the project purpose and need. The project team selected to use the Zoom Webinar virtual meeting platform for the meeting because of its versatility in allowing participants to join over the internet or via telephone. The meeting included a PowerPoint presentation and a live question-and-answer (Q&A) interaction between the development team and participating public. The meeting was recorded, and a video of the meeting was posted to the NMDOT Project website to allow those who were not able to attend to watch the presentation and provide feedback.

The meeting was promoted through advertisements to the project email list, mailers to residents and businesses within the corridor, U.S. Postal Service Every Door Direct Mail (EDDM) mailers, social media, and a newspaper ad (Albuquerque Journal). Additionally, the project team developed partnerships with over 50 neighborhood associations and over 20 local public and private schools surrounding the project corridor to distribute meeting notifications and project information to families, neighbors, members, and distribution lists. The meeting was also promoted through the NMDOT Project website, Public Information Officer, and social media sites (e.g., Facebook, Twitter). Meeting notifications were provided in both English and Spanish.

Attendees were able to 'opt-in' to the meeting by registering at an online event page or calling into a dedicated phone line that was advertised on the meeting notifications. The presentation provided by the project team gave a brief introduction of the project, the existing conditions and preliminary proposed alternatives, and asked for public input. The meeting also included simultaneous Spanish interpretation in which members of the community were able to alternate between the English and Spanish language tracks based on needs. The NMDOT utilized live interpretation services to manage the Spanish language track and provide direct interpretation of the entire meeting presentation and Q&A session.

Participants were encouraged to provide comments via email or through the MetroQuest survey option for a public comment period. The public comment period, initially set for 30 days, was extended for an additional 20 days, ending on January 31, 2021. The project team decided to extend the comment period to allow participants additional time to respond due to other variables including the holiday season and a peak in the pandemic.

A total of 124 people attended the event on Zoom. The video of the meeting has garnered an additional 120 views. The project team received 43 comments during the live public meeting event. Additionally, the project team received comments in 34 emails and 7 phone calls after the event. A summary of these comments is included later in this chapter.

MetroQuest Online Survey

To aid in the public involvement process, an interactive and informative web-based survey tool was created on the MetroQuest platform, compatible with any internet-connected device (laptops, tablets, and smart phones). MetroQuest allowed the public to receive project background information, rank priorities, provide specific comments with geo-referenced locations, vote on tradeoffs, and volunteer demographic information. The survey was provided in both English and Spanish.

Participation in the MetroQuest survey was promoted alongside the virtual public meeting via the project email list, EDDM mailers, and newspaper advertisement. The survey was published on the same day of the meeting; December 9, 2020. The survey remained live until the end of the public comment period on January 31, 2021.

A total of 253 people participated in the English-version MetroQuest survey, consisting of 427 comments and 2,644 data points. The Spanish-version MetroQuest survey saw a total of 14 participants that left 87 data points and 13 comments. A summary of these comment is included later in this chapter.

How Stakeholder Input will be Used

Stakeholder input will be a guiding factor for various elements of the project design and will be used as a metric for developing and evaluating alternatives. Stakeholder input will be especially pertinent for the following:

- Identification of areas where safety or capacity improvements may be needed.
- Identification of areas where bicycle and/or pedestrian connectivity may be needed.
- Phasing and maintenance of traffic (MOT) needs during construction.
- Identification of environmental concerns.

Summary of Stakeholder Issues and Concerns

Throughout the project development process, stakeholder issues and concerns will be compiled and documented as part of the administrative record. During the Phase IA/B study, comments were received through a variety of methods. The questions and comments received to date were largely supportive of the overall project and were primarily focused on design details, schedule and construction phasing for the proposed improvements. Comments received during initial stakeholder coordination and public involvement are summarized below. A comprehensive summary of the key issues and concerns brought forth by the public is included in the *electronic appendices*.

Comments regarding the initial design concepts were also received by the study team from the BOR and MRGCD on March 10, 2021 and documented in the summary prepared for the meeting.

Email and Phone Comments; Public Comment Period:

The following summarizes the comments received via email or telephone during the public comment period beginning on December 9, 2020 and ending on January 31, 2021.

- Length of design and construction phases
- Impact of construction and alternate routes
- Concerns about construction noise
- Concerns about increasing traffic and traffic noise
- Concerns about residential flooding
- Concerns about existing bike route connectivity

Virtual Public Meeting Comments:

The following summarizes the comments received during the Virtual Meeting on December 9, 2020.

- Adding or connecting bicycle paths to improve cyclist safety
- Access to boat access area for search and rescue crews and recreational users
- Timing, cost and phasing of construction
- Impact of construction on access to and quality of life for residential neighborhoods
- Impact of construction to nearby parks
- Communication with residents during construction

MetroQuest Survey, Public Comment Period:

The following summarizes the comments and data received through the MetroQuest survey during the public comment period, beginning December 9, 2020 and ending January 31, 2021.

Priorities:

- Survey participants ranked safety and environmental impacts as the most important priorities with the project design. Appearance and construction cost were ranked the lowest.
- Commenters noted that construction should start and end as soon as possible, and safety should be prioritized over duration.

Access:

- Many commenters expressed concern if the bridge would be shut down completely at any point during construction.
- Several commenters expressed concern about the level of traffic on Rio Bravo Boulevard.

- Commenters expressed concern about the ability to safely access the Bosque, Rio Bravo Picnic Area, open space trailheads, parking lots, and bike path.

Safety:

- Commenters expressed concerns about safety at Poco Loco Drive, and specifically noted that it is difficult to access Rio Bravo Boulevard from Poco Loco Drive and vice versa, a traffic light should be installed at this intersection, and drivers who enter westbound traffic from Poco Loco Drive often make unsafe entries into traffic and cause disruptions to traffic flow.
- Commenters made several comments about the safety of Rio Bravo Boulevard along the entire project area, and specifically noted that speeding is a huge concern, there are potholes, turning conflicts must be minimized, pedestrian access is dangerous, and accidents occur on the bridge. One commenter asked if an adequate barrier will be installed between east and westbound traffic. One commenter suggested using narrow lanes to prevent speeding.
- Commenters expressed concern with the intersection at 2nd Street and specifically noted that the intersection should be safer for pedestrians, vehicles, and cyclists, drivers often run the light to avoid getting held up by the train, and there are a lot of accidents at this location. One commenter suggested adding right-hand turn lanes to improve safety.

Pedestrian Concerns:

- Commenters stated several concerns related to pedestrian facilities and access in the project area:
  - Although the bridge has a pedestrian passage, it does not connect to pedestrian facilities on either side of the bridge. On the east side, the pedestrian part of the bridge is inaccessible to pedestrians and cyclists and does not facilitate travel along Rio Bravo Boulevard. People walk on the bridge even at night when visibility is poor. There should be a pedestrian sidewalk on the north side of the bridge and multi-use trail on the south side of the bridge. The pedestrian pathways need to connect to the Chris Chavez Trail to the Riverside Trail.
  - The bike and pedestrian lanes need to be wider, separated from the speeding traffic, and better protected. The existing pedestrian access is very narrow and run-down. It should be upgraded, safer, and have shade. Separate access would benefit those looking to access the bike trails or Rail Runner station and the nearby homeowners.
  - The slip lanes are incredibly dangerous for pedestrians and cyclists.
  - The intersection at Isleta Boulevard has pedestrian traffic and is unsafe. There needs to be adequate time for pedestrians to cross the intersection at the pedestrian crossing.
  - The intersection at 2nd Street and Rio Bravo Boulevard is unsafe for pedestrians to cross.
- Commenters noted pedestrian concerns at the following locations: Isleta Boulevard intersection, along the Rio Bravo Bridge, Shaw Drive SW, the recreation areas, and the 2nd Street intersection.

Cycling Concerns:

- Several people made comments about cycling concerns on the existing bridge and stated that there are no dedicated bike paths over the bridge, the shoulder is very narrow and never cleared of debris, access to the existing cycling routes is difficult, and speeding cars make cycling unsafe. Additionally, commenters noted that there is no left-hand turn lane to turn to go southbound on Isleta Boulevard, and there is a lack of cycling facilities west of the river. Commenters also noted that the bike lane ends before the intersection, which makes it difficult to merge with traffic and unsafe to turn left onto Isleta Boulevard.

Environmental Concerns:

- Commenters expressed concern about the impacts to the Bosque and Rio Grande, and noted that impacts to the ecosystem (both habitat and wildlife) should be as limited as possible during and after construction and the ecosystem should be protected.
- Several commenters noted that the noise is already very high for residents in the area, specifically along La Mora Lane and Kelsey Road. They also noted that an increase in traffic with a new bridge would increase the noise levels further and add to the disturbances the neighborhood already experiences. Several commenters requested construction of a noise barrier, potentially 6-8 feet tall.

Other Concerns:

- Several commenters provided positive feedback about the format of the MetroQuest survey. They noted that it was comprehensive and appreciated the ability to learn about the project and comment on it without having to attend an in-person public meeting.
- Commenters expressed concern about their homes and properties adjacent to the bridge, including their livestock, and health. One commenter noted concern about being able to access the ditch (i.e., MRGCD riverside drain embankments and service roads) with their horses for training purposes. A number of commenters asked if their properties would be acquired as a part of this project, and if so, how much notice they would get.
- Several commenters expressed full support of the project.
- Four commenters expressed opposition to the project.

Property Owner Interviews

The project team conducted seven property owner interviews with eight different property owners in June 2021 to discuss the project with those adjacent to the Rio Bravo Boulevard corridor. The interviews were held virtually or by conference call format. Common concerns centered around the following:

- Noise from traffic and trucks along the corridor, with inquiries regarding the possibility of installing noise walls
- Dust, debris, road damage, and other impacts from construction traffic through local neighborhoods
- Drainage and flooding concerns along the south side of NM 500
- Dean Road and Rio Bravo intersection safety, turns right now are hard to make and dangerous
- Location of new road alignment and impacts to properties
- Safety of the nearby properties (addressing racing/speeding along corridor, reducing possibility of theft of copper wires, not creating dark access paths behind properties with tall retaining walls, etc.)
- Pedestrian and bicycle access
- Making sure continued notifications of public meetings and interviews are received

Introduction

This chapter documents the existing engineering and environmental conditions within the project limits. The discussion includes the roadway, right-of-way, existing bridges, geotechnical, drainage, utilities, safety, traffic, land use, environmental, cultural and biological resources, and socioeconomic conditions that will influence the need for improvements and the identification and evaluation of project alternatives. Because separate reports were prepared for drainage, geotechnical, traffic signal warrant for Poco Loco Road, and environmental investigations, information contained in this chapter summarizes existing conditions for these topics. Refer to the separate reports for detailed information which are included with the *electronic appendices*.

Roadway Conditions

NM 500/Rio Bravo Boulevard is an access managed, state highway classified as an urban principal arterial. The posted speed limit is 45 mph in both directions. On the east side of the river, there are frontage roads on both sides of Rio Bravo Boulevard; Dean Road on the south and Poco Loco Drive on the north. These frontage roads are less than 700 feet long and are local roads with no posted speed limit signs.

The project is located within the unincorporated area of Bernalillo County. The road maintenance responsibilities are shown in **Exhibit 3-1**. Of note, the segments of the local road system that cross under Rio Bravo Boulevard next to the Albuquerque Riverside Drain are part of the Rio Grande Park Open Space and are considered unmaintained service roads under the jurisdiction of the City of Albuquerque Parks and Recreation Department and MRGCD.

Exhibit 3-1, Bernalillo County Road Network Map and Photos

Source: Excerpts from Bernalillo County Road Inventory Map Book, February 2021


Existing Gate on Dean Road

Existing Sign on Poco Loco Drive


Existing Gate on Poco Loco Drive

NM 500/Rio Bravo Boulevard

Existing characteristics of Rio Bravo Boulevard on both sides of the bridge structures (not including the bridge segment) are summarized below.

Roadway Typical Sections

As shown in **Exhibit 3-2**, Rio Bravo Boulevard is a four-lane, divided roadway with 12-foot lanes, a raised median with variable width, and shoulder widths ranging from 0 to 10 feet. There are essentially no sidewalks on either side of Rio Bravo Boulevard within the project limits. A multi-use trail exists on the south side of Rio Bravo from the Poco Loco Road intersection to 2nd Street, continuing east to I-25.


Existing Multi-Use Trail on south side of Rio Bravo Boulevard looking east

Intersections

Major signalized intersections exist on both sides of the project area, however they are not included in this bridge reconstruction project. The Rio Bravo Boulevard/Isleta Boulevard intersection is on the west side of the project and the Rio Bravo Boulevard/2nd Street intersection is on the east side. These intersections are part of the Rio Bravo adaptive traffic signal control system.

The only other public street intersection is the Rio Bravo Boulevard/Poco Loco Road intersection. This is a full-access, stop-sign controlled intersection that has been identified as a potential future signalized intersection in the NMDOT *Corridor Access Management Plan for NM 500 (Rio Bravo Boulevard)*, August 2020. The needs of this intersection are discussed later in this report.

Driveway Access

Driveway access to Rio Bravo Boulevard is limited within the project area. On the south side of Rio Bravo within 300 feet of Isleta Boulevard, there are two right-in/right-out driveways. One serves a gas station and one provides access to an unimproved service road that parallels Rio Bravo Boulevard. Both driveways are within the channelized free-right turn acceleration lane from northbound Isleta to eastbound Rio Bravo.

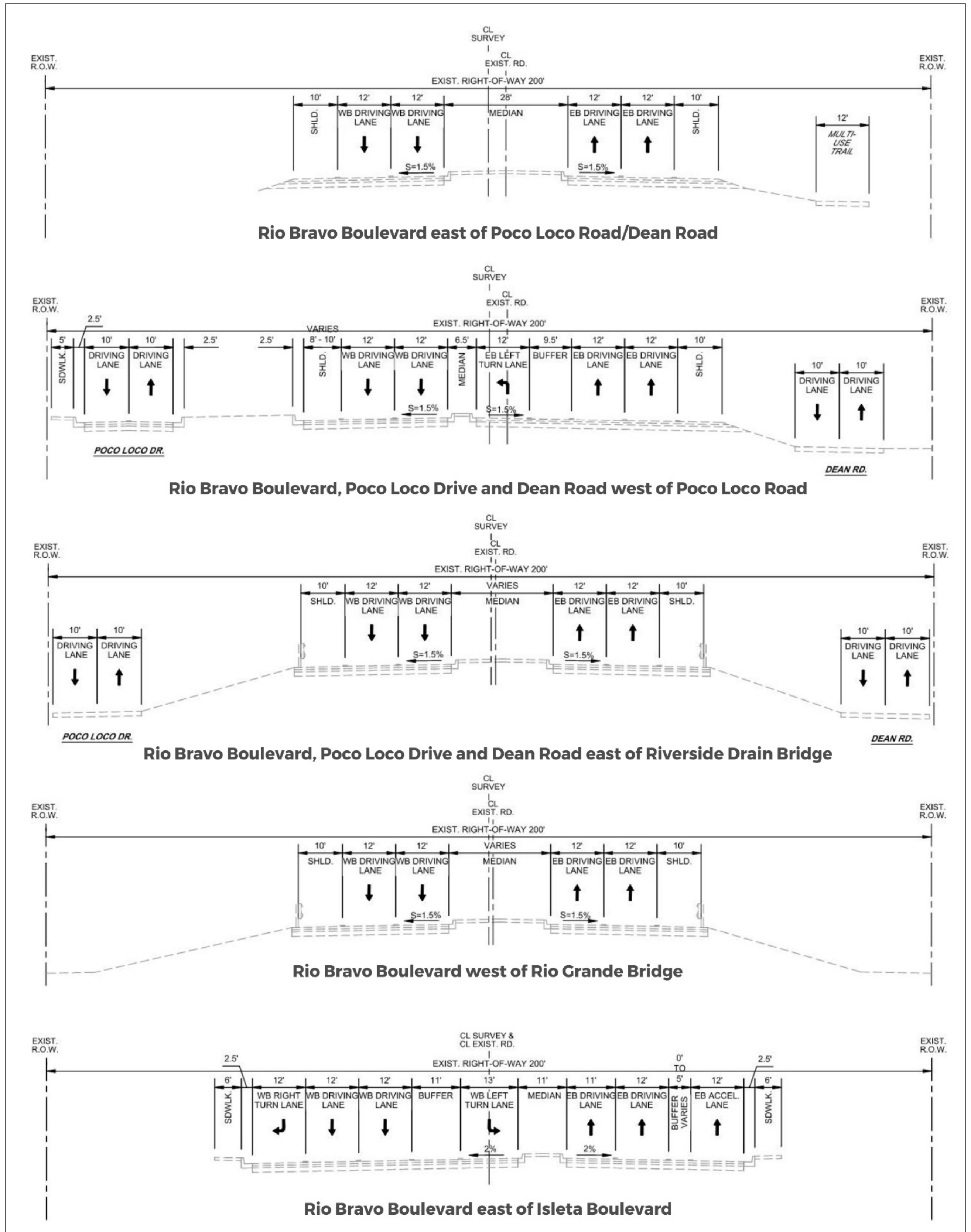
On the north side of Rio Bravo within 400 feet of Isleta Boulevard, there are two right-in/right-out driveways. One serves a Presbyterian medical building and the other provides access to unimproved service roads.

At the Rio Grande bridge west abutment, a 15-foot wide access exists between the guardrail and the bridge barriers that provides access to the service road on top of the levee.


Levee access from the west bridge abutment looking south

East of Poco Loco Road/Dean Road to the east project limits, there are three full-access median openings, two of which provide access to unimproved service roads. The first to agricultural land on the south side and the second to the Barr Canal on both sides. The third provides access to a building supply business north of Rio Bravo Boulevard.

Exhibit 3-2, Existing Roadway Typical Sections



Horizontal Alignment

There are two horizontal curves along the Rio Bravo Boulevard alignment and both are west of the Rio Grande as follows:

- Curve 1 through Isleta Intersection – Radius = 11,459.16 feet; Arc Length = 1,033.33; Design Speed > 55 mph
- Curve 2 west of the Rio Grande Bridges – Radius = 7,639.44 feet; Arc Length = 728.76; Design Speed > 55 mph

Vertical Alignment

The existing vertical alignment geometry based on as-built plans is summarized in Table 3-1. The vertical alignment meets the stopping sight distance (SSD) criteria for a 50-mph design speed.

Table 3-1, Existing Vertical Curve Geometry

Curve No.	Grade In	PVI Station	Grade Out	Curve Type	As-Built Length (ft)	As-Built K Value	As-Built M.O.	As-Built S.S.D.	Design Speed	Posted Speed	Meets Criteria for Design Speed SSD
V1	1.00%	107+00.00	0.34%	Crest	200	303	0.16	1000	50	45	YES
V2	0.34%	114+94.19	1.20%	Sag	200	233	0.22	NA	50	45	YES
V3	1.20%	126+69.82	-1.20%	Crest	1800	750	5.40	1000	50	45	YES
V4	-1.20%	144+94.00	0.90%	Sag	600	286	1.58	NA	50	45	YES
V5	0.90%	150+81.50	0.30%	Crest	200	333	0.15	1265	50	45	YES
V6	0.30%	157+50.00	-1.92%	Crest	300	135	0.83	465	50	45	YES

Other Features

Other features within the Rio Bravo Boulevard corridor include the following:

- Corridor Lighting exists on both sides of the roadway throughout the project limits. The lighting is maintained by Bernalillo County.
- Roadside barriers exist on both sides of the roadway west of the river to protect side/embankment slopes from the raised vertical profile. They also exist along the bridge structures over the Rio Grande and Albuquerque Riverside Drain. The remainder of Rio Bravo Boulevard has curb and gutter only.
- ABQ Ride bus stop locations exist on both sides of the roadway west of the Poco Loco Road/Dean Road intersection. The bus stops are currently not ADA accessible.

ABQ Ride bus stop along westbound Rio Bravo Boulevard looking west

ABQ Ride bus stop along eastbound Rio Bravo Boulevard looking east

Poco Loco Drive

Key characteristics of Poco Loco Drive include:

- The paved width is approximately 20 feet wide with curb and gutter and with sidewalk for the segment adjacent to the newer multi-family housing development.
- Access along the street includes two driveways, both gated, and one public street, which has a cattle guard. The Paseo del Bosque multi-use trail intersects Poco Loco Drive near its west end from the north.
- A gate exists immediately west of the north/south Poco Loco Drive to restrict access to the Rio Grande park.

Poco Loco Drive looking east

Dean Road

Key characteristics of Dean Road include:

- The paved width is approximately 20 feet wide with no curb and gutter.
- Access along the street includes three driveways, two gated, and one public street. The Paseo del Bosque multi-use trail continues south of Dean Road via the Chavez Loop near its west end.
- A gate exists immediately west of the north/south Dean Road to restrict access to the Rio Grande park.
- The north/south Dean Road is a private easement,
- Guardrail exists at two locations.

Dean Road looking east; also, a segment of the Chris Chavez Trail Loop

Multi-modal

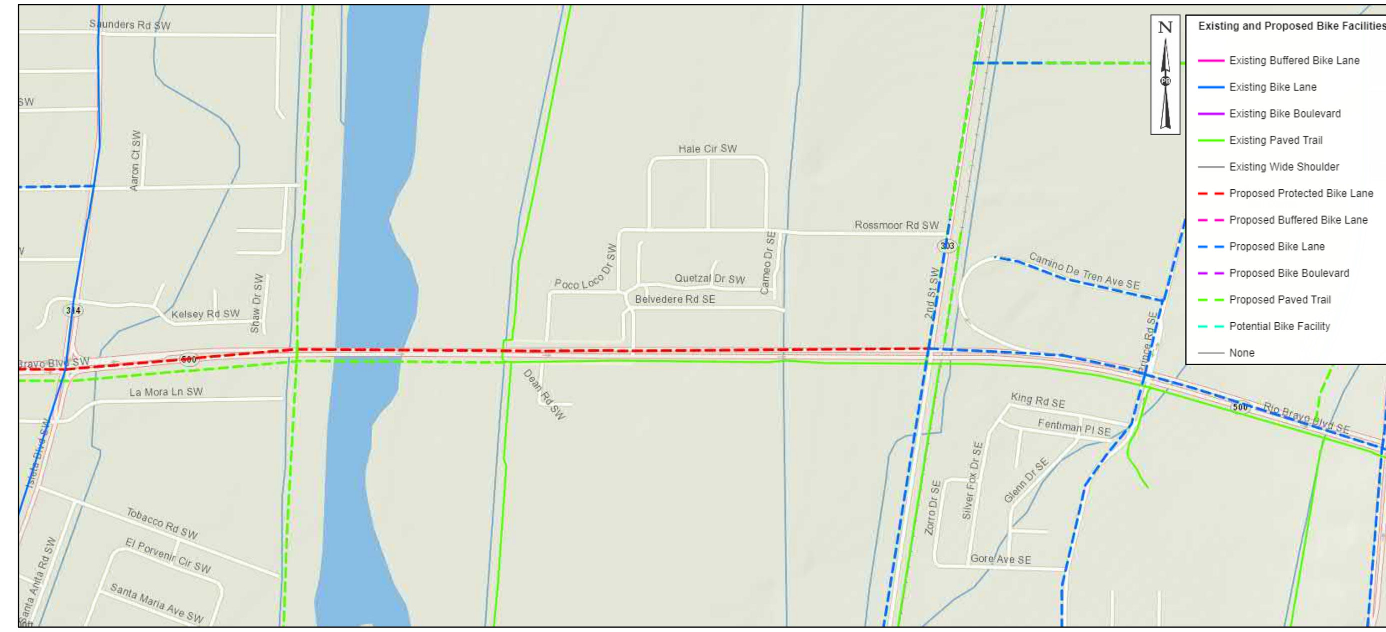
The Rio Bravo Riverside Picnic Area, Fishing Pier and Nature Trail, and the multi-use trails in the project area are well-used attractions resulting in bicycling and walking/hiking along the local roads, levees, and trail system. The existing facilities on Rio Bravo Boulevard are deficient with only a four-foot sidewalk on the south side of the eastbound bridge with no sidewalk continuity from the bridge in either direction. The existing multi-modal facilities include:

Chris Chavez Loop continuation of Paseo del Bosque trail looking south of Dean Road

- Paseo del Bosque (a.k.a., Riverside) Trail along the east side of the Albuquerque Riverside Drain, passes under Rio Bravo Boulevard on local streets to Chris Chavez Loop Trail
- Chris Chavez Loop Trail continues along riverside drain and Dean Road
- Four-foot sidewalk on south side of Rio Grande Bridge
- Five-foot sidewalk installed on north side of Poco Loco Drive with recent Apartment development
- Shoulders are provided on Rio Bravo Boulevard, six to ten feet in width, that may be used for on-street bicycle travel
- ABQ Ride bus route No. 51, Atrisco, uses Rio Bravo Boulevard, Isleta Boulevard and 2nd Street on weekdays and Saturdays (see photos of bus stops on previous page)

An excerpt of the Long Range Bikeway System (LRBS) from the *Connections 2040 Metropolitan Transportation Plan* is provided in **Exhibit 3-3** which shows existing and proposed bike facilities.

Exhibit 3-3, Long Range Bicycle System from Connections 2040 MTP



Bicycle Facility Guidance from Connections 2040 MTP

"The LRBS does not provide prescriptive design guidance about specific treatments, but rather indicates what kinds of facilities might best serve a wider variety of people. For example, if the LRBS indicates that a protected bike lane is proposed for a given roadway, it is providing guidance on the best and highest use. Unfortunately, this type of facility may not fit within the Right of Way limits or may not be appropriate for other reasons and therefore may not be implemented. Also, the LRBS does not determine what type of bike facility should be built, but rather provides sound guidance based on current traffic counts, speed, and the type of roadway."

Right-of-Way

The right-of-way for NM 500/Rio Bravo Boulevard is 200 feet, as shown in the typical sections in **Exhibit 3-2**. There are at least 40 parcels abutting the NM 500 ROW within the project limits, excluding the MRGCD lands. Based on preliminary estimates, encroachments associated with 15 parcels have been identified with a few others that will be field verified. Most of the encroachments are less than one foot into the right-of-way, the majority involving fences and walls. The MRGCD and Bureau of Reclamation are key land owners within the project limits.

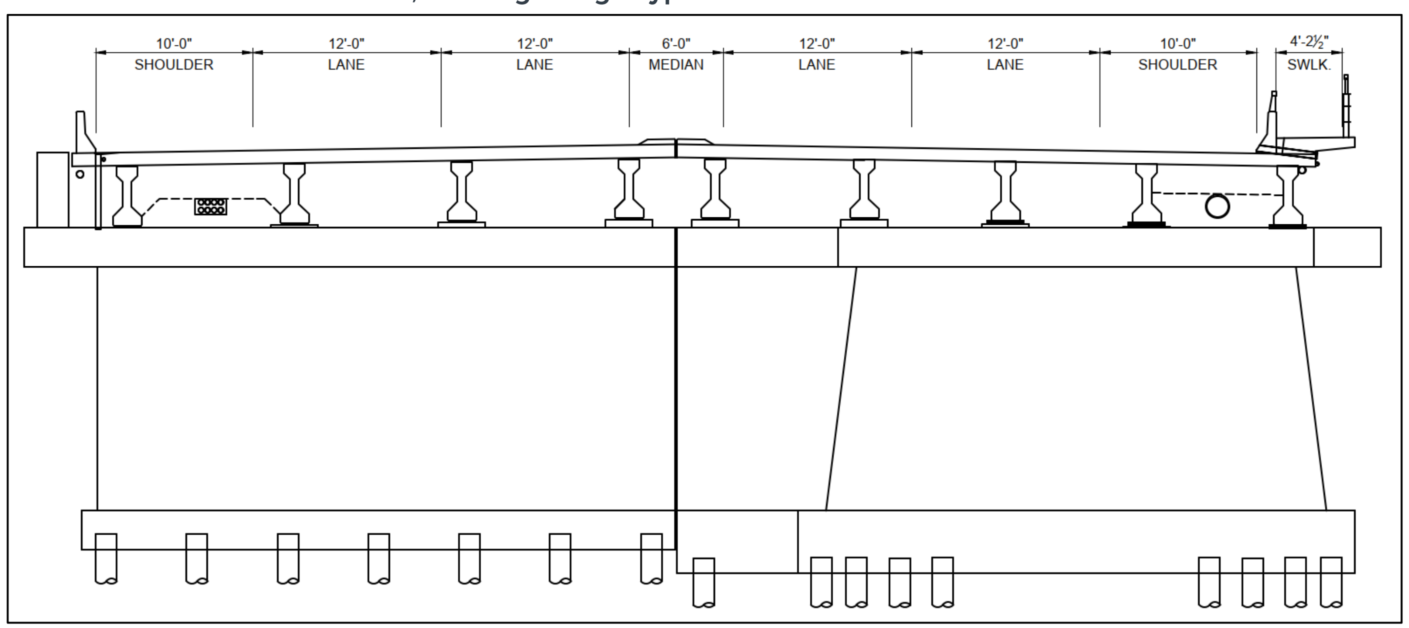
Bridge Conditions

Rio Grande Bridges, No. 6224 and No. 8568

Rio Bravo Boulevard crosses the Rio Grande on two existing Bridges, No. 6224 and No. 8568. The bridges are separated by a 1" joint. Bridge No. 6224 carries the eastbound lanes and was built in 1961, then widened/ reconstructed in 1985. Bridge No. 8568 carries the westbound lanes and was built in 1985. The total bridge length for both is 1,415 feet between the back of the abutments. The bridges are roughly perpendicular to the Rio Grande and have no skew.

Exhibit 3-4 shows the existing typical section for the Rio Grande Bridges. The total out-to-out width of the two bridges is 81'-9" and includes four 12-foot travel lanes, two 10-foot outside shoulders, a 6-foot wide raised median, and one sidewalk with a 4'-2 ½" clear width. The deck has a normal crown and roughly 1.5 percent cross slopes. Both bridges have 25 spans with lengths of 56'-6" and 55'-10 ½" measured between centerlines of piers. Type 45 girders support a reinforced concrete deck which is 9" thick on the eastbound bridge and 10" thick on the westbound bridge. The girders are spaced between 9'-0" to 10'-8" on center with a 5,000 to 5,500 psi design strength.

Exhibit 3-4, Existing Bridge Typical Section across the Rio Grande



The eastbound bridge (No. 6224) foundation consists of 16" diameter ¼" thick walled pipe piles filled with concrete. These piles are almost all battered with two clusters of piles at the north and south ends of the eastbound bridge piers. The piles are battered both longitudinally and transversely. A pile cap connects the piles and supports a thinner stem wall which extends up to the girders. The original eastbound bridge was widened in 1985 and two additional vertical piles were added at each pier to support the extra width. This bridge has bearings consisting of masonry plates and a steel bearing bar.

The westbound bridge (No. 8568) foundation also consists of 16" diameter ¼" thick walled pipe piles filled with concrete. These piles are all battered in the longitudinal direction. The pile lengths vary at every pier to match the soil conditions, and the pile spacing and cap size also varies by pier. The piles support a pile cap and a stem wall extending up to the girders. This bridge has reinforced elastomeric bearings supporting the girders.

Bridge Condition – No. 6224 Carrying Eastbound Traffic

According to the most recent Bridge Inspection Report for Bridge No. 6224, dated 5/31/2020, the deck has a condition rating of 5 (Fair), a Superstructure rating of 6 (Satisfactory), and a substructure rating of 5 (Fair). Refer to **Chapter 1** for rating definitions. NMDOT's AASHTOWare BrR rating model reports load ratings of HS 22.1 and HS 44 for the inventory and operating ratings, respectively. This indicates that bridge has adequate strength based on current design standards. The appraisal ratings indicate the bridge railing and approach railing meet standards, the transition is substandard, the structure scour rating is considered stable within the footing, and the waterway adequacy is above desirable.

The inspection report for Bridge No. 6224 presents many existing issues of concern. The bridge deck has transverse and longitudinal cracks with advanced leaching and rust stains, with the entire deck surface being classified as condition state 2 due to cracking. Isolated girder ends have spalls and the concrete abutments have cracks with major water stains and advanced leaching. The pier walls have vertical and diagonal cracks up to ½" extending into and through the caps, efflorescence and scaling is also present. The concrete pier caps have cracks up to ¼" with heavy water stains and efflorescence at cap wall interfaces.

This bridge has compression joints at every span and many of these are partially filled with dirt and debris, while some seals are torn and missing. The joints leak due to torn or missing seals and the joint dams are spalling and delaminating over the full width of the lanes, as shown in **Exhibit 3-5**. The steel bridge bearings, both moveable and fixed, have major rust with advanced section loss and close to 100% of the bearings are in condition state 2 or worse, as shown in **Exhibit 3-6**. The approach slabs, riprap, and metal bridge railing are in fair condition, while the wingwalls and concrete bridge railing have 1/16" horizontal and vertical cracks.

Exhibit 3-5, Existing Deficiencies of Bridge No. 6224

Corroded Steel Bearings *Spalling Joint*

In December 2019 an issue was identified at Pier 3 and required immediate emergency repair and rehabilitation (**Exhibit 3-6**). The pier wall and cap cracked and lost confinement at the bearing which resulted in the girder span lowering several inches, which in turn lowered the roadway span and created a bump.

Exhibit 3-6, Emergency Repair at Pier 3 of Bridge No. 6224

Damage to Bearing Pads

Repaired Bearing Pads

Bridge Condition – No. 8568 Carrying Westbound Traffic

According to the most recent inspection report for Bridge No. 8568, dated 5/12/20, the deck has a condition rating of 6 (Satisfactory), a Superstructure rating of 6 (Satisfactory), and a Substructure rating of 7 (Good). The bridge has load ratings based on AASHTOWare BrR models of HS 17.7 and HS 28.6 for the inventory and operating ratings, respectively. The bridge has no posted load restrictions. The appraisal ratings indicate the bridge railing and approach railing meet standards, the transition is substandard. The structure scour rating is considered stable within the footing, and the waterway adequacy is above desirable.

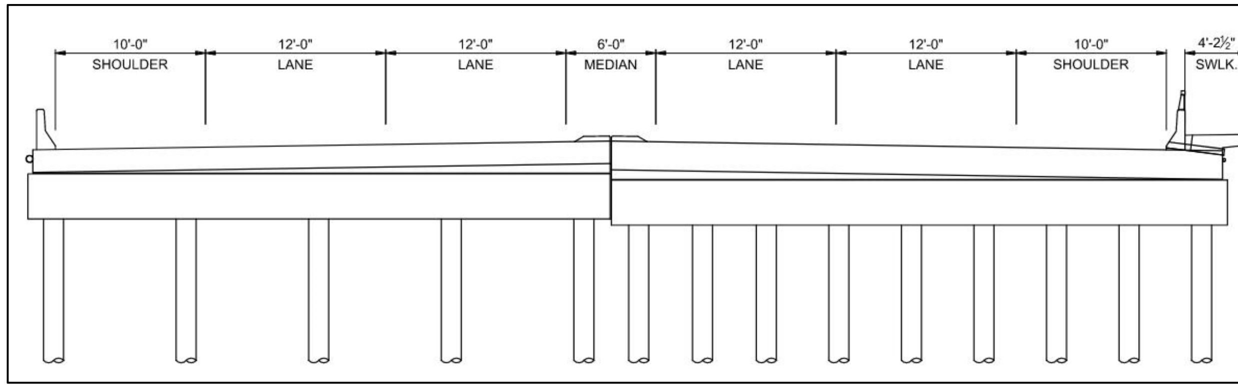
The inspection report for Bridge No. 8568 indicates some deterioration, but much of the bridge is in good condition with all elements being in Condition State 1, except the bridge joint strip seals which are all in Condition State 2. The bridge deck has transverse and longitudinal cracks with moderate efflorescence and major water and rust stains mainly at the median joint and deck ends. Most girder ends show multiple vertical and diagonal cracks up to 0.16" and there is apparent delamination above the sole plates, while the sole plates are "rotating" out of the beams.

The abutments have vertical, horizontal, diagonal, and map cracks with minor leaching, but the wingwalls are in good condition with no deficiencies noted. The reinforced concrete pier caps have vertical cracks and rust stains throughout. Two of the pier caps have slightly larger cracking up to 0.030" that are possibly full depth. The joint strip seals are filled with dirt and debris, are torn and settled. Joint 3 is leaking due to torn strip seals, and all joints are in Condition State 2. The elastomeric bearings are in good condition, while the sole plates have minor rust. The bridge concrete barrier has cracking up to 0.04" and minor damage in multiple places due to traffic. It is worth mentioning that the vertical and diagonal cracking at the girder ends might be due to the bearings that are either locked or too thin to allow girder end rotation with thermal gradient load.

Albuquerque Riverside Drain Bridges, No. 6225 and No. 8569

Bridge No. 6225 carries the eastbound lanes of Rio Bravo Boulevard over the riverside drain. It was constructed in 1961 and widened in 1985. Bridge No. 8569 carries the westbound lanes of Rio Bravo Boulevard over the riverside drain and was constructed in 1985. These bridges are three-span continuous concrete slab bridges with span lengths of 36, 36, and 23 feet. The lane and sidewalk configuration for these bridges is identical to Bridge No. 6224 and No. 8658. The slab thickness for Bridge No. 6224 varies by span, with Span No. 1 being 23", Span No. 2 being 17", and Span No. 3 being 13.5". The slab thickness for Bridge No. 8569 is 18" for the full length of the bridge. The deck slab superstructures are bearing on concrete caps that are supported by steel pipe piles. The bridges' top surfaces are covered with a poly-carb overlay. The vertical clearance below these bridges is about 12'. This low vertical clearance caused minor traffic scratches to the underside of the bridge slabs. **Exhibit 3-7** shows the typical section for the existing bridges over the Albuquerque Riverside Drain.

Exhibit 3-7, Existing Typical Section over the Albuquerque Riverside Drain



Bridge Condition – No. 6225 Carrying Eastbound Traffic

The most recent inspection report for Bridge No. 6225 documents the deck, superstructure, and substructure condition to be Fair (5). The NMDOT's AASHTOWare BrR rating model reports the inventory capacity to be HS17.9 and the operating capacity to be HS29.8. The bridge has no posted load restrictions. The deck edges have longitudinal, vertical, and diagonal cracks up to 0.25" with minor leaching and a delamination of 2'. The underside of the deck has transverse, longitudinal, and map cracks up to 0.125" with spalls, as shown in **Exhibit 3-8**. The construction joint has leaching and water stains. The underside of the deck shows traffic scrapes as shown in **Exhibit 3-8**. The abutments have longitudinal, vertical, and diagonal cracks up to 0.125," with delamination and spalls. The pier caps have vertical, horizontal, and diagonal cracks. The pier piles have advanced rust at the bottoms. The slope paving has minor cracking and settlement.

Exhibit 3-8, Existing Albuquerque Riverside Drain Bridge Conditions

Cracking and Leaching Under the Decks

Scrapes due to Low Clearance

Bridge Condition – No. 8569 Carrying westbound Traffic

The most recent inspection report for Bridge No. 8569 documents the deck, superstructure, and substructure condition to be Fair (5). NMDOT's AASHTOWare BrR rating model reports the inventory capacity to be HS21.9 and the operating capacity to be HS36.6. The underside of the deck has longitudinal, transverse, and map cracks up to 0.125". The underside of the deck has isolated leaching and traffic scratches. Most of the cracks are located at the deck haunches over the piers and abutments. The abutments have longitudinal and vertical cracks up to 0.06", with isolated minor leaching, major water stains, and small spalls. The pier caps have vertical, horizontal, and diagonal cracks. The pier piles have advanced rust at the bottoms. The slope paving has cracking and settlement.

GEOTECHNICAL

Preliminary Geotechnical Report

A *Preliminary Geotechnical Report* dated March 15, 2021 was prepared by Terracon Consultants and is included in the *electronic appendices*. The preliminary geotechnical report presents the results of literature research and site reconnaissance, and includes initial field exploration and laboratory testing performed by NMDOT and Geolines, LLC. Preliminary geotechnical information are provided concerning the evaluation and conceptual and preliminary design of the geotechnical-related aspects of the project. The following summarizes key aspects of the geotechnical conditions within the project area. Refer to the report for more detailed information.

- **Site Soils:** The site surface and subsurface consist predominantly of sand with of some interbedded clay and silt layers to the full depth of exploration of about 90 to 100 feet below existing site grade. The surface and shallow subsurface soils at the project site exhibit a moderate to high tendency for compression with increasing load and when elevated in moisture content. The shallow soils will exhibit low to moderate bearing capacity. The soils may be recompacted to increase bearing capacity and reduce settlement.
- **Groundwater:** Groundwater was encountered at depths ranging from about 3.5 to 21.5 feet below existing grade. The shallowest groundwater conditions are associated with proximity to the existing channel of the Rio Grande. Regional groundwater is anticipated to have moderate seasonal variations and may be encountered at depths ranging from the ground surface to over 20 feet below existing site grade. Groundwater depths are anticipated to be encountered at shallow depths, ranging seasonally with current flow conditions of the Rio Grande and adjacent floodplain.
- **Construction and Excavation:** On-site non-plastic sands or higher quality sands are anticipated to be suitable for use as structural backfill for abutments, wingwalls and pavements. On-site clay and silt will not be suitable for use as structural backfill. Shallow excavations into the on-site soils are expected to be accomplished with conventional earthwork equipment. Shallow groundwater and caving soils should be anticipated due to “very loose” to “loose” granular soil conditions and construction within the Rio Grande floodplain. The soils located below depths of about 45 to 65 feet are expected to exhibit moderate to relatively high bearing capacity.
- **Seismic:** The project is in Site Class D. The Seismic Design Category (SDC) is B for the bridge structure. The steel pipe pile foundations supporting the existing bridge are inadequate to resist the forces and ground displacements from a design level 1 earthquake. Based on the information compiled to date, the existing bridge structures need to be replaced rather than widened and retrofitted to meet current seismic design standards.
- **Slopes:** For permanent slopes in compacted fill and cut areas with maximum heights of about 20 feet, recommended preliminary maximum configurations for on-site materials range from 2H:1V to 3H:1V. Steeper slopes will require the use of structural backfill used in conjunction with slope paving or riprap.
- **Bridge Foundations:** The bridge structure is anticipated to be supported on a deep foundation consisting of up to 60-inch drilled shafts bearing on undisturbed soil. The estimated shaft length below the top of shaft ranges from 60 to 120 feet depending on the strength limit and shaft diameter. The foundation will need to account for design scour depths of about 20 feet. Casing and/or drilling slurry will be required for drilled shaft construction.
- **Other Foundations:** For relatively lightly loaded structures, such as retaining walls, wing walls, RCBCs, and other similar type structures, they are anticipated to bear on shallow foundations bearing on native undisturbed soils or structural backfill. Stabilization of subgrade may be required for support of concrete box culvert extensions. As an alternative to cast-in-place retaining walls or stub abutments, mechanically stabilized earth (MSE) walls could be considered. Moderate to high walls (and associated moderate fill embankments) may be subjected to large settlements.
- **Corrosion Potential:** ASTM Type I-II or modified Type II Portland cement will likely be required for all concrete on and below grade. Foundation concrete will need to be designed for low to high sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4. The results of the pH and minimum resistivity testing in the area indicate a moderate to severe corrosion potential to metal piping or conduits. Therefore, the site-specific corrosion test results will need to be considered in the selection of driven piles, metal conduits/drainage structures, and other metal elements for the project.
- **Scour and Erosion:** Scour and erosion countermeasures will need to be incorporated into the design of the bridge structure for portions located within the Rio Grande channel and floodplain. These measures may include rip rap, slope paving, gabion walls, sediment fencing, and soil cement. The anticipated scour depth for drilled shafts is 20 feet.

Pavement Data and Subgrade Report

A *Pavement Data and Subgrade Report* dated March 19, 2021 was prepared by Terracon Consultants and is included in the *electronic appendices*. The report presents the results of the site reconnaissance, field exploration and laboratory testing, and provides geotechnical data to NMDOT to perform the design of new pavements for the roadways within the project limits. The key findings of the pavement and subgrade investigations are summarized below. Refer to the report for more detailed information.

- The scope of work included the advancement of 18 test borings to approximate depths of 6 to 6.5 below existing pavement surface between mileposts 8.40 and 10.55. Sixteen of the borings were on Rio Bravo Boulevard with one each on Poco Loco Drive and Dean Road.
- The existing pavement section along the existing Rio Bravo Boulevard alignment within the project limits ranges from 5.5 to 7 inches of asphalt concrete overlying approximately 3 to 9 inches of aggregate base course. The boring just east of Isleta Boulevard showed approximately 7 inches of Portland cement concrete below 2 inches of asphalt concrete and 9 inches of base course, which is consistent with the as-built plans.
- The existing pavement section along the existing Dean Road alignment was 2.5 inches of asphalt concrete over 4.5 inches of aggregate base course.
- The existing pavement section along the existing Poco Loco Drive alignment was 4 inches of asphalt concrete over 8 inches of aggregate base course.
- The subgrade soils along the project alignment consisted of sands with varying amounts of clay, silt and gravel. The subgrade soils were classified as A-1-b, A-2-4, A-3, A-4, and A-6 in accordance with the AASHTO Soil Classification System. The poorer quality subgrade soils (A-6) were encountered in a few borings. The majority of the subgrade soils classify as A-2-4 in accordance with the AASHTO Soils Classification System, which are typically considered relatively good quality subgrade soils.
- R-values for Rio Bravo Boulevard within the construction limits range from 15 to 78. The R-value of 15 was near the east limits of proposed construction. The next lowest was 40 with most in the 60’s and 70’s.
- R-values for Dean Road ranged from 45 to 68.
- R-values for Poco Loco Drive ranged from 36 to 53.
- Groundwater was not encountered in the pavement/subgrade borings at the time of field exploration along the project alignment. Based on the results from the soil borings, groundwater control measures should not be necessary in excavations up to about 6.5 feet below existing site grades. However, due to low permeable subgrade soils, a perched groundwater condition could develop during construction. Therefore, dewatering and/or soil subgrade stabilization may be required.

- On-site sand soils are anticipated to be suitable for use as engineered fill beneath new pavements. Shallow excavations into the on-site soils are expected to be accomplished with conventional earthwork equipment. Some low-density and elevated moisture content subgrade soils were encountered in some borings and should be anticipated along portions of the alignment, which may require drying or stabilization/densification during construction.
- The new pavement section thickness will be based upon the subgrade type and condition, traffic loading, and desired design life. In addition, in areas of existing alligator cracking, potholes, patching, areas of other pavement structural distress and elevated moisture contents, remediation and/or replacement of unstable subgrade soils should be anticipated. Adequate drainage should be provided in the design of the roadway.
- For grading and drainage adjacent to the roadways, protective slopes with a minimum grade of approximately two (2) percent for at least 5 feet from the edge of the pavement should be provided.
- Based upon the test results and previous experience in the area, the sulfate contents are typically in the low to moderate range for corrosivity.

Drainage

A *Preliminary Drainage Report* was prepared and is included in the ***electronic appendices***. This section summarizes existing drainage conditions for the project; the detailed hydrological and hydraulics analyses can be found in the preliminary drainage report. For the most part, the drainage basins for existing structures within the project area lie to the north of Rio Bravo Boulevard. The terrain within the study area is flat and slopes at about 0.1% from north to south.

The runoff from the two bridges directly discharges onto the Rio Grande's main channel and its floodplain. The deck runoff for the eastbound Rio Grande bridge passes through block-outs in the concrete railing, flows over the sidewalk and directly over the edge. The deck runoff for the westbound Rio Grande bridge is captured by scuppers and discharges via a pipe through the deck on the inside of the concrete barrier railing. There are rundowns at the east abutment of the Riverside Drain bridges.


Runoff flows directly over the edge of the deck of the eastbound Rio Grande Bridge

In general, the roadway drainage is directed by asphalt curbs away from the Rio Grande and makes its way to Poco Loco Drive and Dean Road on the east side of the river, and to the buffer area next to the roadway embankment on the west side of the Rio Grande. The flow from Poco Loco Drive, Dean Road, and the buffer areas next to the roadway generally either drain into open ditches or ponds along the existing roadway and eventually infiltrates into the ground. A portion of the runoff from the project is discharged at two main outfall locations, the Albuquerque Riverside Drain on the east side of the Rio Grande and the Atrisco Riverside Drain on the west side of the river.

The drainage analysis and design for this project will follow the drainage design criteria and methodologies specified in the *2018 NMDOT Drainage Design Manual* (Drainage Manual). The design flood is the 50-year recurrence interval storm, and the check flood is the 100-year recurrence interval storm.

Bridge

The Rio Grande at the project site is located within a Federal Emergency Management Agency (FEMA) regulated floodplain. The FEMA *Flood Insurance Study (FIS) for Bernalillo County* (November 4, 2016) shows that this segment of the Rio Grande is in a floodway and that any improvements to the project should meet FEMA's no-rise criterion, meaning that the 100-year base flood elevation (BFE) shown on the FEMA floodplain maps should be maintained. The existing hydraulic analysis for the study area was obtained from FEMA. The hydraulic analysis was based on a 1982 HEC-2 hydraulic model. The model showed that the 100-year frequency discharge used at the bridge was 15,700 cubic feet per second (cfs), and the BFE for HEC-2 cross section "L" (a cross section 600 feet upstream of Rio Bravo Boulevard) was 4934.3 feet.

Using the discharge and Manning's coefficient values from FEMA's HEC-2 model, a preliminary Bureau of Reclamation's Sediment and River Hydraulics, Two-Dimensional (SRH-2D) computer model was developed. This analysis was performed to compare the water surface profiles between the existing HEC-2 model and the new two-dimensional analysis. The 2D model used the ground/bathymetry survey obtained for the project in November 2020. Limits of the survey extended approximately 3,000 feet upstream and 3,000 feet downstream of the bridge and covered the entire width of the floodplain. The survey also extended outside of the east and west levee and included both riverside drains.

The results of the SRH-2D model showed that the 100-year water surface elevation at HEC-2 cross section "L" is 4934.1 feet. This value is 0.2 feet lower than the water surface elevation estimated by HEC-2 analysis, and it will be used to ensure the 100-year water surface elevation for the proposed improvements for this project will not rise the water elevation in the Rio Grande.

The minimum elevations of the existing bridge's low chord and the top of levee are at 4940.75 feet and 4937.0 feet, respectively. The existing bridge is hydraulically adequate since it has a freeboard of 6.7 feet, and the levees on both sides of the bridge are high enough to contain the 100-year frequency discharge.


Rio Grande at Rio Bravo Boulevard Bridge, December 2020
Rectangular deck drain pipes also visible, north side of bridge

The procedures in the NMDOT Drainage Manual were used to estimate the peak flows at the bridge which were based on the streamflow gaging station data. The calculated 100-year frequency discharge with this method was 17,925 cfs, approximately 2,200 cfs higher than the one published by FEMA. This higher flow was also evaluated in the SRH-2D model and the results showed that the computed 100-year water surface elevation would be 4934.5 feet. Even with the higher flows, the existing bridge is hydraulically adequate, and it has a freeboard of 6.3 feet, and the levees on both sides of the bridge are still high enough to contain the 100-year frequency discharge.

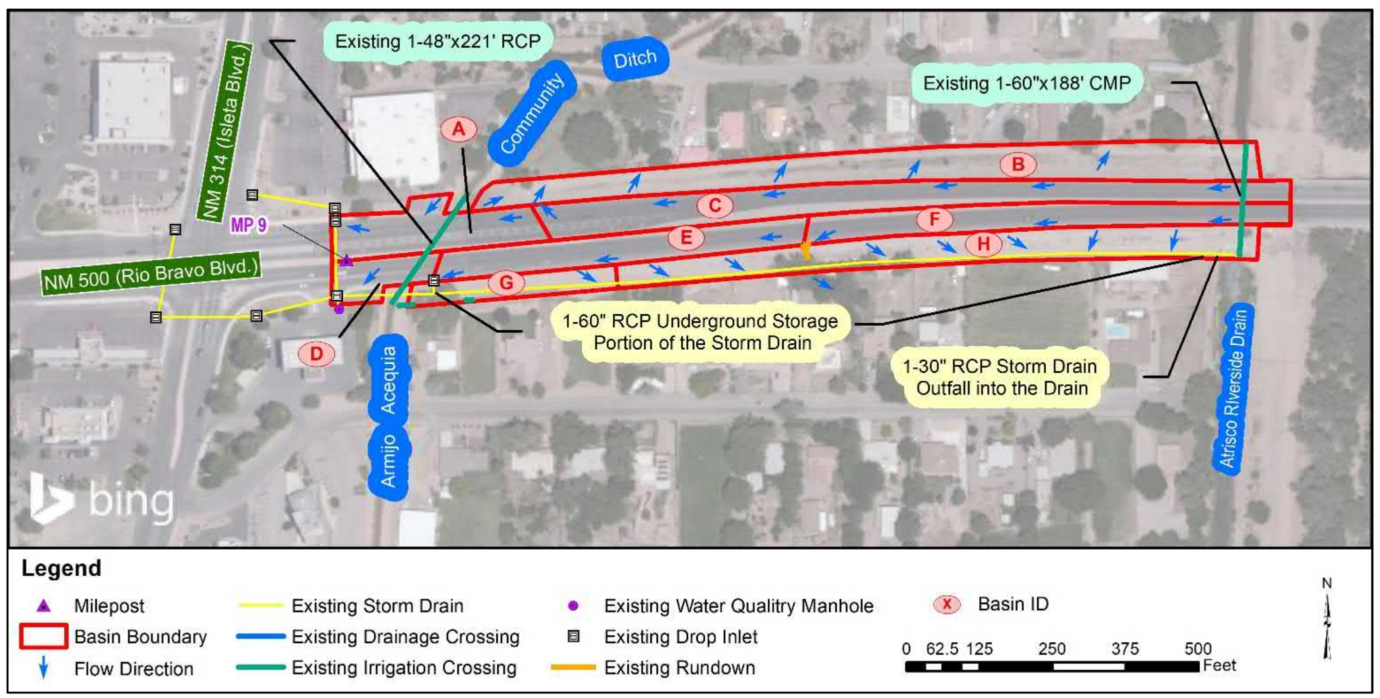
Roadway

West of the Rio Grande

Exhibit 3-9 illustrates the exiting roadway drainage patterns for the west side of the Rio Grande. An existing storm drain system, constructed as part of the Isleta Boulevard/Rio Bravo Intersection Improvements project, collects the roadway drainage from Basins A, D, and E and carries it in an easterly direction to the Atrisco Riverside Drain. This system ranges in size from a 28" span x 18" rise reinforced concrete pipe (RCP) arch to a 60" diameter RCP. The outfall of this system is an existing 30" diameter RCP into the Atrisco Riverside Drain. The 60" diameter RCP portion of this system, which is approximately 1,300 feet long, serves as an underground storage facility and in conjunction with the 30" diameter outfall RCP has been designed to attenuate the flow and maintain the historic discharge into the Atrisco Riverside Drain.

The roadway runoff from Basin C, is directed by an asphalt curb in a westerly direction and it joins the runoff from the buffer area/service road north of the roadway, Basin B; the runoff from these two basins temporarily ponds within Basin B and infiltrates into the ground. The roadway runoff from Basin E gets collected by an existing drop inlet at the western end of the basin and drains to the referenced storm drain system. The roadway runoff from Basin F is carried down the roadway embankment by an existing rundown located at the western end of the basin; the combined flows from Basins F, G, and H either ponds next to the ROW and infiltrates into the ground or sheet flows into the adjoining properties during the higher storm events.

Exhibit 3-9, Existing Drainage Conditions west of the Rio Grande



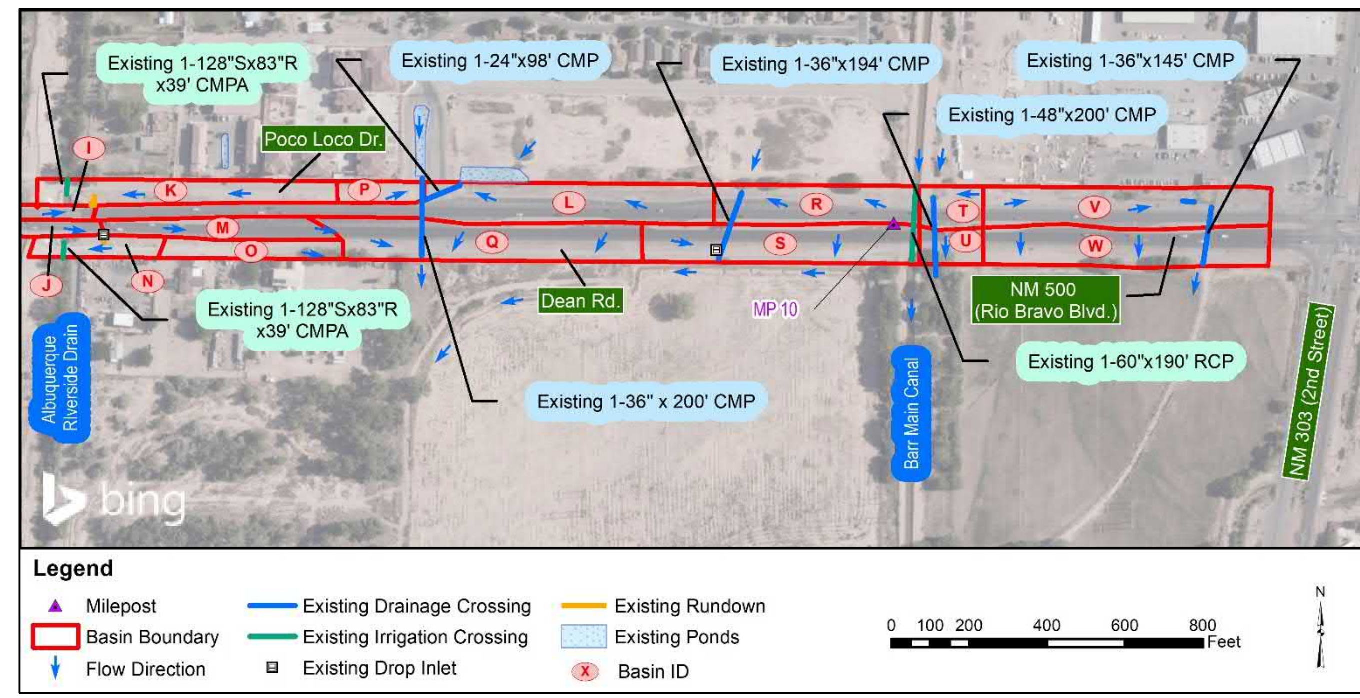
East of the Rio Grande

Exhibit 3-10 illustrates the exiting roadway drainage patterns for the east side of the Rio Grande. The runoff from the eastern portion of the bridge decks and roadway runoff over the Albuquerque Riverside Drain, Basins I and J, get collected by an existing rundown and an existing drop inlet and are carried down the roadway embankment to Poco Loco Drive and Dean Road, respectively. The combined flow from Basins I and K on the north side of Rio Bravo Boulevard and Basins J and N on the south side are discharged into the Albuquerque Riverside Drain.

The roadway drainage from Basins P and L are directed to the inlet of an existing 36" diameter corrugated metal pipe (CMP), located approximately 900 feet east of the Albuquerque Riverside Drain; this culvert, which has concrete blankets at both of its ends, drains from north to south and outfalls into the adjoining property to the south of Rio Bravo. The runoff from Basins M, O, and Q also are directed to the outlet of this culvert. A second 36" diameter CMP, located approximately 1,700 feet east of the Albuquerque Riverside Drain, is the outfall for Basin R. This culvert also drains from north to south and it has a concrete blanket at its inlet side and an end section at its outlet end. The flow from this culvert drains to the south outside of the ROW and it gets collected by an existing irrigation ditch that runs from east to west; the flow in this ditch eventually fans out into an irrigation field south of the project.

The runoff from Basin S either gets collected by an existing drop inlet (slotted drain) or it sheet flows outside of the ROW, and it reaches the east/west irrigation ditch outside the ROW. The roadway runoff from Basin T is collected by an existing 48" diameter culvert, located approximately 50 feet east of the Barr Main Canal. This culvert drains from north to south and it has an end section at its inlet side; the outlet end of this crossing was not found during the field inspection and further investigation would be required during the next phase of the project. The runoff from Basin U sheet flows outside of the ROW into the adjoining irrigation field. The roadway runoff from Basin V is collected by an existing 36" diameter culvert, located approximately 300 feet west of 2nd Street. This culvert drains from north to south and it has an end section at its inlet side and a concrete headwall at its outlet end. The flow from this culvert fans out into the adjoining irrigation fields on the south side of Rio Bravo Boulevard. The runoff from Basin W sheet flows outside of the ROW into the same irrigation fields.

Exhibit 3-10, Existing Drainage Conditions east of the Rio Grande



Irrigation Crossings

Four major MRGCD irrigation crossings exist within the project area, the Armijo Acequia – Community Ditch (Armijo Acequia), the Atrisco Riverside Drain, the Albuquerque Riverside Drain, and the Barr Main Canal. Refer to **Exhibits 3-9** and **3-10**.

The Armijo Acequia is situated approximately 400'east of Isleta Boulevard and it crosses under Rio Bravo Boulevard in an existing 1-48" diameter RCP. This culvert has concrete headwalls at both ends in addition to a trash rack at its inlet side. This culvert was constructed prior to 1960 and its condition could not be explored during the field inspection of the project because the culvert was running full. The MRGCD has expressed capacity issues with this crossing; however, because the proposed improvements will transition back to the existing roadway east of the Armijo Acequia crossing, no work at this crossing is anticipated.

The Atrisco Riverside Drain is located adjacent to the western levee of Rio Grande and it crosses under Rio Bravo Boulevard in an existing 1-60" diameter CMP. This culvert was constructed prior to 1960 and its condition could not be explored during the field inspection of the project because the culvert was running full.

Outlet side of the Atrisco Riverside Drain

The Albuquerque Riverside Drain is situated adjacent to the eastern levee of the Rio Grande and it only crosses under Poco Loco Drive and Dean Road. The Albuquerque Riverside Drain includes an open channel lined with concrete that goes under the Rio Bravo bridges. The size of the existing culverts under the Poco Loco Drive and Dean Road are a single 128" span x 83" rise corrugated metal pipe arch (CMPA). The end treatment for both crossings consist of concrete blankets. These culverts were constructed in 1985, per the latest as-built plans for the project, and their condition could not be explored during the field inspection of the project since the culvert was running about half full.

Open channel of Albuquerque Riverside Drain

The Barr Main Canal is located approximately 1,100 feet west of 2nd Street and it crosses under Rio Bravo Boulevard in an existing 1-60" diameter RCP. This culvert does not have any end treatments and the ends of the pipe are projecting out of the embankment. This culvert was constructed prior to 1960 and its condition could not be explored during the field inspection of the project because the canal was running almost full.

Barr Canal crossing under Rio Bravo Blvd

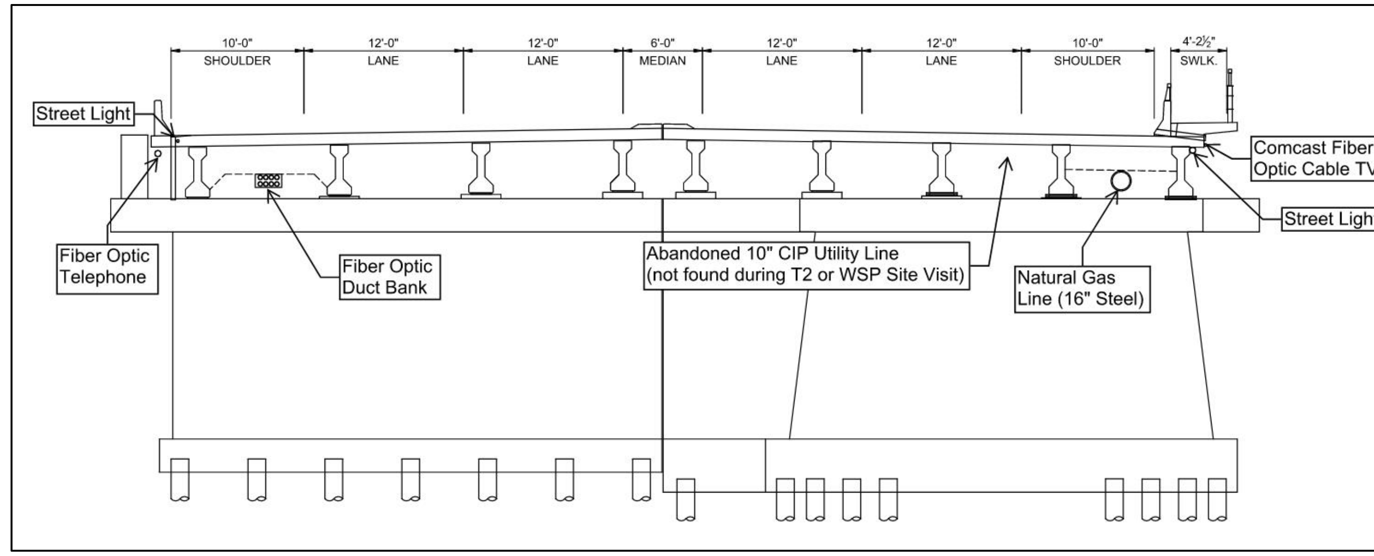
UTILITIES

The utility investigations and coordination for this project are being performed by T2 Utility Engineers. The ASCE 38-QLC/QLD utility mapping plans of existing conditions are included in **Appendix A**. The investigations of depicted utilities through quality level (QL) B were completed in August 2020. The utilities on the existing bridges are shown in **Exhibit 3-11**. In addition, twelve (12) QL A test holes were performed; the results are included in the *electronic appendices*.

An early utility coordination meeting was held on February 17, 2021 to engage utility owners to begin determining potential ways of relocating utilities and applicable relocation requirements. A summary by utility owner is provided below.

- ABCWUA – Have abandoned sewer lines that are not needed on and off the bridge per records. The abandoned sewer lines are (2) 10-inch cast iron, a 15-inch ductile iron and a 24-inch ductile iron. Line on the bridge was a force main, which was flushed and filled with grout in 1986. Line can be abandoned in place off the bridges. Portion hanging off bridge will be removed from bridge. In design plans, call out to cap and not leave sticking out behind abutment. May want to place conduit for the future on the south side of new bridges.
- ADB Co. – Will review the project with their engineering department. Will also need to coordinate with MCI.

Exhibit 3-11, Utilities on the Existing Rio Grande Bridges



- AT&T – Will determine what they want to do with their fiber line on the north side. Whether they take it out until the construction is complete. They have a diverse route.
- Bernalillo County –Traffic interconnect is a 96-pair fiber down roadway as well as the bridges. Lighting on both sides of the bridge that the county maintains for the NMDOT.
- Century Link/Terra Tech – Has the most conduits and will determine plans for relocation. May relocate the same amount of conduits on the north side of the bridge.
- Comcast – Has conduit on south side of bridge and will need to determine their plans for relocation.
- MCI – West of Poco Loco, has fiber optic in a Century Link duct that they are leasing from them. From Poco Loco east, has a buried duct with fiber.
- NM Gas – For the 16" transmission gas line on the bridge, NM Gas is looking at relocating the line by boring under Rio Grande. Gas distribution lines do not appear to be of concern however NM Gas will verify that that is the case when they receive the design plan sets. The timeline for relocation will be subject to the licenses and environmental requirements involved in obtaining approval for boring. Peter Ford, Transmission Division, will be included in further coordination efforts. NM Gas desires to stay within NMDOT ROW when they bore. NM Gas may need to obtain an additional TUA (Temporary Utility Construction Access) to place their boring equipment, and they will need to know the NMDOT ROW limits for the project to determine the location of the bore.
- PNM – Has no underground facilities and does not have any facilities on the bridge. Has overhead facilities on north side and south side of Rio Bravo. On the north side of the project realignment, will need space between sidewalk and property lines for relocations. Has joint use with Century Link and UPN. May request two 5-inch conduits for future expansion. Future traffic signals at Poco Loco Road will require power service. Street lights are owned by PNM however County maintains and will need to coordinate power connections. Coordinate agreements with County.
- UPN – Will need to coordinate with Century Link because they lease a duct from them. May look at obtaining their own duct or continue leasing from Century Link. Will coordinate with PNM as design progresses.
- Zayo – Will need to coordinate with Century Link because they lease a duct from them. May look at obtaining their own duct or continue leasing from Century Link or work with UPN.

Traffic Conditions

This section summarizes the development of existing (2016) and opening year (2025) traffic volumes and the corresponding traffic operations analyses of near-term conditions for the project area.

Existing Traffic Volumes, 2016

Current traffic counts were not obtained for this project due to COVID-19 impacts on traffic patterns. Available traffic count data from previous years were assembled from multiple sources including:

- 2016 Turn Movement Counts (TMCs) for the Prince Street Warehouse TIA (2nd Street/NM 500 TMCs). Source: Bernalillo County/NMDOT
- 2014 Turn Movement Counts for the Poco Loco Apartments TIA (Poco Loco Rd/NM 500 TMCs). Source: Bernalillo County/NMDOT
- 2016 Turn Movement Counts for the McDonalds TIA (Isleta Blvd/NM 500 TMCs). Source: Bernalillo County
- 2016 Turn Movement Counts for the 2nd Street/Rio Bravo Intersection Improvements (2nd Street/NM 500 TMCs). Source: Bernalillo County
- 2016 and 2019 coverage counts performed by MRCOG along NM 500. Source: MRCOG
- 2007-2018 AWDTs throughout the study area. Source: MRCOG

Based on a review of the data from these sources and balancing traffic volumes through the project limits, adjusted AM and PM peak-hour volumes for 2016 were determined. The 2016 volumes were adjusted further based on information obtained using StreetLight "Big Data" as discussed below.

StreetLight "Big Data" Analysis

StreetLight "Big Data" was obtained for the study area roadways/intersections to supplement the available existing traffic count data. The "Big Data" was used to develop turning movement percentages/trends to facilitate estimates of opening year 2025 traffic volumes. Because of the impacts of the pandemic on traffic flows, an opening year dataset was developed to estimate traffic conditions for the near-term, which is more conservative than relying on available traffic volumes.

The StreetLight "Big Data" is based on location tracking apps on cell phones and INRIX data. The volumes are estimates and are not exact counts, since not all vehicles using the roadways have cell phones in the vehicle. StreetLight produces "StreetLight Volumes" based on the "Big Data" collected, the average daily traffic (ADT) volumes for the various roadways (in this case, MRCOG's 2019 ADTs), and additional machine learning algorithms to determine an estimate of the turning volumes. Note that vehicles with more than one cell phone inside do not result in extra trips.

The "Big Data" turning movement trends were based on the average of trips from March 1, 2019 to April 31, 2019 and from September 1, 2019 to October 31, 2019 on Tuesdays to Thursdays. The AM Peak hour was an average of trips from 7-9 AM, and the PM Peak hour was an average of trips from 4-6 PM.

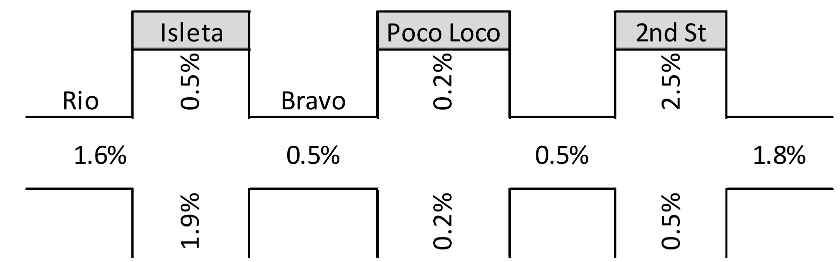
For the Rio Bravo Boulevard/Poco Loco Road intersection during the AM peak, the "Big Data" indicates a heavy east-to-north left-turn movement to Rossmoor Road and eventually to 2nd Street. This traffic apparently cuts through on the local streets to avoid congestion at the Rio Bravo Boulevard/2nd Street intersection, mostly when school is in session. StreetLight analyses confirmed this by reviewing data when school is in session, during the summer, and in Fall 2020 when traffic volumes and congestion were lower. Further verification came from the public meeting when a comment was made about the cut-through traffic using Rossmoor Road.

The final, adjusted 2016 AM and PM peak-hour volumes are shown in **Exhibit 3-12** (next page). The source data are available in the *electronic appendices*.

Opening Year Traffic Volumes, 2025

The 2016 traffic volumes provided the basis for estimating near-term projected traffic volumes representing an opening year of 2025. The development of 2025 volumes was based on annual growth rates calculated from past-year traffic counts, and included normalization through the project limits to provide continuity in the volumes. The annual growth rates are shown in **Exhibit 3-13**.

Exhibit 3-13, Annual Growth Rates to Estimate 2025 Traffic Volumes



The AM and PM peak hour traffic volumes for opening year 2025 are shown in **Exhibit 3-14** (next page). The 2025 traffic volumes are the same with and without the proposed project improvements. Additional information on the development of the volumes is provided in the *electronic appendices*.

Average Daily Traffic Volumes

Average daily traffic (ADT) volumes in vehicles per day (vpd) for 2016 and 2025 are shown in **Exhibit 3-15**.

Exhibit 3-15, Average Daily Traffic Volumes for 2016 and 2025

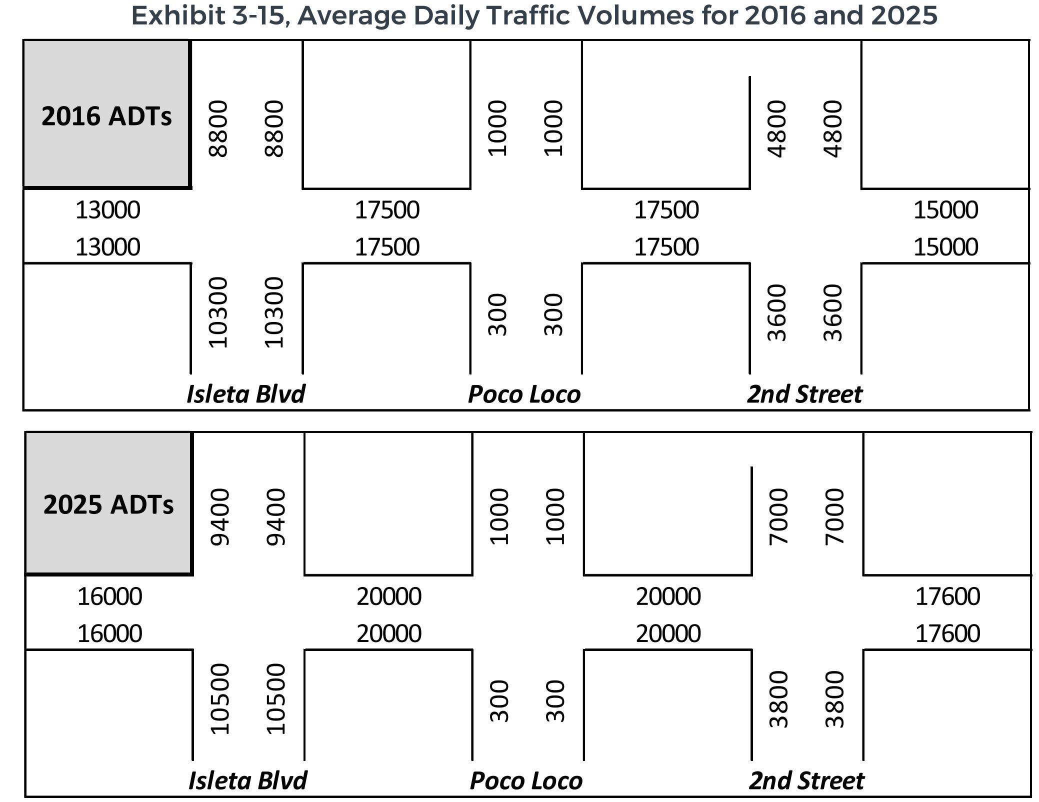


Exhibit 3-12, Existing 2016 AM and PM Peak-Hour Traffic Volumes

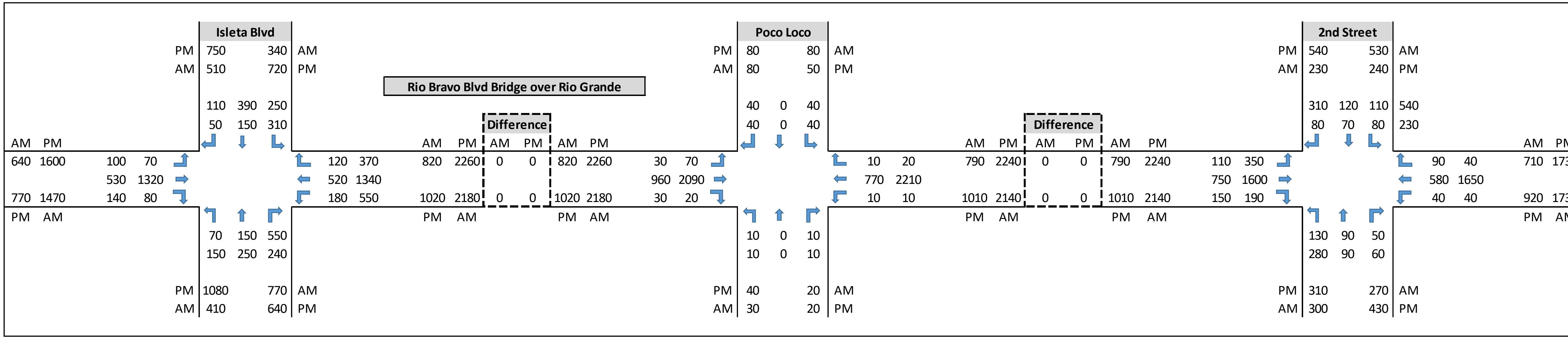
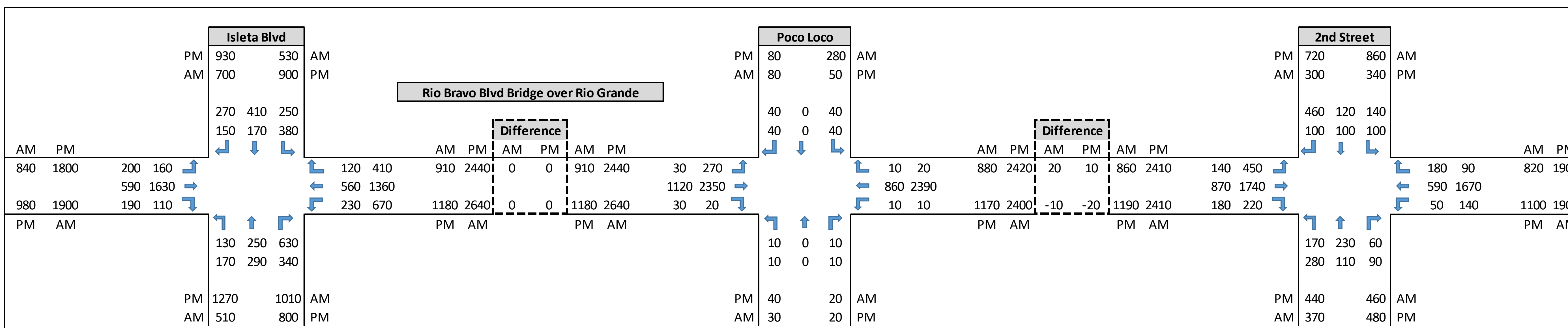


Exhibit 3-14, Opening Year 2025 AM and PM Peak-Hour Traffic Volume Estimates



Streetlight Data Analysis for E-N Left at Poco Loco in the AM Peak
1. Spring and Fall 2019 with school in session is over 300 vehicles.
2. Summer of 2018, volume is 135 vehicles in the AM peak hour
3. Fall 2020, volume is about 50 vph.

Streetlight Data Analysis for W-N Right at Poco Loco in the AM Peak
1. Spring and Fall with school in session is about 13 vph.
2. Summer of 2018, volume is about 5 vph.
3. Fall 2020, volume is about 9 vph.

Vehicle Classification Percentages

Vehicle classifications were estimated for Rio Bravo Boulevard based on available data from NMDOT and using StreetLight data as described above. The resulting breakdown is summarized in **Table 3-2**.

Table 3-2, Estimated Vehicle Classification Percentages for Rio Bravo Boulevard

	AM Peak					PM Peak				
Direction	Heavy Trucks	Medium Trucks	Buses	Total	Autos	Heavy Trucks	Medium Trucks	Buses	Total	Autos
Eastbound	1.0%	5.0%	1.0%	7.0%	93.0%	2.0%	7.0%	1.0%	10.0%	90.0%
Westbound	2.0%	7.0%	1.0%	10.0%	90.0%	1.0%	6.0%	1.0%	8.0%	92.0%

Existing/Near-Term Traffic Operations

This section summarizes an evaluation of the existing (2016) and opening year (2025) traffic operations for Rio Bravo Boulevard. The operations at the signalized intersections adjacent to the bridge along NM 500 were evaluated because their operations are the limiting factor for traffic flows that cross the river on the bridges that will be reconstructed by this project. The signalized intersections evaluated were at Isleta Boulevard and at 2nd Street. The unsignalized intersection of Rio Bravo Boulevard with Poco Loco Road/Dean Road was also evaluated including a traffic signal warrant analysis.

The Highway Capacity Software (HCS7) Streets module was used to evaluate the intersections. Bernalillo County operates an Adaptive Traffic Signal System along Rio Bravo Boulevard. Traffic signal timing plans including coordination plans and time-of-day plans were not available from Bernalillo County when the analyses were completed, only basic background timing settings were provided. As such, cycle lengths and phase splits were optimized using HCS7 to reflect an average over the peak analysis periods. The yellow intervals range from 5.4 to 5.7 seconds and the all-red interval is 1.5 seconds.

The results of the near-term conditions intersection analyses are summarized in **Table 3-3.** Traffic operations for the signalized intersections were evaluated for the AM and PM peak periods. The 2016 analyses were completed using standard peak-hour methodology while the 2025 analyses used 15-minute, multi-period intervals. The HCS multi-period analysis was used to evaluate the intersections where congestion is expected including the impact of residual queues. The Poco Loco Road unsignalized, two-way stop controlled intersection, was analyzed using a standard peak-hour methodology. The existing/committed condition assumes four lanes across the river.

The lane configuration at the Isleta Boulevard intersection was as exists for both analysis years. The lane configuration at the 2nd Street intersection was as exists for the 2016 analysis and was modified to reflect the improvements being developed by Bernalillo County for the 2025 analysis.

As shown in **Table 3-3**, for 2016 conditions, the signalized operations operate at overall LOS D or better with movements near capacity based on high volume-to-capacity (v/c) ratios. The minor street stop-controlled movements from Poco Loco Road and Dean Road are at LOS F suggesting that few gaps in the traffic stream exist in the peak travel direction to accommodate turns from the minor streets at this location.

For 2025 conditions, operational deficiencies can be expected at all of the intersections. At Isleta Boulevard, the eastbound and westbound through traffic demand cannot be accommodated with two through lanes. At 2nd Street, the southbound right-turn movement is deficient in the PM peak. The estimated delays at the Poco Loco/Dean Road unsignalized intersection increase over those shown in the 2016 analysis with excessive delays expected for relatively low traffic volumes. A field gap study should be performed after construction is completed to verify this.

Table 3-3, Near-Term Intersections Operations Summary for Existing/Committed Conditions

Intersection	Ave. Cycle Length (sec)	EASTBOUND Delay (sec/veh)	EASTBOUND LOS	WESTBOUND Delay (sec/veh)	WESTBOUND LOS	NORTHBOUND Delay (sec/veh)	NORTHBOUND LOS	SOUTHBOUND Delay (sec/veh)	SOUTHBOUND LOS	INTERSECTION Delay (sec/veh)	INTERSECTION LOS	INTERSECTION Max V/C
	Year 2016											
Rio Bravo Blvd @ Isleta Blvd												
AM Peak	100	40	D	44	D	17	B	50	D	37	D	0.997
PM Peak	140	41	D	37	D	35	D	50	D	40	D	0.944
Rio Bravo Blvd @ 2nd Street												
AM Peak	100	26	C	26	C	37	D	44	D	29	C	0.917
PM Peak	140	29	C	40	C	70	E	67	E	45	D	0.987
	Year 2025											
Rio Bravo Blvd @ Isleta Blvd												
AM Peak	110	146	***F***	37	D	22	C	45	C	74	E	1.103
PM Peak	130	45	D	108	***F***	61	E	53	D	71	E	1.165
Rio Bravo Blvd @ 2nd Street												
AM Peak	110	14	B	16	B	42	D	47	D	21	C	0.663
PM Peak	130	46	D	61	E	61	E	86	***F***	57	E	1.034

Intersection	Two-Way Stop	EB Left-Turn Delay (sec/veh)	EB Left-Turn LOS	WB Left-Turn Delay (sec/veh)	WB Left-Turn LOS	NORTHBOUND Delay (sec/veh)	NORTHBOUND LOS	SOUTHBOUND Delay (sec/veh)	SOUTHBOUND LOS	Max V/C
	Year 2016									
Rio Bravo Blvd @ Poco Loco Road										
AM Peak	Unsig.	10	B	24	C	169	***F***	46	E	0.54
PM Peak	Unsig.	28	D	11	B	43	E	320	***F***	1.60
	Year 2025									
Rio Bravo Blvd @ Poco Loco Road										
AM Peak	Unsig.	14	B	30	D	-	***F***	429	***F***	2.02
PM Peak	Unsig.	34	D	12	B	59	***F***	484	***F***	2.15

Travel Time Runs

Floating car travel time runs on Rio Bravo Boulevard were conducted from 7:00 to 8:00 AM and 4:30 to 6:00 PM on May 4, 2021. The test car route was from Sausalito Drive west of Isleta Boulevard to Prince Drive east of 2nd Street, approximately two miles. Six runs in each travel direction were obtained in the AM period and eight runs were obtained in the PM period. Key results of the travel time runs (non-cumulative) are provided in **Table 3-4**.

Table 3-4, Summary of Travel Time Runs along Rio Bravo Boulevard

Travel Direction	AM Peak	PM Peak
Eastbound	**(mm:ss.0)**	**(mm:ss.0)**
Average Delay at Isleta Blvd	00:54.6	00:52.6
Travel Time, Isleta Blvd through 2nd St	01:27.7	01:42.1
Average Delay at 2nd St	00:21.8	00:06.1
Total Travel Time for Entire Route	*03:37.5*	*03:35.3*
Westbound		
Average Delay at 2nd St	00:09.6	01:27.9
Travel Time, 2nd St through Isleta Blvd	01:31.0	02:34.4
Average Delay at Isleta Blvd	00:07.0	01:09.2
Total Travel Time for Entire Route	*02:39.8*	*04:56.7*

Traffic Signal Warrant Analysis – Rio Bravo Blvd/Poco Loco Rd/Dean Rd

A traffic signal warrant analysis was performed for the intersection of Rio Bravo Boulevard/Poco Loco/Dean Road based on the Manual on Uniform Traffic Control Devices (MUTCD) warrants. The warrant analysis is documented under separate cover and is available in the *electronic appendices*. The traffic volumes were provided by previous studies and StreetLight Data, as discussed above. The hourly/15-minute incremental data was developed based on 15-minute interval data from StreetLight and the peak-hour volumes projected to 2025. Redacted crash reports for all crashes recorded at this intersection between 2016 to 2019 were obtained from the NMDOT.

The speed-limit along the major street is 45 MPH, which is above 40 MPH, so the 70% warrants were applied. The major street has two approach lanes currently, with three proposed. The Poco Loco Road minor street has two approach lanes as defined in section 4C.01.09 of the 2009 MUTCD. Dean Road has one approach lane.

Warrant 2 was the only warrant met with the minor street volumes at the minimum threshold of 80 vehicles per hour (vph). Note that major street volumes are nearly triple the 1000 vph threshold.

The warrant evaluation is considered preliminary due to the COVID-19 impacts on traffic in Albuquerque and the need to use estimated traffic volumes. The volume conditions following completion of this project and the adjacent Bernalillo County projects are expected to be high resulting in high delays for minor street movements. Also, ABQ Ride has bus stops near this intersection on both sides and while the pedestrian volumes are not expected to be high, traffic signal control would benefit crossings of Rio Bravo Boulevard.

At this time, it is recommended that the traffic signal subsurface infrastructure be installed at this intersection as part of the proposed bridge replacement project improvements, but that the signal not be installed and made operational until a traffic signal warrant study based on actual traffic volumes can be conducted including a study of available gaps in the Rio Bravo traffic streams. The potential need for a traffic signal at Poco Loco Road was identified in the NMDOT *Corridor Access Management NM 500 (Rio Bravo Boulevard)* document dated August 2020.

Safety Conditions

A safety analysis of the existing conditions along Rio Bravo Boulevard was performed from Isleta Boulevard to 2nd Street. Summarized crashes recorded along the corridor between 2015-2019 were analyzed to identify trends in historic crash data. Actual crash reports for the same time period were reviewed for the Rio Bravo Boulevard/Poco Loco Road intersection. The crash data were provided by the NMDOT Traffic Safety Bureau.

A Highway Safety Manual evaluation is documented in **Chapter 5** of this report for existing and proposed conditions.

Crash Occurrence

The number of crashes by segment of Rio Bravo Boulevard are shown in **Table 3-5**, and **Table 3-6** summarizes probable access-related crashes by segment. Crashes by intersection are summarized in **Table 3-7**. The raw 2015-2019 crash data along the corridor and the crash reports for the Poco Loco Road intersection are provided in the *electronic appendices*.

Table 3-5, Rio Bravo Boulevard Roadway Segment Crash Data (2015-2019)

Segment	Number of Reported Crashes						Corridor Length (mi)
	2015	2016	2017	2018	2019	Total	
Isleta Blvd – Poco Loco	3	8	9	13	8	41	0.82
Poco Loco – 2nd St	1	1	0	4	2	8	0.44

Table 3-6, Roadway Segment Summary for Probable Access-Related Crashes (2015-2019)

Roadway Segment	Total Crash Count	Severity			Classification				
		Fatal	Injury	PDO	Angle	Rear End	Head On	Other	Fixed Objects
Isleta Blvd – Poco Loco	41	2	8	31	5	28	3	5	-
Poco Loco - 2nd St	8	-	-	8	1	5	-	1	1

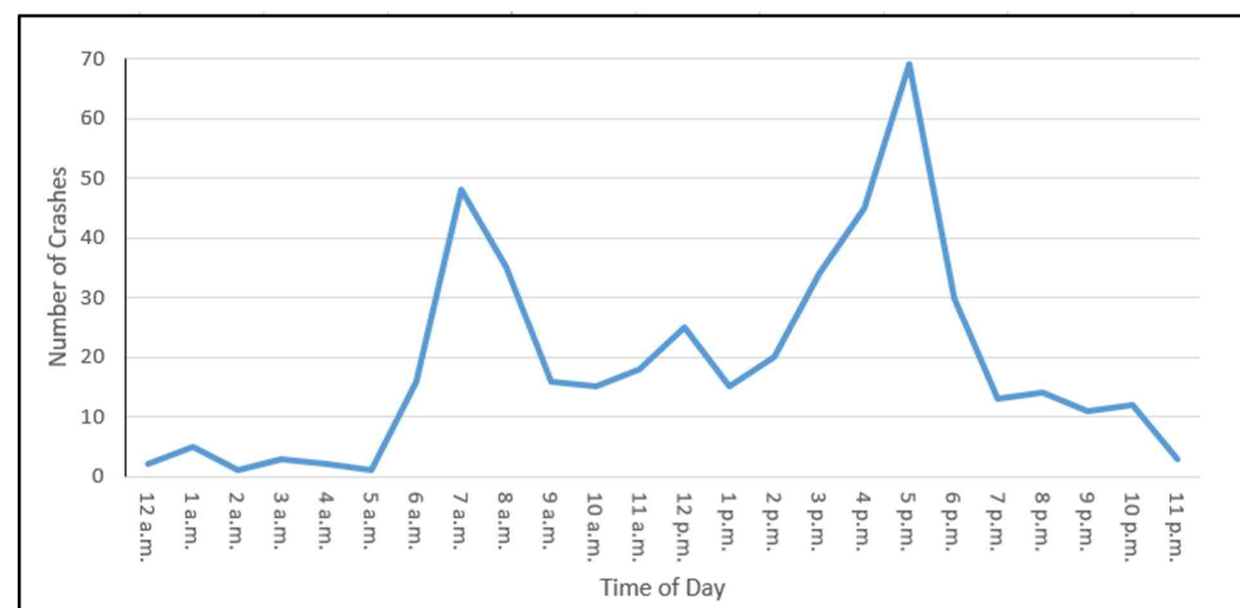
Table 3-7, Rio Bravo Boulevard Intersection Crash Data (2015-2019)

Signalized Intersection with Rio Bravo Boulevard	Number of Reported Crashes					
	2015	2016	2017	2018	2019	Total
Isleta Blvd (Signalized)	16	43	43	43	57	202
Poco Loco (Unsignalized)	0	7	10	6	6	29
2nd St (Signalized)	16	45	32	36	45	174

As shown in **Exhibit 3-16**, crashes occurred throughout the day, but there were definite spikes in crashes that correlated to both the AM and PM peak commute hours. These peak period crash patterns are commensurate with the residential and service industry land-uses along the corridor and Rio Bravo Boulevard's function as a key river crossing in the South Valley of Albuquerque.

The predominant crash type for the segment of Rio Bravo between Isleta Boulevard and 2nd Street, including the Poco Loco Road intersection, is the rear-end crash at 67%. The next highest is right angle at 12%, followed by fixed object at 6%. Crash severity is low with property damage only (PDO) crashes at 75%.

Exhibit 3-16, Crashes per Hour along Rio Bravo Blvd from Isleta Blvd to 2nd St (2015-2019)



Crash Rate Calculations

Crash rates were calculated using the following equations:

$$Roadway\ Segment\ Crash\ Rate\ (R) = \frac{100{,}000{,}000\ x\ C}{365\ x\ N\ x\ V\ x\ L}$$

Where

R = Crash rate expressed as crashes per 100 million vehicle miles traveled (cr/100 MVMT)
C = Total number of crashes in the study period
N = Number of years of data
V = Average Daily Traffic volume along the roadway segment
L = Length of roadway segment in miles

$$Intersection\ Crash\ Rate\ (R) = \frac{1{,}000{,}000\ x\ C}{365\ x\ N\ x\ V}$$

Where

R = Crash rate for the intersection expressed as crashes per million entering vehicles (cr/MEV)
C = Total number of intersection-related crashes in the study period
N = Number of years of data
V = Average Daily Traffic volumes entering the intersection

Table 3-8 summarizes the roadway segment crash rates along the corridor. The average ADT for Rio Bravo Boulevard for the five-year period was 30,000 vpd. For comparison, the average roadway segment crash rate in New Mexico was reported as 162 crashes per 100 Million Vehicle Miles Traveled (MVMT) in the 2016 New Mexico Traffic Crash Annual Report. The crash rate reported specific to Bernalillo County was 316 crashes per 100 MVMT, which is significantly higher than the statewide average. The crash rates in **Table 3-8** are less than the statewide and county averages.

