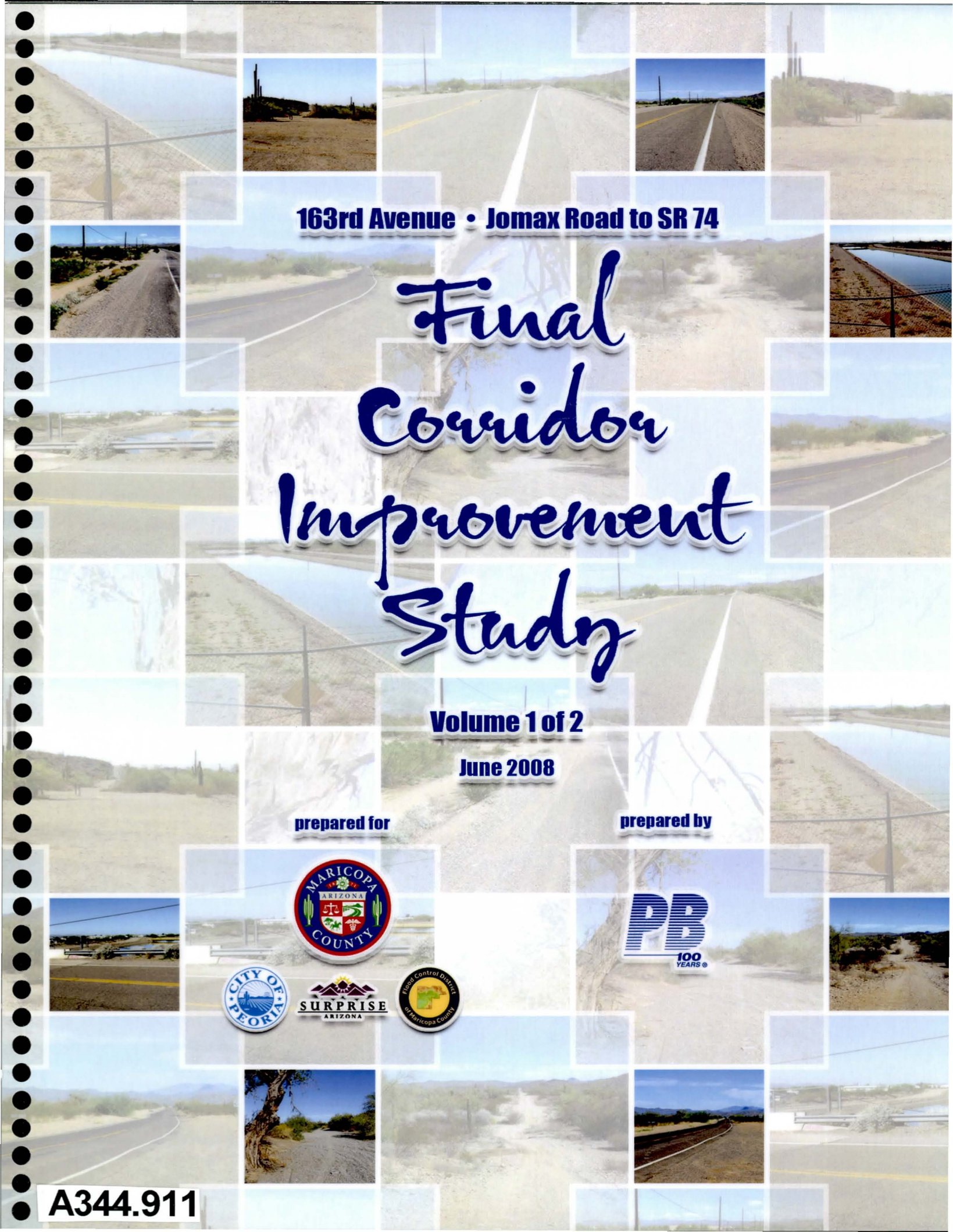

163rd Avenue • Jomax Road to SR 74

Final Corridor Improvement Study

Volume 1 of 2

June 2008

prepared for

MARICOPA COUNTY ARIZONA

CITY OF PEORIA

SURPRISE ARIZONA

Flood Control District of Maricopa County

prepared by

PB 100 YEARS

FINAL

CORRIDOR IMPROVEMENT STUDY

163rd Avenue CIS

JOMAX ROAD TO STATE ROUTE 74

June 2008

Prepared For:

Prepared By:

Expires 3/31/09

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Executive Summary

Executive Summary

Project Background

The Maricopa County Department of Transportation (MCDOT) has adopted its *Comprehensive Plan* (October 1997, Revised August 2002) and *Transportation System Plan* (TSP) (Updated February 2007) for unincorporated areas of the County. To provide more detailed information about northwestern Maricopa County, the *Northwest Area Transportation Study* was conducted in September 2003 to determine future traffic demands and identify transportation improvement requirements necessary to satisfy projected growth. As development extends into this area of the County, both the *Northwest Area Transportation Study* and Maricopa Association of Governments (MAG) *Regional Transportation Plan* (RTP) have recognized the need to improve the existing arterial street network to facilitate projected growth. To help further define specific needs for corridors identified in the TSP and RTP, MCDOT began conducting corridor studies throughout Maricopa County. Three Corridor Improvement Studies (CIS) in the Northwest Area were recently completed, including Patton Road /Jomax Road CIS, East Jomax Road CIS and 163rd Avenue CIS.

The 163rd Avenue CIS establishes the corridor alignment, facility type, number of lanes, and right-of-way of 163rd Avenue that will eventually be required to accommodate forecast travel demands within the corridor. In cooperation with the Cities of Peoria and Surprise, the two municipalities within the study area, the study identifies a preferred roadway alignment, access management guidelines, and a plan for implementing those guidelines that will achieve a high degree of safety and efficiency on the ultimate facility.

The 163rd Avenue CIS addresses the critical need for improved roadway circulation and access in the northern Surprise and western Peoria portion of Maricopa County. The City of Surprise expects rapid growth in the area, with about 50,000 homes anticipated in the immediate vicinity, and significant retail development approved in the City's General Plan for construction over the next 20 years. A number of projects, such as Asante at Grand Avenue and 163rd Avenue, are currently under construction. Added to that activity, developers have purchased the Daimler Chrysler's 5,500-acre proving grounds just north and west of this CIS study area, which is planned to accommodate 50,000 residents. The development of these lands and other properties within the traffic influence area of the 163rd Avenue Corridor will likely cause near-term traffic volumes to exceed long-range MAG forecasts.

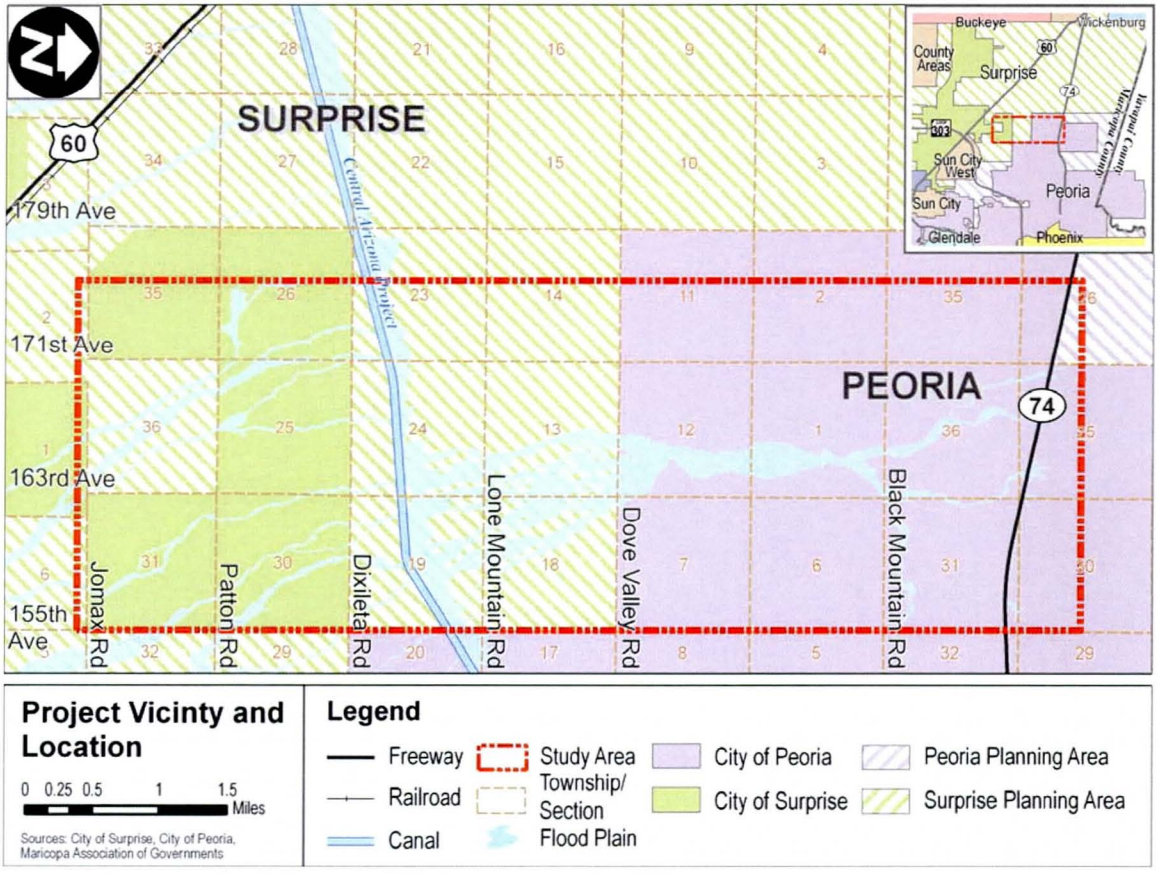
At present, Grand Avenue (US 60) is the only significant roadway available to both existing traffic and traffic resulting from new growth in the area. Existing maximum traffic volumes of between 30,000 and 35,000 ADT on Grand Avenue in the area between Bell Road and Morristown will increase dramatically once new developments are opened and linked to the limited local roadway system. Loop 303, currently under design, provides a complex frontage road connection to 163rd Avenue as part of the Grand Avenue interchange system, but it is an atypical configuration. Other possibilities for connections may exist but they must overcome major obstacles to prove viable. Given these limitations, traffic conditions could become very congested if alternate access is not provided from the growth area to other regional facilities.

163rd Avenue will provide an important direct outlet from Grand Avenue in Surprise to SR 74 and points north, east and west.

Location and Project Limits

The study is located in northwest Maricopa County, see Figure ES-1. The study area is bounded by Jomax Road in the south to SR 74 in the north. The east-west limits defined for the study are 175th Avenue to 155th Avenue. Due to of topography, drainage constraints and committed land uses, alignments east of 163rd were not considered feasible, which effectively limited the easterly project limit to the immediate vicinity of 163rd Avenue.

Figure ES-1: Vicinity and Location Map



The majority of land within this study area remains undeveloped with some low-density subdivisions existing north of Dynamite Road and south of Dove Valley Road. 163rd Avenue is one of a few established north/south grid arterial roadways in this area that has both an at-grade crossing of the Burlington Northern Santa Fe Railroad (south of the study limits) and a Central Arizona Project (CAP) canal crossing. Due to this limitation, 163rd Avenue is currently the only reasonable north/south route available to service this region.

Goals and Objectives

Two levels of goals were identified for this project, regional and project goals. The regional goal addresses the broad sub-regional transportation challenge that gives rise to the need for the project. The project goals relate to accomplishing the alignment study.

Regional Goal

Identify a feasible regional north-south access route in the vicinity of 163rd Avenue.

Project Goals

- Ensure the CIS addresses the critical concerns of the local community, the Cities of Surprise and Peoria, and MCDOT.
- Define a viable corridor alignment between Jomax Road and SR 74.
- Establish the basis for detailed roadway design that will meet the City of Surprise's and the development community's needs for circulation.
- Provide the Cities of Surprise and Peoria with a plan for the corridor which can be used to guide future improvements in conjunction with new developments in the area.

Project objectives were established to achieve the goals noted above. Critical study processes and features were outlined for each project goal. See Table 1.6 for more details.

Corridor Alignment Alternatives

The alternatives selected for evaluation sought to minimize adverse impacts and maximize regional and local benefit. The preferred alignment was selected to best meet the goals and objectives of the project.

Alternatives

Five primary alternatives were studied, as shown in Figure ES-2. Component sections of these alternatives could be combined to create additional options that minimized adverse impacts and optimized best features. The alternatives are limited to varying degrees by common or fixed points at the southerly and northerly termini of the alignment. At the southerly end of the project, at Jomax Road, construction of 163rd Avenue by developers south of the intersection essentially prevents moving the terminus elsewhere. At the northern end, at SR 74, ADOT has designated the intersection of SR 74 with the 167th Avenue alignment as a future grade separated traffic interchange in the long range plan for the corridor.

