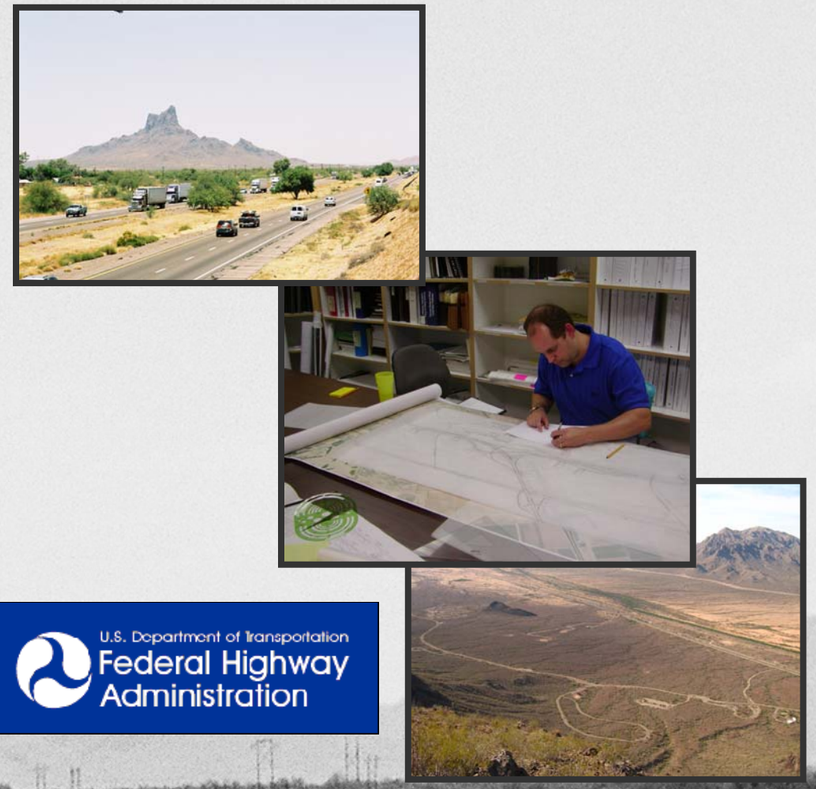
# INTERSTATE 10 CORRIDOR STUDY, *JUNCTION I-8 TO TANGERINE ROAD*

**CASA GRANDE - TUCSON HIGHWAY**

**ADOT PROJECT No. 010 PN 199 H6773 01L**
**FEDERAL PROJECT NO. NH-010-D(ASM)**
**TUCSON DISTRICT / PINAL & PIMA COUNTIES**



***Final***

# DESIGN CONCEPT REPORT

**(VOLUME 1 OF 3)**

November 2010

PREPARED FOR
**Arizona Department of Transportation**


**PREPARED BY:**

AECOM

**2777 E. Camelback Road, Suite 200**
**Phoenix, AZ 85016**

ARIZONA DEPARTMENT OF TRANSPORTATION

***OFFICE MEMO***

INTERMODAL TRANSPORTATION DIVISION

January 10, 2011

TO: TODD EMERY, TUCSON DISTRICT, T100
STEVE WILSON, PROJECT MANAGER, T100
MARY VIPARINA, ASSISTANT STATE ENGINEER, 611E

FROM: VICTOR YANG, ROADWAY PREDESIGN, 605E

SUBJECT: DESIGN MEMORANDUM
10 PN 199.00 H677301L
JCT I-8 TO TANGERINE RD
PHOENIX-CASA GRANDE HWY
I 10

This memorandum is prepared pursuant to Section 3.3 of the ADOT Action Plan for Federal-Aid Highway projects. The proposed major design features for this project are described in the attached Final Design Concept Report.

Your concurrence/approval on the proposed major design features is requested.

Paul O'Brien

PAUL O'BRIEN, ROADWAY PREDESIGN MANAGER, 605E

Concurrence: _____ 3/5/11
TODD EMERY, TUCSON DISTRICT, T100 — Date

* See comments on pgs 1-5 & 6-5

Concurrence: _____ 3/18/11
STEVE WILSON, PROJECT MANAGER, T100 — Date

Approved: Mary Pavia 7/5/11
MARY VIPARINA, ASSISTANT STATE ENGINEER-ROADWAY, 611E — Date

* After discussion, District is ok with the content on Pgs 1-5 & 6-5

cc: Environmental Planning Group, EM02
Roadway Design, 615E

Project Id: 12932

## Table of Contents

## List of Figures

## List of Tables



## Appendices
## (Volume 2 of 3)

## MITIGATION MEASURES

The following mitigation measures and commitments are not subject to change without prior written approval from the Federal Highway Administration.

**Arizona Department of Transportation Design Responsibilities:**

1. Final right-of-way and acquisition requirements will be determined during final design. The Arizona Department of Transportation will implement a right-of-way acquisition program in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646) and the Uniform Relocation Act Amendments of 1987 (Public Law 100-17).
2. Measures to minimize construction impacts will be incorporated into construction contract specifications. Traffic will be managed by detailed traffic control plans and by procedures and guidelines specified in Section 6 of the Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition and the Arizona Supplement to the Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition (ADOT 2004). Contract specifications will be written to ensure that: construction activities that substantially disrupt traffic will not be performed during peak morning and evening travel times; local agencies will be consulted regarding traffic restrictions in their respective jurisdictions to minimize disruptions to local traffic; and the effectiveness of the traffic control measures will be monitored during construction, and any necessary adjustments will be made.
3. During final design, the Arizona Department of Transportation will make a determination on the type, dimensions, and placement of right-of-way fencing within the community of Picacho. The determination will balance the need to prohibit pedestrian crossings with the need for aesthetical appearance and scale.
4. During final design, the Arizona Department of Transportation will coordinate with the Picacho Water Improvement Corporation to mitigate the impacts and ensure a continued source of water to the community of Picacho with minimal disruption of the water supply during construction.
5. No work will occur until stipulations of the Programmatic Agreement on cultural resources are met prior to project implementation, including: a cultural resources inventory of new rights-of-way and temporary construction easements; determinations of eligibility for listing on the National Register of Historic Places of any newly identified cultural resources; and development and implementation of appropriate mitigative treatment for eligible properties.
6. During final design the Arizona Department of Transportation will coordinate with representatives from Picacho Peak State Park to identify measures that minimize impacts to the Park.
7. During final design the Arizona Department of Transportation Project Manager will contact the Environmental Planning Group Noise Coordinator (602.712.7767) to arrange for qualified personnel to review and update the noise analysis.
8. During final design the Arizona Department of Transportation will coordinate with the utility owners to determine the extent of utility conflicts, including relocations, reestablishment, or required vertical clearances. Any utility adjustments or relocations will be scheduled to minimize service interruptions and inconvenience to utility customers.
9. During final design the Floodplain Managers of Pima and Pinal Counties, the cities of Casa Grande and Eloy, and the Town of Marana will be provided an opportunity to review and comment on the design plans.
10. During final design the Arizona Department of Transportation will continue to coordinate with the US Environmental Protection Agency regarding the Section 1424(e) sole source aquifer review.
11. During final design the jurisdictional delineations will be updated and submitted to the US Army Corps of Engineers as part of the Section 404 permitting process.
12. During final design the Arizona Department of Transportation will prepare and submit an application to the US Army Corps of Engineers for a Clean Water Act Section 404 permit for the project. No work will occur within Waters of the United States until the appropriate Clean Water Act Section 404 permit is obtained.
13. All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity.
14. During final design the Arizona Department of Transportation Natural Resources Group will establish a Wildlife Connectivity Technical Advisory Committee consisting of representatives from Federal Highway Administration, Arizona State Parks Department, and Arizona Game and Fish Department, and US Fish and Wildlife Service. The Wildlife Connectivity Technical Advisory Committee will review available data and provide specific recommendations regarding wildlife connectivity throughout the project corridor, including between milepost 212 and milepost 232, which includes the Ironwood-Picacho linkage.
15. During final design the Arizona Department of Transportation Project Manager will contact the Environmental Planning Group (602.712.7767) to evaluate bridges within the project limits for the potential presence of swallows. If cliff swallows are present, specific mitigation measures will be developed and implemented.
16. During final design surveys for burrowing owls will be conducted to determine their presence/absence and extent of occurrence and to guide the development of specific mitigation measures to be implemented before or during construction, as needed.
17. During final design the Arizona Department of Transportation Project Manager will contact the Hazardous Materials Coordinator (602.712.7767) to determine an appropriate treatment for asbestos containing pipe.
18. Prior to modification or demolition activities the Arizona Department of Transportation will determine the appropriate method for treatment of asbestos-containing materials. The Arizona Department of Transportation will be responsible for arranging for the removal of asbestos.
19. During final design, the Arizona Department of Transportation Project Manager will contact the Department Hazardous Materials Coordinator (602-712-7767) to determine the need for additional site assessment.

**Arizona Department of Transportation District Responsibilities:**

1. The Engineer will submit the contractor's Arizona Pollutant Discharge Elimination System Notice of Intent and the Notice of Termination to the District's Environmental Coordinator.

**Arizona Department of Transportation Roadside Development Responsibilities:**

1. Protected native plants within the project limits will be impacted by this project. The Arizona Department of Transportation Roadside Development Section will determine if Arizona Department of Agriculture notification is needed. If notification is needed, the Arizona Department of Transportation Roadside Development Section will send the notification to the Arizona Department of Agriculture at least 60 days prior to the start of construction.

**Contractor Responsibilities:**

1. Access to adjacent businesses and residences shall be maintained throughout construction.
2. For utility work for which the contractor shall be responsible, the contractor shall notify utility customers whose services could be affected prior to construction.
3. No work shall occur within Waters of the United States until any required Clean Water Act Section 404 permit is obtained.
4. The contractor, in association with the Engineer, shall submit the Arizona Pollutant Discharge Elimination System Permit Notice of Intent and the Notice of Termination to the Arizona Department of Environmental Quality only after the Engineer has reviewed and approved the Stormwater Pollution Prevention Plan.
5. Plans and specifications for the salvage and transplanting of protected native species shall be implemented. Saguaros that must be removed shall be replanted within the right-of-way, where possible.
6. To prevent the introduction of invasive species seeds, all earth-moving and hauling equipment shall be washed at the contractor's storage facility prior to entering the construction site.
7. To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.
8. All disturbed soils that shall not be landscaped or otherwise permanently stabilized by construction shall be seeded using species native to the project vicinity.
9. If any Sonoran desert tortoises are encountered during construction, the contractor shall adhere to the attached Arizona Game and Fish Department Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects (Revised October 23, 2007).
10. The contractor shall employ a qualified biologist to complete preconstruction surveys for Sonoran desert tortoises and to conduct a Sonoran desert tortoise awareness program.
11. Preconstruction surveys for Sonoran desert tortoises shall be conducted within 48 hours prior to construction in areas that will be disturbed. Within 48 hours of survey completion, the contractor shall contact the Environmental Planning Group at 602.712.7767 to provide survey results and arrange for delivery of survey documentation.
12. The Sonoran desert tortoise awareness program shall be presented by a qualified biologist to all personnel who shall be on-site, including, but not limited to, contractors, contractors' employees, supervisors, inspectors, and subcontractors. This program shall contain, at a minimum, information concerning the biology and distribution of the desert tortoise, legal status and occurrence in the project area, measures to avoid impacts to tortoises, and procedures to be implemented in case of desert tortoise encounters.

**Standard Specifications Included as Mitigation Measures:**

1. Traffic will be managed by detailed traffic control plans and by procedures and guidelines specified in Part VI and the Arizona Supplement to Part VI of the Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 edition. Construction activities that substantially disrupt traffic will not be performed during peak travel periods. Requirements for the use of construction notices and bulletins will be identified as needed. Local agencies will be consulted regarding traffic restrictions in their respective jurisdictions to minimize disruptions to local traffic. The effectiveness of the traffic control measures will be monitored during construction, and any necessary adjustments will be made.
2. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 107, "Legal Relations and Responsibility to Public," Subsection 05, "Archaeological Features," "[w]hen previously unidentified archaeological, historical, or paleontological features are encountered or discovered during any activity related to the construction of the project, the contractor shall stop work immediately at that location and will take all reasonable steps to secure the preservation of those resources and notify the Engineer." The Arizona Department of Transportation Engineer will (~~would~~), in turn, notify the Environmental Planning Group Historic Preservation Team (602.712.7767) to evaluate the significance of the resources.
3. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 104, "Scope of Work," Subsection 08, "Prevention of Air and Noise Pollution," "[t]he contractor shall control, reduce, remove or prevent air pollution in all its forms, including air contaminants, in the performance of the contractor's work." The contractor shall comply with all air pollution ordinances, regulations, and orders during construction. All dust-producing surfaces will be watered or otherwise stabilized to reduce short-term impacts associated with an increase in particulate matter attributable to construction activity.
4. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 104, "Scope of Work," Subsection 08, "Prevention of Air and Noise Pollution," "[t]he contractor shall comply with all local sound control and noise level rules, regulations, and ordinances which apply to any work preformed pursuant to the contract. Each internal combustion engine used for any purpose on the work or related to the work will be equipped with a muffler of a type recommended by the manufacturer."
5. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 104, "Scope of Work," Subsection 09, "Prevention of Landscape Defacement; Protection of Streams, Lakes, and Reservoirs," "[t]he contractor shall give special attention to the effects of its operations on the landscape and will take special care to maintain natural surroundings undamaged."

6. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 104, “Scope of Work,” Subsection 09, “Prevention of Landscape Defacement; Protection of Streams, Lakes, and Reservoirs,” Arizona Department of Transportation will ensure that, “[t]he contractor shall take sufficient precautions, considering various conditions, to prevent pollution to streams, lakes, and reservoirs with fuels, oils, bitumens, calcium chloride, fresh Portland cement, raw sewage, muddy water, chemicals, or other harmful materials. None of these materials will be discharged into any channels leading to such streams, lakes, or reservoirs.”
7. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 107, “Legal Relations and Responsibility to Public,” Subsection 07, “Sanitary, Health, and Safety Provisions,” should the contractor encounter potential hazardous or contaminated material, the contractor shall immediately stop work, and remove workers, barricade the area, provide traffic controls, and notify the Engineer. The Engineer will arrange for proper assessment, treatment, or disposal of those materials. Such locations will be investigated and proper action implemented prior to the continuation of work in that location.
8. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 1001, “Material Sources,” Subsection 2, “General,” any material sources required for this project outside of the project area will be examined for environmental effects by the contractor prior to use through a separate environmental analysis.
9. According to the Arizona Department of Transportation Standard Specifications for Road and Bridge Construction (2008 Edition), Section 107, “Legal Relations and Responsibility to Public,” Subsection 11, “Protection and Restoration of Property and Landscape,” ‘[m]aterials removed during construction operations such as trees, stumps, building materials, irrigation, and drainage structures, broken concrete, and other similar materials will not be dumped on either private or public property unless the contractor has obtained written permission from the owner or public agency with jurisdiction over the land. Written permission will not be required, however, when materials are disposed of at an operating, public dumping ground.” The contractor shall dispose of excess waste material and construction debris at a municipal landfill approved under Title D of the Resource Conservation and Recovery Act, construction debris landfill approved under Article 3 of the Arizona Revised Statutes 49-241 (Aquifer Protection Permit) administered by the Arizona Department of Environmental Quality, an inert landfill, or at another approved site.

# EX.0 EXECUTIVE SUMMARY

This Final Design Concept Report describes the development and evaluation of capacity improvement alternatives on Interstate 10 (I-10) from near its junction with Interstate 8 (Milepost 196) to Tangerine Road (Milepost 240). A project location map is provided as **Figure EX.1**.

The goal of this study is to develop a long-range master plan for the I-10 corridor in accordance with the approved regional and local transportation plans; to optimize the traffic operations within the corridor for 2030 traffic demand; to retain local access at existing traffic interchanges, to plan for new interchange locations; and to minimize or mitigate impacts the improvements may have on the surrounding community. The I-10 Corridor Study Final Environmental Assessment was approved December 9, 2010.

The following documents have been developed in support of this study;

- Traffic Report
- Initial Drainage Report
- Initial Bridge Concept Reports (7)
- Access Management Plan
- Change of Access Plan
- Design Concept Report
- Design Concept Plans
- Environmental Assessment

## EX.1 NEED FOR THE PROJECT

I-10 is a major commercial corridor for intrastate, interstate, and international commerce. Projected population growth is expected to further compound the existing freeway capacity. This increase is expected to degrade the highway's operational characteristics and capacity, typically measured as Level of Service (LOS). Factors influencing a highway LOS include traffic volumes, terrain, vertical grade, and the presence of trucks (Transportation Research Board 2000).

The specific elements of the purpose and need for this project are as follows:

- **Accommodate travel demand** along this major interstate corridor through the design year 2030;

- Support the purpose of I-10, part of the **CANAMEX Trade Corridor**, as a Congressionally-designated High Priority Corridor;

- Address the need for a **parallel roadway** within the project limits; and

- Address **geometric deficiencies**.

To meet the project objectives and address the elements of need, the preferred alternative recommends freeway improvements to include:

- Expand I-10 to include five (5) general use lanes in each direction,
- Provide for continuous one-way frontage roads,
- Reconstruct or relocate the existing interchanges to improve traffic operations,
- Identify viable locations for future interchanges to enhance access,
- Realignment of the mainline freeway through the community of Picacho

The addition of mainline lanes is anticipated to reduce congestion and travel times, creating an efficient corridor for the transportation of interstate, and regional goods and services. The implementation of a continuous one-way frontage road system would provide alternative access to a long segment of I-10 in case of incidents that could block the mainline, while maintaining local access to adjacent residences and businesses.

The preferred plan recommends locations for new interchanges that can provide additional access to surrounding developments anticipated in the future. The location of these future interchanges has been selected to provide ample spacing between the interchanges to ensure efficient traffic operations along the I-10 mainline.

## EX.2 DESIGN CONCEPT ALTERNATIVES

This Final Design Concept Report documents alternatives that were considered and evaluated to plan the I-10 Corridor as follows:

- No Build Alternative – this alternative includes widening I-10 to six lanes and implementation of the Tortolita Blvd Interchange (MP 234) currently in final design.

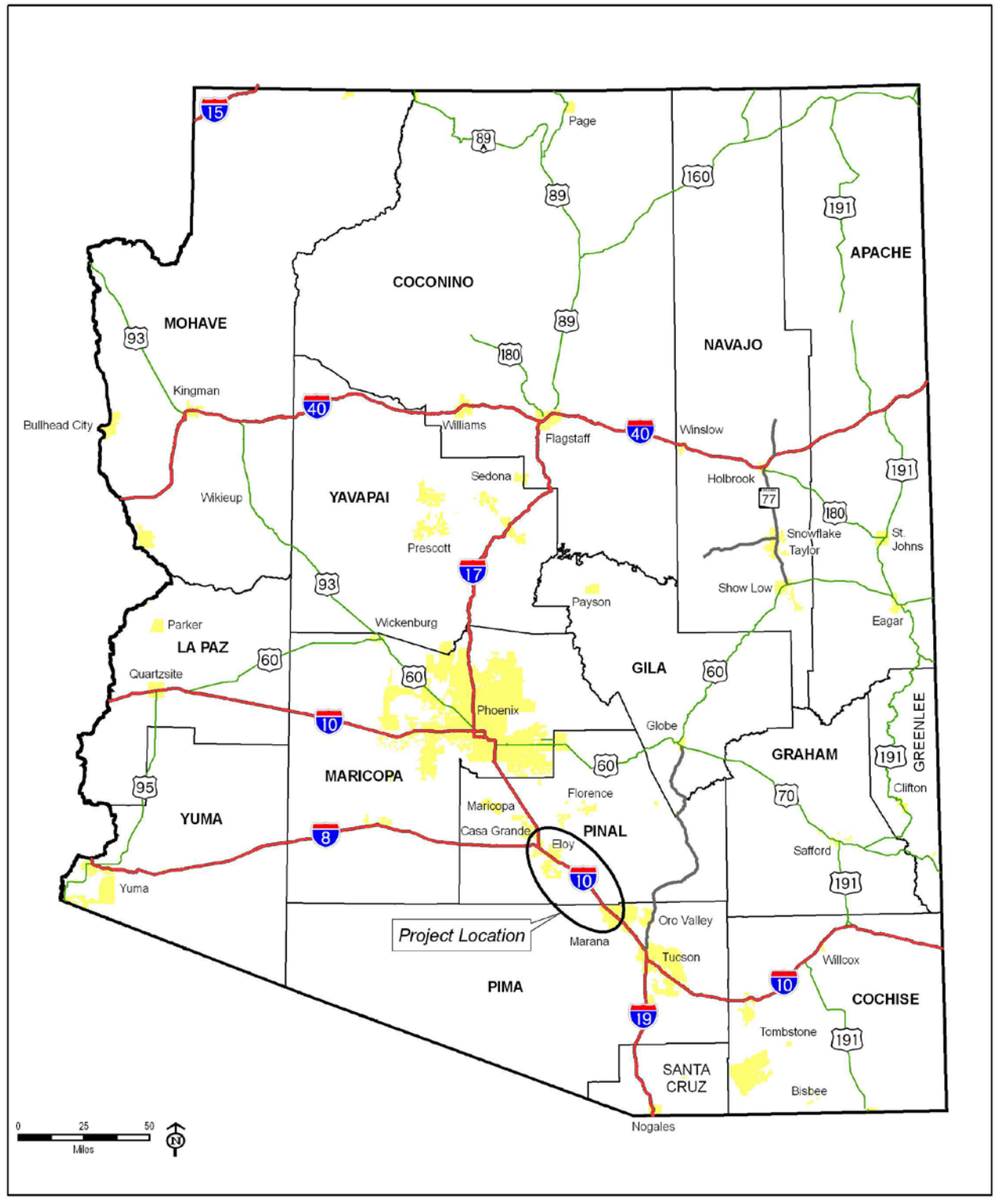
- Build Alternative – this alternative includes expanding the I-10 Corridor to provide up to five (5) lanes in each direction, recommendations for interchange improvements, and a realignment of the freeway through the community of Picacho.

  The development of the Build Alternative was divided into four (4) categories of alternative evaluations as follows:

1. Corridor Cross Section Concepts – Several concepts were compared which included various typical sections for the corridor. The recommendation is to include five (5) general purpose lanes in each direction and provide for continuous one-way frontage roads.

2. Interchange Location Concepts – Concepts were evaluated to identify locations of interchanges along the corridor. The recommendation is to maintain a minimum spacing of two miles between interchanges throughout the corridor.

**Figure EX.1 – Project Location Map**




3. Interchange Design Alternatives – Configurations were considered at each existing interchange location. The Design Concept includes the recommended alternative at each interchange location.

4. Freeway Alignment Options – Several freeway alignments were considered through the community of Picacho to enhance access to the community and improve the geometry of the freeway. The recommended plan includes relocating the freeway through the community of Picacho.

## EX.3 MAJOR FEATURES OF THE RECOMMENDED ALTERNATIVE

### CORRIDOR CROSS SECTIONS

There are two recommended cross sections for the I-10 Corridor; (Jct I-8 to Tangerine Road). One cross section will be used through the more rural area of the corridor and the other will be for the urban section of the corridor.

<u>Earley Road to Tortolita Blvd (MP 196 to MP 234)</u>

The recommended cross section for this rural section of the corridor will provide five (5) lanes in each direction with an open median 84 feet in width. Continuous frontage roads 30 feet in width are recommended to be included and will provide one-way traffic operation. This recommendation will require additional right-of-way throughout the corridor. Based on an engineering evaluation, the typical right-of-way width for the rural section of the corridor will be set at 500 feet wide.

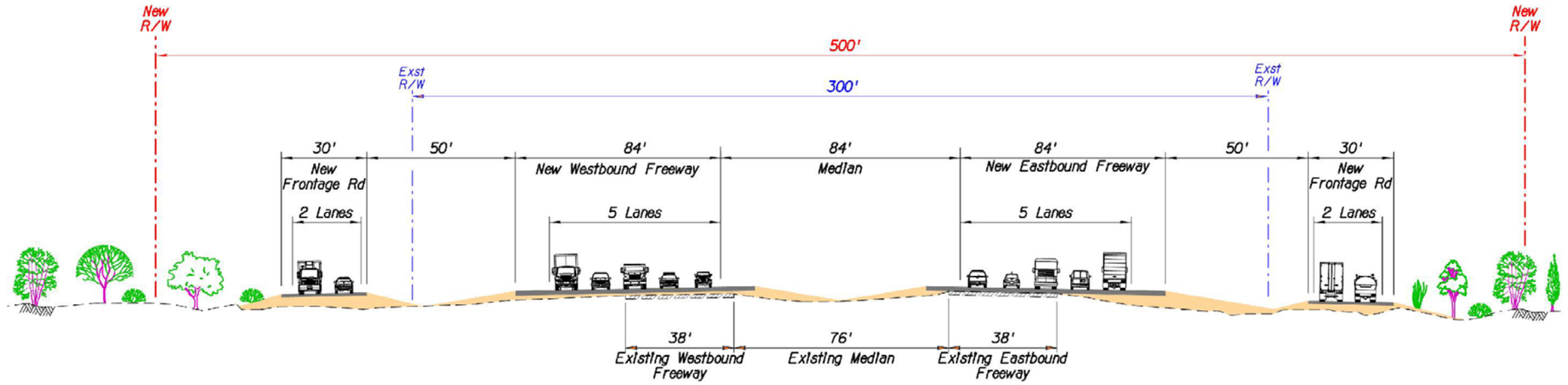
<u>Tortolita Blvd to Tangerine Road (MP 234 to MP 240)</u>

The recommended cross section through this urban section of the corridor will provide 5 lanes in each direction but the median will be closed (continuous barrier) between opposing directions of travel. A continuous one-way frontage road system is recommended to provide an alternative route during incidents and to enhance access to adjacent properties.

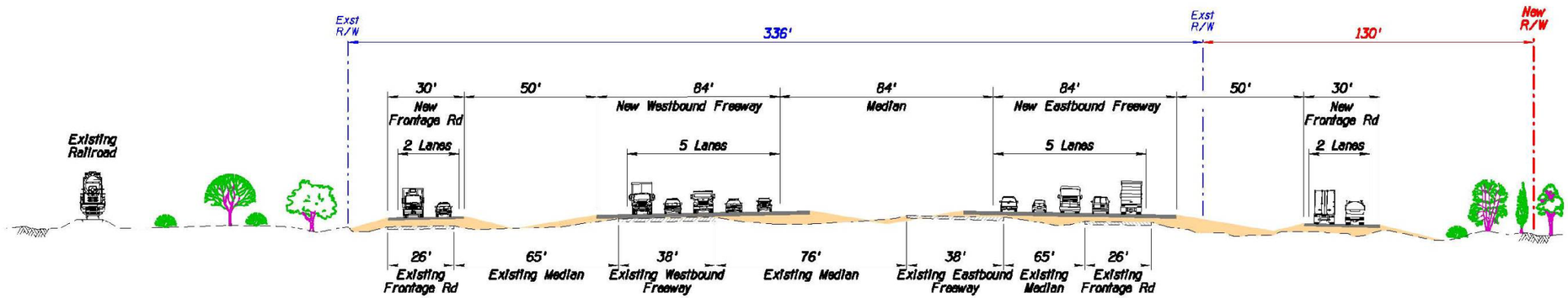
Throughout a significant section of this corridor, the Union Pacific Railroad (UPRR) is located adjacent to the existing right-of-way (MP 210 to MP 240). In areas where the UPRR right-of-way is adjacent to the corridor, it is recommended that all new right-of-way be acquired without acquisition of any UPRR property. Therefore, the property required to expand the corridor will be acquired along the corridor on the opposite side of the UPRR.

**Figure EX.2** depicts the recommended typical sections for the corridor.

**Figure EX.2 – Recommended Typical Sections**

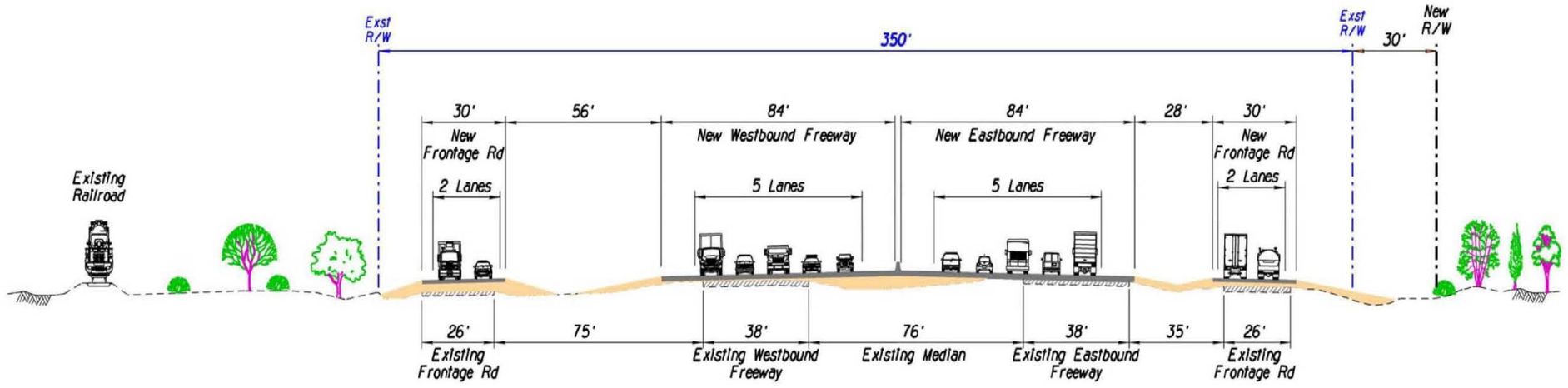



**Typical Mainline Expansion MP 196 to MP 210**




**Typical Mainline Expansion MP 210 to MP 234 (adjacent to UPRR)**

**Figure EX.2 – Recommended Typical Sections (Cont.)**




Typical Mainline Expansion MP 234 to MP 240

**PREFERRED INTERCHANGE LOCATION PLAN**

The preferred interchange plan proposes locations for eight (8) new interchanges along I-10 between Junction I-8 and Tangerine Road (MP 200 to MP 240). These new locations are placed between the existing interchanges to provide a nearly uniform spacing of two miles between interchanges throughout the corridor and is depicted in **Figure EX.3**. This plan will remove an existing interchange at Jimmie Kerr Blvd (MP 198), and replace this with a new interchange at Selma Highway (MP 197). The recommended plan also includes the reconstruction of the I-10/I-8 System Interchange to meet current design guidelines. The configuration of these interchanges may need to be reevaluated at the time of implementation based on updated traffic data.

**FREEWAY ALIGNMENT THROUGH THE COMMUNITY OF PICACHO**

The existing location of Interstate 10 through the community of Picacho includes a curvilinear alignment which includes a horizontal curve that does not meet current design guidelines. This curve located near MP 212 is currently signed with advisory warning signs directing traffic to reduce speed from the posted speed of 75 MPH to 65 MPH, and is identified as an area of concern based on the crash history of the corridor.

Currently, the interstate highway passes through the community on an embankment and underpasses are provided at Phillips Road (MP 211) and Picacho Highway (MP 212) which limits access to the business district along Camino Adelante (old Hwy 84).

The freeway alignment through the Community of Picacho is recommended to realign Interstate 10 along the UPRR mainline (Option C). This will require the realignment of Interstate 10 from MP 210 to MP 213, and relocation of the SR 87 Interchange as depicted in **Figure EX.4**

## EX.4 PUBLIC INVOLVEMENT

To ensure that the community had ample opportunity to provide comments and be involved in the development and evaluation of alternatives, this study has included an extensive public involvement process with public meetings, project newsletters, and a project website.

An Agency Scoping meeting was held on May 16th 2006 at the Marana Municipal Conference Center. The agency scoping meeting was attended by representatives of ADOT, FHWA, ASLD, CAAG, PAG, Casa Grande, Eloy, Marana, Pinal County, Pima County, Picacho Peak State Park, and DPS.
Several public scoping meetings were held in September 2006 including:

- September 12th, 2006 at the Marana Municipal Complex, Marana Arizona
- September 14th, 2006 at the Troy Thomas Center, Eloy Arizona
- September 19th, 2006 at the City Council Chambers, Casa Grande Arizona

The purpose of these meetings was to obtain input from the public on the scope of the project, identify issues, and express concerns. One hundred and two (102) people attended the meetings which included a presentation, question and answer session, and an open house format. Eleven people submitted comments either by returning a comment form at the meeting or by submitting a letter to the project team.

Three public information meetings were held in May 2007 including:

- May 15th, 2007 at the Troy Thomas Center, Eloy Arizona
- May 16th, 2007 at the Estes Elementary School, Marana Arizona
- May 17th, 2007 at the City Council Chambers, Casa Grande Arizona

The purpose of these meeting was to present improvement alternatives for the corridor and obtain comments or concerns about the possible solutions. One hundred and eighteen (118) people attended the meetings which included a presentation, question and answer session, and an open house format. Seven people submitted comments by returning a comment form at the meeting.

A neighborhood meeting was held at the Picacho Elementary School in Picacho Arizona on August 21st, 2008. The purpose of this meeting was to present the preferred alternative for I-10 through the community of Picacho, which included realigning the freeway along the UPRR mainline. Seventy (70) people attended the meeting and seven (7) comments were received.

Three public hearings were held in September 2010 including:

- September 28th, 2010 at the City Council Chambers, Casa Grande Arizona
- September 29th, 2010 at the Picacho Elementary School, Picacho Arizona
- September 30th, 2010 at the Estes Elementary School, Marana Arizona

The purpose of these hearings was to present the draft Environmental Assessment and obtain comments on the document. One hundred and seventy-five (175) people attended the meetings which included graphics of the Preferred Plan, a presentation, question and answer session, and an open house format.

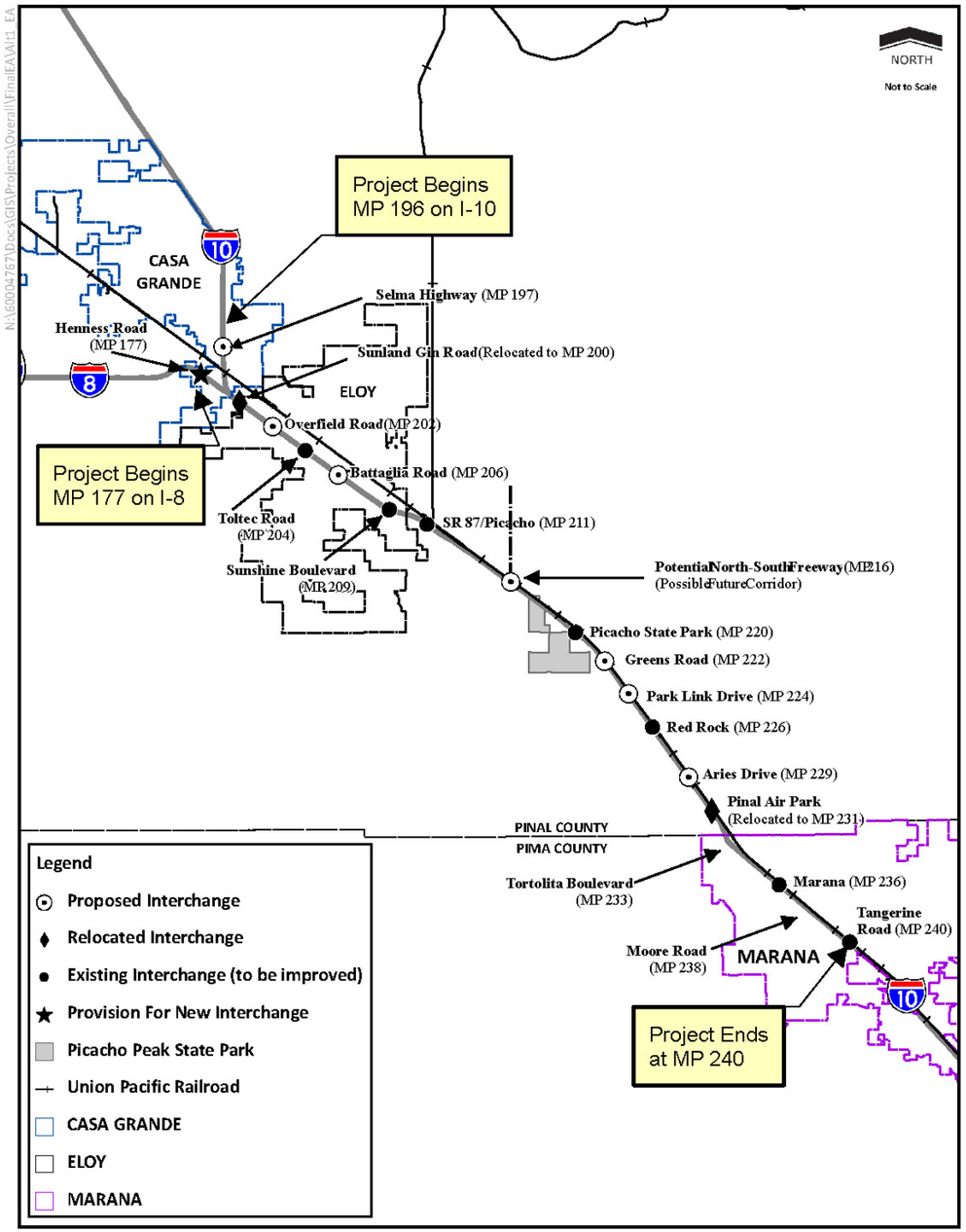
## EX.5 IMPLEMENTATION PLAN

Funding is currently identified in the ADOT 5-year construction program which includes a total of $126 Million to widen the existing freeway to 3 lanes in each direction from Junction I-8 to Tangerine Road with the first construction project identified in Fiscal Year 2010.

This Implementation Plan was developed to propose a logical sequence of construction projects that would systematically build the ultimate I-10 Corridor improvements over time as justified by traffic demand and funding becomes available. The implementation plan is divided into four major stages of construction as follows:

- Stage I – Expansion of I-10 to a six (6) lane freeway
- Stage II – Expansion of I-10 to an eight (8) lane freeway
- Stage III – Reconstruction of the I-10/I-8 System Interchange
- Stage IV – Expansion of I-10 to a ten (10) lane freeway

**Figure EX.3 – Preferred Interchange Location Plan**




Based on the current need for additional capacity within the corridor, ADOT is currently executing Stage I of this implementation plan and is expected to complete construction by 2015. Projects included in Stage I are depicted in **Figure EX.5**

**Figure EX.4 – Preferred Alignment through Picacho**

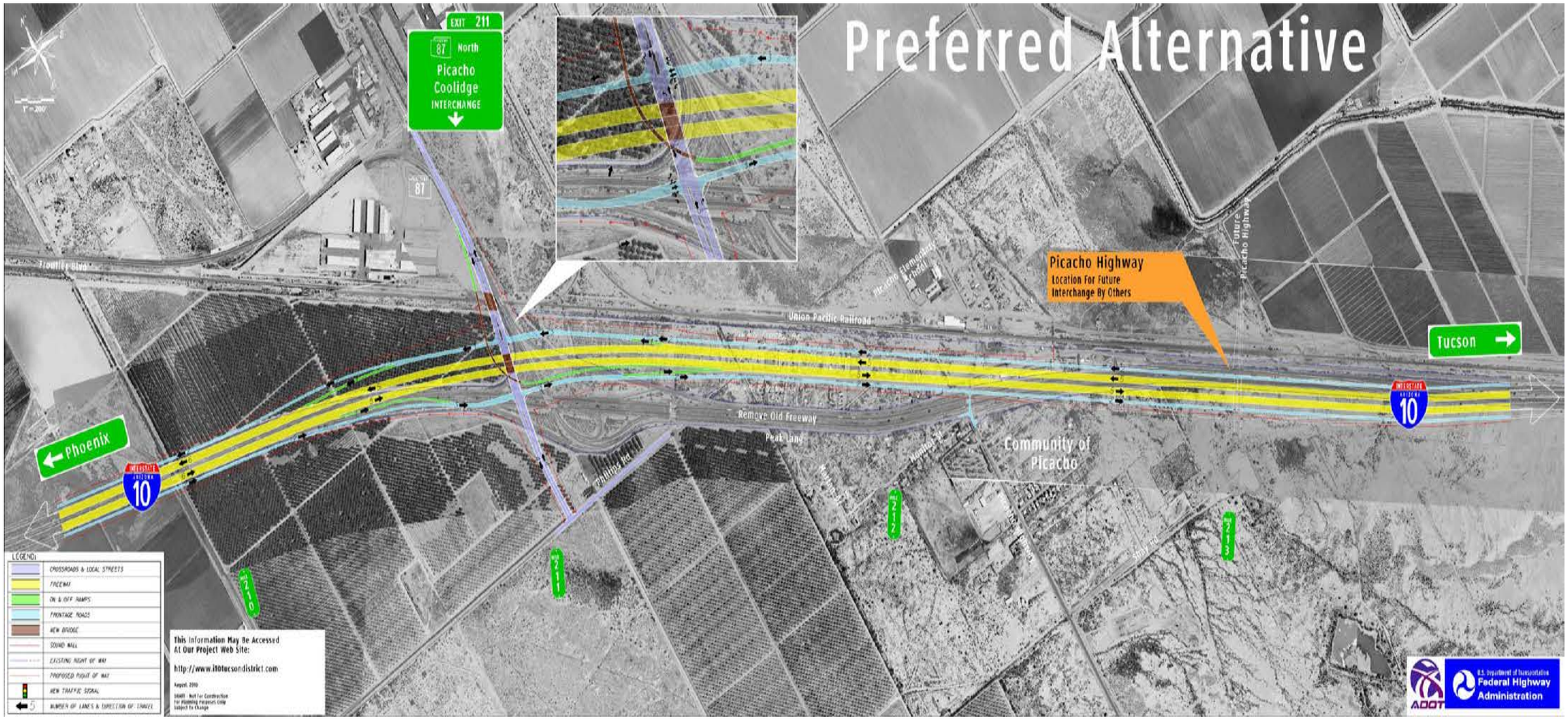
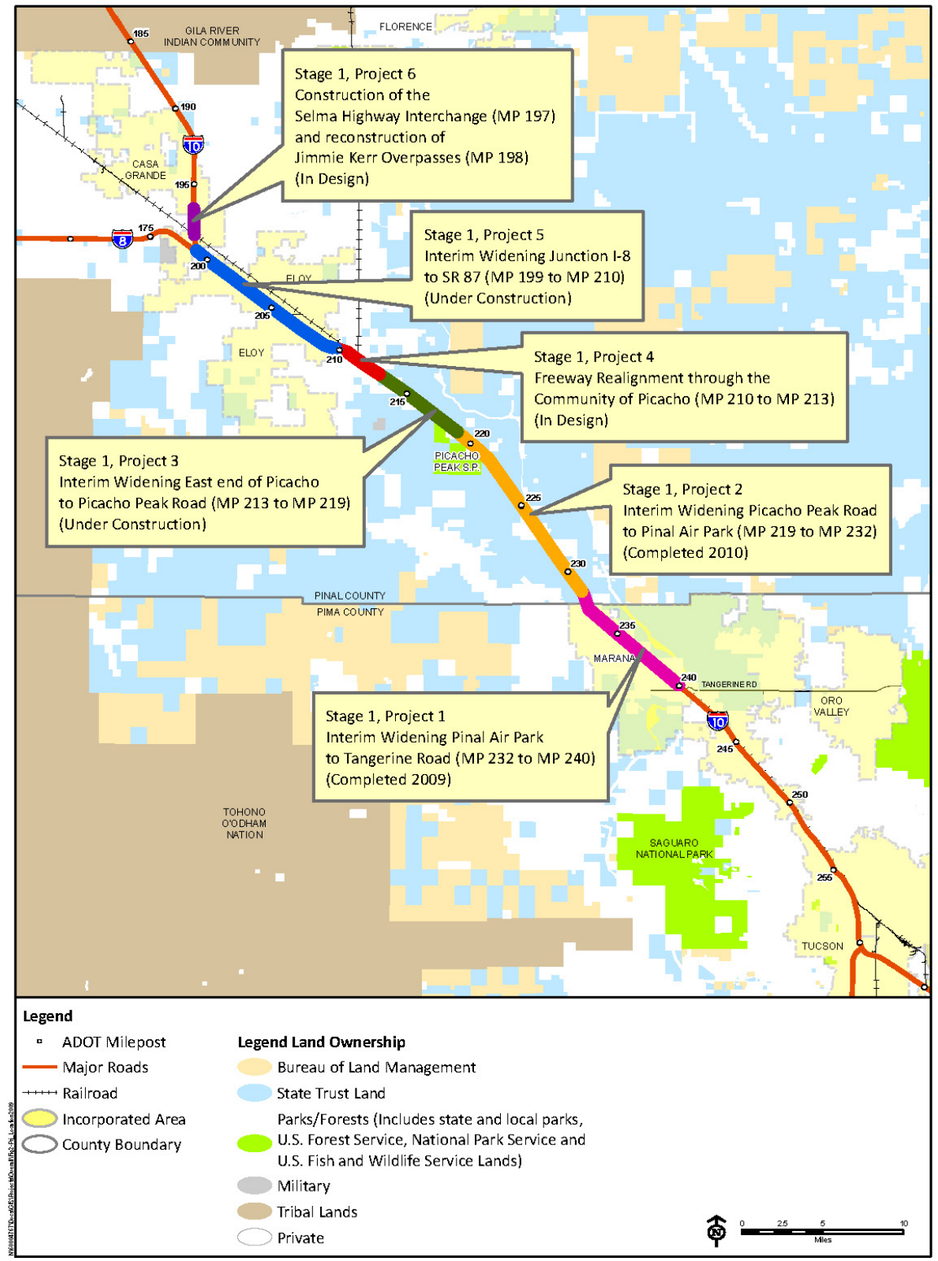


**Figure EX.5 – Stage I - Expansion of I-10 to a Six Lane Freeway**




## EX.6 ITEMIZED ESTIMATE OF PROBABLE COSTS

The estimate of probable construction cost for the preferred alternative is $ 2,641,631,000, which includes an estimate of right-of-way needs. The detailed estimate of probable costs is included in **Table 8.1 - 8.3**. The estimated cost for the Preferred Alternative includes $166,519,000 for design, $386,377,000 for right-of-way, and $2,088,735,000 for construction. This estimate is based on the quantities for the preferred alternative and assumes the project is built as one construction project. However a detailed implementation plan has been documented in this report which includes a phased approach for adding capacity to the corridor.

The estimate of probable costs for the phases of implementation are as follows:

- Stage I – Expansion of I-10 to a six (6) lane freeway (in design or under construction)
- Stage II – Expansion of I-10 to an eight (8) lane freeway $665,622,000
- Stage III – Reconstruction of the I-10/I-8 System Interchange $347,986,000
- Stage IV – Expansion of I-10 to a ten (10) lane freeway $1,628,023,000

The funding identified in the ADOT 5-Year Program includes a total project budget of $126 million, which is programmed for the completion of Stage I improvements (expansion to a six lane freeway). The remaining phases expand the corridor over a long period of time from a six lane freeway to a ten lane freeway, as future traffic demands warrant. Inherent to this approach are some interim construction elements that are built in one phase but may be replaced in a future phase.

# 1.0 INTRODUCTION

## 1.1 FOREWORD

This Final Design Concept Report describes the development and evaluation of capacity improvement alternatives on Interstate 10 (I-10) from near its junction with Interstate 8 (Milepost 196) to Tangerine Road (Milepost 240). This project is located in the Arizona Department of Transportation's (ADOT's) Tucson District within the counties of Pinal and Pima in south-central Arizona. The study area also includes the segment of Interstate 8 from the I-10/I-8 Traffic Interchange (TI) (Milepost 178.3) west to Milepost 177. Project location and vicinity maps are provided with **Figures 1.1** and **1.2**, respectively.

The Arizona Transportation Board has approved some funding in the current ADOT Five-Year Transportation Facilities Construction Program (2011-2015) to begin construction of these long range improvements. Funding is currently programmed to widen I-10 to a six lane freeway (3 lanes in each direction) from Earley Road (MP 196) to Tangerine Road (MP 240), these projects are currently in final design, under construction, or recently opened to traffic.

The goal of this study is to develop a long-range master plan for the I-10 corridor in accordance with the approved regional and local transportation plans; to optimize the traffic operations within the corridor for 2030 traffic demand; to retain local access at existing traffic interchanges, to plan for new interchange locations; and to minimize or mitigate impacts the improvements may have on the surrounding community.

The following documents have been developed in support of this study;

- Traffic Report
- Initial Drainage Report
- Initial Bridge Concept Reports (7)
- Access Management Plan
- Change of Access Plan
- Design Concept Report
- Design Concept Plans
- Environmental Assessment

Interstate 10 (I-10) is a major component of the Federal Interstate Highway System. Several planning documents have identified the need for transportation improvements along the I-10 project corridor.

<u>Phoenix-Tucson Corridor Profile Analysis Study</u>

- The ADOT Phoenix-Tucson Corridor Profile Analysis Study completed in 1999 concluded that travel demands on I-10 were approaching, and in some cases exceeding, the available capacity.

<u>The National I-10 Freight Corridor Study</u>

- This study, completed in 2007, predicted truck movements will double along the I-10 corridor in Arizona between 2008 and 2025.

- To satisfy current traffic demand on I-10, the study recommends, at minimum, an additional three lanes in each direction between Phoenix and Tucson and recommended improvements for SR 85 between I-8 and I-10 even though a shortfall in available funding is anticipated.

MoveAZ

- ADOT in 2004 adopted a long-range transportation plan, entitled MoveAZ, for the entire State of Arizona.
- MoveAz planned projects within the I-10 project corridor include lane widening throughout the corridor, as well as in sections north and south of the project boundaries.
- Public agencies that have been involved with this project include Arizona Department of Transportation (ADOT); Federal Highway Administration (FHWA); Pima Association of Government (PAG); Central Arizona Association of Government (CAAG); the counties of Pinal and Pima; the Cities of Casa Grande and Eloy; and the Town of Marana.

## 1.2 NEED FOR THE PROJECT

I-10 is a major commercial corridor for intrastate, interstate, and international commerce. Projected population growth is expected to further compound the existing freeway capacity. This increase is expected to degrade the highway's operational characteristics and capacity, typically measured as Level of Service (LOS). Factors influencing a highway LOS include traffic volumes, terrain, vertical grade, and the presence of trucks (Transportation Research Board 2000).

The specific elements of the purpose and need for this project are as follows:

- **Accommodate travel demand** along this major interstate corridor through the design year 2030;
- Support the purpose of I-10, part of the **CANAMEX Trade Corridor**, as a Congressionally-designated High Priority Corridor;
- Address the need for a **parallel roadway** within the project limits; and
- Address **geometric deficiencies**.

Accommodate Travel Demand

- Based on predicted traffic volumes and population trends, the project corridor will exceed travel demand capacity by the year 2030.
- Capacity improvements would be required to provide an acceptable LOS for the anticipated 2030 traffic demand.

**Figure 1.1 – Project Location Map**

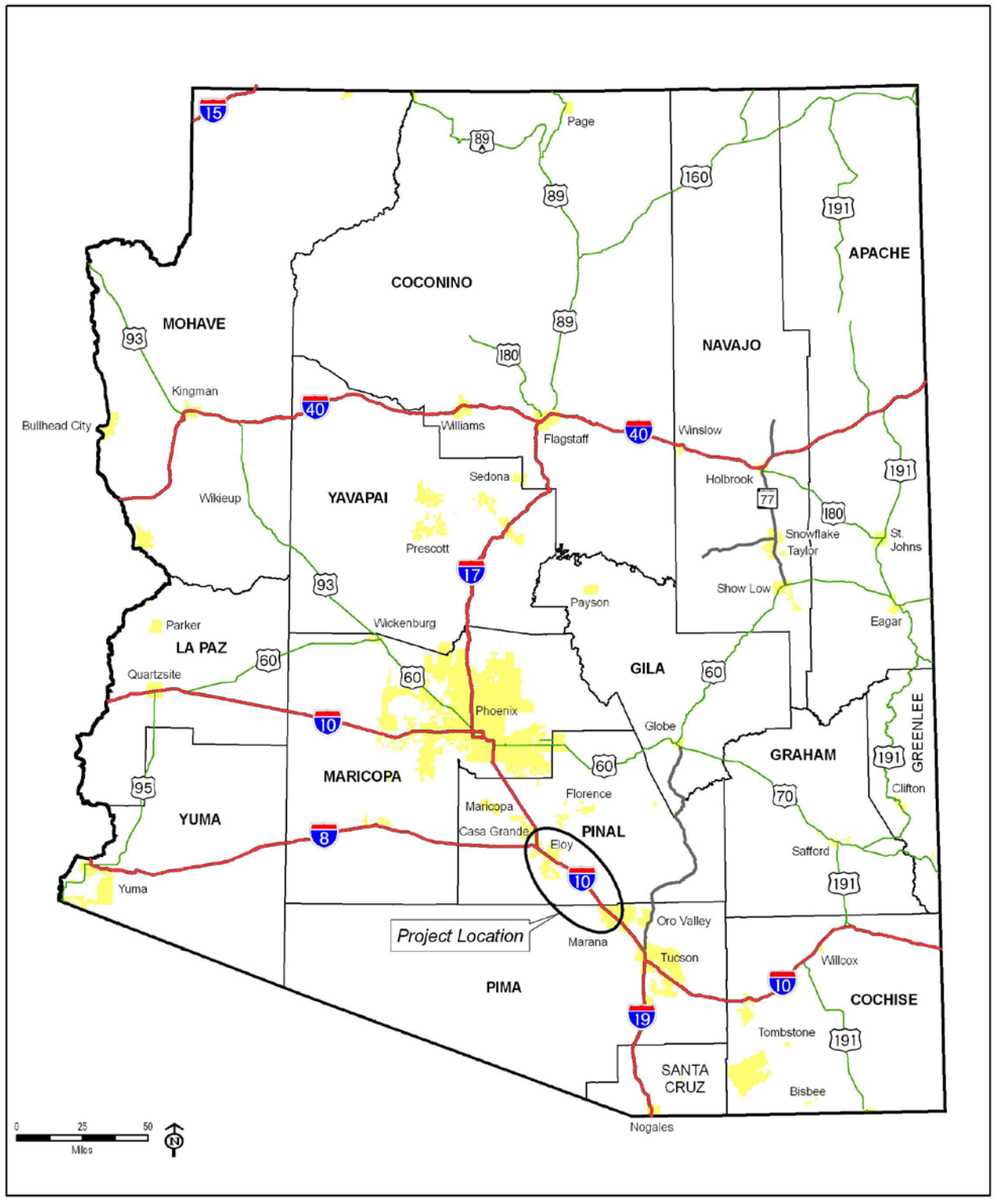
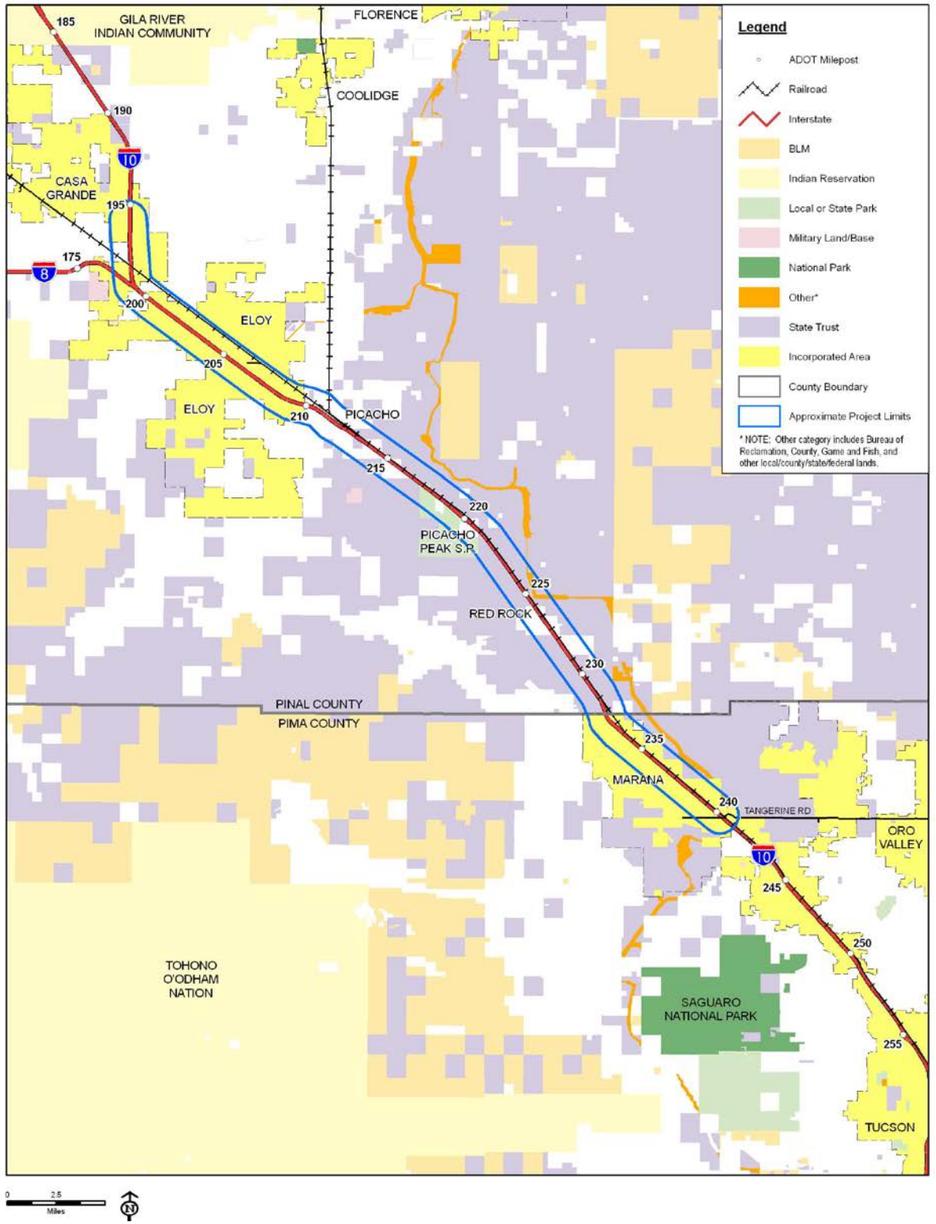


**Figure 1.2 – Project Vicinity Map**




CANAMEX Trade Corridor

- I-10 is part of the National Highway System and within the project limits is a designated section of the Canada-America-Mexico (CANAMEX) Trade Corridor connecting Mexico to Canada.

- The I-10 Corridor between Tucson and Casa Grande is one of the initial segments along this important route and shares the objectives of the CANAMEX Trade Corridor to provide for the seamless and efficient transportation of goods, services, people, and information between Canada, Mexico, and the United States.

- The efficiency of the CANAMEX Trade Corridor will be compromised by the traffic projections previously discussed indicating a need for transportation improvements in the project corridor.

Parallel Roadway System

- Currently, a frontage road system exists as both a one-way and two-way operation and is not continuous. There is a need for a parallel facility to I-10 in the project corridor to maintain access to existing residential and commercial properties and to facilitate travel in emergency situations.

Geometric Deficiencies

- Interstate Highways are designed in accordance with design standards as outlined by the American Association of State Highway Transportation Officials' (AASHTO) *A Policy on Design Standards: Interstate System*. ADOT has developed a comprehensive set of design standards, the ADOT Roadway Design Guidelines (RDG), which supplement the AASHTO guidelines.

- In general, three mainline horizontal curves located at Junction I-8, Picacho, and Pinal Air Park do not meet AASHTO criteria because of insufficient superelevation or length of curve.

- There are numerous deficiencies at the TIs including narrow ramp widths, short acceleration/deceleration lengths, and insufficient design speeds.

## 1.3 PROJECT DESCRIPTION

The project vicinity map (**Figure 1.2**) illustrates the limits of this corridor study which begins at the Earley Road underpass (MP 196) near the junction with I-8 and ends east of the Tangerine Road interchange (MP 240) for a total length of approximately 44 miles.

This project is located in the Arizona Department of Transportation's (ADOT's) Tucson District within the counties of Pinal and Pima in south-central Arizona.

The study area also includes the segment of Interstate 8 from the I-10/I-8 Traffic Interchange (TI) (Milepost 178.3) west to Milepost 177. This project matches the I-10 Widening Study; SR202L to Junction I-8 (ADOT Project number 10 MA 161 H7174 01L) which is currently underway.

This project is recommending a long range plan for the I-10 Corridor that will guide implementation over the next several decades. The preferred alternative includes recommendations for the expansion of the mainline, reconstruction or relocation of existing interchanges, provision for a continuous one-way frontage road system, and viable locations for new interchanges.

### 1.3.1 Mainline Freeway

- The preferred alternative consists of widening I-10 to five general purpose lanes in each direction throughout the corridor. The median is being planned as an 84 foot wide open median from the beginning of the project at MP 196 to the Tortolita Interchange proposed at MP 234. A closed median with a concrete barrier separating the directions of travel is proposed for the remaining section of the corridor from MP 234 to MP 241.

- The end of project is located at Station 12735+00 (MP 241) approximately 1.5 miles east of the existing Tangerine Road TI. Interstate 10 is currently planned to be widened to an eight (8) lane freeway through the downtown area of Tucson. Therefore at the east end of this project, the freeway is proposed to be expanded to an eight (8) lane freeway. However ADOT is currently conducting corridor studies along I-10 from Tangerine Road to Ruthrauff Road (MP 252). Coordination with these adjacent studies should be completed during final design to ensure consistency between plans.

- All lane widths are proposed to be 12 wide throughout the corridor with 12 foot wide inside and outside shoulders. The 12 foot wide shoulders are desirable when truck traffic is expected to be greater than 250 trucks per direction during the peak period.

- Curb and gutter is not proposed along the mainline freeway, and freeway drainage will be collected in linear ditches typically located between the mainline and proposed frontage roads.

- The section of I-10 which passes through the community of Picacho (MP 210 through MP 213) is proposed to be realigned. The freeway alignment would be relocated to follow along the UPRR mainline, about 1000 feet north of the existing alignment.

- From the community of Picacho to the end of the project, the UPRR Sunset Corridor is adjacent to the existing freeway. Typically from the eastern edge of Picacho (MP 213) to the Town of Marana (MP 234) the proposed centerline of the freeway is shifted to the south approximately 30 feet.

- There are exceptions to this centerline shift in the areas of the Picacho Peak Road, Red Rock, and Tortolita Boulevard Interchanges.

- Through the Town of Marana (MP 234 to MP 240) the proposed centerline is shifted 7 feet to the north. This centerline shift is proposed to minimize right-of-way impacts along the southern edge of the corridor, and to simplify the traffic handling during reconstruction of the freeway.

- Because of the high amount of truck traffic predicted within the corridor, the ADOT Materials Group has recommended the freeway be reconstructed using Portland Cement Concrete Pavement (PCCP), and the recommended pavement section is 19 inches in depth.

- Because of the proposed reconstruction to PCCP pavement and the impacts the corridor expansion would have on the existing drainage patterns, the profile of the corridor is generally recommended to be raised a minimum of 2 feet above the existing freeway elevation.

Right-Of-Way

- New right-of-way will be required for the project, and currently over 998 acres is estimated to be acquired for the preferred alternative. Property to be acquired is primarily a combination of private land and Arizona State Land, and a minor amount from other agencies.

- Over 20 acres of land would be acquired from the Picacho Peak State Park located in the area of MP 217 through MP 220. The land required from the state park is a combination of land owned by the Arizona State Parks Department, and land leased from the Arizona State Land Department.

Drainage/Structures

- There are 12 bridge structures, 60 concrete box culverts, 27 concrete pipe culverts, and 53 corrugated metal pipe culverts along the mainline that will need to be replaced or extended.

- A 50 foot wide linear drainage ditch is proposed between the mainline freeway and frontage roads. This ditch would capture onsite drainage flows from the mainline which would be distributed into culverts crossing under the frontage road.

Utilities

- The reconstruction of this corridor and in some sections realignment of the freeway will have impacts to numerous utilities. However, since the corridor is over 40 miles in length and more detailed design will be completed as individual projects move forward, a

comprehensive inventory of all utilities was not completed. An inventory of the major utilities throughout the corridor was completed and potential impacts to these utilities reviewed.

- The Western Area Power Authority (WAPA) has several transmission lines that cross the corridor, and several electrical structures need to be relocated.

- The Cortaro-Marana Irrigation District (CMID) owns a irrigation canal that parallels the corridor within the Town of Marana, and this facility will need to be relocated and converted to an irrigation pipeline.

- The freeway realignment through the community of Picacho will impact numerous utilities including water distribution lines of the Picacho Water Company and an AT&T Fiber Optic line which follows the alignment of old Hwy 84.

### 1.3.2 I-10/I-8 System Interchange

- A major feature of the preferred alternative is the reconfiguration of the I-10/I-8 system interchange to provide high speed directional ramps for all movements. This interchange has been designated as a Rural System Interchange and therefore all system ramp connections meet a design speed of 65 MPH.

- Within the limits of this interchange the existing alignment of I-10 traverses a horizontal curve with a radius of 5,729 feet (1 degree of curvature), however the proposed configuration of the I-10/I-8 Interchange would reconstruct the mainline freeway to include a curve with a radius of approximately 7,639 feet (45 minute degree of curvature).

- Currently there are two service interchanges (Jimmie Kerr Boulevard and Sunland Gin Road) located adjacent to the existing I-10/I-8 interchange. The Jimmie Kerr Boulevard Interchange is proposed to be removed, and a new interchange is proposed at Selma Highway (MP 197).

- The Sunland Gin Road interchange would be relocated approximately ¼ mile east of its existing location. Extended ramps are proposed to grade separate the system interchange movements from the Sunland Gin Interchange movements.

- A private traffic interchange has been proposed along I-8 at Henness Road (MP 177), which is one mile west of the I-10/I-8 System Interchange. The reconfiguration of the system interchange will require collector-distributor (C-D) roadways. The implementation of a new interchange at Henness Road will be required to include the construction of the C-D roadways to ensure appropriate traffic operations.

### 1.3.3 Frontage Roads

- Frontage roads are proposed to connect the new interchange at Selma Highway to Jimmie Kerr Boulevard. The frontage roads are proposed to operate as one-way roadways and are 30 feet in width.

- The project provides the opportunity to implement a continuous one-way frontage road system from Junction I-8 to Tangerine Road. The frontage roads are proposed to operate as one-way roadways and are 30 feet in width. Each frontage road would include two 12 lanes, a 2 foot wide left shoulder, and a 4 foot wide right shoulder.

- Construction of the frontage roads through the City of Eloy (MP 200 to MP 210) would the responsibility of the city or the adjacent land owner. ADOT would own and maintain the frontage roads if they are designed and constructed to current ADOT standards.

- Between interchanges the frontage roads are not proposed to include curb and gutter. Curb and gutter is proposed at each interchange, beginning at the location where the exit ramp and frontage road join, and ending where the entrance ramp and frontage road split.

### 1.3.4 Existing Service Interchanges

The expansion of the freeway to a 10 lane facility with an 84 foot wide open median is not compatible with any of the existing underpass structures. Therefore the bridges at each existing interchange will need to be replaced. The preferred alternative includes the reconstruction or relocation of all existing interchanges along the corridor, **Table 1.1**.

### 1.3.5 Future Viable Interchange Locations

Locations for future viable interchanges have been identified throughout the corridor, however these interchanges would be implemented only if the surrounding land is planned and developed to create a need for the interchange. These interchanges are assumed to be implemented by a local agency or private developer, therefore a design concept for these future interchanges is not included in the DCR plans.

**Table 1.1 – Existing Service Interchanges**

| Existing Service Interchanges | |
|---|---|
| | Preferred Alternative |
| Jimmie Kerr Boulevard (MP 198) | Interchange removed and new diamond interchange proposed at Selma Highway (MP 197). |
| Sunland Gin Road (MP 200) | Interchange relocated ¼ mile east of current location. |
| Toltec Road (MP 204)<br><br>Sunshine Boulevard (MP 209) | Both interchanges are proposed to be reconstructed to intersect I-10 at crossing angles less than 15 degrees from perpendicular. |
| SR 87 (MP 211) | Interchange proposed to be relocated relating to the freeway realignment through the community of Picacho. It will be reconstructed as a partial cloverleaf interchange including new overpass of UPRR. |
| Picacho Peak Road (MP 219)<br><br>Red Rock (MP 226) | Interchange will be reconstructed and frontage roads will be converted to one-way operation. |
| Pinal Air Park (MP 231) | Interchange proposed to be relocated 1 mile west of existing interchange and will included a grade separation of UPRR for Missile Base Road. |
| Marana (MP 236) | Interchange reconstructed with crossroad passing over the freeway and a grade separation over the UPRR. |
| Tangerine Road (MP 240) | Relocate the Interchange about ½ mile West of the existing location with crossroad passing over the freeway and a grade separation over the UPRR. |

The location of these future interchanges has been identified to provide a minimum spacing of approximately 2 miles between interchanges throughout the corridor. Typically the future interchanges are named based on the nearest section line; however future interchanges would be assigned official names as the planning process moves forward. The preferred alternative has recommended locations for future interchanges at the following locations:

- Overfield Road (MP 202)
- Battaglia Drive (MP 206)
- Picacho Highway (MP 213)
- Greenes Road (MP 222)
- Park Link Drive (MP 224)
- Aries Drive (MP 229)
- Tortolita Boulevard (MP 233)
- Moore Road (MP 238)

Currently a separate design concept study is ongoing for a new interchange at Tortolita Boulevard (ADOT Project Number 010 PM 233 H6980 01L).

## 1.4 PROJECT OBJECTIVES

The primary objective of this project is to develop a long-range master plan for the I-10 corridor in accordance with the approved regional and local transportation plans, to optimize the traffic operations within the corridor for the Design Year 2030 traffic demand.

The following plans have been reviewed for consistency with the I-10 Corridor Study:

2000: City of Casa Grande, General Plan 2010
2001: Eloy General Plan
2002: Town of Marana General Plan Update
2003: Southeast Maricopa/Northern Pinal County Area Transportation Study
2004: Pinal County Comprehensive Plan
2005: 2030 Pima Association of Governments Regional Transportation Plan

To meet these objectives the preferred alternative recommends;

- Expanding the freeway to include five (5) general use lanes in each direction.
- Provide the opportunity for continuous one-way frontage roads.
- Reconstruct or relocate the existing interchanges to improve traffic operations.
- The locations of future interchanges have been identified to provide ample spacing between the interchanges to ensure efficient traffic operations along the I-10 mainline.

### 1.4.1 Public Involvement

To ensure that the community had ample opportunity to provide comments and be involved in the development and evaluation of alternatives, this study has included an extensive public involvement process with public meetings, project newsletters, and a project website.

An Agency Scoping meeting was held on May 16th 2006 at the Marana Municipal Conference Center. The agency scoping meeting was attended by representatives of ADOT, FHWA, ASLD, CAAG, PAG, Casa Grande, Eloy, Marana, Pinal County, Pima County, Picacho Peak State Park, and DPS.

Three public scoping meetings were held in September 2006 including:

- September 12th, 2006 at the Marana Municipal Complex, Marana Arizona
- September 14th, 2006 at the Troy Thomas Center, Eloy Arizona
- September 19th, 2006 at the City Council Chambers, Casa Grande Arizona

The purpose of these meetings was to obtain input from the public on the scope of the project, identify issues, and express concerns. One hundred and two (102) people attended the meetings which included a presentation, question and answer session, and an open house format.

Three public information meetings were held in May 2007 including:

- May 15th, 2007 at the Troy Thomas Center, Eloy Arizona
- May 16th, 2007 at the Estes Elementary School, Marana Arizona
- May 17th, 2007 at the City Council Chambers, Casa Grande Arizona

The purpose of these meeting was to present improvement alternatives for the corridor and obtain comments or concerns about the possible solutions. One hundred and eighteen (118) people attended the meetings which included a presentation, question and answer session, and an open house format.

A neighborhood meeting was held at the Picacho Elementary School in Picacho Arizona on August 21st, 2008. The purpose of this meeting was to present the preferred alternative for I-10 through the community of Picacho, which included realigning the freeway along the UPRR mainline. Seventy (70) people attended the meeting.

Three public hearings were held in September 2010 including:

- September 28th, 2010 at the City Council Chambers, Casa Grande Arizona
- September 29th, 2010 at the Picacho Elementary School, Picacho Arizona
- September 30th, 2010 at the Estes Elementary School, Marana Arizona

The purpose of these hearings was to present the draft Environmental Assessment to the public and obtain comments on the document. One hundred and seventy-five (175) people attended the meetings which included graphics of the Preferred Plan, a presentation, question and answer session, and an open house format.

A complete set of public meeting materials including questions asked and comments received can be found in Appendix A.

### 1.4.2 Project Web Site

The general public has been encouraged during the course of the study to use the project web site to access study information and provide feedback to the project team. This project is included on the ADOT Tucson District web site for all projects related to I-10; www.i10tucsondistrict.com.

## 1.5 CHARACTERISTICS OF THE CORRIDOR

Interstate 10 was originally constructed during the 1960's. Since that time numerous improvements and maintenance projects have been completed within the study area.

**Table 1.2** lists the previous projects completed within the study area based on the ADOT Milepost Strip Map.

**Table 1.2 – Previously Completed Projects**

| Project Number | Beginning Milepost | Ending Milepost | As-Built Date | Description |
|---|---|---|---|---|
| 010-A-NFA | 218.2 | 231 | 2007 | Reconstruct/Widen ROW |
| 010-D-NFA | 231.37 | 239.33 | 2007 | Widen Mainline |
| 010-D-NFA | 200 | 208 | 2007 | Spot Repair |
| AC-IR-10-3(232) | 195.08 | 200 | 1992 | Overlay & Safety |
| AC-IR-10-4(101) | 198.6 | 200.35 | 1993 | TI Improvements |
| AC-IR-10-4(99) | 200 | 208 | 1992 | Mill/AC/Overlay/Safety |
| EHS-I-10-3(119) | Unknown | 199.5 | 1973 | Dust Warning Signs |
| EHS-I-10-4(63) | 208 | 244 | 1973 | Dust Warning Signs |
| FA-94D | 212.8 | 231.9 | 1931 | 22' MBS/Frontage Road |
| FA-94E | 234.4 | 240.8 | 1930 | Frontage Road |
| FI-94(13) Unit I | 221.8 | 232.4 | 1951 | 40'Bituminous Mix |
| FI-94(13) Unit II | 232.4 | 232.1 | 1961 | Mill/Overlay |
| FI-94(14) | 232.1 | 243.9 | 1961 | Frontage Road Overlay |
| FI-94(17) | 216.4 | 221.8 | 1955 | 40'Bituminous Mix |
| FI-94(18) | 197.08 | 201.39 | 1955 | 40'Bituminous Mix |
| I-010-D-501 | 236 | 250.08 | 2001 | Bridge Repair |
| I-010-D-508 | 240 | 240 | 2004 | Girder Replacement |
| I-010-D-509 | 236.9 | 244 | 2004 | Mill/Replace ACFC |
| I-10-0(2) | 237 | Unknown | 1991 | Lighting Demonstration |
| I-10-3(128) | 197.74 | 200.6 | 1980 | Safety |
| I-10-3(49) | 197.74 | 199.96 | 1966 | G&D |
| I-10-3(55) | 197.74 | 199.96 | 1966 | 2-38'AC |
| I-10-3(66) | 196.97 | 200.05 | 1971 | Signs |
| I-10-4(1) | 240 | 242.6 | 1963 | TI Interchange Construction |
| I-10-4(10) | 221.5 | 231.9 | 1959 | G&D |
| I-10-4(13) | 206.5 | 216.88 | 1960 | BC & BS |
| I-10-4(18) | 199 | 206 | 1961 | Rest Area/TI Improvement |
| I-10-4(27) Unit I | 216.88 | 217.47 | 1964 | 2-38'AC |

**Table 1.2 – Previously Completed Projects (Cont.)**

| Project Number | Beginning Milepost | Ending Milepost | As-Built Date | Description |
|---|---|---|---|---|
| I-10-4(27) Unit II | 217.47 | 224.93 | 1964 | 2-38'AC |
| I-10-4(3) | 235.83 | 239.64 | 1974 | Lighting |
| I-10-4(312) | 237.33 | 238.16 | 2001 | Reconstruct Roadway |
| I-10-4(39) | 200.3 | 205.7 | 1963 | G&D |
| I-10-4(40) | 210 | 212.8 | 1964 | 2-38' AC |
| I-10-4(41) | 205.65 | 210.09 | 1965 | G&D |
| I-10-4(42) | 210 | 229 | 1970 | Signs/Safety |
| I-10-4(43) | 199 | 200.3 | 1962 | G&D |
| I-10-4(48) | 199.6 | 211.5 | 1966 | 2-38'AC |
| I-10-4(503) | 237 | 237.4 | 1974 | Frontage Road |
| I-10-4(56) | 213 | 242 | 1970 | Landscaping |
| I-10-4(57) | 199.6 | 212.6 | 1980 | Safety |
| I-10-4(72) | 230/233 | Unknown | 2001 | Well |
| I-10-4(75) | 211.53 | 212.8 | 1980 | Resurfacing |
| I-10-4-516 | 208.69 | 208.89 | 2003 | Minor TI Improvements |
| I-10-4-901 | 236.5 | 236.5 | 1963 | Modify Lighting |
| I-10-4-902 | 210.8 | 210.8 | 1963 | Lighting |
| I-10-4-926 | 207.2 | 207.8 | 1977 | Dust Control |
| I-10-4-942 | 216.86 | 216.95 | 1985 | Restroom Building |
| I-IG-10-4(33) | 239.9 | 243.9 | 1967 | 2-38'AC / TI Improvements |
| IM-10-4(130) | 231.75 | 237 | 1995 | Remove/Replace ACFC |
| IM-10-4(163) | 216 | 226 | 1999 | Mill/Replace ACFC |
| IM-10-4(168) | 208 | 216 | 2003 | Pavement Preservation |
| IN-10-4(1) | 211.5 | 213.5 | 1956 | Frontage Road |
| IR-10-3(324) | 160.87 | 241.31 | 1993 | Sign Rehabilitation |
| IR-10-4(106) | 207 | 238 | 1988 | Signing |
| IR-10-4(118) | 237 | 244 | 1992 | Mill/Replace ACFC |
| IR-10-4(66) | 212 | 231 | 1980 | Overlay/Safety |
| IR-10-4(67) | 231.9 | 243.9 | 1980 | Overlay/Safety |
| IR-10-4(84) | 208 | 212 | 1986 | AR/ACFC |
| IR-10-4(90) | 203.2 | 204.4 | 1992 | TI Improvements |
| IR-10-8(4) | 237.38 | Unknown | 1991 | TI Improvements |
| N900-504 | 220 | 220 | 1969 | Picacho Peak State Park Rd |
| N900-961 | 220 | 220 | 1969 | Reconstruct Pavement |
| NH-010-D(007)N | 236 | 247.0 | 2004 | Widen |
| Non I-10-4(61)A | 222.9 | 224.8 | Unknown | Frontage Road Dips |
| STP-010-D(3)P | 236.4 | 248.96 | 2001 | Rumble Strips |

### 1.5.1 Interstate 10

The functional classification for I-10 is a Rural Interstate throughout the study area and the posted speed limit is 75 MPH. The freeway consists of two lanes in each direction, from the project beginning at Earley Road (MP 196) to Tangerine Road interchange (MP 240).

- All of the mainline lanes are 12 feet wide.
- For the majority of the project, the inside shoulder is 4 feet wide, and the outside shoulder is 10 feet wide.
- The existing median is 84 feet in width and includes natural landscaping for most of the corridor.
- Through the community of Picacho (MP 210 to MP 213) the median is reduced to 60 feet in width.
- The existing profile of the corridor is generally level with grades less than 1% throughout most of the corridor. The freeway includes an overpass of the UPRR mainline near MP 198 which includes nearly 3% grades, and some grades near Picacho Peak (MP 220) exceed 1%.

The horizontal alignment of I-10 includes long tangent sections with a total of 21 horizontal curves along this 44 mile section. Of the 21 curves, only two horizontal curves have a degree of curve greater than 30 minutes.

- At the I-10/I-8 System Interchange (MP 199) the I-10 Mainline traverses a 4900 foot long horizontal curve with a radius of 5,729 feet (1 degree of curvature).
- 
- Within the community of Picacho (MP 212) the freeway includes a 796 foot long horizontal curve with a radius of 3,820 feet (1 degree 30 minutes of curvature). This curve does not meet the recommended minimum length of 15 times the design speed (1125 feet).

### 1.5.2 Interim Widening Projects

There are a number of interim widening projects underway along the corridor to expand the freeway to a six (6) lane freeway. These freeway widening projects are referred to as the Interim Widening Projects, because they are expanding the interstate to meet current traffic needs as an interim solution prior to implementing the long range plan recommended by this study.

Earley Road to Junction I-8 (MP 196 to MP 199)

This project is ADOT Project Number 010 PN 188 H7585 01L, and is documented in a Final Project Assessment for Interstate 10; Val Vista Road to Junction I-8 (June 2009).

The project includes the implementation of a new traffic interchange at Selma Highway (MP 197), including a new Diamond Interchange at Selma Highway, and a frontage road connecting Selma Highway to Jimmie Kerr Blvd. The exit and entrance ramps at Jimmie Kerr Blvd will be removed as part of this project, access from I-10 to Jimmie Kerr Blvd will be provided by using the frontage roads. This project includes the construction of the ultimate EB overpass structure at Jimmie Kerr Blvd. The reconstruction of the Jimmie Kerr Overpass will provide a new mainline structure over Jimmie Kerr Blvd and the UPRR Mainline which will meet current design guidelines.

This project is currently under design and construction is expected to begin within the next several years.

Junction I-8 to SR87 (MP 199 to MP 210)

This project is widening the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. Typically, the project is widening on the outside of the existing lanes in the westbound direction, and widening in the median in the eastbound direction resulting in a 78 foot wide median. Because of restrictions at the Alsdorf and Battaglia Road underpasses, the median is reduced and shoulder widths reduced for a short distance at these locations. This project is currently under construction and is expected to be completed in 2012.

Picacho Highway to Picacho Peak Road (MP 212 to MP 219)

This project is widening the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. Typically, the project is widening on the outside of the existing lanes in the eastbound direction, and widening in the median in the westbound direction resulting in a 78 foot wide median. Construction of this project was completed during the summer of 2010.

Picacho Peak Road to Pinal Air Park Road (MP 219 to MP 231)

This project is widening the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. Typically, the project is widening on the outside of the existing lanes in the eastbound direction, and widening in the median in the westbound direction resulting in a 78 foot wide median. Because of restrictions at the Red Rock and Pinal Air Park Interchanges, the median is reduced to 60 feet wide for a short distance at these locations. New bridge structures are being constructed at the Picacho Peak Road interchange which is compatible with the recommendations of this study. A realignment of the freeway is associated with the construction of the new structures at Picacho Peak Road.

Pinal Air Park Road to Tangerine Road (MP 231 to MP 240)

This project widened the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. The project widened into the median and the resulting median is 60 feet in width, requiring a continuous barrier between the two directions of travel. Construction of this project was completed in 2009.

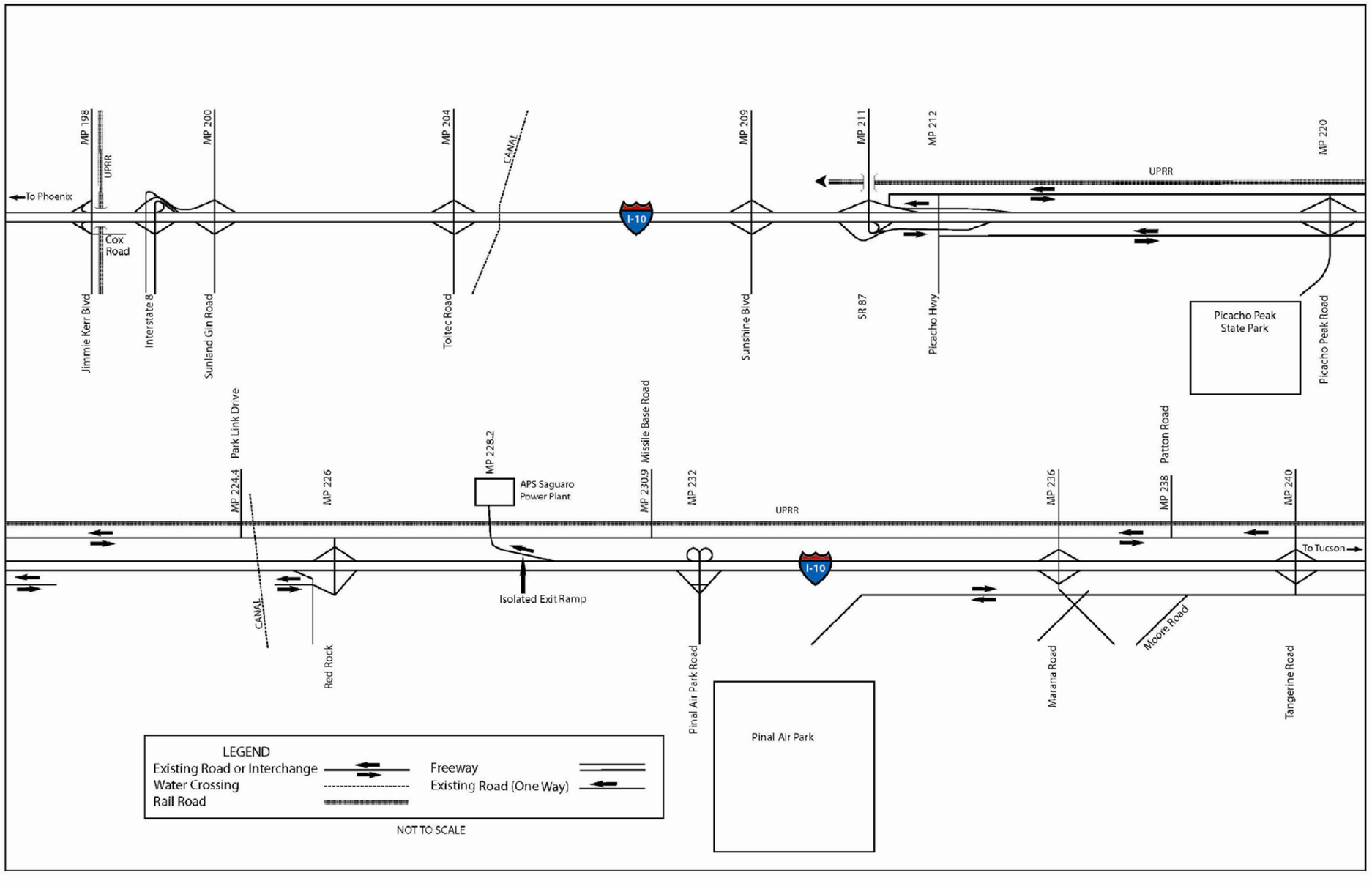
### 1.5.3 Interchanges and Frontage Roads

There are 11 existing interchanges along this section of I-10 and **Figure 1.3** displays the relative location of each interchange, and a schematic of the existing configuration for each. In addition to the existing interchanges, an isolated exit ramp is located at approximately MP 228 which provides direct access to the APS Saguaro Power Plant.

Figure 1.3 also depicts the limits of the existing frontage road system. No frontage roads exist from the beginning of the project (MP 196) to the SR 87 Interchange (MP 211). From SR 87 to Patton Road (MP 238) there is a continuous two-way frontage road along the north side of the freeway. At Patton Road this frontage road converts to a one-way roadway with traffic operating in the westbound direction.

Beginning at SR 87 there is a frontage road along the south side of the freeway, and this roadway ends about one mile east of the Picacho Peak Road Interchange. A frontage road is provided along the south side of the freeway for a short distance at the Red Rock Interchange to provide access to a few residential properties and the community Post Office. Within the Town of Marana a continuous two-way frontage road is provided along the south side of the freeway from approximately MP 234 to the end of the project at MP 241.

**Figure 1.3 – Existing Interchanges and Limits of Frontage Roads**



### 1.5.4 Existing Drainage

Within the project limits, the CAP Canal and the UPRR parallels and abuts the corridor on the northeast side from Picacho Peak State Park to Tangerine Road, approximately 21 miles along I-10. The railroad and CAP canal are upstream of I-10 and provide a physical barrier that attenuates the peak flow that impacts the I-10 cross culverts.

**Table 1.4** is a summary of the existing I-10 culverts including the predicted overtopping depth which is used as an indicator of whether a particular culvert is adequate to convey the 50-year flow.