Table 3-9 shows the crash rate analysis of the Rio Bravo/Poco Loco Road unsignalized intersection, assuming it is separate from the roadway segment that it is part of. That is, the crashes at this intersection were not included in the roadway segment crash rate analysis. The daily entering volumes used for the evaluation were half of the ADTs of the four roadway segments that form the intersection. The 0.92 cr/MEV is considered typical for an unsignalized public street along a principal arterial. Further, congestion at the 2nd Street intersection may result in rear-end crashes as far upstream as the Poco Loco Road intersection.

Table 3-10 summarizes the crash rates for the signalized intersections for which improvements are not being considered as part of this project. The crash rates are high for both intersections, and are indicative of intersections that should be evaluated further to determine if safety-related countermeasures could address the high crash occurrence.

Table 3-8, Roadway Segment Crash Rates

Segment	Crash Rate (cr/100 MVMT)					
	2015	2016	2017	2018	2019	2015-2019
Isleta Boulevard – Poco Loco Road	31	82	107	152	94	91
Poco Loco Road - 2nd Street	19	19	0	87	44	33

Table 3-9, Unsignalized Intersection Crash Rate

Unsignalized Intersection With Rio Bravo Boulevard	Crash Rate (cr/MEV)					
	2015	2016	2017	2018	2019	2015-2019
Poco Loco Road	0	1.15	1.89	1.12	1.13	1.03

Table 3-10, Signalized Intersection Crash Rates

Signalized Intersection With Rio Bravo Boulevard	Crash Rate (cr/MEV)					
	2015	2016	2017	2018	2019	2015-2019
Isleta Boulevard	1.83	5.14	5.12	4.90	6.75	4.73
2nd Street	2.49	6.54	4.86	5.41	6.67	5.23

Environmental Conditions

Existing environmental conditions within the project area were assessed with the primary objective to identify conditions that warrant consideration as alternatives are being developed and evaluated. Environmental resources reviewed include cultural resources, Waters of the U.S., which are under USACE jurisdiction, and wetlands, floodplains, farmlands, geology and soils, vegetation and wildlife, endangered species and critical habitat, hazardous materials, air quality, and noise. The findings described here are based on a review of available data records and databases and supplemented with a preliminary cultural and natural resources field surveys. Additionally, the Project Team held a multi-agency kick off meeting on October 19, 2020 to identify initial resource concerns with those agencies having regulatory or land managing authority in proximity to the project. Coordination meetings with specific agencies are being held as needed to discuss initial concepts and seek input to support the project development process.

This section identifies the environmental conditions of the corridor and discusses those topics that are germane to the project.

Land Use, Business, and Community Resources

The Rio Bravo Boulevard Bridge is one of seven roadway crossings over the Rio Grande within the City of Albuquerque. These bridges are heavily trafficked by commuters and serve as key connector routes between the east and the west side of Albuquerque. At least one ABQRide bus route currently operates along Rio Bravo Boulevard with stops within and adjacent to the corridor. The Project Development Team met with ABQRide on May 4, 2021 to discuss these facilities and receive initial input.

In addition to crossing the Rio Grande, lands within and surrounding the project consist of a mix of residential, light industrial, commercial, and open space. Residential areas include neighborhoods, an apartment complex, and a condominium complex. Light industrial and commercial business include a building supply company, equipment rental company, and gas stations.

Several levees and irrigation canals exist along the Rio Grande and are maintained and rehabilitated by the Middle Rio Grande Conservancy District (MRGCD). Land from the base of levee to edge of river water is managed by the Bureau of Reclamation (BOR). Open space within the project area owned by City of Albuquerque consists of the City of Albuquerque Rio Bravo Open Space Park and Riverside Picnic Area and multi-use trails. The river is used by recreationists, and an unpaved boat ramp off the riverbank on the northwest side of the Rio Bravo Bridge serves as the southern-most ramp for Bernalillo County and the City of Albuquerque search and rescue boat access.

Recreation and Multi-Modal Facilities

Recreation and multi-modal facilities within the project area include the Rio Bravo Open Space Park and associated Riverside Picnic Area owned by the City of Albuquerque, and the John A. Aragón Bosque Park, owned by the MRGCD. The John A. Aragón Park has ADA accommodations and connects to the City's Paseo del Bosque Trail system for bicycle commuters and other recreationists. The Paseo del Bosque Trail system is a 16-mile developed and paved multi-modal riverside trail from Rio Bravo Boulevard to Alameda Boulevard and contains several informal fishing access locations along the trail. According to Bernalillo County, this is a heavily used trailhead and parking space. The Rio Grande is also often used for boat recreation; however, most boaters exit the river before the Rio Bravo bridge.

Demographics

The demographic characteristics of the project area population were reviewed to identify the presence of groups that may require special consideration consistent with Title VI and Executive Order (EO) 12898. Data from the U.S. Census Bureau was obtained via the Economic Profile System (EPS) and the EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN), and was analyzed to determine the demographic characteristics of the project area. This data is presented in **Table 3-11**.

Three Census Block Groups are located adjacent to the project area as shown in **Exhibit 3-17** (next page). Approximately, 82% of the population in the study area is Hispanic or Latino which is higher than the state average of 48%. In total, 53% of people report speaking Spanish at home, which is higher than the state average of 28%. Approximately 18% of the population surrounding the study area is low-income compared to the state average of 16%, as shown in **Table 3-11**. The age distribution within the project area is similar to the state and county.

Cultural Resources

Cultural resources within the project area are protected under the National Historic Preservation Act (NHPA), as well as several state statutes. Only those resources listed in, or determined to be eligible for listing in, the National Register of Historic Places (NRHP) or New Mexico State Register of Cultural Properties (SRCP) are considered protected under federal and state law. Much of the project corridor has been previously surveyed, though not to today's standards for cultural resources inventory.

Based on the results of these previous investigations, three archaeological sites and fourteen historic structures are within or adjacent to the project. One archaeological site has been documented as a historic structure also, so there are 16 known properties. One of the archaeological sites has been determined not eligible for listing in the NRHP, while a second has undetermined eligibility. Five historic buildings have been determined not eligible for listing in the NRHP, but the other nine structures – seven acequias, the Riverside Drain, and the NMRX Rail Runner tracks - are eligible for listing in the NRHP. Additionally, the southern bridges (#6224 and #6225) were constructed in 1961 and must be evaluated as a cultural resource.

During Phase C, a 100% pedestrian survey of the preferred alternative will be performed to the current standards outlined in *NMDOT Guidelines for Cultural Resource Investigations 2018*.

Section 4(f) Properties

Section 4(f) of the Department of Transportation Act of 1966, as amended (49 USC 303), states that the US Department of Transportation may not approve the use of land from a significant publicly owned park, recreation area, wildlife or wildfowl refuge, or a significant historic site unless a determination is made that:

- There is no feasible and prudent alternative to the use of land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use.

Table 3-11, 2013-2017 Demographics

	New Mexico	Bernalillo County	Project Area (2 mile buffer)	Tract 4001 BG3	Tract 4501 BG2	Tract 4603 BG1
Total Population	2,084,828	674,855	24,588	1,452	1,780	485
White	38%	39%	14%	17%	14%	9%
African American	2%	3%	1%	3%	0%	0%
Native American	9%	4%	2%	1%	1%	0%
Asian	1%	2%	1%	0%	0%	0%
Some Other Race	9%	12%	19%	8%	23%	17%
Two or More Races	3%	2%	2%	0%	1%	2%
Hispanic or Latino:	48%	50%	82%	79%	85%	89%
under 5	6%	6%	5%	7%	5%	0%
0-17	24%	23%	25%	34%	20%	18%
18 and over	76%	77%	75%	66%	80%	82%
65 and over	16%	15%	15%	6%	15%	19%
Language Spoken at Home	**New Mexico**	**Bernalillo County**	**Project Area (2 mile buffer)**	**Tract 4001 BG3**	**Tract 4501 BG2**	**Tract 4603 BG1**
English	65%	70%	46%	38%	35%	64%
Spanish	28%	24%	53%	-	-	-
Other and not-specified	5%	2%	0%	-	-	-
Total non-English	35%	30%	54%	62%	65%	36%
Income*	**New Mexico**	**Bernalillo County**	**Project Area (2 mile buffer)**	**Tract 4001 BG3**	**Tract 4501 BG2**	**Tract 4603 BG1**
Median Household Income	$46,718	$50,386	-	$32,667	$36,891	$50,000
Per Capita Income	$25,257	$28,340	$18,905	$13,972	$19,887	$22,322
Percent Unemployed	4%	4%	5%	6%	7%	1%
Percent Below Poverty	16%	14%	18%	35%	24%	5%

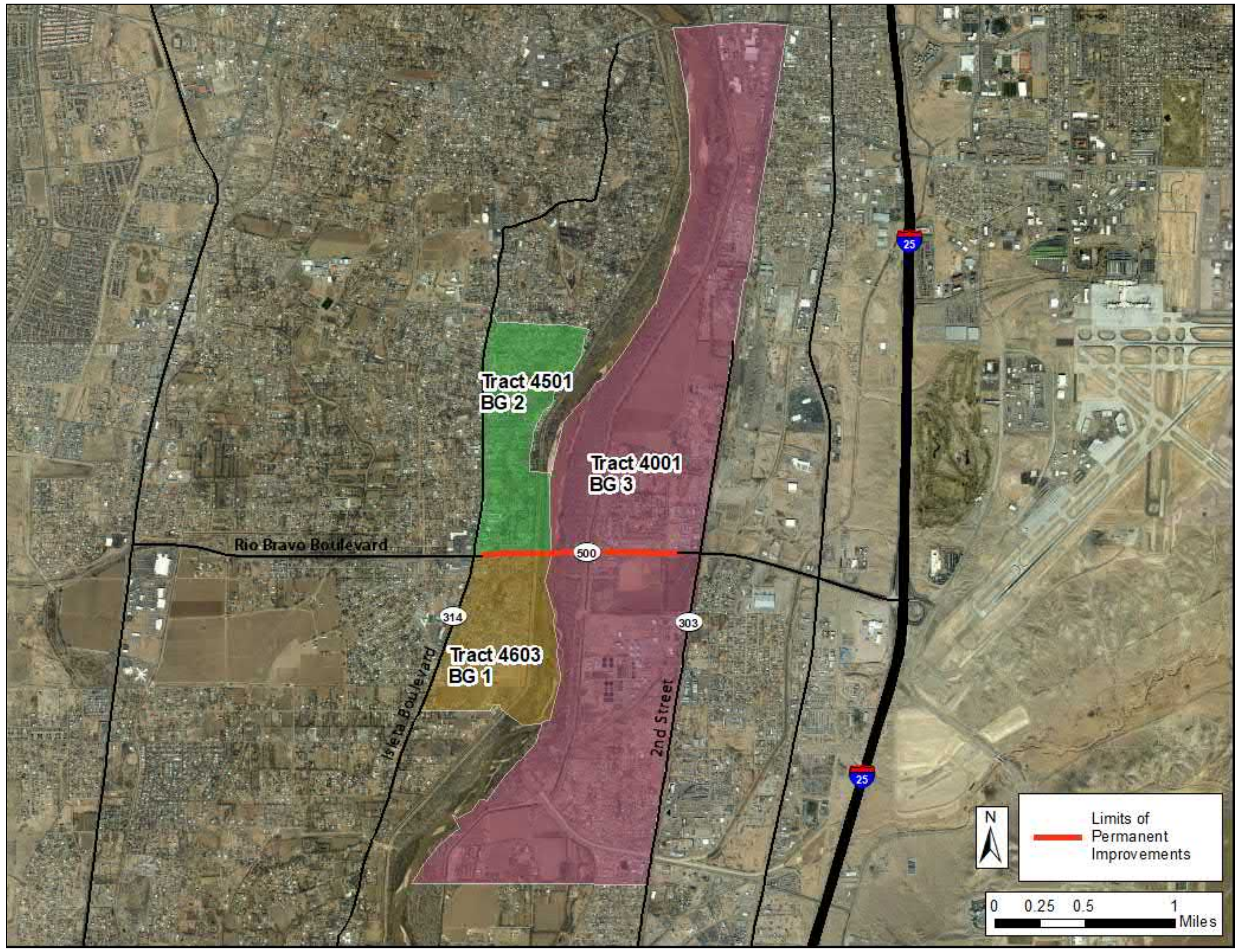
The nine historic structures noted in the prior section that are eligible for listing in the NRHP qualify as Section 4(f) resources. The Rio Bravo Open Space, with its Riverside Picnic Area, is a Section 4(f) resource. The multiuse trails associated with the Riverside Drain are also Section 4(f) resources as they qualify as bikeways functioning primarily for recreation.

Waters of the U.S., Wetlands, and Floodplains

Waters of the U.S.

The major surface water feature in the project area is the Rio Grande, which is a Water of the United States regulated by the US Army Corps of Engineers (USACE) under the Clean Water Act. Only the USACE has the regulatory authority to determine those waters that may be considered a Waters of the US and other regulated facilities. The Rio Grande is a perennial, riverine system. Water from the Rio Grande is seasonally diverted into irrigation canals for nearby agricultural use. Discharge at the Alameda Bridge is typically between 300 cubic feet

Exhibit 3-17, Census Block Groups



per second (cfs) and 1,000 cfs. Additionally, the National Hydrography Dataset (NHD) maps show one unnamed ephemeral drainage east of the Rio Grande, and 5 canal/ditches, including the Barr Canal and the San Jose Drain, the Ranchos de Atrisco Ditch, and two branches of the Lagunitas Ditch.

Preliminary engineering will further inform the potential impacts (permanent and temporary) to jurisdictional waters. Construction or disturbance (permanent or temporary) within the OHWM of the jurisdictional waterways will require coordination with the USACE and Section 404 permitting depending on the impacts and fill quantities. Additionally, the project will also require Section 408 permitting for alterations to the levees. The Project Development Team met with USACE representatives on April 29 and May 5, 2021 to present initial conceptual layouts and receive input regarding USACE facilities, levee requirements, and permitting.

Wetlands and Other Special Aquatic Sites

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapper depicts a freshwater emergent wetland and a freshwater forested/shrub wetland on the east side of the Rio Grande (NWI, 2021). The NWI maps provide high altitude, reconnaissance-level data prepared from the analysis of imagery based on vegetation, visible hydrology and geography, and field verification of these data (NWI 2021). It is necessary to ground-truth the results.

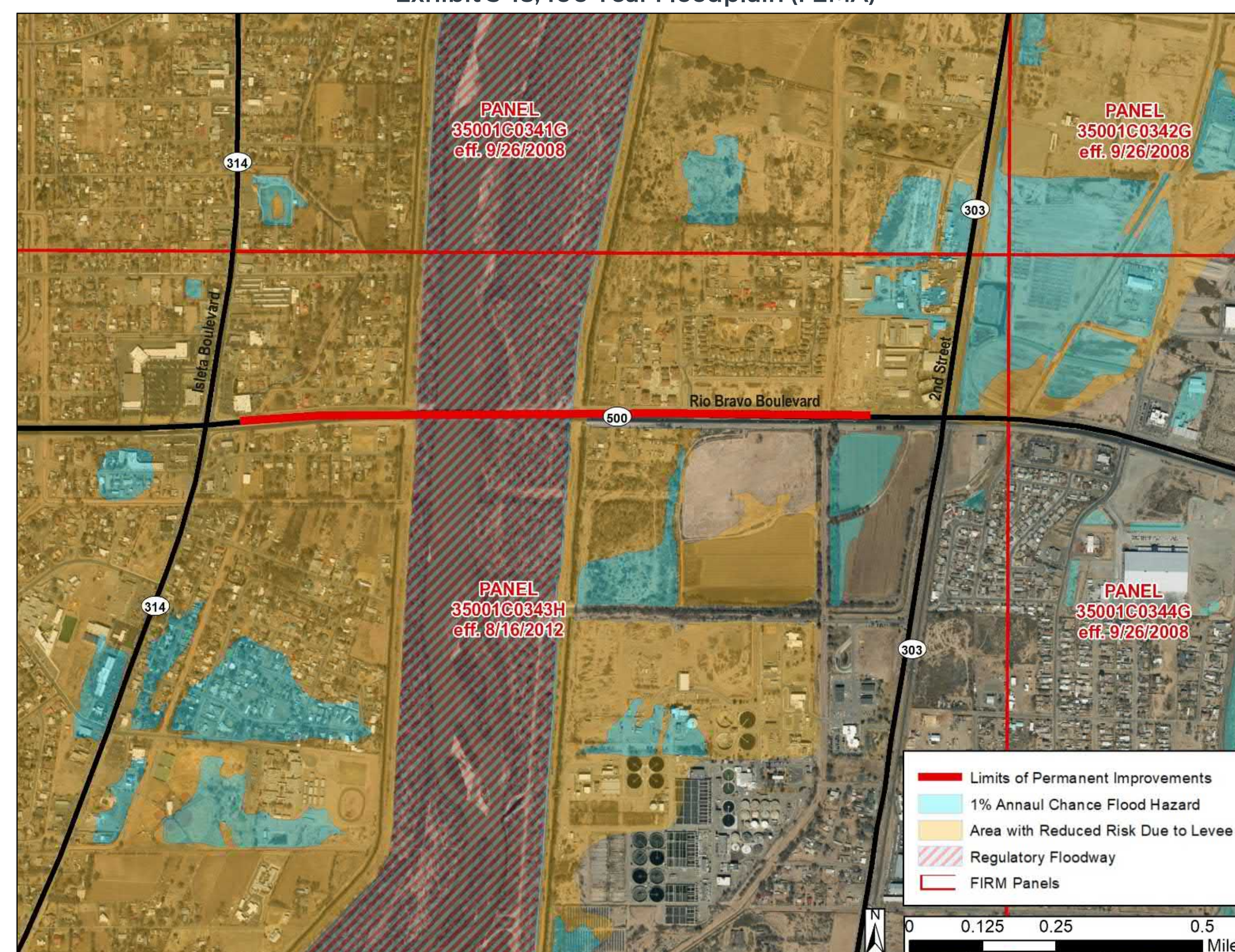
On January 7, 2020, representatives from the NMDOT Environmental Bureau conducted a wetland determination within the portion of the project area being subject to emergency repair. The NMDOT did not identify wetlands within this area and determined that the overall area is rarely, if ever, subject to overbank flooding.

Floodplains and Levees

According to the Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps (DFIRM) data, the Rio Grande is a regulated floodway (see **Exhibit 3-18**). The area surrounding the waterway is an area with reduced flood risk due to the presence of levees and the upstream construction of Cochiti Dam in 1965 to control flooding within the larger Middle Rio Grande Basin. Based on federal authorizations, the levees have been designed and constructed to a height of 4,937 feet and can accommodate a flood event of 4,200 cfs. The USACE is the agency responsible for building levees and has regulatory authority. The floodplain is under Bureau of Reclamation (BOR) ownership. The Middle Rio Grande Conservancy District (MRGCD) maintains and rehabilitates the nearly 200 miles of riverside levees that protect the Rio Grande from overflowing its banks (MRGCD, 2020).

Small sections on the eastern end of the project boundary, near the Second Street intersection, are FEMA-designated areas with a 1% Annual Chance Flood Hazard, Zone AH (FEMA, 2020); however, all of the Rio Grande floodplain has potential to be inundated with floodwaters.

Exhibit 3-18, 100 Year Floodplain (FEMA)



Vegetation and Wildlife Habitat

The project area is located over the river channel and floodplain of the Rio Grande, west of the Sandia Mountains. The topography of the project area is level with a slight gradient to the south. The elevation at the river's edge is approximately 4,930 feet (1,502.7 meters) msl.

The project area habitat is part of the Rio Grande Floodplain Level IV ecoregion of the Arizona/New Mexico Plateau. The project area and surrounding habitat clearly exhibit the characteristic mix of river channel and floodplain, low terraces, and levees. Habitat within this ecoregion is commonly subject to conversion into urban habitat. Vegetation in this ecoregion typically contains cottonwood and willow with understories of coyote willow, New Mexico olive, false indigo, and seepwillow (Griffith et al., 2006). Much of the project area is developed/ disturbed and vegetation is characteristic of an urban developed corridor with exception of the river and adjacent riparian habitat.

The floodplains associated with these types of river system are typically less well-developed and can range from deep cut ravines to wide, braided streambeds. These floodplains can be very dynamic in any given year. The project area habitat consists of cottonwood-dominated Bosque forest on a terrace approximately three vertical feet above the river surface, with the bank consisting of a steep, sparsely-vegetated sand/silt surface.

Overall abundance of vegetation is generally low considering the proximity to a perennial water source. The communities of the Rio Grande are typically riparian forests; these areas are often greatly affected by several factors such as heavy water use, dams, grazing, and/or agriculture, and can be heavily degraded. Groundwater depletion and reduction in overbank flooding has resulted in additional habitat changes and species composition.

The project area has the potential to provide foraging habitat for nesting birds, raptors and owls, and small-to-medium-sized mammals such as jack rabbit and coyote. During the September 17, 2020, field review, bats were observed (seen and heard) underneath both river bridges and remnants of multiple cliff swallow mud nests were also observed along the fascias of both river bridges. A prairie dog colony is present within the right-of-way north of Rio Bravo Boulevard by the Barr Canal. The BOR has expressed concern regarding potential impacts to riparian vegetation, particularly mature cottonwoods, that may occur as a result of the project.

Farmlands

None of the soils present in the project area are designated as farmland of statewide importance by the Natural Resources Conservation Service (NRCS), and none of the soils within the study corridor are being used for agricultural production. Irrigation canals traverse through the project area that seasonally convey diverted water from the river to agricultural land uses in the City.

Threatened and Endangered Species and Critical Habitats

A total of five (5) federal threatened or endangered species are identified by USFWS as having the potential to occur within the project area. These include: Mexican spotted owl; Southwestern willow flycatcher; Western yellow-billed cuckoo; Rio Grande silvery minnow; and the New Mexico meadow jumping mouse. This stretch of the Rio Grande, within the project area, is designated critical habitat for the federally endangered Rio Grande silvery minnow and proposed critical habitat for the Western yellow-billed cuckoo. Designated critical habitat for the Southwestern willow flycatcher and proposed critical habitat for the Western yellow-billed cuckoo is located within management units of the river upstream and downstream of the project.

Representatives of the USFWS attended the multi-agency kick off meeting on October 19, 2020 and provided early input on concerns and species presence. Habitat within the project area is potentially suitable habitat for three special status species: Southwestern willow flycatcher, Western yellow-billed cuckoo, and Rio Grande silvery minnow. A Biological Assessment will be completed to evaluate any potential impacts and associated minimization and/or mitigation measures for these species and habitats.

Rio Grande Silvery Minnow

The Rio Grande silvery minnow is a federal endangered species. The minnow prefers silt substrates in areas of low or moderate water velocity (e.g., eddies formed by debris piles, pools, and backwaters). The Rio Grande silvery minnow is rarely found in habitats with high water velocities, such as main channel runs, which are often deep and swift. The project area is located within designated critical habitat and contains silt substrates and low to moderate water velocity.

USFWS Species Biologist, Andy Dean, confirmed that silvery minnows are typically present within this section of the river and the Project Team will need to address any potential take and conservation measures.

Southwestern Willow Flycatcher

The Southwestern willow flycatcher is a federal endangered species. This species of willow flycatchers are habitat specialists in that they require moist microclimatic and vegetative conditions, and breed only in dense riparian vegetation near surface water or saturated soil. While wet conditions are uniformly required, the structure and species of vegetation in which they nest vary by region and availability (Sogge et al., 2010). The birds frequently build nests in nonnative saltcedar (*Tamarix* spp.), as well as in native willow (*Salix* spp.), typically in vegetation stands of 13 to 23 feet (4 to 7 meters) in height. Nesting habitat patches can range widely in size, although flycatchers typically avoid narrow, linear patches less than 33 feet (10 meters) wide (Sogge et al., 2010).

USFWS Species Biologist, Vicky Ryan, confirmed there are no known nesting Southwestern willow flycatchers in this area.

Western Yellow-Billed Cuckoo

The Western yellow-billed cuckoo is a federal threatened species. This species nests almost exclusively in low to moderate elevation riparian woodlands with native broadleaf trees and shrubs that are 50 acres (20 hectares) or more in extent. It is most commonly associated with cottonwood-willow communities, but the composition of dominant riparian vegetation can vary across its range (Halterman et al., 2015). The riparian community can often have a distinct overstory of willow, cottonwood, or other broadleaf trees, with recognizable subcanopy layers and an understory of mixed species trees and shrubs, including saltcedar.

USFWS Species Biologist, Vicky Ryan, confirmed there are no known nesting Western yellow-billed cuckoos in this area.

Visual Resources

The FHWA has developed guidance to assist with visual resource impact assessment. Publication FHWA-HI-88-054, Visual Impact Assessment for Highway Projects, provides a general framework for the identification and assessment of visual resources. According to this document, visual resource assessment involves describing the visual characteristics of the project area, the visual resources and viewers affected, the significance of the main visual issues, and the effects of project alternatives. Project visual impacts are seen both from the road and of the road.

Visibility of the Rio Grande and the Bosque are prominent features of the project corridor. The project area is an urban environment with a mix of residential and commercial buildings of various architectural styles, time periods, and materials. In order to evaluate the existing visual resources in the project area, and identify potential impacts, a Visual Impact Assessment has been performed. A summary of the assessment is provided in **Chapter 5** of this report, and is available in the ***electronic appendices***.

Air Quality

Air quality regulations pertinent to transportation projects are found in the Clean Air Act Amendments of 1990 (CAA) and the Final Transportation Conformity rule (40 CFR Parts 51 and 93). The CAA requires the US Environmental Protection Agency (EPA) to develop National Ambient Air Quality Standards (NAAQS) for several major air pollutants. These pollutants, known as criteria pollutants, are carbon monoxide, nitrogen dioxide (usually referenced as oxides of nitrogen), ozone, particulate matter (PM 10 and PM 2.5), sulfur dioxide, and lead.

Bernalillo County is in attainment of the National Ambient Air Quality Standards as established by the Environmental Protection Agency under the authority of the Clean Air Act, and therefore, the air quality of Bernalillo County is generally considered to be good.

From a discussion with the Mid-Region Council of Governments (MRCOG) on September 23, 2020, it was confirmed that Bernalillo County is in attainment for criteria pollutants, and as such, it is up to individual local agencies to determine the level of analysis needed for each project, if any. MRCOG can assist but is currently not at capacity with staffing or equipment for air quality analysis (MRCOG, 2020b). It is anticipated that further air quality analysis for this project will not be required.

Noise

The project is located within the Albuquerque city limits. Land use within the project area includes urban development, including the Rio Bravo Boulevard river bridge crossing, private residences and businesses, and public open space. The project area serves as a major traffic corridor connection between the east and west sides of Albuquerque. The FHWA has established noise abatement criteria for assessing potential noise impacts associated with transportation projects. The abatement threshold criteria for uses within the corridor is 67 dB(A), although the NMDOT considers abatement when the sound level reaches 66 dB(A). A noise analysis has been performed to evaluate changes in the ambient noise levels as a result of the various alternatives being considered. A summary of the noise study is provided in **Chapter 5** of this report, and the noise study report is available in the ***electronic appendices***.

Hazardous Materials

A preliminary investigation using the EPA EnviroMapper database shows a total of fifteen underground storage tank locations within a 0.5 mile distance of the project area currently reporting hazardous waste to the EPA. Of the underground storage tanks within proximity to the project, there are ten leaking petroleum tanks – seven of which currently are considered to have contaminants in the groundwater and require further action. There are no Superfund sites located within the project area or vicinity. The NMDOT Hazardous Material Investigations Bureau will perform a comprehensive review of the project to evaluate the potential for hazardous materials within and adjacent to the project area. Since the bridges were constructed in 1961 and 1985, it is assumed that lead-based paint is present which poses a concern to workers' health and safety, as well as potential cleanup liability.

Introduction

This chapter summarizes the screening evaluation of bridge alternatives and identifies the proposed bridge alternative(s) to advance for detailed evaluation. Recognizing that this is primarily a bridge reconstruction project, the focus of the screening analysis is on a long-list of bridge alignment alternatives followed by a screening of key structural design elements that need to be defined for detailed evaluation. The 3D photo simulations prepared to illustrate the proposed improvements and a summary of the Risk Workshop conducted for this project are provided.

Roadway and drainage improvement alternatives arise from the bridge alignments as appropriate to tie the bridges into Rio Bravo Boulevard and adjacent areas and will be discussed in the detailed evaluation in **Chapter 5**. Vertical alignments are only cursorily considered in the screening process. In addition, other improvements such as multi-use trail connections and other details will be developed in the detailed evaluation of alternative(s). More detailed evaluation of the bridge design is documented in the Bridge Type Selection (BTS) Report under separate cover.

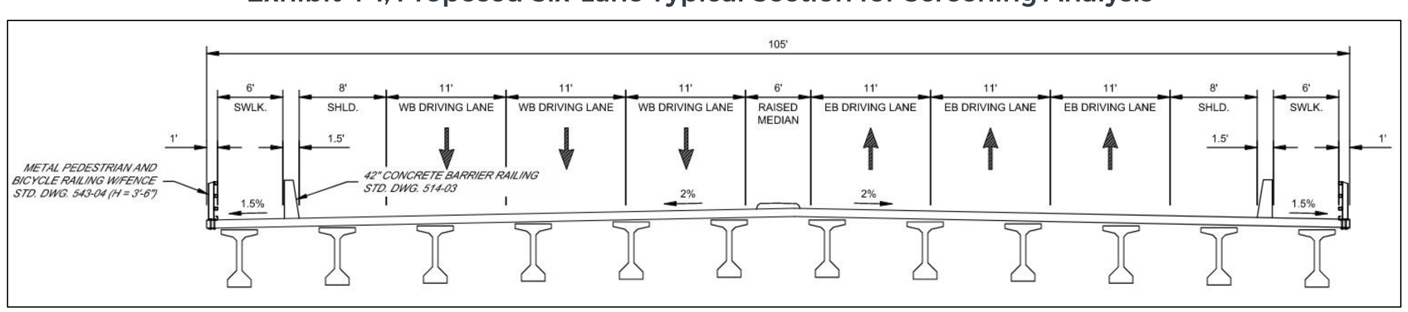
Alternatives were evaluated with a two-stage screening process. The first evaluation stage, documented in this chapter, is an initial screening based primarily on qualitative and limited quantitative criteria. The second stage, described in **Chapter 5**, focuses on detailed evaluation of the most viable improvement alternatives. The proposed improvements and alternatives were developed to satisfy the purpose and need of this project.

Bridge Alignment Alternatives

The purpose of the proposed improvements is to address structural deficiencies of the existing bridges over the Rio Grande and Albuquerque Riverside Drain, to reduce congestion, and to improve multi-modal transportation system connectivity within the project limits. To this end, a full range of bridge alternatives was considered including doing nothing (No Build), rehabilitation of existing bridges, and replacement of the bridges.

A preliminary proposed typical section is shown in **Exhibit 4-1**. This typical section provides the basis for developing the horizontal alignment concepts considered in the initial screening analysis. The horizontal alignment geometry was based on satisfying the low-speed (45 mph) urban arterial criteria in the AASHTO Green Book with a two percent (2%) normal crown for all curves.

Exhibit 4-1, Proposed Six-Lane Typical Section for Screening Analysis



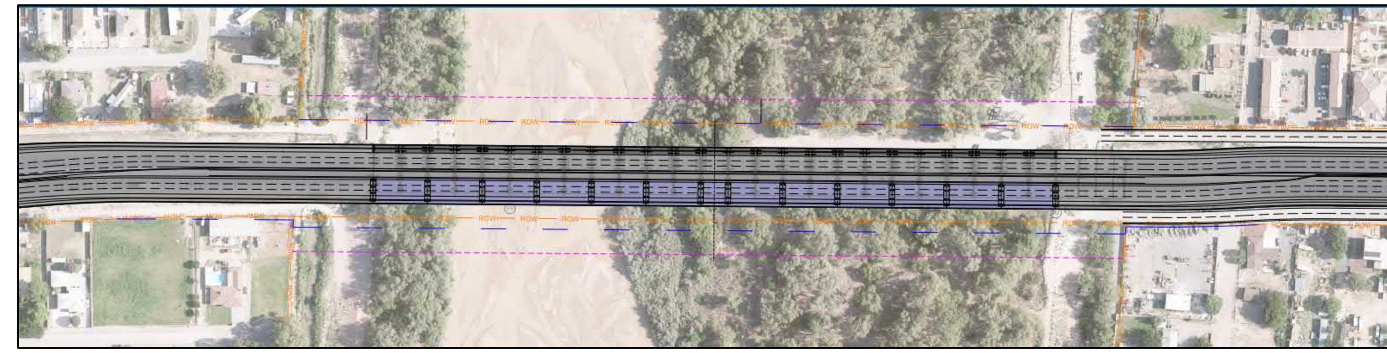
No Build Alternative

The No Build Alternative would leave all the existing bridges in place and continue to maintain them without major rehabilitation or other construction. The No Build Alternative does not satisfy the project purpose and need because the physical condition of the 1961 eastbound bridge is not sustainable. This alternative will not be discussed further in the alternatives analysis, but it will appear in the evaluation screening matrix as a baseline for comparison.

Long List of Conceptual Bridge Alignment Alternatives

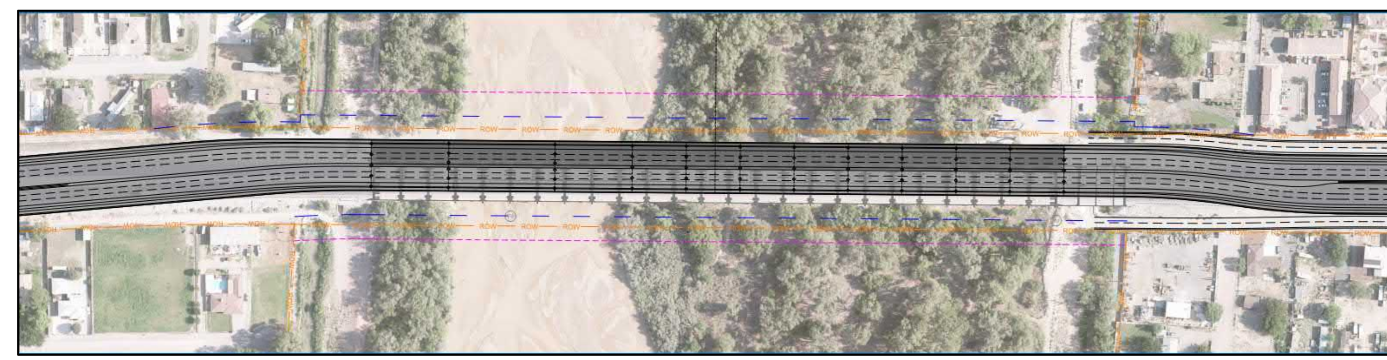
Conceptual layouts of multiple bridge alignment alternatives were prepared for the screening analysis. This includes alternatives to improve both the Rio Grande bridges and the Albuquerque Riverside Drain bridges along the existing alignment, partially offset from the existing alignment, and fully offset from the existing alignment. The alternatives considered are summarized below.

Exhibit 4-2, Alternative 1 - Eastbound Replacement & Westbound Rehabilitation



Rehabilitate and widen both westbound bridges in place; Replace and widen both eastbound bridges along the same alignment.

Exhibit 4-3, Alternative 2 - In-Line Replacement

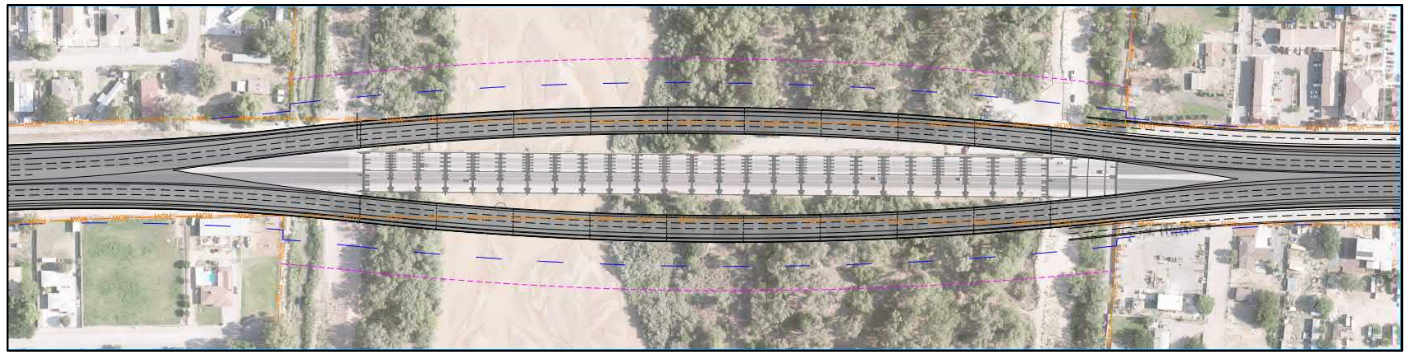


Replace all bridges on the same alignment as the existing bridges. Realign slightly to the north to maintain traffic during construction.

Exhibit 4-4, Alternative 3 - North Curved Fully Offset Alignment

Build all new bridges on a curved alignment to the north of and separate from the existing bridge.

Exhibit 4-5, Alternative 4 - Split Alignment

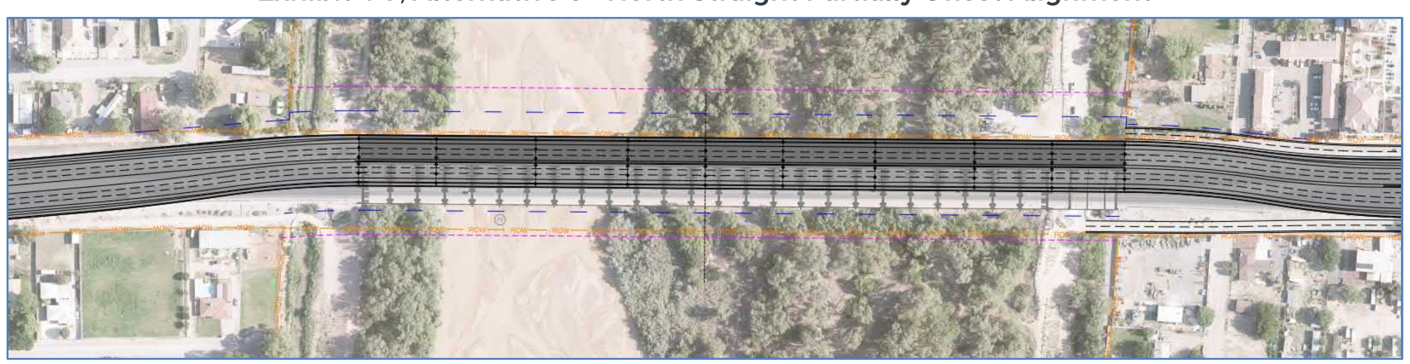


Build all new bridges on both sides of the existing alignment to the north and south of, and separate from, the existing bridges.

Exhibit 4-6, Alternative 5 - North Curved Partially Offset Alignment

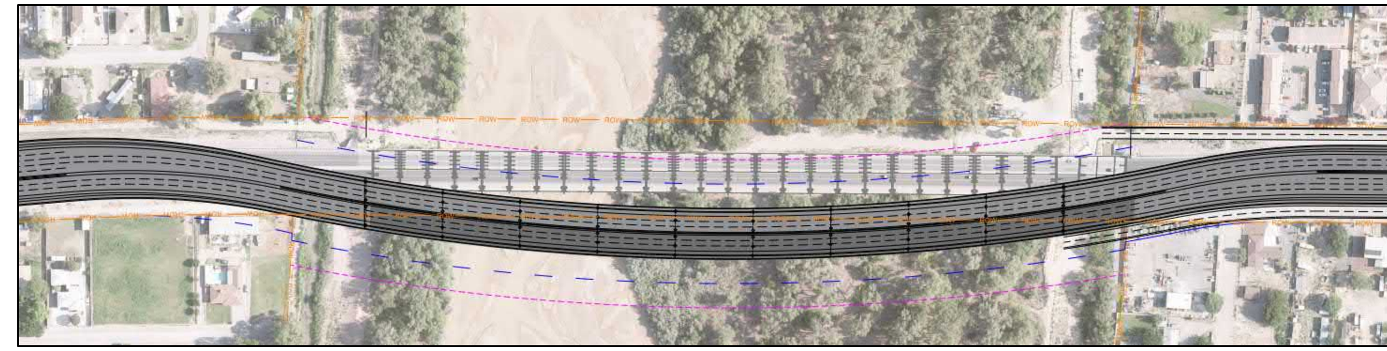
Build all new bridges on an alignment offset from the existing alignment, curved and to the north, with the new bridge footprint overlapping a portion of the existing bridge.

Exhibit 4-7, Alternative 6 - North Straight Partially Offset Alignment



Build all new bridges on an alignment offset from the existing alignment, tangent to existing and to the north, with the new bridge footprint overlapping a portion of the existing bridge.

Exhibit 4-8, Alternative 7 - South Curved Partially Offset Alignment



Build all new bridges on an alignment offset from the existing alignment, curved and to the south, with the new bridge footprint overlapping a portion of the existing bridge.

Alternative 8, Rehabilitate All Four Bridges (No Exhibit)

Rehabilitate the existing bridges including possible superstructure replacement, bearing replacement, foundation rehabilitation/retrofitting, and widening to provide the needed roadway capacity and sidewalks.

Evaluation Criteria for Initial Screening of Bridge Alignments

The initial screening is intended to identify relative advantages and disadvantages to select alternatives that satisfy the project purpose for further detailed analysis. The primary evaluation factors are as follows: consistency with purpose and need, construction cost, future maintenance, constructability, maintenance of traffic during construction, property takes & right-of-way (ROW) impacts, environmental factors, Section 4(f) property impacts, utility phasing, pedestrian & bicycle mobility, hydrology requirements, alignment geometry, impacts to MRGCD facilities, and public & stakeholder support.

Consistency with Purpose and Need

Alternatives 1 through 7 satisfy the project need to address the existing condition of the eastbound bridge and to rehabilitate or replace the westbound bridge. Alternative 8 and the No Build alternative do not satisfy the project need as they do not adequately address the condition of the eastbound bridge. The design for any alignment would be in accordance with appropriate standards and policies for structures, transportation, drainage, etc. It is noted that the existing substructure of the westbound bridge in Alternative 1 is not expected to satisfy current seismic design requirements.

Construction Cost

The initial construction cost is a key factor in evaluating alternatives. These costs do not include future maintenance costs nor do they consider accelerated bridge construction (ABC) techniques. For the initial screening, the alternatives were compared using order of magnitude conceptual qualitative comparisons. These qualitative comparisons were developed based on the following:

- Bridge Construction
  - **Bridge Rehabilitation:** Initial construction costs are typically lower for rehabilitation than a new bridge, but the expected lifespan of the improvements is shorter. Frequent recurring maintenance would be required, and long-term costs would be higher than for a new bridge.

- **Bridge on a new alignment:** A new alignment provides the best new bridge cost due to the relative ease of construction in an area away from traffic and other obstacles, reduced mobilizations, and efficiency in labor and materials.
- **Partially offset bridge construction:** Offset construction is expected to be 10-15% more expensive than a bridge on a new alignment. This reflects the judgement of the design team based on typical costs of bridge construction in New Mexico, which is affected by the cost and difficulty of building the structure in multiple phases adjacent to traffic.
- **In-Line Bridge Replacement:** In-line replacement is expected to be 20-30% more expensive than a bridge on a new alignment. This cost is based on the proposed phasing associated with Alternative 2 which requires more phases than partially offset bridge construction.

- Roadway Reconstruction is assumed to be similar for all alternatives from a cost perspective. The length of roadway reconstruction required, nearly a mile, reduces the importance of minor length variations at the bridge location. The cost of retaining walls increases as the bridge moves offline, but relative to the cost of such a large bridge this is a lower magnitude difference and is neglected.
- Right-of-Way (ROW)
  - **MRGCD property:** Costs for preparation of license documents and payment of fees are assumed to be negligible.
  - **Properties fronting the Rio Bravo Boulevard ROW:** Comparing the relatively small property takes under investigation against the cost of such a large bridge, it is assumed that the bridge cost efficiencies due to a new alignment will dominate over the expense of acquiring the small property takes required.

Future Maintenance

Maintenance of a large/long bridge is an important consideration. Future Maintenance was considered in terms of:

- **Frequency and cost of on-going maintenance operations:** A new bridge will have a longer (75 year) design life and significantly reduced maintenance compared to a rehabilitated bridge.
- **Bridge geometry:** Based on NMDOT District 3 input, a curved bridge is less desirable for maintenance and more complicated to construct than a straight bridge.

Constructability

Constructability refers to the difficulty and risk of construction operations and this is one of the most critical considerations to ensure the success of the project. This project is heavily constrained by adjacent private properties on all sides of the corridor which limits site access and the availability of staging areas for construction equipment and materials. This project is also constrained by seasonal requirements for working in the river as well as the flow conditions of the Rio Grande and riverside drains. Constructability was considered in terms of:

- Risk of construction operations with respect to cost, safety, and schedule
- Complexity of construction operations
- Constraints imposed on construction operations (such as limited site access)

Maintenance of Traffic during Construction

Rio Bravo Boulevard is a critical corridor, and this is one of only seven Rio Grande river crossings in the Albuquerque Metropolitan Area. Rush hour traffic causes this crossing to become congested and maintaining at least two lanes of traffic in the rush hour direction is a critical consideration. Maintenance of Traffic was considered in terms of:

- The total duration of construction impacting traffic
- The number of lanes of traffic the alignment phasing will accommodate, 4-lanes is the most desirable
- Construction operations introducing undesirable traffic situations

Private Property and Right-of-Way

This project corridor is constrained on all sides by private properties. The Bosque and all land between riverside drains is owned by MRGCD and the Bureau of Reclamation. Use of the MRGCD property can be obtained through a licensing agreement and has negligible costs to acquire. This project's impact on the Bosque can be measured by environmental impacts and the actual acquisition process is not a significant factor. The Right-of-Way impacts were considered in terms of:

- The size and number of acquisitions of private properties (e.g., no major structures; could involve fencing, walls, sheds, etc.)
- The impact to buildings and/or other structures (e.g., horse barn)

Environmental Considerations

The environmental considerations on this project extend beyond just the natural resources and include: community resources, cultural resources, air quality, highway traffic and construction noise, the Bosque habitat, identified wetlands, protected species, protected species habitat, and agency permitting. For the initial screening analysis, environmental considerations are described in terms of impact to Bosque habitat, measured as the footprint of temporary and permanent disturbance.

Section 4(f) Property

The Rio Bravo Riverside Picnic Area is a City of Albuquerque Section 4(f) designated property. Located at the northeast corner of the bridge this area provides public parking, picnic areas, trails, and recreational area that is protected under the section 4(f) status. The Section 4(f) property impacts were considered in terms of:

- Permanent incorporation of property, which is considered worse than temporary occupancy only
- Temporary occupancy of property during construction
- Constructive use, where impacts are a result of proximity to the project though the property is not within the project boundary

Utilities

There are more than a dozen utility lines on the existing bridges, and it is anticipated that more will be added to the new bridge(s). These utilities will need to maintain service during construction and are only allowed very small windows to discontinue service, if that is allowed at all. The construction phasing is a critical part of how these utilities will need to be accommodated during construction. The utilities were considered in terms of:

- Number of major construction phases required to relocate all utilities
- Room on the bridge deck overhangs to hang utilities (limited room will result in undesirable placement, such as between girders where the utilities will need to penetrate pier diaphragms)
- Geometry; a curved bridge will introduce complexity hanging and connecting utilities compared to a straight bridge

Pedestrian and Bicycle Mobility

One of the project needs is to improve multi-modal facilities along Rio Bravo Boulevard to make it easier and safer for pedestrians and bicyclists to cross the river. This includes providing ADA compliant facilities. Pedestrian and bicycle mobility was considered in terms of:

- The ability of each alternative to improve multi-modal access
- Alternatives which replace and/or widen the existing bridges and roadway are advantageous as new construction can accommodate multi-modal improvements.

Drainage Requirements

Storm water management for large bridges is an important consideration for long-term durability of the structure. In addition, the storm water must be diverted away from the structure in a way that meets environmental and roadway safety requirements. It is expected that any new construction for this project will meet storm water drainage requirements and the impacts will be similar for all alternatives.

This project is in a FEMA regulatory floodway and the design team made efforts to meet FEMA's no-rise criterion. That is, any work performed as part of this project shall not result in a rise of the Rio Grande water level. This criterion was met by limiting the number of piers in the river to the extent possible while still providing a cost-effective structure. Drainage requirements were considered in terms of:

- The number of piers in the Rio Grande
- Interaction of proposed piers with existing bridge foundations during construction

MRGCD Facilities

The Middle Rio Grande Conservancy District (MRGCD) operates, maintains and manages irrigation, drainage, and flood control in the Middle Rio Grande Valley. They protect the environment, wildlife and endangered species, and provide multi-use recreational opportunities within the valley. MRGCD and the Bureau of Reclamation own the property between the levees including the levees and drains on either side of the river. MRGCD access roads, barriers and gates will be impacted as part of this project. The final design will replace any of these facilities with comparable access independent of the alignment alternative. Similarly, levees will be impacted and will be replaced or repaired in kind. Neither of these is a comparative consideration between alignment alternatives.

The Albuquerque Riverside Drain (east side) is carried under Poco Loco Drive in a large pipe less than 40 feet in length, it then travels in an open channel under Bridge No.'s 6225 and 8569, then in another large pipe under Dean Road. The existing condition of these pipes is unknown. If there are significant impacts to a pipe, then replacement of the entire pipe is most likely required which can be a significant cost. If impacts are limited, an extension of the existing pipe may be adequate and is significantly less costly. This is further evaluated later in this report.

Impacts to MRGCD Infrastructure for the comparison of alignments was considered in terms of:

- Impacts to the riverside drains, and whether those impacts will result in replacing or extending infrastructure. An expensive dewatering process will be required for any extension or replacement of the pipes.
- Replacement of the Atrisco Riverside Drain (west side) may require extensive excavation which will be expensive and introduce complexity in maintenance of traffic.
- Replacement of the concrete box culvert on the west side that provides access across Rio Bravo

Public Input and Stakeholder Support

As described in **Chapter 2**, public input was solicited and summarized. With respect to the alternatives screening the Public Input and Stakeholder support was considered in terms of:

- Maintenance of Traffic during Construction
- Private property impacts

Findings of Initial Screening Evaluation

The findings of the analysis are summarized in **Table 4-1**. Findings are color coded to visually indicate the relative scoring of each alternative relative to the evaluation criteria:

- Red – The alternative is fatally flawed with respect to the evaluation criteria.
- Light Red – The alternative has a disadvantage with respect to the evaluation criteria.
- Light Yellow – The alternative is neutral, or has a balanced ratio of advantages and disadvantages with respect to the evaluation criteria.
- Light Green – The alternative has an advantage with respect to the evaluation criteria.
- Bright Green – The alternative has a significant advantage with respect to the evaluation criteria and relative to other alternatives.

The key findings of the initial screening of alternative bridge alignments are discussed below.

Alternative 1, Eastbound Replacement & Westbound Rehabilitation – Findings

Alternative 1 has some of the most significant disadvantages weighed against one of the most significant advantages, lowest initial construction cost, and deserves its own discussion here.

This alternative would replace and widen the eastbound bridge on the existing alignment. Due to the FEMA floodplain regulations, 'no rise' in water surface elevation is allowed, which makes the following necessary:

- New piers must line up with the adjacent Bridge No. 8568 piers to remain in place
- New piers cannot be thicker than the adjacent Bridge No. 8568 piers
- New piers would occupy the same space as the replaced Bridge No. 6224 piers, but wider to accommodate widening

These constraints introduce significant cost and construction complexity for the replacement. Replacing the piers in line means that the existing Bridge No. 6224 steel piles must either be removed or avoided as new substructure is constructed over the same footprint (see **Exhibit 4-9**). Existing pile removal is impractical as there are more than 400 steel piles supporting Bridge No. 6224, most of which are battered. Pile removal is uncommon in New Mexico which introduces risk and added expense for the local contractor. A new substructure system with the geometry to avoid existing piles is more practical. This system could use smaller diameter drilled shafts to support a cap spanning the existing piles. The top of this drilled shaft cap would have to be set at or below the mud line to meet the floodplain and drainage requirements. Due to the cap embedment, the construction would be subject to groundwater issues during excavation, drilling, and cap construction, requiring an expensive dewatering process for many of the new piers. Matching the Bridge No. 8568 spans will also introduce inefficiency and expense as spans cannot be optimized, and must match either the existing spans, or alternating spans.

Rating Scale

Significant Advantage	Advantage	Neutral	Disadvantage	Fatal Flaw

Table 4-1, Comparative Evaluation Matrix for the Initial Screening of Bridge and Roadway Alignment Alternatives

Evaluation Criteria	Bridge and Roadway Alignment Alternatives								
	0	1	2	3	4	5	6	7	8
	No Build	Widen WB in place, replace EB In-Line	In-Line Replacement	North Curved Fully Offset Alignment	Split Bridge	North Curved Partially Offset Alignment	North Straight Partially Offset Alignment	South Curved Partially Offset Alignment	Rehabilitate all Bridges
Consistency with Purpose and Need	Not consistent with project purpose and need, existing bridge will continue to deteriorate	New bridges will address existing issues and meet current standards. Rehabilitation bridge may not be able to meet current seismic standards	New bridges will address existing issues and meet current standards	New bridges will address existing issues and meet current standards	New bridges will address existing issues and meet current standards	New bridges will address existing issues and meet current standards	New bridges will address existing issues and meet current standards	New bridges will address existing issues and meet current standards	Major rehabilitation of the existing EB bridge is impractical and not cost effective
Construction Cost	None	Expensive WB bridge widening, EB bridge replacement with inefficient spans and foundation constraints is offset by re-using existing infrastructure.	Largest number of construction phases increases the new bridge cost the most	fully offline construction provides the lowest new bridge cost	offline construction provides the lowest new bridge cost. This is somewhat offset by the higher existing bridge demolition cost	Multi-phase construction increases the new bridge cost	Multi-phase construction increases the new bridge cost	Multi-phase construction increases the new bridge cost	Initial Rehabilitation cost much lower than new bridges
Future Maintenance	Significant ongoing maintenance required; Additional emergency repair is a risk.	The rehabilitated bridge will require increased future maintenance	All new bridges require the least future maintenance. A curved bridge is undesirable with respect to maintenance.	All new bridges require the least future maintenance. A curved bridge is undesirable with respect to maintenance.	All new bridges require the least future maintenance. A curved bridge is undesirable with respect to maintenance.	All new bridges require the least future maintenance. A curved bridge is undesirable with respect to maintenance.	All new bridges require the least future maintenance. A straight bridge is desirable with respect to maintenance.	All new bridges require the least future maintenance. A curved bridge is undesirable with respect to maintenance.	Significant ongoing maintenance required; Additional emergency repair is a risk.
Constructability	No new construction required	WB bridge widening is complicated by the existing foundations. In-line replacement of the EB bridge has significant foundation complications.	Large number of construction phases is undesirable	Offline new construction provides excellent phasing and site access for new construction and existing bridge demolition. The curved bridge introduces some complexity.	Offline construction is desirable, active construction on both sides of the traffic may present issues. Demolition of the existing bridge between new bridges and traffic is constrained and undesirable.	Multi-phase construction provides good site access. The curved bridge introduces some complexity.	Multi-phase construction provides good site access. A straight bridge reduces complexity.	Site access is particularly constrained at the Southwest corner of the proposed river bridges. The curved bridge introduces some complexity.	Extensive rehabilitation will present some complications
Maintenance of Traffic during Construction	No traffic disturbance	One of the primary construction phases provides 3 lanes during construction to avoid additional width of new bridge construction; longer construction schedule	One of the primary construction phases provides 3 lanes during construction to remain "In-Line"; longest potential construction schedule	The primary construction phases provide 4 lanes during construction; Shortest construction schedule	The primary construction phases provide 4 lanes during construction; Shorter construction schedule. The existing Bridge demolition introduces undesirable traffic situations.	The primary construction phases provide 3 or 4 lanes during construction; longer construction schedule	The primary construction phases provide 3 or 4 lanes during construction; longer construction schedule	The primary construction phases provide 3 or 4 lanes during construction; longer construction schedule	Traffic will have to be reduced down to 2 or 3 lanes during major operations. This will be of shorter duration relative to replacement efforts.
Private Property and Right-of-Way	No new property impacts or ROW required	Net ROW Take - 0.9 Acres, Property Take - 0.1 Acres (Impacts 4 properties)	Net ROW Take - 0.2 Acres, Property Take - 0.1 Acres (Impacts 4 properties)	Net ROW Take - 0.3 Acres, Property Take - 0.4 Acres (Impacts 6 properties)	Net ROW Take - 5.7 Acres, Property Take - 0.4 Acres (Impacts 7 properties)	Net ROW Take - 0.2 Acres, Property Take - 0.1 Acres (Impacts 2 properties)	Net ROW Take - 0.2 Acres, Property Take - 0.2 Acres (Impacts 3 properties)	Net ROW Take - 0.2 Acres, Property Take - 0.2 Acres (Impacts 4 properties)	No new property impacts or ROW required
Environmental Considerations	No change to Bosque habitat	Protected Species Habitat Impact: Temporary - 4.8 Acres, Permanent - 1.6 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impact: Temporary - 4.9 Acres, Permanent - 0.9 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impacts: Temporary - 9.2 Acres, Permanent - 0.9 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impact: Temporary - 9.7 Acres, Permanent - 6.4 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impact: Temporary - 7.6 Acres, Permanent - 0.9 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impact: Temporary - 5.6 Acres, Permanent - 0.9 Acres; Clean Water Act permitting Req'd	Protected Species Habitat Impact: Temporary - 7.6 Acres, Permanent - 0.9 Acres; Clean Water Act permitting Req'd	No change to Bosque habitat
4(f) Property	No impacts	4(f) Property Permanent Incorporation - 0.0 Acres; Temporary Occupancy - 0.7 Acres	4(f) Property Permanent Incorporation - 0.4 Acres; Temporary Occupancy - 1.7 Acres	4(f) Property Permanent Incorporation - 2.0 Acres; Temporary Occupancy - 2.8 Acres	4(f) Property Permanent Incorporation - 1.7 Acres; Temporary Occupancy - 1.0 Acres	4(f) Property Permanent Incorporation - 1.4 Acres; Temporary Occupancy - 2.2 Acres	4(f) Property Permanent Incorporation - 0.6 Acres; Temporary Occupancy - 1.4 Acres	4(f) Property Permanent Incorporation - 0.0 Acres; Temporary Occupancy - 0.5 Acres	No impacts

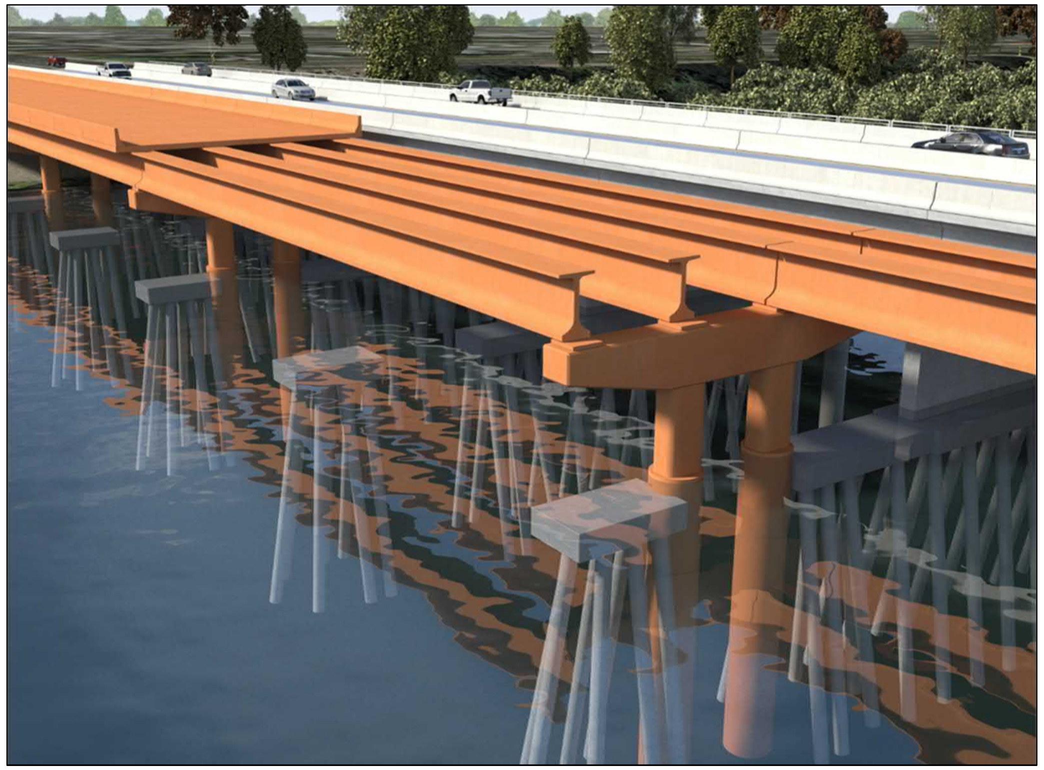
Rating Scale

Significant Advantage	Advantage	Neutral	Disadvantage	Fatal Flaw

Table 4-1, Comparative Evaluation Matrix for the Initial Screening of Bridge and Roadway Alignment Alternatives (continued)

Evaluation Criteria	**Bridge and Roadway Alignment Alternatives**								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	No Build	Widen WB in place, replace EB In-Line	In-Line Replacement	North Curved Fully Offset Alignment	Split Bridge	North Curved Partially Offset Alignment	North Straight Partially Offset Alignment	South Curved Partially Offset Alignment	Rehabilitate all Bridges
Utilities	No Re-Location Required	One phase of Utility re-location required to hang utilities with limited room on the existing WB bridge or with ample room and poor maintenance access	Two phases of Utilit re-location required. Limited room to hang utilities on the North side of the new bridge	One phase of Utility re-location required. Ample room to hang utilities on the new bridge. The curved bridge introduces complexity.	One phase of Utility re-location required. Ample room to hang utilities on the new bridges. The curve introduces complexity.	One phase of Utility re-location required. Limited room to hang utilities on the North side of the new bridge. The curve introduces complexity.	One phase of Utility re-location required. Limited room to hang utilities on the North side of the new bridge	One phase of Utility re-location required. Limited room to hang utilities on the South side of the new bridge. The curve introduces complexity.	No Re-Location Required
Pedestrian and Bicycle Mobility	Existing pedestrian route is not ADA compliant and does not have paved access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	New construction will provide ADA compliant pedestrian route and access	Some ADA compliance issues can be addressed with rehabilitation, but not as completely as with replacement
Drainage Requirements	Existing conditions do not require improvements in this respect	In-Line replacement of the EB bridges will require in-line piers, the longer pier width may cause the Water Surface Elevation to rise which is not acceptable	In-Line replacement will be able to meet drainage requirements, but will be significantly limited in span configuration options to do so	Offset alignment provides complete flexibility in span arrangements to meet drainage requirements	Offset alignments provides complete flexibility in span arrangements to meet drainage requirements	Partially offset curved alignment provides a lot of flexibility in span arrangements to meet drainage requirements	In-Line replacement will be able to meet drainage requirements, but will be significantly limited in span configuration options to do so	Partially offset curved alignment provides a lot of flexibility in span arrangements to meet drainage requirements	Existing conditions do not require improvements in this respect
Roadway Geometry	Existing alignment meets minimum and desirable criteria	Alignment close to existing meets minimum and desirable criteria	Alignment close to existing meets minimum and desirable AASHTO criteria. But introducing a large curve on an existing straight alignment is not desirable.	Alignment close to existing meets minimum and desirable AASHTO criteria. But introducing a large curve on an existing straight alignment is not desirable.	Alignment close to existing meets minimum and desirable AASHTO criteria. But introducing a large curve on an existing straight alignment is not desirable.	Alignment close to existing meets minimum and desirable AASHTO criteria. But introducing a large curve on an existing straight alignment is not desirable.	Proposed alignment meets minimum and desirable criteria	Proposed alignment meets minimum criteria but the additional reverse curve heading to the south, opposing the existing direction, is undesirable	Existing alignment meets minimum and desirable criteria
MRGCD Facilities	No impacts	Extensions of the East & West drain pipes are anticipated	Extensions of the East & West drain pipes are anticipated	Replacement of the East & West drain pipes are anticipated	Replacement of the East & West drain pipes are anticipated	Replacement of the East & West drain pipes are anticipated	Replacement of the East & West drain pipes are anticipated	Replacement of the East & West drain pipes are anticipated	No impacts
Public and Stakeholder Support - Key Criteria, Maintenance of Traffic during Construction	No traffic impacts	Maintains 2-lanes in the peak direction; average construction duration	Maintains 2-lanes in the peak direction; longer than average construction duration	Maintains 2-lanes in the peak direction; shortest construction duration	Maintains 2-lanes in the peak direction; shorter construction duration	Maintains 2-lanes in the peak direction; average construction duration	Maintains 2-lanes in the peak direction; average construction duration	Maintains 2-lanes in the peak direction; average construction duration	Traffic will have to be reduced down to 2 or 3 lanes during major operations. This will be of shorter duration relative to replacement efforts.
Public and Stakeholder Support - Key Input, Private Property Impacts	No new property impacts or ROW required	Limited Property Impacts	Limited Property Impacts	Largest Property Impacts	Lesser property impacts but at all 4 corners of the bridges	Limited Property Impacts	Larger Property Impacts are still acceptable as they do not impact house structures	Limited Property Impacts	No new property impacts or ROW required
Summary	Fatal Flaws	5x Advantage	3x Advantage	7x Advantage	5x Advantage	5x Advantage	5x Advantage	5x Advantage	Fatal Flaws
		4x Disadvantage	5x Disadvantage	4x Disadvantage	5x Disadvantage	3x Disadvantage	1x Disadvantage	4x Disadvantage	
Net (Advantages - Disadvantages)		**+1**	**-2**	**+3**	**0**	**+2**	**+4**	**+1**	

Exhibit 4-9, Illustration of New Piers within Existing Piers of Bridge No. 6224



The rehabilitation and widening of Bridge No. 8568 presents its own challenges. The most significant of these include:

- The bridge must be retrofitted to meet current seismic standards
- All existing bearings require replacement as part of the seismic retrofit
- The existing steel pile foundation requires evaluation and inspection to evaluate adequacy for continued use
- The existing substructure has four different battered pile configurations and different pile lengths along the structure which will need to be matched

In addition to these challenges, Bridge No. 8568 will be 40-years old on a 50-year design life at the time of new construction. It will likely require its own replacement project in 15-20 years which will be similarly constrained by the floodplain requirements and require the same expensive measures as the eastbound bridge replacement to accommodate these.

These significant constraints are balanced against the primary advantage of this alternative. Alternative 1 provides the lowest initial construction cost of Alternatives 1 through 7. However, the long-term cost of this alternative is greater than Alternatives 2 through 7 due to the increased expense of the referenced constraints over two separate bridge replacement projects. A Bridge Life Cycle Cost Analysis was prepared to demonstrate this, which is available in the *electronic appendices* and further described later in this chapter. It is expected that the total cost of Alternative 1 would be roughly 27% higher, or about $8 Million more, than the average cost of the other replacement alternatives.

Alternatives 2 through 7 – Findings

Alternatives 2 through 7 satisfy the project purpose and need. The screening analysis identified differences between the alternatives as described below.

Construction Cost

- Alternative 3 has the lowest construction cost. This is due to the offline construction and good site access for major construction operations.
- Alternative 4 has the second lowest construction cost. The cost savings is due to the offline construction but there is added expense due to the premium on the existing bridge demolition cost as discussed in the Constructability section.
- Alternative 2 has the highest construction cost. This is due to the large number of major construction phases and anticipated construction schedule, which is the longest of any alternative.
- Alternatives 5, 6, and 7 have similar construction costs, higher than Alternative 4 but lower than Alternative 2. This is due to the construction phasing which will increase the costs.

Future Maintenance

- Alternative 2, 3, 4, 5, and 7 provide all new bridges which minimizes future maintenance.
- Alternative 6 is the most desirable for future maintenance because it provides all new bridges and straight bridges. Based on District 3 input, curved bridges are less desirable for maintenance.

Constructability

- Alternative 6 is the most desirable with respect to constructability. All construction phases provide good site access and a straight bridge presents the fewest complications. It does require a three-lane section with a reversible lane for one phase of construction.
- Alternative 4 has a major constructability disadvantage. Due to the phasing, the existing bridge must be demolished between the new bridges. This will constrain equipment for demolition and removal operations and introduce undesirable traffic restrictions and access issues.
- Alternative 7 has a significant disadvantage because site access is poor at the southwest corner which is important for construction of a new southern bridge.
- Alternative 2 has several constructability disadvantages. This option requires the most major construction phases which is undesirable. One phase of traffic maintenance will span over both bridges and the raised median will require removal and rework to be traffic ready. Experience indicates the elevations may not line up which introduces uncertainty. Partial demolition of the existing bridge while ensuring it is vehicle-worthy also introduces risk and uncertainty.

Maintenance of Traffic during Construction

- New bridge construction would be the longest part of the overall project construction. Alternative 3 has the least impacts to traffic. This alternative would be built offline, so bridge construction would be separated from the existing traffic. This would allow traffic to be relatively unaffected while the new bridge is being built. Traffic detours would be required when the approach roadways are reconstructed but four lanes of traffic could be maintained for the majority of the project.
- Alternative 4 has many of the advantages of Alternative 3. However, because the offline bridges are located to the north and south there is expected to be more equipment moving between bridges and disrupting traffic. Demolition of the existing bridge will also introduce traffic constraints not present in Alternative 3.

- Alternative 2 has the most phases of construction, which requires the largest number of traffic movements and the longest construction schedule which is undesirable. This alternative requires a major construction phase that only maintains three lanes of traffic.
- Alternatives 5, 6, and 7 have multiple phases of construction. One major construction phase only maintains three lanes of traffic. Alternatives 5 and 7 could be modified to provide four lanes of traffic during this phase. Alternative 6 is not practical to provide four lanes due to property impacts.

Private Property and Right-of-Way

- Alternatives 2, 5, and 7 require the least property homeowner property acquisition. Alternative 7 will impact a horse barn at a southwest property, and a perimeter wall at a southeast property.
- Alternative 3 requires the most property acquisition and the largest takes from the two properties adjacent to the bridge and to the North. This alternative would require acquisition very close to the northwest first house structure and could possibly impact the northwest second house structure.
- Alternative 4 requires takes from more properties but the amount required from each is less than Alternative 3. A horse barn at a southwest property will be impacted, and a perimeter wall at a southeast property will be impacted.
- Alternative 6 requires less property acquisition than Alternatives 3 and 4, but more than the remaining alternatives.

Environmental Considerations

- Alternative 2 results in the least temporary impact to protected species habitat.
- Alternative 4 results in the greatest temporary impact as well as the greatest permanent impact to protected species habitat.
- Alternatives 3, 5, 6, and 7 result in similar temporary impacts to the Bosque but require minimal permanent impacts.
- The potential impacts of any alternative to cultural resources are currently undefined because a project-specific inventory has not yet been performed. This inventory will be part of Phase IC.

Section 4(f) Property

- Alternative 7 is the only alternative to require no permanent impact to the Rio Bravo Riverside Picnic Area. It requires some temporary impact similar to the average of the remaining alternatives.
- Alternatives 2 and 6 require limited permanent impact to the Riverside Picnic Area in addition to temporary impacts.
- Alternatives 3, 4, and 5 require moderate permanent impacts to the Riverside Picnic Area in addition to temporary impacts.
- The potential impacts under Section 4(f) of the alternatives have not been defined for the screening analysis. It is expected that impacts to the Riverside picnic area can be documented and mitigated.

Utilities

- Alternative 2 provides undesirable phasing for utility relocations. Due to the initial partial demolition of the existing bridge, this option will require utilities to be moved from the westbound bridge onto another portion of the existing structures.
- Alternative 3 and 4 provide desirable utility phasing. The initial offline construction allows for one major phase of utility relocation with ample room on the new bridge overhangs to place utilities. The curve of these bridges is less desirable as the utilities will be composed of short length tangent pipe sections which will need special connections to accommodate the curvature.
- Alternatives 5, 6, and 7 provide workable utility phasing. Due to the phasing, these alternatives only have room on one deck overhang to relocate utilities. Alternative 6 provides a straight bridge which is desirable for connecting utility pipes and reducing complexity.

Pedestrian and Bicycle Mobility

- All alternatives provide improved, ADA-compliant pedestrian facilities and route continuity.

Drainage Requirements

- All alternatives provide adequate conveyance area and freeboard and they all meet the FEMA limits of not raising the water elevations.
- Alternatives 3, 4, 5, and 7 are the most advantageous for drainage requirements as they provide the most flexibility in span arrangement and least potential impact to the river.
- Alternatives 2 and 6 will require piers to be placed such that they avoid existing bridge foundations which limits their placement. This provides less flexibility than the other alternatives.

Roadway Geometry

- Alternatives 2 and 6 would have tighter-radius horizontal curves approaching the bridge with a series of reverse curves to tie into the existing roadway. These curves would meet or exceed AASHTO minimum standards. The tangent alignment would meet driver expectations.
- Alternative 7 would introduce a large curve to the south which does not follow the existing horizontal alignment west of the bridge. While the alignment would meet or exceed AASHTO minimum standards, it is the least desirable from a horizontal alignment standpoint.
- Alternatives 3, 4, and 5 would introduce large-radius curves that would meet or exceed AASHTO standards.

MRGCD Facilities

- Alternative 2 requires less impact to the MRGCD facilities. It is anticipated that the riverside drain culverts will only need to be extended for this alternative while it is anticipated that the riverside drain culverts will need to be replaced for Alternatives 3 through 7.

Public Input and Stakeholder Support

- Alternatives 3 and 4 would be most desirable to the public in terms of length of construction as the phasing for these alternatives allows for the shortest duration of construction.
- Alternative 2 would require the longest construction duration and would be least desirable to the public in this regard.
- Alternatives 2, 5, and 6 would require the least amount of impact to the surrounding properties which was a key concern of the public and surrounding community.
- Alternative 3 would require the largest impact to the surrounding properties.

Alternative 8, Bridge Rehabilitation - Findings

The screening process indicates that Alternative 8, bridge rehabilitation, has significant drawbacks. The existing eastbound river bridge is 60-years old on a 50-year design life and would require extensive rehabilitation and retrofitting that would be expensive. All the existing steel bearings should be replaced, and the foundations should be inspected and rehabilitated to prevent future pier failures. The pipe pile foundations have thin walls and would require inspection to verify their adequacy for continued use. Even with repairs, the improvements would not extend the life of the bridge appreciably due to its overall age and condition. Components would continue to deteriorate, and extensive maintenance and repair work would be needed on a regular basis.

NMDOT bridge design policy typically prohibits major rehabilitation, such as superstructure replacement, if the foundations are not in good condition. Reference Article 9.6 of NMDOT *Bridge Procedures and Design Guide 2018*, "the condition rating of the substructure elements should be a 6 (Satisfactory) or greater. Additionally, the substructure should show no distress under existing live load conditions." Based on the Bridge Inspection Report, dated 5/31/2020, the existing substructure is rated as 5 (Fair) and has been for more than 20 years. The existing substructure has shown distress under existing live load conditions, evidenced in the vertical pier cracking and pier bearing failure. Therefore, the bridge rehabilitation alternative is not practical.

Initial Screening Recommendations for Bridge Alignments

Based on the screening analysis of conceptual bridge alignment alternatives, Alternatives 3, 5 and 6 are considered the leading alternatives and would meet the project purpose and need. The primary difference is a curved bridge structure versus a straight bridge structure. Therefore, the following actions are recommended:

- **Eliminate Alternative 0, No Build, from consideration**. This alternative does not meet the project purpose and need.
- **Eliminate Alternative 1, Replace the Eastbound Bridge & Rehabilitate the Westbound Bridge, from consideration.** This alternative has the highest long-term cost with limited advantages, including potential seismic design issues. Anticipated funding is adequate for other alternatives with a higher initial cost but with lower long-term costs and significant advantages over Alternative 1.
- **Eliminate Alternative 2, In-Line Replacement, from consideration.** This alternative has the highest construction cost, the longest construction duration, less desirable traffic phasing, poor utility phasing, and constructability concerns. The limited property impacts are not significantly less than Alternatives 5 and 7, which offer significant advantages over Alternative 2.
- **Eliminate Alternative 3, North New Alignment, from consideration.** This alternative has the most property impacts, threatening residential structures on the northwest corner of the bridge. The curved bridge introduces complexity with the construction, utilities, and maintenance of the bridge.
- **Eliminate Alternative 4, Split Bridge, from consideration.** This alternative has some of the largest environmental impacts due to its large footprint. The geometry introduces a blunt end at the intersection of the eastbound and westbound lane barriers and locations like these are some of the most frequent crash sites in District 3. This alternative adds complexity to the existing bridge demolition and provides poor site access for this major operation.
- **Eliminate Alternative 5, North Curved Offset, from consideration.** This alternative has similar advantages to Alternative 6 but has more disadvantages. The curved bridge introduces complexity in construction, utilities, and future maintenance relative to the straight bridge in Alternative 6. The curve is less desirable for utilities and has larger impacts to the Bosque habitat than Alternative 6.
- **ADVANCE ALTERNATIVE 6, NORTH STRAIGHT OFFSET, FOR DETAILED EVALUATION.** The straight bridge is advantageous for constructability, maintenance, and utilities. The construction phasing provides good site access for all major phases. This alternative will impact the Bosque habitat and Section 4(f) property but those impacts are unavoidable based on the engineering feasibility analysis. Alternative 6 is the NMDOT preferred alternative.
- **Eliminate Alternative 7, South Curved Offset, from consideration.** This alternative is very similar to but has more disadvantages than Alternatives 5 and 6. There is particularly poor site access at the southwest bridge corner for a new southern bridge. The curved bridge introduces complexity relative to the straight bridge in Alternative 6.
- **Eliminate Alternative 8, Bridge Rehabilitation, from consideration.** The existing eastbound structure is not in adequate condition to justify major rehabilitation or superstructure replacement. Major rehabilitation is not economical or practical.

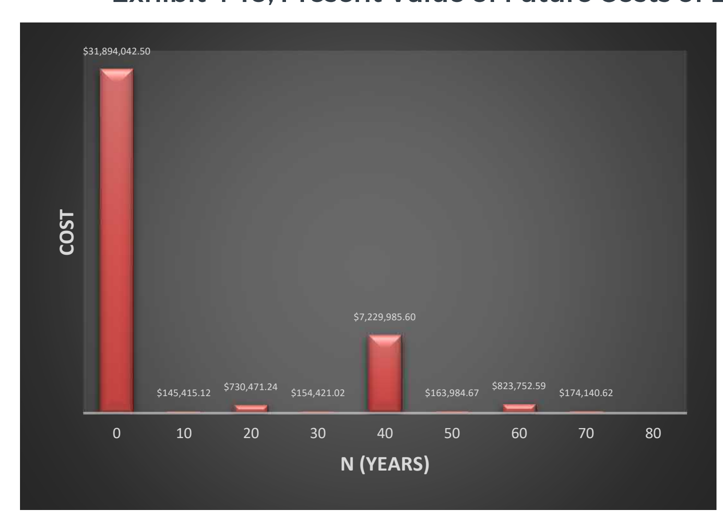
Life-Cycle Cost Analysis

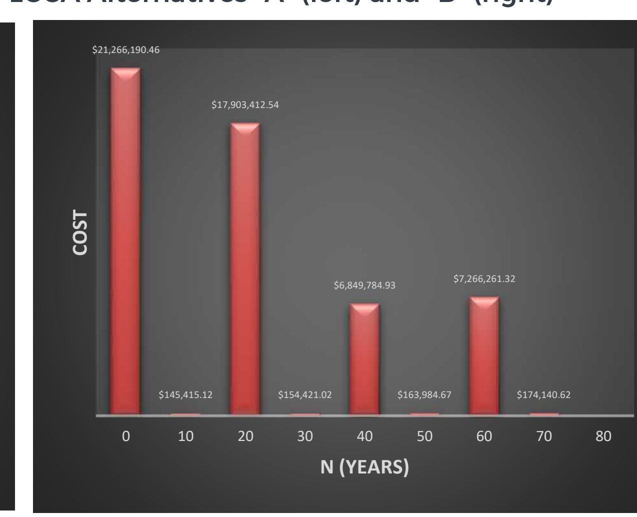
As mentioned previously in this chapter, a life cycle cost analysis (LCCA) was performed to determine the present value of future costs of two major alignment alternatives explored by the WSP design team for this project. The major alignment alternatives include replacing the existing westbound bridges, constructed in 1985 (LCCA Alternative "A"), versus rehabilitating them as part of this project and replacing them at a later time (LCCA Alternative "B").

Of the alignment alternatives discussed above, Alternatives 2 through 7 were based on replacing the eastbound (south) bridges, #6224 and #6225, and the westbound (north) bridges, #8568 and #8569, all at once. These six alternatives were grouped together into LCCA Alternative "A." For the sake of the LCCA, the same conceptual, conservative costs were used for the generic alternative "A." Alignment Alternative 1 described above, which is labeled LCCA Alternative "B", was to replace the eastbound bridges and leave the westbound bridges in place. In addition, this alternative included widening the existing north bridges to accommodate an extra traffic lane and replacing the north bridges at the end of their service life in future. The bridge service life was assumed to be 75 years for the LCCA.

The LCCA includes the construction and repair costs for each alternative and the remaining structure value at the end of the 75-year analysis period. Minor repair costs consist of deck repairs and deck joint replacement. It is assumed that minor repair costs occur approximately every 10 years based on the past NMDOT projects. Major repair costs include a larger amount of deck repairs and deck joint replacements plus repair of girders and substructure rehabilitation. It is anticipated that the major repair costs occur approximately every 20 years and full deck replacement every 40 years based on other NMDOT bridge projects. **Exhibit 4-10** displays a representation of replacement and repair costs for the two alternatives over the 75-year life span.

Exhibit 4-10, Present Value of Future Costs of LCCA Alternatives "A" (left) and "B" (right)





Comparison of the bridge life cycle cost analysis results for each alternative indicates that the present value of total costs of alternative "A" is less than alternative "B" by $12.607 million based on the conceptual costs and the real discount rate used in the analysis. The design team recommends alternative "A" that includes demolishing the existing bridges #6224, #6225, #8568, and #8569 and replacing them with new bridges. Alternative "A" has a lower total cost and fewer hydraulic, geometric and seismic challenges identified in the study phase. It must be noted that all the costs shown in the study phase are only for comparing the two alternatives and do not include all aspects of the project.

Screening of Additional Structural Design Elements

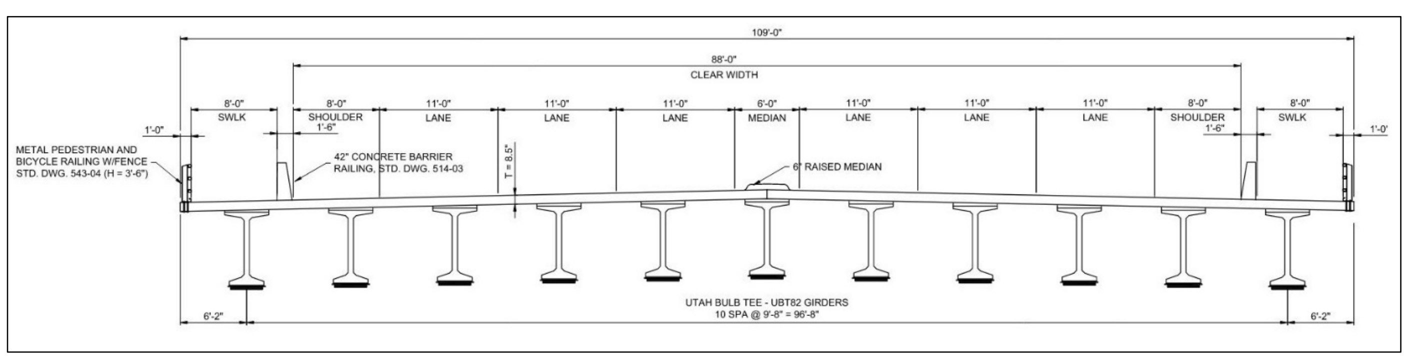
In addition to the alignment alternatives described above, various other structural alternatives were evaluated, compared, and narrowed down before arriving at the final bridge alternatives which were fully evaluated through a comparison matrix in the Bridge Type Selection (BTS) Report. The final alternatives comparison, as well as additional discussion regarding the various structural elements considered, can be found in the BTS Report for this project, which is available in the ***electronic appendices***.

Girder Types

Various girder types were considered while developing the final bridge superstructure alternatives for the Rio Grande Bridge. The main girder types evaluated were Type 72 Modified prestressed concrete girders, 82-inch Utah Bulb Tee (UBT 82) prestressed girders, simple span steel plate girders, continuous steel plate girders, simple-made continuous steel plate girder, and a combination of girders.

Type 72 Modified girders were one of the initial girders considered, due to their wide use in New Mexico and their recent use on the similar NM 6 Bridge over the Rio Grande. As an alternative to these, the UBT 82 girders were considered because they could reduce the number of piers needed in the river. The 4'-1" wide top flange of UBT 82 girders improves the construction stability and can reduce deck thickness as well (see **Exhibit 4-11**). The primary disadvantage of using UBT 82 girders is that pre-casters in New Mexico do not have the forms to fabricate these girders, and they are not as common in New Mexico. For these reasons, costs would be expected to significantly increase for girder fabrication and erection. There is also a higher possibility of cracking due to the tall and thin web, though it is expected that this could be designed around by having very closely spaced stirrups near the girder ends to control the cracking at release. This complicates the girder fabrication and will increase the cost. For these reasons, the alternatives using UBT 82 girders were eliminated from further consideration.

Exhibit 4-11, Proposed Typical Section for Alternative Using UBT 82 Girders



Based on conversations with NMDOT and others, various steel alternatives were included in the girder type screening analysis as an alternate to concrete girders, which are much more common in New Mexico. Initially, continuous steel girders were evaluated as they would reduce the number of spans and piers in the water. As an additional alternative, simple span steel girders were also included, which would simplify erection in the field. When developing the simple span steel alternative, steel plate girders consisting of simple spans made continuous were also considered. During preliminary analysis, it was found that the controlling design check was top flange stress during the deck pour. At this stage of construction, the deck is not yet composite with the girders and does not provide lateral bracing to the top flange. Because this construction stage would still need to be checked if the girders were made continuous for live loads, there is no benefit in terms of steel weight by establishing continuity. For this reason, this alternative was eliminated from further discussion.

Lastly, a few combinations of girder types were considered. Those including UBT 82 girders were eliminated for the reasons described above. Combinations of steel and concrete girders were also eliminated from further evaluation due to the expectation of higher costs and greater complexity associated with the inspection and maintenance of various superstructure types within one bridge.

Span Lengths, Pier Arrangements, and Continuity

As the various girder types above were being considered, many iterations of span lengths were also being evaluated. The main constraint in selecting span arrangements was to avoid the battered pile foundation of existing bridges. For the concrete girder alternatives, the goal was to minimize the number of different span lengths that were being used to simplify girder fabrication. The individual thermal units were also arranged so that they could be symmetric if possible. For the steel girder alternatives, the initial goal was to increase span lengths to take advantage of the continuous steel girders benefit over precast concrete girders for similar superstructure depths. In addition to the final steel girder options described further in **Chapter 5** of this report, and in the BTS Report, a steel plate girder alternative utilizing two four span continuous thermal units over the Rio Grande was also considered. This alternative had the advantage of eliminating two piers and resulted in span ratios closer to the ideal ratio of 0.78. However, this option included a pier at the center of the river. This would require a large work area to be constructed in the river which would have larger impacts on the stream flow. There was also a concern that the cost to ship the large field pieces for this alternative would negate some of the cost savings associated with fewer piers. For these reasons this alternative was eliminated from further consideration.

Longitudinally – Two Bridges versus One Bridge

Consideration was given to constructing a single bridge over both the Rio Grande and Albuquerque Riverside Drain crossings, as well as maintaining separate bridges over the Rio Grande and Riverside Drain. A single bridge would allow for a single superstructure type to simplify construction and future inspections and maintenance. However, it was ultimately decided that maintaining separate bridges would be preferable for the following reasons:

- Using separate superstructure types allows for an efficient structure design over the Rio Grande while reducing superstructure depth over the riverside drain. Because the critical location for setting the vertical profile is Rio Bravo Boulevard over the service road adjacent to the Albuquerque Riverside Drain, this reduces the impact to the proposed vertical profile and reduces the construction costs associated with roadway earthwork and retaining walls.
- There is a lot of congestion on the east side of the river due to the existing bridge foundations, levee, riverside drain, and service road. This makes it difficult to establish a span arrangement that is efficient for the superstructure type required to span the Rio Grande.

- The levee on the east side of the Rio Grande provides a logical location to separate the bridges, similar to the existing conditions. This eliminates the need to span over the levee and can decrease the amount of superstructure required, as the west abutment of the Drain bridge can be shifted closer to the drain.

Four Bridges versus Two Bridges

The proposed typical sections for the bridges over the Rio Grande and the Albuquerque Riverside Drain both contain a single structure that carries eastbound and westbound traffic. Separate bridges carrying eastbound and westbound traffic were also considered, similar to the existing conditions. This would eliminate the need to project reinforcing steel from the first phase of construction to lap with the reinforcing steel in the second phase closure pour. However, this configuration would require an additional girder line and an additional drilled shaft at each substructure location. These additional elements would add approximately two million dollars to construction costs and increase future maintenance. These disadvantages outweigh the benefits of independent eastbound and westbound bridges and this alternative was eliminated from further consideration.

3D Photo Simulations

Based on the findings of the screening analysis, 3-dimensional (3D) photo simulations were prepared to illustrate how the proposed bridge improvements would fit within the Rio Bravo Boulevard corridor. Before and After photos are shown in **Exhibits 4-12, 4-13, and 4-14**. These simulations highlight the preferred alignment alternative (Alternative 6), to the north of the existing alignment, as well as an increased profile and longer bridge spans. Reconfigured pedestrian and vehicular access at both riverside drains is also shown.

Risk Workshop

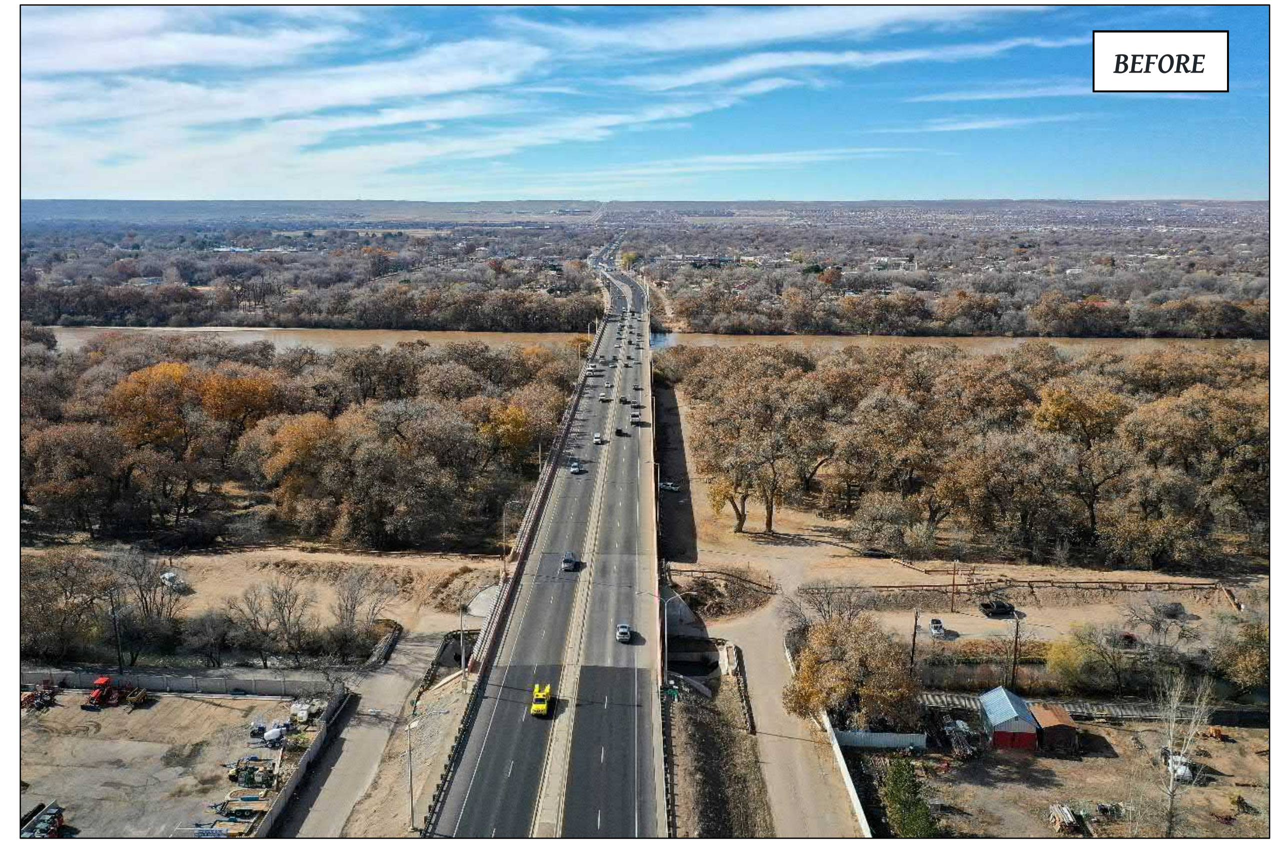
On April 6, 2021, a Risk Workshop was held between WSP, NMDOT, and FHWA to identify possible risks and opportunities that could arise as part of the NM 500 Rio Grande Bridge Replacement Project. This meeting focused on the identification of risks and opportunities, while future efforts will involve determining probabilities of occurrence, severity/priority of the risks, costs associated with the risks, and mitigation measures. Risks were categorized by discipline (with the exception of some that fell into multiple categories or were not easily classifiable). The main topics of risks that were discussed at the workshop are summarized as follows:

- **Drainage:** Dewatering of riverside drains during culvert replacements/extensions could present schedule and cost risks due to permitting requirements as well as complications with ground water in the area. Also, flows within the river during partial blockage of the active channel with a work platform will need to be analyzed, and coordination with various agencies will need to take place, to assure treatments within the river do not result in undesired consequences (this is related to the work that was done on the NMDOT NM 6 project).
- **Traffic:** Emergency access plans, incident management plan, appropriate detours, local intersection improvements, robust traffic control, and public outreach throughout construction will all have to be identified and implemented to mitigate undesirable or unsafe traffic scenarios during construction.
- **Utilities:** Utility relocation staging, planning, and company coordination was identified as an area of risk for schedule impacts due to the limitations with staged construction and the need for some utilities to be moved prior to the start of construction.
- **Geotechnical**: Based on previous complications with recent projects, drilled shaft integrity, testing, and reinforcing detailing was noted as a possible risk; in addition, retaining wall detailing and construction was noted as a risk due to the possibility of liquefaction in the project area, as well as working around levees along the river.
- **Structures**: Various structural details and design elements were noted as having a possibility of risk to the project cost or schedule. Some of these include concrete fabricator capacity and quality, material availability, steel fabrication, construction access in the river and between old and new bridge and staging concerns, access at bridges for maintenance (possibility of attracting dangerous wildlife or homeless encampments).
- **Environmental**: Schedule restrictions when working in river, working around public accessing the riverside park and paths, coordinating with agencies, 4(f) property procedure scheduling, public input and outreach throughout construction were all noted as possible risk areas.
- **Other:** Various construction and coordination concerns not covered in other disciplines were noted as well. Some examples include coordinating with other projects going on in the area around the same time, overall construction cost estimating to assure proper obligation of funds, and trucking association coordination.