The evaluation process was applied to the following five alternative alignments:

Alternative 1A, West Alignment – Alternative 1A begins at the Jomax Road intersection and follows the 163rd Avenue alignment northward for about one mile where it turns northwesterly to join the alignment of 171st Avenue just south of the CAP canal. It remains on 171st Avenue until approximately one mile north of Dove Valley Road where it turns northeasterly and follows a straight line north to the intersection of SR 74 and the entrance to the Quintero development. The option adds substantial distance to the route by shifting west to 171st Avenue then returning to the eventual terminus at SR 74 on the 167th Avenue alignment.

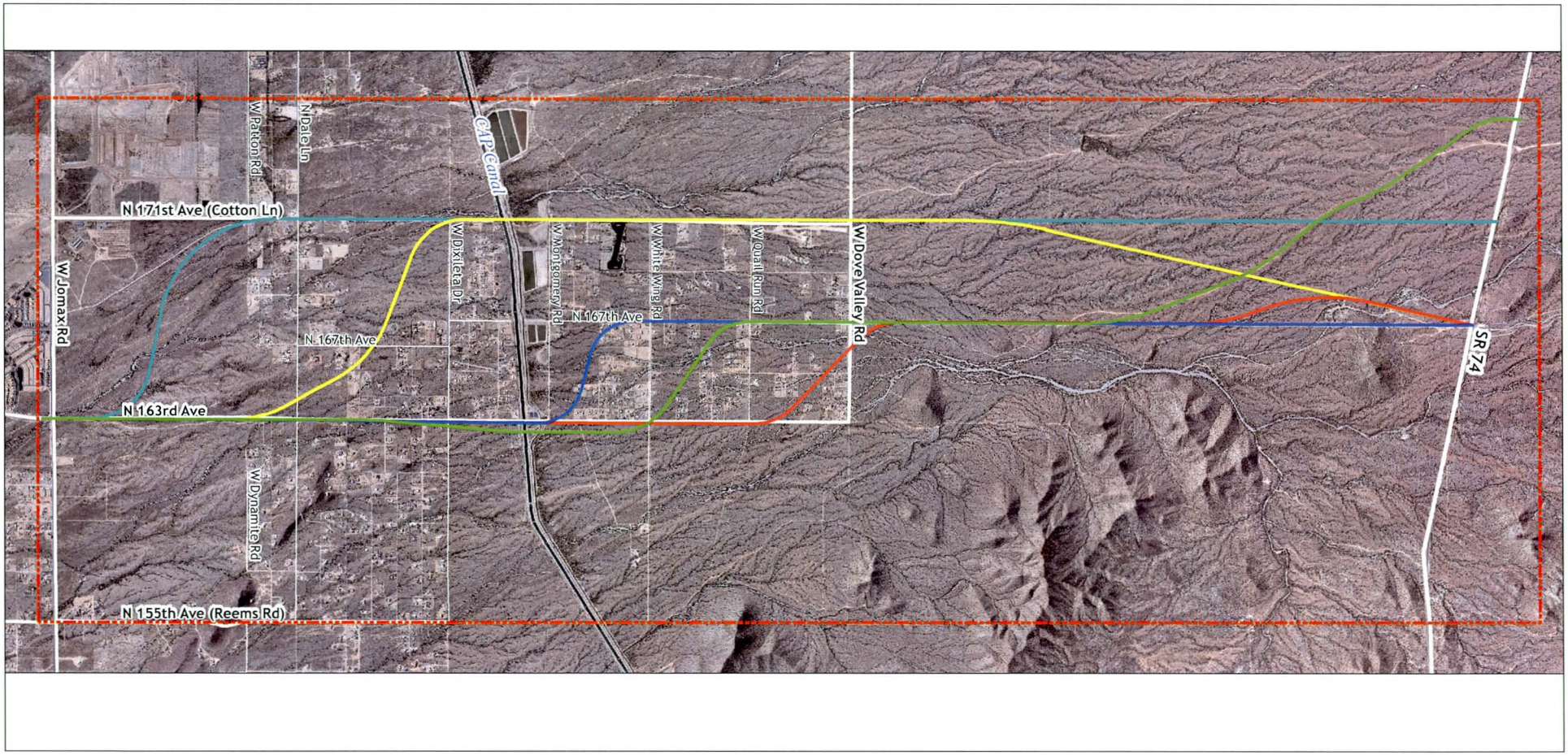


Figure ES - 1
Study Area

Legend

Study Area

Preliminary Corridor Alignments

- 1A *West*
- 2D *CAR*
- 3B *East*
- 4C *163rd Ave*
- 7C *171st Ave*

0 0.25 0.5 1 Miles

Alternative 2D, CAR Alignment – The Alternative 2D alignment follows the routing defined in the Candidate Assessment Report (CAR) completed in 2002. The challenge of this alignment is that it introduces a couple of relatively short radius reversing curves requiring superelevation within a residential area to connect 163rd Avenue to the 167th Avenue alignment. Many homes extant today would be impacted by this alignment.

Alternative 3B, East Alignment – Alternative 3B follows 163rd Avenue from Jomax Road to Dixileta Drive where it moves slightly east of the existing road at the CAP canal crossing. It remains east of the 163rd Avenue section line until White Wing Road where it returns westward to align with 167th Avenue. Alternative 3B remains on this alignment until about one and a half miles north of Dove Valley Road where it follows a ridge to the 175th Avenue alignment at SR 74. This option reduces the number of drainage crossings substantially, but terminates approximately one mile west of the planned SR 74 interchange which has been agreed to by the surrounding municipalities and results in significant realignment of the existing roads north of SR 74.

Alternative 4C, 163rd Avenue Alignment – Alternative 4C follows 163rd Avenue until about one half mile south of Dove Valley Road where it moves northeasterly toward the 167th Avenue alignment and remains there until its intersection with SR 74. It shifts west for a short distance to accommodate drainage and topography just south of SR 74. This alignment has minimal impact on homes and manages drainage crossings effectively.

Alternative 7C, 171st Avenue Alignment – Alternative 7C is similar to Alternative 1A, but moves westward to 171st Avenue within a half mile of the intersection with Jomax Road. It remains on the 171st alignment until it intersects SR 74. This option affects residential properties and does not have an acceptable northerly terminus at SR 74.

Evaluation Criteria

The project purpose set forth the basis for the evaluation process. The alignments analyzed aimed to maintain design standards and avoid impacts. This included considerations such as minimizing drainage crossings, avoiding homes and maintaining environmental character. There were multiple criteria gathered in groupings based on the following major evaluation categories:

- Engineering Features
- Traffic/Transportation Planning Considerations
- Environmental Impacts
- Utility Impacts
- Right-of-Way Requirements
- Socio-Economic Factors
- Public Opinion

A complete description of these factors is discussed in the main report document. Table ES-1 provides a summary of the evaluation matrix.

Table ES-1: Alternative Evaluation Matrix Summary

Criterion Category	1A West Alignment	2D CAR Alignment	3B East Alignment	4C 163rd Avenue Alignment	7C 171st Avenue Alignment
Engineering Features	●	⊙	⊙	⊙	●
Traffic / Transportation	☒	○	○	○	☒
Environmental Impacts	⊙	⊙	⊙	⊙	⊙
Utilities	⊙	⊙	⊙	⊙	●
New Right-of-Way	●	●	●	●	●
Impact to State Land	☒	○	○	○	☒
Public Acceptance	⊙	●	⊙	○	⊙

LEGEND: ○ No/Minimal Impact/Issue ⊙ Modest Impact/Issue ● Significant Impact/Issue ☒ Fatal Flaw

Preferred Alternative

Alternative 4C - 163rd Avenue Alignment was selected as the preferred alternative, which modifies the findings of the earlier CAR. Through the evaluation outlined in the Alternative Evaluation Matrix Summary, this alternative best achieved the goals and needs established for this corridor. Alternative 4C has the least impact on the community, minimizes drainage crossings and offers the best opportunity to meet the project objectives. The selection of the preferred alignment was based largely on which alignment would cause the least disruption in the community and still accommodate the needs of the project.

The improvements associated with Alternative 4C include a six-lane urban parkway typical section, on-site drainage system, 12 concrete box culverts (CBC) and bridges spanning the CAP canal, Padelford Wash Split 3 and Padelford Wash Tributary B. Utility relocation is required. APS overhead power lines will need to be relocated to the new right-of-way line. Underground utilities also exist within the improvement area, including a 16" water line and telephone line. An underground utility investigation was not performed for the CIS nor was a vertical profile created for the preferred alignment. During future development of the facility, the profile should be designed in consideration of underground utilities and conflicts avoided when possible. New right-of-way will be required for this project. The City of Surprise typical section requires a minimum 200 foot right-of-way width resulting in 79 acres of new right-of-way and impact to two residential homes. The City of Peoria typical section requires a minimum 150 foot right-of-way width resulting in 58 acres of new right-of-way. Additional right-of-way may be required to accommodate intersection configurations, roadway embankments and drainage improvements.

The portion of the alignment between Jomax Road and Dove Valley Road (within the City of Surprise planning area) will be developed in more detail as part of a subsequent study. A Design Concept Report (DCR) will be prepared immediately following the CIS that further identifies the requirements for construction of the roadway.

Project Costs

The preliminary cost estimate for Alternative 4C - 163rd Avenue is $121,650,000. A breakdown of the costs is provided in Table ES-2.

Table ES-2: Preferred Corridor Alignment Preliminary Costs (Alternative 4C)

Description	Cost
Construction	$52,080,000
Design (12% of Construction Value)	$6,250,000
Construction Management (15% of Construction Value)	$7,810,000
New Right-of-Way	$49,260,000
Utility Relocation (2% of Construction Value)	$1,040,000
Administration (10% of Construction Value)	$5,210,000
TOTAL COST	$121,650,000

Access Control Requirements

Important access management considerations for this corridor include:

- Bidirectional access at crossroads restricted to signalized intersection every 1/2 mile
- Minor roadways at 1/4 and 1/8 mile spacing limited to right in-right out only
- No roadways closer than 1/8 mile
- No residential drives along 163rd Avenue
- Future commercial access should encourage shared drives

Considerations for Future Development

A list of considerations has been compiled to assist with the future development of the 163rd Avenue corridor. In general, the development progression will start with identifying the need for, then preparing DCRs that better define the proposed improvements. The DCRs will provide the necessary information for specific design and construction projects to the funded in the appropriate improvement programs. Projects may be advanced according to developer participation.

- *Project Funding* - Funding for final design and construction has not yet been identified. A DCR will be prepared for 163rd Avenue between Jomax Road and Dove Valley Road following the completion of the CIS. The DCR recommendations will be evaluated for inclusion in the MCDOT *Transportation Improvement Program* (TIP) and the City of Surprise *Capital Improvement Program* (CIP). A portion of the funding is expected to come from adjacent developments as part of project requirements.

- *Right-of-Way Preservation* - A DCR level document is needed to preserve the right-of-way requirements for the 163rd Avenue corridor. This will be completed in 2008 for 163rd Avenue between Jomax Road and Dove Valley Road. MCDOT and the City of Surprise will be responsible for obtaining new right-of-way and/or preserving the corridor during future development.

- *Access Management* - In addition to MCDOT, the Cities of Surprise and Peoria have specific expectations about how access to the roadway should be managed to ensure good traffic flow and good access to local land uses. The City of Surprise plans to introduce a non-traditional intersection design to minimize the impact of left turns on roadway traffic flow. MCDOT and the City of Surprise, along with several other municipalities, are engaged in developing the *Arizona Parkway Design Guidelines*, which will provide criteria for designing a parkway with the indirect left-turn intersection treatment (completion expected in summer 2008).

- *Environmental Impacts* - The environmental documentation for this study was limited to an Environmental Overview (EO). Additional environmental study and documentation will be required at future stages of project development. Areas of additional consideration may include biological resources, jurisdictional waters, noise, hazardous materials and Section 4(f) resources. Since more than one acre of land will be disturbed, an AZPDES (Arizona Pollutant Discharge Elimination System) Permit and Storm Water Pollution Prevention Plan (SWPPP) will be required.

- *Utility Relocations* - Utility relocations are required to implement the corridor improvements. Coordination with existing utility owners is required. Also, new utilities are planned for this area and must be coordinated with the recommended improvements to minimize future conflicts.

- *Landscaping Plans* - Final project design will specify the type of landscaping to be used to enhance the roadway corridor and its relationship to adjacent land uses.