Based on the layout of the land within the project limits, both northeast and southwest of the I-10 facility, three distinct contributory drainage reaches have been identified as follows:

**Santa Cruz Flats (MP 196 to MP 214)**

The Santa Cruz Flats is a vast floodplain area. Storm water runoff from the Santa Cruz River spreads out over a large area extending from the Town of Picacho to I-8. This section of the corridor is fairly flat and the offsite drainage patterns are not naturally defined. Consequently, discharge to a specific cross drainage structure cannot be determined. As indicated on the as-built plans, the cross culverts constructed underneath this reach of I-10 were originally intended to serve as flow equalizer pipes.

**Picacho Pass (MP 214 to MP 222)**

This section of I-10 is affected mostly by the flows from Picacho Peak State Park, the McClellan Wash from the northeast, and Santa Cruz River flooding from the southwest. Surface runoff from Picacho Peak State Park flows north, through culverts underneath I-10, towards the railroad and the McClellan Wash.

The Northeast side of I-10 and the UPRR facility receives flood waters from the McClellan Wash contributory watershed, which originates at Black Mountain on the west side of the Tortolita Mountains. The McClellan Wash intersects I-10 and the UPRR facilities from the north, approximately two (2) miles south of the Picacho Peak traffic interchange (TI).

**Tortolita Fan (MP 222 to MP 240)**

For the purpose of this study, the Tortolita Fan drainage reach extends from south of the Picacho Pass area to the end of the project at Tangerine Road. The CAP Canal has an 8- to 9-foot high collective earthen dike on the upstream side and the dike has drastically altered the natural flow pattern in this area. Impounded storm water behind the dike is conveyed over the top of the Canal to the downstream side through over-chutes in a concentrated fashion.

The UPRR embankment also impounds storm water upstream of I-10. From Tangerine Road to the eastern end of the Picacho Pass drainage reach, there are approximately 50 railroad culvert/bridge crossings. Storm water detained upstream of the railroad embankment crosses to the I-10 right-of-way through the railroad culverts/bridges or by overtopping the railroad tracks during less frequent flows.

The UPRR currently has a single track along its Sunset Route mainline along the I-10 Corridor, and is in the process of upgrading to double track. As part of the upgrade, railroad culverts/bridges will be upgraded and/or replaced with bigger culverts in the area of the project.

Double tracking is an improvement to expand the Sunset Route to meet immediate capacity needs, long term improvements along the route would require additional tracks, therefore UPRR has requested that all bridge crossings of the UPRR plan for up to four tracks.

## Table 1.4 – Existing Culvert Information

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3417+50 | 1 | CMPA | 1 | 50” | 31” | 1475.17 | 1475.12 | 208 | FLOODPLAIN | | | | | | | |
| 3426+00 | 2 | CMPA | 1 | 50” | 31” | 1475.95 | 1475.17 | 218 | | | | | | | | |
| 3433+21 | 3 | CMPA | 1 | 50” | 31” | | | 234 | | | | | | | | |
| 3448+00 | 4 | CMPA | 1 | 50” | 31” | 1481.84 | 1481.84 | 232 | | | | | | | | |
| **SUNLAND GIN TI** | | | | | | | | | | | | | | | | |
| 3462+00 | 5 | RCP | 1 | 24” | 24” | 1482.37 | 1481.50 | 212 | | | | | | | | |
| 3468+00 | 6 | CBC | 1 | 10 | 5 | 1481.71 | 1481.27 | 101 | | | | | | | | |
| 3484+00 | 7 | RCP | 1 | 36” | 36” | 1483.02 | 1482.69 | 210 | | | | | | | | |
| 3499+83 | 8 | CBC | 3 | 10 | 5 | 1487.90 | 1487.45 | 100 | | | | | | | | |
| 3513+00 | 9 | RCP | 1 | 24” | 24” | 1490.50 | 1489.76 | 212 | | | | | | | | |
| 3525+83 | 10 | CBC | 3 | 10 | 5 | 1491.92 | 1491.64 | 100 | | | | | | | | |
| 3544+00 | 11 | RCP | 1 | 48” | 48” | 1496.56 | 1495.90 | 210 | | | | | | | | |
| 3568+78 | 12 | CBC | 4 | 10 | 5 | 1500.06 | 1499.55 | 114.5 | | | | | | | | |
| 3580+00 | 13 | CMP | 1 | 36” | 36” | 1504.54 | 1504.50 | 170 | | | | | | | | |
| 3595+00 | 14 | RCP | 1 | 36” | 36” | 1508.76 | 1508.60 | 154 | | | | | | | | |
| 3610+00 | 15 | RCP | 1 | 30” | 30” | 1512.09 | 1511.56 | 171 | | | | | | | | |
| 3625+50 | 16 | RCP | 1 | 24” | 24” | | | 200 | | | | | | | | |
| **TOLTEC TI** | | | | | | | | | | | | | | | | |
| 3663+00 | 17 | RCP | 1 | 24” | 24” | 1523.17 | 22.30 | 196 | | | | | | | | |
| 3671+50 | 18 | RCP | 1 | 24” | 24” | | | 106 | | | | | | | | |
| 3694+95 | 19 | RCP | 1 | 24” | 24” | | | 120 | | | | | | | | |
| 3719+50 | 20 | RCP | 1 | 24” | 24” | | | 84 | | | | | | | | |
| 3726+00 | 21 | CMPA | 1 | 43” | 27” | | | 174 | | | | | | | | |
| 3739+00 | 22 | CMPA | 1 | 43” | 27” | | | 190 | | | | | | | | |
| 3751+00 | 23 | CMPA | 1 | 43” | 27” | | | 194 | | | | | | | | |
| 3759+43 | 24 | RCP | 1 | 36” | 36” | | | 232 | | | | | | | | |
| 3760+03 | 25 | RCP | 1 | 36” | 36” | | | 248 | | | | | | | | |
| 3776+60 | 26 | CMPA | 1 | 43” | 27” | | | 210 | | | | | | | | |
| 3792+71 | 27 | CMPA | 1 | 43" | 27" | | | 218 | | | | | | | | |
| 3804+77 | 28 | CMPA | 1 | 43" | 27" | | | 308 | | | | | | | | |

## Table 1.4 – Existing Culvert Information (Cont.)

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SUNSHINE BOULEVARD TI** | | | | | | | | | | | | | | | | |
| 3807+54 | 29 | CBC | 1 | 10 | 3 | | | 161.5 | | | | | | | | |
| 3816+00 | 30 | CMPA | 1 | 43" | 27" | | | 178 | | | | | | | | |
| 3825+38 | 31 | CMPA | 1 | 36" | 36" | | | 218 | | | | | | | | |
| 3825+89 | 32 | CMPA | 1 | 36" | 36" | | | 228 | | | | | | | | |
| 3831+00 | 33 | CMPA | 1 | 43" | 27" | | | 186 | | | | | | | | |
| 3836+00 | 34 | CMPA | 1 | 43" | 27" | | | 182 | | | | | | | | |
| 3841+00 | 35 | CMPA | 1 | 43" | 27" | | | 184 | | | | | | | | |
| 3846+00 | 36 | CMPA | 1 | 43" | 27" | | | 164 | | | | | | | | |
| 3851+00 | 37 | CMPA | 1 | 43" | 27" | | | 158 | | | | | | | | |
| 3856+00 | 38 | CMPA | 1 | 43" | 27" | | | 162 | | | | | | | | |
| 3861+00 | 39 | CMPA | 1 | 43" | 27" | | | 164 | | | | | | | | |
| 3865+99 | 40 | CMPA | 1 | 43" | 27" | | | 178 | | | | | | | | |
| 3870+97 | 41 | CMPA | 1 | 43" | 27" | | | 202 | | | | | | | | |
| 3875+96 | 42 | CMPA | 1 | 43" | 27" | | | 216 | FLOODPLAIN | | | | | | | |
| 3882+34 | 43 | CMPA | 1 | 43" | 27" | | | 304 | | | | | | | | |
| 3892+04 | 44 | CMPA | 1 | 36" | 36" | 1569.17 | 1568.47 | 202 | | | | | | | | |
| 3903+87 | 45 | CMPA | 1 | 43" | 27" | | | 192 | | | | | | | | |
| 3908+85 | 46 | CMPA | 1 | 43" | 27" | | | 180 | | | | | | | | |
| 3913+84 | 47 | CMPA | 1 | 43" | 27" | | | 182 | | | | | | | | |
| 3920+07 | 48 | CMPA | 1 | 43" | 27" | | | 182 | | | | | | | | |
| 3923+81 | 49 | CMPA | 1 | 43" | 27" | | | 194 | | | | | | | | |
| 3929+00 | 50 | CMPA | 1 | 43" | 27" | 1574.87 | 1574.46 | 190 | | | | | | | | |
| 3934+00 | 51 | CMPA | 1 | 43" | 27" | 1575.43 | 1575.23 | 198 | | | | | | | | |
| 3939+00 | 52 | CMPA | 1 | 43" | 27" | 1575.71 | 1575.24 | 232 | | | | | | | | |
| 3952+50 | 53 | CMPA | 1 | 43” | 27” | 1578.37 | 1577.78 | 234 | | | | | | | | |
| 3957+00 | 54 | CMPA | 1 | 43” | 27” | 1579.10 | 1578.86 | 198 | | | | | | | | |
| 3961+52 | 55 | CMPA | 1 | 43” | 27” | 1579.52 | 1579.09 | 192 | | | | | | | | |
| 3968+55 | 56 | CMPA | 1 | 43” | 27” | 1581.06 | 1580.99 | 194 | | | | | | | | |

## Table 1.4 – Existing Culvert Information (Cont.)

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3981+10 | 58 | CMPA | 1 | 43” | 27” | 1584.49 | 1584.17 | 196 | FLOODPLAIN | | | | | | | |
| 3987+13 | 59 | CMPA | 1 | 43” | 27” | 1586.14 | 1585.87 | 172 | | | | | | | | |
| 3993+00 | 60 | CMPA | 1 | 43” | 27” | 1588.10 | 1586.97 | 124 | | | | | | | | |
| 4001+00 | 61 | CMPA | 1 | 36” | 22” | 1620.83 | 1618.92 | 216 | | | | | | | | |
| **SR 87 TI** | | | | | | | | | | | | | | | | |
| 4009+50 | 62 | RCP | 1 | 24” | 24” | | | 116 | | | | | | | | |
| 4028+77 | 63 | RCP | | | | | | 312 | | | | | | | | |
| 1697+14 | 64 | CMPA | 2 | 43” | 37” | | | 190 | | | | | | | | |
| 1710+60 | 65 | CMPA | 1 | 24” | 24” | | | 206 | | | | | | | | |
| 1727+42 | 66 | CBC | 2 | 8 | 3 | | | | | | | | | | | |
| **PICACHO BOULEVARD TI** | | | | | | | | | | | | | | | | |
| 1743+90 | 67 | CBC | 2 | 8 | 3 | | | | FLOODPLAIN | | | | | | | |
| 1758+21 | 68 | CMPA | 1 | 36” | 19” | | | 138 | | | | | | | | |
| 1775+64 | 69 | CMP | 2 | 36” | 36” | | | 166 | | | | | | | | |
| 1792+20 | 70 | CBC | 1 | 6 | 3 | 1632.00 | 1631.10 | 234.5 | | | | | | | | |
| 1832+30 | 71 | CBC | 1 | 6 | 3 | 1648.70 | 1648.06 | 234.6 | | | | | | | | |
| 1866+00 | 72 | CBC | 1 | 6 | 3 | 1665.09 | 1664.66 | 234.6 | | | | | | | | |
| 1897+85 | 73 | CBC | 1 | 8 | 3 | 1682.51 | 1682.21 | 234.1 | | | | | | | | |
| 1934+00 | 74 | CMP | 3 | 30” | 30” | 1701.76 | 1701.33 | 145.4 | | | | | | | | |
| 1949+76 | 75 | CMP | 2 | 30” | 30” | 1710.18 | 1709.95 | 253.3 | | | | | | | | |
| 1961+00 | 76 | CBC | 1 | 8 | 3 | 1715.34 | 1715.27 | 234.5 | | | | | | | | |
| 1993+90 | 77* | CBC | 2 | 6 | 3 | 1732.03 | 1731.92 | 233.7 | | 1737.2 | 1735.20 | 1735.65 | 162 | 198 | - | - |
| 2030+00 | 77A | NOT FOUND | | | | | | | | | | | | | - | - |
| 2032+66 | 78* | CBC | 2 | 6 | 3 | 1745.87 | 1743.18 | 237.5 | | 1750.68 | 1749.57 | 1750.24 | 212 | 257 | - | - |
| 3425+36 | 79* | CBC | 2 | 6 | 3 | 1754.64 | 1753.25 | 237.4 | | 1758.39 | 1758.49 | 1758.98 | 223 | 255 | 0.1 | 0.59 |
| 3435+82 | 80* | CBC | 2 | 6 | 3 | 1758.78 | 1757.50 | 233.2 | | 1763.41 | 1762.64 | 1763.39 | 223 | 271 | - | - |
| 3444+75 | 81* | CBC | 2 | 6 | 3 | 1765.86 | 1763.12 | 233.1 | | 1770 | 1769.25 | 1769.66 | 190 | 220 | - | - |
| 3453+50 | 82* | CBC | 2 | 6 | 3 | 1774.60 | 1770.10 | 233.1 | | 1776.78 | 1777.40 | 1777.68 | 145 | 168 | 0.62 | 0.9 |
| 3458+47 | 83* | CBC | 2 | 6 | 6 | 1775.76 | 1771.70 | 239.2 | | 1783 | 1780.59 | 1781.24 | 334 | 403 | - | - |
| 3470+26 | 84* | CMP | 1 | 30" | 30" | 1793.06 | 1787.62 | 230.4 | | 1796.73 | 1797.07 | 1797.14 | 33 | 34 | 0.34 | 0.41 |

## Table 1.4 – Existing Culvert Information (Cont.)

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3473+78 | 85* | CBC | 1 | 6 | 5 | 1793.41 | 17898.10 | 238.9 | | 1800 | 1798.08 | 1798.75 | 156 | 190 | - | - |
| 3486+85 | 86* | CBC | 2 | 8 | 3 | 1802.11 | 1790.80 | 280.4 | | 1804.49 | 1803.74 | 1803.97 | 89 | 108 | - | - |
| **PICACHO PEAK TI** | | | | | | | | | | | | | | | | |
| 3508+65 | 87* | CBC | 1 | 6 | 5 | 1805.95 | 1798.27 | 250.3 | | 1813 | 1813.30 | 1813.51 | 281 | 289 | 0.3 | 0.51 |
| 3515+00 | 88* | CBC | 1 | 6 | 3 | 1809.48 | 1805.36 | 227.4 | | 1814.25 | 1810.30 | 1810.40 | 12 | 14 | - | - |
| 3517+70 | 89* | CMP | 1 | 30" | 30" | 1808.78 | 1803.67 | 211.3 | | 1813.85 | 1811.82 | 1812.45 | 25 | 31 | - | - |
| 3521+10 | 90* | RCP | 1 | 24" | 24" | 1812.69 | 1802.89 | 176 | | 1813.47 | 1813.68 | 1813.72 | 5 | 5 | 0.21 | 0.25 |
| 3523+25 | 91* | RCP | 1 | 24" | 24" | 1807.46 | 1803.30 | 252.3 | | 1812.22 | 1812.42 | 1812.45 | 6 | 6 | 0.20 | 0.23 |
| 3526+50 | 92* | RCP | 2 | 36" | 36" | 1803.86 | 1801.15 | 251.8 | | 1809.9 | 1806.11 | 1806.38 | 45 | 54 | - | - |
| 3532+76 | 93* | CMP | 2 | 36" | 36" | 1798.49 | 1794.96 | 275 | | 1805.55 | 1803.23 | 1805.85 | 93 | 111 | - | - |
| 3540+00 | 94* | CBC | 2 | 6 | 3 | 1796.35 | 1794.13 | 194.7 | | 1801.11 | 1799.31 | 1799.78 | 459 | 194 | - | - |
| 3545+54 | 95* | RCP | 1 | 30" | 30" | 1800.59 | 1795.30 | 130.3 | | 1802 | 1806.32 | 1807.22 | 40 | 42 | | - |
| 3549+94 | 96* | CMP | 1 | 24" | 24" | 1796.73 | 1795.81 | 194.5 | | 1801.08 | 1804.76 | 1801.87 | 16 | 17 | 0.68 | 0.79 |
| 3561+00 | 97* | CBC | 2 | 6 | 3 | 1797.43 | 1796.89 | 194.3 | | 1802.78 | 1801.35 | 1801.18 | 227 | 279 | - | - |
| 3620+17 | 98 | CBC | 3 | 10 | 3 | 1804.52 | 1803.42 | 193.7 | 4000 | 1808.5 | 1807.2^ | 1806.9^ | 369^ | 328^ | - | - |
| 3633+92 | 99 | CBC | 3 | 10 | 3 | 1807.22 | 1806.19 | 193.4 | 5400 | 1812.31 | 1810.12 | 1810.39 | 331 | 383 | - | - |
| 3659+82 | 100 | CBC | 4 | 10 | 3 | 1813.55 | 1813.18 | 194.1 | 8000 | 1815.43 | 1815.4 | 1816.36 | 238 | 571 | - | 0.93 |
| 3680+00 | 101 | CBC | 3 | 10 | 3 | 1817.72 | 1817.38 | 192.9 | 10100 | 1822 | 1820.23 | 1821.13 | 321 | 574 | - | - |
| 3692+55 | 102 | CBC | 5 | 10 | 3 | 1821.20 | 1820.92 | 192.5 | 11300 | 1825.78 | 1824.42 | 1824.88 | 677 | 842 | - | - |
| 3711+52. | 103 | CBC | 4 | 10 | 3 | 1827.70 | 1826.71 | 192.8 | 13200 | 1834.15 | 1831.39 | 1831.45 | 642 | 668 | - | - |
| 3742+83 | 104 | CBC | 3 | 10 | 4 | 1835.58 | 1833.95 | 193.2 | 16300 | 1839.77 | 1839.23 | 1839.23 | 466 | 466 | - | - |
| 3765+00 | 105 | CBC | 4 | 10 | 3 | 1844.98 | 1844.71 | 192.8 | 18500 | 1848.03 | 1847.03 | 1847.1 | 271 | 291 | - | - |
| 3777+00 | 106 | CBC | 3 | 10 | 3 | 1846.02 | 1845.56 | 192.7 | 19700 | 1851.59 | 1850.25 | 1850.37 | 592 | 613 | - | - |
| 3795+00 | 107 | CBC | 2 | 8 | 3 | 1853.16 | 1852.01 | 191.5 | 21500 | 1857.82 | 1857.06 | 1857.45 | 331 | 372 | - | - |
| 3812+70 | 108 | CBC | 2 | 10 | 8 | 1856.01 | 1855.25 | 300.2 | 23300 | 1864.4 | 1864.27 | 1863.91 | 1123 | 1062 | - | - |

## Table 1.4 – Existing Culvert Information (Cont.)

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RED ROCK TI** | | | | | | | | | | | | | | | | |
| 3860+56 | 110 | CBC | 3 | 10 | 4 | 1874.41 | 1872.38 | 233 | 28100 | 1878.06 | 1877.29 | 1877.31 | 332 | 332 | - | - |
| NOT IN AS-BUILT PLANS | 110A | CBC | 3 | 10 | 5 | 1878.73 | 1877.69 | 192.8 | | | | | | | - | - |
| 3931+37 | 111 | CBC | 3 | 10 | 5 | 1891.98 | 1891.90 | 192.8 | 35100 | 1899.74 | 1897.41 | 1897.43 | 886 | 886 | - | - |
| 3954+00 | 112 | CBC | 4 | 10 | 4 | 1899.30 | 1898.87 | 194.2 | 37400 | 1904 | 1902.87 | 1902.89 | 642 | 642 | - | - |
| 3982+51 | 113 | CBC | 2 | 10 | 3 | 1906.76 | 1903.21 | 192.34 | 40200 | 1910.94 | 1910.63 | 1910.25 | 339 | 300 | - | - |
| 4006+01 | 114 | CBC | 2 | 10 | 4 | 1911.07 | 1908.13 | 192.9 | 42600 | 1915.48 | 1915.65 | 1915.79 | 455 | 475 | 0.17 | 0.31 |
| 4036+35 | 115 | CBC | 2 | 8 | 3 | 1919.09 | 1916.83 | 192.5 | 45600 | 1923.61 | 1922.28 | 1922.39 | 207 | 217 | - | - |
| 4063+60 | 116 | CBC | 2 | 6 | 4 | 1928.44 | 1927.40 | 192.1 | 48400 | 1932 | 1930.94 | 1930.96 | 104 | 111 | - | - |
| 4074+17 | 117 | CBC | 3 | 10 | 4 | 1930.77 | 1928.67 | 192.4 | 49500 | 1935.69 | 1934.4^ | 1934.31 ^ | 467^ | 449^ | - | - |
| 4084+51 | 118 | CBC | 2 | 10 | 4 | 1932.21 | 1930.29 | 192.3 | 50500 | 1938 | 1936.98 | 1937.46 | 473 | 548 | - | - |
| 4107+00 | 119 | CBC | 2 | 6 | 3 | 1940.48 | 1939.76 | 193.7 | 52700 | 1946.35 | 1943.53 | 1943.57 | 186 | 186 | - | - |
| 4115+92 | 120 | CBC | 2 | 10 | 4 | 1941.32 | 1939.66 | 220.5 | 53600 | 1946.52 | 1944.85 | 1944.85 | 305 | 305 | - | - |
| 4133+75 | 121* | RCP | 1 | 40" | 40" | 1939.80 | 1938.68 | 221.3 | 55400 | 1942.78 | 1933.1 | 1933.15 | 0 | 0 | - | - |
| 4150+75 | 122* | CBC | 1 | 8 | 3 | 1938.02 | 1936.89 | 213.5 | 57000 | 1941.74 | 1933.1 | 1933.15 | 0 | 0 | - | |
| 4165+97 | 123* | RCP | 2 | 36" | 36" | 1932.62 | 1930.70 | 220.3 | 58500 | 1933.5 | 1933.1 | 1933.15 | 9 | 11 | - | - |
| 4168+45 | 124* | RCP | 2 | 36" | 36" | 1932.25 | 1929.88 | 227.3 | 58700 | 1935.79 | 1933.1 | 1933.15 | 9 | 11 | - | - |
| 4170+20 | 125* | RCP | 2 | 36" | 36" | 1932.69 | 1932.09 | 217 | 1934.25 | 1934.25 | 1933.1 | 1933.1 | 9 | 11 | - | - |
| 4181+83 | 126* | CBC | 6 | 10 | 4 | | | | 1932.37 | 1932.37 | 1933.1 | 1933.1 | 1693 | 1720 | 0.73 | 0.8 |
| 4194+79 | 127* | RCP | 1 | 24" | 24" | 1932.57 | 1930.77 | 218.8 | 1937.02 | 1937.02 | 1933.1 | 1933.1 | 4 | 5 | - | - |
| 4203+00 | 128* | RCP | 1 | 24" | 24" | 1934.03 | 1932.25 | 219.4 | 1938.17 | 1938.17 | 1933.1 | 1933.1 | 4 | 5 | - | - |
| 4215+00 | 129* | RCP | 1 | 24" | 24" | 1936.14 | 1935.56 | 211 | 1940.91 | 1940.91 | 1933.1 | 1933.1 | 4 | 5 | - | - |
| 4266+28 | 130 | CBC | 4 | 10 | 4 | 1949.27 | 1949.11 | 194 | 1953.45 | 1953.45 | 1951.2^ | 1950.5^ | 247^ | 139^ | - | - |
| 4275+97 | 131 | CBC | 4 | 10 | 4 | 1951.05 | 1950.91 | 193.9 | 1956.55 | 1956.55 | 1953.7^ | 1952.6^ | 400^ | 193^ | - | - |

## Table 1.4 – Existing Culvert Information (Cont.)

| ***I-10 Sta. (as-builds) | Culv.# | Culvert Type | Cells/ Barrels | Span (ft) | Rise (ft) | **Inlet Invert Elev. | **Outlet Invert Elev. | Total Length (ft) | RAS Station | Pavmt. Elev. | 50-Yr WSEL | 100-Yr WSEL | 50-Yr Culv. Disch (cfs) | 100-Yr Culv. Disch (cfs) | 50-Yr Overtop Depth (ft) | 100-Yr Overtop Depth (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MARANA TI** | | | | | | | | | | | | | | | | |
| 4400+50 | 132 | FRONTAGE ROAD CULVERT | | | | | | | | | | | | | | |
| 4415+51 | 133 | CBC | 4 | 10 | 3 | 1994.32 | 1993.91 | 194.2 | 83400 | 1998 | 1996.5^ | 1995.8^ | 304^ | 188^ | - | - |
| 4429+21 | 134 | CBC | 4 | 10 | 4 | 1996.74 | 1996.25 | 194.2 | 84800 | 2002.7 | 1998.8^ | 1998.2^ | 295^ | 165^ | - | - |
| 4439+24 | 135 | CBC | 6 | 10 | 4 | 1998.12 | 1997.89 | 194.3 | 85800 | 2004 | 2000.8^ | 2000.3^ | 655^ | 485^ | - | - |
| 4447+12 | 136 | CBC | 3 | 10 | 4 | 1999.18 | 1998.97 | 194 | 86700 | 2004 | 2001.7^ | 2000.5^ | 264^ | 93^ | - | - |
| 4455+44 | 137 | CBC | 6 | 10 | 4 | 2000.26 | 1999.90 | 174 | 87400 | 2004.2 | 2003.5^ | 2002.6^ | 825^ | 539^ | - | - |
| 4467+36 | 138 | CBC | 4 | 10 | 3 | 2003.12 | 2002.90 | 194 | 88600 | 2005.9 | 2005.7^ | 2005.3^ | 412^ | 323^ | - | - |
| 4495+90 | 139 | CBC | 2 | 6 | 3 | 2009.21 | 2009.19 | 193.7 | 91500 | 2012.79 | 2012.5^ | 2012.0^ | 167^ | 130^ | - | - |
| 4553+85 | 140 | CBC | 2 | 6 | 3 | 2027.87 | 2027.79 | 194.2 | 97300 | 2032.7 | 2031.4 | 2031.7 | 189 | 206 | - | - |
| 4568+60 | 141 | CMP | 1 | 30" | 30" | 2032.13 | 2031.92 | 129.6 | 98800 | 2039.5 | 2035.8 | 2035.9 | 33 | 34 | - | - |

- Culverts not Overtopped During the Storm Event
^ Inconsistency Due to Error in HEC-RAS. HEC-RAS Was Unable to Balance the Energy Equation.
* Modeled Using HY-8
** Basis of Elevation - NAVD 88 Datum
*** As-Built Plan Station Numbers

### 1.5.5 Utilities and Railroads

The **Table 1.5** indicates the major utility crossings. Detailed utility inventories will be completed during final design.

**Table 1.5 – Existing Utilities**

| Utilities and Railroads | Mile Post | Description | Crossing Type |
|---|---|---|---|
| Santa Rosa A Canal | MP 204 | The Santa Rosa A Canal operated by the Maricopa-Stanfield Irrigation and Drainage District (MSIDD), crosses I-10 south of the Toltec Road TI near MP 204. | Canal |
| WAPA Transmission Lines | MP 208 | At MP 208 three overhead crossings of high voltage transmission power lines belong to the Western Area Power Administration (WAPA). | Overhead |
| ED4 power substation | MP 208 | The only power substation in the project corridor is the ED4 power substation located approximately ¾-mile south of I-10 along Eleven Mile Corner Road. | N/A |
| Union Pacific Railroad | MP 211-240 | The Union Pacific Railroad (UPRR) tracks are located along the east side of I-10 throughout most of the project corridor. Several communication cables and petroleum pipelines are located within the UPRR right-of-way. | Parallel to Freeway |
| AT&T Transcontinental Fiber Optic Line | MP 211-MP 240 | AT&T transcontinental long distance fiber optic cable that enters the project corridor at SR 87 (MP 211) across the UPRR tracks and follows the westbound frontage road to Tangerine Road (MP 240). | Parallel to Freeway |
| Central Arizona Irrigation and Drainage District (CAIDD) | MP 214, MP 225 | Two Central Arizona Irrigation and Drainage District (CAIDD) canals cross I-10 near MP 214 and 225. | Culvert |
| The El Paso Natural Gas Transmission Line | MP 218, MP 225, MP 228, MP 233, MP 234 | The El Paso Natural Gas (EPNG) 10.75” Tucson-Phoenix transmission line and its distribution lines cross the I-10 corridor in five locations near MP 218, 225, 228, 233 and 234. | Below Ground |
| APS Saguaro Power Plant | MP 228 | The Arizona Public Service (APS) Saguaro Power Plant (MP 228) near Red Rock is located east of the UPRR right-of-way adjacent to I-10. At this location, there are five overhead crossings of high voltage transmission power lines. | Adjacent to Corridor |
| APS Transmission Lines | MP 228 | Overhead crossing of high voltage lines occurs at MP 228. | Overhead |
| WAPA transmission Lines | MP 228 | At MP 228 overhead crossings of high voltage transmission power lines belong to the Western Area Power Administration (WAPA). | Overhead |
| Southwest Gas | MP 234 | Southwest Gas has a small sleeved distribution pipeline across I-10 in the Marana area. | Below Ground |
| Cortaro-Marana Irrigation District (CMID) | MP 236-240 | The Cortaro-Marana Irrigation District (CMID) owns an irrigation canal that parallels the corridor within the Town of Marana, and this facility will need to be relocated and converted to an irrigation pipeline. | Parallel to Freeway |
| Quest Telephone Line | MP 236-240 | Qwest has buried telephone cables paralleling the eastbound frontage road of I-10. | Parallel to Freeway |
| Central Arizona Project | MP 240 | The Central Arizona Project (CAP) Canal moves Colorado River water from Lake Havasu to south of Tucson, it crosses I-10 in a 10-foot siphon south of Tangerine Road near MP 240. | Below Ground (Siphon) |

Adjacent to the project corridor, several utility agencies provide electrical services to surrounding areas, including APS, Electrical District No. 2 (ED2), ED3, ED4, ED5, San Carlos Project, Tucson Electric and Power (TEP), and WAPA. Within the project limits, over 30 power lines cross over I-10; many of which will require relocation in the event of a corridor widening.

### 1.5.6 Right-of-Way

The existing ADOT right-of-way width varies along the I-10 throughout the study area. The total right-of-way width varies from approximately 280 to 425 feet.

In 1997 ADOT abandoned the frontage roads and various drainage easements to Pinal County (resolution 97-10-A-053, recorded 11-20-97), and this reduced the typical freeway right-of-way to approximately 240 feet in width. For purposes of this project, the existing right-of-way width is considered the combination of ADOT freeway right-of-way and right-of-way abandoned to Pinal County for the frontage roads. In advance of implementing the recommendations proposed in this study, ADOT would need to reacquire much of the right-of-way that was abandoned to Pinal County.

The **Table 1.6** displays specific ADOT right-of-way widths throughout the corridor, as well as additional county right-of-way where applicable.

**Table 1.6 – Existing Right-of-Way Widths**

| Location | Existing Right-of-Way Width (feet) | | | |
|---|---|---|---|---|
| | Eastbound | | Westbound | |
| | County | ADOT | ADOT | County |
| Sunland Gin Road to Toltec Road TI | 0 | 150 | 150 | 0 |
| Toltec Road TI to Sunshine Boulevard TI | 0 | 150 | 150 | 0 |
| Sunshine Boulevard TI to SR 87 TI | 0 | 150 | 150 | 0 |
| SR 87 TI to Picacho Highway | 0 | 140 | 140 | * |
| Picacho Highway to Picacho Peak TI | 80 | 105 | 99 | 52 |
| Picacho Peak TI to Red Rock TI | 94 | 92 | 150 | 52 |
| At Red Rock TI | 54 | 92 | 150 | 60 |
| Red Rock TI to Pinal Air Park TI | 94 | 92 | 150 | 0 |
| Pinal Air Park TI to Marana Road TI | * | 275 | 150 | * |
| Marana Road TI to Tangerine Road TI | * | 200 | 150 | * |

* Frontage road included in ADOT right-of-way.

NOTES:
1. ADOT right-of-way is shown from I-10 median centerline.
2. County right-of-way widths for frontage roads as shown in table may not extend entire length between TIs.
3. Right-of-way widths as shown above are representative of location. Right-of-way widths may vary from values shown in table.

### 1.5.7 Structures

There are 25 structures; 21 are bridges or overpasses and the remaining 4 being canal crossings at Santa Rosa and La Palma. **Table 1.7** catalogs existing vertical clearance and structural dimensions and capacity. The minimum vertical clearance required by ADOT is 16 feet plus an additional 6 inches for future pavement overlays. For more information about the existing conditions of the structures, refer to the *AASHTO Controlling Design Report*, 2006.

## Table 1.7 – Existing Structure Conditions

| VERTICAL CLEARANCE | | | | | | | STRUCTURES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STRUCTURE | STR. NO. | MILEPOST | PRECONSTRUCTION CLEARANCE | | AASHTO MINIMUM ALLOWABLE CLEARANCE | EXISTING BRIDGE LENGTH (ft) | EXISTING BRIDGE WIDTH (ft) | RECOMMEND BRIDGE WIDTH (ft) | BRIDGE RAIL GEOMETRY ADEQUATE? | BRIDGE RAIL STRUCTURES ADEQUATE? | EXISTING STRUCTURAL CAPACITY | RECOMMEND STRUCTURAL CAPACITY |
| | | | EB | WB | | | | | | | | |
| I8 TI UP WB | 1102 | 178.33 (I-8 MP) | 16'-6" | 16'-3" | 16'-0" | 286.0 | 30.0* | 31.0 | YES | YES | HS-20 + | HS-20 |
| I8 TI UP EB RAMP | 1103 | 178.33 (I-8 MP) | 16'-3" | 16'-3" | 16'-0" | 286.0 | 24.0* | 31.0 | YES | YES | HS-20 + | HS-20 |
| SUNLAND GIN ROAD TI UP | 941 | 200.12 | 16'-4" | 16'-4" | 16'-0" | 337.0 | 30.0* | 31.0 | YES | YES | HS-20 + | HS-20 |
| TOLTEC ROAD TI UP | 2152 | 203.84 | 17'-7" | 16'-2" | 16'-0" | 258.0 | 68.0 | 31.0 | YES | YES | HS-20 + | HS-20 |
| SANTA ROSA CNL BR WB | 1427 | 204.51 | N/A | N/A | N/A | 70.0 | 42.0 | 37.5 | YES | YES | HS-20 | HS-20 |
| SANTA ROSA CNL BR EB | 1426 | 204.51 | N/A | N/A | N/A | 70.0 | 42.0 | 37.5 | YES | YES | HS-20 | HS-20 |
| BATTAGLIA DRIVE UP | 943 | 205.45 | 16'-1" | 16'-1" | 16'-0" | 82.0 | 37.8 | 37.5 | YES | YES | HS-20 + | HS-20 |
| ALSDORF ROAD UP | 944 | 207.17 | 16'-7" | 16'-2" | 16'-0" | 82.0 | 37.9 | 37.5 | YES | YES | HS-20 + | HS-20 |
| SUNSHINE BOULEVARD TI UP | 945 | 208.79 | 16'-1" | 16'-6" | 16'-0" | 277.0 | 30.0* | 31.0 | YES | YES | HS-20 + | HS-20 |
| LA PALMA ROAD BR WB | 1104 | 209.85 | N/A | N/A | N/A | 82.0 | 37.8 | 37.5 | YES | YES | HS-20 + | HS-20 |
| LA PALMA ROAD BR EB | 908 | 209.85 | N/A | N/A | N/A | 82.0 | 37.9 | 37.5 | YES | YES | HS-20 + | HS-20 |
| HWY 87 TI OP WB | 959 | 210.97 | 15'-5" | 15'-4" | 14'-0" | 137.0 | 37.9 | 37.5 | YES | YES | HS-20 + | HS-20 |
| HWY 87 TI OP EB | 958 | 210.97 | 15'-5" | 15'-4" | 14'-0" | 137.0 | 37.9 | 37.5 | YES | YES | HS-20 + | HS-20 |
| PICACHO 5TH ST OP WB | 1088 | 211.34 | 16'-1" | 16'-1" | 14'-0" | 91.0 | 37.8 | 37.5 | YES | YES | HS-20 + | HS-20 |
| PICACHO 5TH ST OP EB | 1087 | 211.34 | 15'-8" | 15'-8" | 14'-0" | 91.0 | 55.1 | 37.5 | YES | YES | HS-20 + | HS-20 |
| E PICACHO TI OP EB | 793 | 212.21 | 15'-0" | 15'-0" | 14'-0" | 97.0 | 37.9 | 37.5 | YES | YES | HS-18.9* | HS-20 |
| E PICACHO TI OP WB | 794 | 212.21 | 15'-2" | 15'-2" | 14'-0" | 97.0 | 37.9 | 37.5 | YES | YES | HS-18.9* | HS-20 |
| PICACHO PK TI OP WB | 573 | 219.85 | 14'-10" | 15'-0" | 14'-0" | 29.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |
| PICACHO PK TI OP EB | 572 | 219.85 | 14'-11" | 15'-0" | 14'-0" | 29.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |
| RED ROCK TI UP | 592 | 226.45 | 16'-6" | 16'-1" | 16'-0" | 162.0 | 26.0* | 37.5 | YES | YES | HS-20 | HS-20 |
| PINAL AIR PARK TI UP | 771 | 232.02 | 16'-8" | 16'-3" | 16'-0" | 251.0 | 30.0* | 31.0 | NO* | YES | HS-20 + | HS-20 |
| MARANA OP TI WB | 774 | 236.42 | 14'-5" | 14'-5" | 14'-0" | 127.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |
| MARANA OP TI EB | 773 | 236.42 | 14'-5" | 14'-5" | 14'-0" | 127.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |
| TANGERINE TI OP WB | 961 | 240.45 | 15'-3" | 15'-3" | 14'-0" | 127.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |
| TANGERINE TI OP EB | 960 | 240.45 | 15'-6" | 15'-6" | 14'-0" | 127.0 | 38.0 | 37.5 | YES | YES | HS-20 + | HS-20 |

# 2.0 TRAFFIC AND CRASH DATA

## 2.1 TRAFFIC ANALYSIS

Travel operations along roadways are described in terms of LOS and are evaluated at intersections or mainline travel segments. Service levels are measured on a scale from A to F, with "A" representing the best performance and "F" indicating the worst, which are defined in **Table 2.1**.

I-10 in the project corridor is categorized as a "Controlled Access/Rural Highway of level terrain" by the ADOT Roadway Design Guidelines. Under this classification ADOT guidelines indicate that the roadway should be designed to accommodate traffic at a LOS B or better. The LOS analysis conducted on the I-10 basic freeway segments indicated that both eastbound and westbound directions currently operate at LOS B but are near the threshold for LOS C.

**Table 2.1 – Level of Service (LOS) Definitions**

| LOS | Mainline Description |
|---|---|
| A | Free flow conditions. Individual users are unaffected by the presence of other vehicles. |
| B | Stable flow conditions. Presence of other users in traffic stream begins to be noticeable. |
| C | In the range of stable flow, but individual users are starting to be affected by the presence of others. Maneuvering within the traffic stream can be difficult. |
| D | High density but stable flow. Speed and freedom to maneuver are severely restricted. |
| E | Operating conditions at or near the capacity level. Freedom to maneuver within the traffic stream is extremely difficult. |
| F | Forced or breakdown flow. The amount of traffic exceeds available capacity of road; characterized by stop and go traffic and queues. |

*Source: Highway Capacity Manual (Transportation Research Board, 2000)*

Traffic volumes were collected during the months of February and April in 2006 to analyze existing conditions within the study area. The traffic volumes collected include counts on the I-10 mainline, the existing ramps at each interchange, major cross-streets, and principal intersections surrounding the traffic interchanges (TI). Twenty-four hour volume data was recorded on weekdays and weekends for the mainline, ramps and cross-streets. Turning moving counts were collected during AM and PM peak hour periods during weekdays.

ADOT seasonal adjustment factors were used to seasonally adjust the traffic volumes and generate average daily traffic (ADT). Adjustment factors were obtained from ADOT; February's adjustment factor is equal to 1.07, and April's adjustment factor is 1.15.

## 2.2 EXISTING TRAFFIC CONDITIONS

In 2006, I-10 carried an average of nearly 44,200 vehicles per day through the project corridor with the heaviest volume experienced at the eastern end of the study area toward Tucson. The heaviest volume throughout the project corridor was experienced on the segment east of Tangerine Road, with an average of 54,400 vehicles per day. Due to movement of goods along this transcontinental trade corridor and the large amount of commercial activity between Phoenix and Tucson, truck traffic accounts for approximately 30 percent of the total vehicles on the roadway.

K values, which are the proportion of daily traffic occurring during the analysis peak hour, were computed. The K value for the eastbound direction is nine percent and the K value for the westbound direction is equal to eight percent. In summary, the following existing traffic factors were estimated for the purpose of this analysis:

- Existing ADT = 42,100 vpd
- Existing D = 51% westbound
- Existing T = 30%
- Existing K = 9 % westbound, 8% eastbound

The I-10 mainline counts are provided in **Tables 2.2** and **2.3**. Included in each of these tables are the directional one-way annual ADT, the K factor, D factor, and truck percentages over a period of 24 hours. The eastbound I-10 mainline counts are provided in Table 2.2.

**Table 2.2 – Existing Traffic Volumes; Eastbound I-10 Segments**

| Segment Beginning | Segment End | Rounded ADT (veh/day) | K-factor | D-factor | Truck Percentage |
|---|---|---|---|---|---|
| **Eastbound** | | | | | |
| I-10 West of I-8 | | 21,000 | 0.09 | 0.49 | 27% |
| I-8 off-ramp | I-8 on-ramp | 20,400 | 0.09 | 0.55 | • |
| I-8 on-ramp | Sunland Gin Road off-ramp | 24,600 | 0.09 | 0.60 | 32% |
| Sunland Gin Road off-ramp | Sunland Gin Road on-ramp | 17,900 | 0.09 | 0.47 | • |
| Sunland Gin Road on-ramp | Toltec Road off-ramp | 20,700 | 0.09 | 0.49 | • |
| Toltec Road off-ramp | Toltec Road on-ramp | 18,300 | 0.09 | 0.49 | • |
| Toltec Road on-ramp | Sunshine Blvd off-ramp | 20,200 | 0.09 | 0.49 | • |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | 17,400 | 0.09 | 0.49 | • |
| Sunshine Blvd on-ramp | SR 87 off-ramp 1 | 19,800 | 0.09 | 0.49 | 32% |
| SR 87 off-ramp 1 | SR 87 off-ramp 2 | 19,500 | 0.09 | 0.48 | • |
| SR 87 off-ramp 2 | SR 87 on-ramp | 19,400 | 0.09 | 0.49 | • |
| SR 87 on-ramp | Picacho Hwy on-ramp | 20,300 | 0.09 | 0.48 | • |
| Picacho Hwy on-ramp | Picacho Peak Road off-ramp | 20,500 | 0.09 | 0.48 | 32% |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | 19,900 | 0.09 | 0.48 | • |
| Picacho Peak Road on-ramp | Red Rock off-ramp | 20,400 | 0.09 | 0.48 | • |
| Red Rock off-ramp | Red Rock on-ramp | 20,200 | 0.09 | 0.48 | • |
| Red Rock on-ramp | Pinal Air Park Road off-ramp | 20,600 | 0.09 | 0.48 | 32% |
| Pinal Air Park Road off-ramp | Pinal Air Park Road on-ramp | 20,000 | 0.09 | 0.46 | • |
| Pinal Air Park Road on-ramp | Marana Road off-ramp | 21,200 | 0.10 | 0.48 | 31% |
| Marana Road off-ramp | Marana Road on-ramp | 20,000 | 0.10 | 0.48 | • |
| Marana Road on-ramp | Tangerine Road off-ramp | 23,500 | 0.09 | 0.49 | 31% |
| Tangerine Road off-ramp | Tangerine Road on-ramp | 21,700 | 0.09 | 0.48 | • |
| I-10 East of Tangerine Road | | 26,900 | 0.09 | 0.49 | • |

- - Classification count not taken at this location.

**Table 2.3 – Existing Traffic Volumes; Westbound I-10 Segments**

| Segment Beginning | Segment End | Rounded ADT (veh/day) | K-factor | D-factor | Truck Percentage |
|---|---|---|---|---|---|
| **Westbound** | | | | | |
| I-10 East of Tangerine Road | | 27,500 | 0.08 | 0.51 | • |
| Tangerine Road off-ramp | Tangerine Road on-ramp | 23,100 | 0.08 | 0.52 | • |
| Tangerine Road on-ramp | Marana Road off-ramp | 24,900 | 0.08 | 0.51 | 22% |
| Marana Road off-ramp | Marana Road on-ramp | 21,700 | 0.08 | 0.52 | • |
| Marana Road on-ramp | Pinal Air Park Road on-ramp | 22,900 | 0.08 | 0.52 | 30% |
| Pinal Air Park Road on-ramp | Pinal Air Park Road off-ramp | 23,200 | 0.08 | 0.54 | • |
| Pinal Air Park Road off-ramp | Red Rock off-ramp | 22,300 | 0.08 | 0.52 | 36% |
| Red Rock off-ramp | Red Rock on-ramp | 22,100 | 0.08 | 0.52 | • |
| Red Rock on-ramp | Picacho Peak Road off-ramp | 22,300 | 0.08 | 0.52 | • |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | 21,400 | 0.08 | 0.52 | • |
| Picacho Peak Road on-ramp | Picacho Hwy off-ramp | 22,300 | 0.08 | 0.52 | 30% |
| Picacho Hwy off-ramp | SR 87 off-ramp | 22,100 | 0.08 | 0.52 | • |
| SR 87 off-ramp | SR 87 on-ramp 1 | 20,400 | 0.08 | 0.51 | • |
| SR 87 on-ramp 1 | SR 87 on-ramp 2 | 20,900 | 0.08 | 0.52 | • |
| SR 87 on-ramp 2 | Sunshine Blvd off-ramp | 21,000 | 0.08 | 0.51 | 30% |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | 18,400 | 0.08 | 0.51 | • |
| Sunshine Blvd on-ramp | Toltec Road off-ramp | 21,400 | 0.08 | 0.51 | • |
| Toltec Road off-ramp | Toltec Road on-ramp | 19,300 | 0.08 | 0.51 | • |
| Toltec Road on-ramp | Sunland Gin Road off-ramp | 21,800 | 0.08 | 0.51 | • |
| Sunland Gin Road off-ramp | I-8 off-ramp | 19,900 | 0.08 | 0.53 | 31% |
| I-8 off-ramp | I-8 on-ramp | 16,600 | 0.08 | 0.40 | • |
| I-8 on-ramp | Sunland Gin Road on-ramp | 17,000 | 0.08 | 0.45 | • |
| I-10 West of Sunland Gin on-ramp | | 21,900 | 0.07 | 0.51 | 29% |

- n/a – Classification count not taken at this location.

The westbound I-10 mainline counts are provided in Table 2.3, including the resulting K factor, D factor, and truck percentages.

The collected traffic data indicates that the highest traffic volumes for both eastbound and westbound traffic occurred during Sunday afternoon. These traffic volumes were higher, in both directions, than the other peak hour volumes recorded on weekdays. As a result, the LOS analysis of existing conditions was conducted for one peak period since the traffic patterns within the corridor do not indicate a AM and PM peak hour. The weekend peak hour is used to represent the highest design hour for the corridor analysis.

## 2.3 EXISTING TRAFFIC ANALYSIS

To analyze the operations of the existing conditions on the mainline, the ramps, and the adjacent traffic intersections of the surrounding roadway network, a LOS analysis was conducted. ADOT criteria for traffic operations under rural conditions require freeway segments and traffic interchanges to operate at LOS “B” or better. The HCM, published by the Transportation Research Board (TRB), considers traffic parameters used to determine LOS for mainline, ramps, and intersections. Hence, the HCM methodologies were followed to calculate the LOS for all

elements within the corridor network. The results of these analyses are shown in the following subsections.

The LOS analysis conducted for the I-10 basic freeway segments indicated that both eastbound and westbound directions operate at LOS B or better except for the weaving section along Eastbound I-10 between Junction I-8 and Sunland Gin Road (MP 200), as indicated in the following two tables. **Table 2.4** presents the LOS analysis findings for I-10 Eastbound. **Table 2.5** presents the LOS analysis findings for I-10 Westbound.

**Table 2.4 – Eastbound I-10 Mainline 2006**
**Level of Service Summary**

| Segment Beginning | Segment End | LOS |
|---|---|---|
| **Eastbound** | | |
| I-8 off-ramp | I-8 on-ramp | B |
| I-8 on-ramp | Sunland Gin Road off-ramp | C* |
| Sunland Gin Road off-ramp | Sunland Gin Road on-ramp | B |
| Sunland Gin Road on-ramp | Toltec Road off-ramp | B |
| Toltec Road off-ramp | Toltec Road on-ramp | B |
| Toltec Road on-ramp | Sunshine Blvd off-ramp | B |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | B |
| Sunshine Blvd on-ramp | SR 87 off-ramp 1 | B |
| SR 87 off-ramp 1 | SR 87 off-ramp 2 | B |
| SR 87 off-ramp 2 | SR 87 on-ramp | B |
| SR 87 on-ramp | Picacho Hwy off-ramp | B |
| Picacho Hwy off-ramp | Picacho Peak Road off-ramp | B |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | B |
| Picacho Peak Road on-ramp | Red Rock off-ramp | B |
| Red Rock off-ramp | Red Rock on-ramp | B |
| Red Rock on-ramp | Pinal Air Park Road off-ramp | B |
| Pinal Air Park Road off-ramp | Pinal Air Park Road on-ramp | B |
| Pinal Air Park Road on-ramp | Marana Road off-ramp | B |
| Marana Road off-ramp | Marana Road on-ramp | B |
| Marana Road on-ramp | Tangerine Road off-ramp | B |
| Tangerine Road off-ramp | Tangerine Road on-ramp | A |

* The weaving methodology was used to estimate the LOS on this segment

**Table 2.5 – Westbound I-10 Mainline 2006**
**Level of Service Summary**

| Segment Beginning | Segment End | LOS |
|---|---|---|
| **Westbound** | | |
| Tangerine Road off-ramp | Tangerine Road on-ramp | A |
| Tangerine Road on-ramp | Marana Road off-ramp | B |
| Marana Road off-ramp | Marana Road on-ramp | B |
| Marana Road on-ramp | Pinal Air Park Road on-ramp | B |
| Pinal Air Park Road on-ramp | Pinal Air Park Road off-ramp | B |
| Pinal Air Park Road off-ramp | Red Rock off-ramp | B |
| Red Rock off-ramp | Red Rock on-ramp | B |
| Red Rock on-ramp | Picacho Peak Road off-ramp | B |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | B |
| Picacho Peak Road on-ramp | Picacho Hwy off-ramp | B |
| Picacho Hwy off-ramp | SR 87 off-ramp | B |
| SR 87 off-ramp | SR 87 on-ramp 1 | B |
| SR 87 on-ramp 1 | SR 87 on-ramp 2 | B |
| SR 87 on-ramp 2 | Sunshine Blvd off-ramp | B |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | B |
| Sunshine Blvd on-ramp | Toltec Road off-ramp | B |
| Toltec Road off-ramp | Toltec Road on-ramp | B |
| Toltec Road on-ramp | Sunland Gin Road off-ramp | B |
| Sunland Gin Road off-ramp | I-8 off-ramp | B |
| I-8 off-ramp | I-8 on-ramp 1 | B |
| I-8 on-ramp 1 | I-8 on-ramp 2 | B |

A level of service analysis was completed for each of the ramps and intersections at existing interchanges. The results of this analysis indicated that all ramps and intersections currently operate at LOS C or better. Detailed results of this analysis can be found in the *I-10 Corridor Study; Jct I-8 to Tangerine Road Traffic Report, 2009.*

## 2.4 CRASH ANALYSIS

The Traffic Records Section of ADOT provided crash data for the I-10 corridor and adjacent roads from 0.5 miles west of the I-8 junction to 0.5 miles east of Tangerine Road (MP 198.60 to MP 240.95). Crash data for the five-year period between October 1, 2000 and September 30, 2005 were provided and reviewed.

During the five-year crash analysis period, a total of 1,869 crashes were recorded on the I-10 mainline between I-8 and Tangerine Road. Of these crashes:

- 1,183, which was approximately 63 percent, did not result in bodily injury (property damage only)
- 74 crashes or about four percent resulted in fatal crashes.
- At the ramps, a total of 97 crashes were recorded, of which one resulted in a fatal crash.

A summary of the 1,869 crashes that were recorded on I-10 between I-8 and Tangerine Road is presented in **Table 2.6**.

**Table 2.6 – I-10 Mainline Crash Summary October 1, 2000-September 30, 2005**

| Manner of Collision | Total | Percent of Total |
|---|---|---|
| Single Vehicle | 1,056 | 56.5% |
| Sideswipe (same) | 232 | 12.4% |
| Sideswipe (opposite) | 2 | 0.1% |
| Angle | 6 | 0.3% |
| Left Turn | 0 | 0.0% |
| Rear-End | 386 | 20.7% |
| Head-On | 20 | 1.1% |
| Backing | 2 | 0.1% |
| Other | 143 | 7.7% |
| Driveway/Alley Related | 0 | 0.0% |
| Non-Contact (mc) | 0 | 0.0% |
| Non-Contact (not mc) | 21 | 1.1% |
| U-Turn | 1 | 0.1% |
| Total Accidents | 1,869 | 100.0% |

| Daylight Condition | Total | Percent of Total |
|---|---|---|
| Not Reported | 6 | 0.3% |
| Daylight | 1,168 | 62.5% |
| Dawn or Dusk | 102 | 5.5% |
| Darkness | 593 | 31.7% |
| Total Accidents | 1,869 | 100.0% |

| Traffic Way | Total | Percent of Total |
|---|---|---|
| Roadway/Alley | 1,079 | 57.7% |
| Shoulder | 42 | 2.2% |
| Roadside | 528 | 28.3% |
| Frontage Road | 0 | 0.0% |
| Turning Road | 0 | 0.0% |
| Non-Trafficway | 1 | 0.1% |
| Median | 209 | 11.2% |
| Outer Separator | 9 | 0.5% |
| Sidewalk/Bike Path | 1 | 0.1% |
| Total Accidents | 1,869 | 100.0% |

| Month | Total | Percent of Total |
|---|---|---|
| January | 150 | 8.0% |
| February | 132 | 7.1% |
| March | 163 | 8.7% |
| April | 147 | 7.9% |
| May | 165 | 8.8% |
| June | 174 | 9.3% |
| July | 181 | 9.7% |
| August | 157 | 8.4% |
| September | 137 | 7.3% |
| October | 139 | 7.4% |
| November | 173 | 9.3% |
| December | 151 | 8.1% |
| Total Accidents | 1,869 | 100.0% |

| Injury Severity | Total | Percent of Total |
|---|---|---|
| No Injury Accident | 1,183 | 63.3% |
| Possible Injury Accident | 180 | 9.6% |
| Non-Incapacitating Injury Accident | 278 | 14.9% |
| Incapacitating Injury Accident | 94 | 5.0% |
| Fatal Accident | 74 | 4.0% |
| Unknown | 60 | 3.2% |
| Total Accidents | 1,869 | 100.0% |

| Surface Condition | Total | Percent of Total |
|---|---|---|
| Not Reported, No Unusual Conditions | 105 | 5.6% |
| Dry | 1,645 | 88.0% |
| Wet | 107 | 5.7% |
| Sand, Mud, Dirt, Oil or Gravel | 6 | 0.3% |
| Snow | 2 | 0.1% |
| Slush | 1 | 0.1% |
| Ice | 0 | 0.0% |
| Other | 0 | 0.0% |
| Unknown | 3 | 0.2% |
| Total Accidents | 1,869 | 100.0% |

| Road Condition | Total | Percent of Total |
|---|---|---|
| Not Reported, No Unusual Conditions | 1,780 | 95.2% |
| Under Construction, Traffic Allowed | 43 | 2.3% |
| Under Construction, Traffic Not Allowed | 2 | 0.1% |
| Obstruction (protected) | 1 | 0.1% |
| Obstruction (unprotected) | 5 | 0.3% |
| Obstruction (unlighted at night) | 7 | 0.4% |
| Changing Roadwidth | 2 | 0.1% |
| Flooded | 15 | 0.8% |
| Temporary Lane Closure | 14 | 0.7% |
| Total Accidents | 1,869 | 100.0% |

| Weather Condition | Total | Percent of Total |
|---|---|---|
| Not Reported, No Adverse Conditions | 3 | 0.2% |
| Clear | 1,653 | 88.4% |
| Cloudy | 93 | 5.0% |
| Sleet/Hail | 7 | 0.4% |
| Rain | 85 | 4.5% |
| Snow | 2 | 0.1% |
| Severe Crosswinds | 12 | 0.6% |
| Blowing Sand, Soil, Dirt, Snow | 14 | 0.7% |
| Total Accidents | 1,869 | 100.0% |

| Involvement | Total | Percent of Total |
|---|---|---|
| 1 Vehicle | 1,046 | 56.0% |
| 2 Vehicles | 721 | 38.6% |
| 3 or More Vehicles | 102 | 5.5% |
| Total Accidents | 1,869 | 100.0% |

| First Harmful Occurance | Total | Percent of Total |
|---|---|---|
| Overturning | 314 | 16.8% |
| Exhaust Fume Poisoning | 0 | 0.0% |
| Breakage of Vehicle | 131 | 7.0% |
| Explosion of Vehicle | 0 | 0.0% |
| Fire in Vehicle | 84 | 4.5% |
| Occupant Fall from Vehicle | 1 | 0.1% |
| Object Falling from, or in Vehicle | 3 | 0.2% |
| Object Thrown towards, in, or on Vehicle | 1 | 0.1% |
| Object Fall on Vehicle | 2 | 0.1% |
| Toxic Chemical Leak | 0 | 0.0% |
| All Other Non-Collision | 93 | 5.0% |
| Collision with Pedestrian | 8 | 0.4% |
| Collision with Pedestrian Conveyance | 0 | 0.0% |
| Collision with other Motor Vehicle | 680 | 36.4% |
| Collision with Motor Vehicle Other Roadway | 11 | 0.6% |
| Collision with Motor Vehicle Parked Properly | 21 | 1.1% |
| Collision with Motor Vehicle Parked Improperly | 5 | 0.3% |
| Collision with Train, Forward | 0 | 0.0% |
| Collision with Train, Stopped | 0 | 0.0% |
| Collision with Train, Backward | 0 | 0.0% |
| Collision with Wild Animal | 1 | 0.1% |
| Collision with Wild Game | 3 | 0.2% |
| Collision with Animal Pets | 3 | 0.2% |
| Collision with Animal Livestock | 3 | 0.2% |
| Collision with Tree | 61 | 3.3% |
| Collision with Boulder | 1 | 0.1% |
| Collision with Utility Pole | 1 | 0.1% |
| Collision with Luminaire | 3 | 0.2% |
| Collision with Traffic Signal | 0 | 0.0% |
| Collision with Traffic Sign | 22 | 1.2% |
| Collision with Median Barrier | 67 | 3.6% |
| Collision with Guard Rail | 57 | 3.0% |
| Collision with Fence | 86 | 4.6% |
| Collision with Bridge Abutment | 1 | 0.1% |
| Collision with Traffic Barricade | 1 | 0.1% |
| Collision with Bridge Culvert | 2 | 0.1% |
| Collision with Curb | 3 | 0.2% |
| Collision with Other Fixed Object | 22 | 1.2% |
| Collision with Object Dropped from Vehicle | 152 | 8.1% |
| Collision with Spec Devices | 0 | 0.0% |
| Collision with Fallen Tree or Stone | 0 | 0.0% |
| Collision with Animal with Person | 0 | 0.0% |
| Collision with Animal Draw Conveyance | 0 | 0.0% |
| Collision with Other Non-Fixed | 19 | 1.0% |
| Collision with Pedalcyclist | 1 | 0.1% |
| Collision with Unknown | 5 | 0.3% |
| Collision with Machine Transport | 1 | 0.1% |
| Total Accidents | 1,869 | 100.0% |

Key findings of the analysis of the mainline crash data include the following:

- A majority, approximately 56 percent, of the crashes involved a single vehicle;
- Nearly 63 percent of the crashes occurred during daylight hours;
- No unusual roadway conditions were reported for nearly all of the crashes, which was over 95 percent;
- Approximately 88 percent of the crashes occurred on dry pavement and during clear weather conditions;
- The first harmful occurrences cited most often were a collision with another motor vehicle (over 36 percent), and vehicle overturns (nearly 17 percent).

Statistics were also obtained that included intersection crashes at the interchanges. This data indicated that a total of 75 crashes occurred at the interchange intersections over the five-year period. Of these total crashes:

- 58 involved property damage only,
- 16 resulted in bodily injury, and
- One resulted in fatality.

A summary of the interchange crashes is presented in **Table 2.7**. The profile of the intersection crashes by interchange includes the following key findings:

- The highest number of crashes occurred at the Sunland Gin Road TI. A total of 26 crashes occurred at the Sunland Gin Road intersections, of which 21 involved property damage only and five involved bodily injury; (Since this analysis traffic signals have been installed at these intersections)
- Toltec Road and Sunshine Boulevard TIs have the second highest number of crashes each with twelve crashes each recorded over the five year period;
- One fatal crash was recorded at the Marana Road TI;
- Pinal Air Park Road TI is the only interchange which reported no intersection crashes over the 5 year period.

**Table 2.7 – Intersection Crash Summary October 1, 2000-September 30, 2005**

| Sunland Gin Road (Exit 200) | | | | Toltec Road (Exit 203) | | | | Sunshine Boulevard (Exit 208) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Accident Type | North Intersection | South Intersection | Total Interchange | Accident Type | North Intersection | South Intersection | Total Interchange | Accident Type | North Intersection | South Intersection | Total Interchange |
| Rear End | 3 | 11 | 14 | Rear End | 2 | 3 | 5 | Rear End | 1 | 1 | 2 |
| Turning | 2 | 0 | 2 | Turning | 0 | 0 | 0 | Turning | 1 | 1 | 2 |
| Angle | 3 | 4 | 7 | Angle | 2 | 2 | 4 | Angle | 1 | 3 | 4 |
| Single Vehicle | 0 | 0 | 0 | Single Vehicle | 0 | 0 | 0 | Single Vehicle | 1 | 1 | 2 |
| Miscellaneous | 1 | 0 | 1 | Miscellaneous | 0 | 1 | 1 | Miscellaneous | 0 | 0 | 0 |
| Fixed Object | 0 | 0 | 0 | Fixed Object | 0 | 0 | 0 | Fixed Object | 0 | 0 | 0 |
| Backing | 0 | 0 | 0 | Backing | 0 | 1 | 1 | Backing | 1 | 1 | 2 |
| Head On | 0 | 1 | 1 | Head On | 0 | 0 | 0 | Head On | 0 | 0 | 0 |
| Side Swipe | 0 | 1 | 1 | Side Swipe | 0 | 1 | 1 | Side Swipe | 0 | 0 | 0 |
| Pedestrian/Animal | 0 | 0 | 0 | Pedestrian/Animal | 0 | 0 | 0 | Pedestrian/Animal | 0 | 0 | 0 |
| Total Accidents | 9 | 17 | 26 | Total Accidents | 4 | 8 | 12 | Total Accidents | 5 | 7 | 12 |
| Accident Severity | | | | Accident Severity | | | | Accident Severity | | | |
| Fatal | 0 | 0 | 0 | Fatal | 0 | 0 | 0 | Fatal | 0 | 0 | 0 |
| Bodily Injury | 2 | 3 | 5 | Bodily Injury | 1 | 1 | 2 | Bodily Injury | 1 | 2 | 3 |
| Property Damage | 7 | 14 | 21 | Property Damage | 3 | 7 | 10 | Property Damage | 4 | 5 | 9 |
| SR 87 (Exit 211) | | | | Picacho Peak Road (Exit 219) | | | | Red Rock (Exit 226) | | | |
| Accident Type | North Intersection | South Intersection | Total Interchange | Accident Type | North Intersection | South Intersection | Total Interchange | Accident Type | North Intersection | South Intersection | Total Interchange |
| Rear End | 0 | 0 | 0 | Rear End | 2 | 0 | 2 | Rear End | 0 | 0 | 0 |
| Turning | 0 | 0 | 0 | Turning | 0 | 1 | 1 | Turning | 0 | 0 | 0 |
| Angle | 4 | 0 | 4 | Angle | 0 | 0 | 0 | Angle | 0 | 0 | 0 |
| Single Vehicle | 0 | 0 | 0 | Single Vehicle | 0 | | 0 | Single Vehicle | 2 | 1 | 3 |
| Miscellaneous | 0 | 1 | 1 | Miscellaneous | 2 | 0 | 2 | Miscellaneous | 0 | 0 | 0 |
| Fixed Object | 0 | 0 | 0 | Fixed Object | 0 | 0 | 0 | Fixed Object | 0 | 0 | 0 |
| Backing | 0 | 0 | 0 | Backing | 0 | 0 | 0 | Backing | 0 | 0 | 0 |
| Head On | 0 | 0 | 0 | Head On | 0 | 0 | 0 | Head On | 0 | 0 | 0 |
| Side Swipe | 1 | 0 | 1 | Side Swipe | 0 | 0 | 0 | Side Swipe | 0 | 0 | 0 |
| Pedestrian/Animal | 0 | 0 | 0 | Pedestrian/Animal | 0 | 0 | 0 | Pedestrian/Animal | 0 | 0 | 0 |
| Total Accidents | 5 | 1 | 6 | Total Accidents | 4 | 1 | 5 | Total Accidents | 2 | 1 | 3 |
| Accident Severity | | | | Accident Severity | | | | Accident Severity | | | |
| Fatal | 0 | 0 | 0 | Fatal | 0 | 0 | 0 | Fatal | 0 | 0 | 0 |
| Bodily Injury | 3 | 0 | 3 | Bodily Injury | 0 | 0 | 0 | Bodily Injury | 1 | 0 | 1 |
| Property Damage | 2 | 1 | 3 | Property Damage | 3 | 2 | 5 | Property Damage | 1 | 1 | 2 |
| Marana Road (Exit 236) | | | | Tangerine Road (Exit 240) | | | | | | | |
| Accident Type | North Intersection | South Intersection | Total Interchange | Accident Type | North Intersection | South Intersection | Total Interchange | | | | |
| Rear End | 1 | 2 | 3 | Rear End | 0 | 1 | 1 | | | | |
| Turning | 0 | 0 | 0 | Turning | 1 | 0 | 1 | | | | |
| Angle | 1 | 0 | 1 | Angle | 1 | 0 | 1 | | | | |
| Single Vehicle | 3 | 0 | 3 | Single Vehicle | 0 | 0 | 0 | | | | |
| Miscellaneous | 0 | 0 | 0 | Miscellaneous | 0 | 0 | 0 | | | | |
| Fixed Object | 0 | 0 | 0 | Fixed Object | 0 | 0 | 0 | | | | |
| Backing | 1 | 0 | 1 | Backing | 0 | 0 | 0 | | | | |
| Head On | 0 | 0 | 0 | Head On | 0 | 0 | 0 | | | | |
| Side Swipe | 0 | 0 | 0 | Side Swipe | 0 | 0 | 0 | | | | |
| Pedestrian/Animal | 0 | 0 | 0 | Pedestrian/Animal | 0 | 0 | 0 | | | | |
| Total Accidents | 6 | 2 | 8 | Total Accidents | 2 | 1 | 3 | | | | |
| Accident Severity | | | | Accident Severity | | | | | | | |
| Fatal | 1 | 0 | 1 | Fatal | 0 | 0 | 0 | | | | |
| Bodily Injury | 1 | 0 | 1 | Bodily Injury | 1 | 0 | 1 | | | | |
| Property Damage | 4 | 2 | 6 | Property Damage | 1 | 1 | 2 | | | | |

Note that Table 2.6 does not include the I-8, Picacho Highway or Pinal Air Park Intersections. I-8 is not included because this system TI does not have street intersections. Picacho Highway and Pinal Air Park were not a part of this table because no crashes were recorded at the intersections.

Ramp crashes were defined as the crashes that occurred on the ramps and were not related to interchange intersections. The result of analysis conducted indicates that crashes on the ramps are not common events;

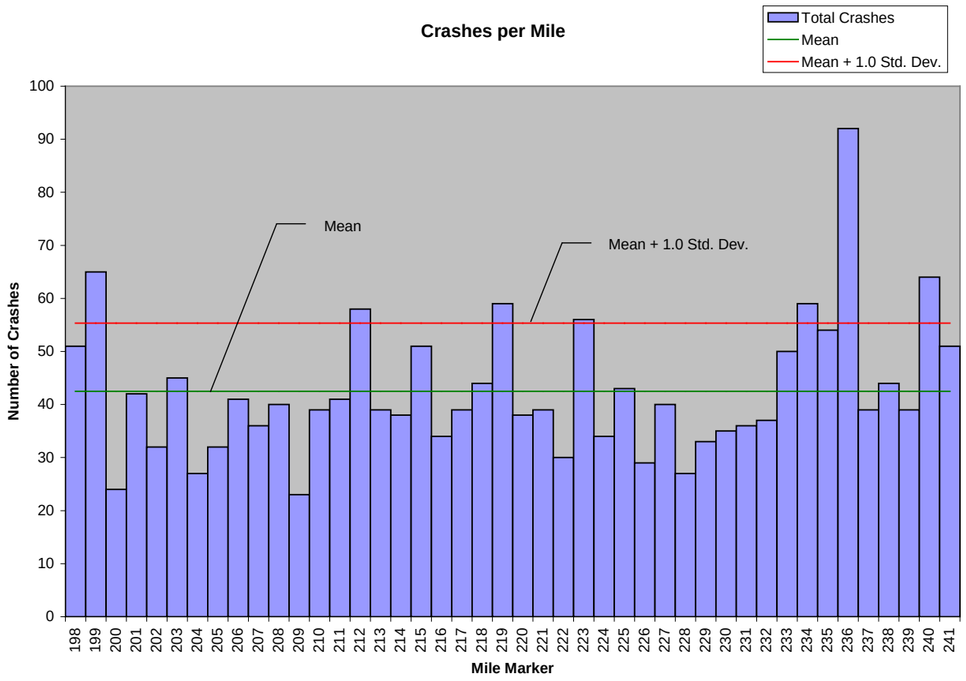
- The ramps located at the I-8, Sunland Gin Road, SR 87, and Picacho Peak Road interchanges have a higher number of crashes in comparison to the other TIs,

- A unique feature of this corridor is a slip ramp that provides access to the power plant located on the north side of I-10 near Exit 228. On this slip ramp that does not service any TI, two crashes were recorded.

### 2.4.1 Crashes by Milepost

The mainline crashes were analyzed by milepost in order to ascertain whether or not there are particular areas along the mainline with a higher number of crashes. These mainline crashes were segmented by milepost and presented in **Figure 2.1** below.

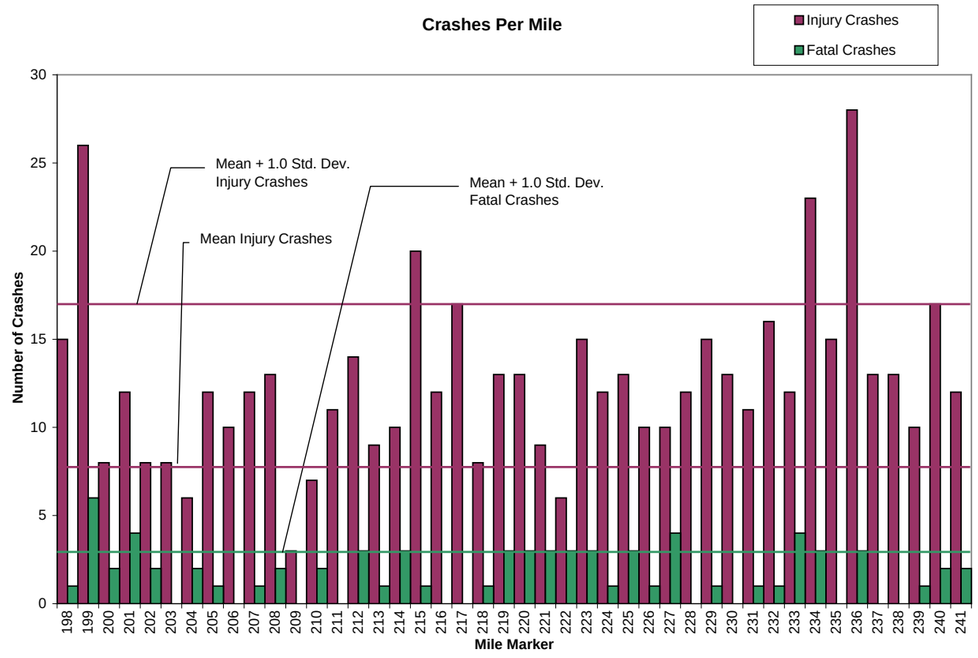
**Figure 2.1 – Crashes by Milepost**




Data by milepost enabled the determination of areas of concern along the mainline where crash mitigation might be warranted. Areas of concern were defined as areas where the number of crashes at any given milepost exceeded the mean number of crashes plus one standard deviation.

The following chart in **Figure 2.2** indicates the severity of the crashes at each milepost. It highlights the relationship between the number of injury crashes and fatal crashes with the corridor average plus one standard deviation of each type of crash. Areas of concern were also indicated where the number of either type of crash, injury or fatal, exceeds the corridor mean plus one standard deviation.

**Figure 2.2 – Crash Severity by Milepost**



### 2.4.2 Areas of Concern

As a result, the following Areas of Concern were determined with their locations and crash occurrences as follows:

- Area of Concern #1: At Milepost 199 (I-8 interchange) where 65 crashes occurred. At this milepost, both injury crashes and fatal crashes exceed the average plus one standard deviation;

- Area of Concern #2: Between Milepost 212 and Milepost 216 (Community of Picacho) where 58 crashes occurred at Milepost 212 (where the fatal crashes met the average plus one standard deviation) and 51 occurred at Milepost 215 (where the injury crashes exceeded the average plus one standard deviation);

- Area of Concern #3: Between Milepost 219 and Milepost 224 (Picacho Peak Road area) where 59 crashes occurred at Milepost 219 and 56 occurred at Milepost 223. Each of the mileposts in this area of concern met the crash threshold of the average plus one standard deviation for fatal crashes;

- Area of Concern #4: Between Milepost 233 and Milepost 237 (between Pinal Air Park Road and Marana Road) where 92 crashes occurred at Milepost 236 (exceeding the average plus one standard deviation for injury crashes), 59 occurred at Milepost 234 (exceeding the average plus one standard deviation for fatal crashes), 54 occurred at Milepost 235, and 50 occurred at Milepost 233 (exceeding the average plus one standard deviation for fatal crashes); and

- Area of Concern #5: At Milepost 240 (Tangerine Road TI) where 64 crashes occurred, meeting the threshold of the average plus one standard deviation for injury crashes.

A more detailed crash analysis of each of these areas of concern can be found in the *I-10 Corridor Study; Jct I-8 to Tangerine Road Traffic Report, 2009.*

## 2.5 FUTURE TRAFFIC CONDITIIONS

The project study area, which includes southern Pinal and northern Pima Counties, is projected to be one of the highest growth areas in Arizona over the next 20 to 30 years. Due to the high projected growth rates throughout Pinal, Pima, and Maricopa Counties, as well as plans for substantial expansion of the region's transportation system, a network-based modeling approach was selected to forecast traffic volumes for this project. This approach allows traffic volumes to equilibrate over all available existing and future roadways, and more accurately reflects drivers' tendencies to alter travel routes in order to avoid or minimize congestion.

Four network-based models that cover portions of the study area had been previously developed by others including:

1. The Maricopa Association of Governments (MAG) travel demand model
2. The Pima Association of Governments (PAG) travel demand model
3. The Pinal County travel demand model (PCM)
4. The Southeast Arizona (SEAZ) travel demand model (which includes the PAG model)

After considering various modeling options, it was decided to combine the SEAZ and Pinal County travel demand models into a single I-10 model. The I-10 model uses 2005 as the base year to forecast 2030 traffic volumes. The 2005 model includes the existing highway network and observed socioeconomic characteristics. Development of the traffic models included a review of roadway network characteristics including roadway classification, speed, and capacity. This review permitted edits to the highway model network such as the addition of various traffic interchanges and highway ramps. Model development also included a review of pertinent socioeconomic data at the Traffic Analysis Zone (TAZ) level such as population and employment. **Table 2.8** presents the socioeconomic data used to develop the models. Information about the traffic model development and application to this study is provided in Appendix C.

**Table 2.8 – Population and Employment Totals within the I-10 Model**

| County | Population | | Employment | |
|---|---|---|---|---|
| | 2005 | 2030 | 2005 | 2030 |
| Pinal | 222,913 | 1,954,016 | 40,027 | 519,774 |
| Pima | 943,413 | 1,494,105 | 481,336 | 673,383 |
| **Total** | **1,166,326** | **3,448,121** | **521,363** | **1,193,157** |

Source: Pima Association of Governments, Pinal County Small Area Transportation Studies, Working Paper #1.

The 2030 No-Build network was developed to represent the roadway network without any infrastructure or operational improvements along I-10 other than currently programmed projects. The 2030 network layer from the Pinal County model and the 2030 network layer from the SEAZ model were combined to develop the 2030 No-Build network.

Based on population projections for the corridor the traffic model produced traffic volume projections for I-10 which far exceed the capacity of a conventional freeway. A decision was made by ADOT management to limit the capacity of I-10 to a conventional freeway, which was determined to be no more than 5 general purpose lanes in each direction. The traffic modeling completed for the Build Alternative assumes that parallel high capacity corridor would be

established parallel to I-10 either East or West of the I-10 corridor. These parallel corridors could be new freeway corridors, parkways, or high capacity rail corridors.

In January 2008, ADOT completed the I-10 Phoenix-Tucson Bypass Study which evaluated feasible corridors that could be studied to establish a parallel corridor. The study recommended further evaluation of "Route 4" which is a parallel corridor west of I-10 from Junction I-8 and continuing around the west and south sides of the Tucson Metropolitan area. If this corridor were implemented it would provide a high capacity alternative to the I-10 corridor.

The 'Building a Quality Arizona (BQAZ)' program, was an ambitious, long-range statewide planning process that identifies the multi-modal infrastructure needs in the State for 2050. The BQAZ identified conceptual corridors for High-Speed Intercity Rail connections between Phoenix, Las Vegas, Los Angeles, and Tucson.

At the time of this study, ADOT is currently studying a high-speed intercity rail line (Phoenix-Tucson) which could also serve as a parallel high capacity corridor. Traffic analysis conclusions documented in this study assume a parallel high capacity corridor will be implemented by 2030 to help limit traffic volumes along the I-10 corridor. The 500 foot wide corridor with an open median provides enough flexibility in the corridor for an intercity rail line to be incorporated if an alignment along I-10 were selected.

## 2.6 NO BUILD ALTERNATIVE TRAFFIC ANALYSIS

The No-Build Alternative does not provide any major improvements along I-10 excerpt for what is currently programmed for construction. The difference between the No-Build Alternative and existing conditions is that a lane is being added to the mainline in each direction of travel from I-8 to Tangerine Road, and a new traffic interchange, currently under final design, is incorporated at Tortolita Boulevard. The change in the mainline cross-section from a four-lane section to a six-lane section is based on the fact that ADOT already has programmed the addition of one lane in each direction within the study corridor that will be constructed within the next five years. The traffic interchanges modeled in this scenario retain the existing land configurations and intersection control.

**Tables 2.9** through **2.11** shows the traffic volumes resulted from the modeling process for 2030 No-Build network.

**Table 2.9 – 2030 No-Build Traffic Volumes; Eastbound I-10 Segments**

| Segment Beginning | Segment End | Rounded ADT | K-Factor | Truck Percentage |
|---|---|---|---|---|
| **Eastbound** | | | | |
| I-10 West of I-8 | | 57,200 | 0.09 | 25% |
| I-8 off-ramp | I-8 on-ramp | 45,600 | 0.09 | 25% |
| I-8 on-ramp | Sunland Gin Road off-ramp | 88,300 | 0.09 | 25% |
| Sunland Gin Road off-ramp | Sunland Gin Road on-ramp | 66,600 | 0.09 | 25% |
| Sunland Gin Road on-ramp | Toltec Road off-ramp | 71,900 | 0.09 | 25% |
| Toltec Road off-ramp | Toltec Road on-ramp | 52,300 | 0.09 | 25% |
| Toltec Road on-ramp | Sunshine Blvd off-ramp | 77,400 | 0.09 | 25% |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | 67,300 | 0.09 | 25% |
| Sunshine Blvd on-ramp | SR 87 off-ramp 1 | 97,400 | 0.09 | 25% |
| SR 87 off-ramp 1 | SR 87 off-ramp 2 | 93,000 | 0.09 | 25% |
| SR 87 off-ramp 2 | SR 87 on-ramp | 92,400 | 0.09 | 25% |
| SR 87 on-ramp | Picacho Hwy on-ramp | 126,400 | 0.09 | 25% |
| Picacho Hwy on-ramp | Picacho Peak Road off-ramp | 150,900 | 0.09 | 25% |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | 131,000 | 0.09 | 25% |
| Picacho Peak Road on-ramp | Red Rock off-ramp | 158,100 | 0.09 | 25% |
| Red Rock off-ramp | Red Rock on-ramp | 140,300 | 0.09 | 25% |
| Red Rock on-ramp | Pinal Air Park Road off-ramp | 176,900 | 0.09 | 25% |
| Pinal Air Park Road off-ramp | Pinal Air Park Road on-ramp | 149,200 | 0.09 | 25% |
| Pinal Air Park Road on-ramp | Tortolita Blvd off-ramp | 171,200 | 0.09 | 25% |
| Tortolita Blvd off-ramp | Tortolita Blvd on-ramp | 145,800 | 0.09 | 25% |
| Tortolita Blvd on-ramp | Marana Road off-ramp | 184,500 | 0.09 | 25% |
| Marana Road off-ramp | Marana Road on-ramp | 164,900 | 0.09 | 25% |
| Marana Road on-ramp | Tangerine Road off-ramp | 193,200 | 0.09 | 25% |
| Tangerine Road off-ramp | Tangerine Road on-ramp | 177,600 | 0.09 | 25% |
| I-10 East of Tangerine Road | | 210,700 | 0.09 | 25% |

**Table 2.10 – 2030 No-Build Traffic Volumes; Westbound I-10 Segments**

| Segment Beginning | Segment End | Rounded ADT |
|---|---|---|
| **Westbound** | | |
| I-10 East of Tangerine Road | | 215,000 |
| Tangerine Road off-ramp | Tangerine Road on-ramp | 191,900 |
| Tangerine Road on-ramp | Marana Road off-ramp | 195,200 |
| Marana Road off-ramp | Marana Road on-ramp | 164,200 |
| Marana Road on-ramp | Tortolita Blvd off-ramp | 187,200 |
| Tortolita Blvd off-ramp | Tortolita Blvd on-ramp | 148,500 |
| Tortolita Blvd on-ramp | Pinal Air Park Road on-ramp | 177,800 |
| Pinal Air Park Road on-ramp | Pinal Air Park Road off-ramp | 209,900 |
| Pinal Air Park Road off-ramp | Red Rock off-ramp | 178,800 |
| Red Rock off-ramp | Red Rock on-ramp | 139,100 |
| Red Rock on-ramp | Picacho Peak Road off-ramp | 158,100 |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | 129,700 |
| Picacho Peak Road on-ramp | PicachoHwy off-ramp | 150,800 |
| Picacho Hwy off-ramp | SR 87 off-ramp | 128,100 |
| SR 87 off-ramp | SR 87 on-ramp 1 | 92,500 |
| SR 87 on-ramp 1 | SR 87 on-ramp 2 | 108,500 |
| SR 87 on-ramp 2 | Sunshine Blvd off-ramp | 108,600 |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | 76,200 |
| Sunshine Blvd on-ramp | Toltec Road off-ramp | 79,800 |
| Toltec Road off-ramp | Toltec Road on-ramp | 54,300 |
| Toltec Road on-ramp | Sunland Gin Road off-ramp | 72,800 |
| Sunland Gin Road off-ramp | I-8 off-ramp | 67,700 |
| I-8 off-ramp | I-8 on-ramp | 50,600 |
| I-8 on-ramp | Sunland Gin Road on-ramp | 51,100 |
| I-10 West of Sunland Gin Road on-ramp | | 66,200 |

The ADT for the eastbound direction is equal to 123,600 and the westbound direction is equal to 128,100, averaged over the entire corridor. The directional distributional factor is equal to 51 percent on the westbound direction.

The traffic volumes presented for the No-Build conditions were developed without including additional parallel corridors described in the previous section which would provide new transportation connections between Pinal County and the Tucson Metropolitan Area.

**Table 2.11 – 2030 No-Build Traffic Volumes; Ramp Segments**

| Traffic Interchange | Ramp | ADT | |
|---|---|---|---|
| | | Eastbound | Westbound |
| I-8 | Off-ramp | 11,600 | 17,100 |
| | On-ramp | 42,700 | 1,200 |
| Sunland Gin Road | Off-ramp | 21,700 | 4,300 |
| | On-ramp | 5,400 | 15,100 |
| Toltec Hwy | Off-ramp | 19,600 | 25,600 |
| | On-ramp | 25,000 | 18,500 |
| Sunshine Blvd | Off-ramp | 10,100 | 32,400 |
| | On-ramp | 30,100 | 3,600 |
| SR 87 | Off-ramp | 4,400 | 35,600 |
| | | 600 | NA |
| | On-ramp | 34,000 | 16,700 |
| | | NA | 100 |
| Picacho Peak Hwy | Off-ramp | NA | 22,600 |
| | On-ramp | 24,500 | NA |
| Picacho Peak Road | Off-ramp | 19,900 | 28,400 |
| | On-ramp | 27,100 | 21,000 |
| Red Rock | Off-ramp | 17,800 | 39,700 |
| | On-ramp | 36,600 | 19,000 |
| Pinal Air Park Road | Off-ramp | 27,700 | 31,100 |
| | On-ramp | 21,900 | 32,100 |
| Tortolita Blvd. | Off-ramp | 25,400 | 38,700 |
| | On-ramp | 38,700 | 29,400 |
| Marana Road | Off-ramp | 19,600 | 31,000 |
| | On-ramp | 28,300 | 23,000 |
| Tangerine Road | Off-ramp | 15,600 | 23,100 |
| | On-ramp | 33,100 | 3,000 |

Using the No-Build 2030 volumes, an operational analysis was conducted. Since this analysis is the basis for comparison between the No-Build condition and the build conditions, only the peak hour was analyzed for each condition. The projected No-Build traffic volumes were factored into peak hour volumes by applying the existing peak period K factor. The peak period K factor is the portion of daily traffic occurring in the analysis hour. The factor for the eastbound is nine percent and for the westbound is eight percent.

Operational analyses for the various sections were performed using the HCS. The following input assumptions were used in the No-Build LOS analyses:

- Mainline free flow speed: 75 mph
- Lane width: 12 feet
- Ramp speed (at body of the ramp): 50 mph
- Peak hour factor: 0.92
- Heavy vehicle usage: 25%
- Recreational vehicle usage: 5%

A heavy vehicle factor of 30 percent, which includes heavy trucks and recreational vehicles, was used for the operational analysis. 30 percent was utilized due to a recommendation by ADOT traffic group.

The results of the analysis are shown in the **Tables 2.12** through **2.14**. These results indicate that generally an unacceptable LOS, will be experienced on the freeway facility that includes the mainline and ramps in the design year 2030 with 3 lanes in each direction along I-10.