All of these risks will be further vetted and categorized, and mitigation measures identified, throughout the next phases of the project.

Exhibit 4-12, NM 500 Bridge Reconstruction – Southeast View

Exhibit 4-13, NM 500 Bridge Reconstruction – West View



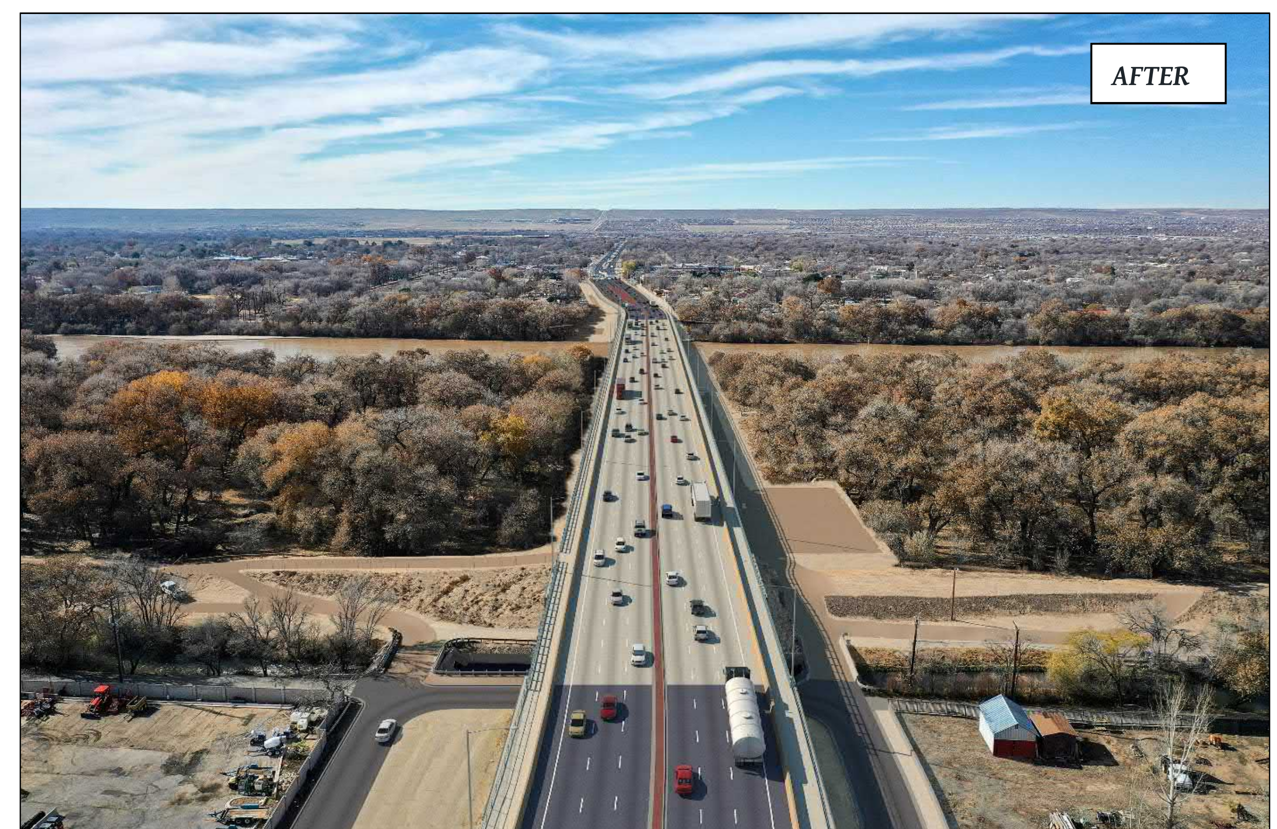
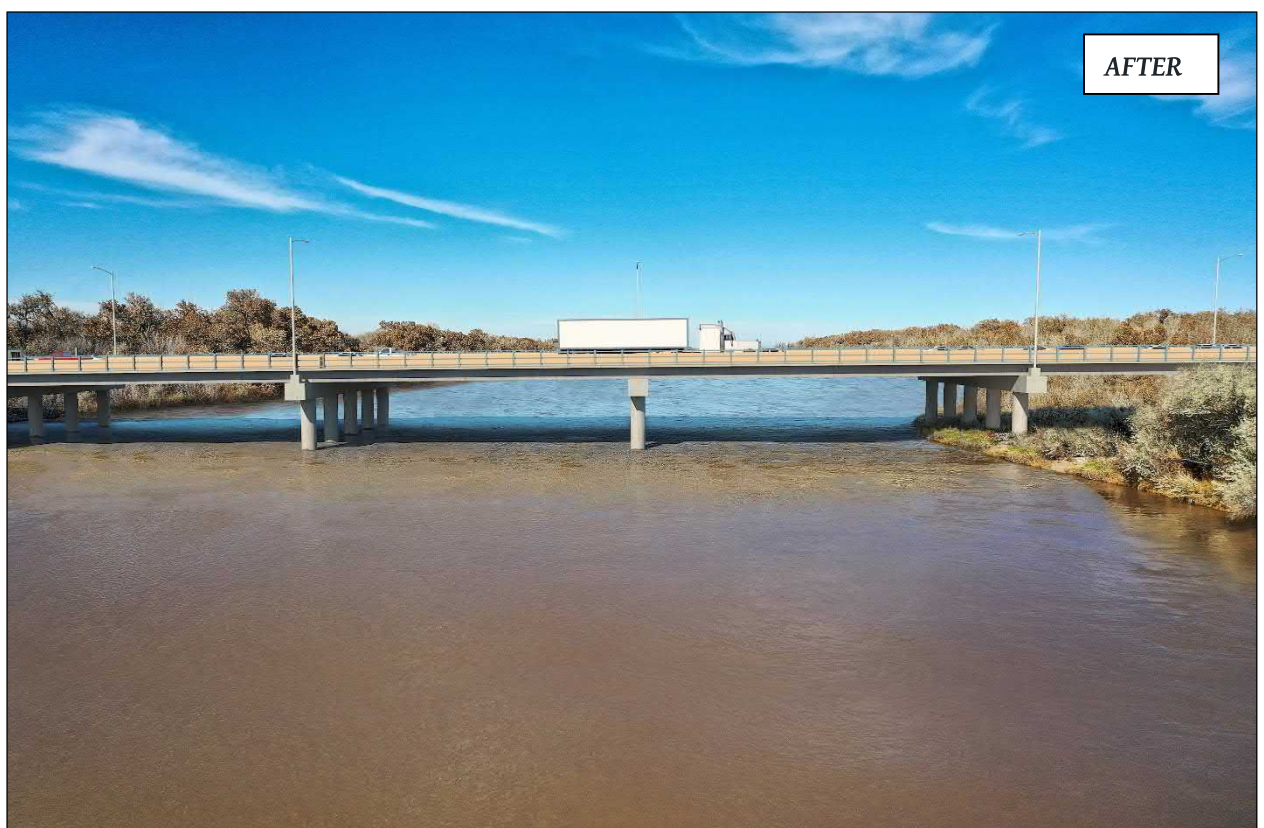


Exhibit 4-14, NM 500 Bridge Reconstruction – North View from Rio Grande



Introduction

The initial screening analysis eliminated bridge alignment alternatives that are not feasible or practical. Bridge alignment Alternative 6, the North Straight Offset bridge, was advanced for detailed evaluation and refinement. There are several aspects of the straight bridge conceptual design that require further development. These aspects are developed in this chapter resulting in two build alternatives to be evaluated, referred to as Build Alternative A and Build Alternative B. The No Build alternative is also considered for NEPA purposes.

A description of the refinements is provided below followed by a comparative evaluation of the two alternatives. The results will be used to identify the proposed improvements to advance to Phase IC and Phase ID.

No Build Alternative

The No Build Alternative, also included in the Alignment Alternatives discussion in **Chapter 4**, serves as a baseline condition in which the NM 500 Rio Bravo Bridge Project would remain as it is today with no improvements made within the project limits. It has been established that the No Build Alternative is not a sustainable solution but is considered as part of the environmental documentation process for this project.

Description of Build Alternatives

The proposed roadway typical sections are similar for both build alternatives and are shown in **Exhibit 5-1** on the following page. After discussions with the project team, a symmetrical bridge typical section was agreed upon as the preferred approach of NMDOT. Across the bridges, the eastbound and westbound directions of travel both have three eleven-foot lanes and an eight-foot shoulder separated by a six-foot raised median. A symmetric cross section also meant having a sidewalk on both sides of the bridge, as opposed to having a sidewalk only on the south side similar to the existing configuration. The width of the sidewalk was also discussed with the project team. A minimum width of 6'-0" was discussed, as well as 10'-0" wide or more multi-use paths. In the end, balancing multi-modal access with cost and ROW and environmental impacts, 8'-0" sidewalks on both sides of the bridge were chosen. The sidewalks are separated from traffic by 1'-6" concrete barriers and have one-foot wide pedestrian railings on the exterior edge.

The fundamental engineering parameters of the proposed improvements are defined by the roadway design criteria that will be used to develop the overall design layouts. **Table 5-1** on **page 5-3** summarizes the roadway design criteria for this project. The roadway conceptual design plans for Build Alternative A and Build Alternative B are provided in **Appendix B**. In addition, plan sheets for the bridge girder/span configuration alternatives are provided in **Appendix C**.

Refinements Considered

The design aspects and/or locations that require refinement based on a straight bridge alignment include:

- Atrisco Riverside Drain and West Abutment Location
- Albuquerque Riverside Drain and Bridge
- Superstructure Types and Span Configurations for Rio Grande Bridge
- Horizontal and Vertical Alignments for Rio Bravo Boulevard
- Trail Connections

These aspects are described in the following sections and are incorporated into the straight bridge alignment to develop Build Alternative A and Build Alternative B.

Atrisco Riverside Drain and West Abutment Location

On the west side of the Rio Grande Bridge, an existing concrete box culvert provides access under Rio Bravo Boulevard, the Atrisco Riverside Drain crosses under the roadway embankment, and the levee elevation rises to the west bridge abutment. The emergency boat ramp on the north side of Rio Bravo is also accessed by driving over the levee. There are two improvement scenarios to accommodate these facilities as described below.

Build Alternative A – Atrisco Drain/West Abutment

In Build Alternative A, the west abutment would align with the levee similar to existing, and would consist of structural backfill and abutment walls which need to be battered to enable compaction of the levee. The Atrisco Riverside drain would be reconstructed with an upsized culvert pipe (existing 60", proposed 72") and would remain under the roadway embankment. Concrete headwalls would be designed for the inlet and outlet sides. A 14' W x 13' H concrete box culvert (CBC) would be constructed to replace the existing 12' W x 12' H CBC for grade-separated access across Rio Bravo Boulevard.

The emergency boat ramp would be relocated to the south side of Rio Bravo Boulevard because it is not feasible to drive over the levee on the north side in the short distance available (i.e., too steep). As such, boat ramp access would be through the new CBC. This would require an adequate turning radius on the north side, which would require extending the Atrisco Drain culvert further north. Access to the Rio Grande Bosque would be from the north side via the local street network, Kelsey Road and Shaw Drive, from Isleta Boulevard. A plan view of this scenario is provided in **Exhibit 5-2**.

Exhibit 5-2, Plan View of Build Alternative A, Atrisco Drain/West Abutment

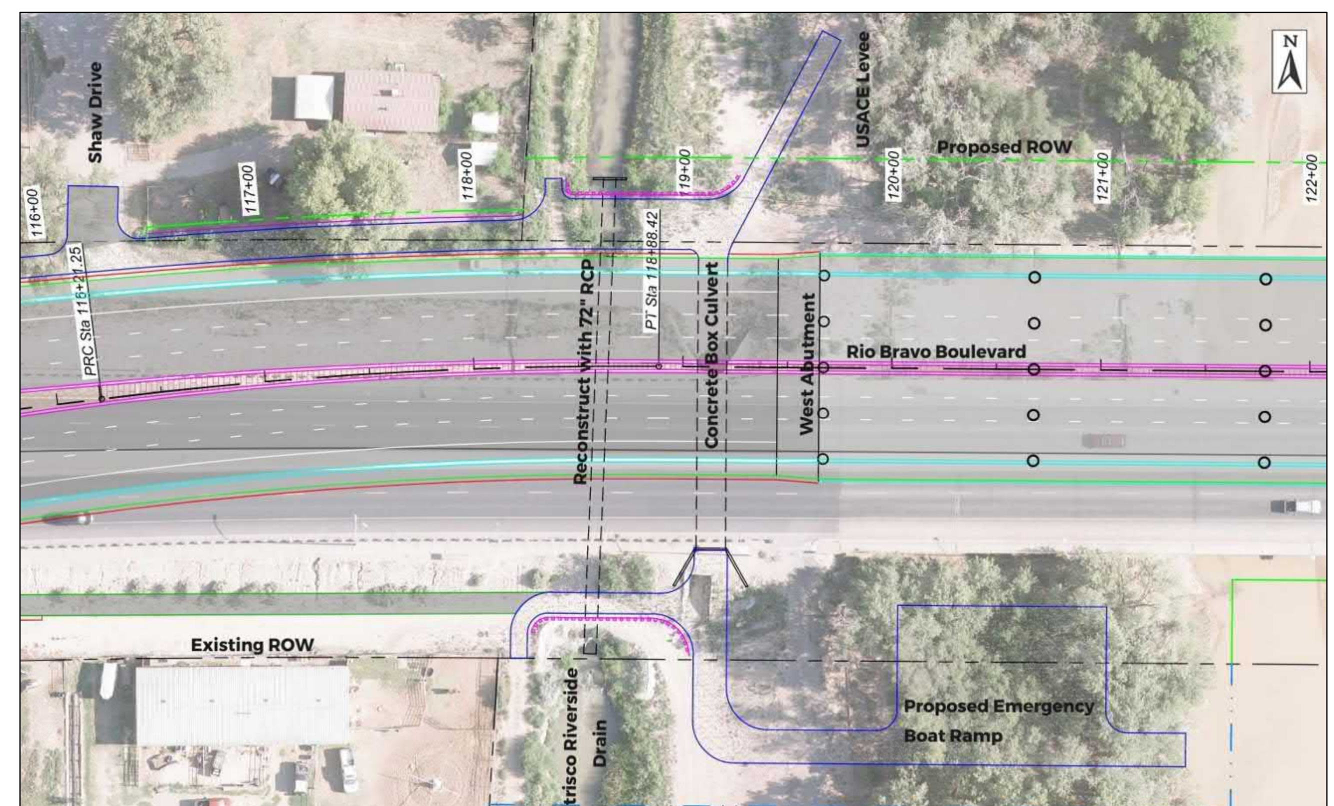
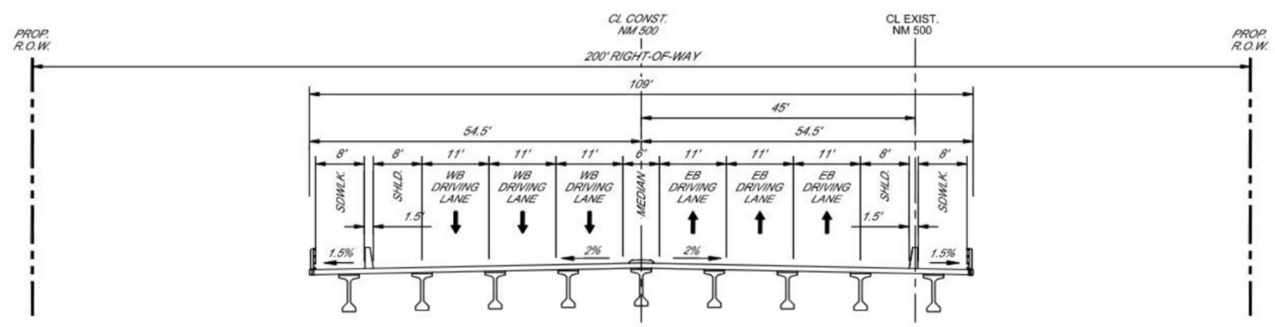
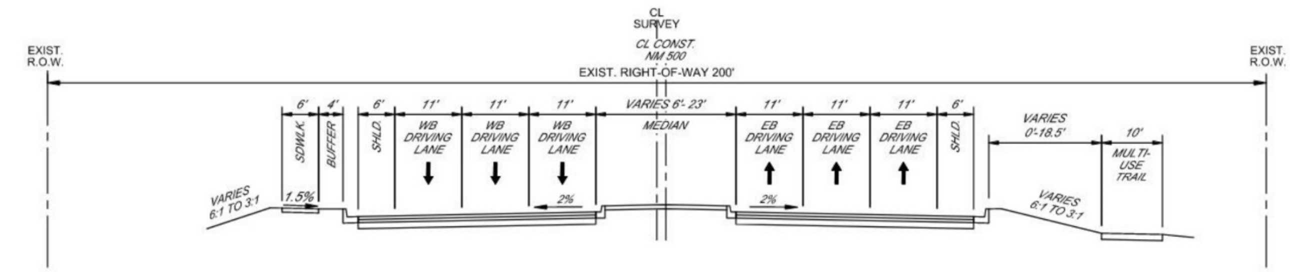


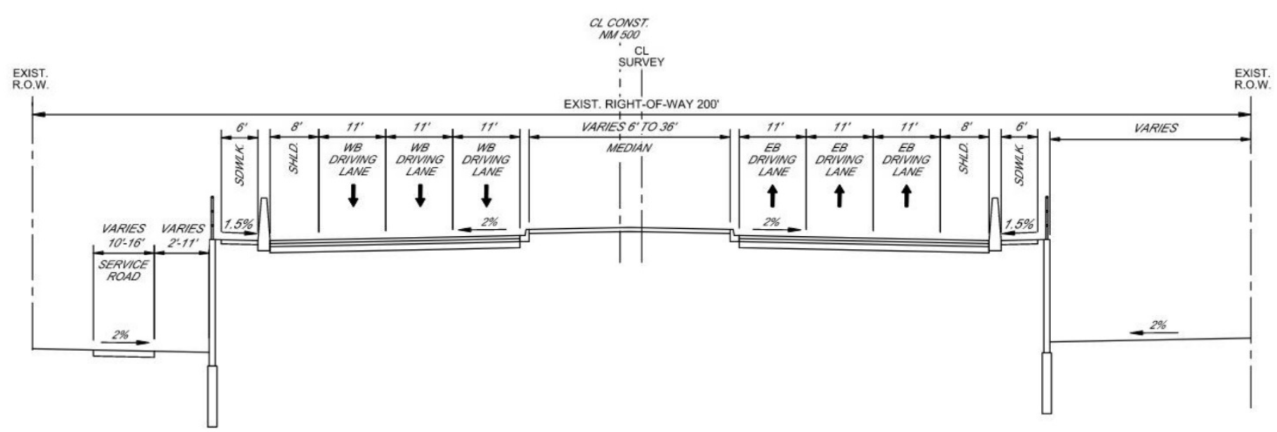
Exhibit 5-1, Proposed Roadway Typical Sections for Build Alternatives



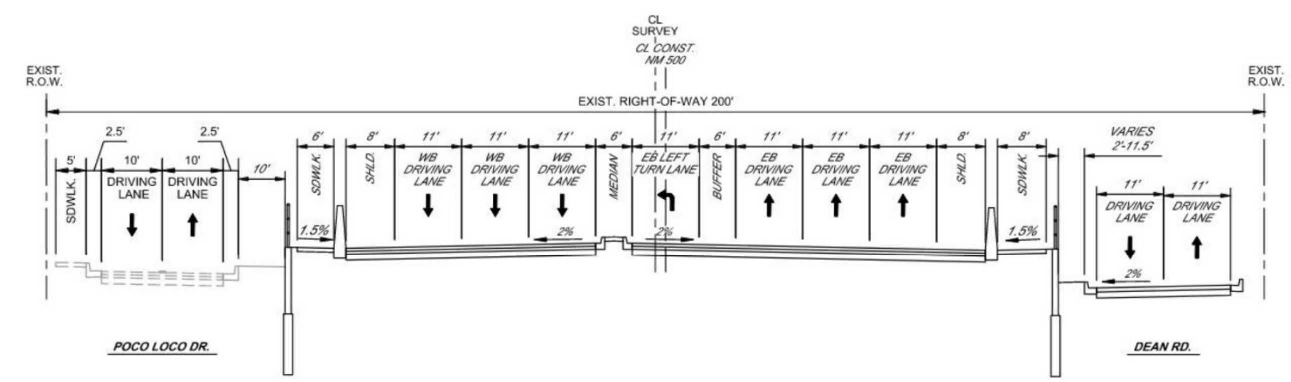
Rio Bravo Boulevard at Rio Grande Bridge



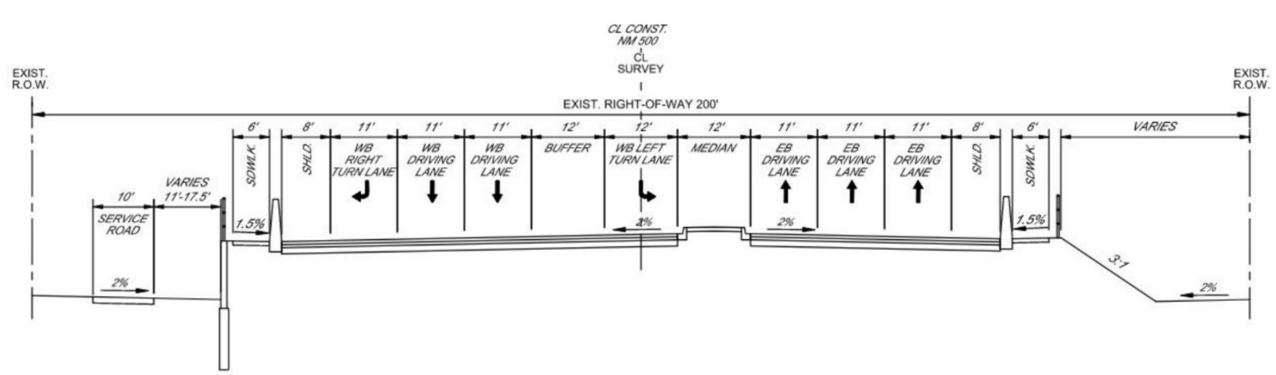
Rio Bravo Boulevard east of Poco Loco Road/Dean Road



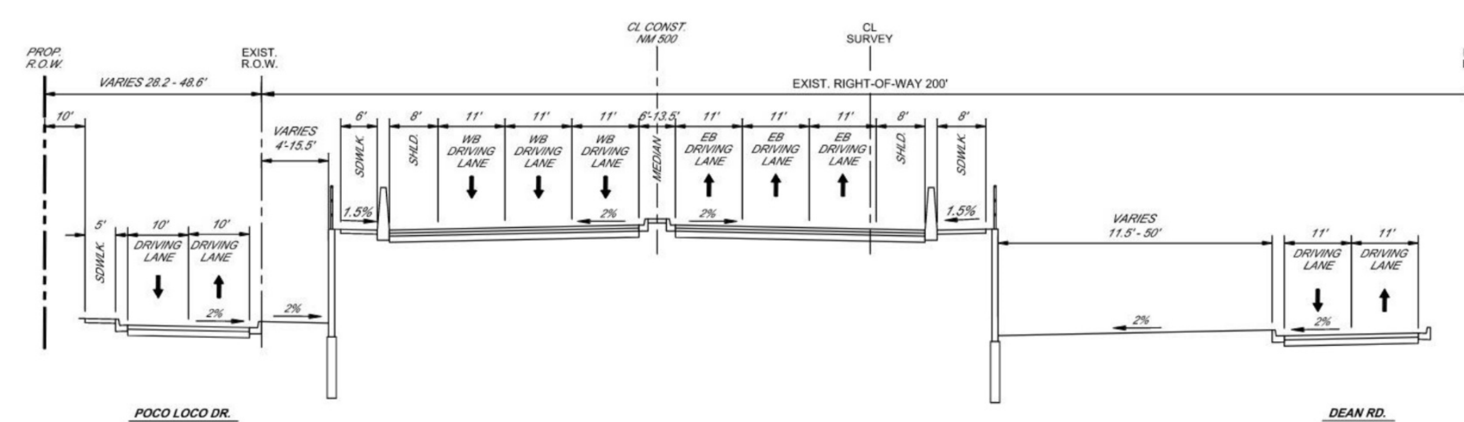
Rio Bravo Boulevard west of Rio Grande Bridge



Rio Bravo Boulevard, Poco Loco Drive and Dean Road west of Poco Loco Road



Rio Bravo Boulevard east of Isleta Boulevard



Rio Bravo Boulevard, Poco Loco Drive and Dean Road east of Riverside Drain Bridge

Table 5-1, Design Criteria for Development of Improvements

Description	*NM 500/Rio Bravo Boulevard*	*Comments / Reference*
GENERAL		
Design Classification	Low-Speed Urban	AASHTO Chapter 3.3 - Arterials in Urban Areas
Terrain Classification	Level	AASHTO 3.4.1, page 3-121
Design Speed	45 mph	See AASHTO Section 2.3.6.3 (Page 2-23)
Posted Speed	45 mph	Existing Posted Speed
Current / Design Year AWDT (veh/day)	35,000 (2016) / 61,200 (2040)	Estimated from available traffic data
% Trucks (year)	10% (2019) / 10% (2040)	Estimated from available traffic data
Design Vehicle a. Mainline b. Local Streets	a. Interstate Semitrailer (WB-62) b. Single-Unit Truck (SU-30)	AASHTO Section 2.8, page 2-55
VERTICAL ALIGNMENT		
Stopping Sight Distance	360 ft	AASHTO Table 3-1, page 3-4
Curvature for Crest Curves (Stopping Sight Distance)	K = 61	AASHTO Table 3-35, page 3-170 Object ht = 2.0 ft, AASHTO page 3-15
Curvature for Sag Curves (Stopping Sight Distance)	K = 79	AASHTO Table 3-37, page 3-176 (Comfort Crit. Eqn. 3-52, page 3-175 if Illum.)
Maximum Grade	Mainline = 3.0%	Site conditions (AASHTO allows 6%)
Minimum Grade	Curbed sections: 0.3% minimum (0.5% desirable)	See AASHTO 7.3.2.6, page 7-37
HORIZONTAL ALIGNMENT		
Emax	Normal Crown (no SE)	See AASHTO 7.3.2.7, page 7-38
Minimum Curve Radii (Superelevation)	1039 ft (-2%)	AASHTO Table 3-13, page 3-54
Minimum Curve Radii - Horizontal Sight Distance (Stopping Sight Distance)	Check in CAD	See AASHTO Section 3.3.12.1 (page 3-114) Eye height = 3.50', Object height = 2.0'
Minimum Curve Radii - Horizontal Sight Distance (Passing Sight Distance)	Check in CAD	See AASHTO Section 3.3.12.2 (page 3-119) Eye height = 3.50', Object height = 3.5'

Table 5-1, Design Criteria for Development of Improvements (continued)

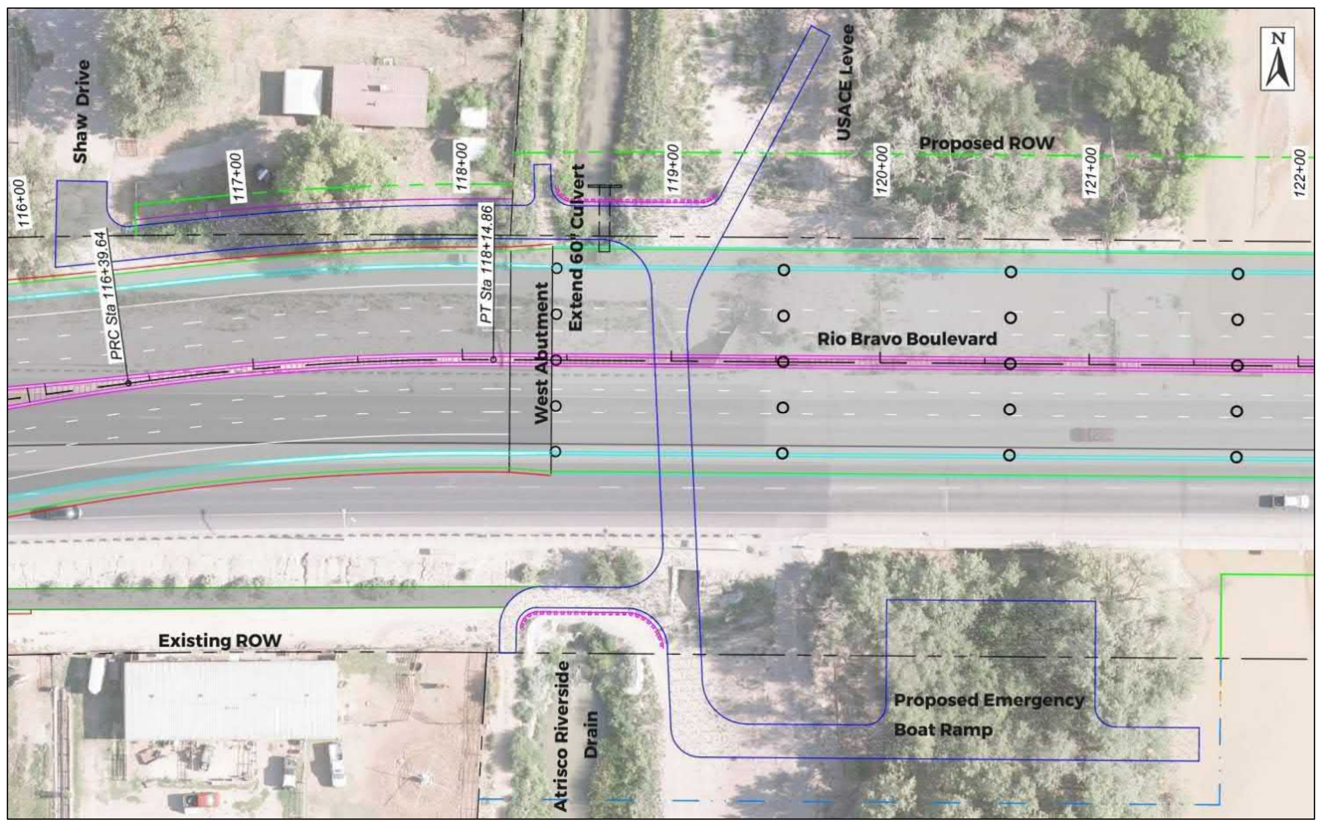
Description	*NM 500/Rio Bravo Boulevard*	*Comments / Reference*
CROSS SECTION ELEMENTS		
Normal Cross Slope	2%	AASHTO Table 4-1, page 4-7
Lateral Offset, Curbed Section for Urban Conditions	Lateral Offset = 1.5 ft or 3.0 ft at intersections/driveways 4.0 ft desirable	AASHTO Roadside Design Guide Chapter 10 See AASHTO Section 4.6.2 (page 4-18)
Clear Zone for Urban Conditions Speed ≤ 45 mph	1V:6H foreslope, 20-22 ft 1V:4H foreslope, 24-28 ft	AASHTO Roadside Design Guide Table 3.1, page 3-3 (Design ADT > 6,000)
Lane Width a. Mainline b. Auxiliary	a. 11 ft b. 11 ft	AASHTO Section 4.3, page 4-9 MRCOG Long Range Transportation System Guide April 2020
Shoulder Width (mainline) a. Isleta to Poco Loco b. East of Poco Loco	a. 8 ft b. 6 ft	AASHTO Section 4.4.2, page 4-12 SAMM page 94 (Includes 2 ft shy distance at barriers)
Median a. East of Bridge b. Bridge c. West of Bridge	a. 6 ft to 23 ft b. 6 ft c. 6 ft to 36 ft	AASHTO Section 7.3.3.5, page 7-40 AASHTO Section 4.11, page 4-38 (as needed for left-turn lanes plus 6 ft)
Sidewalk Width (minimum) a. East of Bridge b. Bridge c. West of Bridge	a. 6 ft b. 8 ft c. 6 ft	MRCOG Long Range Transportation System Guide April 2020 (minimum 6 ft for regional principal arterial)
Tapers (mainline) a. Redirect or Merge Taper b. Lane Addition Taper	a. 495 ft (WS) b. 248 ft (1/2WS)	SAMM page 96 Lengths calculated for 11 ft lane using posted speed
Deceleration Lane a. Deceleration length b. Deceleration taper length	a. 400 ft (to stop) 370 ft (to 15 mph) b. 150 ft (12.5:1)	SAMM Table 18.K-1, page 92 Decel length excludes storage No storage provided for right-turn decel lanes

Build Alternative B – Atrisco Drain/West Abutment

In Build Alternative B, the Rio Grande Bridge is proposed to extend past the CBC and Atrisco Drain; the west abutment would be west of the Atrisco Riverside Drain. The first bridge pier would align with the levee and would be designed as a flood wall. Grade-separated access would be provided under the first bridge span. Because the Atrisco Riverside drain is no longer under the roadway embankment, it would not be replaced but would be extended on the north side to accommodate the new bridge alignment. A concrete headwall would be provided at the inlet side of the drain.

Access to the Rio Grande Bosque would be the same as Build Alternative A with the emergency boat ramp on the south side of Rio Bravo Boulevard. A key difference is, access to the boat ramp area from the north side would be provided with more open space under a bridge span when compared to the CBC in Build Alternative A. As such, the turning maneuver on the north side would be possible without further extension of the drain culvert. A plan view of this scenario is provided in **Exhibit 5-3**.

Exhibit 5-3, Plan View of Build Alternative B, Atrisco Drain/West Abutment



Albuquerque Riverside Drain and Bridge

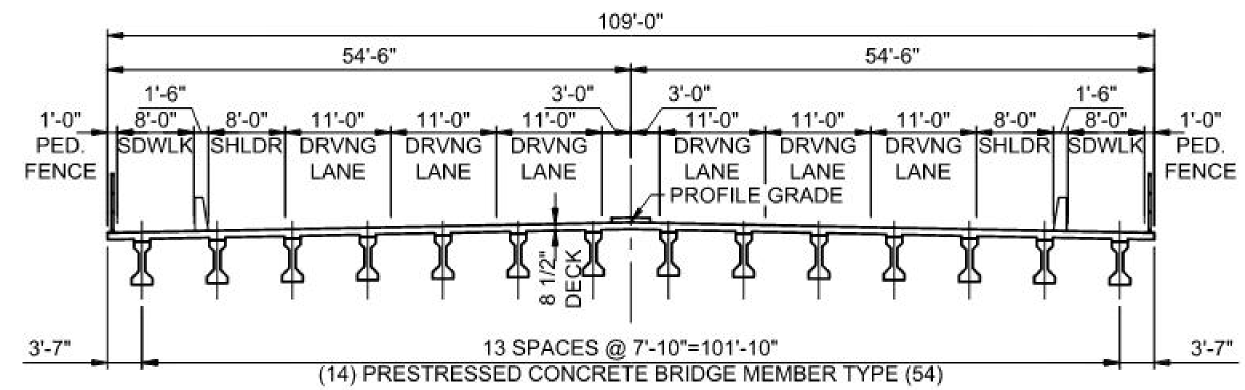
Immediately east of the Rio Grande Bridge along Rio Bravo Boulevard, a second bridge structure exists spanning the Albuquerque Riverside Drain and an access road connecting Poco Loco Drive on the north with Dean Road on the south. The access road is also the continuation of the Paseo del Bosque trail under Rio Bravo Boulevard. Currently, the access road is on the west side of the riverside drain. The Albuquerque Riverside Drain consists of culvert pipes on both ends of an open channel section, which is directly under the bridge structure. The segments of the drain with culvert pipes provide access across and/or onto the levee on both sides of the bridge. The levee is aligned with the bridge abutments for both bridges; the east abutment for the Rio Grande Bridge(s), and the west abutment for the Riverside Drain Bridge(s). There are two improvement scenarios to accommodate these facilities as described below. The Albuquerque Riverside Drain Bridges are also discussed in greater detail in the Bridge Type Selection (BTS) Report, included in the *electronic appendices*.

Option A – Albuquerque Drain/Bridge

Riverside Drain Single-Span Bridge

The Riverside Drain Bridge in Option A spans the riverside drain and service road with a single span of 100 feet measured between centerline of bearings. The superstructure, shown in **Exhibit 5-4**, consists of fourteen Type 54 prestressed concrete girders spaced at 7'-10" with 3'-7" overhangs. The deck thickness is 8½ inches and is composite with the prestressed girders. The abutments are closed-type integral abutments with retaining walls and deep foundations. The retaining walls will likely need to be reinforced concrete to be consistent with the compaction needs at the levee and geotechnical and seismic considerations. This bridge Option is more efficient than the two-span option described below with fewer girder lines and substructure units. However, this Option will have larger impacts to the vertical profile because it is a deeper superstructure.

Exhibit 5-4, Proposed Typical Section for Single-Span Riverside Drain Bridge



Albuquerque Riverside Drain – Keep Open Channel Section

In Option A, the Albuquerque Riverside drain would remain as an open channel under the bridge, however some demolition and repair of the concrete channel would be expected during removal of the existing bridge. The culvert on the north side would be replaced including a concrete headwall. The culvert on the south side would remain in place. Guardrail would be installed as a barrier between the various roads and the drain. The access road adjacent to the riverside drain would be relocated to the east side of the drain to provide more distance to drive over the levee via the Poco Loco Drive extension. A plan view layout is provided in **Exhibit 5-5**.

Option B – Albuquerque Drain/Bridge

Riverside Drain Two-Span Bridge

The Riverside Drain Bridge in Option B would be a two-span prestressed concrete slab girder structure with spans of 54'-0" and 45'-0" measured between centerline of bearings. The superstructure, shown in **Exhibit 5-6**, consists of sixteen 21-inch deep slab girders spaced at 6'-9¾" with a ½-inch gap between slab girders and a five-inch composite cast-in-place deck. The center pier is a concrete cap supported by steel pipe piles. The abutments are closed-type integral abutments with retaining walls and deep foundations. The retaining walls will likely need to be reinforced concrete to be consistent with the compaction needs at the levee and geotechnical and seismic considerations. This Option would have less impact to the vertical alignment of Rio Bravo Boulevard than the single-span option, which reduces earthwork and retaining wall costs.

Exhibit 5-5, Albuquerque Riverside Drain Options

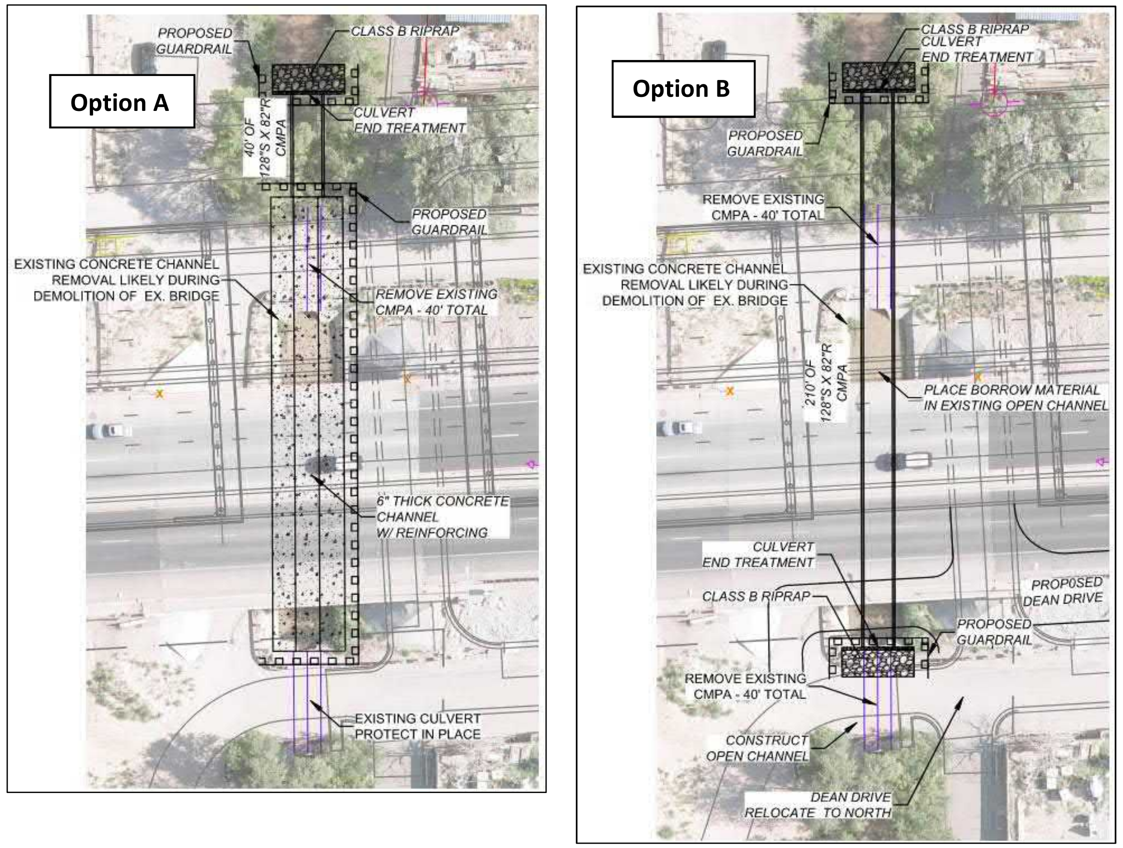
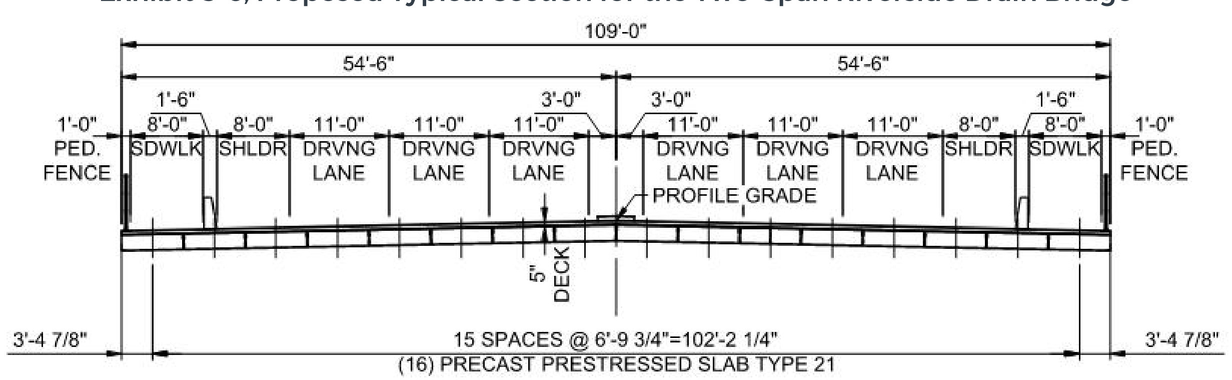


Exhibit 5-6, Proposed Typical Section for the Two-Span Riverside Drain Bridge



Albuquerque Riverside Drain – Reconstruct with Culvert Pipe

In Option B, the open channel segment of the drain would be removed and replaced with a buried culvert to allow for the middle pier of the two-span bridge to be placed between the access road and the drain. The middle pier would not conflict with MRGCD maintenance of the Albuquerque Riverside Drain because the open channel is converted to a culvert pipe. Dean Road would be realigned on the south side to shorten the length of the drain culvert pipe. The estimated length of the culvert is approximately 210 feet. Concrete headwalls would be provided at the inlet and outlet. Guardrail would be installed to protect the headwall areas on both sides. The access road adjacent to the riverside drain would be relocated to the east side of the drain to provide more distance to drive over the levee via the Poco Loco Drive extension. A plan view layout is provided in **Exhibit 5-5**.

Superstructure Types and Span Configurations for Rio Grande Bridge

As described in **Chapter 3**, the existing bridge configuration within these project limits consists of four separate structures. This includes separate bridges carrying eastbound and westbound traffic as well as separate bridges over the Rio Grande and Albuquerque Riverside Drain. The proposed typical section includes a single structure transversely that carries westbound and eastbound traffic. As discussed in **Chapter 4**, a single structure for both directions of travel was chosen to minimize the number of girder lines and drilled shafts and reduce future maintenance efforts. This also allows for a girder line to be placed at the center of the bridge where the phased construction line is anticipated to be.

Chapter 4 also describes various other structural design element screenings that were performed, such as combining the two bridges longitudinally, evaluating various span arrangements, and comparing a number of different superstructure types. After the initial screening of alternatives was completed, three primary superstructure/girder types remained for the Rio Grande Bridge.

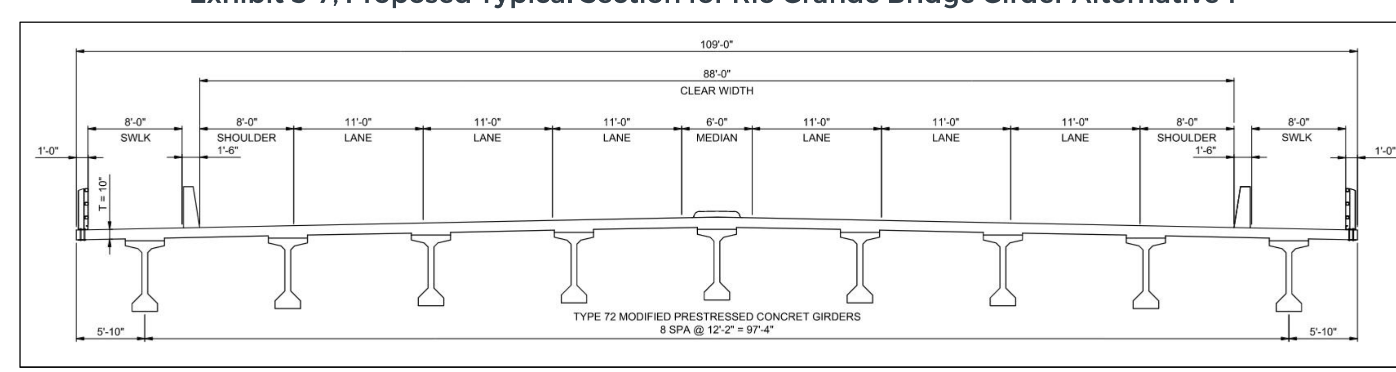
Rio Grande Bridge Superstructure Alternatives

The sections below discuss the three Girder Alternatives for the Rio Grande bridge. The piers for all alternatives are cap and column piers with 54-inch diameter columns on 60-inch diameter drilled shafts. The upper portion of the drilled shafts have 66-inch permanent casings. The abutments for all options are closed wall, semi-integral abutments founded on 48-inch diameter drilled shafts. Refer to **Appendix C** for plan sheets for the alternatives.

Girder Alternative 1 – Rio Grande Bridge

This alternative is a 14-span Type 72 Modified prestressed girder superstructure with a composite cast-in-place deck. The superstructure is shown in **Exhibit 5-7** and consists of nine girders spaced at 12'-2" supporting a 10"deck with 5'-10"overhangs. The 14 spans are divided into three thermal units. The first thermal unit consists of four spans of 108'-8," the second thermal unit consists of five spans of 116'-8," and the third thermal unit consists of five spans of 108'-8." All spans are measured between centerline of supports. The span arrangement for this alternative includes two piers near the middle of the river resulting in a larger area impacted during construction compared to Girder Alternative 3. However, Type 72 Modified girders are easily erected and require little maintenance. The unit cost for the prestressed girders used for preparing the preliminary construction cost for this alternative considers the concern that the current fly ash shortage will increase the price of prestressed girders.

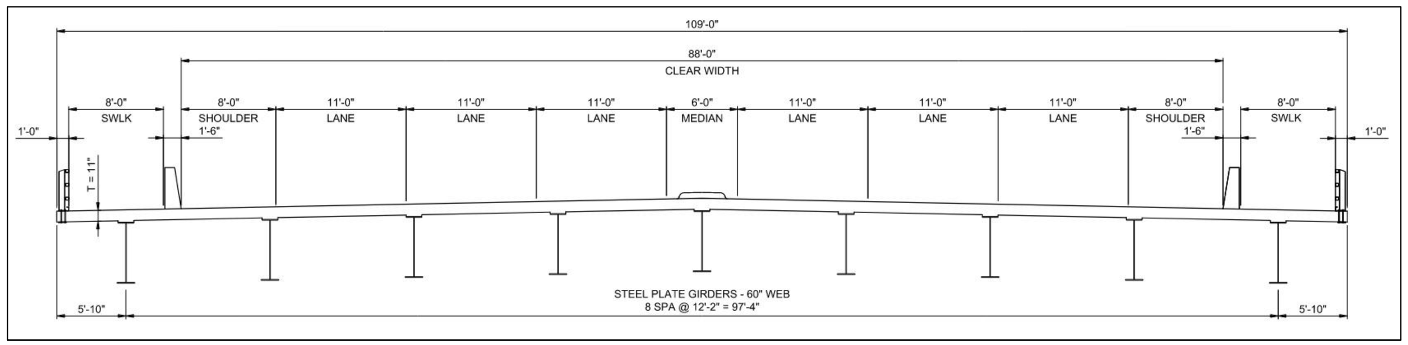
Exhibit 5-7, Proposed Typical Section for Rio Grande Bridge Girder Alternative 1



Girder Alternative 2 – Rio Grande Bridge

This alternative has an identical span arrangement and identical expansion joint locations to Girder Alternative 1. The superstructure is shown in **Exhibit 5-8** and consists of nine simple span steel plate girders with 60-inch webs spaced at 12'-2" with 5'-10" overhangs. The deck is 11 inches thick and composite with the girders. Simple span steel plate girders allow for a simpler construction sequence compared to continuous steel plate girders because there is no field splicing of girder pieces. Simple spans also eliminate the concrete diaphragm at the piers to establish continuity for simple span made continuous girders. Link slabs will be used to span the gap between girders at the piers. Steel superstructures are also lighter than concrete superstructures so it is expected that drilled shaft lengths for this alternative will be slightly less than that of Girder Alternative 1. The combination of reduced girder erection costs, volume of concrete, and drilled shaft length offsets the additional cost associated with steel plate girders.

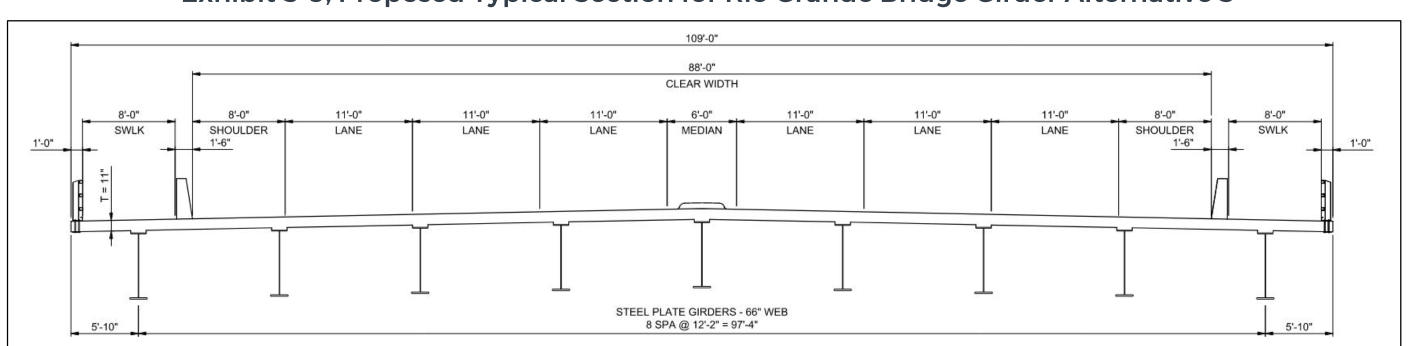
Exhibit 5-8, Proposed Typical Section for Rio Grande Bridge Girder Alternative 2



Girder Alternative 3 – Rio Grande Bridge

This alternative is a 10-span superstructure with two five-span continuous thermal units with span arrangements of 125'-160'-170'-8"-175'-150'measured between centerline of supports. The superstructure is shown in **Exhibit 5-9** and consists of nine continuous span steel plate girders with 66-inch webs spaced 12'-2" with 5'-10" overhangs. The deck is 11 inches thick and composite with the girders. The span arrangement for this alternative was chosen to place fewer piers in the river and to avoid placing a pier near the center of the river. By placing piers closer to the edge of the river, smaller work areas will be required resulting in less impact to the river during construction. This alternative is a hybrid girder design which utilizes 70 kips per square inch (ksi) steel for the flange plates of field pieces over the piers and 50 ksi steel for all other plates. Utilizing 70 ksi steel for the flanges at the piers allows for a shallower girder where demands are the highest and a more efficient use of steel in positive moment regions where demands are significantly less. While 70 ksi steel is about $0.25 more per pound compared to 50 ksi steel, the cost savings are realized in less total steel weight as well as decreased shipping and erection costs and substructure demands due to lighter girders.

Exhibit 5-9, Proposed Typical Section for Rio Grande Bridge Girder Alternative 3



Horizontal and Vertical Alignments for Rio Bravo Boulevard

The proposed horizontal and vertical geometric design for Rio Bravo Boulevard was developed based on the design criteria in **Table 5-1**. The bridge alignment partially offset to the north of the existing alignment requires horizontal curves to transition between the existing and proposed alignments and these curves will be smaller-radius curves than exists today. The existing horizontal curve through the Isleta Boulevard intersection will remain unchanged. Plan and profile sheets are provided in **Appendix B** for both build alternatives.

Horizontal curve data for Build Alternative A and Build Alternative B are summarized in **Table 5-2**. The design speed range is based on a friction factor of 0.15 for low-speed urban, 45 mph, and 0.12 for up to 65 mph. The key difference between the Build Alternatives is the design speed of the controlling horizontal curve at the west bridge abutment for Build Alternative B is 15 mph less than that for Build Alternative A. Both designs satisfy the AASHTO low-speed urban design criteria, and Rio Bravo Boulevard should be posted at 45 mph.

Table 5-2, Proposed Horizontal Curve Design Data for Rio Bravo Boulevard

Horizontal Curve Element	Build Alternative A		Build Alternative B	
	Eastbound	Westbound	Eastbound	Westbound
West of Bridge, Curve 1				
Radius	6,000 ft		6,000 ft	
Super-elevation	-2%	2%	-2%	2%
Design Speed	> 65 mph	> 65 mph	> 65 mph	> 65 mph
West of Bridge, Curve 2				
Radius	2,000 ft		1,200 ft	
Super-elevation	2%	-2%	2%	-2%
Design Speed	60-65 mph	60-65 mph	45-50 mph	45-50 mph
East of Bridge, Curve 1				
Radius	2,000 ft		2,000 ft	
Super-elevation	2%	-2%	2%	-2%
Design Speed	60-65 mph	60-65 mph	60-65 mph	60-65 mph
East of Bridge, Curve 2				
Radius	2000 ft		2000 ft	
Super-elevation	-2%	2%	-2%	2%
Design Speed	60-65 mph	60-65 mph	60-65 mph	60-65 mph

The key aspects of the Rio Bravo Boulevard vertical alignment of the proposed build alternatives are where the existing elevation is matched on both sides of the bridges, the profile grades approaching and crossing the bridge, and the location of the high point on the bridge (see **Table 5-3**). On the Rio Grande Bridge, Alternative A is much flatter than Alternative B. All K values are well above the established design criteria.

Table 5-3, Proposed Vertical Curve Design Data for Rio Bravo Boulevard

Vertical Alignment Element	Build Alternative A	Build Alternative B
Match Existing West	STA 107+00; east end of left-turn lane to Isleta Blvd	Similar to Alternative A
Match Existing East	STA 144+00; low point east of Poco Loco intersection	Same as Alternative A
Maximum Profile Grade West	1.5%	2.5%
Maximum Profile Grade East	2.5%	2.5%
High Point Location on Rio Grande Bridge	STA 129+40 (max. 7.2' above Ex.)	STA 127+00 (max. 12.5' above Ex.)

Trail Connections

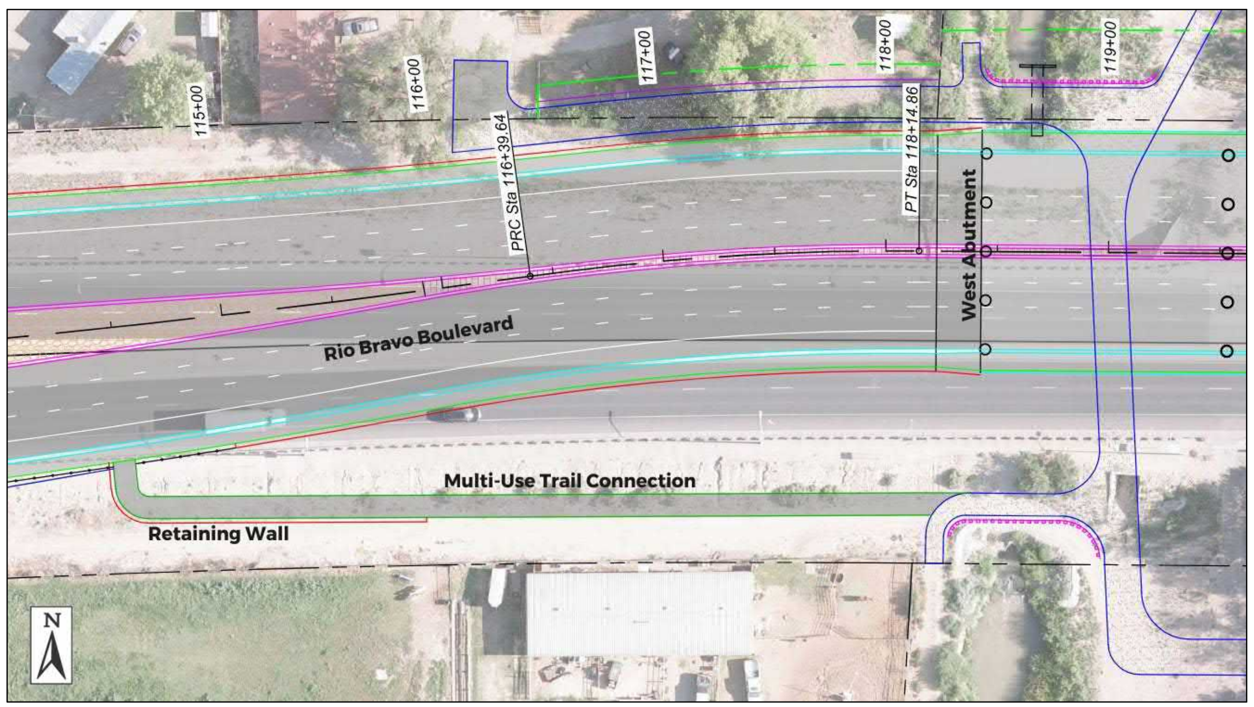
The deck for the proposed bridge alternatives will be higher than the existing bridge deck making it infeasible to provide direct pedestrian/bicycle access from the bridge to the USACE levee system on either side of the river while providing ADA compliant profile grades. USACE will have access from the ground in order to inspect the levee system. This section describes the proposed connections from the reconstructed Rio Bravo Boulevard to the existing and future multi-use trail systems within the project limits.

West side of Rio Grande

While an improved trail does not exist on the west side of the Rio Grande, a future north/south trail along the west levee has been identified in bikeways planning documents. It is also beneficial to provide a good connection from the roadway to the levee for recreational purposes. **Exhibit 5-10** illustrates the proposed connection on the west side of the river. The profile of this trail is approximately 3%, with about 10 feet of elevation drop.

In Build Alternative A, the levee could be raised to the bridge deck elevation on the north side as there is enough run-out length to provide a 5% profile grade. In Build Alternative B, users on the north side of Rio Bravo Boulevard will be required to cross under the bridge to access the proposed trail connection.

Exhibit 5-10, Multi-Use Trail Connection from Rio Bravo Boulevard to Levee System on West Side

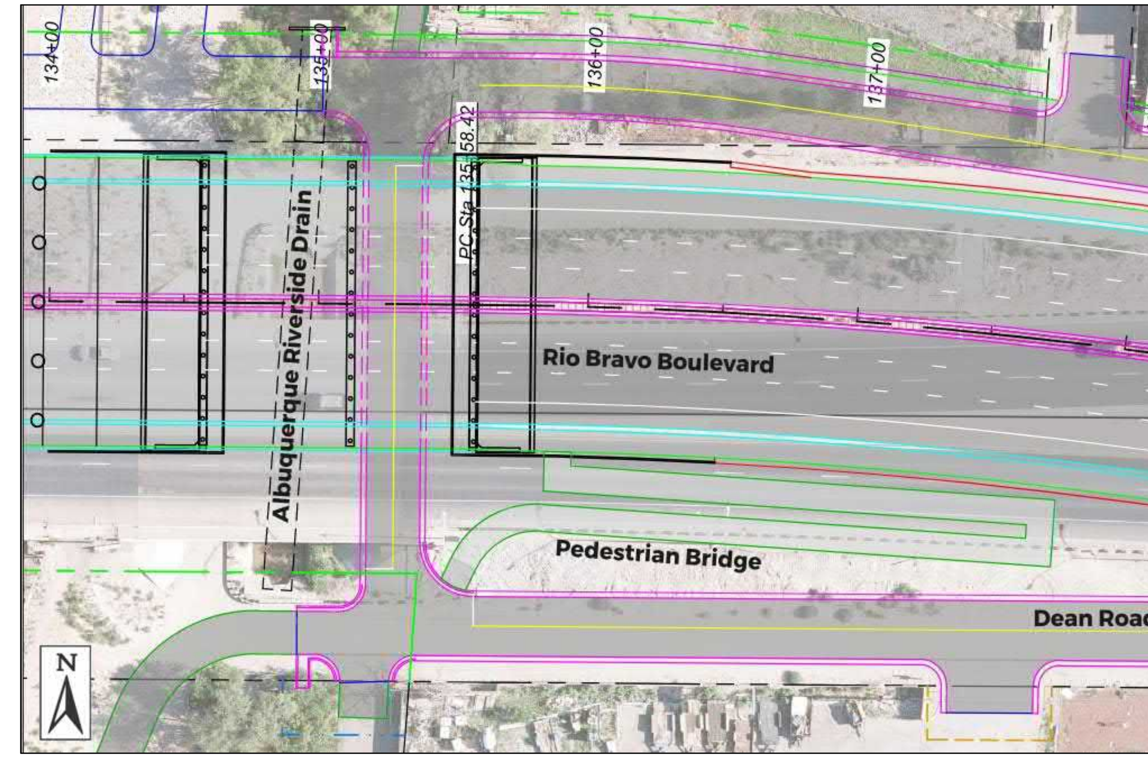


East side of Rio Grande

The trail connection on the east side of the bridge crossings will be brought down from Rio Bravo Boulevard to the Paseo del Bosque/Chavez Loop Trail via an elevated pedestrian/bikeway structure on the south side of the roadway. There are two proposed configurations for the elevated pedestrian structure, which are shown in **Exhibit 5-11** and **Exhibit 5-12.**

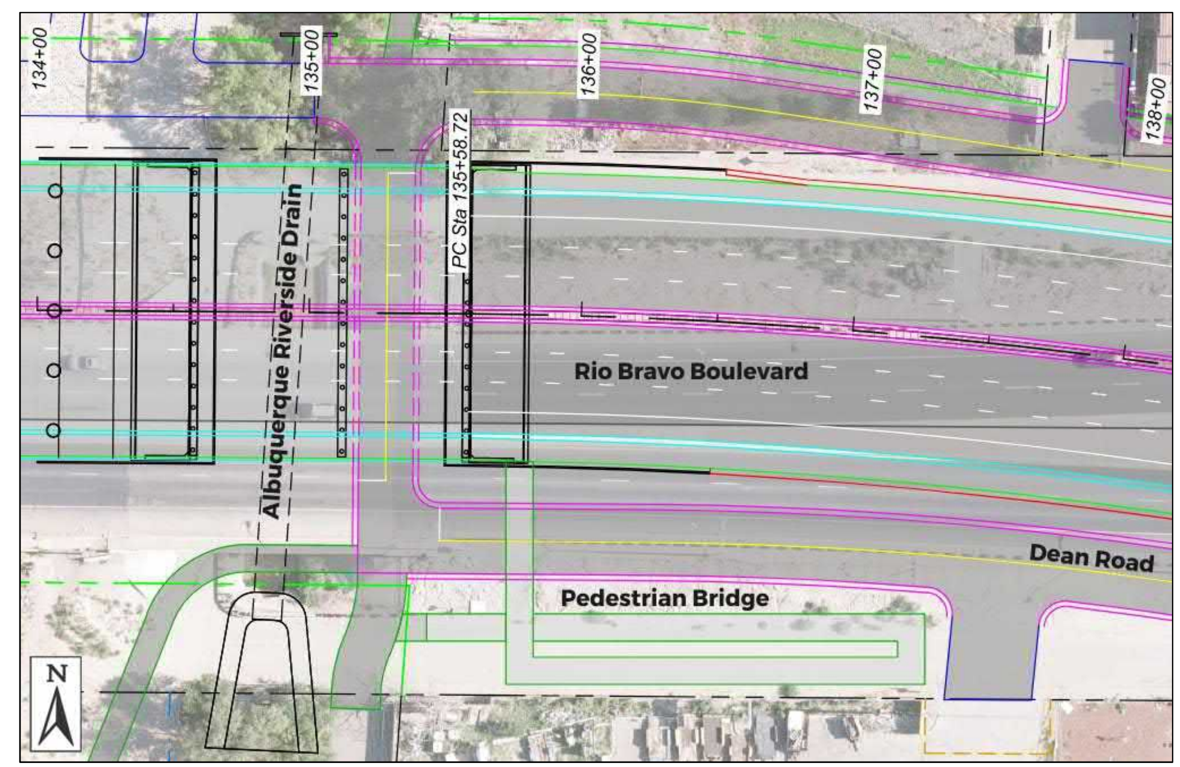
It is expected that the pedestrian structure will include a steel thru-truss superstructure with steel floor beams and framing members below a fiber reinforced polymer (FRP) deck. The proposed pedestrian bridge would be supported on single drilled shaft and column piers.

Exhibit 5-11, Pedestrian Bridge Option shown in Build Alternative A



Note: This option would also apply to a scenario that maintains the open channel section of the Albuquerque Riverside Drain.

Exhibit 5-12, Pedestrian Bridge Option shown in Build Alternative B



Bridge Type Evaluation

Several factors were considered to compare bridge type alternatives. The NMDOT *Bridge Procedures and Design Guide* lists functional requirements, economics, future maintenance, construction feasibility, aesthetics, and accelerated bridge construction (ABC) as important considerations. As part of these factors, traffic control costs, impacts to the Rio Grande, and vertical profile adjustments were considered. Descriptions of the factors used to compare the bridge type alternatives is provided, followed by the decision matrices for the Rio Grande and Riverside Drain bridges.

Key Factors

Functional Requirements

The proposed improvements to Rio Bravo Boulevard include adding an additional lane of traffic in each direction, and eight-foot shoulders and an eight-foot sidewalk on each side of the roadway to accommodate bicycle and pedestrian traffic. All alternatives considered are wide enough to accommodate these improvements and meet horizontal and vertical clearance requirements. The alternatives considered will not result in a rise in the water level of the Rio Grande in the final condition and will meet freeboard requirements specified in the NMDOT *Bridge Procedures and Design Guide*. The scour potential is similar for all alternatives and is not expected to impact which alternative is recommended.

The vertical profile of Rio Bravo Boulevard will be adjusted to accommodate the new alignment and provide the required vertical clearance over the access roads adjacent to the riverside drains on either side of the Rio Grande. Alternatives with shallower superstructures are advantageous as they will require less impact to the vertical profile.

Several utilities are supported by the existing bridge. Many of these utilities will be moved to the overhang on the north side of the proposed structures. This was considered when determining girder spacing and overhang widths for each alternative so that adequate space between the edge of the top flange and edge of slab is provided for these utilities. The steel plate girder alternatives have a slight advantage in this regard as they have narrower top flanges and thus, more space would be available for utilities within the overhang. Because the girder arrangements for each alternative were chosen to provide adequate space for utilities, all alternatives are feasible in this regard.

Economics

A summary of estimated bridge construction costs is shown in **Table 5-4** and a detailed breakdown of bridge construction costs is included in the *Bridge Type Study Report*. These construction costs are preliminary and are only intended to be used as a comparison of alternatives. These costs are based on recent NMDOT projects, correspondence with fabricators, and engineering judgement. The bridge costs shown here do not include contingencies or price escalation to account for inflation.

Table 5-4, Summary of Bridge Construction Costs

Bridge	Bridge Cost	Cost/ft²
Rio Grande Bridge		
Girder Alternative 1	$27,376,950	$161
Girder Alternative 2	$27,238,350	$160
Girder Alternative 3	$27,897,500	$164
Riverside Drain Bridge		
Single-Span Alternative	$2,113,986	$188
Two-Span Alternative	$2,050,362	$182

The unit cost of prestressed girders in this cost analysis considers the possibility of higher than expected costs due to the shortage of fly ash. Girder Alternative 2 uses a slightly lower unit cost for structural steel than Girder Alternative 3. This is because simple span steel plate girders do not require field splicing thus reducing erection costs.

Although not considered in the bridge construction costs shown in **Table 5-4**, traffic control costs were considered qualitatively when comparing alternatives. During the second phase of construction, three lanes of traffic will be maintained. One lane will be maintained in each direction with the middle lane being reversible to accommodate a second lane in the rush hour direction. The temporary barrier separating the two directions of traffic will be shifted two times each day to allow for this method of traffic control. Shifting the temporary barrier adds construction cost, and minimizing construction time and number of days that the reversible lane will be in use is an important consideration.

Future Maintenance

The proposed alternatives were chosen considering future maintenance. Alternatives with fewer girder lines and substructure units are advantageous from a future maintenance perspective because fewer girders, piers, and bearing lines will need to be inspected and potentially repaired or replaced throughout the life of the bridge. Span arrangements were chosen to minimize the number of expansion joints, as expansion joints are often a large contributor to water damage and deterioration of bridges. Weathering steel is assumed for the steel plate girder alternatives to eliminate the maintenance costs associated with the recoating of painted steel.

In addition to the future maintenance considerations included here, a discussion is included below regarding methods of extending the design life of the proposed bridges beyond the 75-year design life specified in the AASHTO *LRFD Bridge Design Specifications*. It should be noted that the future maintenance comparisons here are qualitative only and a detailed life cycle cost analysis was not performed for each alternative included in this chapter.

Construction Feasibility

The construction sequence will be similar for all alternatives considered. The northern portions of the proposed bridges will be constructed first while current traffic conditions are maintained on the existing eastbound and westbound bridges. Traffic will then be shifted to the northern portions of the proposed bridges while the existing bridges are demolished and the southern portions of the proposed bridges are constructed. The proposed alignment and width of bridges constructed in the first stage of construction were designed so that the construction joint falls over a girder to avoid the use of a closure pour. Clearance will be provided between the edge of slab constructed in the first stage of construction and the existing bridge so that reinforcing steel can project out of the slab and splice with reinforcing steel from the second stage of construction.

Precast prestressed girders and simple span steel plate girders are simpler to erect compared to continuous span steel plate girders, which require field splicing of girder pieces. Furthermore, steel plate girders, both simple span and continuous span, require large lead times to ensure girders are fabricated and arrive to the construction site on time. If steel plate girders are used on this project, they will be shipped from out of state which will require close coordination between the contractor and steel girder fabricator to ensure there are no delays in girder erection and increased traffic control costs. However, coordination between the contractor and precaster is also a concern because of the size of this project. With over 100 girders required for the Rio Grande bridge, it will be critical that the precaster has capacity to cast and store the girders while meeting the production schedule.

Construction access will be similar for all alternatives. The picnic area northeast of the existing bridge may be used as a staging and storage area during construction. Construction activities will take place in the river for all Rio Grande bridge alternatives. NM 6 over the Rio Grande had similar construction requirements, and experience and lessons learned from that project have been applied to this bridge. Additional considerations regarding the feasibility of constructing the proposed bridge in the river are discussed below.

Environmental and Drainage Considerations

Minimizing impacts to the river during construction is an important consideration for all Rio Grande bridge alternatives. Preliminary hydraulic analyses of the Rio Grande indicate that the water level will not rise for the final condition for any of the alternatives included in this study. NMDOT has expressed concerns with the effects of the stream flow due to the construction of temporary work areas in the river. The span arrangement for Girder Alternative 3 was chosen so that piers will be closer to the edge of the stream under normal flow conditions. This will minimize the size of temporary work areas and potential impacts to the river.

Drainage of rain water on the bridge deck is another consideration. The bridge over the Rio Grande will require stormwater runoff to be diverted off the bridge deck to eliminate ponding and reduce corrosion of the expansion joint system. The deck drainage system is expected to be similar for all alternatives considered.

Because impacts to the river flow are only applicable to the bridge over the Rio Grande, and because the deck drainage will not vary between alternatives, environmental and drainage costs are included in the weighted decision matrix for the Rio Grande Bridge only.

Bridge Aesthetics

The bridges span the densely vegetated Bosque along the Rio Grande. The bridges are primarily visible to roadway users, though the exterior and underside of the bridges are visible to recreational users in the Bosque and along the river. Aesthetic treatments, such as painting/powder-coating of the bridge rails, will be similar for all alternatives. Other aesthetic considerations include span arrangement and superstructure depth. Span arrangements with similar span lengths or shorter end spans are considered more aesthetically pleasing. Additionally, a shallow superstructure is desirable from an aesthetic perspective.

The functional requirements for this project are considered more important than aesthetics for determining the recommended bridge alternative. This is reflected in the relatively low weighting factor used in the weighted decision matrices below.

Accelerated Bridge Construction (ABC)

An ABC analysis based on the Wisconsin Department of Transportation Bridge Manual guidelines was performed and it was determined that ABC would not be included in the weighted decision matrices due to the associated added cost being unjustified for this bridge. However, prefabricated bridge elements and systems (PBES) may be considered during final design in coordination with NMDOT. This may include the use of precast partial depth deck panels and precast pier and abutment caps.

Weighted Decision Matrices

Table 5-5 and **Table 5-6** show the weighted decision matrices for the Rio Grande and Riverside Drain bridges, respectively. Weighting factors for each evaluation criteria were chosen based on their relative importance after coordination with the design team, NMDOT, and the *Bridge Procedures and Design Guide*. The bridge type cost weighting factor is lower for the riverside drain because the cost of that bridge is much smaller than the cost of the Rio Grande Bridge and will be a small portion of total project costs. The impact to the vertical profile is a primary evaluation factor for the Riverside Drain Bridge. The raw scores (rating from 1 to 5 before weighting factors are applied) were chosen based on how well the alternatives meet the requirements of each evaluation criterion.

Table 5-5, Weighted Decision Matrix for the Rio Grande Bridge

		Girder Alternative 1 P/S Concrete Type 72 Modified Girders		Girder Alternative 2 Simple Span Steel Plate Girders		Girder Alternative 3 Continuous Span Steel Plate Girders	
Evaluation Criteria	**Weighting Factor**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**
Functional Requirements	5	3	15	5	25	4	20
Bridge Type Cost	5	5	25	5	25	4	20
Future Maintenance	4	4	16	3	12	5	20
Construction Feasibility	5	4	20	4	20	2	10
Environmental/Drainage	3	2	6	2	6	4	12
Bridge Aesthetics	1	4	4	5	5	3	3
		Total Score	**86**	**Total Score**	**93**	**Total Score**	**85**

Table 5-6, Weighted Decision Matrix for the Riverside Drain Bridge

		Single-Span Alternative P/S Concrete Type 54 Girders		Two-Span Alternative P/S Concrete Slab Girders	
Evaluation Criteria	**Weighting Factor**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**
Functional Requirements	5	3	15	5	25
Bridge Type Cost	3	5	15	5	15
Future Maintenance	4	5	20	3	12
Construction Feasibility	5	4	20	4	20
Bridge Aesthetics	1	5	5	5	5
		Total Score	**75**	**Total Score**	**77**

For the Rio Grande Bridge, Girder Alternative 2 scores the highest when all evaluation criteria are considered. Girder Alternative 3 scores the lowest of the three alternatives considered for this bridge. A summary of the scoring for each evaluation criterion is included below

- **Functional Requirements**: Girder Alternative 2 scores the highest in terms of functional requirements because it has the shallowest superstructure, which will have the smallest impact on vertical profile adjustments. Girder Alternative 1 scores the lowest because it has the deepest superstructure.
- **Bridge Type Cost**: As shown in **Table 5-5**, Girder Alternative 2 has the lowest initial construction cost. However, there is only a 2% difference in cost between Girder Alternative 2 and Girder Alternative 3, the most expensive alternative. Girder Alternative 1 is slightly more expensive than Girder Alternative 2. However, it is assumed that simple span steel plate girders will take longer than prestressed girders to erect because of the cross-frame connections. For these reasons, Girder Alternatives 1 and 2 have the same score for bridge type cost. Girder Alternative 3 will require the longest construction time, increasing traffic control costs. Longer construction time will also indirectly increase the user's costs. In addition, Alternative 3 requires field splicing of girder pieces and larger pieces to be shipped which will result to higher bridge cost.

- **Future Maintenance**: Girder Alternative 3 scores the highest in terms of future maintenance because it has the fewest number of expansion joints, bearing lines, and substructure units. Girder Alternative 2 scores the lowest because it has more expansion joints, bearings lines, and substructure units than Girder Alternative 3.
- **Construction Feasibility**: Girder Alternative 1 will be the easiest to erect. However, there is concern that local precasters may not have the capacity to fabricate and store girders for a project of this size. Simple span steel plate girders (Girder Alternative 2) will require cross-frames to be bolted to the girders in the field, which adds complexity to the erection sequence. For these reasons, Girder Alternatives 1 and 2 score the same in terms of construction feasibility. Continuous span steel plate girders (Girder Alternative 3) will take longer to erect than Girder Alternatives 1 and 2 because of the cross-frame connections previously mentioned, as well as field splicing of girder pieces.
- **Environmental/Drainage Considerations**: Girder Alternative 3 scores the highest in terms of environmental and drainage costs because it has the fewest number of piers in the river and floodplain.
- **Bridge Aesthetics**: Girder Alternative 2 scores the highest in terms of aesthetics. This alternative has the shallowest superstructure and all spans lengths are similar. Girder Alternative 1 has an identical span arrangement but deeper girders. Girder Alternative 3 scores the lowest in terms of aesthetics because it has an irregular span arrangement.

For the Riverside Drain Bridge, the Two-Span Alternative has a slight advantage over the Single-Span Alternative when considering all evaluation criteria. A summary of the scoring for each evaluation criterion is included below.

- **Functional Requirements**: The Two-Span Alternative scores higher in terms of functional requirements because it has a shallower superstructure depth, which will have less impact to vertical profile adjustments.
- **Bridge Type Cost**: Neither alternative has an advantage in terms of bridge type cost. The Single-Span Alternative is only about 2% more expensive than the Two-Span Alternative. This cost difference is negligible when considering total project cost.
- **Future Maintenance:** The Single-Span Alternative has an advantage over the Two-Span Alternative when considering future maintenance because it has fewer girder and bearing lines. This will reduce inspection efforts and future maintenance costs.
- **Construction Feasibility:** Neither alternative has an advantage in terms of construction feasibility. Both girder types will have simple erection sequences. The Single-Span Alternative has fewer substructure units to construct, however the adjacent slab girders for the Two-Span Alternative will simplify the deck construction.
- **Bridge Aesthetics:** Neither alternative has an advantage in terms of aesthetics. The Two-Span Alternative has a shallower superstructure than the Single-Span Alternative, but it has two unequal span lengths.

Extended Lifespan

The AASHTO *LRFD Bridge Design Specifications* specifies a design life of 75 years. However, due to the importance of these bridges to the surrounding community and region, NMDOT has requested that the design team investigate methods of extending the design life of the proposed bridges to 100 years. The AASHTO *Guide Specifications for Service Life Design of Highway Bridges* provides guidance regarding the durability of bridges and designing bridges to meet specific service lives. While a full service life analysis has not been completed for the preparation of this report, this section provides a brief overview of the steps to be taken and factors to consider during final design to extend the service life of the proposed bridges.

Expansion joints and deck drains are a primary source of deterioration for bridges and minimizing the number of these elements in the bridge superstructure is an effective way of extending the service life of the bridge. When the use of expansion joints and deck drains cannot be avoided, which is the case for the bridge over the Rio Grande, proper detailing is required to divert water from entering the joints and to drain away from the structural elements below. Regular maintenance of expansion joints and deck drains is also required to ensure clogging does not occur which can result in ponding of water on the bridge deck. Coordination with roadway and drainage engineers is critical to ensure the grades and cross-slopes provide positive drainage at all locations and an efficient deck drainage design is achieved.

There are several measures that can be taken during the design, detailing, and construction of concrete to ensure adequate durability, some of which are already standard practice. These measures include providing adequate clear cover to reinforcing steel, using corrosion resistant reinforcing steel, using low permeability concrete, using concrete mixes that prevent cracking due to thermal effects and shrinkage, minimizing exposure to moisture (especially moisture containing sulfates), ensuring adequate curing before the first freeze cycle, and specifying enhanced construction inspection requirements in the contract documents. Additionally, where alkali-aggregate reaction is a concern, the use of low-alkali cement and nonreactive aggregates can improve concrete durability.

One of the primary deterioration mechanisms for steel bridges is corrosion. There are several coating systems to protect steel from corrosion, including galvanizing, metalizing, painting, or a combination of these methods. An alternative to the coating systems previously mentioned is the use of uncoated weathering steel. While weathering steel should not be considered maintenance free, it is usually a less expensive means of corrosion protection over the life span of the bridge. However, the use of weathering steel is limited to specific conditions to ensure the steel is exposed to the wet-dry cycles required to form the patina that protects the steel from corrosion. Recent steel girder projects in New Mexico have included a special provision in the contract documents which requires the fabricator to complete wet-dry cycles prior to shipment. This initiates the patina forming process and ensures the weathering steel achieves the required corrosion resistance. It is also recommended to paint the ends of weathering steel girders to protect them from water falling through expansion joints.

The other primary deterioration mechanism for steel bridges is fatigue. Proper detailing and design of steel elements and their connections is critical for preventing deterioration due to fatigue stresses. Section 5.2.2 of the AASHTO *Guide Specifications for Service Life Design of Highway Bridges* recommends steel bridges to be designed using the Infinite Life (Fatigue I) case and only use details in Detail Category C’ or better from Table 6.6.1.2.3-1 of the AASHTO *LRFD Bridge Design Specifications*.

Even with regular maintenance, it is often not feasible to assume some bridge elements will remain effective for the entire life of the bridge. The AASHTO *Guide Specifications for Service Life Design of Highway Bridges* recommends detailing bridges so that elements that often require replacement during the life of the bridge can be replaced while keeping the main structural elements intact. These elements include joints, deck drains, bearings, barriers, railings, and cast-in-place decks.

Bridge Type Recommendations

Three girder alternatives were evaluated for the bridge over the Rio Grande. These include superstructures consisting of prestressed concrete girders, simple span steel plate girders, and continuous span steel plate girders. Girder Alternative 3, the continuous span steel plate girder superstructure, will be the most expensive to construct and will require the longest construction time. Therefore, this alternative is not recommended.

Preliminary analysis indicates that Girder Alternative 2, the simple span steel plate girder alternative, is the least expensive. This alternative also scores the highest when all major evaluation factors are considered. For this reason, the design team recommends Girder Alternative 2, simple span steel plate girders, to be advanced to preliminary and final design for the bridge replacing the existing two Rio Grande bridges.

For the Riverside Drain Bridge, two alternatives were evaluated including a prestressed concrete girder superstructure and a prestressed concrete slab girder superstructure. The Single-Span Alternative, the prestressed concrete girder alternative, uses a girder type that is commonly fabricated by local precasters. However, the Two-Span Alternative, the prestressed concrete slab girder alternative, is less expensive to construct and will have significantly less impact to the vertical alignment resulting in reduced roadway and retaining wall costs. Due to these advantages, the Two-Span Alternative is recommended to be advanced to preliminary and final design for the bridge replacing the existing Riverside Drain Bridge. The Two-Span Alternative is shown in the conceptual roadway design layouts for Build Alternative A and Build Alternative B.

Geotechnical Design

A Preliminary Geotechnical Report based upon geologic and geotechnical literature searches, site reconnaissance, field exploration, and laboratory testing, was prepared by Terracon Consultants, Inc. for the NM 500 Bridge Replacement over the Rio Grande located in Bernalillo County, New Mexico. This report can be found in the *electronic appendices*. Based on the information obtained, the following geotechnical considerations were identified.

Site Soils

The site surface and subsurface consist predominantly of sand with of some interbedded clay and silt layers to the full depth of exploration of about 90 to 100 feet below existing site grade. The surface and shallow subsurface soils at the project site exhibit a moderate to high tendency for compression with increasing load and when elevated in moisture content. The shallow soils will exhibit low to moderate bearing capacity. The soils may be recompacted to increase bearing capacity and reduce settlement. It is believed that the sand soils have relatively good quality pavement support characteristics.

Construction and Excavation

On-site non-plastic sands or higher quality sands are anticipated to be suitable for use as structural backfill for abutments, wingwalls and pavements. On-site clay and silt will not be suitable for use as structural backfill. Shallow excavations into the on-site soils are expected to be accomplished with conventional earthwork equipment. Shallow groundwater and caving soils should be anticipated due to very loose to loose granular soil conditions and construction within the Rio Grande floodplain.

Slopes

For permanent slopes in compacted fill and cut areas with maximum heights of less than about 20 feet, recommended preliminary maximum configurations for on-site materials range from 2:1 to 3:1 (horizontal:vertical). Where bridge elements interface with the levees, they will need to be battered to facilitate proper compaction of the levee material against the wall or other structural element.

Foundations

The bridge structure is anticipated to be supported on a deep foundation consisting of drilled shafts bearing on undisturbed soil. The foundation will need to account for design scour depths. Casing and/or drilling slurry will be required for drilled shaft construction. Stabilization of subgrade may be required for support of RCBC extension or replacement.

Scour and Erosion

Scour and erosion countermeasures will need to be incorporated into the design of the bridge structure for portions located within the Rio Grande channel and floodplain.

Pavement

The subgrade soils will consist predominantly of relatively high quality sand subgrade with high R-values. The anticipated pavement thickness will be based upon the subgrade materials and traffic types and volumes along the project alignment. Thicker pavement sections will be associated with poorer quality subgrades associated with clayey or more silty sand subgrade. The NMDOT Pavement Management and Design Bureau will provide final pavement section recommendations based on the borings completed for this project.

Seismic and Liquefaction Considerations

A summary of seismic and liquefaction considerations is provided below. Refer to the Preliminary Geotechnical Report for further information.

The on-site shear wave velocity (Vs) tests indicated that the upper 100 feet of the profile has average values of 995 and 1125 feet per second at two Array Locations. Therefore, the Site Class is D. De-aggregation of the USGS ground motion data identified that Basin and Range sources were the dominant contributors to strong ground shaking at the site. The mean value of magnitude for PGA was 6.3 and the source-to-site distance was 24 km. The recommended design response spectra (DRS) parameters AS, SDS, and SD1 are 0.150, 0.375, and 0.163, respectively. The value of SD1 leads to a Seismic Design Category (SDC) of B for the bridge structure.

The term liquefaction refers to a phenomenon by which saturated soils develop high porewater pressures during seismic shaking and, as a result, lose their strength characteristics. This phenomenon generally occurs in areas of high seismicity, where groundwater is relatively shallow and where loose granular soils (mainly sands) or non-plastic fine-grained soils (mainly silts) are present. The recent and Holocene deposits at the site would have a relatively high susceptibility to liquefaction given their grain size distribution and relative density.

The liquefaction potential was evaluated using empirical methods. For each soil interval being analyzed, the method calculates a factor of safety. A safety factor less than 1.0 indicates liquefaction and a safety factor greater than 1.0 indicates a low risk of liquefaction. The standard of practice is to target a minimum factor of safety of 1.2 to 1.3 in accordance with AASHTO. The analysis involved data from Boring No. BH-1 advanced near the southeast abutment location.

Soil liquefaction during a design level seismic event may result in a temporary reduction in soil strength and as much as six (6) inches of post-liquefaction settlement and lateral spread. The slope instability at the abutment and approach embankment locations warrants evaluation. The lateral spread hazard is considered low at the boring location. However, it is anticipated that the lateral spread hazard is higher in recent channel deposits. Groundwater monitoring should be considered to develop a design groundwater elevation for the project. The effects on pile or drilled shaft foundations could include the following:

- Reduced axial capacity subsequent to seismic loading.
- Transient soil displacements during seismic loading that apply kinematic loads.
- Down-drag loads as the ground settles during post-liquefaction reconsolidation.
- Permanent lateral displacements that unseat the superstructure.

Based on the preliminary analysis, there is a liquefaction hazard at the site during the design seismic event. The hazard appears to be greatest closer to the river (i.e., Borings 1 through 3). Boring B-4 also had a sample with a factor of safety of 1.1 at a depth of approximately 60 feet. See **Exhibit 5-13** for liquefaction data at each boring.

Exhibit 5-13, Liquefaction Data at Borings

Boring No.	Approx. Depth of liquefiable zone in feet	Range of Factors of Safety in liquefiable zone
1	7 to 22[1]	0.8 to 1.0
2	4 to 22[1]	0.9 to 1.4[2]
3	6 to 27[1]	0.9 to 1.4[2]
4	13 to 22	1.0 to 1.7[2]
5	7 to 17[1]	1.1 to 1.3
6	27 to 32	1.3

[1]Top of liquefiable zone controlled by groundwater table location.
[2]Liquefiable zones identified with FS ≤ 1.3. Values greater than 1.3 are for samples within the identified zone.

Retaining Walls and Ancillary Structure Foundations

If steeper slopes are required for site development, it is recommended that retaining walls/systems are used. As an alternative to cast-in-place retaining walls or stub abutments, mechanically stabilized earth (MSE) walls were considered. Moderate to high walls (and associated moderate fill embankments) may be subjected to large settlements. MSE wall performance during past earthquakes has generally been relatively good because of the ability of these structures to accommodate ground displacement deformations without collapse. However, while MSE walls could be feasible in some areas of the project, they would not be the appropriate choice around the levees, as compaction requirements necessitate a CIP retaining wall with a battered face against which the levee soils can be compacted. In addition, there are some areas of the project which could require drainage pipes to protrude through a retaining wall. In these areas, CIP walls would also be the recommendation. Lastly, the piers and abutments that align with the levees in the proposed condition are recommended to be constructed as CIP flood walls in place of an earthen levee. Given the multiple locations of CIP walls required on this project, it is expected that CIP walls will be used everywhere.

For relatively lightly loaded structures, such as retaining walls, wing walls, RCBCs, and other similar type structures, a deep foundation is also considered applicable for support. However, due to the significantly lighter loads associated with these structures as compared to the bridge structures, it is likely that the depths of the deep foundations would be shallower; however, the deep foundations will need to extend below the liquefiable layers. The deep foundations could consist of either drilled shafts or driven piles. In lieu of a deep foundation system, a shallow foundation system consisting of shallow spread or continuous footings may be considered feasible, provided that some movement can be tolerated. Due to the potential for compression in the near surface soils, footings bearing on a zone of backfill/engineered fill may be required for support of the proposed foundations.

Areas of very loose to loose soils may be encountered at shallow foundation bearing depth after excavation is completed for footings. When such conditions exist beneath planned footing areas, the subgrade soils should be surficially compacted prior to placement of the foundation system. If sufficient compaction cannot be achieved in-place, the loose soils should be removed and replaced as backfill/engineered fill. For placement of backfill/engineered fill below footings, the excavation should be widened laterally, at least eight (8) inches for each foot of fill placed below footing base elevations.

Proposed Drainage Conditions

A summary of proposed drainage conditions is provided below. Refer to the Preliminary Drainage Report for additional information which is available in the ***electronic appendices***.

Bridge Hydrology

The observed flow at USGS Station 08330000, Rio Grande at Albuquerque, was reviewed for the estimation of the peak flows in cubic feet per second (cfs) at the Rio Bravo Boulevard bridge over the Rio Grande. The gage is located approximately four miles upstream of the bridge location and has a flow record from 1942 to 2019. The USGS PeakFQ computer program, Version 7.3, was used to estimate the 50- year, 100-year, and 500-year recurrence interval storms at the gage. The estimated flood is then translated to the bridge location using the equation developed by Saur (1974) and mentioned in Scientific Investigations Report 2008–5119 developed by Scott D. Waltemeyer (https://pubs.usgs.gov/sir/2008/5119/pdf/sir2008-5119.pdf). Refer to **Table 5-7** for peak discharges at the bridges over the Rio Grande at Rio Bravo Boulevard.