- *Drainage* - The preferred alignment corridor crosses a number of washes and is partly in a flood zone. The roadway must be designed to accommodate the water flow from major storms without flooding. The alignment conflicts with the delineated 100-year floodplains, especially between the CAP canal and Dove Valley Road. Conditional Letters of Map Revision (CLOMR) may be required for the construction of proposed improvements. The development of regional drainage solutions in the Padelford Wash area has been explored by the project partners. Further coordination and additional studies will be required to define and quantify in more detail the benefits to the transportation grid that could also improve flood protection for the area's residents.

- *Structures* - Major structures are included as part of the recommended improvements for 163rd Avenue. In addition to several CBCs, bridges will be required at the CAP canal, the Padelford Wash Split 3 (south of Dove Valley Road) and the Padelford Wash Tributary B (south of SR 74). A preliminary bridge plan and typical section at the two southern locations will be prepared for the DCR. During final design, a bridge type selection will need to be completed.

- *Bicycle, Pedestrian and Transit Access* - The corridor will be designed to accommodate alternative modes of travel to help encourage reduction in single occupant vehicle usage over time and provide access to trails and neighborhoods in the area. Guidance on how to integrate these features will be provided by the *Arizona Parkway Design Guidelines*.

- *Corridor Traffic Management* - ITS and operational control of traffic between the standard and the non-traditional intersection configurations will need to be coordinated. Left turns will be treated differently along 163rd Avenue depending on the jurisdiction. The signal coordination will need to be adapted to accommodate those differences.

- *Jurisdictional Coordination* - As with the overall traffic control, implementation of different corridor improvements and access management concepts will need to be coordinated into a seamless operation for the motorist.

Section 1
Introduction

1 Introduction

1.1 Project Overview

The Maricopa County Department of Transportation (MCDOT), in partnership with the City of Surprise, City of Peoria and Flood Control District of Maricopa County (FCDMC), has prepared a Corridor Improvement Study (CIS) for a section of 163rd Avenue. The corridor length is approximately 8 miles extending from Jomax Road to State Route (SR) 74. This section of 163rd Avenue lies within the jurisdiction of unincorporated Maricopa County, the City of Surprise and the City of Peoria.

When the study was initially proposed in 2004, the original limits extended south to Grand Avenue. Since project conception, Lennar Homes designed improvements on the west side of 163rd Avenue between Grand Avenue and Jomax Road; construction of their project commenced in March, 2006. The Phase 1 construction complies with the recommendations of the January 2004 Candidate Assessment Report (CAR) and preserves a 130 foot right-of-way corridor for the future four lane facility. The design of Phase 2, improvements on the east side of 163rd Avenue between Grand Avenue and Jomax Road, will be initiated by the City of Surprise in 2008. The CAR also recommended widening and extending 163rd Avenue north from Jomax Road to SR 74 beginning in 2010. The phasing of these improvements were based on future volumes that were projected using conventional traffic impact study assignment procedures that assigned actual traffic demand generated from each development within the study area. Since the completion of the CAR, a significant number of new developments are under consideration, some have been approved and are preparing to break ground. New traffic models for this region have also been developed, which take into account additional pass-through traffic from areas to the west. Due to the projected increase in traffic, capacity and phasing of traffic improvements needed to be reevaluated.

Presently within the CIS study area, 163rd Avenue exists as a two-lane paved roadway between Jomax Road and Dove Valley Road. The remaining portion of the 163rd Avenue corridor north of Dove Valley Road is undefined. The majority of land remains undeveloped however some low-density subdivisions exist north of Dynamite Boulevard and south of Dove Valley Road. The 163rd Avenue corridor is one of a few established north/south grid arterial roadways in this area that has both an at-grade crossing of the Burlington Northern Santa Fe Railroad and a Central Arizona Project (CAP) canal crossing. Due to this limitation, 163rd Avenue is currently the only reasonable north/south route available to service this portion of the County.

Existing traffic generators in this corridor consist of minimal residential developments. New developments will include a high number of low to medium residential traffic and some commercial traffic, which will be the major generators along this corridor. There are few predicted destinations within this corridor. Additionally, significant development is anticipated in the region to the west, which will add a higher volume of pass-through traffic to the 163rd corridor.

This section of 163rd Avenue is classified as a Principal Arterial (Road of Regional Significance) according to the MCDOT *Major Streets and Routes Plan*. The ultimate 163rd Avenue roadway is

classified as a Parkway according to the Surprise *Transportation Plan* and a Major Arterial according to the Peoria *General Plan*. The City of Peoria has indicated that 163rd Avenue will be elevated to a parkway classification based on the recommendations of this study.

The primary purpose of the CIS is to evaluate the corridor needs and provide definition of the future 163rd Avenue facility. Due to the existing constraints of Grand Avenue, the railroad and the mountains, 163rd Avenue is needed to improve north-south circulation in the northwest valley. The corridor study establishes the facility type, number of lanes, right-of-way, and alignment of the 163rd Avenue corridor that will eventually be required to accommodate forecast travel demands within the area. In cooperation with the City of Surprise and the City of Peoria, the study will also develop access management guidelines and a plan for the implementation of those guidelines that will ensure a high degree of safety and efficiency on the ultimate facility.

1.2 Need for Study

The 163rd Avenue CIS will address a critical need for improved roadway circulation and access in the northern Surprise and western Peoria portion of Maricopa County. The City of Surprise anticipates rapid growth in the general area with about 50,000 homes and significant retail development approved in the City's General Plan for construction over the next 20 years. A number of projects such as Asante at Grand Avenue and 163rd Avenue are already under construction. Added to that activity, in the biggest land sale in Arizona history, developers have purchased the Daimler Chrysler's 5,500-acre proving grounds which is planned to be a major project of 50,000 residents. The development of these lands and other properties within the traffic influence area of the 163rd Avenue Corridor will likely cause near-term traffic volumes to exceed long-range MAG forecasts.

Limited Development in Southern Study Area

Undeveloped in Northern Study Area

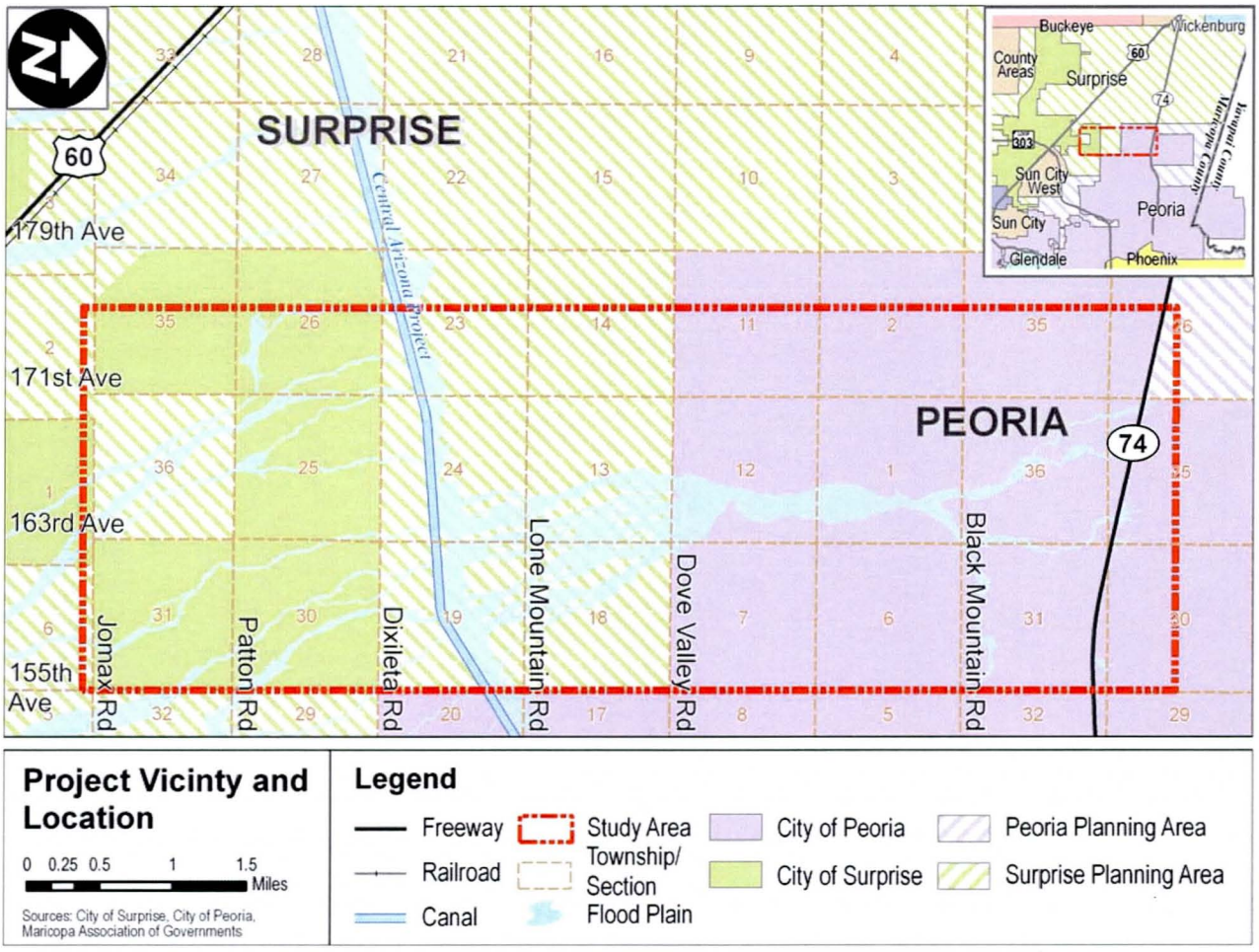
At present, Grand Avenue (US 60) is the only significant roadway available to both existing traffic and traffic resulting from new growth in the area. Existing maximum traffic volumes of between 30,000 and 35,000 ADT on Grand Avenue in the area between Bell Road and Morristown will increase dramatically once new developments are opened and linked to the limited local roadway system. Loop 303, currently under design, provides a complex frontage road connection to 163rd Avenue as part of the Grand Avenue interchange system, but it is an atypical configuration. Other possibilities for connections may exist but they must overcome

major obstacles to prove viable. Given these limitations, traffic conditions could become very congested if alternate access is not provided from the growth area to other regional facilities. 163rd Avenue will open an important direct outlet from Grand Avenue in Surprise to SR 74 and points north, east and west.

1.3 Study Area

The CIS extends from Jomax Road in the south to SR 74 in the north, shown in Figure 1.3. The east-west limits defined for the study are 175th Avenue to 155th Avenue. The study area encompasses approximately 10,240 acres in northwest Maricopa County (T4N R1W(Section 6), T5N R1W(Sections 6,7,18,19,30,31), and T6N R1W(Sections 31,30), T4N R2W (Section 1), T5N R2W (Sections 1,12,13,24,25), T6N R2W (Sections 25,36)). The project boundaries extend 1/2 mile south of Jomax Road to 1/2 mile north of SR 74 and from 155th Avenue (Reems Road) to 175th Avenue.

Figure 1.3: Vicinity and Location Map



1.4 Study Process

The 163rd Avenue CIS has been conducted in two phases: a Planning Phase and an Engineering Phase.

CIS Planning Phase: In the Planning Phase, the study team gathered general background information and prepared several reports (traffic analysis, drainage, utilities, environmental) leading to recommendations for improvements and longer-term needs along 163rd Avenue. Meetings were conducted with affected jurisdictions, agencies, stakeholders and the impacted public to form a broad consensus of the overall needs and vision of the corridor. Based on the needs identified, alternatives were developed and evaluated for technical and environmental feasibility, public acceptability and economic viability.

CIS Engineering Phase: The Engineering Phase of the study followed the selection of a preferred corridor alignment. Preliminary engineering design plans, right-of-way requirements and estimated construction costs were prepared for near-term and long-term roadway improvements. Roadway construction phasing priorities, along with policies and guidelines to preserve the intended function of the future roadway, were developed.

Several Technical Memoranda and analyses were prepared to document the study processes and findings at key stages of the study. They include the following, which are summarized in this report and located in appendices for reference.

- Technical Memorandum No. 1 - *Traffic Overview*, Appendix A
- Technical Memorandum No. 2 - *Environmental Overview*, Appendix B
- Technical Memorandum No. 3 - *Conceptual Drainage Report*, Appendix C
- Technical Memorandum No. 4 - *Utility Overview*, Appendix D
- Technical Memorandum No. 5 - *Major Features & Access Management*, Appendix E

Coordination and collaboration among the study team members ensured that the CIS met transportation needs, considered public and agency stakeholder input, respected budget constraints, and was technically feasible. Study team members participated in the process on multiple levels including Project Partners, Stakeholders Advisory Committee (SAC), Technical Advisory Committee (TAC), and Public Involvement. Technical reviews of study documents were provided by personnel from various MCDOT technical discipline sections, the City of Surprise and the City of Peoria. Project Partner, SAC, TAC and Public Involvement Meetings were held throughout the study duration.