**Table 2.12 – 2030 No-Build Eastbound I-10 Mainline Level of Service Summary**

| Segment Beginning | Segment End | LOS |
|---|---|---|
| **Eastbound** | | |
| I-8 off-ramp | I-8 on-ramp | C |
| I-8 on-ramp | Sunland Gin Road off-ramp | F* |
| Sunland Gin Road off-ramp | Sunland Gin Road on-ramp | F |
| Sunland Gin Road on-ramp | Toltec Road off-ramp | F |
| Toltec Road off-ramp | Toltec Road on-ramp | D |
| Toltec Road on-ramp | Sunshine Blvd off-ramp | F |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | F |
| Sunshine Blvd on-ramp | SR 87 off-ramp 1 | F |
| SR 87 off-ramp 1 | SR 87 off-ramp 2 | F |
| SR 87 off-ramp 2 | SR 87 on-ramp | F |
| SR 87 on-ramp | Picacho Hwy on-ramp | F |
| Picacho Hwy on-ramp | Picacho Peak Road off-ramp | F |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | F |
| Picacho Peak Road on-ramp | Red Rock off-ramp | F |
| Red Rock off-ramp | Red Rock on-ramp | F |
| Red Rock on-ramp | Pinal Air Park Road off-ramp | F |
| Pinal Air Park Road off-ramp | Pinal Air Park Road on-ramp | F |
| Pinal Air Park Road on-ramp | Tortolita Blvd off-ramp | F |
| Tortolita Blvd off-ramp | Tortolita Blvd on-ramp | F |
| Tortolita Blvd on-ramp | Marana Road off-ramp | F |
| Marana Road off-ramp | Marana Road on-ramp | F |
| Marana Road on-ramp | Tangerine Road off-ramp | F |
| Tangerine Road off-ramp | Tangerine Road on-ramp | F |

* The weaving methodology was used to estimate the LOS on this segment

**Table 2.13 – 2030 No-Build Westbound I-10 Mainline Level of Service Summary**

| Segment Beginning | Segment End | LOS |
|---|---|---|
| **Westbound** | | |
| Tangerine Road off-ramp | Tangerine Road on-ramp | F |
| Tangerine Road on-ramp | Marana Road off-ramp | F |
| Marana Road off-ramp | Marana Road on-ramp | F |
| Marana Road on-ramp | Tortolita Blvd off-ramp | F |
| Tortolita Blvd off-ramp | Tortolita Blvd on-ramp | F |
| Tortolita Blvd on-ramp | Pinal Air Park Road on-ramp | F |
| Pinal Air Park Road on-ramp | Pinal Air Park Road off-ramp | F |
| Pinal Air Park Road off-ramp | Red Rock off-ramp | F |
| Red Rock off-ramp | Red Rock on-ramp | F |
| Red Rock on-ramp | Picacho Peak Road off-ramp | F |
| Picacho Peak Road off-ramp | Picacho Peak Road on-ramp | F |
| Picacho Peak Road on-ramp | Picacho Hwy off-ramp | F |
| Picacho Hwy off-ramp | SR 87 off-ramp | F |
| SR 87 off-ramp | SR 87 on-ramp 1 | F |
| SR 87 on-ramp 1 | SR 87 on-ramp 2 | F |
| SR 87 on-ramp 2 | Sunshine Blvd off-ramp | F |
| Sunshine Blvd off-ramp | Sunshine Blvd on-ramp | F |
| Sunshine Blvd on-ramp | Toltec Road off-ramp | F |
| Toltec Road off-ramp | Toltec Road on-ramp | C |
| Toltec Road on-ramp | Sunland Gin Road off-ramp | E |
| Sunland Gin Road off-ramp | I-8 off-ramp | E |
| I-8 off-ramp | I-8 on-ramp | C |
| I-8 on-ramp | Sunland Gin Road on-ramp | D |

**Table 2.14 – 2030 No-Build I-10 Ramp Level of Service Summary**

| Eastbound | | Westbound | |
|---|---|---|---|
| **Segment** | **LOS** | **Segment** | **LOS** |
| I-8 off-ramp | E | Tangerine Road off-ramp | F |
| I-8 on-ramp | F | Tangerine Road on-ramp | F |
| Sunland Gin Road off-ramp | F | Marana Road off-ramp | F |
| Sunland Gin Road on-ramp | F | Marana Road on-ramp | F |
| Toltec Road off-ramp | F | Tortolita Blvd off-ramp | F |
| Toltec Road on-ramp | F | Tortolita Blvd on-ramp | F |
| Sunshine Blvd off-ramp | F | Pinal Air Park Road off-ramp | F |
| Sunshine Blvd on-ramp | F | Pinal Air Park Road on-ramp | F |
| SR 87 off-ramp 1 | F | Red Rock off-ramp | F |
| SR 87 off-ramp 2 | F | Red Rock on-ramp | F |
| SR 87 on-ramp | F | Picacho Peak Road off-ramp | F |
| Picacho Hwy on-ramp | F | Picacho Peak Road on-ramp | F |
| Picacho Peak Road off-ramp | F | Picacho Hwy off-ramp | F |
| Picacho Peak Road on-ramp | F | SR 87 off-ramp | F |
| Red Rock off-ramp | F | SR 87 on-ramp 1 | F |
| Red Rock on-ramp | F | SR 87 on-ramp 2 | F |
| Pinal Air Park Road off-ramp | F | Sunshine Blvd off-ramp | F |
| Pinal Air Park Road on-ramp | F | Sunshine Blvd on-ramp | F |
| Tortolita Blvd off-ramp | F | Toltec Road off-ramp | F |
| Tortolita Blvd on-ramp | F | Toltec Road on-ramp | F |
| Marana Road off -ramp | F | Sunland Gin Road off-ramp | E |
| Marana Road on -ramp | F | I-8 off-ramp | E |
| Tangerine Road off-ramp | F | I-8 on-ramp | C |
| Tangerine Road on-ramp | F | Sunland Gin Road on-ramp | D |

Intersection LOS analyses were conducted using Synchro 6.0 in accordance with procedures outlined in the HCM. **Table 2.15** presents the results of this analysis. The results of the intersection analysis indicate that an unacceptable LOS would be present in design year 2030 for all of the intersections within the study area for the No-Build condition.

**Table 2.15 – 2030 No-Build Intersection Level of Service Summary**

| TI | Local Intersections | Intersection LOS* | Traffic Control |
|---|---|---|---|
| Sunland Gin Road | Sunland Gin Road / I-10 WB Ramps | F | Signalized |
| | Sunland Gin Road / I-10 EB Ramps | F | |
| Toltec Road | Toltec Hwy / I-10 WB Ramps | F | Signalized |
| | Toltec Hwy / I-10 EB Ramps | F | |
| Sunshine Boulevard | Sunshine Blvd / I-10 WB Ramps | F | Unsignalized |
| | Sunshine Blvd / I-10 EB Ramps | F | |
| 5th Street | 5th Street / I-10 WB Ramps | F | Unsignalized |
| | Phillips Road / 5th Street / Frontage Road | F | |
| Picacho Highway | Picacho Hwy / Camino Adelante Drive | F | Unsignalized |
| | Picacho Hwy / I-10 WB Ramps | F | |
| | Picacho Hwy / I-10 EB Ramps | F | |
| Picacho Peak Road | Picacho Peak Road / Camino Adelante Drive | F | Unsignalized |
| | Picacho Peak Road / I-10 WB Ramps | F | |
| | Picacho Peak Road / I-10 EB Ramps | F | |
| Tortalita Road | Tortalita Road / I-10 WB Ramps | F | Signalized |
| | Tortalita Road / I-10 EB Ramps | F | |
| Sasco Road | Sasco Road / I-10 WB Ramps | F | Unsignalized |
| | Sasco Road / I-10 EB Ramps | F | |
| | Sasco Road / Camino Adelane Drive | F | |
| Marana Road | Marana Road / Frontage Road (N) | F | Unsignalized |
| | Marana Road / I-10 WB Ramps | F | |
| | Marana Road / I-10 EB Ramps | F | |
| | Marana Road / Frontage Road (S) | F | |
| Tangerine Road | Tangerine Road / I-10 WB Ramps | F | Signalized |
| | Tangerine Road / I-10 EB Ramps | F | |

## 2.7 PREFERRED ALTERNATIVE TRAFFIC ANALYSIS

The Preferred Alternative would include 5 lanes in each direction on I-10. Continuous, two-lane, one-way frontage roads would also parallel the corridor. There would be new TIs included at Bataglia Road, the redesigned Picacho Highway, Moore Road, Aries Drive, Park Link Drive, Greenes Road, and Overfield Road. Moreover, the Preferred Alternative includes a reconfiguration of the I-10/I-8 TI.

The Preferred Alternative also accommodates other transportation modes. Bicycles would be accommodated in this alternative by providing a 5-foot shoulder on the cross-streets and a 4-foot shoulder on the frontage roads, in accordance with ADOT Roadway Design Guidelines (RDG). This alternative also accounts for pedestrians by incorporating sidewalks on bridges. However, High Occupancy Vehicle (HOV) lanes were not considered in this alternative. The proposed cross-section with an open median provides the flexibility to accommodate additional transportation modes in the future.

The 2030 traffic volume projections for the Preferred Alternative are shown in **Figure 2.3** and are summarized in **Table 2.16**. The 2030 traffic projections along I-10 for the Preferred Alternative are lower than the No-Build Alternative because the implementation of a parallel high capacity corridor is assumed as part of the traffic modeling for the preferred plan. In January 2008, ADOT presented recommendations for the I-10 Phoenix-Tucson Bypass Study, and ADOT is currently studying a high capacity Intercity Rail connections between Phoenix and Tucson. Either of these recommendations could serve as the parallel capacity assumed in the traffic model.

In order to evaluate this alternative, the 2030 traffic volumes projections were converted into peak hour volumes, by applying a factor (K) to the daily volumes. The daily volumes were multiplied by K factors to estimate the peak hour demand. Two K factors were used in this calculation: seven percent (7%) for mainline and eight and a half percent (8.5%) for intersections. These values are lower than the existing peak period K factors. The K factor for the peak hour period is assumed to be lower because of the roadway character, which changes from rural in its existing condition to more urbanized in 2030. Due to this change, the peak period would spread and would not represent the same percentage of the daily volume as existing. The directional distribution is assumed to be 50 percent in the year 2030. Based on input from ADOT, the truck percentage is expected to be 30 percent (25% heavy vehicles and 5% RVs).

As shown in Section 5 of this report, higher rural design controls have been used for the segment between Selma Highway and Tortolita Boulevard based on the assumption that this segment of I-10 will retain the rural character during most of the years that precede the 2030 design year, but as development continues will become more urbanized as the year 2030 approaches.

**Table 2.16 – 2030 Projected Traffic Factors**

| Direction of Travel | Projected Average Traffic Volumes | K-Factor | D-Factor | T-Percentage |
|---|---|---|---|---|
| Eastbound | 108,300 | 0.07 | 50% | 30% |
| Westbound | 109,300 | 0.07 | 50% | 30% |

The CORSIM computer program was used to provide a simulation of portions of the freeway system within the study area. CORSIM is a microscopic traffic simulation program that uses roadway geometry and traffic volume inputs to simulate operations of an entire freeway network. CORSIM has the ability to provide various measures of effectiveness for each link within the system. The vehicle density and speed output from CORSIM were used as the measure of effectiveness to relate to an LOS as established by the HCM.

**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative**

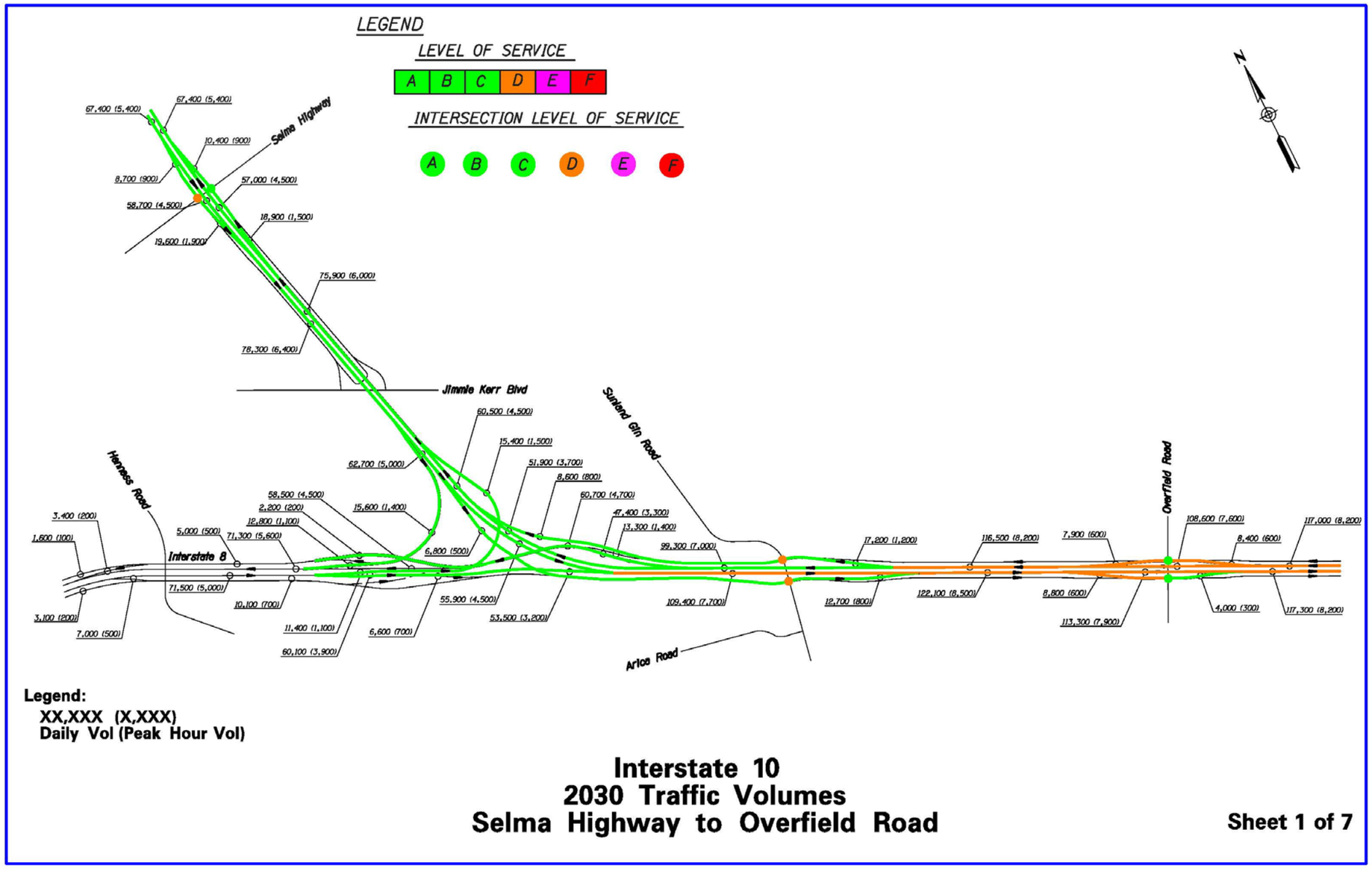


**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

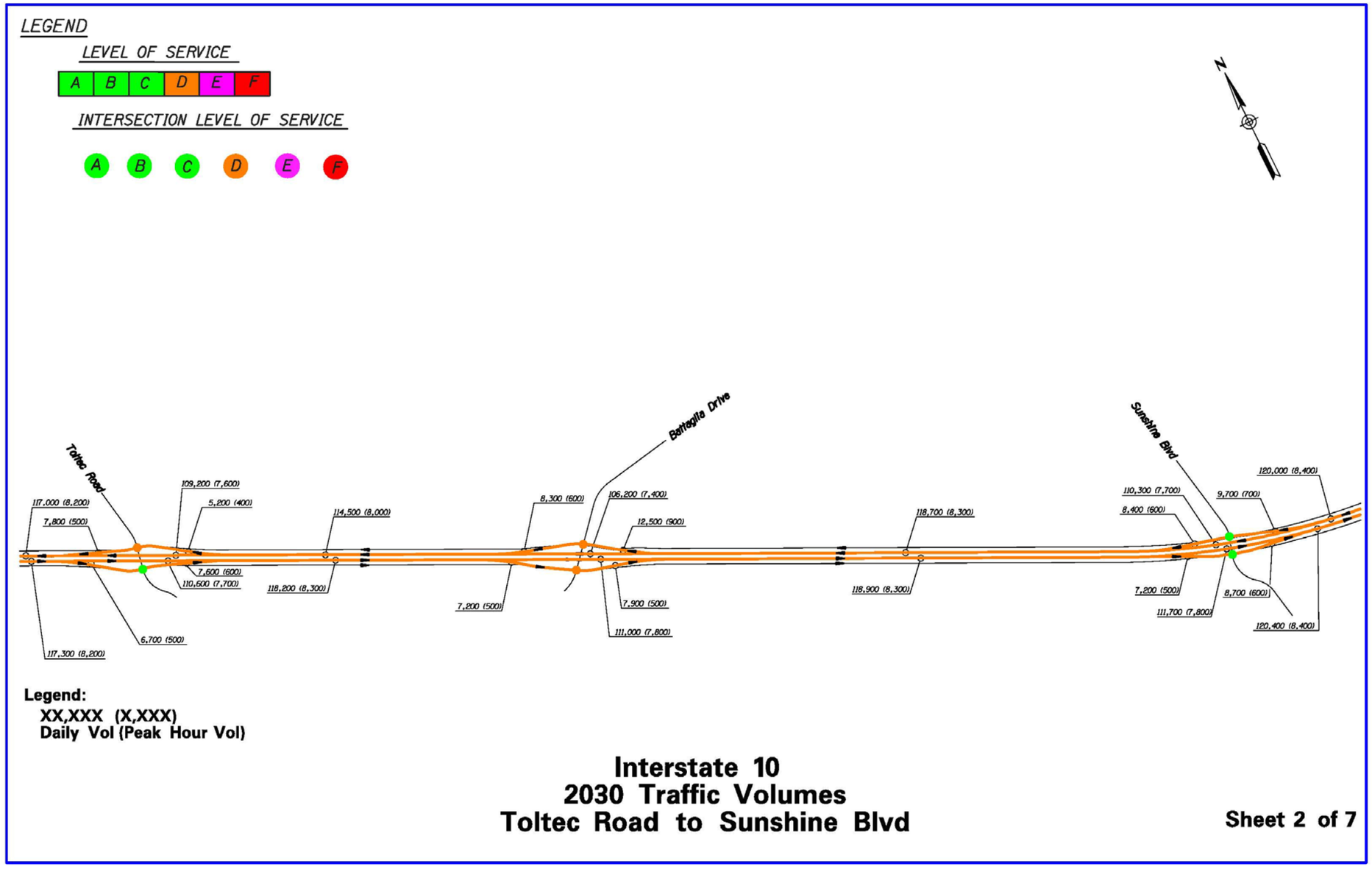


**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

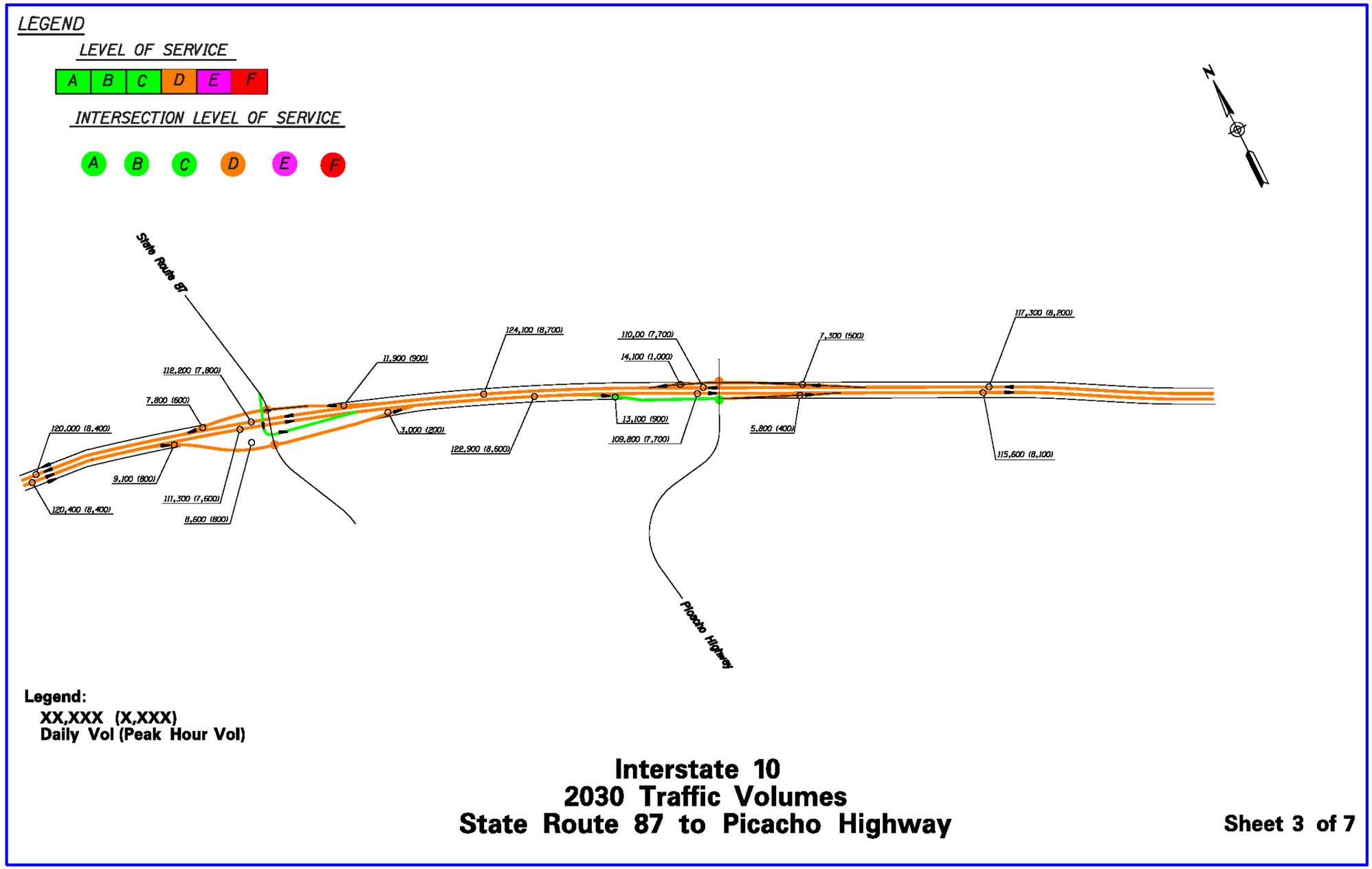


**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

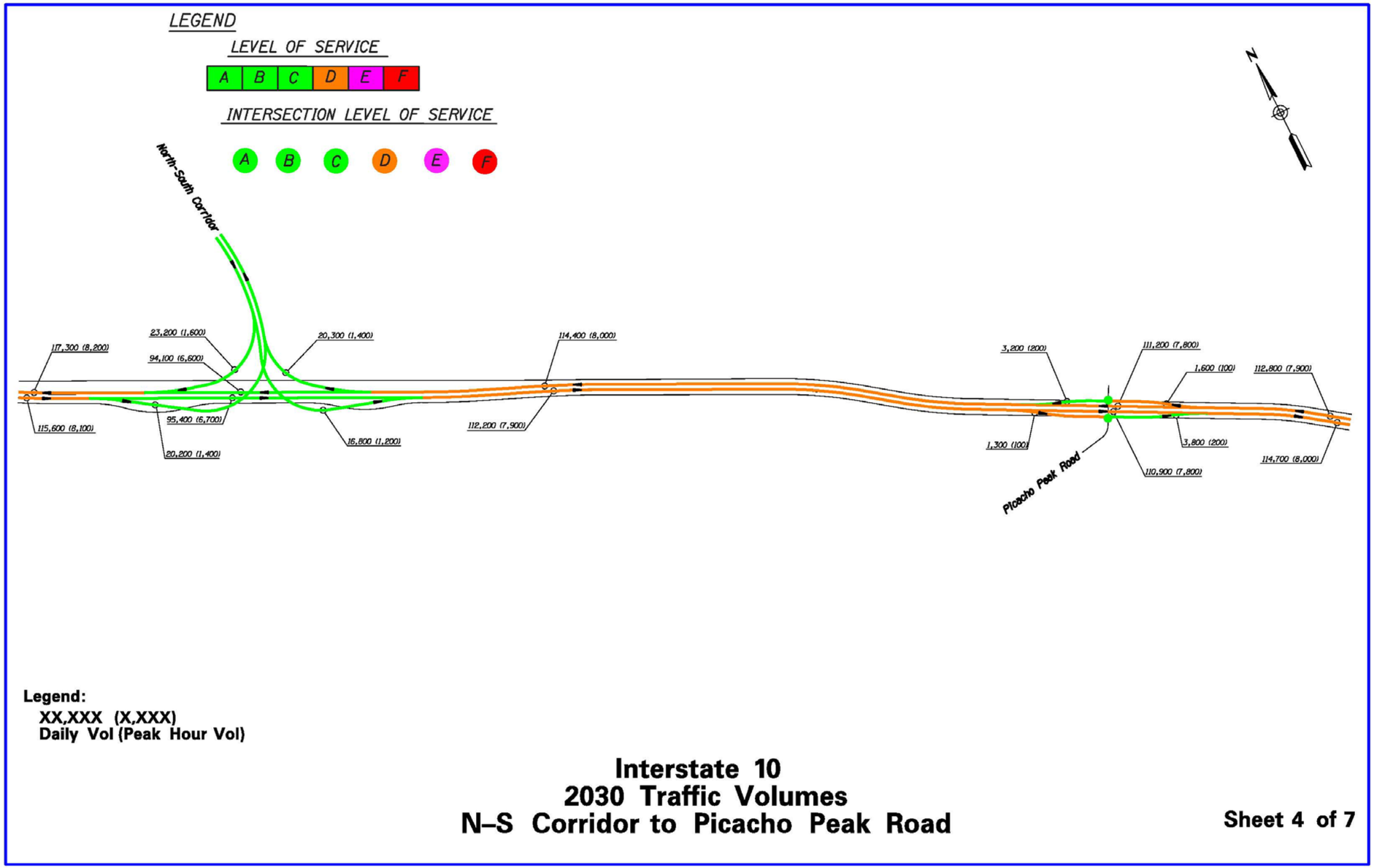


**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

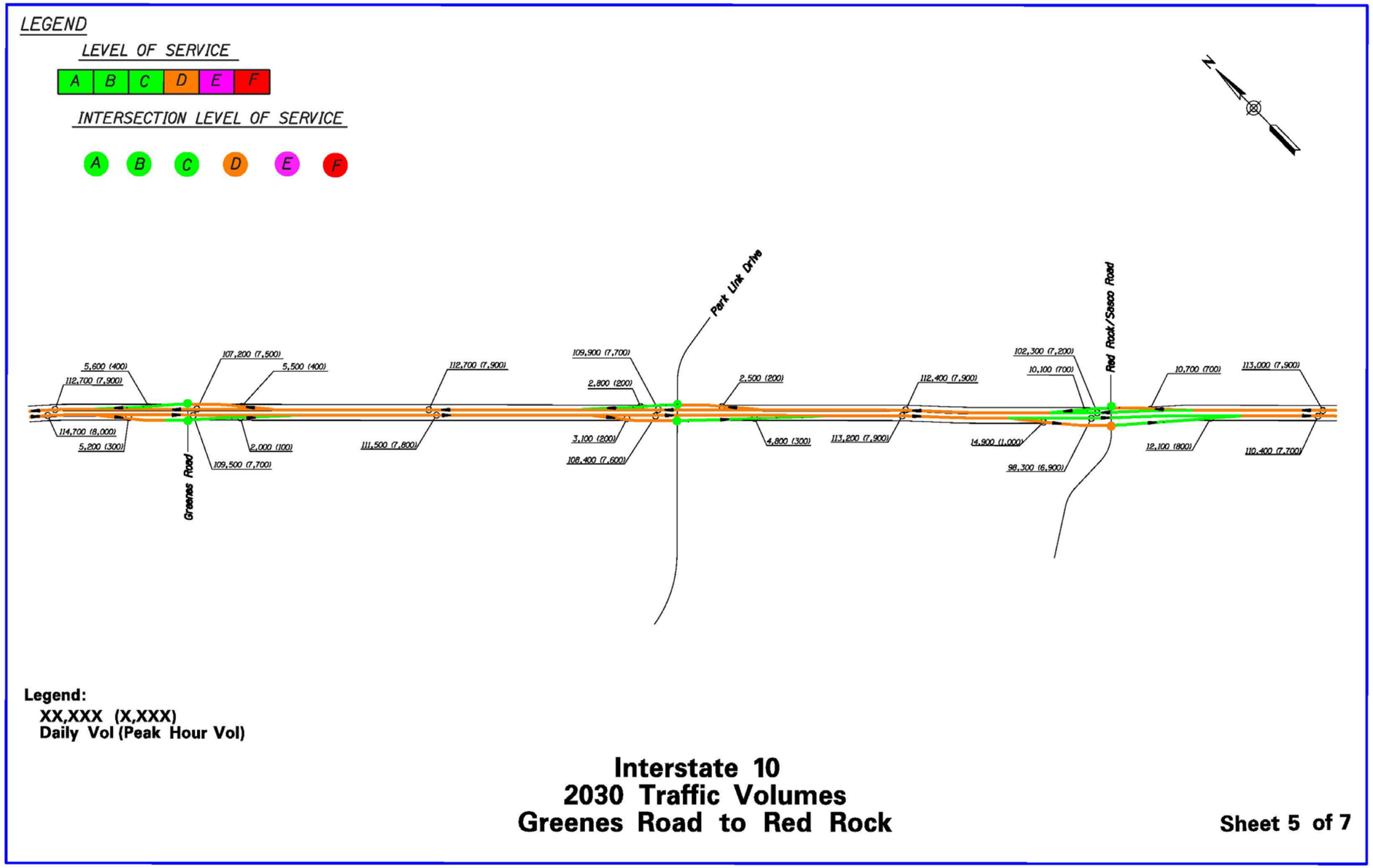


**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

**Figure 2.3 – 2030 Traffic Volumes and Los for Preferred Alternative (Cont.)**

The following CORSIM model input assumptions were used for the operational analysis:

- Free flow speed of 65 mph for the mainline general-purpose lanes
- Free flow speed of 55 mph for the system interchange ramps
- Free flow speed of 50 mph for the service interchange ramps
- Truck percentage was assumed to be 30% during peak hour (25% Trucks, 5% RVs)

The truck percentage was recommended by ADOT traffic group to the consultant team. This recommendation was used in the analysis of all the build cases and is based on the existing high percentage of trucks traveling within this corridor and expected growth of freight traffic.

In general, CORSIM was used to evaluate the I-10/I-8 TI and the Sunshine Boulevard-SR 87-Picacho Highway area. In addition, microsimulation was used to analyze the location for auxiliary lanes, and the length of the acceleration lanes at the entrance ramps.

The results of the level of service analysis of the preferred alternative are presented in Figure 2.3**.**

### 2.7.1 Auxiliary Lanes

Auxiliary lanes provide an additional lane adjacent to the mainline general purpose lanes that connect an entrance ramp to the next successive downstream exit ramp. The auxiliary lane provides enhanced weaving operations by providing a greater distance for entering vehicles to accelerate and a greater weave distance for vehicles entering and exiting the freeway. Auxiliary lanes have been shown to provide enhanced weaving operations throughout the regional freeway system within Maricopa County. A detailed auxiliary lane analysis should be conducted during final design.

Recommendations for auxiliary lanes are as follows:

- Selma Highway to Jct I-8 (eastbound and westbound)
- Sunshine Boulevard to SR 87 (eastbound and westbound)
- SR 87 to Picacho Highway (eastbound and westbound)

### 2.7.2 Acceleration/Deceleration Lanes

Traffic on freeway facilities is disrupted when traffic entering or exiting takes place directly on the mainline. To minimize the potential traffic conflicts of traffic entering onto the mainline, acceleration lanes are provided. An acceleration length should enable the driver to safely maneuver into the freeway mainline. The length of the acceleration lane should be sufficient for the entering driver to determine and use an available gap by applying a minor change in speed.

Because the corridor will become more urbanized over time, ADOT roadway Group has recommended all ramps be a parallel design for the entire corridor.

The ADOT Roadway Design Guidelines establish a minimum acceleration length of 700 feet with a minimum taper of 600 feet for parallel ramps. CORSIM was used to estimate the minimum acceleration length required to operate with an acceptable LOS based on the 2030 traffic volumes. The results of these calculations are shown in the **Table 2.17**.

**Table 2.17 – Recommended Minimum Acceleration Lengths**

| Eastbound | | Westbound | |
|---|---|---|---|
| Ramp | L (ft) | Ramp | L (ft) |
| Henness Road on-ramp | 1,000 | Selma Hwy on-ramp | 1000 |
| Selma Hwy on-ramp | 1,000 | I-8 on-ramp | N/A |
| I-8 on-ramp | 5,280 | Sunland Gin Road on-ramp | 1,000 |
| Sunland Gin Road on-ramp | 1,500 | Overfield Road on-ramp | 1,200 |
| Overfield Road on-ramp | 1,200 | Toltec Road on-ramp | 1,000 |
| Toltec Road on-ramp | 1,200 | Battaglia Drive on-ramp | 1,000 |
| Battaglia Drive on-ramp | 1,500 | Sunshine Blvd on-ramp | 1,500 |
| Sunshine Blvd on-ramp | N/A | SR 87 on-ramp | N/A |
| SR 87 on-ramp | N/A | Picacho Hwy on-ramp | N/A |
| Picacho Hwy on-ramp | 1,000 | Picacho Peak Road on-ramp | 1,000 |
| Picacho Peak Road on-ramp | 1,000 | Greenes Road on-ramp | 1,000 |
| Greenes Road on-ramp | 1,000 | Park Link Drive on-ramp | 1,000 |
| Park Link Drive on-ramp | 1,000 | Red Rock on-ramp | 1,200 |
| Red Rock on-ramp | 1,200 | Aries Drive on-ramp | 1,000 |
| Aries Drive on-ramp | 1,000 | Pinal Air Park Road on-ramp | 1,700 |
| Pinal Air Park Road on-ramp | 1,500 | Tortolita Blvd on-ramp | 1,700 |
| Tortolita Blvd on-ramp | 1,700 | Marana Road on-ramp | 1,700 |
| Marana Road on-ramp | 1,700 | Moore Road on-ramp | 1,200 |
| Moore Road on-ramp | 1,200 | Tangerine Road on-ramp | N/A |
| Tangerine Road on-ramp | 1,700 | | |

Note: N/A – acceleration lengths are not applicable where an auxiliary lane is proposed, or an entrance ramp adds a basic lane onto the freeway.

## 2.8 SERVICE INTERCHANGES

### 2.8.1 Introduction

- The proposed service interchanges (**Table 2.18**) for the study corridor were classified into three groups:

- **Existing interchanges with improvements** are the existing service interchanges that are proposed to be improved to accommodate the expected 2030 traffic demand.

- **Relocated or new interchanges** consists of existing service interchanges that will be relocated to provide acceptable operations with the expected traffic demand.

- **Future viable locations for interchanges** the proposed location for additional service interchanges along the study corridor were identified. These locations were determined based on participation from the local jurisdictions and maintaining a 2-mile desirable spacing between traffic interchanges. These interchanges would be implemented by local agencies or developers as required to meet traffic needs.

**Table 2.18 – Service Interchanges**

| Service Interchanges | | | |
|---|---|---|---|
| | Existing Interchanges with Improvements | Relocated or New Interchanges with Improvements | Future Viable Locations for Interchanges |
| Henness Road (MP 178) | | | x |
| Selma Highway (MP 197) | | x | |
| Sunland Gin Road (MP 200) | | x | |
| Overfield Road (MP 202) | | | x |
| Toltec Road (MP 204) | x | | |
| Battaglia Road (MP 206) | | | x |
| Sunshine Boulevard (MP 209) | x | | |
| SR 87 (MP 211) | x | | |
| Picacho Highway (MP 213) | | | x |
| Picacho Peak Road (MP 219) | x | | |
| Greens Road (MP 222) | | | x |
| Park Link Drive (MP 224) | | | x |
| Red Rock (MP 226) | x | | |
| Aries drive (MP 228) | | | x |
| Pinal Airpark/Missile Base Road (MP 231) | | x | |
| Tortolita Boulevard (MP 234) | | | x |
| Marana Road (MP 236) | x | | |
| Moore Road (MP 238) | | | x |
| Tangerine Road (MP 240) | x | | |

*The Tangerine Road interchange is included in the **Existing Interchanges with Improvements** category because it is an existing interchange that is proposed to be improved. However, a current concept by a private developer proposes to relocate the interchange up to ½ mile from its existing location.

In accordance with the goals established for the operational performance of this corridor, the service interchanges were evaluated to provide LOS 'D' or better for the overall intersection LOS. In addition, for the service interchanges that will be reconstructed, it is desirable to provide LOS D or better for each intersection approach.

The following section describes the lane configuration and LOS for the existing and relocated interchanges with improvements. Lane arrangements in this report are preliminary and are based on the traffic projections created for this study. During final design, detailed land use data surrounding the interchanges will be evaluated, traffic volumes will be updated, and lane arrangements re-evaluated. Bicycle facility designs would also be assessed during the final design process. Note that the traffic interchanges (TIs) are listed from west to east which is the direction of increasing mileposts.

2.8.2 Existing Interchanges with Improvements

2.8.2.1 Toltec Road Diamond TI

A full diamond interchange would be provided at Toltec Road with ramp connections to and from I-10. The traffic analysis was performed with three through lanes in each direction of travel on Toltec Road within the interchange area. **Figure 2.4** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

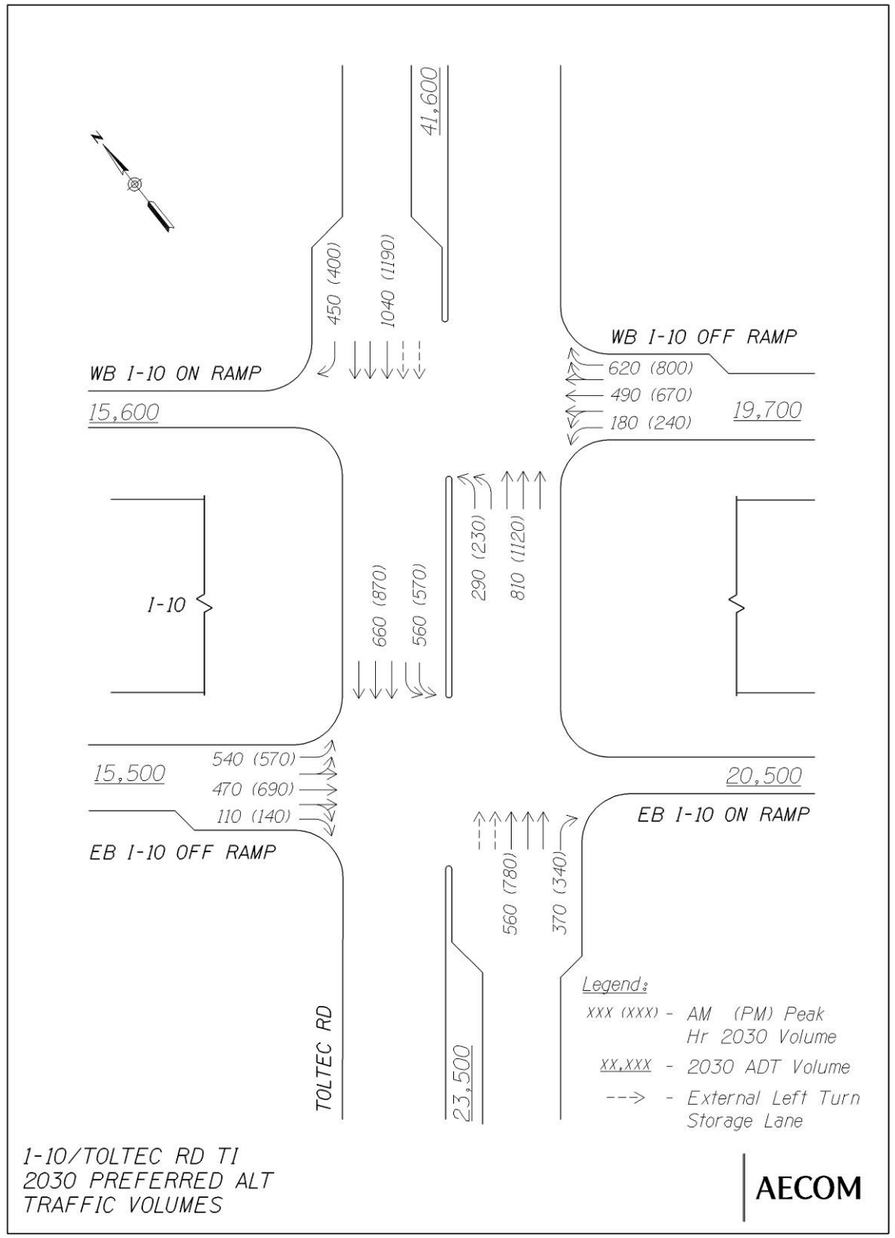
Two left-turn lanes would be provided for the Toltec Road northbound to I-10 westbound and Toltec Road southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the northbound to I-10 eastbound and southbound to I-10 westbound traffic movements. A five lane approach to Toltec Road would be provided for both exit ramps.

**Table 2.19** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.19 – Toltec Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Toltec Road TI & I-10 Eastbound Ramps | 2030 A.M. | 30.1 | C | 100 |
| | 2030 P.M. | 32.6 | C | 100 |
| Toltec Road TI & I-10 Westbound Ramps | 2030 A.M. | 28.9 | C | 100 |
| | 2030 P.M. | 30.7 | C | 100 |

**Figure 2.4 – Toltec Road Diamond TI**



2.8.2.2 Sunshine Boulevard Diamond TI

A full diamond interchange would be provided at Sunshine Boulevard with ramp connections to and from I-10. The traffic analysis was performed with three through lanes in each direction of travel on Sunshine Boulevard within the interchange area. **Figure 2.5** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

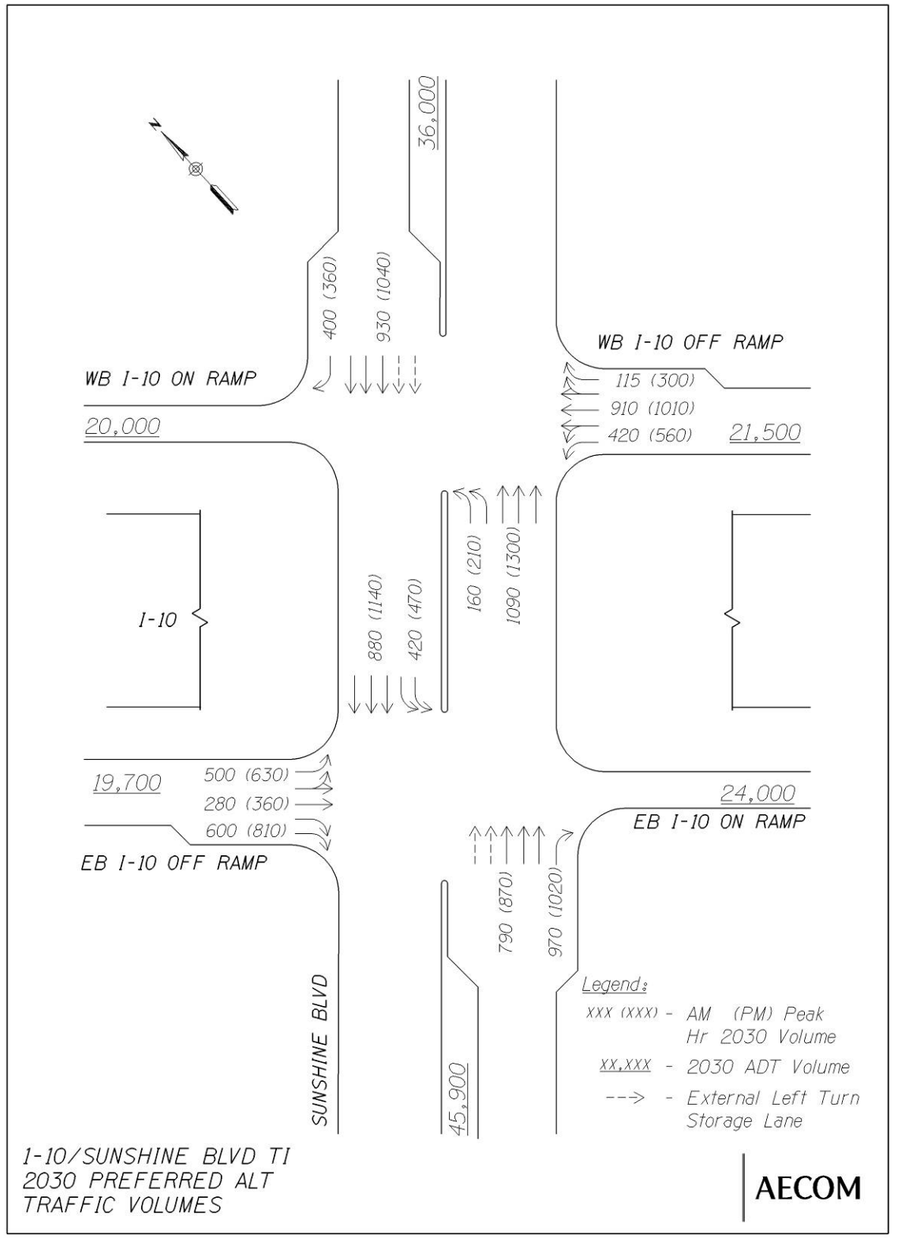
Two left-turn lanes would be provided for the Sunshine Boulevard northbound to I-10 westbound and Sunshine Boulevard southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the northbound to I-10 eastbound (free flow movement) and southbound to I-10 westbound traffic movements. A five lane approach to Sunshine Boulevard would be provided for both exit ramps.

**Table 2.20** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.20 – Sunshine Boulevard TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Sunshine Boulevard & I-10 Eastbound Ramps | 2030 A.M. | 20.5 | C | 90 |
| | 2030 P.M. | 25.5 | C | 90 |
| Sunshine Boulevard & I-10 Westbound Ramps | 2030 A.M. | 26.2 | C | 90 |
| | 2030 P.M. | 30.3 | C | 90 |

**Figure 2.5 – Sunshine Boulevard Diamond TI**



2.8.2.3 SR 87 Partial Cloverleaf TI

A partial cloverleaf interchange would be provided at SR 87 with ramp connections to and from I-10. An additional access point to I-10 eastbound would be provided in the form of a loop ramp from SR 87 southbound. The traffic analysis was performed with four through lanes in each direction of travel on SR 87 within the interchange area. **Figure 2.6** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

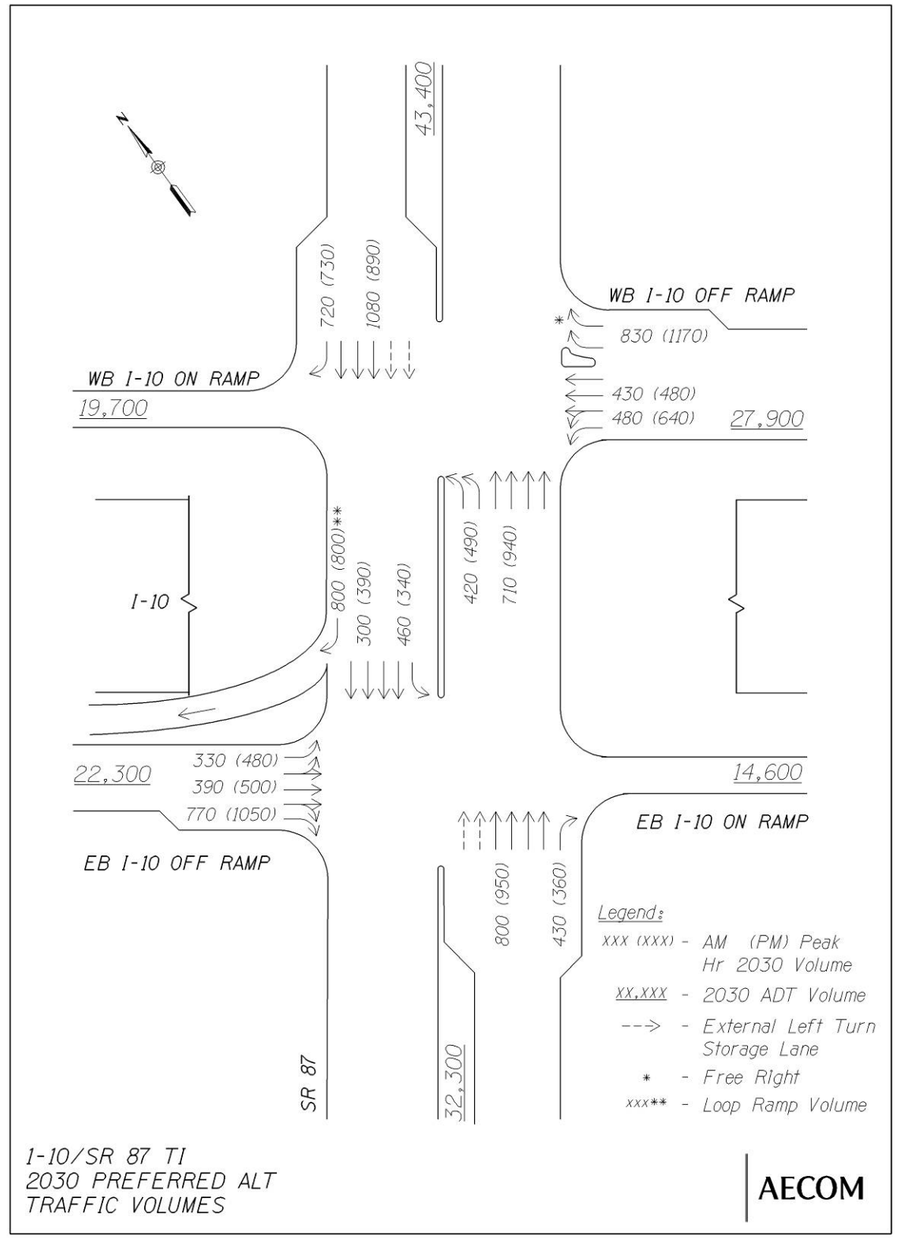
Two left-turn lanes would be provided for the movement on SR 87 northbound to I-10 westbound, and one left-turn lane would be required for the movement on SR 87 southbound to I-10 eastbound to provide access to the frontage road. This movement would also be served by the single-lane loop ramp from SR 87 southbound to I-10 eastbound. One right-turn lane would be provided for the southbound to westbound and northbound to eastbound traffic movements. A five lane approach to SR 87 would be provided for the eastbound exit ramp. A six lane approach to SR 87 with two channelized free right turn-lanes would be provided for traffic exiting from I-10 westbound.

**Table 2.21** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.21 – SR 87 TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| SR 87 & I-10 Eastbound Ramps | 2030 A.M. | 51.4 | D | 150 |
| | 2030 P.M. | 40.6 | D | 120 |
| SR 87 & I-10 Westbound Ramps | 2030 A.M. | 34.4 | C | 150 |
| | 2030 P.M. | 43.3 | D | 120 |

**Figure 2.6 – SR 87 Partial Cloverleaf TI**



2.8.2.4 Picacho Peak Road Diamond TI

A full diamond interchange would be provided at Picacho Peak Road with ramp connections to and from I-10. The traffic analysis was performed with two through lanes in each direction of travel on Picacho Peak Road within the interchange area. **Figure 2.7** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

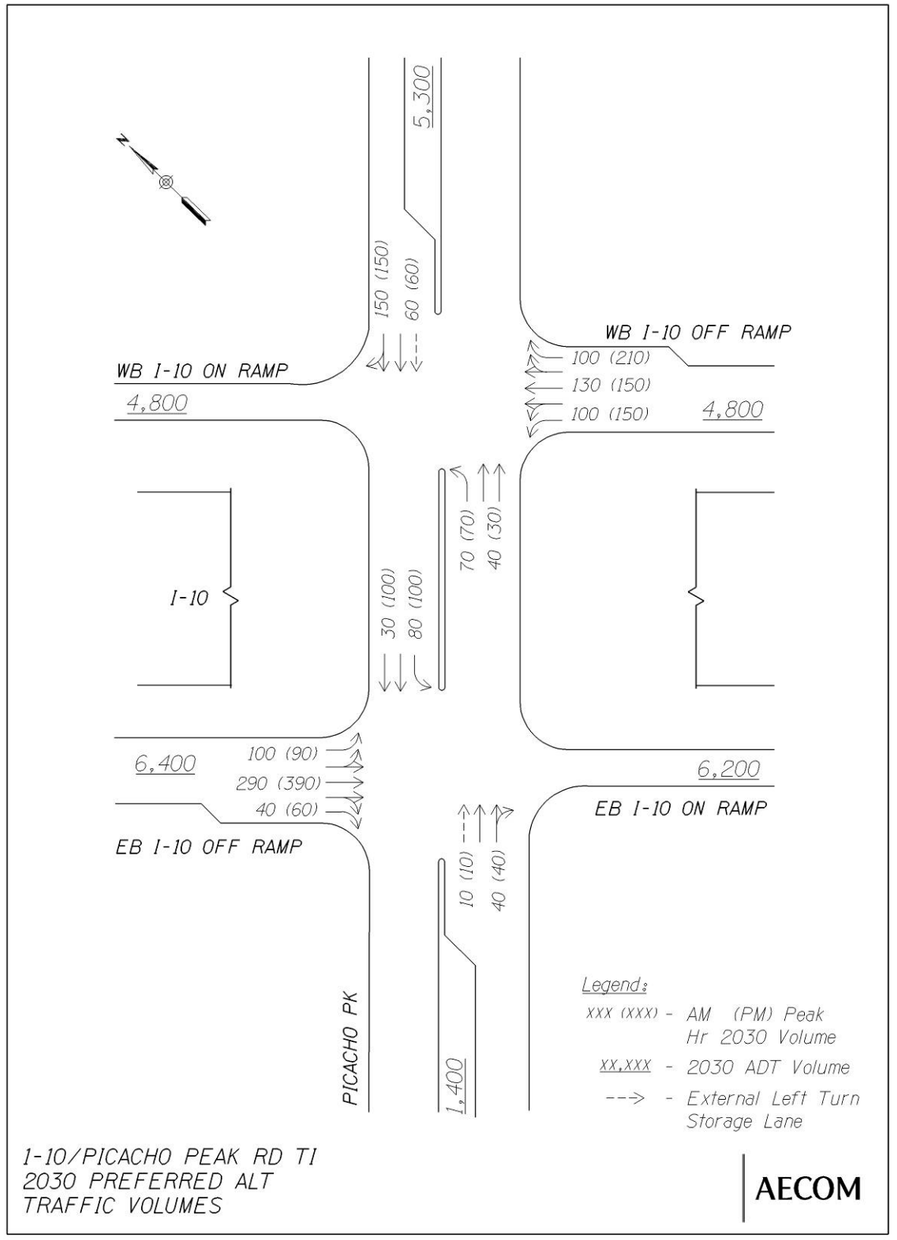
One left-turn lane would be provided for the Picacho Peak Road northbound to I-10 westbound and Picacho Peak Road southbound to I-10 eastbound traffic movements. A shared right-through lane would be provided for the southbound to I-10 westbound and northbound to I-10 eastbound traffic movements. A five lane approach to Picacho Peak Road would be provided for both exit ramps.

**Table 2.22** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.22 – Picacho Peak Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Picacho Peak Road & I-10 Eastbound Ramps | 2030 A.M. | 18.2 | B | 50 |
| | 2030 P.M. | 20.8 | C | 60 |
| Picacho Peak Road & I-10 Westbound Ramps | 2030 A.M. | 15.5 | B | 50 |
| | 2030 P.M. | 18.9 | B | 60 |

**Figure 2.7 – Picacho Peak Road Diamond TI**



2.8.2.5 Red Rock Diamond TI

A full diamond interchange would be provided at Red Rock with ramp connections to and from I-10. The traffic analysis was performed with three through lanes in each direction of travel on Sasco Road within the interchange area. **Figure 2.8** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

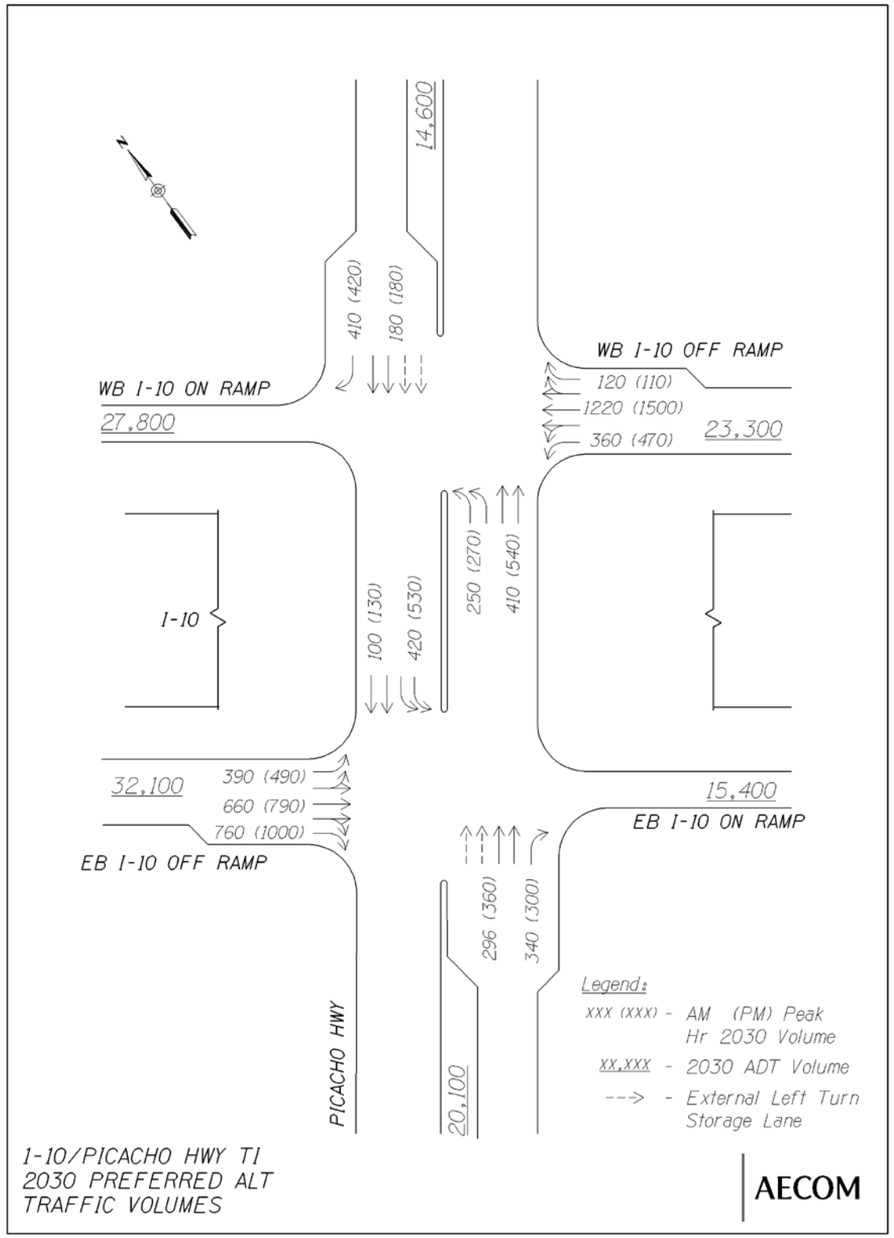
Two left-turn lanes would be provided for the Sasco Road eastbound to I-10 westbound (northbound) and Sasco Road westbound to I-10 eastbound (southbound) traffic movements. One shared right-through lane would be provided for the westbound to I-10 westbound traffic movement, and a right-turn lane would be provided for the eastbound to I-10 eastbound traffic movement. A five lane approach to Sasco Road would be provided for both exit ramps.

**Table 2.23** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.23 – Red Rock TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Sasco Road & I-10 Eastbound Ramps | 2030 A.M. | 27.9 | C | 90 |
| | 2030 P.M. | 31.2 | C | 90 |
| Sasco Road & I-10 Westbound Ramps | 2030 A.M. | 26.2 | C | 90 |
| | 2030 P.M. | 22.2 | C | 90 |

**Figure 2.8 – Red Rock Diamond TI**



2.8.2.6 Marana Road Diamond TI

A full diamond interchange would be provided at Marana Road with ramp connections to and from I-10. The traffic analysis was performed with three through lanes in each direction of travel on Marana Road within the interchange area. **Figure 2.9** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

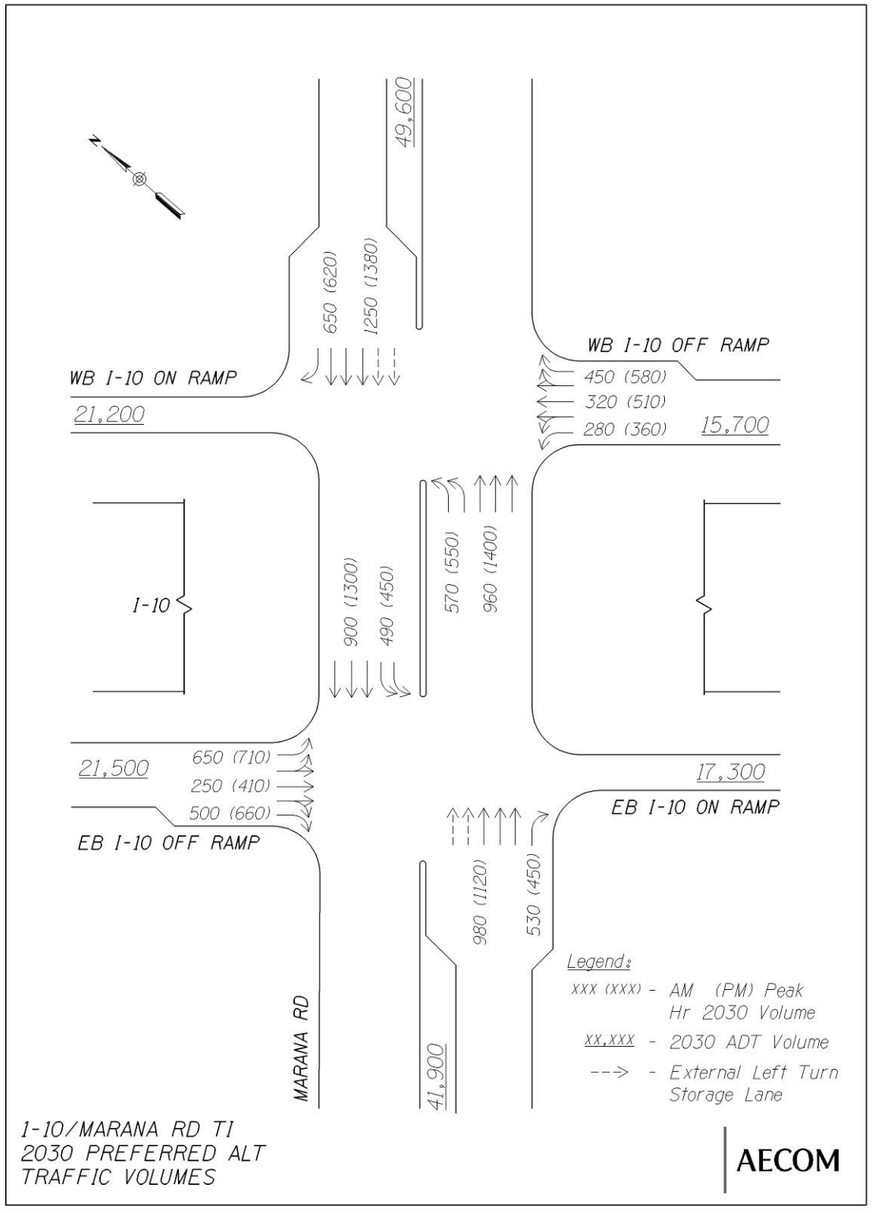
Two left-turn lanes would be provided for the Marana Road eastbound to I-10 westbound (northbound) and westbound to I-10 eastbound (southbound) traffic movements. One right-turn lane would be provided for the westbound to I-10 westbound and eastbound to I-10 eastbound traffic movements. A five lane approach to Marana Road would be provided for both exit ramps.

**Table 2.24** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.24 – Marana Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Marana Road & I-10 Eastbound Ramps | 2030 A.M. | 33.9 | C | 125 |
| | 2030 P.M. | 40.4 | D | 130 |
| Marana Road & I-10 Westbound Ramps | 2030 A.M. | 41.4 | D | 125 |
| | 2030 P.M. | 30.3 | C | 130 |

**Figure 2.9 – Marana Road Diamond TI**



2.8.2.7 Tangerine Road Diamond TI

A full diamond interchange would be provided at Tangerine Road with ramp connections to and from I-10. The traffic analysis was performed with four through lanes in each direction of travel on Tangerine Road within the interchange area. **Figure 2.10** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

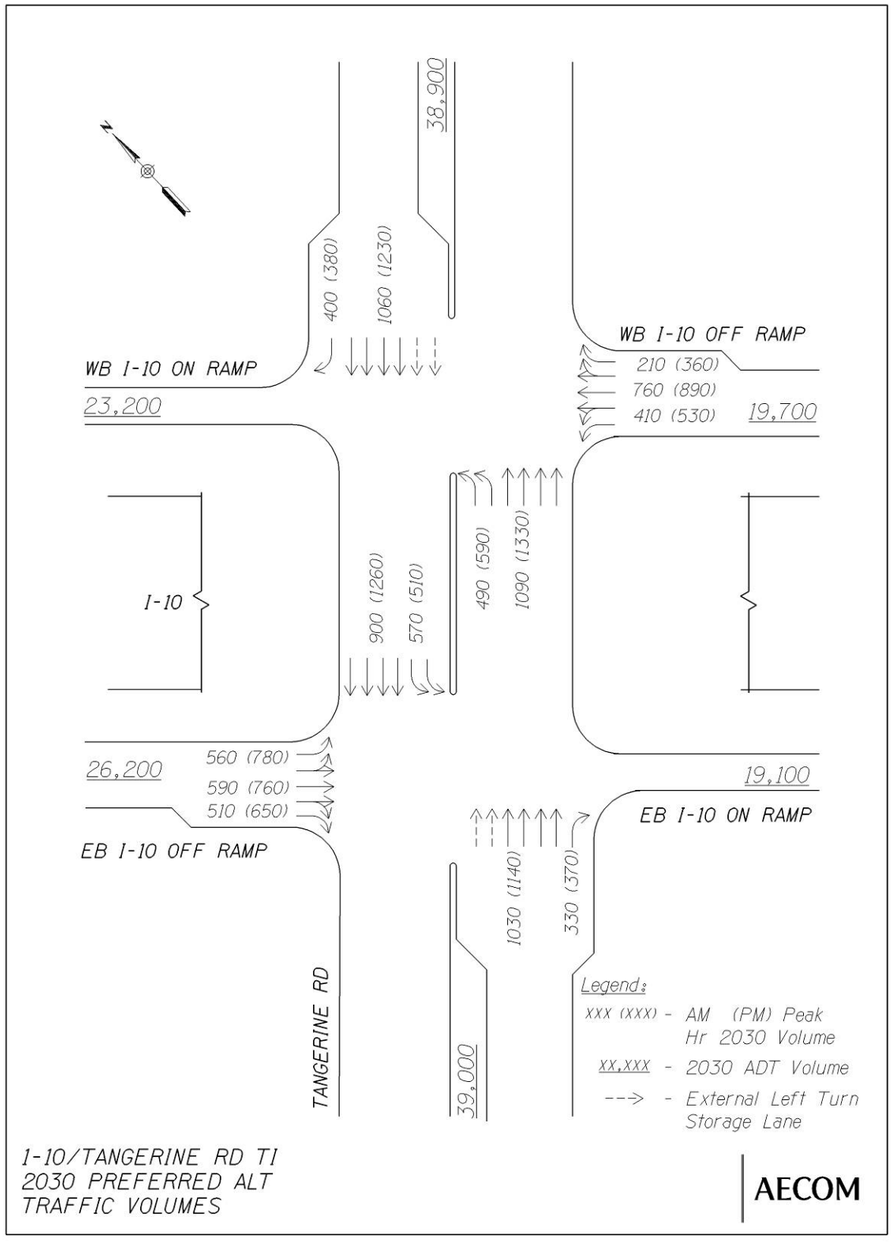
Two left-turn lanes would be provided for the Tangerine Road eastbound to I-10 westbound (northbound) and Tangerine Road westbound to I-10 eastbound (southbound) traffic movements. One right-turn lane would be provided for the westbound to I-10 westbound and eastbound to I-10 eastbound traffic movements. A five lane approach to Tangerine Road would be provided for both exit ramps.

**Table 2.25** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.25 – Tangerine Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Tangerine Road & I-10 Eastbound Ramps | 2030 A.M. | 32.0 | C | 90 |
| | 2030 P.M. | 48.9 | D | 120 |
| Tangerine Road & I-10 Westbound Ramps | 2030 A.M. | 30.1 | C | 90 |
| | 2030 P.M. | 43.2 | D | 120 |

**Figure 2.10 – Tangerine Road Diamond TI**



2.8.2.8 Relocated or New Interchanges

2.8.2.9 Selma Highway Diamond TI

A full diamond interchange would be relocated to Selma Highway from Jimmie Kerr Boulevard, with ramp connections to and from I-10. The traffic analysis was performed with three through lanes in each direction of travel on Selma Highway within the interchange area. **Figure 2.11** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

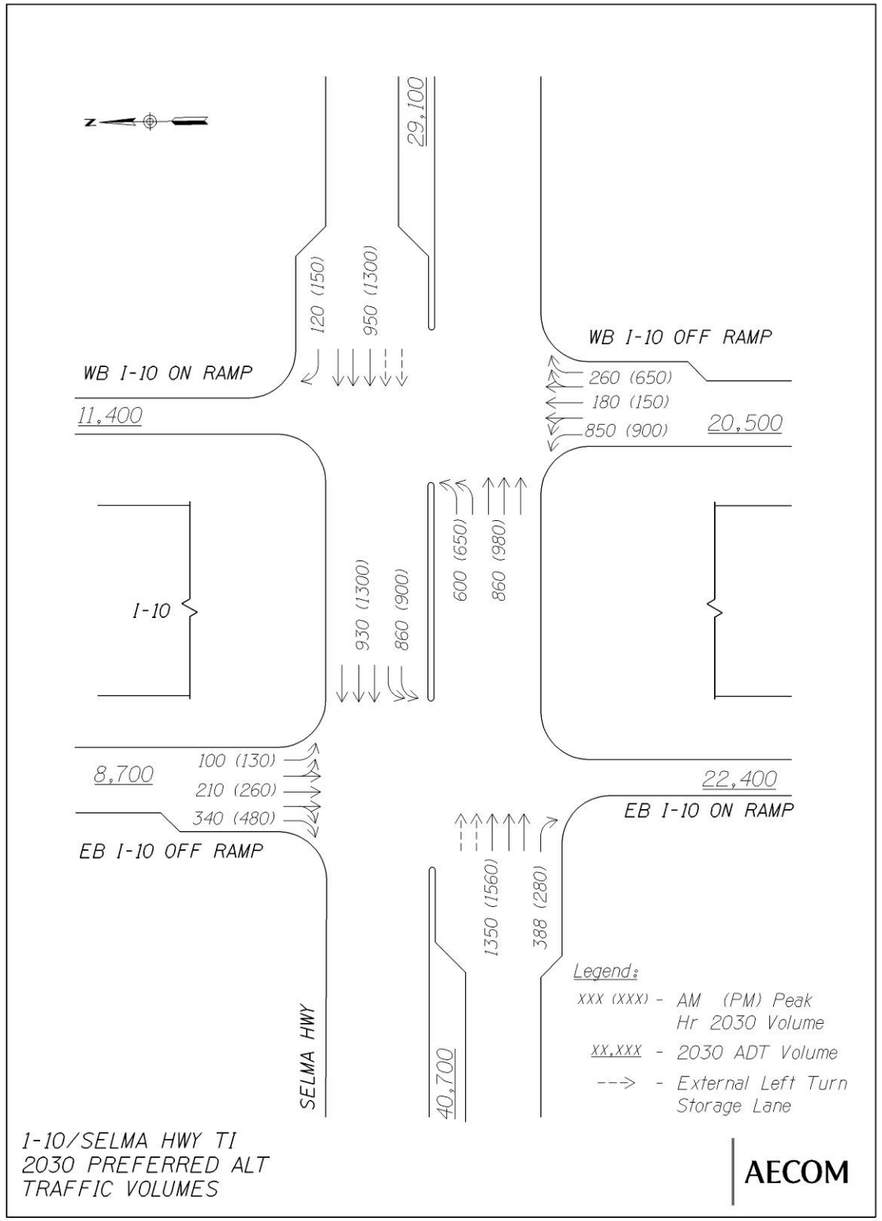
Two left-turn lanes would be provided for the Selma Highway eastbound to I-10 westbound (northbound) and Selma Highway westbound to I-10 eastbound (southbound) traffic movements. One right-turn lane would be provided for the Selma Highway eastbound to I-10 eastbound (southbound) and Selma Highway westbound to I-10 westbound (northbound) traffic movements. A five lane approach to Selma Highway would be required for both exit ramps.

**Table 2.26** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.26 – Selma Highway TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Selma Highway & I-10 Eastbound Ramps | 2030 A.M. | 28.3 | C | 110 |
| | 2030 P.M. | 28.5 | C | 110 |
| Selma Highway & I-10 Westbound Ramps | 2030 A.M. | 26.2 | C | 110 |
| | 2030 P.M. | 31.9 | C | 110 |

**Figure 2.11 – Selma Highway Diamond TI**



### 2.8.2.10 Sunland Gin Road Diamond TI

A full diamond interchange would be provided at Sunland Gin Road with ramp connections to and from I-10 and I-8. This new service interchange will be relocated approximately 1,000 feet south of the existing TI. The traffic analysis was performed with three through lanes in each direction of travel on Sunland Gin Road within the interchange area. **Figure 2.12** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

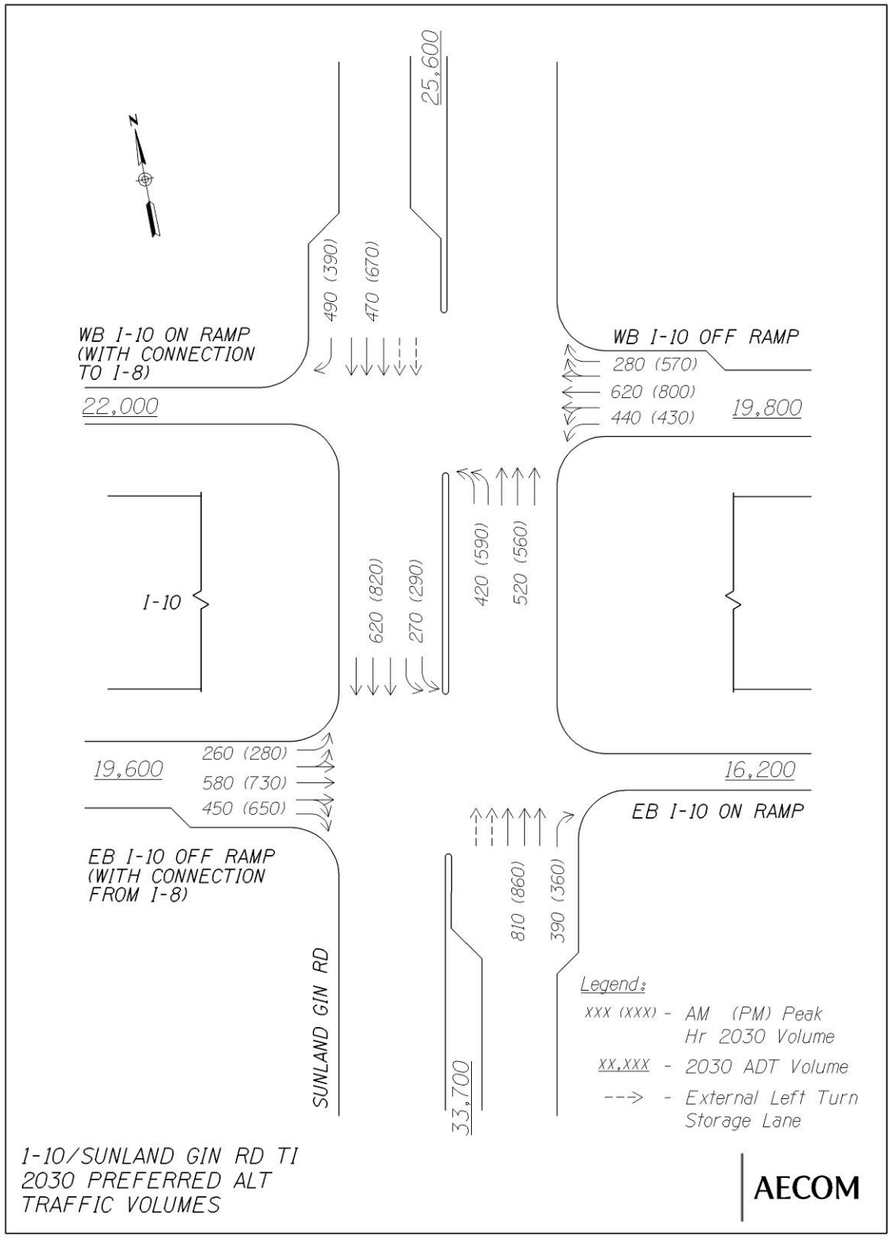
Two left-turn lanes would be provided for the Sunland Gin Road northbound to I-10 westbound and Sunland Gin Road southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the Sunland Gin Road northbound to I-10 eastbound and Sunland Gin Road southbound to I-10 westbound traffic movements. A five lane approach to Sunland Gin Road would be provided for both exit ramps.

**Table 2.27** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.27 – Sunland Gin Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Sunland Gin Road & I-10 Eastbound Ramps | 2030 A.M. | 35.9 | D | 120 |
| | 2030 P.M. | 35.6 | D | 110 |
| Sunland Gin Road & I-10 Westbound Ramps | 2030 A.M. | 39.1 | D | 120 |
| | 2030 P.M. | 45.8 | D | 110 |

**Figure 2.12 – Sunland Gin Road Diamond TI**



2.8.2.11 Pinal Airpark Road Diamond TI

A full diamond interchange would be provided at Pinal Airpark Road with ramp connections to and from I-10. The traffic analysis was performed with two through lanes in each direction of travel on Pinal Airpark Road within the interchange area. **Figure 2.13** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

Two left-turn lanes would be provided for the Pinal Airpark Road eastbound to I-10 westbound and Pinal Airpark Road westbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the westbound to I-10 westbound traffic movement, and a shared right-through lane would be provided for the eastbound to I-10 eastbound traffic movement. A five lane approach to Pinal Airpark Road would be provided for both exit ramps.

**Table 2.28** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.28 – Pinal Airpark Road TI Analysis**

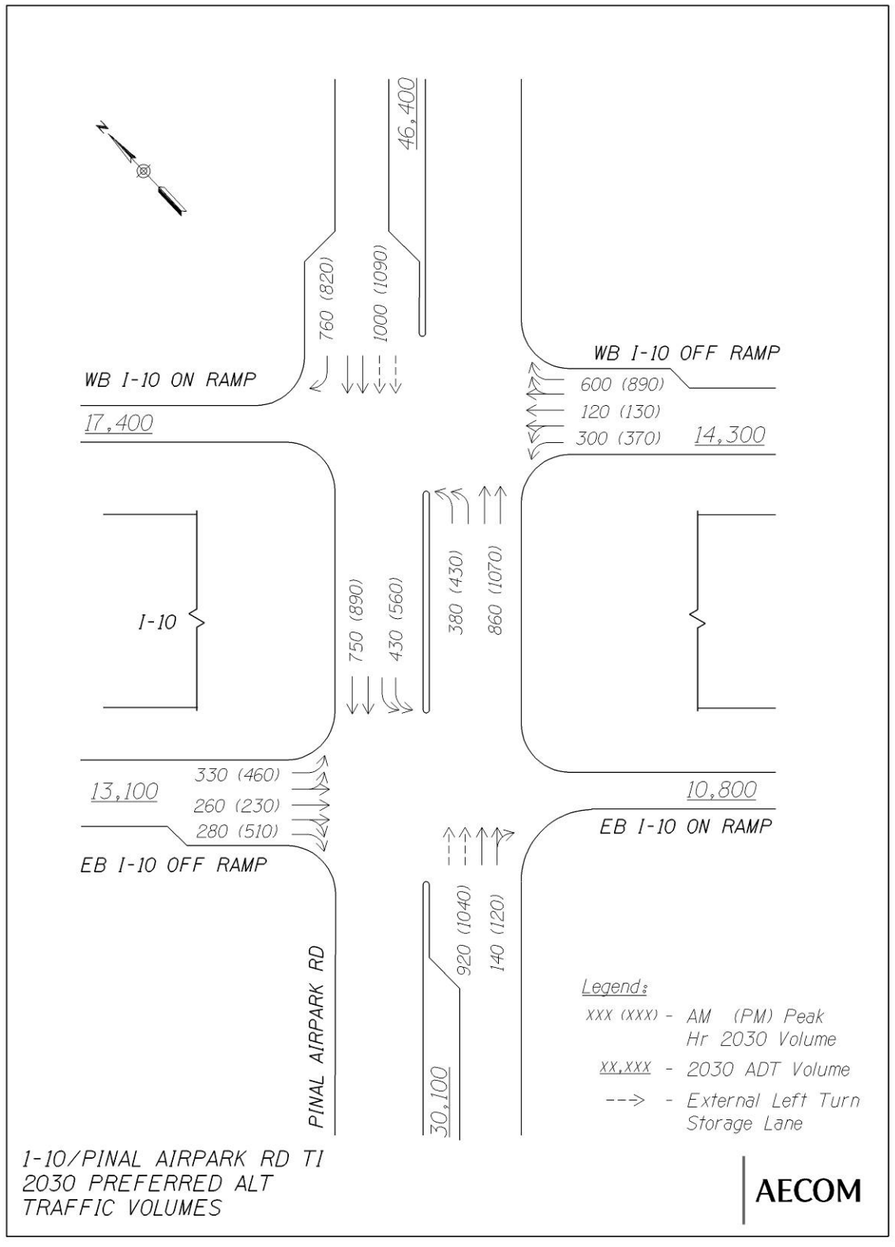
| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Pinal Airpark Road & I-10 Eastbound Ramps | 2030 A.M. | 21.4 | C | 90 |
| | 2030 P.M. | 38.7 | D | 136 |
| Pinal Airpark Road & I-10 Westbound Ramps | 2030 A.M. | 26.9 | C | 90 |
| | 2030 P.M. | 27.3 | C | 136 |

2.8.3 Future Viable Interchanges

Locations for future viable interchanges have been identified throughout the corridor, however these interchange would be implemented only if the surrounding lands are planned and developed to create a need for the interchange. These interchanges are assumed to be implemented by a local agency or private developer, therefore a design concept is not included in the DCR plans for these interchanges.

Implementation of the future viable interchanges shall follow the ADOT "Privately Funded Interchange Development Process" which is a uniform protocol for private entities to implement new interchanges on the state highway system. The latest handbook describing these procedures can be found on the ADOT website (www.azdot.gov). As a part of this process private entities must adhere to current ADOT access management recommendations.

**Figure 2.13 – Pinal Airpark Road Diamond TI**



2.8.3.1 Henness Road Diamond TI (Interstate 8)

A viable location for the future construction of a full diamond interchange is Henness Road on I-8 (MP 177). The traffic analysis was performed with two through lanes in each direction of travel on Henness Road within the interchange area. **Figure 2.14** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

One left-turn lane would be provided for the Henness Road northbound to I-8 westbound and Henness Road southbound to I-8 eastbound traffic movements. One right-turn lane would be provided for the northbound to I-8 eastbound traffic movement, and a shared right-through lane would be provided for southbound to I-8 westbound traffic movements. A five lane approach to Henness Road would be provided for both exit ramps.

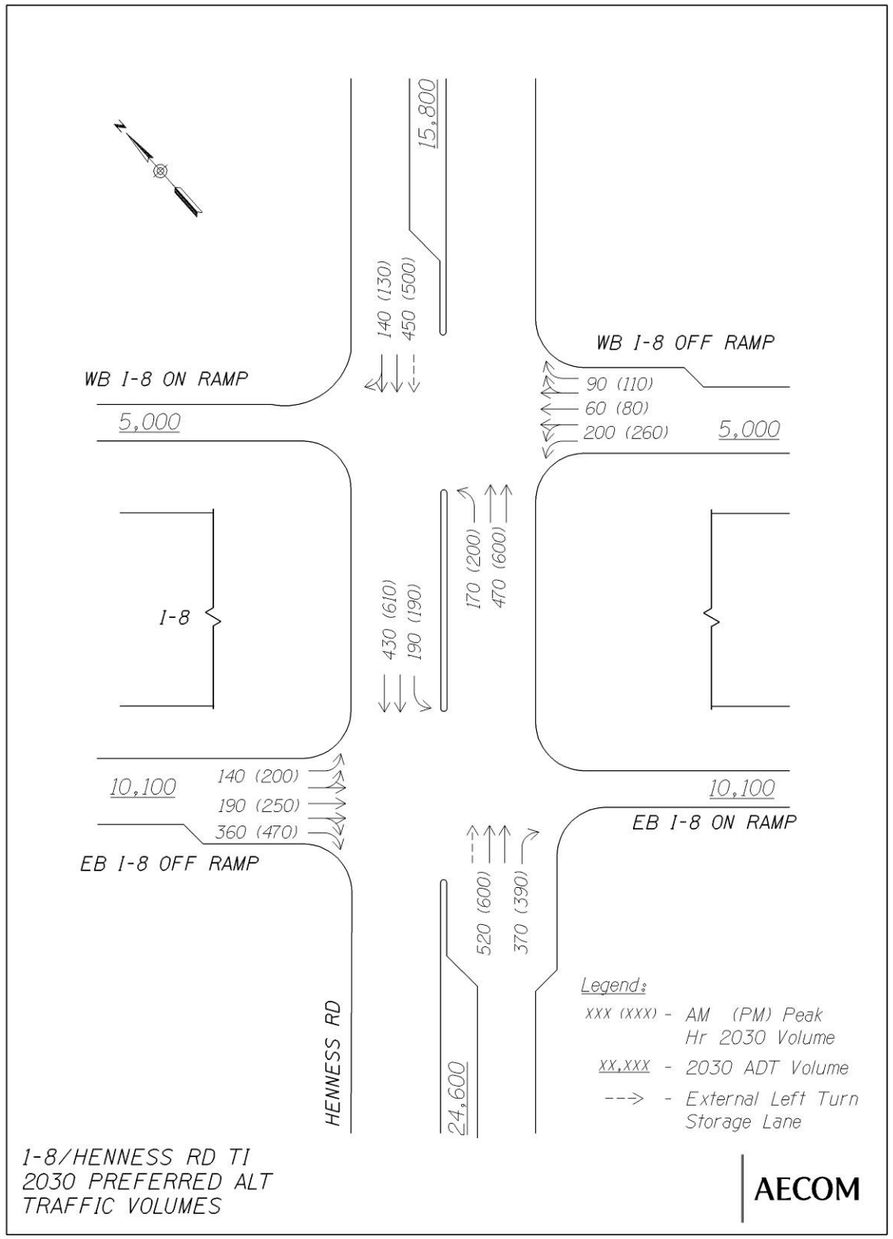
The proposed location for the Henness Road TI is about one mile west of the I-10/I-8 System Interchange, therefore Collector-Distributor (C-D) roadways are needed to maintain proper traffic operations along I-8 based on 2030 traffic volumes. At such time that the Henness Road TI is implemented, provisions for implementation of these C-D roadways must be included as part of a Design Concept for this interchange. Approval of the Henness Road TI will require a separate DCR, environmental document, and change of access request.