Table 5-7, Bridge #6224/#8568 Peak Discharges

Rio Grande Bridge Location	Basin Area (sq. mi.)	50-Year Discharge (cfs)	100-Year Discharge (cfs)	500-Year Discharge (cfs)
Rio Bravo Boulevard	13,000	15,625	17,925	23,550

Bridge Hydraulics

The Bureau of Reclamation's Sediment and River Hydraulics, Two-Dimensional Model (SRH-2D) version 13.0, was used for the hydraulic analysis of the existing and proposed bridges. SRH-2D solves the two-dimensional depth averaged dynamic wave equations using the finite volume numerical method. Solved variables include the water surface elevation, water depth, and depth averaged velocity. Additional output variables include the Froude Number, bed shear stress, critical sediment diameter, and sediment transport capacity.

A steady flow analysis was performed in SRH-2D to develop water surface profiles for the 50-, 100-, and 500-year recurrence interval storm events. The basis for the hydraulic modeling is a ground and bathymetry survey that was performed by Maser Consulting in November 2020. Limits for this study extended approximately 3000 feet upstream and 3000 feet downstream of the bridge, as well as data at the existing bridge, and extending the width of the floodplain from levee to levee. The survey also includes areas outside of the east and west levees.

A scatter data set was imported from the ground and bathymetry survey and a mesh was created to model the exiting bridge. The scatter data was adjusted at the pier locations and a mesh was created to model the proposed bridge configurations. Manning's "n" values, monitoring points and lines, and boundary conditions were associated with each mesh. The boundary conditions consisted of an upstream inlet boundary (Inlet-Q) with a peak flow hydrograph and subcritical flow regime and a downstream exit boundary (Exit-H) with a water surface elevation and subcritical flow regime at the end of the model.

Manning's "n" values for the channel and floodplains were established based on the USGS Water-Supply Paper 2339, "Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains," visual observation, and photographs. Values were added to the model using a material properties shapefile. The assumed natural channel and floodplain "n" values for the model ranged from 0.023 to 0.090 (also, an "n" value of 0.017 was used for the roadway pavement).

Per the NMDOT Drainage Design Criteria (Drainage Design Manual, 2018), bridges should provide 2 feet of freeboard between the low chord of the bridge and the water surface elevation of the 50-year frequency storm (design flood) for this project. In addition, the 100-year frequency storm (check flood) water surface elevation should be below the low chord of the bridge. Furthermore, bridge scour should be evaluated for the 100- and 500-year frequency storms.

Other hydraulic considerations for designs of bridges include:

- The proposed improvements must not have any adverse impacts on adjacent properties.
- The proposed structure should not cause significant changes to channel velocity, aggradation or degradation, scour, head cutting, and conveyance.
- The proposed improvements should meet the requirements of USACE, the New Mexico Environment Department, FEMA, and other regulatory agencies.

Several bridge improvement alternatives were considered for this project as discussed in **Chapter 4**. The alternatives included in-line replacement, offset alignments, and bridges on new alignments. The proposed bridge alignment for reconstruction is on an alignment partially offset to the north of the existing bridge. Several span length configurations and girder types were considered as discussed in this chapter.

Hydraulic analyses were evaluated for the existing bridge and for the proposed bridge to verify that the Department's drainage design criteria are met. Since the existing bridge would be demolished once the north offset bridge is constructed, the existing and proposed bridge were not analyzed together. In addition, while there are 24 existing piers in the floodplain, the proposed bridge will have 12 piers or less. The hydraulic analyses were performed based on 12 piers with 54 inch cylindrical piers (66 inch shafts) in the floodplain (three in the live channel) for the build condition to be conservative.

A comparison of the existing and proposed SRH-2D models revealed that there is no variation between the existing and proposed water surface elevations. This is likely attributed to the relatively wide channel and floodplain upstream of the Bridge. With this in mind, minimal variation in the water surface profile upstream and downstream of the bridge, within the vicinity of the project, is expected. Refer to **Table 5-8** for the water surface elevations at the upstream face of the bridge. In addition, the main channel velocities for the existing and proposed bridge were also evaluated and it was determined that velocities are comparable.

Table 5-8, SRH-2D Bridge Hydraulic Results

Bridge	Storm Event	WSE at Upstream Face of Bridge (ft.)	Low Chord Elevation (ft.)	Available Free Board (ft.)	Channel Velocity (fps)
Existing Bridge	50-Year	4932.5	4940.75	8.25	6.4
	100-Year	4934.1		6.65	7.2
Proposed Bridge	50-Year	4932.5	4946.90	14.4	6.1
	100-Year	4934.1		12.8	7.0

Scour Analysis of Proposed Rio Grande Bridge

A scour analysis was performed to estimate the scour potential at the proposed Rio Grande Bridge based on the proposed condition river hydraulics. Per the Department's drainage design criteria, the 100-year and 500-year storm events were used for the scour analysis. As recommended by HEC-18, channel horizontal stability, long term stream degradation, contraction scour, and local (abutment and pier) scour were analyzed for the bridge. **Table 5-9** summarizes the results of the scour analyses for the 100- and 500-year storm events. The analyses showed that the 500-year event produces the worst-case scour scenario for the proposed bridge.

Table 5-9, Preliminary Scour Results

Flood Frequency (Year)	Q (CFS)	Contraction Scour (ft)	Max Pier Scour (ft)	Total Pier Scour (Pier + Contraction) (ft)	Abutment Scour (ft)	
					East	West
100	17,925	0.4	12.2	12.6	7.4	7.9
500	23,550	0.4	12.6	13.0	7.6	8.1

FEMA Hydraulic Analysis

Since the bridge is located within a FEMA regulatory floodway, as shown on the Flood Insurance Rate Maps (FIRM) 35001C0343H and 35001C0341G, an additional hydraulic analysis of the proposed bridge was performed to ensure there was no rise in water surface elevations due to construction of the proposed bridge. The basis of the no-rise analysis came from the latest Flood Insurance Study (FIS) for Bernalillo County and Incorporated Areas, dated November 2016, which references a previous FEMA study done in 1982. In the study, a hydraulic analysis was completed using the U.S. Army Corp of Engineers - Hydraulic Engineering Center software program HEC-2. Cross sections J, K, and L in the HEC-2 model were found to be in close proximity to the project area and were used for comparison purposes. For the purposes of this analysis, the HEC-2 model will serve as the original Effective Model.

To complete the no-rise analysis, a Corrected Effective Model was developed using the existing conditions SRH-2D model previously prepared for the project. The flow rate (determined using gage data) was updated with the 100-year flow rate of 15,700 cfs shown in the FEMA study. Observation lines were cut across cross sections J, K, and L as shown in the HEC-2 model. Results from the Observation plots showed minimal variations in the water surface elevation variations between the HEC-2 Effective Model and SRH-2D Corrected Effective model. Refer to **Table 5-10** for the model comparison.

The Corrected Effective Model was updated with the proposed bridge configuration to create a Proposed Conditions Model (the model used 12 piers in the floodplain). The updated SRH-2D analysis showed no rise in water surface elevations due to the proposed bridge replacement as shown in **Table 5-10**.

Table 5-10, FEMA No-Rise Analysis

HEC-2 FEMA Section	HEC-2 Effective Model WSE (ft)	SRH-2D Corrected Effective Model WSE (ft)	Difference (Effective - Corrected)	SRH-2D Proposed Conditions Model WSE (ft)	Rise (ft)
J	4933.2	4933.3	+0.1	4933.3	0.0
K	4933.4	4933.5	+0.1	4933.5	0.0
L	4934.3	4934.1	-0.2	4934.1	0.0

Based on the results of the analysis there will be no rise in the base flood elevations (BFE) due to construction of the proposed bridge alternative. Therefore, a Conditional Letter of Map Revision (CLOMR/LOMR) will not be required as a result of this project.

Bridge Deck Drains

For the bridge deck drains, a spreadsheet was developed based on the FHWA Design of Bridge Deck Drainage Manual, Hydraulic Engineering Circular No. 21 (HEC-21) guidelines, and was used to determine the required size and spacing of the proposed concrete wall barrier block-outs and deck scuppers. Approximately 12" X 4" block-outs and equivalent-sized scuppers will be required every 13 feet to meet the Department's spread criteria for the 50- and 100-year storm. Additional analysis will be required to verify the sizes.

The proposed bridge typical section will partially consist of an eastbound and westbound 8-foot outside shoulder adjacent to an 8-foot, level (1.5%) sidewalk with metal railing (C-channels at base) along the north and south side of the bridge. Block outs will be installed in the wall barrier between the roadway shoulder and sidewalk to limit spread along the roadway. Scuppers at the edge of the sidewalk along the C-channel/metal railing will capture runoff. The scuppers will be connected to a storm drain underneath the deck. Based on recommendations provided by the NMDOT Environmental Bureau, the storm drain will discharge at approximately 200 feet away from the channel banks into well vegetated areas of the floodplain. This will allow for proper filtration of the contaminants prior to entering the live channel. Coordination with the United States Fish and Wildlife Service (USFWS) will be required to ensure the discharge locations within the floodplain meet the requirements of the Agency.

Riverside Drains

Atrisco Riverside Drain

The Atrisco Riverside Drain crossing consists of 1-60" diameter corrugated metal pipe (CMP) and lies to the west of the Rio Grande. For Build Alternative A, the crossing structure will be replaced with 1-72" diameter reinforced concrete pipe (RCP) under the new roadway embankment and will lengthen to the north to accommodate the proposed improvements. Concrete headwalls would be provided at the inlet and outlet.

For Build Alternative B, which extends between the west abutment of the new bridge to just west of the Atrisco Riverside Drain, the existing 60" diameter crossing pipe will remain in place and will be extended to the north. A concrete headwall would be provided at the relocated inlet.

Albuquerque Riverside Drain

The Albuquerque Riverside Drain crossing consists of 1-128" Span x 83" Rise corrugated metal pipe arch (CMPA) crossing Poco Loco Drive and Dean Road. The two crossings are connected by a concrete open channel with a bottom width of 14 feet and 1:1 channel side slopes. The concrete channel is in fair condition but has a large crack at the north end. In a meeting held with the stakeholders on April 29th, 2021, MRGCD expressed their desire to replace the open channel with a new crossing pipe due to ongoing maintenance issues such as shopping carts and other debris falling in the channel. The total length of the 1-128"x83" crossing pipe would increase to approximately 230 feet. The existing length of the two crossings combined is approximately 100 feet.

MRGCD also expressed concern that lengthening the pipe could decrease the hydraulic capacity of the crossing due to additional friction losses along the length of the pipe. However, the entrance and exit losses associated with the flow transitioning between the pipe and open channel would be removed by extending the pipe. Additional analysis will be required to determine the actual head losses associated with lengthening the pipe. Since there is minimal cover available at the Poco Loco crossing, upsizing the pipe will not be feasible. Also, there are no flow rates available for the Albuquerque Riverside Drain and a complex hydrologic analysis, which is outside the scope of this study, would be required to determine the flow rates at the drain.

NMDOT Crossing Structures

Based on a preliminary analysis, the majority of the existing crossing structures have sufficient capacity to handle the 50- and 100-year off-site and proposed on-site flows within the project area, with the exception of the 36" diameter CMP at Poco Loco Road. An additional 36" diameter crossing pipe will be required to handle the extra flows generated by the proposed improvements. Additional analysis will be required to verify the crossing structure capacities. The existing 48" diameter corrugated metal pipe just east of the Barr Main Canal captures minimal roadway flows, therefore, it's capacity is not expected to be affected. However, the crossing may need to be extended as part of the proposed improvements.

Roadway Drainage

For the roadway drainage analysis and proposed storm drain systems the FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22 (HEC-22), was used to design the new system along Rio Bravo Boulevard including the frontage roads east of the bridge, Poco Loco and Dean Road. Since a good portion of the existing flows are maintained on-site, within the ROW and along the frontage roads, a combination of drainage swales, berms, and/or underground storage features will be required to store or attenuate excess flows from the project site. The existing storm drain system design by the NMDOT in 2013 does not have the capacity to handle any additional flows. The proposed peak flows and volumes are shown in the **Table 5-11**.

Table 5-11, Proposed On-Site Peak Flows and Volumes

Outfall	Basin Area (Acres)	Peak Flow		Volume	
		50-Year (cfs)	100-Year (cfs)	50-Year (ac-ft)	100-Year (ac-ft)
Rio Bravo North	2.76	8.43	2.34	0.37	0.46
Existing Storm Drain	1.21	17.54	20.52	0.23	0.26
Rio Bravo Southwest 1	0.33	0.49	0.62	0.02	0.03
Rio Bravo Southwest 2	2.47	6.91	7.98	0.30	0.35
Atrisco Riverside Drain	0.31	0.83	1.06	0.04	0.04
Bridge	2.74	15.60	18.22	0.68	0.80
ABQ Riverside Drain	3.0	5.26	6.77	0.25	0.30
36" CMP Poco Loco Rd	4.66	21.39	25.33	0.94	1.11
36" CMP East	2.78	8.39	10.10	0.40	0.47
48" CMP	2.10	7.45	8.92	0.30	0.36

To determine the required pond or underground storage requirements, the 100-year volumes were compared in **Table 5-12**.

The flows and runoff volume to the Existing Storm Drain, Rio Bravo Southwest 1, the Atrisco Riverside Drain, Albuquerque Riverside Drain, and the 36" CMP East of Barr Main Canal will not increase. However, Excess flow volume will be generated at Rio Bravo North, Rio Bravo Southwest 2, the Bridge, 36" CMP Poco Loco Rd, and the 36" CMP East due to the construction of the proposed roadway and bridge improvements.

The following drainage improvements are recommended at the existing outfalls to retain excess flows and runoff volumes on-site to avoid adverse impacts downstream. It should be noted that ground water may be a potential concern due to the project's close proximity to the Rio Grande, therefore, below grade ponding improvements are not recommended. If it is determined that ground water is not an issue, pond improvements can be explored in subsequent reports. Refer to Exhibit 5-14 for the plan layout of the proposed on-site storage improvements.

Rio Bravo North

The proposed improvement at the Rio Bravo North Outfall will follow the drainage patterns similar to existing conditions; flows along the westbound lanes and a portion of the shoulder outfall to the north side of Rio Bravo Boulevard via a curb cut just south of the Armijo Acequia. However, instead of discharging the flows at one location, the recommended option will consider multiple inlets spaced along the north side of Rio Bravo Boulevard that would distribute the flows evenly and provide additional surface area for infiltration to the existing ground.

Table 5-12, 100-Year Volume Comparison

Outfall	Basin Area (Acres)	Volume		Excess Volume (ac-ft)
		100-Year Existing (ac-ft)	100-Year Proposed (ac-ft)	
Rio Bravo North	2.76	0.43	0.46	0.03
Existing Storm Drain	1.21	0.23	0.23	0
Rio Bravo Southwest 1	0.33	0.03	0.03	0
Rio Bravo Southwest 2	2.47	0.28	0.35	0.07
Atrisco Riverside Drain	0.31	0.04	0.04	0
Bridge	2.74	0.53	0.69	0.16
ABQ Riverside Drain	3.0	0.40	0.30	-0.30
36" CMP Poco Loco Rd	4.66	0.81	1.11	0.30
36" CMP East	2.78	0.46	0.47	0.01
48" CMP	2.10	0.34	0.36	0.02

Since the roadway grade is higher than the surrounding area, an individual storm drain pipe or rundown at each inlet will be required to convey flows to the north. The proposed ground north of Rio Bravo Boulevard, within the ROW, will be graded toward the roadway to ensure the additional 0.03 ac-ft of water ponds between the edge of the lots and the roadway. No additional ROW will be required.

Rio Bravo Southwest 2

Similar to the Rio Bravo North option, multiple inlets will be placed along the eastbound lanes of Rio Bravo. The inlets will likely be connected to a storm drain trunk line that carries the flows to the south and discharges them to a proposed storage chamber. A 60" diameter storm drain culvert pipe, approximately 160 feet in length, will be required to store the additional 0.07 acre-feet of runoff. The proposed storage chamber will be connected to the existing system and will provide additional capacity. The existing 30" outfall pipe from the existing system will remain in place, therefore, the flow rate to the Atrisco Riverside Drain will not increase. Additional coordination will be required with MRGCD to determine if discharging the storage chamber to the Atrisco Riverside drain is a viable option. No additional ROW will be required.

If construction of the storage chamber is not feasible a berm or retaining wall, approximately 2 feet high, located along the north edge of the properties may be constructed to store the additional 0.07 acre-feet of runoff. Additional analysis prior to submittal of the final drainage report will be required to verify the location and height of the berm or retaining wall.

Bridge

Refer to the Bridge Deck Drains section of the report for a discussion on the proposed bridge deck flows.

36" CMP Poco Loco Road

The existing 36" CMP at Poco Loco Road will need to be extended for the construction of the proposed improvements. The proposed 100-year on-site flow rate and runoff volume arriving at the crossing will increase by 8 cfs and 0.30 acre-feet, respectively, due to widening of the roadway and installation of concrete wall barrier along the roadway. Inlets will likely be constructed along the eastbound and westbound lanes of Rio Bravo Boulevard and connect to the existing crossing structure via a storm drain trunk line and manholes. The existing 36" CMP at Poco Loco Road has the capacity to accept the additional on-site flows, however, additional analysis will be required to verify this assumption. If it is determined that the existing 36" CMP crossing is over capacity it will be upsized or a parallel crossing structure will be installed.

A 2-foot high berm will be constructed at the crossing outfall to retain the additional 0.30 acre-feet of runoff volume and ensure the existing conditions flow rate is maintained. Due to the location of the outfall, additional ROW will be required to construct the proposed berm.

36" CMP west of Barr Canal

The existing 36" CMP to the east (between Poco Loco Road and the Barr Main Canal) appears to have sufficient length for the construction of the proposed improvements and will not need to be extended. The proposed 100-year on-site flow rate and runoff volume arriving at the crossing will increase by 0.44 cfs and 0.01 acre-feet, respectively, due to widening and installation of curb and gutter along the roadway. Inlets will likely be constructed along the eastbound and westbound lanes of Rio Bravo Boulevard and connect to the existing crossing structure via a storm drain trunk line and manholes. Since the excess flows and runoff volumes are small, there will be minimal impact to the crossing culvert capacity and no adverse impacts are expected downstream.

48" CMP

Since the proposed improvements stop short of the existing 48" diameter CMP, no work will be done on this crossing. The proposed 100-year on-site flow rate and runoff volume arriving at the crossing will increase by 0.40 cfs and 0.02 acre-feet, respectively, due to widening and installation of curb and gutter along the roadway. Inlets will likely be constructed along the eastbound and westbound lanes of Rio Bravo Boulevard and connect to the existing crossing structure via a storm drain trunk line and manholes. Since the excess flows and runoff volumes are small, there will be minimal impact to the crossing culvert capacity and no adverse impacts are expected downstream.

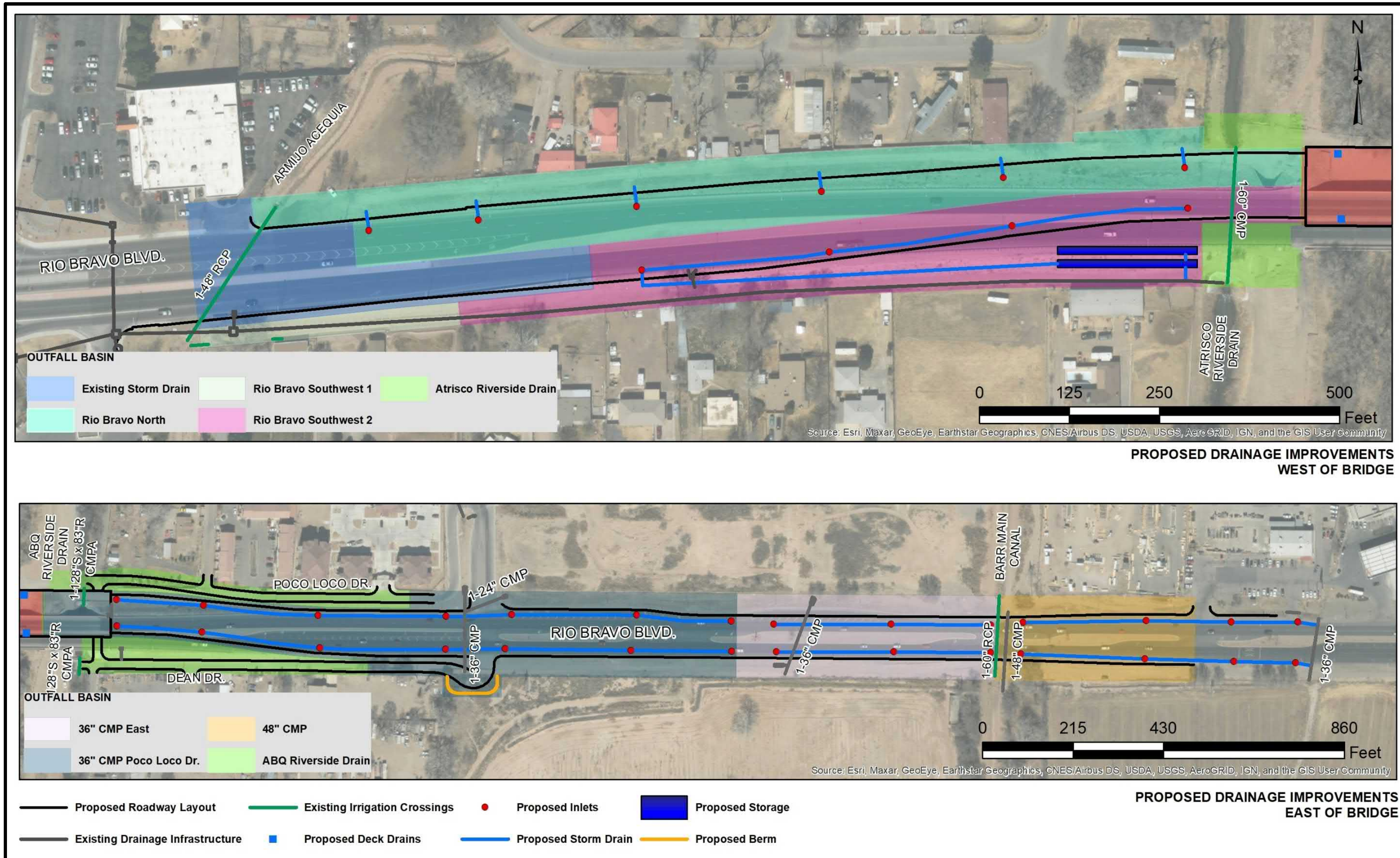
Stormwater Quality

One of the requirements of the Environmental Protection Agency (EPA's) National Pollution Discharge Elimination System (NPDES) program is compliance with the Municipal Separate Storm Sewer System (MS4) permit. The reconstruction of this bridge is subject to the requirements of the permit. This permit requires that for all new or redeveloped impervious areas, a portion of the rainfall depth, the 80th-percentile rainfall event for redevelopment and 90th-percentile rainfall for new development, be used to estimate the required retention volumes. For the Albuquerque area, the 80th-percentile and 90th-percentile rainfall events are 0.48 inches and 0.65 inches, respectively. For this reconstruction project, the 80th-percentile rainfall event value was used for the analysis of the required retention volume.

Due to the widening of the bridges/roadway, the impervious area of the bridge is expected to increase by 3.74 acres, from an area of 13.75 acres to 17.49 acres for the proposed bridge. With this in mind, the corresponding required retention volume would be 6,367 cubic-feet. The proposed retention areas east and west of the bridge, on the south side of Rio Bravo Boulevard, would have an additional retention volume of at least 6,367 cubic-feet (0.15 ac-ft), which will satisfy the MS4 permit requirements.

During construction, the project will adhere to the standards of the EPA's NPDES construction permit. This requires planning, implementation, and documentation of stormwater pollution controls. Local agencies have developed a menu of standard best management practices (BMPs) that have been used for this project. Best management practices consisting of drop inlet protections, composted mulch socks, and rock check dams are applicable to this project and are expected to be included in the final construction plans.

Exhibit 5-14, Proposed On-Site Storage Improvements



Other Improvements

Other corridor-wide and frontage road improvements that will be included in the proposed project are described in this section. Refer to **Appendix B** for roadway conceptual plan and profile design details.

Roadway Lighting

Roadway corridor lighting is currently provided along Rio Bravo Boulevard throughout the project limits, with dual arms on the Type V light poles to illuminate Dean Road and Poco Loco Drive on the south and north sides of Rio Bravo. Intersection-specific lighting is not currently provided for the Rio Bravo/Poco Loco/Dean Road intersection. There are also a few off-corridor area lights on utility poles in the Riverside Park area and along trails.

The proposed improvements will include replacement of the corridor lighting, will consider intersection lighting for the Poco Loco/Dean Road intersection, and will replace any off-corridor area lighting impacted by the proposed construction. The NMDOT and Bernalillo County have a signals and lighting agreement in place for operation and maintenance of the system that will be updated as part of this project.

Intelligent Transportation Systems (ITS)

Because Rio Bravo Boulevard is a principal arterial roadway and a river crossing, NMDOT ITS communications infrastructure is proposed to be included in the project. Further coordination with the NMDOT ITS Bureau will be needed to define the extent of ITS improvements.

Bernalillo County has a fiber-optic communications system as part of their adaptive traffic signal system. The continuity of this system will be important before, during and after construction. There is a camera pole in the southeast corner of the Riverside Drain Bridge with two cameras, one with a view on Rio Bravo and the other with a view on the Chris Chavez Loop trail. Coordination with Bernalillo County will be needed to define design requirements for their systems.

Proposed Poco Loco Drive Design

The proposed typical section for Poco Loco Drive was shown in **Exhibit 5-1**. The typical section shows two 10-foot lanes, curb and gutter, and a 5-foot sidewalk on the north side. Modifications to the recent improvements installed for the Paseo del Rio Apartment Complex are not proposed. Further investigation and discussion with the City of Albuquerque Open Space Division is needed to determine the appropriate improvements beyond the gates just west of the north/south Poco Loco Drive street. To minimize maintenance requirements, the proposed design may use a rural section instead of curb and gutter with a flush sidewalk on the north side. A flush concrete estate curb would be proposed at the pavement edges to eliminate the need for surfacing tapers.

The proposed design of Poco Loco includes the extension of the road over the levee to access the Riverside Park area parking lot. The profile grade over the levee is shown in **Appendix B**, which is currently about 12%.

Proposed Dean Road Design

The proposed typical section for Dean Road was shown in **Exhibit 5-1**. The typical section shows two 11-foot lanes and curb and gutter. Further investigation and discussion with the City of Albuquerque Open Space Division is needed to determine the appropriate improvements beyond the gates just west of the north/south Dean Road easement. To minimize maintenance requirements, the proposed design may use a rural section instead of curb and gutter. A flush concrete estate curb would be proposed at the pavement edges to eliminate the need for surfacing tapers. Improvements across the Albuquerque Riverside Drain to access the levee and Bosque will end at the drain. The access road will continue as currently exists as base course and will not be paved.

Poco Loco Road/Dean Road Intersection

The roadway and intersection geometry for this intersection are shown in **Appendix B** (same for both alternatives). No changes are proposed to Poco Loco Road. Dean Road is proposed to be realigned to improve the design of its intersection with Rio Bravo Boulevard. An SU-30 design vehicle was used for the conceptual design. Also, traffic signal control may be justified at this intersection, which is included in the project cost estimate. At a minimum, subsurface infrastructure (i.e., conduits, pull boxes, etc.) should be installed with the project. The intersection design will include ADA-compliant curb ramps.

Right-of-Way Impacts

Temporary and permanent right-of-way (ROW) impacts will be required for this project. Plan sheets depicting the ROW impacts for Build Alternative A and Build Alternative B are provided in **Appendix D**. Property acquisition/takes, temporary construction permits (TCPs), MRGCD license agreements, and a possible construction maintenance easement (CME) were identified based on the proposed layouts of the build alternatives.

As shown in the table, the ROW impacts are similar for Build Alternatives A and B, with Build Alternative B requiring slightly more ROW than Build Alternative A. No major buildings are expected to be impacted. Most ROW impacts involve fences, walls, out-buildings, and may require tree removals. Proximity impacts at several locations will need to be further evaluated.

Table 5-13, Summary of ROW Impacts by Build Alternative

Type of Impact	Build Alternative A		Build Alternative B	
	Area of Impact		Area of Impact	
	SQ.FT.	ACRES	SQ.FT.	ACRES
ROW-1	2,023	0.046	3,818	0.088
ROW-2	69,390	1.593	69,390	1.593
ROW-3	55,148	1.266	55,148	1.266
ROW-4	9,181	0.211	9,181	0.211
ROW-5	1,316	0.030	1,316	0.030
ROW-6	18,000	0.413	18,000	0.413
Total	**155,058**	**3.560**	**156,853**	**3.601**
TCP-1	920	0.021	920	0.021
TCP-2	681	0.016	681	0.016
TCP-3	219	0.005	219	0.005
TCP-4	640	0.015	640	0.015
TCP-5	1,933	0.044	1,933	0.044
Total	**4,393**	**0.101**	**4,393**	**0.101**
MRGCD-1	24,704	0.567	24,704	0.567
MRGCD-2	42,889	0.985	42,889	0.985
MRGCD-3	926	0.021	2,526	0.058
Total	**68,519**	**1.573**	**70,119**	**1.610**
CME-1	**6,818**	**0.157**	**6,818**	**0.157**

Proposed Traffic Conditions

This section summarizes the traffic volumes and expected traffic performance for the 2040 design year No Build and Build scenarios as well as the near-term 2025 Build conditions. The development of the 2040 design year traffic forecasts are discussed below, followed by a summary of the expected traffic performance for the scenarios evaluated. The near-term 2025 Build conditions are also included as an indication of expected operations when construction is completed. Refer to **Chapter 3** for a discussion of the existing and near-term No Build traffic conditions including the near-term 2025 No Build/Build traffic volumes. Note that because this is primarily a bridge reconstruction project and improvements to the intersections at Isleta Boulevard and at 2nd Street are not included, congestion can be expected based on the 2040 design-year conditions.

MRCOG Regional Travel Demand Model

The 2040 design-year traffic forecasts were based on the regional travel demand model developed and maintained by the Mid-Region Council of Governments (MRCOG). The MRCOG generated CUBE model data based on the adopted *Connections 2040 Metropolitan Transportation Plan* (2040 MTP) "Revised, May 2020" data sets. Model data were provided for the base MTP scenario which reflects the No Build four-lane alternative, and for a six-lane Build alternative from Isleta Boulevard east to the existing six-lane section. The MRCOG also provided the year 2016 data representing the base-year conditions of the travel demand model.

The Connections 2040 MTP includes two scenarios for growth in the Albuquerque Metro Area, the "Trend" scenario and the "Target" Scenario. The "Trend" scenario is generally based on historic trends for land use development and socioeconomic conditions which reflects an unbalanced housing/jobs balance west and east of the river. The "Target" scenario modifies this relationship and places more jobs on the west side of Albuquerque which would reduce the number of commute trips crossing the river. For 2040 travel demand forecasting, MRCOG uses the "Trend" scenario. As such, the 2040 design-year traffic forecasts are conservative for the Rio Bravo river crossing.

Proposed Design Year Traffic Volumes

The CUBE model data provided by MRCOG was used to estimate growth rates for each roadway within the project limits, which were applied to the 2016 volumes to estimate initial forecast volumes. Further post-processing was performed to provide volume balance and continuity along the study corridor, including FRATAR application at the intersections. Smoothed forecasts for roadway segments and intersections were generated within the project study area. The post-processing protocol was not capacity constrained.

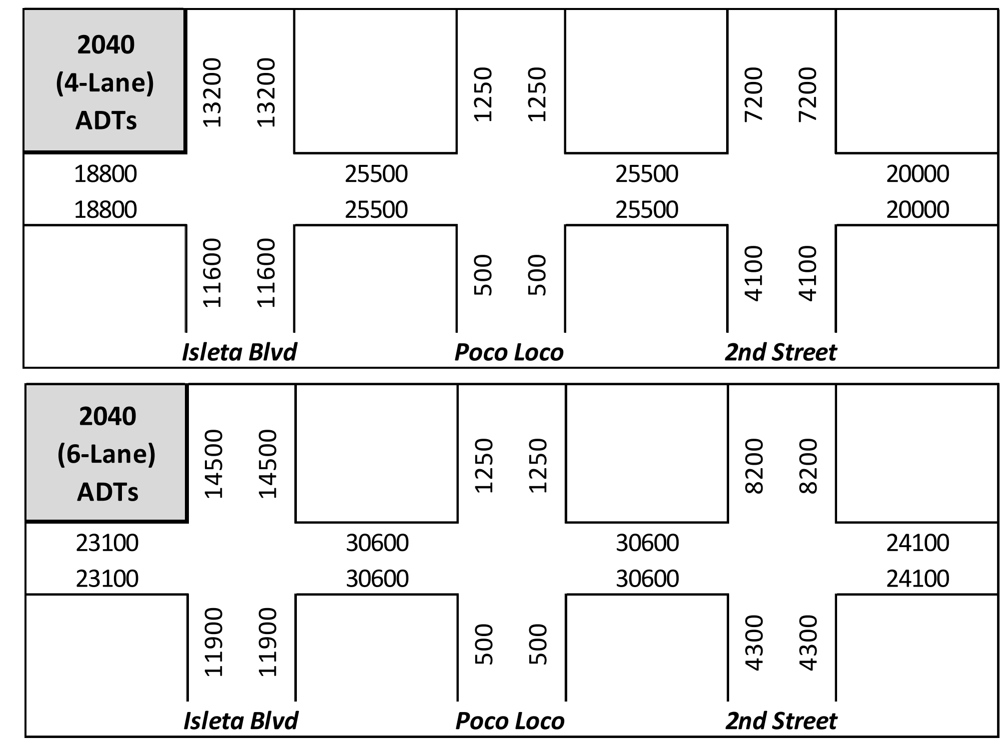
The available traffic count data, StreetLight data, and the CUBE model traffic estimates were reviewed, analyzed and contemplated to derive proposed AM and PM peak-hour traffic volumes to use for this project. The proposed traffic volumes were estimated based on engineering judgment considering all the data available, including a review of the resulting K-factors for the peak-hour volumes. Because the resulting traffic volumes are estimates, all values were rounded to nearest ten (generally up).

For comparison, 2040 peak-hour traffic forecasts were developed by Lee Engineering for the Bernalillo County project to improve the Rio Bravo Boulevard/2nd Street intersection. These estimates were based on a four-lane river crossing and the previous Futures 2040 MTP datasets. These previous estimates were reviewed as part of the development of the 2040 forecasts for the Rio Bravo Boulevard river crossing project to inform engineering judgement required to produce future-year traffic estimates.

The 2025 vehicular demand forecasted for both the 4-lane and the 6-lane bridges were the same, however, the forecasted demand varied between the 4-lane and 6-lane bridges in the 2040 MRCOG CUBE model due to the change in capacity on the bridge. The lane configuration between the 4-lane and 6-lane alternatives only varied slightly with a change in through lanes at the Rio Bravo Boulevard/Poco Loco Road intersection. There were no lane configuration changes at the Isleta Boulevard intersection or the 2nd Street intersection between the alternatives because improvements at these intersections are not part of this project.

Estimates of the daily traffic volumes for the 2040 No Build (4-lane) and Build (6-lane) conditions are shown in **Exhibit 5-15**. The AM and PM peak hour design year volumes are shown in **Exhibit 5-16** and **Exhibit 5-17**.

Exhibit 5-15, Average Daily Traffic Forecasts for 2040 No Build (4 Lane) and Build (6 Lane) Conditions



Expected Operational Performance

The Highway Capacity Software (HCS7) Streets module was used to evaluate the intersections. Bernalillo County operates an Adaptive Traffic Signal System along Rio Bravo Boulevard. Traffic signal timing plans including coordination plans and time-of-day plans were not available from Bernalillo County when the analyses were completed, only basic background timing settings were provided. As such, cycle lengths and phase splits were optimized using HCS7 to reflect an average over the peak analysis periods. The yellow intervals range from 5.4 to 5.7 seconds and the all-red interval is 1.5 seconds.

The lane configuration at the Isleta Boulevard intersection was as exists for both analysis years. In the westbound direction with six-lanes crossing the river, the outside lane drops at the right-turn lane at Isleta Boulevard. The lane configuration at the 2nd Street intersection was modified to reflect the improvements being developed by Bernalillo County to provide three lanes in each direction along with other lane configuration enhancements.

Traffic operations for the signalized intersections were evaluated for the AM and PM peak periods. The analyses used 15-minute, multi-period intervals. The HCS multi-period analysis was used to evaluate the intersections where congestion is expected including the impact of residual queues. The Poco Loco Road intersection was analyzed as a signalized intersection based on deficiencies identified for the existing/committed, near-term conditions. The traffic operational analysis results are summarized in **Table 5-14** and **Table 5-15** for the AM and PM peak periods, respectively. The traffic analyses output reports are provided in the *electronic appendices*.

Exhibit 5-16, 2040 AM and PM Peak Hour Traffic Volumes with 4-lane River Crossing [No Build] (vehicles per hour)

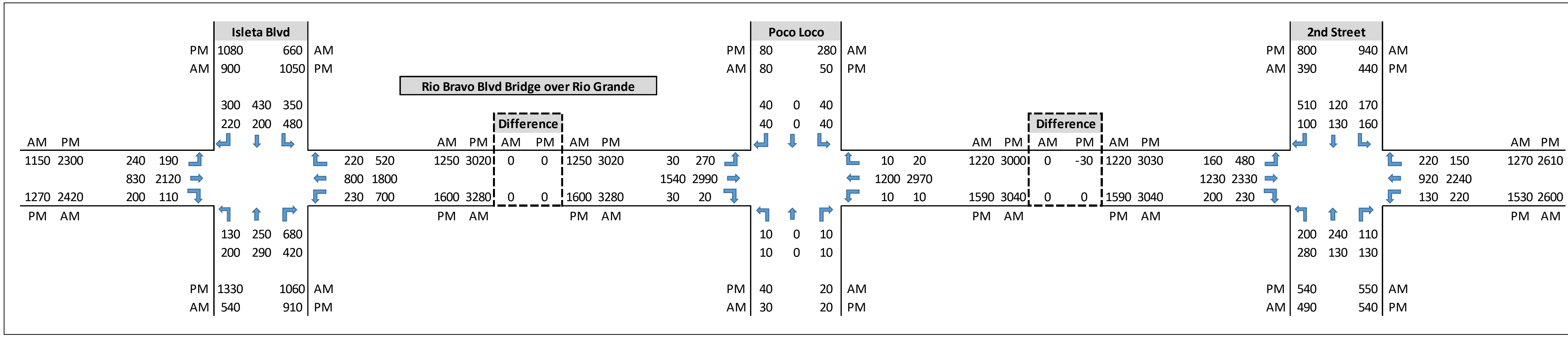


Exhibit 5-17, 2040 AM and PM Peak Hour Traffic Volumes with 6-lane River Crossing [Build] (vehicles per hour)

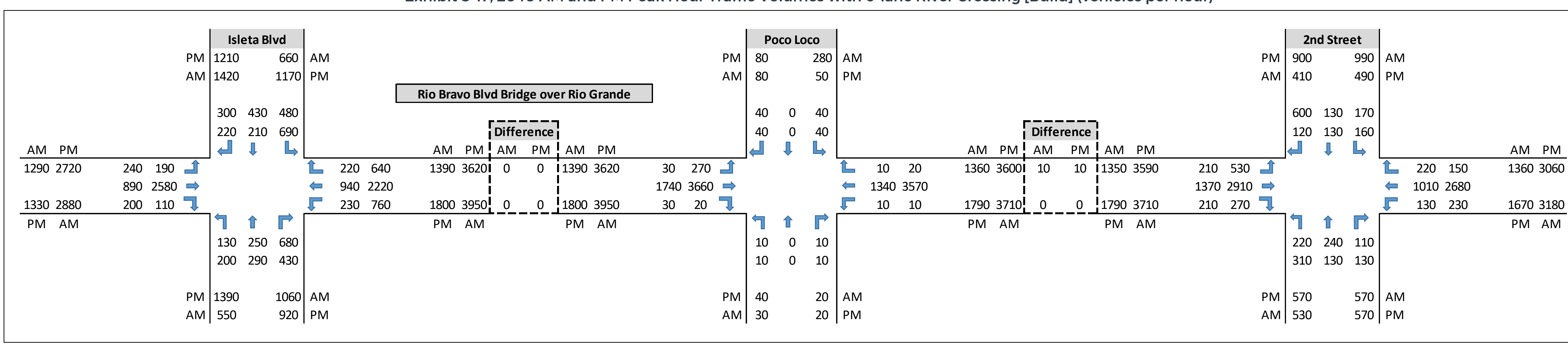


Table 5-14, AM Peak Period Traffic Operations Summary – 2025 Build and 2040

	Approach	Movement	2025	2040			
			6-Lane	4-Lane		6-Lane	
Rio Bravo Blvd/ Isleta Blvd	EB	L	C	B	F	B	F
		T		F		F	
		R		A		A	
	WB	L	C	D	B	D	B
		T		B		B	
		R		A		B	
	NB	L	B	E	F	E	F
		T		F		F	
		R		A		A	
	SB	L	E	F	F	F	F
		T		F		F	
		R		F		F	
Rio Bravo/ Poco Loco (signalized)	EB	Approach	A	A	A	A	A
	WB	Approach	A	A		A	
	NB	Approach	D	E		E	
	SB	Approach	D	E		E	
Rio Bravo Blvd / 2nd St	EB	L	B	B	C	B	C
		T		C		C	
		R		B		B	
	WB	L	B	C	B	C	B
		T		B		B	
		R		B		B	
	NB	L	D	E	E	E	E
		T		E		E	
		R		E		E	
	SB	L	D	E	E	E	E
		T		E		E	
		R		E		E	

Table 5-15, PM Peak Period Traffic Operations Summary – 2025 Build and 2040

	Approach	Movement	2025	2040			
			6-Lane	4-Lane		6-Lane	
Rio Bravo Blvd / Isleta Blvd	EB	L	C	E	C	E	C
		T		C		C	
		R		B		B	
	WB	L	C	C	F	C	F
		T		F		F	
		R		C		C	
	NB	L	C	F	F	F	F
		T		F		F	
		R		A		A	
	SB	L	E	F	F	F	F
		T		F		F	
		R		E		E	
Rio Bravo/ Poco Loco (signalized)	EB	Approach	A	A	F	A	A
	WB	Approach	B	F		A	
	NB	Approach	D	E		E	
	SB	Approach	D	E		E	
Rio Bravo Blvd / 2nd St	EB	L	C	E	D	E	C
		T		D		D	
		R		A		A	
	WB	L	D	E	F	E	F
		T		F		F	
		R		B		B	
	NB	L	D	F	E	F	E
		T		D		D	
		R		D		D	
	SB	L	F*	F	F	F	F
		T		D		D	
		R		F		F	

** Note: The southbound right-turn in the PM peak period at 2nd Street is the only failing movement in the 2025 scenario due to a predicted increase in demand from downtown Albuquerque and the areas to the north of Rio Bravo Boulevard.*

For 2025 Build (6-lane) conditions, acceptable operational performance can be expected for most movements at the intersections. At 2nd Street, the southbound right-turn movement is deficient in the PM peak. The Poco Loco/Dean Road intersection can be expected to perform at acceptable levels with signal control.

As shown in **Table 5-14** for the AM peak, acceptable performance is expected for the 2nd Street and Poco Loco intersections (Poco Loco signalized). Without substantial improvements, operational deficiencies are expected at the Isleta Boulevard intersection for both the 2040 No Build and Build conditions. There are multiple failing movements due to the limited capacity and high demand crossing the river.

As shown in **Table 5-15** for the PM peak, only the Poco Loco signalized intersection can be expected to operate at acceptable levels for the design year Build condition. The Isleta Boulevard and 2nd Street intersections both had multiple failing movements/approaches and are not expected to operate at acceptable performance levels. As stated above, the "Trend" scenario results in conservative estimates of future traffic demand. With the ongoing changes involving work-from-home and other factors, it is difficult to predict how traffic will change in twenty years. Nevertheless, Rio Bravo is a river crossing and river crossing capacity will be needed for travel in the Metro area.

The operations of the bridge are influenced by the adjacent intersections at Isleta Boulevard and 2nd Street. The vehicular demand is forecasted to a level that will require a 6-lane bridge, however, the capacity of the bridge will largely be contingent on the performance of the adjacent intersections which are not part of the scope of this project.

Highway Safety Manual Evaluation

An evaluation of the existing and proposed safety conditions along Rio Bravo Boulevard was completed using the methodologies of the 2010 Highway Safety Manual (HSM). This analysis used version 16.0.0 of the Federal Highway Association's (FHWA) Interactive Highway Design Model (IHSDM) Crash Prediction Module (CPM) to implement the HSM Part C predictive methods for the project area. This version of the IHSDM incorporates the findings of NCHRP Project 17-58 for 6+ lane arterials.

The purpose of the HSM evaluation was to provide an indication of how crash occurrence may change with the widening of Rio Bravo Boulevard from four lanes to six lanes along with the substantial increase in traffic volume that would cross the river on the six-lane roadway. There is also the potential for traffic signal control at the Rio Bravo/Poco Loco/Dean Road intersection that would be expected to influence crash occurrence. As the results indicate, crash occurrence and related costs are expected to increase with the proposed improvements.

Existing Conditions IHSDM Analysis

The HSM analysis focused on the segment of Rio Bravo Boulevard from east of Isleta Boulevard to west of 2nd Street as a suburban arterial with a 45 mph posted speed limit, including the intersection at Poco Loco Road/Dean Road. The IHSDM model has an extensive list of inputs that factor into the predictive algorithm. Below is a list of the inputs and sources:

- Existing horizontal and vertical alignments (exported from Civil3D surface created from 2020 survey)
- Functional Classification (NMDOT)
- Average Daily Traffic (MRCOG and Project Forecasts)
- Roadway Cross Sections (2020 survey)
- Posted Speed and Design Speed (Posted speed limits and design team decision)
- Driveway Density (Google Earth)
- No Passing zones (Google Earth)
- Outside Barrier (2020 Survey)
- Roadside Hazard Rating (FHWA Roadside Ratings)
- Curb Location (Google Earth)
- Lighting (Google Earth)
- Site Specific Crash Data (NMDOT Traffic Safety Bureau)

The existing condition site-specific crash data used in the IHSDM model was for the roadway segments from Isleta to Poco Loco (40 crashes) and from Poco Loco to 2nd Street (7 crashes), and for the unsignalized intersection of Rio Bravo with Poco Loco/Dean Road (27 crashes). The total reported crashes for these locations from 2015 to 2019, a five-year period, was 74 crashes, or 14.8 per year, with a severity breakdown of 73% property damage only (PDO) and 27% fatal/injury (FI) crashes.

The ISHDM existing conditions model produces "Predicted Crash Frequencies" based on the inputs listed above. The model then performs an Empirical Bayes (EB) calibration to estimate the "Expected Crash Frequencies" which were compared to the reported crashes for the corridor. The IHSDM expected crash frequency of 81 crashes was greater than the observed crash history of 74 crashes. The expected severity was 68% PDO and 32% FI, compared to 73% PDO based on the crash history. The IHSDM model overpredicts the crashes along the segments of Rio Bravo Boulevard, however the expected crashes for the Poco Loco intersection was accurate at 27 crashes. The resulting IHSDM model is considered appropriate for relative comparisons (i.e., order of magnitude) between the roadway types considered in this analysis. The IHSDM outputs are provided in the *electronic appendices*.

Future Year Conditions IHSDM Analysis

The IHSDM predictive model produces unique segment predictions for every change in geometry along the analysis corridor then provides cumulative statistics. The HSM analysis focused on the segment from just west of Isleta Boulevard to east of 2nd Street including the intersection at Poco Loco Road/Dean Road.

The key differences between the No Build and the Build scenarios are the six-lane roadway cross-section compared to the existing/No Build four-lane cross-section, and one Build scenario has the Poco Loco Road intersection signalized. The proposed Build alignment also has tighter horizontal curves to allow for constructability of the north offset bridge alignment but the horizontal design satisfies AASHTO geometric standards.

The IHSDM model results for existing conditions, 2040 No Build, and 2040 Build conditions are compared in **Table 5-16**. The expected crash frequencies are shown for the existing and 2040 No Build because they are based on the existing roadway. Predicted crash frequencies are shown for the 2040 Build scenarios with six lanes because there are no observed crashes for the EB calibration of a six lane roadway. The crash rates are normalized by length and daily traffic flows (ADT), so these rates are more appropriate to use as a direct comparison between the scenarios. The total crashes per year are not normalized and thus will be higher for higher volume segments. Along with a higher number of predicted crashes, the results show crash severity increasing for the 2040 Build scenarios.

Table 5-16, Comparison of Expected and Predicted Crash Statistics by Scenario

Scenario	Crashes (Cr/Mi/Yr)	% Fatal/Injury Crashes	% Property-Damage-Only (PDO) Crashes	Crash Rate (Cr/MVM)
2015-2019 Existing	15.0 (expected)	32%	68%	1.37
2040 No Build	17.9 (expected)	34%	66%	0.96
2040 Build (stop controlled at Poco Loco)	24.2 (predicted)	45%	55%	1.08
2040 Build (traffic signal at Poco Loco)	25.9 (predicted)	47%	53%	1.16

Economic Evaluation of Rio Bravo Boulevard

The HSM provides monetary values for each crash severity type along a roadway system to provide a quantitative comparison between the existing conditions and various proposed alternatives. The monetary values assigned to each crash type are listed in **Table 5-17**. The IHSDM software takes the existing conditions model and the models for each scenario and converts the predicted crashes for each into a monetary value to facilitate a comparison of expected costs. The economic output reports from the IHSDM can be found in the *electronic appendices*.

Table 5-17, FHWA Crash Costs by Severity Level

Severity Level	Comprehensive Crash Cost
Fatality (K)	$11,295,400
Disabling Injury (A)	$655,000
Evident Injury (B)	$198,500
Possible Injury (C)	$125,600
PDO (O)	$11,900

The FHWA costs associated with each crash severity level were applied to the crash frequencies in **Table 5-16** using the IHSDM economic analysis tool. The present value of crash cost by scenario are shown in **Table 5-18**. The expected cost of the scenarios shows that both the 2040 No Build and 2040 Build conditions are expected to result in higher crash costs when compared to the existing conditions. The higher cost of expected crashes for the 2040 Build scenarios is attributed to the mainline widening from a four-lane to a six-lane corridor, higher daily traffic volumes, and the horizontal curvature necessary along the bridge in proposed conditions.

Table 5-18, Economic Evaluation by Scenario

Scenario	Cost of Expected Crashes
2015-2019 Existing (per year)	$ 1,804,000
2040 No Build	$ 4,008,000
2040 Build (stop controlled at Poco Loco)	$ 7,332,000
2040 Build (traffic signal at Poco Loco)	$ 7,976,000

Maintenance of Traffic During Construction

Maintenance of traffic (MOT) during construction will be a critical element of this project for NMDOT District 3 due to lessons learned from the emergency repair work on the eastbound Rio Grande Bridge in early 2020. Two lanes of traffic flow must be maintained in the peak travel direction. The preference for a straight bridge across the Rio Grande influences how much new bridge can be built north of the existing bridges without substantial ROW impacts. Also, it was determined that partial demolition of the existing westbound bridge is not feasible to create space for the new offset bridge. These conditions along with existing traffic volumes led to an approach to build enough bridge partially offset to the north to provide three lanes, one reversible, and a sidewalk. This will allow for two-lanes in the peak travel direction when the existing bridges are demolished and the south half of the new bridge is constructed.

The construction sequence is anticipated to consist of three main phases with subphases as needed to complete site-specific construction activities. The first main phase is to keep traffic on the existing bridges, two lanes in each direction, and build 57.5 feet of the new bridge approximately 6 feet north of the existing westbound bridge.

Traffic will then be shifted to the new half bridge while the existing bridges are demolished. A key aspect of the second and third phases is the use of movable barrier to provide two-lanes in the peak travel direction on the new three-lane bridge. Coordination with Lindsay, the provider of the Road Zipper Movable Barrier System, is ongoing to assist with the first implementation of this system in New Mexico. The width of the typical section for the first phase was determined to provide sufficient space for safe implementation of the movable barrier operation.

Road Zipper Movable Barrier System to provide a reversible lane during construction

After the existing bridges are cleared, in the third main phase, the remainder of the bridge will be constructed.

Key considerations of the MOT for this project include:

- The proposed posted speed on Rio Bravo Boulevard during construction is no more than 35 mph.
- The length of the transitions from the new half bridge to the existing Rio Bravo Boulevard lanes will be based on where the existing and proposed profile grades approximately match.
- On the east side of the river, the lane transitions are expected to occur east of the Poco Loco intersection.
- On the west side, a goal will be to limit the lane reductions within the Isleta Boulevard intersection. Efforts will be made to provide lane shifts east of Isleta Boulevard, although short durations of lane reductions should be planned for within the intersection.
- Complete closures of Dean Road and Poco Loco Drive within the Open Space limits are expected, which includes the Riverside Park and Picnic area. This will require alternative access for users of the Paseo del Bosque Trail, which is anticipated to be through the Rio Bravo/Poco Loco/Dean Road intersection. Temporary traffic signal control is expected to facilitate this alternative access.
- A key consideration for Build Alternative A, which includes replacement and upsizing of the Atrisco Riverside Drain culvert pipe, is the duration of dewatering and maintaining drain flows throughout construction. It is thought that Build Alternative B has a distinct advantage as it does not propose replacement of the Atrisco Drain.
- Early utility coordination activities have been conducted for this project. A key question involves how to maintain continuity of existing fiber-optic communication lines, public and private, throughout construction. Also, with only one side of the new bridge, all existing utilities will need to be on the north side either on the overhang, in the bridge deck (e.g., lighting conduit), or in the concrete barrier railing.
  - Between the first and second main construction phases, a duration of sufficient length will be needed to transition utilities from the old bridges to the new bridges prior to bridge demolition. Considering the transitions from the Rio Bravo roadway to the bridges, an interim phase may be needed.
  - Utility considerations will require additional coordination and investigation to determine how continuity will be provided.

TransModeler Traffic Simulations of Lane Reduction Scenarios

The critical movements across the bridge are the eastbound direction during the AM peak and the westbound direction in the PM peak. This includes the Isleta Boulevard and 2nd Street intersection turning movements that turn towards the bridge across the Rio Grande. Under current conditions, the bridge has a four-lane cross-section. As a major arterial crossing the river, the volumes along Rio Bravo Boulevard are projected to increase in the future, leading to higher levels of congestion. This project will provide additional river crossing capacity, however, maintaining traffic across the bridge during construction will require a temporary reduction in capacity. There will be multiple phases of construction that will require multiple maintenance of traffic (MOT) scenarios. This modeling analysis sought to determine the delay and queues that drivers would experience as a result of the different MOT scenarios.

Modeling Process

Various MOT scenarios were modeled in TransModeler to determine the impact of the lane reduction scenarios on traffic along the corridor. It was assumed that no traffic was diverted to other river crossings, so the results of this analysis are based on 100% of the forecasted 2025 vehicular demand for the corridor. Due to the high demand along the corridor, multi-period analysis was used based on the peak-hour distribution found based on StreetLight big data, as discussed in **Chapter 3**. The following time periods were modeled:

- AM Peak Period – 6:00 AM to 9:00 AM
- PM Peak Period – 2:00 PM to 8:00 PM

All of the intersections were modeled with a cycle length of 140 seconds to provide maximum capacity to the movements. The phase split timings were then optimized in TransModeler for each of the scenarios to balance the delay across all of the vehicles along the corridor. This resulted in some of the movements receiving more or less time in different scenarios.

The model was calibrated by collecting travel times in the field and comparing them to travel times output by the model for 2025 conditions. Peak AM and PM travel times were performed on May 4th, 2021 while school was in session and vehicular demand was starting to recover from COVID conditions. The travel times were collected traveling westbound from Prince Street to Sausalito Drive and eastbound from Sausalito Drive to Prince Street. The travel times were performed from 7:00-8:00 AM and from 4:30-6:00 PM. The travel times in **Table 5-19** are the average travel times during those periods. Travel times were taken from the model during the same time periods to/from the same locations. Considering that the 2025 volumes are higher than the 2021 volumes, the field and model travel times were found to be reasonably similar and therefore no calibration factors were applied to the model.

Table 5-19, Field vs Model Travel Time Averages

Peak Period	Westbound (mm:ss)		Eastbound (mm:ss)	
	Model (2025)	Field (5/4/2021)	Model (2025)	Field (5/4/2021)
AM	3:05	2:40	3:55	3:38
PM	4:50	4:57	3:57	3:35

The following MOT layouts were analyzed:

- Three-Lane Cross Section, with a reversible center lane
  - AM Peak Layout (two lanes eastbound, one lane westbound)
  - PM Peak Layout (two lanes westbound, one lane eastbound)
- Two-Lane Cross Section, one lane in each direction all day
- Four-Lane Cross Section, two lanes in each direction all day

The shift in geometry for the MOT layouts occurred east of the Isleta Boulevard intersection and west of the 2nd Street intersection, so the layouts modeled included all existing lanes at those intersections, other than the northbound free right-turn at Isleta Boulevard which was restricted to a signal-controlled movement. The 2nd Street intersection was modeled assuming the construction of the planned updates was completed by the time construction commences for the Rio Bravo Boulevard Bridge project.

The Poco Loco intersection was modeled with a temporary signal to accommodate pedestrian/bicycle traffic along the Bosque Trail that will not be able to pass under the Rio Bravo Boulevard bridge during construction. The lane reductions/geometry shifts occurred east of the Poco Loco Road intersection due to limitations in horizontal/vertical geometries. As such, the lanes were reduced to the number of through lanes for each MOT layout through the Poco Loco Road intersection (e.g., for the two-lane MOT cross-section, there was one eastbound and one westbound through lane modeled through the Poco Loco Road temporary signal). To accommodate this reduction in capacity, the left-turn movements were restricted at Poco Loco Road and it was assumed that vehicles would make U-turns at Isleta Boulevard or 2nd Street or seek alternative routes onto/off of Poco Loco Road/Dean Road.

These changes resulted in unique traffic impacts to the corridor. The removal of the northbound free right at the Isleta Boulevard intersection created a significant reduction in capacity for this movement which resulted in an increase in delay for all movements at the intersection to balance out the delay/reduction in capacity. However, this movement was still given less time than it required to operate at an ideal level due to the capacity needs of the eastbound/westbound traffic at the intersection. This resulted in significant northbound queuing along Isleta during all scenarios/peaks. Additionally, some of the scenarios limited capacity across the bridge to the extent that the downstream/off-peak intersection operated with lower delays/queues due to fewer vehicles, even though the MOT scenario was less ideal for the intersection on the upstream/peak side of the bridge.

Results

Tables 5-20 through 5-25 summarize the maximum delays and the average peak hour delays that occurred at each movement for each of the MOT scenarios analyzed. All of the scenarios were analyzed with a 140-second cycle length. The same phase split timings were used for all of the AM peak scenarios and the same PM split timings were used for all three PM scenarios.

Despite identical phase split timing and demand, the southbound approach saw the highest delay in the two-lane scenario while the other scenarios saw the greatest delay in the northbound direction. This was due to the unique way the network responded to the catastrophic failure of the network due to the drastic reduction in eastbound capacity across the bridge in the AM peak for the two-lane scenario.

The maximum delays shown for the AM peak were shown at the Isleta Boulevard intersection with Rio Bravo Boulevard for the two-lane MOT scenario. This is as expected, since the delay is mostly due to the high eastbound demand crossing the river in the AM peak, which is unable to be served by a single eastbound lane. This scenario resulted in a 24-minute delay for eastbound vehicles crossing the river. The southbound demand was also unable to be met, due to the high left-turn demand. The southbound delay along Isleta Boulevard was 53 minutes.

The three-lane MOT scenario also shows delays at the Isleta Boulevard intersection, but the maximum eastbound delay was 3.4 minutes with a maximum of 11.8 minutes delay for the northbound right-turn movement, which is significantly less than the two-lane scenario. Additionally, those are the maximum delays and the average eastbound delay was 1.8 minutes with an average northbound delay of 4.7 minutes.

The delays shown for westbound Rio Bravo at the Isleta Boulevard intersection increased between the two-lane and four-lane scenarios because the vehicular demand was able to get to the intersection from the east side of the bridge with two lanes of capacity.

The maximum delays shown for the PM peak are found at the 2nd Street intersection with Rio Bravo Boulevard for the two-lane MOT scenario. This is as expected, since the delay is mostly due to the high westbound demand crossing the river in the PM peak, which is unable to be served by a single westbound lane. Unlike the AM peak that saw some high maximum delays with much lower peak hour averages, the PM peak has average delays much closer to the maximum, showing that the queues/delays are maintained for a much longer time period in the PM peak. This scenario resulted in a maximum 27-minute delay for westbound vehicles crossing the river. The southbound demand was also unable to be met, due to the high demand of right-turning vehicles. The southbound delay along 2nd Street was 22 minutes.

The three-lane and four-lane MOT scenarios resulted in nominal delays at the 2nd Street intersection, but more significant delays at the Isleta Boulevard intersection with an average westbound delay of 3 minutes for the four-lane scenario. The four-lane scenario is similar to existing conditions, except that the northbound free-right at the Isleta Boulevard intersection is restricted to a signalized movement which results in additional delay on all approaches at the intersection to provide signal capacity for this movement.

Table 5-20, AM Peak: Isleta Boulevard at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	L	1,440 sec (24 min)	654	205	110	148	91
	T	1,291 sec (22 min)	698	203	111	150	95
	R	1,272 sec (21 min)	616	162	82	106	58
NB	L	683	233	705	260	593	218
	T	706	249	721	280	610	235
	R	734	247	739	267	694	259
SB	L	3,158 sec (53 min)	544	597	160	506	155
	T	1,781 sec (30 min)	329	82	60	106	59
	R	2,285 sec (38 min)	187	85	14	104	17
WB	L	136	75	159	82	148	74
	T	9	16	20	14	24	16
	R	19	9	12	9	23	10

Table 5-21, AM Peak: Poco Loco Road at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	LTR	200	178	14	11	10	4
NB	LTR	119	55	87	38	143	90
SB	LT	94	48	115	76	102	63
	R	20	11	65	11	20	9
WB	LTR	12	4	86	6	8	6

Table 5-22, AM Peak: 2nd Street at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	L	16	12	12	11	64	46
	T	12	10	10	7	58	44
NB	L	83	67	78	66	79	68
	T	76	50	73	56	81	54
	R	46	42	50	42	47	39
SB	L	59	19	48	39	68	41
	T	52	47	80	48	58	53
	R	25	19	23	18	25	20
WB	L	65	54	95	61	64	54
	T	27	24	34	28	34	29
	R	10	8	13	11	16	11

Table 5-23, PM Peak: Isleta Boulevard at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	L	48	34	119	80	178	109
	T	47	36	61	54	160	74
	R	47	38	58	54	80	64
NB	L	228	123	154	110	150	112
	T	121	73	113	79	114	77
	R	194	30	40	23	39	20
SB	L	85	73	82	71	907	136
	T	74	64	133	92	720	219
	R	30	26	79	54	686	162
WB	L	50	40	236	75	247	174
	T	40	36	236	68	242	174
	R	31	26	222	50	226	157

Table 5-24, PM Peak: Poco Loco Road at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	LTR	38	16	35	26	16	10
WB	LTR	76	37	81	40	60	42
SB	L	0	0	17	0	15	1
	R	166	20	8	1	15	5
NB	LTR	406	339	19	13	26	16

Table 5-25, PM Peak: Second Street at Rio Bravo Boulevard Maximum and Peak Hour Average Movement Delays for MOT Scenarios

Approach	Movement	2 Lane Delay (seconds)		3 Lane Delay (seconds)		4 Lane Delay (seconds)	
		Max	Average	Max	Average	Max	Average
EB	L	91	58	78	63	78	63
	T	44	38	40	36	29	28
NB	L	84	67	72	62	74	62
	T	85	40	92	46	98	46
	R	41	23	36	27	34	28
SB	L	1,255 sec (21 min)	959 sec (16 min)	67	34	62	42
	T	1,331 sec (22 min)	1,019 sec (17 min)	77	59	100	63
	R	1,347 sec (22 min)	1,074 sec (18 min)	38	32	54	45
WB	L	1,635 sec (27 min)	1,471 sec (25 min)	73	65	73	64
	T	1,601 sec (27 min)	1,482 sec (25 min)	42	37	39	38
	R	1,645 sec (27 min)	1,486 sec (25 min)	11	10	11	9

Estimated Queue Lengths

The 95th-percentile queue lengths for the multiple scenarios analyzed were reviewed to determine how far back the congestion would queue. The impact of queues that backed up into other signalized intersections or onto I-25 were not analyzed, so the impacts of those queues would likely be even more significant on the entire Albuquerque roadway network than was able to be modeled in this analysis. The queuing results are summarized in **Table 5-26** through **Table 5-31**.

The longest 95th-percentile queues shown for the AM peak period were for the two-lane MOT scenario at the Isleta Boulevard Intersection with Rio Bravo Boulevard. The eastbound queue was about 1.16 miles and the southbound queue was 1.0 miles. Both of these queues backed up into other signalized and unsignalized intersections, which would lead to additional delays/queues not modeled in this analysis.

For the AM Peak, the three-lane MOT scenario had a maximum 95th-percentile queue of 1,952 feet for the northbound right-turn at the Isleta Boulevard/Rio Bravo Boulevard intersection, which did not impact any signalized intersections. This movement also had the longest queues for the four-lane scenario with a 95th-percentile queue of 1,805 feet.

The queues at the 2nd Street/Rio Bravo intersection were the highest in the PM peak for the two-lane MOT scenario. The 95th-percentile queue for the westbound direction for this scenario was about 5.6 miles long which would back significantly onto I-25 northbound and I-25 southbound (I-25 is 1.15 miles east of the 2nd Street/Rio Bravo Boulevard intersection).

For the three-lane and four-lane MOT scenarios, the 95th-percentile queues at the 2nd Street/Rio Bravo Boulevard intersection do not back up significantly in the PM peak period.

Conclusion

The TransModeler analysis was performed using unadjusted year 2025 traffic volumes which resulted in lengthy estimated delays and queues during construction. While river crossing spacing and congestion will make it difficult to take alternative routes during construction, some re-distribution of traffic in time and/or space is expected.

The two-lane MOT scenarios result in average delays of 12 minutes in the AM peak and 27 minutes in the PM peak, with 95th-percentile queues in both peaks backing up into other signalized intersections and onto I-25, which would result in significant impacts to the overall Albuquerque roadway network beyond what was able to be modeled in this analysis. The *maximum queues* for the two-lane scenario are even higher.

The three-lane MOT scenario resulted in a maximum delay of 12 minutes in the AM peak and 4 minutes in the PM peak with 95th-percentile queues that did not reach back to other signalized intersections that would result in additional impacts to the roadway network. The highest average delays were 4.7 minutes for the AM peak and 1 minute for the PM peak.

The four-lane MOT scenario resulted in a maximum delay of 15 minutes in the AM peak and 4 minutes in the PM peak with queues that did not reach back to other signalized intersections that would result in additional impacts to the roadway network. The highest average delays were 3.7 minutes for the AM peak and 4.3 minutes for the PM peak.

Table 5-26, AM Peak: Isleta Boulevard at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	L	69	102	67
	T	6,116	967	860
	R	19	47	48
NB	L	98	104	86
	T	265	349	194
	R	1,912	1,952	1,805
SB	L	5,553	1,278	1,254
	T	139	76	89
	R	39	34	27
WB	L	229	226	268
	T	134	126	86
	R	16	15	0

Table 5-27, AM Peak: Poco Loco Road at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	LTR	1	0	0
NB	LTR	18	17	19
SB	LT	46	51	46
	R	16	19	15
WB	LTR	0	82	1

Table 5-28, AM Peak: 2nd Street at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	L	77	77	198
	T	74	79	213
NB	L	118	129	132
	T	92	100	100
	R	60	66	58
SB	L	66	59	65
	T	72	73	56
	R	23	23	24
WB	L	46	46	40
	T	89	91	85
	R	23	29	20

Table 5-29, PM Peak: Isleta Boulevard at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	L	138	202	312
	T	212	240	438
	R	134	149	168
NB	L	512	294	283
	T	328	350	337
	R	156	126	132
SB	L	162	118	317
	T	217	247	487
	R	148	127	159
WB	L	265	462	378
	T	260	361	405
	R	80	122	155

Table 5-30, PM Peak: Poco Loco Road at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	LTR	186	218	86
NB	LTR	18	18	18
SB	LT	0	0	0
	R	33	0	0
WB	LTR	313	104	141

Table 5-31, PM Peak: 2nd Street at Rio Bravo Boulevard 95th-Percentile Queues for Each Movement

Approach	Movement	95th %-tile Queue Length (feet)		
		2 Lane	3 Lane	4 Lane
EB	L	80	101	76
	T	187	184	163
	R			
NB	L	271	182	190
	T	59	18	47
	R	41	39	42
SB	L	104	82	100
	T	2,269	179	229
	R	2,456	139	181
WB	L	127	112	110
	T	29,726 ft (5.6 mi)	255	256
	R	0	14	0

Environmental Impacts

This section summarizes the potential environmental impacts based on our understanding of the existing conditions and anticipated preliminary effects of the recommended alternatives. Only those topics that are germane to the project are included below. A detailed analysis of the preferred alternative and associated effects as a result of the project will be performed during Phase IC.

No Build Alternative

Under the No-Build Alternative there would be no improvements and the existing bridge capacity and existing conditions would remain the same. Although the No Build Alternative would not result in any impacts to the human and natural environment, it would not meet the project purpose and need. The remainder of this section focuses on the preferred alternative.

Agency Coordination

The Project Team held a multi-agency kick off meeting on October 19, 2020 to identify initial resource concerns with those agencies having regulatory or land managing authority in proximity to the project. Coordination meetings with specific agencies are being held as needed to discuss initial concepts and seek input to support the project development process.

Land Use, Business, and Community Resources

The Rio Bravo Boulevard Bridge is one of seven roadway crossings over the Rio Grande within the City of Albuquerque. These bridges are heavily trafficked by commuters and serve as key connector routes between the east and the west side of Albuquerque. The project is being designed to have a positive impact on all modes of travel through the corridor.

Property owner interviews will be held with those having residences and commercial or industrial businesses that may potentially be impacted by the recommended alternatives. The project will be designed to minimize effects to businesses and homeowners to the extent feasible.

The Project Team has met with MRGCD, BOR and USACE throughout the study phase to discuss the levees and irrigation drains potentially affected by the proposed project and to coordinate on design elements to minimize or eliminate any significant impacts. The Project Team will continue to coordinate closely with these agencies as the preferred alternative is advanced.

Multiple developed and undeveloped recreation facilities, including the river, are accessed by the public within and adjacent to the project. Both of the recommended alternatives are offset to the north, which would encroach into the Open Space and Picnic Area. During Phase IC, the analysis of the preferred alternative will consider strategies for minimizing impacts to recreation facilities.

An unimproved boat ramp off the riverbank on the northwest side of the Rio Bravo Bridge serves as the southern-most ramp for Bernalillo County and the City of Albuquerque search and rescue boat access (See **Exhibit 5-18**). Access to this ramp would be significantly impacted by a new bridge offset to the north. The Project Development Team conducted a field review with Bernalillo County Fire Department and identified a location on the southwest side of the existing bridge for a new access ramp. To better accommodate the 'put-in' and 'take-out' of boats, the County requests the project design incorporate an area adjacent to the riverbank where the water can slow and act as an eddy. Build Alternative A includes a CBC that would need to be redesigned to accommodate the larger turning radius needed when trailering a boat.

Exhibit 5-18, Existing Access Ramp for Search and Rescue

Recreational and Multi-Modal Facilities

There are multiple recreational and multi-modal facilities within or intersecting with the project area, including the Chris Chavez and Riverside trails along the Albuquerque Riverside Drain on the east side of the river, the unimproved trail/service road along the Atrisco Riverside Drain on the west side, as well as Rio Bravo Open Space and associated trails. The development of project alternative has considered all of these facilities to minimize impacts and improve connectivity, where feasible. Additionally, the new bridge would have sidewalks along both sides. Both recommended alternatives would have an impact on the Rio Bravo Open Space north of the existing bridge. Bernalillo County has participated in initial coordination meetings and does not anticipate the project to result in a significant impact to the park and its facilities. Coordination with the City of Albuquerque Open Space Division has been initiated and needs to occur. Reconfiguring specific aspects of the park, such as parking, may be considered during detailed analysis of the preferred alternative.

Cultural Resources

A Class III intensive cultural resource survey will be performed during Phase IC to identify historic properties and to evaluate potential effects that may occur as a result of constructing the preferred alternative. The pedestrian survey will be performed to the current standards outlined in NMDOT Guidelines for Cultural Resource Investigations 2018.

As a result of previous surveys, five historic buildings have been determined not eligible for listing in the NRHP, but the other nine structures – seven acequias, the Riverside Drain, and the NMRX Rail Runner tracks - are eligible for listing in the NRHP. Additionally, the southern bridges (#6224 and #6225) were constructed in 1961 and must be evaluated as a cultural resource. All these properties and structures are within the area of potential effect (APE).

Section 4(f) Properties

There are multiple resources within the project area that qualify as Section 4(f) properties: nine historic structures that are eligible for listing in the NRHP, Rio Bravo Open Space, its Riverside Picnic Area, and numerous multi-use trails. The largest Section 4(f) property within proximity to the project is the Rio Bravo Riverside Park.

Both of the recommended alternatives are offset to the north, which would encroach into the Open Space and Picnic Area (see **Exhibit 5-19**). Affected properties will be evaluated to determine the exact nature of the impacts, the. During Phase IC, an in-depth review of potential constructive use of Section 4(f) properties will be conducted.

Exhibit 5-19, Section 4(f) Property North of Existing Bridge

Waters of the U.S., Wetlands, and Floodplains

Both recommended Build Alternatives would result in new concrete piers within the active river channel. The project alternatives have been designed to limit the number of piers within the river, resulting in fewer spans than the existing bridges there today. The existing piers would be removed during bridge demolition, which would entail cutting the piers at the river bottom base and removing the above grade structure.

Both of the recommended alternatives would result in a wider bridge structure and larger quantities of stormwater run-off following rain events. MRGCD has expressed concern over any additional discharges of stormwater beyond that existing quantities from NM 500. Based on NMDOT's experience consulting on other bridge replacement projects of similar nature (e.g., NM 6 and NM 550 bridges), the USFWS has concerns regarding stormwater discharges and potential for contaminants entering the river, which is a critical habitat for silvery minnow. To minimize impacts, the USFWS prefers for stormwater discharge to be diverted to the floodplain rather than be allowed to discharge as sheet flow off the bridge deck edge.

The Project Development Team met with USACE representatives on April 29 and May 5, 2021 to present initial conceptual layouts and receive input regarding USACE facilities, levee requirements, and permitting. Based on initial agency input, the project will require both Clean Water Act Sections 404, 401, and 408 permitting. Depending on the design elements and impacts of the preferred alternative, the project is anticipated to be authorized under a 404 Nationwide Permit.

Due to the vertical steep banks disconnecting the river from the floodplain terrace, wetland hydrological conditions are not present. Overall the area is rarely, if ever, subject to overbank flooding. Both recommended alternatives would result in removal of riparian vegetation; however, significant impacts to wetlands are not anticipated. A wetland delineation of the entire project corridor will be performed for the recommended alternative to evaluate specific impacts, if any.

Both recommended alternatives have been designed to minimize impacts to floodplains and result in a 'no net rise' floodplain condition. The Project Team has been coordinating with MRGCD and USACE to discuss specific design features to minimize potential impacts to levee structures.

Vegetation and Wildlife Habitat

The project area is located within the river channel and floodplain of the Rio Grande. The vegetation community at the river crossing and associated floodplain is primarily composed of mature cottonwoods and a sparse understory of willow, salt cedar, and Russian olive. Once the existing bridge is demolished and the area would be re-vegetated; however, removal of vegetation will be required to construct the new bridges. The BOR has expressed concern over removal of mature cottonwoods as a result of the project. Specific impacts to riparian vegetation and mature cottonwoods as a result of the preferred alternative will be evaluated during Phase IC.

The existing bridge structures provide ample habitat for bat roosting and breeding as a result of deteriorated conditions offering numerous cracks in the concrete structure. Both of the recommended alternatives would result in the loss of roosting and breeding habitat as a result removing the existing bridges. It is anticipated that mitigation for loss of habitat would be required, and bat boxes similar to those installed underneath the new NM 6 bridge would effectively mitigate the habitat loss (See **Exhibit 5-20**).

Beyond the limits of the floodplain, levee, and irrigation ditches, the vegetation along the NM 500 roadway is sparse and generally disturbed. A portion of the project area contains a prairie dog colony. A Biological Evaluation will be performed for the recommended alternative to evaluate potential impacts to wildlife and habitats.

Exhibit 5-20, Example of a Bat Box Installed on a Recent NMDOT Project

Threatened and Endangered Species and Critical Habitats

Representatives of the USFWS attended the multi-agency kick off meeting on October 19, 2020 and provided early input on concerns and species presence. A Biological Evaluation will be prepared during Phase IC to evaluate specific impacts of the preferred alternative and associated minimization and/or mitigation measures for these species and habitats. Additional coordination with USFWS will be needed to refine the preferred alternative. It is anticipated that formal Section 7 Endangered Species Act consultation will be required.

This stretch of the Rio Grande, within the project area, is designated critical habitat for the federally endangered Rio Grande silvery minnow, and the adjacent land provides suitable habitat for the Southwestern willow flycatcher (federal endangered species) and yellow-billed cuckoo (federal threatened species).

Southwestern Willow Flycatcher and Yellow-Billed Cuckoo

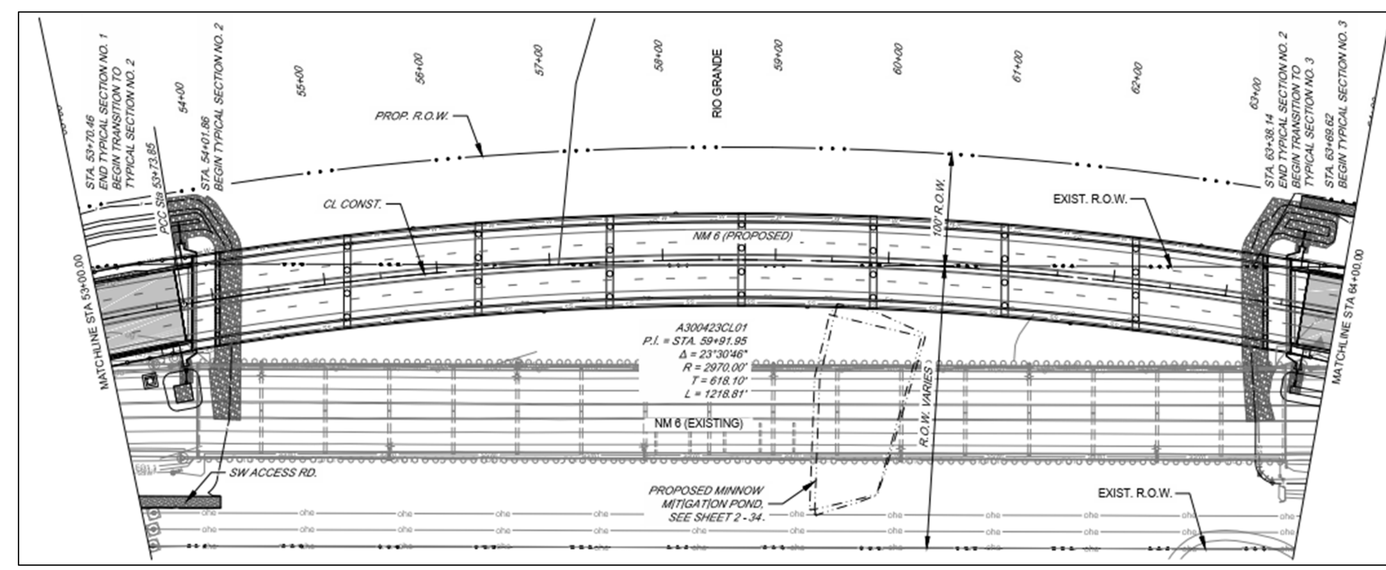
Riparian and aquatic habitat within and adjacent to the project area is potentially suitable migration and foraging habitat for the flycatcher and cuckoo. Neither species is known to nest in proximity to the project. Vegetation that would be removed represents a negligible percent of the total vegetation available within the Middle Rio Grande; therefore, the potential effects resulting from vegetation loss is expected to be insignificant. Construction noise may cause flycatchers or cuckoos in proximity of the project to temporarily avoid the area.

Rio Grande Silvery Minnow

The project is being designed to limit the number of piers within the river, resulting in fewer spans. The project is also expected to result in a bridge that is wider than the existing bridge which increases surface water shading. These two design elements are anticipated to be favorable to silvery minnow habitat.

A Biological Evaluation will be prepared during Phase IC that assess the potential impacts of the preferred alternative on the Rio Grande silvery minnow. It is anticipated that the USFWS would require seasonal timing restrictions for working within the active channel of the Rio Grande to minimize impacts to this species. Additionally, it is anticipated that USFWS may require mitigation for loss of habitat, such as constructing a new minnow mitigation pond similar to what was constructed as part of the new NM 6 Bridge Replacement Project (See **Exhibit 5-21**).

Exhibit 5-21, Plan View of Minnow Mitigation Pond for NM 6 Bridge Replacement Project



Visual Impact Assessment

While the current bridges are existing visual features in the landscape, replacing them could create a new image in the landscape and alter the current views. Both recommended alternatives would be partially offset to the north and have an elevation higher than the existing bridge. Build Alternative B would result in a taller bridge profile than Build Alternative A, by approximately five feet.

During Phase IA/B, a Visual Impact Assessment was completed and is available in the ***electronic appendices***. The assessment concluded that views from the project area and views of the project area, especially at the new boat access ramp, will be slightly different from the current condition. Taken in part or in whole, these changes will be noticeable, but not substantively different from the existing conditions. As such, the project merits aesthetic considerations and the following treatments are being considered for inclusion in the project:

- Form-liner designs for concrete wall barrier
- Pedestals at each end of the bridge to allow for dedication plaques
- Color treatments for:
  - Concrete wall barrier
  - Metal railing on edges of bridge
  - Pier caps
  - Deck edge
  - Girders
  - Bridge median

For maintenance reasons, a concrete barrier is proposed to separate the travel lanes from sidewalks rather than an open railing. However, if acceptable to the NMDOT, consideration of concrete railings that improve Bosque and Rio Grande views from the bridge should also be considered as the project design advances.

Noise Analysis

The level of traffic noise at a given site depends on both site geometry and traffic characteristics of proposed roadways near a site. During Phase IA/B a Traffic Noise Analysis was completed, and is available in the ***electronic appendices***. The analysis considered existing noise and predictive modeling of existing and future noise levels, and preliminary roadway design information developed for the recommended alternatives. Typical ambient noise within the corridor includes existing traffic on Rio Bravo Boulevard and Isleta Boulevard.

The results of the analysis show that several residential sites (receptors) east of Isleta Boulevard SW and west of Poco Loco Road would experience relatively high noise levels in the future design year (2040). Generally, noise at most receptors in the project area increase by 0 to 4 dBA between existing and 2040 levels. The high noise levels at these receptors would result from the proposed traffic volumes on the Rio Bravo Boulevard, and the bridge alignment shifting north of the existing alignment.

By and large, human hearing can perceive a difference of approximately 2-3 dBA in outdoor noise levels. Therefore, future noise levels would likely be perceived as being louder than existing noise levels at some locations in the project area. The expected increases in noise at all locations are below the 10-dBA increase used by NMDOT to define a 'substantial increase'; however, 46 receptors have predicted noise levels exceeding the 66 dBA NAC for residential land uses, and one receptor exceeds the 71 dBA NAC for commercial land uses.

State and federal noise policy stipulates that when traffic noise impacts occur, noise abatement must be considered and implemented if found to be feasible and reasonable. Typically, noise abatement measures include construction of noise wall barriers, modification of horizontal or vertical geometric design features, or traffic management techniques. Consideration of noise abatement measures was given to all receptors impacted by the recommended alternatives. Build Alternative B would result in a much taller bridge than the existing bridge. Three noise wall barriers were modeled and evaluated; two of which were determined to meet NMDOT feasibility and reasonableness criteria (see **Exhibit 5-22** and **Exhibit 5-23**). Noise wall barriers are recommended for inclusion in the preferred alternative to mitigate noise impacts that are anticipated as a result of the project.

Ambient noise levels would temporarily increase during construction. Provisions requiring the contractor to make every reasonable effort to minimize construction noise through measures, such as work-hour controls (e.g., nighttime/daytime) and maintenance of muffler systems, will be considered as the project development advances.

Hazardous Materials

During Phase IC, the NMDOT Hazardous Material Investigations Bureau will perform a comprehensive review of the project to evaluate the potential for hazardous materials within and adjacent to the project area. Since the bridges were constructed in 1961 and 1985, it is assumed that lead-based paint is present which poses a concern to workers' health and safety, as well as potential cleanup liability. To minimize potential exposure to lead-based paint, a notice to contractor would likely be required.

Environmental Clearance Level of Effort

During Phase IC, an environmental clearance document evaluating the preferred alternative and its impact on the human and natural environment will be prepared. This documentation and associated analysis will comply with the National Environmental Policy Act (NEPA) as well as the requirements of 23 CFR Part 771, Federal Highway Administration (FHWA) Technical Advisory T6640.8A, the current NMDOT Location Study Procedures, and other applicable guidelines and regulations. The NEPA analysis will be supported by research and environmental resource investigations performed during Phase IA/B and Phase IC to document pertinent environmental conditions within the project limits.

The NMDOT has applied federal funding to this project, which makes FHWA the lead federal agency for meeting all requirements of NEPA. Under the stewardship and oversight agreement between the FHWA and NMDOT, the NMDOT assumes the authority of the FHWA for project responsibilities. Multiple federal and state agencies have regulatory authority or land management responsibilities within or adjacent to the corridor. These agencies have roles as participating agencies and have not been invited to serve as cooperating agencies to carrying out the NEPA process. Both recommended Build Alternatives would require acquiring right-of-way. This process would entail a license agreement issued by MRGCD and co-signed by BOR.

Based on an initial review of potential impacts to the human and natural environment during Phase IA/B and input from agencies to date, it is anticipated that the appropriate level of effort for environmental clearance and NEPA compliance would be a Categorical Exclusion document.

Exhibit 5-22, Noise Wall Barriers Modeled West of Rio Grande

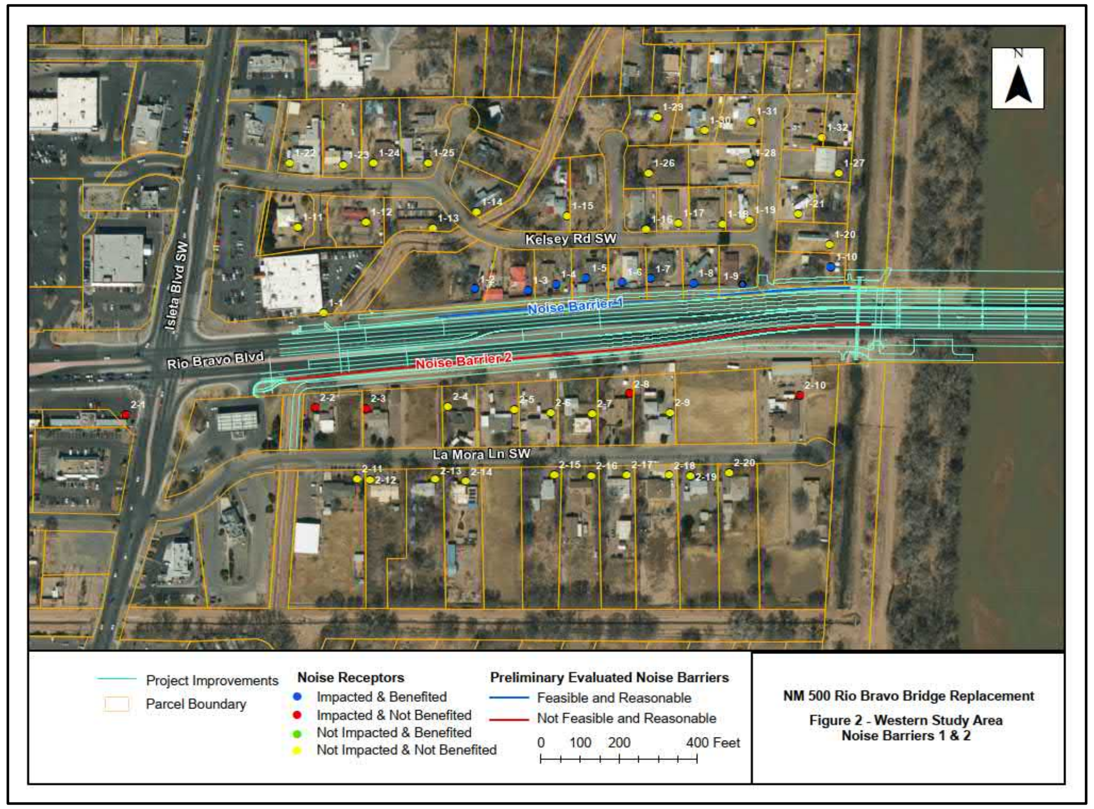
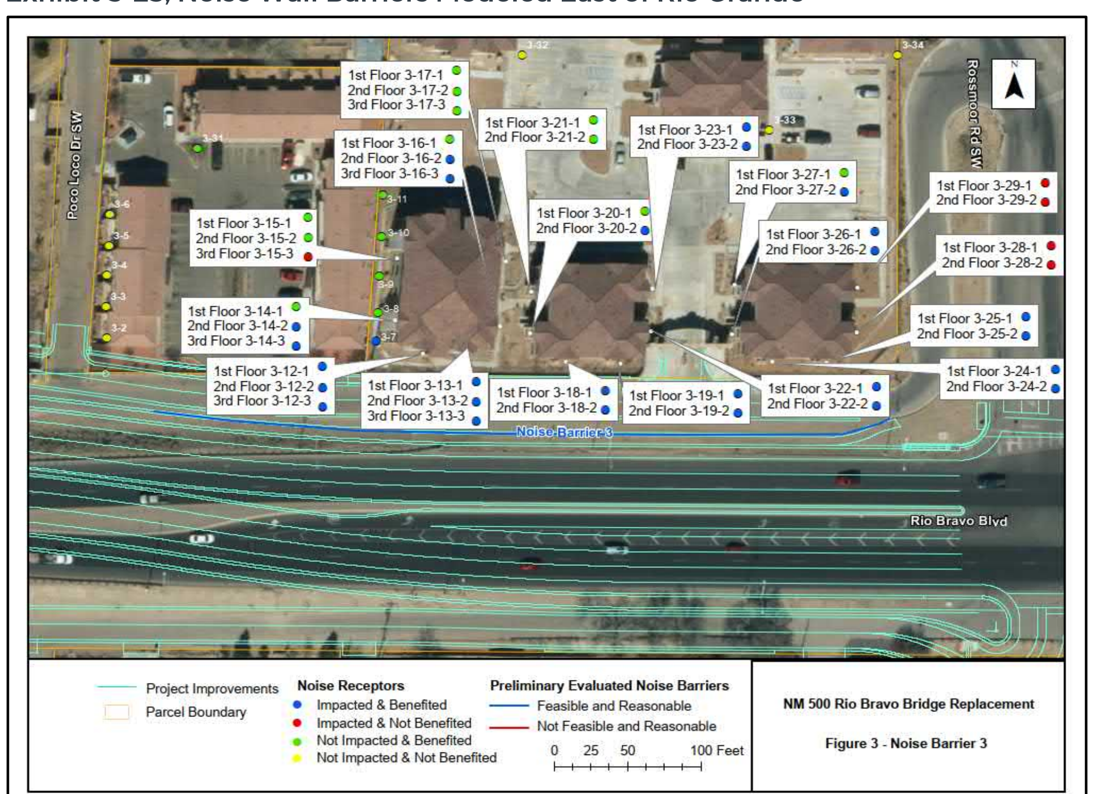


Exhibit 5-23, Noise Wall Barriers Modeled East of Rio Grande



Conceptual Cost Estimates

Two Engineer's Opinions of Probable Cost were created for Build Alternatives A and B. The detailed costs can be found in **Appendix E**, as well as in the ***electronic appendices***. Cost summaries of major items are provided in **Table 5-32** and **Table 5-33**. As the design of the project has only been progressed to the Study Phase, various assumptions and decisions were made to arrive at a cost that would be as accurate as possible based on current conditions and the ever-changing economy. The following is a discussion of those assumptions and decisions.

- **Bridge Costs** – Bridge costs were developed for all three Girder Alternatives evaluated for the Rio Grande Bridge, and for both the Single-Span and Two-Span Alternatives for the Albuquerque Drain Bridge, as documented in the Bridge Type Selection Report. To be able to compare the costs for the three Girder Alternatives for the Rio Grande Bridge quantitatively, the assumption was made that Build Alternative B would be the preferred layout for the bridge's west end. Changing this assumption would not have qualitatively changed the outcome of the recommended alternative. Girder Alternative 2 (simple span steel girders) was chosen as the preferred alternative in the BTS Study. Once the preferred Girder Alternative was chosen, a second bridge cost estimate was developed for that Girder Alternative applied to the Build Alternative A scenario. These two Girder Alternative costs were carried forward into the overall project cost estimates for Build Alternatives A and B. For the Albuquerque Riverside Drain Bridge, the Two-Span Alternative was chosen as the preferred in the BTS Study. This cost was carried forward and used in both Build Alternative cost estimates.

  A comprehensive list of pay items was developed for both bridges' cost estimates, referencing other similar, recent bridge projects. Unit costs for the pay items were estimated by comparing NMDOT average unit bid prices, unit costs for items in similar, recent projects (such as the NM 6 Bridge over the Rio Grande), and BidX costs, if needed. In addition, steel girder fabricators were contacted to gain additional information regarding current pricing trends, shipping and erection costs, and availability. Lastly, in some cases, unit costs were also further increased to account for the recent increase in construction costs across all projects.