1.5 Project Description

The corridor alignment limits extend from the north leg of the 163rd Avenue and Jomax Road intersection to future ADOT SR 74 Traffic Interchange (TI) at 167th Avenue. The southern approach to the corridor alignment at Jomax Road will require widening to match the City of Surprise Parkway Typical Section utilized for this project. Likewise, the northern approach to the future SR 74 TI will require minimal realignment to match the bearing of the proposed 163rd

Avenue alignment. This approach currently serves as access to the Quintero Golf Course and future housing development.

The improvements associated with this project include constructing a new six-lane Parkway with three travel lanes in each direction separated by a raised median. Pedestrian and bicycle traffic will be accommodated on both sides of the roadway. The Parkway Typical Sections developed by the Cities of Surprise and Peoria will be used within their respective jurisdictions.

The Surprise Parkway cross section includes a 60 foot median to be used for indirect left turns at intersections. MCDOT has evaluated the effectiveness of the indirect left turn concept in the *Enhanced Parkway Study* (August 2007). The study suggested that an improved level of service is recognized at intersections utilizing indirect left turns. Since the study only evaluated performance of the concept and did not make recommendations regarding typical sections or design criteria, MCDOT will defer to the City of Surprise's Parkway section within their jurisdiction and likewise to the City of Peoria's Parkway section north of and including Dove Valley Road. Based upon results of the *Enhanced Parkway Study*, MCDOT and several other municipalities, including the City of Surprise, agreed to cooperatively develop guidelines for a new facility type that utilizes indirect left-turn intersection treatments. The typical section for 163rd Avenue within the City of Surprise should be updated during final design to reflect the parkway typical section adopted by the *Arizona Parkway Design Guidelines* (expected completion summer 2008).

Drainage structures will be installed to meet the FCDMC design standards and provide all-weather access. Due to the significant presence of washes within the alignment, three bridges will be required in addition to 12 concrete box culverts (CBC).

Based on future traffic volumes used in this study, warranted signals will be installed no closer than 1/2-mile spacing. Left turning movements at intersections will be accommodated differently for each of the cities, per their respective adopted policies. Between Jomax Road and just south of Dove Valley Road, left turns will be made using u-turn crossovers located approximately 660 feet beyond the intersection. For the segment beginning just south of Dove Valley Road to SR 74, left turns will be made at the intersection per a conventional intersection design. Required capacity for left turning movements at each intersection is to be determined at future stages of development. Right turn lanes will be provided at all intersections to allow for deceleration. Dual right turn lanes are not required. Conceptual striping plans are provided in Figure 8.1-3.

Access management features will be implemented to improve traffic flow along the corridor. Right in and right out access is recommended for local connectors. As this facility is a parkway, direct access to and from private residences is discouraged and future commercial driveways should be minimized. Instead, access from residences adjacent to 163rd Avenue will be redirected to newly constructed public roads that connect to corridor crossroads. Residences not immediately adjacent to 163rd Avenue will continue to utilize the "wildcat" road system developed with neighboring parcels.

1.6 Goals and Objectives

The regional goal of the study is to identify an alternative regional north-south access route in the vicinity of 163rd Avenue from the rapidly developing portions of the City of Surprise to other parts of the Valley. To achieve this goal, specific project goals and objectives were established, as summarized in Table 1.6.

Table 1.6: Project Goals

Goals	Objectives
Ensure the project addresses the critical concerns of the local community, the Cities of Surprise and Peoria, and MCDOT.	▪ Take full advantage of the public involvement opportunities to understand the issues and how they can best be addressed in the course of developing alternatives and solutions.
Define a viable alignment and roadway footprint between Jomax Road and SR 74.	▪ Establish centerline alignment ▪ Define needed capacity ▪ Recommend realistic access management plan ▪ Ensure support of existing and future land uses
Establish the basis for detailed roadway design that will meet the City of Surprise's and the development community's needs for circulation.	▪ Prepare preliminary design plans for the four-mile segment between Jomax Road and Dove Valley Road ▪ Ensure roadway design meets requirements for safety and operational efficiency
Provide the Cities of Surprise and Peoria with a supportable basis for facilitating contributions from development toward transportation solutions in the area.	▪ Present a CIS alignment that can be used as a basis for compliance with local circulation requirements ▪ Develop preliminary DCR plans that will serve as a foundation for final design with sufficient detail to identify critical design issues and develop solutions or strategies for solutions. (It is assumed that affected development interests will pursue final roadway construction plans to support the City's local needs.)

1.7 Public and Stakeholder Involvement

Gaining consensus among the agencies and the public was critical to the success of the study and implementation of its recommendations to provide an efficient roadway for the long term. Three public information meetings were held during the course of this study process. The first "Public Scoping" meeting, held November 2006, provided the public with an opportunity to inform the project team about the study area and local transportation needs. The second meeting, held March 2007, presented corridor alignment alternatives for public review and comment. The third "Preferred Alignment" public meeting, held July 2007, presented the CIS findings and a recommended roadway and corridor selection along with generalized access management strategies for public review.

Prior to each public meeting, a Stakeholder Advisory Committee (SAC) meeting was held to review the project status and study materials to be presented to the public. Minutes from the SAC meetings are provided in Appendix G.

Section 2
Corridor Characteristics

2 Corridor Characteristics

2.1 Existing Conditions

163rd Avenue, also referred to as Sarival Avenue, is a rural two-lane roadway on the section line between Jomax Road and Dove Valley Road, approximately four miles in length. The existing roadway is functionally classified as a rural minor collector with a posted speed of 50 mph.

Looking North at 163rd Avenue from Jomax Road

The roadway geometry was reviewed according to survey information collected during the project study. As-built plans for 163rd Avenue were not available from MCDOT Engineering Records. The horizontal alignment follows the section line between Ranges 2W and 1W. The profile is flat allowing drainage to cross the roadway at grade.

Within the study limits, 163rd Avenue is paved from Jomax Road to approximately 380 feet south of Dove Valley Road. Paved width is 30 feet. Pavement condition information is limited to the segment within the County jurisdiction, which is between Dixileta Drive and Dove Valley Road. The pavement consists of 2 inches of penetration chip over stabilized soil. The original pavement was laid in 1992. Recorded pavement maintenance activities indicate a chip seal was applied in 1995.

Parameters used by MCDOT to evaluate existing pavement include the Pavement Condition Rating (PCR), International Roughness Index (IRI), Rutting Index (RI) and the Sufficiency Rating (SUFF):

- PCR: Describes the overall condition of the pavement by assigning a numerical value between 0 and 100. A PCR value less than 40 indicates "Poor Condition", between 40 – 54 indicates "Fair Condition", between 55 – 74 indicates "Good Condition", between 71 – 84 indicates "Very Good Condition" and between 85 – 100 indicates "Excellent Condition".
- IRI: Measures the pavement roughness in inches per mile to indicate the quality of ride. An IRI value less than 60 indicates a very smooth ride. An IRI value greater than 220 indicates a very rough ride.
- RI: Rutting is the measurement of the depression along the wheel-path in inches. According to MCDOT Standards, the highest acceptable rutting value is 0.5 inches.
- SUFF: The geometric information for each arterial road segment collected by the Road Management Section. The rating identifies how well each road segment compares to the MCDOT Roadway Design Manual (RDM) standards for each roadway functional classification. The information is maintained in the RMS database for each road segment for lane width, shoulder width, bottleneck features, drainage features, vertical sight distance, and horizontal sight distance. Ratings for each category are combined so that each road segment is scored on a scale from 0 to 100, 100 representing a road in complete compliance with the RDM standards.

Table 2.1-1 summarizes the available pavement conditions information for 163rd Avenue. As shown in the table, the pavement is in overall "Good Condition". The road has a rough ride that is approaching the threshold of acceptability for an overlay treatment. Rutting along the wheel-paths is not currently an issue.

Table 2.1-1: Pavement Condition Information

163rd Avenue Segment	PCR	IRI	RI	SUFF
Dixileta Drive to White Wing Road	68	202	0.14	100
White Wing Road to Dove Valley Road	73	202	0.14	100

The existing 163rd Avenue right-of-way width varies from 95 feet to 110 feet between Jomax Road and Dove Valley Road. The majority of the roadway between Jomax Road and Dixileta Drive is on private property. Adjacent land ownership is Federal, State and Private.

163rd Avenue provides neighborhood access to various east/west dirt roads and driveways. Most lots in this area are 1-2 acres in size with approximately one-half containing mobile or custom homes, many with equestrian and storage outbuildings. Several properties have direct driveway access to 163rd Avenue, as shown in Table 2.1-2.

Table 2.1-2: Access on 163rd Avenue

163rd Avenue Between		No. of Driveways	
South	**North**	**East**	**West**
Jomax Road	Dale Lane	3	0
Dale Lane	Peak View Road	0	0
Peak View Road	Duane Lane	1	4
Duane Lane	Dixileta Drive	1	1
Dixileta Drive	Windstone Trail	0	2
Windstone Trail	CAP	1	1
CAP	Montgomery Road	2	1
Montgomery Road	White Wing Road	0	4
White Wing Road	Quail Run Road	0	6
Quail Run Road	Dove Valley Road	0	4

Existing utilities within the study area include overhead power, underground electric, water, sewer, well fill, effluent, gas, telephone, fiber optic and coaxial cable. Only one known utility exists north of Dove Valley Road, which is a water line that serves the Quintero Golf Course located north of SR 74.

2.2 Traffic

Given the anticipated dramatic changes within the corridor, existing traffic volumes are irrelevant indicators of future conditions. Consequently, no traffic counts were conducted for this study. Existing traffic data for the area was gathered, see Table 2.2-2. All other facilities carry only nominal volumes.

Table 2.2-2: Existing Traffic Volumes

Location	AADT	Year	Source
SR 74	4,100	2005	ADOT
163rd Avenue (South of Jomax)	5,600	2008	City of Surprise

Development within the study area is minimal, although the southerly portion, between Jomax and Dove Valley Roads, is bounded by roadways along the section lines and crisscrossed by several small local roadways. The existing roadway network along 163rd Avenue between Jomax Road and Dove Valley Road is provided in Figure 2.2 and summarized in Table 2.2-1.