**Table 2.29** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.29 – Henness Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Henness Road & I-8 Eastbound Ramps | 2030 A.M. | 20.0 | B | 90 |
| | 2030 P.M. | 20.6 | C | 90 |
| Henness Road & I-8 Westbound Ramps | 2030 A.M. | 18.9 | B | 90 |
| | 2030 P.M. | 19.2 | B | 90 |

**Figure 2.14 - Henness Road Diamond TI (Interstate 8)**



### 2.8.3.2 Overfield Road Diamond TI

A viable location for the future construction of a full diamond interchange is Overfield Road (MP 202). The traffic analysis was performed with two through lanes in each direction of travel on Overfield Road within the interchange area. **Figure 2.15** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

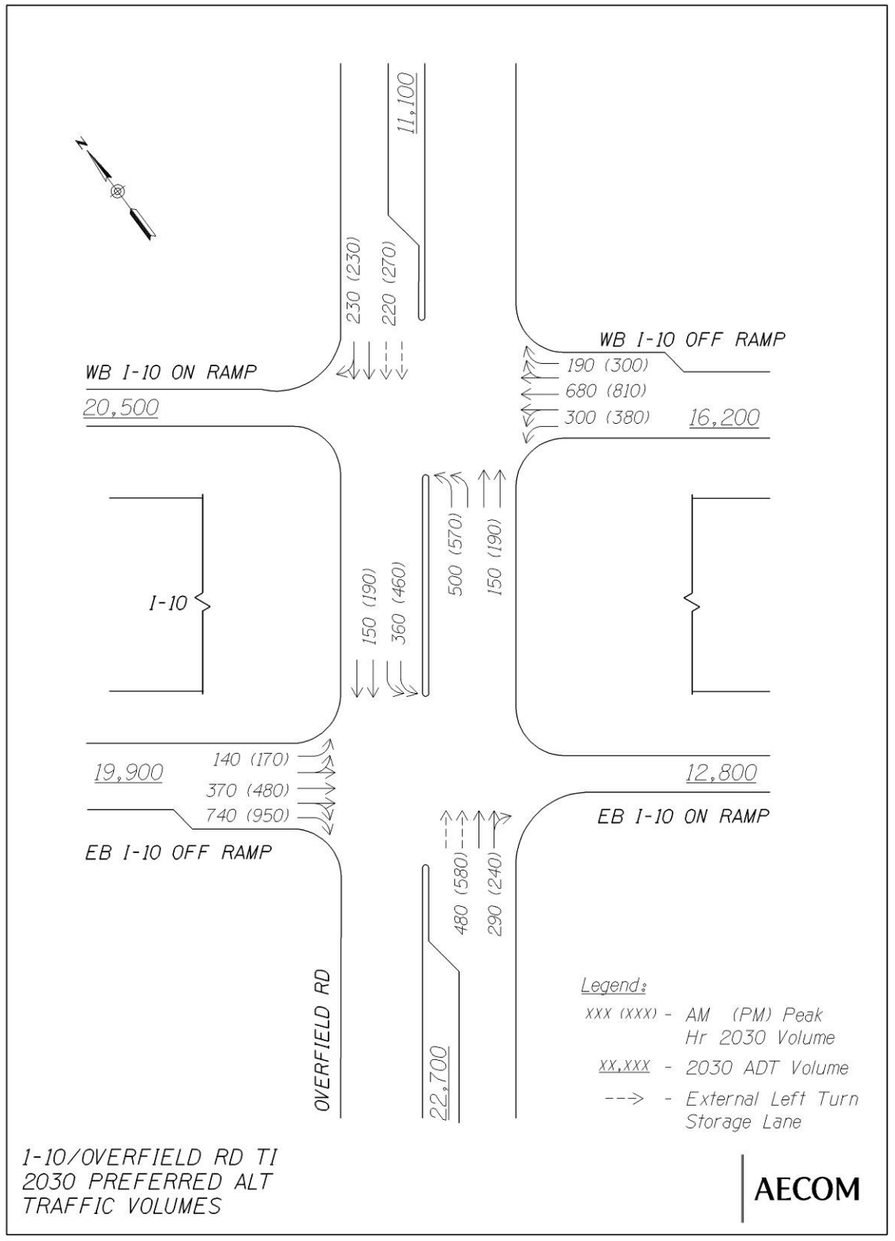
Two left-turn lanes would be provided for the northbound to I-10 westbound (northbound) and southbound to I-10 eastbound (southbound) traffic movements. A shared right-through lane would be provided for the northbound to I-10 eastbound and southbound to I-10 westbound traffic movements. A five lane approach to Overfield Road would be provided for both exit ramps.

**Table 2.30** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.30 – Overfield Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Overfield Road & I-10 Eastbound Ramps | 2030 A.M. | 23.9 | C | 90 |
| | 2030 P.M. | 24.7 | C | 90 |
| Overfield Road & I-10 Westbound Ramps | 2030 A.M. | 21.4 | C | 90 |
| | 2030 P.M. | 22.1 | C | 90 |

**Figure 2.15 – Overfield Road Diamond TI**



2.8.3.3 Battaglia Drive Diamond TI

A viable location for the future construction of a full diamond interchange is Battaglia Drive (MP 206). The traffic analysis was performed with three through lanes in each direction of travel on Battaglia Drive within the interchange area. **Figure 2.16** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

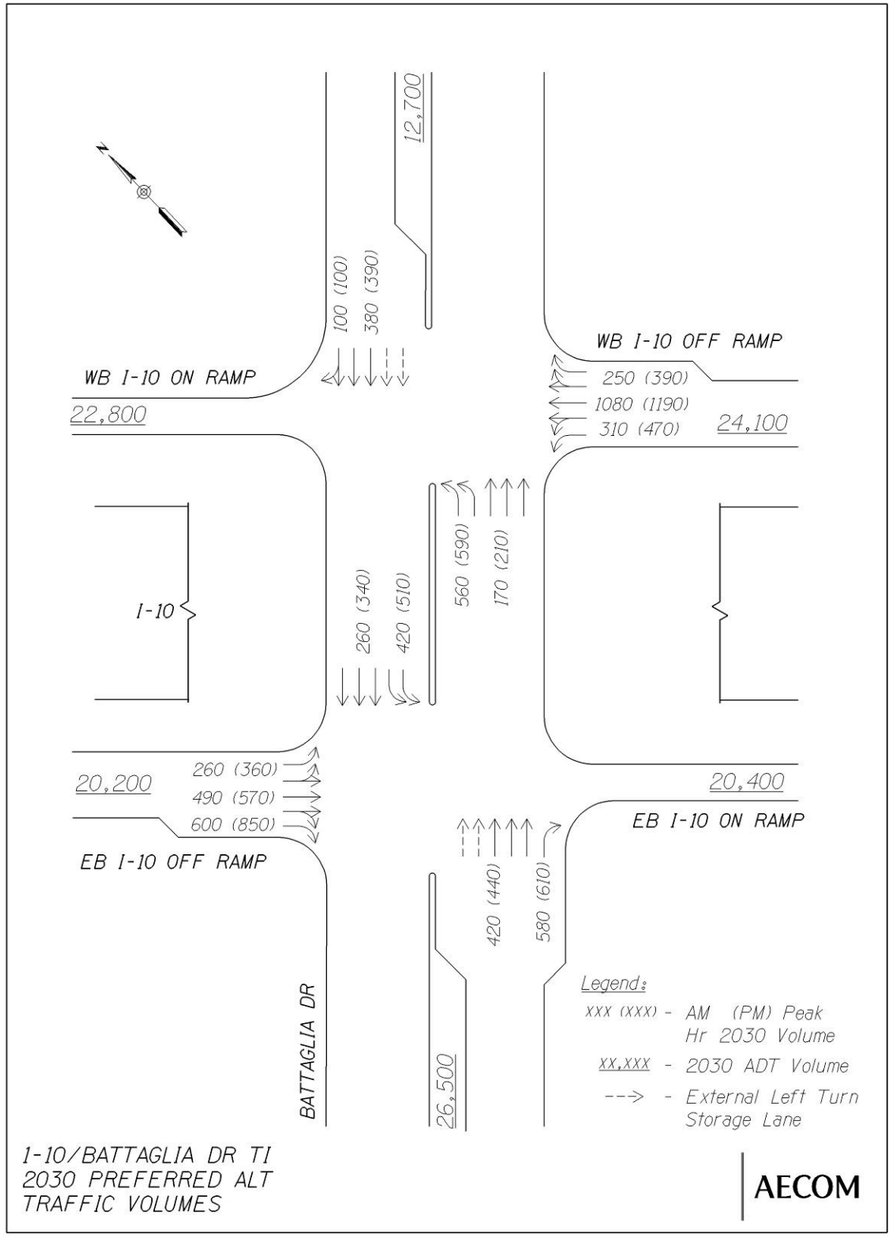
Two left-turn lanes would be provided for the Battaglia Drive eastbound to I-10 westbound (northbound) and Battaglia Drive westbound to I-10 eastbound (southbound) traffic movements. One right-turn lane would be provided for the eastbound to I-10 eastbound traffic movement, and a shared right-through lane would be provided for westbound to I-10 westbound traffic movements. A five lane approach to Battaglia Drive would be provided for both exit ramps.

**Table 2.31** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.31 – Battaglia Drive TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Battaglia Drive & I-10 Eastbound Ramps | 2030 A.M. | 36.5 | D | 110 |
| | 2030 P.M. | 52.3 | D | 120 |
| Battaglia Drive & I-10 Westbound Ramps | 2030 A.M. | 36.1 | D | 110 |
| | 2030 P.M. | 39.2 | D | 120 |

**Figure 2.16 – Battaglia Drive Diamond TI**



2.8.3.4 Picacho Highway Diamond TI

A viable location for the future construction of a full diamond interchange at Picacho Highway (MP 213). The traffic analysis was performed with two through lanes in each direction of travel on Picacho Highway within the interchange area. **Figure 2.17** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

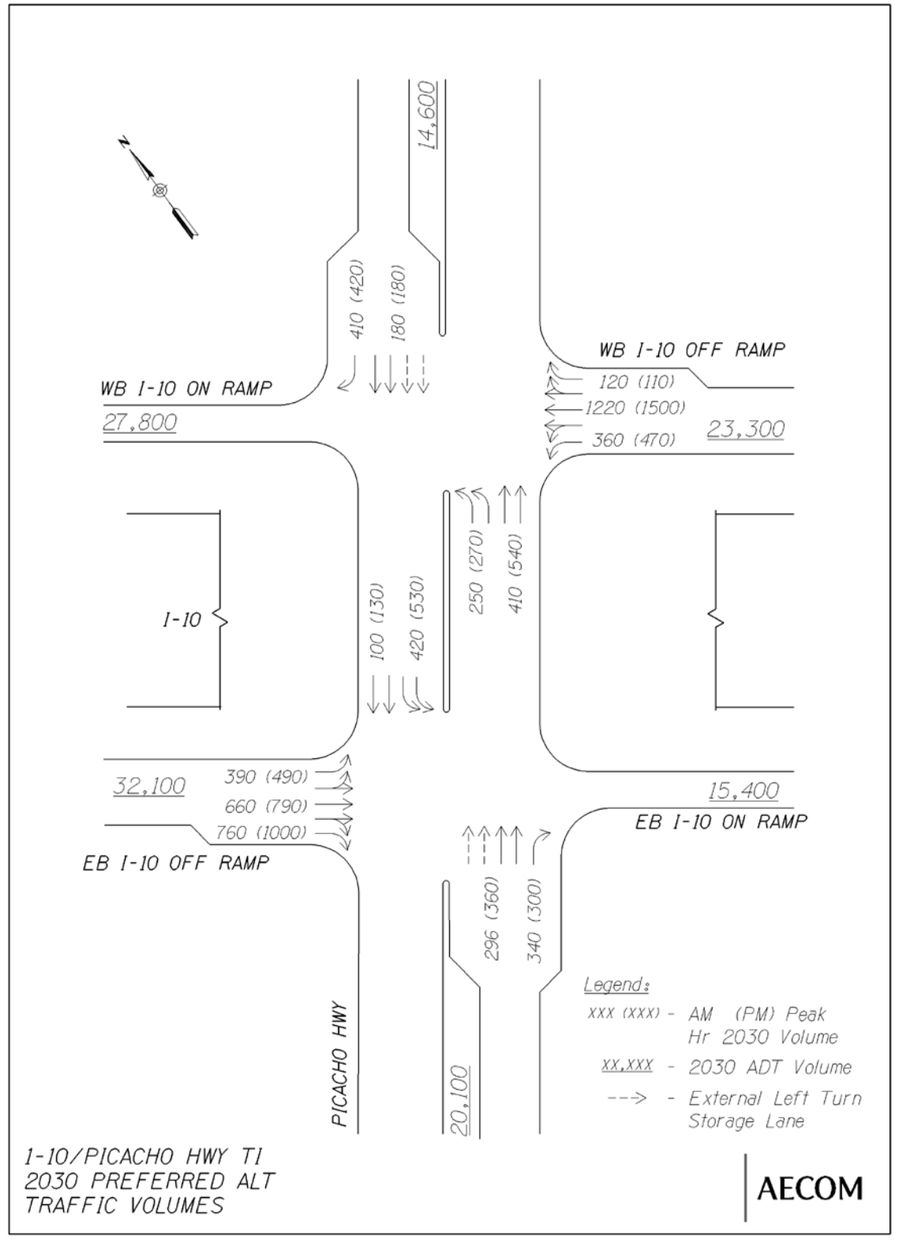
Two left-turn lanes would be provided for the Picacho Highway northbound to I-10 westbound and Picacho Highway southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the southbound to I-10 westbound and northbound to I-10 eastbound traffic movements. A five lane approach to Picacho Highway would be provided for both exit ramps.

**Table 2.32** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.32 – Picacho Highway TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Picacho Highway & I-10 Eastbound Ramps | 2030 A.M. | 31.5 | C | 90 |
| | 2030 P.M. | 38.1 | D | 110 |
| Picacho Highway & I-10 Westbound Ramps | 2030 A.M. | 33.4 | C | 90 |
| | 2030 P.M. | 44.0 | D | 110 |

**Figure 2.17 – Picacho Highway Diamond TI**



2.8.3.5 Greenes Road Diamond TI

A viable location for the future construction of a full diamond interchange is Greenes Road (MP 222). The traffic analysis was performed assuming that Greenes Road will only extend west of the interstate because a railroad switching yard is proposed east of the interstate. Greenes Road was analyzed with two through lanes in each direction of travel within the interchange area. **Figure 2.18** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

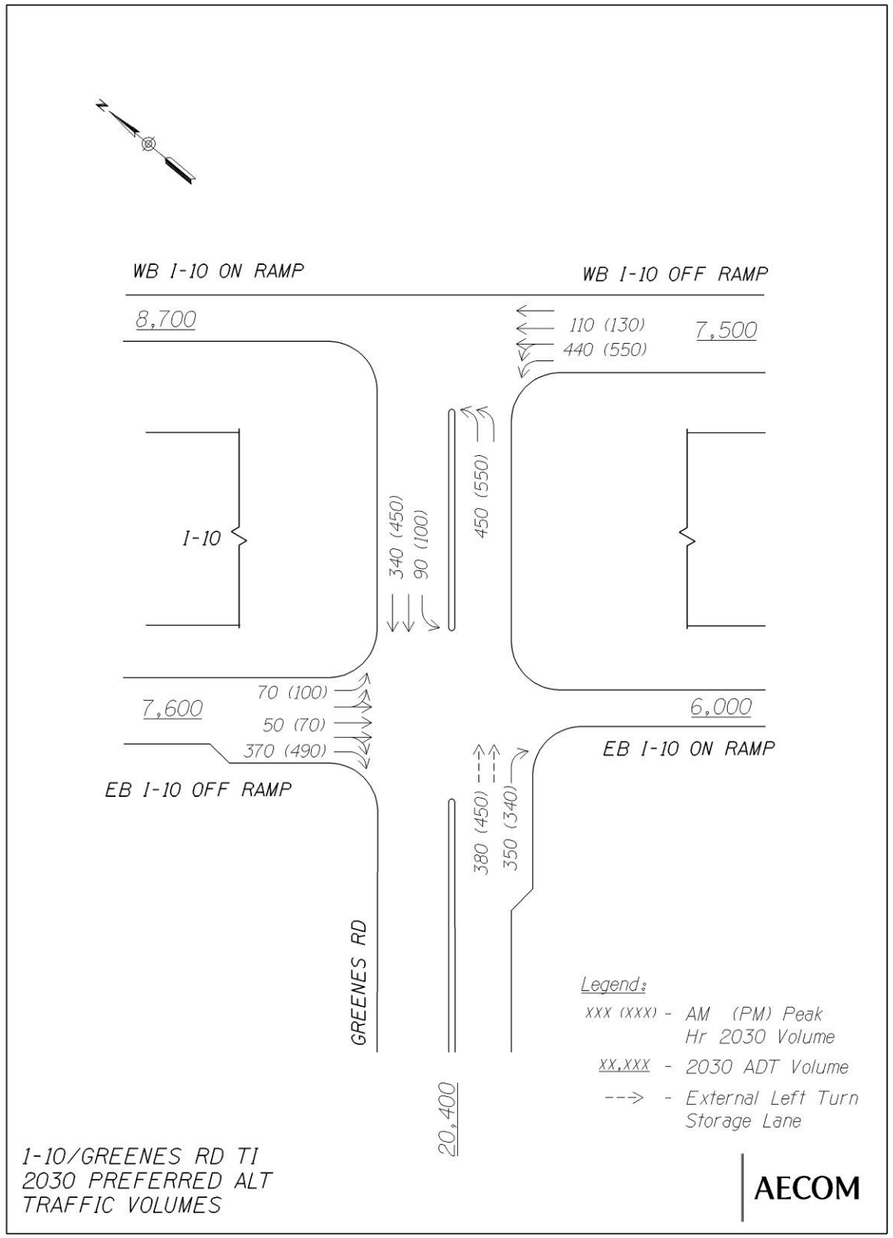
Two left-turn lanes would be provided for the Greenes Road northbound to I-10 westbound traffic movement (Greenes Road ends at the TI), and one left-turn lane would be provided for the Greenes Road southbound to I-10 eastbound traffic movement. A right-turn lane would be provided for the northbound to I-10 eastbound traffic movement. A five lane approach to Greenes Road would be provided for the eastbound exit ramp, and a four-lane approach would be provided for the westbound exit ramp.

**Table 2.33** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.33 – Greenes Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Greenes Road & I-10 Eastbound Ramps | 2030 A.M. | 13.2 | B | 50 |
| | 2030 P.M. | 13.8 | B | 50 |
| Greenes Road & I-10 Westbound Ramps | 2030 A.M. | 10.4 | B | 50 |
| | 2030 P.M. | 11.3 | B | 50 |

**Figure 2.18 – Greenes Road Diamond TI**



2.8.3.6 Park Link Drive Diamond TI

A viable location for the future construction of a full diamond interchange is Park Link Drive (MP 224). The traffic analysis was performed with three through lanes in each direction of travel on Park Link Drive within the interchange area. **Figure 2.19** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

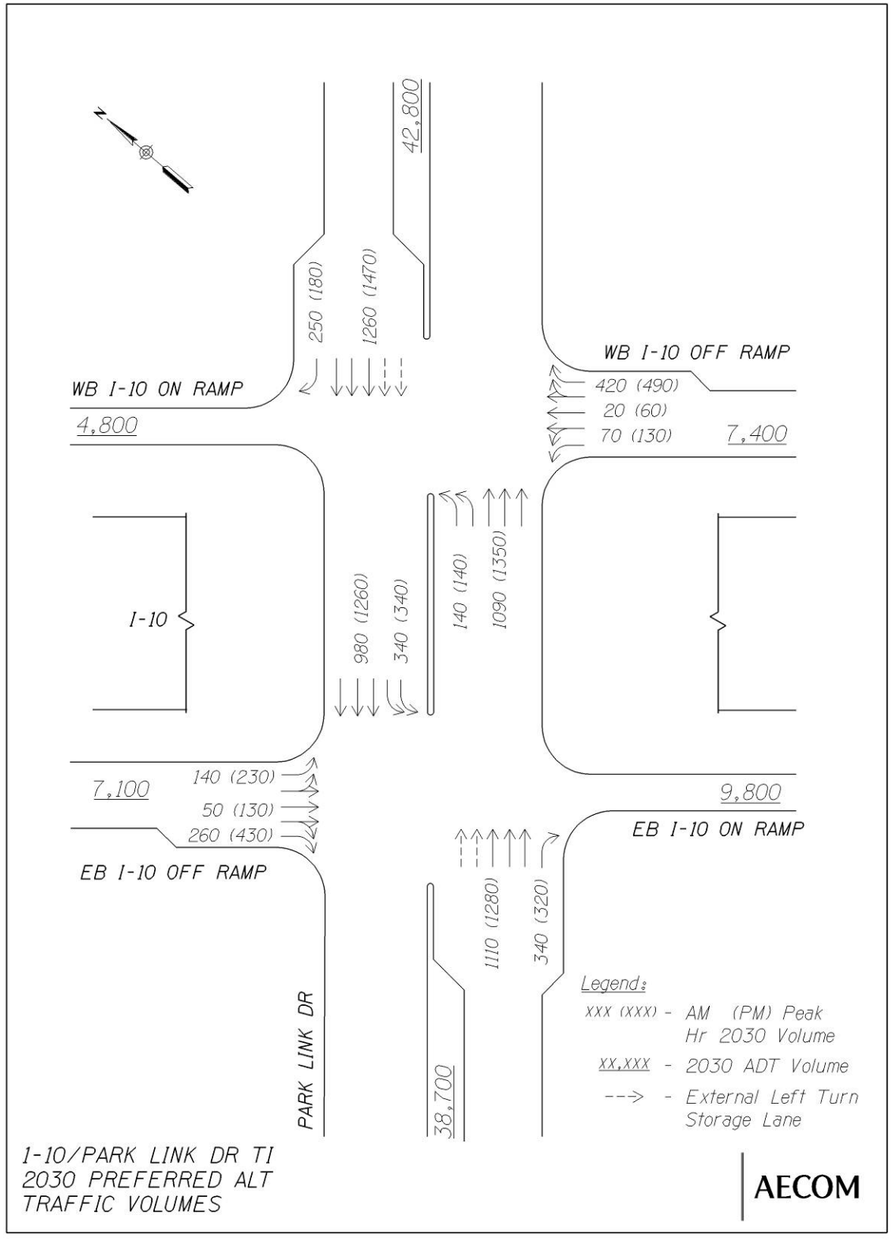
Two left-turn lanes would be provided for the Park Link Drive northbound to I-10 westbound and Park Link Drive southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the southbound to I-10 westbound and northbound to I-10 eastbound traffic movements. A five lane approach to Park Link Drive would be provided for both exit ramps.

**Table 2.34** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.34 – Park Link Drive TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Park Link Drive & I-10 Eastbound Ramps | 2030 A.M. | 15.1 | B | 90 |
| | 2030 P.M. | 17.1 | B | 90 |
| Park Link Drive & I-10 Westbound Ramps | 2030 A.M. | 13.5 | B | 90 |
| | 2030 P.M. | 15.1 | B | 90 |

**Figure 2.19 – Park Line Drive TI**



### 2.8.3.7 Aries Drive Diamond TI

A viable location for the future construction of a full diamond interchange is Aries Drive (MP 229). The traffic analysis was performed with three through lanes in each direction of travel on Aries Drive within the interchange area. **Figure 2.20** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

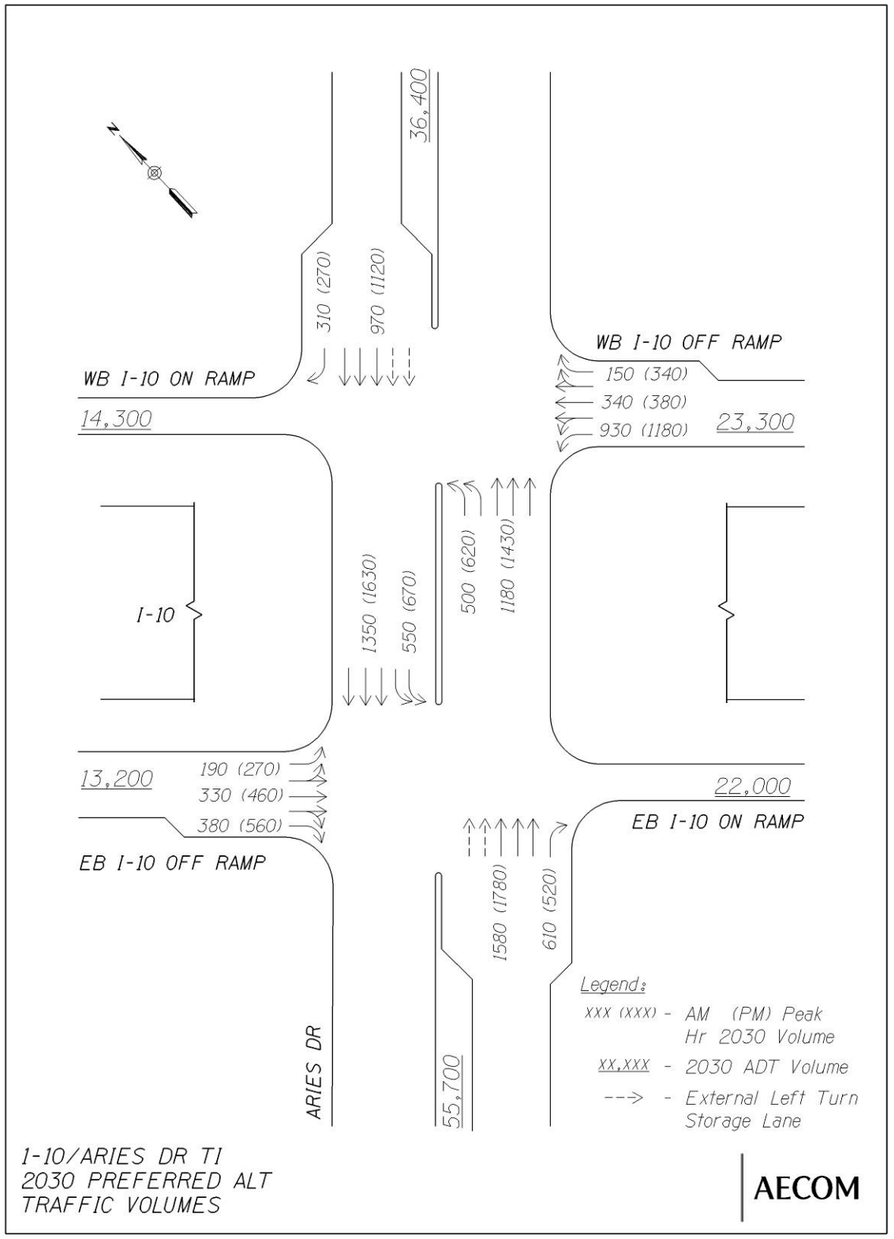
Two left-turn lanes would be provided for the Aries Drive northbound to I-10 westbound and Aries Drive southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the southbound to I-10 westbound and northbound to I-10 eastbound traffic movements. A five lane approach to Aries Drive would be provided for both exit ramps.

**Table 2.35** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.35 – Aries Drive TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Aries Drive & I-10 Eastbound Ramps | 2030 A.M. | 29.4 | C | 110 |
| | 2030 P.M. | 46.5 | D | 130 |
| Aries Drive & I-10 Westbound Ramps | 2030 A.M. | 24.7 | C | 110 |
| | 2030 P.M. | 38.4 | D | 130 |

**Figure 2.20 – Aries Drive Diamond TI**



2.8.3.8 Tortolita Boulevard Diamond TI

A viable location for the future construction of a full diamond interchange is Tortolita Boulevard (MP 233). The traffic analysis was performed with three through lanes in each direction of travel on Tortolita Boulevard within the interchange area. **Figure 2.21** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

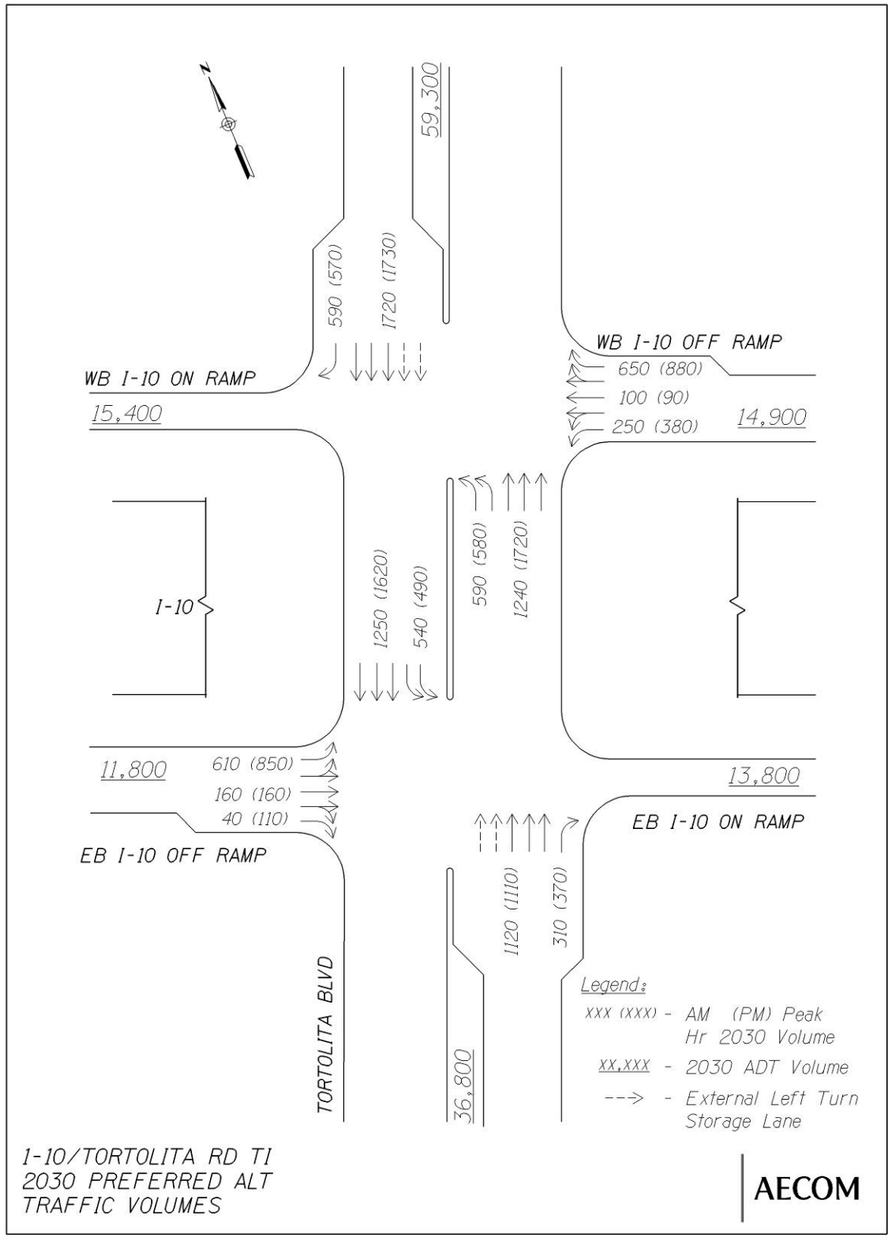
Two left-turn lanes would be provided for the Tortolita Boulevard northbound to I-10 westbound and Tortolita Boulevard southbound to I-10 eastbound traffic movements. One right-turn lane would be provided for the southbound to I-10 westbound and northbound to I-10 eastbound traffic movements. A five lane approach to Tortolita Boulevard would be provided for both exit ramps.

**Table 2.36** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.36 – Tortolita Boulevard TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Tortolita Boulevard & I-10 Eastbound Ramps | 2030 A.M. | 20.0 | C | 90 |
| | 2030 P.M. | 30.0 | C | 115 |
| Tortolita Boulevard & I-10 Westbound Ramps | 2030 A.M. | 28.3 | C | 90 |
| | 2030 P.M. | 40.6 | D | 115 |

**Figure 2.21 – Tortolita Boulevard Diamond TI**



### 2.8.3.9 Moore Road Diamond TI

A viable location for the future construction of a full diamond interchange is Moore Road (MP 238). The traffic analysis was performed with three through lanes in each direction of travel on Moore Road within the interchange area. **Figure 2.22** presents the traffic volumes used for the analysis, and the lane configuration resulting from the analysis.

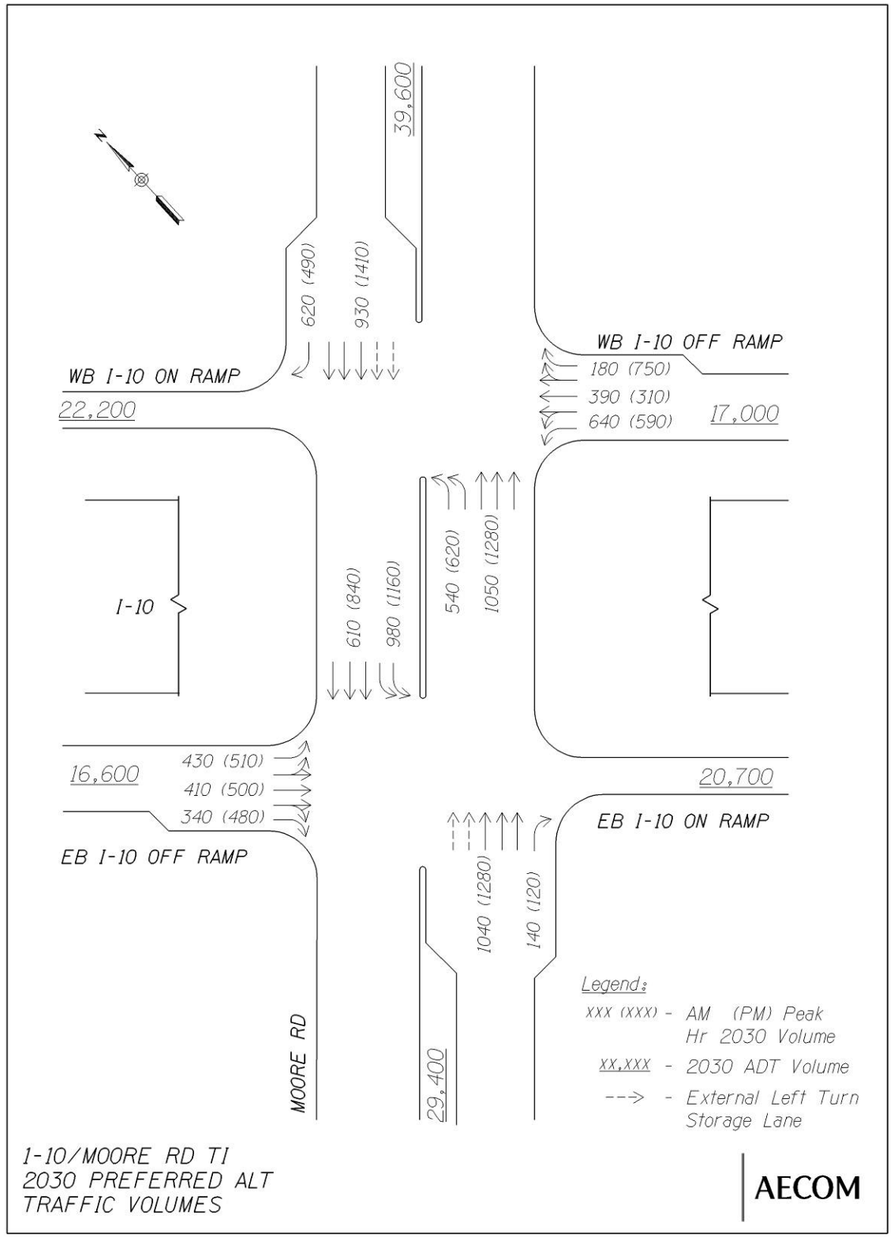
Two left-turn lanes would be provided for the Moore Road eastbound to I-10 westbound (northbound) and Moore Road westbound to I-10 eastbound (southbound) traffic movements. One right-turn lane would be provided for the westbound to I-10 westbound and eastbound to I-10 eastbound traffic movements. A five lane approach to Moore Road would be provided for both exit ramps.

**Table 2.37** presents the 2030 A.M. and P.M. peak hour delay with the corresponding level-of-service results.

**Table 2.37 – Moore Road TI Analysis**

| Intersection | Period | Average Delay (Sec/Veh) | Intersection Level of Service (LOS) | Cycle Length (Sec) |
|---|---|---|---|---|
| Moore Road & I-10 Eastbound Ramps | 2030 A.M. | 43.7 | D | 150 |
| | 2030 P.M. | 47.7 | D | 135 |
| Moore Road & I-10 Westbound Ramps | 2030 A.M. | 43.9 | D | 150 |
| | 2030 P.M. | 39.4 | D | 135 |

**Figure 2.22 – Moore Road Diamond TI**



## 2.9 I-10 / I-8 SYSTEM INTERCHANGE

To provide adequate access between I-10 and I-8 and ensure the ramp movements meet current design guidelines, the system interchange would be reconstructed at this location.

The traffic volumes, level of service, and lane configuration at the I-10/I-8 TI and the surrounding areas can be seen in **Figure 2.23 and Figure 2.24.**

All four system ramps (Ramp S-W, Ramp N-W, Ramp E-S, Ramp E-N) would be two-lane ramps. Ramp N-S would contain an entrance from Sunland Gin Road that would be developed as a parallel entrance. Ramp S-W could also contain a proposed tapered exit for Henness Road, if needed. Ramp E-N could contain a parallel entrance from Henness Road, if needed.

The I-10/I-8 System Interchange has been planned to provide an opportunity for the implementation of a new interchange at Henness Road. The proposed location of the Henness Road TI is about one-mile west of the I-10/I-8 system interchange which is considered less than desirable spacing between these interchanges. The design concept of the system interchange has been complicated by the incorporation of connector ramps for Henness Road which are braided (grade separations) with the system ramp connections.

The Henness Road connector ramps are only needed if the Henness Road TI is constructed, therefore provisions for these connector ramps must be included in the planning and implementation of the Henness Road TI. Approval of the Henness Road TI will require a separate DCR, environmental document and change of access request.

**Figure 2.23 – I-10/I-8 System Interchange 2030 Traffic Volumes**

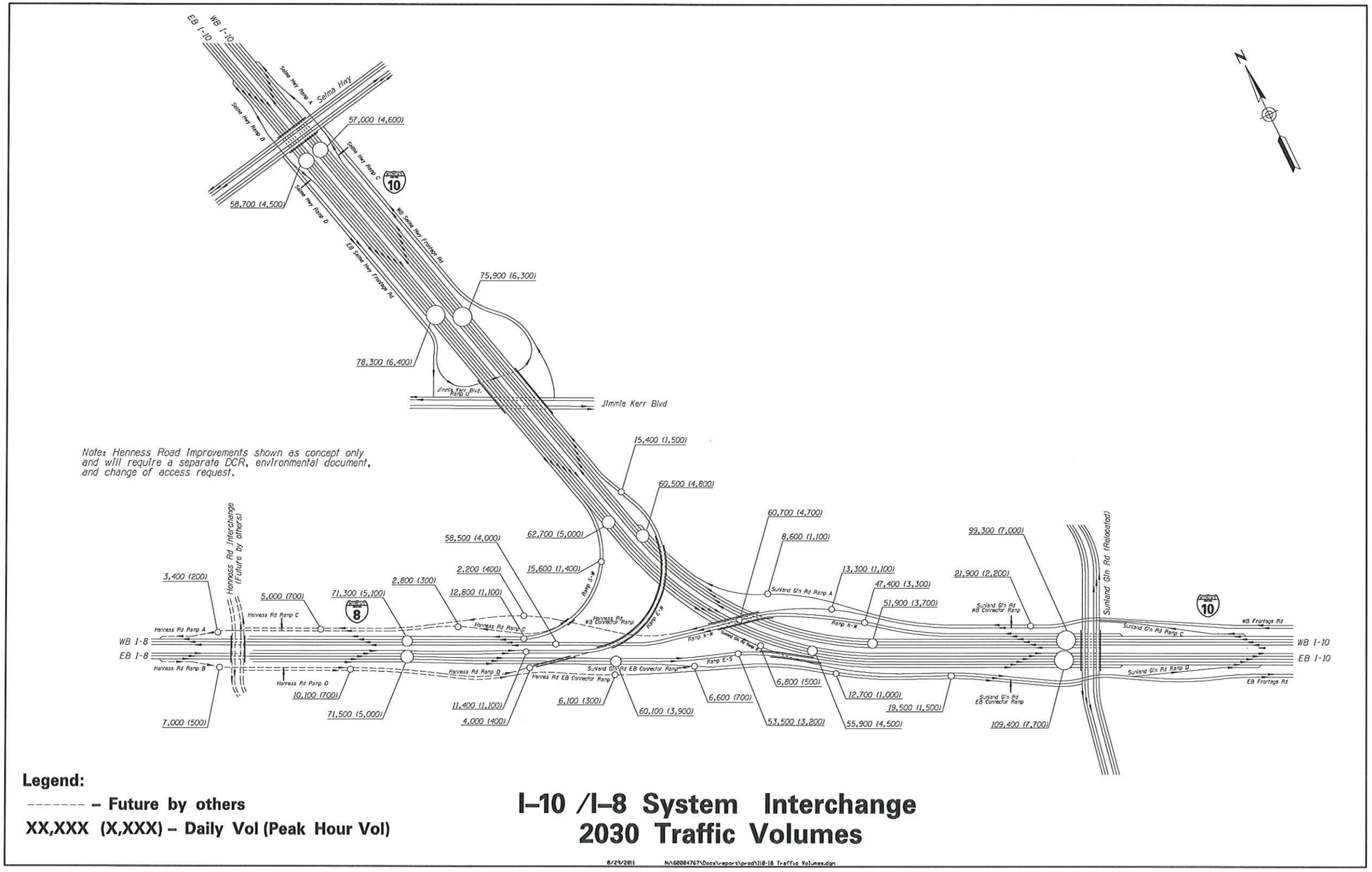
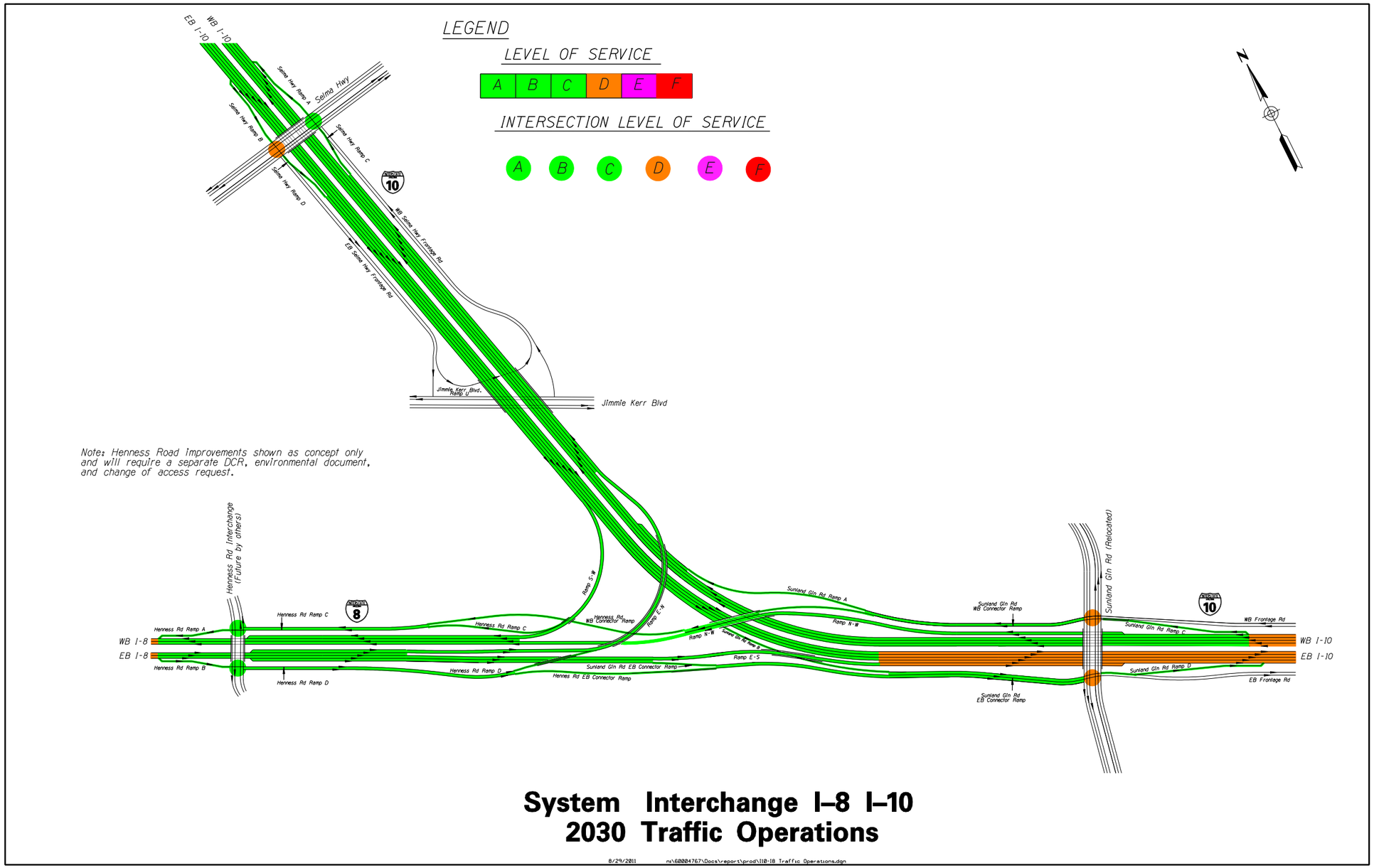


**Figure 2.24 – I-10/I-8 System Interchange 2030 Level of Service**



# 3.0 AASHTO Controlling Design Criteria

## 3.1 INTRODUCTION

The existing features of I-10 between Earley Road near its junction with I-8 at MP 196 to Tangerine Road at MP 240 were analyzed using the American Association of State Highway and Transportation Officials (AASHTO) Controlling Design Criteria outlined in *A Policy on Geometric Design of Highways and Streets (1990 edition)*, also known as the AASHTO Green Book. The analysis of vertical curve stopping sight distance is based on the 2001 AASHTO Green Book, using ADOT's "Vertical Curve Analyzer 2001".

## 3.2 AASHTO NON-CONFORMING GEOMETRIC DESIGN ELEMENTS

A complete listing of the existing I-10 features and evaluation results of the AASHTO criteria are presented within the AASHTO Controlling Criteria Report, dated December 2006. This report is included in Appendix A (Volume 2 of 3), along with a summary of the horizontal and vertical sight distance calculations for the existing features.

The preferred alternative for this project proposes to reconstruct all elements of the corridor. Therefore, all of the existing non-conforming AASHTO features would be reconstructed upon completion of the long range plan, and no design exceptions based on AASHTO controlling criteria are required.

The Implementation Plan described in Section 6.0 of this document indicates that the preferred alternative could be constructed in various stages of development. Individual projects within these development stages may not upgrade all of the non-conforming design elements. Therefore, each implementation project should review the non-conforming elements listed in Appendix A to determine if design exceptions need to be requested.

## 3.3 ADOT NON-CONFORMING GEOMETRIC ELEMENTS

Design elements of the preferred alternative that would not conform to ADOT Roadway Design Guidelines (RDG) include the following:

I-10 Mainline (Eastbound and Westbound) -

Two horizontal curves do not meet the required length of curve.

1. Station 12320+00 to 12324+18.68 (HPI Station 12322+09.34; the proposed 418.68 ft length of the 1 degree delta curve does not meet the required 900 ft minimum length of curve.
2. Station 12324+18.68 to 12328+40.95 (HPI Station 12326+29.82; the proposed 422.28 ft length of the 1 degree delta curve does not meet the required 900 ft minimum length of curve.

These horizontal curves create a shift in the ultimate centerline of 7 feet north of the existing I-10 centerline. This shift is proposed to simplify maintenance of traffic during the reconstruction of the freeway.

This shift in the I-10 alignment could be designed to avoid non-conforming design guidelines, however during the development of this DCR a privately funded interchange at Tortollita Boulevard was being designed. The final design of this interchange was beyond 95% complete, and a decision was made to not propose any geometric elements which would require a modification to the design of the Tortollita Boulevard interchange. This DCR assumes the Tortollita Boulevard interchange will be constructed as proposed in the design plans prepared during the development of this report.

At the time that ADOT moves forward with more detailed design of the I-10 corridor where these two horizontal curves are located, alternative designs could be considered.

# 4.0 DESIGN CONCEPT ALTERNATIVES

## 4.1 INTRODUCTION

This section of the Design Concept Report documents design options that were considered and evaluated to plan the I-10 Corridor to accommodate future traffic volumes. For discussion purposes the options are divided into four (4) categories as follows:

- Traffic Interchange Location Options – evaluated the location and configuration of existing and future interchanges along the corridor to properly plan for the access needs of the adjacent communities.

- Corridor Cross Section Options – evaluated the number and configuration of lanes required in each direction along the freeway and the inclusion of parallel frontage roads.

- I-10/I-8 System Interchange Options (MP 199) – evaluated potential solutions to the design issues associated with this freeway to freeway (system) interchange.

- Community of Picacho Options (MP 210 to MP 213) – evaluated freeway alignments through Picacho to assess the unique impacts on this unincorporated community.

Based on the regional travel demand for central and southern Arizona, the project team recommended that I-10 be planned to accommodate the maximum amount of traffic that can be served by a conventional freeway (10 lanes), and include flexibility within the corridor for future traffic enhancements. Additional travel demand within central and southern Arizona would need to be accommodated by planning new transportation corridors to alleviate travel demand along I-10. The project team recommended that a conventional freeway should not include more than five general purpose lanes in each direction of travel, and any additional capacity would need to be provided by another facility.

The project team presented these recommendations to ADOT Management in June of 2006. Since that time, additional studies have been initiated to review other freeway and rail corridors through central Arizona that could provide additional transportation capacity to the region.

## 4.2 NO-BUILD ALTERNATIVE

The design options identified in this chapter were compared against a No-Build alternative which include some improvements to the existing conditions.

### 4.2.1 Definition of the No-Build Alternative

The No-Build Alternative is limited to include improvements within the study area that have been programmed or planned at the time of this study which include;

- ADOT has programmed improvements to I - 10 to expand the mainline to six lanes (three lanes in each direction).

- A privately funded interchange is proposed at Tortolita Boulevard (MP 234).

- The Red Rock area is currently under development by Pulte Homes south of Interstate 10 along Sasco Road. The proposed roadway system is depicted in Figure 4.1.

- The Town of Marana adopted a Major Routes Plan in January of 2006 which includes the expansion of existing roadways and new corridors within the Town of Marana. This proposed roadway system is depicted in Figure 4.2.

**Figure 4.1 – Red Rock Area Roadway Plan**

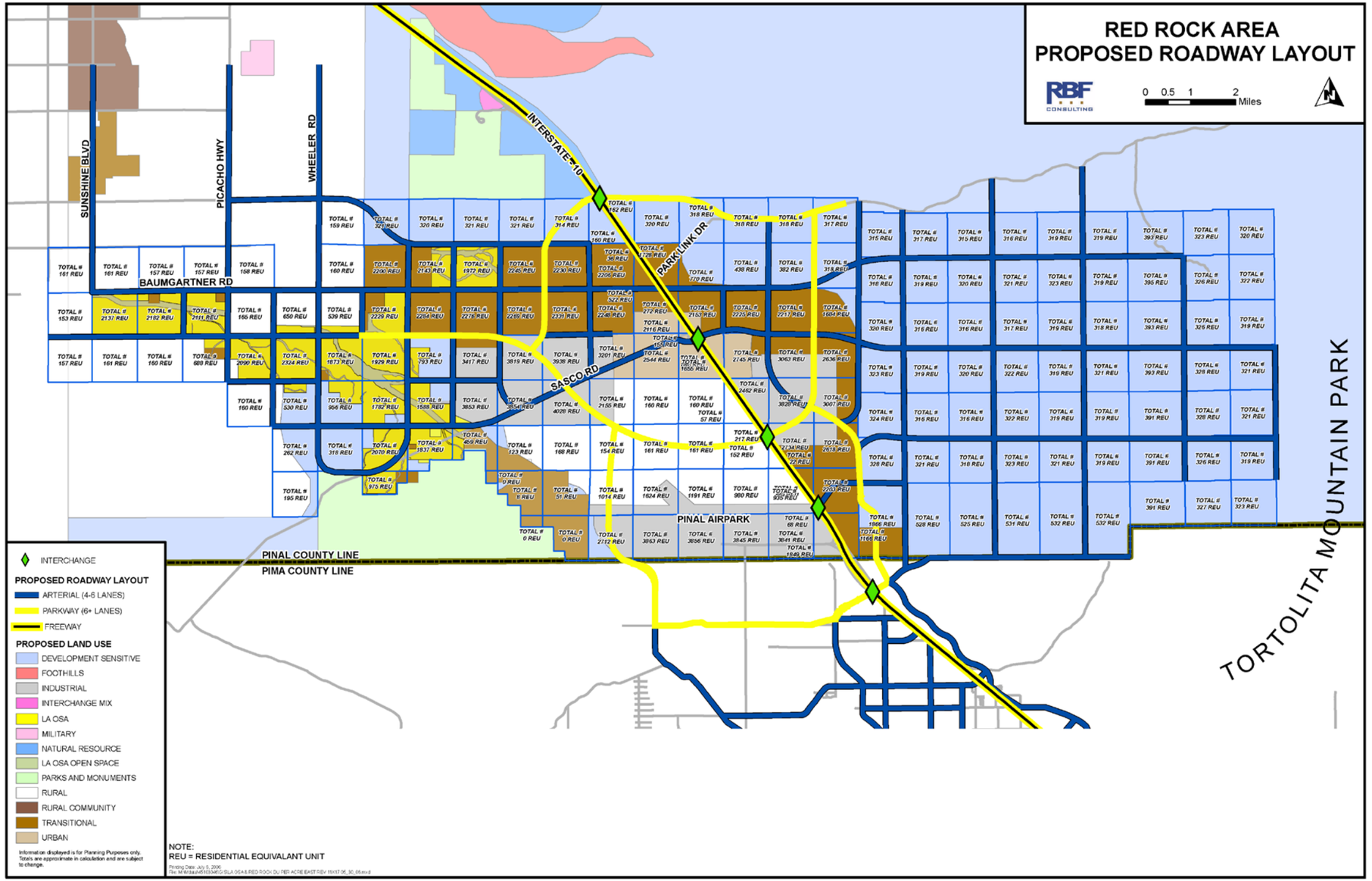
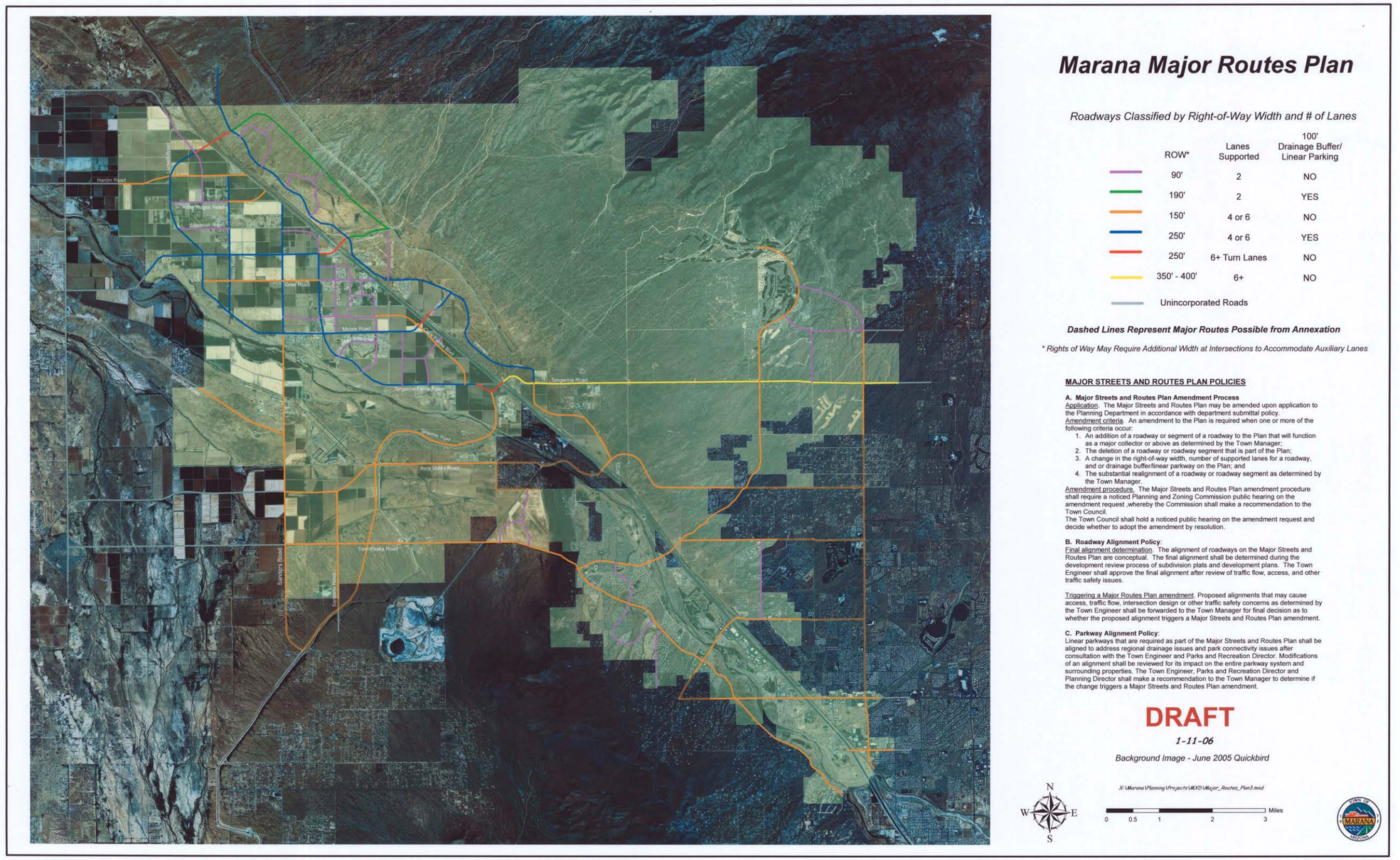


**Figure 4.2 – Marana Major Routes Plan**



### 4.2.2 No-Build Alternative Evaluation

The volumes predicted for I-10 No-Build Alternative range from about 110,000 vehicles per day (vpd) near the I-8 interchange (MP 199) to about 425,000 vpd near the Tangerine interchange (MP 240). This level of traffic volumes far exceeds the capacity of a six lane freeway and the majority of the freeway is predicted to operate at Level of Service F during extended periods.

The No-Build Alternative is not recommended for the following reasons;

- The No-Build Alternative would not accommodate future travel demand, and the majority of the corridor would operate at LOS F during extended periods.
- The No-Build Alternative does not support the designation of I-10 as a part of the CANAMEX trade corridor. The expected traffic delays based on future demand would delay regional, interstate, and international trade throughout central Arizona.
- The No-Build Alternative would not improve the existing geometric deficiencies identified in Section 3.0 of this report.
- The No-Build Alternative would not enhance access to adjacent properties or provide an alternative route because the frontage road system would remain discontinuous.

However, the No-Build Alternative will continue to be carried forward for evaluation in the Environmental Assessment.

## 4.3 CORRIDOR CROSS SECTION OPTIONS

The purpose of this analysis was to establish recommendations for design elements of I-10 that would define the cross sectional character of the corridor. These design elements will define a standard cross section that will be applied to the ultimate configuration of I-10. To establish this cross section, the number of lanes, median widths, drainage concepts, constructability, right-of-way and physical constraints were evaluated.

This corridor is currently designated as a rural interstate; however, based on the future conditions of the study area the character of the corridor is expected to become more urbanized over time.

Based on the traffic model projections, future travel demand will require the I-10 corridor to be planned for a high capacity conventional freeway and it was determined that a maximum ten-lane cross section should be planned for the corridor, but flexibility for additional capacity should be included for the ultimate condition of I-10. However, an eight-lane concept was evaluated because this configuration would generally fit within the existing ROW. This led to the creation of four roadway cross sections for the ultimate I-10 corridor plan that include various combinations of lane numbers and median widths. These options include:

- Cross Sectional Option 1: 4-lanes in each direction with an open median
- Cross Sectional Option 2: 5-lanes in each direction with a closed median and continuous one-way frontage roads
- Cross Sectional Option 3: 5-lanes in each direction with an open median
- Cross Sectional Option 4: 5-lanes in each direction with an open median and continuous one-way frontage roads

Figure 4.3 presents these four corridor options and how the lane arrangements and median widths compare to the existing conditions.

### 4.3.1 Corridor Cross Section Option Evaluation

An evaluation was completed for the four (4) corridor options which utilized various evaluation criteria. **Table 4.1** shows the evaluation matrix which compares the cross section options based on the evaluation criteria.

***Corridor Option 1 – 4 lanes in each direction with an open median***

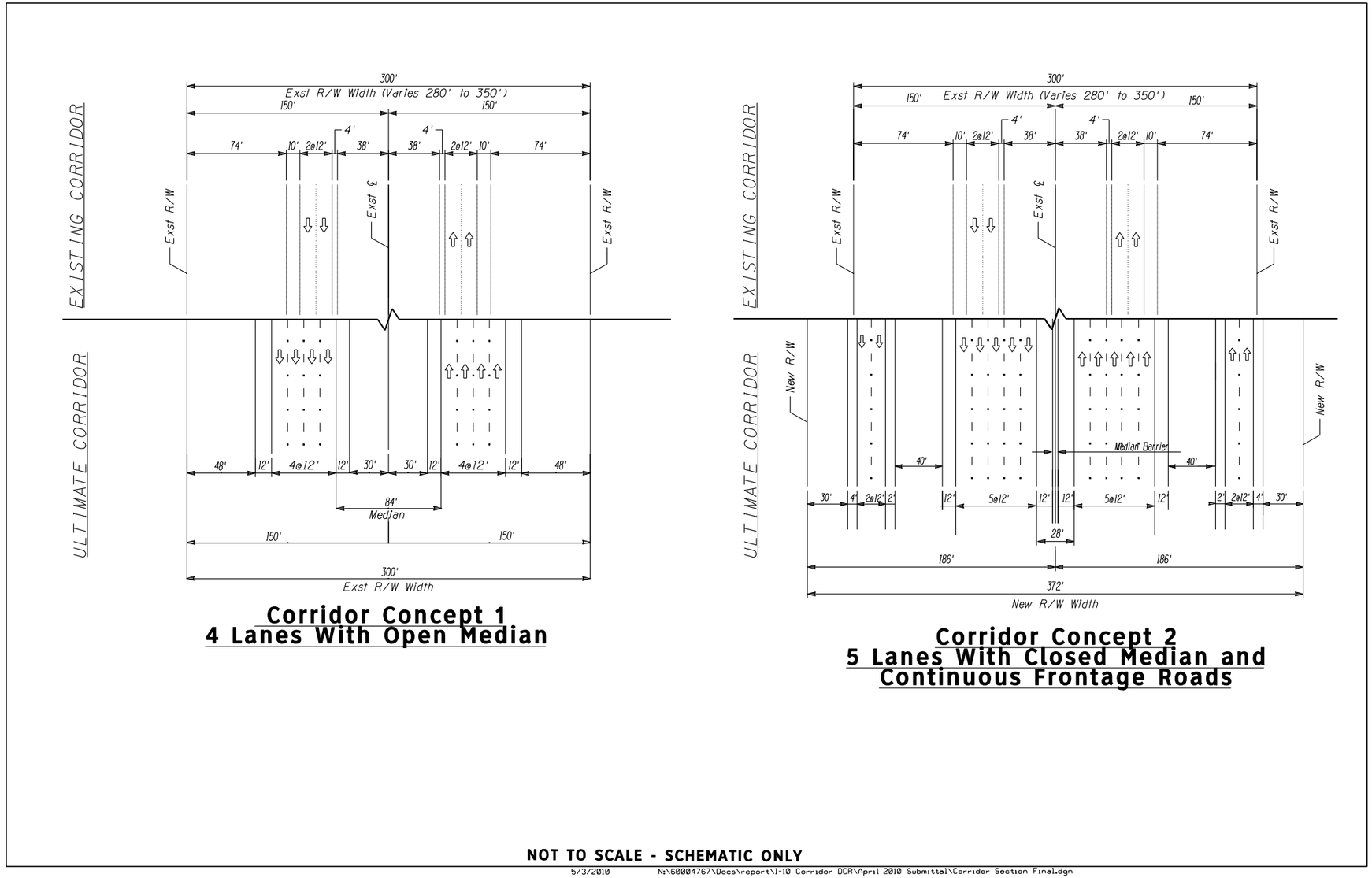
This concept would fit within the existing right-of-way width and provides an open median. However, this concept only plans for four (4) lanes in each direction, and if a fifth lane were added it would need to be constructed in the median.

**Table 4.1 – Corridor Cross Section Evaluation Matrix**

| | No Build | Concept 1<br>8 Lane Freeway with Open Median | Concept 2<br>10 Lane Freeway with Closed Median (Continuous Frontage Roads) | Concept 3<br>10 Lane Freeway with Open Median | Concept 4<br>10 Lane Freeway with Open Median (Continuous Frontage Roads) |
|---|---|---|---|---|---|
| **Mainline Capacity** | ○ Roadway capacity will not meet predicted traffic volumes | ○ Four lanes in each direction provides the lowest capacity | ● Five lanes in each direction plus frontage roads provides the highest capacity | ◒ Five lanes in each direction provides high capacity | ● Five lanes in each direction plus frontage roads provides the highest capacity |
| **Roadside Design Features** | ○ Existing overcrossings do not provide adequate clear zone | ◒ Sufficient clear zone along mainline and open median | ◒ Closed median requires a barrier, sufficient clear zone along mainline | ● Sufficient clear zone along mainline and desirable (84 feet) open median | ● Sufficient clear zone along mainline and desirable (84 feet) open median |
| **Flexibility for Corridor Expansion** | N / A | ◒ Open median allows for future flexibility to add capacity | ◒ Closed median limits flexibility to add capacity in the future | ◒ Open median allows for future flexibility to add capacity | ● Open median and frontage roads allows for the greatest flexibility to add capacity |
| **Flexibility during mainline incidents** | ○ Discontinuous frontage roads do not provide adequate detour route; existing roadway width limits ability to bypass incidents | ◒ Open median allows for emergency access, however no detour capacity is included | ◒ Closed median restricts emergency access, frontage roads provide a detour route | ◒ Open median allows for emergency access, however no detour capacity is included | ● Open median allows for emergency access; frontage roads provide a detour route |
| **Estimated Corridor Costs** | N / A | ● Lowest estimated costs to implement corridor improvements; requried structure length is 234 feet | ◒ 10 lane freeway and continuous barrier estimated to increase costs; required structure length is 206 feet | ◒ 10 lane freeway, additional right-of-way, and required structure length is 264 feet | ○ 10 lane freeway, frontage roads, additional right-of-way, and required structure length is 264 feet |
| **Constructability** | N / A | ◒ Sufficient width to maintain three lanes in each direction during construction | ● Desirable width to maintain three lanes in each direction during construction | ○ Limited width available to maintain three lanes in each direction during construction | ◒ Sufficient width to maintain three lanes in each direction during construction |
| **Compatibility with Environmental Resources** | ◒ Predicted traffic congestion may contribute to air quality issues | ● Concept fits within existing right-of-way | ◒ Concept is expected to impact areas outside existing right-of-way | ◒ Concept is expected to impact areas outside existing right-of-way | ◒ Concept is expected to have greatest impact to areas outside existing right-of-way |
| **Compatibility with Existing Right of Way width** | ● Concept fits within existing right-of-way | ● Concept fits within existing right-of-way | ◒ Concept is expected to require additional right-of-way | ◒ Concept is expected to require additional right-of-way | ◒ Concept is expected to require the greatest amount of additional right-of-way |
| **Recommend for Further Study** | **NO** | **NO** | **YES (Urban areas only)** | **NO** | **YES (Rural areas only)** |

LEGEND: ○ Least Desirable ◒ Somewhat Desirable ◒ Moderately Desirable ● Most Desirable

**Figure 4.3 – Corridor Cross Section Concepts**




**Corridor Concept 1**
**4 Lanes With Open Median**

**Corridor Concept 2**
**5 Lanes With Closed Median and Continuous Frontage Roads**

**NOT TO SCALE - SCHEMATIC ONLY**

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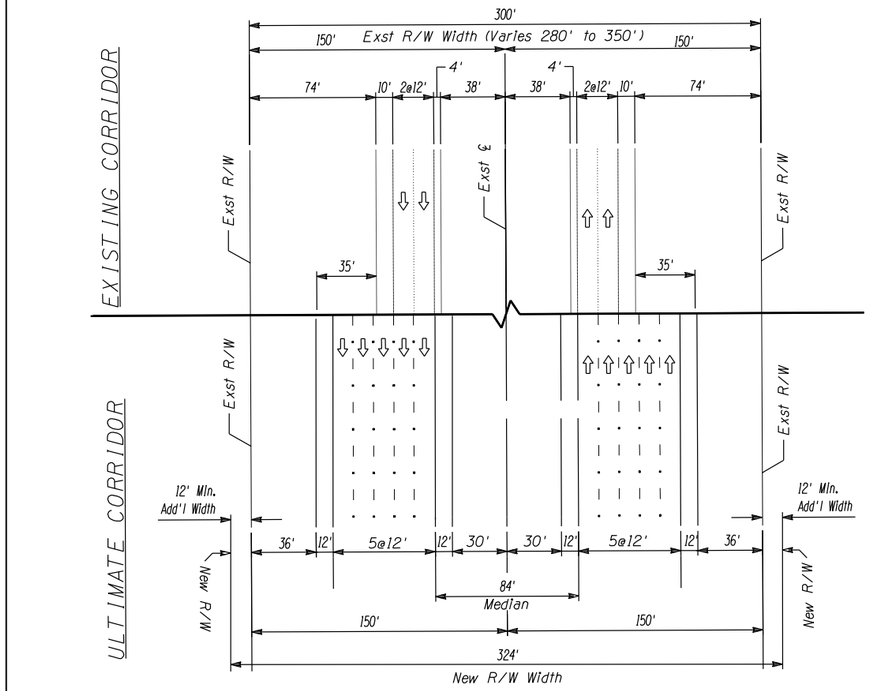
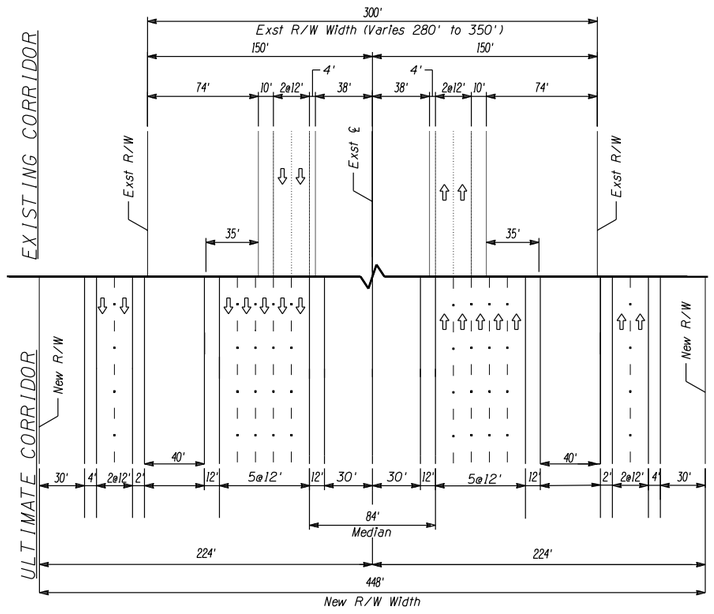
**Figure 4-3 – Corridor Cross Section Concepts (Cont.)**




**Corridor Concept 3**
**5 Lanes With Open Median**




**Corridor Concept 4**
**5 Lanes With Open Median And Continuous Frontage Roads**

**NOT TO SCALE - SCHEMATIC ONLY**

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***Corridor Option 2 – 5 lanes in each direction with a closed median and continuous frontage roads***

This concept includes five (5) lanes in each direction, provides a closed median, and includes continuous one-way frontage roads. This concept meets the objectives of this study by providing a high amount of corridor capacity, and the continuous frontage roads provide an alternative route. However, the closed median concept does not provide flexibility for additional capacity enhancements in the future, and can be restrictive to emergency services during incidents. This concept will require the acquisition of right-of-way throughout the corridor.

***Corridor Option 3 – 5 lanes in each direction with an open median***

This concept includes planning for five (5) lanes in each direction and provides an open median. This concept would not fit within the existing right-of-way and new right-of-way would need to be acquired throughout the corridor.

One of the objectives of this project is to enhance access to adjacent properties and provide an alternative route to I-10 that can enhance the capacity of the corridor during incidents. This concept does not include a continuous frontage road system which can provide an alternative route, but may require right-of-way along the entire corridor. If right-of-way is needed throughout the corridor, then consideration should be given to include continuous frontage roads.

***Corridor Option 4 – 5 lanes in each direction with an open median and continuous frontage roads***

This concept includes five (5) lanes in each direction, provides an open median, and includes continuous one-way frontage roads. This concept best meets the objectives of this study by providing the highest amount of corridor capacity and flexibility for future improvements, and the continuous frontage roads provide an alternative route. However, this concept will require the acquisition of the greatest amount of right-of-way throughout the corridor.

## 4.4 CORRIDOR CROSS SECTION RECOMMENDATION

There are two recommended cross sections for the I-10 Corridor; (Jct I-8 to Tangerine Road). One section will be used through the rural section of the corridor and the other in the section which is more urban. **Figure 4.4** depicts the recommended corridor typical sections for the corridor. The description of the recommended cross section is as follows:

Earley Road to Tortolita Blvd (MP 196 to MP 234)

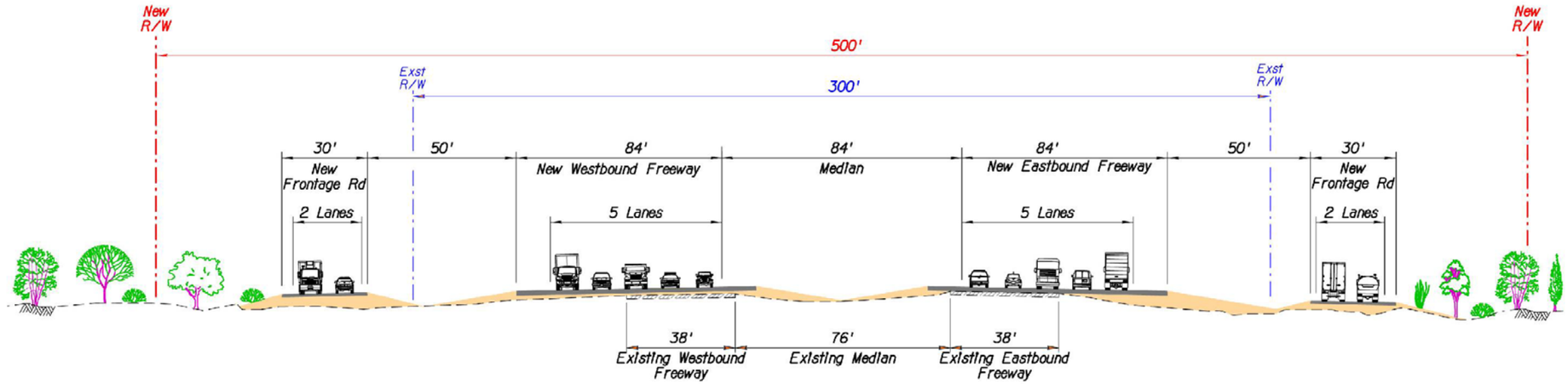
The recommended cross section for this rural section of the corridor will provide five (5) lanes in each direction with an open median 84 feet in width (Option 4). Continuous frontage roads 30 feet in width are recommended to be included and will provide one-way traffic operation. This recommendation will require additional right-of-way throughout the corridor. Based on an engineering evaluation, the typical right-of-way width for the rural section of the corridor will be set at 500 feet wide.

Tortolita Blvd to Tangerine Road (MP 234 to MP 240)

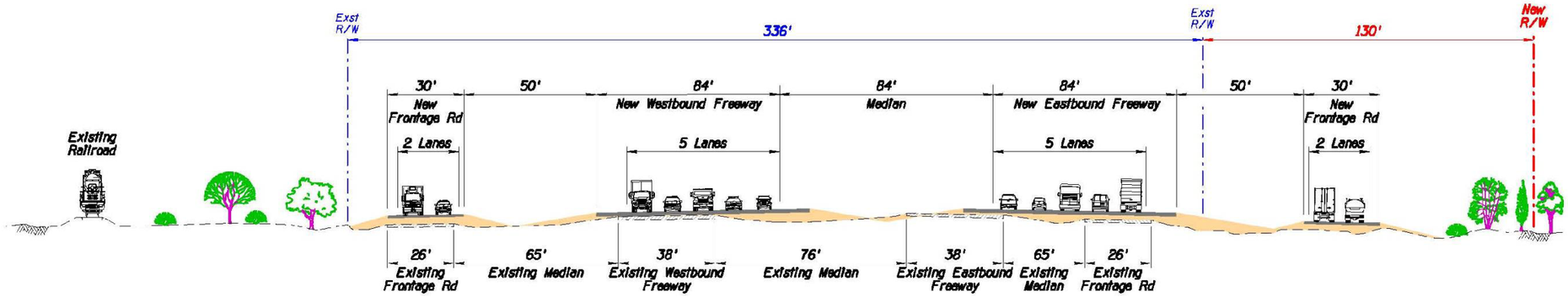
The recommended cross section through the urban section of the corridor will provide 5 lanes in each direction and the median will be closed (continuous barrier) between opposing directions of travel (Option 2). A continuous one-way frontage road system is recommended to provide an alternative route during incidents and to enhance access to adjacent properties.

Throughout a significant section of this corridor, the Union Pacific Railroad (UPRR) is located adjacent to the existing right-of-way (MP 213 to MP 240). In areas where the UPRR right-of-way is adjacent to the corridor, it is recommended that all new right-of-way be acquired without impacts to any UPRR property. Therefore, the property required to expand the corridor will be acquired on the opposite side of the UPRR.

**Figure 4.4 – Recommended Typical Sections**

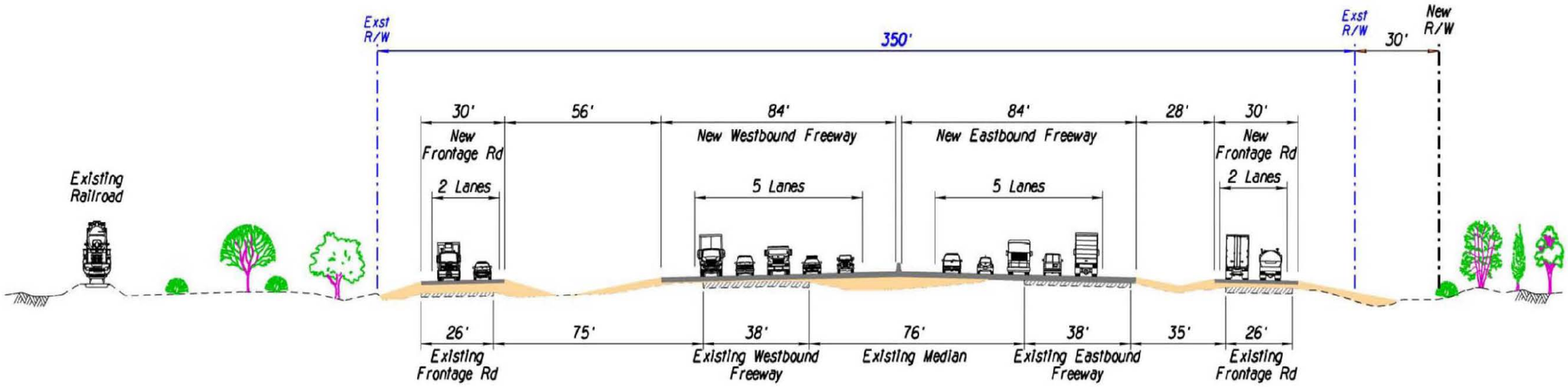



Typical Mainline Expansion MP 196 to MP 210




Typical Mainline Expansion MP 210 to MP 234
(adjacent to UPRR)

**Figure 4.4 – Recommended Typical Sections (Cont.)**




**Typical Mainline Expansion MP 234 to MP 240**

## 4.5 TRAFFIC INTERCHANGE LOCATION OPTIONS

Future projections for the communities along the I-10 Corridor indicate a large increase in population is expected over the next several decades. This increase in population will occur with new developments throughout central and southern Arizona. To support these anticipated developments there may be a need to approve additional interchanges along I-10. New interchanges will enhance access to adjacent communities, but with each new interchange location additional traffic is allowed to access the interstate. Logical locations for new interchanges must be planned along the corridor to provide the additional access that will be desired to new developments, but locations should be limited to promote safe, efficient regional and interstate travel.

Spacing of interchanges has a significant effect on the operation of interstate highways. A plan to provide proper spacing of interchanges is critical to ensure that traffic operations along the interstate highway are not degraded because of the demand for frequent access points.

- AASHTO guidelines (A Policy on Design Standards – Interstate System, January 2005) indicate a minimum spacing of 1 mile in urban areas, and 3 miles in rural areas.

- The Arizona State Transportation Board Policies (August 2003) states “Maintaining that the approximate minimum spacing between interchanges on the limited access State and Interstate Highway Systems be three (3) miles in rural areas, two (2) miles in suburban and transitional areas, and one (1) mile in urban areas”.

- At locations where spacing is needed that are less than these minimums, interchanges can be developed by using collector-distributor roads, braided ramps, auxiliary lanes or other techniques.

- Limiting the number of interchange locations may enhance the mobility of interstate freight movements because a greater spacing between interchanges would reduce the number of traffic conflict points associated with entrance and exit ramps.

- The purpose of this analysis was to establish interchange locations along I-10 that will balance the need for additional access while preserving the desired traffic operations.

Two concepts were developed for the corridor, one that proposes as many as eight new interchanges locations, and the second that would limit the number to six new interchange locations.

### 4.5.1 Interchange Location Option 1

This alternative includes locations for eight (8) new interchanges along I-10 between Junction I-8 and Tangerine Road (MP 200 to MP 240). These new locations are placed between the existing interchanges to provide a nearly uniform spacing of two miles between interchanges throughout the corridor. The interchange locations proposed in Option 1 are depicted in **Figure 4.5** and described as follows:

- Selma Highway Interchange (MP197) – This option includes removing the Jimmie Kerr Boulevard Interchange (MP 198) and providing a new interchange at Selma Highway. This will extend the distance between the Selma Highway interchange and the I-10/I-8 interchange to nearly two miles.

- Overfield Road Interchange (MP 202) – This is a proposed location for a new interchange and would be located approximately two miles east of the Sunland Gin Road interchange. The location of this interchange would not align with existing Overfield Road, but be located about one-half mile east of the existing alignment.

- Tweedy Road Interchange (MP 206) – This alternative proposes a new interchange located between Toltec Road TI (MP 204) and Sunshine Boulevard TI (MP 209). The interchange is proposed at Tweedy Road which is a north-south alignment located two miles east of Toltec Road.

- SR 87 – East Picacho Interchange (MP 211 to MP 212) – Currently an existing interchange is located at SR 87 providing ramp connections for all movements, and a half interchange is located at Picacho Highway, known as the East Picacho Interchange. It is not desirable to provide partial interchanges along an interstate route. This alternative proposes concentrating all of the ramp movements at one interchange located at SR 87.

- Greenes Road Interchange (MP 222) – This is a proposed location for a new interchange and would be located approximately two miles east of the Picacho Peak Road interchange.

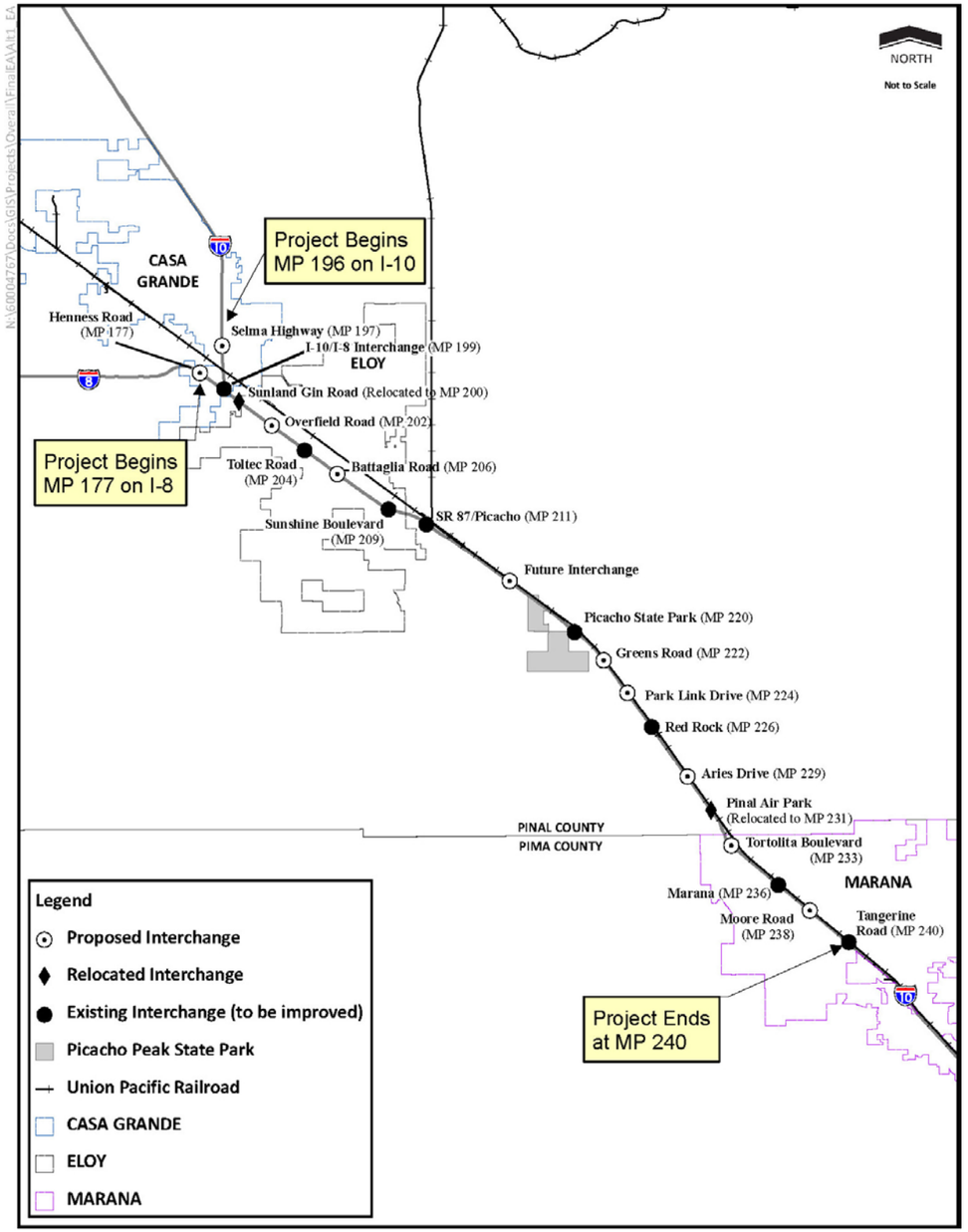
- Park Link Drive Interchange (MP 224) – This is a proposed location for a new interchange and would be located approximately two miles west of the Red Rock interchange. Park Link Drive is an existing corridor that connects SR 79 to I-10. Existing Park Link Drive intersects the I-10 frontage road at approximately MP 225; therefore, the proposed location of this new interchange would require a realignment of the existing Park Link Drive.

- Aries Drive Interchange (MP 229) – This is a proposed location for a new interchange and would be approximately three (3) miles east of the Red Rock TI.

- Pinal Air Park Road Interchange (MP 232) – An interchange at Pinal Air Park Road would remain, however the location of this interchange should be evaluated to address interchange spacing with the proposed Tortolita Boulevard Interchange.

- Tortolita Boulevard Interchange (MP 233) – A new interchange locate about one mile east of the existing Pinal Air Park TI has been proposed and would be constructed with private funds.

**Figure 4.5 – Interchange Location Option 1**




- Moore Road Interchange (MP 238) – This is a proposed location for a new interchange and would be located approximately 2 miles east of the Marana TI.

- Existing interchanges not listed are proposed to remain in their existing location.

### 4.5.2 Interchange Location Option 2

This alternative includes locations for six (6) new interchange locations along I-10 between Junction I-8 and Tangerine Road (MP 200 to MP 240). These new locations are placed between the existing interchanges to provide a nearly uniform spacing of two miles between interchanges in the areas that could become more urbanized, namely the Cities of Casa Grande, Eloy, and the Town of Marana. Greater interchange spacing is proposed in the section of the corridor that may remain more rural in character from the community of Picacho (MP 212) to the Pima/Pinal county line (MP 232).

The interchange locations proposed in Option 2 are depicted in **Figure 4.6** and described as follows:

- Overfield Road Interchange (MP 202) – This is a proposed location for a new interchange and would be located approximately two miles east of the Sunland Gin Road interchange. The location of this interchange would not align with existing Overfield Road, but be located about one-half mile east of the existing alignment.