  In the end, a square foot bridge cost of approximately $160 was calculated for the Rio Grande Bridge Girder Alternative 2. While this may seem high compared to other comparable projects, the recent trend of increasing construction costs, the phased construction necessary for this project, construction of flood walls in place of typical substructures at the levee locations, and the early stage of study/design that the cost is based on supports a conservative square foot cost.

  The pedestrian bridge that was included in the project study was estimated as a cost per square foot. Other pedestrian bridge, as well as vehicular bridge, square foot cost estimates were reviewed, escalation for inflation to today's date were added, and an increase for the current increase in construction costs were applied, arriving at a $130/sf of deck cost.

- **Retaining Wall Costs** – Based on the recommended bridge alternatives, the preliminary vertical and horizontal roadway alignments, and constraints from drainage/water features, geotechnical parameters, access roads, and levees, preliminary retaining wall geometry was laid out along the length of the project. The assumption was made that the retaining walls would be CIP concrete walls, based on various constraints and needs, as discussed previously in this chapter. Retaining wall costs were calculated based on the preliminary geometry by quantifying concrete, rebar, excavation, and backfill. The same approach was used to determine the unit costs as described for the bridge.

- **Roadway, Drainage, and Lump Sum Costs** – Roadway and Drainage unit costs were also determined based on a combination of average unit bid costs, recent, similar projects (particularly the NM 528 Corridor Improvements and NM 6 over the Rio Grande). And again, certain material costs (namely items related to concrete, steel, and oil) were increased in price due to recent construction cost increases that have been widely experienced. Large, lump sum costs, such as mobilization, were calculated as a percentage of the total construction cost after all other costs had been accounted for.

- **Traffic Control Costs** – Traffic Control Costs were estimated with a combination of actual costs and estimated percentage of total project costs. This project will use a movable barrier/reversible lane system in order to maintain two lanes of traffic in the peak traffic direction during both morning and evening commute hours. The company Lindsay who manufactures these movable barrier systems was contacted to gain information about the system, required specifications, and costs. Lindsay provided a quote for use of the system over both a 9-month and an 18-month period. The 18-month period has a lower per-day cost to rent and use the system, and this cost was used in these cost estimates. On top of the movable barrier cost, an additional lump sum amount was added to bring the total cost up to approximately 3% of total construction cost.
- **Contingency** – Typically for a study phase cost estimate, a large contingency percentage of 25-30% would be used to account for the unidentified project costs and generic nature of the pay item quantities. However, this Phase I-A/B Study advanced the project design further than what is typically done during a study, including completion of a BTS report; identification of a preferred bridge design; development of a preliminary horizontal and vertical alignment for the entire project area, including side streets; and preliminary estimates of retaining wall lengths and heights within the project limits. Because of the preliminary design completed and the detailed pay item quantities and unit costs developed, a lower 15% contingency was used for this project.
- **Construction Augmentation** – A 4.5% Construction Augmentation was calculated on the pre-tax cost estimate developed for each alternative.
- **ROW** – ROW costs are not included in the cost estimate at this phase. These costs will be coordinated with the NMDOT ROW Bureau for future design submissions as the project design is further developed.

Table 5-32, Build Alternative A Cost Estimate

Major Items	Construction Cost	E&C 15%	Total Estimated Cost
ROADWAY	$10,475,016	$1,571,252	$12,046,268
RIVER BRIDGE	$24,903,850	$3,735,578	$28,639,428
DRAIN BRIDGE	$2,050,362	$307,554	$2,357,916
DRAINAGE	$3,587,430	$538,115	$4,125,545
MAJOR STRUCTURE	$4,043,450	$606,518	$4,649,968
DETOUR	$152,000	$22,800	$174,800
CONSTRUCTION SIGNING	$1,550,000	$232,500	$1,782,500
PERMANENT SIGNING AND STRIPING	$71,680	$10,752	$82,432
LIGHTING	$518,200	$77,730	$595,930
SIGNALIZATION	$321,241	$48,186	$369,427
ITS	$221,000	$33,150	$254,150
SUBTOTAL	$47,894,228	$7,184,134	$55,078,362
NM GROSS RECEIPTS TAX			$4,337,421
TOTAL			$59,415,783
		USE	**$59,500,000**
Construction Augmentation (4.5%)			$2,479,000

Table 5-33, Build Alternative B Cost Estimate

Major Items	Construction Cost	E&C 15%	Total Estimated Cost
ROADWAY	$10,475,016	$1,571,252	$12,046,268
RIVER BRIDGE	$27,238,350	$4,085,753	$31,324,103
DRAIN BRIDGE	$2,050,362	$307,554	$2,357,916
DRAINAGE	$3,232,430	$484,865	$3,717,295
MAJOR STRUCTURE	$3,337,610	$500,642	$3,838,252
DETOUR	$152,000	$22,800	$174,800
CONSTRUCTION SIGNING	$1,550,000	$232,500	$1,782,500
PERMANENT SIGNING AND STRIPING	$71,680	$10,752	$82,432
LIGHTING	$518,200	$77,730	$595,930
SIGNALIZATION	$321,241	$48,186	$369,427
ITS	$221,000	$33,150	$254,150
SUBTOTAL	$49,167,888	$7,375,183	$56,543,071
NM GROSS RECEIPTS TAX			$4,452,767
TOTAL			$60,995,838
		USE	**$61,000,000**
Construction Augmentation (4.5%)			$2,544,000

Comparative Evaluation of Build Alternatives A and B

This section compares the overall Build Alternatives A and B, including associated structural, drainage, roadway, traffic, environmental, right of way, constructability, and maintenance considerations for each. Various elements of this project will be the same or very similar for either alternative, such as the Albuquerque Drain Bridge design, the Rio Grande hydraulics analysis, and the Poco Loco Drive and Dean Road roadway design. These elements are all included in the overall costs for each alternative, but are not included in the comparison matrix below. The matrix compares the elements that differ between the two Build Alternatives. Below is a brief discussion of each of these elements.

- **Design Speed** – Build Alternative A has larger horizontal curves on the west end of the bridge tangent alignment. This improves the design speed for the roadway by 15 mph; therefore, Build Alternative A is rated higher for this Criterion. This Evaluation Criterion was given a weighting of 4, as it is considered an important design factor.
- **Right-of-Way** – Build Alternative B will require more right-of-way impacts due to extension of the tangent roadway alignment to the west before beginning the curve to the south. This Evaluation Criterion was given a weighting of 3, as the differences between the two alternatives are small.
- **Construction Feasibility** – Both Build Alternatives are considered to have similar construction feasibility and access. However, Build Alternative B was given a higher raw score due to several factors. First, the construction of a box culvert will not be required, eliminating one structure from the project. Second, it is expected that construction of a pier floodwall at the west levee in Build Alternative B will be slightly less

complicated than the construction of an abutment floodwall with retaining walls or wingwalls at the west levee in Build Alternative A. Third, the assumption that the Atrisco Riverside Drain will not be fully replaced and only extended to the north in Build Alternative B means that dewatering of this drain will not be required during phase 2 of construction, shortening the time that the reversible lane will need to be in place. This Evaluation Criterion was weighted as a 5, as it is considered one of the most important criteria.

- **Future Bridge Maintenance** – Build Alternative A has fewer girders, bearing lines, and substructure units than Build Alternative B, which means fewer inspection and maintenance concerns in the future. This Evaluation Criterion was given a weighting of 4.
- **Geotechnical** – Build Alternative B will have more drilled shafts, which could present more opportunities for construction complications given issues during recent similar projects. This Evaluation Criterion was given a weighting of 3.
- **Structure Efficiency** – The bridge design for Build Alternative B was able to be slightly more optimized than Build Alternative A by normalizing the span lengths and reducing the number of different girder lengths required to be fabricated. This Evaluation Criterion was given a weighting of 2. For concrete girders, the consistent girder lengths are considered to be a bigger factor in construction efficiency. However, since the preferred alternative is steel, the girder lengths consideration was not weighted as highly as some other criteria.
- **Atrisco Drain Accessibility** – Build Alternative B eliminates the roadway embankment from over the Atrisco Riverside Drain, which aids in future repair or maintenance complications for the drain. This Evaluation Criterion was given a weighting of 4.
- **Bridge Drainage** – Build Alternative B will have better geometry for bridge drainage due to an increase in vertical curve across the Rio Grande Bridge. This Evaluation Criterion was given a waiting of 3.
- **Boat Ramp Access** – Build Alternative B provides for easier access and turning geometry for vehicles needing to access the boat ramp at the southwest corner of the bridge. The elimination of the box culvert provides for more clearance and flexibility when crossing under Rio Bravo Boulevard at this location. Given that this is used for emergency response river access, this Evaluation Criterion was given a weighting of 4.
- **Costs** – The costs for both alternatives are relatively close, within less than 3% of each other. Build Alternative B is slightly more expensive due to the larger bridge and increase in profile height, which outweighs the savings in drainage and CBC construction. This Evaluation Criterion was given a weighting of 5 as cost is considered to be one of the most important criteria.
- **Environmental Considerations** – Environmental considerations for the project include a Visual Impact Assessment, Traffic Noise Analysis, wildlife habitat impacts, wetlands impacts, as well as many others. While environmental concerns are important, and there could be some minor differences to some of these evaluations, such as visual and noise impacts, these differences are considered to be negligible between the two Build Alternatives at this time. Therefore, this Evaluation Criterion was weighted as 4 with both Build Alternatives given the same rating.

The comparison matrix shown in **Table 5-34** depicts the evaluation criteria, weighting factors, raw scores, and weighted scores for each Build Alternative, and totals these scores to arrive at a preferred alternative. Given all the criteria discussed above, Build Alternative B is recommended to be advanced to Phase IC and Phase ID.

Table 5-34, Build Alternative A and B Comparative Evaluation Matrix

		Build Alternative A		*Build Alternative B*	
Evaluation Criteria	**Weighting Factor**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**
Design Speed	4	5	20	3	12
Right-of-Way	3	3	9	2	6
Construction Feasibility	5	3	15	5	25
Future Bridge Maintenance	4	4	16	3	12
Geotechnical	3	4	12	3	9
Structure Efficiency	2	4	8	5	10
Atrisco Drain Accessibility	4	3	12	4	16
Bridge Drainage	3	4	12	5	15
Boat Ramp Access	4	3	12	5	20
Cost	5	5	25	4	20
Environmental Considerations	4	4	16	4	16
		Total	**157**	**Total**	**161**

Introduction

This chapter provides a summary of the various improvement alternatives evaluated during Phase IA/B of the NM 500 Rio Bravo Bridge Replacement project, and identifies the recommended alternatives proposed for advancement to Phase IC and ID of the project.

Bridge Alignment Alternatives

During the initial screening of alternatives (**Chapter 4**), which focused on the bridges, a variety of different bridge alignments for Rio Bravo Boulevard over the Rio Grande were considered. Nine alignments were compared qualitatively to arrive at a final, recommended alignment. These Rio Grande Bridge alignment alternatives consisted of the following:

- Alternative 0 - No Build
- Alternative 1 - Replace the Eastbound Bridge and Rehabilitate the Westbound Bridge
- Alternative 2 - In-Line Replacement
- Alternative 3 - North New Alignment
- Alternative 4 - Split Bridge
- Alternative 5 - North Curved Offset
- Alternative 6 - North Straight Offset
- Alternative 7 - South Curved Offset
- Alternative 8 - Bridge Rehabilitation

After comparing factors such as consistency with project purpose and need, initial construction costs, life cycle costs, constructability and MOT, ROW impacts, Environmental considerations, utility phasing, multi-modal considerations, drainage requirements, roadway geometry and public and stakeholder input, **Alternative 6, which replaces the current bridges with straight bridges offset to the north by half of the roadway width, was chosen as the recommended alignment to advance for more detailed alternatives evaluation.**

Number and Continuity of Bridges

The current river and drain crossings in this area are spanned by four individual bridges: two parallel bridges crossing the Rio Grande, and two parallel bridges crossing the Albuquerque Riverside Drain. Consideration was made to replace these four bridges with either one continuous bridge that would cross both the river and the drain; two separate bridges along Rio Bravo, one crossing the river and one crossing the drain; two bridges in parallel, one for each direction of traffic, and both crossing both the river and the drain; or four bridges similar to the current configuration.

First, it was decided that based on span layout efficiencies, constructability around the levee, and vertical profile impacts, separating the bridges at the levee and having one bridge crossing the Rio Grande and one bridge crossing the Albuquerque Drain would be the preferred alternative.

Second, it was determined that constructing one bridge at each crossing, instead of two bridges in parallel, would be the preferred approach based on cost and future maintenance (one bridge would have fewer drilled shafts, fewer girders, and fewer bearings).

Therefore, the recommended configuration advanced for more detailed alternatives evaluation is two bridges constructed along Rio Bravo, one for each waterway crossing.

Albuquerque Riverside Drain and Bridge

Two main alternatives were considered for the treatment of the Albuquerque Riverside Drain and the replacement of the bridge over the drain.

Alternative 1 consisted of replacing the bridge with a single-span, prestressed concrete girder bridge and maintaining the open channel of the drain under the bridge. This alternative would include repairing or replacing the existing open channel portion of the drain, extending the open channel portion to the north, and constructing a new drainage pipe culvert north of the open channel below the extension to Poco Loco Drive. The southern drainage pipe culvert would remain in place, and Dean Road would cross over that pipe similar to the current alignment of the road. This Alternative would have slightly lower drain culvert costs, but would have a greater impact to the vertical profile along Rio Bravo Boulevard. An increase in vertical profile means additional costs for embankment backfill and retaining walls.

Alternative 2 consisted of replacing the bridge with a two-span, prestressed concrete slab girder bridge and replacing the open portion of the drain with a continuous culvert pipe that crosses under Poco Loco Drive, the Rio Bravo Bridge, and Dean Road. In this alternative, Dean Road would be realigned to the north to limit the amount of drainage culvert being constructed. This Alternative would have a lower bridge cost and would have a shallower superstructure, allowing for a reduction in the vertical profile increase along Rio Bravo Boulevard.

After considering cost and profile impacts, **Alternative 2, two-span bridge with closed pipe culvert for the drain, is recommended for advancement to Phase IC and ID**.

Rio Grande Bridge Replacement

After the recommended straight alignment alternative was chosen for the Rio Grande Bridge, various girder types and pier arrangements were evaluated and compared for the replacement structure. Ultimately, three final alternatives were advanced for detailed comparison in the Bridge Type Selection Report. The final alternatives were the following:

- Girder Alternative 1 – 14-span, Precast Prestressed Concrete Girders
- Girder Alternative 2 – 14-span, Simple Span (60") Steel Plate Girders
- Girder Alternative 3 – 10-span, Continuous Span (66") Steel Plate Girders

These span arrangements are based on Build Alternative B (described in the following section). All alternatives were assumed to have similar substructure types: columns supported on drilled shafts, with floodwall-type piers and/or abutments at the levee locations. The decks were assumed to be the standard decks as tabulated in the NMDOT *Bridge Procedures and Design Guide*.

Comparison of these alternatives was performed through the development of a matrix which listed various Evaluation Criteria, applied weighting factors to each criteria to indicate their relative importance when comparing the alternatives, and assigned a raw rating score for each Evaluation Criteria as they apply to each Girder Alternative. The weighting factor and raw scores were then multiplied to get a weighted score, and all weighted scores for each Girder Alternative were added together to arrive at a total score for each alternative.

The Evaluation Criteria included functional requirements, bridge type cost, future maintenance, construction feasibility, environmental/drainage considerations, and bridge aesthetics. After calculating all weighted factors and totaling the score for each alternative, **Girder Alternative 2, Simple Span (60") Steel Plate Girders, was chosen as the recommended alternative for advancement into Phase IC and ID of the project**.

Atrisco Riverside Drain and West Abutment Location

The final major component of the project that went through a formal comparison in Phase IA/B of this project was the configuration of the west end of the project study area. This included the treatment of the Atrisco Riverside Drain, the Concrete Box Culvert replacement for the riverside drain access road, and the location of the west abutment of the Rio Grande Bridge. Two configurations were evaluated, a full project cost estimate was developed for both, and a matrix comparing the two alternatives was developed to arrive at a recommended alternative for advancement. The two alternatives are described below:

- Build Alternative A – West abutment located in line with the west levee, Atrisco Riverside Drain culvert upsized and lengthened with a 72" replacement culvert pipe under the Rio Bravo Boulevard embankment, existing CBC replaced with a lengthened, upsized CBC.
- Build Alternative B – West abutment located behind the west levee, first pier located in line with the levee, Atrisco Riverside Drain culvert left in place and extended to the north, existing CBC demolished and access road aligned under first bridge span.

The project cost estimates for these two build alternatives (before tax and construction augmentation costs) are $55.1 million for Build Alternative A and $56.5 million for Build Alternative B, meaning the costs for both Alternatives came within 3% of each other. Along with cost, a number of other important criteria were used to determine the recommended alternative. These criteria were tabulated in a matrix, similar to the Bridge Type Selection matrix, with weighting factors, raw scores, and total scores for each alternative. The criteria used in the comparison were Design Speed, ROW Impacts, Construction Feasibility, Future Bridge Maintenance, Geotechnical, Structure Efficiency, Atrisco Drain Accessibility, Bridge Drainage, Boat Ramp Access, Cost, and Environmental Impacts. Of these Evaluation Criteria, Construction Feasibility, Cost, Design Speed, Future Bridge Maintenance, Atrisco Drain Accessibility, Boat Ramp Access, and Environmental Impacts were weighted highest.

After applying raw scores and calculating the weighted score for each criterion and each alternative, a total score was added up for each alternative. Build Alternative A was given a weighted score of 157 and Build Alternative B was given a weighted score of 161. **Therefore, Build Alternative B is recommended for advancement to Phase IC and ID of this project.**

Retaining Walls

Though a formal evaluation and comparison of retaining wall types was not performed during this study phase of the project, multiple discussions between project team members as well as stakeholder agency experts (MRGCD, Bureau of Reclamation, and the USACE) took place during which the proposed retaining walls on the project were discussed. Mechanically Stabilized Earth (MSE) retaining walls and Cast-in-Place Concrete (CIP) retaining walls were both proposed as feasible wall types for this project location. However, after input regarding construction around the levees, drainage requirements, and seismic and liquefaction considerations, **it is expected that CIP retaining walls will be used throughout the project**.

Pedestrian Access

Lastly, pedestrian access at each end of the bridge was reviewed to identify feasible alternatives to connect the bridge and Rio Bravo Boulevard sidewalks to the riverside drain trails below the bridges. The preliminary layout includes a trail with one 180 degree turn on the west side of the bridges and drains, running parallel to Rio Bravo Boulevard, and an elevated pedestrian walkway structure which will carry pedestrians down from Rio Bravo Boulevard to Dean Road and connect them to the Paseo del Bosque and Chavez Loop Trail east of the bridges and drains. This elevated structure was laid out with two possible alignments which will be evaluated further during Phase IC and ID of the project.

Environmental Clearance Level of Effort

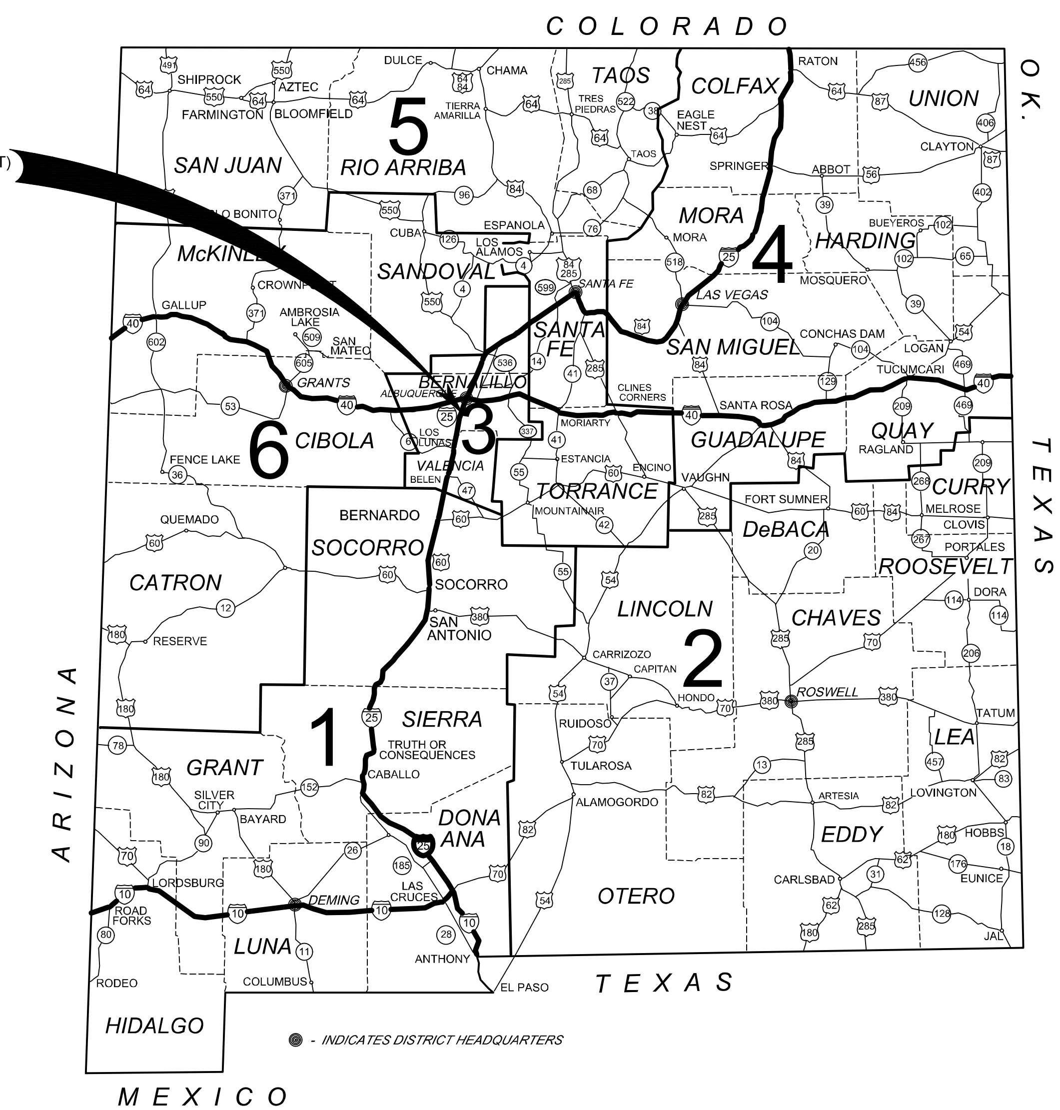
During Phase IC and concurrent with preliminary and final design, an environmental clearance document evaluating the preferred alternative and its impact on the human and natural environment will be prepared. Based on a review of potential impacts to the human and natural environment during Phase IA/B and input from agencies to date, it is anticipated that the appropriate level of effort for environmental clearance and NEPA compliance will be a Categorical Exclusion (CE) document.

APPENDICES

APPENDIX A
UTILITY MAPPING PLANS, CN A301000

New Mexico
DEPARTMENT OF TRANSPORTATION
ASCE 38-QLC/QLD UTILITY MAPPING PLANS
NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
CN A301000

NMDOT PROJECT (NM 500 BRIDGE REPLACEMENT)



NMDOT

NO.	DESCRIPTION	DATE	BY
4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
COVER SHEET

nm811 Know what's below. Call before you dig.

R. RAMSEY NEW MEXICO 23234 PROFESSIONAL ENGINEER 04/29/2021

GENERAL NOTES

1. SUBSURFACE UTILITY ENGINEERING IS A PROFESSIONAL PRACTICE DEFINED BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE.) T2 UE CONDUCTS UTILITY INVESTIGATIONS IN ACCORDANCE WITH ASCE 38: STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. IDENTIFYING AND MAPPING UNDERGROUND UTILITIES IS A RESULT OF GATHERING EVIDENCE FROM VARIOUS SOURCES AND EXACT UTILITY LOCATIONS ARE NOT CONFIRMED UNLESS VISUALLY EXPOSED AND SURVEYED, AND THEN ONLY AT THOSE SPECIFIC EXPOSED LOCATIONS. ADDITIONALLY, T2 UE CANNOT GUARANTEE THAT ALL UTILITIES HAVE BEEN DISCOVERED AND DEPICTED.

2. T2 UE INVESTIGATED THE DEPICTED UTILITIES AS INCLUDED IN THE LEGEND. OTHERS PROVIDED ALL OTHER INFORMATION, NOTABLY THE BACKGROUND INFORMATION (TOPOGRPAHIC AND ALIGNMENT INFORMATION). T2 UE DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

3. INVESTIGATIONS OF DEPICTED UTILITIES WERE COMPLETED ON AUGUST 28, 2020. T2 UE CLAIMS NO RESPONSIBILITY FOR NEW INSTALLATIONS OR ALTERATIONS TO EXISTING UTILITIES AFTER THIS DATE. CONSIDERATION SHOULD BE GIVEN TO UPDATING THIS INVESTIGATION PRIOR TO FINAL DESIGN AND/OR CONSTRUCTION.

4. UTILITY SIZE AND MATERIAL ARE SHOWN IF AVAILABLE FROM RECORD INFORMATION. ADDITIONALLY, FIELD OBSERVATIONS WERE CONDUCTED, WHERE POSSIBLE, TO CORROBORATE AND SUPPLEMENT RECORD INFORMATION BUT T2 UES INC. DOES NOT GUARANTEE ITS ACCURACY OR COMPLETENESS. PIPE DIAMETERS ARE NOMINAL AND NOT EXACT. IN THE EVENT NO INFORMATION IS PROVIDED OR INVESTIGATED IN THE FIELD, UTILITY LINES SIZE AND MATERIAL COMPOSITION ARE UNKNOWN. FOR LINES IN CONFLICT ADDITIONAL UTILITY COORDINATION AND INVESTIGATION IS RECOMMENDED.

5. PROFESSIONAL ASSISTANCE IS RECOMMENDED IN SELECTING LOCATIONS FOR QUALITY LEVEL A DATA FOR SPECIFIC DESIGN DECISIONS.

6. THIS INVESTIGATION DEPICTS UTILITIES FOR PLANNING AND DESIGN PURPOSES AND NOT FOR CONSTRUCTION. FOR DAMAGE PREVENTION DURING CONSTRUCTION, COMPLY WITH APPLICABLE ONE-CALL LAWS.

7. AS DEFINED BY THE PROJECT SCOPE, T2 UE ATTEMPTED TO FIND UNDOCUMENTED UTILITIES; LABELLED AS UNKNOWN UTILITIES ON THE PLAN SET, AS THEY HAVE NO CORRELATED RECORDS OR VISIBLE APPURTENANCES TO DETERMINE FUNCTION OR TYPE. HOWEVER, UNDOCUMENTED UTILITIES MAY BE PRESENT IN THE PROJECT AREA THAT WERE NOT DISCOVERABLE BY THE SCOPED EFFORT AND THEREFORE NOT DEPICTED.

8. THESE PLANS HAVE BEEN PREPARED FOR THE USE OF T2 UE'S CLIENT AND MAY NOT BE USED, REPRODUCED OR RELIED UPON BY THIRD PARTIES EXCEPT AS AGREED BY T2 UE AND ITS CLIENT OR AS REQUIRED BY LAW.

9. AS PER PROJECT SCOPE, THE POSITIONING AND SIZE OF SUBSURFACE UTILITY VAULTS WERE NOT INCLUDED AS PART OF THIS INVESTIGATION. IF FOUND TO BE IN CONFLICT WITH PROPOSED PLANS, THE POSITIONING AND SIZE OF VAULTS SHOULD BE CONFIRMED. THREE LARGE STORM DRAIN VAULTS WERE OBSERVED EAST OF THE INTERSECTION OF ISLETA BLVD & RIO BRAVO SW. THE SIZE/DIMENSIONS OF THESE VAULTS IS DEPICTED ACCORDING TO RECORD INFORMATION ONLY AND WAS NOT FIELD VERIFIED.

10. UNDER THE PROJECT SCOPE, THE FOLLOWING UTILITIES WERE EXPRESSLY EXCLUDED FROM THIS INVESTIGATION: LANDSCAPE IRRIGATION SYSTEMS, TRAFFIC LOOP DETECTION DEVICE, SEWER LATERALS AND UNDERGROUND STORAGE TANKS / ASSOCIATED PIPING OR SEPTIC SYSTEMS.

11. UTILITIES AND STRUCTURES SHOWN BEYOND THE PROJECT LIMITS ARE SHOWN FOR CONNECTIVITY PURPOSES ONLY AND WERE NOT INVESTIGATED WITH THE EXCEPTION OF CONFIRMING INVERTS AND DIRECTION OF PIPES.

12. SANITARY SEWER SERVICES WERE UNDISCOVERABLE DURING THE FIELD INVESTIGATION, UNDER THE CURRENT SCOPE, AND ARE DEPICTED HEREIN ACCORDING TO RECORD. A CCTV INVESTIGATION IS RECOMMENDED IF MORE ACCURATE SEWER SERVICE INFORMATION IS REQUIRED.

13. NON-CONDUCTIVE UTILITY PIPES, WHERE TRACER WIRE WAS AVAILABLE, IS DESIGNATED AND LABELED QLB. HOWEVER, THE ALIGNMENT LOCATION OF THE TRACER WIRE MAY BE DIFFERENT FROM THE ALIGNMENT LOCATION OF THE ACTUAL UTILITY PIPE.

14. UTILITIES ARE GENERALLY DEPICTED BY A SINGLE LINE. HOWEVER, LARGER UTILITIES (12" AND GREATER) MAY BE DEPICTED AT THEIR REPORTED WIDTH CENTERED OVER THE ACTUAL QUALITY LEVEL RESULTS. THEREFORE, ANY UTILITY EDGES SHOWN ARE FOR SCHEMATIC DEPICTION ONLY AND SHOULD NOT BE CONSIDERED RELIABLE FOR DESIGN. IF EXACT EDGES OF UTILITY ARE NEEDED, QLA DATA IS REQUIRED.

15. OVERHEAD ULITIES ARE DEPICTED WITH THE PRIMARY UTILITY ONLY (SHOWN AS A SINGLE LINE). IF SECONDARY UTILITIES EXIST WITHIN A GIVEN OVERHEAD UTILITY SEGMENT, THEY ARE NOTED AS SUCH ON THESE PLANS, WITH THE APPARENT SECONDARY UTILITY OWNERS NOTED. NOTE: THE PRECISE HORIZONTAL AND VERTICAL POSITIONING ON EACH INDIVIDIUAL OVERHEAD UTILITY LINE HAS NOT BEEN DETERMINED AS PART OF THIS PROJECT.

16. DEPICTED ON THESE PLANS ARE 2 ABANDONED FORCEMAIN SEWER LINES. NO EVIDENCE OF THESE LINES WERE OBSERVED IN THE FIELD AND AS SUCH THEY ARE DEPICTED ON THESE PLANS ACCORDING TO UTILITY RECORD INFORMATION, QLD, ONLY. FURTHER COORDINATION IS RECOMMENDED TO CONFIRM THE PRESENCE AND STATUS OF THESE SEWER LINES.

17. AN ACTIVE CONSTRUCTION ZONE WAS PRESENT DURING THE SUE INVESTIGATION ON THE NORTH-EAST CORNER OF ISLETA BLVD AND RIO BRAVO BLVD (SHEET 4). A FEW UTILITIES AND UTILITY FEATURES WERE OBSERVED TO BE LOCATED WITHIN THIS CONSTRUCTION ZONE. AS SUCH ADDITIONAL UTILITIES MAY BE PRESENT WHICH WERE INACCESSIBLE AND HENCE NOT DEPICTED ON THESE PLANS.

UTILITY INVESTIGATION STATEMENT OF ASCE 38 COMPLIANCE

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UTILITY CONTACT INFORMATION

OWNER	UTILITY	CONTACT	PHONE	RESPONSE
ABCWUA	WATER	MARTIN SANCHEZ mvsanchez@abcwua.com	(505) 289-3246	RECORDS RECEIVED
ADB COMPANIES	TELECOMMUNICATION	BRAD MELTON bmelton@adb-us.com	(314) 724-2067 (314) 426-5200	RECORDS RECEIVED
AT&T	TELECOMMUNICATION	SEAN KELLY sk1561@att.com	(505) 200-1994	RECORDS RECEIVED
BERNALILLO CO (BLC)	DRAINAGE	PATRICK CHAVEZ pachavez@bernco.gov	(505) 848-1505	RECORDS RECEIVED
BERNALILLO CO. (BLC)	TRAFFIC	ANTONIO JARAMILLO aejaramillo@bernco.gov DAVID HALL dhall@bernco.com	(505) 848-1548 (505) 848-1542	RECORDS RECEIVED
CENTURYLINK (CLN)	TELECOMMUNICATION	ABDUL BHUIYAN abdul.bhuiyan2@centurylink.com	(505) 767-7443 (505) 231-0999	RECORDS RECEIVED
CITY OF ALBUQUERQUE (COA)	DRAINAGE	VINCENT PAUL vpaul@cabq.gov	(505) 768-2727	RECORDS RECEIVED
COMCAST (CST)	TV - CABLE	MIKE MORTUS mike_mortus@cable.comcast.com ARTJAHMEL DAVIS artjahmel_davis@comcast.com	(505) 269-4006 (720) 413-1517	RECORDS RECEIVED
MCI	TELECOMMUNICATION	LEONARD MANZANARES leonard.manzanares@verizon.com	(505) 274-4127	RECORDS RECEIVED
NM DOT	FIBER OPTIC	CHARLES REMKES charles.remkes@state.nm.us	(505) 490-3308 (505) 222-6554	RECORDS RECEIVED
NM GAS (NMG)	GAS	DANNA DOMINGUEZ danna.dominguez@nmgco.com	(505) 697-3139	RECORDS RECEIVED
PNM	ELECTRIC	CHRIS BUDD chris.budd@pnm.com	(505) 241-3697	RECORDS RECEIVED
SACRED WIND (SDW)	TELECOMMUNICATION	GARY KLASEN gklasen@sacredwindnm.com	(505) 908-2667	NO CONFLICT
UNITE PRIVATE NETWORKS (UPN)	TELECOMMUNICATION	JOHN HUFNAGEL john.hufnagel@upnfiber.com	(505) 301-9118	RECORDS RECEIVED
ZAYO (ZYO)	TELECOMMUNICATION	KENNETH RILEY kenneth.riley@zayo.com	(505) 514-7024 (505) 234-0799	RECORDS RECEIVED

UTILITY DETECTION EQUIPMENT UTILIZED

- DITCH WITCH SUBSITE 950T
- RADIODETECTION RD8100PDL
- VIVAX METROTECH 810
- VIVAX METROTECH PROLOC 2
- GSSI GPR
- LMX200 (GPR)
- SCHONDSTEDT MAGNETIC LOCATOR
- MAGNAWAND - MAGNETIC LOCATOR
- DETECTABLE RODDER

SURVEY CONTROL

CONTROL WAS PROVIDED BY THE CLIENT VIA THE FILE "CN A301000 - PRIMARY CONTROL PNEZD.CSV" AND AN ACCOMPANYING GOOGLE EARTH FILE "CN A301000 PRIMARY CONTROL NETWORK.KMZ". WITH NO OTHER QUALIFYING STATEMENTS PROVIDED, THE CONTROL POINTS WERE IMPORTED INTO GOOGLE EARTH FROM THE *.CSV AND THEY PERFORMED AS GROUND COORDINATES DEVELOPED BY SCALING NEW MEXICO COORDINATE SYSTEM 1983, CENTRAL ZONE VALUES BY SOME UNDISCLOSED GRID TO GROUND FACTOR. DUE TO THIS UNCERTAINTY AS TO THE SCALING PARAMETERS, A NO PROJECTION/NO DATUM SYSTEM WAS EMPLOYED WHERE ALL FIVE (5) CONTROL POINTS WERE HELD IN A SITE CALIBRATION, HOLDING ALL POINTS BOTH HORIZONTALLY AND VERTICALLY. THE RESULTING MAXIMUM RESIDUALS WERE 0.045 FT HORIZONTALLY AND 0.016 FEET VERTICALLY. THE SUE MAPPING WAS PROVIDED IN THE CONTEXT OF THIS CONTROL.

THE FOLLOWING POINTS WERE PROVIDED BY THE CLIENT AND USED IN THE CALIBRATION AND SUBSEQUENT SUE MAPPING; UNIT OF MEASURE IS INTERNATIONAL FEET.

CP #	GRID NORTHING	GRID EASTING	NAVD88 ELEVATION	DESCRIPTION
1	1465730.112	1509806.560	4929.484'	2" ALUM CAP A301000
2	146589.999	1512938.084	4939.086'	2" ALUM CAP A301000
3	1465968.087	1515363.474	4944.628'	2" ALUM CAP A301000
4	1465827.797	1518506.852	4933.550'	2" ALUM CAP A301000
5	1468953.175	1519210.616	4934.545'	2" ALUM CAP A301000

SHEET INDEX

SHEET NO.	DESCRIPTION
01	COVER SHEET
02	GENERAL NOTES, SURVEY CONTROL
03	KEY MAP AND LEGEND
04 to 17	UTILITY MAPPING PLAN SHEET

NO.	DESCRIPTION	DATE	BY
4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

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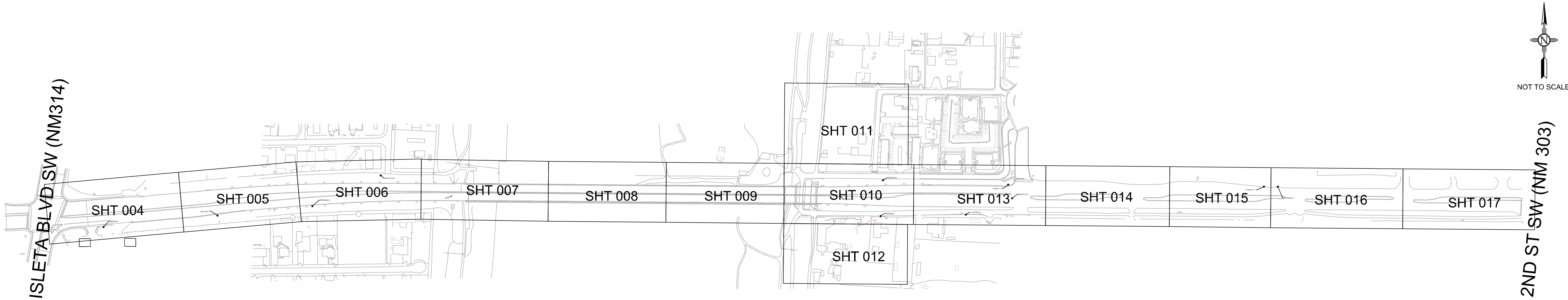
NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
GENERAL NOTES

PROJECT CONTROL NUMBER: A301000



RIO BRAVO BLVD (NM500)

LEGEND

UTILITY SYMBOLS

- TRAFFIC SIGNAL JUNCTION BOX
- TRAFFIC SIGNAL POLE
- STREET LIGHT JUNCTION BOX
- UG TRAFFIC VAULT
- ELECTRIC CABINET
- ELECTRIC JUNCTION BOX
- ELECTRIC METER
- ELECTRIC RISER/OUTLET
- LIGHT - ARM
- CATV MANHOLE
- CATV RISER
- UG CATV VAULT
- TELEPHONE MANHOLE
- TELEPHONE RISER
- TELEPHONE WARNING SIGN
- UG TELEPHONE VAULT
- FIBER OPTIC WARNING SIGN
- GAS METER
- AIR RELEASE VALVE
- GAS WARNING SIGN
- GUY ANCHOR
- CATCH BASIN
- SANITARY SEWER CLEANOUT
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- FIRE HYDRANT
- MONITORING WELL
- WATER METER
- WATER VALVE
- IRRIGATION CONTROL
- UTILITY POLE
- EDGE OF CONCRETE
- UNDERGROUND STORM DRAIN STRUCTURE

UTILITY LINETYPES

TS	BERNALILLO COUNTY TRAFFIC SIGNAL LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
SL	PNM STREET LIGHT LINE UNLESS OTHERWISE NOTED (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
OHSL	PNM OVERHEAD STREET LIGHT LINE (QUALITY LEVEL C UNLESS OTHERWISE NOTED)
E	PNM ELECTRIC LINE UNLESS OTHERWISE NOTED (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
OHE	PNM OVERHEAD ELECTRIC LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
CTV	COMCAST CABLE TV LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
OHCTV	COMCAST OVERHEAD CABLE TV LINE (QUALITY LEVEL C UNLESS OTHERWISE NOTED)
FOCT	COMCAST FIBER OPTIC CABLE TV LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
T	TELEPHONE LINE (OWNER AS NOTED) (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
OHT	OVERHEAD TELEPHONE LINE (OWNER AS NOTED) (QUALITY LEVEL AS NOTED)
FOT	FIBER OPTIC TELEPHONE LINE (OWNER AS NOTED) (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
G	NM GAS NATURAL GAS LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
SD	BERNALILLO COUNTY STORM DRAINAGE LINE (QUALITY LEVEL C UNLESS OTHERWISE NOTED)
SS	ABCWUA SANITARY SEWER LINE (QUALITY LEVEL C UNLESS OTHERWISE NOTED)
W	ABCWUA WATER LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
RW	ABCWUA RECLAIMED WATER LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
IRR	IRRIGATION LINE (OWNER AS NOTED) (QUALITY LEVEL C UNLESS OTHERWISE NOTED)
UNK	UNKNOWN UTILITY LINE (QUALITY LEVEL B UNLESS OTHERWISE NOTED)
ABAN	ABANDONED UTILITY LINE (QUALITY LEVEL IS AS NOTED)
	AREA UNDER CONSTRUCTION BOUNDARY LINE (UNABLE TO INVESTIGATE)
	ASCE 38 INVESTIGATION BOUNDARY LINE
	END/ LOSS OF SIGNAL
	LIMITS OF ASCE 38 INVESTIGATION
X	CHANGE OF ASCE 38 QUALITY LEVEL
	END OF UTILITY LINE
	LINE LEADS TOWARD BUILDING
COP-36"VCP-QLD	(UTILITY OWNER)-(SIZE AND/OR TYPE)- (ASCE QUALITY LEVEL) (IF UTILITY SIZE AND/OR TYPE ARE UNKNOWN, THEN MARKED UNK)

UTILITY QUALITY LEVELS

(OBTAINED FROM ASCE PUBLICATION CI/ASCE STANDARD 38)

- QUALITY LEVEL "D" (QLD)
  INFORMATION DERIVED FROM EXISTING RECORDS AND/OR ORAL RECOLLECTIONS.
- QUALITY LEVEL "C" (QLC)
  INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL "D" INFORMATION.
- QUALITY LEVEL "B" (QLB)
  INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. THIS INFORMATION IS SURVEYED TO PROJECT TOLERANCES.
- QUALITY LEVEL "A" (QLA)
  PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES AT A SPECIFIC POINT. DIAMETERS SHOWN ARE VERIFIED VISUALLY AND MAY NOT BE EXACT.

ABBREVIATIONS

ABDN	ABANDONED
BLC	BERNALILLO COUNTY
CCTV	CLOSED CIRCUIT TELEVISION
CTV	CABLE TELEVISION
CCP	CONCRETE CYLINDER PIPE
CIP	CAST IRON PIPE
CP	CONCRETE PIPE
CU	COPPER PIPE
DIP	DUCTILE IRON PIPE
EL	ELEVATION
FOT	FIBER OPTIC TELEPHONE
FOCT	FIBER OPTIC CABLE TELEVISION
INV	INVERT
LV3	LEVEL 3
OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OHT	OVERHEAD TELEPHONE
PE	POLYETHYLENE PIPE
PRI	PRIVATE
PVC	POLYVINYL CHLORIDE
STL	STEEL
TELE	TELEPHONE
TH	TESTHOLE
TN	TOP OF NUT
UNK	UNKNOWN
UPN	UNITE PRIVATE NETWORKS
VCP	VITRIFIED CLAY PIPE
ZYO	ZAYO

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NEW MEXICO PROFESSIONAL ENGINEER 23234 RAMSEY 04/29/2021

NO.	DESCRIPTION	DATE	BY
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3			
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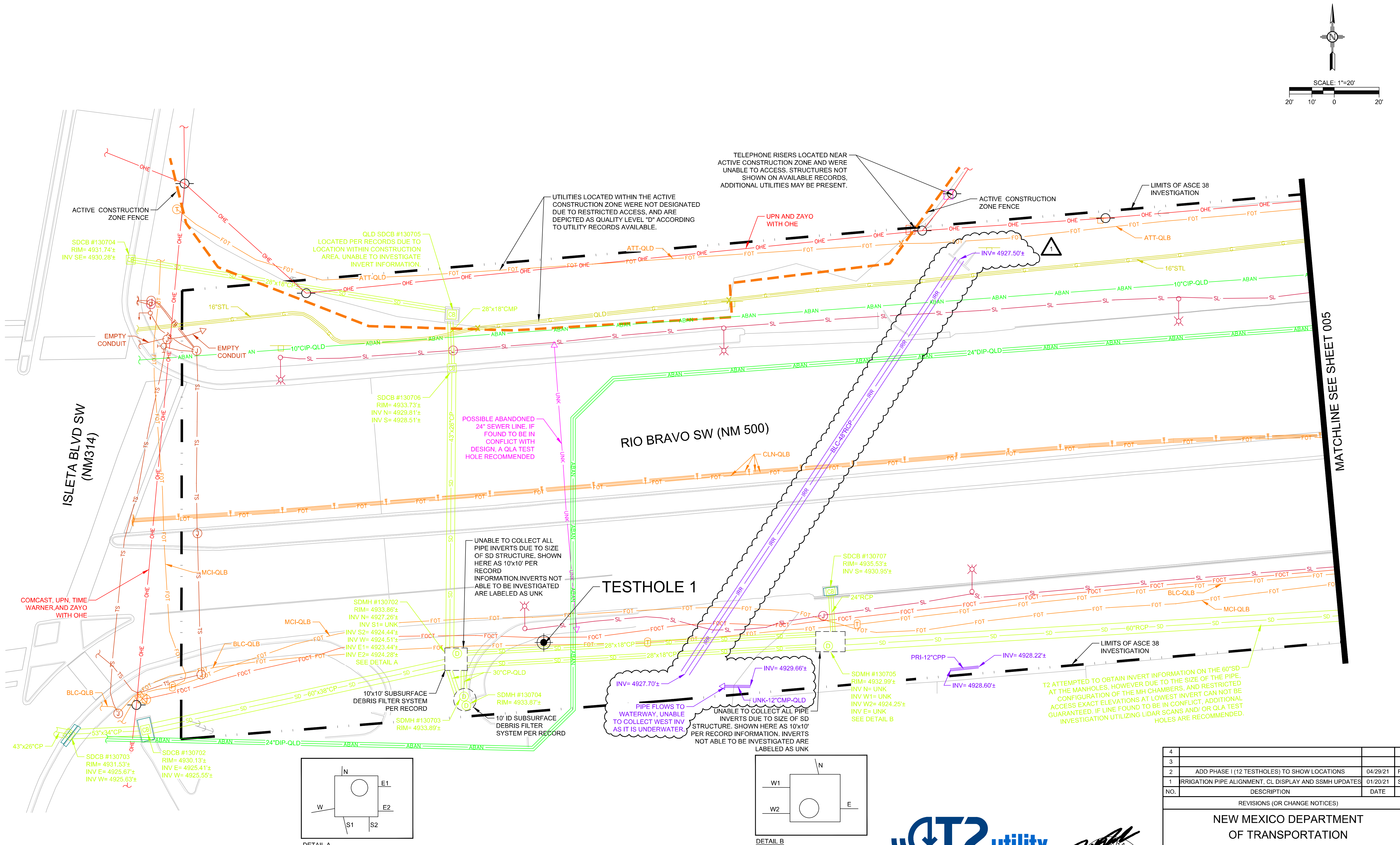
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
KEY MAP AND LEGEND



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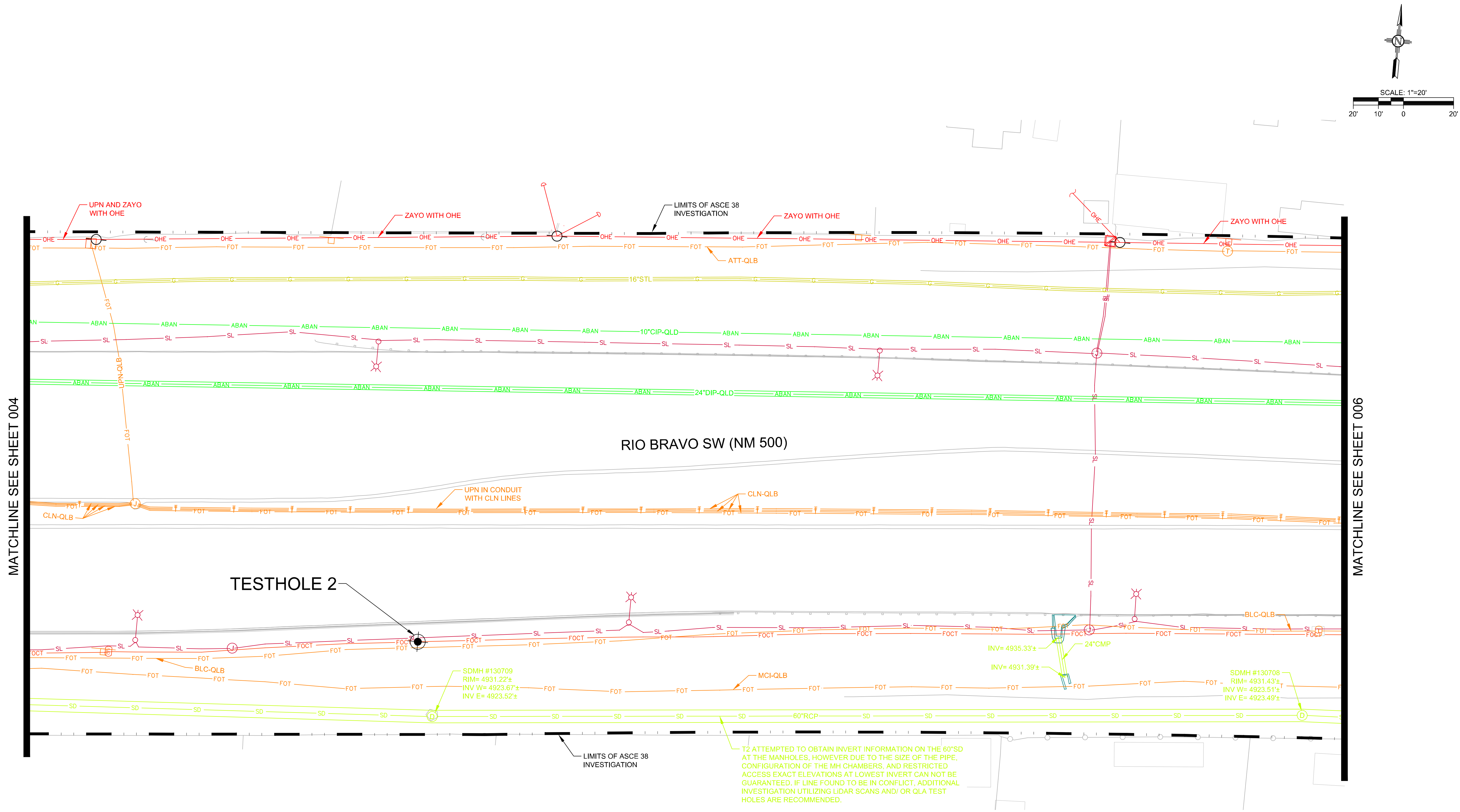
NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

Drawing File: J:\Project\NM08400500 - NM 500 bridge replacment\CAD\Utilities\NM08400500-SUR-SUE-UTIL.dwg Save Date:Apr. 29, 21
PLOT DATE: Apr. 29, 21 BY: ronald.carrell

DESIGNED BY: SEM

NEW MEXICO PROJECT NO. A301000

DRAWING SCALE: 1" = 20'



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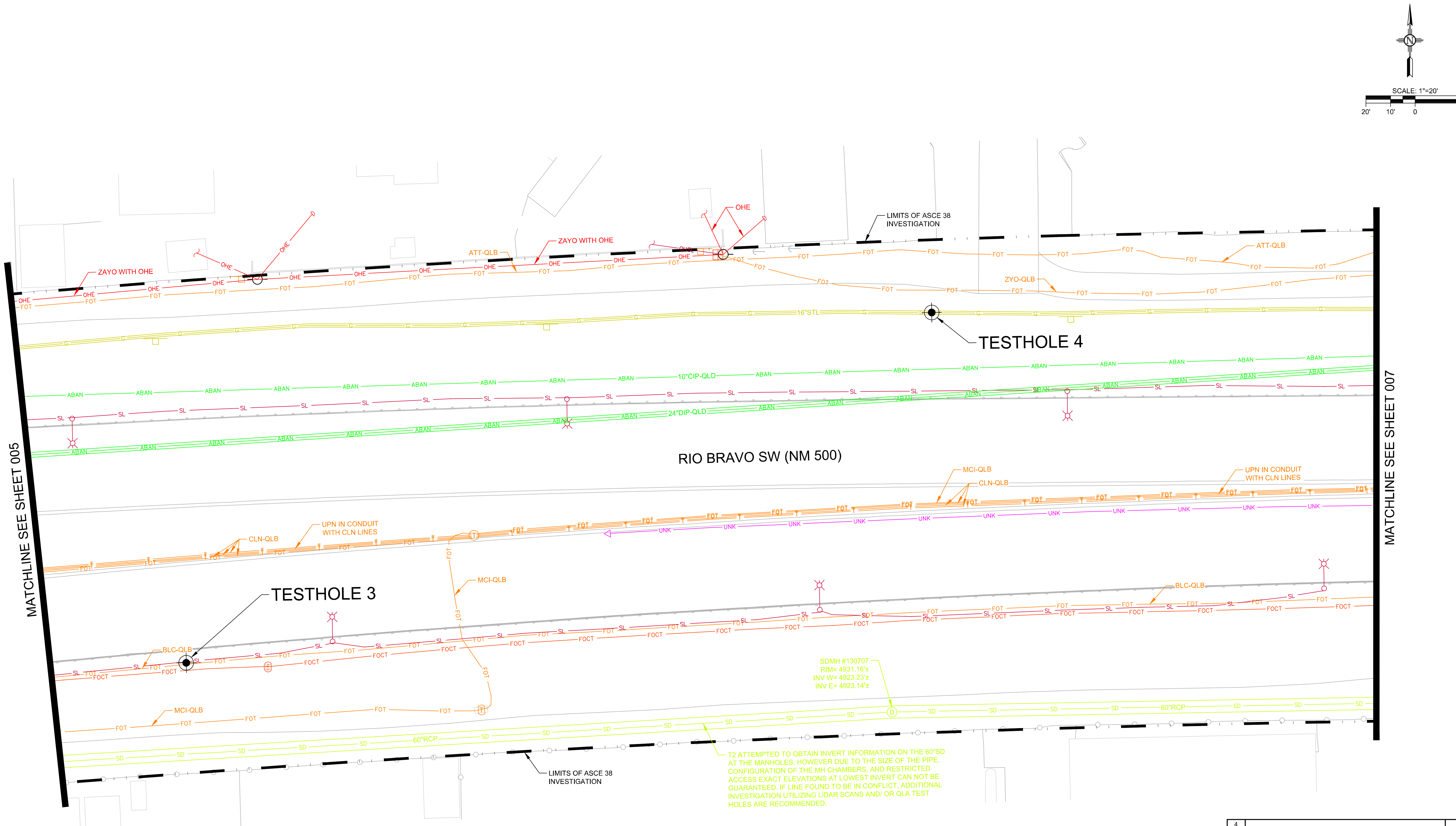

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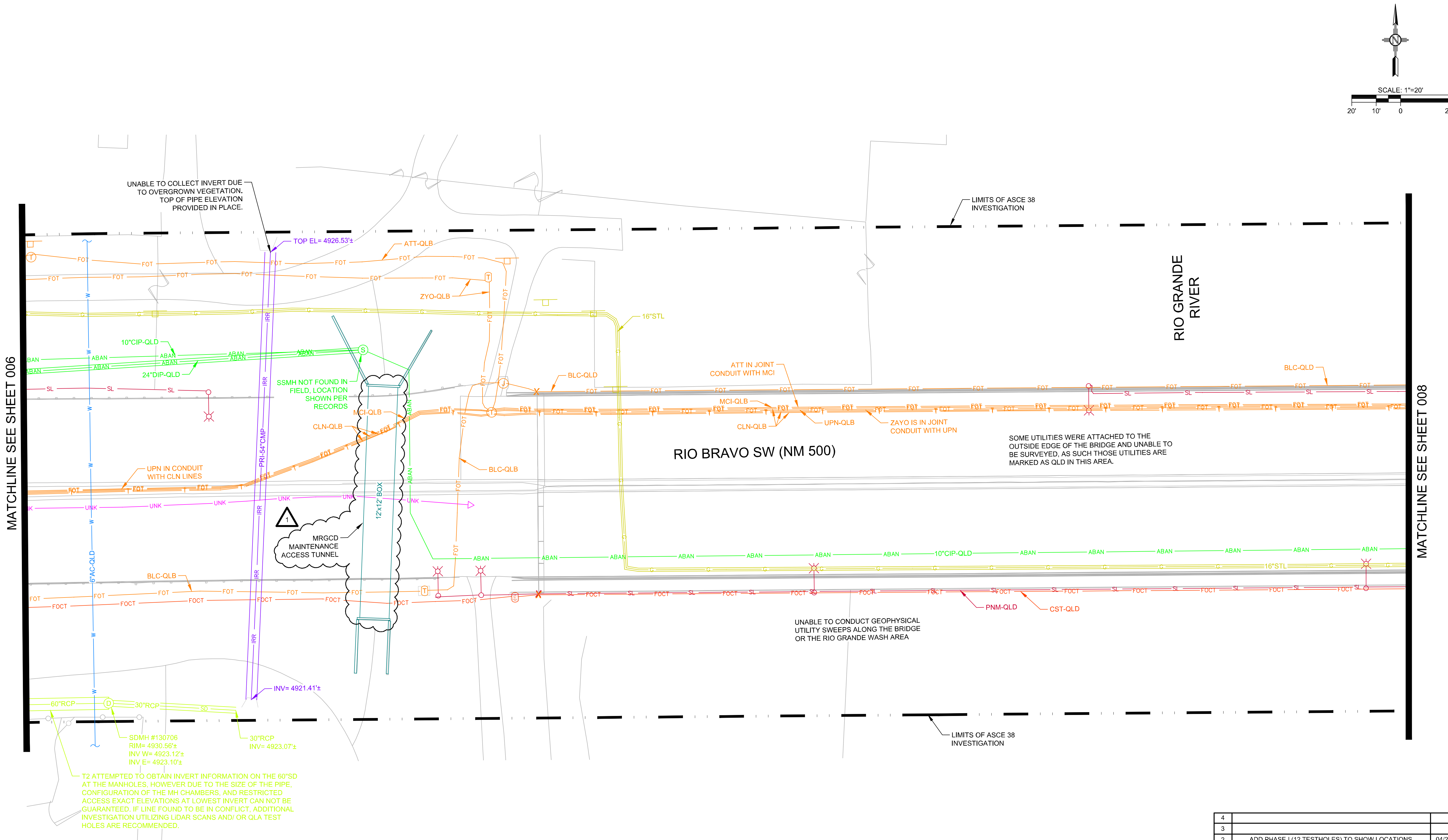

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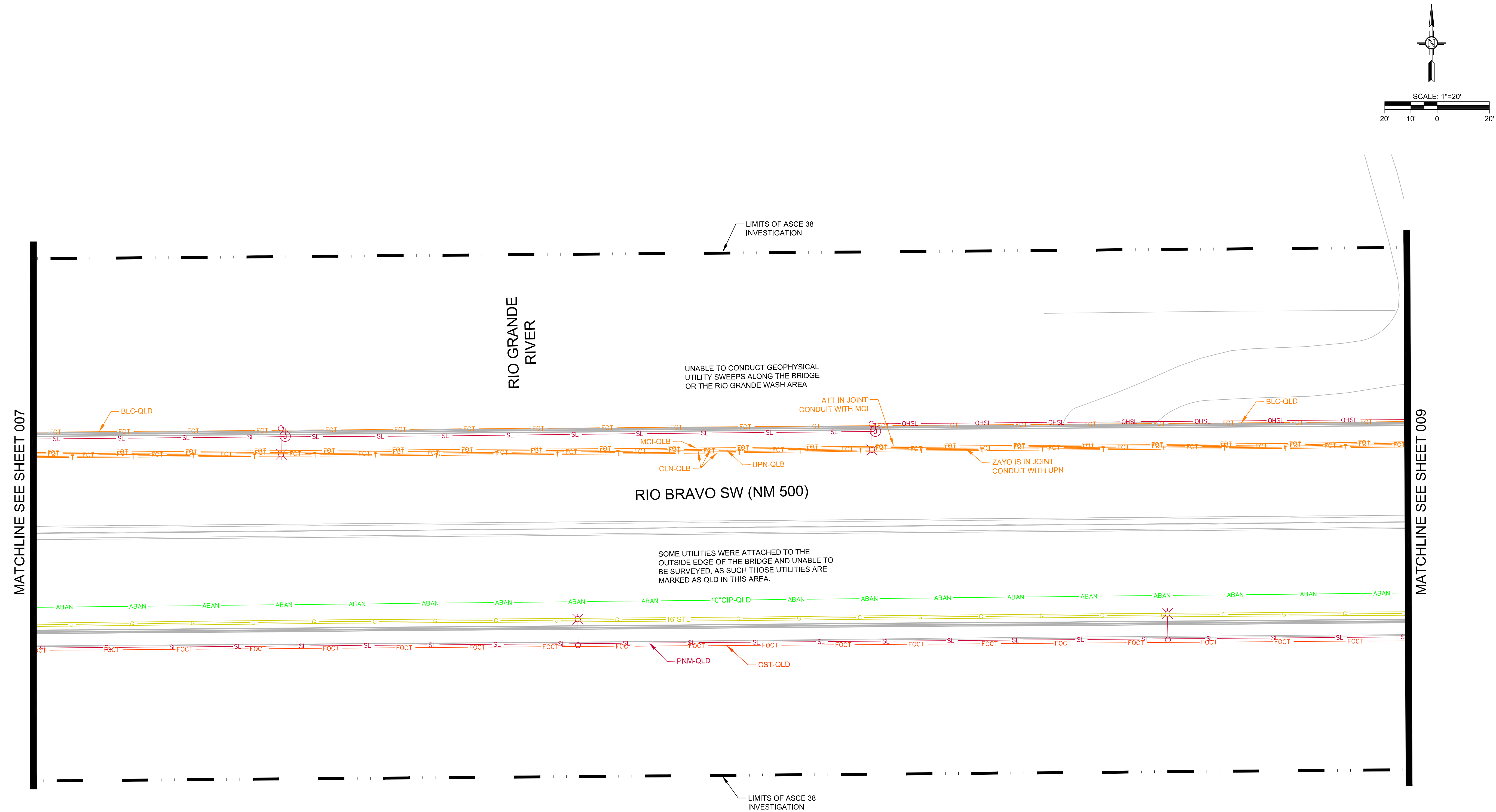

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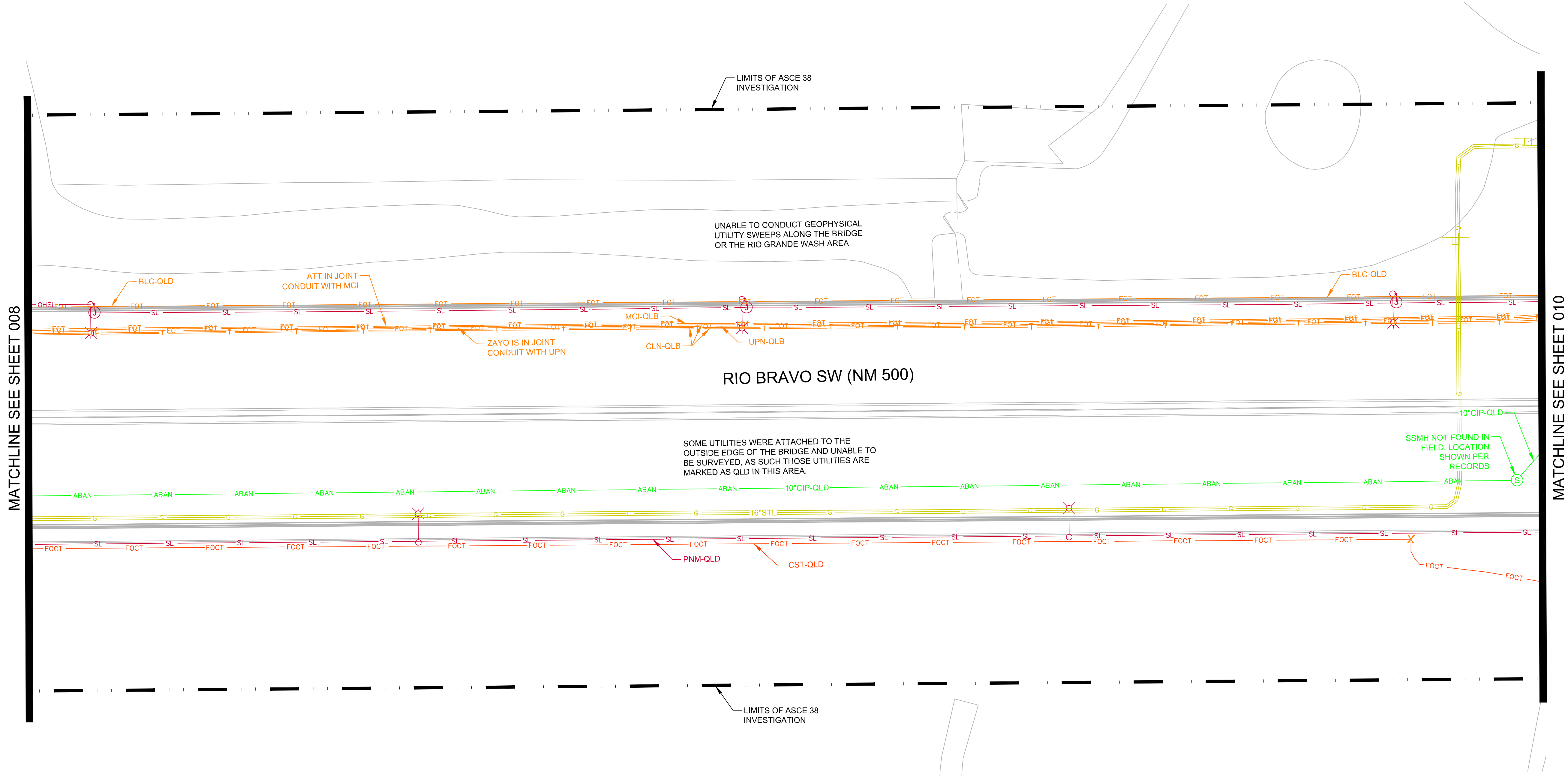

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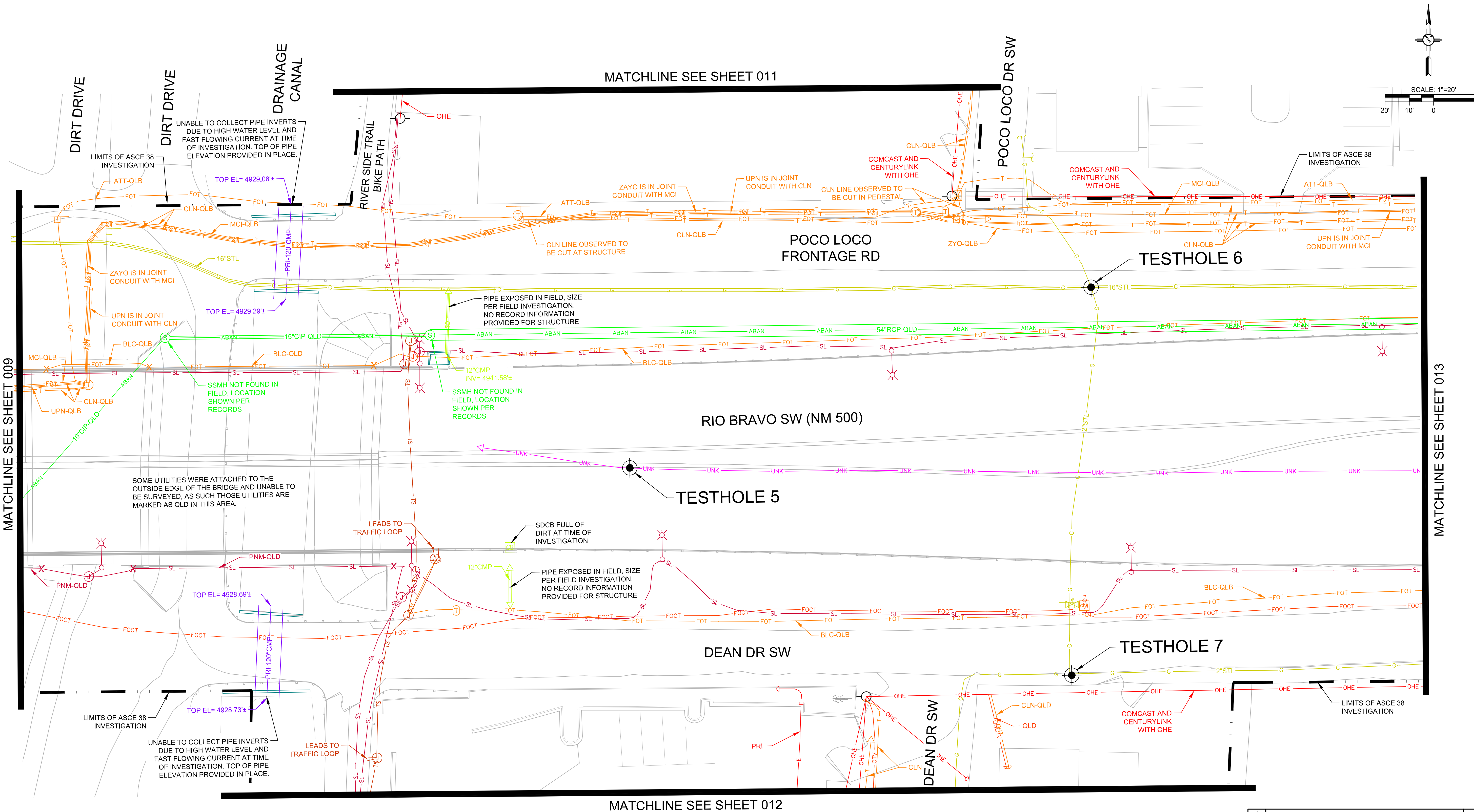

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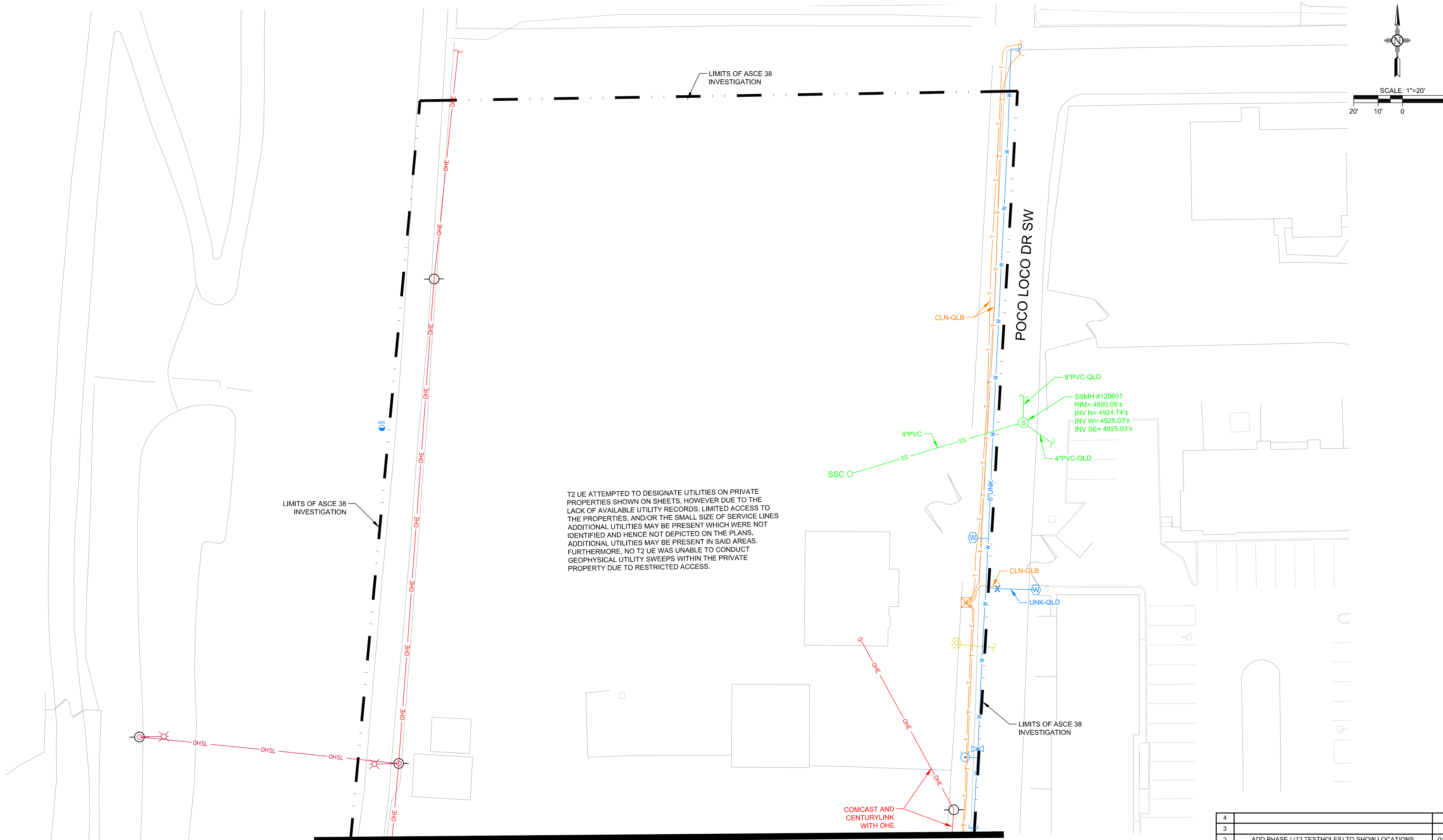
R. RAMSEY NEW MEXICO 23234 PROFESSIONAL ENGINEER 04/29/2021

UTILITY INVESTIGATION STATEMENT OF ASCE 38 COMPLIANCE

THE UTILITIES DEPICTED HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH THE ASCE 38 STANDARD AND SHOWN AT THEIR ACHIEVED QUALITY LEVELS. ALL OTHER INFORMATION HAS BEEN PROVIDED BY OTHERS AND INCLUDED AS REFERENCE ONLY.



MATCHLINE SEE SHEET 010

UTILITY INVESTIGATION STATEMENT OF ASCE 38 COMPLIANCE

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1-855-222-T2UE | WWW.T2UE.COM
ALBUQUERQUE
2815 BROADBENT, NE, SUITE A,
ALBUQUERQUE, NM 87107

NO.	DESCRIPTION	DATE	BY
4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

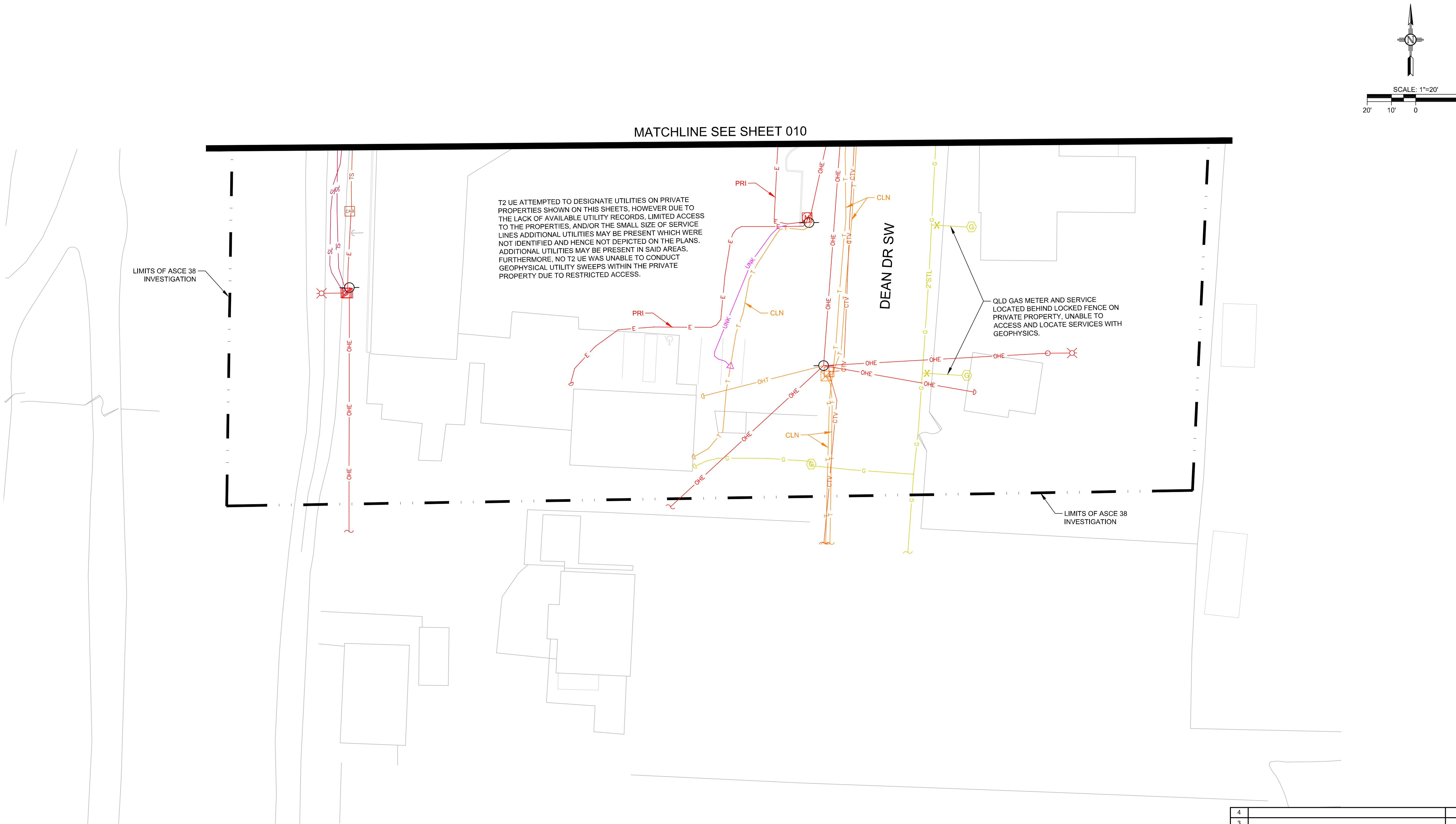
NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

Drawing File: J:\Project\NM08400500 - NM 500 bridge replacment\CAD\Utilities\NM08400500-SUR-SUE-UTIL.dwg Save Date:Apr. 29, 21
PLOT DATE: Apr. 29, 21 BY: ronald.carrell

DESIGNED BY: SEM

NEW MEXICO PROJECT NO. A301000

DRAWING SCALE: 1" = 20'



4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM
NO.	DESCRIPTION	DATE	BY

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

T2 utility engineers
1-855-222-T2UE | WWW.T2UE.COM
ALBUQUERQUE
2815 BROADBENT, NE, SUITE A,
ALBUQUERQUE, NM 87107

NEW MEXICO 23234 PROFESSIONAL ENGINEER 04/29/2021

nm811 Know what's below. Call before you dig.

UTILITY INVESTIGATION STATEMENT OF ASCE 38 COMPLIANCE
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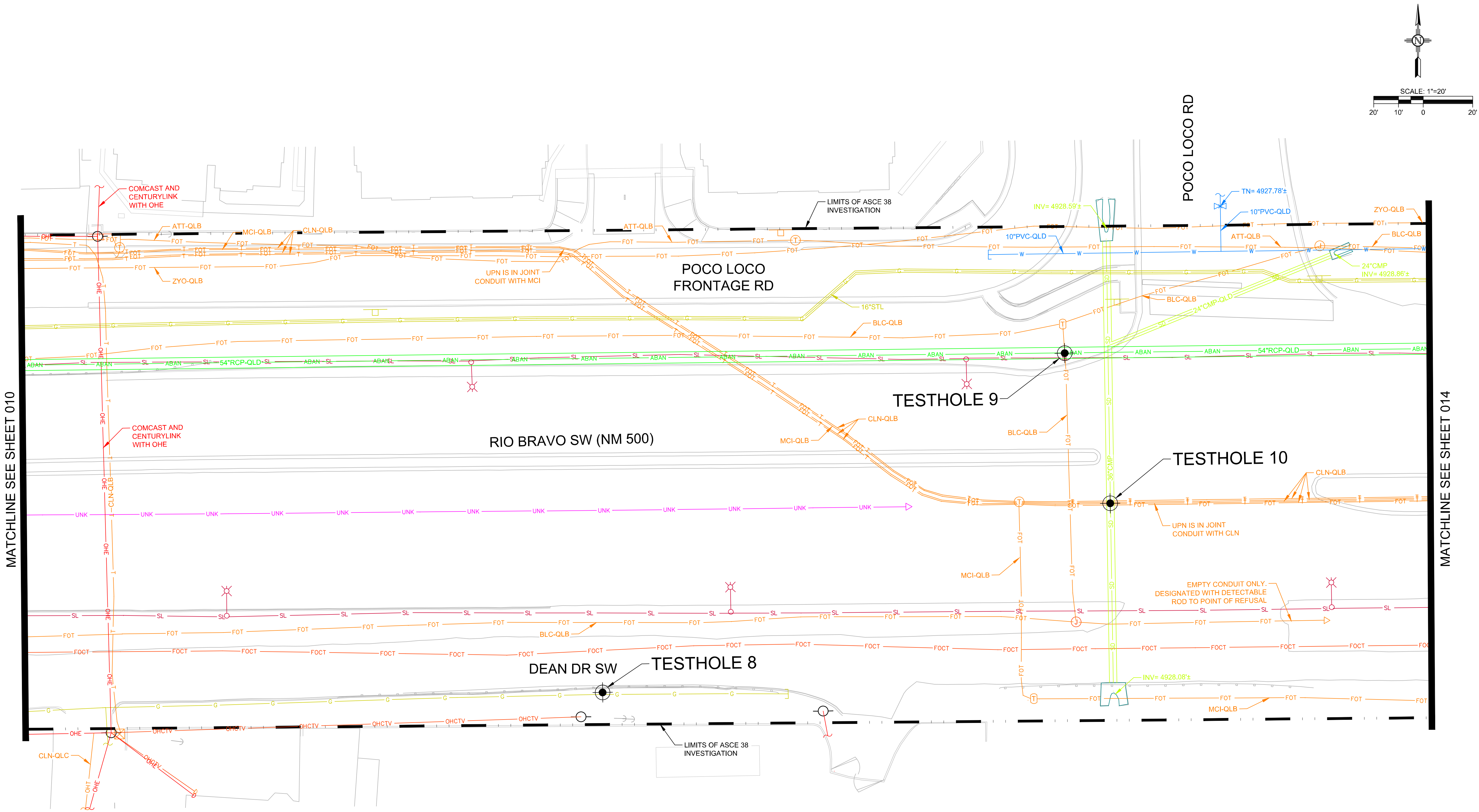

UTILITY INVESTIGATION STATEMENT OF ASCE 38 COMPLIANCE

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ALBUQUERQUE
2815 BROADBENT, NE, SUITE A,
ALBUQUERQUE, NM 87107

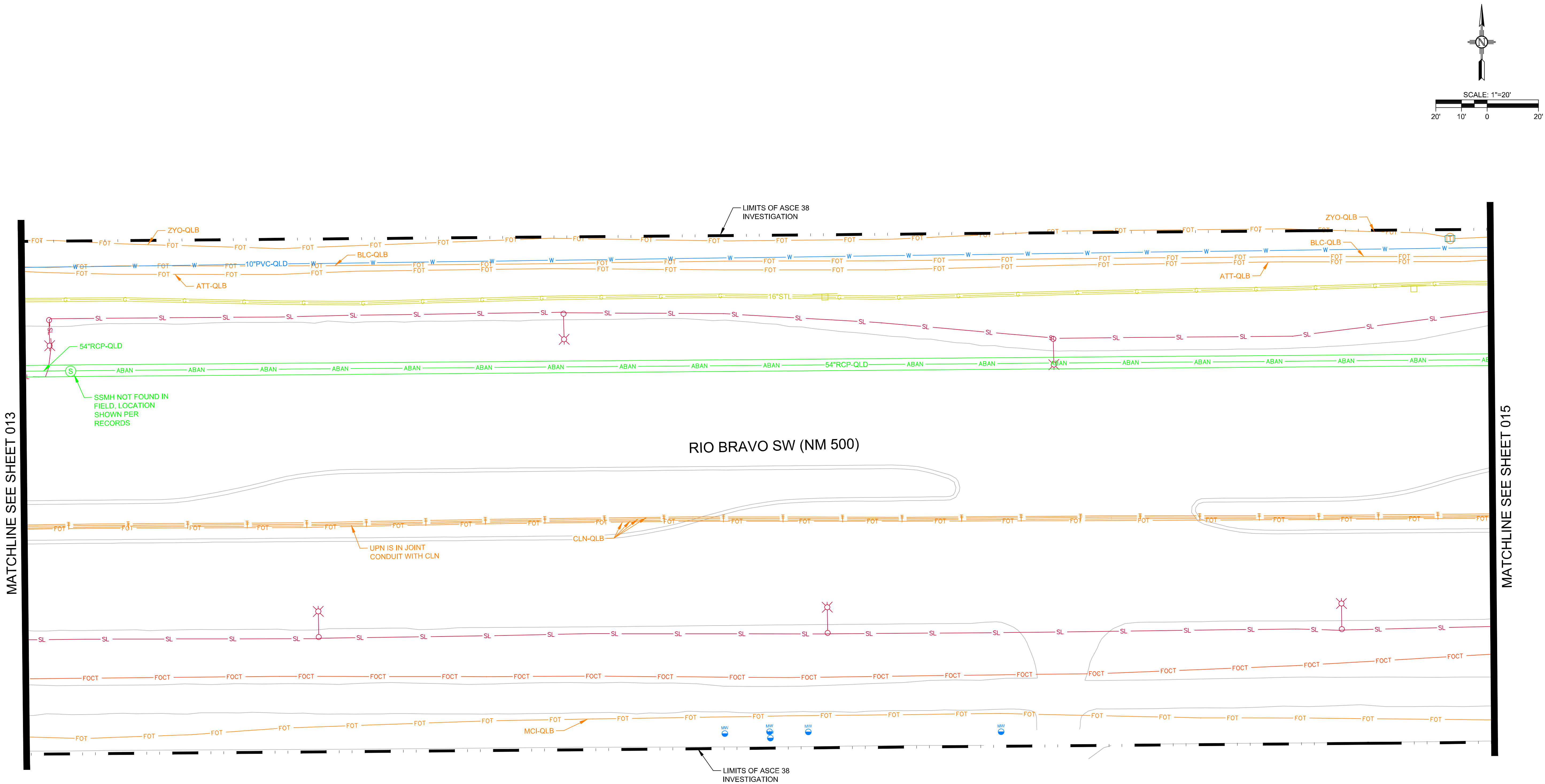
NEW MEXICO PROFESSIONAL ENGINEER 23234 04/29/2021

NO.	DESCRIPTION	DATE	BY
4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET



NO.	DESCRIPTION	DATE	BY
4			
3			
2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

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ALBUQUERQUE
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NEW MEXICO PROFESSIONAL ENGINEER 23234 04/29/2021

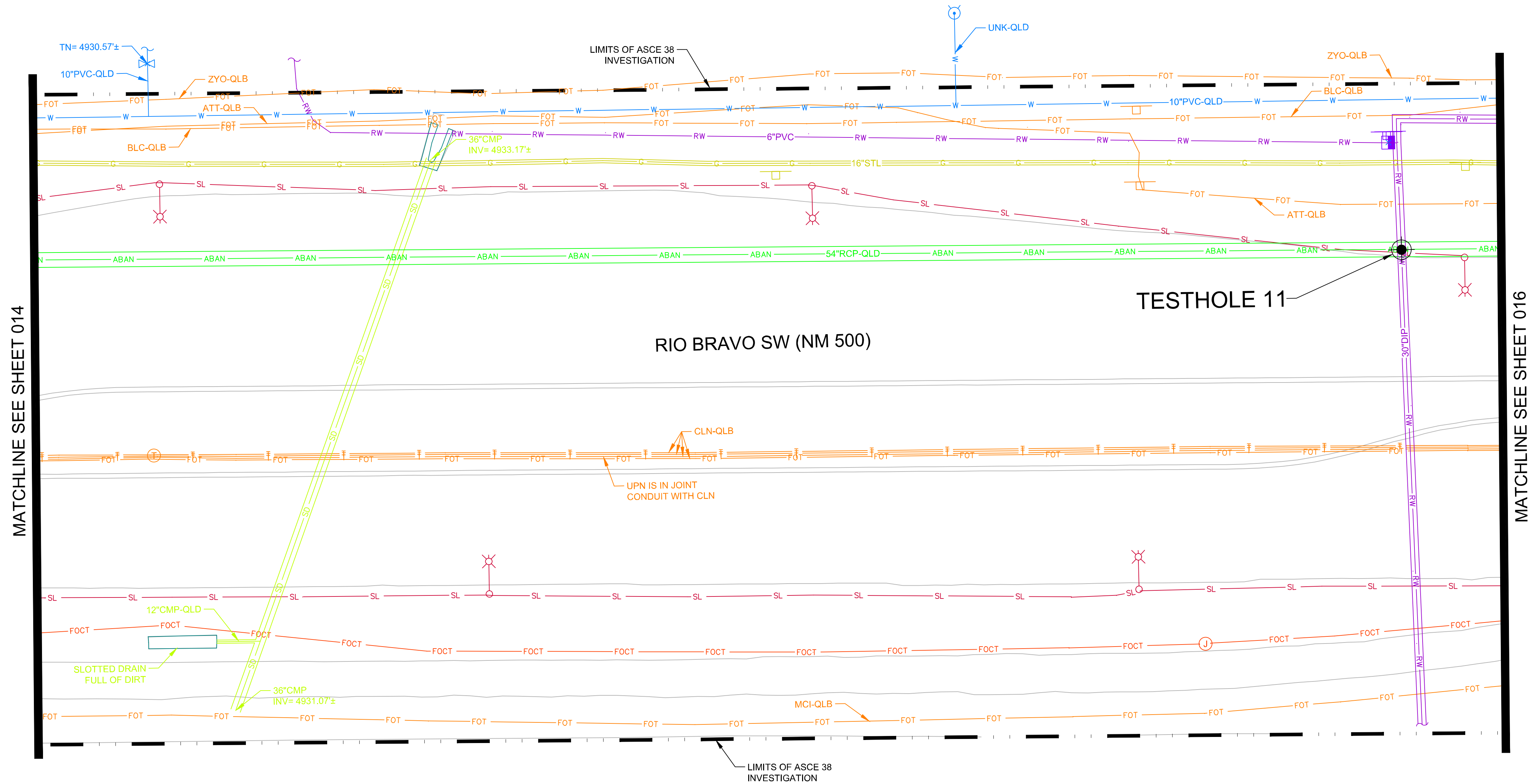
Drawing File: J:\Project\NM08400500 - NM 500 bridge replacment\CAD\Utilities\NM08400500-SUR-SUE-UTIL.dwg Save Date:Apr. 29, 21
PLOT DATE: Apr. 29, 21 BY: ronald.carrell

DESIGNED BY: SEM

NEW MEXICO PROJECT NO. A301000

DRAWING SCALE: 1" = 20'

SCALE: 1"=20'



NO.	DESCRIPTION	DATE	BY
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2	ADD PHASE I (12 TESTHOLES) TO SHOW LOCATIONS	04/29/21	RDC
1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

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2815 BROADBENT, NE, SUITE A,
ALBUQUERQUE, NM 87107