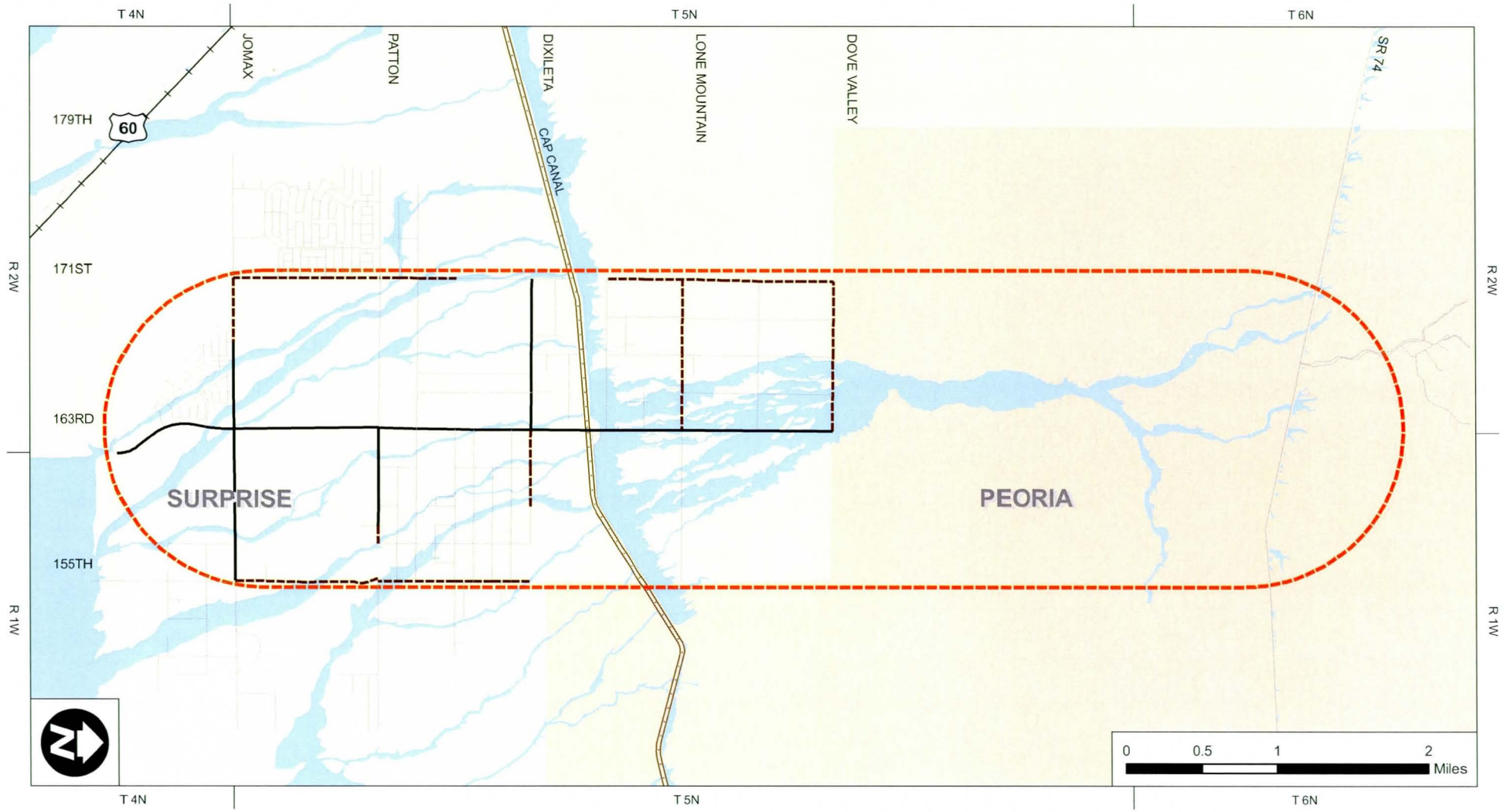


Figure 2.2
Existing Roadway Network

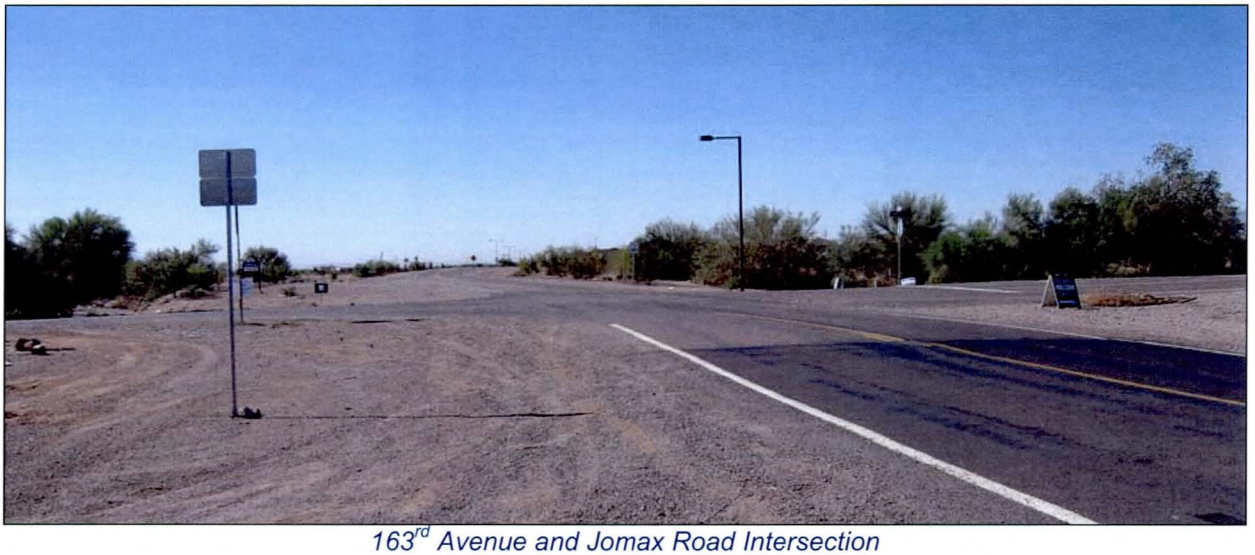
Legend

- Paved Roadway
- Unpaved Roadway
- Unpaved Residential
- Central Arizona Project (CAP) Canal
- Railroad
- Corridor Study Area
- Flood Plains
- Peoria Planning Area
- Surprise Planning Area

Table 2.2-1: Existing 163rd Avenue Lane Configurations

Intersection	Classification	Type	Traffic Control	Approach Lanes			
				N	S	E	W
Jomax Road	Major	"+"	Two-Way Stop	1	1	1	1
Dale Lane	Minor	"+"	Two-Way Stop	1	1	1	Unpaved
Peak View Road	Minor	"+"	Two-Way Stop	1	1	1	Unpaved
Duane Lane	Minor	"T"	One-Way Stop	1	1	Unpaved	-
Dixileta Drive	Major	"+"	Two-Way Stop	1	1	Unpaved	1
Windstone Trail	Minor	"T"	One-Way Stop	1	1	-	Unpaved
Montgomery Road	Major	"T"	One-Way Stop	1	1	-	Unpaved
White Wing Road	Minor	"T"	One-Way Stop	1	1	-	Unpaved
Quail Run Road	Minor	"T"	One-Way Stop	1	1	-	Unpaved
Dove Valley Road	Major	"L"	None	-	1	-	Unpaved

The crossroads are one lane in each direction with no signalized intersections. Traffic control is limited to one-way or two-way stops with stop signs. Several of the minor roadways have an unpaved leg of the intersection leading to residential development.



163rd Avenue and Jomax Road Intersection

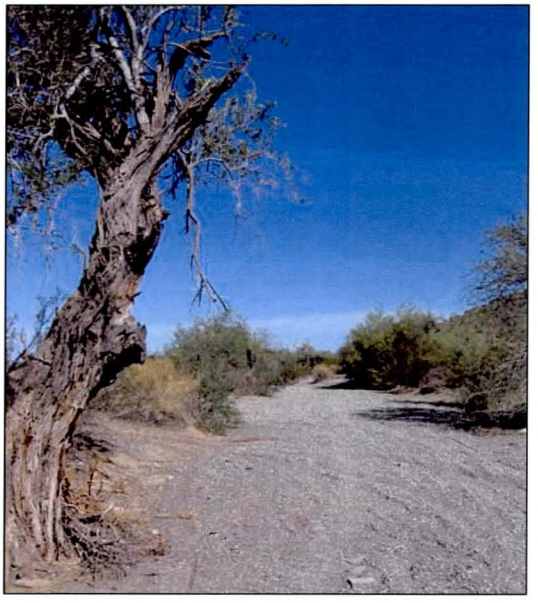
There were three crashes in this corridor from 2003 to 2005, as shown in Table 2.2-3. No conclusions can be drawn from the data to prevent similar accidents as the demographics, socioeconomic conditions, and roadway conditions will change dramatically in the future and establish very different roadway use patterns. Consequently, no immediate measures to specifically prevent these types of accidents are suggested other than to ensure good design practices in any final alternative selected.

Table 2.2-3: Accident Summary, 2003-2005

Location	Total No. of Accidents	Severity		
		Non-Incapacitating Injury	Possible Injury	No Injury
163rd Avenue - North of Duane Lane	1	1		
Jomax Road - West of 163rd Avenue	2		1	1

2.3 Drainage

The study area is comprised of desert rangeland with scattered buildings that for the most part have not altered historical drainage patterns. The Padelford Wash is the most significant natural drainage feature of the area, traversing it in a north/south direction. Several other washes follow the general direction of Padelford Wash. The CAP canal and its protection levees cut across the study area, intersecting all drainage ways.



Padelford Wash

The main channel of Padelford Wash is well defined and incised from its origin north of SR 74 to a point approximately 0.25 miles north of the Dove Valley Road alignment, where it opens onto an alluvial fan. The floodplain of the alluvial fan is about one mile wide at the intersection with the CAP canal, continuing its expansion to the south.

The protection levees on the north side of the CAP canal intercept flows from the Padelford Wash alluvial fan and other drainage ways into a flood pool that extends approximately 500 to 1,000 feet to the north. Overchutes spaced along the length of the levees serve as outfall structures that allow flows from the flood pool to cross over the CAP canal and discharge into downstream channels to the south.

Two major structures exist within the study area. At 163rd Avenue and Jomax Road, a 5-7'x3' CBC was constructed beneath the intersection. Approximately 2.3 miles north along 163rd Avenue, a 109-foot single span pre-cast concrete girder bridge was constructed over the CAP

canal in 1980. The clear roadway width is 48 feet. All other drainage ways cross the roadway in dip sections.

The Maricopa County Flood Control District has been engaged in two studies that fully cover the study area, the "Padelford Wash Floodplain Delineation Study" (FDS) (complete) and the Wittmann Area Drainage Master Study (ADMS) Update (underway). Flow data from these studies was used to estimate peak flows at potential roadway wash crossings.

2.4 Physical Features

The project area is located within the Basin and Range physiographic province, which is characterized by northwest/southeast trending mountain ranges divided by broad alluvial valleys. Topography is defined primarily by the Hieroglyphic Mountains to the north and northeast and by slopes from the low hills in the north to the generally flat areas south of Dove Valley Road. The profile rises from approximately 1,425 feet elevation near Jomax Road to 1,840 feet elevation near SR 74.

The majority of the project area geology is young alluvium from the numerous small alluvial fans originating in the foothills of the Hieroglyphic Mountains. The Padelford Wash is one of the major topographic features in the corridor area that requires consideration in the alignment selection.

2.5 Socioeconomic Environment

2.5.1 Land Jurisdiction and Ownership

The 163rd Avenue corridor is located in an area of projected change and development within Maricopa County. It lies in the northwest portion of the Phoenix urban area. The area was once completely within the jurisdiction of Maricopa County. Subsequent annexations have brought part of the area into the Cities of Peoria and Surprise. The two cities have also identified planning areas that extend beyond their corporate limits shown in Figure 2.5-1.

Land ownership is a combination of private land, State Trust land administered by the Arizona State Land Department, federal land administered by the U.S. Bureau of Land Management, and the right-of-way for the CAP canal, which is administered by the U.S. Bureau of Reclamation.

The approximate percentages of the ownership categories are:

- Private - 50.2%
- State Trust - 43.1%
- Bureau of Land Management - 4.3%
- Bureau of Reclamation - 2.4%

Figure 2.5-1
Existing Jurisdictions

Jurisdiction

- Surprise
- County/Surprise Planning Area
- Peoria
- County/Peoria Planning Area

Sources: City of Surprise, City of Peoria, and Maricopa Association of Governments

0 0.25 0.5 1 Miles

2.5.2 Existing Land Use

The major portion of the study area is undeveloped vacant land. No development exists in the northern portion of the area between Dove Valley Road and SR 74. Limited residential development has occurred in the southern portion between Jomax Road and Dove Valley Road. This development consists of rural/estate single family homes interspersed with vacant land. Other uses, which comprise small areas, include commercial, public facilities, and the CAP canal. Existing land uses are illustrated on Figure 2.5-2.

Looking north along the 167th Avenue alignment

The approximate percentages of existing land uses in the study area are:

- Vacant – 80.9%
- Residential – 18.5%
- Other – 0.6%

2.5.3 Planned Future Land Use

The Cities of Surprise and Peoria have approved General Plans that identify the planned land uses within their respective planning areas, see Figure 2.5-3.

The City of Surprise planning area occupies the southern portion of the study area between Jomax Road and Dove Valley Road.