- Battaglia Road Interchange (MP 206) - This alternative proposes a new interchange located between Toltec Road TI (MP 204) and Sunshine Boulevard TI (MP 209). Battaglia Road currently crosses Interstate 10 at a grade separation located near MP 205. However the existing alignment of Battaglia Road intersects the freeway at a significant skew angle and the existing roadway would need to be realigned to provide a more perpendicular crossing and the interchange located near MP 206 to provide a nearly two mile spacing from the Toltec Road interchange (MP 204).

- SR 87 – Picacho Highway Interchanges (MP 211 to MP 213) – Currently an existing interchange is located at SR 87 providing ramp connections for all movements, and a half interchange is located at Picacho Highway, known as the East Picacho Interchange. An interchange is proposed at SR 87 (MP 211) and a new interchange is proposed two miles east of SR 87 at Picacho Highway (MP 213).

- Park Link Drive Interchange (MP 223) – This is a proposed location for a new interchange and would be located approximately three miles east of the Picacho Peak Road interchange. The proposed location of this interchange at MP 223 provides three mile spacing between adjacent interchanges in both direction. Existing Park Link Drive intersects the I-10 frontage road at approximately MP 225, therefore the proposed location of this new interchange would require a realignment of the existing Park Link Drive.

- Pinal Air Park Road Interchange (MP 232) – An interchange at Pinal Air Park Road would remain, however the location of this interchange should be evaluated to address interchange spacing with the proposed Tortolita Parkway Interchange.

- Tortolita Boulevard Interchange (MP 233) – A new interchange locate about one mile east of the existing Pinal Air Park TI has been proposed and would be constructed with private funds.

- Moore Road Interchange (MP 238) – This is a proposed location for a new interchange and would be located approximately 2 miles east of the Marana TI.

### 4.5.3 Evaluation of the Interchange Location Options

A traffic evaluation of both Option 1 and Option 2 was performed and documented in the I-10 Corridor Study; Jct I-8 to Tangerine Road, Preliminary Traffic Report (May 2008). The traffic analysis concluded that there are no significant differences in the expected traffic operations of I-10 based on the various interchange locations.

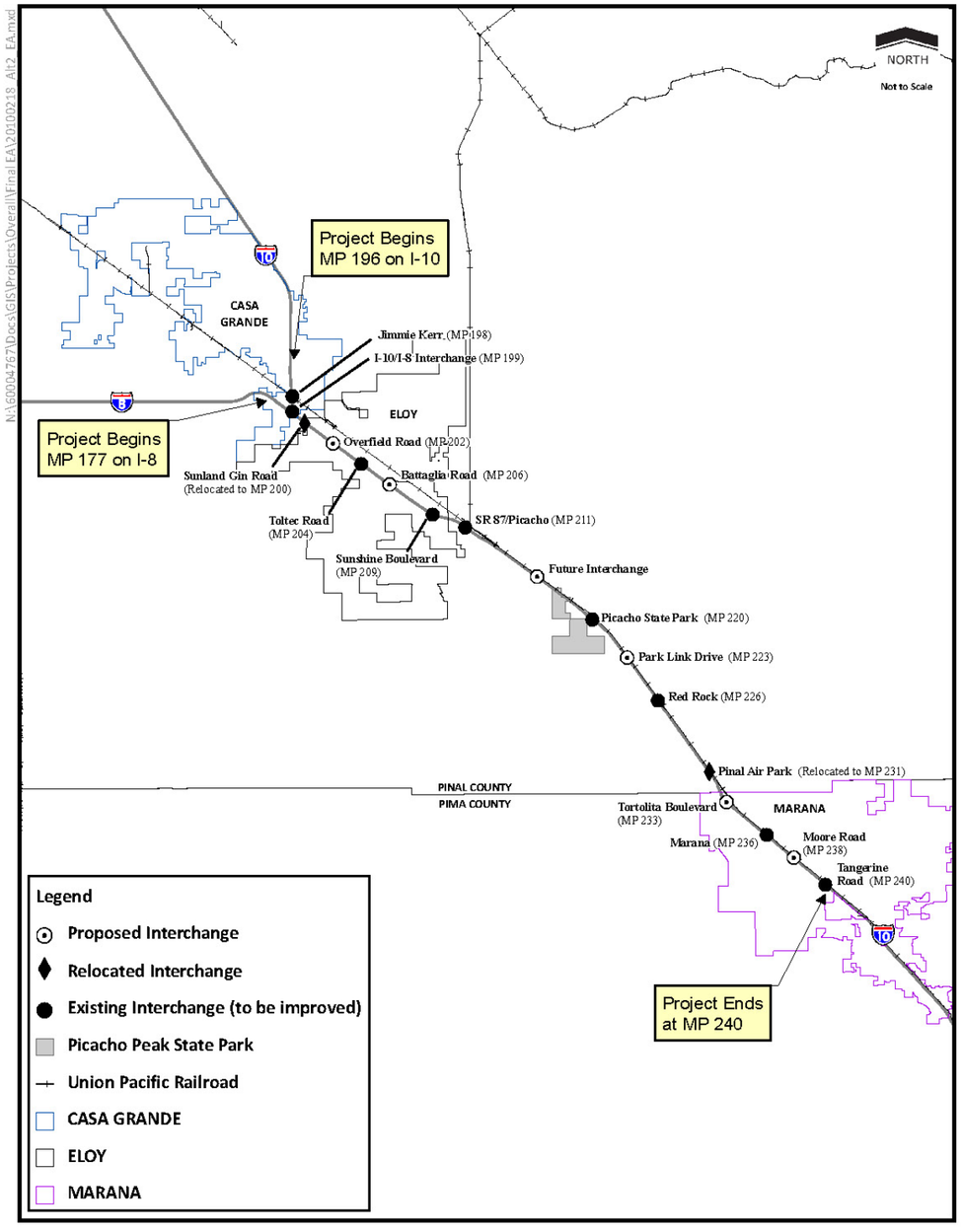
- The traffic analysis does indicate that traffic operations in 2030 along I-10 would be degraded to LOS E in the area of the I-10/I-8 Interchange. This is primarily caused by the spacing between the I-8 System Interchange and the adjacent service interchanges. The Jimmie Kerr Interchange is located less than a mile to the west of the I-8 interchange, and the Sunland Gin Road interchange is located less than a mile to the east.

- The project team heard that it is important to provide as many interchanges as possible along I-10 to provide sufficient access to the adjacent communities. Therefore the local communities indicated their support for Alternative I.

- The Arizona State Land Department encourages ADOT to plan interchanges at least two miles apart through the section of the corridor primarily bounded by ASLD lands (MP 215 to MP 232) to support the potential developments that could be located in this section of the corridor.

- In December 2006, The Pinal County Board of Supervisors passed a resolution (No. 112906-A-1) which states that Alternative 1 provides the best coordination with the recommendations of the Pinal County Small Area Transportation Study (SATS) in respect to the location of proposed traffic interchanges with the least impacts to the residents and businesses along the corridor.

**Figure 4.6 – Interchange Location Alternative 2**



### 4.5.4 Preferred Interchange Location Plan

The preferred interchange plan proposes locations for nine (9) new interchanges along I-10 between Junction I-8 and Tangerine Road (MP 200 to MP 240). These new locations are placed between the existing interchanges to provide a nearly uniform spacing of two miles between interchanges throughout the corridor and is depicted in **Figure 4.7**. The preferred plan closely follows the description of Option 1 in section 4.4.1 with some exceptions as follows:

- Battaglia Road Interchange (MP 206) – Option 1 proposed locating an interchange at Tweedy Road, but the City of Eloy commented that the Battaglia corridor is an important east-west corridor through the city. All of the existing interchanges along I-10 within the City of Eloy connect to north-south arterials, and locating an interchange at Battaglia Road is an opportunity to provide interstate access to an east-west corridor. The City of Eloy General Plan includes an interchange at Battaglia Road; therefore the preferred interchange plan recommends an interchange located at Battaglia Road.

- SR 87 and Picacho Highway Interchanges (MP 211 to MP 213) – Option 1 proposed one interchange in the area of the Community of Picacho at SR 87. The additional interchange at Picacho Highway is considered a favorable enhancement to the community. Therefore the preferred interchange plan includes two interchange locations in the area of Picacho, one at SR 87 (MP 211) and the other at Picacho Highway (MP 213).

## 4.6 I-10/I-8 SYSTEM INTERCHANGE OPTIONS

The purpose of this analysis was to establish the configuration for I-10/I-8 system interchange (I-8 Interchange). The I-8 interchange was constructed in 1966 and includes geometric features for a rural system interchange of that time period. The reconfiguration of the I-10/I-8 interchange is needed to address the following concerns;

- The ramp geometry of the existing I-8 interchange includes short exit and entrance tapers and curvilinear alignments that that do not meet current ADOT guidelines (**Figure 4.8**).

- Highway Enhancement for Safety Project (HES), Project No. A HE 008-A(018), has been completed for the eastbound I-8 to westbound I-10 ramp. The HES study recommends the long range plan is to remove this loop ramp and replace it with a directional ramp that meets current ADOT design guidelines.

- The crash summary documented in the Preliminary Traffic Report, I-10 Corridor Study; Jct I-8 to Tangerine Road, indicates the I-8 interchange as an area of concern where crash occurrences were documented to be greater than one standard deviation over the corridor wide average.

- The City of Casa Grande recently completed a small area transportation study (SATS) in July 2007. A recommendation from the study is to plan for a new interchange along I-8 at Henness Road (MP 177), which is located one mile west of the I-10/I-8 system interchange.

- In rural areas, ADOT guidelines state that the spacing between interchanges should be no less than 2 miles; however the Jimmie Kerr Boulevard interchange and Sunland Gin Road interchange are both located within a mile of the I-8 interchange.

The project team discussed concepts that incorporated braided ramps between each interchange, a collector-distributor system along I-10 to accommodate the entering and exiting traffic, and the converting the interchanges at Jimmie Kerr Boulevard and Sunland Gin Road to half interchange configurations. The review of these concepts and discussions with the project team resulted in the creation of three (3) options for the I-8 system interchange and surrounding service interchanges. Two of these options include concepts for a new interchange at Henness Road.

### 4.6.1 I-10/I-8 System Interchange - Option 1

Option 1 provides directional ramps between I-10 and I-8 that accommodate design speeds up to 65 MPH. All of the ramp connections between the two interstate highways are proposed to provide two lanes of free-flowing traffic to accommodate future traffic demands.

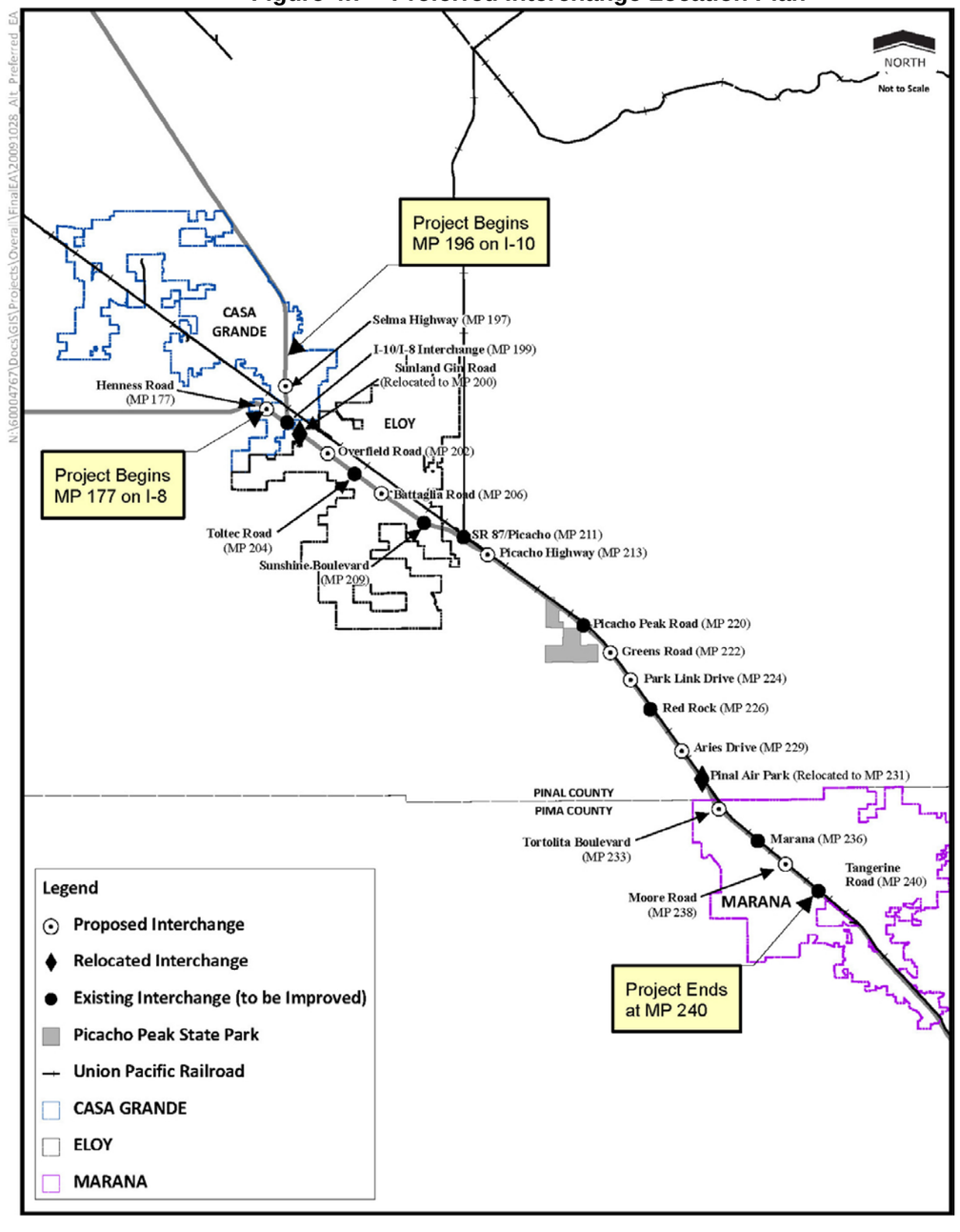
- Option 1 removes the TI at Jimmie Kerr Boulevard and relocates it approximately one mile north to Selma Highway. Relocating the interchange to Selma Highway provides nearly a two mile separation between the I-8 interchange and the proposed Selma Highway TI.

- Access is provided between Jimmie Kerr Boulevard and Selma Highway by incorporating frontage roads along each side of the freeway.

- The interchange at Sunland Gin Road is proposed to be relocated approximately ¼ mile east of its existing location. Extended ramps and ramp braids are proposed between the I-8 interchange and Sunland Gin Road to separate the weaving between entering and exiting traffic along the I-10 mainline.

- This alternative does not include an interchange along I-8 at Henness Road. A modification to the recommendations of the Casa Grande SATS would be required if a new interchange at Henness Road cannot be accommodated.

**Figure 4.7 – Preferred Interchange Location Plan**




Option 1 for the I-8 Interchange is displayed in **Figure 4.9**.

### 4.6.2 I-10/I-8 System Interchange Option 2

Option 2 includes the relocation of the Jimmie Kerr Boulevard TI to Selma Highway similar to Option 1. The Sunland Gin Road interchange is relocated about ¼ mile east of its existing location similar to Option 1. This option also proposes an additional interchange along I-8 at Henness Road (MP 177), west of the I-10/I-8 system interchange.

- The proposed Henness Road Interchange is located approximately one mile west of the I-10/I-8 system interchange, and this creates the potential for traffic operational issues along the I-8 mainline in the future if a standard diamond interchange were constructed at Henness Road.

- Option 2 proposes extended ramps for the Henness Road movements that enter and exit from the I-8 mainline within the I-10/I-8 interchange. These extended ramps are proposed to braid with the directional ramps between the freeways which will separate the entering and exiting movements that would have to weave across each other if the ramp braids were not provided.

Option 2 for the I-8 Interchange is displayed in **Figure 4.10**.

### 4.6.3 I-10/I-8 System Interchange Option 3

Option 3 proposes to relocate Jimmie Kerr Boulevard to be offset from the UPRR mainline approximately ¼ mile. This option maintains the Jimmie Kerr Boulevard interchange and incorporates collector-distributor (C-D) roadways along I-10 between the Jimmie Kerr interchange and Sunland Gin Road interchange.

- As compared to the other alternatives, Option 3 includes many additional ramps within the I-8 interchange to collect and distribute traffic from the various interchanges and the mainline freeways by providing various connections to the C-D roadways.

- This alternative includes several additional structures to grade separate various movements and this alternative is expected to have a significantly higher construction cost than the other alternatives considered.

- The Sunland Gin Road interchange is relocated approximately ¼ mile east of its existing location similar to Option 1.

- The proposed Henness Road Interchange (MP 177) is located approximately one mile west of the I-10/I-8 system interchange, and Option 3 proposes extended ramps for the Henness Road movements that enter and exit from the I-8 mainline within the I-10/I-8 interchange.

**Figure 4.8 – Existing I-8 System Interchange**

**Figure 4.9 – I-10/I-8 System Interchange Option 1**

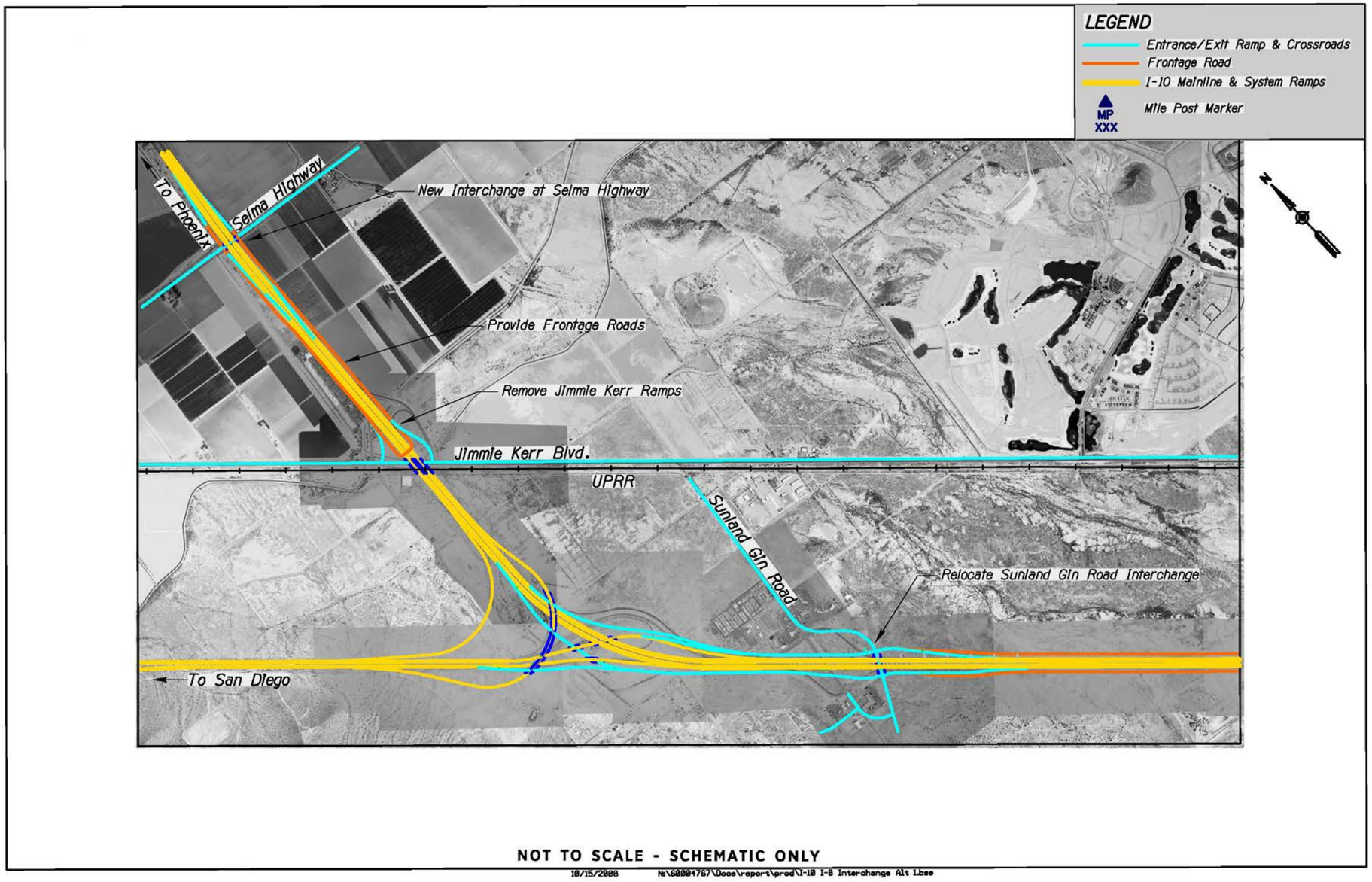
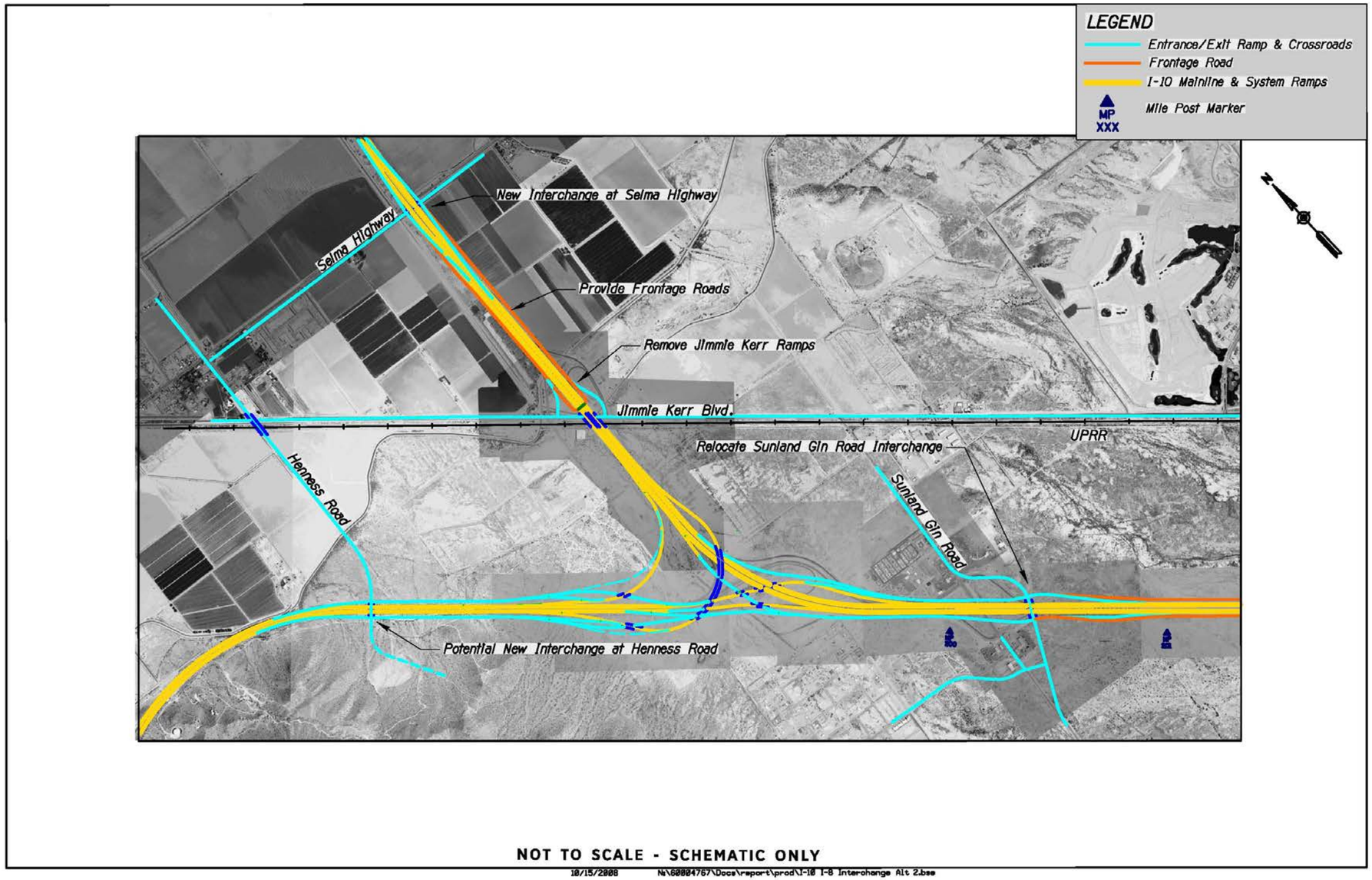


**Figure 4.10 – I-10/I-8 System Interchange Option 2**



Option 3 for the I-8 Interchange is displayed in **Figure 4.11**.

### 4.6.4 I-10/I-8 System Interchange Evaluation

An evaluation of the three system interchange options is shown in **Table 4.2**.

Based on the evaluation criteria and input from the project stakeholders, Option 2 is recommended as the preferred alternative for the I-8 Interchange

- Option 2 proposes to remove the interchange at Jimmie Kerr Boulevard and implement a new interchange at Selma Highway. The addition of an interchange at Selma Highway is consistent with the recommendations in the Casa Grande SATS.

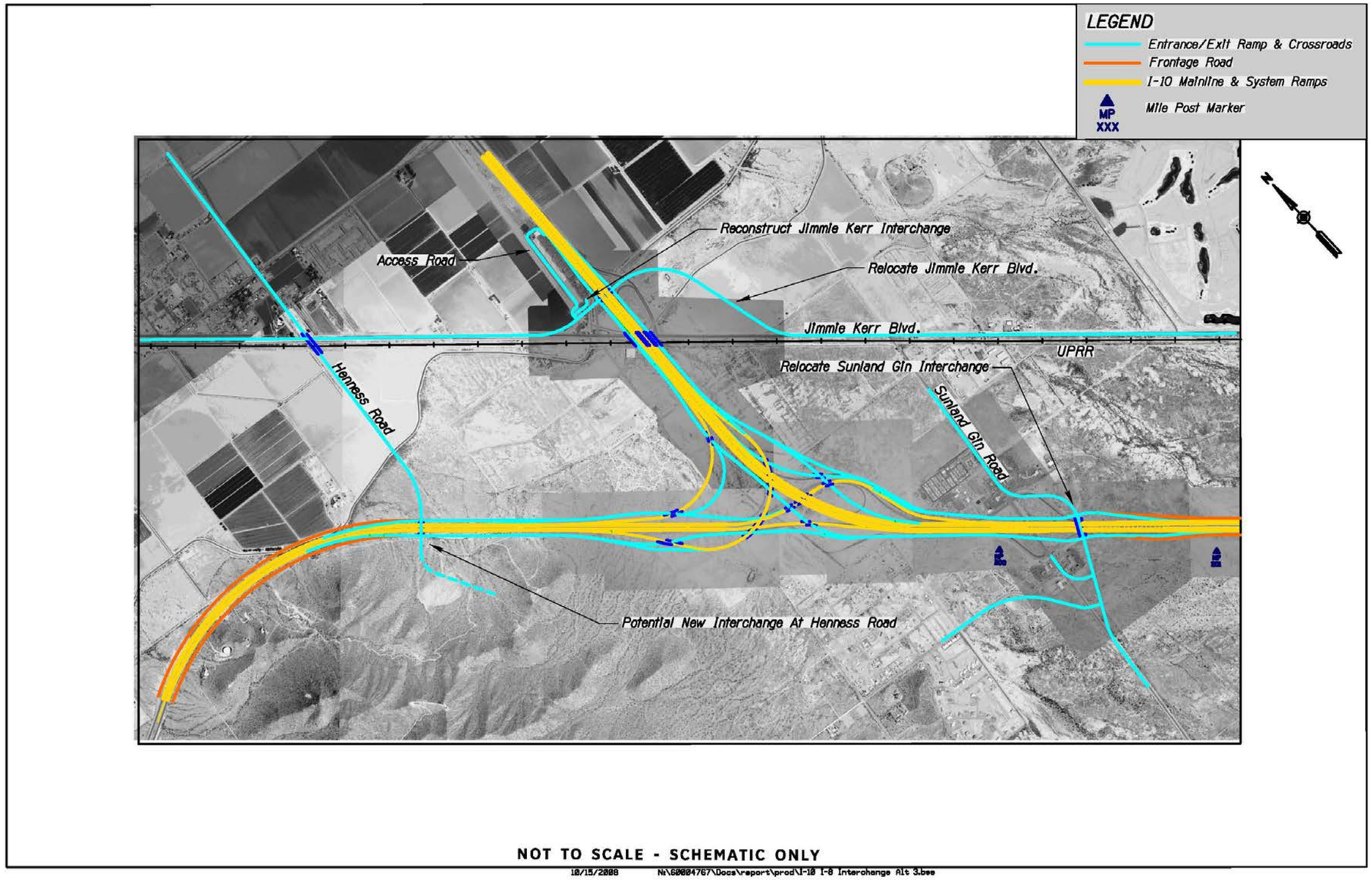
- The ramp connections to I-10 at Jimmie Kerr Boulevard will be removed, but access is provided to I-10 by using frontage roads that are proposed on each side of the freeway.

- Provision for an interchange at Henness Road (MP 177) along I-8 is consistent with recommendations of the Casa Grande SATS.

Discussions with the project stakeholders have resulted in an Interstate 10 mainline realignment being included in the preferred alternative. Based on the crash analysis for Interstate 10 that is documented in the I-10 Corridor Study, Preliminary Traffic Report; Jct. I-8 to Tangerine Road (May 2008), the existing curvature of the I-10 mainline should be considered for improvement. The preferred alternative for the I-8 interchange includes a change in the I-10 alignment to increase the radius of the mainline curve to approximately 7,600 feet (45 minute degree of curve). The realignment of the I-10 mainline is envisioned to simplify the construction phasing during the reconstruction of this interchange.

The preferred option for the I-8 interchange is displayed in **Figure 4.12**.

**Figure 4.11 – I-10/I-8 System Interchange Option 3**

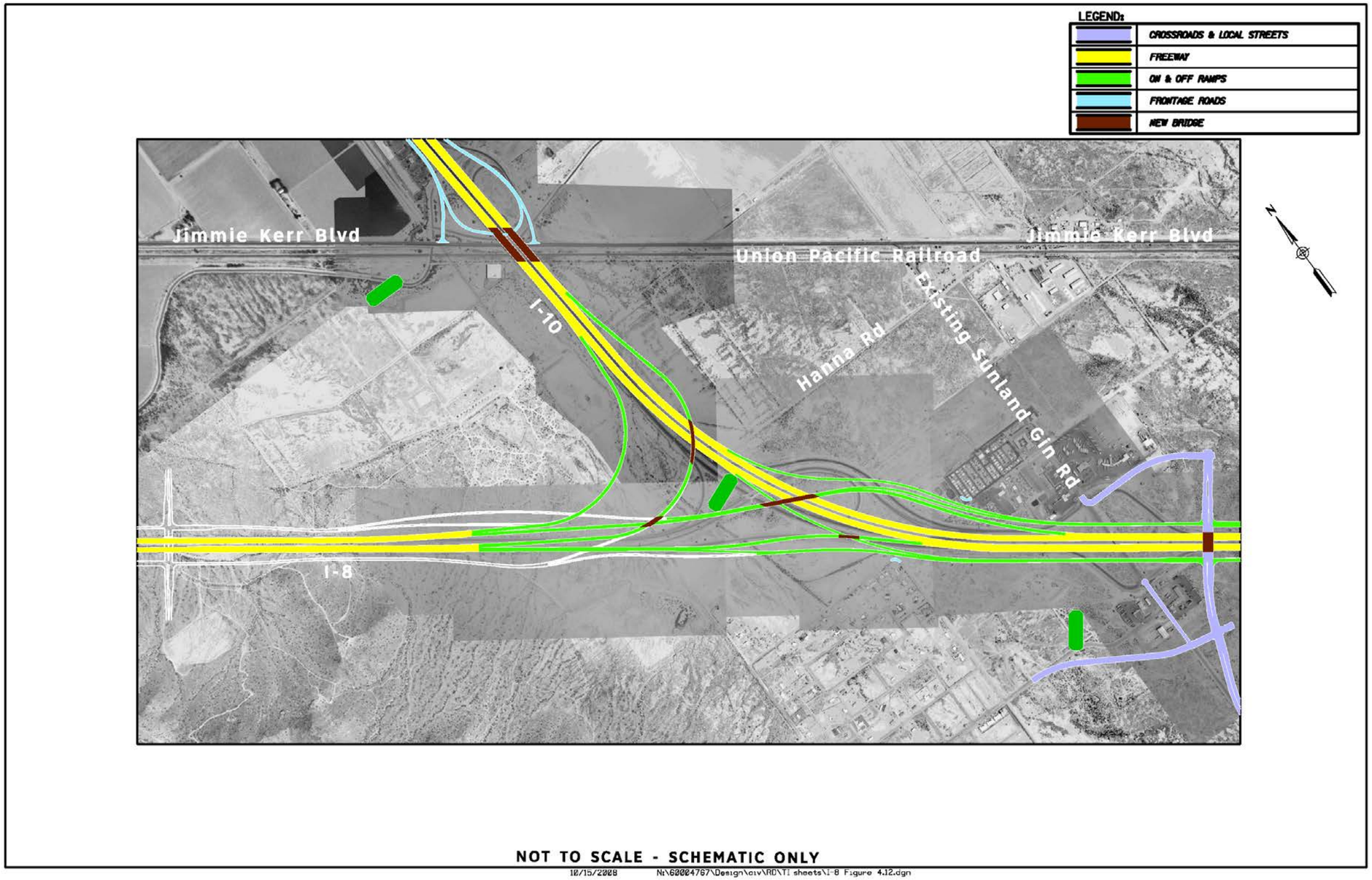


## Table 4.2 – I-10/I-8 Interchange Alternative Matrix

| | No Build | Alternative 1<br>Relocated Sunland Gin TI and Selma Highway TI | Alternative 2<br>Relocated Sunland Gin TI, Selma Highway TI, and Henness Road TI | Alternative 3<br>Relocated Sunland Gin TI, Jimmie Kerr TI, and Henness TI |
|---|---|---|---|---|
| **Compatibility with Existing Land Uses** | ● Minor changes to existing access to comply with current standards | ◒ 1) Relocation of Sunland Gin TI revises existing access patterns, 2) Relocation of the Jimmie Kerr Interchange to Selma Highway revises existing access patterns | ● 1) Relocation of Sunland Gin TI revises existing access patterns, 2) Relocation of the Jimmie Kerr Interchange to Selma Highway revises existing access patterns. 3) Addition of Henness Road Intechange can provide additional access to existing land use surrounding the I-10/I-8 interchange | ○ Reconstruction of Jimmie Kerr Interchange could require the acquisition of the Outlet Mall |
| **Compatibility with Planned Land Uses** | ○ Existing interchanges at Jimmie Kerr and Sunland Gin have limited capacity for additional traffic growth | ◒ Improvements at the Sunland Gin and Selma Highway interchanges provide capacity for additional traffic growth associated with new development | ● 1) Improvements at the Sunland Gin and Selma Highway interchanges provide capacity for additional traffic growth associated with new development. 2) Henness Road TI provides additional access to lands adjacent to Interstate 8. | ◒ The location of the Jimmie Kerr Interchange limits access to the surrounding area because of the proximity to the railroad corridor |
| **Interchange Spacing from System Interchange** | ○ Existing interchanges at Jimmie Kerr and Sunland Gin do not meet current guidelines for interchange spacing | ◒ 1) Relocation of Sunland Gin TI provides better spacing of interchanges 2) Relocation of Jimmie Kerr TI to Selma Highway provides desirable spacing from the System Interchange | ◒ 1) Relocation of Sunland Gin TI provides better spacing of interchanges 2) Relocation of Jimmie Kerr TI to Selma Highway provides desirable spacing from the System Interchange. 3) Location of Henness Interchange provides sufficient spacing with the use of extended ramps and grade separations. | ◒ 1) Relocation of Sunland Gin TI provides better spacing of interchanges 2) Location of the Jimmie Kerr TI provides sufficient spacing with the use of Collector-Distributor roadways. 3) Location of Henness Interchange provides sufficient spacing with the use of extended ramps and grade separations. |
| **Compatibility with Engineering Standards** | ○ Ramp curvature and alignments at all interchanges do not meet current ADOT design standards | ● Interchange configurations all meet current engineering standards | ● Interchange configurations all meet current engineering standards | ◒ Location of the Jimmie Kerr Interchange in relation to the mainline crest vertical curve over the railroad tracks is not desirable. |
| **Estimated Corridor Costs** | **N / A** | ◒ Relocation of Jimmie Kerr TI to Selma Highway limits the number of extended ramps and grade separations needed. | ◒ Location of Henness Interchange requires extended ramps and grade separations | ○ This alternative includes the greatest number of structures and collector-distributor roadways |
| **Constructability** | **N / A** | ◒ Relocated interchanges can be constructed with minimal impacts to existing traffic patterns | ◒ Relocated interchanges can be constructed with minimal impacts to existing traffic patterns | ○ Reconstruction of Jimmie Kerr Interchange could impact existing traffic patterns during construction |
| **Compatibility with Environmental Resources** | ◒ Traffic congestion predicted at interchanges could contribute to air quality issues | ◒ Impacts to undisturbed lands at Selma Highway and Sunland Gin interchanges | ◒ Impacts to undisturbed lands at Selma Highway, Henness Road and Sunland Gin interchanges | ○ The reconstruction of the Jimmie Kerr Interchange may have impacts to the historic Casa Grande-Florence Canal |
| **Compatibility with Existing Right of Way width** | ● Concept fits within existing right-of-way | ◒ Lowest amount of right of way required compared to other alternatives | ◒ Additional right of way for Henness Road Interchange is anticipated to be provided in conjunction with private development | ○ Greatest amount of right of way required compared to the other alternatives |
| **Traffic Operations and Signing Issues** | ○ Existing capacity will not serve 2030 traffic volumes | ● Signing of this alternative is less complicated than other alternatives, traffic operations expected to be superior to the other alternatives | ◒ Addition of Henness Road Interchange complicates signing, and generates additional traffic which accesses the interstate. | ◒ Additional signing complications due to additional collector-distributor roadways associated with the Jimmie Kerr Interchange |
| **Recommend for Further Study** | **NO** | **NO** | **YES** | **NO** |

LEGEND: ○ Least Desirable ◒ Somewhat Desirable ◒ Moderately Desirable ● Most Desirable

**Figure 4.12 – I-10/I-8 Interchange Preferred Alternative – Option 2**



## 4.7 COMMUNITY OF PICACHO OPTIONS (MP 210 TO MP 213)

The community of Picacho was originally settled in the late 1800s at the junction of the two railroad lines. The business district of the community evolved along State Route 84 which was the original highway connecting Casa Grande and Tucson. The alignment of I-10 parallels the original SR 84 from Casa Grande to Tucson, and was designed to provide access to the community of Picacho while preserving the original business district.

Currently, the interstate highway passes through the community on an embankment and underpasses are provided at Phillips Road (MP 211) and Picacho Highway (MP 212) which connect sections of the community south of the interstate with the business district along Camino Adelante (old Hwy 84).

The existing location of Interstate 10 through the community of Picacho includes a curvilinear alignment which includes a horizontal curve that does not meet current design guidelines. This curve located near MP 212 is currently signed with advisory warning signs directing traffic to reduce speed to 65 MPH, and is identified as an area of concern based on the crash history of the corridor.

Three (3) alignment options were considered and presented to the public for comment at several open houses in May of 2007. These options included:

- Option A – Maintain a freeway alignment along the existing corridor with a new westbound frontage road along the UPRR
- Option B – Maintain a freeway alignment along the existing corridor with parallel frontage roads
- Option C – Realign the freeway along the UPRR with parallel frontage roads

Each of these freeway options were evaluated based on a number of criteria to allow for a comparison of the benefits or impacts of each. The evaluation matrix for the I-10 alignment through the community of Picacho is provided in **Table 4.3**

A fourth option was considered during the evaluation process, an I-10 Bypass (Option D). This option was considered to include a fatal flaw and was not presented in detail to the public. An I-10 Bypass alignment would relocate the freeway about one-mile south of the Community of Picacho which would have substantial impacts on the economic vitality of the community. Option D was eliminated from further consideration and is not included in the detailed evaluation.

## Table 4.3 – Alignment Through Community of Picacho Evaluation Matrix

| | Comparative Issue | Method of Measurement | Option A<br>New Frontage Road (WB) next to UPRR | Option B<br>Freeway and Frontage Roads follow existing I-10 alignment | Option C<br>Freeway and Frontage Roads realigned along UPRR right of way |
|---|---|---|---|---|---|
| Compatibility with Existing Land Uses | Property Impacts | # of Relocations (N. of I-10) | 16 Relocations | 21 Relocations | 27 Relocations |
| | Level of Access | Level of Access from existing properties to I-10 | Isolated WB Fr Rd may be more circuitious | Parallel frontage roads provides most direct access | Local roadway system would help circulation |
| Compatibility with Planned Land Uses | Property Impacts | # of Acres of Planned Development required for Freeway improvements | 55 Acres | 50 Acres | 104 Acres |
| | Level of Access | Level of Access from Planned Developments to I-10 | NE Quad of SR 87 has circuitous circulation | NE Quad of SR 87 has circuitous circulation | Local roadway system would help circulation |
| Local Circulation | Out-of-Direction Travel | Relative amount of out of direction travel | Isolated WB Fr Rd may be more circuitious | Parallel frontage roads provides most direct access | Local roadway system would help circulation |
| Compatibility with Engineering Guidelines | | | Ramps located within curves are less desirable<br>Reverse curvature in mainline is less desirable | Ramps located within curves are less desirable<br>Reverse curvature in mainline is less desirable | Ramps located on tangent alignment<br>Reverse curvature nearly eliminated |
| Estimated Corridor Costs | Construction Costs | $3,000 per Linear foot of Freeway<br>$50 Million for SR 87 Interchange | $103 Million | $98 Million | $ 92 Million |
| | Right of Way Req'd | Acres (Excess Acres) | 61 Acres (0) | 80 Acres (0) | 175 Acres (54) |
| Constructability | | Level of Complexity to maintain traffic during construction | $12 Million<br>12% of Construction | $13 Million<br>13% of Construction | $ 5 Million<br>5% of Construction |
| Compatibility with Environmental Resources | Community Disruption | Level of disruption to the existing community during and after construction | Least amount of disruption | Highest amount of disruption | Moderate amount of disruption |
| | Noise Impacts | # of Receptors within 400 Feet of Freeway centerline | 32 Noise Receptors | 32 Noise Receptors | 19 Noise Receptors |
| Traffic Operations | Intersection Delay | # of controlled intersections | 6 Controlled intersections | 6 Controlled intersections | 2 Controlled Intersections |
| Safety | Level of Safety | Comparative among the alternatives | Isolated WB Fr Rd could contribute to wrong way movements (drivers expectations) | Reverse curvature in mainline is less desirable | Reverse curvature nearly eliminated, no freeway embankment, limited access points on Frontage Road System |
| Public Acceptance | | | No public input was received about this alternative | Favorable input from land owners in the area of SR 87 Interchange | Favorable input from residents within the Community of Picacho |
| Recommend for Further Study | | | NO | NO | YES |

LEGEND: Least Desirable ○ Somewhat Desirable ◒ Moderately Desirable ◕ Most Desirable ●

4.7.1 Option A

- I-10 nearly follows the existing alignment. However, the freeway will be realigned to improve the geometrics of the horizontal curve at approximately MP 212, which would result in a shift from the existing alignment of over 100 feet to the north in the area of the Picacho Highway overpass.

- Proposes a curvilinear alignment similar to the existing freeway but all horizontal curves would meet current guidelines. The proposed right-of-way width for the expanded freeway would be increased to 500 feet allowing for a maximum of five (5) lanes in each direction and an open median 84 feet in width. These improvements and expansion of the freeway corridor would impact numerous properties adjacent to the existing freeway corridor.

- The freeway corridor is being planned to include continuous one-way frontage roads from Junction I-8 to Tangerine Road, and therefore frontage roads need to be planned through the community of Picacho. The eastbound frontage road is proposed to parallel the freeway alignment, and is located about on the same alignment as the existing south side frontage road (Peak Road). Properties along the south side of the freeway would be provided access from the eastbound frontage road.

- The westbound frontage road would be aligned along the UPRR corridor passing north of the existing business district of Picacho. This alignment would allow existing commercial businesses along Camino Adelante (old Hwy 84) to remain, and access would be provided from the westbound frontage road or Camino Adelante.

- The primary advantage of this option is that it would minimize the impacts to existing businesses and residential properties in the community of Picacho.

- The Option A plan is depicted in **Figure 4.13**.

4.7.2 Option B

- The freeway alignment proposed for Option B nearly follows the existing alignment of I-10. However, the freeway will be realigned to improve the geometrics of the horizontal curve at approximately MP 212 which would result in a shift from the existing alignment of over 100 feet to the north in the area of the Picacho Highway overpass.

- Option B proposes a curvilinear alignment similar to the existing freeway but all horizontal curves would meet current guidelines. The proposed right-of-way width for the expanded freeway would be increased to 500 feet allowing for a maximum of five (5) lanes in each direction, an open median 84 feet in width, and continuous one-way frontage roads. These improvements and expansion of the freeway corridor will impact numerous properties adjacent to the existing freeway corridor.

- Option B proposes the one-way frontage roads to parallel the proposed freeway alignment similar to what is recommended throughout the rest of the corridor. The alignment of the westbound frontage road parallel to the freeway alignment would require the acquisition of many existing businesses in the community. Many commercial properties along old Hwy 84 including a gas station, motor lodges, and the local bar would be relocated.

- This alternative would provide limited access from the freeway corridor to the area of Picacho north of the freeway. Access to the business district would be circuitous since limited access can be provided from the frontage roads.

- The Option B plan is depicted in **Figure 4.14**.

4.7.3 Option C

- Realignment of the I-10 Corridor through the community of Picacho. The freeway is proposed to be moved to parallel the UPRR mainline throughout the community, and connect to its existing alignment west of the SR 87 interchange and east of Picacho Highway TI.

- The SR 87 interchange would be relocated and reconstructed in a location north of the existing interchange.

- Alignment of the freeway with a minimal number of horizontal curves, which is considered desirable over the other options through the community.

- The realigned freeway is proposed to be constructed at ground level through the community, eliminating a substantial length of elevated freeway.

- Relocation of most residential and commercial properties located north of the existing I-10 freeway, resulting in this option having the greatest impacts to existing properties within the community.

- Following the implementation of this realignment the community of Picacho would no longer be divided by the highway corridor and private properties would no longer be located between the freeway and UPRR mainline.

- The Option C plan is depicted in **Figure 4.15**.

4.7.4 Preferred Alignment through the Community of Picacho

The evaluation matrix for the I-10 alignment through the community of Picacho is provided in **Table 4-3**, and based on the analysis recommends Option C for further study. The preferred plan is depicted in **Figure 4.16**.

**Figure 4.13 – Option A Plan**

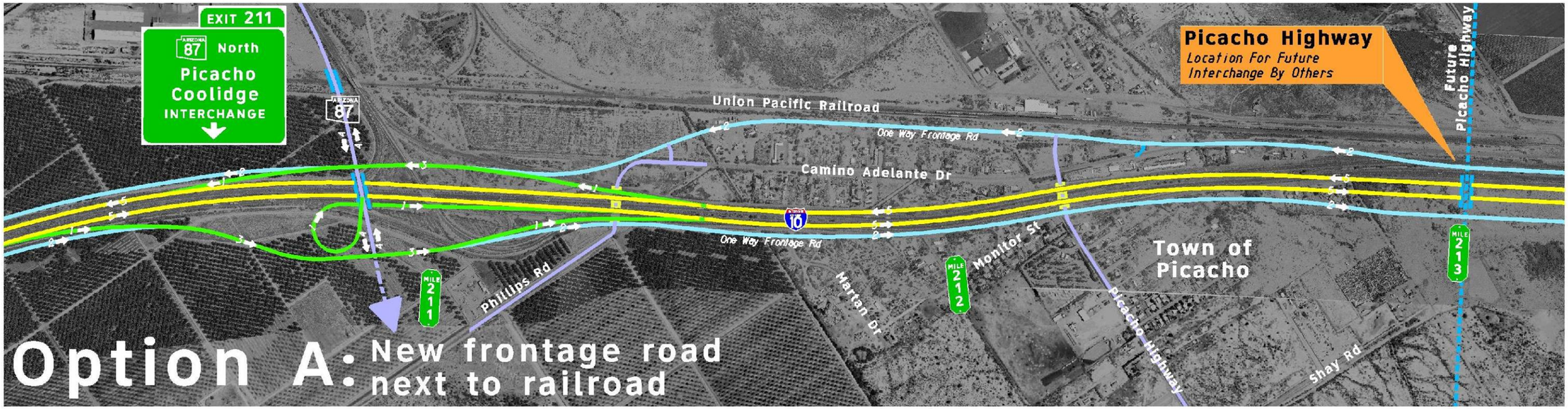


**Figure 4.14 – Option B Plan**

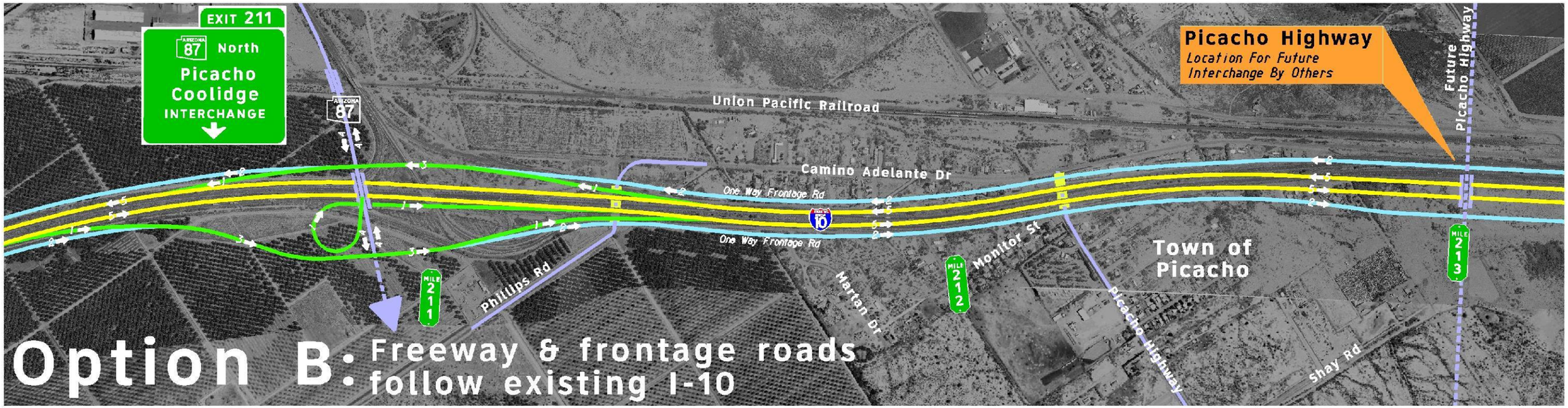


**Figure 4.15 – Option C Plan**

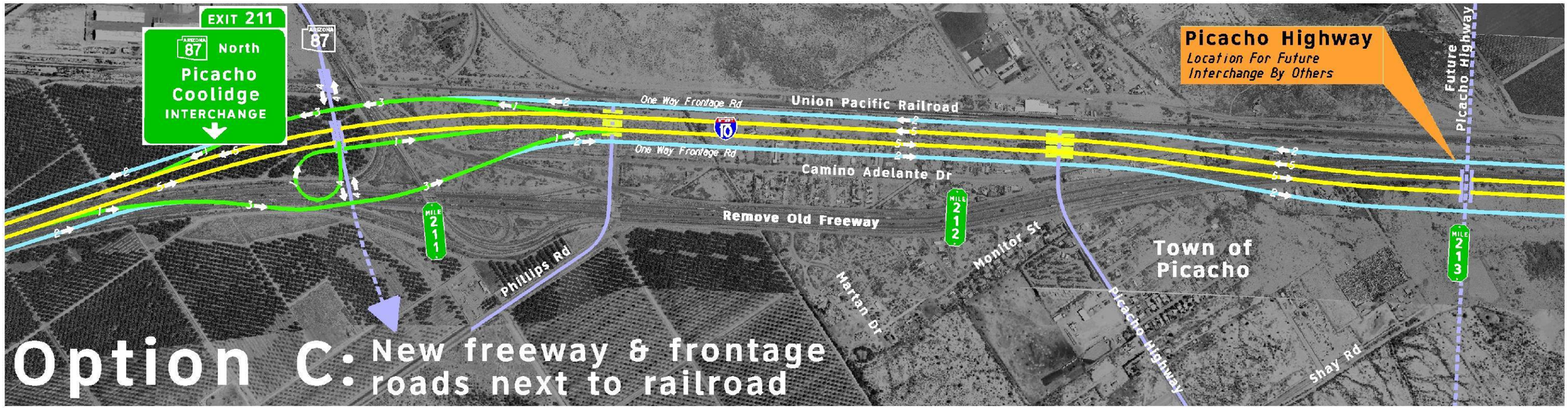
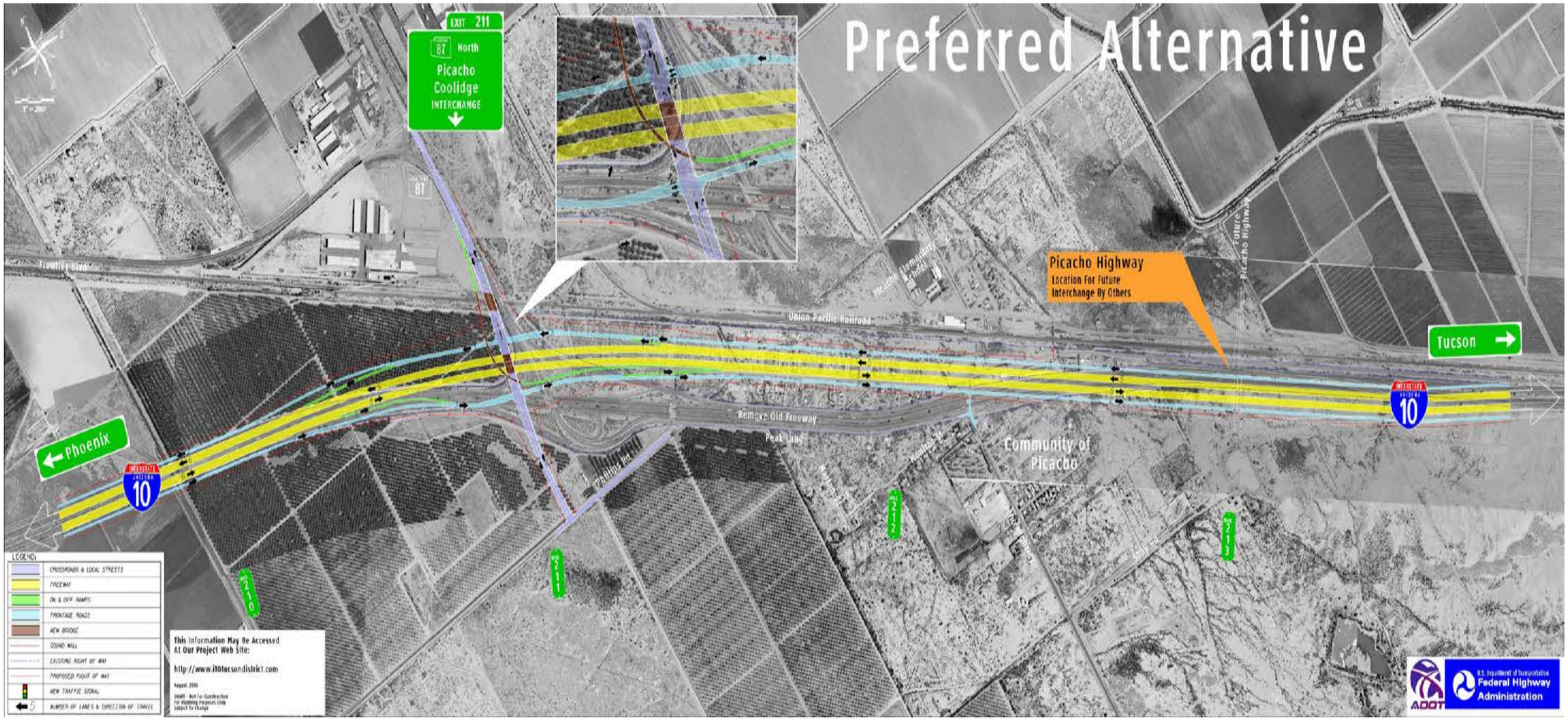


**Figure 4.16 – Preferred Alignment through Picacho**



- The Option C realignment of the freeway eliminates all substandard features and virtually all undesirable features associated with the existing freeway alignment through the community of Picacho.

- Option C eliminates a substantial length of elevated freeway which improves the visual aspects and noise impacts to the surrounding community.

- Options A and B would include an embankment 15 to 25 feet higher than existing ground through Picacho which creates a roadside safety concern along the freeway and would continue to divide the community into two distinct parts.

- Option C eliminates most of the private parcels located between the freeway and UPRR corridors.

- The existing freeway alignment would be abandoned and provide the opportunity for development of freeway compatible commercial development adjacent to the south side of the corridor.

## 4.8 SERVICE INTERCHANGE CONFIGURATION ALTERNATIVES

The proposed widening of Interstate 10 as recommended in Section 4.3.2 of this report would widen the corridor to as many as five (5) lanes in each direction and provide continuous one-way frontage roads. The expansion of the corridor to a 10-lane freeway is not compatible with any of the existing structures along the corridor.

Typically, the existing structures that pass over Interstate 10 were constructed as three (3) span structures and include bridge piers adjacent to the existing outside shoulders of I-10. A freeway cross section that includes five (5) lanes in each direction and an open median that is 84 feet in width will require the replacement of all structures that pass over Interstate 10. Since the recommendations for expanding I-10 will require the replacement of the existing interchange structures throughout the corridor, the I-10 Corridor study evaluated alternative configurations at each interchange. The results of the Alternative evaluation of these configurations is summarized in **Table 4.4**

### 4.8.1 Sunland Gin Road Interchange (MP 200)

- The existing interchange at Sunland Gin Road is a generally a diamond configuration, and is located less than a mile from the I-8 system interchange.

- In the eastbound direction the separation between entrance and exit ramps is less than 1000 feet, and this is expected to create traffic conflicts as volumes increase.

- The alignment of Sunland Gin Road intersects with Interstate 10 at a skewed angle in excess of 30 degrees from perpendicular.

- Commercial driveways are located within a couple hundred feet of the ramp terminals which does not meet current access management principles or ADOT guidelines. The existing Sunland Gin Road interchange is shown in **Figure 4.17**.

Alternative configurations have been considered at Sunland Gin Road to address existing deficiencies including the minimal spacing between this interchange and the I-8 system interchange, the excessive skew angle with Interstate 10, constructability issues, and access management concerns along the crossroad.

#### 4.8.1.1 Sunland Gin Road Interchange Alternative 1

- Proposes to move the interchange approximately ¼ mile east of its existing location. Existing Sunland Gin Road would be realigned from its existing alignment about a ¼ mile north of the interstate, cross I-10 at the proposed location for the new interchange, and then reconnect to existing Sunland Gin Road at a 4-legged intersection with Arica Road.

- This alternative provides additional separation between Sunland Gin Road and the I-8 interchange, minimizes the angle of skew with Interstate 10, and simplifies the construction of the new interchange since it is located approximately ¼ mile to the east.

- The proposed ramp terminals would be relocated over 1000 feet from any existing commercial driveway, which is expected to improve traffic operations of the new interchange by removing turning movements into the various businesses from the immediate area of the interchange.

- Alternative 1 for the Sunland Gin Road interchange is displayed in **Figure 4.18**.

#### 4.8.1.2 Sunland Gin Road Interchange Alternative 2

- Proposes to maintain the interchange at nearly its existing location. To simplify the constructability of the new bridge structure over the interstate, Sunland Gin Road is proposed to be offset to the east from its existing alignment and intersect the I-10 at a skew angle of 15 degrees from perpendicular.

- A raised median along Sunland Gin Road to restrict left turning movements would be included, and several of the existing commercial driveways would be restricted to right-in and right-out movements only.

- Alternative 2 for the Sunland Gin Road interchange would not increase the separation of this interchange from the I-8 system interchange.

- Alternative 2 for the Sunland Gin Road interchange is displayed in **Figure 4.19.**

**Figure 4.17 – Existing Sunland Gin Road Interchange**

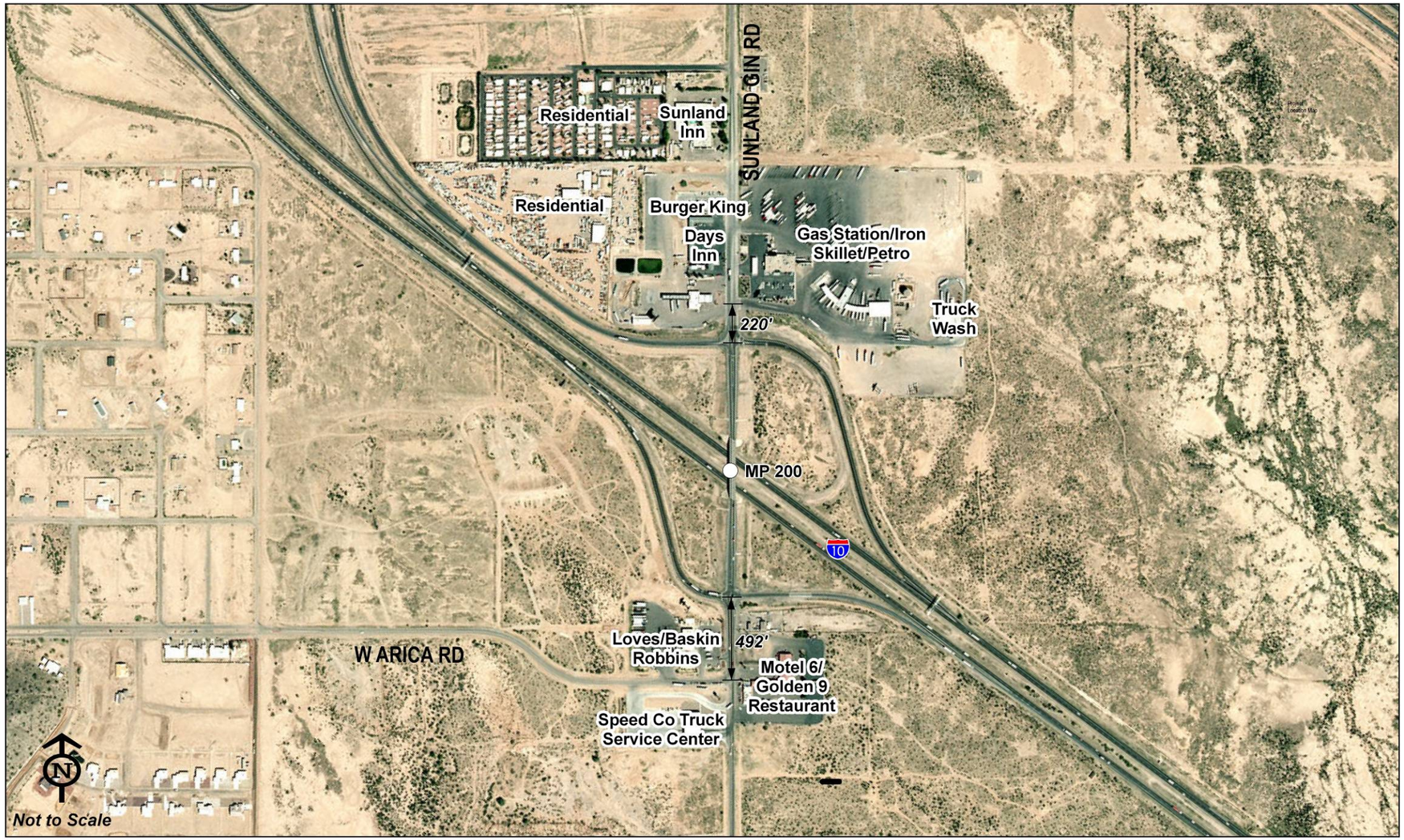


**Figure 4.18 – Sunland Gin Road Alternative 1**

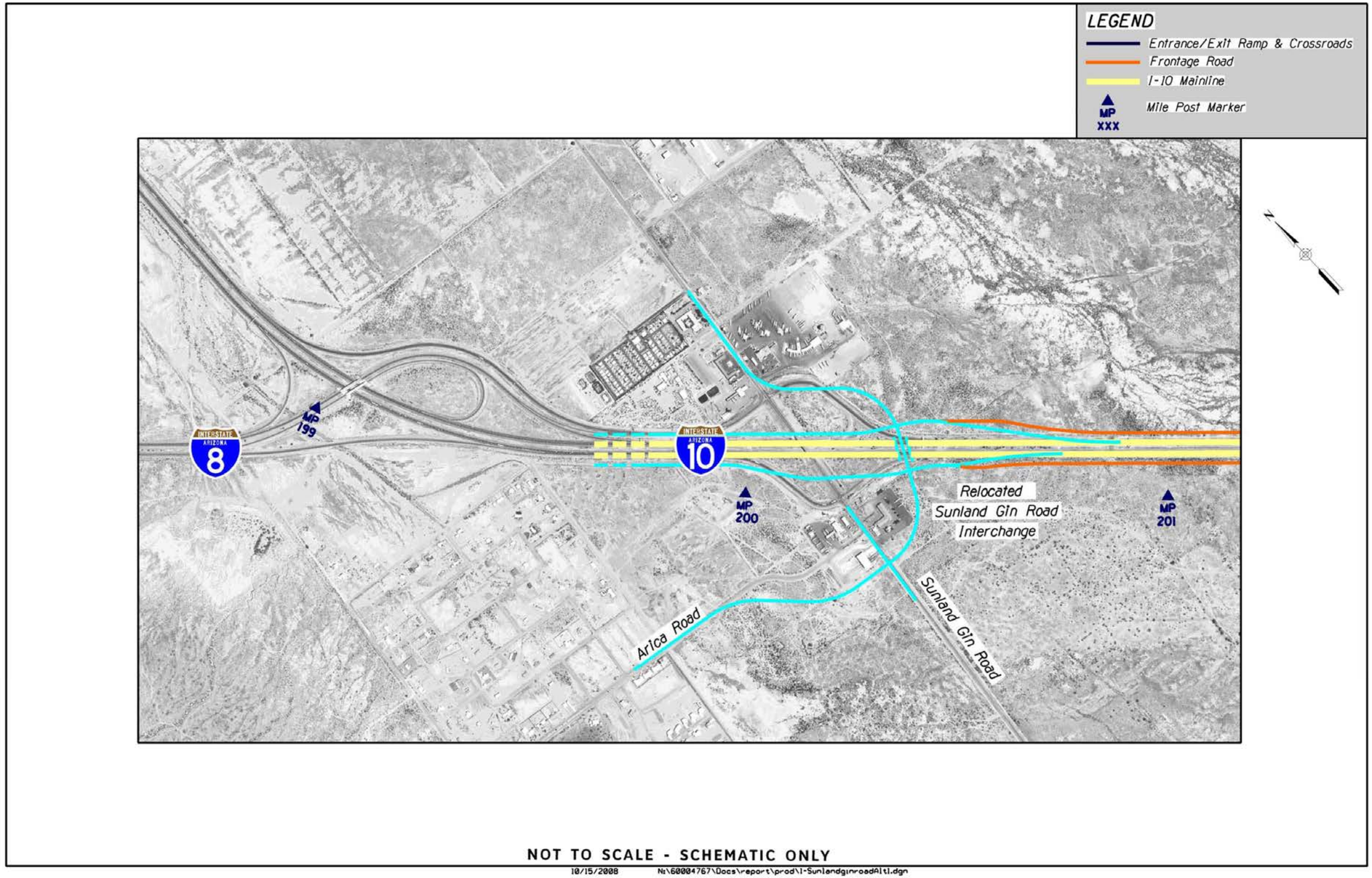
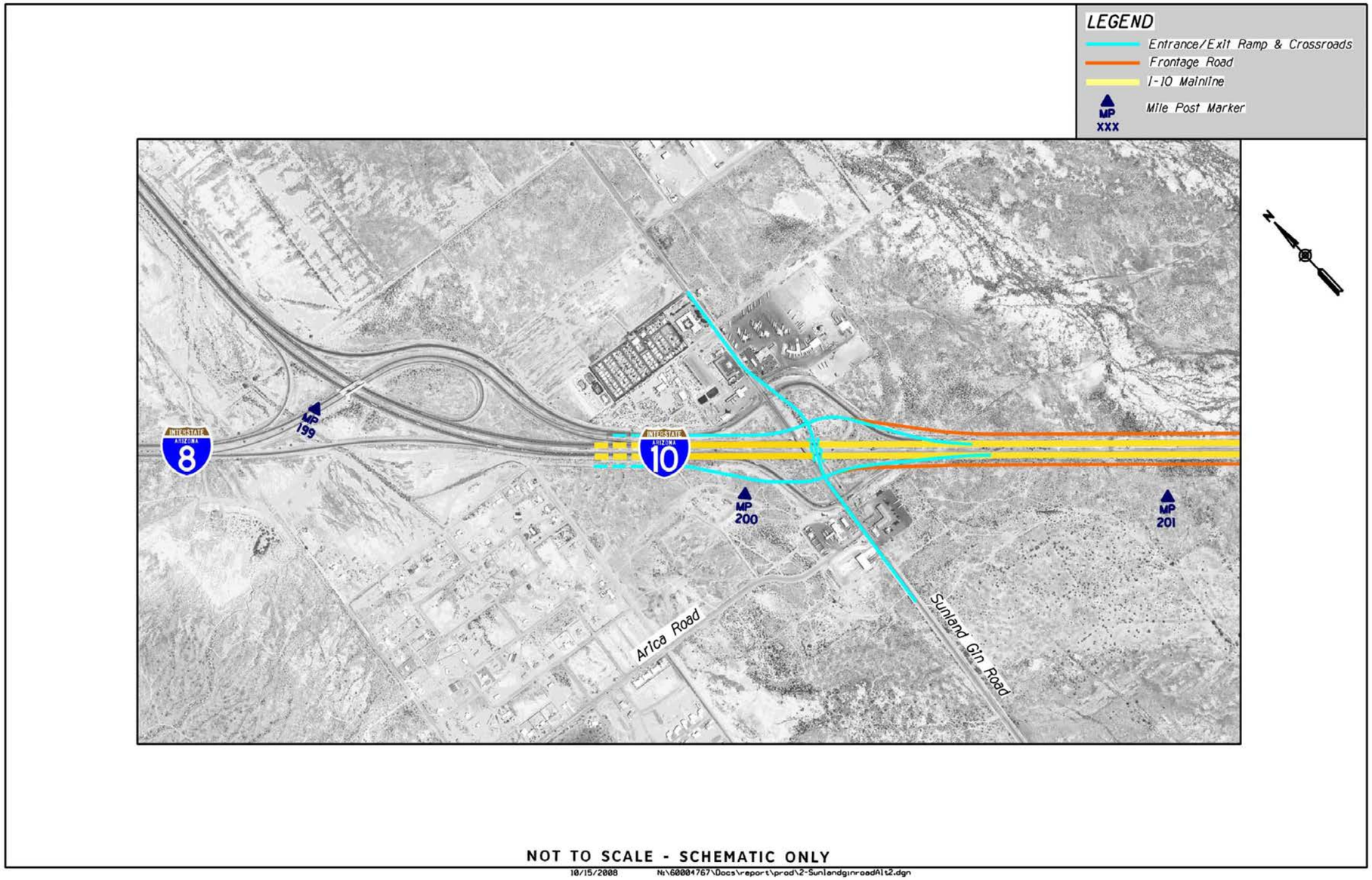


**Figure 4.19 – Sunland Gin Road Alternative 2**



## Table 4.4 – Interchange Configuration Alternatives Evaluation Matrix

**Interchange Location Alternative Evaluation Matrix**

| | Sunland Gin Road | | | Toltec Road | | | Interchange between Toltec and Sunshine | |
|---|---|---|---|---|---|---|---|---|
| | **No Build** | **Alternative 1**<br>Relocated Interchange | **Alternative 2**<br>Offset Bridge | **No Build** | **Alternative 1**<br>Offset Bridge | **Alternative 2**<br>Maintain Existing Alignment | **Alternative 1**<br>Tweedy Road Interchange | **Alternative 2**<br>Battaglia Road Interchange |
| **Compatibility with Existing Land uses** | Access revisions required along the existing roadway would modify current access points | Relocation of road creates circuitous routes to existing development | Minor changes to existing access locations | Access revisions required along the existing roadway would modify current access points | Minor changes to existing access locations | Minor changes to existing access locations | Impacts to businesses near proposed interchange | Intechange serves existing businesses along Battaglia Road |
| **Compatibility with Planned Land uses** | Existing cross road has limited capacity for traffic growth | Relocated roadway provides capacity for additional traffic growth | Widening of existing crossroad limited by existing development | Existing cross road has limited capacity for traffic growth | Widening of existing crossroad limited by existing development | Widening of existing crossroad limited by existing development | Proposed crossroad is not planned as a major arterial corridor | Battaglia Road is planned as a major arterial route through Eloy serving planned developments |
| **Intersection Spacing (Crossroad)** | Insufficient spacing between EB ramps and Arica Road | Greatest spacing between ramp terminals and adjacent streets | Sufficient spacing between ramp terminals and adjacent side streets | Insufficient spacing between ramp terminals and Houser Road | Sufficient spacing between ramp terminals and adjacent side streets | Sufficient spacing between ramp terminals and adjacent side streets | Desirable spacing between ramp terminals and adjacent streets | Desirable spacing between ramp terminals and adjacent streets |
| **Interchange Spacing along I-10** | Insufficient spacing between existing interchange and I-8 system interchange | Greatest spacing between proposed interchange and I-8 system interchange | Intechange spacing with I-8 is not appreciably increased | N / A | N / A | N / A | Located at two mile spacing with adjacent interchanges | Interchange proposed 1 1/2 miles from Toltec Road interchange |
| **Compatibility with Engineering Standards** | Sharp curvature on ramps near crossroad | Curvalinear alignment provides a 40 MPH design speed | Acceptable curvature at ramp terminals | Slight curvature on ramps near crossroad | Minimal curvature at ramp terminals | Acceptable curvature at ramp terminals | Perpendicular crossing with Interstate 10 | Acceptable curvature at ramp terminals |
| **Constructability** | Additional lanes on I-10 will require replacement of existing bridge | New interchange can be constructed without impacting existing traffic | Reconstruction of interchange will impact existing traffic during construction | Additional lanes on I-10 will require replacement of existing bridge | Construction of new structure ocurrs away from existing traffic | Reconstruction of interchange will impact existing traffic during construction | Battaglia overcrossing reconstruction would impact existing traffic during construction | New interchange can be constructed without impacting existing traffic |
| **Compatibility with Environmental Resources** | Traffic congestion predicted at intersections could contribute to air quality issues | Largest impact to undisturbed lands | Recommended improvements are contained within existing interchange footprint | Traffic congestion predicted at intersections could contribute to air quality issues | Minimal impact to undisturbed lands | Recommended improvements are contained within existing interchange footprint | Impacts to undisturbed lands at Tweedy and Battaglia crossings | Minimal impact to undisturbed lands |
| **Traffic Operations** | Existing capacity will not serve 2030 traffic volumes | New interchange can include high access management | Adequate spacing between ramp terminals and adjacent busineeses to improve access management | Existing capacity will not serve 2030 traffic volumes | Improvements can accommodate the future traffic volumes | Improvements can accommodate the future traffic volumes | Interchange is not located on a major arterial corridor | Interchange is proposed on a major arterial corridor |
| **Public acceptance** | Does not improve geometric or traffic conditions | Relocation of road creates circuitous routes to existing development | Existing crossroad is not relocated | Does not improve geometric or traffic conditions | Minor changes to existing access locations | Minor changes to existing access locations | City of Eloy General Plan does not include this interchange location | Proposed interchange is compatible with City of Eloy General Plan |
| **Recommend for Further Study** | **NO** | **YES** | **NO** | **NO** | **YES** | **NO** | **NO** | **YES** |

LEGEND: Least Desirable ○ Somewhat Desirable ◒ Moderately Desirable ◓ Most Desirable ●

## Table 4.4 – Interchange Configuration Alternatives Evaluation Matrix (Cont.)

**Interchange Location Alternative Evaluation Matrix**

| | Alsdorf Road | | Sunshine Boulevard | | | Picacho Highway | | |
|---|---|---|---|---|---|---|---|---|
| | Alternative 1<br>With Frontage Road Access | Alternative 2<br>Without Frontage Road Access | No Build | Alternative 1<br>Offset Bridge | Alternative 2<br>Maintain Existing Alignment | No Build | Alternaitve 1<br>Split Diamond w SR 87 | Alternative 2<br>Full Diamond |
| **Compatibility with Existing Land uses** | Impacts to businesses near Interstate 10 | Minimal impacts to existing businesses | Access revisions required along the existing roadway would modify current access points | Minor changes to existing access locations | Minor changes to existing access locations | Existing access to surrounding properties maintained | Circuitous access to I-10 from adjacent properties | Full freeway access from Picacho Highway |
| **Compatibility with Planned Land uses** | Intersection between the frontage roads and Alsdorf Road can enhance access to adjacent lands | No connection between frontage road and Alsdorf Road | Existing cross road has limited capacity for traffic growth | Widening of existing crossroad limited by existing development | Widening of existing crossroad limited by existing development | Circuitous access to I-10 from adjacent properties | Circuitous access to I-10 from adjacent properties | Full freeway access from Picacho Highway |
| **Intersection Spacing (Crossroad)** | N / A | N / A | Insufficient spacing between ramp terminals and Milligan Road | Sufficient spacing between ramp terminals and adjacent side streets | Sufficient spacing between ramp terminals and adjacent side streets | Insufficient spacing between ramp terminals and adjacent intersections | Minimal separation between ramp terminals and adjacent properties | Adequate separation between ramp terminals and adjacent properties |
| **Interchange Spacing along I-10** | N / A | N / A | N / A | N / A | N / A | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges |
| **Compatibility with Engineering Standards** | Acceptable curvature at ramp terminals | No intersections included in plan | Sharp curvature on ramps near crossroad | Minimal curvature at ramp terminals | Acceptable curvature at ramp terminals | Partial interchanges are not desirable | Partial interchanges are not desirable | Full interchange configuration is preferred |
| **Constructability** | Alsdorf overcrossing reconstruction would impact existing traffic during construction | Alsdorf overcrossing reconstruction would impact existing traffic during construction | Additional lanes on I-10 will require replacement of existing bridge | Construction of new structure ocurrs away from existing traffic | Reconstruction of interchange will impact existing traffic during construction | Additional lanes on I-10 will require reconstruction of existing ramps and adjacent intersections | Implementation of partial interchange may impact existing traffic patterns | New interchange can be constructed without impacting existing traffic |
| **Compatibility with Environmental Resources** | Greatest impact to undisturbed lands | Recommended improvements are contained within existing interchange footprint | Traffic congestion predicted at intersections could contribute to air quality issues | Minimal impact to undisturbed lands | Recommended improvements are contained within existing interchange footprint | Minimal impact to undisturbed lands | Impacts to surrounding businesses and other adjacent properties | largest impact to undisturbed lands |
| **Traffic Operations** | Two new signalized intersections added to Alsdorf Road | No new intersections added to Alsdorf Road | Existing capacity will not serve 2030 traffic volumes | Improvements can accommodate the future traffic volumes | Improvements can accommodate the future traffic volumes | Existing capacity will not serve 2030 traffic volumes | Partial interchange configuration assigns additional traffic to frontage roads | Full interchange configuration provides capacity for future traffic volumes |
| **Public acceptance** | Impacts to businesses near Interstate 10 | Minimal impacts to existing businesses | Does not improve geometric or traffic conditions | Minimal impact to adjacent businesses | Minimal impact to adjacent businesses | Existing access to surrounding properties maintained | Partial access is not preferred | Full freeway access is preferred |
| **Recommend for Further Study** | **NO** | **YES** | **NO** | **YES** | **NO** | **NO** | **NO** | **YES** |

LEGEND: Least Desirable

## Table 4.4 – Interchange Configuration Alternatives Evaluation Matrix (Cont.)

**Interchange Location Alternative Evaluation Matrix**

| | Park Link Drive | | | Red Rock | | Pinal Air Park Road | | |
|---|---|---|---|---|---|---|---|---|
| | Alternative 1<br>Diamond Interchange | Alternative 2<br>Directional Interchange | | No Build | Alternative 1<br>Diamond Interchage | No Build | Alternative 1<br>Combined Pinal Air Park Road and Missile Base Road | Alternative 2<br>Relocate Interchange to Missile Base Road |
| **Compatibility with Existing Land uses** | Diamond interchange provides good access to adjacent properties | Directional ramps would limit access to adjacent properties | | Circuitous access to adjacent properties | Relocation of Sasco Road and conversion of frontage roads to one way creates circuitous access | Directional ramps limit access to adjacent properties | Full freeway access to Pinal Air Park and Missile Base Road | Circuitous access to Pinal Air Park Road |
| **Compatibility with Planned Land uses** | Diamond interchange provides good access to adjacent properties | Directional ramps would limit access to adjacent properties | | Limited access to adjacent properties planned for development | Provision to extend Sasco Road across the railroad to access properties | Directional ramps limit access to adjacent properties | Full freeway access to Pinal Air Park and Missile Base Road, interchange location allows an interchange at Aries Road | Circuitous access to Pinal Air Park Road; interchange location does not allow for an interchange at Aries Road |
| **Intersection Spacing (Crossroad)** | Adequate separation between ramp terminals and adjacent properties | Adequate separation between ramp terminals and adjacent properties | | Insufficient spacing between WB ramp terminal and frontage road | Adequate separation between ramp terminals and adjacent properties | No adjacent intersections | Adequate separation between ramp terminals and adjacent properties | Adequate separation between ramp terminals and adjacent properties |
| **Interchange Spacing along I-10** | Two mile spacing between this interchange and adjacent interchanges | Directional ramps typically require greater than 2 mile spacing of interchanges | | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Existing interchange located within one mile of the proposed Tortolita Interchange | Two mile spacing between this interchange and adjacent interchanges | Greater than two mile spacing between this interchange and adjacent interchanges |
| **Compatibility with Engineering Standards** | Diamond interchange configuration meets all engineering standards | Directional Ramp configuration meets all engineering standards | | Ramp curvatures and alignments do not meet current ADOT standards | Diamond interchange configuration meets all engineering standards | Ramp curvatures and alignments do not meet current ADOT standards | Diamond interchange configuration meets all engineering standards | Diamond interchange configuration meets all engineering standards |
| **Constructability** | New interchange can be constructed without impacting existing traffic | New interchange can be constructed without impacting existing traffic | | Additional lanes on I-10 will require replacement of existing bridge | Reconstruction of structure and WB frontage road may impact existing traffic patterns | Additional lanes on I-10 would requre removal of loop ramps | New interchange can be constructed without impacting existing traffic | Impacts to traffic patterns on Missile Base Road may occur during construction |
| **Compatibility with Environmental Resources** | Minimal impact to undisturbed lands | largest impact to undisturbed lands | | Traffic congestion predicted at intersections could contribute to air quality issues | Minimal impact to undisturbed lands | Minimal impact to undisturbed lands | Largest impact to undisturbed lands | Minimal impact to undisturbed lands |
| **Traffic Operations** | Full interchange configuration provides capacity for future traffic volumes | Directional ramps improve the capacity of Park Link Drive | | Existing configuration and roadway capacity will not serve 2030 traffic volumes | Diamond interchange configuration provides capacity for future traffic volumes | Existing configuration and roadway capacity will not serve 2030 traffic volumes, loop ramps create a safety | Full interchange configuration provides capacity for future traffic volumes | Full interchange configuration provides capacity for future traffic volumes |
| **Public acceptance** | Diamond interchange is a conventional design | Directional ramps require a large amount of land from adjacent properties | | Does not improve geometric or traffic conditions | Full freeway access is preferred | Does not improve geometric or traffic conditions | Combined interchange with Missile Base Road and potential interchange at Aries Road is preferred | Location of this alternative does not allow for an interchange at Aries Road |
| **Recommend for Further Study** | **YES** | **NO** | | **NO** | **YES** | **NO** | **YES** | **NO** |

LEGEND: Least Desirable ○ Somewhat Desirable ◒ Moderately Desirable ◓ Most Desirable ●

## Table 4.4 – Interchange Configuration Alternatives Evaluation Matrix (Cont.)

| | Marana Road and Tangerine Road | | |
|---|---|---|---|
| | **No Build** | **Alternative 1**<br>Diamond Interchange with at-grade railroad crossing | **Alternative 2**<br>Diamond interchange with grade-separated railroad crossing |
| **Compatibility with Existing Land uses** | Minimal changes to existing access needed to meet access management requirements | Conversion of frontage roads to one way causes circuitous access | Raising Marana-Trico road over the railroad reduces access to adjacent properties |
| **Compatibility with Planned Land uses** | Existing crossroad has limited capacity for traffic growth | At-grade railroad crossing limits the capacity for traffic growth | Grade separated crossing provides greater capacity for additional traffic volumes |
| **Intersection Spacing (Crossroad)** | Insufficient spacing between ramp terminals and frontage roads. | Adequate separation between ramp terminals and adjacent properties | Adequate separation between ramp terminals and adjacent properties |
| **Interchange Spacing along I-10** | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges |
| **Compatibility with Engineering Standards** | Ramp alignments and intersection spacing do not meet current ADOT standards | At-grade railroad crossing is not desirable adjacent to a freeway interchange | Grade separated crossing preferred near a freeway interchange |
| **Constructability** | Additional lanes on I-10 can be added by widening existing bridge | Interchange can be reconstructed with minor impacts to existing traffic patterns | Crossroad would be closed during reconstruction of interchange |
| **Compatibility with Environmental Resources** | Traffic congestion predicted at intersections could contribute to air quality issues | Minimal impact to undisturbed lands | Largest impact to undisturbed lands |
| **Traffic Operations** | Existing configuration and roadway capacity will not serve 2030 traffic volumes | At-grade railroad crossing limits the capacity for traffic growth | Grade separated crossing provides greater capacity for additional traffic volumes |
| **Public acceptance** | Does not improve geometric or traffic conditions | At-grade crossing of the railroad is not preferred | Grade separated crossing of railroad is preferred |
| **Recommend for Further Study** | **NO** | **NO** | **YES** |

LEGEND: Least Desirable ○ Somewhat Desirable ◒ Moderately Desirable ◓ Most Desirable ●

#### 4.8.1.3 Sunland Gin Road Interchange Preferred Alternative (Alternative 1)

An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives proposed at Sunland Gin Road. An Evaluation Matrix is included as **Table 4.4**, Interchange Configuration Alternatives Evaluation Matrix, which includes the results of the evaluation for the two alternatives proposed at Sunland Gin Road.

- The preferred alternative recommended for further study is Alternative 1, which proposes to relocate the existing interchange approximately ¼ mile east of its current location
- North of I-10 the realignment of Sunland Gin Road is expected to continue to the northeast and become Overfield Road north of Jimmie Kerr Boulevard.
- Access to existing businesses is provided from collector roads that connect to the realigned Sunland Gin Road.
- The preferred interchange configuration at Sunland Gin Road is displayed in **Figure 4.20**.

### 4.8.2 Toltec Road Interchange (MP 204)

- The existing interchange at Toltec Road is a diamond configuration. The alignment of Toltec Road intersects with Interstate 10 at a skew angle in excess of 30 degrees from perpendicular.
- Commercial driveways are located within several hundred feet of the ramp terminals which does not meet current access management principles or ADOT guidelines.
- The existing Toltec Road interchange is shown in **Figure 4.21**.

#### 4.8.2.1 Toltec Road Interchange Alternative 1

- Proposes to maintain the interchange at nearly its existing location.
- To simplify the constructability of the new bridge structure over the interstate, Toltec Road is proposed to be offset to the east from its existing alignment and intersect I-10 at a skew angle of 15 degrees from perpendicular.
- Current ADOT guidelines suggest restricting access onto the cross road up to 1400 feet from the ramp terminals of an interchange. A raised median along Toltec Road to restrict left turning movements would be included, and several of the existing commercial driveways would be restricted to right-in and right-out movements only.
- Alternative 1 for the Toltec Road interchange is shown in **Figure 4.22**.