NEW MEXICO PROFESSIONAL ENGINEER 23234 04/29/2021

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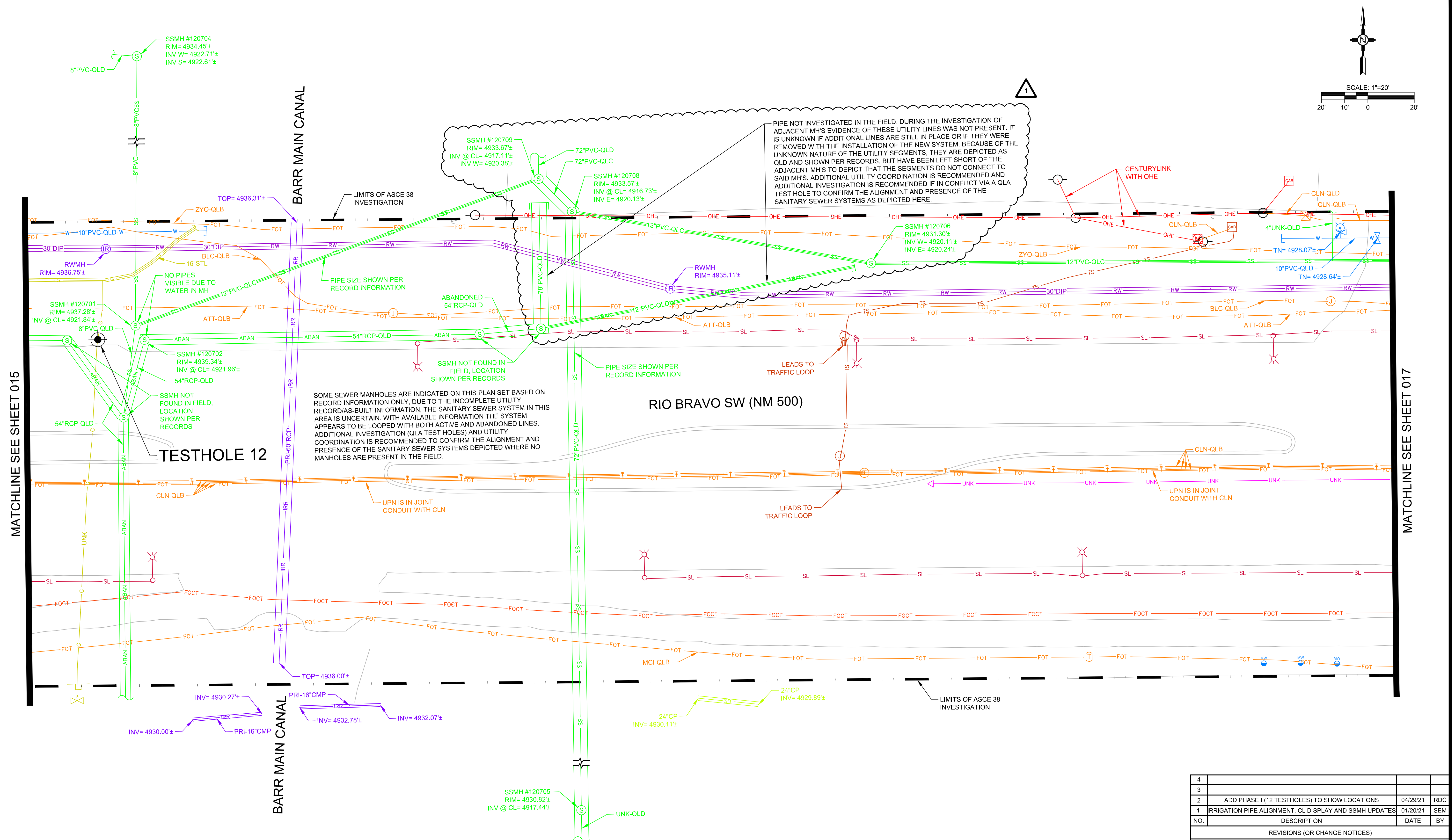

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1	IRRIGATION PIPE ALIGNMENT, CL DISPLAY AND SSMH UPDATES	01/20/21	SEM

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

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ALBUQUERQUE
2815 BROADBENT, NE, SUITE A,
ALBUQUERQUE, NM 87107

R... RAMSEY NEW MEXICO 23234 PROFESSIONAL ENGINEER 04/29/2021

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REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
BERNALLILO COUNTY
PLAN SHEET

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PLOT DATE: Apr. 29, 21 BY: ronald.carrell

DESIGNED BY: SEM

NEW MEXICO PROJECT NO. A301000

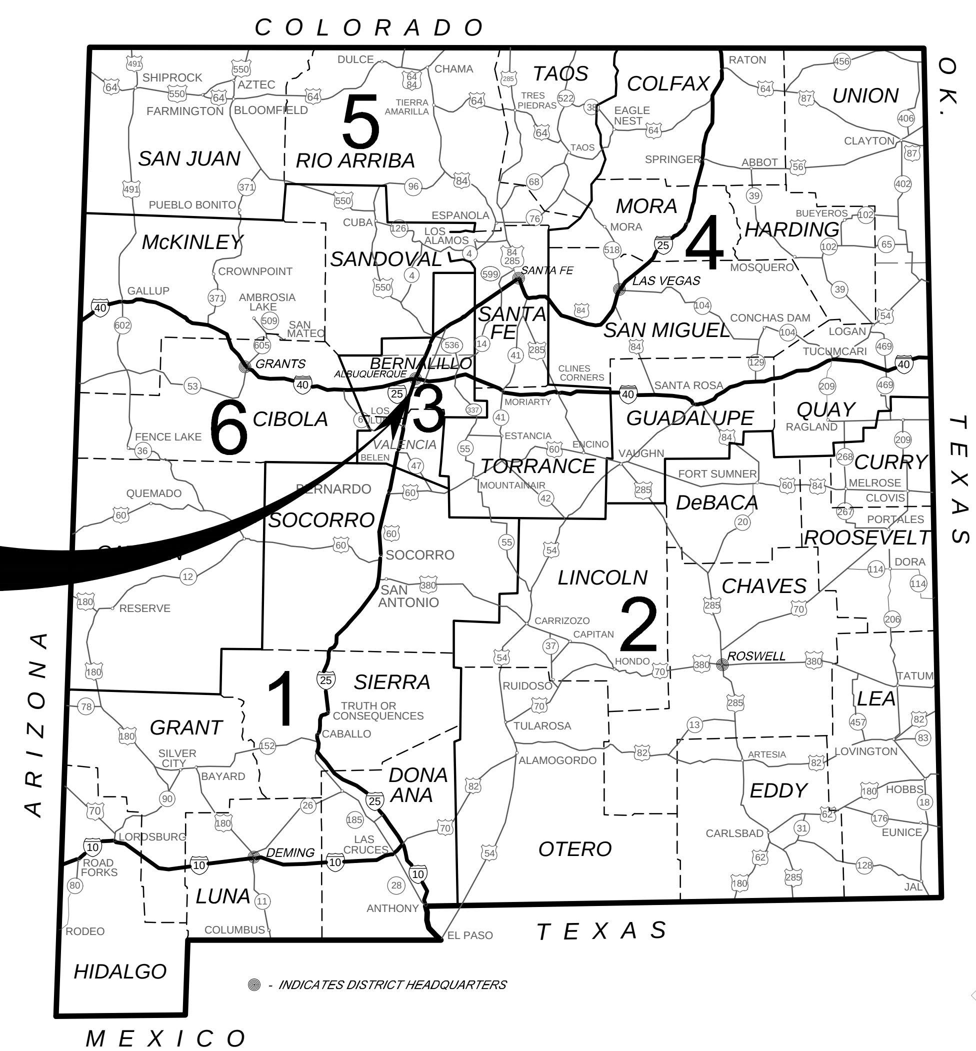
DRAWING SCALE: 1" = 20'

APPENDIX B
PHASE IA/B CONCEPTUAL DESIGN PLANS, CN A301000

New Mexico
DEPARTMENT OF TRANSPORTATION

NM 500 - MP 9.087 TO MP 10.318
PHASE IA/B CONCEPT PLANS - ALTERNATIVES A AND B
BERNALILLO COUNTY
CN - A301000

N.M.P. CN A301000
NM 500 MP 9.087 TO
MP 10.318

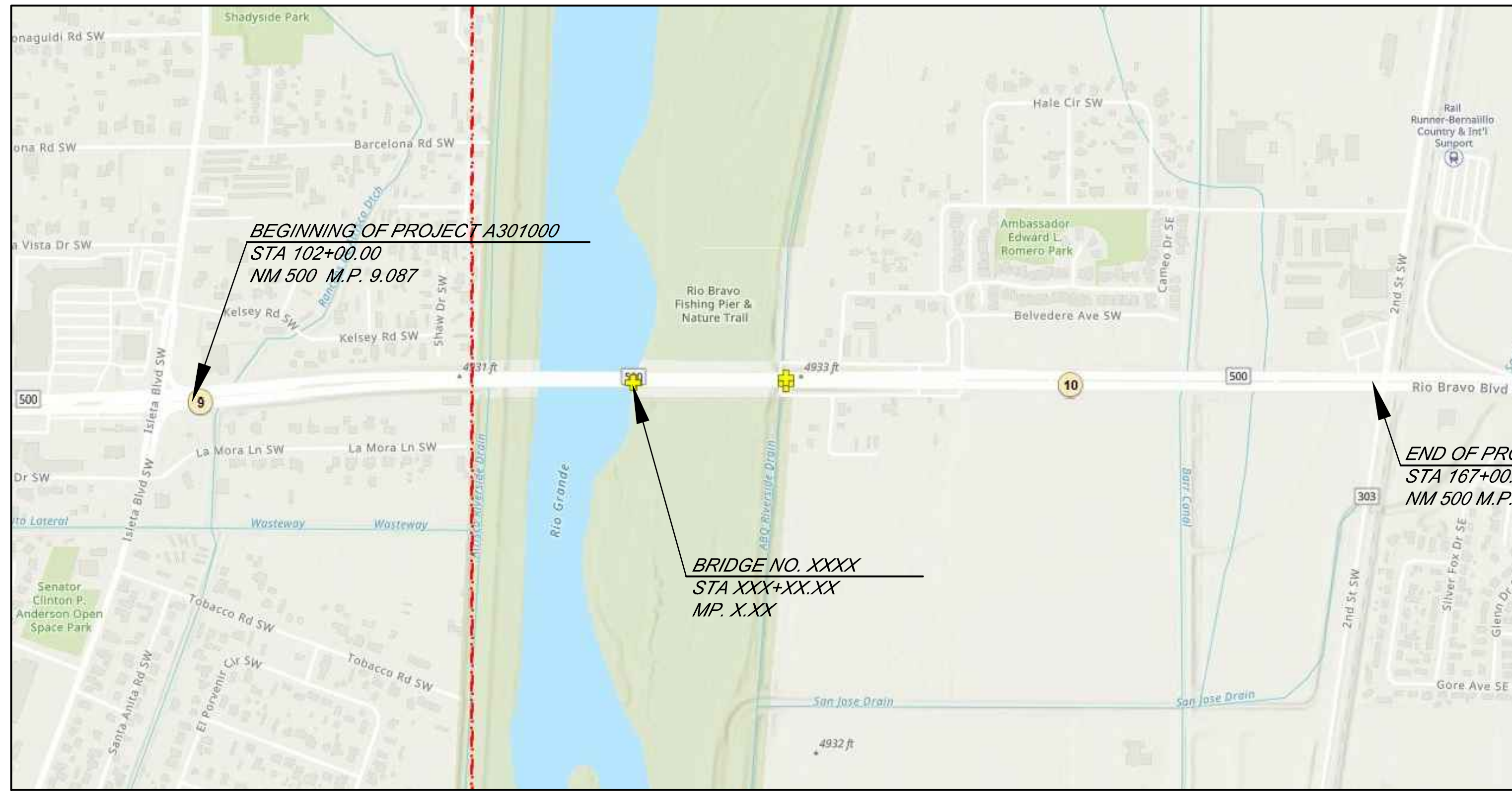


NMDOT

wsp

LENGTH OF PROJECT 1.231 MILES

THIS PROJECT BEGINS IN SECTION 12, T9N, R2E
THIS PROJECT ENDS IN SECTION 7, T9N, R3E



N

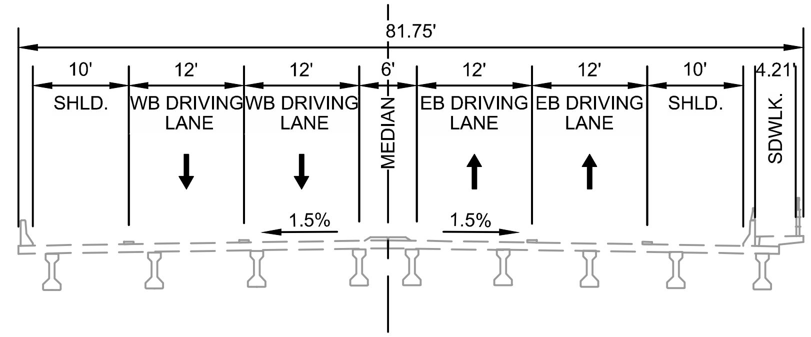
VICINITY MAP

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318
VICINITY MAP



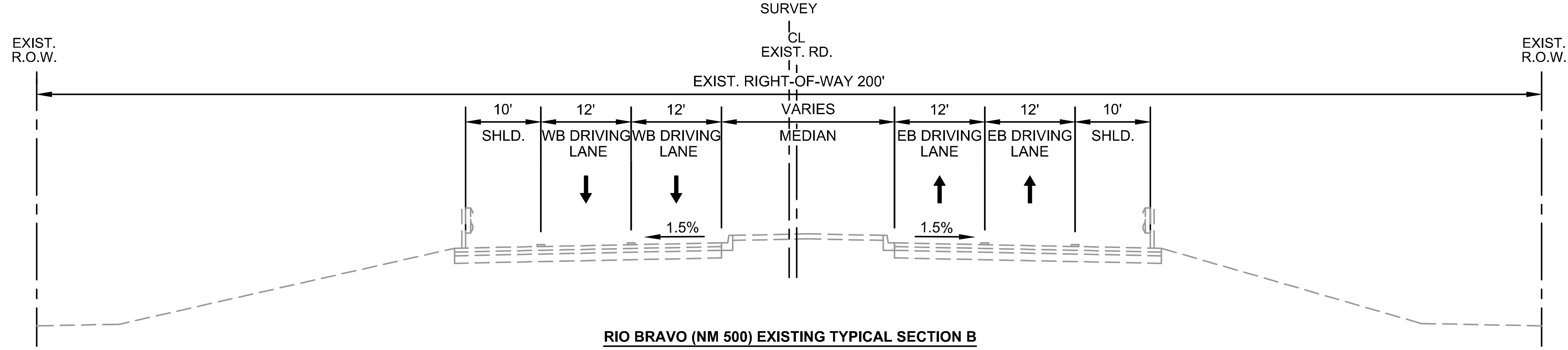
RIO BRAVO (NM 500) EXISTING TYPICAL SECTION C
EXISTING BRIDGE OVER RIO GRANDE

NM500 LENGTH OF PROJECT

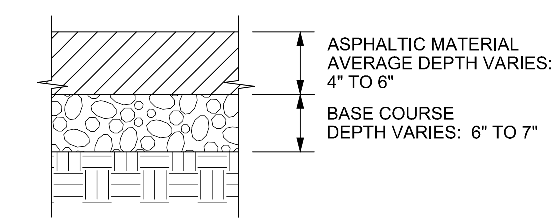
CL OF CONSTRUCTION NM 500 STA TO STA		LENGTH FT.	LENGTH MILES	NOTES
102+00.00	119+67.23	1,767.23	0.335	B.O.P. TO MAJOR STRUCTURE
119+67.23	133+95.89	1,428.66	0.271	MAJOR STRUCTURE (RIO BRAVO BRIDGE)
133+95.89	134+57.23	61.34	0.012	MAJOR STRUCTURE TO MAJOR STRUCTURE
134+57.23	135+57.73	100.50	0.019	MAJOR STRUCTURE (ABQ. RIVERSIDE DRAIN BRIDGE)
135+57.73	167+00.00	3,142.27	0.595	MAJOR STRUCTURE TO E.O.P.
PROJECT LENGTH		**6,500.00**	**1.231**	

NM 500 DESIGN DATA
DESIGN SPEED = 45 MPH
POSTED SPEED = 45 MPH

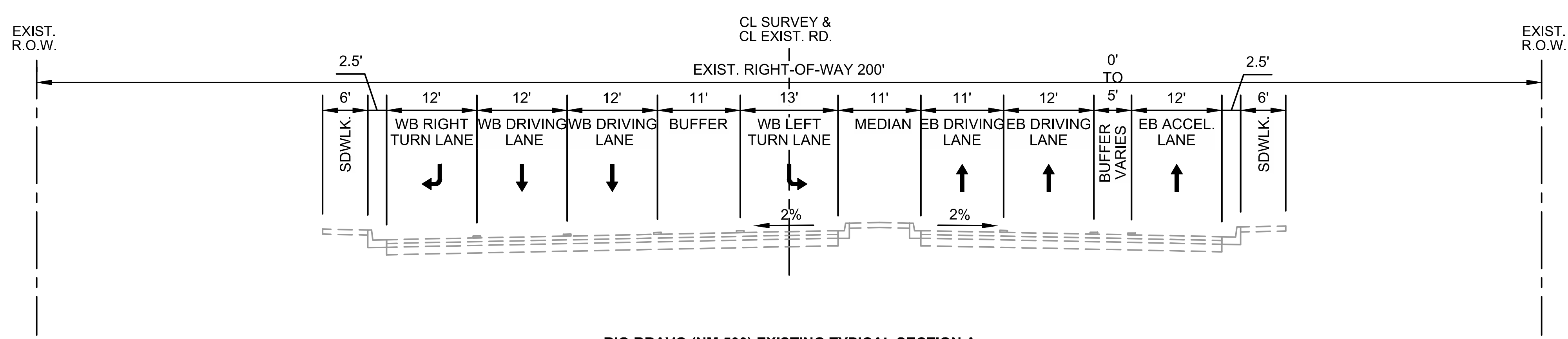
TRAFFIC DATA
AVERAGE DAILY TRAFFIC (2016) = 35,000 VEH/DAY
% HEAVY COMMERCIAL (2019) = 10%
AVERAGE DAILY TRAFFIC (2040) = 61,200 VEH/DAY
% HEAVY COMMERCIAL (2040) = 10%
ESALS (20 YEAR) = TBD



RIO BRAVO (NM 500) EXISTING TYPICAL SECTION B
STA 107+00 TO RIO BRAVO BRIDGE



EXISTING PAVEMENT SECTION



RIO BRAVO (NM 500) EXISTING TYPICAL SECTION A
ISLETA BLVD. TO STA. 107+00

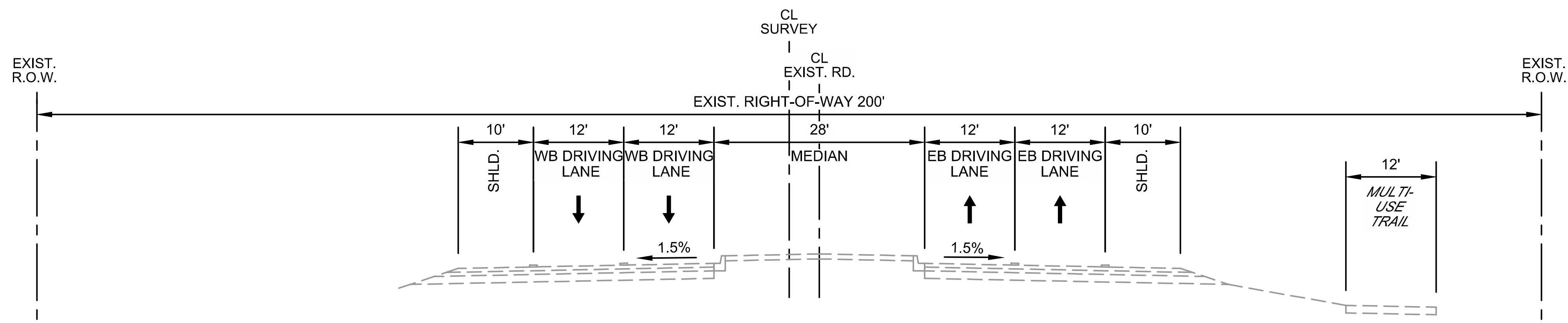
NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

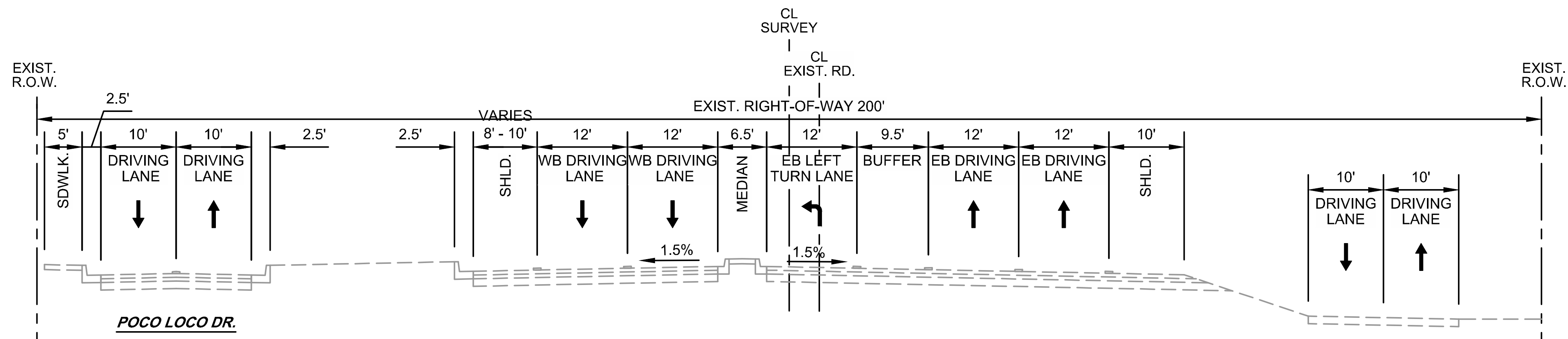
NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

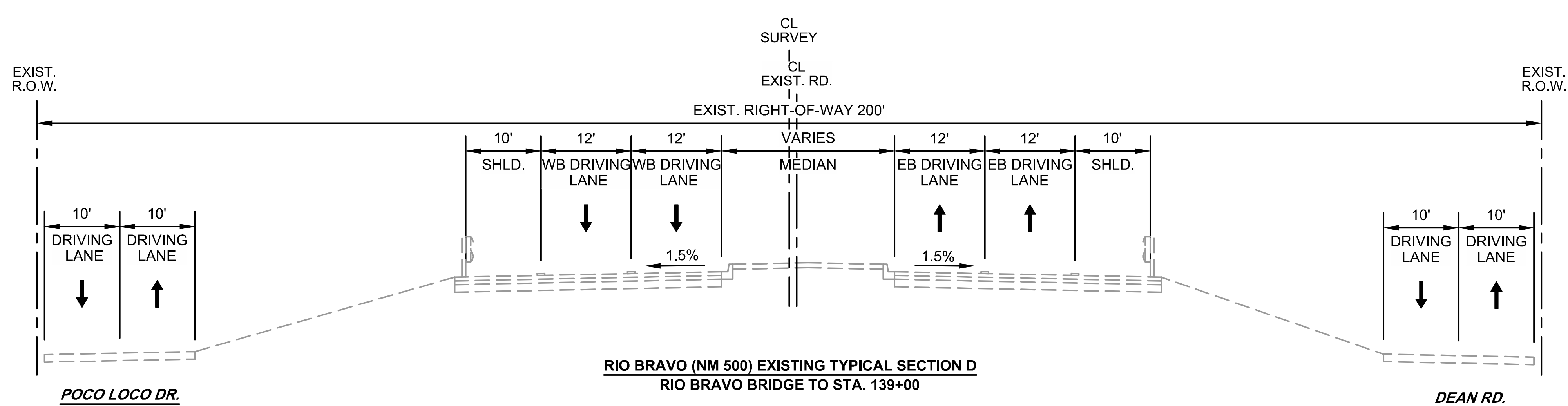
EXISTING TYPICAL SECTIONS



RIO BRAVO (NM 500) EXISTING TYPICAL SECTION F
POCO LOCO RD. TO E.O.P.



RIO BRAVO (NM 500) EXISTING TYPICAL SECTION E
STA. 139+00 TO POCO LOCO RD.



RIO BRAVO (NM 500) EXISTING TYPICAL SECTION D
RIO BRAVO BRIDGE TO STA. 139+00

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

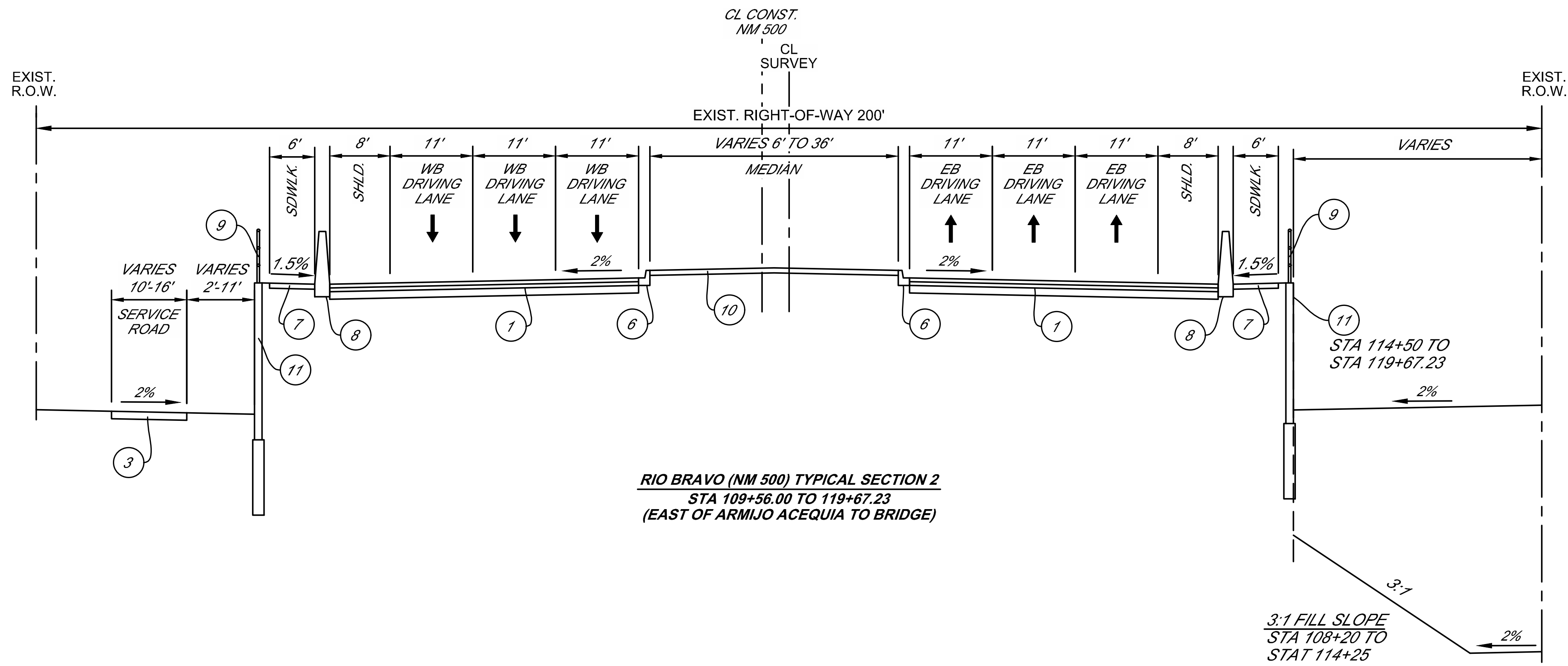
EXISTING TYPICAL SECTIONS

NOTES

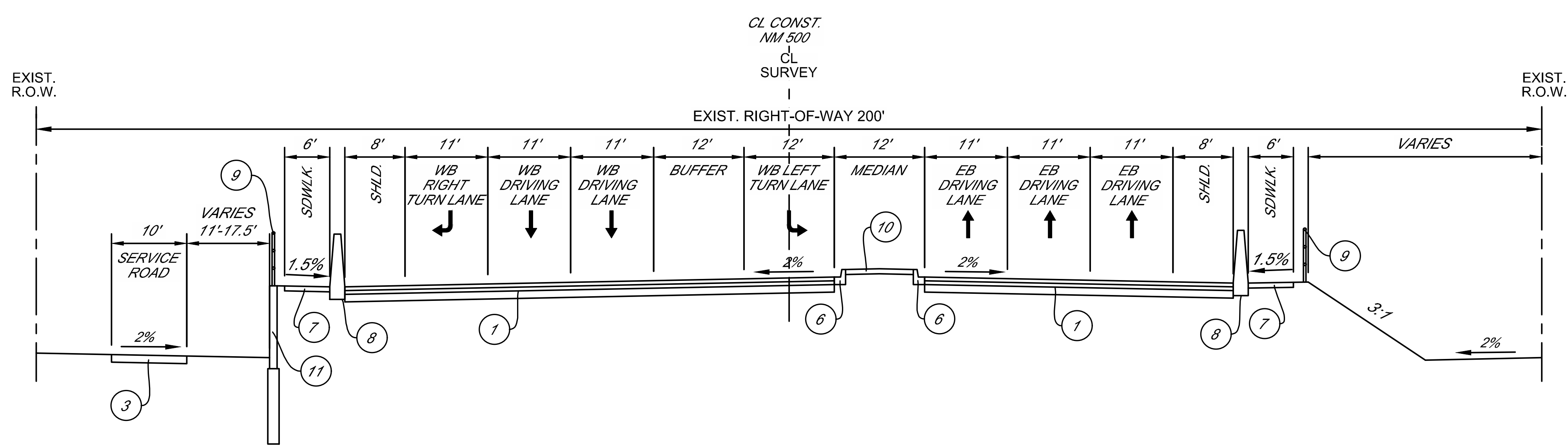
1. *SEE SHEET 2-6 FOR PAVEMENT SECTION DETAILS.*

◯ *KEYED NOTES*

1. *PAVEMENT SECTION NO. 1, SEE SHEET 2-6*
2. *PAVEMENT SECTION NO. 2, SEE SHEET 2-6*
3. *PAVEMENT SECTION NO. 3, SEE SHEET 2-6*
4. *CONCRETE VERTICAL CURB AND GUTTER TYPE B 8"X30"*
5. *CONCRETE VERTICAL CURB AND GUTTER TYPE B 6"X24"*
6. *CONCRETE VERTICAL CURB AND GUTTER TYPE D 6"X18"*
7. *CONCRETE SIDEWALK 4"*
8. *CONCRETE WALL BARRIER 42"*
9. *PEDESTRIAN/ BICYCLE RAILING*
10. *CONCRETE MEDIAN PAVEMENT 4"*
11. *RETAINING WALL*
12. *ABUTMENT WALL*
13. *PAVEMENT SECTION NO. 4, SEE SHEET 2-6*



RIO BRAVO (NM 500) TYPICAL SECTION 2
STA 109+56.00 TO 119+67.23
(EAST OF ARMIJO ACEQUIA TO BRIDGE)



RIO BRAVO (NM 500) TYPICAL SECTION 1
STA 105+29.73 TO 108+20.00
(ISLETA BLVD. TO EAST OF ARMIJO ACEQUIA)

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

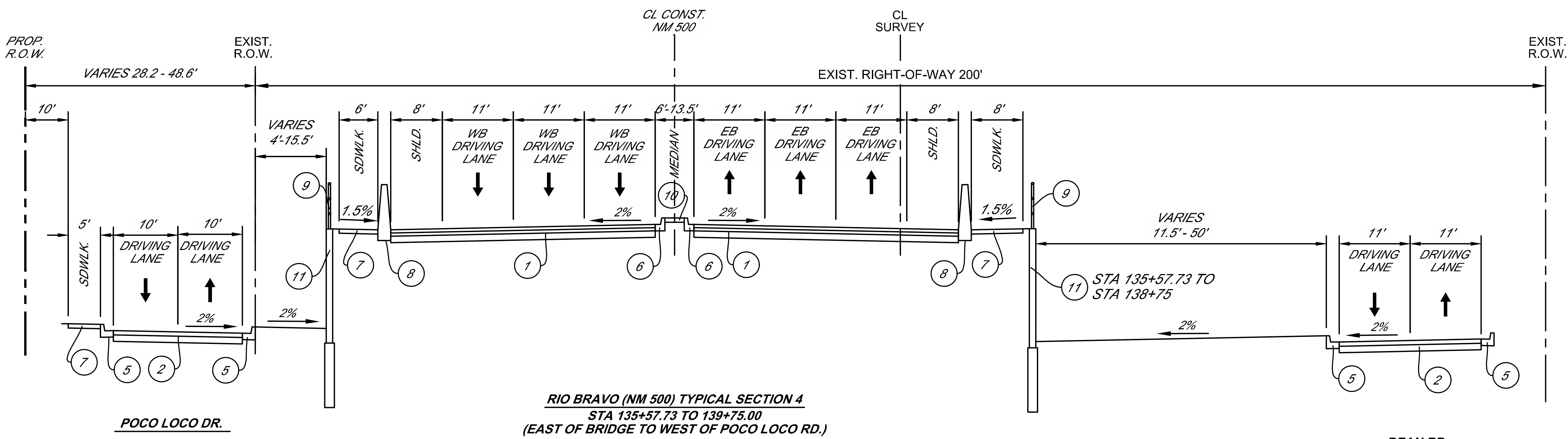
PROPOSED TYPICAL SECTIONS

NOTES

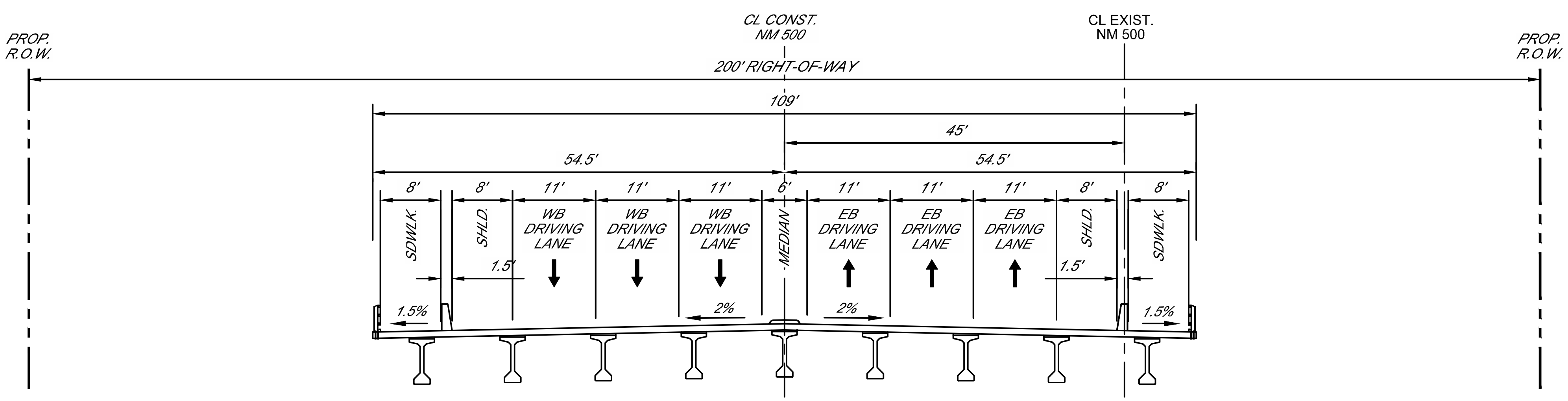
1. SEE SHEET 2-6 FOR PAVEMENT SECTION DETAILS.

KEYED NOTES

1. PAVEMENT SECTION NO. 1, SEE SHEET 2-6
2. PAVEMENT SECTION NO. 2, SEE SHEET 2-6
3. PAVEMENT SECTION NO. 3, SEE SHEET 2-6
4. CONCRETE VERTICAL CURB AND GUTTER TYPE B 8"X30"
5. CONCRETE VERTICAL CURB AND GUTTER TYPE B 6"X24"
6. CONCRETE VERTICAL CURB AND GUTTER TYPE D 6"X18"
7. CONCRETE SIDEWALK 4"
8. CONCRETE WALL BARRIER 42"
9. PEDESTRIAN/ BICYCLE RAILING
10. CONCRETE MEDIAN PAVEMENT 4"
11. RETAINING WALL
12. ABUTMENT WALL
13. PAVEMENT SECTION NO. 4, SEE SHEET 2-6



RIO BRAVO (NM 500) TYPICAL SECTION 4
STA 135+57.73 TO 139+75.00
(EAST OF BRIDGE TO WEST OF POCO LOCO RD.)



RIO BRAVO (NM 500) TYPICAL SECTION 3
STA 119+67.23 TO 133+95.89
(BRIDGE OVER RIO GRANDE)

STA 134+57.23 TO 135+57.73
(BRIDGE OVER ABQ. RIVERSIDE DRAIN)

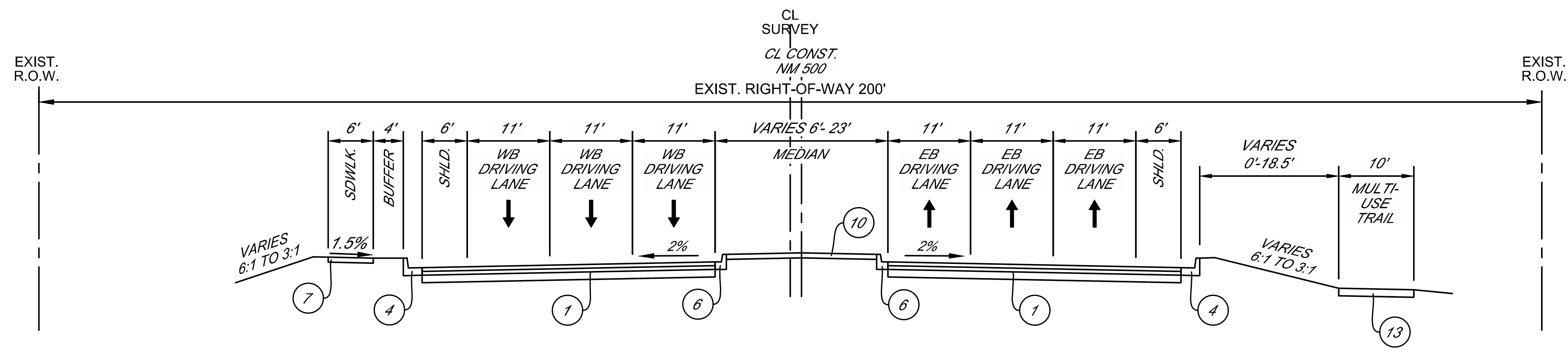
NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

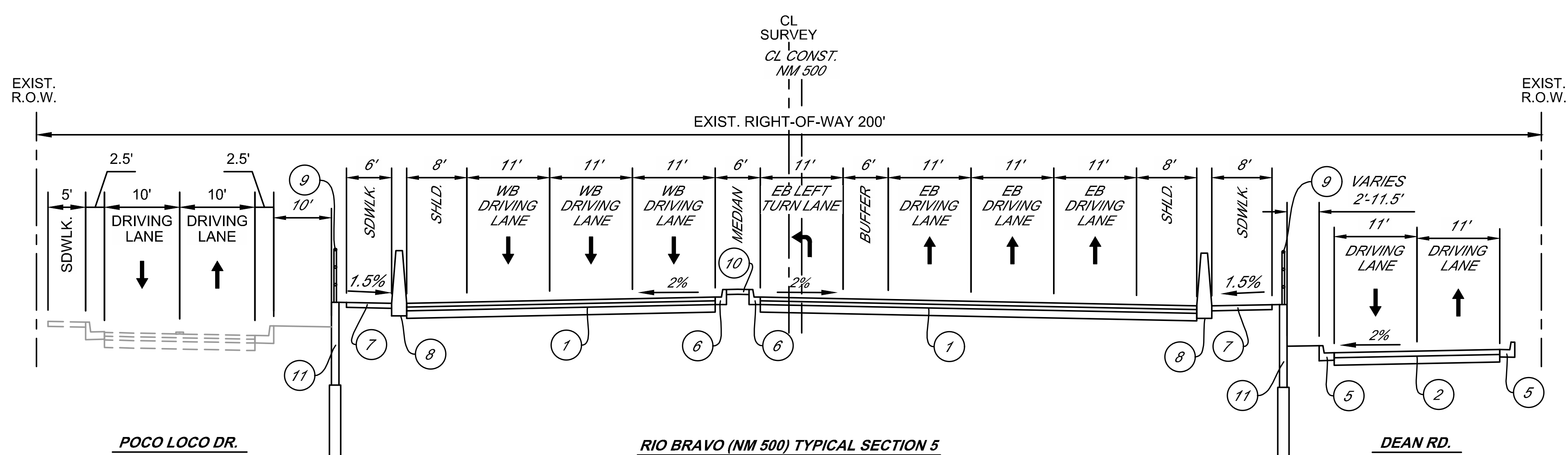
NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

PROPOSED TYPICAL SECTIONS



RIO BRAVO (NM 500) TYPICAL SECTION 6
STA 144+98.69 TO 161+37.98
(POCO LOCO RD. TO BARR MAIN CANAL)



RIO BRAVO (NM 500) TYPICAL SECTION 5
STA 140+37.09 TO 144+00.00
(WEST OF POCO LOCO RD TO POCO LOCO INTERSECTION)

NOTES

1. *SEE SHEET 2-6 FOR PAVEMENT SECTION DETAILS.*

◯ *KEYED NOTES*

1. *PAVEMENT SECTION NO. 1, SEE SHEET 2-6*
2. *PAVEMENT SECTION NO. 2, SEE SHEET 2-6*
3. *PAVEMENT SECTION NO. 3, SEE SHEET 2-6*
4. *CONCRETE VERTICAL CURB AND GUTTER TYPE B 8"X30"*
5. *CONCRETE VERTICAL CURB AND GUTTER TYPE B 6"X24"*
6. *CONCRETE VERTICAL CURB AND GUTTER TYPE D 6"X18"*
7. *CONCRETE SIDEWALK 4"*
8. *CONCRETE WALL BARRIER 42"*
9. *PEDESTRIAN/ BICYCLE RAILING*
10. *CONCRETE MEDIAN PAVEMENT 4"*
11. *RETAINING WALL*
12. *ABUTMENT WALL*
13. *PAVEMENT SECTION NO. 4, SEE SHEET 2-6*

NO.	DESCRIPTION	DATE	BY
4			
3			
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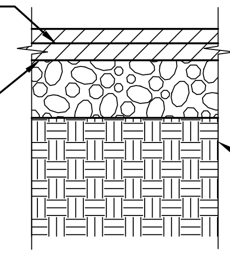
NEW MEXICO DEPARTMENT
OF TRANSPORTATION

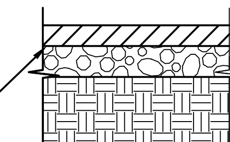
NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

PROPOSED TYPICAL SECTIONS



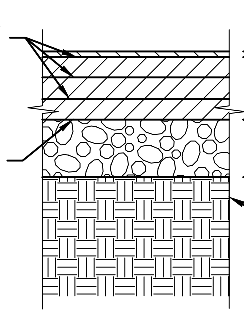
PAVEMENT SECTION NO. 2

PAVED FRONTAGE ROADS
AND ACCESS ROADS



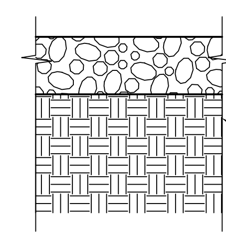
PAVEMENT SECTION NO. 4

MULTI-USE TRAILS



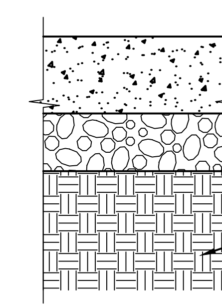
PAVEMENT SECTION NO. 1

NM 500



PAVEMENT SECTION NO. 3

BASECOURSE SERVICE ROADS



PAVEMENT SECTION NO. 5

CONCRETE PAVEMENT
BETWEEN RIVER BRIDGE
AND ABQ. DRAIN BRIDGE

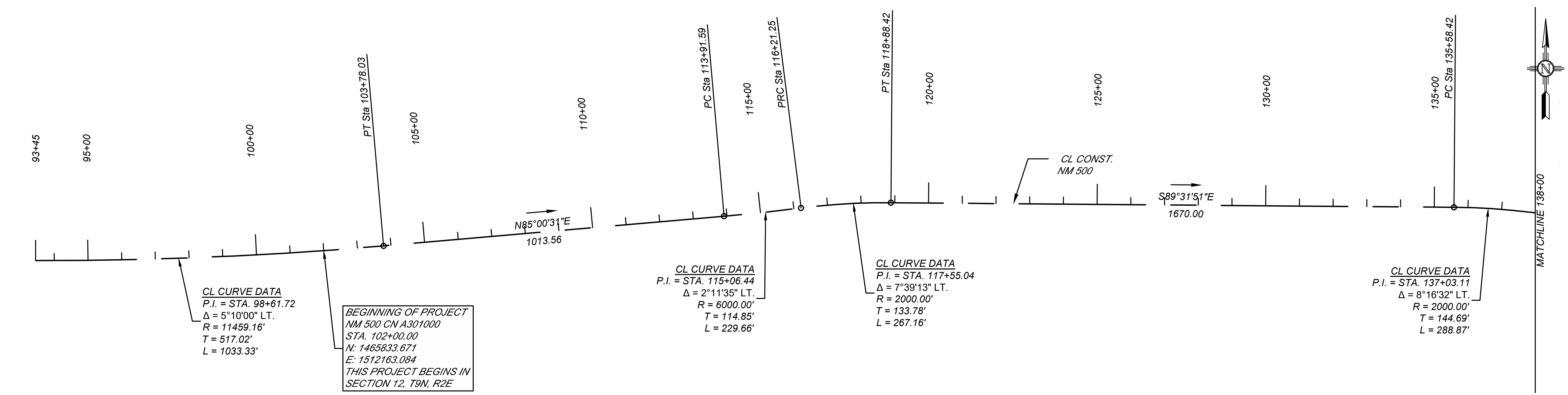
NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

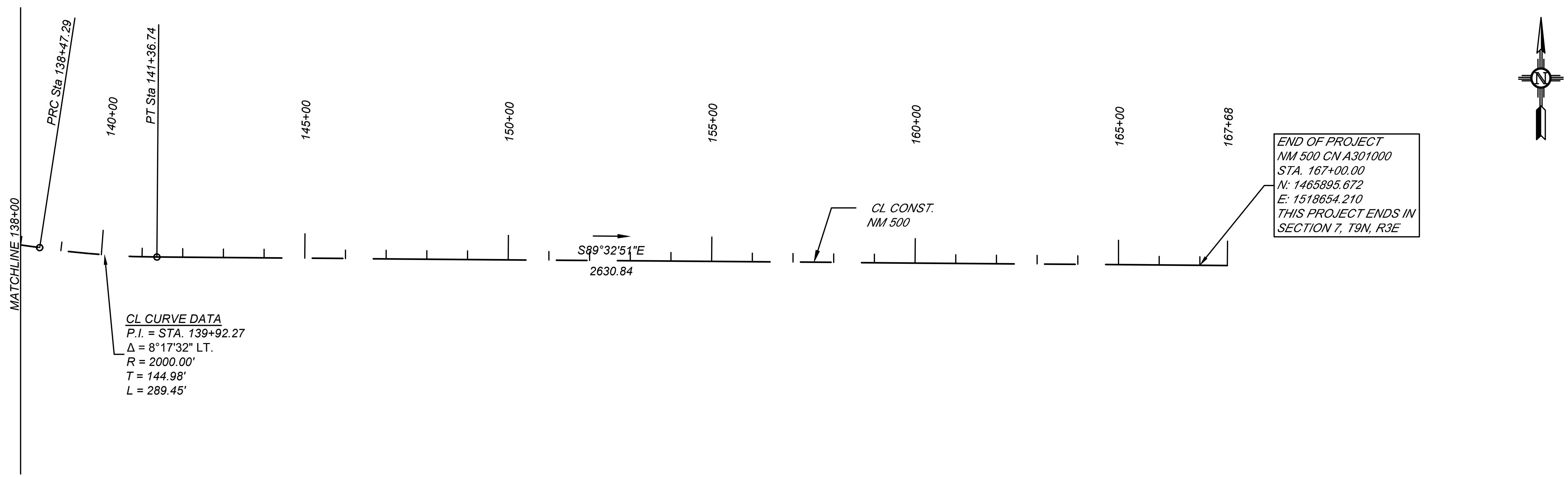
REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

PROPOSED TYPICAL SECTION
DETAILS





NOTES

1. ALL COORDINATES VALUES LISTED ARE LOCAL PROJECT GROUND COORDINATES.
2. ELEVATIONS LISTED ARE NAVD 88.

PRELIMINARY
NOT FOR CONSTRUCTION

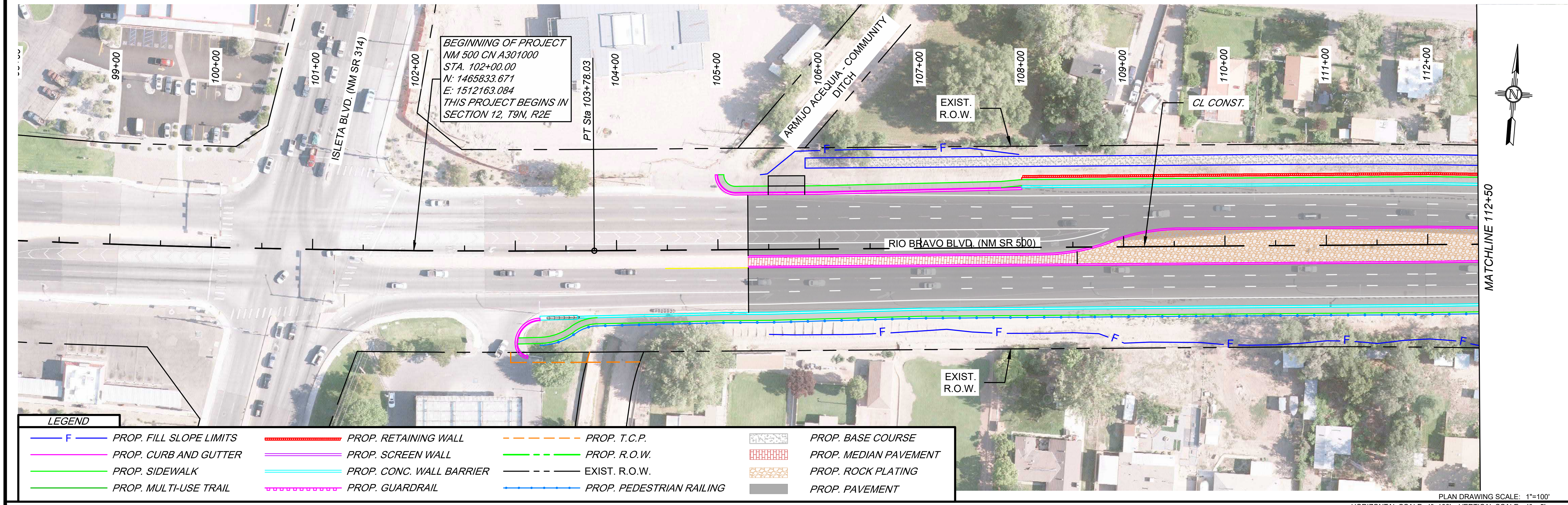
NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION

NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318

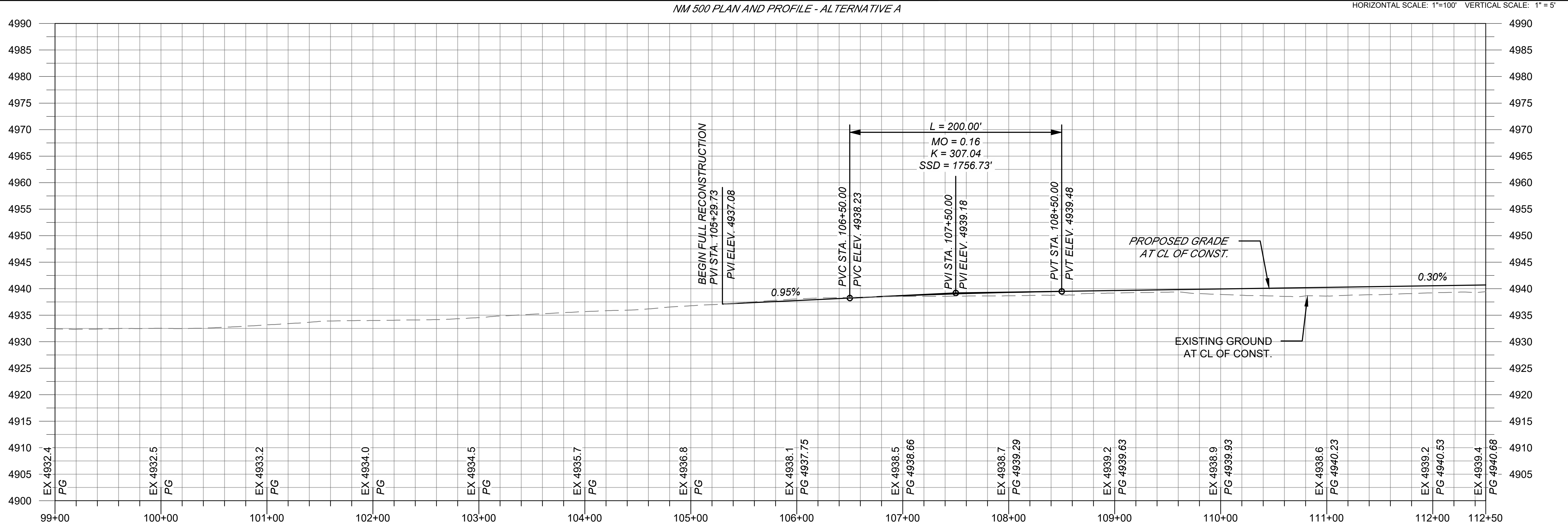
PROJECT HORIZONTAL LAYOUT
ALTERNATIVE A

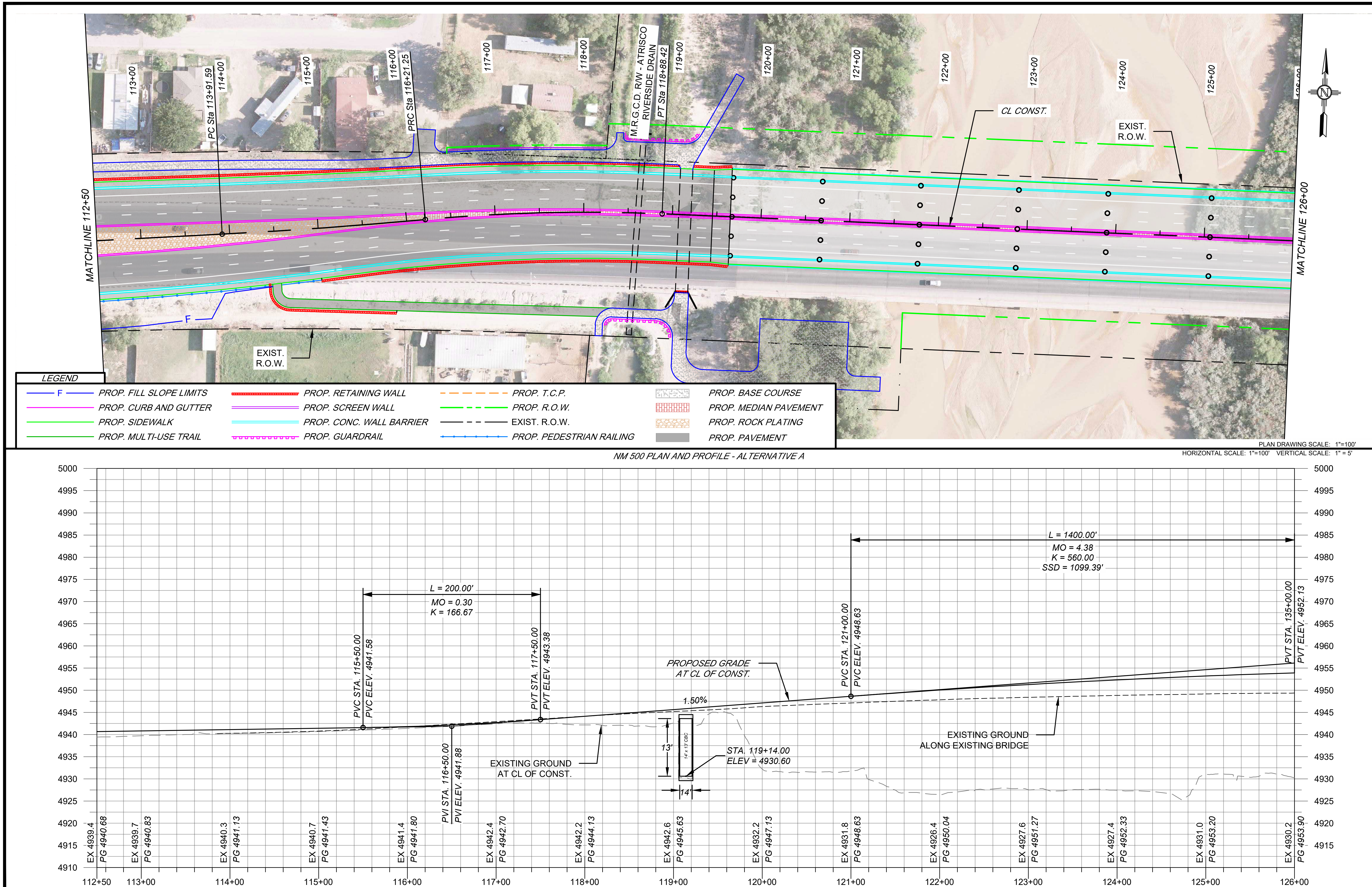


PLAN DRAWING SCALE: 1"=100'

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 5'

NM 500 PLAN AND PROFILE - ALTERNATIVE A

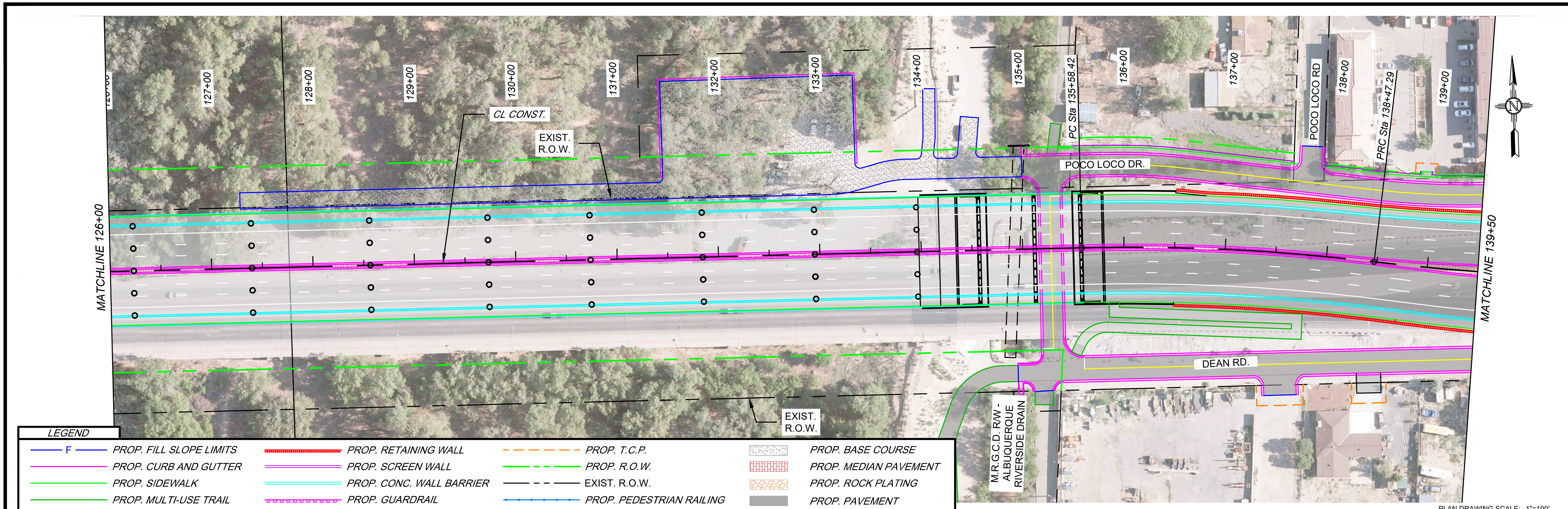




GONZALES, MARCOS F.
13-May-21

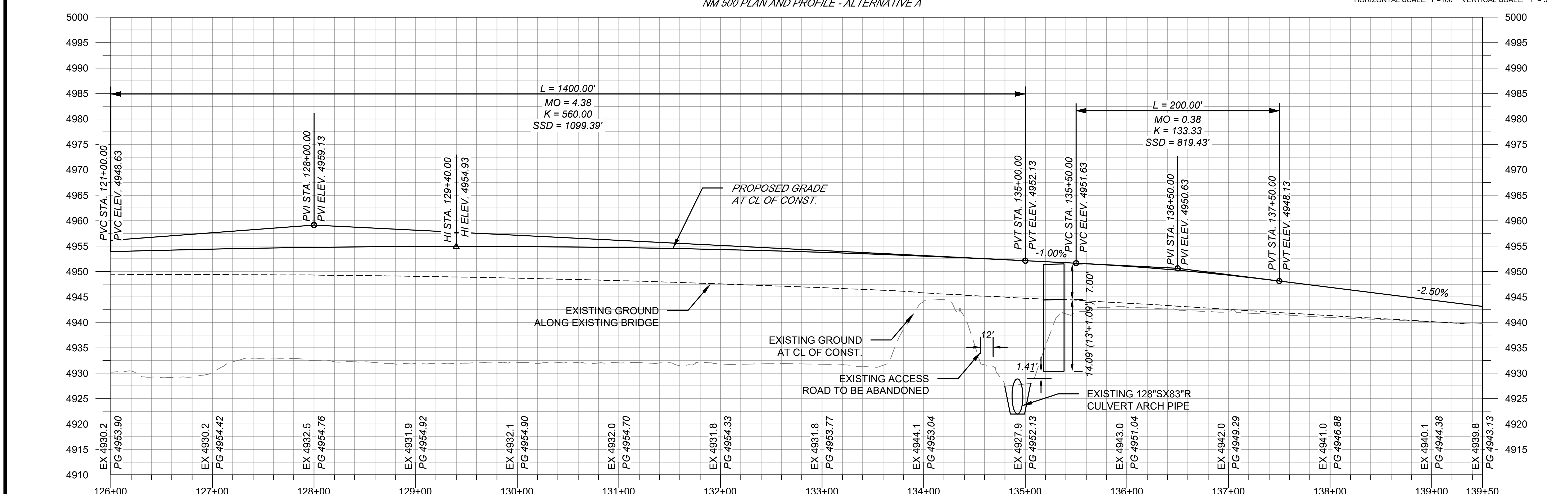
Drawing File: J:\30900298 NM 500 RIO BRAVO BRIDGE REPLACEMENT\04 ENGINEERING - PCN#A301000\PLANS\3_SHEETS\A3010003PP01.DWG
2:10 PM

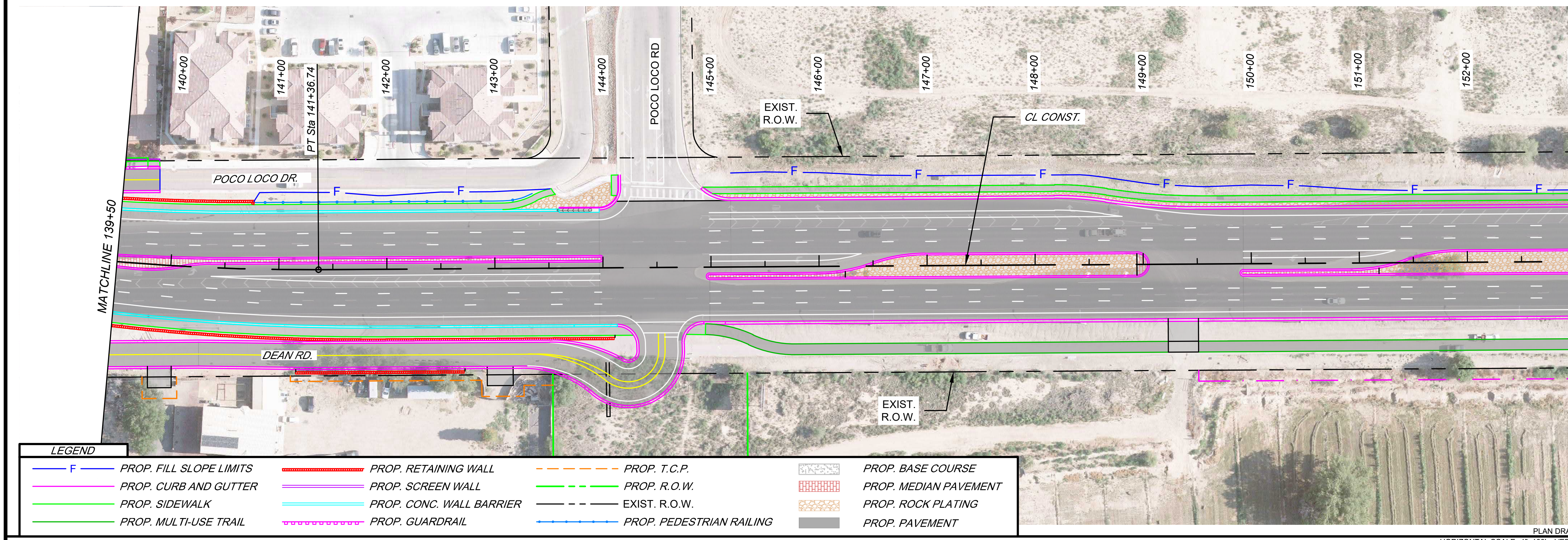
NEW MEXICO PROJECT NO. A301000



NM 500 PLAN AND PROFILE - ALTERNATIVE A

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 5'

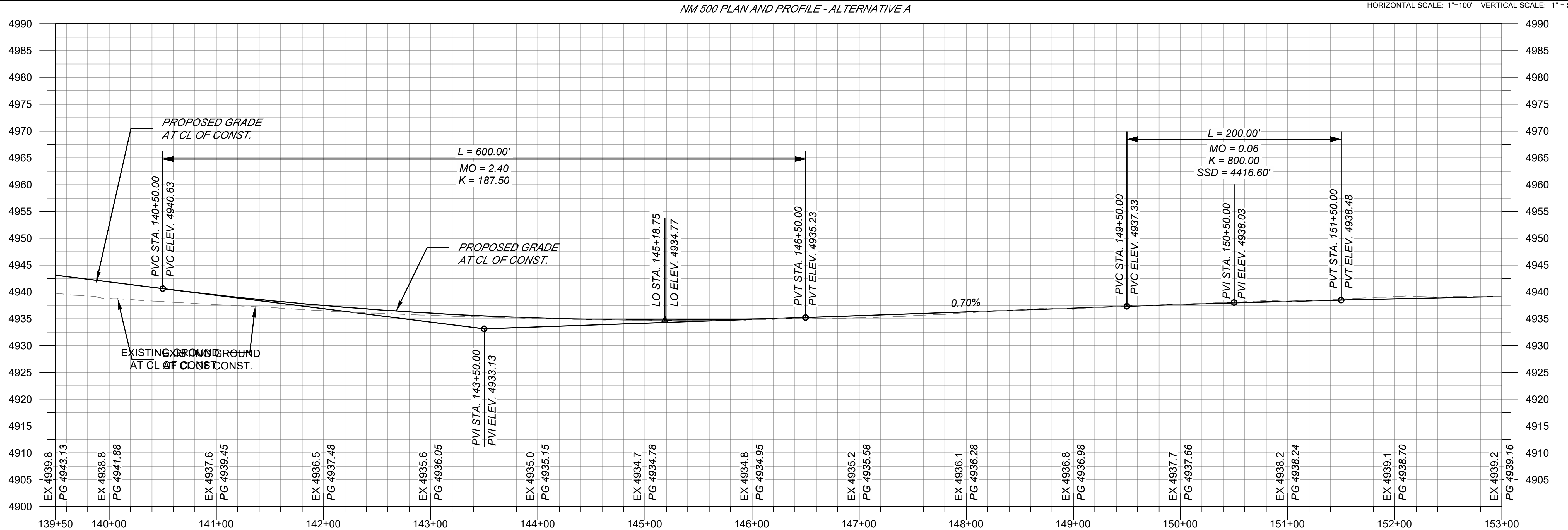


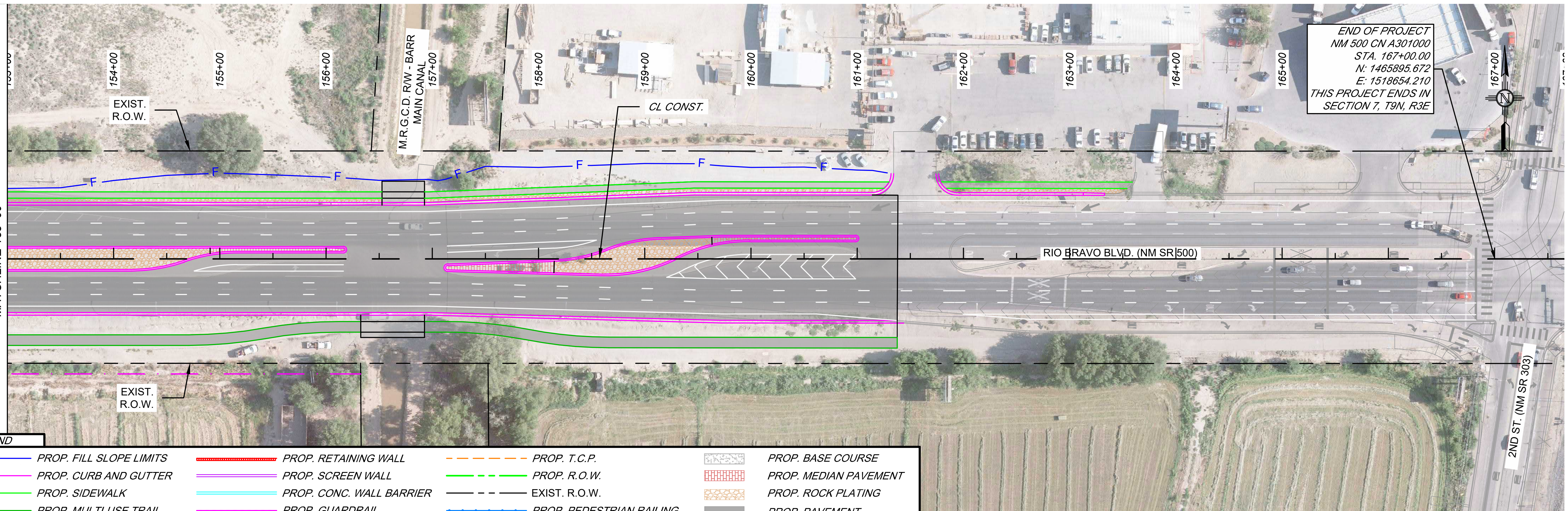


PLAN DRAWING SCALE: 1"=100'

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 5'

NM 500 PLAN AND PROFILE - ALTERNATIVE A





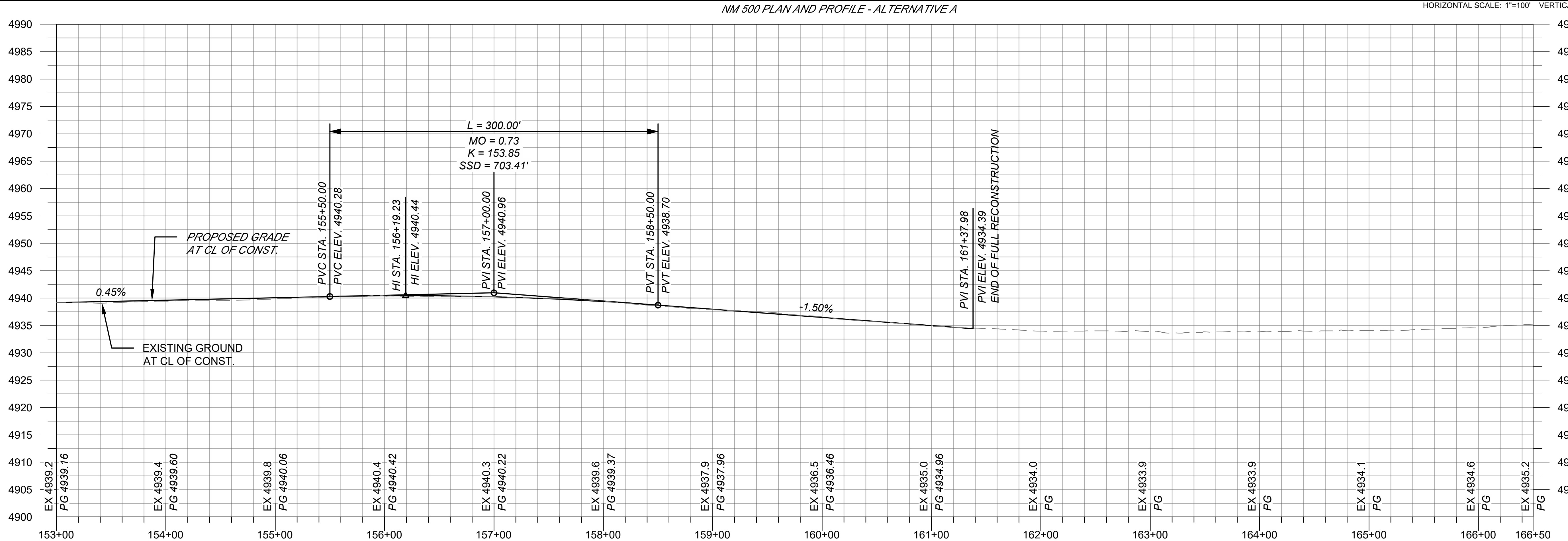
LEGEND

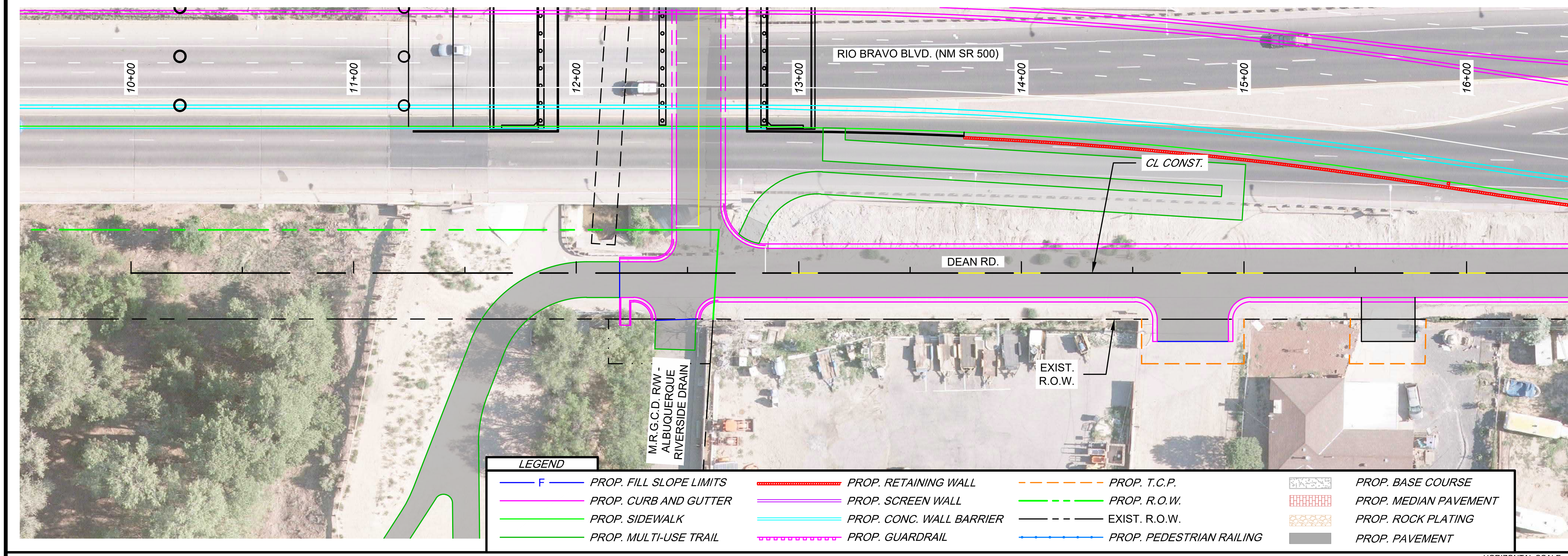
PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

PLAN DRAWING SCALE: 1"=100'

NM 500 PLAN AND PROFILE - ALTERNATIVE A

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 5'





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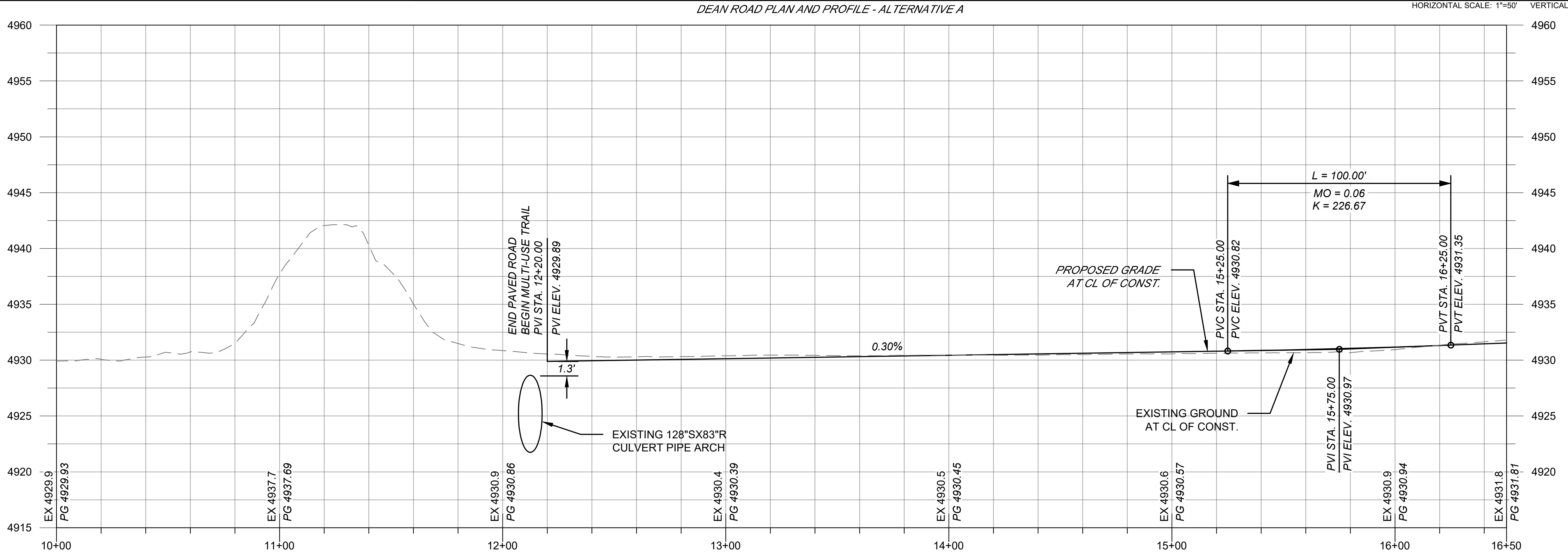
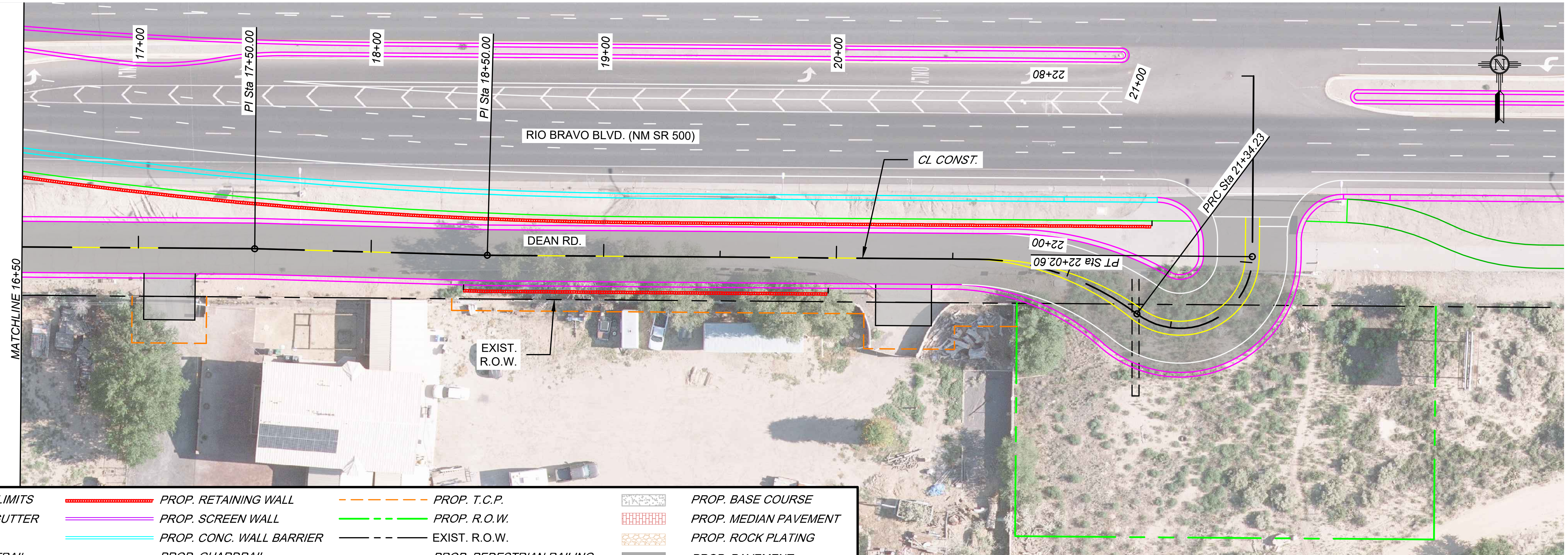
HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=5'

DEAN ROAD PLAN AND PROFILE - ALTERNATIVE A





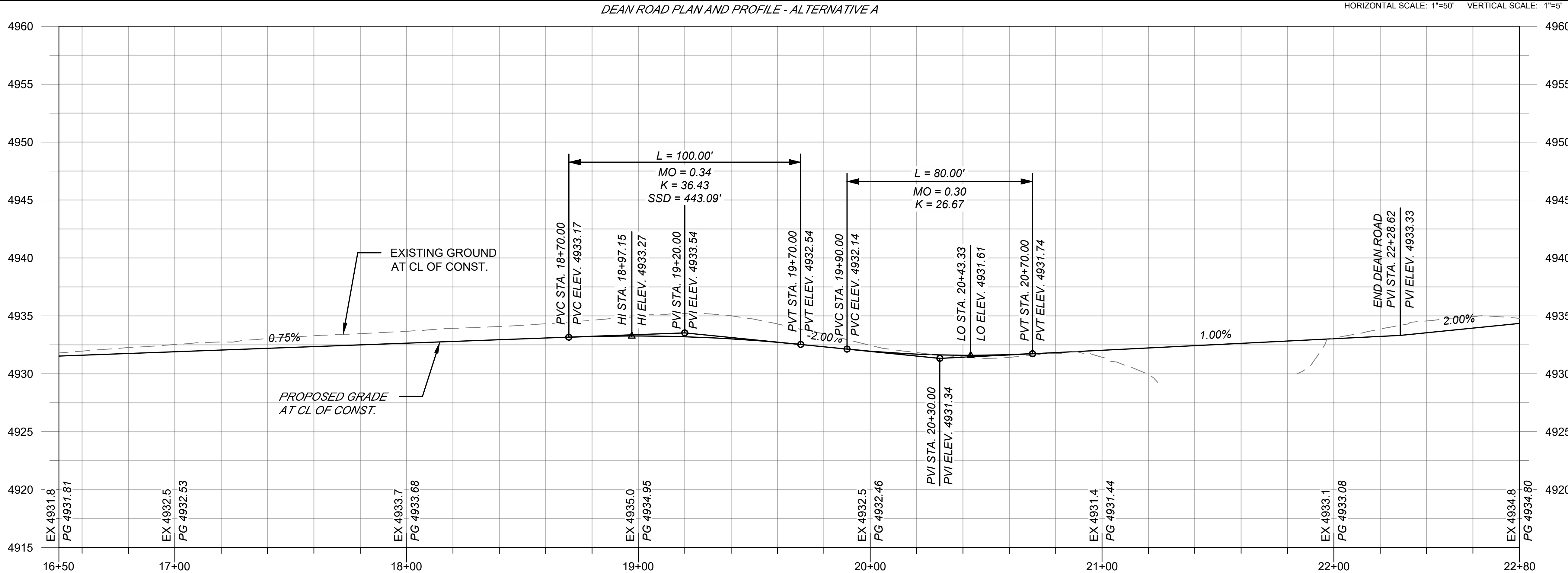
LEGEND

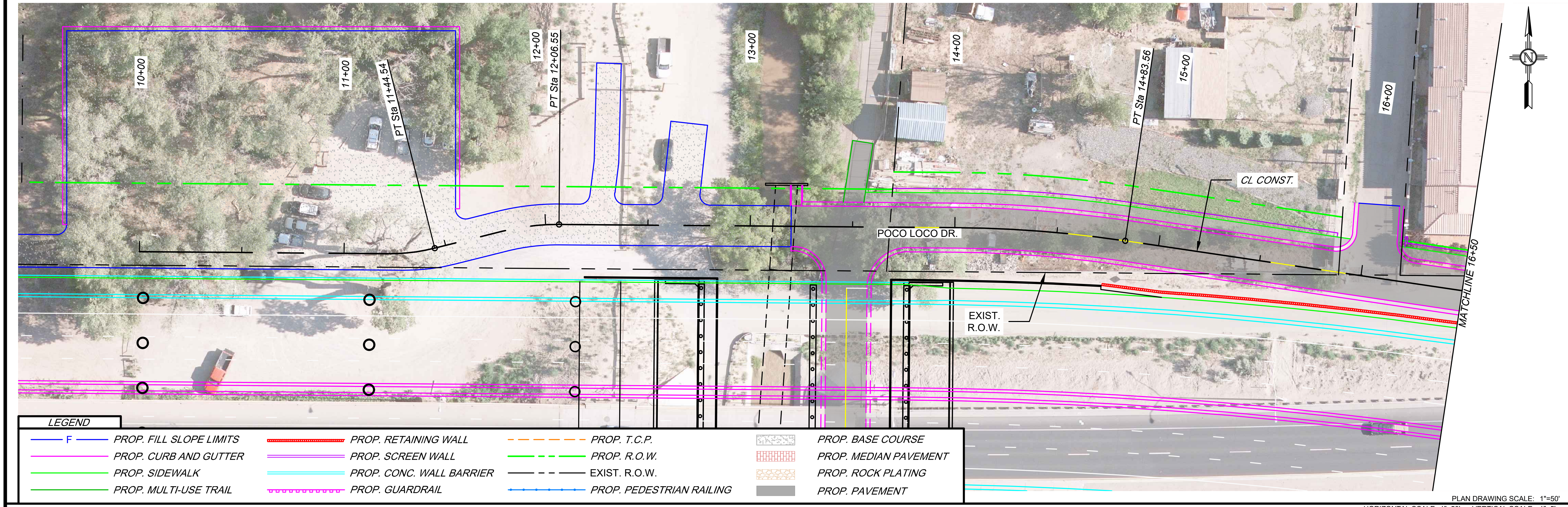
PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

PLAN DRAWING SCALE: 1"=50'

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=5'

DEAN ROAD PLAN AND PROFILE - ALTERNATIVE A

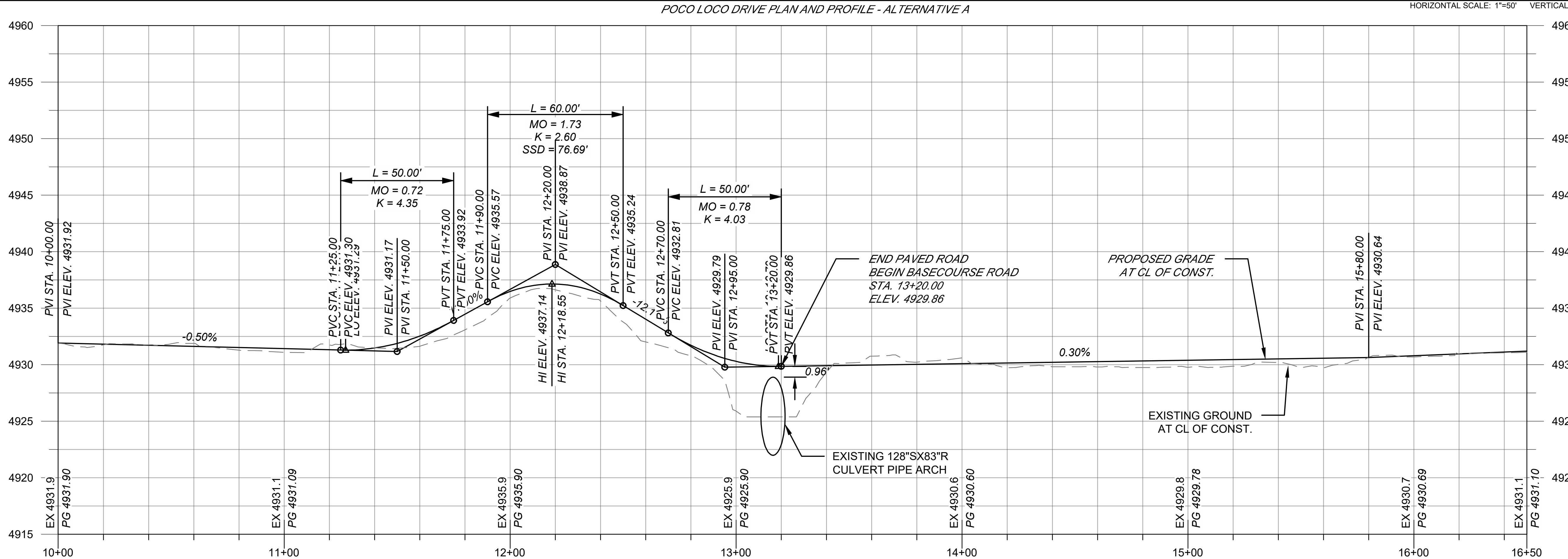


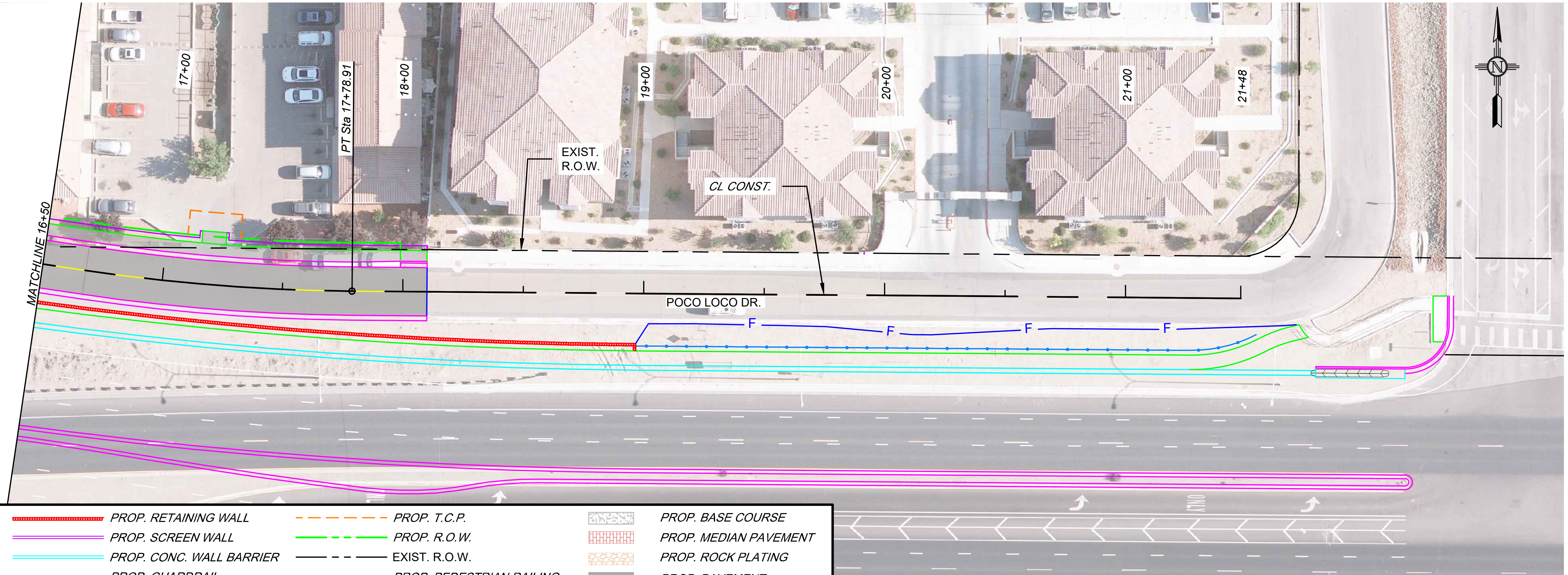


PLAN DRAWING SCALE: 1"=50'

POCO LOCO DRIVE PLAN AND PROFILE - ALTERNATIVE A

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=5'