Approximate percentages of the planned land uses in the Surprise portion of the study area are:

- Commercial – 1.15%
- Low Density Residential – 54.4%
- Open Space – 0.36%
- Rural Residential – 28.76%
- Suburban Residential – 15.33%

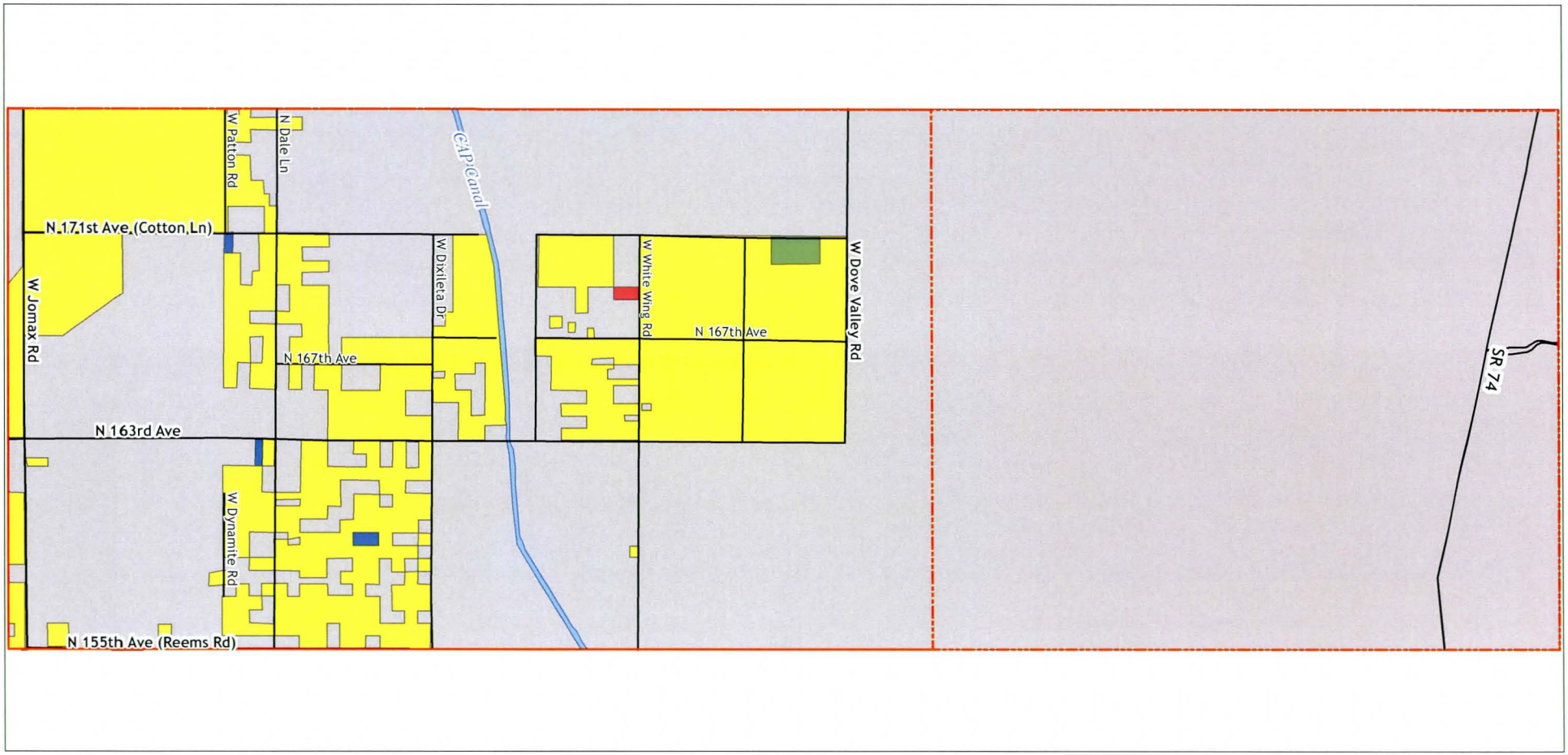


Figure 2.5-2
Existing Land Use

Land Use

- Residential
- Commercial
- Agriculture
- Public/Quasi-Public
- Vacant
- Water

Source: Maricopa Association of Governments (MAG)

0 0.25 0.5 1 Miles

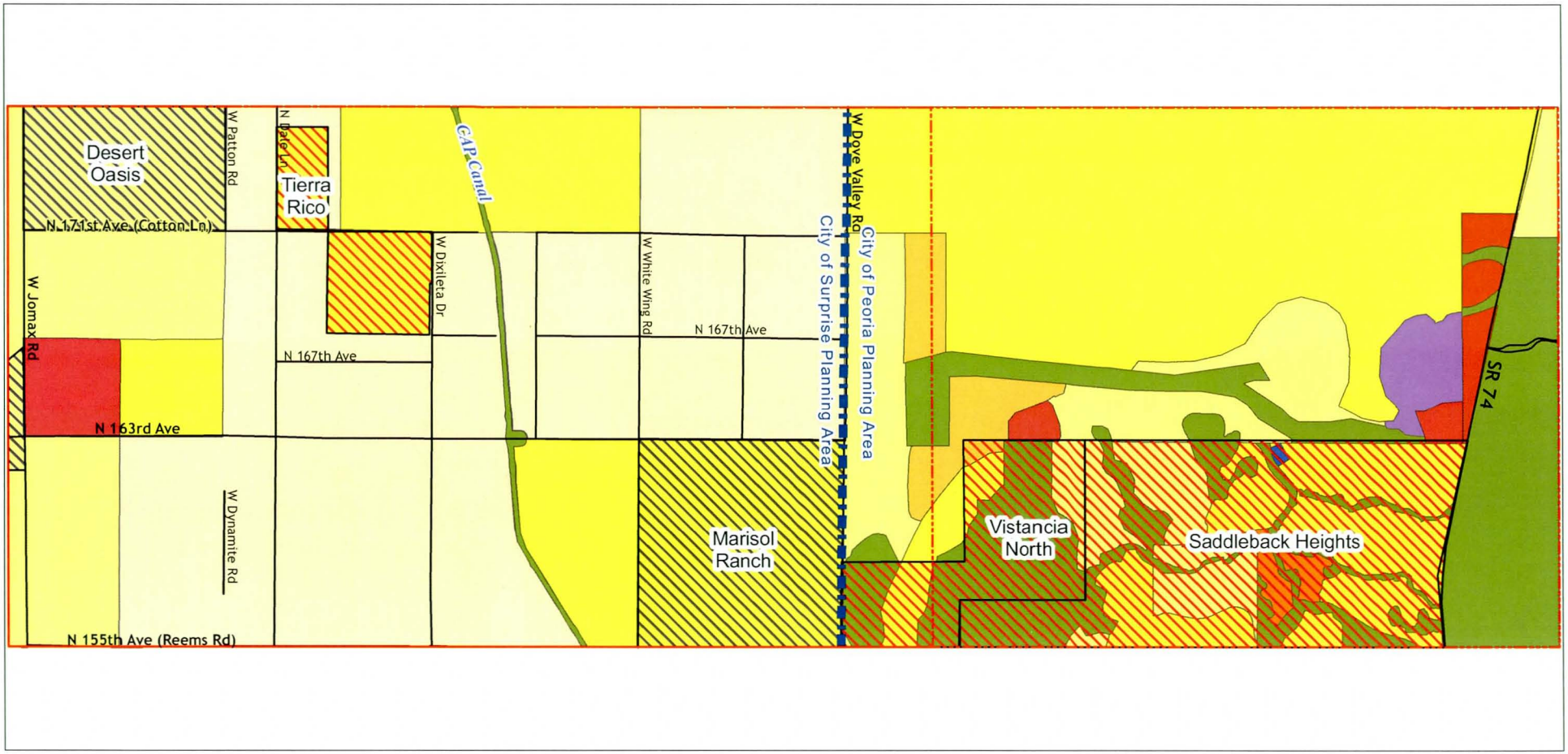


Figure 2.5-3
Future Land Use and Major Developments

General Plan Land Use

Surprise Land Use	Peoria Land Use		
Rural Residential	Residential/Estate	Business Park/Industrial	Major Development (Approved)
Low Density Residential	Residential/Low	Community Commercial	Major Development (Not Approved)
Suburban Residential	Residential/Medium	Park/Open Space	Study Area
Commercial	Residential/Medium High	Public/Quasi-Public	Planning Area
Open Space	Mixed Use		

Source: City of Peoria; City of Surprise

0 0.25 0.5 1 Miles

The City of Peoria planning area occupies the northern portion of the study area between Dove Valley Road and SR 74. The Peoria General Plan specifies the following land use categories.

Approximate percentages of the planned land uses in the Peoria portion of the study area are:

- Business Park/Industrial – 2.18%
- Community Commercial – 0.96%
- Mixed Use – 1.74%
- Public/Open Space – 14.79%
- Public/Quasi-Public – 0.07%
- Residential/Estate – 19.00%
- Residential/Low – 56.14%
- Residential/Medium – 4.07%
- Residential/Medium High – 1.05%

2.6 Future Roadway Improvements

2.6.1 Maricopa County Department of Transportation

The MCDOT TIP for fiscal year 2007-2011 does not include any improvement projects within the study area. MCDOT, in partnership with the City of Surprise, is currently conducting a Design Concept Report (DCR) for 163rd Avenue between Jomax Road and Dove Valley Road. Upon completion, the recommendations from the DCR will compete with other County-wide projects for inclusion in the TIP.

In the Northwest County region, a CIS for Patton/Jomax Road was completed (October 2007) and a CIS for East Jomax Road is underway. Coordination among the three CIS study teams was continual to ensure consistent input information and methodology.

2.6.2 Maricopa Association of Governments (MAG)

MAG is currently conducting the *I-10 Hassayampa Valley Transportation Framework Study* (I-10 HVTFS) in northwest Maricopa County. The purpose of this study is to establish the framework for a future transportation system and provide feedback to local land use planners on how alternative development scenarios can be part of regional transportation solutions. The study will identify and reserve right-of-way for future travel corridors, based on regional and local transportation and land use planning.

The MAG RTP and TIP do not include any right-of-way, design or construction projects within the study area.

2.6.3 City of Surprise

The Traffic Circulation Element in the *Surprise General Plan 2020* shows the street system in the southern portion of the study area. The *General Plan* classifies 163rd Avenue, Jomax Road and Lone Mountain as future parkways. The alignment for Lone Mountain Parkway has not been finalized. However, the General Plan shows that the parkway will shift from the Dove Valley Road alignment to the Lone Mountain (White Wing Road) alignment west of 171st Avenue on undeveloped property. Dove Valley Road is classified as a major arterial. Patton Road and Dixileta Drive are classified as minor arterials.

The Surprise 2008 to 2012 CIP includes two items of improvement for the area. Item No. 20612, Pave Dirt Road Program involves paving Dynamite Road from 163rd Avenue to 157th Avenue. Item No. 20526 is the Saguaro View Rehabilitation Project. In addition to the improvements listed in the CIP, the City of Surprise will be administering an interim signal project at the 163rd Avenue and Jomax Road intersection.

2.6.4 City of Peoria

The *Peoria General Plan 2006* depicts the traffic circulation plan for the northern portion of the study area. The Plan shows 163rd Avenue and Dove Valley Road as arterials. The City of Peoria has indicated that 163rd Avenue will be elevated to a parkway classification based on the recommendations of this study. No improvement projects are currently listed in the City of Peoria's FY 2008 CIP.

2.6.5 Arizona Department of Transportation (ADOT)

According to ADOT's *SR 74 Access Management Study*, SR 74 will be a future controlled-access facility. Several TI locations have been determined as part of the study, including a TI at the 167th Avenue alignment. MCDOT and the City of Peoria were key contributors to the study's findings and recommendations.

The ADOT 2007-2011 Five-Year Transportation Facilities Construction Program does not include any improvements to SR 74 within the study area.

2.6.6 Private Development

Within the City of Surprise, four future developments have approached the City. Plats have been approved for Desert Oasis, Tierra Rico and Sierra Norte. Desert Oasis is located in the northeast quadrant of 171st Avenue and Jomax Road. Construction of this development is underway. Tierra Rico is a 40 acre development located in the southwest quadrant of 171st Avenue and Dale Road. The final plat for this development has been approved by the City of Surprise. Sierra Norte has submitted a preliminary plat of a 160 acre development situated in the southeast quadrant of 171st Avenue and Dixileta Drive. The fourth development is Marisol Ranch, located in the section bounded between Quail Run and Dove Valley Road (south and north) and 163rd Avenue and 155th Avenue (west and east). This development is in the conceptual stages (plat not yet been submitted or approved). Improvements to the 163rd Avenue corridor, as recommended by this study, will need to be incorporated by the developments as appropriate.

Future developments within the City of Peoria include Saddleback Heights and Vistancia. These developments are located north of Dove Valley Road and east of 167th Avenue. Both developments are shown on the City's General Plan.

Section 3
Traffic Analysis

3 Traffic Analysis

The Traffic Analysis summarizes future conditions of the 163rd Avenue corridor. The data presented includes future socioeconomic conditions, projected traffic volumes and functional classification of the roadway. See Appendix A for the Technical Memorandum.

Two models were utilized for interim and ultimate design of the 163rd Avenue corridor. The first is a detailed sub-regional modeling effort, called the *Northwest Valley Model Influence Area (NWVMIA)* prepared for MDCOT by Wilson & Company which developed long-range travel demand used in multiple corridor studies. Model output generated for the NWVMIA provided the basis for interim conditions traffic assignment for 163rd Avenue. The second is the MAG regional model for the I-10 HVTFS which is considered build-out for the region with no associated year, although it is projected to reach build-out beyond the 2030 time frame. Under the long range build-out conditions modeled in the I-10 HVTFS, MAG identified the need for a new functional classification roadway system, comprised of intermediate capacity parkway facilities designed to meet the regional travel demands. "The Arizona Parkway System" which was recommended by the MAG study includes approximately 82 miles of indirect-left design concept parkways within the City of Surprise, four miles of which consist of the 163rd Avenue corridor in this study as well as two intersection parkways, Lone Mountain Road and Jomax Road.

3.1 Socioeconomic Conditions

A sub-regional travel demand model, NWVMIA model, was created utilizing the updated long-range general plan socioeconomic data collect by MAG staff in September, 2006. This new housing and employment data set was primarily based on current general and comprehensive plans of MAG member agencies within the Study Influence Area. In addition, these estimates took into consideration the presence and potential disposition of State Trust Lands, which cover a significant portion of the study area. For the modeling region outside of the traffic influence area defined for this study, the NWVMIA travel demand model applied the MAG Adopted Year 2030 data.