#### 4.8.2.2 Toltec Road Interchange Alternative 2

- Proposes to maintain the interchange in its existing location. The alignment of Toltec Road would remain on its existing alignment, and the new bridge would be replaced in the same location as the existing structure.
- There may be the need for false work over interstate traffic which is not desirable.
- A raised median along Toltec Road to restrict left turning movements would be included, and several of the existing commercial driveways would be restricted to right-in and right-out movements only.
- Alternative 2 for the Toltec Road interchange is shown in **Figure 4.23**.

#### 4.8.2.3 Toltec Road Interchange Preferred Alternative (Alternative 1)

An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives proposed at Toltec Road. An Evaluation Matrix is included as Table 4.4, Interchange Configuration Alternatives Evaluation Matrix, which includes the results of the evaluation for the two alternatives proposed at Toltec Road.

- The preferred alternative recommended for further study is Alternative 1, which proposes to reconstruct the new structure for Toltec Road offset from the existing alignment, and realign Toltec Road to intersect I-10 at a maximum skew angle of 15 degrees.
- Houser Road is realigned both east and west of the Toltec Road interchange, and the intersection locations are separated from the proposed interchange by a greater distance than existing.
- Raised medians are proposed along Toltec Road from the interchange ramp terminals to the relocated Houser Road intersections to restrict left-turn movements.
- The preferred configuration for Toltec Road is displayed in **Figure 4.24**.

**Figure 4.20 – Sunland Gin Road Interchange Preferred Configuration**

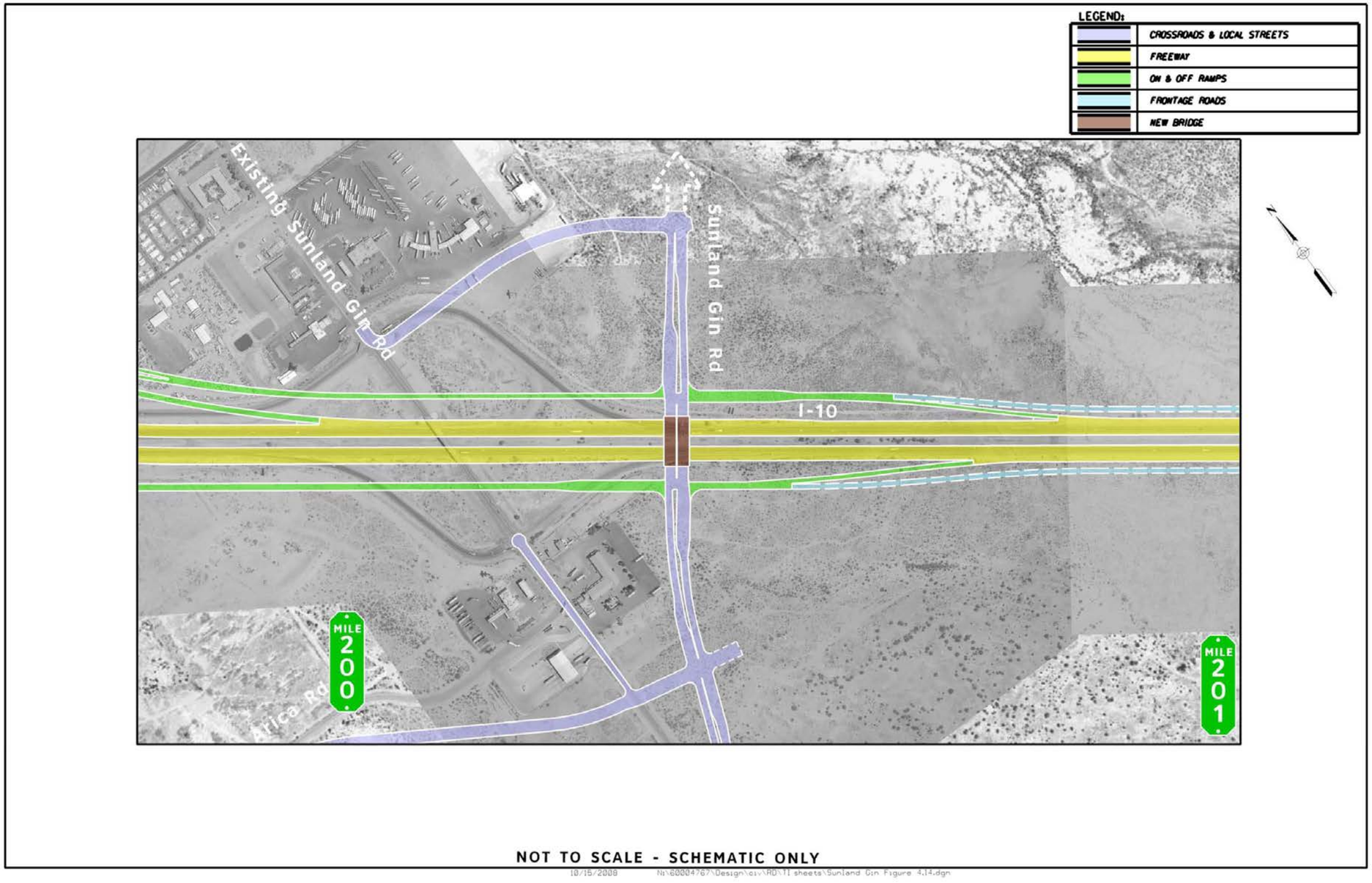


**Figure 4.21 – Existing Toltec Road Interchange**

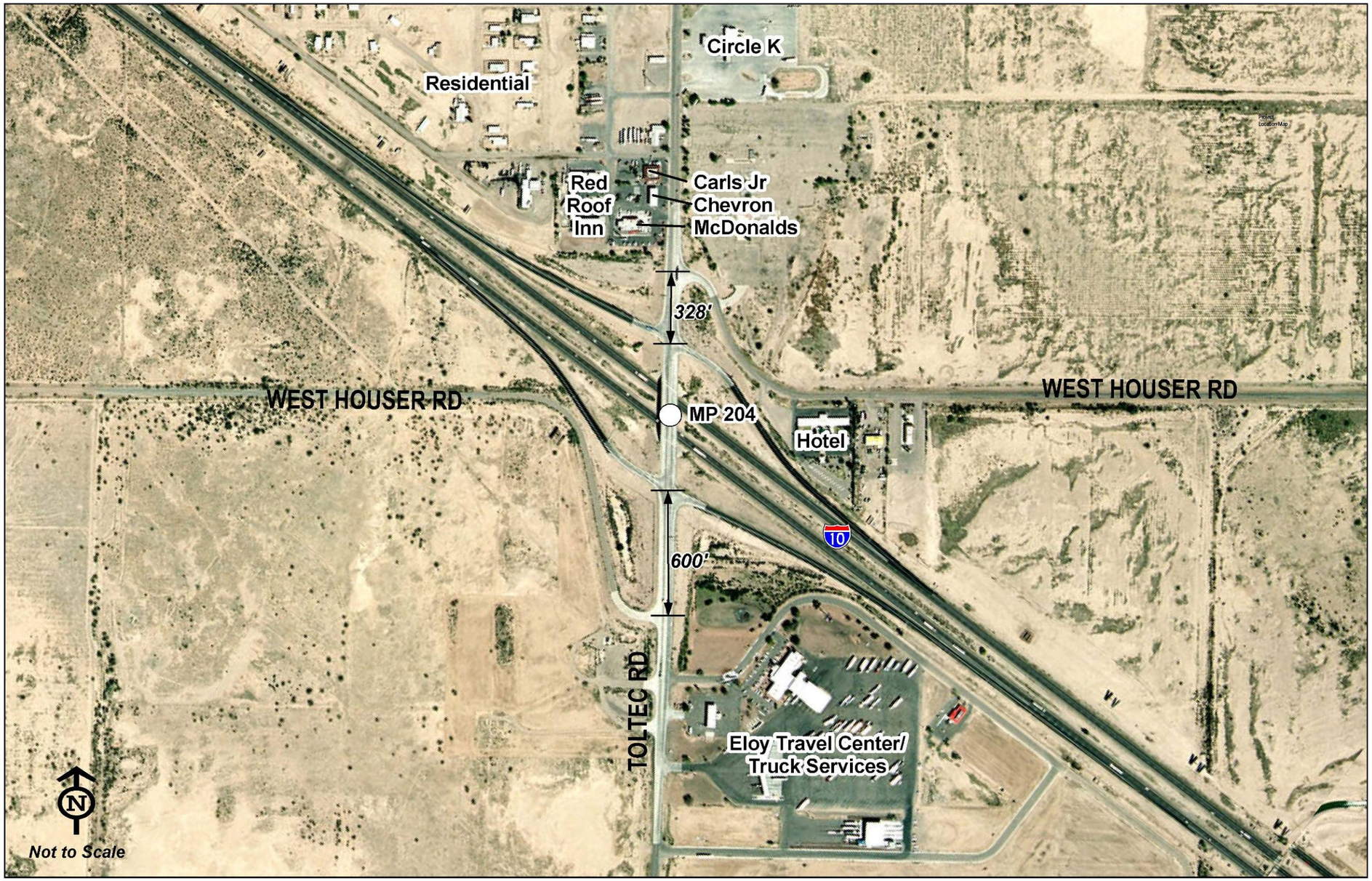


**Figure 4.22 – Toltec Road Alternative 1**

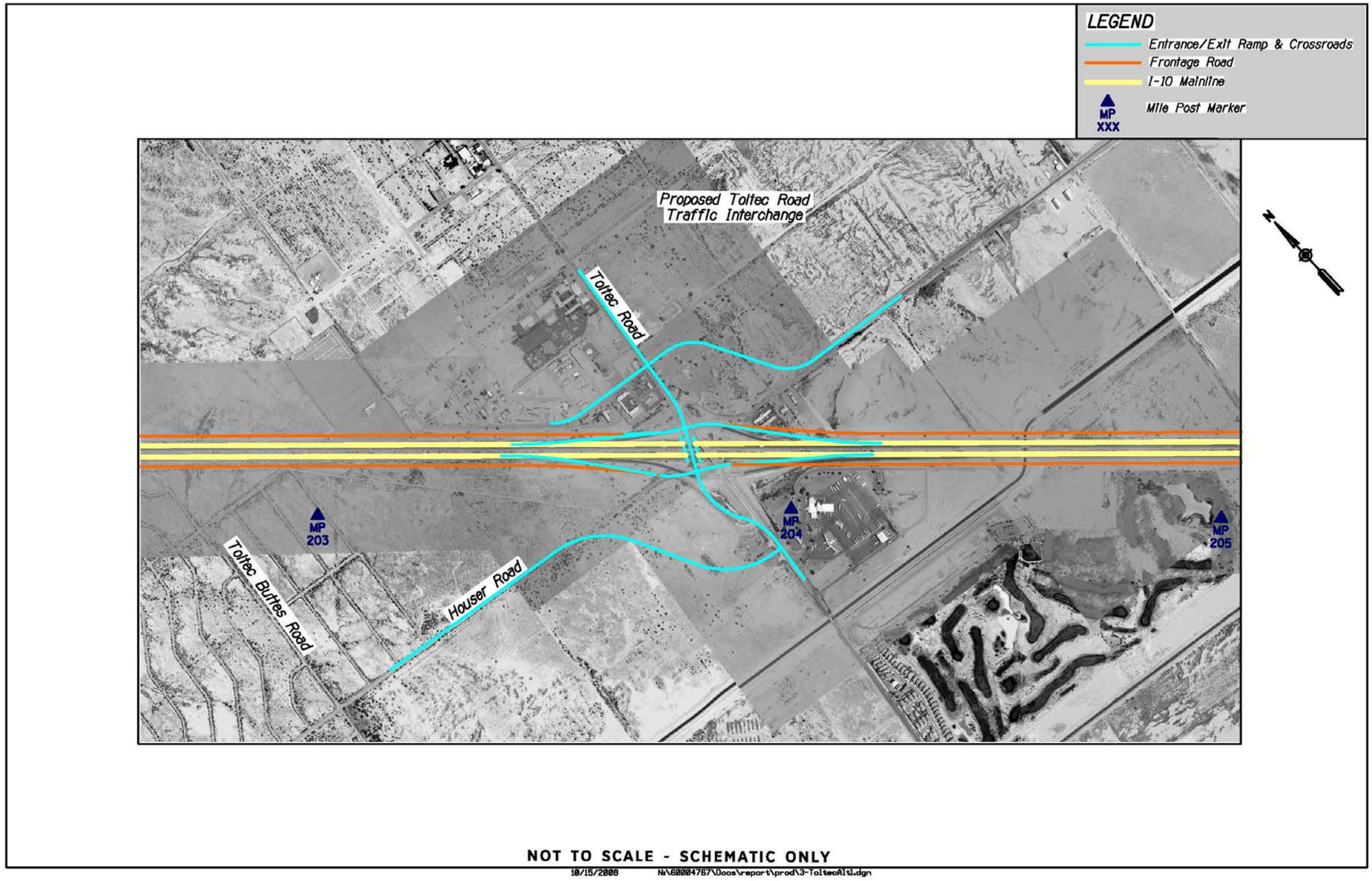


**Figure 4.23 – Toltec Road Alternative 2**

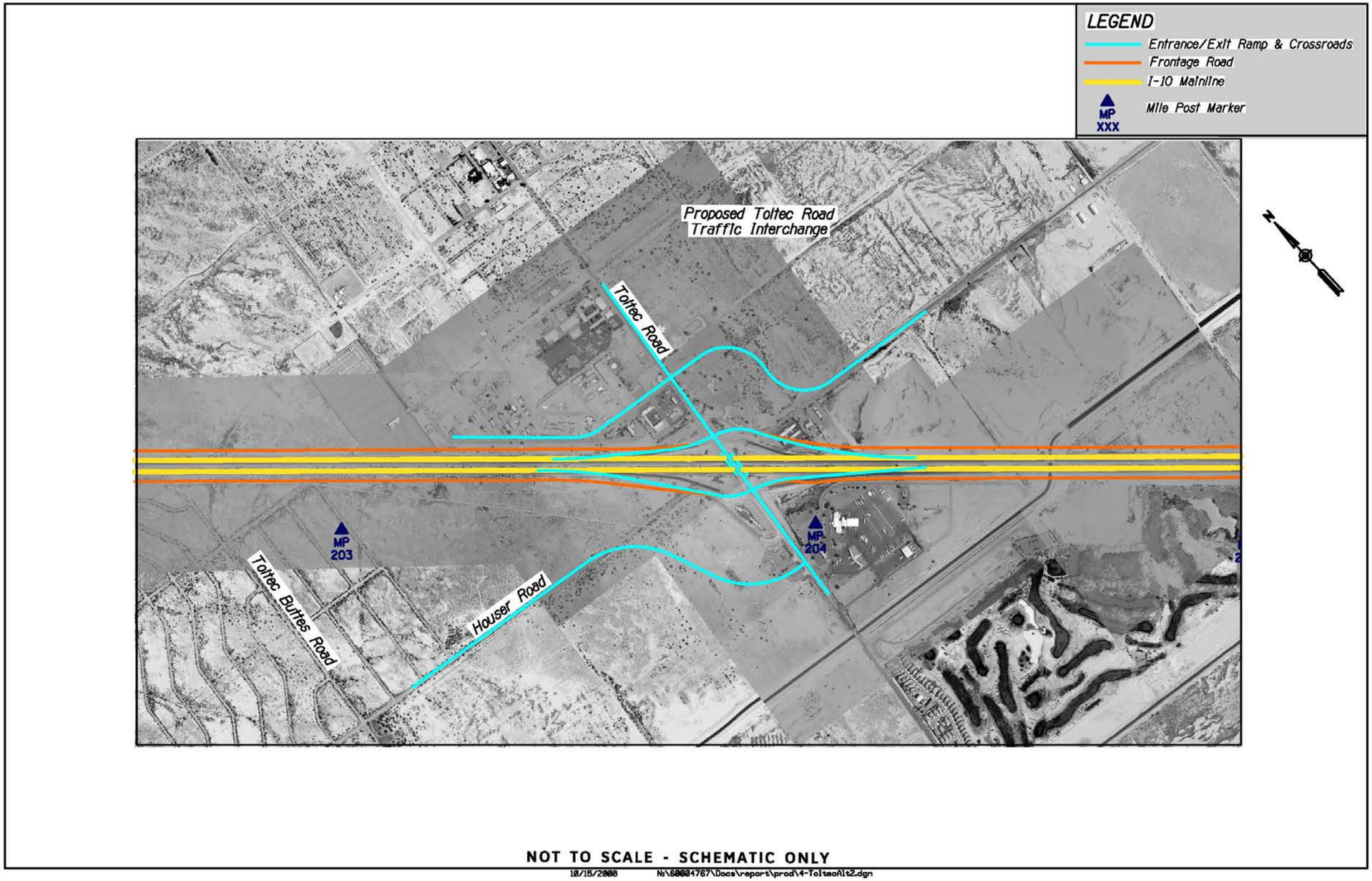
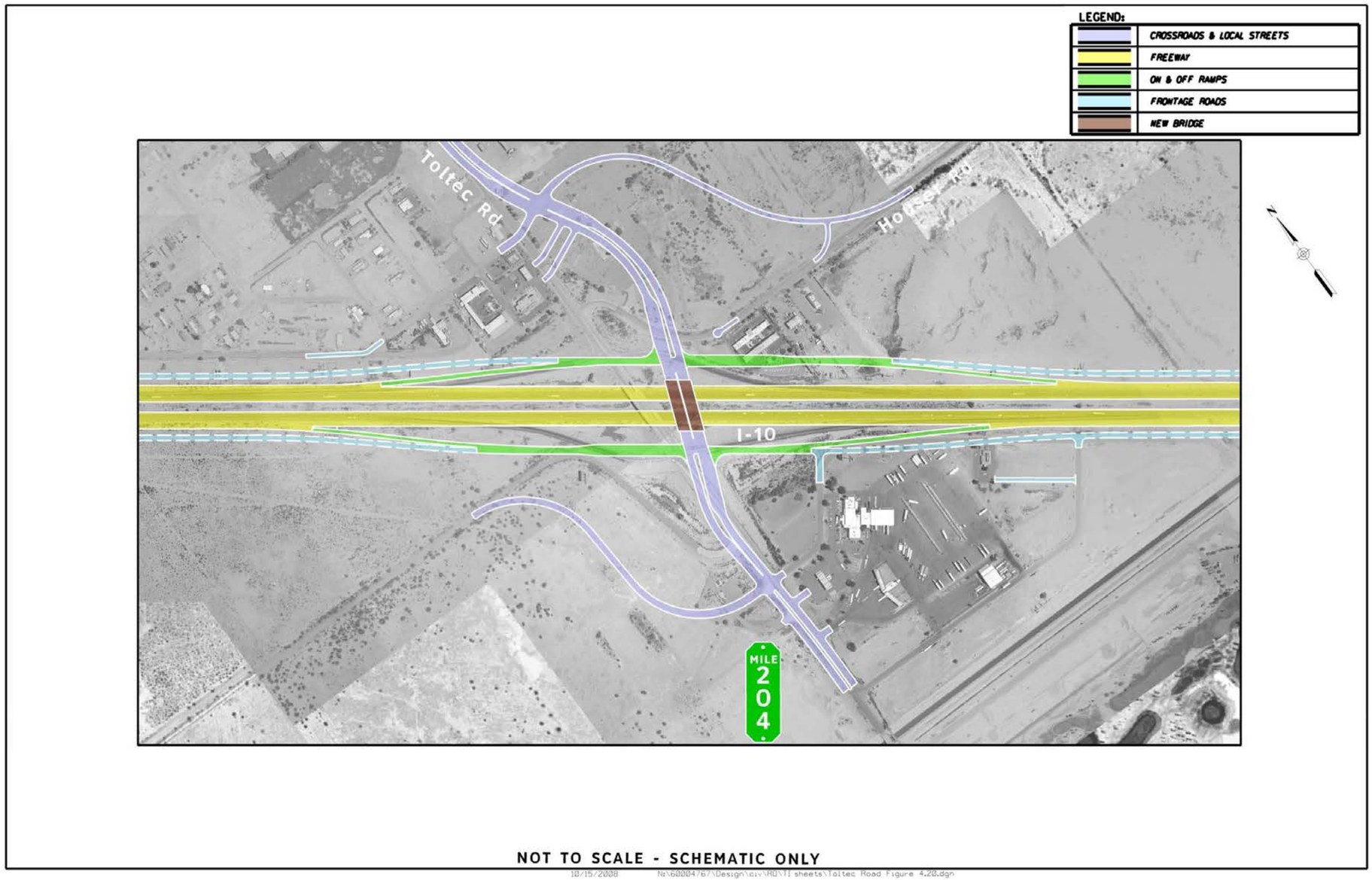


**Figure 4.24 – Toltec Road Interchange Preferred Configuration**



4.8.3 Interchange between Toltec Road and Sunshine Boulevard. (MP 206)

- The Toltec Road TI (MP 204) and Sunshine Boulevard TI (MP 209) are spaced nearly five (5) miles apart, allowing for the implementation of a new interchange located between MP 206 and MP 207.

- Two potential locations were identified for the new interchange, either at Battaglia Road (MP 206) or at Tweedy Road (MP 206.5). As discussed in Section 4.4, Battaglia Road was identified as the preferred location for a new interchange.

4.8.3.1 Alternative 1 – Tweedy Road Interchange

- Alternative 1 for locating an interchange between Toltec Road and Sunshine Boulevard is to locate the interchange near the Tweedy Road alignment.

- This alternative would place the new interchange half way between the existing interchanges along I-10, maximizing the spacing, the Tweedy Road interchange is displayed in **Figure 4.25**.

- This alternative provides an interchange on a north-south arterial and is located between Battaglia Road and Alsdorf Road.

- I-10 is proposed to have parallel frontage roads along the freeway, and this alternative proposes at-grade intersections between the frontage roads and the east-west corridors (Battaglia and Alsdorf) **Figure 4.27**.

4.8.3.2 Alternative 2 – Battaglia Road Interchange

- Implement an interchange at Battaglia Road. This alternative proposes to relocate Battaglia Road to intersect with I-10 at nearly a perpendicular angle to improve the geometrics of the proposed interchange.

- The realignment of Battaglia Road located the proposed interchange at approximately MP 206 which is slightly less than the desired two mile spacing from the Toltec Road interchange.

- An interchange at Battaglia Road is currently included in the City of Eloy General Plan, and this alternative is best compatible with the long range transportation plan for the city.

- The proposed Battaglia Road interchange is displayed in **Figure 4.26**.

4.8.3.3 Interchange located between Toltec Road and Sunshine Boulevard - Preferred Alternative (Alternative 2)

- An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives for an interchange located near MP 206. An Evaluation Matrix is included as **Table 4.4**, Interchange Configuration Alternatives Evaluation Matrix, which includes the results of the evaluation for the two alternatives proposed at Toltec Road.

- The preferred alternative recommended for further study is Alternative 2, which proposes to implement a new interchange at Battaglia Road.

- Since the recommended interchange is located at Battaglia Road (an east-west corridor), the recommendation at Alsdorf Road is to grade separate the frontage roads. Therefore, no access is provided between the frontage roads and Alsdorf Road (**Figure 4.28**).

4.8.4 Sunshine Boulevard Interchange (MP 209)

- The existing interchange at Sunshine Boulevard is a diamond configuration. The alignment of Sunshine Boulevard intersects with Interstate 10 at a skew angle in excess of 30 degrees from perpendicular.

- Commercial driveways are located within several hundred feet of the ramp terminals which does not meet current access management principles or ADOT guidelines.

- The existing Sunshine Boulevard interchange is shown in **Figure 4.29**.

4.8.4.1 Sunshine Boulevard Interchange Alternative 1

- Proposes to maintain the interchange at nearly its existing location.

- To simplify the constructability of the new bridge structure over the interstate, Sunshine Boulevard is proposed to be offset to the west from its existing alignment and intersect I-10 at a skewed angle of 15 degrees or less from perpendicular.

- Alternative 1 for the Sunshine Boulevard interchange is displayed in **Figure 4.30**.

- Current ADOT guidelines suggest restricting access onto the cross road up to 1400 feet from the ramp terminals of an interchange. A raised median along Sunshine Boulevard to restrict left turning movements would be included.

- Milligan Road both east and west of Sunshine Boulevard is proposed to be realigned to provide greater separation of the intersections from the interchange ramp terminals.

**Figure 4.25 – Alternative 1 – Tweedy Road Interchange**

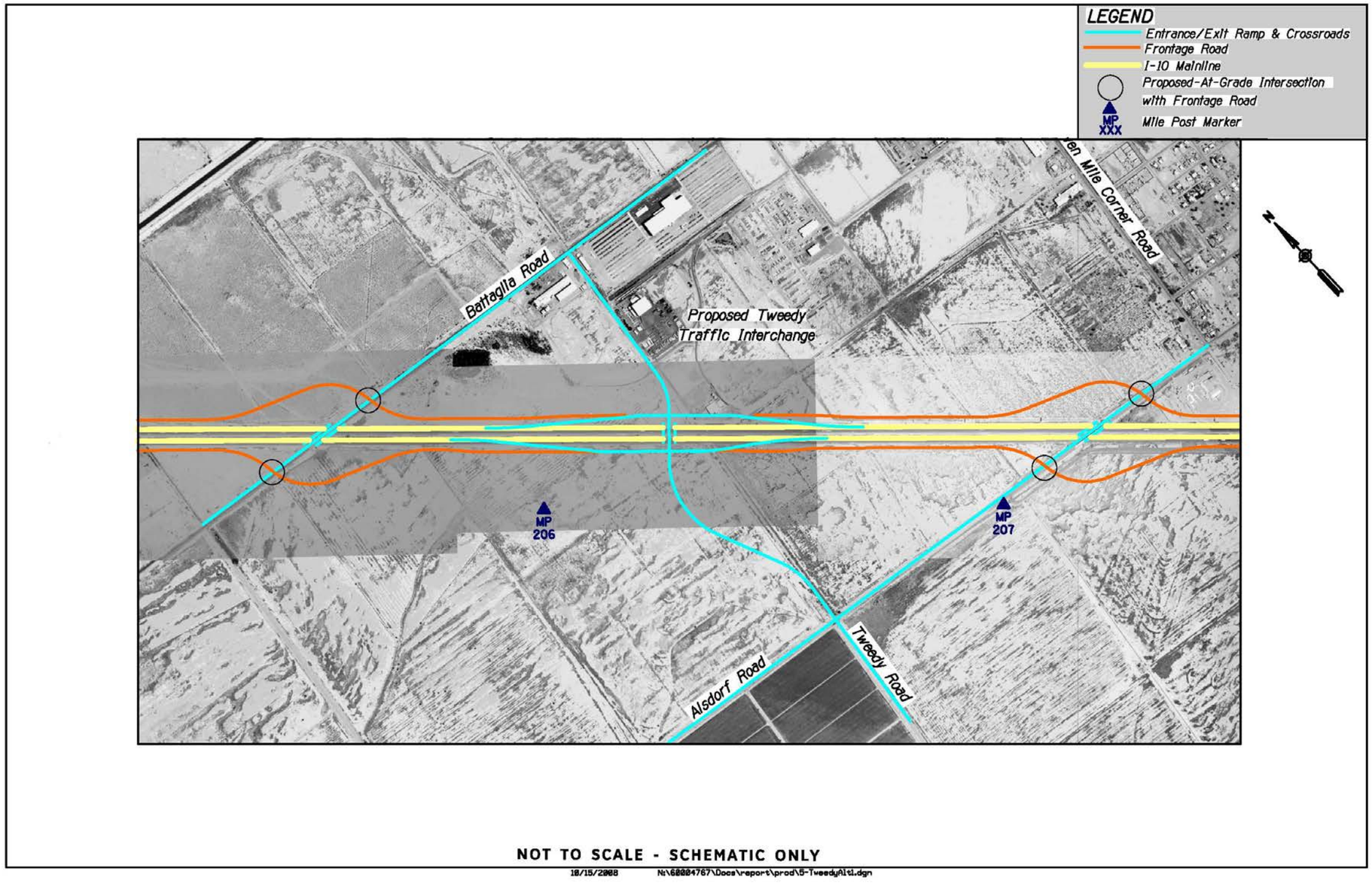


**Figure 4.26 – Alternative 2 – Battaglia Road**

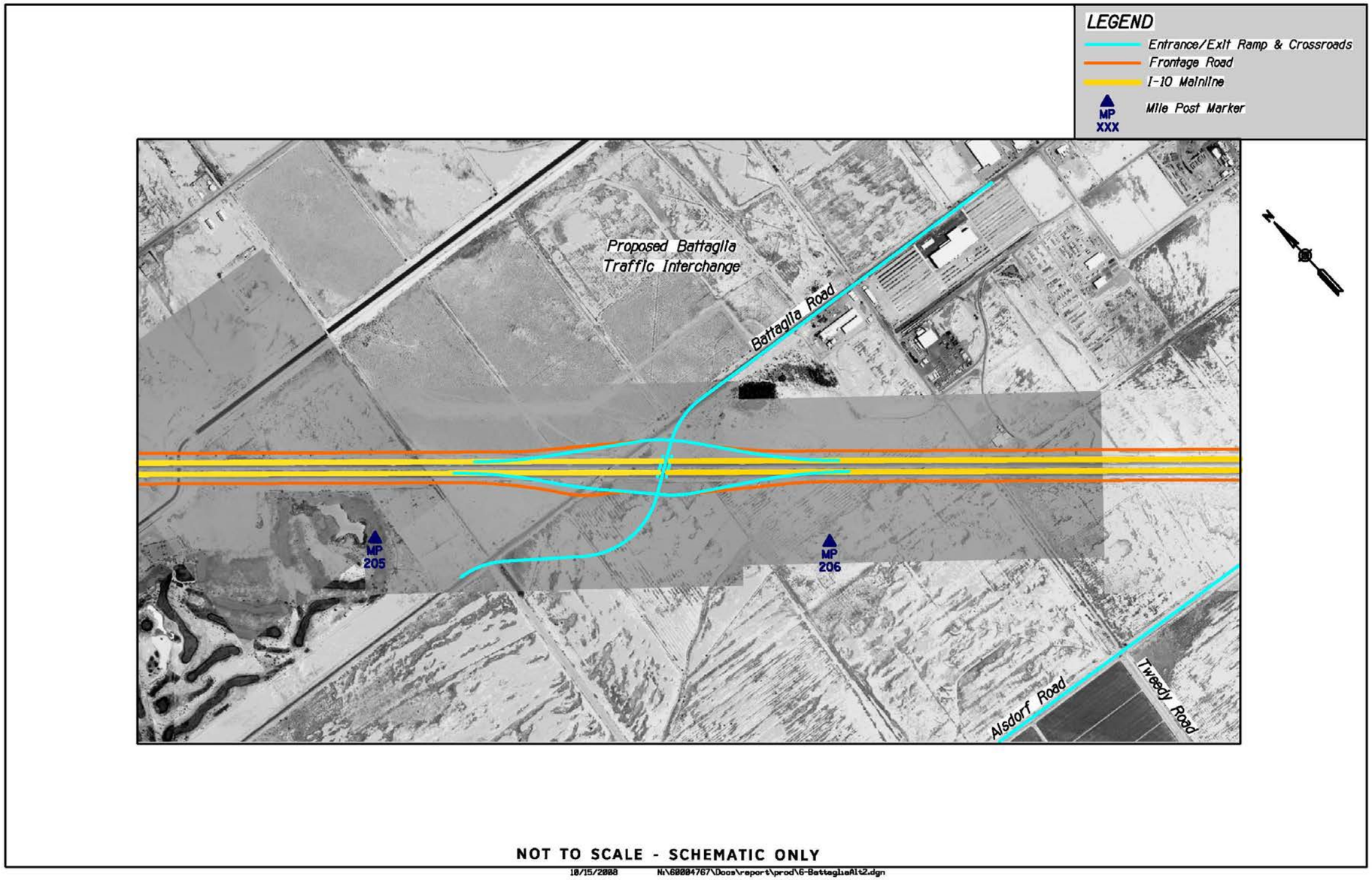


**Figure 4.27 – Alsdorf Road Alternative 1**

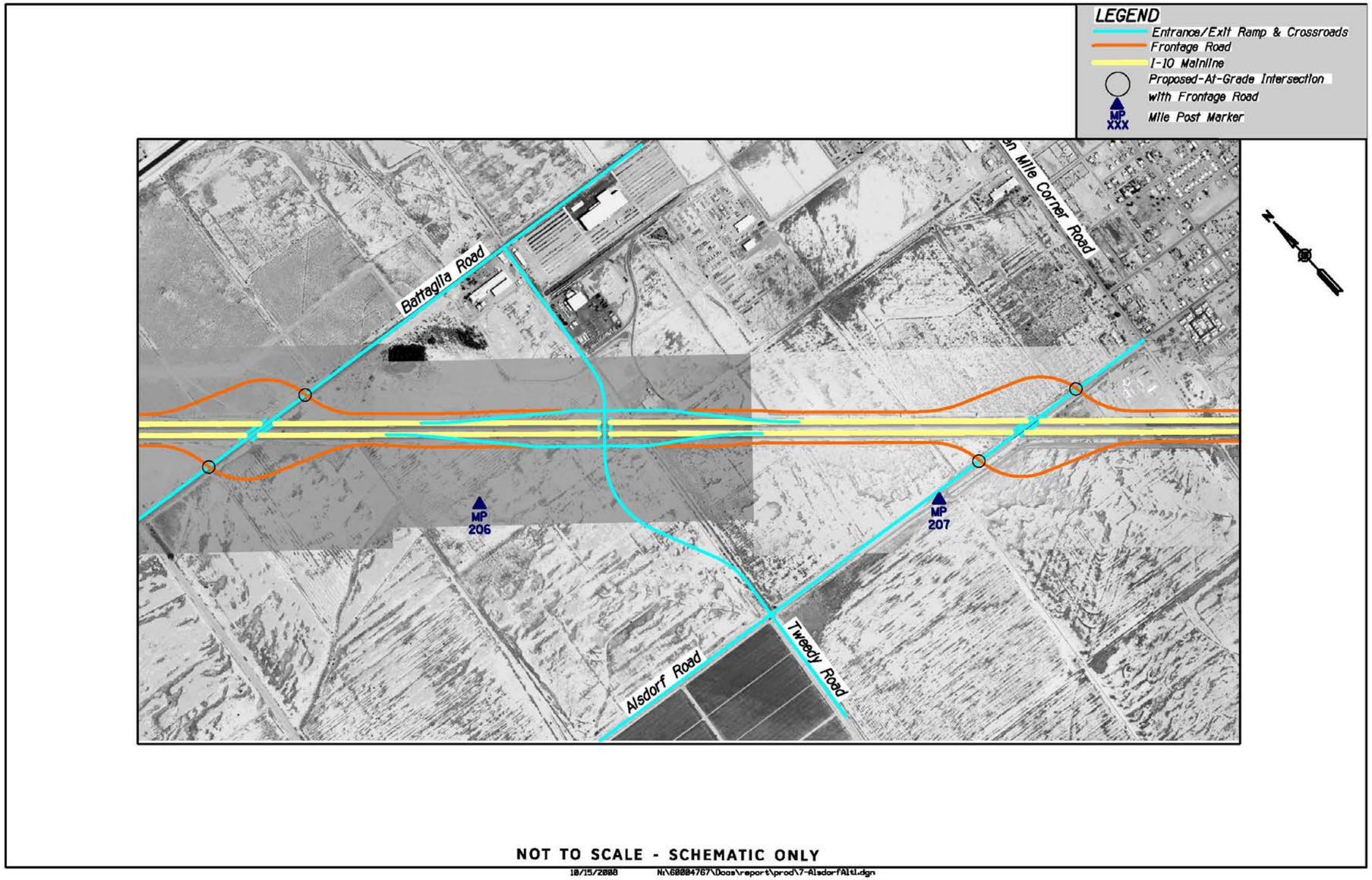


**Figure 4.28 – Alsdorf Road Alternative 2**

**Figure 4.29 – Existing Sunshine Boulevard Interchange**

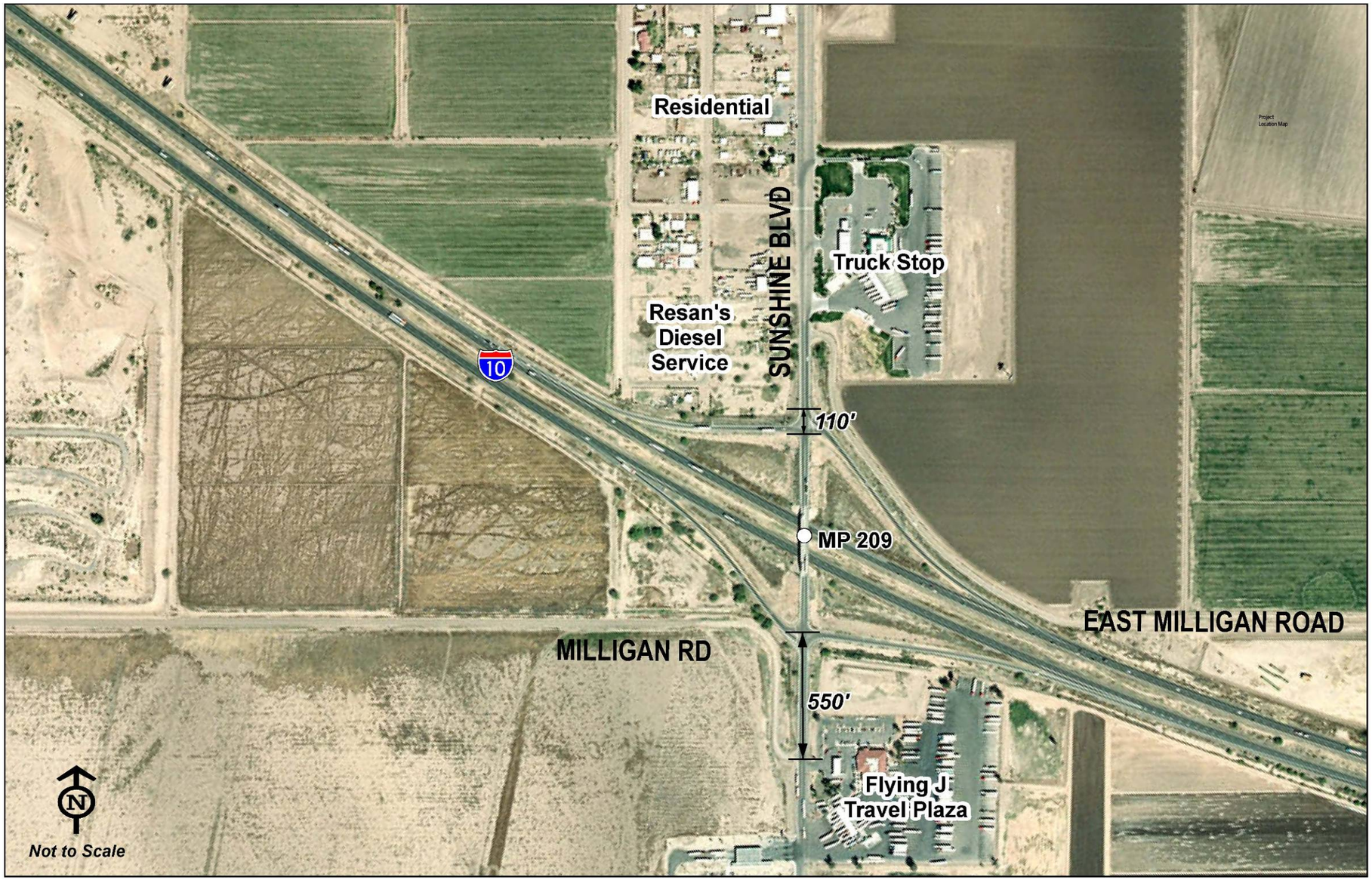


**Figure 4.30 – Sunshine Boulevard Alternative 1**

4.8.4.2 Sunshine Boulevard Interchange Alternative 2

- Maintain the interchange in its existing location. The alignment of Sunshine Boulevard would remain on its existing alignment, and the new bridge would be replaced in the same location as the existing structure.

- Depending on the type of bridge selected for this alternative, false work maybe required over interstate traffic which is not desirable.

- A raised median along to restrict left turning movements would be included, and Milligan Road both east and west of Sunshine Boulevard would be realigned to provide greater separation between intersections.

- Alternative 2 for the Sunshine Boulevard interchange is shown in **Figure 4.31**.

4.8.4.3 Sunshine Boulevard Interchange Preferred Alternative (Alternative 1)

- An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives proposed at Sunshine Boulevard. An Evaluation Matrix is included as Table 4.4, Interchange Configuration Alternatives Evaluation Matrix (Pages 34 through 37), which includes the results of the evaluation for the two alternatives proposed at Sunshine Boulevard

- The preferred alternative recommended for further study is Alternative 1, which proposes to reconstruct the new structure for Sunshine Boulevard offset from the existing alignment, and realign Sunshine Boulevard to intersect I-10 at a maximum skew angle of 15 degrees.

- West of the Sunshine Boulevard interchange, Milligan Road would be realigned to the south. Raised medians are proposed along Sunshine Boulevard from the interchange ramp terminals to the driveway access for the Pilot Truck Stop (north of the interchange), and the Flying J Truck Plaza (south of the interchange).

- The intersection between Milligan Road and Sunshine Boulevard north of the interchange would be eliminated as the City of Eloy is currently abandoning this street as part of a redevelopment plan for the area.

- The preferred configuration for Sunshine Boulevard is displayed in **Figure 4.32**.

4.8.5 State Route 87 Interchange (MP 211)

- The existing interchange at SR 87 includes free flowing directional ramps between I-10 and SR 87 with a loop in the southeast quadrant. Slip ramps in the eastbound and westbound direction provide access from SR 87 and the frontage roads that continue east of the interchange through the community of Picacho.

- Approximately ¾ mile to the east of the SR 87 interchange is the East Picacho interchange, which is a half diamond configuration that provides access to and from I-10 east of the community (**Figure 4.33)**.

Seven (7) configurations were considered for the SR 87 interchange. The community of Picacho currently is served by the SR 87 interchange and a half interchange at Picacho Highway. Alternatives were considered that evaluated combining these two interchanges. The alternatives considered for the SR 87 interchange are as follows:

- Alternative 1 – Split Diamond Configuration between SR 87 and Picacho Highway
- Alternative 2 – Split Diamond Configuration between SR 87 and Phillips Drive
- Alternative 3 – Conventional Diamond Interchange
- Alternative 4 – Diamond Interchange with Triple Left turn (southbound to eastbound)
- Alternative 5 – Partial Cloverleaf (loop ramp in SW quadrant)
- Alternative 6 – Single Point Interchange
- Alternative 7 – Flyover Interchange (directional ramp southbound to eastbound)

Each of the alternatives was evaluated based on a number of criteria to allow for a comparison of the benefits or impacts of each. Several of the alternatives were determined to contain a fatal flaw which eliminated that alternative from further consideration. The SR 87 Evaluation Matrix is provided as **Table 4.5**.

4.8.5.1 SR 87 Interchange Alternative 1 – Split Diamond with Picacho Highway

- The SR 87 interchange would be modified to a standard diamond configuration, and is connected through frontage roads with a partial diamond interchange at Picacho Highway.

- In the westbound direction, Camino Adelante (old Hwy 84) would be converted to a one-way frontage road.

- This split diamond configuration allows drivers to access the community of Picacho from both the SR 87 or Picacho Highway interchange, and travel along the frontage roads to access specific properties.

- Alternative 1 for SR 87 and Picacho Highway is depicted in **Figure 4.34**.

- This alternative would convert Camino Adelante (old Hwy 84) to one-way operation, creating the potential for wrong-way movements through the community of Picacho. These factors led to the decision that this alternative is fatally flawed and is not recommended for further study.

**Figure 4.31 – Sunshine Boulevard Alternative 2**

**Figure 4.32 – Sunshine Boulevard Interchange Preferred Configuration**

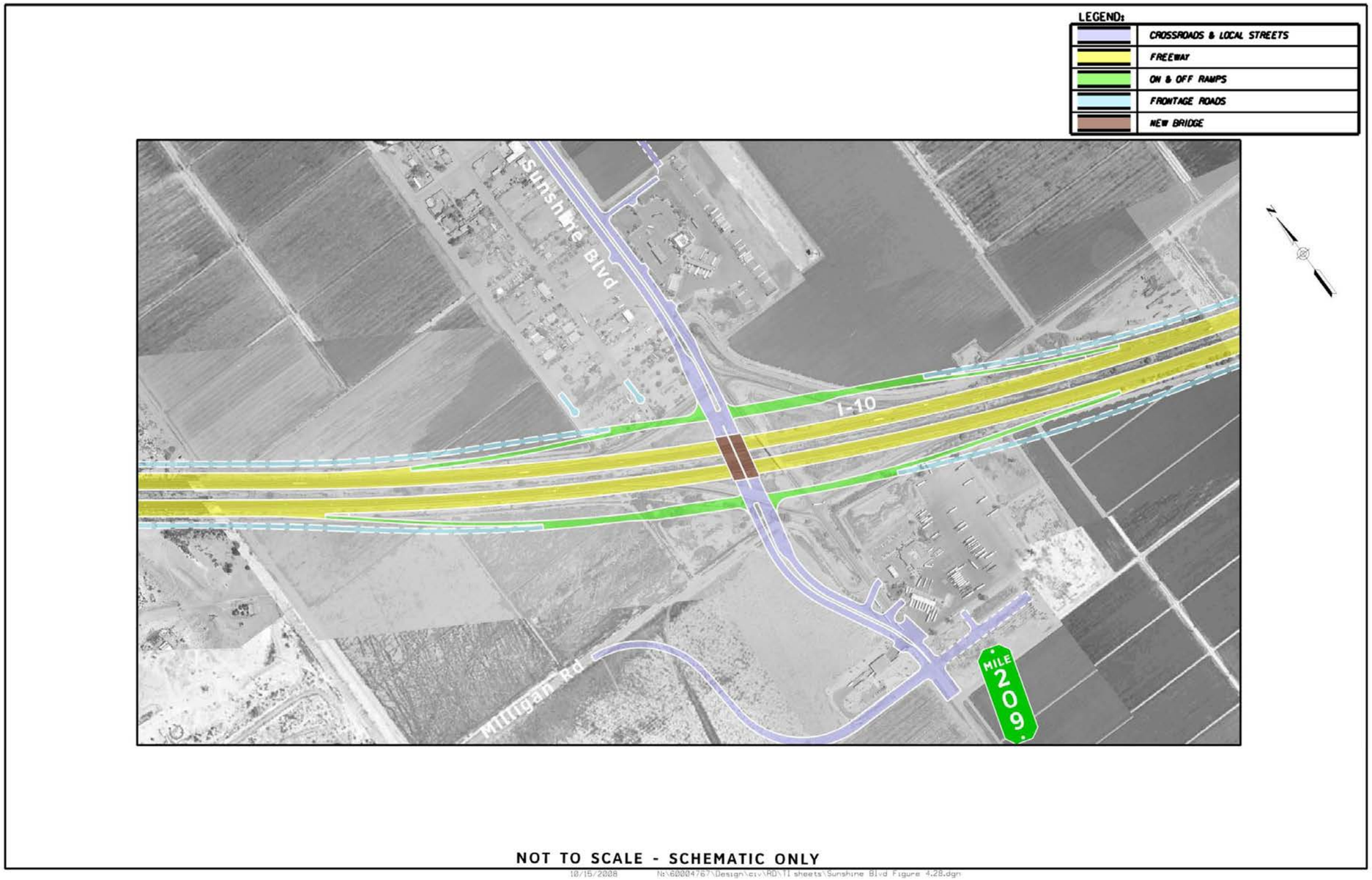


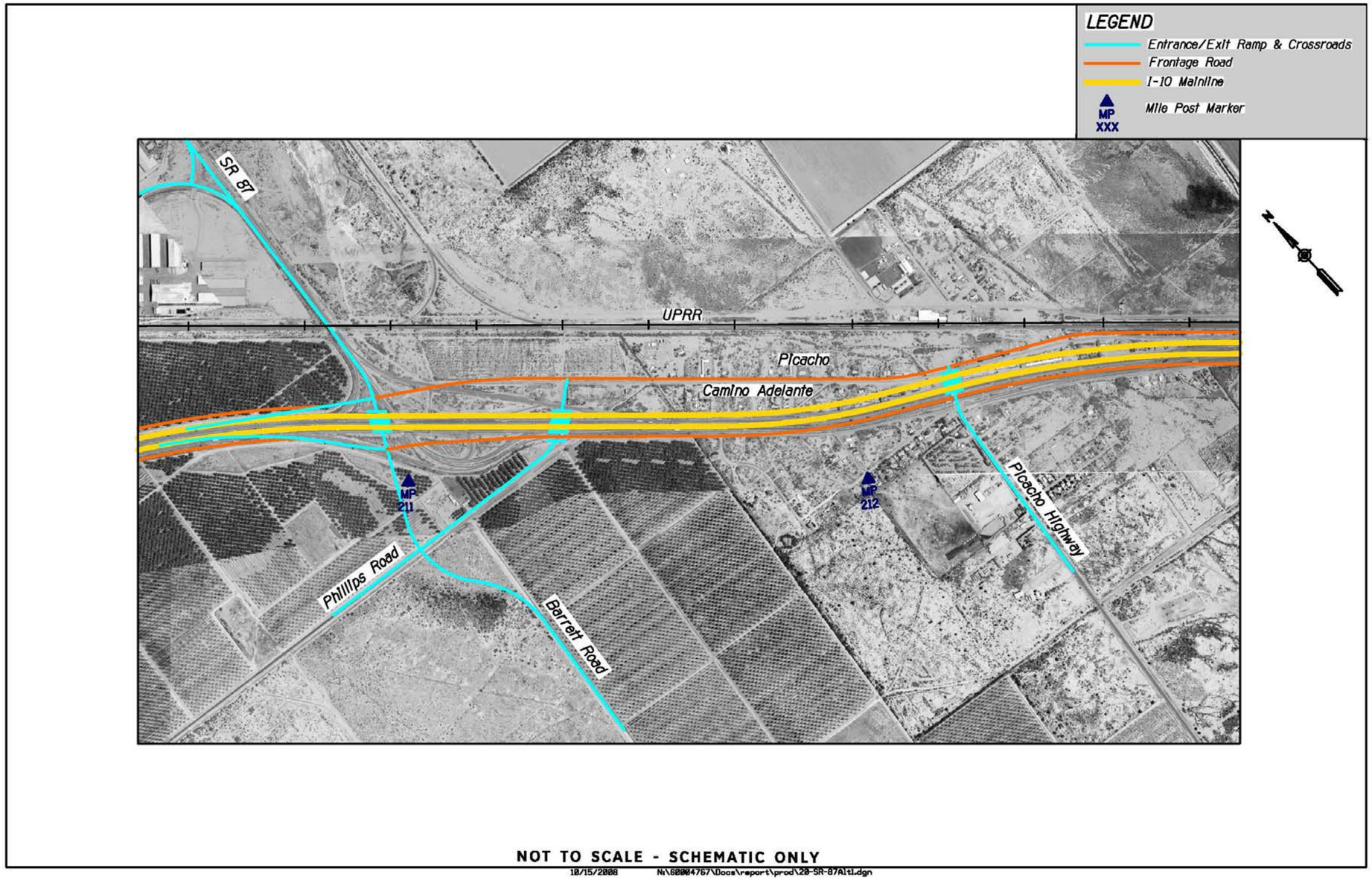
**Figure 4.33 – Existing SR 87 and East Picacho Interchanges**

## Table 4.5 – SR 87 Alternatives Evaluation Matrix

| | SR 87 Interchange Configuration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Evaluation Categories | **No Build** | **Alternative 1**<br>Split Diamond w/ Picacho Highway | **Alternative 2**<br>Split Diamond w/ Phillips Dr (combined with Bypass Route) | **Alternative 3**<br>Conventional Diamond Interchange | **Alternative 4**<br>Diamond Interchange w/ Triple Left | **Alternative 5**<br>Partial Cloverleaf (SW Quadrant) | **Alternative 6**<br>Single Point Interchange | **Alternative 7**<br>Flyover Ramp |
| **Compatibility with Existing Land uses** | Directional ramps limit access | Circuitous access to SR 87 from adjacent properties | Full freeway access from SR 87 and Phillips Road improves access to adjacent properties | Full freeway access at SR 87 | Full freeway access at SR 87 | Full freeway access at SR 87 | Full freeway access at SR 87 | Additional access management along EB frontage Road |
| **Compatibility with Planned Land uses** | Roadway is not extended south to access adjacent properties | Circuitous access to SR 87 from adjacent properties | Full freeway access from SR 87 and Phillips Road improves access to adjacent properties | Full freeway access at SR 87 | Full freeway access at SR 87 | Additional Right of Way needed for Loop Ramp reduces available land for development | Full freeway access at SR 87 | Additional access management along EB frontage Road |
| **Right of Way Requirements** | No new Right of Way | Right of Way required for diamond type ramps | FATAL FLAW<br>Right of Way required for Bypass Route | Right of Way required for diamond type ramps | Right of Way required for diamond type ramps | Highest amount of right of way required | Right of Way required for diamond type ramps | Additional right of way required over diamond configuration |
| **Interchange Spacing along I-10** | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Two mile spacing between this interchange and adjacent interchanges | Less than 2 mile spacing between interchanges |
| **Compatibility with Engineering Standards** | Ramp curvatures do not meet current ADOT standards | FATAL FLAW<br>Split interchanges with long distance between ramp pairs is least desirable | Split interchanges are not as desirable as conventional diamonds | Full interchange configuration is preferred | FATAL FLAW<br>Triple left turn configuration is not desireable | Loop ramp design may violate drivers expectations | FATAL FLAW<br>Requires a closed median on Interstate 10 | 40 MPH flyover design is below desirable recommendations |
| **Constructability** | Additional lanes on I-10 will require reconstruction of the existing ramps | Implementation of split interchange may impact existing traffic patterns during construction | Much of bypass alignment can be constructed without impacts to existing traffic | Construction of ramps on east side of the interchange may impact existing traffic patterns during construction | Construction of ramps on east side of the interchange may impact existing traffic patterns during construction | Spread ramp design provides greater flexibility to maintain traffic during construction | Construction of ramps on east side of the interchange may impact existing traffic patterns during construction | Spread ramp design provides greater flexibility to maintain traffic during construction |
| **Compatibility with Environmental Resources** | Minimal impacts to adjacent properties | Minimal impacts to adjacent properties | Largest impacts to undisturbed lands (combined with Bypass) | Minimal impact to adjacent lands | Minimal impact to adjacent lands | greater impact to adjacent lands | Minimal impacts to adjacent properties | greater impact to adjacent lands |
| **Traffic Operations** | Existing capacity will not serve 2030 traffic volumes | Split interchange configuration assigns additional traffic to frontage roads potentially increasing traffic delays | Split interchange configuration assigns additional traffic to frontage roads potentially increasing traffic delays | Double left turn (SB to EB) does not provide capacity for 2030 volumes | Triple left turn configuration provides capacity for 2030 traffic volumes | Loop ramp design provides capacity in excess of 2030 traffic volumes | Double left turn (SB to EB) does not provide capacity for 2030 volumes | Flyover ramp design provides capacity in excess of 2030 traffic volumes |
| **Construction Costs** | No Costs | **$** | **$$$ (Bypass Route)** | **$** | **$** | **$$** | **$$** | **$$$ (Flyover Ramp)** |
| **Recommend for Further Study** | **NO** | **FATAL FLAW** | **FATAL FLAW** | **NO** | **FATAL FLAW** | **YES** | **FATAL FLAW** | **YES** |

LEGEND: Least Desirable ○ Somewhat Desirable ◒ Moderately Desirable ◕ Most Desirable ●

**Figure 4.34 – SR 87 Interchange Alternative 1**



4.8.5.2 SR 87 Interchange Alternative 2 – Split Diamond with Phillips Road

- A half diamond interchange is provided at SR 87 and another half interchange at Phillips Road. The separation between these two crossroads is about a ¼ mile, which is a more desirable configuration for a split diamond interchange.
- A diamond interchange is provided at Picacho highway.
- This alternative is associated with an alignment of I-10 that would bypass the community of Picacho.
- Alternative 2 for SR 87 and Picacho Highway is shown in **Figure 4.35**.

4.8.5.3 SR 87 Interchange Alternative 3 – Conventional Diamond Interchange

- Conventional diamond configuration, with one-way frontage roads merging onto the ramps.
- The left-turn movement from southbound SR 87 to eastbound I-10 will greatly exceed the capacity of a conventional double left-turn bay that is typically provided at a diamond interchange.
- Alternative 3 for the SR 87 interchange is depicted in **Figure 4.36**.

4.8.5.4 SR 87 Interchange Alternative 4 – Diamond Interchange with Triple Left

- Provide a diamond interchange, however a triple left-turn bay is provided for the southbound SR 87 to eastbound I-10 turning movement.
- Traffic analysis indicates that the triple left-turn bay will provide sufficient capacity for this key movement, but the project team decided that a triple left-turn bay is not desirable.
- Alternative 4 for the SR 87 interchange is depicted in **Figure 4.37**.

4.8.5.5 SR 87 Interchange Alternative 5 – Partial Cloverleaf (Loop Ramp in SW Quadrant)

- Partial cloverleaf interchange configuration which includes a loop ramp in the southwest quadrant. The loop ramp provides a high level of capacity for the southbound SR 87 to eastbound I-10 movement, and a free right turn would be provided for the compliment movement (westbound I-10 to northbound SR 87).
- This concept is expected to require the greatest amount of right-of-way as compared to the other alternatives, thus having a greater impact to adjacent lands.
- Alternative 5 for the SR 87 interchange is depicted in **Figure 4.38**.

4.8.5.6 SR 87 Interchange Alternative 6 – Single Point Interchange

- The inclusion of frontage roads combined with an 84 foot wide open median along the freeway create a large separation between the stop bars for traffic on SR 87.
- Removal of the open median along I-10 through this proposed interchange was considered a fatal flaw associated with this concept, therefore the evaluation matrix for the SR 87 interchange (**Table 4.5**) indicates that this alternative is not recommended for further evaluation.
- A single-point urban interchange configuration for the SR 87 interchange and is depicted in **Figure 4.39**.

4.8.5.7 SR 87 Interchange Alternative 7 – Flyover Interchange

- A directional ramp (flyover) for the southbound SR 87 to eastbound I-10 movement, and a free right turn would be provided for the compliment movement (westbound I-10 to northbound SR 87).
- The interchange is proposed to include continuous frontage roads and a left-turn bay to the eastbound frontage road.
- This concept is expected to require a high amount of right-of-way, and the flyover ramp is expected to increase the construction costs of this interchange over the other alternatives.
- Alternative 7 for the SR 87 interchange is shown in **Figure 4.40**.

4.8.5.8 SR 87 Interchange Preferred Alternatives (Alternatives 5 and 7)

Based on the alternative evaluation presented in **Table 4.4**, several of the concepts considered are not recommended for further study because of fatal flaws. Those alternatives that were determined to include a fatal flaw are as follows:

- Alternative 1 (Split Diamond with Picacho Highway) – FATAL FLAW; split interchanges with a long distance between crossroads in not desirable.
- Alternative 2 (Split Diamond with Phillips Drive) – FATAL FLAW; this alternative is not feasible unless I-10 is realigned around the community of Picacho. The realignment of I-10 south of Picacho is not recommended for further study (see section 4.4 of this document).

**Figure 4.35 – SR 87 Interchange Alternative 2**

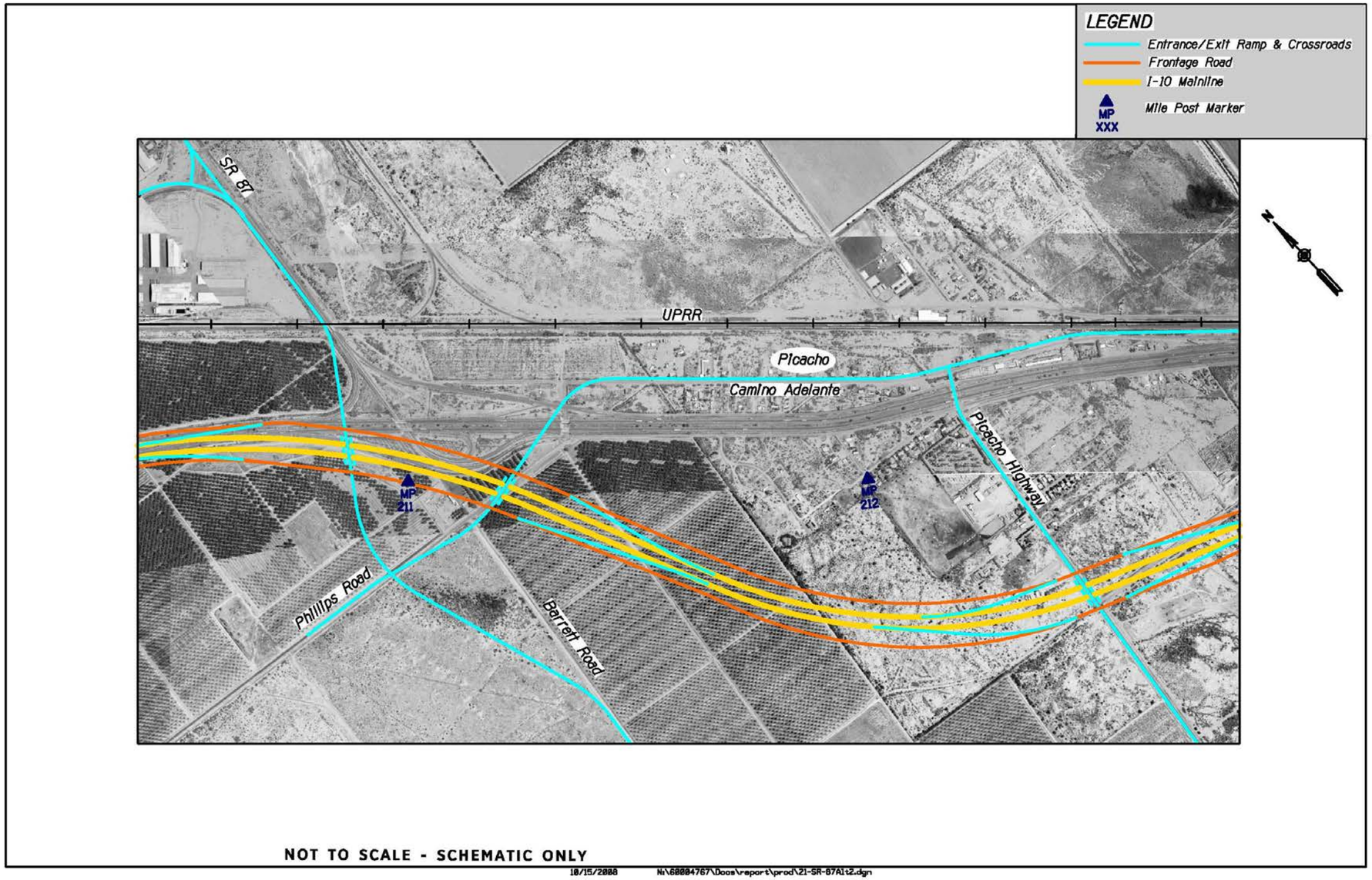


**Figure 4.36 – SR 87 Interchange Alternative 3**

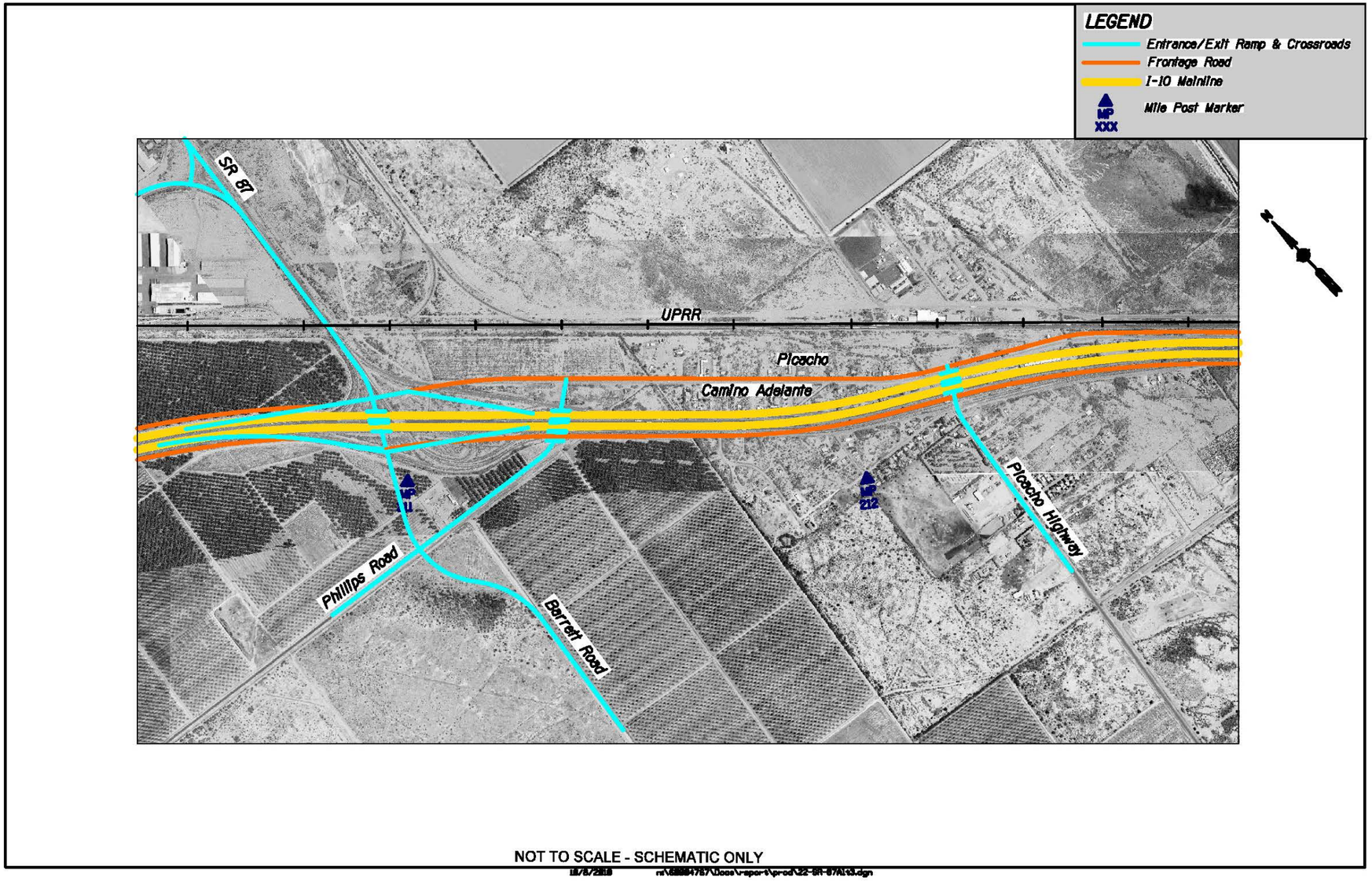


**Figure 4.37 – SR 87 Interchange Alternative 4**

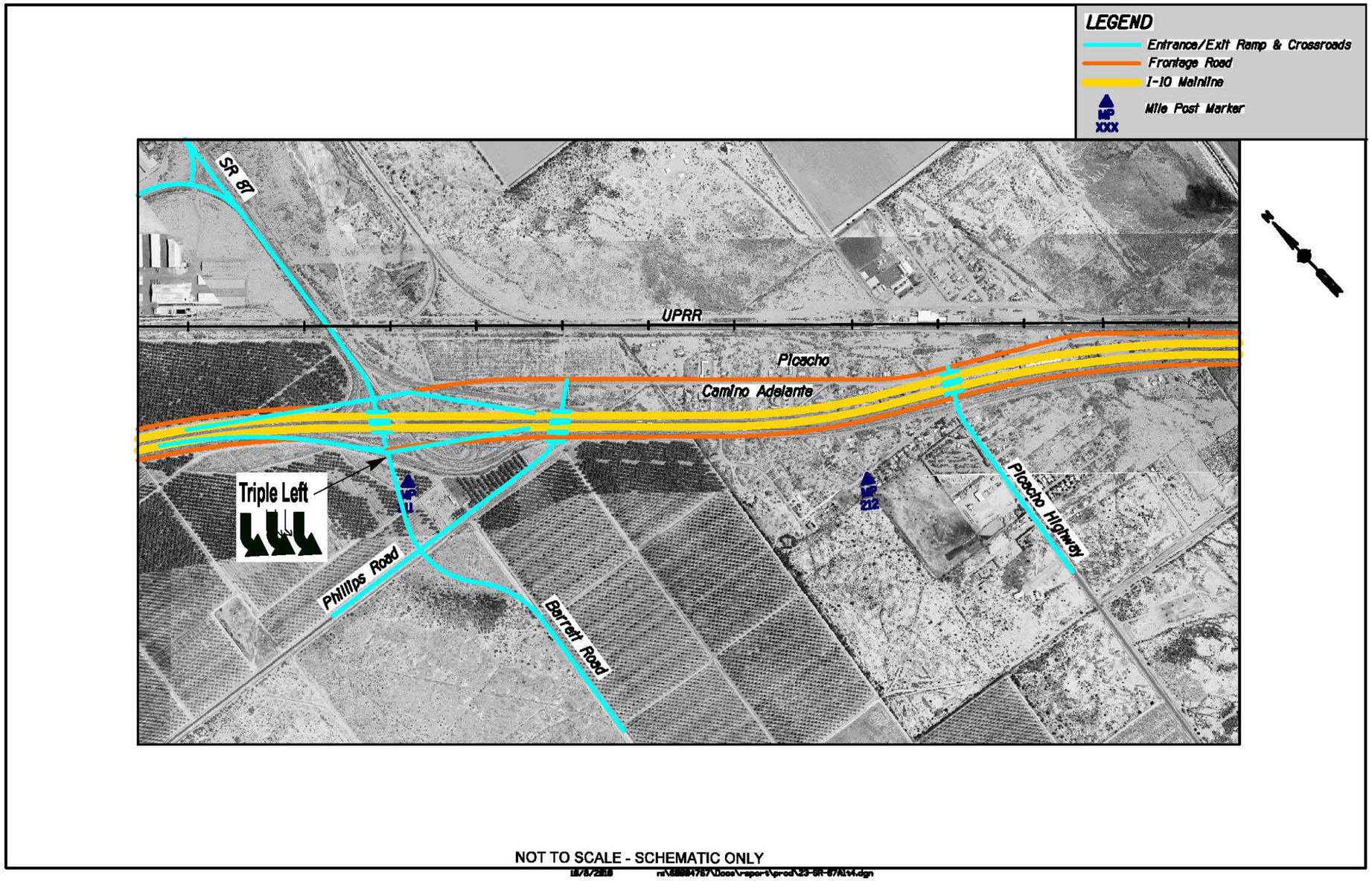


**Figure 4.38 – SR 87 Interchange Alternative 5**

**Figure 4.39 – SR 87 Interchange Alternative 6**

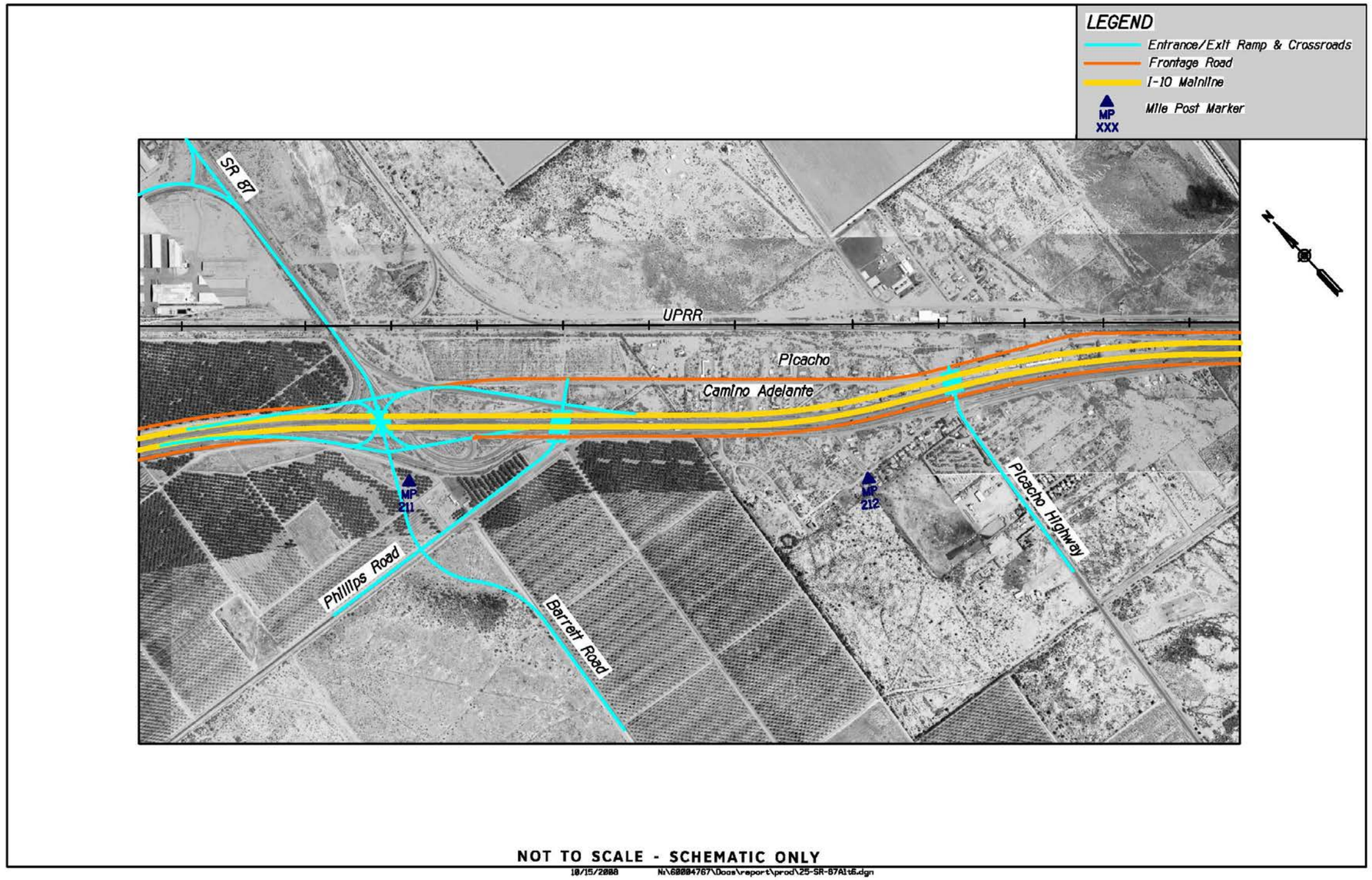


**Figure 4.40 – SR 87 Interchange Alternative 7**

- Alternative 4 (Diamond Interchange with Triple left) – FATAL FLAW; a triple left-turn bay is not compatible with a rural interchange, and this configuration does not provide the flexibility to accommodate potential changes in future traffic patterns.

- Alternative 6 (Single Point Interchange) – FATAL FLAW; this concept can provide capacity for future traffic demands if the open median along I-10 is narrowed. Narrowing the 84 foot wide open median within the rural section of the corridor is not acceptable.

- Both Alternative 5 (Partial Cloverleaf) and Alternative 7 (Flyover Interchange) are considered most desirable based on the evaluation process. Each of these concepts include a high capacity ramp for the southbound SR 87 to eastbound I-10 movement which will meet future traffic demands. The partial cloverleaf (Alternative 5) is expected to have a lower construction cost as compared to the Flyover interchange (Alternative 7), but is expected to require a greater amount of right-of-way.

- The selection of the Partial Cloverleaf (Alternative 5) as the recommended alternative provides the greatest flexibility for accommodating future traffic requirements for a lower construction cost. However, during the final design process the Flyover Interchange (Alternative 7) should be reevaluated, because it could reduce the right of way requirements. More detailed design is required to determine the more desirable configuration for this interchange. A directional ramp operates at a higher speed than a partial cloverleaf and is generally viewed by the traveling public as a more conventional and acceptable solution.

  During the development of this DCR, the final design process of the SR 87 Interchange began. A Value Engineering exercise was completed by the final design team, and the Flyover Alternative was selected as the final configuration for the interchange. The DCR plans (Volume 3) have been updated to reflect the Flyover design as the Recommended plan.

- For the purpose of documenting the Design Concept for the corridor the preferred configuration for the SR 87 Interchange is the Partial Cloverleaf and is displayed in **Figure 4.41.**

4.8.6 Park Link Drive Interchange (MP 224)

- Park Link Drive is currently a dirt road which connects SR 79 to I-10 in southern Pinal County. Park Link Drive intersects the existing I-10 frontage road about 1.5 miles west of the Red Rock interchange, and crosses the UPRR mainline at an at-grade railroad crossing.

4.8.6.1 Park Link Drive Interchange Alternative 1

- Proposes a diamond interchange configuration. This interchange would be similar to most of the other interchanges along the corridor and would perform as a service type interchange.

- The objective of a service interchange is to provide access to properties adjacent to the freeway corridor, and typically the crossroad has an arterial classification. Alternative 1 for the Park Link Drive interchange is displayed in **Figure 4.42**.

4.8.6.2 Park Link Drive Interchange Alternative 2

- Proposes a directional interchange configuration. This interchange would provide high capacity ramp connections for key movements between Park Link Drive and I-10.

- Directional ramps are provided between Park Link Drive east and Tucson, since these are identified as the key traffic movements.

- Located within the footprint of the directional ramps is a diamond type interchange which would provide access to the arterial extension of Park Link Drive. Therefore, all movements are provided at this interchange and the frontage roads are proposed to merge onto the diamond ramps.

- Alternative 2 for the Park Link Drive interchange is displayed in **Figure 4.43**.

4.8.6.3 Park Link Drive Interchange Preferred Alternative (Alternative 1)

- An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives proposed at Park Link Drive. An Evaluation Matrix is included as Table 4.3, Interchange Configuration Alternatives Evaluation Matrix (Pages 30 through 33), which includes the results of the evaluation for the two alternatives proposed at Park Link Drive.

- Alternative 2 would require a much larger footprint for the directional ramps, which has an impact on surrounding properties and would add costs to the project. Therefore the alternative recommended for further study is Alternative 1 which proposes a diamond interchange.

4.8.7 Red Rock Interchange (MP 226)

- The existing interchange at Red Rock is a modified diamond with the eastbound exit ramp having a low-speed curve to intersect with Sasco Road and the frontage road. The existing Red Rock interchange is provided as **Figure 4.44**.

- A new housing development is currently under constructions known as the Red Rock Village. In coordination with this development, an ultimate configuration for the Red Rock interchange has been approved by ADOT. Sasco Road will be realigned and the interchange will be reconstructed as a standard diamond interchange with the provision for continuous one-way frontage roads. The proposed Red Rock Interchange is provided as **Figure 4.45**.

4.8.8 Pinal Air Park Interchange (MP 232)

- The existing interchange at Pinal Air Park Road is a partial cloverleaf configuration. Currently there are loop ramps located in the northeast and southeast quadrants of the interchange which creates a short weaving section along westbound I-10 between these two ramps.

- The eastbound exit and entrance ramps are designed to provide free flow movements to and from Pinal Air Park Road. Because of the configuration of this interchange, Pinal Air Park Road does not extend to the east of I-10, and does not intersect with the existing frontage road.

- A new development known as The Villages of Tortolita is proposing to implement a new interchange at Tortolita Boulevard located at about MP 233. This new interchange is located about one mile from the existing Pinal Air Park interchange.

- Currently, Missile Base Road crosses the UPRR mainline at-grade and intersects with the existing frontage road. The nearest interchange to Missile Base Road is the Pinal Air Park Interchange, however Pinal Air Park Road does not intersect with the frontage road.

- The existing Pinal Air Park interchange is shown in **Figure 4.46**.

4.8.8.1 Pinal Air Park Interchange Alternative 1

- Relocates the existing interchange to approximately MP 231.5, relocates Pinal Air Park Road to intersect I-10 at the new interchange, and the existing interchange would be removed.

- Missile Base Road would be realigned to intersect I-10 at the new interchange, and would be grade separated from the UPRR mainline.

- Alternative 1 for the Pinal Air Park interchange is shown in **Figure 4.47**.

4.8.8.2 Pinal Air Park Interchange Alternative 2

- Proposes to remove the existing interchange and replace it with a new interchange located at Missile Base Road (MP 231).

- Missile Base Road would be reconstructed to include a grade separation of the UPRR mainline and extended south to intersect existing Pinal Air Park Road about one mile south of Interstate 10.

- Existing Pinal Air Park Road would remain along its existing alignment, and a new over crossing of the interstate would be provided where the existing interchange is located.

- Alternative 2 for the Pinal Air Park (Missile Base Road) interchange is shown in **Figure 4.48**.

4.8.8.3 Pinal Air Park Preferred Alternative (Alternative 1)

- An alternative evaluation was completed based on a number of criteria to allow for a comparison of the two alternatives proposed at Pinal Air Park. An Evaluation Matrix is included as **Table 4.4,** Interchange Configuration Alternatives Evaluation Matrix**,** which includes the results of the evaluation for the two alternatives proposed at Pinal Air Park.

- The alternative recommended for further study is Alternative 1, which proposes to realign both Pinal Air Park Road and Missile Base Road to a new interchange located at approximately MP 231.5.