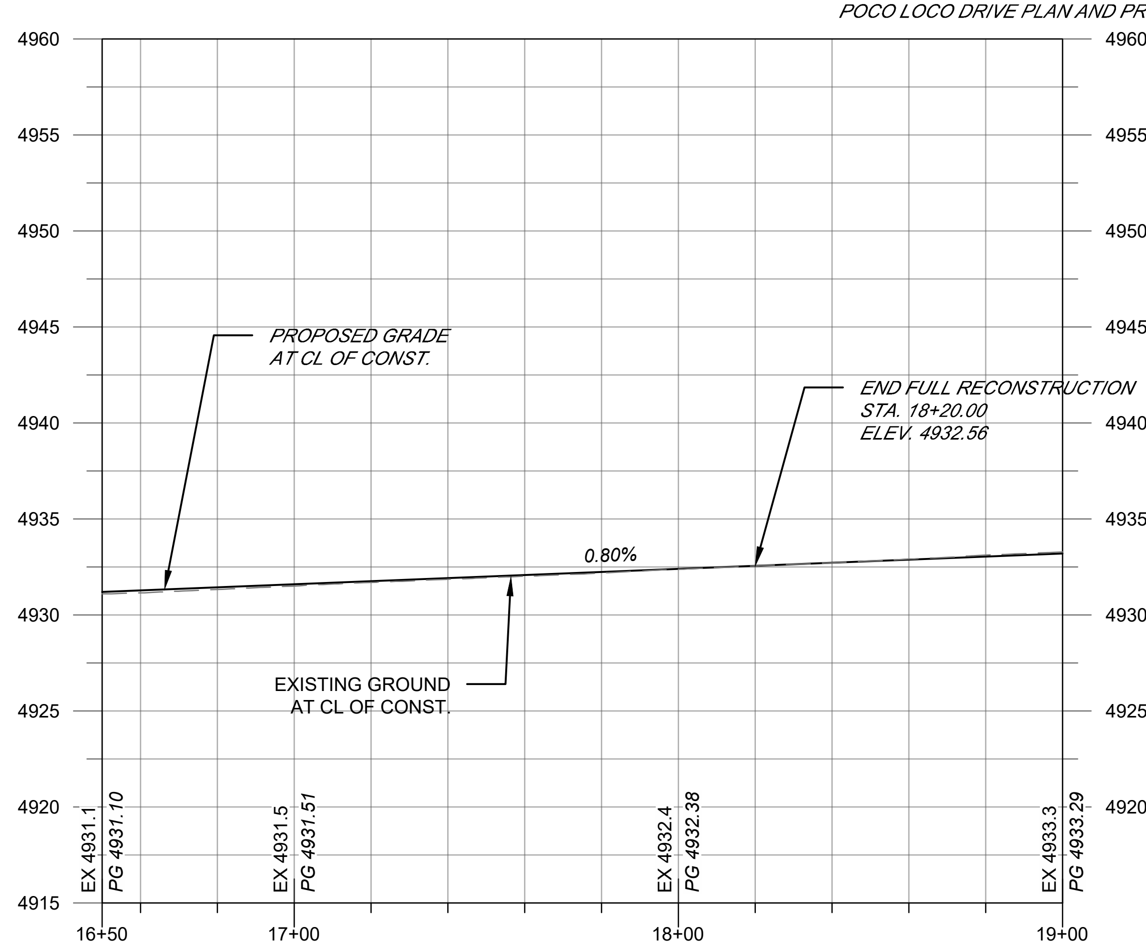
LEGEND

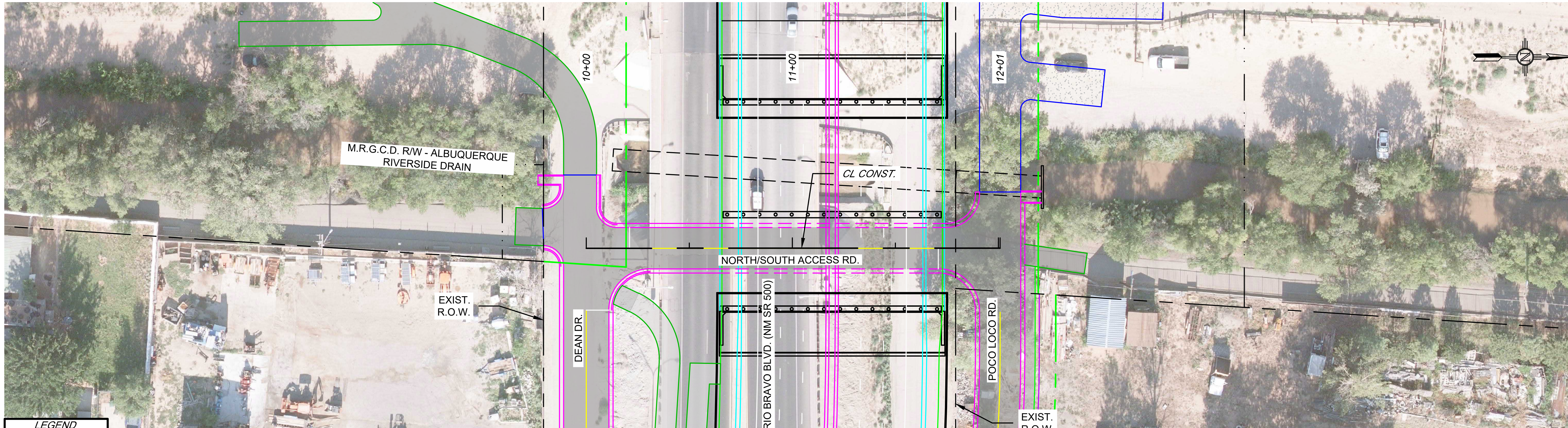
PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

PLAN DRAWING SCALE: 1"=50'

POCO LOCO DRIVE PLAN AND PROFILE - ALTERNATIVE A

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=5'





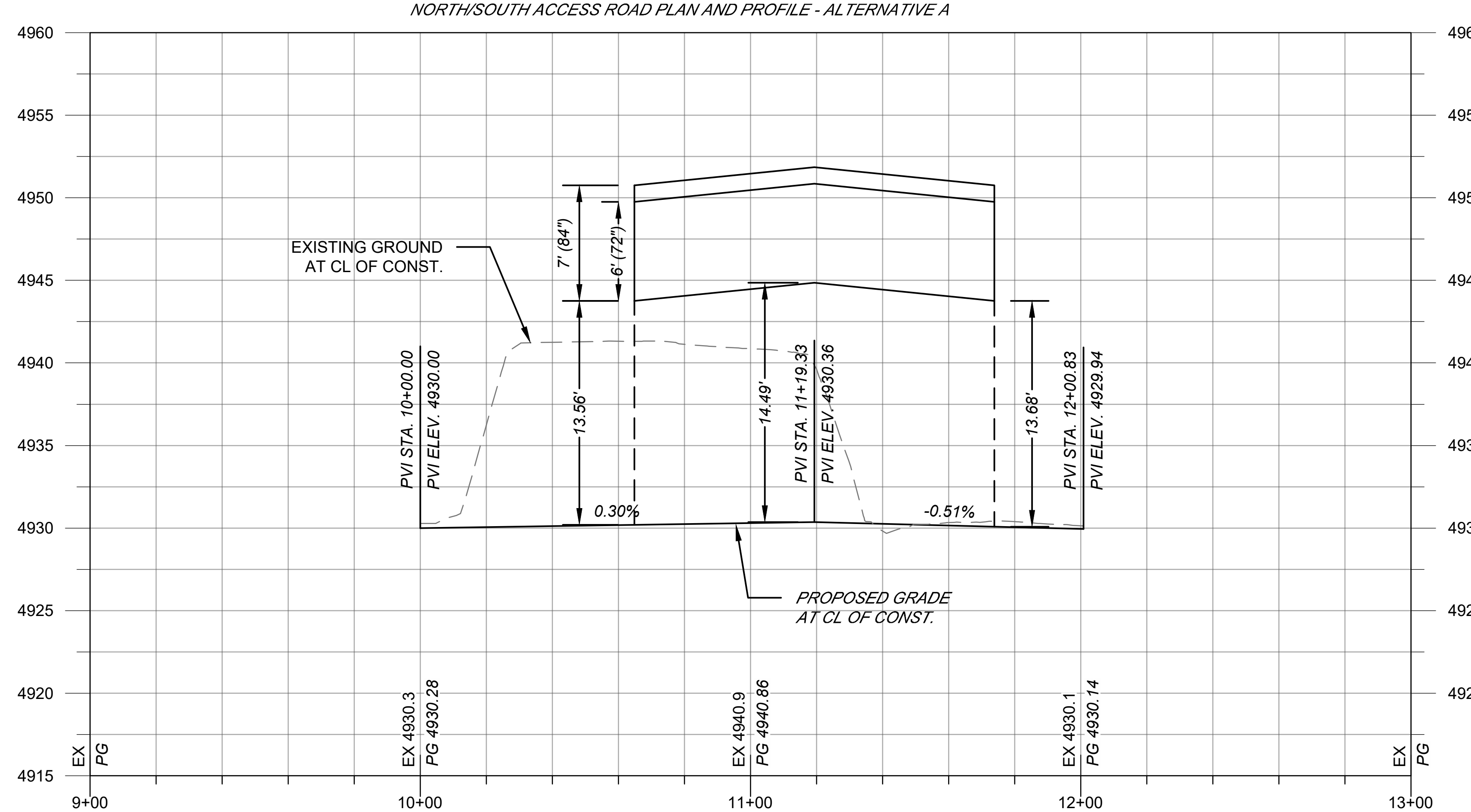
LEGEND

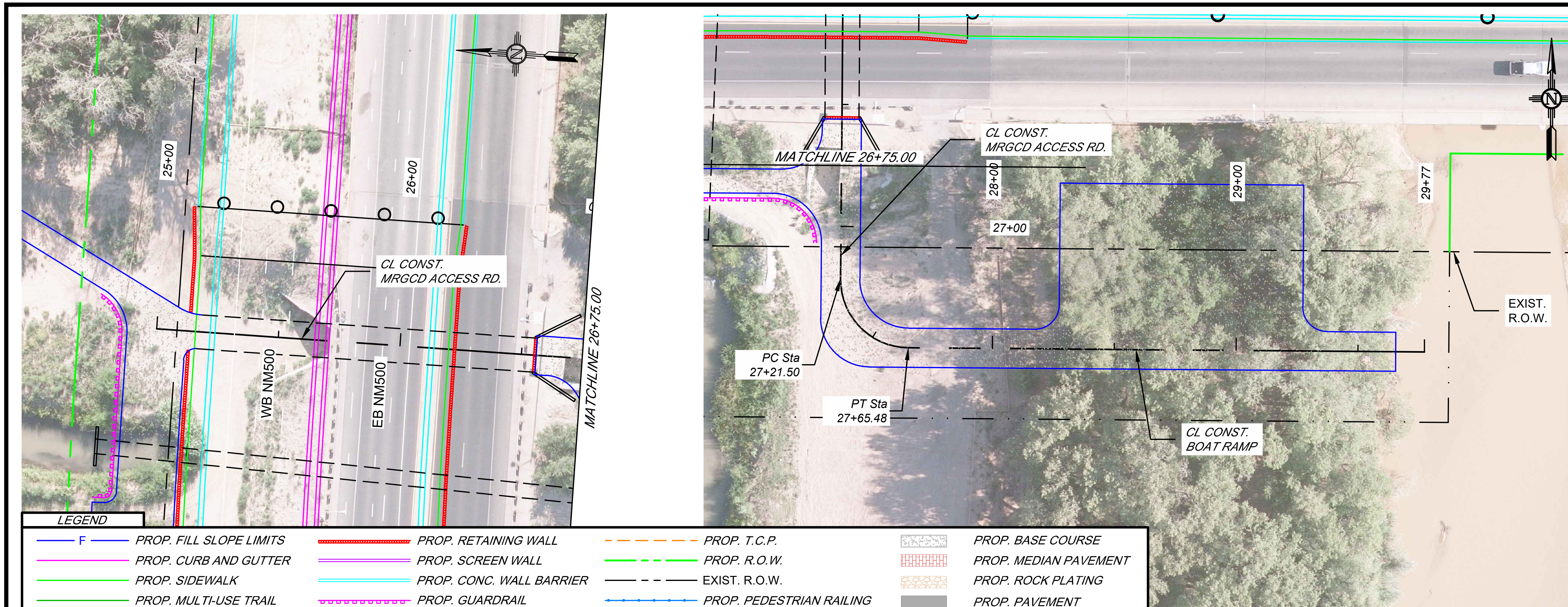
PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

PLAN DRAWING SCALE: 1"=50'

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=5'

NORTH/SOUTH ACCESS ROAD PLAN AND PROFILE - ALTERNATIVE A





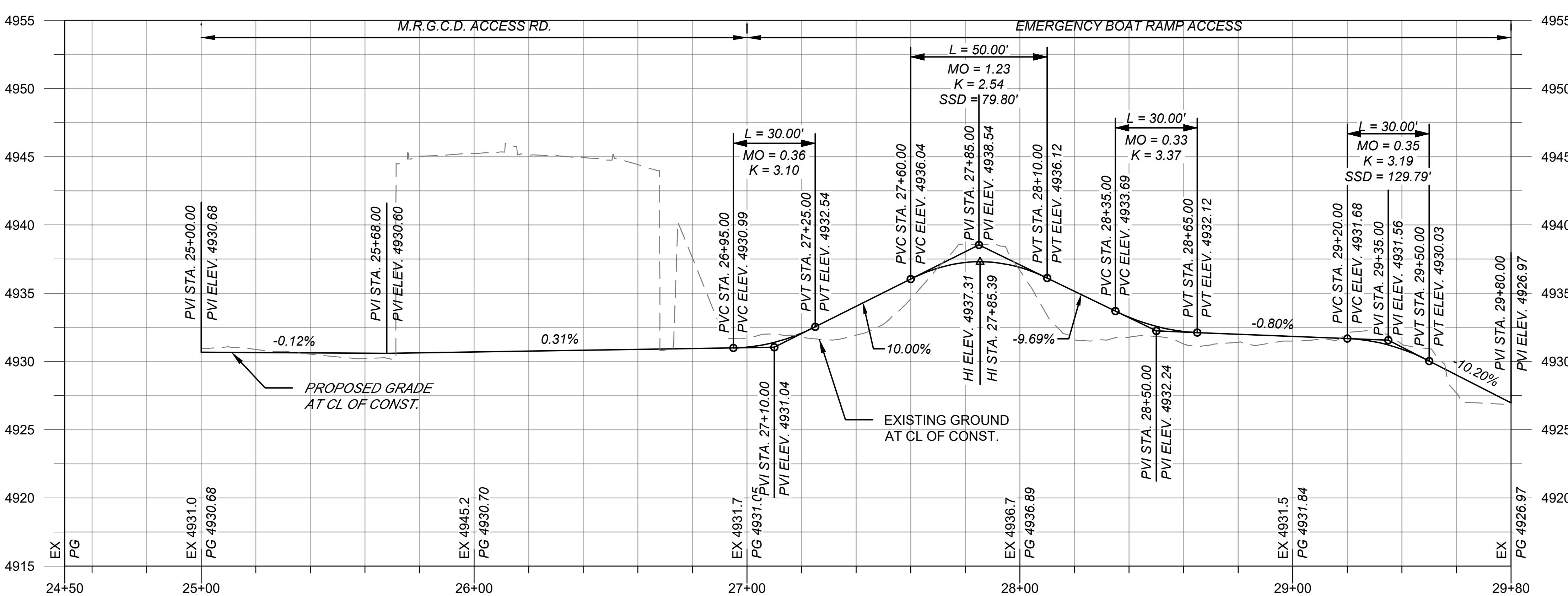
LEGEND

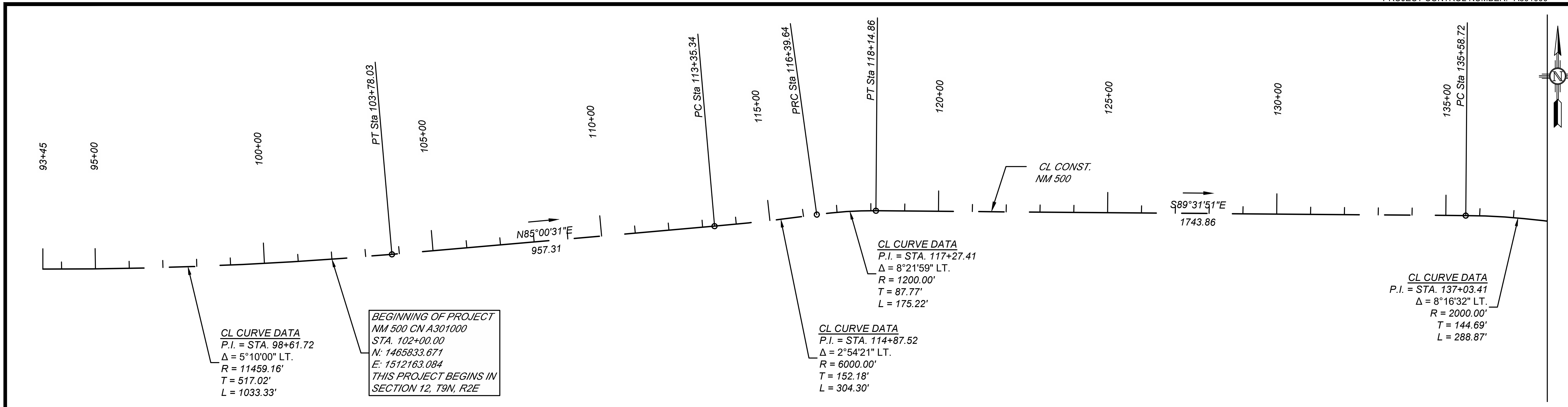
PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

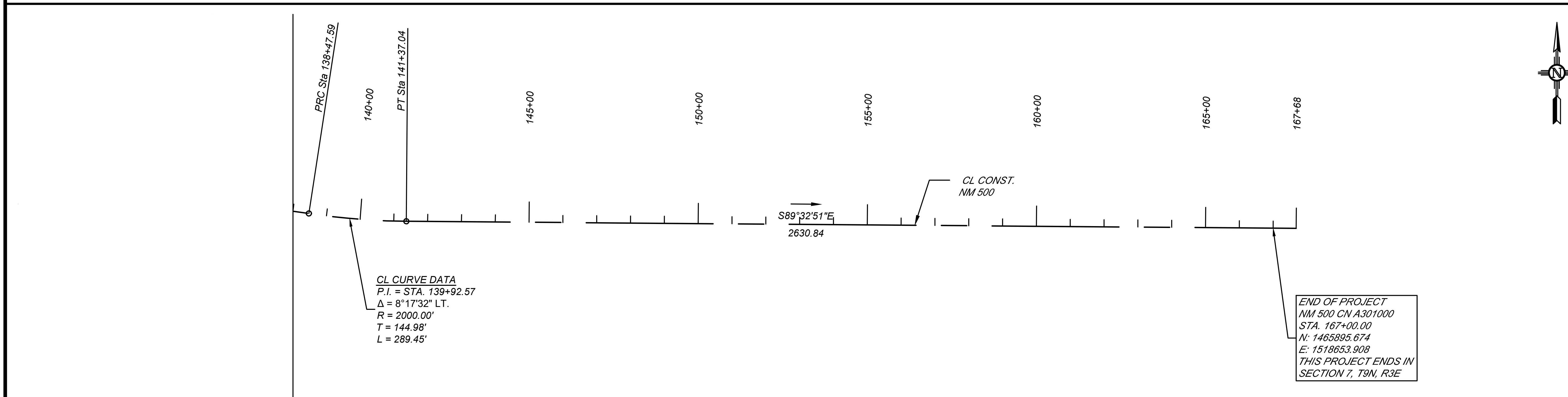
PLAN DRAWING SCALE: 1"=50'

M.R.G.C.D. ACCESS ROAD PLAN AND PROFILE - ALTERNATIVE A

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1" = 100'







NOTES

1. ALL COORDINATES VALUES LISTED ARE LOCAL PROJECT GROUND COORDINATES.
2. ELEVATIONS LISTED ARE NAVD 88.

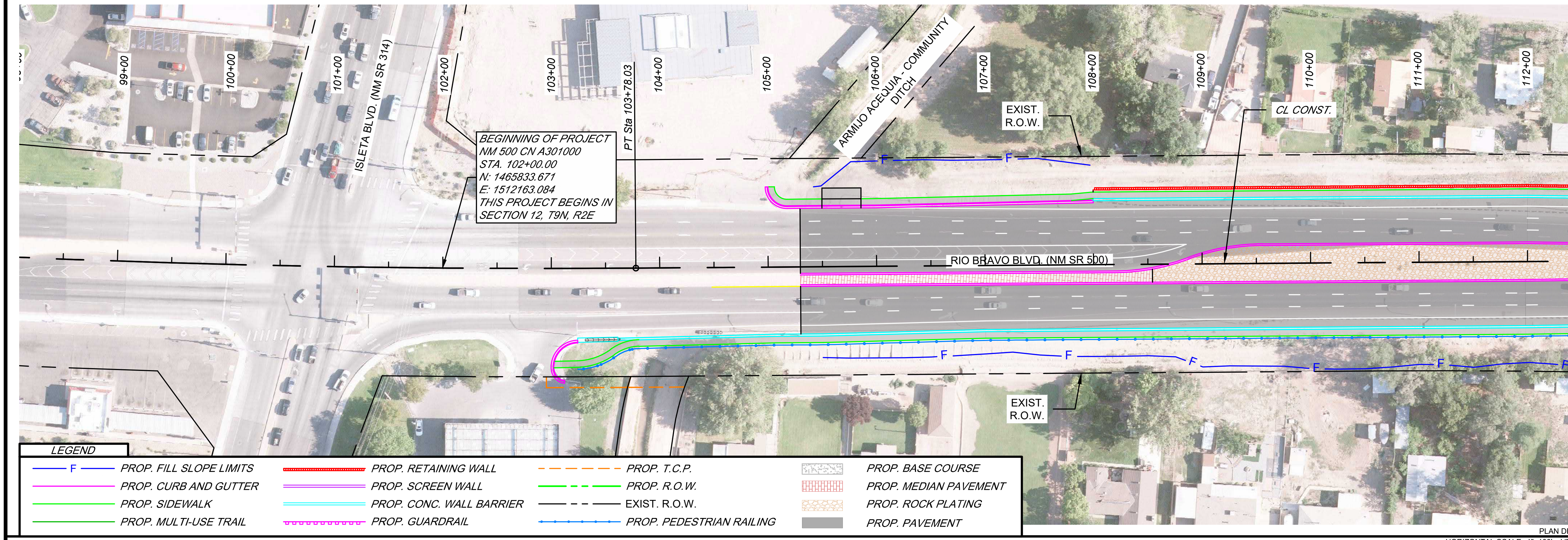
PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DESCRIPTION	DATE	BY
4			
3			
2			
1			

REVISIONS (OR CHANGE NOTICES)

NEW MEXICO DEPARTMENT
OF TRANSPORTATION

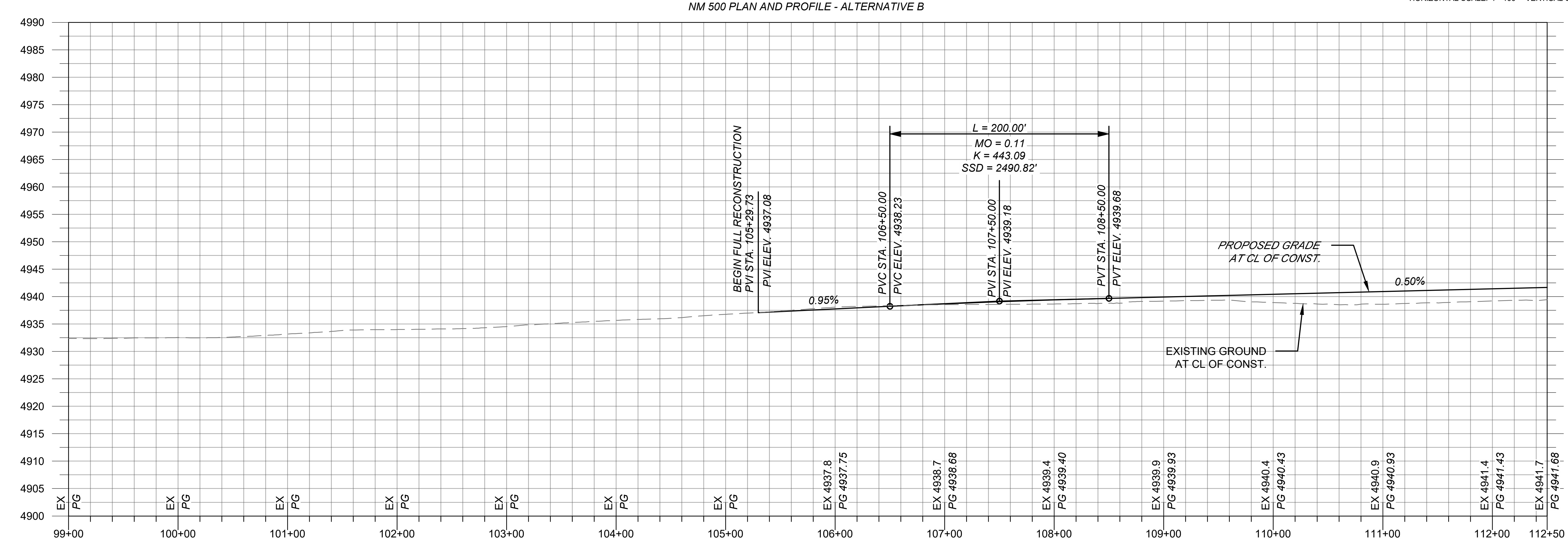
NM 500 - PHASE IA/B
MP 9.087 TO MP 10.318
PROJECT HORIZONTAL LAYOUT
ALTERNATIVE B

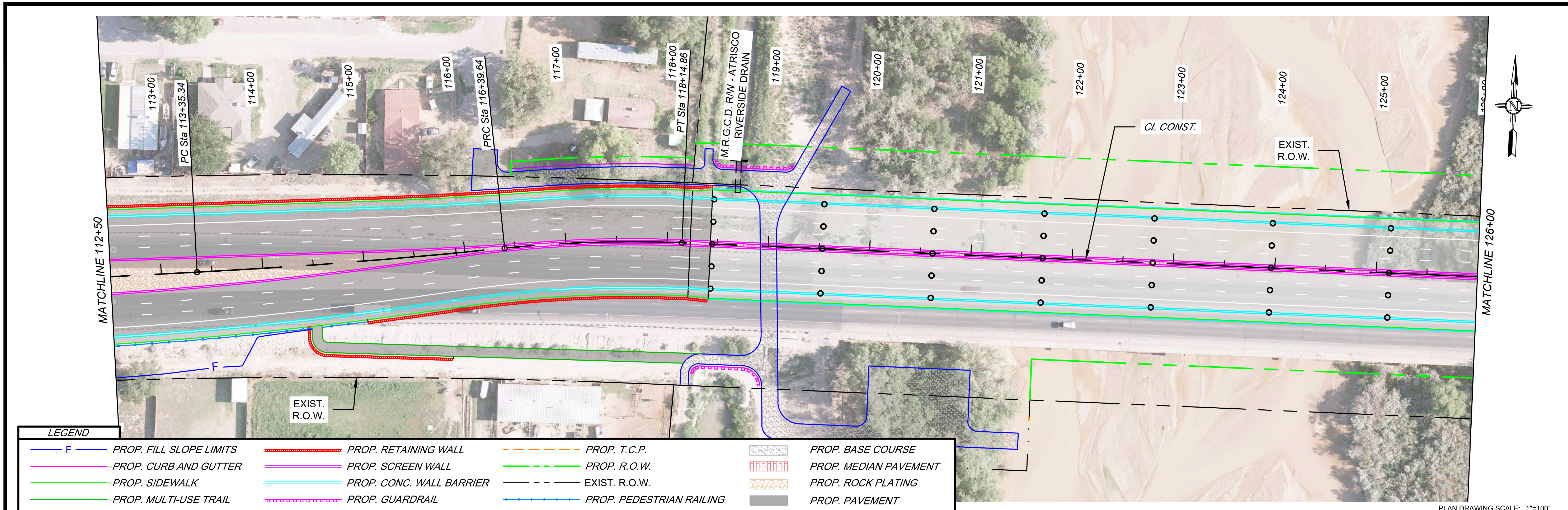


PLAN DRAWING SCALE: 1"=100'

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 100'

NM 500 PLAN AND PROFILE - ALTERNATIVE B

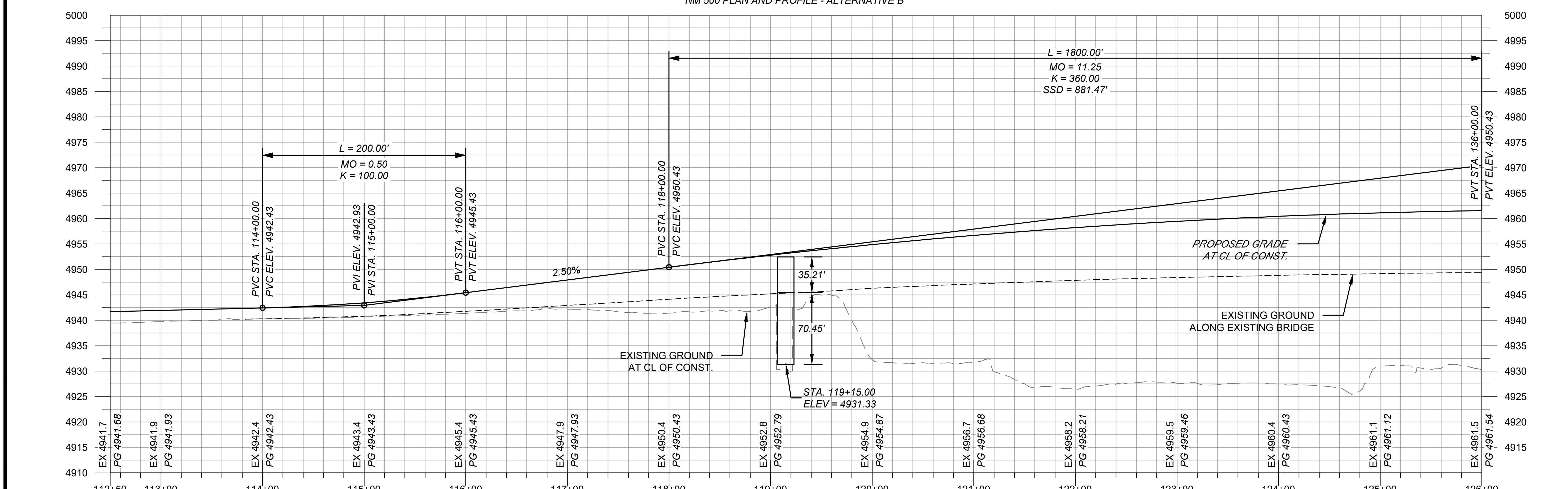


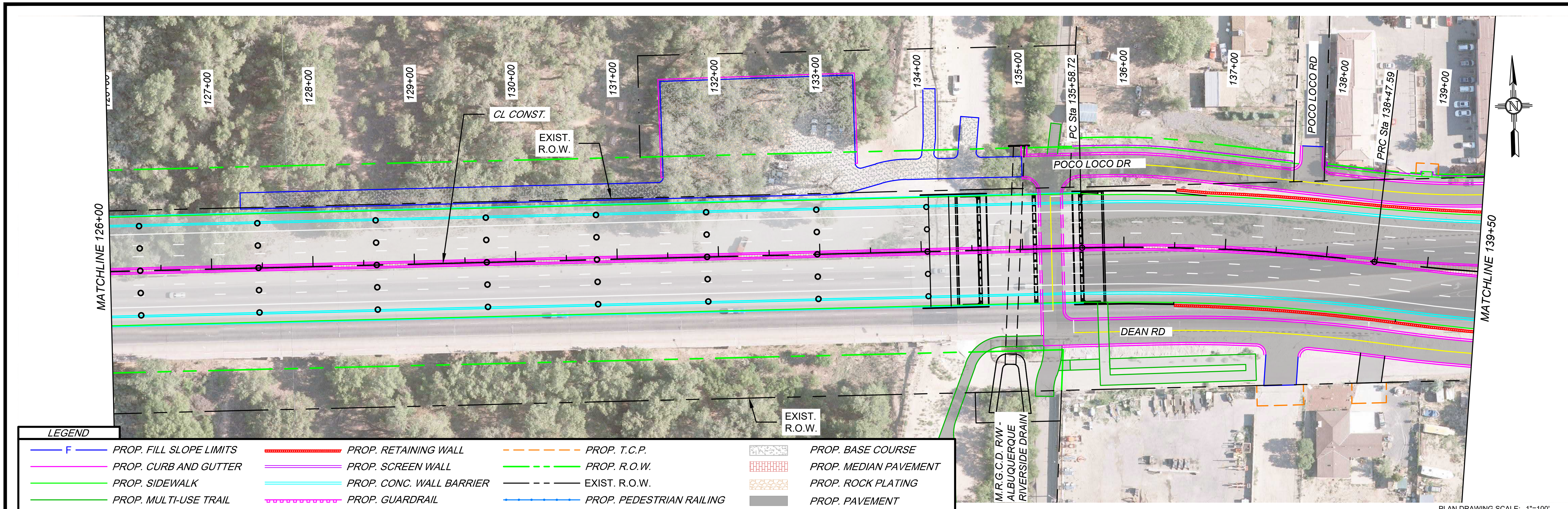


PLAN DRAWING SCALE: 1"=100'

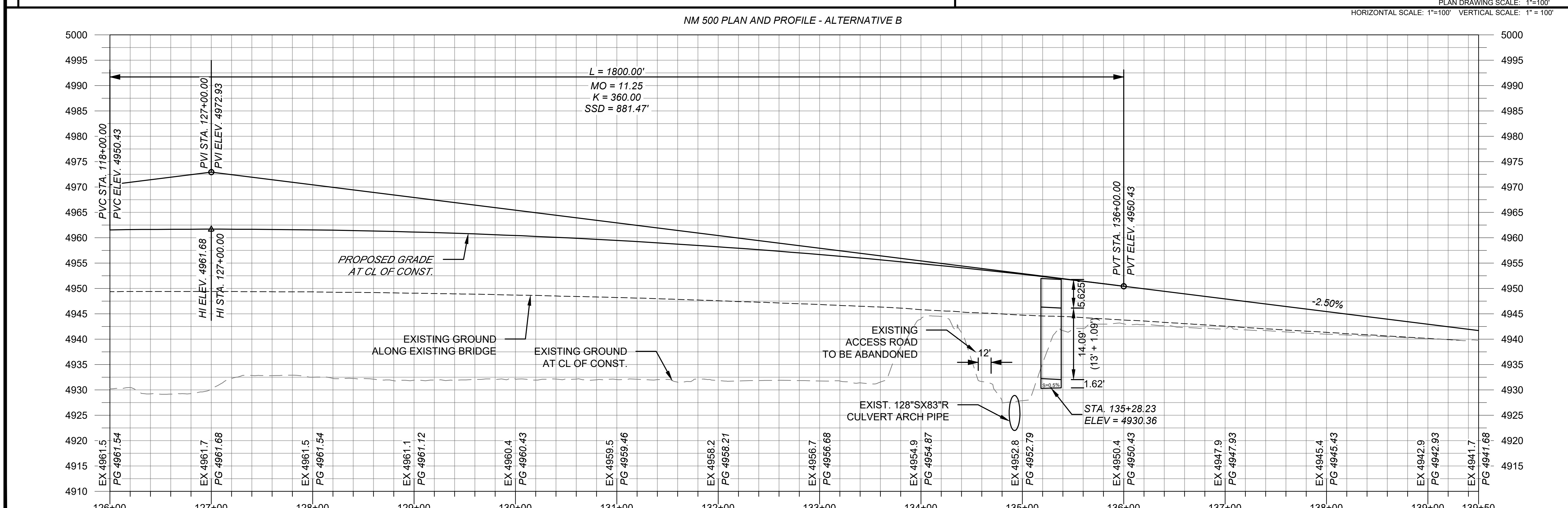
HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 100'

NM 500 PLAN AND PROFILE - ALTERNATIVE B





MATCHLINE 126+00
127+00
128+00
129+00
130+00
131+00
132+00
133+00
134+00
135+00
PC Sta 135+58.72
136+00
137+00
POCO LOCO RD
138+00
PRC Sta 138+47.59
139+00
MATCHLINE 139+50
CL CONST.
EXIST. R.O.W.
POCO LOCO DR
DEAN RD
EXIST. R.O.W.
M.R.G.C.D. R/W - ALBUQUERQUE RIVERSIDE DRAIN
N
LEGEND
F PROP. FILL SLOPE LIMITS
PROP. CURB AND GUTTER
PROP. SIDEWALK
PROP. MULTI-USE TRAIL
PROP. RETAINING WALL
PROP. SCREEN WALL
PROP. CONC. WALL BARRIER
PROP. GUARDRAIL
PROP. T.C.P.
PROP. R.O.W.
EXIST. R.O.W.
PROP. PEDESTRIAN RAILING
PROP. BASE COURSE
PROP. MEDIAN PAVEMENT
PROP. ROCK PLATING
PROP. PAVEMENT
PLAN DRAWING SCALE: 1"=100'



HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 100'
NM 500 PLAN AND PROFILE - ALTERNATIVE B
L = 1800.00'
MO = 11.25
K = 360.00
SSD = 881.47'
PVC STA. 118+00.00
PVC ELEV. 4950.43
PVI STA. 127+00.00
PVI ELEV. 4972.93
HI ELEV. 4961.68
HI STA. 127+00.00
PROPOSED GRADE AT CL OF CONST.
EXISTING GROUND ALONG EXISTING BRIDGE
EXISTING GROUND AT CL OF CONST.
EXISTING ACCESS ROAD TO BE ABANDONED
12'
EXIST. 128"SX83"R CULVERT ARCH PIPE
5.625'
14.09' (13' + 1.09')
1.62'
STA. 135+28.23
ELEV = 4930.36
PVT STA. 136+00.00
PVT ELEV. 4950.43
-2.50%
5000
4995
4990
4985
4980
4975
4970
4965
4960
4955
4950
4945
4940
4935
4930
4925
4920
4915
4910
EX 4961.5 PG 4961.54
EX 4961.7 PG 4961.68
EX 4961.5 PG 4961.54
EX 4961.1 PG 4961.12
EX 4960.4 PG 4960.43
EX 4959.5 PG 4959.46
EX 4958.2 PG 4958.21
EX 4956.7 PG 4956.68
EX 4954.9 PG 4954.87
EX 4952.8 PG 4952.79
EX 4950.4 PG 4950.43
EX 4947.9 PG 4947.93
EX 4945.4 PG 4945.43
EX 4942.9 PG 4942.93
EX 4941.7 PG 4941.68
126+00
127+00
128+00
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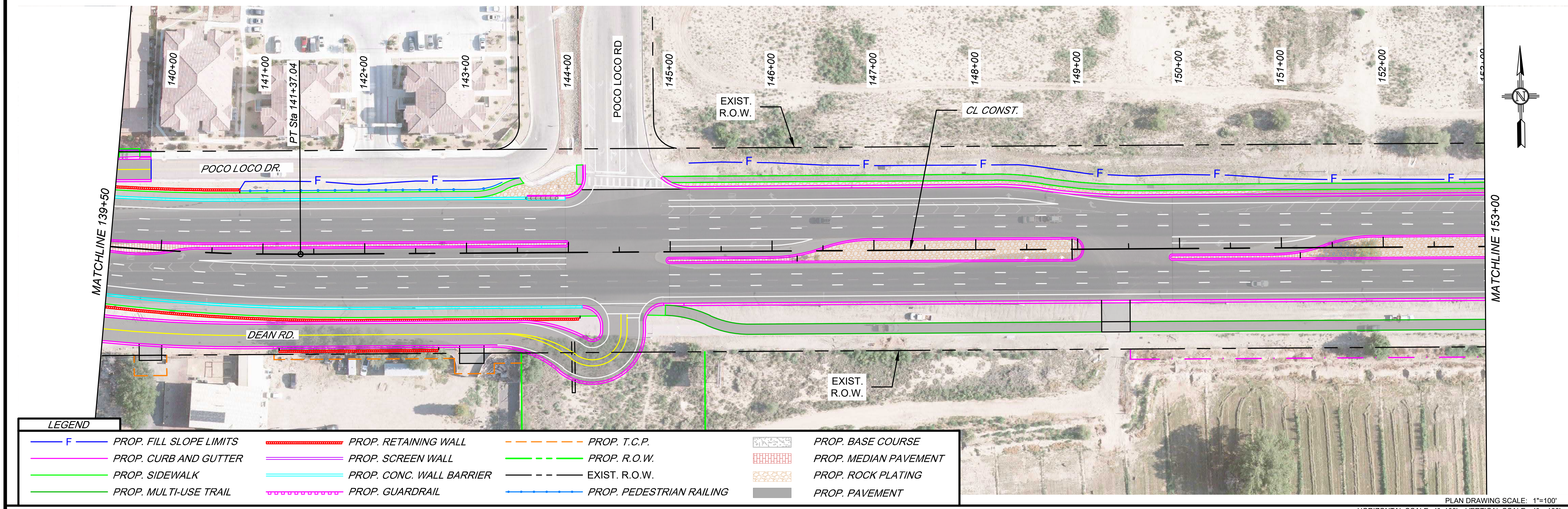
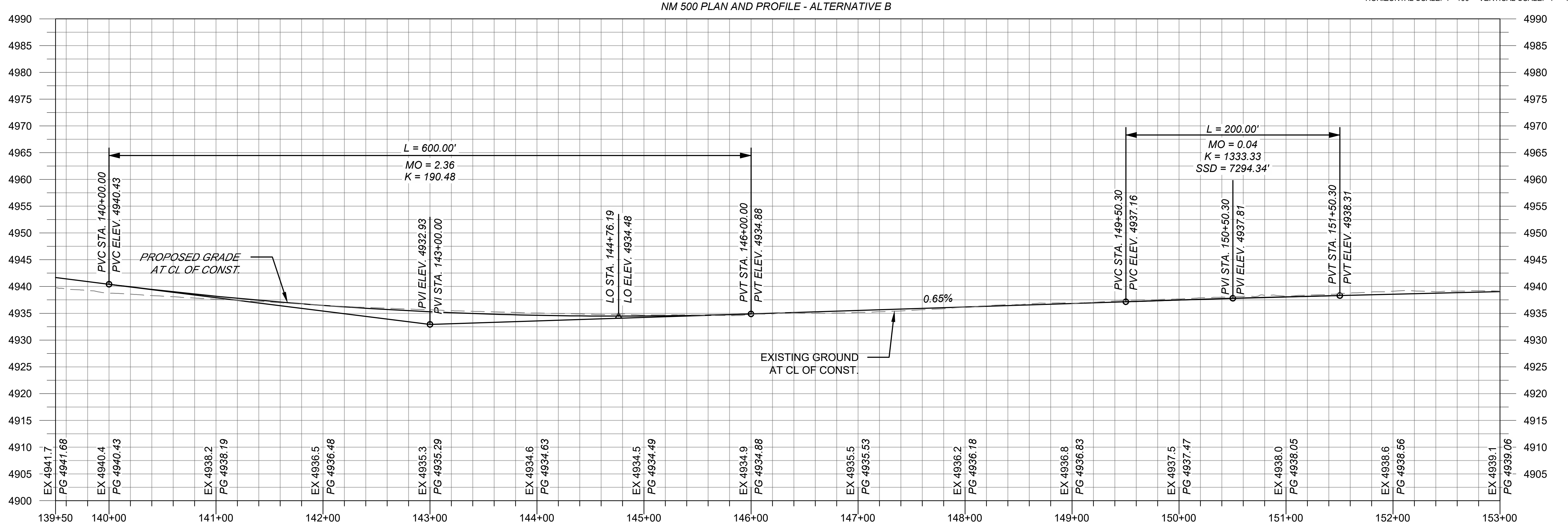
139+50

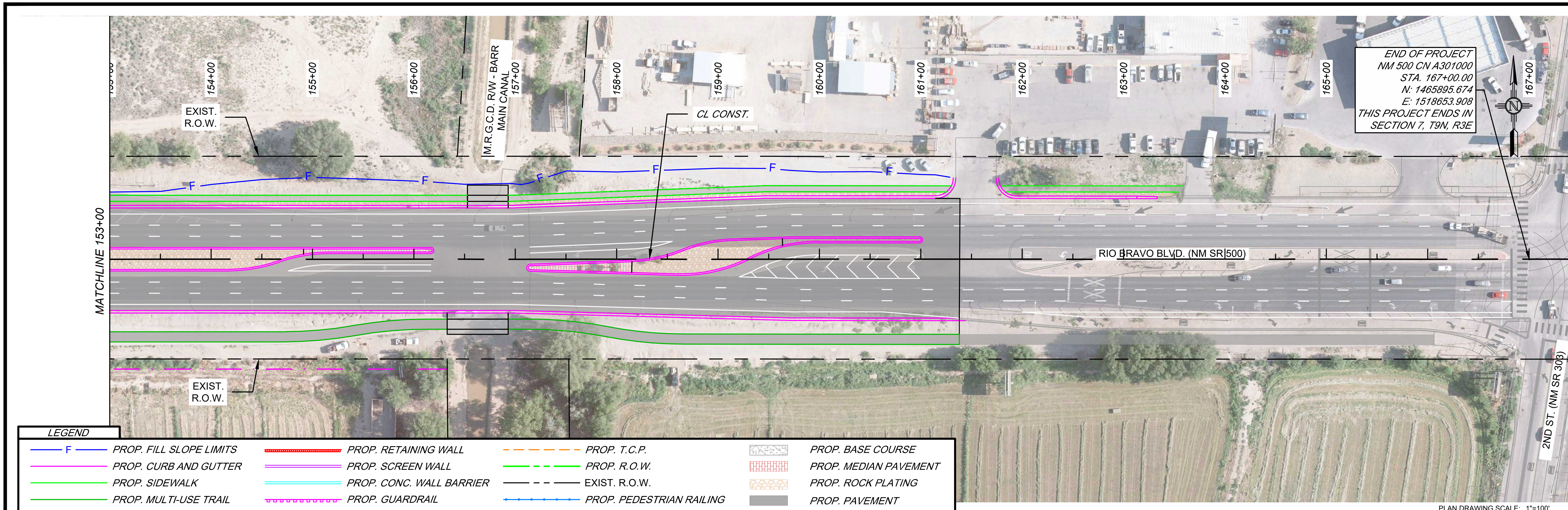


PLAN DRAWING SCALE: 1"=100'

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 100'

NM 500 PLAN AND PROFILE - ALTERNATIVE B

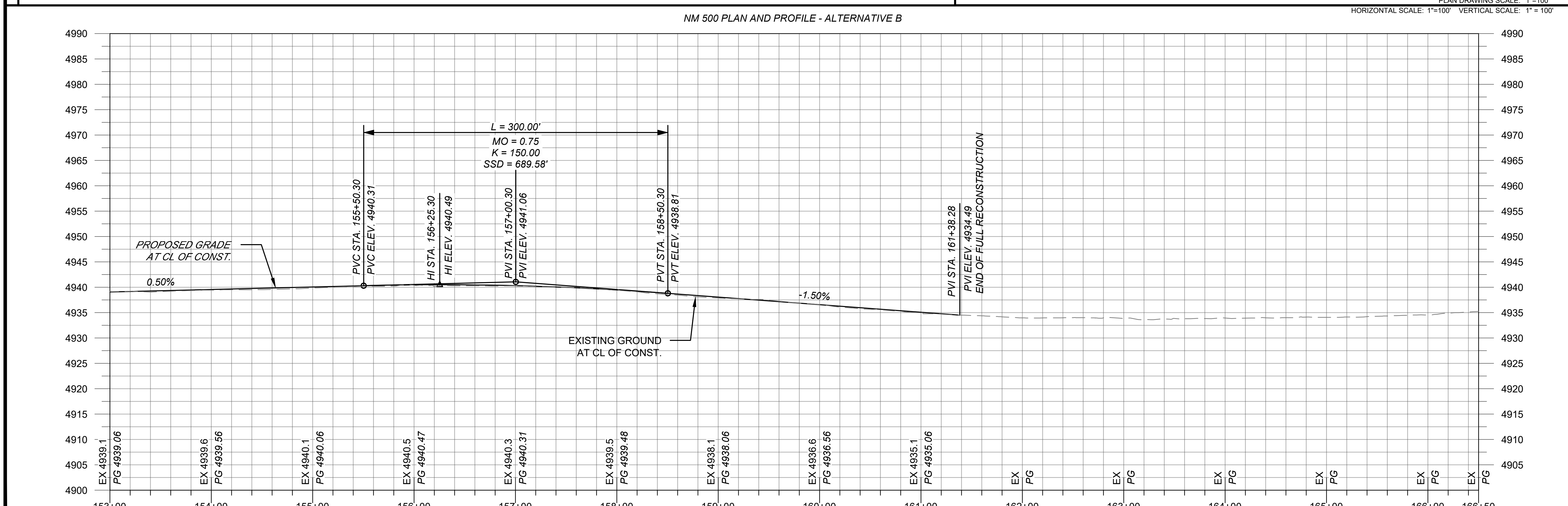


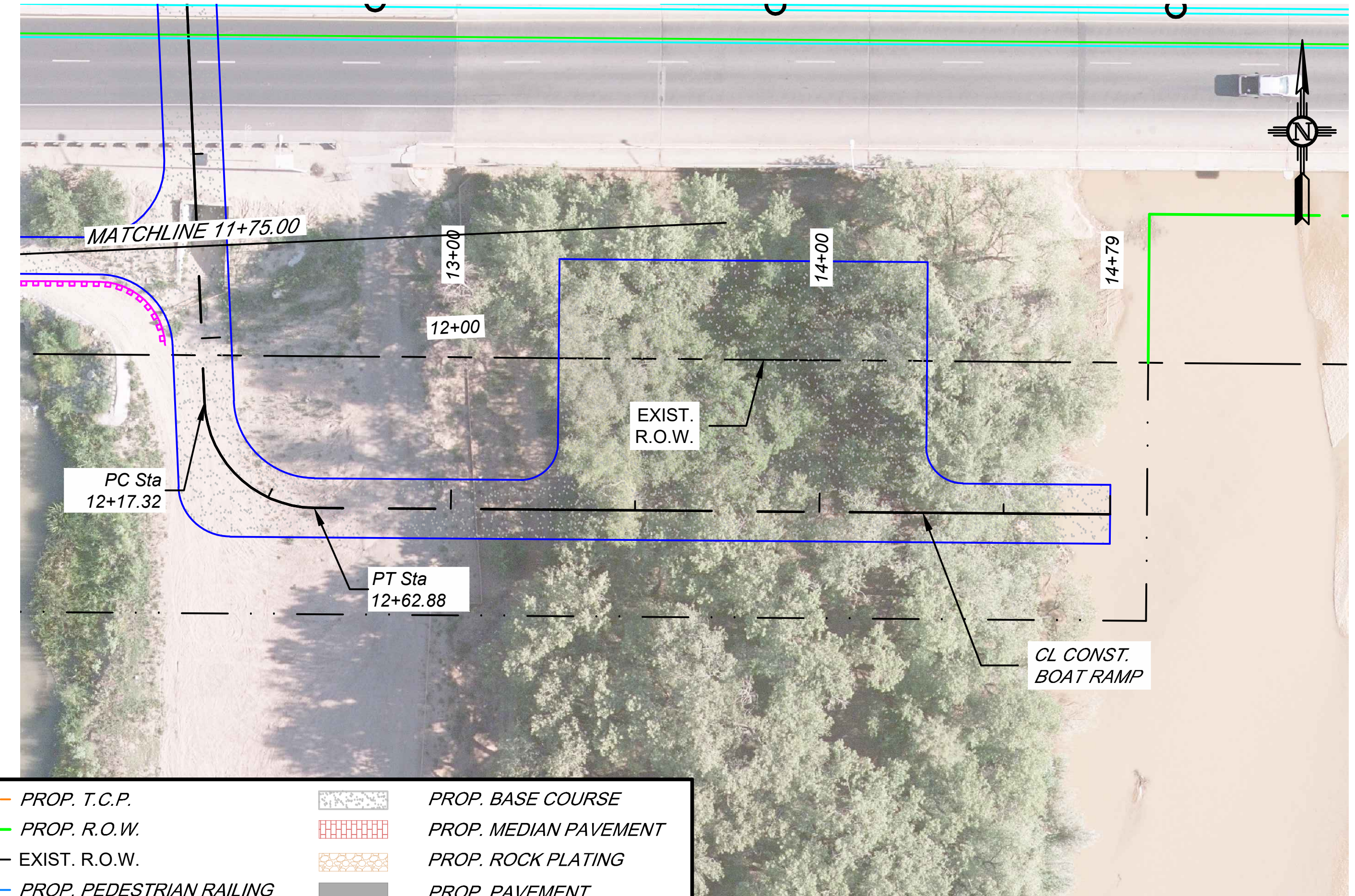


PLAN DRAWING SCALE: 1"=100'

HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1" = 100'

NM 500 PLAN AND PROFILE - ALTERNATIVE B





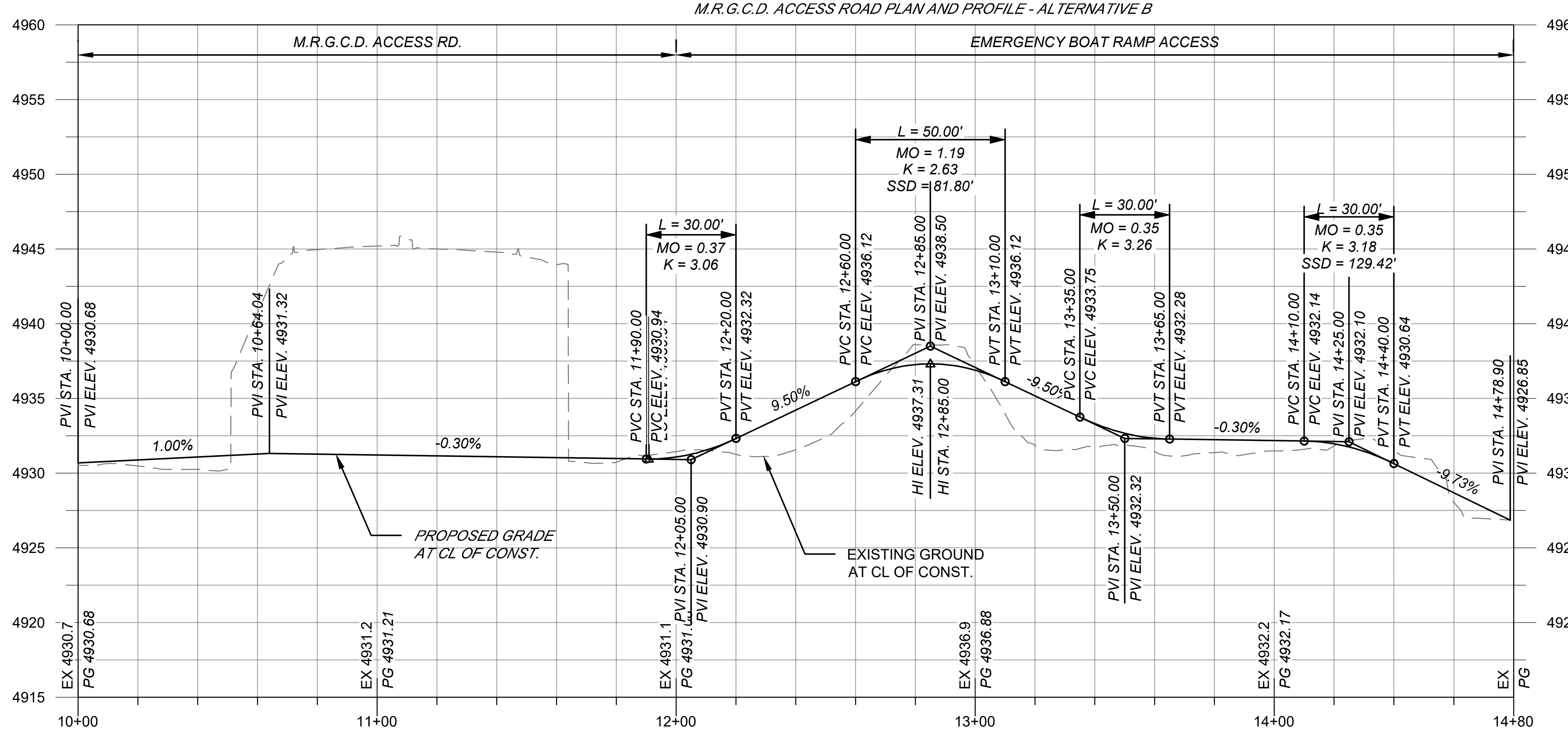
LEGEND

PROP. FILL SLOPE LIMITS	PROP. RETAINING WALL	PROP. T.C.P.	PROP. BASE COURSE
PROP. CURB AND GUTTER	PROP. SCREEN WALL	PROP. R.O.W.	PROP. MEDIAN PAVEMENT
PROP. SIDEWALK	PROP. CONC. WALL BARRIER	EXIST. R.O.W.	PROP. ROCK PLATING
PROP. MULTI-USE TRAIL	PROP. GUARDRAIL	PROP. PEDESTRIAN RAILING	PROP. PAVEMENT

PLAN DRAWING SCALE: 1"=50'

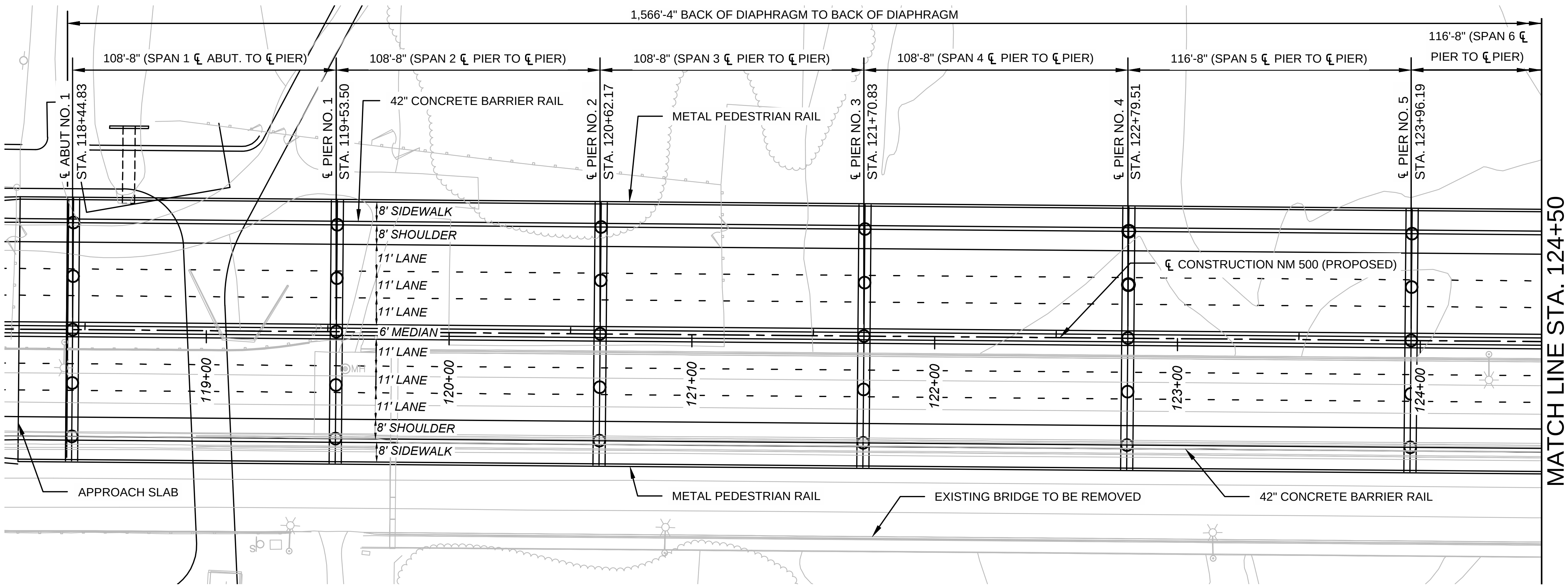
HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1" = 100'

M.R.G.C.D. ACCESS ROAD PLAN AND PROFILE - ALTERNATIVE B



APPENDIX C
BRIDGE GIRDER/SPAN CONFIGURATION ALTERNATIVES

CONTROL No.	SHEET No.
A301000	



BRIDGE PLAN ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

REVISIONS

NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

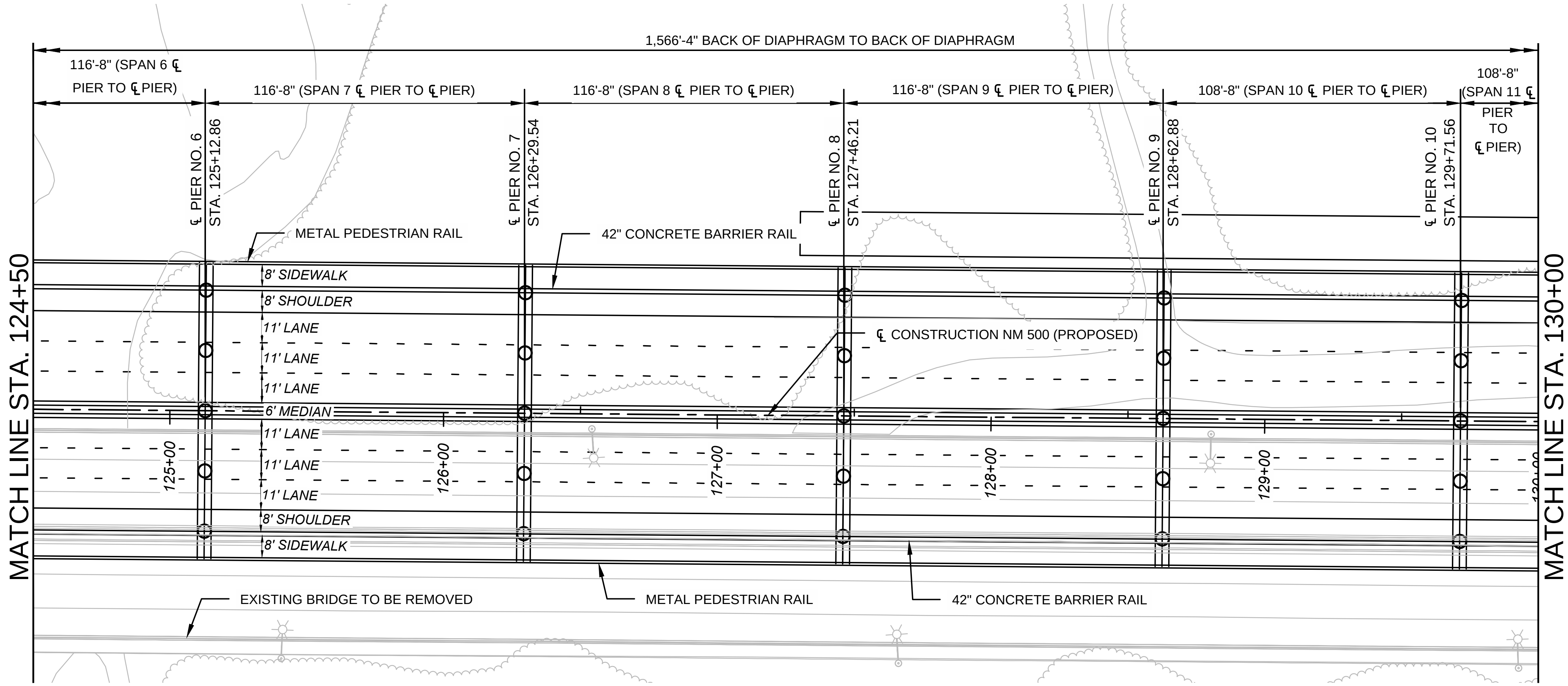
STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:______ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:______ DATE:______

CONTROL No.	SHEET No.
A301000	



BRIDGE PLAN ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

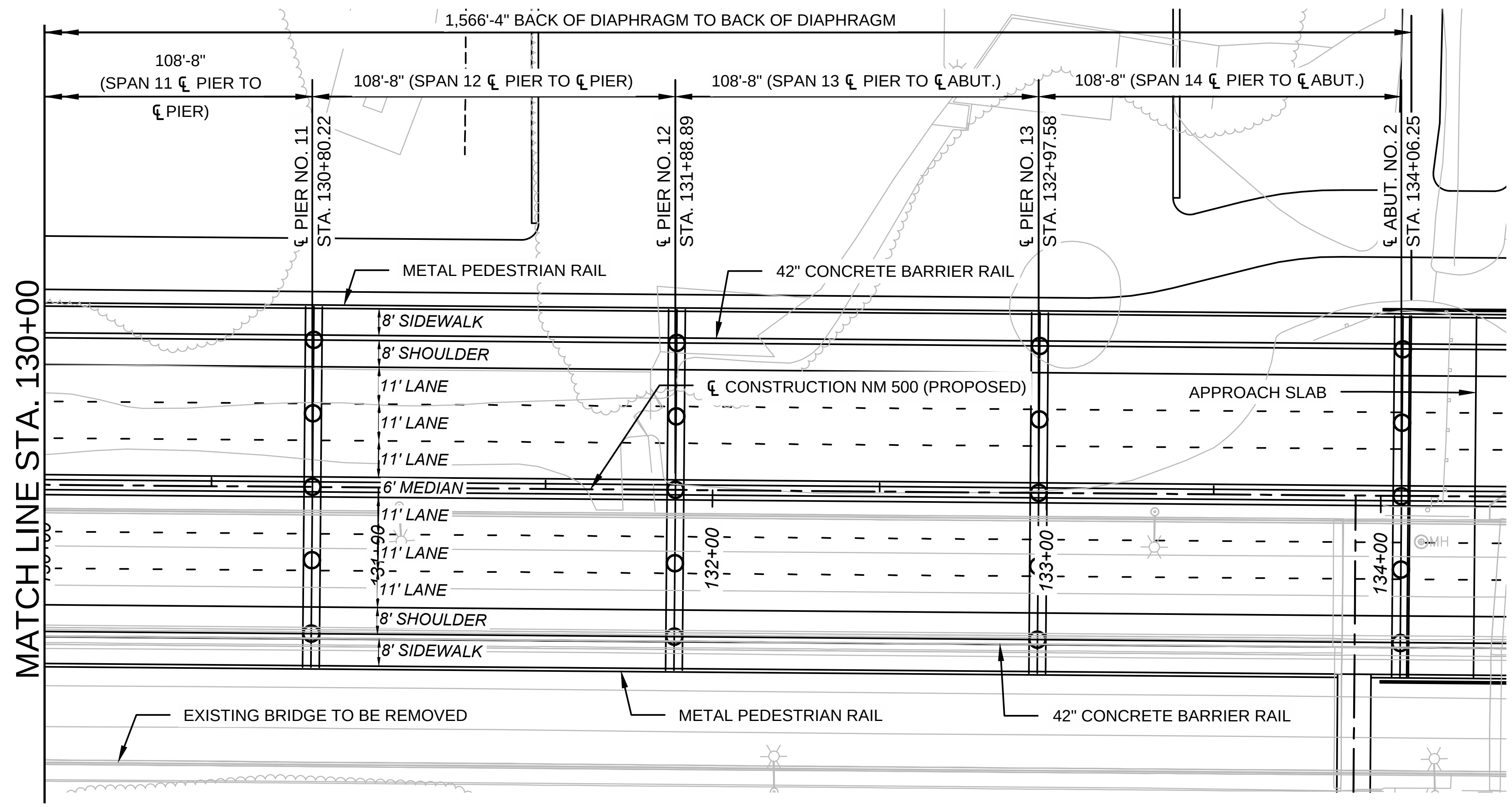
STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PLAN ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

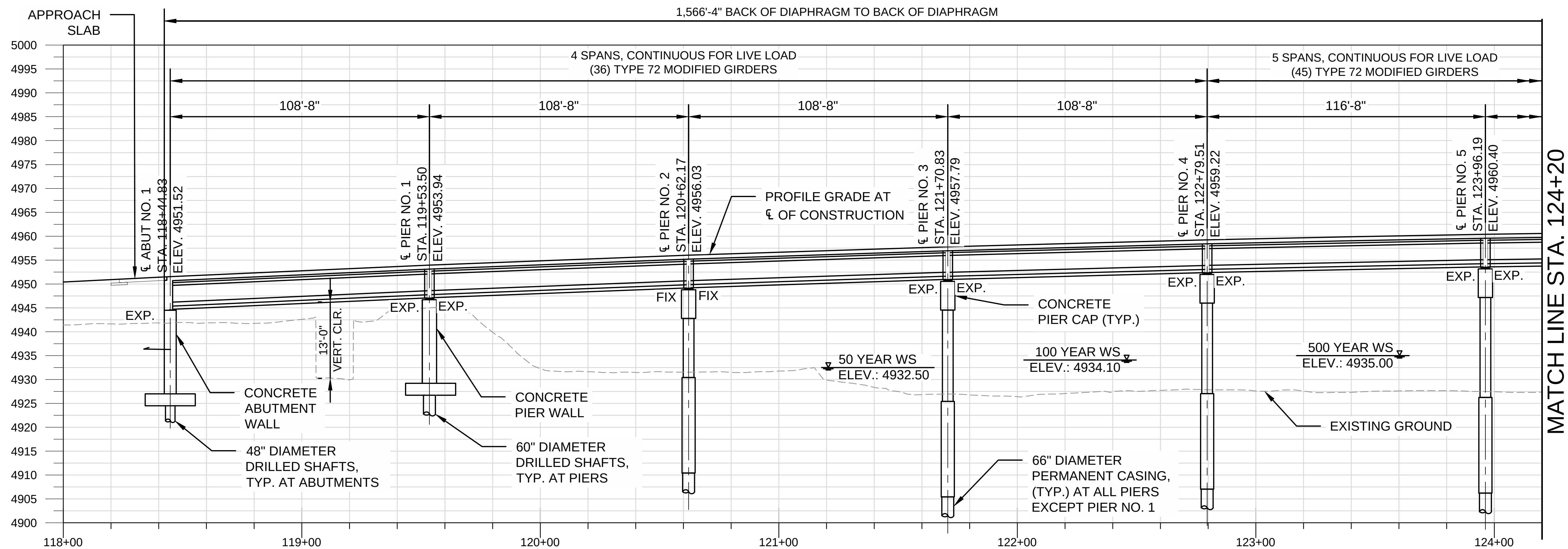
STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:______ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:__________ DATE:______

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

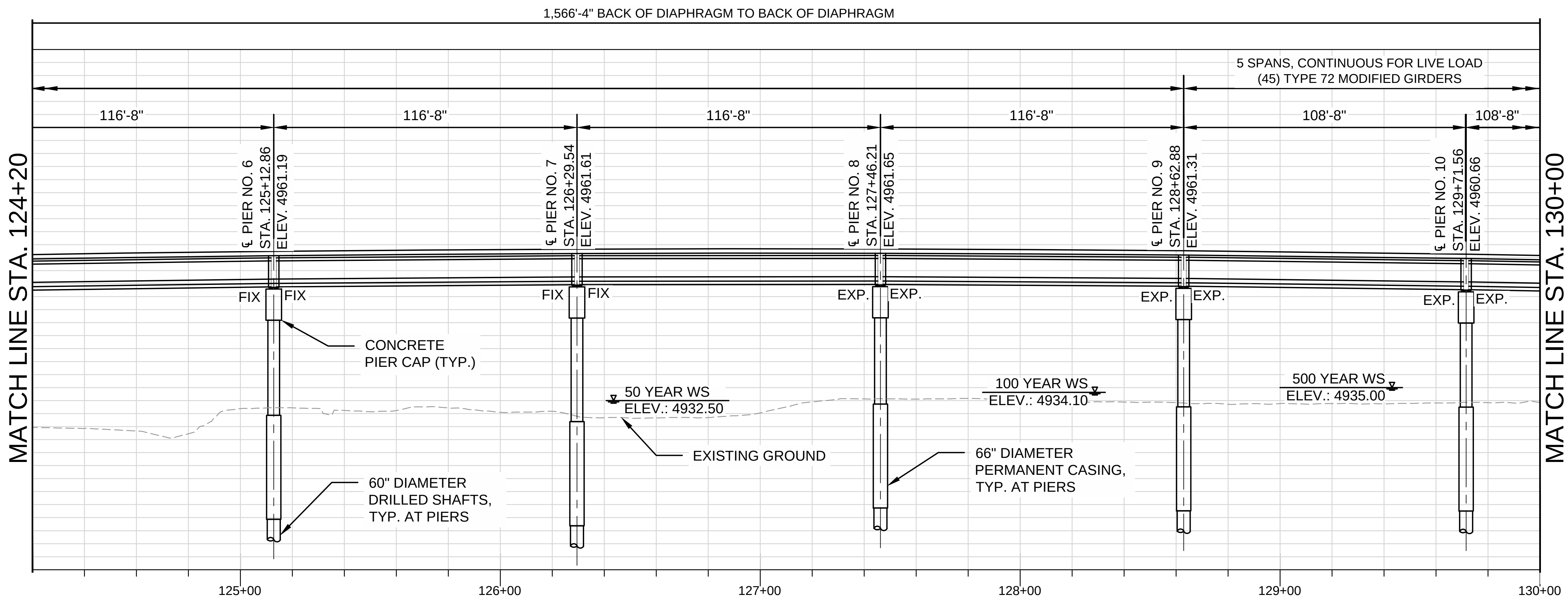
ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021 APPROVED FOR CONSTRUCTION:______________________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

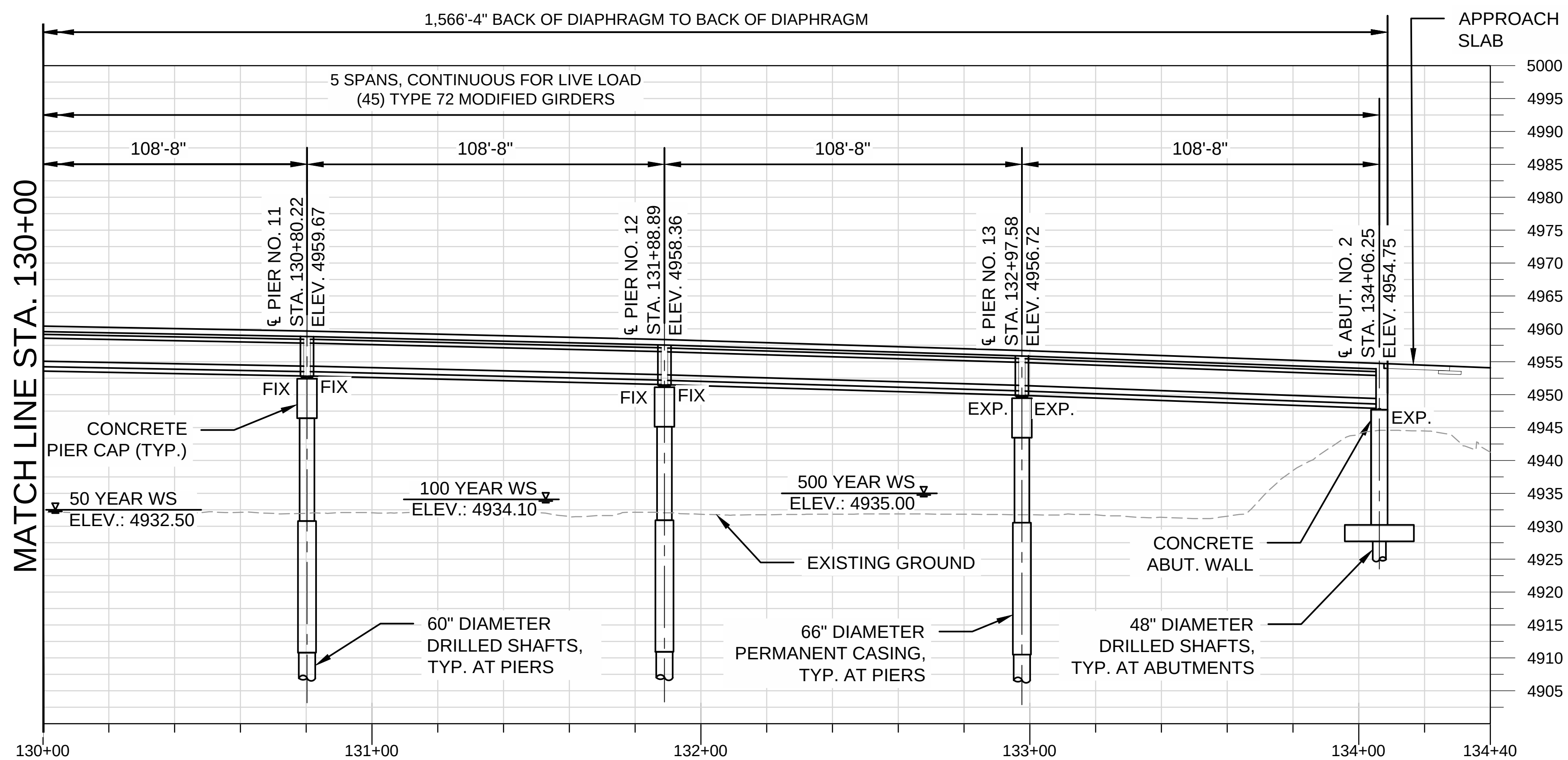
STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:______________________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 1

TYPE 72 MODIFIED PRESTRESSED CONCRETE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

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ALTERNATIVE 1
TYPE 72 MODIFIED GIRDERS

STA. SHEET NO.

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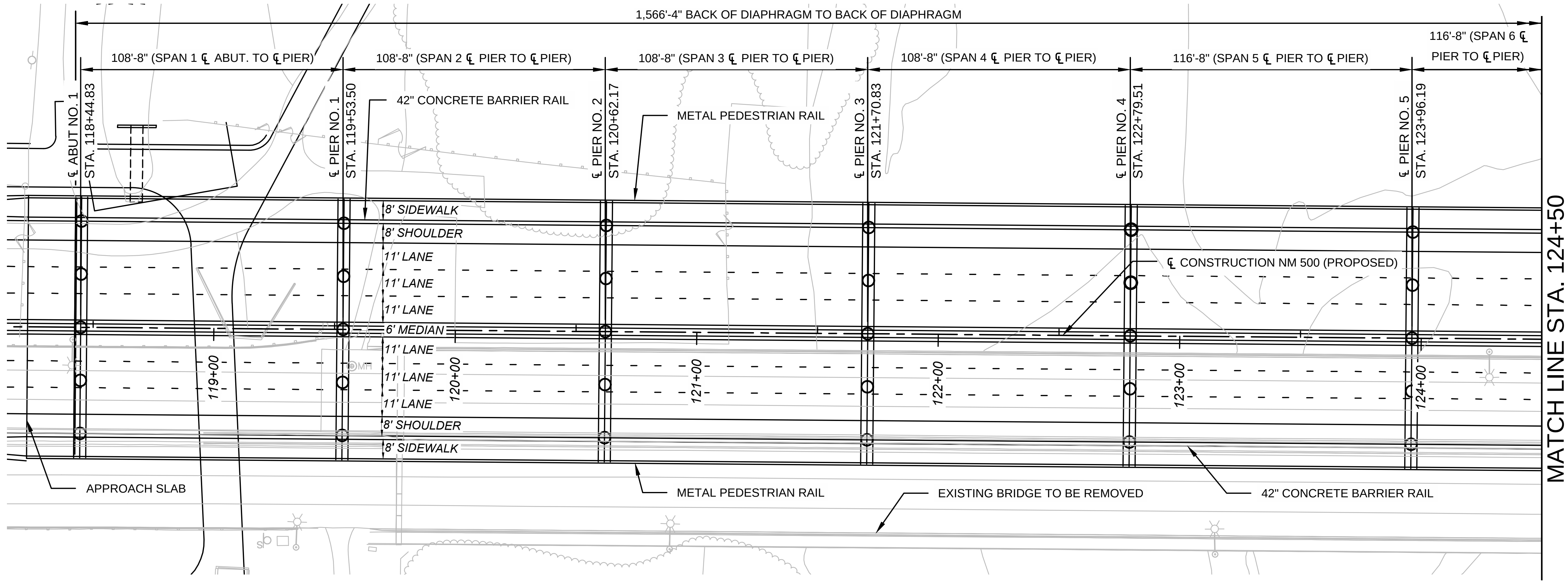
DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:______________________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

BRIDGE

REVISIONS

NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 2
TYPE 72 MODIFIED GIRDERS

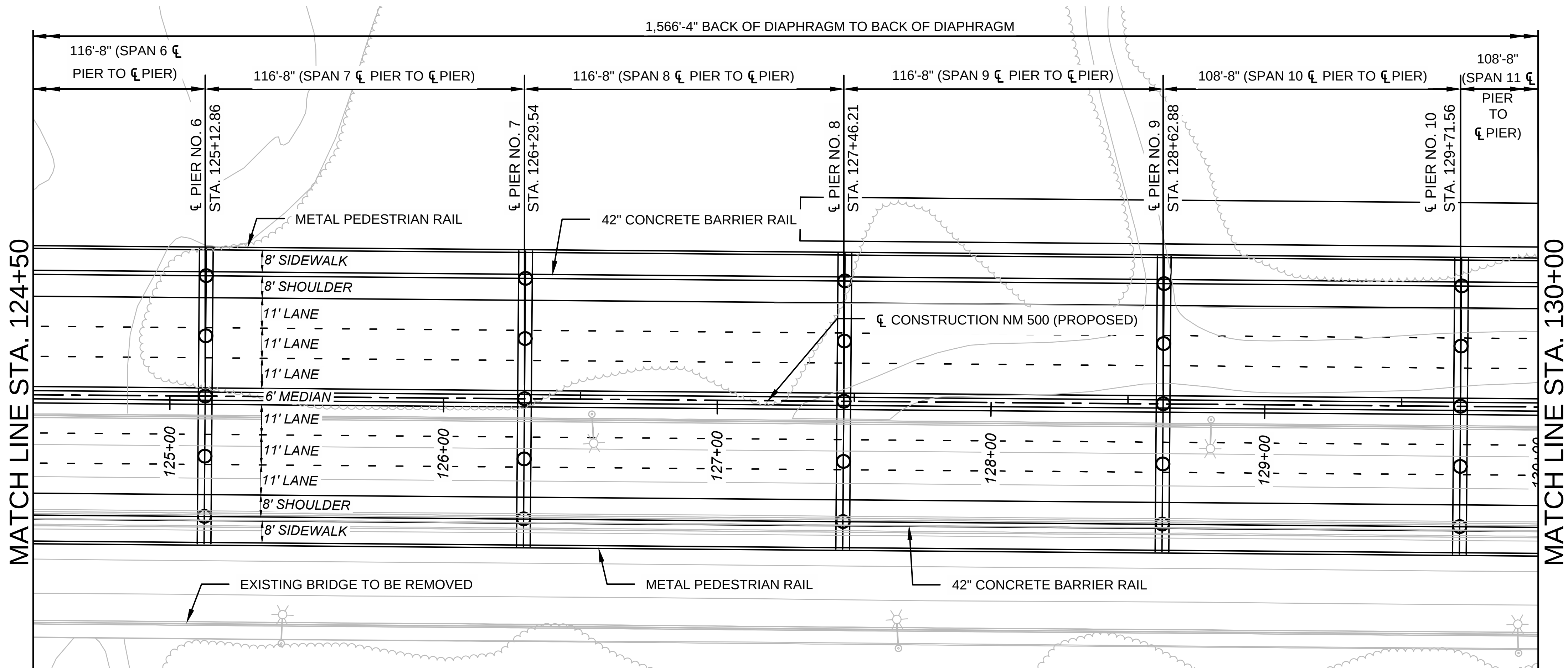
DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:____________________ DATE:__________

STA. SHEET NO.

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 2
TYPE 72 MODIFIED GIRDERS

STA. SHEET NO.

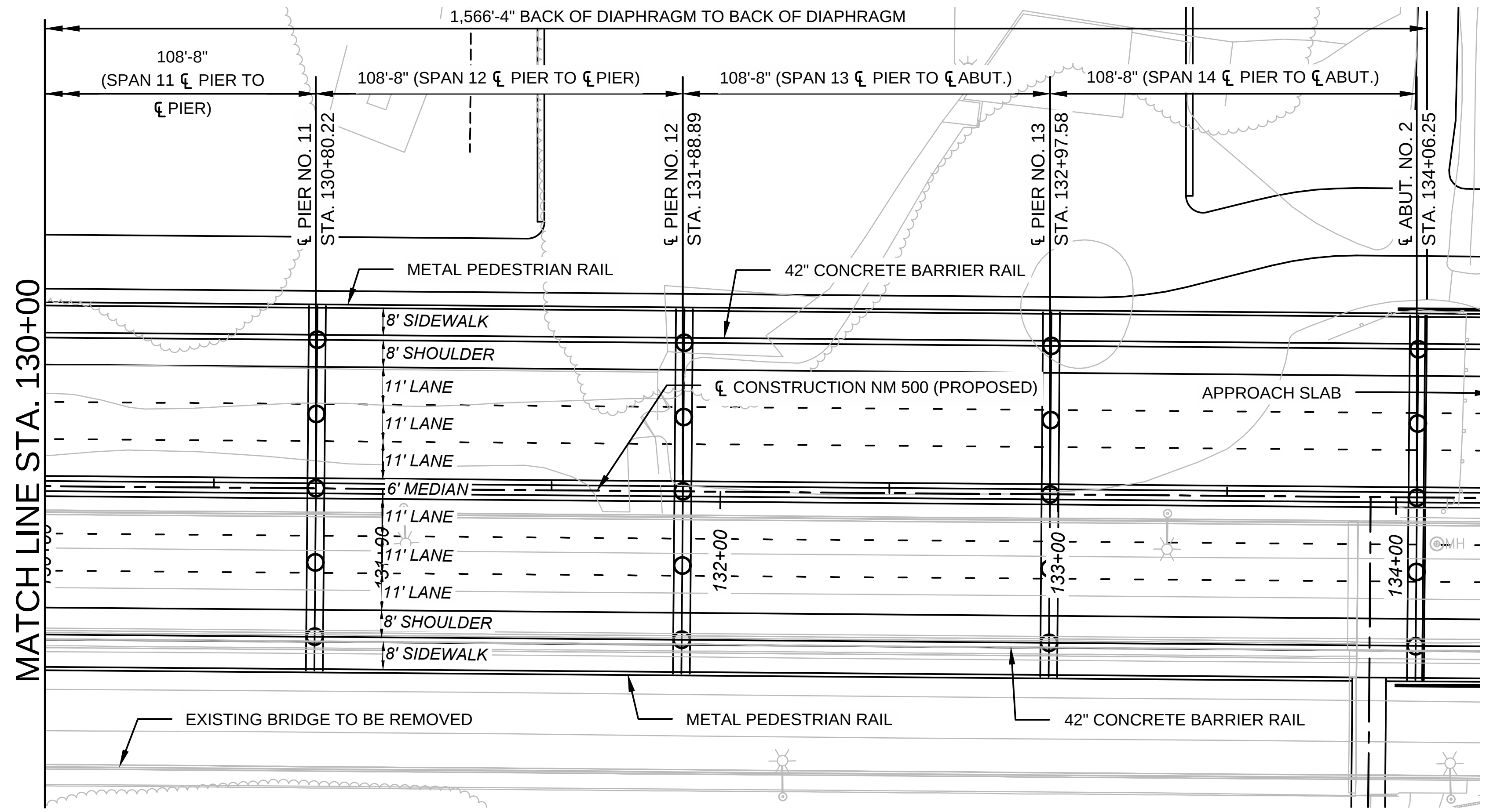
CONCEPTUAL FOR REVIEW

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:__________________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

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NEW MEXICO DEPARTMENT OF TRANSPORTATION

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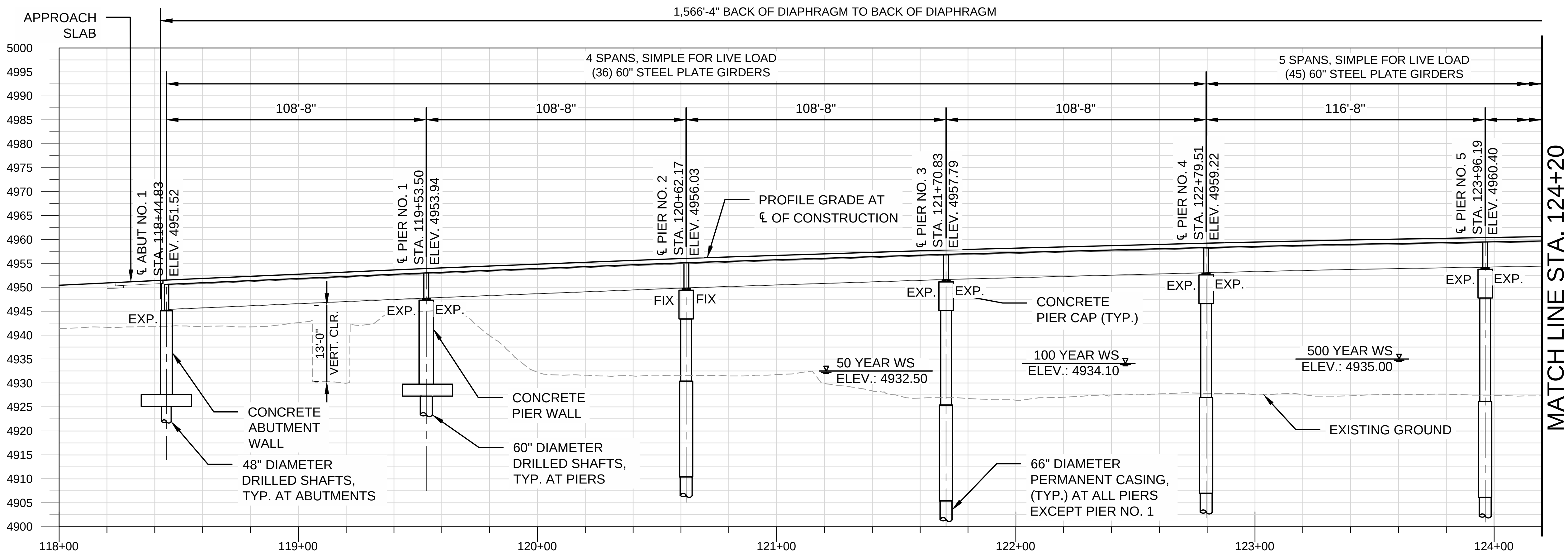
A301000	



BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 2
60" STEEL PLATE GIRDERS

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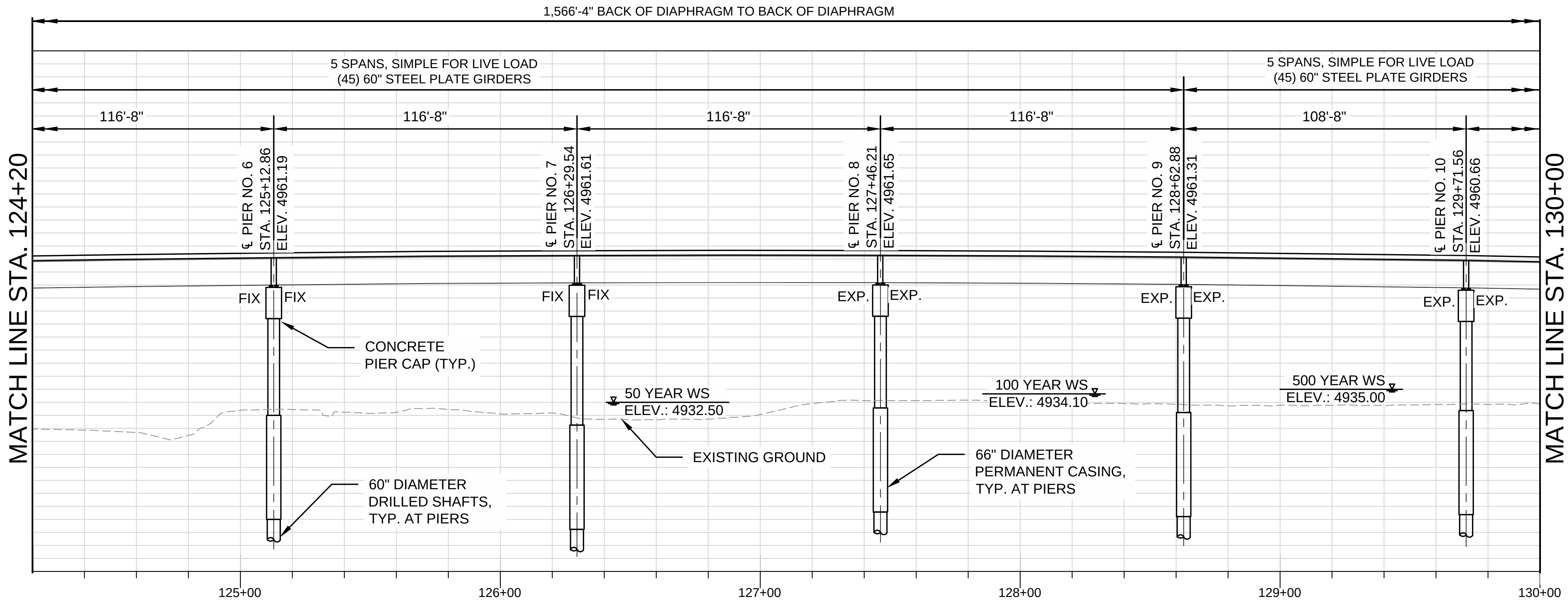
DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/12/2021

APPROVED FOR CONSTRUCTION:______________________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

CONCEPTUAL FOR REVIEW

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

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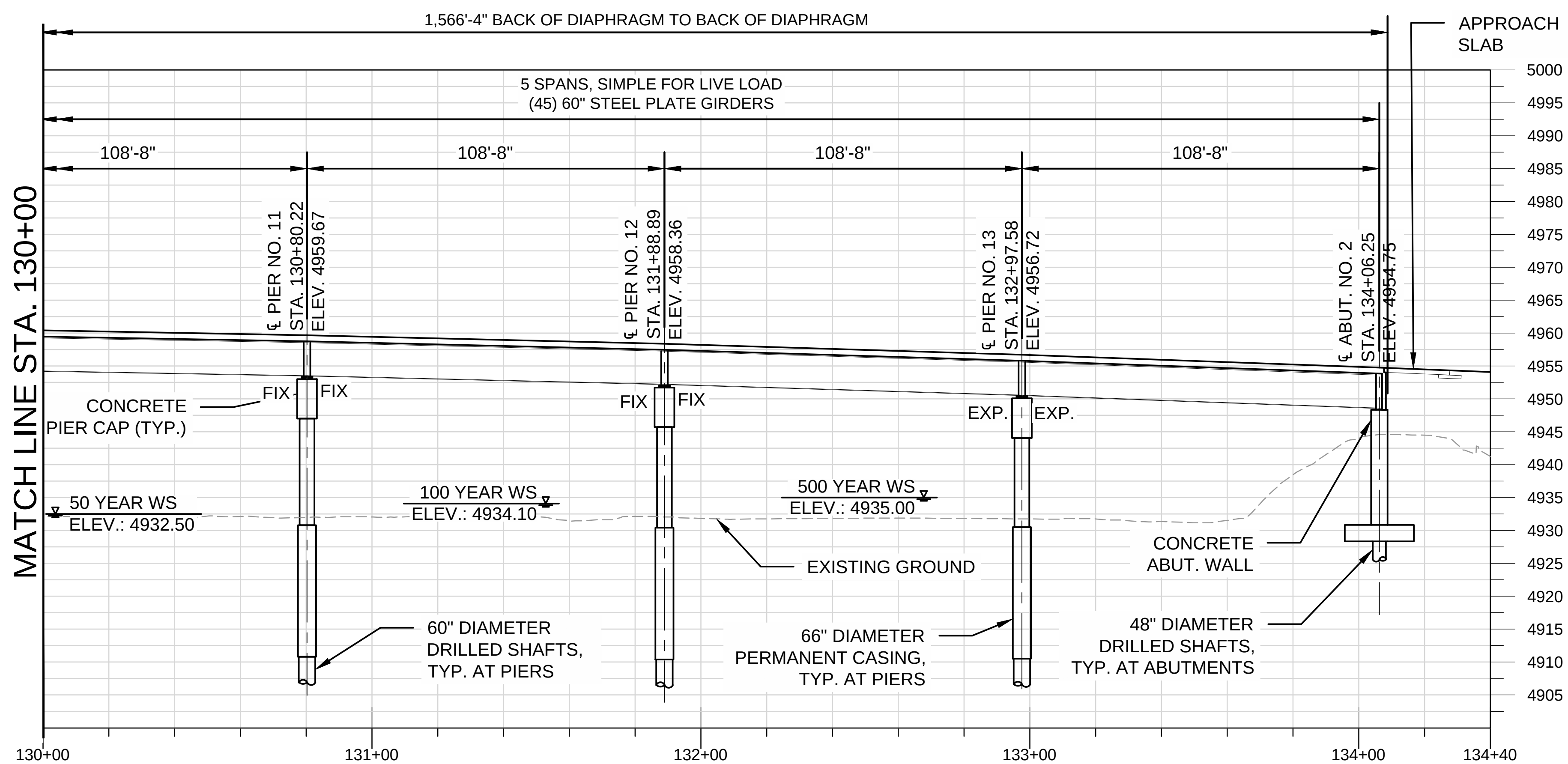

BRIDGE PROFILE ALTERNATIVE 2

60" STEEL PLATE GIRDERS

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REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

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60" STEEL PLATE GIRDERS

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APPROVED FOR CONSTRUCTION:____________________ DATE:________

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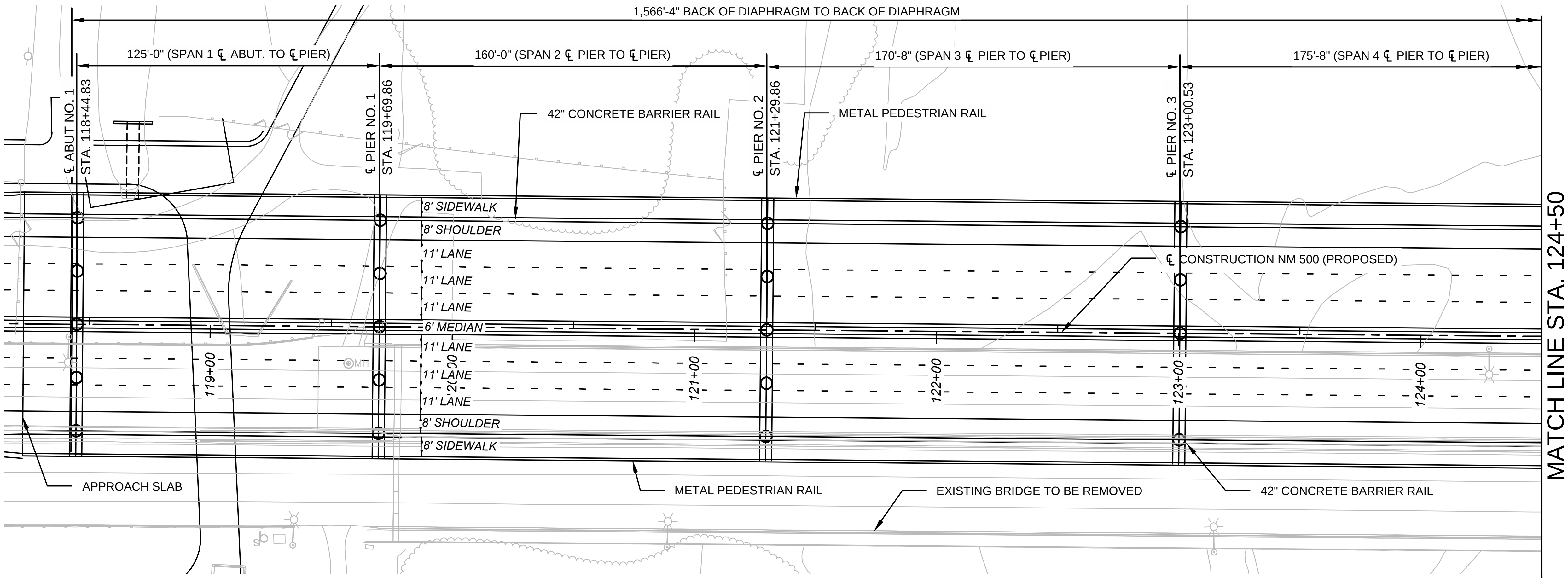
A301000	



BRIDGE PLAN ALTERNATIVE 3

66" STEEL PLATE GIRDERS

CONCEPTUAL
FOR REVIEW

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 3
TYPE 72 MODIFIED GIRDERS

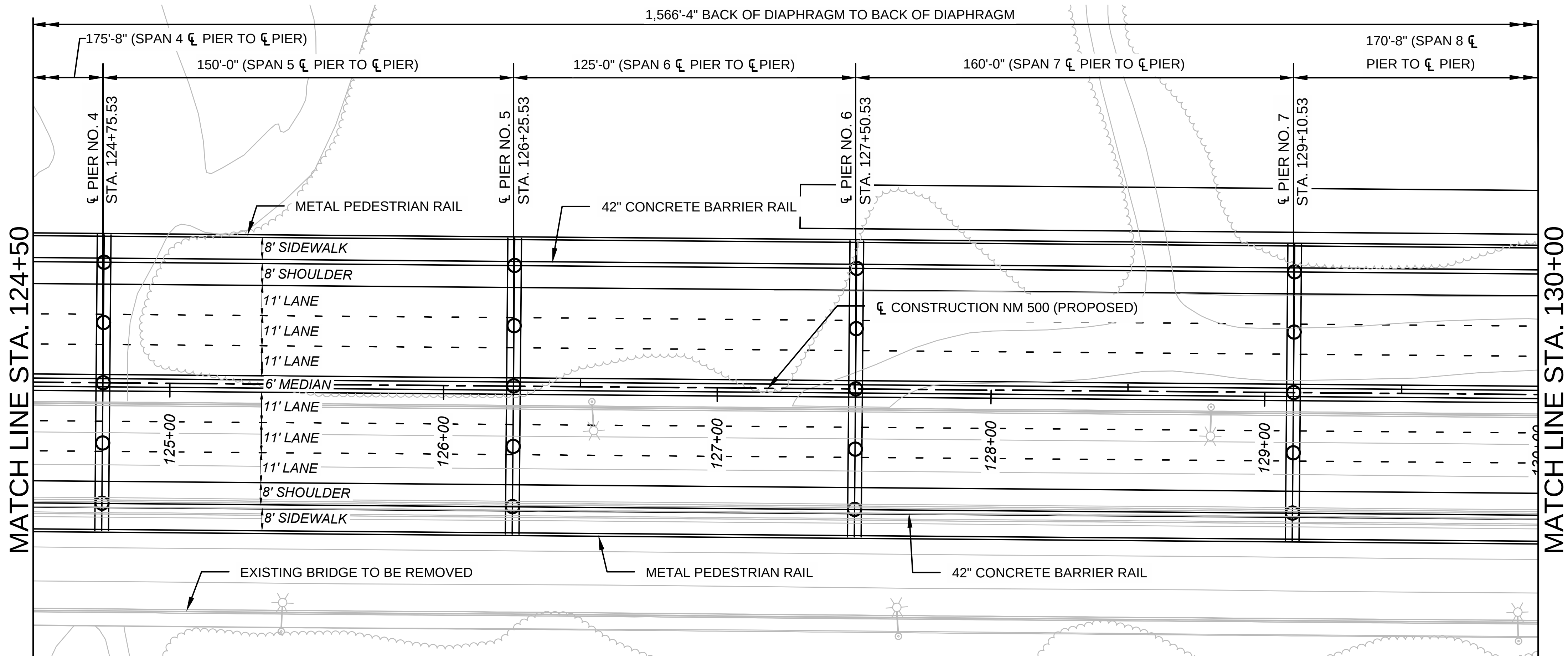
DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:______________________________ DATE:__________

STA. SHEET NO.