Based on a comparison to other areas of the region, the NWVMIA model most likely underestimates future employment in the region, which can be compared to development and growth patterns in the East Valley. Most trips generated travel outside the NWVMIA area for employment. As the area matures and the general plans are updated, the employment areas will most likely shift so that a more balanced housing/employment ratio occurs in the NWVMIA Model Influence Area. Consequently, the future roadway capacity should be revisited as the area socioeconomic conditions are better understood.

3.2 Future Volumes

The traffic volumes for the build-out scenario for this region were projected in MAG's I-10 HVTFS. No specific year was projected for build-out conditions. Build-out was defined as the ultimate development of all lands in the areas to a reasonable "net holding capacity" based on the

various municipal General Plan land use and density standards. Based upon this build-out scenario for residential and employment land uses in the Northwest Valley, the traffic volumes will increase significantly beyond the design year for this project. Under the higher traffic volumes identified in the I-10 HVTFS, the ultimate design of 163rd Avenue will accommodate the demand. The Enhanced Parkway concept is able to handle substantially higher traffic than a typical arterial roadway; in fact the capacity of the MLT design was estimated to be 45 to 50 percent greater than the capacity of a standard intersection design. The results of the MCDOT Enhance Parkway Study also suggested that a six-lane MLT design should be capable of handling more traffic volume at signalized intersections than an 8-lane parkway with standard intersection design. 163rd Avenue is being designed with the flexibility to grow capacity to meet demand as travel increases in the future. A traffic analysis for the future proposed intersections is recommended at the DCR level. The future traffic volumes of the roadway network along with the associated functional classifications in the area are shown in Figure 3.2.

3.3 Roadway Classifications

The 163rd Avenue corridor is included in the City of Surprise and the City of Peoria Circulation plans as a parkway and an arterial, respectively. This functional classification defines the width, number of lanes, and capacity of the roadway. The functional classification per segment is shown in Tables 3.3-1 and 3.3-2.

Table 3.3-1: Functional Classification per Adopted Circulation Plans, North/South

163rd Avenue	Jurisdiction	Classification from Adopted Plans	Classification from Travel Demand Model
Dove Valley Rd to SR 74	Peoria	Arterial	Major Arterial
Jomax Rd to Dove Valley Rd	Surprise	Parkway	Major Arterial

Table 3.3-2: Functional Classification per Adopted Circulation Plans, East/West

Roadway	Jurisdiction	Classification from Adopted Plans	Classification from Travel Demand Model
SR 74	Peoria	Arterial	Freeway
Saddleback Heights/Cloud Rd	Peoria	Collector	-
Black Mountain Rd	Surprise	Major Arterial	Major Arterial
Dove Valley Rd	Surprise	Major Arterial	Minor Arterial
Lone Mountain Rd	Surprise	Parkway	Major Arterial
Dixileta Dr	Surprise	Minor Arterial	Minor Arterial
Dynamite Rd	Surprise	Minor Arterial	Minor Arterial
Jomax Rd	Surprise	Parkway	Major Arterial

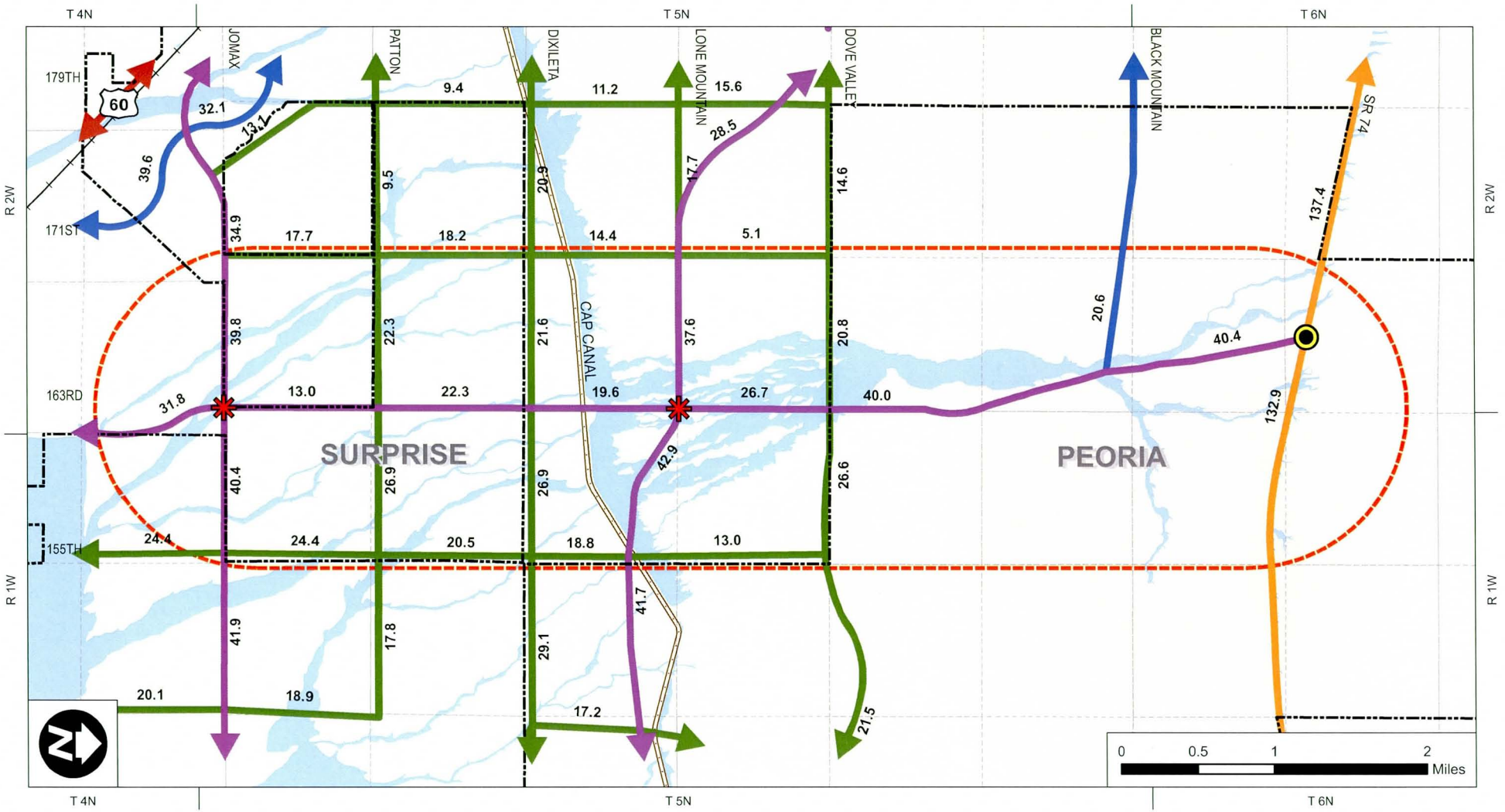


Figure 3.2
Future Traffic Network

Note: Volumes are shown in thousands.
Sources: MCDOT, MAG, the CK Group Inc.

Legend

- 6 Lane Freeway
- 6 Lane Expressway
- 6 Lane Parkway
- 6 Lane Major Arterial
- 4 Lane Minor Arterial
- Central Arizona Project (CAP) Canal
- Railroad
- Corridor Study Area
- City Boundaries
- Major Design Feature
- Flood Plains
- Traffic Interchange
- Peoria Planning Area
- Surprise Planning Area

3.4 Segment Level of Service

The efficiency of roadway system components, such as intersections and road segments, can be described by Level of Service (LOS). LOS is used to describe the degree of congestion for a roadway. LOS, which range from A to F, is generally defined as follows:

- *Level of Service A* represents free flow operation
- *Level of Service B* is in the range of free flow, but the presence of other users in the traffic stream begins to be noticeable
- *Level of Service C* is in the range of stable flow, but marks the beginning of the range in which the operation of individual users becomes significantly affected by others.
- *Level of Service D* represents high density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience
- *Level of Service E* represents operating conditions at or near the capacity level. All speed is reduced to a low but relatively uniform value
- *Level of Service F* is used to define forced or stop and go travel. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse that point.

In this study, an acceptable LOS was considered to be LOS D. Tables 3.4-1 and 3.4-2 show the capacity at LOS D for a standard design and indirect left turn, the predicted volume, and if the roadway will be over or under capacity. These thresholds shown demonstrate that the roadway will be designed under capacity. Additional information can be found in the "Level of Service Methodology for Planning Level Traffic Analysis" by the CK Group, January 2007.

Table 3.4-1: Roadway Capacity per NWVMIA Model, North/South

163rd Avenue	Functional Classification	Number of Lanes	Daily Capacity (LOS D)[1]	Capacity with Indirect Left Turn	Projected Two-Way Daily Volume	Over/ Under Capacity
SR 74 to Black Mountain Rd	Parkway	6	50,100	60,120	40,400	Under
Black Mountain Rd to Dove Valley Rd	Parkway	6	50,100	60,120	40,000	Under
Dove Valley Rd to Lone Mountain Rd	Parkway	6	50,100	60,120	26,700	Under
Lone Mountain Rd to Dixileta Dr	Parkway	6	50,100	60,120	19,600	Under
Dixileta Dr to Dynamite Rd	Parkway	6	50,100	60,120	22,300	Under
Dynamite Rd to Jomax Rd	Parkway	6	50,100	60,120	13,000	Under

[1] Daily Volume Capacity Threshold Values derived from analysis conducted by the CK Group, Inc. as documented in the "Level of Service (LOS) Methodology for Planning Level Traffic Analysis", January 24th, 2007

Table 3.4-2: Roadway Capacity per NWVMIA Model, East/West

Roadway	Functional Classification	Number of Lanes	Daily Capacity (LOS D)	Capacity with Indirect Left Turn	Projected Two-Way Daily Volume	Over/ Under Capacity
SR 74 West of 163rd Ave	Freeway	6	120,000	-	137,400	Over
SR 74 East of 163rd Ave	Freeway	6	120,000	-	132,900	Over
Black Mountain Rd	Major Arterial	6	47,000	-	20,600	Under
Dove Valley Rd West of 163rd Ave	Minor Arterial	4	31,300	-	20,800	Under
Dove Valley Rd East of 163rd Ave	Minor Arterial	4	31,300	-	26,600	Under
Lone Mountain Rd West of 163rd Ave	Parkway	6	50,100	60,120	37,600	Under
Lone Mountain Rd East of 163rd Ave	Parkway	6	50,100	60,120	42,900	Under
Dixileta Dr West of 163rd Ave	Minor Arterial	4	31,300	-	21,600	Under
Dixileta Dr East of 163rd Ave	Minor Arterial	4	31,300	-	26,900	Under
Dynamite Rd West of 163rd Ave	Minor Arterial	4	31,300	-	22,300	Under
Dynamite Rd East of 163rd Ave	Minor Arterial	4	31,300	-	26,900	Under
Jomax Rd West of 163rd Ave	Parkway	6	50,100	60,120	39,800	Under
Jomax Rd East of 163rd Ave	Parkway	6	50,100	60,120	40,400	Under

3.5 Intersections

This CIS identifies a non-traditional intersection design, the indirect left turn, as a method to maintain higher flow rates in the corridor. The indirect left, as contrasted with a more conventional multi-phase signal controlled intersection, can accommodate higher volumes of traffic by eliminating all of the left turns from intersections. The City of Surprise is promoting the use of the indirect left in rapid growth areas to manage high anticipated future volumes. The City of Peoria designates 163rd Avenue as an arterial with conventional intersection design. Table 3.5 shows ownership, characteristics of crossroads, and intersection types along 163rd Avenue.

Table 3.5: Intersection Type

163rd Avenue Intersection	Classification	Number of Lanes	Jurisdiction	Intersection Type
Jomax Road	Parkway	6	Surprise	Indirect Left
Patton Road	Minor Arterial	4	Surprise	Indirect Left
Dixileta Drive	Minor Arterial	4	Surprise	Indirect Left
Lone Mountain Parkway	Parkway	6	Surprise	Indirect Left
Dove Valley Road	Minor Arterial	4	Peoria	Conventional
Black Mountain Road	Parkway	6	Peoria	Conventional
SR 74	Freeway	6	Peoria	Traffic Interchange

Indirect left turns, commonly used in Michigan, replace the left turn at an intersection by a u-turn beyond the intersection and then a right turn onto the crossroad. This is an unusual design in the west, but the conditions on 163rd Avenue offer an opportunity to use it in a way that provides an improvement in roadway capacity over time.