**Figure 4.41 – SR 87 Interchange Preferred Configuration**

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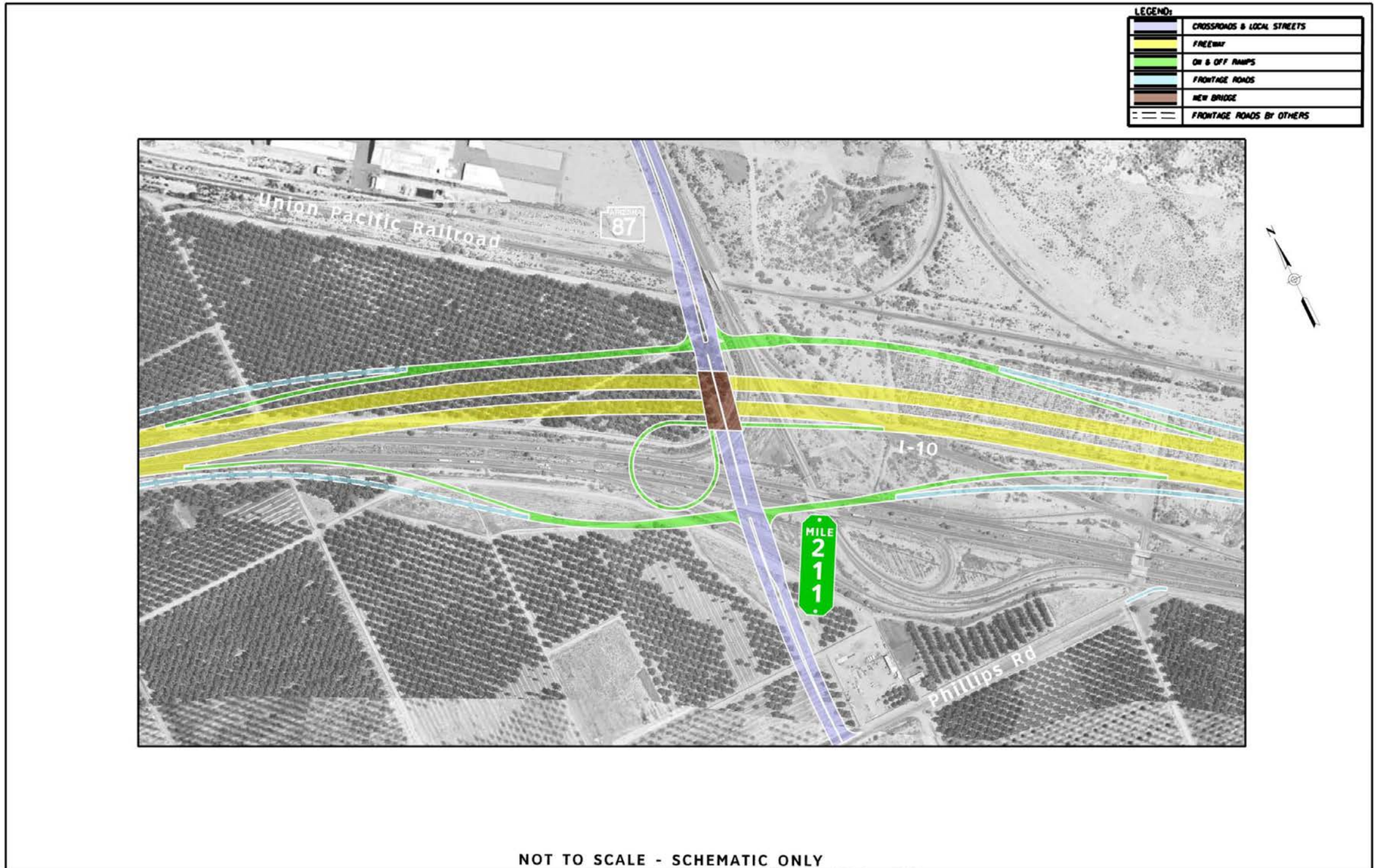


**Figure 4.42 – Park Link Drive Interchange Alternative 1**

**Figure 4.43 – Park Link Drive Interchange Alternative 2**

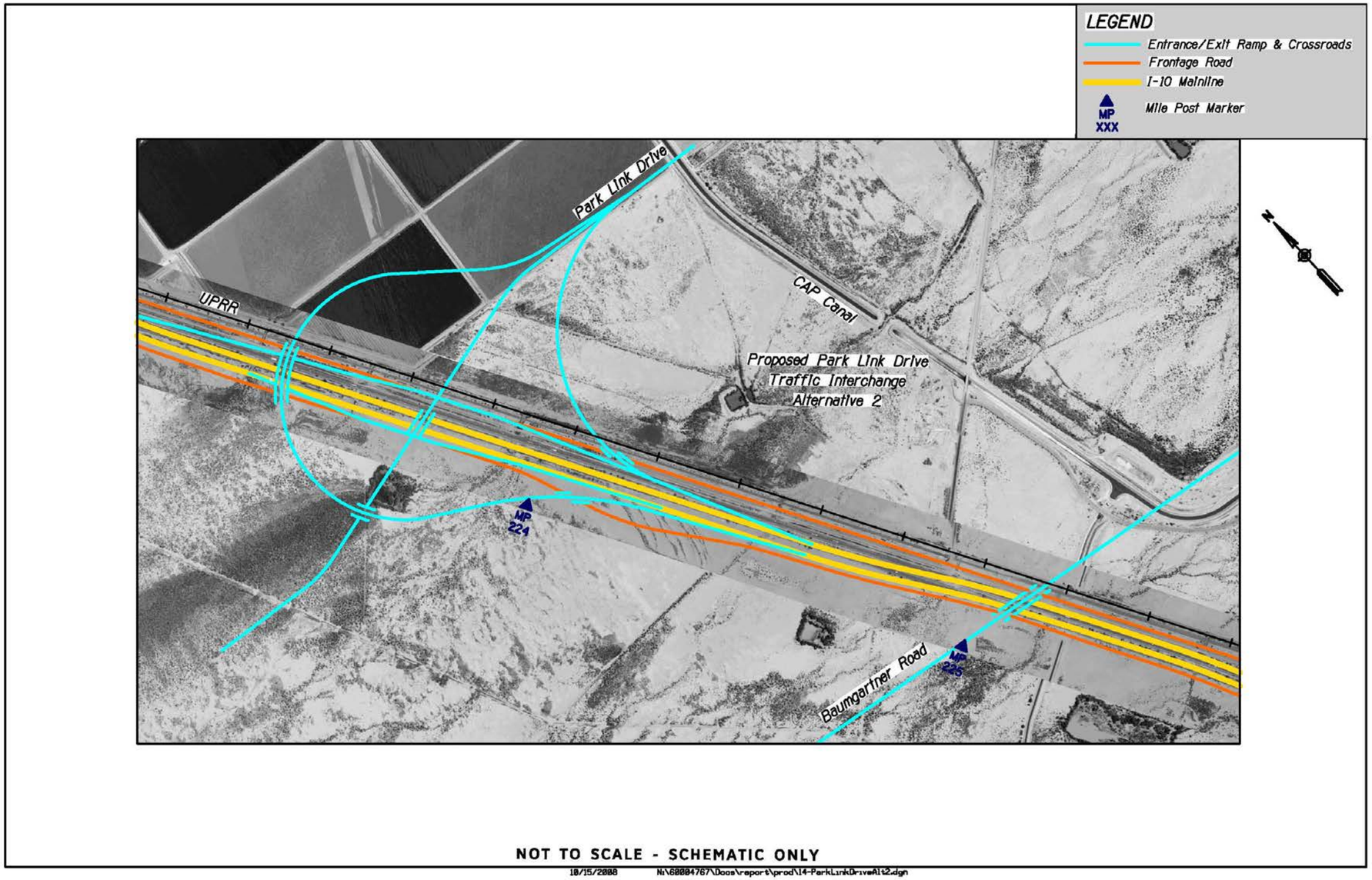


**Figure 4.44 – Existing Red Rock Interchange**

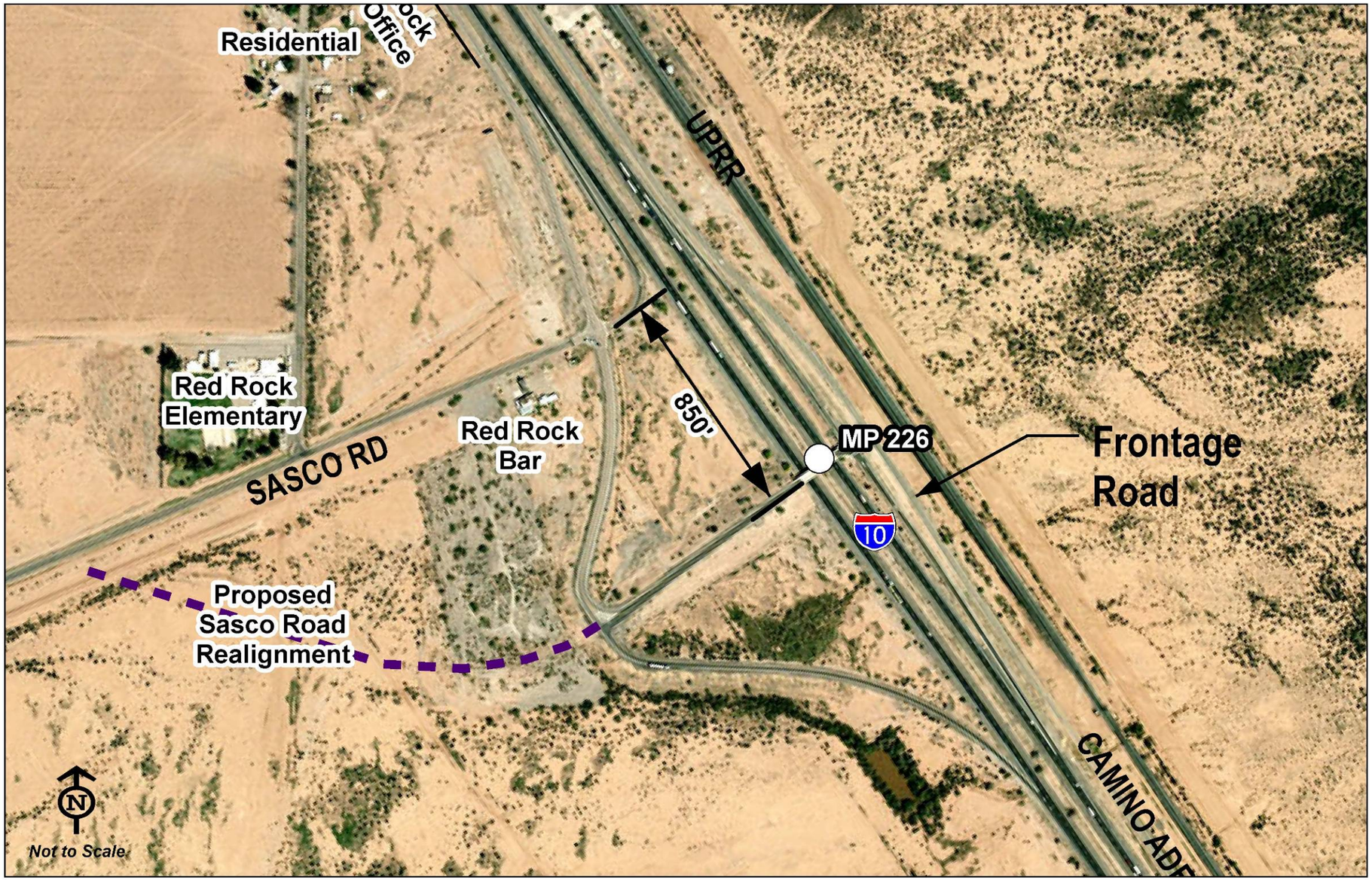


**Figure 4.45 – Proposed Red Rock Interchange**

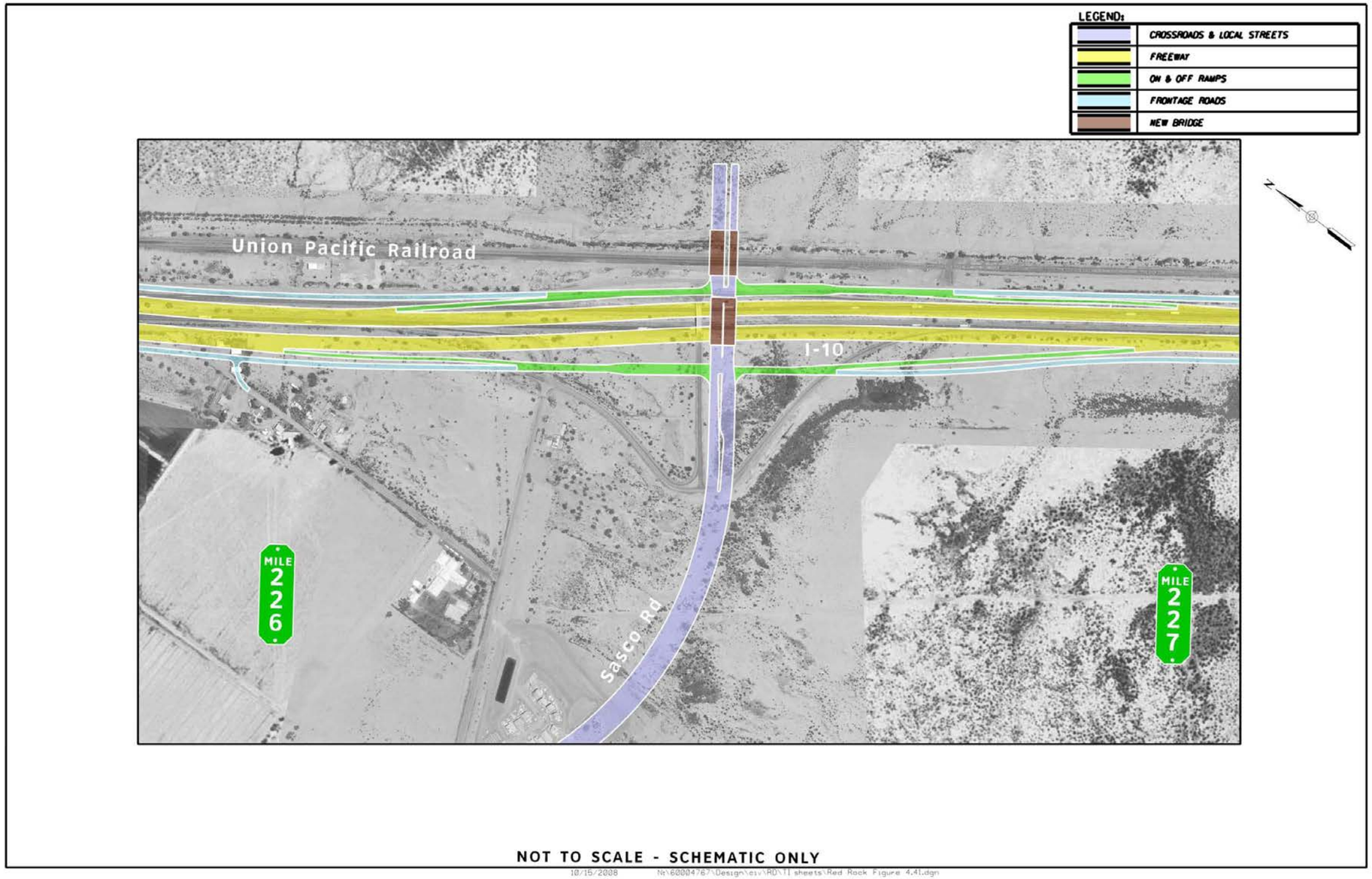


**Figure 4.46 – Existing Pinal Air Park Interchange**

**Figure 4.47 – Pinal Air Park Interchange Alternative 1**

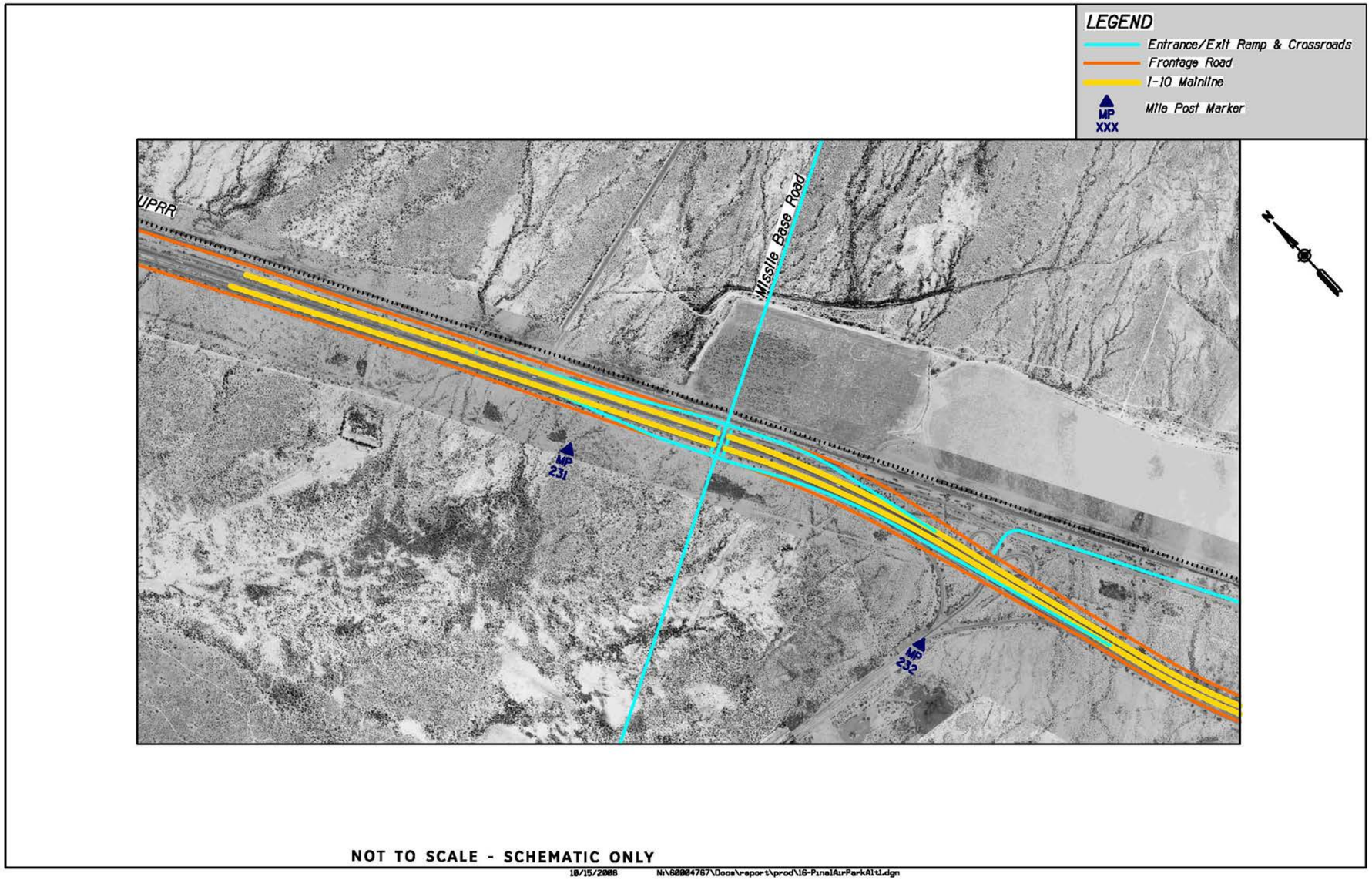
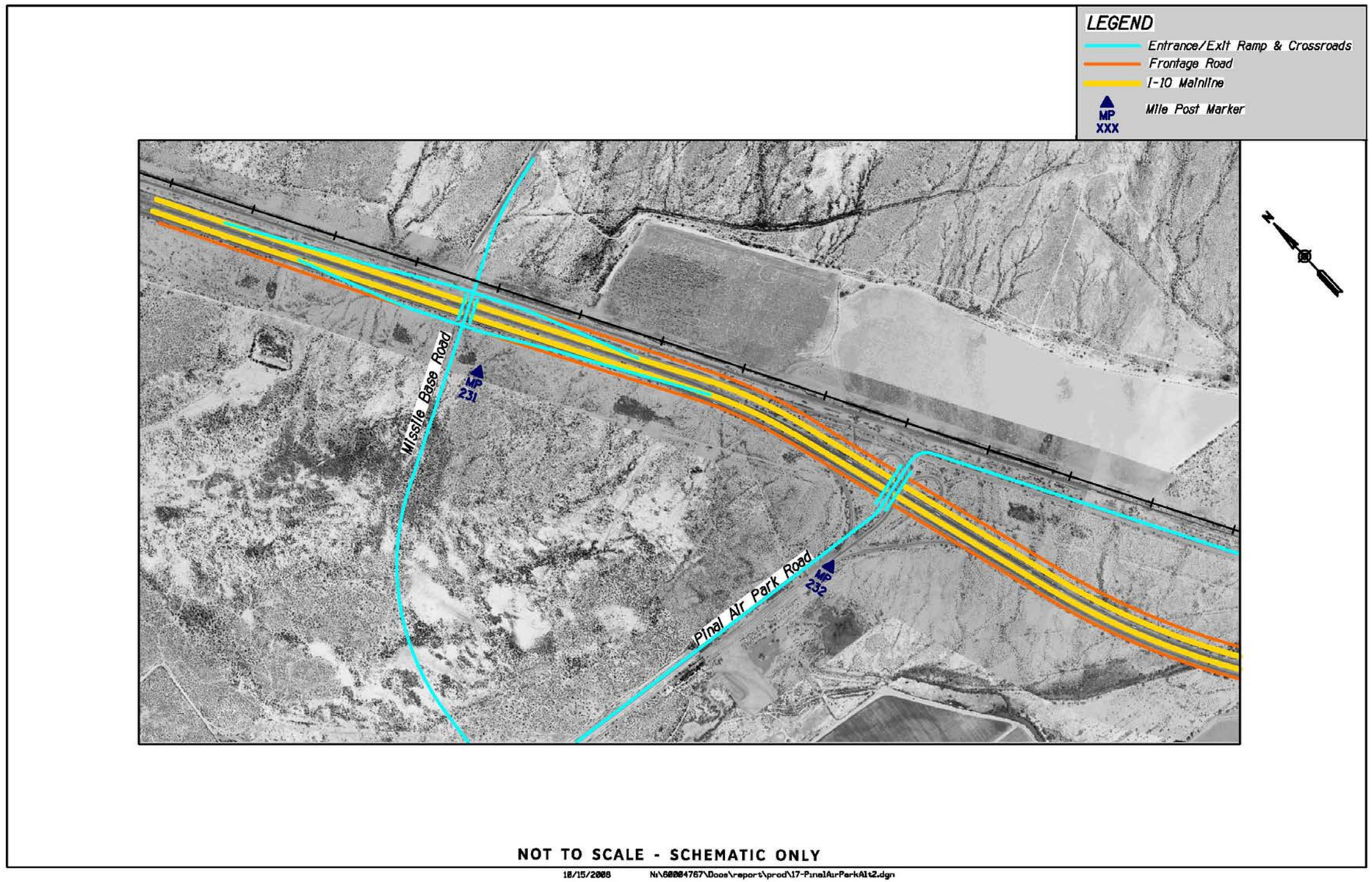


**Figure 4.48 – Pinal Air Park Interchange Alternative 2**



4.8.9 Marana and Tangerine Road Interchanges (MP 236 and MP 240)

- The existing interchanges at Marana (MP 236) and Tangerine Road (MP 240) are diamond interchanges where the freeway passes over the crossroad. Immediately east of each interchange is the UPRR mainline, and the crossroads include an at-grade railroad crossing.

- Frontage roads exist on each side of the freeway, and the intersection between the crossroad and frontage roads are located within 100 feet of the ramp terminals. The existing Marana and Tangerine interchanges are shown in **Figures 4.49 and 4.50**.

- The UPRR is currently expanding the capacity of the Sunset Corridor and is implementing a second mainline track. With the completion of the second mainline track the number of trains traveling along the Sunset Corridor is expected to increase dramatically. Eventually UPRR plans to upgrade the corridor to a total of four tracks all along the I-10 mainline, structures crossing the UPRR should provide a span to accommodate all four tracks.

- The Marana and Tangerine Road interchanges are recommended to be reconstructed with the cross roads passing over the freeway, including a grade separated crossing of the UPRR. This recommendation will require the freeway and crossroads to be reconstruction at a new profile, or the interchange will need to be relocated to a new location.

4.8.9.1 Marana Interchange Preferred Alternative

- Reconstruct the interchange at nearly its existing location. This will require the freeway to be reconstructed at a profile that nearly matches existing ground level, and the crossroad to be raised one level (20 – 25 feet) above ground level. The crossroad will be grade separated from the UPRR.

- The preferred alternative includes realigning the crossroad to provide a through movement to Trico-Marana Road instead of Sandario Road. This complies with the Town of Marana's General Plan.

- The preferred alternative is shown in **Figure 4.51**.

- The preferred interchange configuration and crossroad alignment are conceptual, and are designed to allow for efficient maintenance of traffic during the reconstruction of the interstate and interchange. However, during the final design process re-evaluation of the geometry should be considered on the context of the Town of Marana's redeveloped Town Center surrounding this interchange.

4.8.9.2 Tangerine Road Preferred Alternative

- A separate design concept study has been completed for the Tangerine Road interchange (ADOT Project Number 10 PM 239 H7467 01L). 100% plans for construction have been prepared.

- This design concept study is recommending the Tangerine Road interchange be relocated about one-half mile west of the existing interchange. The new interchange would be a diamond configuration and include a grade separated crossing of the UPRR mainline.

- This corridor study has incorporated the recommendations of the Tangerine Road Design Concept Study as the preferred alternative for this interchange.

## 4.9 CORRIDOR RECOMMENDATIONS

The combination of all of the recommendations described in this section has defined the preferred plan for the I-10 Corridor from Junction I-8 to Tangerine Road as follows:

- Corridor Cross Section Concepts –

  Earley Road to Tortollita Blvd (MP 196 to MP 234) –

  The recommended cross section for the more rural section of the corridor is to provide 5 lanes in each direction with an open median 84 feet in width (Concept 4). Continuous frontage roads 30 feet in width are recommended to be included and will provide one-way traffic operation.

  Tortollita Blvd to Tangerine Road (MP 234 to MP 240) –

  The recommended cross section through the urban section of the corridor will provide 5 lanes in each direction but the median will be closed (continuous barrier) between opposing directions of travel. (Concept 2) A continuous one-way frontage road system is recommended to provide an alternative route during incidents and to enhance access to adjacent properties.

**Figure 4.49 – Existing Marana Interchange**

**Figure 4.50 – Existing Tangerine Interchange**

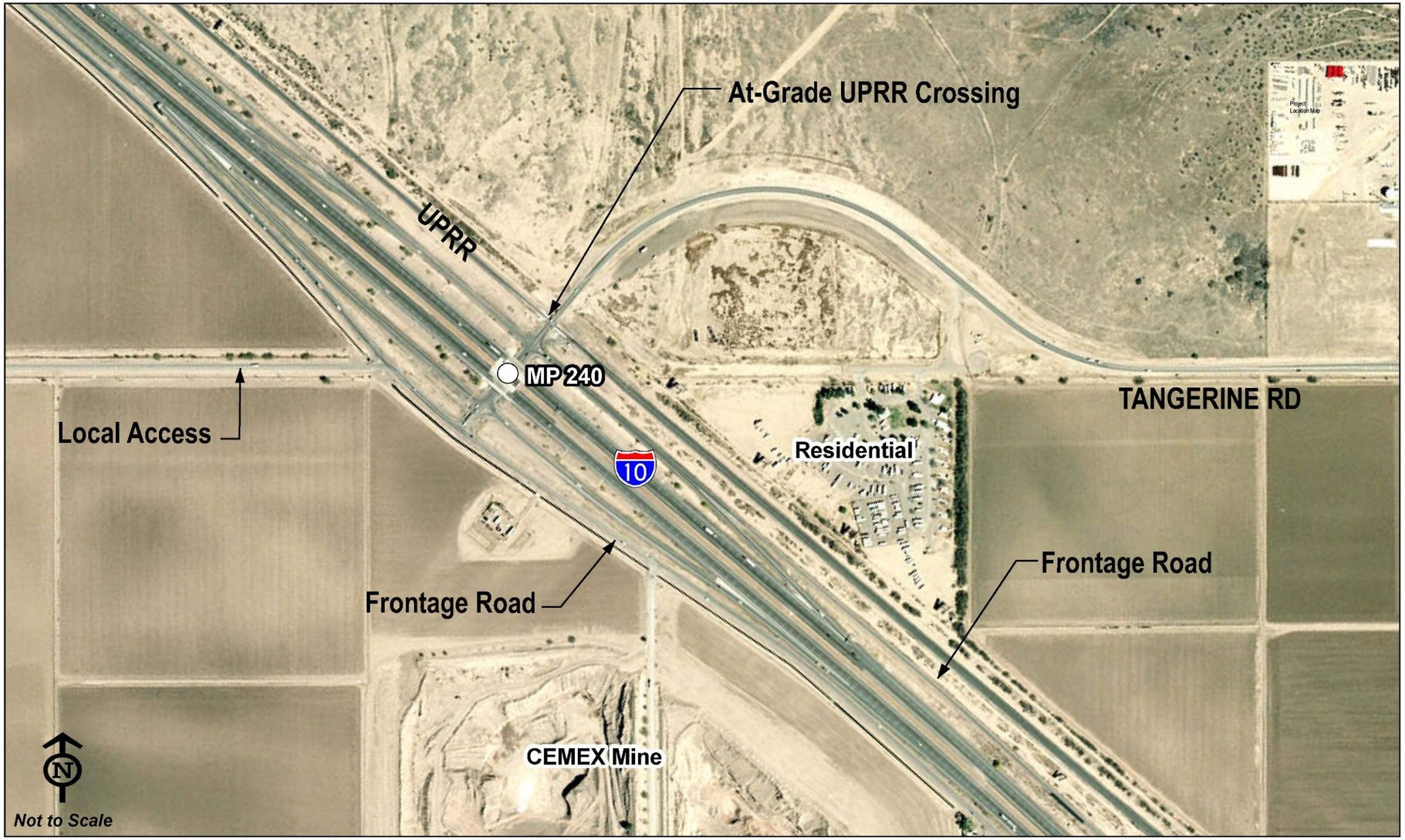
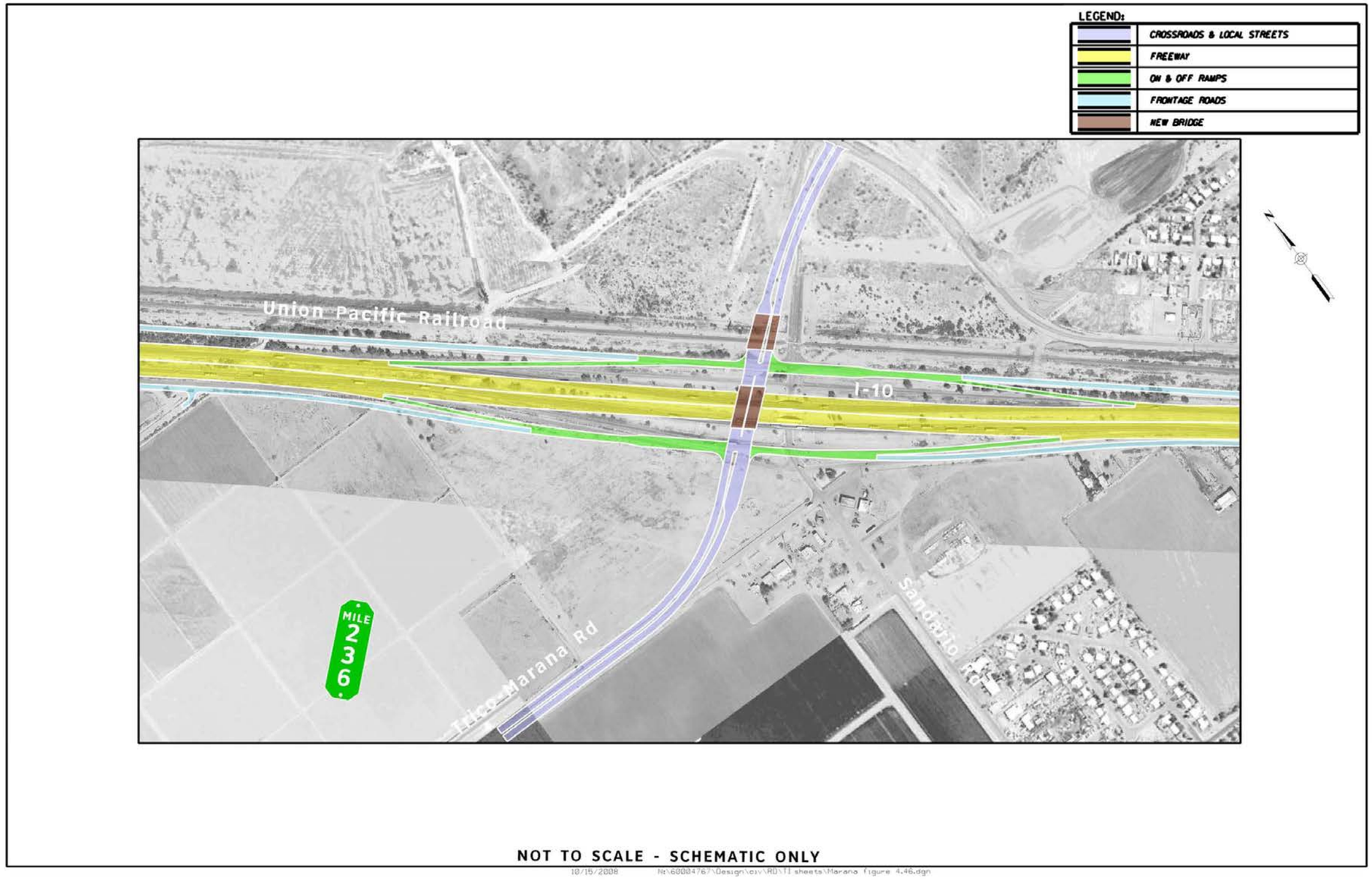


**Figure 4.51 – Marana Interchange Preferred Alternative**



- Interchange Location Concepts –

  The preferred interchange plan proposes locations for eight (8) new interchanges along I-10 between Junction I-8 and Tangerine Road (MP 200 to MP 240). These new locations are placed between the existing interchanges to provide a nearly uniform spacing of two miles between interchanges throughout the corridor.

- Interchange Design Alternatives –

  Design Alternatives were evaluated at most of the existing and proposed interchange locations. The recommended alternative at each location will be incorporated into the preferred corridor plan.

- Freeway Alignment Options through the Community of Picacho –

  The freeway alignment through the Community of Picacho is to realign Interstate 10 along the UPRR mainline (Option C). This will require the realignment of Interstate 10 from MP 210 to MP 213, and relocation of the SR 87 Interchange.

# 5.0 MAJOR DESIGN FEATURES OF THE RECOMMENDED ALTERNATIVE

## 5.1 INTRODUCTION

This section describes the design controls and design features for the Preferred Alternative and the associated system and service interchanges within the study limits. The proposed improvements are shown in the Preferred Alternative Concept Plans in Volume 3.

I-10 is an east-west transcontinental route, however it is primarily situated diagonally through the study limits. To provide clarification throughout this report regarding the angular alignment, generally descriptions *north* of I-10 refer to land adjacent to westbound I-10, and descriptions *south* of I-10 refer to land adjacent to eastbound I-10.

## 5.2 DESIGN CRITERIA

The current classification for I-10 throughout the entire corridor is Rural Principal – Interstate. However the section of the corridor within Pima County is expected to become more urbanized as development continues within the Town of Marana. Therefore, I-10 is classified as a controlled access Rural Principal – Interstate from I-8 to Tortolita Road (MP 196 to MP 234). I-10 is assumed to be classified as a controlled access Urban Principal – Interstate from Tortolita Road to Tangerine Road (MP 234 to MP 240). I-8 is classified as a controlled access Rural Principal – Interstate. A summary of the design controls for I-10 and I-8 is provided in **Table 5.1 and Table 5.2.**

**Table 5.1 – Rural Design Controls for I-10 (MP 196 to MP 234) and I-8**

| Description of Criteria | Values for Design |
|---|---|
| Design Year: | 2030 |
| Design Speed: | 75 mph |
| Superelevation: | 0.10 ft/ft maximum |
| Cross Slope: | 2.0% |
| Lane Width: | 12 ft. |
| Shoulder Width: | |
| - Median: | 12 ft. |
| - Outside: | 12 ft. |
| Median Width: | 84 ft. |
| Horizontal Curve: | |
| - Minimum Length: | 1125 ft (75x15) |
| Delta<5 deg | 500 ft+(5 deg-Delta)x100 |
| Maximum Gradient: | 3% |
| Maximum Grade Brakes: | 0.2% |
| Minimum Vertical Curve: | 1000 ft |
| Taper Rate: | 75:1 |
| Minimum Vertical Clearance: | |
| - Highway structure: | 16.5 ft. |
| - Sign Structure: | 18.0 ft. |
| - Railroad overpass: | 23.5 ft. |

**Table 5.2 – Urban Design Controls for I-10 (MP 234 to MP 240)**

| Description of Criteria | Values for Design |
|---|---|
| Design Year: | 2030 |
| Design Speed: | 65 mph |
| Superelevation: | 0.06 ft/ft maximum |
| Cross Slope: | 2.0% |
| Lane Width: | 12 ft. |
| Shoulder Width: | |
| - Median: | 12 ft. |
| - Outside: | 12 ft. |
| Median Width: | 26 ft. (Median Barrier) |
| Horizontal Curve: | |
| - Minimum Length: | 975 ft (65x15) |
| - Delta<5 deg | 500 ft+(5 deg-Delta)x100 |
| Maximum Gradient: | 3% |
| Maximum Grade Brakes: | 0.2% |
| Minimum Vertical Curve: | 800 ft |
| Taper Rate: | 65:1 |
| Minimum Vertical Clearance: | |
| - Highway structure: | 16.5 ft. |
| - Sign Structure: | 18.0 ft. |

Within the urban section of the corridor (MP 233 to MP 240), the I-10 mainline is designed to meet a 75 MPH design speed since replacement of the mainline may occur before the corridor is reclassified to an urban classification. The design speed listed in Table 5.2 would be utilized once this section of the corridor is reclassified to an urban classification.

The I-10/I-8 System Interchange is considered a rural interchange; therefore the directional ramps are designed to meet a design speed 10 MPH less than the mainline. A summary of design controls for the directional ramps (rural) is provided in **Table 5.3**.

**Table 5.3 – Design Controls for Directional Ramps (Rural)**

| DESCRIPTION OF CRITERIA | VALUES FOR DESIGN |
|---|---|
| Design Year: | 2030 |
| Design Speed: | |
| - Body & Entrance to Mainline Curve: | 65 mph |
| - Initial Ramp Curve | 75 mph |
| Superelevation: | 0.10 ft/ft maximum |
| Horizontal Curve: | |
| - Minimum Length Body: | 975 ft (65x15) |
| - Minimum Length Initial Curve: | 1125 ft (75x15) |
| - Delta<5 deg | 500 ft+(5 deg-Delta)x100 |
| Pavement Width: | |
| - Two lane ramp: | 36 ft., plus 2 ft. offset to barrier |
| Lane Width: | 12 ft. |
| Maximum Downgrade:<br>Maximum Upgrade: | 5%<br>4% |
| Maximum GradeBrakes | 0.2% |
| Minimum Vertical Curve | 1000 ft |
| Minimum Vertical Clearance:<br>Highway structure: | 16.5 ft. |
| Sign Structure: | 18.0 ft. |

A summary of the design controls for the frontage roads is provided in **Table 5.4, and 5.5.**

**Table 5.4 – Design Controls for Frontage Roads**

**(Selma Highway to Jimmie Kerr Boulevard, including Ramp U)**

| DESCRIPTION OF CRITERIA | VALUES FOR DESIGN |
|---|---|
| Design Year: | 2030 |
| Design Speed: | |
| - Frontage Road: | 45 mph |
| - Body of Ramp “U”: | 40 mph (Desirable) |
| - Ramp “U” Minimum: | 25 mph (Minimum) |
| Superelevation: | 0.04 ft/ft maximum; 0.06 ft/ft Ramp “U” |
| Lane Width: | 12 ft. |
| Shoulder Width: | |
| - Inside: | 2 ft. |
| - Outside: | 4 ft. |
| Horizontal Curve: | |
| - Minimum Length: | 750 ft. |
| - Delta<5 deg | 500 ft+(5 deg-Delta)x100 |
| Maximum Gradient: | |
| - Upgrade: | 4% |
| - Downgrade: | 5% |
| 400’ advance of stop bar: | 3% |
| - Min Grade with Curb: | 0.40% |
| - Max Grade Brakes at Terminus | 2% or less Desirable; 4% max |
| Maximum Grade Brakes: | 0.2% |
| Minimum Vertical Curve: | |
| - Terminus: | 200 ft |

**Table 5.5 – Design Controls for Frontage Roads (Rural)**
**(Sunland Gin Road to Tangerine Road)**

| DESCRIPTION OF CRITERIA | VALUES FOR DESIGN |
|---|---|
| Design Year: | 2030 |
| Design Speed: | 55 mph |
| Superelevation: | 0.10 ft/ft maximum |
| Lane Width: | 12 ft. |
| Shoulder Width: | |
| - Inside: | 2 ft. |
| - Outside: | 4 ft. |
| Horizontal Curve: | |
| - Minimum Length: | 825 ft (55x15) |
| - Delta<5 deg | 500 ft+(5 deg-Delta)x100 |
| Maximum Gradient: | 3% |
| Maximum Grade Brakes: | 0.2% |
| Minimum Vertical Curve: | 800 ft |
| Minimum Vertical Clearance: | |
| - Highway structure: | 16.5 ft. |
| - Sign Structure: | 18.0 ft. |

A summary of the design controls for service TI ramps is provided in **Table 5.6**.

**Table 5.6 – Design Controls for Service TI Ramps**

| DESCRIPTION OF CRITERIA | VALUES FOR DESIGN |
|---|---|
| Design Year: | 2030 |
| Design Speed: | |
| - Ramp Terminus | 35 mph |
| - Ramp Body | 50 mph |
| - Entrance Ramp Gore | 65 mph |
| - Exit Ramp Gore | 70 mph |
| Pavement Width: | |
| Single lane exit ramp: | 22 ft., plus 2 ft. offset to barrier |
| Two lane exit ramp: | 34 ft., plus 2 ft. offset to barrier |
| Entrance ramp: | 28 ft., plus 2 ft. offset to barrier |
| Superelevation: | 0.10 ft/ft maximum |
| Horizontal Curve: | |
| - Min Length Low Speed: | 300 Feet |
| - Min Length High Speed: | 500 Feet |
| - Ratio of compound curves | 2:1 or less |
| Maximum Gradient: | |
| - Upgrade: | 4% |
| - Downgrade | 5% |
| - 400’ advance of stop bar | 3% |
| Min Grade with Curb: | 0.40% |
| Max Grade Brakes at Terminus | 2% or less Desirable; 4% max |
| Maximum Grade Brakes | 0.2% |
| Minimum Vertical Curve | |
| - Terminus: | 200 ft |
| - Body: | 400 ft |

## 5.3 I-10 WIDENING CONCEPT

- The ultimate recommendation for I-10 is expansion to a ten-lane freeway consisting of five lanes and one-way frontage roads in each direction of travel to accommodate projected traffic volumes in the study corridor.

- Access to and from the interstate would be restricted to interchange locations. Mainline expansion of I-10 would require new right-of-way from adjacent properties to accommodate the additional lanes and frontage road system

- The preferred alternative for this corridor study includes a new system for stationing the freeway. This corridor study begins at Station 10337+00 near milepost 196 which matches the stationing system proposed for the I-10 Widening Study; SR202L to Junction I-8 (ADOT Project Number 10 MA 161 H7174 01L). The design concept plans of the preferred alternative (Volume 3) show the proposed stationing and As-Built stationing for clarification.

5.3.1 Earley Road to Selma Highway

- I-10 would contain five lanes in each direction of travel. The proposed median centerline would follow the existing median centerline for this section of I-10.
- Frontage roads would not be constructed along this section of I-10.

5.3.2 Selma Highway to Sunland Gin Road

- I-10 would contain five general purpose lanes and an auxiliary lane in each direction of travel from Selma Highway to the I-10/I-8 TI and from the I-10/I-8 TI to Sunland Gin Road. I-10 would consist of four lanes in each direction of travel through the I-10/I-8 TI.
- To improve the geometry of I-10 and the existing system interchange, and to help maintain traffic during construction, I-10 would be shifted to the north through the I-10/I-8 TI (system interchange).
- In this section of I-10, traffic interchanges would be located at Selma Highway (MP 197), I-8 (MP 199) and Sunland Gin Road (MP 200). There would also be a grade separation where I-10 crosses over Jimmie Kerr Boulevard and the Union Pacific Railroad
- The Selma Highway TI would provide access to Jimmie Kerr Boulevard through one-way frontage roads.

5.3.3 Sunland Gin Road to SR 87

- I-10 would contain five lanes in each direction of travel. The proposed median centerline would follow the existing median centerline for this section of I-10. Auxiliary lanes are proposed between the Sunshine Boulevard TI and SR 87 TI.
- In this section of I-10, traffic interchanges would be located at Sunland Gin Road (MP 200), Toltec Road (MP 204), and Sunshine Boulevard (MP 209), and one grade separation at Alsdorf Road.
- Future one-way frontage roads are planned from Sunland Gin Road to SR 87. Through this section of the corridor, one way frontage roads are included in the design concept, but would be implemented by adjacent landowners or communities when warranted.
- Future traffic interchanges could be located at Overfield Road (MP 202) and Battagila Road (MP 206). I-10 would cross under all of the crossroads. Typically the future interchanges are named based on the nearest section line, however future interchanges would be assigned official names as the planning process moves forward. A separate DCR and environmental clearance would be required for approval to construct any of these future interchanges.

5.3.4 SR 87 to Picacho Highway

- I-10 would contain five general purpose lanes in each direction of travel, and an auxiliary lane is proposed from the SR 87 TI to a future interchange at Picacho Highway.
- The freeway is proposed to be realigned to follow the UPRR through the community of Picacho and one-way frontage roads would be constructed along I-10 as part of this project.
- The Union Pacific Railroad runs parallel to I-10 on the north side of the interstate.
- This segment would include one traffic interchange located at SR 87 (MP 211).
- The existing roadway would be removed as would the half diamond TI at the Picacho Highway. A future Picacho Highway TI (MP 213) could be planned approximately 4,000 feet east of the existing TI. A separate DCR and environmental clearance is required for approval to construct this future interchange.

5.3.5 Picacho Highway to MP 218

- I-10 would contain five lanes in each direction of travel. One-way frontage roads would be constructed along I-10 as part of this project. The centerline would be shifted approximately 25 feet south of the existing centerline. The shift in the proposed centerline is to avoid right of way impacts to the UPRR.
- ADOT is about to begin planning for a high-capacity roadway to connect I-10 to the Phoenix Metro Freeway system in the area of Apache Junction. This corridor known as the North-South corridor is expected to interchange with I-10 in the area of MP 216.
- To allow for flexibility to plan for a potential North-South corridor, no service interchanges are recommended within 3 miles in either direction of MP 216.

5.3.6 MP 218 to MP 221

- I-10 would contain five lanes in each direction of travel. One-way frontage roads would be constructed along I-10 as part of this project. The centerline would be shifted approximately 50 feet north of the existing centerline.
- The Picacho Peak TI (MP 220) would be the only interchange in this section of I-10. I-10 would cross over Picacho Peak Road. A current project to expand the freeway to 3 lanes in each direction is constructing new structures at the Picacho Peak Road interchange. These structures are compatible with the preferred alternative.

### 5.3.7 MP 221 to Tortolita Road

- I-10 would contain five lanes in each direction of travel. One-way frontage roads would be constructed along I-10 as part of this project. The centerline would be shifted approximately 30 feet south of the existing centerline except at the Pinal Air Park Road TI where the centerline shifts approximately 210 feet south. The proposed shifts in the centerline are to avoid right of way impacts to the UPRR.

- In this section of I-10, traffic interchanges would be located at Red Rock TI (Sasco Road)(MP 226) and Pinal Air Park Road (MP 231). The Pinal Air Park Road TI would be relocated approximately 4,100 feet west of the existing interchange as a diamond TI. The existing Pinal Air Park Road interchange would be removed. Following the implementation of the relocated Pinal Air Park TI, the existing exit ramp at the Saguaro Powerplant (MP 228 shall be removed.

- Future traffic interchanges could be located at Greenes Road (MP 222), Park Link Road (MP 224), and Aries Road (MP 229). I-10 would cross under all of the crossroads, and the crossroads are designed to allow for a grade separated crossing of the UPRR mainline tracks. A separate DCR and environmental clearance is required for approval to construct any of these future interchanges.

### 5.3.8 Tortolita Road to Tangerine Road

- I-10 would contain five lanes in each direction of travel. One-way frontage roads would be constructed along I-10 as part of this project.

- The centerline would shift approximately 7 feet north of the existing centerline in this section of I-10.This shift is proposed to minimize right of way impacts along the south side of the corridor and to more easily maintain traffic during the reconstruction of the corridor. This 7 foot shift will need to be included in the design of all interchanges within this section of the corridor, center pier locations for overcrossing structures would be located based on the future centerline location.

- In this section of I-10, traffic interchanges would be located at Marana Road (MP 236) and Tangerine Road (MP 240). ADOT Project No. 10 PM 239 H7467 01X could relocate the Tangerine Road TI 2500 feet to the north and the existing Tangerine Road overpass would remain to provide a grade separated crossing of I-10.

- Future traffic interchanges could be located at Tortolita Boulevard (MP 233) and Moore Road (MP 238). During the development of this DCR, the design and environmental clearance for the Tortolita Boulevard interchange was underway as a separate project. Approval to construct the Moore Road interchange will require a separate DCR and environmental clearance process.

## 5.4 TRAFFIC INTERCHANGES

### 5.4.1 Introduction

The proposed traffic interchanges for the study corridor were classified into three groups: reconstructed service interchanges/grade separations; future viable interchanges; and system interchanges. In the first group, reconstructed service interchanges/grade separations, are the locations that would be improved to accommodate the expected travel demand and includes existing service interchanges that would be reconstructed; new relocated service interchanges; and existing grade separations that would be reconstructed. The locations included in this group are:

- Selma Highway (New)
- Jimmie Kerr Boulevard (Grade separation only)
- Sunland Gin Road (Relocated)
- Toltec Road
- Alsdorf Road (Grade separation only)
- Sunshine Boulevard
- State Route 87
- Picacho Peak Road
- Red Rock Interchange (Sasco Road)
- Pinal Air Park Road (Relocated)
- Marana Interchange (Sandario Road)
- Tangerine Road

In the second group, future viable interchanges, are locations for future interchanges along I-10 from Junction I-8 to Tangerine Road. These locations are envisioned as opportunities to provide additional freeway access to properties along the I-10 corridor, and may enhance the possibility to develop these adjacent properties. Therefore, ADOT does not envision implementing any of the future interchanges until the development of the adjacent land warrants, and the cost to implement these interchanges would be the responsibility of those who benefit, namely the land developers or local agencies promoting adjacent development. Typically the future interchanges are named based on the nearest section line, however future interchanges would be assigned official names as the planning process moves forward. These locations were determined based on participation from the local jurisdictions and maintaining a two-mile spacing between traffic interchanges. These locations include:

- Overfield Road
- Battaglia Drive
- Picacho Highway
- Greenes Road
- Park Link Drive
- Aries Drive

- Tortolita Boulevard
- Moore Road
- Henness Road (on I-8)

5.4.2 Reconstructed or Relocated Service Interchanges

5.4.2.1 Selma Highway Diamond TI

- A full diamond interchange would be provided at Selma Highway (MP 197) with ramp connections to and from I-10. Selma Highway would contain three through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- Two left-turn lanes would be provided for the eastbound to northbound and westbound to southbound traffic movements. One right-turn lane would be provided for the eastbound to southbound and westbound to northbound traffic movements. A five lane approach to Selma Highway would be provided for both I-10 exit ramps.

- The eastbound exit ramp (1 lane) would be developed as a parallel exit from I-10. The westbound exit ramp (1 lane) from I-10 would be developed as a mandatory exit from an auxiliary lane and would connect to the westbound I-10 one-way frontage road.

- The westbound entrance ramp (1 lane) would be developed as a parallel entrance. The eastbound entrance ramp (1 lane) would be developed as an auxiliary lane to Ramp S-W (I-10/I-8 TI) and would diverge from the eastbound I-10 one-way frontage road. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

5.4.2.2 Jimmie Kerr Boulevard Grade Separation

- A grade separation would be provided at Jimmie Kerr Boulevard (MP 198

- To maximize spacing between the I-10/I-8 system interchange and adjacent traffic interchanges, the existing ramps at Jimmie Kerr Boulevard would be removed.

- A frontage road system would be constructed between Selma Highway and Jimmie Kerr Boulevard to maintain access to Jimmie Kerr Boulevard and the Casa Grande Outlet Mall west of I-10. The frontage road will parallel both sides of I-10 from Selma Highway, looping underneath I-10 just north of the current Jimmie Kerr Boulevard alignment, with ramps connecting the frontage road to Jimmie Kerr Boulevard

5.4.2.3 Sunland Gin Road Diamond TI

- A full diamond interchange would be provided at Sunland Gin Road (MP 200) with ramp connections to and from I-10 to the east and frontage roads to the west. This service interchange would be relocated approximately 1,300 feet east of the existing TI.

- Sunland Gin Road would be realigned to connect with the existing Sunland Gin Road approximately 2,500 feet south of I-10. Arica Road will be realigned to create a new four-legged intersection with the Sunland Gin Road approximately 950 feet south of the eastbound ramp terminal.

- North of I-10, Sunland Gin Road would continue on a tangent alignment. Approximately 900 feet north of the westbound ramp terminal, a new four-legged intersection would be constructed with Sunland Gin Road forming the south leg of the intersection. The west leg would include a collector roadway that would extend to the west and connect to the existing Sunland Gin Road.

- Sunland Gin Road is planned to be relocated east of its existing alignment, and would be extended north of I-10 to align with the Overfield Road corridor. The extension of Sunland Gin Road north of I-10 is proposed to include a grade separation with the UPRR mainline, and construction of this extension would be the responsibility of the local agencies.

- Two left-turn lanes would be provided for the northbound to westbound and southbound to eastbound traffic movements. One right-turn lane would be provided for the northbound to eastbound and southbound to westbound traffic movements. A five lane approach to Toltec Road would be provided for both I-10 exit ramps.

- The westbound exit ramp and eastbound entrance ramp at Sunland Gin Road should be designed to be compatible with a one-way frontage road system, if implemented.

- The westbound exit ramp (1 lane) from I-10 would be developed as a parallel exit from I-10 and the eastbound exit ramp (1 lane) would be developed as a mandatory exit from I-10 within the I-10/I-8 TI. Access from eastbound I-8 would be provided via a one-lane exit from Ramp E-S at the I-10/I-8 TI.

- The eastbound entrance ramp (1 lane) would be developed as a parallel entrance and the westbound entrance ramp (1 lane) would be developed as a parallel entrance to I-10 and would diverge from the westbound one-way Sunland Gin Road Connector Ramp. The body of the eastbound entrance ramp would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

#### 5.4.2.4 Toltec Road Diamond TI

- A full diamond interchange would be provided at Toltec Road (MP 204) with ramp connections to and from I-10. Toltec Road would be realigned to improve the crossing angle with I-10 and improve the interchange geometrics. Toltec Road would contain three through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- South of I-10, Toltec Road would maintain its current alignment except near I-10 where it would be realigned to create an improved crossing of the interstate. Houser Road would be realigned to intersect with Toltec Road approximately 800 feet south of the eastbound ramp terminal.

- The existing entrance into the Eloy Travel Center currently becomes a frontage road along I-10 for one-half mile. With the new frontage road system, the entrance would form a tee intersection into the frontage road, providing alternate access to the Eloy Travel Center. The existing driveway into the Eloy Travel Center would remain with full turning movements. The road paralleling the southern edge of the Eloy Travel Center would remain and curve around to form a tee intersection with the eastbound frontage road.

- North of I-10, Toltec Road would contain reverse horizontal curves to connect to the exiting Toltec Road approximately 2,000 feet north of I-10. The realigned Houser Road would forms a new four-legged intersection with Toltec Road approximately 1,200 feet north of the westbound frontage road.

- Two left-turn lanes would be provided for the northbound to westbound and southbound to eastbound traffic movements. One right-turn lane would be provided for the northbound to eastbound and southbound to westbound traffic movements. A five lane approach to Toltec Road would be provided for both I-10 exit ramps.

- Both the eastbound and westbound exit ramps (1 lane) would be developed as parallel exits from I-10 and would be designed to be compatible with a one-way frontage road system, if implemented.

- Both the eastbound and westbound entrance ramps (1 lane) would be developed as parallel entrances to I-10 and would be compatible with a one-way frontage road system. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

#### 5.4.2.5 Alsdorf Road Grade Separation

- A grade separation would be provided at Alsdorf Road (MP 209). No ramp connections would be provided to I-10. Alsdorf Road would contain two through lanes in each direction of travel. Alsdorf Road would generally remain in its existing location with a slight shift (approximately 25') to the south, to more easily maintain traffic during construction.

- The I-10 frontage roads are planned to pass beneath the Alsdorf Road structure and would not directly connect to Alsdorf Road. The existing connector roadway south of Alsdorf Road would remain and would be relocated to the south to provide a connection between Alsdorf Road and the eastbound frontage road.

#### 5.4.2.6 Sunshine Boulevard Diamond TI

- A full diamond interchange would be provided at Sunshine Boulevard (MP 209) with ramp connections to and from I-10. Sunshine Boulevard would be realigned to improve the crossing angle with I-10 and improve the interchange geometrics. Sunshine Boulevard would contain three through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- North of I-10, Sunshine Boulevard would maintain its current alignment except near I-10 where it be realigned to create an improved crossing of the interstate. South of I-10, Sunshine Boulevard would contain reverse horizontal curves to connect to the existing Sunshine Boulevard. Milligan Road (west of Sunshine Boulevard) will be realigned one-quarter mile south of the interchange to form a new four-legged intersection with Sunshine Boulevard. Milligan Road to the east of Sunshine Blvd has been abandoned by the City of Eloy, and access no longer needs to be provided.

- Two left-turn lanes would be provided for the northbound to westbound and southbound to eastbound traffic movements. One right-turn lane would be provided for the northbound to eastbound and southbound to westbound traffic movements. A five lane approach to Sunshine Boulevard would be provided for both I-10 exit ramps.

- The eastbound exit ramp (1 lane) would be developed as a parallel exit from I-10 and would be compatible with a one-way frontage road, if implemented. The westbound exit ramp (1 lane) from I-10 would be developed as a mandatory exit from an auxiliary lane and would be compatible with a one-way frontage road.

- The westbound entrance ramp (1 lane) would be developed as a parallel entrance to I-10 and would be compatible with a one-way frontage road, if implemented. The eastbound entrance ramp (1 lane) would be developed as an auxiliary lane to SR 87 and would be compatible with a one-way frontage road. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

5.4.2.7 SR 87 TI

- A reconstructed interchange would be provided at SR 87 (MP 211) with ramp connections to and from I-10 including a loop ramp or a flyover ramp in the southwest quadrant. The interchange would be constructed approximately 400 feet west of the existing crossroad location. SR 87 would contain four through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- North of I-10, SR 87 would connect to the existing SR 87 approximately 1,800 feet north of the westbound frontage road. The existing bridge over the UPRR mainline would be removed and replaced with a new bridge immediately to the west. South of I-10, SR 87 would be extended to a new intersection with Phillips Road.

- Two left-turn lanes would be provided for the northbound to westbound movement, and one left- turn lane would be provided for the southbound to eastbound movement, providing access to the proposed Frontage Road.

- The southbound to eastbound movement would also be served by a single-lane loop ramp or a flyover ramp in the southwest quadrant. One right-turn lane would be provided for the southbound to westbound and northbound to eastbound traffic movements.

- The eastbound exit ramp (1 lane) from I-10 would be developed as an auxiliary lane from Sunshine Boulevard and become a mandatory exit that would connect to the eastbound I-10 one-way frontage road. The westbound exit ramp (1 lane) would be developed a parallel exit from I-10 and would connect to the I-10 one-way frontage roads.

- The eastbound entrance ramp (1 lane) would be developed as parallel entrance to I-10 and would diverge from the I-10 one-way frontage road.

- The westbound entrance ramp (1 lane) would be developed as an auxiliary lane to Sunshine Boulevard and would diverge from the westbound I-10 one-way frontage road.

- The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

5.4.2.8 Picacho Peak Road Diamond TI

- A full diamond interchange would be provided at Picacho Peak Road (MP 219) with ramp connections to and from I-10. Picacho Peak Road would contain two through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- North and south of I-10, Picacho Peak Road would remain at its existing alignment. To the north, Picacho Peak Road would create a tee intersection with the existing two-way frontage road along the UPRR right-of-way. To the south, Picacho Peak Road would provide access to the Picacho Peak State Park.

- One left-turn lane would be provided for the northbound to westbound and southbound to eastbound traffic movements. A five lane approach to Picacho Peak Road would be provided for both I-10 exit ramps.

- Both the eastbound and westbound exit ramps (1 lane) would be developed as parallel exits from I-10 and would connect to the I-10 one-way frontage roads.

- Both the eastbound and westbound entrance ramps (1 lane) would be developed as parallel entrances to I-10 and would diverge from the I-10 one-way frontage roads. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

5.4.2.9 Red Rock Diamond TI (Sasco Road)

- A full diamond interchange would be provided at Red Rock TI (Sasco Road)(MP 226) with ramp connections to and from I-10. The interchange would be constructed approximately 500 feet east of the existing crossroad location, and the new interchange will be configured to extend Sasco Road over the UPRR mainline. Sasco Road would contain three through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- Two left-turn lanes would be provided for the eastbound to northbound (I-10 westbound) and westbound to southbound (I-10 eastbound) traffic movements. A separate right-turn lane would be provided for the eastbound to southbound (I-10 eastbound) traffic movement. A five lane approach to Sasco Road would be provided for both I-10 exit ramps.

- Both the eastbound and westbound exit ramps (1 lane) would be developed as parallel exits from I-10 and would connect to the I-10 one-way frontage roads.

- Both the eastbound and westbound entrance ramps (1 lane) would be developed as parallel entrances to I-10 and would diverge from the I-10 one-way frontage roads. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

- The location of this interchange has been coordinated with the developer of Red Rock Village. The developer has designed and will construct the realignment of Sasco Road to align with the interchange layout presented in this DCR.

5.4.2.10 Pinal Air Park Road Diamond TI

- A full diamond interchange would be provided at Pinal Air Park Road (MP 231) with ramp connections to and from I-10. Pinal Air Park Road would be realigned approximately ¾ mile west of its existing location. Pinal Air Park Road would contain two through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- East of I-10, the TI would connect to a realigned Missile Base Road and provide a grade separated crossing over the UPRR mainline. West of I-10, the TI would connect to a realigned Pinal Air Park Road.

- Two left-turn lanes would be provided for the eastbound to northbound (I-10 westbound) and westbound to southbound (I-10 eastbound) traffic movements. One right-turn lane would be provided for the westbound to northbound (I-10 westbound) traffic movement. A five lane approach would be provided for both I-10 exit ramps.

- Both the eastbound and westbound exit ramps (1 lane) would be developed as parallel exits from I-10 and would connect to the I-10 one-way frontage roads.

- Both the eastbound and westbound entrance ramps (1 lane) would be developed as parallel entrances to I-10 and would diverge from the I-10 one-way frontage roads. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

- Following the implementation of this interchange, the existing exit ramp at the Saguaro Powerplant (MP 228) shall be removed.

5.4.2.11 Marana Road Diamond TI

- A full diamond interchange would be provided at Marana Road (MP 236) with ramp connections to and from I-10. Marana Road would contain three through lanes in each direction of travel through the interchange area, and approaching and departing the interchange.

- East of I-10, the TI would provide a grade separated crossing over the UPRR mainline. West of I-10, the TI would connect to a realigned Marana Road. I-10 would be constructed on ground level (currently passes over crossroad) and the crossroad would be constructed to pass over I-10 and the UPRR mainline.

- Two left-turn lanes would be provided for the eastbound to northbound (I-10 westbound) and westbound to southbound (I-10 eastbound) traffic movements. One right-turn lane would be provided for the westbound to northbound (I-10 westbound) and eastbound to southbound (I-10 eastbound) traffic movements. A five lane approach would be required for both I-10 exit ramps.

- Both the eastbound and westbound exit ramps (1 lane) would be developed as parallel exits from I-10 and would connect to the I-10 one-way frontage roads.

- Both the eastbound and westbound entrance ramps (1 lane) would be developed as parallel entrances to I-10 and would diverge from the I-10 one-way frontage roads. The body of the entrance ramps would contain two lanes with one lane being dropped near the mainline gore and one lane connecting to I-10. See the design concept plans (Volume 3) for more detailed information.

- Due to the complexities to reconstruct this interchange, the crossroad will be closed throughout the duration of construction. Before this interchange is programmed for reconstruction, the Tortolita Boulevard Interchange and Tangerine Road Interchange should be constructed and the frontage roads converted to one-way operation.

- The preferred interchange configuration and crossroad alignment are conceptual, and are designed to allow for efficient maintenance of traffic during the reconstruction of the interstate and interchange. However, during the final design process re-evaluation of the geometry should be considered on the context of the Town of Marana's redeveloped Town Center surrounding this interchange.

5.4.2.12 Tangerine Road Diamond TI

- The reconstruction of the Tangerine Road interchange is being planned under ADOT Project No. 10 PM 239 H7467 01X. This project will construct a new full diamond interchange approximately 2,500 feet north of the existing Tangerine Road TI and will realign portions of the eastbound frontage road. I-10 will remain at ground level and the crossroad will be constructed to pass over I-10 and the UPRR mainline. The existing Tangerine Road structures will remain in-place to provide a grade separated crossing of I-10.

- This design concept would reconstruct the Tangerine Road ramps to be compatible with the I-10 mainline widening and to connect the ramps to the eastbound and westbound one-way frontage roads.

5.4.3 Future Viable Interchanges

This project has determined viable locations for future interchanges along I-10 from Junction I-8 to Tangerine Road. These locations are envisioned as opportunities to provide additional freeway

access to properties along the I-10 corridor, and may enhance the possibility to develop these adjacent properties.

ADOT does not envision implementing any of the future interchanges until the development of the adjacent land warrants, and the cost to implement these interchanges would be the responsibility of those who benefit, namely the land developers or local agencies promoting adjacent development. Typically the future interchanges are named based on a known name of the nearest section line, however Future interchanges would be assigned official names as the planning process moves forward.

Development of Future Viable Interchange Locations was based on a minimum two mile TI spacing, with an option for a future system interchange near MP 216 (North-South Corridor). A minimum of three miles on each side of this future system interchange is recommended.

Development of the Future Viable Traffic Interchange Locations also included input from municipality and agency representatives as well as public input gathered during public meetings and outreach.

The recommended future viable traffic interchange locations are summarized below:

- Overfield Road (MP 202)
- Battaglia Drive (MP 206)
- Picacho Highway (MP 213)
- Greenes Road (MP 222)
- Park Link Drive (MP 224)
- Aries Drive (MP 229)
- Tortolita Boulevard (MP 233)
- Moore Road (MP 238)
- Henness Road (I-8 MP 177)

These locations have been set to maintain approximately two mile spacing between interchanges along I-10. The long range objective for the I-10 corridor is to maintain a minimum two mile spacing between interchanges.

- The construction of the Tortolita Boulevard interchange is being planned under ADOT Project No. 010 PM 233 H 6980 01X which will construct a new full diamond interchange at MP 233.

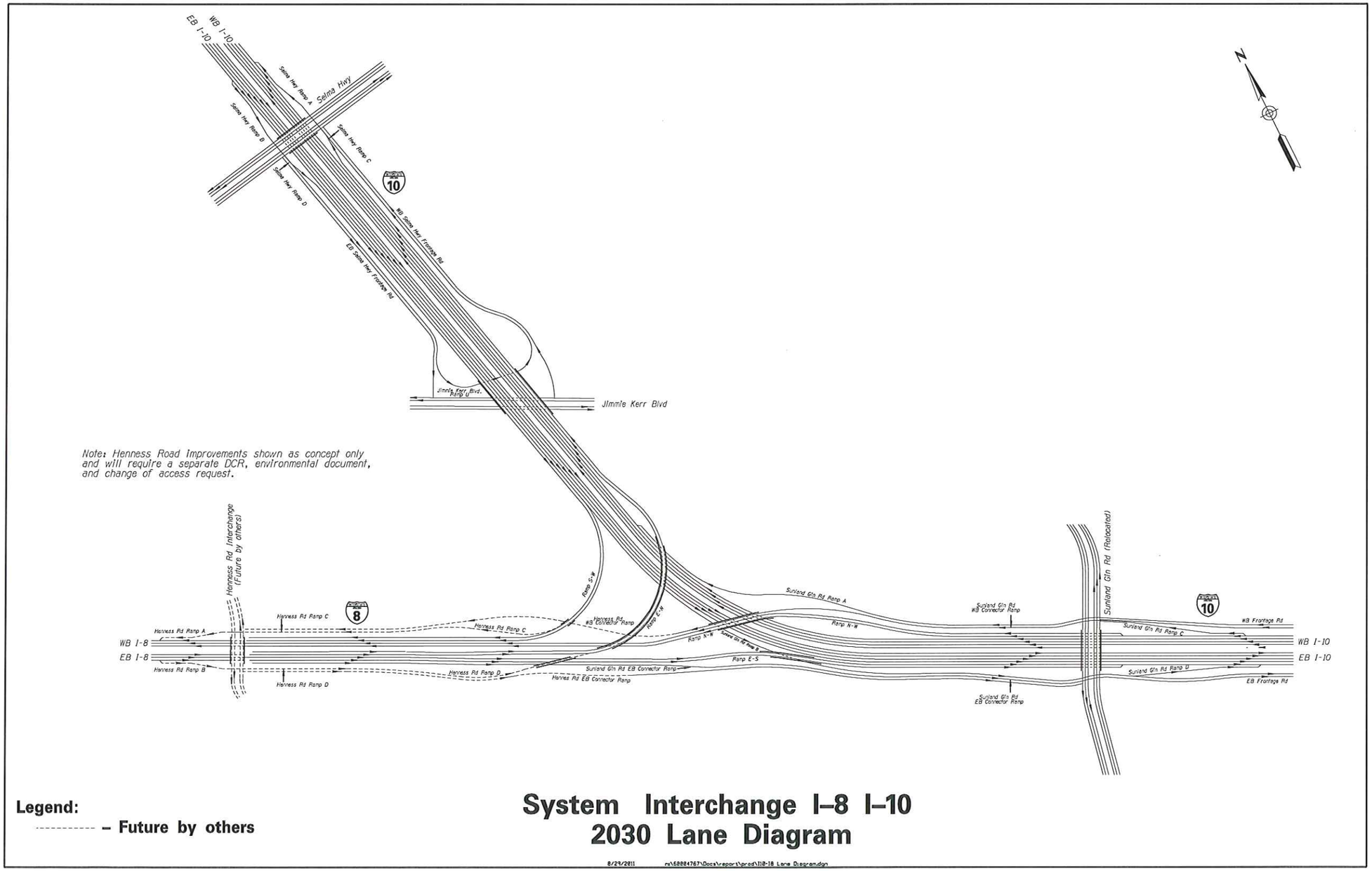
- ADOT has begun planning for a high-capacity roadway to connect I-10 to the Phoenix Metro Freeway system in the area of Apache Junction, known as the North-South corridor. To allow for the flexibility to plan for the North-South corridor, no service interchanges are recommended within 3 miles in either direction of MP 216. If the North-South corridor is not deemed feasible, then there is an opportunity for additional service interchanges from MP 213 to MP 219 while maintaining a minimum of two mile spacing between interchanges.

### 5.4.4 I-10/I-8 System Interchange

Traffic movement will be enhanced at the I-10/I-8 System Interchange by reconstructing the existing system interchange. Extended ramps and braided ramps would be incorporated into the new system TI. Extended ramps are defined as exit or entrance ramps that move traffic an extended distance between the crossroad and freeway.
The extended ramp system would be located at the I-10/I-8 system interchange to provide full access to the reconstructed Sunland Gin Road TI. A schematic lane diagram of the proposed system interchange is provided as **Figure 5.1**.

Extended ramps and ramp braids are proposed along I-8 between I-10 and a future interchange at Henness Road. The proposed Henness Road interchange is located about one mile from the I-10/I-8 interchange, which is considered an inadequate separation between a service and system interchange. The extended ramps and ramp braids are needed along I-8 if the Henness Road interchange is implemented. Construction of the Henness Road Interchange would include the construction of the extended ramps and ramp braids required to maintain adequate traffic operations along I-8. Approval of the Henness Road Interchange will require a separate DCR, environmental document, and change of access request.

**Figure 5.1 – I-10 / I-8 Schematic Lane Diagram**



- Approaching Sunland Gin Road from the east, westbound I-10 would contain five travel lanes. The Sunland Gin Road westbound exit would be developed as a parallel exit from westbound I-10 with five lanes continuing to the west. Near Sunland Gin Road, a sixth westbound lane would be added to provide six westbound lanes on I-10 approaching the I-10/I-8 TI.

- Ramp N-W would be developed as a two-lane mandatory exit with four lanes continuing westbound on I-10 through the TI. The westbound Sunland Gin Road entrance ramp would be developed as a parallel entrance that would drop prior to Ramp E-N gore.

- Ramp E-N would be developed as two-lane entrance to provide six westbound lanes on I-10. The outside lane would continue as an auxiliary lane to the Selma Highway exit ramp with five westbound lanes continuing on I-10.

- Approaching Selma Highway from the west, eastbound I-10 would contain five travel lanes. The Selma Highway eastbound exit would be developed as a parallel exit from eastbound I-10 with five lanes continuing to the east. The eastbound Selma Highway entrance ramp would add the sixth eastbound lane which would continue to Ramp S-W as an auxiliary lane.

- Ramp S-W would be developed as two-lane exit with a mandatory exit from the outside (auxiliary) lane and an optional exit from the inside lane. This configuration would provide five eastbound lanes immediately after the Ramp S-W exit.

- The fifth lane would be a mandatory exit to the Sunland Gin Road eastbound exit ramp. Ramp E-S would be developed as a two-lane entrance to provide six eastbound lanes departing the system TI. The outside lane would be dropped near Sunland Gin Road to provide five eastbound lanes on I-10.

- Approaching Henness Road from the west, eastbound I-8 would contain three travel lanes. Two lanes would be added to eastbound I-8 near Henness Road, one into the I-8 median and one on the outside, to provide five eastbound lanes on I-8 approaching I-10.

- Ramp E-N would be developed a two-lane mandatory exit from the left two lanes while the three remaining lanes would continue east toward I-10. The Sunland Gin Road Connector Ramp exit ramp would be developed as a mandatory exit from the outside lane to provide access to Sunland Gin Road. The remaining three eastbound lanes would continue to the east as Ramp E-S.

- Westbound I-8 would be developed as a four lane mainline from the combination of the two-lane ramps Ramp N-W and Ramp S-W. The outside lane would be dropped near Henness Road to provide three westbound lanes on I-8.

- All four system ramps (Ramp S-W, Ramp N-W, Ramp E-S, Ramp E-N) would be two-lane ramps. Ramp N-S would contain an entrance from Sunland Gin Road that would be developed as a parallel entrance. Ramp S-W could also contain a tapered exit for Henness Road, if needed. Ramp E-N could contain a parallel entrance from Henness Road, if needed.

## 5.5 ACCESS CONTROL

- Access control already exists along I-10 and will be maintained in accordance with ADOT and FHWA Access Control Policy requirements.

- Access control is achieved by regulating public access rights to and from properties abutting the interstate, frontage roads, and crossroads. The *Access Management Plan* identifies modifications to current access points as well as defines opportunities for future access points. Future development should be consistent with this plan.

- In association with this corridor study, ADOT has submitted a request for change of access to FHWA based on the features of this preferred alternative. Once this request is granted, the interchange locations and configurations will be approved by FHWA in concept.

- In general, a minimum spacing of two miles has been used for TI spacing, one-half mile spacing for access along frontage roads, and access controlled a minimum of 300 feet each side of the ramp terminal intersections along TI crossroads.

- The existing frontage road system is not continuous and is composed of both one-way and two-way frontage roads. The ultimate corridor improvements would consist of a continuous one-way frontage road system between I-8 and Tucson. Ultimately, eastbound and westbound one-way frontage roads will parallel the mainline and merge with the entrance and exit ramps at each TI. Existing frontage roads will be converted into part of the ultimate frontage road system in most locations.

## 5.6 RIGHT-OF-WAY

- The total estimated right-of-way acquisition is 1024 acres. The acquisition includes 778 acres from private landholders; 226 acres from Arizona State Land Department; and approximately 20 acres from Arizona State Park.

- Temporary Construction Easements (TCE's) will be required for the construction of the Recommended Alternative. The TCE locations will be determined during final design.

## 5.7 DRAINAGE

All hydrologic analyses were conducted using the guidelines and procedures in the "Highway Drainage Design Manual: Hydrology" (ADOT, 1993) (i.e., the Rational Method was used for basins less than 160 acres and HEC-HMS for larger basins.) Likewise, all hydraulic analyses were based on the procedures in the ADOT "Highway Drainage Design Manual: Hydraulics" (ADOT, 2006) and recommended FHWA procedures, with culverts evaluated using HY-8 Culvert Analysis (US DOT, 1987) and other approved procedures, where applicable. The 50-year storm event peak flow is the design flow for this project. The 100-year storm event was evaluated for overtopping conditions in conformance with federal requirements for roadway safety and performance.

The following drainage criteria should be used for the analysis and design of drainage structures within the project limits:

- Design Storm Frequency
  - Cross Culverts — 50-year storm event
  - Median Ditches — 10-year storm event
  - Pavement — 10-year storm event
  - Roadside Channel/Ditches — 10-year storm event
- Allowable Headwater
  - Median Ditches — No higher than subgrade
  - Cross Culverts — No higher than 3 inches below top of pavement edge and the headwater depth to culvert height (HW/D) should not exceed 1.5
- Cover
  - Culverts should have a minimum of 1 foot of cover below the structural section

- Culvert End Treatment
  - ADOT Std. Det. C-13.25 will be used for culverts less than 48 inches
  - Culverts with diameters greater than or equal to 48 inches shall have concrete headwalls

- Median Dikes
  - Median dikes will be provided downstream of median inlets and at specified distances based on the roadway longitudinal slope to provide temporary storage for pavement runoff
  - Top of median dike shall be no higher than 12 inches below top of pavement edge

- Pipe Culverts
  - Minimum pipe size for new storm drain shall be 24 inches
  - Pipe bend angular will not exceed 15 degrees. Manhole or modified catch basin will be used for pipe bend angular greater than 15 degrees.
- Concrete Box Culvert
  - Minimum RCBC size will be 6'x 4' (width x height)
  - Existing RCBC less than the minimum will be replaced

- Erosion Control
  - An evaluation of the outlet scour potential should be made at all culverts
  - Riprap aprons/basins should be considered whenever the outlet velocity is between 4 and 15 feet per second (fps)
  - Energy dissipaters should be considered if outlet velocity is greater than 15 fps. The ratio of outlet velocity to natural stream velocity can also be used as a guide to determine the actual need and type of outlet protection.

In order to comply with current ADOT culvert design guidelines, existing box culverts that are less than four (4) feet tall will be replaced. Box culverts that are four (4) feet tall or taller will be extended, where appropriate, to the proposed cut and fill lines. Individual culverts under the frontage roads will be designed with the same size requirements as the I-10 downstream or upstream culverts. All culverts downstream of the UPRR should be designed to convey the maximum flow allowed from the UPRR upstream culvert/bridges. During the development of this DCR the Union Pacific Railroad began construction on a project to double track the UPRR mainline across Arizona. The project included replacement of all culverts along the UPRR mainline, and several of the drainage crossings included increases in capacity.

Based on local topography and directions of offsite stormwater runoff, the project limits were divided into three drainage reaches: Santa Cruz Flats; Picacho Pass; and Tortolita Fans. The Santa Cruz Flats drainage reach includes the segment of I-10 between I-8 and the Town of Picacho. The Picacho Pass drainage reach is between the Town of Picacho and the eastern end of the Picacho Peak state park. The Tortolita Fan drainage reach extends from the eastern end of the Picacho Peak state park to the end of the projects eastern limit at the I-10/Tangerine Road TI.

### 5.7.1 Santa Cruz Flats

The Santa Cruz Flats drainage reach includes the segment of I-10 between I-8 and the Town of Picacho. The area on both sides of the interstate within this drainage reach is shown to be inundated during the 100-year storm and is located within a FEMA Special Flood Hazard Zone A. Cross culverts serve to provide flow equalization for both sides of I-10. The same cross drainage approach will be maintained for the proposed roadway improvements. Existing culverts will be extended or replaced when appropriate. No upsizing is anticipated.

### 5.7.2 Picacho Pass

The Picacho Pass drainage reach is between the Town of Picacho and the eastern end of the Picacho Peak state park. This reach is affected by flows from the Picacho Peak area and the McClellan Wash, a FEMA Zone A flood hazard area. Of the approximate 30 culverts in this reach, 10 may be affected by either the McClellan Wash flood waters or the Santa Cruz River flood

waters as suggested in the current FEMA FIRM Maps flood limits. The remainder 20 culverts convey runoff water from the Picacho Peak area under I-10 towards the Union Pacific Railroad (UPRR). Seven (7) of the 20 culverts are overtopped during the 50-year storm event and nine (9) are overtopped during the 100-year storm event. The recommendation is to replace all of the culverts in order to convey the 50-year peak flow and to maintain overtopping depth to less than one (1) foot during the 100-year storm event. It is recommended that a detailed hydrologic study be conducted before the final design to accurately size proposed culverts in this reach.

### 5.7.3 Tortolita Fan

The Tortolita Fan drainage reach extends from the eastern end of the Picacho Peak state park to the end of the projects eastern limit at the I-10/Tangerine Road TI. This reach is affected by the Tortolita Mountains, the Central Arizona Project (CAP) Canal, and the UPRR. A detailed offsite hydrologic analysis, reservoir routing, and a hydraulic analysis were implemented to estimate the flow contribution to each of the cross culverts located underneath the UPRR tracks and the I-10 mainline. Using the existing UPRR culverts as the metering mechanism for the I-10 mainline culverts, the hydraulic model identified three culverts that are not adequate to pass the 50-year flow and five culverts that are not adequate to convey the 100-year flow (Table 4-1). The proposed culvert design concept in this reach is to match culvert sizes and locations to the upstream UPRR culvert sizes and locations. As part of the proposed double tracking, the UPRR is upgrading its culverts and bridges that discharge to the I-10 right-of-way. The preliminary culvert design data provided by UPRR will in general convey more water than the existing UPRR drainage structures. The I-10 Corridor final design team should obtain the new culvert and bridge data from the UPRR and design the I-10 culverts to convey the UPRR culverts maximum flow capacity.

### 5.7.4 Median Drainage

A majority of the corridor will have an open median between the eastbound and westbound mainlines. The approximate southern end of the project, between the Tortolita Boulevard TI and the Tangerine Road TI, will have a closed median due to right-of-way limitations. Rainfall collected in the median will drain through grate inlets into cross culverts. To minimize flooding at the culvert grate inlets during storm events, dikes with bleed off pipes will be constructed across the median at specified intervals to provide temporary storage and control flow rates across the dike storage areas. The dikes will be on average three (3) feet high and will be located at specific intervals to provide storage for the total 10-year storm rainfall. The top of the median dikes shall be no higher than 12 inches below the top of the pavement edge.

**Table 5.7 – Median Dike Spacing Criterion**

| Longitudinal Slope (ft/ft) | Distance Between Dike (ft) | Median Basin Storage Volume ($ft^3$) |
|---|---|---|
| 0.001 | 3000 | 81000 |
| 0.00125 | 2400 | 64800 |
| 0.0015 | 2000 | 54000 |
| 0.002 | 1500 | 40500 |
| 0.0025 | 1200 | 32400 |
| 0.003 | 1000 | 27000 |
| 0.0035 | 857 | 23143 |

### 5.7.5 Pavement Drainage

The 10-year storm is the pavement drainage design storm. The pavement runoff will drain to the open median between the mainline and the frontage roads.

Dikes built between the frontage road and the mainline will be approximately 2.6 feet high. The dikes will be used to create temporary storage areas for the 10-year design storm total rainfall. The top of the dikes shall be no higher than 12 inches below top of pavement edge.

**Table 5.8 – Mainline-Frontage Road Median Dike Spacing Criterion**

| Longitudinal Slope (ft/ft) | Distance Between Dike (ft) | Median Basin Storage Volume ($ft^3$) |
|---|---|---|
| 0.001 | 2580 | 51213 |
| 0.00125 | 2064 | 40970 |
| 0.0015 | 1720 | 34142 |
| 0.002 | 1290 | 25607 |
| 0.0025 | 1032 | 20485 |
| 0.003 | 860 | 17071 |
| 0.0035 | 737 | 14632 |

### 5.7.6 Outfall Channels

The need for downstream outfall channels was not evaluated for the proposed widening project. The proposed policy is that this project will provide detention structures to attenuate developed peak discharges to existing peak discharges downstream of the I-10 facility. Where development is proposed along the frontage road, stormdrain systems will convey pavement drainage to detention facilities in order to attenuate peak flows to pre-development conditions.

### 5.7.7 Section 404 of the Clean Water Act

The Section 404 of the Clean Water Act requires all linear construction projects to determine areas and the extent of impact and propose mitigation measures to minimize discharge of dredge construction debris into waters of the United States. The proposed construction will cross several watercourses. Based on the number of culverts that will be constructed in this project and the extent of impact, it is anticipated that more than 0.5 acre of waters of the United States may be impacted. Therefore, a Section 404 permit of the Clean Water Act will be required.

## 5.8 STRUCTURES

The recommended corridor plan includes the reconstruction of I-10 to provide five lanes in each direction of travel and frontage roads. All of the existing structures will require replacement to accommodate this ultimate plan. In addition, several new structures are included in this concept plan.

To expedite the evaluation of the structures, the structures were combined into groups with similar geometric properties. Six groups were created to evaluate the structures as follows:

Group 1: Underpasses with approximately 15 degree skew to mainline and no UPRR crossing
- Toltec Road TI Underpass
- Sunshine Boulevard TI Underpass

Group 2: Underpasses approximately perpendicular to mainline and no UPRR crossing
- Selma Highway TI Underpass
- Sunland Gin Road TI Underpass

Group 3A: Underpasses approximately perpendicular to mainline and with UPRR crossing
- Red Rock TI Underpass
- Pinal Air Park Road TI Underpass

Group 3B: Underpasses approximately perpendicular to mainline with closed median and with UPRR crossing
- Marana Road TI Interchange

Group 4: Overpass approximately perpendicular to mainline
- Picacho Peak TI Overpass
- Tangerine Road TI Overpass

Group 5: Unique underpasses/overpasses
- Alsdorf Road Underpass
- Jimmie Kerr Boulevard Overpass
- SR 87 TI Underpass (Partial Cloverleaf Alternative)
- SR87 TI (Flyover Alternative)

Group 6: I-10/I-8 System Interchange
- Ramp N-W
- Ramp E-N Separator A
- Ramp E-N Separator B

One structure per group was selected to serve as a representative model for the entire group. From this model, unit costs were derived and this unit cost was applied to the remaining structures in each group. Recommendations for each Bridge group are documented in an initial bridge concept report for each group. Highlights of these recommendations follow about each group;

### 5.8.1 Recommended Structure Types

<u>Group 1 (Toltec Road TI)</u>

The structure will have two equal spans of approximately 139 feet for a total structure length of approximately 282 feet (back to back of abutments). Girder spacing for this alternative is 6’-9” on center and has 3’-3” cantilever deck overhangs, and an 8” cast-in-place deck slab. The total maximum superstructure depth will be approximately 7’-5”using Type Super VI Modified AASHTO girders per span with a composite cast-in-place concrete deck.

<u>Group 2 (Selma Highway TI)</u>

The structure will have two equal spans of approximately 134’ for a total structure length of approximately 272 feet (back to back of abutments). Girder spacing for this alternative is 7’-6” on center and has 3’-3” cantilever deck overhangs, and an 8” cast-in-place deck slab. The total maximum superstructure depth will be approximately 7’-5”using Super VI Modified AASHTO girders per span with a composite cast-in-place concrete deck.

<u>Group 3A (Red Rock TI)</u>

The structure will have two equal spans of approximately 134 feet for a total structure length of approximately 272 feet (back to back of abutments). Girder spacing for this alternative is 7’-6” on center and has 3’-3” cantilever deck overhangs, and an 8” cast-in-place deck slab. The total maximum superstructure depth will be approximately 7’-5”using Super VI Modified AASHTO girders per span with a composite cast-in-place concrete deck.

<u>Group 3B (Marana Road TI)</u>

The structure will have two equal spans of approximately 108 feet for a total structure length of approximately 220 feet (back to back of abutments). Girder spacing for this alternative is 8’-4” on center and has 3’-8” cantilever deck overhangs, and an 8” cast-in-place deck slab. The total

maximum superstructure depth will be approximately 6’-2”using Type V Modified AASHTO girders per span with a composite cast-in-place concrete deck.

Group 4

An evaluation was not conducted for Group 4 since Picacho Peak TI is currently under design and Tangerine Road TI is being studied under ADOT Project No. 10 PM 239 H7467 01X.

Group 5 (Alsdorf Road Underpass)

The structure will have four spans: two equal end spans of approximately 149 feet and two equal middle spans of 226 feet for a total structure length of approximately 756 feet (back to back of abutments).The center spans were set by placing a pier at the I-10 construction center line and another at the midpoint between I-10 and frontage roads. Girder spacing for this alternative will be at 10’-0” on center and 3’-0” cantilever deck overhangs on each side, and an 9” cast-in-place deck slab. The total structure depth will be approximately 8’-2”, using welded steel girders with a composite concrete deck.

Group 5 (Jimmie Kerr Boulevard Overpass)

There are two separated structures, each will be made by a cast-in-place prestressed concrete box and custom drop-in precast prestressed boxes to span over the UPRR tracks. The structures will each consist of three spans: one of approximately 150 feet, a mid-span of approximately 233 feet, and an end-span of approximately 226 feet with a hinge located approximately 50 feet from pier 2, for a total structure length of approximately 616 feet (back to back of abutments). Abutment 1 was located to provide a minimum of 30 feet from the proposed frontage road link (Ramp U) travel lane, Pier 1 was located to provide approximately 10’ horizontal clearance to the edge of the canal and 15 feet to edge of the Ramp U travel lane, Pier 2 was located to provide about 30 feet horizontal clearance for both the Jimmie Kerr Boulevard edge of travel lanes and the center of the proposed UPRR track, and Abutment 2 was located so it approximately matches the location of the existing abutment providing approximately 76 feet horizontal clearance to the centerline of the existing tracks.

Group 5 (SR 87 – Partial Cloverleaf Alternative)

The structure will have three spans of approximately 88 feet, 142 feet and 139 feet for a total structure length of approximately 374 feet (back to back of abutments) based on providing 30 feet minimum horizontal clear distance to proposed SR 87 loop ramp and I-10 westbound lanes as well as providing enough bridge span at span 1 to prevent uplift. The total maximum superstructure depth will be approximately 7’-6” using Super VI modified AASHTO girders with a composite cast-in-place concrete deck.

Group 6 (Ramp N-W)

The structure will have four spans of approximately 156 feet, 183 feet, 216 feet and 228 feet for a total structure length of approximately 792 feet (back to back of abutments). Because existing I-10 lanes needed to remain in use during construction, the Abutment 1 was located to provide a minimum of 30 feet clear from the existing eastbound lanes. Pier 1 was located to provide 30 feet clear minimum horizontal clearance to the proposed Sunland Gin Road Ramp B and about 27 feet to the existing eastbound travel lanes, Pier 2 was located to provide approximately 18 feet from the edge of existing I-10 westbound travel lanes and 30 feet from the proposed I-10 eastbound lanes. The total structure depth will be approximately 9’-2”using 5 lines of composite welded girders with a composite cast-in-place concrete deck.

Group 6 (Ramp E-N Separator A)

The structure will have two spans of approximately 102 feet and 207 feet with a total structure length of approximately 318 feet (back to back of abutments). The total structure depth will be approximately 9’-0” using a cast-in-place post-tensioned concrete box.

Group 6 (Ramp E-N Separator B)

The structure will have 3 spans, of approximately 208 feet, 232 feet and 190 feet for a total structure length of approximately 638 feet (back to back of abutments). Pier 2 was located in the median of the existing I-10 roadway section. At this location, there is a clearance of over 30 feet to the existing I-10 travel lanes and a clearance of over 60 feet to ultimate I-10 eastbound lanes. Abutment 2 was located to provide a minimum of 30 feet horizontal clearance from the edge of the existing lanes of the existing I-10 ramp to westbound I-8. The total structure depth will be approximately 8’-6” using composite welded girders with a composite cast-in-place concrete deck.

## 5.9 UTILITY AND RAILROAD COORDINATION

The reconstruction of this corridor and in some sections realignment of the freeway will have impacts to numerous utilities. The Western Area Power Authority (WAPA) has several transmission lines that cross the corridor, and several electrical structures would need to be relocated. The Cortaro-Marana Irrigation District (CMID) owns a irrigation canal that parallels the corridor within the Town of Marana, and this facility would need to be relocated and converted to an irrigation pipeline. The freeway realignment through the community of Picacho would impact numerous utilities including water distribution lines of the Picacho Water Company and an AT&T Fiber Optic line which follows the alignment of old Highway 84.

The Central Arizona Project (CAP) Canal moves Colorado River water from Lake Havasu to south of Tucson. Through this section of Pinal and Pima Counties the canal is along the east side of I-10 and it crosses I-10 in a 10-foot siphon south of Tangerine Road near MP 240. Two Central Arizona Irrigation and Drainage District (CAIDD) canals cross I-10 near MP 214 and 225. The

Santa Rosa A Canal, operated by the Maricopa-Stanfield Irrigation and Drainage District (MSIDD), crosses I-10 south of the Toltec Road TI near MP 190.

The Arizona Public Service (APS) Saguaro Power Plant (MP 228) near Red Rock is located east of the UPRR right-of-way adjacent to I-10. At this location, there are five overhead crossings of high voltage transmission power lines, two belonging to APS and three to the Western Area Power Administration (WAPA).

Adjacent to the project corridor, several utility agencies provide electrical services to surrounding areas, including APS, Electrical District No. 2 (ED2), ED3, ED4, ED5, San Carlos Project, Tucson Electric and Power (TEP), and WAPA. Within the project limits, over 30 power lines cross over I-10; many of which would require relocation with the corridor widening.

The El Paso Natural Gas (EPNG) 10.75" Tucson-Phoenix transmission line and its distribution lines cross the I-10 corridor in five locations between I-8 and Tangerine Road near MP 218, 225, 228, 233 and 234. Southwest Gas has a small sleeved distribution pipeline across I-10 in the Marana area.