CONTROL No.	SHEET No.
A301000	



BRIDGE PLAN ALTERNATIVE 3

66" STEEL PLATE GIRDERS

CONCEPTUAL FOR REVIEW

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 3
TYPE 72 MODIFIED GIRDERS

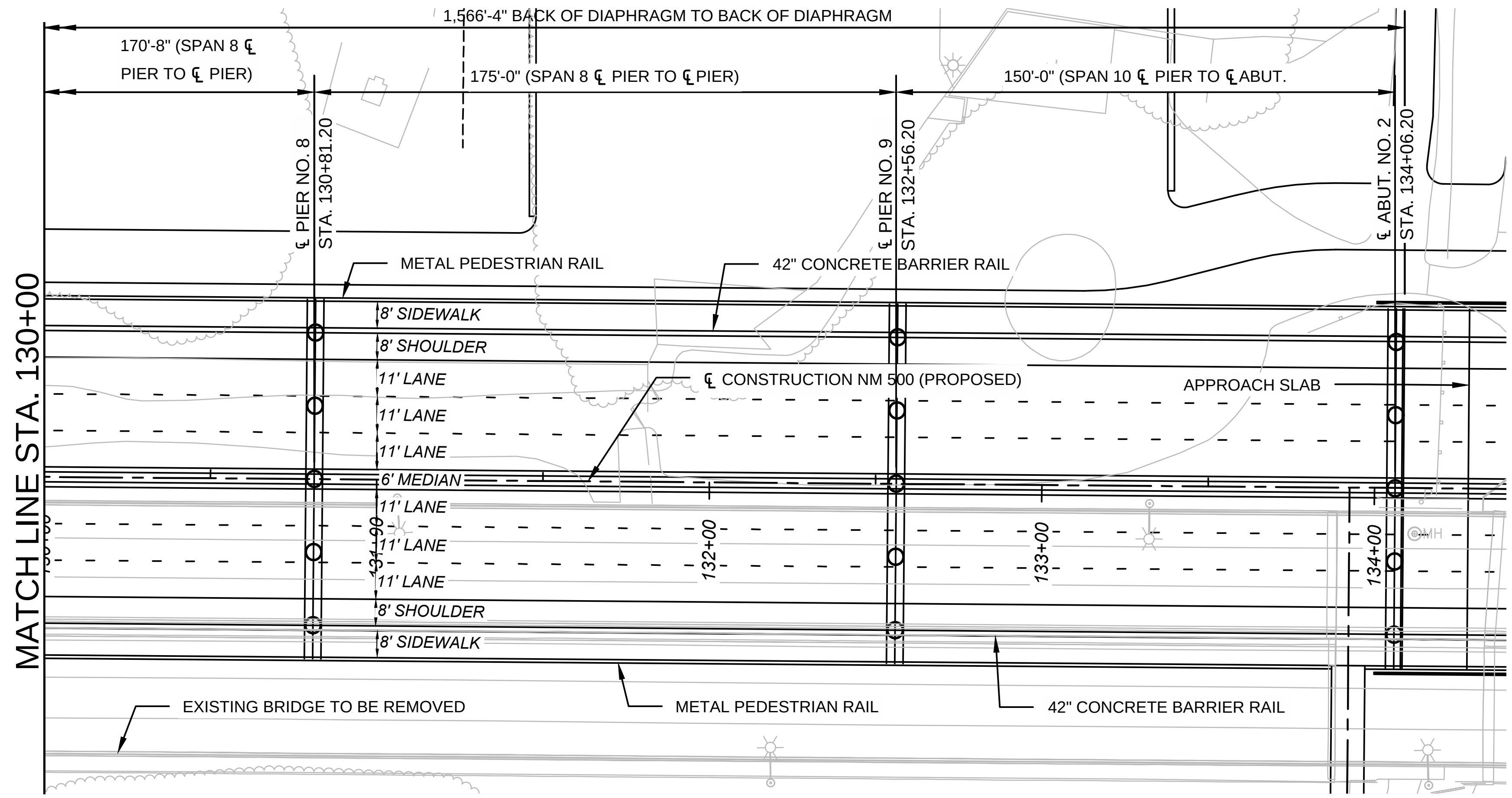
STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:______ PLOT DATE: 5/12/2021

APPROVED FOR CONSTRUCTION:____________ DATE:______

CONTROL No.	SHEET No.
A301000	



BRIDGE PLAN ALTERNATIVE 3

66" STEEL PLATE GIRDERS

CONCEPTUAL FOR REVIEW

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

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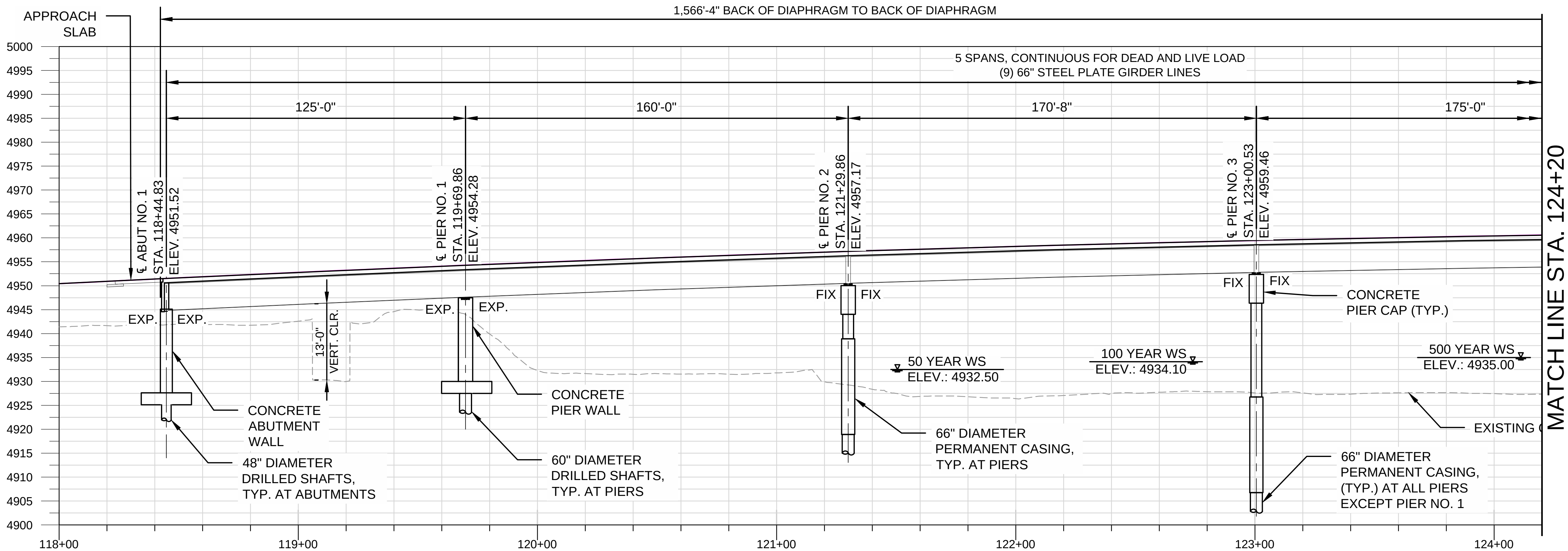
CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 3

66" STEEL PLATE GIRDERS

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
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ALTERNATIVE 3
66" STEEL PLATE GIRDERS

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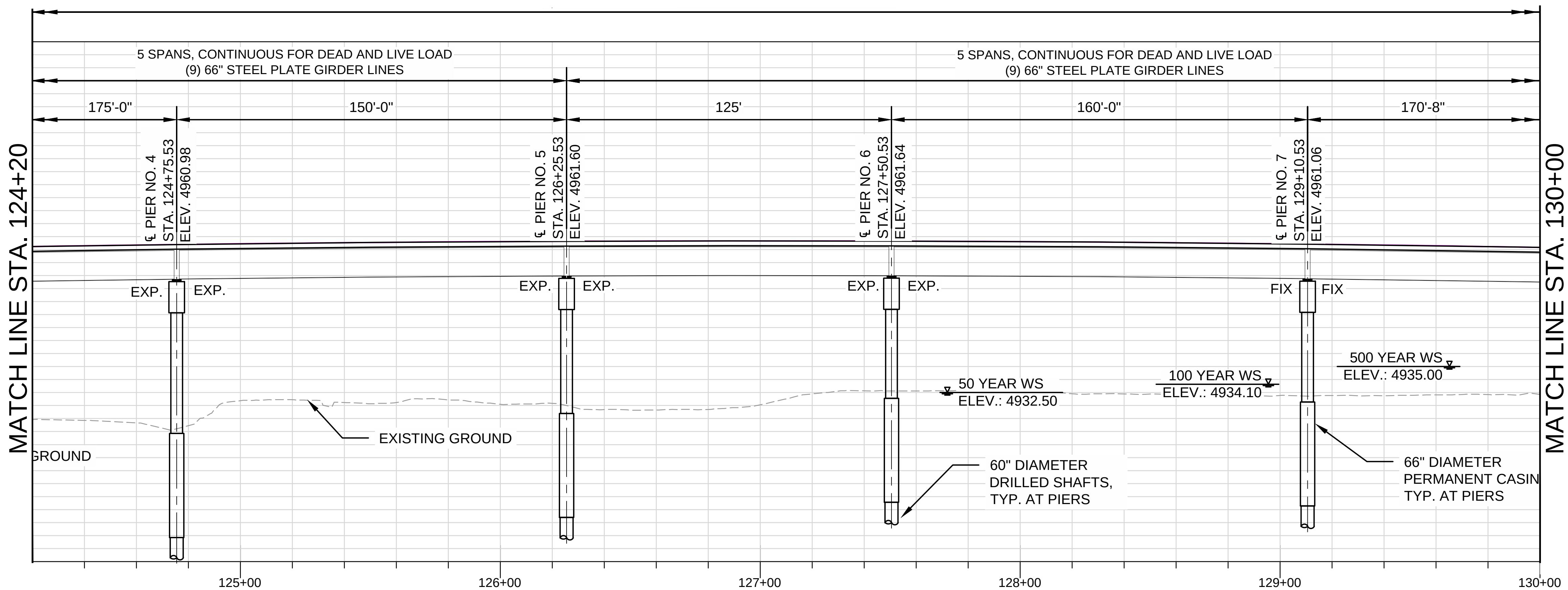
A301000	



BRIDGE PROFILE ALTERNATIVE 3

66" STEEL PLATE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 3
66" STEEL PLATE GIRDERS

STA. SHEET NO.

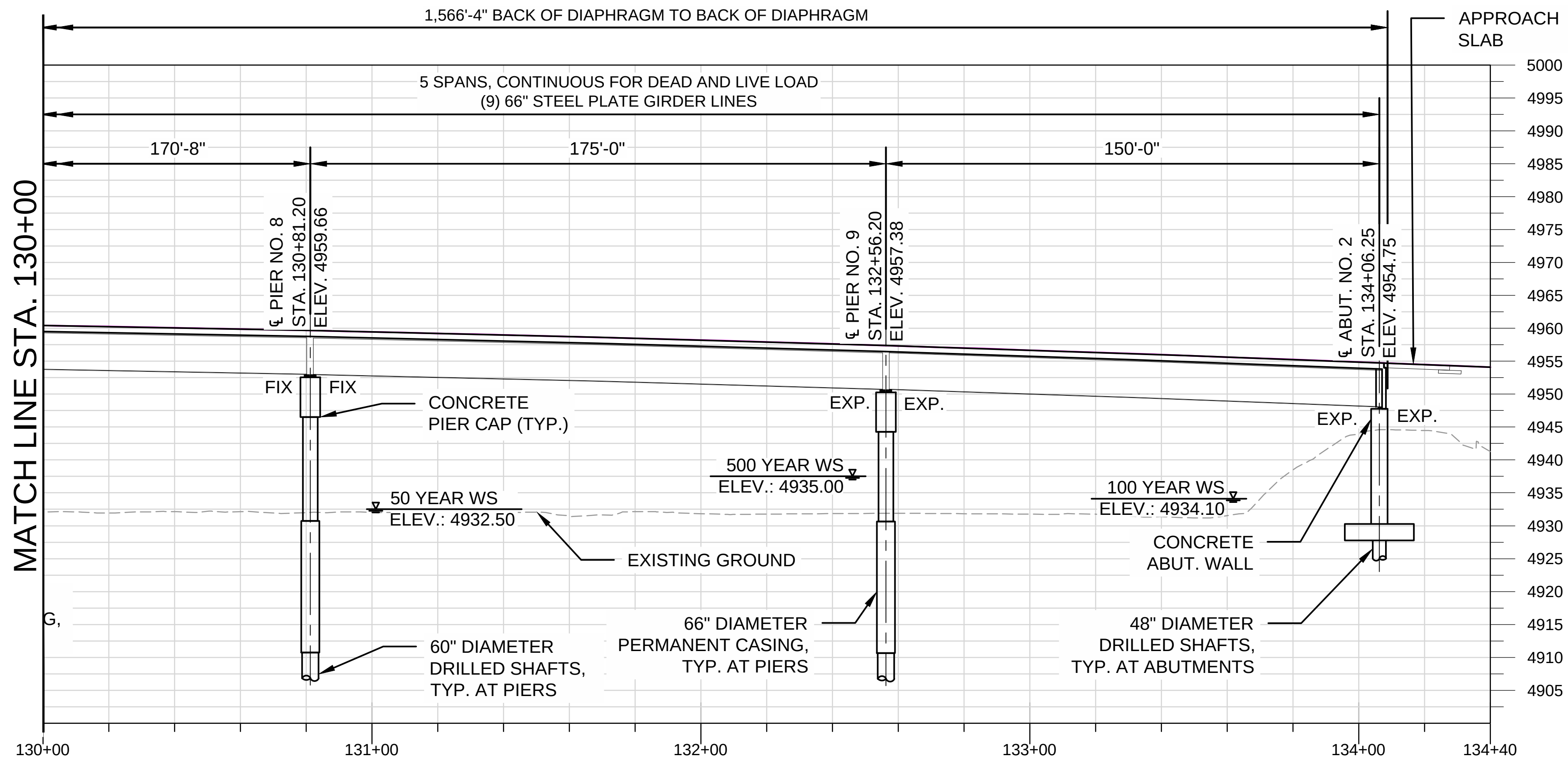
CONCEPTUAL
FOR REVIEW

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:__________ PLOT DATE: 5/14/2021

APPROVED FOR CONSTRUCTION:____________________ DATE:__________

CONTROL No.	SHEET No.
A301000	



BRIDGE PROFILE ALTERNATIVE 3

66" STEEL PLATE GIRDERS

BRIDGE

REVISIONS			
NO.	DESCRIPTION	DATE	BY

NEW MEXICO DEPARTMENT OF TRANSPORTATION

NM 500 BRIDGE REPLACEMENT
MP 8.8 TO 10.5
ALTERNATIVES ANALYSIS

RIO GRANDE BRIDGES

ALTERNATIVE 3
66" STEEL PLATE GIRDERS

STA. SHEET NO.

DRAWING PATH:

DESIGNED BY: MA DRAWN BY: EJR CHECKED BY:______ PLOT DATE: 5/14/2021 APPROVED FOR CONSTRUCTION:______ DATE:______

APPENDIX D
PLAN SHEETS FOR RIGHT-OF-WAY IMPACTS

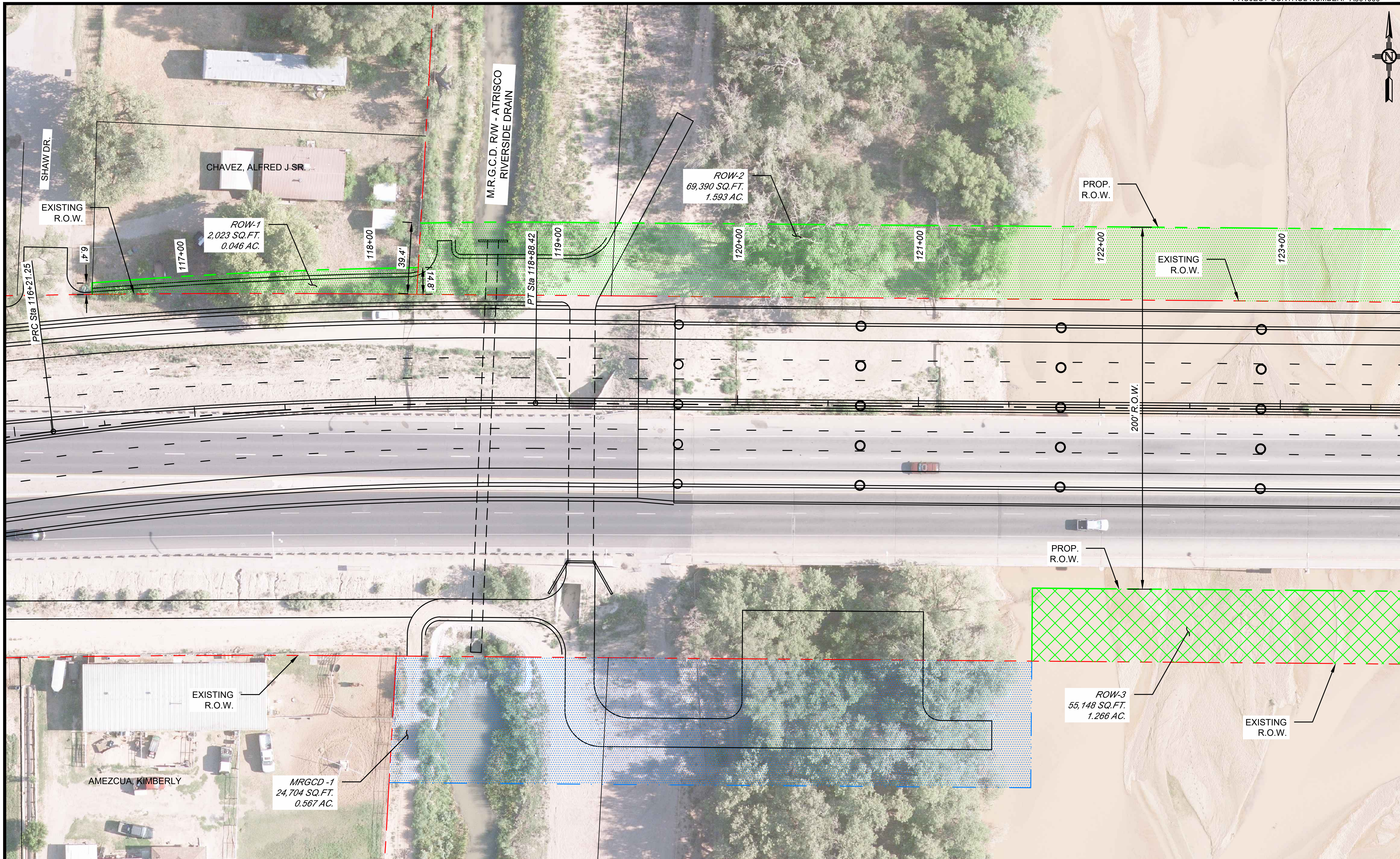
PROJECT CONTROL NUMBER: A301000

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

GONZALES, MARCOS F. 13-May-21 Drawing File: J:\30900298 NM 500 RIO BRAVO BRIDGE REPLACEMENT\04 ENGINEERING - PCN#A301000\PROPOSED\ROW\A301000_ROW_PROP_ALT A.DWG 5:00 PM

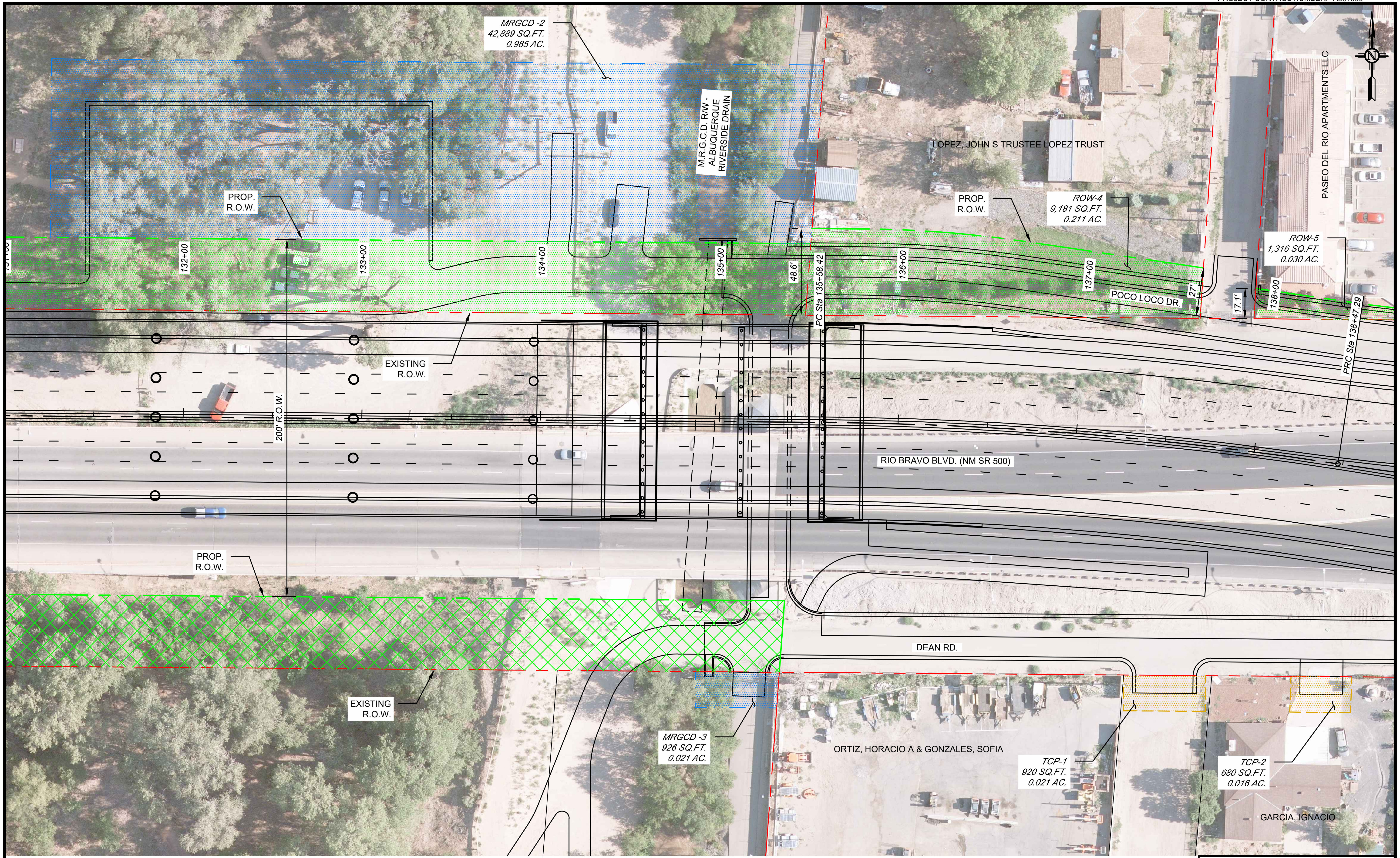
DESIGNED BY: WSP USA NEW MEXICO PROJECT NO. A301000 DRAWING SCALE: 1"=50' SHEET NO. 1 OF 9

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

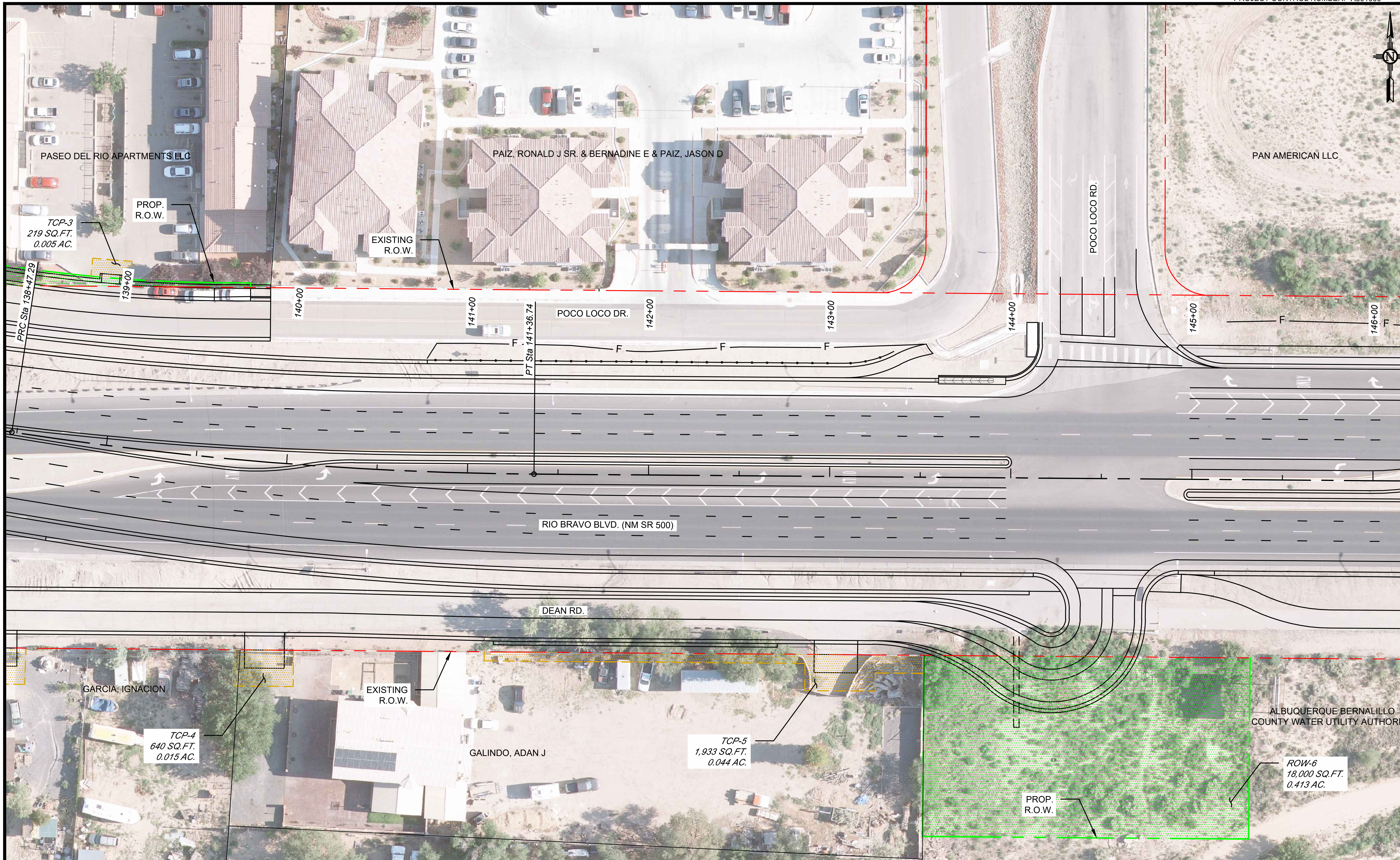


NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A



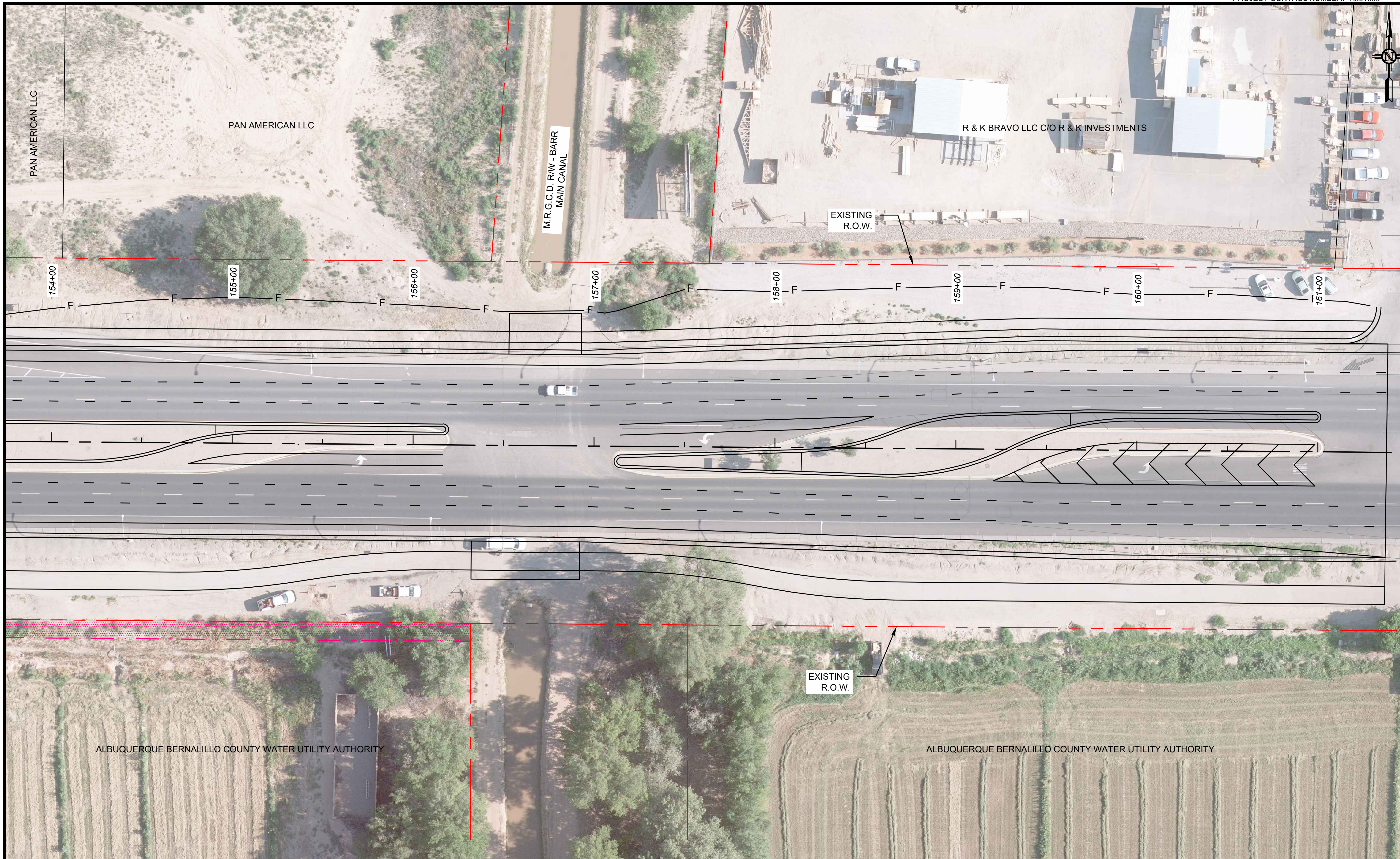
NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

PROJECT CONTROL NUMBER: A301000



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

GONZALES, MARCOS F. 13-May-21 Drawing File: J:\30900298 NM 500 RIO BRAVO BRIDGE REPLACEMENT\04 ENGINEERING - PCN#A301000\PROPOSED\ROW\A301000_ROW_PROP_ALT A.DWG 5:00 PM

DESIGNED BY: WSP USA

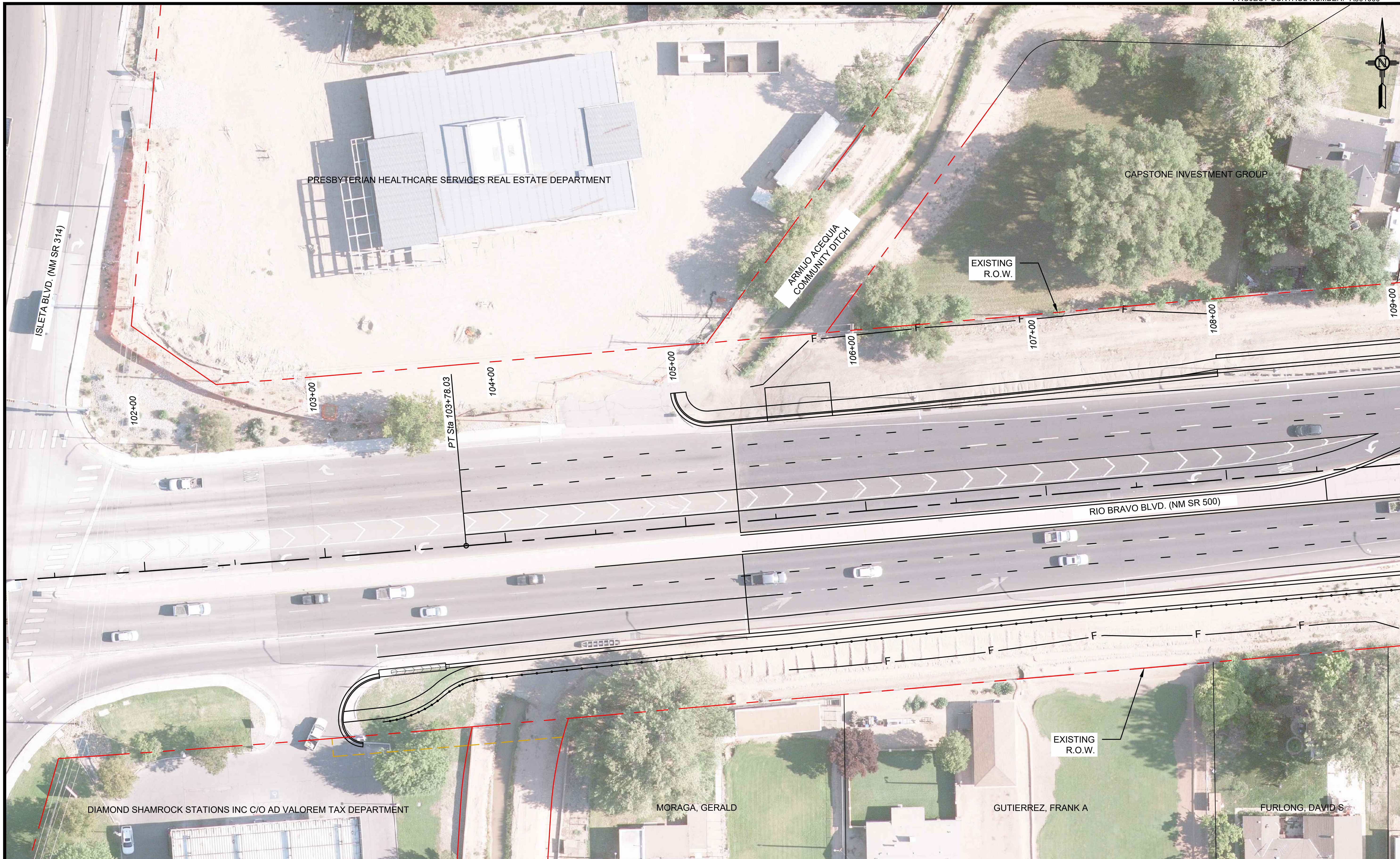
NEW MEXICO PROJECT NO. A301000

DRAWING SCALE: 1"=50'

SHEET NO. 8 OF 9

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE A

PROJECT CONTROL NUMBER: A301000



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

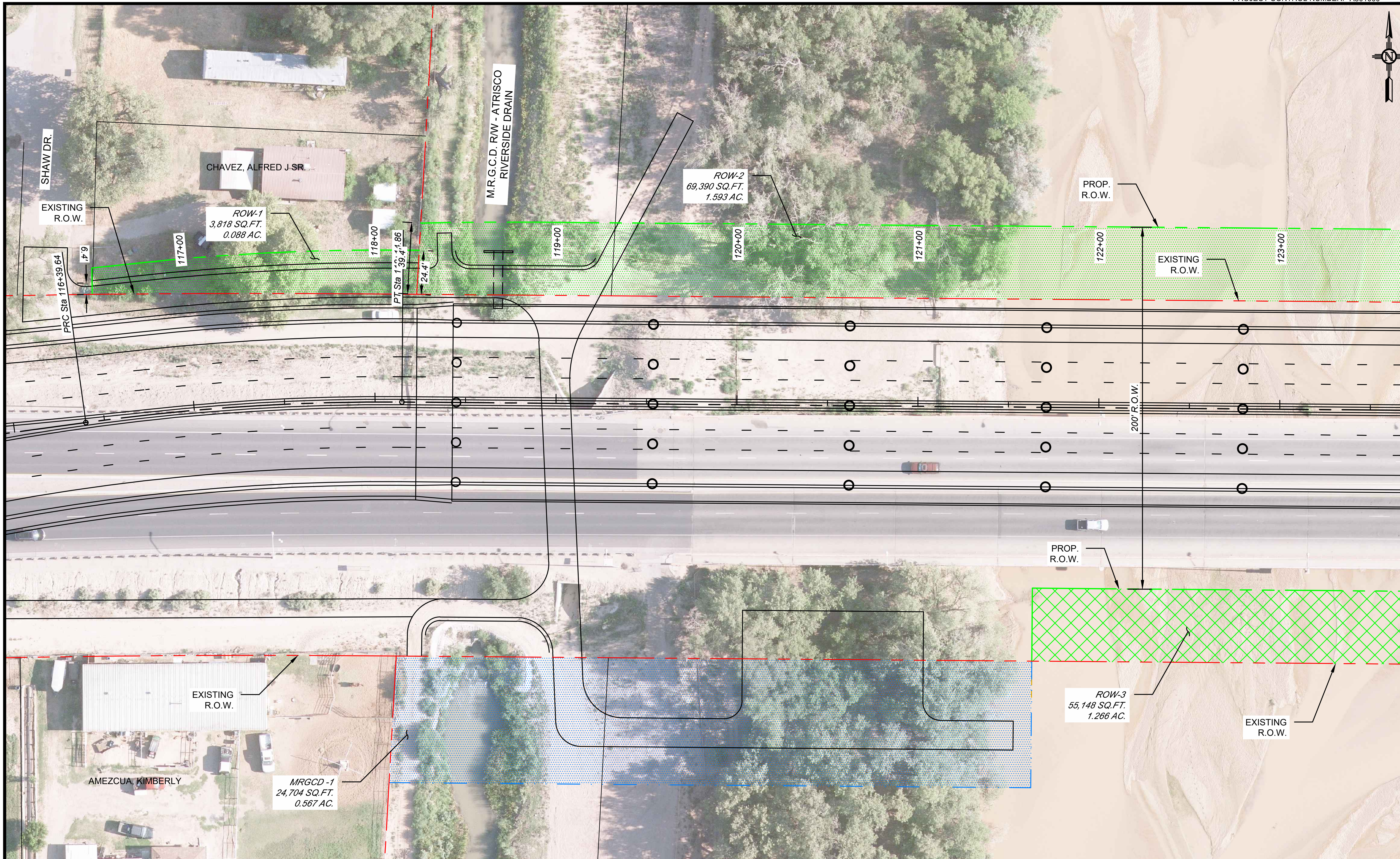
GONZALES, MARCOS F. 13-May-21

Drawing File: J:\30900298 NM 500 RIO BRAVO BRIDGE REPLACEMENT\04 ENGINEERING - PCN#A301000\PROPOSED\ROW\A301000_ROW_PROP_ALT B.DWG 5:52 PM

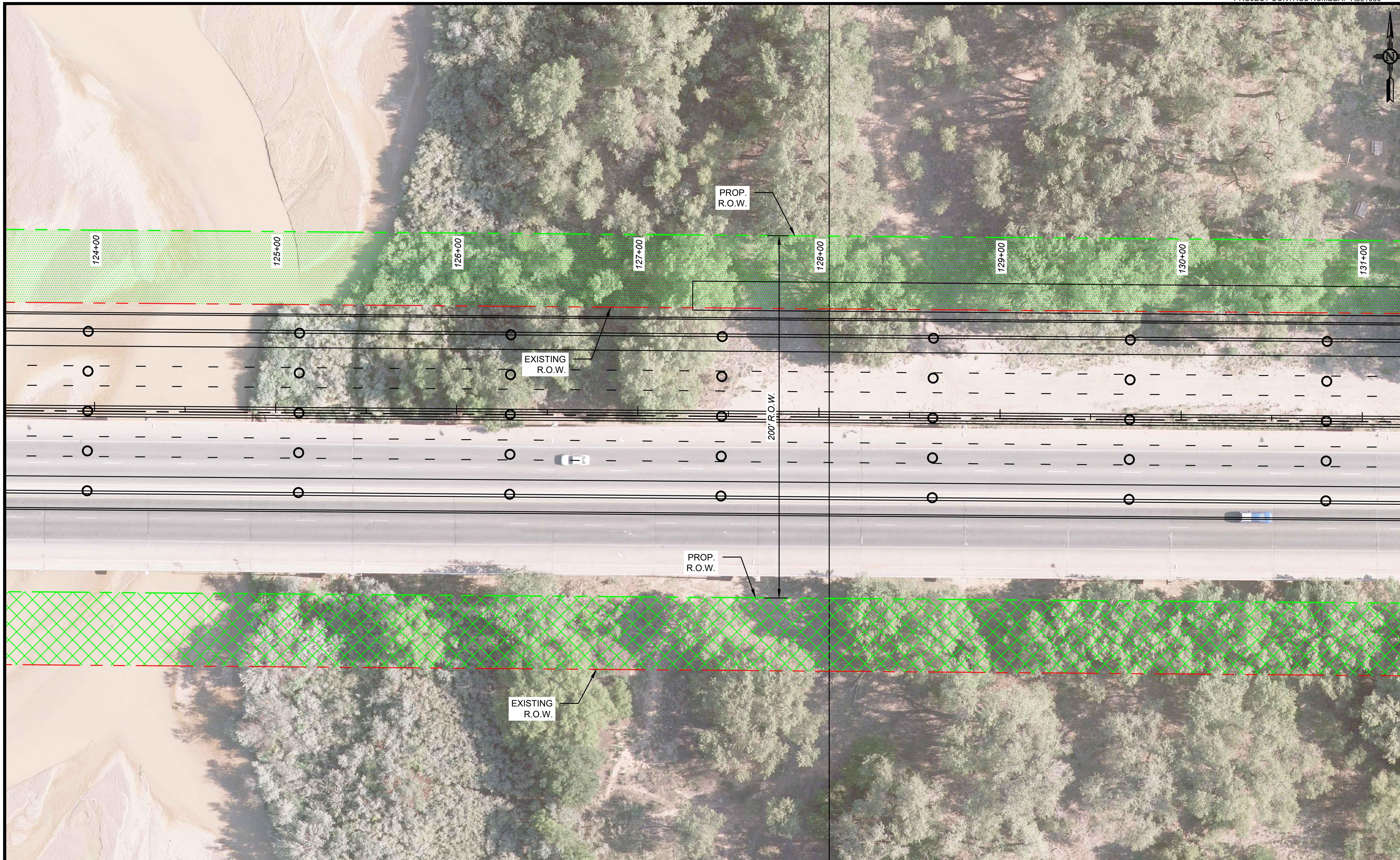
DESIGNED BY: WSP USA

NEW MEXICO PROJECT NO. A301000

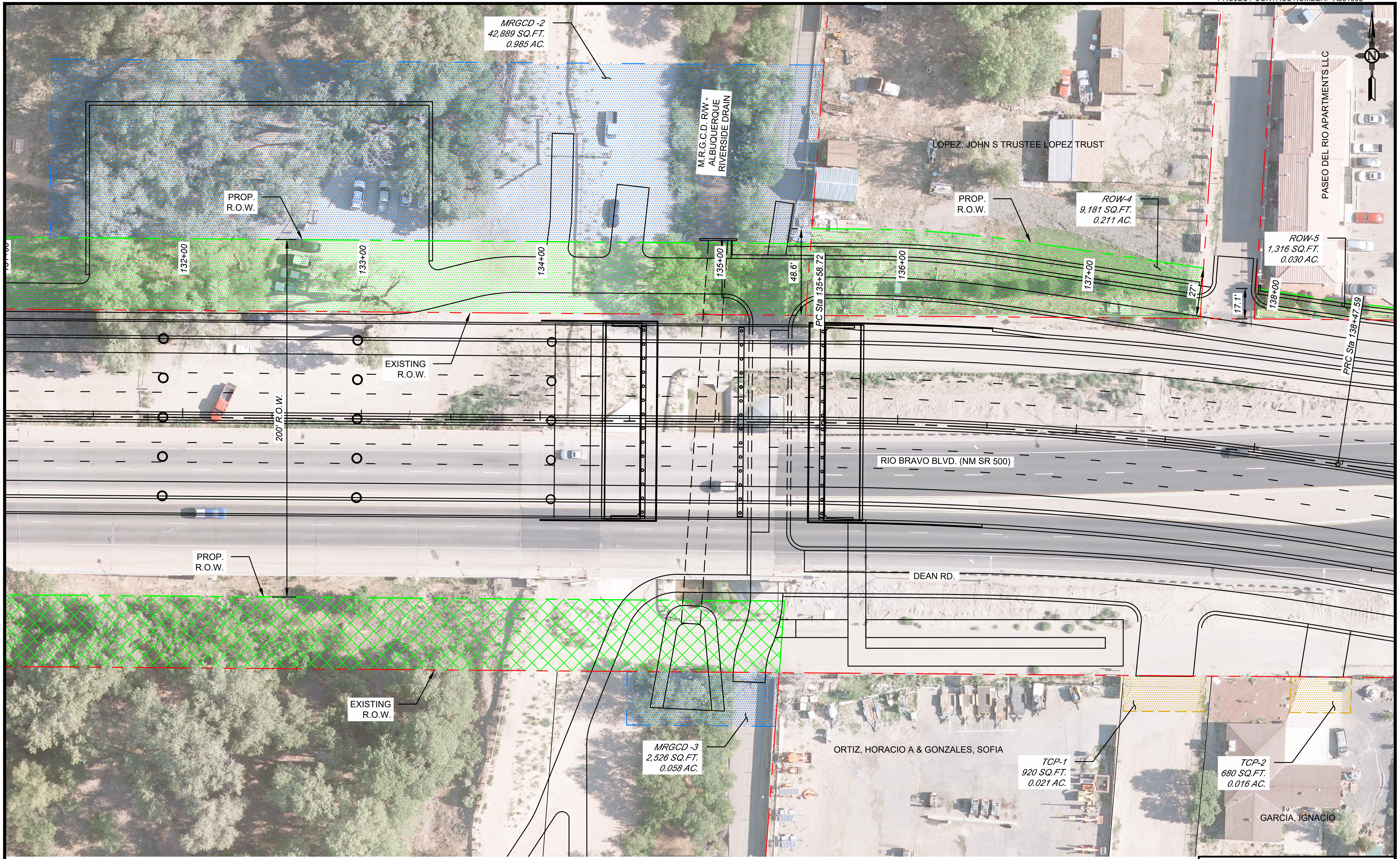
DRAWING SCALE: 1"=50'



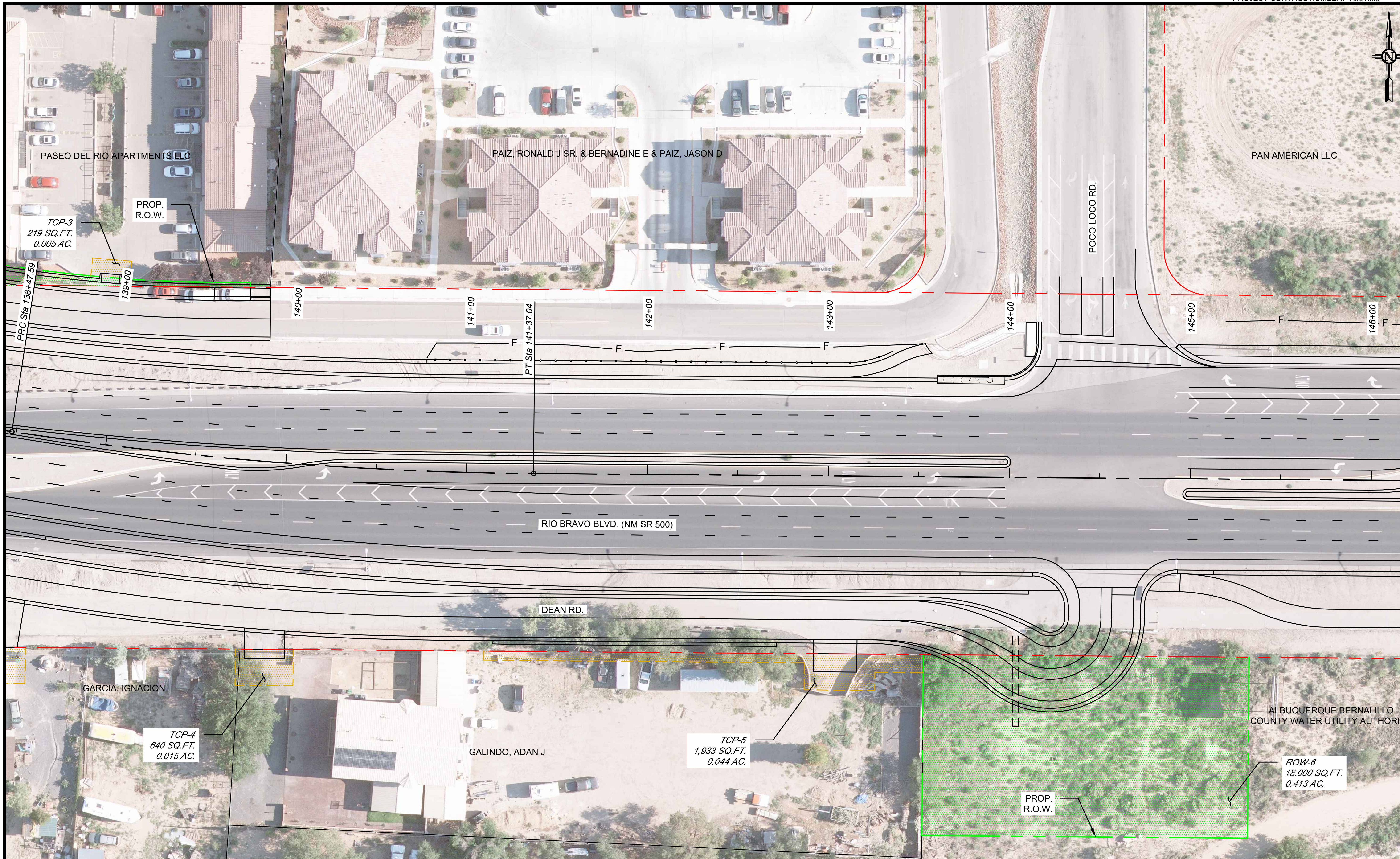
NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B



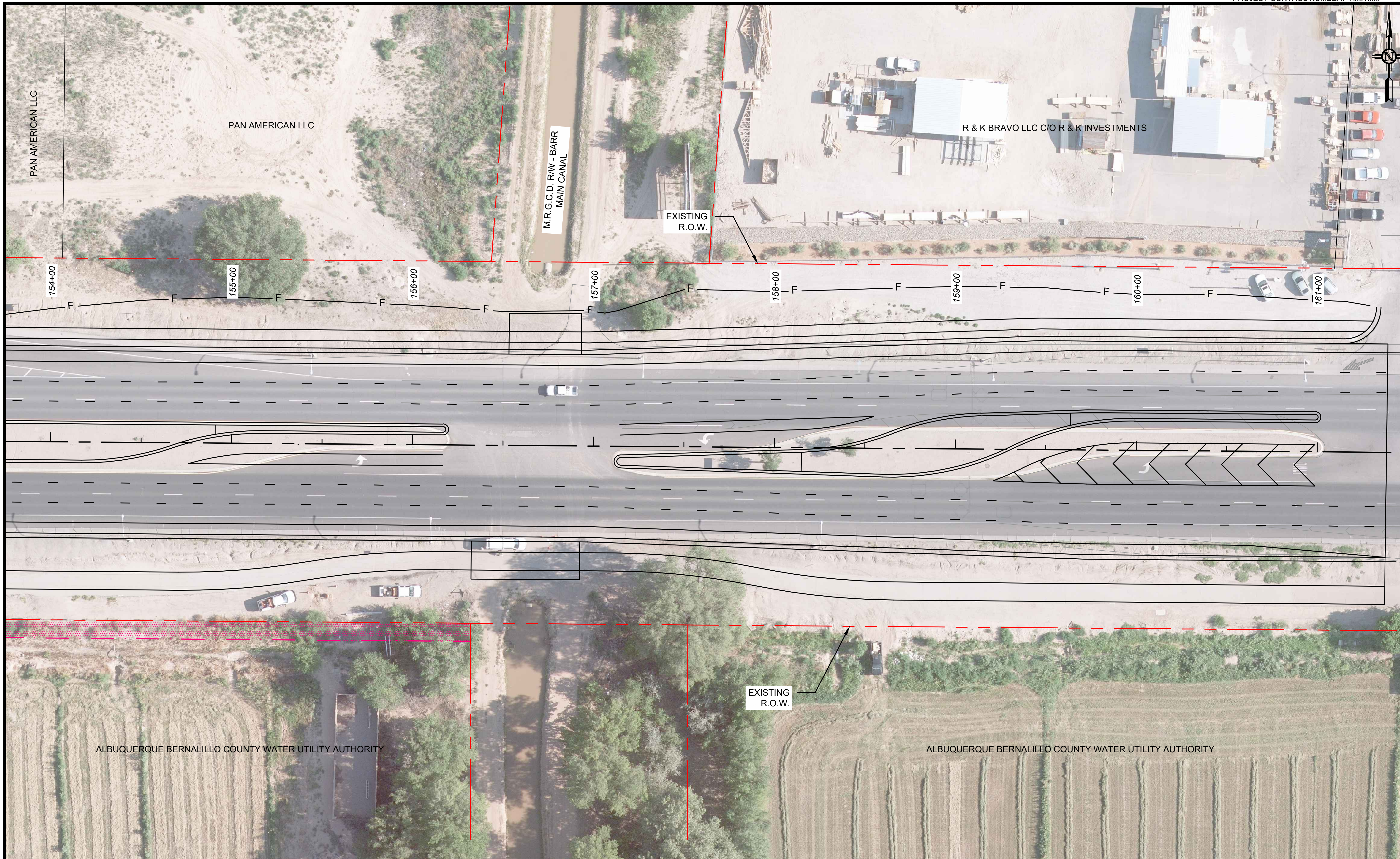
NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

PROJECT CONTROL NUMBER: A301000



NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

GONZALES, MARCOS F. 13-May-21 Drawing File: J:\30900298 NM 500 RIO BRAVO BRIDGE REPLACEMENT\04 ENGINEERING - PCN#A301000\PROPOSED\ROW\A301000_ROW_PROP_ALT B.DWG 5:52 PM

DESIGNED BY: WSP USA

NEW MEXICO PROJECT NO. A301000

DRAWING SCALE: 1"=50'

NM 500 - PHASE IA/B
PROPOSED RIGHT-OF-WAY
ALTERNATIVE B

APPENDIX E
CONCEPTUAL CONSTRUCTION COST ESTIMATE

Estimate of Probable Cost

NM 500
NM 500 Rio Bravo Bridge Replacement : Build Alt. A

PN A301000
CN A301000
Phase IA/B
5/15/2021

COST SUMMARY

TYPE OF CONSTRUCTION	CONSTRUCTION COST TOTAL	E&C 15%	TOTAL ESTIMATED COST
ROADWAY	$10,475,015.50	$1,571,252.33	$12,046,267.83
RIVER BRIDGE	$24,903,850.00	$3,735,577.50	$28,639,427.50
DRAIN BRIDGE	$2,050,361.50	$307,554.23	$2,357,915.73
DRAINAGE	$3,587,430.00	$538,114.50	$4,125,544.50
MAJOR STRUCTURE	$4,043,450.00	$606,517.50	$4,649,967.50
DETOUR	$152,000.00	$22,800.00	$174,800.00
CONSTRUCTION SIGNING	$1,550,000.00	$232,500.00	$1,782,500.00
PERMANENT SIGNING AND STRIPING	$71,680.00	$10,752.00	$82,432.00
LIGHTING	$518,200.00	$77,730.00	$595,930.00
SIGNALIZATION	$321,240.50	$48,186.08	$369,426.58
ITS	$221,000.00	$33,150.00	$254,150.00
SUBTOTAL	$47,894,227.50	$7,184,134.13	$55,078,361.63
NM GROSS RECEIPTS TAX (SEE BELOW)			$4,337,420.98
TOTAL			**$59,415,782.60**
Construction Augmentation			$2,478,526.27

NMGRT Rates: (January 1, 2021 to June 30, 2021):
Albuquerque, Bernalillo County 7.8750%

NM 500 RIO BRAVO BRIDGE REPLACEMENT : Build Alt A 5/15/2021
CN A301000
ENGINEER'S OPINION OF PROBABLE COST
PHASE IA/B

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
201000	CLEARING AND GRUBBING	L.S.	L.S.	$100,000.00	$100,000.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	22,620	$8.00	$180,960.00
203100	BORROW	C.Y.	29,900	$15.00	$448,500.00
203200	UNSUITABLE MATERIAL EXCAVATION	C.Y.	1,712	$14.00	$23,968.00
203211	UNSTABLE SUBGRADE STABILIZATION	S.Y.	5,850	$9.00	$52,650.00
207000	SUBGRADE PREPARATION	S.Y.	39,000	$2.00	$78,000.00
210002	MAJOR STRUCTURE EXCAVATION	C.Y.	6,730	$30.00	$201,900.00
210003	MAJOR STRUCTURE BACKFILL	C.Y.	14,630	$60.00	$877,800.00
303000	BASE COURSE	TON	12,700	$20.00	$254,000.00
403705	WARM MIX OPEN-GRADED FRICTION COURSE COMPLETE	TON	790	$115.00	$90,850.00
405000	DETOUR PAVEMENT CONSTRUCTION	S.Y.	3,800	$40.00	$152,000.00
407000	ASPHALT MATERIAL FOR TACK COAT	TON	26	$750.00	$19,500.00
408100	PRIME COAT MATERIAL	TON	60	$500.00	$30,000.00
424004	WMA SP-IV COMPLETE	TON	9,500	$80.00	$760,000.00
451080	CONCRETE PAVEMENT-8"	S.Y.	660	$140.00	$92,400.00
501100	PILE SPLICES	EACH	3	$681.00	$2,043.00
501101	PILE CUT-OFFS	L.F.	105	$82.70	$8,683.50
501116	DRIVEN PILES (16" PIPE)	L.F.	2,100	$127.00	$266,700.00
502030	DRILLED SHAFT FOUNDATION 30" DIAMETER	L.F.	210	$170.00	$35,700.00
502036	DRILLED SHAFT FOUNDATION 36" DIAMETER	L.F.	32	$200.00	$6,400.00
502042	DRILLED SHAFT FOUNDATION 42" DIAMETER	L.F.	32	$225.00	$7,200.00
502048	DRILLED SHAFT FOUNDATION 48" DIAMETER	L.F.	750	$450.00	$337,500.00
502060	DRILLED SHAFT FOUNDATION 60" DIAMETER	L.F.	4,500	$650.00	$2,925,000.00
502166	PERMANENT CASING 66" DIAMETER	L.F.	1,200	$575.00	$690,000.00
502600	OBSTRUCTION REMOVAL	L.F.	100	$350.00	$35,000.00
504301	PILE DYNAMIC TEST CONSULTANT TESTING	EACH	6	$3,880.00	$23,280.00
504401	CASE PILE WAVE ANALYSIS TEST CONSULTANT TESTING	EACH	6	$1,140.00	$6,840.00
505001	CROSSHOLE SONIC LOGGING DEPARTMENT TESTING	EACH	70	$1,500.00	$105,000.00
505010	LOW STRAIN INTEGRITY DEPARTMENT TESTING	EACH	14	$500.00	$7,000.00
511000	STRUCTURAL CONCRETE, CLASS A	C.Y.	5,557	$650.00	$3,612,050.00
511030	STRUCTURAL CONCRETE, CLASS AA	C.Y.	430	$1,100.00	$473,000.00
511070	STRUCTURAL CONCRETE, CLASS HPD	C.Y.	6,325	$750.00	$4,743,750.00
514042	CONCRETE BARRIER RAILINGS 42"	L.F.	3,242	$100.00	$324,200.00
518074	PRESTRESSED CONCRETE BRIDGE MEMBER TYPE 72 MODIFIED	L.F.	0	$400.00	$0.00
518121	PRECAST PRESTRESSED SLAB TYPE 21	L.F.	1,616	$400.00	$646,400.00
518270	PRESTRESSING POST-TENSIONED CONCRETE	LS	L.S.	$30,000.00	$30,000.00
536001	EPOXY URETHANE POLYMER CONCRETE BRIDGE DECK OVERLAY	S.Y.	16,085	$35.00	$562,975.00
540060	REINFORCING BARS GRADE 60	LB	956,820	$1.40	$1,339,548.00
540076	UNCOATED CORROSION RESISTANT REINFORCING BARS GRADE	LB	1,481,000	$2.15	$3,184,150.00
540160	EPOXY COATED REINFORCING BARS GRADE 60	LB	74,250	$1.60	$118,800.00
540170	MECHANICAL COUPLERS	EACH	1,700	$150.00	$255,000.00
541000	STRUCTURAL STEEL FOR CONCRETE BRIDGES	LB	50	$3.00	$150.00
541100	STRUCTURAL STEEL FOR STEEL BRIDGES	LB	3,446,000	$1.90	$6,547,400.00
541405	PREFAB PEDESTRIAN BRIDGE	LS	L.S.	$552,500.00	$552,500.00
543100	METAL RAILING, PEDESTRIAN	L.F.	3,242	$240.00	$778,080.00
548001	COATING OF CONCRETE - STAIN	S.F.	24,000	$1.50	$36,000.00
560000	ELASTOMERIC BEARING PADS	EACH	362	$350.00	$126,700.00
562000	BRIDGE JOINT STRIP SEAL	L.F.	663	$250.00	$165,750.00
563099	POLYMER BRIDGE JOINT SEALS	L.F.	509	$30.00	$15,270.00
570072	72" CULVERT PIPE	L.F.	375	$300.00	$112,500.00
5700X1	128"S X 82"R CULVERT PIPE	L.F.	210	$900.00	$189,000.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	10,000	$120.00	$1,200,000.00
570441	24" STORM DRAIN CULVERT PIPE END SECTION	EACH	5	$1,200.00	$6,000.00
570461	36" STORM DRAIN CULVERT PIPE	L.F.	1,000	$140.00	$140,000.00
570465	36" STORM DRAIN CULVERT PIPE END SECTION	EACH	5	$1,400.00	$7,000.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	L.S.	$1,775,000.00	$1,775,000.00
601110	REMOVAL OF SURFACING	S.Y.	41,800	$8.00	$334,400.00
601300	DEMOLITION	LS	L.S.	$50,000.00	$50,000.00
602000	RIPRAP CLASS A	C.Y.	2,850	$250.00	$712,500.00
602010	RIPRAP CLASS B	C.Y.	325	$180.00	$58,500.00
606001	SINGLE FACE W-BEAM GUARDRAIL	L.F.	163	$35.00	$5,687.50
606051	END TREATMENT TL-3 END TERMINAL	EACH	2	$3,400.00	$6,800.00
606053	END TREATMENT W-BEAM END ANCHOR	EACH	4	$1,600.00	$6,400.00
606062	TRANSITION METAL BARRIER TO RIGID BARRIER	EACH	2	$4,000.00	$8,000.00
606542	CONCRETE WALL BARRIER 42"	L.F.	4,500	$150.00	$675,000.00
607079	PEDESTRIAN/BICYCLE RAILING	L.F.	4,440	$130.00	$577,200.00
607251	REMOVE AND RESET GATE	EACH	10	$3,000.00	$30,000.00
608004	CONCRETE SIDEWALK 4"	S.Y.	4,870	$70.00	$340,900.00
608106	DRIVE PAD 6"	S.Y.	570	$125.00	$71,250.00
608404	CONCRETE MEDIAN PAVEMENT 4" (COLORED AND PATTERNED)	S.Y.	1,680	$85.00	$142,800.00
609424	CONCRETE VERTICAL CURB AND GUTTER TYPE B 6" X 24"	L.F.	3,710	$35.00	$129,850.00
609450	CONCRETE VERTICAL CURB AND GUTTER TYPE B 8" X 30"	L.F.	3,930	$45.00	$176,850.00
609478	CONCRETE VERTICAL CURB AND GUTTER TYPE D 6" X 18"	L.F.	10,660	$30.00	$319,800.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	L.S.	$800,000.00	$800,000.00
621000	MOBILIZATION	LS	L.S.	$4,000,000.00	$4,000,000.00
623332	CURB DROP INLET TYPE II-B, OVER 4'	EACH	30	$11,000.00	$330,000.00
623410	DROP INLET SPECIAL DESIGN	EACH	4	$18,000.00	$72,000.00
662022	MANHOLE TYPE C-6' DIAMETER OVER 6' TO 10' DEPTH	EACH	15	$20,000.00	$300,000.00
664000	LANDSCAPE, COMPLETE	LS	L.S.	$200,000.00	$200,000.00
667219	GRAVITY WALL	S.F.	3,600	$75.00	$270,000.00
668000	DEWATERING	LS	1	$900,000.00	$900,000.00
701000	PANEL SIGNS	S.F.	400	$20.00	$8,000.00
701100	STEEL POST AND BASE POST FOR ALUMINUM PANEL SIGNS	L.F.	450	$12.00	$5,400.00
704700	HOT THERMOPLASTIC PAVEMENT MARKINGS 4"	L.F.	60,000	$0.65	$39,000.00
704701	HOT THERMOPLASTIC PAVEMENT MARKINGS 6"	L.F.	3,000	$0.80	$2,400.00
704704	HOT THERMOPLASTIC PAVEMENT MARKING 24"	L.F.	1,000	$6.00	$6,000.00
704717	HOT THERMOPLASTIC PAVEMENT MARKING RIGHT ARROW	EACH	10	$120.00	$1,200.00
704718	HOT THERMOPLASTIC PAVEMENT MARKING LEFT ARROW	EACH	12	$120.00	$1,440.00
704719	HOT THERMOPLASTIC PAVEMENT MARKING THRU ARROW	EACH	12	$120.00	$1,440.00
704720	HOT THERMOPLASTIC PAVEMENT MARKING WORD (ONLY)	EACH	12	$150.00	$1,800.00
704732	HOT THERMOPLASTIC PAVEMENT MARKING BIKE SYMBOL (BIKEW	EACH	20	$250.00	$5,000.00
705000	SIGNAL/LIGHTING SYSTEM START-UP COSTS	ALOW	1	$30,000.00	$30,000.00
706200	METER PEDESTAL (SIGNAL)	EACH	1	$6,000.00	$6,000.00
706405	LIGHTING CONTROL CABINET-SIX CIRCUIT	EACH	3	$6,500.00	$19,500.00
707335	TYPE III STANDARD, 35' ARM	EACH	2	$13,000.00	$26,000.00
707350	TYPE III STANDARD, 50' ARM	EACH	2	$16,000.00	$32,000.00
707540	TYPE V STANDARD, 40'	EACH	60	$4,000.00	$240,000.00
709020	RIGID ELECTRICAL CONDUIT 2" (DIA.)	L.F.	12,500	$11.00	$137,500.00
709030	RIGID ELECTRICAL CONDUIT 3" (DIA.)	L.F.	600	$18.00	$10,800.00
709040	RIGID ELECTRICAL CONDUIT 4" (DIA.)	L.F.	180	$22.00	$3,960.00
710000	ELECTRICAL PULL BOX (STANDARD)	EACH	29	$550.00	$15,950.00
710010	ELECTRICAL PULL BOX (LARGE)	EACH	9	$650.00	$5,850.00
710400	TRAFFIC SIGNAL MANHOLE	EACH	1	$1,800.00	$1,800.00
711005	MULTI CONDUCTOR CABLE 5	L.F.	1,200	$1.60	$1,920.00
711007	MULTI CONDUCTOR CABLE 7	L.F.	1,900	$2.15	$4,085.00
711020	MULTI CONDUCTOR CABLE 20	L.F.	1,700	$5.50	$9,350.00
711102	SINGLE CONDUCTOR 2	L.F.	24,350	$1.35	$32,872.50
711106	SINGLE CONDUCTOR 6	L.F.	12,800	$0.60	$7,680.00
711110	SINGLE CONDUCTOR 10	L.F.	4,000	$0.55	$2,200.00
711230	SINGLE CONDUCTOR 3/0	L.F.	300	$7.00	$2,100.00
712031	3 SECTION TRAFFIC SIGNAL ASSEMBLY (LED)	EACH	10	$650.00	$6,500.00
712051	5 SECTION TRAFFIC SIGNAL ASSEMBLY (LED)	EACH	8	$900.00	$7,200.00
712202	PEDESTRIAN COUNTDOWN SIGNAL (LED)	EACH	8	$600.00	$4,800.00
712330	3 SECTION BACKPLATE	EACH	4	$110.00	$440.00
712350	5 SECTION BACKPLATE	EACH	6	$140.00	$840.00
713025	ACCESSIBLE PEDESTRIAN SIGNAL PUSH BUTTON STATION	EACH	8	$1,000.00	$8,000.00
713420	PHASE SELECTOR RACK, 2 CHANNEL	EACH	1	$225.00	$225.00
713430	PHASE SELECTOR MODULE	EACH	2	$4,000.00	$8,000.00
713511	OPTICAL DETECTOR, 1 DIRECTION, 1 CHANNEL	EACH	2	$825.00	$1,650.00
713600	OPTICAL DETECTOR CABLE	L.F.	900	$2.10	$1,890.00
713807	VIDEO CABLE	L.F.	200	$2.00	$400.00
713810	VIDEO CAMERA	EACH	4	$10,000.00	$40,000.00
714000	TRAFFIC ACTUATED CONTROLLER	EACH	1	$6,000.00	$6,000.00
714280	8 PHASE DOUBLE RING CONTROLLER CABINET	EACH	1	$24,000.00	$24,000.00
714300	CLOSED LOOP TRAFFIC CONTROL SYSTEM	LS	L.S.	$30,000.00	$30,000.00
716301	INTERNALLY ILLUMINATED SIGN	EACH	4	$3,000.00	$12,000.00
716701	LED ROADWAY LUMINAIRE	EACH	64	$500.00	$32,000.00
750000	INTELLIGENT TRANSPORTATION SYSTEM	LS	L.S.	$75,000.00	$75,000.00
750040	ITS CONDUIT (4" MULTIDUCT, PVC)	L.F.	7,500	$14.00	$105,000.00
750060	ITS PULLBOX (33"X24"X24")	EACH	25	$1,200.00	$30,000.00
750080	ITS MANHOLE (48"X48"X48")	EACH	1	$5,000.00	$5,000.00
750100	CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)	EACH	1	$6,000.00	$6,000.00
	Reversable Lane - Lindsay	LS	L.S.	$1,250,000.00	$1,250,000.00
	Construction Traffic Control	LS	L.S.	$300,000.00	$300,000.00

Total Cost: $47,894,227.50

Estimate of Probable Cost

NM 500
NM 500 Rio Bravo Bridge Replacement : Build Alt. B
PN A301000
CN A301000
Phase IA/B
5/15/2021

COST SUMMARY

TYPE OF CONSTRUCTION	CONSTRUCTION COST TOTAL	E&C 15%	TOTAL ESTIMATED COST
ROADWAY	$10,475,015.50	$1,571,252.33	$12,046,267.83
RIVER BRIDGE	$27,238,350.00	$4,085,752.50	$31,324,102.50
DRAIN BRIDGE	$2,050,361.50	$307,554.23	$2,357,915.73
DRAINAGE	$3,232,430.00	$484,864.50	$3,717,294.50
MAJOR STRUCTURE	$3,337,610.00	$500,641.50	$3,838,251.50
DETOUR	$152,000.00	$22,800.00	$174,800.00
CONSTRUCTION SIGNING	$1,550,000.00	$232,500.00	$1,782,500.00
PERMANENT SIGNING AND STRIPING	$71,680.00	$10,752.00	$82,432.00
LIGHTING	$518,200.00	$77,730.00	$595,930.00
SIGNALIZATION	$321,240.50	$48,186.08	$369,426.58
ITS	$221,000.00	$33,150.00	$254,150.00
SUBTOTAL	$49,167,887.50	$7,375,183.13	$56,543,070.63
NM GROSS RECEIPTS TAX (SEE BELOW)			$4,452,766.81
TOTAL			**$60,995,837.44**
Construction Augmentation			$2,544,438.18

NMGRT Rates: (January 1, 2021 to June 30, 2021):
Albuquerque, Bernalillo County 7.8750%

NM 500 RIO BRAVO BRIDGE REPLACEMENT : Build Alt B 5/15/2021
CN A301000
ENGINEER'S OPINION OF PROBABLE COST
PHASE IA/B

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
201000	CLEARING AND GRUBBING	L.S.	L.S.	$100,000.00	$100,000.00
203000	UNCLASSIFIED EXCAVATION	C.Y.	22,520	$8.00	$180,160.00
203100	BORROW	C.Y.	29,900	$15.00	$448,500.00
203200	UNSUITABLE MATERIAL EXCAVATION	C.Y.	1,712	$14.00	$23,968.00
203211	UNSTABLE SUBGRADE STABILIZATION	S.Y.	5,850	$9.00	$52,650.00
207000	SUBGRADE PREPARATION	S.Y.	39,000	$2.00	$78,000.00
210002	MAJOR STRUCTURE EXCAVATION	C.Y.	6,439	$30.00	$193,170.00
210003	MAJOR STRUCTURE BACKFILL	C.Y.	14,853	$60.00	$891,180.00
303000	BASE COURSE	TON	12,700	$20.00	$254,000.00
403705	WARM MIX OPEN-GRADED FRICTION COURSE COMPLETE	TON	790	$115.00	$90,850.00
405000	DETOUR PAVEMENT CONSTRUCTION	S.Y.	3,800	$40.00	$152,000.00
407000	ASPHALT MATERIAL FOR TACK COAT	TON	26	$750.00	$19,500.00
408100	PRIME COAT MATERIAL	TON	60	$500.00	$30,000.00
424004	WMA SP-IV COMPLETE	TON	9,500	$80.00	$760,000.00
451080	CONCRETE PAVEMENT-8"	S.Y.	660	$140.00	$92,400.00
501100	PILE SPLICES	EACH	3	$681.00	$2,043.00
501101	PILE CUT-OFFS	L.F.	105	$82.70	$8,683.50
501116	DRIVEN PILES (16" PIPE)	L.F.	2,100	$127.00	$266,700.00
502030	DRILLED SHAFT FOUNDATION 30" DIAMETER	L.F.	210	$170.00	$35,700.00
502036	DRILLED SHAFT FOUNDATION 36" DIAMETER	L.F.	32	$200.00	$6,400.00
502042	DRILLED SHAFT FOUNDATION 42" DIAMETER	L.F.	32	$225.00	$7,200.00
502048	DRILLED SHAFT FOUNDATION 48" DIAMETER	L.F.	750	$450.00	$337,500.00
502060	DRILLED SHAFT FOUNDATION 60" DIAMETER	L.F.	4,875	$650.00	$3,168,750.00
502166	PERMANENT CASING 66" DIAMETER	L.F.	1,200	$575.00	$690,000.00
502600	OBSTRUCTION REMOVAL	L.F.	100	$350.00	$35,000.00
504301	PILE DYNAMIC TEST CONSULTANT TESTING	EACH	6	$3,880.00	$23,280.00
504401	CASE PILE WAVE ANALYSIS TEST CONSULTANT TESTING	EACH	6	$1,140.00	$6,840.00
505001	CROSSHOLE SONIC LOGGING DEPARTMENT TESTING	EACH	75	$1,500.00	$112,500.00
505010	LOW STRAIN INTEGRITY DEPARTMENT TESTING	EACH	15	$500.00	$7,500.00
511000	STRUCTURAL CONCRETE, CLASS A	C.Y.	6,857	$650.00	$4,457,050.00
511030	STRUCTURAL CONCRETE, CLASS AA	C.Y.	0	$1,100.00	$0.00
511070	STRUCTURAL CONCRETE, CLASS HPD	C.Y.	6,785	$750.00	$5,088,750.00
514042	CONCRETE BARRIER RAILINGS 42"	L.F.	3,502	$100.00	$350,200.00
518074	PRESTRESSED CONCRETE BRIDGE MEMBER TYPE 72 MODIFIED	L.F.	0	$400.00	$0.00
518121	PRECAST PRESTRESSED SLAB TYPE 21	L.F.	1,616	$400.00	$646,400.00
518270	PRESTRESSING POST-TENSIONED CONCRETE	LS	L.S.	$30,000.00	$30,000.00
536001	EPOXY URETHANE POLYMER CONCRETE BRIDGE DECK OVERLAY	S.Y.	17,385	$35.00	$608,475.00
540060	REINFORCING BARS GRADE 60	LB	1,073,470	$1.40	$1,502,858.00
540076	UNCOATED CORROSION RESISTANT REINFORCING BARS GRADE	LB	1,596,000	$2.15	$3,431,400.00
540160	EPOXY COATED REINFORCING BARS GRADE 60	LB	74,250	$1.60	$118,800.00
540170	MECHANICAL COUPLERS	EACH	1,800	$150.00	$270,000.00
541000	STRUCTURAL STEEL FOR CONCRETE BRIDGES	LB	50	$3.00	$150.00
541100	STRUCTURAL STEEL FOR STEEL BRIDGES	LB	3,853,000	$1.90	$7,320,700.00
541405	PREFAB PEDESTRIAN BRIDGE	LS	L.S.	$552,500.00	$552,500.00
543100	METAL RAILING, PEDESTRIAN	L.F.	3,502	$240.00	$840,480.00
548001	COATING OF CONCRETE - STAIN	S.F.	26,000	$1.50	$39,000.00
560000	ELASTOMERIC BEARING PADS	EACH	380	$350.00	$133,000.00
562000	BRIDGE JOINT STRIP SEAL	L.F.	663	$250.00	$165,750.00
563099	POLYMER BRIDGE JOINT SEALS	L.F.	509	$30.00	$15,270.00
570060	60" CULVERT PIPE	L.F.	50	$250.00	$12,500.00
570072	72" CULVERT PIPE	L.F.	150	$300.00	$45,000.00
5700X1	128"S X 82"R CULVERT PIPE	L.F.	210	$900.00	$189,000.00
570437	24" STORM DRAIN CULVERT PIPE	L.F.	10,000	$120.00	$1,200,000.00
570441	24" STORM DRAIN CULVERT PIPE END SECTION	EACH	5	$1,200.00	$6,000.00
570461	36" STORM DRAIN CULVERT PIPE	L.F.	1,000	$140.00	$140,000.00
570465	36" STORM DRAIN CULVERT PIPE END SECTION	EACH	5	$1,400.00	$7,000.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	L.S.	$1,775,000.00	$1,775,000.00
601110	REMOVAL OF SURFACING	S.Y.	41,800	$8.00	$334,400.00
601300	DEMOLITION	LS	L.S.	$50,000.00	$50,000.00
602000	RIPRAP CLASS A	C.Y.	250	$250.00	$62,500.00
602010	RIPRAP CLASS B	C.Y.	125	$180.00	$22,500.00
606001	SINGLE FACE W-BEAM GUARDRAIL	L.F.	163	$35.00	$5,687.50
606051	END TREATMENT TL-3 END TERMINAL	EACH	2	$3,400.00	$6,800.00
606053	END TREATMENT W-BEAM END ANCHOR	EACH	4	$1,600.00	$6,400.00
606062	TRANSITION METAL BARRIER TO RIGID BARRIER	EACH	2	$4,000.00	$8,000.00
606542	CONCRETE WALL BARRIER 42"	L.F.	4,500	$150.00	$675,000.00
607079	PEDESTRIAN/BICYCLE RAILING	L.F.	4,440	$130.00	$577,200.00
607251	REMOVE AND RESET GATE	EACH	10	$3,000.00	$30,000.00
608004	CONCRETE SIDEWALK 4"	S.Y.	4,870	$70.00	$340,900.00
608106	DRIVE PAD 6"	S.Y.	570	$125.00	$71,250.00
608404	CONCRETE MEDIAN PAVEMENT 4" (COLORED AND PATTERNED)	S.Y.	1,680	$85.00	$142,800.00
609424	CONCRETE VERTICAL CURB AND GUTTER TYPE B 6" X 24"	L.F.	3,710	$35.00	$129,850.00
609450	CONCRETE VERTICAL CURB AND GUTTER TYPE B 8" X 30"	L.F.	3,930	$45.00	$176,850.00
609478	CONCRETE VERTICAL CURB AND GUTTER TYPE D 6" X 18"	L.F.	10,660	$30.00	$319,800.00
618000	TRAFFIC CONTROL MANAGEMENT	LS	L.S.	$800,000.00	$800,000.00
621000	MOBILIZATION	LS	L.S.	$4,000,000.00	$4,000,000.00
623332	CURB DROP INLET TYPE II-B, OVER 4'	EACH	30	$11,000.00	$330,000.00
623410	DROP INLET SPECIAL DESIGN	EACH	4	$18,000.00	$72,000.00
662022	MANHOLE TYPE C-6' DIAMETER OVER 6' TO 10' DEPTH	EACH	15	$20,000.00	$300,000.00
664000	LANDSCAPE, COMPLETE	LS	L.S.	$200,000.00	$200,000.00
667219	GRAVITY WALL	S.F.	3,600	$75.00	$270,000.00
668000	DEWATERING	LS	1	$600,000.00	$600,000.00
701000	PANEL SIGNS	S.F.	400	$20.00	$8,000.00
701100	STEEL POST AND BASE POST FOR ALUMINUM PANEL SIGNS	L.F.	450	$12.00	$5,400.00
704700	HOT THERMOPLASTIC PAVEMENT MARKINGS 4"	L.F.	60,000	$0.65	$39,000.00
704701	HOT THERMOPLASTIC PAVEMENT MARKINGS 6"	L.F.	3,000	$0.80	$2,400.00
704704	HOT THERMOPLASTIC PAVEMENT MARKING 24"	L.F.	1,000	$6.00	$6,000.00
704717	HOT THERMOPLASTIC PAVEMENT MARKING RIGHT ARROW	EACH	10	$120.00	$1,200.00
704718	HOT THERMOPLASTIC PAVEMENT MARKING LEFT ARROW	EACH	12	$120.00	$1,440.00
704719	HOT THERMOPLASTIC PAVEMENT MARKING THRU ARROW	EACH	12	$120.00	$1,440.00
704720	HOT THERMOPLASTIC PAVEMENT MARKING WORD (ONLY)	EACH	12	$150.00	$1,800.00
704732	HOT THERMOPLASTIC PAVEMENT MARKING BIKE SYMBOL (BIKEW	EACH	20	$250.00	$5,000.00
705000	SIGNAL/LIGHTING SYSTEM START-UP COSTS	ALOW	1	$30,000.00	$30,000.00
706200	METER PEDESTAL (SIGNAL)	EACH	1	$6,000.00	$6,000.00
706405	LIGHTING CONTROL CABINET-SIX CIRCUIT	EACH	3	$6,500.00	$19,500.00
707335	TYPE III STANDARD, 35' ARM	EACH	2	$13,000.00	$26,000.00
707350	TYPE III STANDARD, 50' ARM	EACH	2	$16,000.00	$32,000.00
707540	TYPE V STANDARD, 40'	EACH	60	$4,000.00	$240,000.00
709020	RIGID ELECTRICAL CONDUIT 2" (DIA.)	L.F.	12,500	$11.00	$137,500.00
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709040	RIGID ELECTRICAL CONDUIT 4" (DIA.)	L.F.	180	$22.00	$3,960.00
710000	ELECTRICAL PULL BOX (STANDARD)	EACH	29	$550.00	$15,950.00
710010	ELECTRICAL PULL BOX (LARGE)	EACH	9	$650.00	$5,850.00
710400	TRAFFIC SIGNAL MANHOLE	EACH	1	$1,800.00	$1,800.00
711005	MULTI CONDUCTOR CABLE 5	L.F.	1,200	$1.60	$1,920.00
711007	MULTI CONDUCTOR CABLE 7	L.F.	1,900	$2.15	$4,085.00
711020	MULTI CONDUCTOR CABLE 20	L.F.	1,700	$5.50	$9,350.00
711102	SINGLE CONDUCTOR 2	L.F.	24,350	$1.35	$32,872.50
711106	SINGLE CONDUCTOR 6	L.F.	12,800	$0.60	$7,680.00
711110	SINGLE CONDUCTOR 10	L.F.	4,000	$0.55	$2,200.00
711230	SINGLE CONDUCTOR 3/0	L.F.	300	$7.00	$2,100.00
712031	3 SECTION TRAFFIC SIGNAL ASSEMBLY (LED)	EACH	10	$650.00	$6,500.00
712051	5 SECTION TRAFFIC SIGNAL ASSEMBLY (LED)	EACH	8	$900.00	$7,200.00
712202	PEDESTRIAN COUNTDOWN SIGNAL (LED)	EACH	8	$600.00	$4,800.00
712330	3 SECTION BACKPLATE	EACH	4	$110.00	$440.00
712350	5 SECTION BACKPLATE	EACH	6	$140.00	$840.00
713025	ACCESSIBLE PEDESTRIAN SIGNAL PUSH BUTTON STATION	EACH	8	$1,000.00	$8,000.00
713420	PHASE SELECTOR RACK, 2 CHANNEL	EACH	1	$225.00	$225.00
713430	PHASE SELECTOR MODULE	EACH	2	$4,000.00	$8,000.00
713511	OPTICAL DETECTOR, 1 DIRECTION, 1 CHANNEL	EACH	2	$825.00	$1,650.00
713600	OPTICAL DETECTOR CABLE	L.F.	900	$2.10	$1,890.00
713807	VIDEO CABLE	L.F.	200	$2.00	$400.00
713810	VIDEO CAMERA	EACH	4	$10,000.00	$40,000.00
714000	TRAFFIC ACTUATED CONTROLLER	EACH	1	$6,000.00	$6,000.00
714280	8 PHASE DOUBLE RING CONTROLLER CABINET	EACH	1	$24,000.00	$24,000.00
714300	CLOSED LOOP TRAFFIC CONTROL SYSTEM	LS	L.S.	$30,000.00	$30,000.00
716301	INTERNALLY ILLUMINATED SIGN	EACH	4	$3,000.00	$12,000.00
716701	LED ROADWAY LUMINAIRE	EACH	64	$500.00	$32,000.00
750000	INTELLIGENT TRANSPORTATION SYSTEM	LS	L.S.	$75,000.00	$75,000.00
750040	ITS CONDUIT (4" MULTIDUCT, PVC)	L.F.	7,500	$14.00	$105,000.00
750060	ITS PULLBOX (33"X24"X24")	EACH	25	$1,200.00	$30,000.00
750080	ITS MANHOLE (48"X48"X48")	EACH	1	$5,000.00	$5,000.00
750100	CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)	EACH	1	$6,000.00	$6,000.00
	Reversable Lane - Lindsay	LS	L.S.	$1,250,000.00	$1,250,000.00
	Construction Traffic Control	LS	L.S.	$300,000.00	$300,000.00

Total Cost: $49,167,887.50

Submitted by:

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