This project will impact the distribution system of the Picacho Water company, which serves about two square miles surrounding the community of Picacho. During final design, ADOT will coordinate with Picacho Water to develop mitigation measure to assure continued water service to the community of Picacho. Mitigation would include replacement of water pipelines currently located within the ADOT Right of Way. Additional mitigation could include the replacement of other water delivery infrastructure needed to insure the continued water supply for the community of Picacho.

Other utilities in the study area include an AT&T transcontinental long distance fiber optic cable that enters the project corridor at SR 87 (MP 211) across the UPRR tracks and follows the eastbound frontage road to Tangerine Road (MP 240). Qwest has buried telephone cables paralleling the eastbound frontage road of I-10.

## 5.10 EARTHWORK

Approximately 1,278,477 cubic yards of excavation and 16,706,819 cubic yards of embankment are anticipated for this ultimate design concept. Earthwork factors and slope recommendations will need to be developed based on the geotechnical investigations during final design.

## 5.11 GEOTECHNICAL AND PAVEMENT DESIGN

Geotechnical investigations were not conducted as part of this project. Detailed geotechnical investigations will be required during the design phase. The ultimate design concept includes the removal of the existing AC pavement and the construction of Portland Cement Concrete Pavement (PCCP). For cost estimating purposes, preliminary pavement designs were provided by ADOT as follows:

- I-10 Mainline – 15" PCCP on 4" AC
- Ramps and crossroads – 10" PCCP on 4" AB
- Frontage Roads – 5" AC on 4" AB

Near I-10 milepost 215, a subsidence fissure crosses I-10. For cost estimating purposes, a preliminary subsurface treatment and pavement design was provided by ADOT as follows: 15" continually reinforced concrete pavement over 4" AB followed by five one-foot layers of subgrade with geogrid between each layer.

# 6.0 IMPLEMENTATION PLAN

The purpose of this section is to recommend an implementation strategy for the preferred alternative. Funding is currently identified in the ADOT 5-year construction program which includes a total of $126 Million to widen the existing freeway from Junction I-8 to Tangerine Road with the first construction project identified in Fiscal Year 2010.

This Implementation Plan was developed to propose a logical sequence of construction projects that would systematically build the ultimate I-10 Corridor improvements over time as justified by traffic demand and funding becomes available. The implementation plan is divided into four major stages of construction as follows:

- Stage I – Expansion of I-10 to a six (6) lane freeway
- Stage II – Expansion of I-10 to an eight (8) lane freeway
- Stage III – Reconstruction of the I-10/I-8 System Interchange
- Stage IV – Expansion of I-10 to a ten (10) lane freeway

Based on the current need for additional capacity within the corridor, ADOT is currently executing Stage I of this implementation plan and is expected to complete construction by 2015.

## 6.1 STAGE I – EXPANSION OF I-10 TO A SIX (6) LANE FREEWAY

I-10 has been expanded from the center of Tucson west to Tangerine Road. Construction or Final design is currently ongoing to complete the six (6) lane facility from Tangerine Road (MP 240) to Junction I-8 (MP 199). The current ADOT 5-year construction program includes a total of $126 Million to complete this stage of construction.

Stage I has been divided into 6 construction projects shown in **Figure 6.1** and described as follows:

### 6.1.1 Stage I, Project 1 – Interim Widening Pinal Air Park to Tangerine Road (MP 232 to MP 240)

This project is complete and has expanded the freeway to 6 lanes (3 lanes in each direction). The additional lanes have been added in the median, and a continuous cable barrier system included for safety.

### 6.1.2 Stage I, Project 2 – Interim Widening Picacho Peak Road to Pinal Air Park (MP 219 to MP 232)

This project is complete and has widened the freeway to a six lane facility from Picacho Peak Road to Pinal Air Park Road near the Pima/Pinal county line.

This project widened the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width.

New bridge structures have been constructed at the Picacho Peak Road interchange which are compatible with the recommendations of this study.

### 6.1.3 Stage I, Project 3 – East end of Picacho to Picacho Peak Road (MP 213 to MP 219) Interim Widening

Project 3 would widen the freeway to a six lane facility from the east end of the community of Picacho to Picacho Peak Road. This project is described as an interim widening project because the additional lanes are provided by widening the existing roadway.

This project is widening the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. Typically, the project is widening on the outside of the existing lanes in the westbound direction, and widening in the median in the eastbound direction resulting in a 78 foot wide median.

This project is currently under construction is anticipated to be complete in 2011.

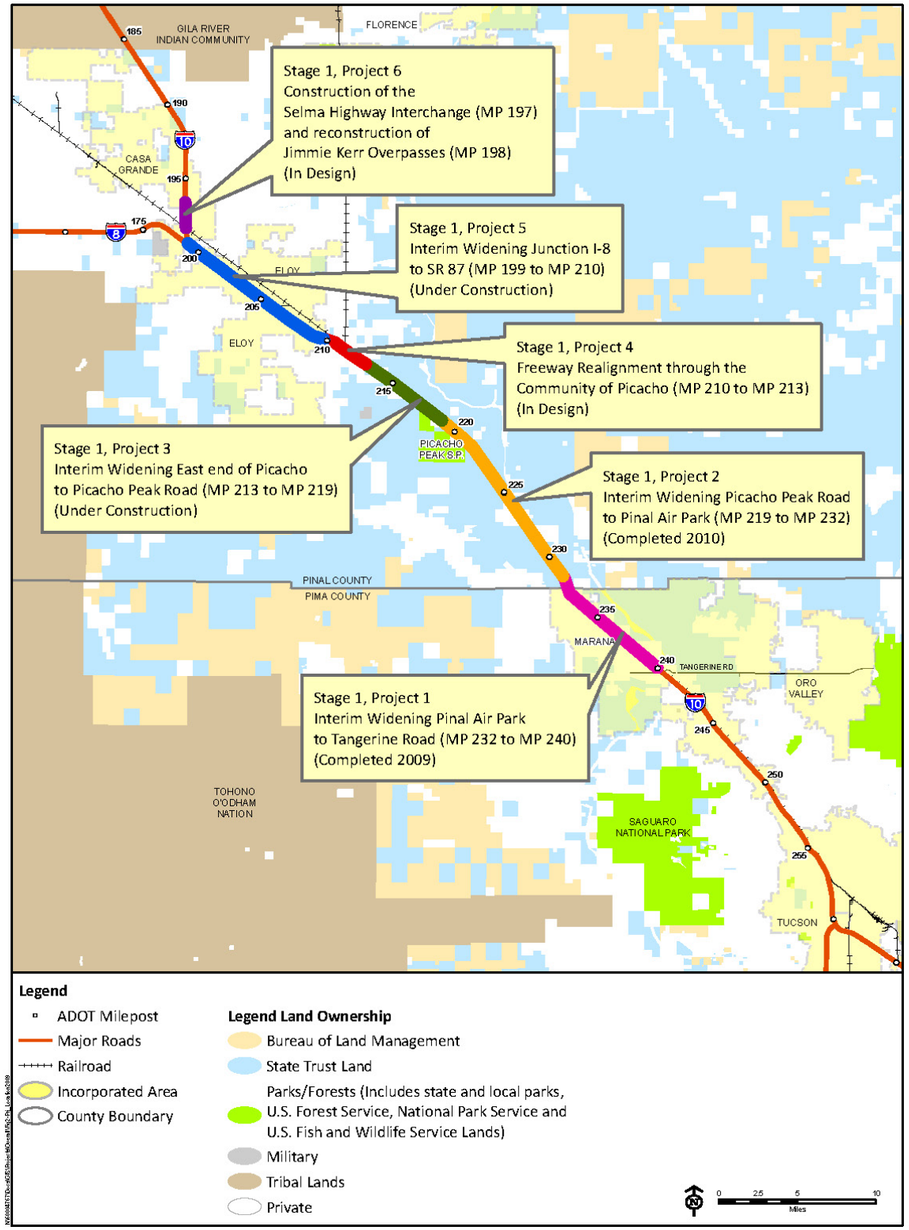
### 6.1.4 Stage I, Project 4 – Freeway Realignment through the Community of Picacho (MP 210 to MP 213)

Project 4 includes the construction of the freeway realignment through the community of Picacho. The freeway will be realigned to be adjacent to the UPRR mainline within Picacho, and will include the reconstruction of the SR 87 Interchange.

This project would construct approximately three miles of new freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. The project would include extension of the westbound frontage road from approximately MP 213 to SR 87 (MP 211), and this frontage road would be converted to one-way operation.

The SR 87 interchange would be reconstructed as a diamond interchange, and the project would include a new overpass at the UPRR mainline. The preferred alternative for the SR 87 interchange includes a Flyover Ramp for the south to east movement. This ramp would be implemented in a future project once traffic demand warrants.

**Figure 6.1 – Stage I - Expansion of I-10 to a Six Lane Freeway**




This project would require the acquisition and relocation of numerous residential and business properties within the community of Picacho. Many utility relocations will be associated with the freeway realignment, including impacts to water distribution facilities of the Picacho Water Company, and a AT&T fiber optic line located along old Highway 84.

This project is currently in the final design phase and construction is anticipated to begin in 2012. A value engineering evaluation has been completed for this project, and one recommendation is to implement the Flyover Alternative at the SR 87 Interchange. Therefore the DCR plans included in Volume 3 have been updated to show this alternative as the recommended configuration for the SR87 Interchange.

### 6.1.5 Stage I, Project 5 – Interim Widening Junction I-8 to SR 87 (MP 199 to MP 210)

Project 5 would widen the freeway to a six lane facility from the I-10/I-8 System interchange to SR 87 at Picacho. This project is described as an interim widening project because the additional lanes are provided by widening the existing roadway.

This project is widening the freeway to provide three (3) lanes, 12 feet wide, in each direction and inside and outside shoulders 12 feet in width. Typically, the project is widening on the outside of the existing lanes in the westbound direction, and widening in the median in the eastbound direction resulting in a 78 foot wide median. Because of restrictions at the Battaglia Road, Alsdorf Road, and Sunshine Boulevard Underpasses, the median is reduced to 60 feet wide for a short distance at these locations. Shoulder width reductions would be needed at Battaglia Road and Alsdorf Road because these bridges include two sets of piers in the freeway median.

Bridge structures would be widened at the Santa Rosa Canal (MP 204.5) and the La Palma Road overpass (MP 210). Because of the high amount of truck traffic along this section of I-10, several exit and entrance ramps would be modified to parallel ramp designs. This would require the acquisition of small amounts of right-of-way at the existing Sunland Gin Road and Toltec Road interchanges.

This project is currently under construction and is anticipated to be completed in 2012.

### 6.1.6 Stage I, Project 6 – Construction of the Selma Highway Interchange and Replacement of the Jimmie Kerr Blvd Overpass

This project is ADOT Project Number 010 PN 188 H7585 01L, and is documented in a Final Project Assessment for Interstate 10; Val Vista Road to Junction I-8 (June 2009).

The preferred alternative includes the implementation of a new traffic interchange at Selma Highway (MP 197). This project would include reconstruction of the Selma Highway underpass, a new Diamond Interchange at Selma Highway, and a frontage road connecting Selma Highway to Jimmie Kerr Blvd. The limits of Project 1 are depicted in Figure 6.1. The exit and entrance ramps

at Jimmie Kerr Blvd will be removed as part of this project, access from I-10 to Jimmie Kerr Blvd will be provided by using the frontage roads.

This project includes the construction of the ultimate EB overpass structure at Jimmie Kerr Blvd. The reconstruction of the Jimmie Kerr Overpass will provide a new mainline structure over Jimmie Kerr Blvd and the UPRR Mainline which will meet current design guidelines. The vertical curvature over the existing structures does not meet sight distance guidelines for 75 MPH, and the existing structures do not provide adequate shoulder widths. The location of the existing bridge piers within the UPRR right of way do not provide recommended horizontal clearances from the double mainline track currently under construction.

The Final Project Assessment for these improvements includes widening I-10 to be six (6) lanes from I-8 to Val Vista Road (MP 188). This widening is outside the limits of this corridor study and would require a separate environmental document.

Benefits of Stage I, Project 6 include;

- Removal of the Jimmie Kerr Interchange ramps; the existing loop ramps at this interchange are not desirable.

- New Interchange at Selma Highway; recommended configuration will accommodate year 2030 traffic projections.

- Frontage Road connections to Jimmie Kerr Blvd; improves access to the existing Casa Grande Outlet Mall.

- Reconstruction of the Jimmie Kerr Blvd Overpass will upgrade the structures to meet current design standards and provide full shoulder widths.

## 6.2 STAGE II – EXPANSION OF I-10 TO AN EIGHT LANE FREEWAY

The completion of the State I widening projects from Earley Road to Tangerine Road, will provide an I-10 corridor with 3 lanes in each direction. At such time as traffic warrants, the corridor would be expanded to 4 lanes in each direction in a manner which would plan for the future reconstruction of the corridor once a 5$^{th}$ lane is needed.

This expansion would be accomplished by adding additional lanes into the existing open median between the travel lanes, and therefore a barrier will be required between the opposing directions of travel. The Department of Public Safety (DPS) has requested that cross over opportunities be located a maximum distance of two miles apart, a crossover maneuver can be accomplished at an interchange or located in the median. The implementation of a barrier in the median will obstruct many of the existing median crossover locations and during the design of Stage II projects the design must provide crossover opportunities at a maximum distance of two mile separation.
The expansion of I-10 to an eight lane freeway is divided into two construction methods;

- Earley Road to Tortollita Blvd (MP 196 to MP 234) – Median widening for an additional lane in each direction

- Tortollita Blvd to Tangerine Road (MP 234 to MP 240) – Reconstruction of the freeway with Concrete (PCCP) Pavement.

<u>Earley Road to Tortollita Blvd</u> (MP 196 to MP 234)

The strategy for expanding the freeway to 4 lanes in each direction throughout this section of the corridor is to widen in the median. Additional lanes would be constructed by widening additional pavement onto the improvements implemented in Stage I.

The freeway from Earley Road to Junction I-8 would have been constructed in concrete (PCCP) pavement based on projects recommended in Stage II. Expansion to an eight lane freeway would require additional concrete pavement be added in the median.

During Stage I the freeway is proposed to be widened from Junction I-8 to SR87 utilizing interim widening of the existing asphalt lanes. The expansion of the freeway to an eight lane freeway would further widen the existing lanes into the median. This would reduce the width of the median to a dimension that will require a continuous barrier be installed.

The Alsdolf Road structure must be replaced to allow for the expansion of the freeway to eight lanes. The Stage I interim widening (six lane freeway) will result in design exceptions for reduced shoulder widths through the Alsdorf Road Structure, to provide 4 lanes in each direction this structure must be replaced.

The Battaglia Road structure must be replaced to allow for the expansion of the freeway. A future interchange has been proposed at this location. If the new interchange has been constructed by a private developer, then the structure would have been planned to accommodate a 10-lane freeway. If an interchange has not been constructed before an 8-lane freeway is warranted, then replacement of the Battaglia Road structure would be included in Stage II construction.

The Long Range Plan for the I-10 Corridor includes relocation of the Pinal Air Park Interchange to a location about ½ Mile north of its existing location. The existing Pinal Air Park Interchange includes two loop ramps, which includes a short weaving section on the I-10 Mainline and as traffic volumes increase on the interstate; this could become a traffic operational issue. The existing interchange does not intersect with the frontage road system, and the existing loop ramp design does not easily allow for an extension of Pinal Air Park Road to the frontage road. The relocated interchange would be constructed as a Diamond Interchange and the frontage road system would intersect with the crossroad. The location of the new interchange would allow Missile Base Road to be realigned to intersect with I-10 at the new Pinal Air Park Road interchange, providing direct freeway access.

Benefits of Relocation of the Pinal Air Park Interchange;

- Construction of a New Pinal Air Park Interchange removes the existing partial loop ramp configuration

- Realignment of Missile Base Road provides direct freeway access.

During Stage I the freeway is proposed to be realigned through the Community of Picacho, this realignment would include an open median which will allow for additional lanes. Through the Community of Picacho the 4th lane in each direction would be added utilizing concrete (PCCP) pavement, and the median will be of sufficient width to not require a continuous barrier.

The expansion of the freeway to eight lanes from just east of the Community of Picacho to Tortollita Blvd will further widen the existing lanes in the median, expanding on the widening completed in Stage I. This would reduce the width of the median to a dimension that will require a continuous barrier be installed between the directions of travel.

Tortollita Blvd to Tangerine Road (MP 234 to MP240)

The recommendation for expanding the freeway to eight lanes through the Town of Marana is to reconstruct the freeway utilizing concrete (PCCP) pavement. Freeway reconstruction is recommended to utilize the existing open median (60 Feet) to help maintain traffic during the reconstruction. A seven (7) foot shift in the mainline centerline has been included in the design concept to more easily maintain 3 lanes in each direction during the reconstruction of the freeway.

Reconstruction of the freeway through the Town of Marana will require the reconstruction of the Marana Interchange and Tangerine Interchange prior to this project, or included with the reconstruction of the freeway.

## 6.3 STAGE III – RECONSTRUCTION OF THE I-10/I-8 SYSTEM INTERCHANGE

The reconstruction of the I-10/I-8 System Interchange includes implementation of directional ramps for each of the system movements, a new service interchange at Selma Highway, removal of the Jimmie Kerr Boulevard interchange, realignment of the I-10 mainline, and relocation of the Sunland Gin Road interchange. However several of these construction items have been included in previous stages of implementation. The Selma Highway Interchange and implementation of two directional ramps (S-W and E-N) have been proposed for implementation in Stage II.

Therefore, completion of the reconstruction of the system interchange has been divided into four (4) phases which could be programmed as individual construction projects. The implementation plan for the system interchange was developed to propose a logical sequence of construction projects that would systematically build the ultimate interchange over time as funding becomes available.

The five (5) phases for the reconstruction of the I-10/I-8 System Interchange are proposed as follows:

- Phase 1 – Reconstruction of Ramps E-N and S-W
- Phase 2 – Construct Ramp N-W
- Phase 3 – Relocation of the I-10 Mainline
- Phase 4 – Construct Ramp E-S
- Phase 5 – Relocate the Sunland Gin Road Interchange (MP 200)

### 6.3.1 Stage III, Phase 1 – Reconstruction of Ramps E-N and S-W

Reconstruction of Ramp E-N at the I-10/I-8 Interchange would eliminate the need for the existing loop ramp connecting EB I-8 to WB I-10. This loop ramp does not meet current design guidelines for a freeway to freeway connection. Ramp E-N would be designed to meet a 65 MPH design speed providing a direct connection from I-8 to I-10. In order to construct Ramp E-N the existing ramp connection from EB I-10 to WB I-8 must be relocated, therefore the reconstruction of Ramp S-W is also included in this project. The limits of Phase I are depicted in **Figure 6.2**.

Ramp E-N is designed to be a left exit from the EB I-8 Mainline, and therefore a portion of the WB I-8 mainline will need to be relocated to the location identified in the Design Concept plans. Also the structure which carries Ramp E-N over the I-10 is designed to span the existing mainline, and the future mainline which will be shifted further to the east.

Ramp E-N is envisioned to add an auxiliary lane onto WB I-10 which would be extended as an exit only ramp at the Selma Highway Interchange. This would require the WB overpass at Jimmie Kerr Blvd to be constructed as part of this project.

### 6.3.2 Stage III, Phase 2 – Construct Ramp N-W

This phase of construction would reconstruct most of the ramps associated with westbound I-10 traffic movements. Ramp A (Sunland Gin Road) can be reconstructed with temporary ties to the existing Ramp A and the I-10 mainline. Ramp N-W would be constructed with a temporary tie to the existing I-8 mainline just west of the I-10 overpass. The initial bridge concept for the Ramp N-W structure includes span lengths that can span the existing mainline and the proposed realignment of I-10. Therefore, this ramp can be implemented without the reconstruction of the I-10 mainline. The westbound connector ramp would be constructed to provide a traffic movement from Sunland Gin Road to westbound Interstate 8. The limits of Phase 2 improvements are provided in **Figure 6.3**.

### 6.3.3 Stage III, Phase 3 – Relocation of the I-10 Mainline

The I-10 mainline is proposed to be relocated east of the existing alignment to increase the radius of the long mainline curve through the interchange, and help to maintain traffic during construction. The mainline would be constructed with a 108 foot open median to allow for the implementation of additional lanes in the median. The limits of Phase 3 improvements are provided in **Figure 6.3.**

### 6.3.4 Stage III, Phase 4 – Construct Ramp E-S

This phase of construction would reconstruct most of the ramps associated with eastbound I-10 traffic movements and reconstruct the I-8 mainline. Ramp B (Sunland Gin Road) can be reconstructed with a temporary tie to the existing Ramp B. Ramp E-S would be constructed and the eastbound connector ramp would be constructed to provide traffic movements from eastbound Interstate 8 to Sunland Gin Road. The limits of Phase 4 improvements are provided in **Figure 6.4**.

### 6.3.5 Stage III, Phase 5 – Relocation of the Sunland Gin Interchange

The Sunland Gin Road interchange is proposed to be relocated approximately a ¼ mile east of its existing location. This project is shown as the last phase of construction; however the relocation of the Sunland Gin Interchange can be constructed independent of the I-10 /I-8 System interchange. The limits of Phase 5 improvements are provided in **Figure 6.4**.

## 6.5 STAGE IV – EXPANSION OF I-10 TO A TEN LANE FREEWAY

At such time as traffic warrants, the corridor is recommended to be widened to 5 lanes in each direction, as specified in the Design Concept Plans (Volume 3). During the expansion of the freeway to ten lanes remaining sections of the corridor would be reconstructed providing concrete (PCCP) pavement throughout the corridor.

Throughout the previous stages of construction the corridor has been planned for the reconstruction of the freeway. **Figure 6.5** depicts the dimensions for various sections of the corridor following the recommended expansion to an eight lane freeway. The figure further depicts proposed traffic phasing during the reconstruction of the freeway, and the resulting freeway corridor following the reconstruction and expansion to a ten lane freeway.

## 6.6 IMPLEMENTATION OF ONE-WAY FRONTAGE ROADS

The preferred alternative includes the provision for continuous one-way frontage roads throughout the corridor from Junction I-8 to Tangerine Road. Currently there is a combination of one-way and two-way frontage roads which are not continuous. The continuous frontage road system has two objectives, first to provide a parallel alternative roadway to I-10, and second to provide access to adjacent properties along the corridor.

The frontage road system proposed from SR 87 to Tangerine Road (MP 211 to MP 240) would provide a convenient parallel alternative route to I-10 in case of emergency incidents. The implementation of a continuous one-way frontage road system is a high priority from Picacho to Marana since there are no existing alternative routes within this section of the corridor.

The frontage road system proposed within the City of Eloy from Junction I-8 to SR 87 (MP 200 to MP 211) would be implemented by the City or adjacent property owners. If an incident were to occur within this section of the corridor and traffic would need to use an alternative route the SR 287, SR 387, and SR 87 corridors provide several route options. Therefore the implementation of a continuous one-way frontage road system is not a high priority from Junction I-8 to SR 87. The preferred alternative includes the provision for implementing these roadways, but the construction would be the responsibility of the adjacent land owners or the City of Eloy. ADOT would accept the roadways for maintenance if they meet current ADOT design guidelines and adhere to the Access Management principles documented in *the I-10 Corridor Study – Access Management Plan.*

The reconstruction of most of the interchanges along the corridor will require the existing frontage roads to be converted to one-way operation. The conversion of the frontage roads from two-way to one-way operation must be phased throughout the corridor as improvements are made to existing interchanges and new interchanges are implemented. In combination with any interchange improvements proposed along the I-10 corridor, the frontage roads in the area of that interchange should be considered for conversion to one-way operation since the frontage roads are designed to merge with the ramps which are one-way. The goal of this implementation plan is to incrementally convert the frontage roads to one-way operation in combination with improvements to existing interchanges or implementation of new interchanges along the corridor.

One method for converting frontage roads from two-way to one-way operation is to convert the frontage roads to one-way operation between interchanges. The concern with converting the frontage roads between interchanges is the amount of out-of-direction travel that may be required. The out-of-direction travel would result from a driver accessing a one-way frontage road, but wanting to travel in the opposite direction. The driver would need to travel along the frontage road to the next interchange or overpass, then turn around to travel the desired direction. ADOT is concerned about the amount of out-of-direction travel imposed once the frontage roads are converted, and requests it be limited to no more than 6 miles. This would mean that interchanges must be spaced a maximum of 3 miles apart before converting the frontage roads to one-way. Another issue is that the existing frontage roads are not always continuous, and if the frontage roads are converted to one-way operation, the system must be continuous between the interchanges. Construction of continuous frontage roads may not always be practical, therefore the planning of a new interchange or improvements to existing interchanges along I-10 must be coordinated with adjacent projects proposed by developers, or local agencies to plan an overall circulation plan that could allow for conversion of the frontage roads to one-way operation.

**Figure 6.2 – Stage III (I-10/I-8 System Interchange) Phase 1**

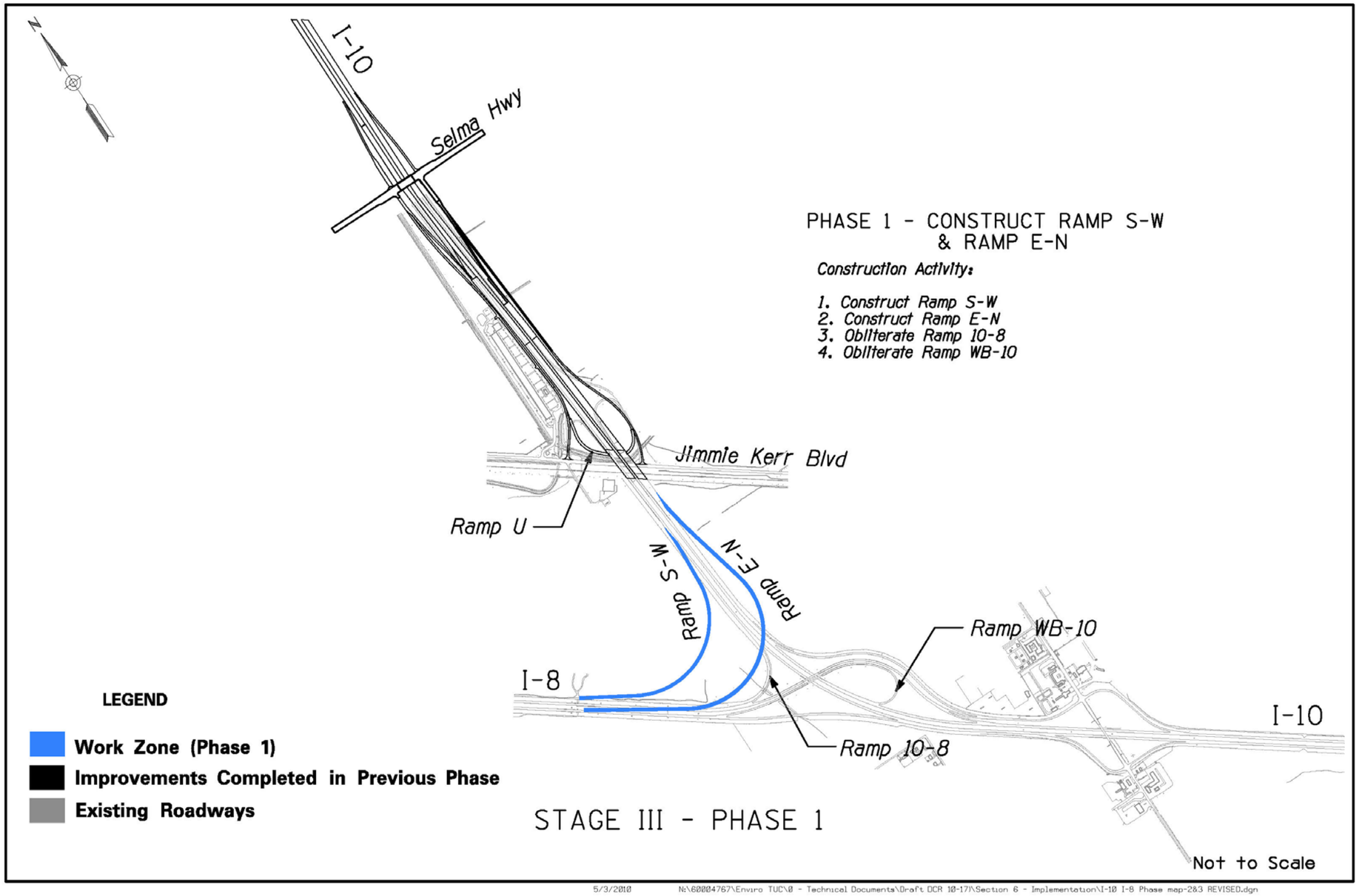


**Figure 6.3 – Stage III (I-10/I-8 System Interchange) Phase 2 and 3**

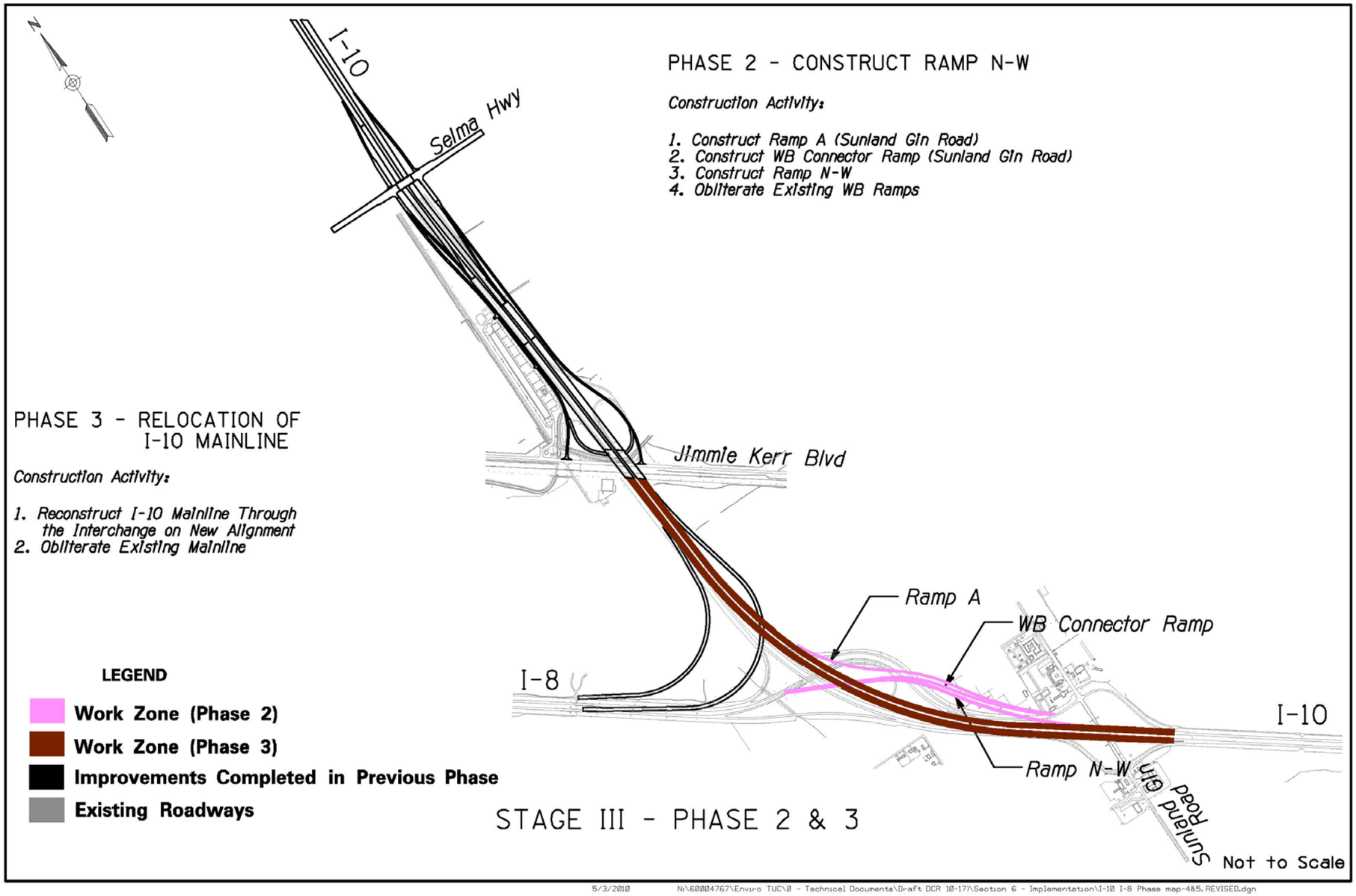


**Figure 6.4 – Stage III (I-10/I-8 System Interchange) Phase 4 & 5**

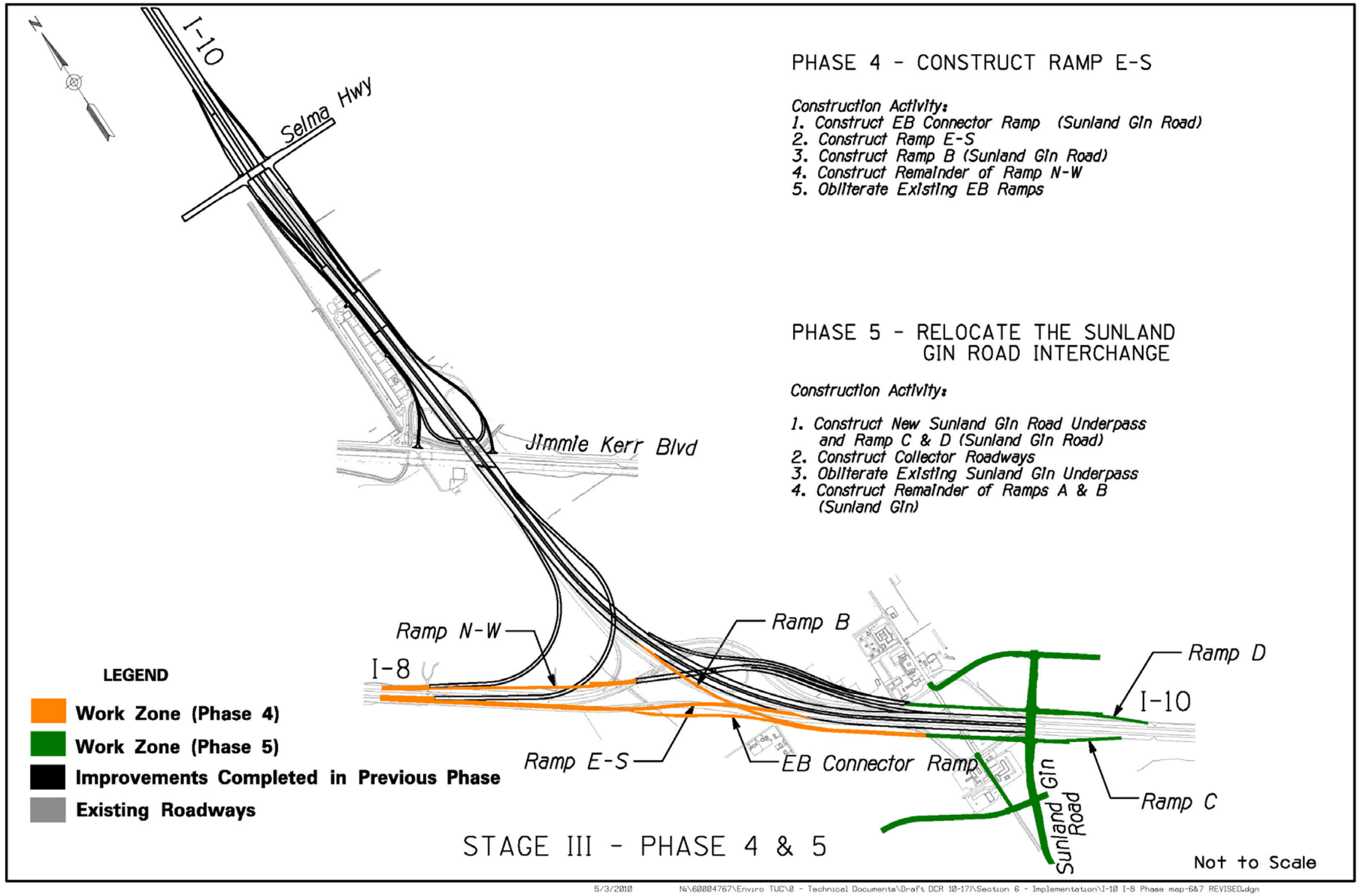


**Figure 6.5 – Construction Staging Sections**

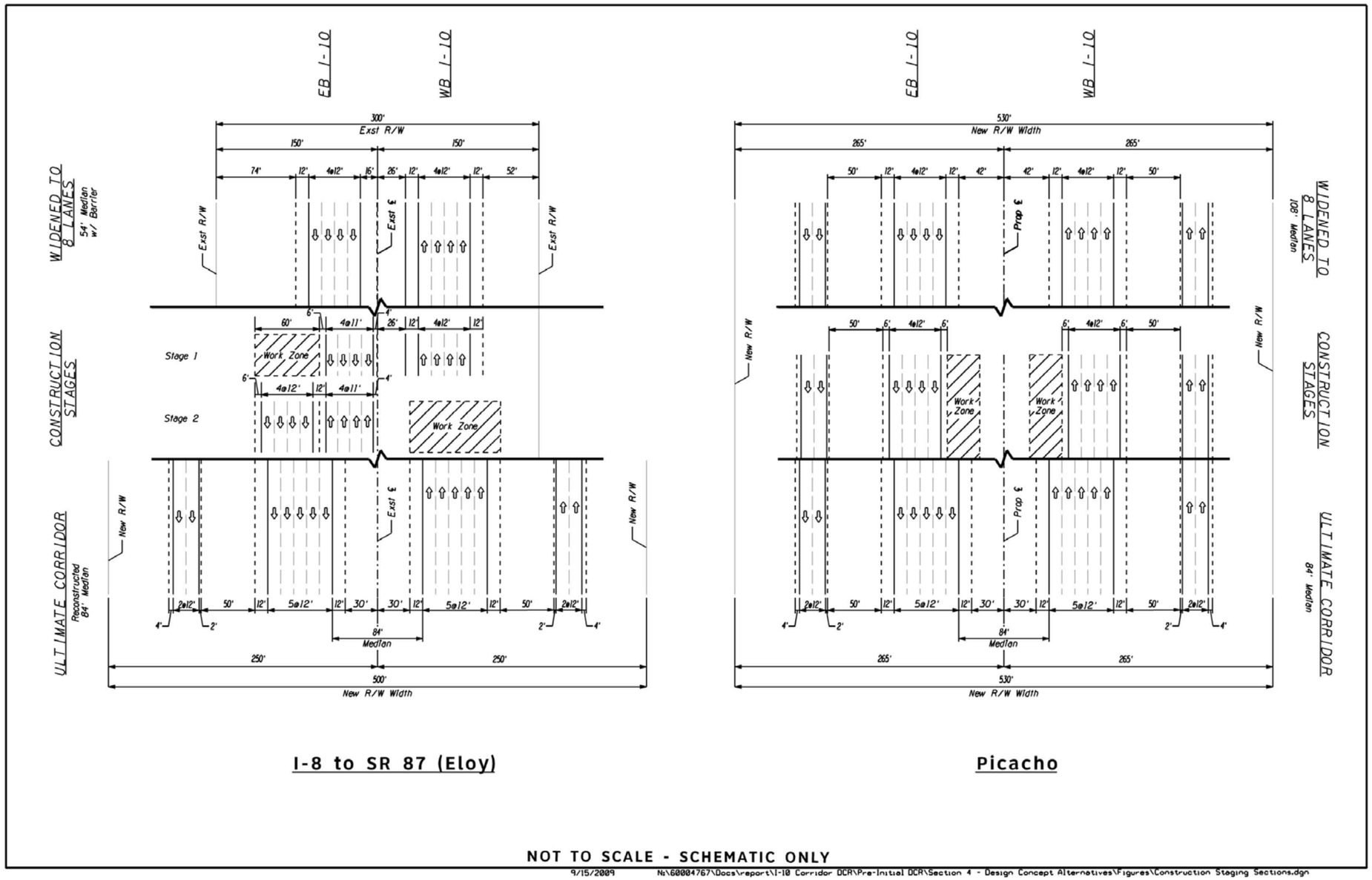
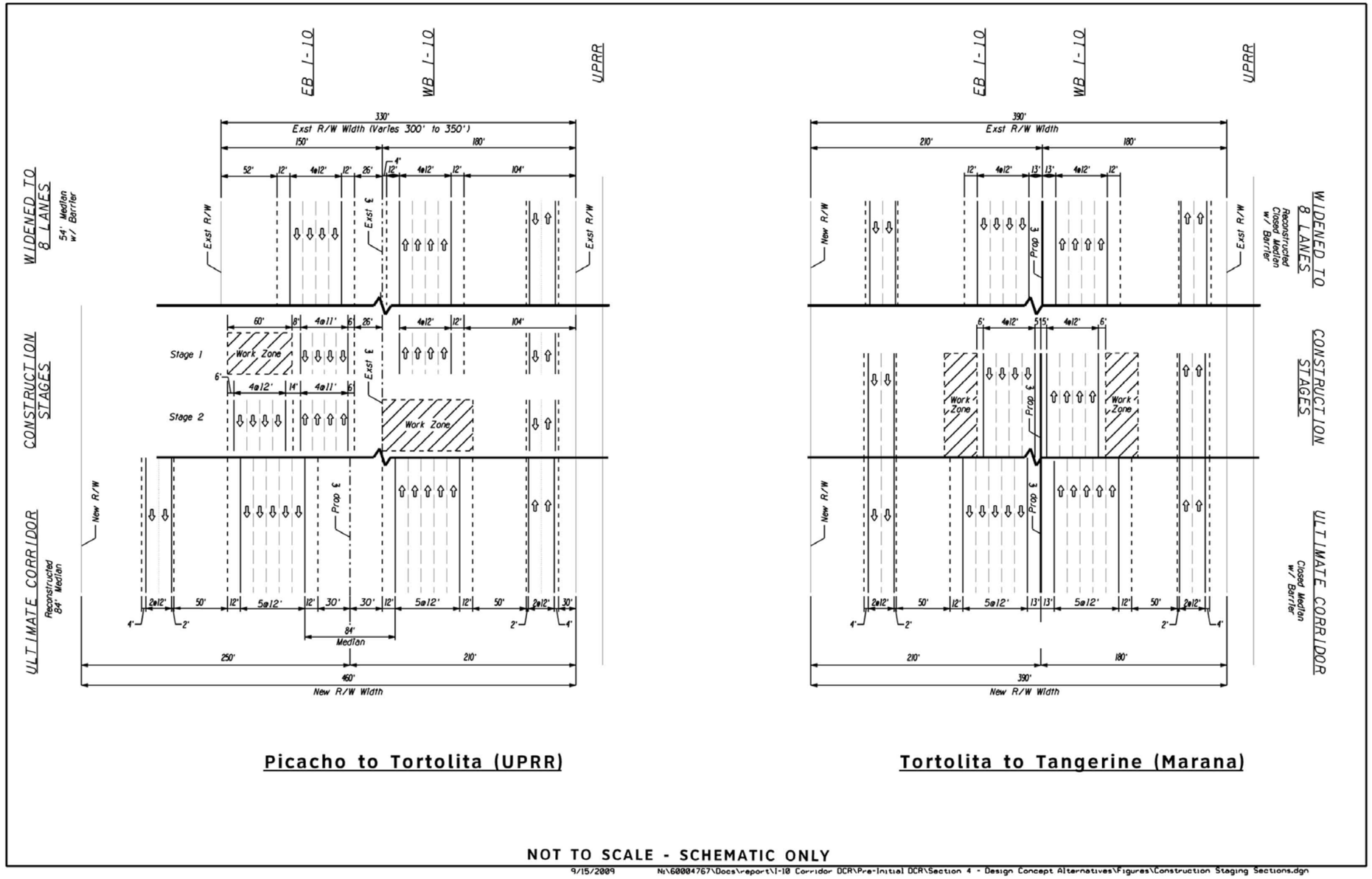


**Figure 6.5 – Construction Staging Sections (Cont.)**



An alternative method for converting the frontage roads to one-way operation in the area of an interchange is to incorporate a circulation loop road into the design. This method has been used at the I-10/Cortaro Road interchange and is currently proposed at the Tangerine Road interchange, both located in Marana, Arizona. **Figure 6.6** depicts how a circulation loop could be included with an interchange project to convert the frontage roads to one-way operation through the interchange, but the frontage roads could operate as two-way beyond the interchange. This method of frontage road conversion may need a partnership between ADOT, adjacent developments, and local agencies to ensure the circulation loop can be integrated into the long range transportation plan for the surrounding community.

## 6.7 IMPLEMENTATION OF FUTURE VIABLE INTERCHANGES

The I-10 Corridor Study has determined viable locations for future interchanges along I-10 from Junction I-8 to Tangerine Road. These locations are envisioned as opportunities to provide additional freeway access to properties along the I-10 corridor, and may enhance the possibility to develop these adjacent properties. Therefore, ADOT does not envision implementing any of the future interchanges until the development of the adjacent land warrants, and the cost to implement these interchanges would be the responsibility of those who benefit, namely the land developers or local agencies promoting adjacent development.

Implementation of the future viable interchanges shall follow the ADOT "Privately Funded Interchange Development Process" which is a uniform protocol for private entities to implement new interchanges on the state highway system. The latest handbook describing these procedures can be found on the ADOT website (www.azdot.gov). As a part of this process private, entities must adhere to current ADOT access management recommendations and be compatible with the design concept of the long range plan as presented in this report.

Generally for future interchanges to be compatible with the preferred alternative, the over-crossing structure must provide spans and clearance to allow for the 10 lane freeway to be implemented. The minimum vertical clearance recommended for this design concept is 17 feet 0 inches, but the future profile of I-10 is proposed to be about 2 feet higher than existing. Therefore, designer of future interchange structures should plan for about 19 feet 0 inches of minimum clearance over the existing freeway to comply with the preferred alternative. Specific profile information can be obtained in the design concept plans located in Appendix D.

The ADOT Bridge Group has provided guidance for over-crossing structures for future interchanges to be compatible with the preferred plan. The bridge spans must be minimum of 135 feet 6 inches (at 0 degree skew) to allow for the implementation of a 10 lane freeway with a 84 foot wide open median. The structures can be designed with a sloped abutment in the interim condition, but must be designed to allow for a vertical abutment with a minimum 30 foot clear zone from the future freeway travel lanes. The guidance for future interchange structures is presented in **Figure 6.7.**

The ramp design for future interchanges must allow for the future implementation of frontage roads, if one-way frontage roads are not being constructed in the same project. This will require that the ramp terminals at the crossroads are designed to meet the design criteria for the frontage roads, and the geometry of the ramps provide enough distance for traffic queuing and weaving for future frontage road traffic movements. Design parameters for minimum weaving and storage lengths that are compatible with the proposed frontage road system are shown in **Figure 6.8**.

During final design of any new interchanges along the I-10 corridor, the design team should coordinate with the local transit authorities to determine if there is any need for Park and Ride facilities near the interchange. If practicable, any excess right of way required for the interchange should be considered for use as a Park and Ride facility if warranted.

**Figure 6.6 – Circulation Loop Design**

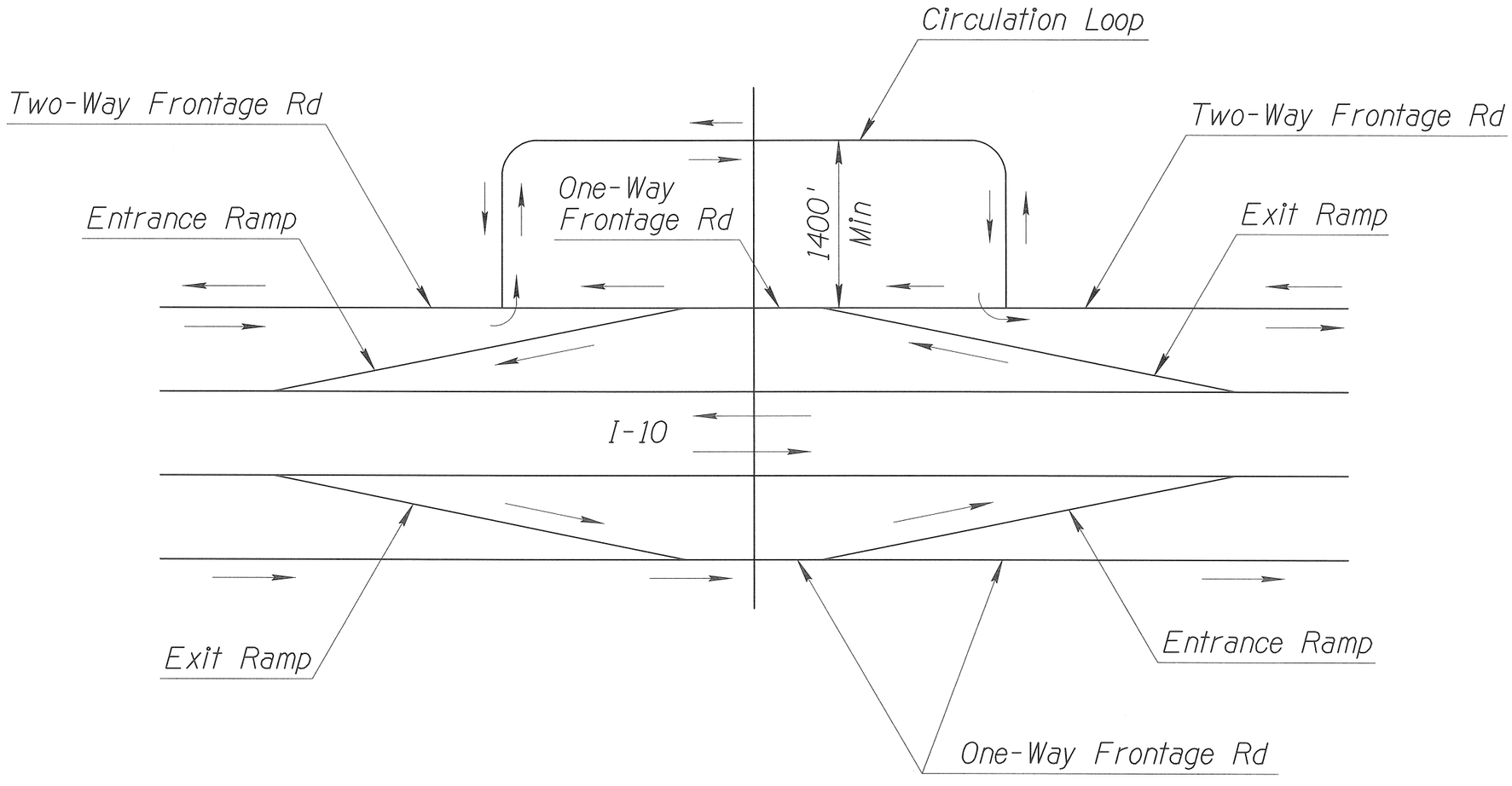


**Figure 6.7 – Future Interchange Structure Guidelines**

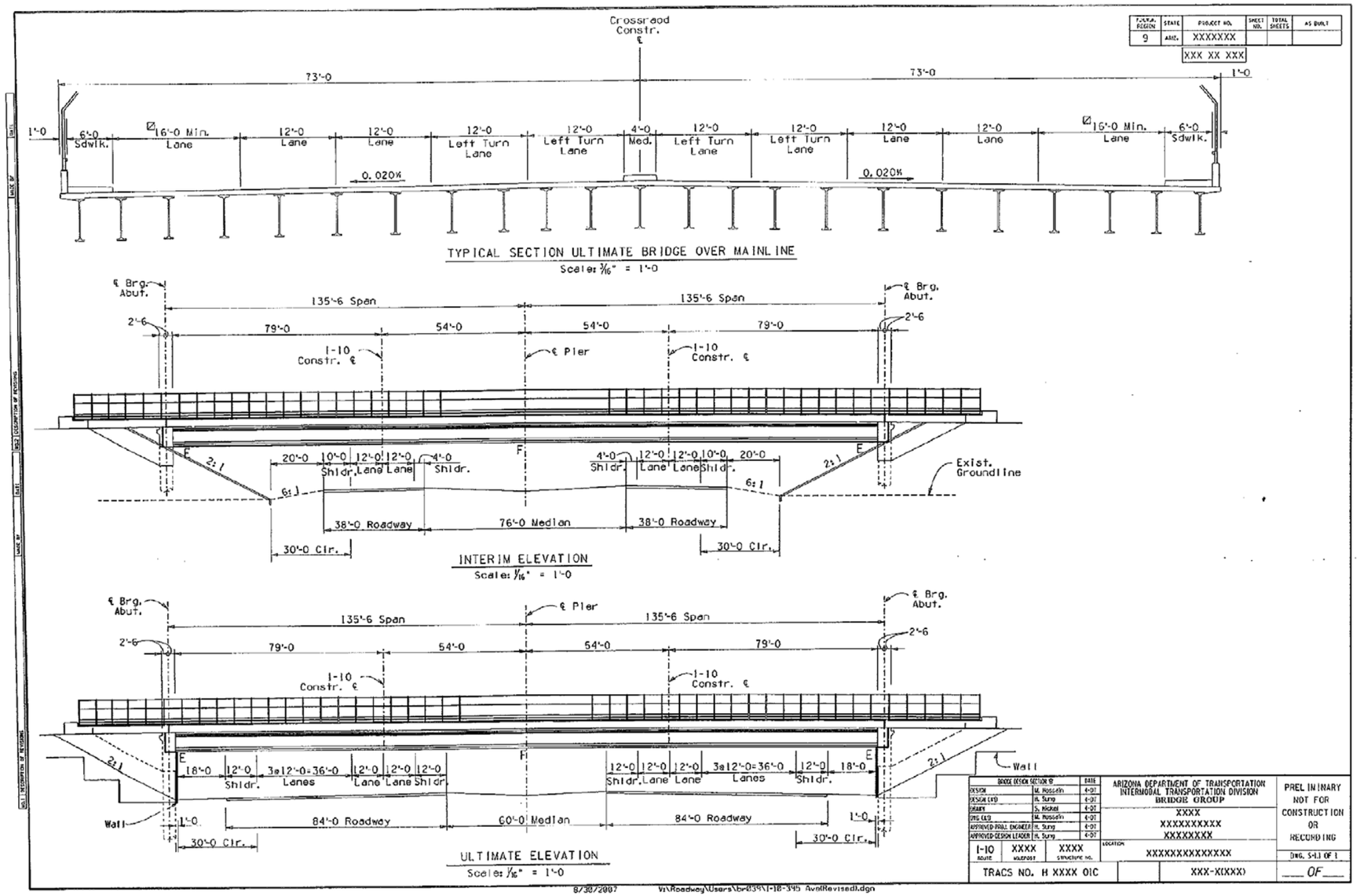
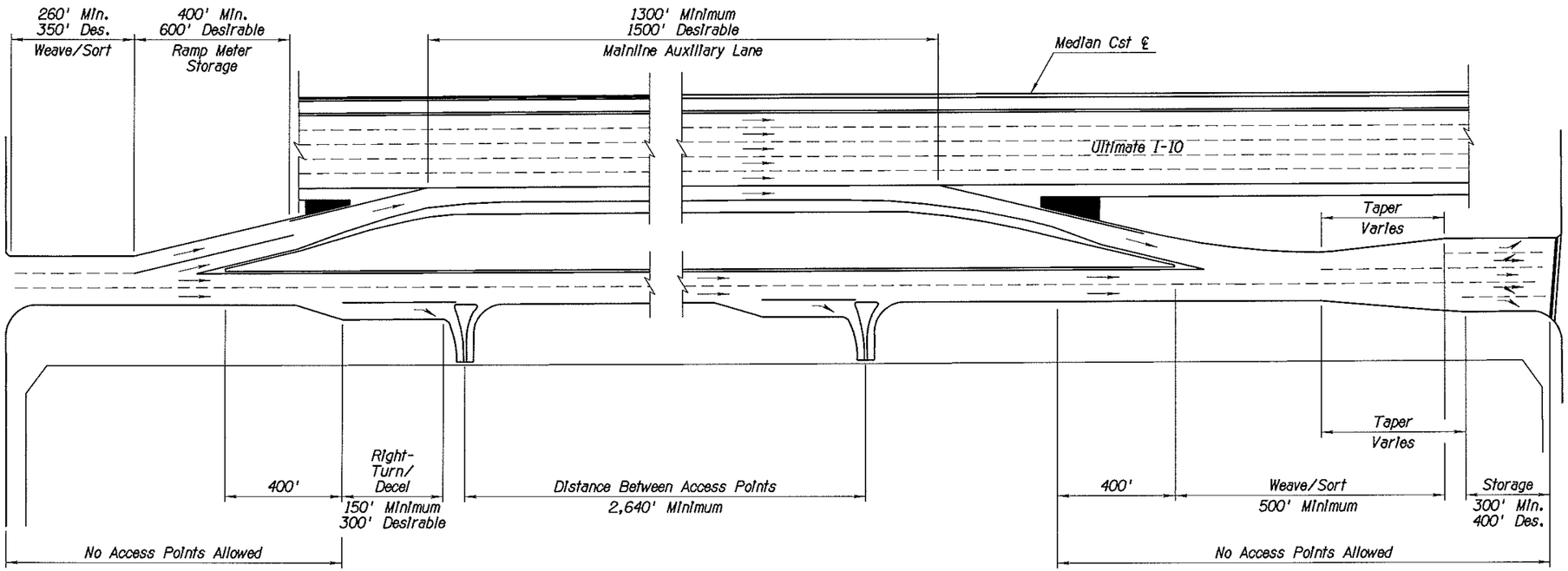


**Figure 6.8 – Frontage Road Design Guidelines**



# 7.0 SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONCERNS

An Environmental Assessment (EA) as authorized by the Federal Highway Administration, is being prepared in accordance with provisions and requirements of Chapter 1, Title 23 USC, 23 CFR Parts 771 and 774, relating to the implementation of the National Environmental Policy Act of 1969 and Section 4(f) of the Department of Transportation Act of 1966. Please reference the EA for information on social, economic, and environmental concerns.

Several of the mitigation measures and commitments which will require further design efforts are provided in this section. This is not the entire list of mitigation measures and commitments. A complete list of mitigation measures can be found at the beginning of this document (see page i-v).

1. During final design, the Arizona Department of Transportation will make a determination on the type, dimensions, and placement of right-of-way fencing within the community of Picacho. The determination will balance the need to prohibit pedestrian crossings with the need for aesthetical appearance and scale.

2. During final design, ADOT will coordinate with Picacho Water to develop mitigation measure to assure continued water service to the community of Picacho. Mitigation would include replacement of water pipelines currently located within the ADOT Right of Way. Additional mitigation could include the replacement of other water delivery infrastructure needed to insure the continued water supply for the community of Picacho.

3. During final design, ADOT would coordinate with representatives from Picacho Peak State Park to identify measures that minimize impacts to the Park. Potential mitigation could include, among others, the following:

- Improvement of Park infrastructure (e.g., repaving of roads or parking lots),
- Access modifications to the Park,
- Construction of a perimeter road or trail around Picacho Peak,
- Landscaping enhancement of the Picacho Peak traffic interchange,
- Noise mitigation at Park campgrounds,
- Paving of roadways or parking areas,
- Habitat improvement for sensitive wildlife species (e.g., desert tortoise),
- Construction of educational kiosks related to the history and importance of Picacho Peak, or
- Providing assistance to support GIS model for the natural resource identification.

Mitigation would have to be appropriate to the use and context of the park and the total cost of mitigation would not exceed twice the assessed fair market value of the land being acquired for right-of-way.

4. During final design the Arizona Department of Transportation Natural Resources Group will establish a Wildlife Connectivity Technical Advisory Committee consisting of representatives from Federal Highway Administration, Arizona State Parks Department, and Arizona Game and Fish Department, and US Fish and Wildlife Service. The Wildlife Connectivity Technical Advisory Committee will review available data and provide specific recommendations regarding wildlife connectivity throughout the project corridor, including between milepost 212 and milepost 232, which includes the Ironwood-Picacho linkage.

# 8.0 ITEMIZED ESTIMATE OF PROBABLE COSTS

The estimate of probable construction cost for the preferred alternative is $ 2,641,631,000, which includes an estimate of right-of-way needs. This estimated cost does not include costs associated with the expansion of I-10 to a six lane freeway, which is currently under construction or in design.

The estimated cost for the Preferred Alternative includes $166,519,000 for design, $386,377,000 for right-of-way, and $2,088,735,000 for construction. The funding identified in the ADOT 5-Year Program includes a total project budget of $126 million, which is programmed for the completion of Stage I improvements (expansion to a six lane freeway).

The following assumptions are the basis of the estimate:

- The ADOT Right of Way Group provided average land costs for right-of-way acquisitions. The right-of-way requirements through the communities of Casa Grande and Eloy (MP 196 to MP 219.83) are estimated at $5.00 per square foot ($217,800 per Acre). The right-of-way requirements through the remainder of the corridor (MP 219.83 to MP 240) are estimated at $8.00 per square foot ($348,480 per Acre).

- The preferred alternative impacts 64 billboards that will need to be either moved or purchased as part of the project. The cost to move or purchase a billboard can be difficult to estimate because the value can be based on the amount of revenue that could have been realized; therefore the estimate reflects a $500,000 cost for each billboard, a total cost of $32 Million.

- New landscaping is included for the urban section of the corridor (MP 234 to MP 240) through the Town of Marana. The costs included in the estimate are based on an average cost per mile experienced in the Phoenix Metro Area for freeway landscaping.

- No costs are included in this estimate for continuous roadway lighting, ramp metering, or FMS features. Roadway signing and pavement marking costs are included and based on an average cost per mile experienced in the Phoenix Metro Area. The preferred alternative will include overhead signing throughout the corridor, and all existing sign structures will be replaced.

- Sound wall and retaining wall costs include standard surface treatment or rustication, the cost of any additional aesthetic treatments would be the responsibility of the local agencies.

- The ADOT Materials Group provided preliminary pavement sections for the project, which are described in Section 5.11 of this document. These pavement sections were used to estimate pavement costs for the project, and include a special pavement section to address the subsidence fissure located near MP 215.

- Currently the I-10 corridor incorporates a pass-through drainage system. The drainage system proposed for the preferred alternative maintains a pass-through system, however as the corridor becomes more urbanized the drainage requirements may change. No additional costs have been included in this cost estimate for additional drainage features that may be needed to provide an urban drainage system.

- No downstream energy dissipation structures or outfall channels are included in this estimate. Where development is proposed along the downstream side of the corridor, the developer may be required to provide detention facilities in order to attenuate peak flows to pre-development conditions.

- Several potential utility conflicts have been identified as outlined in Section 5.9 of this document. A cost per mile is included in this estimate for all utility relocations required, and is considered an average cost per mile regardless of utility type or complexity of the relocations encountered.

- The preferred alternative will require the reconstruction of all existing structures along the corridor. In some cases, structural costs were derived by selecting a bridge type at a location which is similar to several proposed bridges along the corridor, and a unit cost per square foot applied to all similar locations.

- Several interchanges are proposed to include the provision for a grade separated railroad crossing, however the costs to extent the crossroad beyond the interchange and over the railroad is not included in this cost estimate.

- This estimate does not include costs for future interchanges. These locations are envisioned as opportunities to provide additional freeway access to properties along the I-10 corridor. Therefore, ADOT does not envision implementing any of the future interchanges until the development of the adjacent land warrants, and the cost to implement these interchanges would be the responsibility of those who benefit, namely the land developers or local agencies promoting adjacent development.

- This estimate does not include costs for extended ramps and ramp braids along I-8 between I-10 and the future Henness Road Interchange. Construction of these ramps will be part of any project which constructs the Henness Road interchange.

- This estimate does not include costs for frontage roads from Sunland Gin Road to SR87. If warranted, these frontage roads would be implemented by the adjacent landowners or local communities.

As described in Section 6**,** the ultimate I-10 Corridor improvements will be implemented over time as justified by traffic demand and funding becomes available. The implementation plan is divided into four stages of construction as follows:

- Stage I – Expansion of I-10 to a six (6) lane freeway
- Stage II – Expansion of I-10 to an eight (8) lane freeway
- Stage III – Reconstruction of the I-10/I-8 System Interchange
- Stage IV – Expansion of I-10 to a ten (10) lane freeway

ADOT is currently executing Stage I of this implementation plan and is expected to complete construction by 2015.

Estimates of probable cost were developed for the remaining three stages as follows:

- Stage II – $665,622,000
- Stage III – $347,986,000
- Stage IV – $1,628,023,000

The detailed estimate of probable costs for each stage is included in **Tables 8.1 through 8.3**. The individual items shown in the Stage III estimate (Table 8.2) represent the reconstruction of the I-10 mainline from Tortolita Boulevard to Tangerine Road and the reconstruction of the Alsdorf Road and Battaglia Road grade separated structures. The interim widening to an 8-lane freeway is included in the project-wide items (401x003 and 406x005) which unit prices are based on recent bids and engineers estimates for similar widening projects along I-10 and include all elements of construction.

**Table 8.1 – Stage II Order of Magnitude Itemized Estimate**

| Item No | Item Description | Unit | Quantity | Unit Price | Amount |
|---|---|---|---|---|---|
| 2020002 | REMOVE BRIDGE | L.SUM | 1 | $644,090.00 | $644,090 |
| 2020021 | REMOVAL OF CONCRETE CURB AND GUTTER | L.FT. | 1,228 | $7.00 | $8,596 |
| 2020029 | REMOVAL OF ASPHALTIC CONCRETE PAVEMENT | SQ.YD. | 1,019,302 | $3.00 | $3,057,906 |
| 2020053 | REMOVE | EACH | 1 | $500,000.00 | $500,000 |
| 2020071 | REMOVE GUARD RAIL | L.FT. | 12,702 | $5.00 | $63,510 |
| 2020101 | REMOVE FENCE | L.FT. | 58,517 | $3.00 | $175,551 |
| 2030301 | ROADWAY EXCAVATION | CU.YD. | 286,585 | $7.50 | $2,149,388 |
| 2030900 | BORROW | CU.YD. | 1,830,594 | $12.00 | $21,967,128 |
| 2060002 | FURNISH WATER SUPPLY | L.SUM | 1 | $3,843,600.00 | $3,843,600 |
| 3030026 | AGGREGATE SUBBASE, CLASS 6 | CU.YD. | 294,448 | $35.00 | $10,305,680 |
| 3080001 | GEOGRID BASE REINFORCEMENT | SQ.YD. | 1 | $115,740.00 | $115,740 |
| 4010010 | PORTLAND CEMENT CONCRETE PAVEMENT (10") | SQ.YD. | 294,172 | $46.00 | $13,531,912 |
| 4010015 | PORTLAND CEMENT CONCRETE PAVEMENT (15") | SQ.YD. | 672,644 | $60.00 | $40,358,640 |
| 4060021 | ASPHALTIC CONCRETE (BASE MIX) | TON | 350,992 | $50.00 | $17,549,600 |
| 4140040 | ASPHALTIC CONCRETE FRICTION COURSE (ASPHALT-RUBBER) | TON | 23,074 | $170.00 | $3,922,580 |
| 5012936 | PIPE CULVERT, 36" | L.FT. | 921 | $110.00 | $101,310 |
| 501Y048 | PIPE, CONCRETE, 48" | L.FT. | 571 | $200.00 | $114,200 |
| 501Y060 | PIPE, CONCRETE, 60" | L.FT. | 944 | $250.00 | $236,000 |
| 501Z036 | FLARED END SECTION, 36" | EACH | 6 | $500.00 | $3,000 |
| 501Z048 | FLARED END SECTION, 48" | EACH | 1 | $500.00 | $500 |
| 501Z060 | FLARED END SECTION, 60" | EACH | 1 | $500.00 | $500 |
| 601X020 | HEADWALL | EACH | 30 | $5,000.00 | $150,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 2,315 | $800.00 | $1,852,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 4,717 | $2,200.00 | $10,377,400 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 948 | $3,800.00 | $3,602,400 |
| 608XX01 | SIGNING | COST | 1 | $1,640,400.00 | $1,640,400 |
| 701X001 | MAINTENANCE AND PROTECTION OF TRAFFIC | L.SUM | 1 | $28,542,500.00 | $28,542,500 |
| 7020007 | IMPACT ATTENUATION DEVICE | EACH | 3 | $25,000.00 | $75,000 |
| 704X003 | PAVEMENT MARKING | L.SUM | 1 | $701,800.00 | $701,800 |
| 733X001 | TRAFFIC SIGNAL | EACH | 6 | $150,000.00 | $900,000 |
| 800X002 | LANDSCAPING | L.SUM | 1 | $12,501,000.00 | $12,501,000 |
| 901XX01 | MOBILIZATION | COST | 1 | $19,482,400.00 | $19,482,400 |
| 9030011 | BARBED WIRE FENCE, TYPE 1 | L.FT. | 58,741 | $10.00 | $587,410 |
| 9080201 | CONCRETE SIDEWALK (C-05.20) | SQ.FT. | 7,076 | $10.00 | $70,760 |
| 9080296 | CONCRETE SIDEWALK RAMP | EACH | 16 | $2,200.00 | $35,200 |
| 908X002 | CONCRETE CURB & GUTTER | L.FT. | 104,017 | $20.00 | $2,080,340 |
| 910X001 | CONCRETE BARRIER | L.FT. | 20,574 | $70.00 | $2,000,180 |
| 910X004 | CONCRETE MEDIAN BARRIER | L.FT. | 41,237 | $120.00 | $4,948,440 |
| 9110001 | RIGHT-OF-WAY MARKER | EACH | 106 | $180.00 | $19,080 |
| 914X018 | RETAINING WALL | SQ.FT. | 49,895 | $60.00 | $2,993,700 |
| 914X021 | SOUND BARRIER WALL | SQ.FT. | 144,440 | $25.00 | $3,611,000 |
| 924X015 | CONTRACTOR QUALITY CONTROL | L.SUM | 1 | $4,667,400.00 | $4,667,400 |
| 925XX01 | CONSTRUCTION SURVEYING AND LAYOUT | COST | 1 | $9,314,900.00 | $9,314,900 |
| 999X004 | NEW BRIDGE | SQ. FT. | 22,620 | $150.00 | $3,393,000 |
| 999X004 | NEW BRIDGE | SQ. FT. | 130,032 | $200.00 | $26,006,400 |
| 999X004 | NEW BRIDGE | SQ. FT. | 40,256 | $135.00 | $5,434,560 |
| 999X004 | NEW BRIDGE | SQ. FT. | 32,580 | $140.00 | $4,558,400 |
| | | | | PA/DCR | $269,274,901 |
| **PROJECT WIDE** | | | | | |
| 100XX01 | DESIGN CONTINGENCY UNIDENTIFIED ITEMS | COST | 20% | | $53,854,980 |
| 401X003 | PORTLAND CEMENT CONCRETE PAVEMENT (PCCP WIDENING | SQ.YD. | 56,500 | $280.00 | $15,820,000 |
| 406X005 | ASPHALTIC CONCRETE (AC WIDENING TO 8 LANES) | SQ.YD. | 480,500 | $240.00 | $115,320,000 |
| | | | | PROJECT WIDE SUBTOTAL | $184,994,980 |
| 951X001 | CONSTRUCTION ENGINEERING | COST | 8% | | $40,884,289 |
| 951X002 | CONTINGENCY | COST | 5% | | $22,713,494 |
| 951X010 | INDIRECT COST ALLOCATION | COST | 5% | | $22,713,494 |
| | | | | PROJECT WIDE | $271,306,257 |
| **OTHER COST** | | | | | |
| | RIGHT-OF-WAY | ACRE | 231 | $340,400.00 | $80,490,800 |
| | UTILITY RELOCATION | MILE | 12 | $108,000.00 | $1,296,000 |
| | ENGINEERING DESIGN | COST | 8% | | $43,246,493 |
| | | | | OTHER COST | $125,041,373 |

| Summary | |
|---|---|
| Section | Total |
| PA/DCR | $269,275,000 |
| PROJECT WIDE | $271,306,000 |
| OTHER COST | $125,041,000 |
| Total Project Cost | $665,622,000 |

## Table 8.2 – Stage III Order of Magnitude Itemized Estimate

| Item No | Item Description | Unit | Quantity | Unit Price | Amount |
|---|---|---|---|---|---|
| 2020002 | REMOVE BRIDGE | L.SUM | 1 | $19,204.00 | $19,204 |
| 2020029 | REMOVAL OF ASPHALTIC CONCRETE PAVEMENT | SQ.YD. | 423,215 | $3.00 | $1,269,646 |
| 2020053 | REMOVE | EACH | 4 | $500,000.00 | $2,000,000 |
| 2020071 | REMOVE GUARD RAIL | L.FT. | 9,800 | $5.00 | $48,998 |
| 2020101 | REMOVE FENCE | L.FT. | 35,107 | $3.00 | $105,321 |
| 2030301 | ROADWAY EXCAVATION | CU.YD. | 131,347 | $7.50 | $985,103 |
| 2030900 | BORROW | CU.YD. | 2,842,570 | $12.00 | $34,110,840 |
| 2060002 | FURNISH WATER SUPPLY | L.SUM | 1 | $2,979,000.00 | $2,979,000 |
| 3030022 | AGGREGATE BASE, CLASS 2 | CU.YD. | 289,942 | $35.00 | $10,147,971 |
| 3030026 | AGGREGATE SUBBASE, CLASS 6 | CU.YD. | 10,408 | $35.00 | $364,269 |
| 3060001 | GEOGRID BASE REINFORCEMENT | SQ.YD. | 1 | $115,740.00 | $115,740 |
| 4010010 | PORTLAND CEMENT CONCRETE PAVEMENT (10") | SQ.YD. | 287,565 | $46.00 | $13,228,005 |
| 4010015 | PORTLAND CEMENT CONCRETE PAVEMENT (15") | SQ.YD. | 301,699 | $60.00 | $18,101,960 |
| 4060021 | ASPHALTIC CONCRETE (BASE MIX) | TON | 69,020 | $50.00 | $3,451,011 |
| 4060022 | ASPHALTIC CONCRETE | TON | 267 | $50.00 | $13,350 |
| 4060023 | ASPHALTIC CONCRETE (3/4") | SQ.YD. | 295,588 | $45.00 | $13,301,457 |
| 4140040 | ASPHALTIC CONCRETE FRICTION COURSE (ASPHALT-RUBBER) | TON | 23,234 | $170.00 | $3,949,747 |
| 608XX01 | SIGNING | COST | 1 | $1,622,020.00 | $1,622,020 |
| 701X001 | MAINTENANCE AND PROTECTION OF TRAFFIC | L.SUM | 1 | $22,323,100.00 | $22,323,100 |
| 7020007 | IMPACT ATTENUATION DEVICE | EACH | 5 | $25,000.00 | $125,000 |
| 704X003 | PAVEMENT MARKING | L.SUM | 1 | $694,580.00 | $694,580 |
| 901XX01 | MOBILIZATION | COST | 1 | $14,492,000.00 | $14,492,000 |
| 9030011 | BARBED WIRE FENCE, TYPE 1 | L.FT. | 37,541 | $10.00 | $375,410 |
| 9080201 | CONCRETE SIDEWALK (C-05.20) | SQ.FT. | 5,537 | $10.00 | $55,370 |
| 9080296 | CONCRETE SIDEWALK RAMP | EACH | 16 | $2,200.00 | $35,200 |
| 908X002 | CONCRETE CURB & GUTTER | L.FT. | 78,893 | $20.00 | $1,577,860 |
| 910X001 | CONCRETE BARRIER | L.FT. | 20,617 | $70.00 | $1,443,190 |
| 9110001 | RIGHT-OF-WAY MARKER | EACH | 50 | $180.00 | $9,000 |
| 914X018 | RETAINING WALL | SQ.FT. | 62,689 | $60.00 | $3,761,340 |
| 924X015 | CONTRACTOR QUALITY CONTROL | L.SUM | 1 | $3,577,000.00 | $3,577,000 |
| 925XX01 | CONSTRUCTION SURVEYING AND LAYOUT | COST | 1 | $9,628,700.00 | $9,628,700 |
| 999X004 | NEW BRIDGE | SQ. FT. | 44,342 | $200.00 | $8,868,400 |
| 999X004 | NEW BRIDGE | SQ. FT. | 60,842 | $185.00 | $11,255,770 |
| 999X004 | NEW BRIDGE | SQ. FT. | 27,535 | $235.00 | $6,470,725 |
| 999X004 | NEW BRIDGE | SQ. FT. | 17,572 | $185.00 | $3,250,820 |
| 999X004 | NEW BRIDGE | SQ. FT. | 43,216 | $130.00 | $5,618,080 |
| | | | | **PA/DCR** | **$199,375,187** |
| **PROJECT WIDE** | | | | | |
| | | | | | |
| 100XX01 | DESIGN CONTINGENCY UNIDENTIFIED ITEMS | COST | 20% | | $39,875,037 |
| | | | | **PROJECT WIDE SUBTOTAL** | **$39,875,037** |
| 951X001 | CONSTRUCTION ENGINEERING | COST | 9% | | $21,532,520 |
| 951X002 | CONTINGENCY | COST | 5% | | $11,962,511 |
| 951X010 | INDIRECT COST ALLOCATION | COST | 5% | | $11,962,511 |
| | | | | **PROJECT WIDE** | **$85,332,580** |
| **OTHER COST** | | | | | |
| | | | | | |
| | RIGHT-OF-WAY | ACRE | 181 | $217,800.00 | $39,421,800 |
| | UTILITY RELOCATION | MILE | 10 | $108,000.00 | $1,080,000 |
| | ENGINEERING DESIGN | COST | 8% | | $22,776,621 |
| | | | | **OTHER COST** | **$63,278,421** |

| Summary | |
|---|---|
| **Section** | **Total** |
| PA/DCR | $199,375,000 |
| PROJECT WIDE | $85,333,000 |
| OTHER COST | $63,278,000 |
| **Total Project Cost** | **$347,986,000** |

## Table 8.3 – Stage IV Order of Magnitude Itemized Estimate

### Itemized Estimate

| Item No | Item Description | Unit | Quantity | Unit Price | Amount |
|---|---|---|---|---|---|
| 2020002 | REMOVE BRIDGE | L.SUM | 1 | $1,711,100.00 | $1,711,100 |
| 2020021 | REMOVAL OF CONCRETE CURB AND GUTTER | L.FT. | 5,932 | $7.00 | $41,524 |
| 2020029 | REMOVAL OF ASPHALTIC CONCRETE PAVEMENT | SQ.YD. | 2,513,254 | $3.00 | $7,539,762 |
| 2020053 | REMOVE | EACH | 59 | $500,000.00 | $29,500,000 |
| 2020071 | REMOVE GUARD RAIL | L.FT. | 20,635 | $5.00 | $103,175 |
| 2020101 | REMOVE FENCE | L.FT. | 268,419 | $3.00 | $805,257 |
| 2030301 | ROADWAY EXCAVATION | CU.YD. | 1,100,449 | $7.50 | $8,253,368 |
| 2030900 | BORROW | CU.YD. | 10,108,978 | $12.00 | $121,307,736 |
| 2060002 | FURNISH WATER SUPPLY | L.SUM | 1 | $13,050,000.00 | $13,050,000 |
| 3030022 | AGGREGATE BASE, CLASS 2 | CU.YD. | 749,054 | $35.00 | $26,216,890 |
| 3030026 | AGGREGATE SUBBASE, CLASS 6 | CU.YD. | 294,448 | $35.00 | $10,305,680 |
| 3060001 | GEOGRID BASE REINFORCEMENT | SQ.YD. | 1 | $115,740.00 | $115,740 |
| 4010010 | PORTLAND CEMENT CONCRETE PAVEMENT (10") | SQ.YD. | 664,502 | $46.00 | $30,567,092 |
| 4010015 | PORTLAND CEMENT CONCRETE PAVEMENT (15") | SQ.YD. | 3,670,003 | $60.00 | $220,200,180 |
| 4060021 | ASPHALTIC CONCRETE (BASE MIX) | TON | 857,058 | $50.00 | $42,852,900 |
| 4060022 | ASPHALTIC CONCRETE | TON | 3,768 | $50.00 | $188,400 |
| 4060023 | ASPHALTIC CONCRETE (3/4") | SQ.YD. | 333,451 | $45.00 | $15,005,295 |
| 4060023 | ASPHALTIC CONCRETE | SQ.YD. | 7,084,004 | $5.00 | $35,420,020 |
| 5012924 | PIPE CULVERT, 24" | L.FT. | 4,672 | $70.00 | $327,040 |
| 5012930 | PIPE CULVERT, 30" | L.FT. | 3,870 | $90.00 | $348,300 |
| 5012936 | PIPE CULVERT, 36" | L.FT. | 12,226 | $110.00 | $1,344,860 |
| 5013028 | PIPE CULVERT | L.FT. | 14,926 | $150.00 | $2,238,900 |
| 5013028 | PIPE CULVERT | L.FT. | 476 | $150.00 | $71,400 |
| 5013028 | PIPE CULVERT | L.FT. | 3,206 | $200.00 | $641,200 |
| 5013028 | PIPE CULVERT | L.FT. | 1,073 | $150.00 | $160,950 |
| 501Z024 | FLARED END SECTION, 24" | EACH | 120 | $500.00 | $60,000 |
| 601X020 | HEADWALL | EACH | 108 | $5,000.00 | $540,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 6,277 | $800.00 | $5,021,600 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 108 | $5,000.00 | $540,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 543 | $1,000.00 | $543,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 3,882 | $1,200.00 | $4,658,400 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 624 | $1,400.00 | $873,600 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 2,147 | $2,400.00 | $5,152,800 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 478 | $3,000.00 | $1,434,000 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 7,756 | $2,200.00 | $17,063,200 |
| 601X025 | REINFORCED CONCRETE BOX CULVERT | L.FT. | 478 | $3,800.00 | $1,816,400 |
| 608XX01 | SIGNING | COST | | $6,224,400.00 | $6,224,400 |
| 701X001 | MAINTENANCE AND PROTECTION OF TRAFFIC | L.SUM | 1 | $97,880,000.00 | $97,880,000 |
| 704X003 | PAVEMENT MARKING | L.SUM | 1 | $2,667,600.00 | $2,667,600 |
| 7330031 | TRAFFIC SIGNAL | EACH | 13 | $150,000.00 | $1,950,000 |
| 800X002 | LANDSCAPING | L.SUM | 1 | $1,250,100.00 | $1,250,100 |

## Table 8.3 – Stage IV Order of Magnitude Itemized Estimate (Cont.)

| | | | | | |
|---|---|---|---|---|---|
| 901XX01 | MOBILIZATION | COST | | $78,270,000.00 | $78,270,000 |
| 9030011 | BARBED WIRE FENCE, TYPE 1 | L.FT. | 252,740 | $10.00 | $2,527,400 |
| 9080201 | CONCRETE SIDEWALK (C-05.20) | SQ.FT. | 58,984 | $10.00 | $589,840 |
| 9080296 | CONCRETE SIDEWALK RAMP | EACH | 124 | $2,200.00 | $272,800 |
| 908X002 | CONCRETE CURB & GUTTER | L.FT. | 190,185 | $20.00 | $3,803,700 |
| 910X001 | CONCRETE BARRIER | L.FT. | 33,810 | $70.00 | $2,366,700 |
| 9110001 | RIGHT-OF-WAY MARKER | EACH | 211 | $180.00 | $37,980 |
| 914X018 | RETAINING WALL | SQ.FT. | 168,774 | $60.00 | $10,126,440 |
| 914X021 | SOUND BARRIER WALL | SQ.FT. | 139,080 | $25.00 | $3,477,000 |
| 924X015 | CONTRACTOR QUALITY CONTROL | L.SUM | 1 | $13,050,000.00 | $13,050,000 |
| 925XX01 | CONSTRUCTION SURVEYING AND LAYOUT | COST | | $26,100,000.00 | $26,100,000 |
| 999X004 | NEW BRIDGE | SQ. FT. | 16,200 | $150.00 | $2,430,000 |
| 999X004 | NEW BRIDGE | SQ. FT. | 41,677 | $130.00 | $5,418,010 |
| 999X004 | NEW BRIDGE | SQ. FT. | 41,677 | $130.00 | $5,418,010 |
| 999X004 | NEW BRIDGE | SQ. FT. | 21,940 | $150.00 | $3,291,000 |
| 999X004 | NEW BRIDGE | SQ. FT. | 7,228 | $150.00 | $1,084,200 |
| 999X004 | NEW BRIDGE | SQ. FT. | 40,330 | $135.00 | $5,444,550 |
| | | | | **PA/DCR** | **$879,699,498** |

**PROJECT WIDE**

| | | | | | |
|---|---|---|---|---|---|
| 100XX01 | DESIGN CONTINGENCY UNIDENTIFIED ITEMS | COST | 20% | | $175,939,900 |
| | | | | **PROJECT WIDE SUBTOTAL** | **$175,939,900** |
| 951X001 | CONSTRUCTION ENGINEERING | COST | 9% | | $95,007,546 |
| 951X002 | CONTINGENCY | COST | 5% | | $52,781,970 |
| 951X010 | INDIRECT COST ALLOCATION | COST | 5% | | $52,781,970 |
| | | | | **PROJECT WIDE** | **$376,511,385** |

**OTHER COST**

| | | | | | |
|---|---|---|---|---|---|
| | RIGHT-OF-WAY | ACRE | 649 | $217,800.00 | $141,352,200 |
| | RIGHT-OF-WAY | ACRE | 359 | $348,480.00 | $125,104,320 |
| | UTILITY RELOCATION | MILE | 45 | $108,000.00 | $4,860,000 |
| | ENGINEERING DESIGN | COST | 8% | | $100,496,871 |
| | | | | **OTHER COST** | **$371,813,391** |

**Summary**

| Section | Total |
|---|---|
| **PA/DCR** | **$879,699,000** |
| **PROJECT WIDE** | **$376,511,000** |
| **OTHER COST** | **$371,813,000** |
| **Total Project Cost** | **$1,628,023,000** |

## 8.1 ESTIMATE OF FUTURE MAINTENANCE COSTS

An estimate of the additional future maintenance costs that would be the result of the additional roadway lane miles within the corridor was evaluated for the Preferred Alternative. The additional maintenance costs for the ultimate 10-lane freeway are estimated to be approximately $29,300,000 per year, as shown in **Table 8.4**.

**Table 8.4 – Future Maintenance Costs**

| **Annual Maintenance Cost Per Lane Mile Using PeCoS Latest FY Data[1]** | |
|---|---|
| **Category** | **Metropolitan Phoenix** |
| 1. Paved Surfaces & Shoulders | 600 |
| 2. Roadside | 3,070 |
| 3. Drainage & Environmental | 300 |
| 4. Rest Areas | |
| 5. Traffic Operations - Signal & Lighting; Signing & Striping - ITS | 1,030 |
| 6. Landscaping | 6,720 |
| 7. Winter Storms | |
| 8. Emergency Response | 130 |
| 9. Miscellaneous Maintenance[2] | 2,400 |
| 10. Support and Other Operating Expenses | 3,150 |
| 11. Other Specialty Items[3] | |
| | |
| **MCL = Maintenance Cost per Lane Mile** | **$17,400** |
| **Annual Maintenance Cost of Project at PA/DCR Phase** | **Metropolitan Phoenix[6]** |
| PW = Total Pavement Width[4] | 12 |
| NL = Number of Lane Miles | 1 |
| LP = Length of Project in Miles | 545 |
| **PMC = Current Project Maintenance Cost** | **$9,483,000** |
| **Annual Maintenance Cost of Project at Beginning of Maintenance Phase** | **Metropolitan Phoenix[6]** |
| IF = Inflation Factor[5] | 1.058 |
| N = Number of Years to Maintenance Phase | 20 |
| **PMCI = Project Maintenance Cost including Inflation** | **$29,285,936** |

Notes:
1- Lane mile width is 12 ft, Total maintenance lane miles = 27,722 miles
Metropolitan Phoenix maintenance lane miles = 2016 miles, Other Locations = 25,706 miles
2- Miscellaneous maintenance include building and yard maintenance, work for other divisions, training, material handling, vegetation control and contract administration for categories not considered in the maintenance cost breakdown
3- For Other Specialty Items, contact Central Maintenance.
4- Total pavement width includes the main line, ramps and shoulders.
5- Based on increase in maintenance costs of 76% over the last 10 years
6- Numbers for maintenance cost at PA/DCR Phase and Beginning of Maintenance Phase represent an Example Project, 24 feet wide, 2 miles long, going into the maintenance phase 3 years later.