The indirect left turn must occur on a divided roadway. A significant median, at least 60 feet wide, is necessary to accommodate the u-turn movement. This width is adequate for buses and trucks, as shown in Figure 3.5, although depending on the mainline roadway conditions extra pavement might be advised to accommodate all types of trucks allowed on the roadway.

Figure 3.5: Indirect Left Turn Minimum Median Width

TYPE OF MANEUVER	M - MIN. WIDTH OF MEDIAN (ft) FOR DESIGN VEHICLE						
	P	WB-40	SU	BUS	WB-50	WB-60	TDT
	LENGTH OF DESIGN VEHICLE (ft)						
	19	50	30	40	55	65	118
INNER LANE TO INNER LANE	30	61	63	63	71	71	101
INNER LANE TO OUTER LANE	18	49	51	51	59	59	89
INNER LANE TO SHOULDER	8	39	41	41	49	49	79

Source: A Policy on Geometric Design of Highways and Streets, 4th Edition, Copyright 2001, AASHTO, Washington, DC. Used by permission.

With an indirect left turn configuration, the traffic signal at the main intersection becomes a two-phase signal. In corridors where a series of these signals are used, as recommended, traffic progression is improved. In areas with high volumes of u-turns (> 400 vph) a signal is recommended at the u-turn. This signal cycle is short in length and does not negatively affect the signal progression.

Once an alignment alternative is selected and advanced, this study will identify intersections to be assessed through a future signal warrant analysis. Signal spacing along the parkway is recommended to be at least every 1/2 mile apart. As necessary, signals with increased spacing are acceptable. Signals that are closer than 1/2 mile are not advised in order to maintain an acceptable level of operation and signal coordination for the corridor.

Section 4
Environmental Overview

4 Environmental Overview

The Environmental Overview generally describes the social, economic, and environmental character of the area in the vicinity of the 163rd Avenue CIS (see Appendix B for the full document). The Environmental Overview can be used to identify "fatal flaws" and associated issues that pertain to the project and to assist in evaluation of alternatives for future roadway improvements. This general description of environmental conditions is not intended to meet the requirements of the National Environmental Policy Act (NEPA). Additional environmental study and documentation will be required at future stages of project development.

4.1 Physical and Natural Environment

4.1.1 General Physiography/Topography

The project area is located within the Basin and Range physiographic province, which is characterized by northwest-southeast trending mountain ranges divided by broad alluvial valleys. Topography is defined primarily by the Hieroglyphic Mountains to the north and northeast and by slopes from the low hills in the north to the generally flat areas south of Dove Valley Road. The profile rises from approximately 1,425 feet elevation near Jomax Road to 1,840 feet elevation near SR 74.

The majority of the project area geology is young alluvium from the numerous small alluvial fans originating in the foothills of the Hieroglyphic Mountains. The Padelford Wash runs north-south from near SR 74 to the CAP canal north of Dixileta Drive and is one of the major topographic features in the corridor area that requires consideration in the alignment selection.

4.1.2 Biological Resources

Vegetative Communities

The study area is within the Arizona upland subdivision of the Sonoran desert scrub biotic community, with elements of the Lower Colorado River subdivision near the southern extent. The southern portion of the project area (south of Dove Valley Road) is characterized primarily by creosote bush with triangle leaf bursage and scattered desert broom.

Native Vegetation in the Corridor

The density and diversity of plant species increase northward from Dove Valley Road. The predominant plant community transitions to the Arizona upland subdivision community. In this portion of the project area, yellow palo verde, and

buckhorn cholla become predominant, with compass barrel cactus, teddy bear cholla, and prickly pear. Scattered saguaro and ocotillo also occur in this area.

Several small washes and dirt two-track trails dissect the project area. Padelford Wash runs through the study area from north of SR 74 to near Dove Valley Road, where it widens into an alluvial fan. In these areas, ironwood and canyon ragweed occur primarily with yellow palo verde.

Species Identification

The United States Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AGFD) species lists for Maricopa County were reviewed by a qualified biologist to determine species that may be present in the study area. Only one state sensitive species, the Sonoran desert tortoise has the potential to occur within the project vicinity. No federally listed species have the potential to occur within the project vicinity.

State Sensitive Species

As part of the NEPA scoping process, a letter describing the project was sent to the AGFD to inform them of the project and to solicit comments. Specifically, the letter requested any specific concerns, suggestions or recommendations the agency may have related to the project as well as a list of sensitive species that may occur within the project area.

The following sensitive species were identified by AGFD as occurring within the project vicinity:

- Bat colony (unspecified species);
- Sonoran desert tortoise;
- California leaf-nosed bat.

Impacts to the Sonoran desert tortoise are discussed in Sections 2.2.3 of the Environmental Overview. Suitable roost sites for the bat colony and California leaf-nosed bat do not occur within the project area. Although bat species may forage within the project area, they are more likely to utilize the hills and washes within the Hieroglyphic Mountains; therefore, this project will have no impacts on those species.

Protected Native Plants

The project area was surveyed for the presence of protected native plants. The following protected plant species were found within the project area: ironwood, mesquite, yellow palo verde, buckhorn cholla, compass barrel cactus, teddy bear cholla, prickly pear and saguaro. Protected native plants within the project limits may be impacted by construction activities. Therefore, the Arizona Department of Agriculture should be notified at least 60 days prior to the start of construction to afford commercial salvagers the opportunity to remove and salvage any of these plants that may be impacted.

4.1.3 Water Resources

Drainage

The study area is comprised of desert rangeland with scattered buildings that for the most part have not altered historical drainage patterns. Padelford Wash is the most significant natural drainage feature of the area, traversing it in a north-south direction. Several other washes follow the general direction of Padelford Wash. The CAP canal and its protection levees cut across the study area, intersecting all drainage ways.

Waters of the United States

Section 404 of the Clean Water Act establishes a permit program for activities that will discharge dredged or fill material into "waters of the United States". The delineation of waters of the United States is the responsibility of the U.S. Army Corps of Engineers. (This designation is discussed further in the drainage section of this report.) Most natural channels in the study area may fit the criteria for designation as jurisdictional waters of the United States and would therefore be regulated by the U.S. Army Corps of Engineers. In recent times, streams that are tributaries to waterways of regional significance, such as the Agua Fria River, have been given jurisdictional waters designation. Construction of roadway improvements within the delineated jurisdictional waters will require permits issued by the Corps.

4.1.4 Air Quality

This project is located in the Phoenix Metropolitan Non-Attainment Area, which means that air quality in the region does not meet National Ambient Air Quality Standards (NAAQS) for ozone (O_3) and particulates (PM_{10}).

Unpaved Crossroads Common in the Corridor (Dove Valley Road)

The proposed project will add lanes to the existing road and construct a new road in parts of the study area where no road presently exits. Through travel lanes of greater than one-half mile in length will be added. Therefore, the project will require inclusion in conformity analysis by

MAG to ensure that the additional roadway does not cause or contribute to new violations of the air quality standards, and conforms to the existing air quality improvement plans.

Roadway construction activities may result in some deterioration of the existing air quality on a temporary basis. Such impacts are expected to be localized and temporary. Dust generated by construction activities will be controlled in accordance with County Air Pollution Regulations and as stipulated in the required County Earthmoving Permit.

4.1.5 Noise

Sound from roadway traffic is generated primarily from a vehicle's tires, engine, and exhaust. It is commonly measured in decibels and is expressed as "dB." Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear. Therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dBA". Also, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, a single value is used to represent the average or equivalent sound level and is expressed as "Leq".

If it is likely that the predicted noise levels will eventually approach or exceed the noise abatement criterion, or cause a substantial increase over the existing traffic noise level, MCDOT, or another responsible entity, will evaluate the impacted properties for possible abatement. Noise abatement measures must be reasonable and feasible. The reasonableness of any noise abatement measure will be discussed with the affected property owners and mutual agreement is required for construction of a barrier if one is determined to be a reasonable mitigation measure.

The feasibility deals primarily with engineering considerations (e.g., whether a barrier can be built given the topography of the location; whether a substantial noise reduction can be achieved given certain access, drainage, safety, or maintenance requirements; whether other noise sources are present in the area).

4.1.6 Hazardous Materials

The database review did not identify the presence of any hazardous materials. The site visit observed wildcat dumping of household wastes at various locations along the 167th Avenue alignment between Dove Valley Road and SR 74. No hazardous materials concerns were identified other than the household waste dumping. The review team concluded that no further investigation of hazardous materials is required at this time. Once the project design is complete, concrete structures that will be affected by the project construction will require asbestos and/or lead-based paint sampling. If suspected hazardous materials are encountered during project work, activities should cease and the project engineer notified so that arrangements can be made to properly assess the material.

4.1.7 Prime and Unique Farmland

The Farmland Protection Act of 1981 (FPPA) requires the identification and consideration of adverse effects on the preservation of farmland. Identification is made of farmland that is prime, unique, or of statewide or local importance. Land in the study area consists of scattered residential developments and vacant land. Therefore, impacts on prime or unique farmland or other farmland of statewide or local importance are not expected to be created by the proposed project.

4.1.8 Section 4(f) Resources

The CAP Trail is a Section 4(f) property. This recreational trail is planned on the unfenced strip of land, approximately 20 feet wide, between the CAP canal security fence and the canal property boundary line. The general trail location is on the downhill side of the canal. Multiple recreation uses of the trail are planned. These uses include walking, jogging, equestrian use, bicycling, and in-line skating if paved. This facility was designated as a National Recreation Trail by the Secretary of the Interior on June 3, 2003. This property will require the completion of a Section 4(f) evaluation in accordance with NEPA and the procedures specified by the Department of Interior.

4.2 Demographic Characteristics

4.2.1 Population and Employment

As a basis for describing the population characteristics and employment conditions, data from the 2000 U. S. Census and the 2005 Special Census were compiled for Maricopa County, the City of Peoria, and the City of Surprise. Between 2000 and 2005, the two cities and Maricopa County experienced high population growth. Surprise grew over 200% during this period and Peoria grew by 50%. The rates are higher than Maricopa County, which grew by 17% during this same period.

In 2000, the population in all three jurisdictions was primarily white, with 77.4% in Maricopa County, 84.9% in the City of Peoria, and 86.0% in Surprise. The largest minority group in all three jurisdictions was Hispanic (any race). Hispanics made up 24.8% in Maricopa County, 15.4% in Peoria, and 23.3% in Surprise. These percentages remained similar in 2005. The largest change was in Surprise, where the white percentage decreased from 86.0% to 82.1% and the Hispanic percentage decreased from 23.3% to 18.7%.

In 2000, the percentage of the population over 65 was substantially higher in Surprise (25.4%) than in Peoria (14.4%) and Maricopa County (11.7%). By 2005, these percentages were lower for all three jurisdictions, with Surprise remaining the highest at 17.3%. The poverty status in all three jurisdictions remained relatively stable between 2000 and 2005.

In the subject area, the smallest unit for which U.S. Census data are reported in the study area is the block group. The study area is located within a block group that covers a much larger area. Thus, exact data for the study area are not available.

The racial composition in the relevant block group was overwhelmingly white at 96.5 %, which is higher than any of the three jurisdictions. The largest minority group was Hispanic (of any

race) with 2.9%, which is substantially lower than the three jurisdictions. The poverty status in the block group was similar to that of the county but higher than the two cities. The percentage of persons over 65 was substantially higher (59.7%) in the block group than in any of the jurisdictions. This condition is due to the large portion of the block group that contains retirement communities. While it is not possible to determine the portion of this percentage that is within the study area, it is thought to be much lower.

4.2.2 Title VI/Environmental Justice

As described above, minority populations are present in the study area, but represent a very small portion of the total. The percentage of low-income persons, while higher than in the Cities of Peoria and Surprise, is almost identical to that of Maricopa County. These percentages are well below the general guidelines for the definition of a substantial population. It is unlikely that the project would cause disproportionate impacts on these populations.

The percentage of persons over age 65 in the study area, as it is defined by the Census block group, is much higher than the surrounding jurisdictions due to the presence of large retirement communities in the area. The portion of this population that is actually within the defined study area cannot be determined from available data. However, the future definition and evaluation of impacts should clearly document the potential effects on this group. Care should be taken to ensure their participation in future public involvement activities.

4.3 Cultural Resources

Available archaeological and historic records were reviewed to identify previous studies and the number and types of previously identified cultural resources in the area. Sources examined for this overview included site and project files at the State Historic Preservation Office (SHPO) and the AZSITE Cultural Resources Database (AZSITE). Historic General Land Office (GLO) maps were also reviewed at the Bureau of Land Management (BLM) Arizona State Office.

4.3.1 Cultural Sensitivity Evaluation

As described above, numerous cultural resources have been documented in the review area. In addition, many Native American groups have a long history of use and/or settlement either within or in the vicinity of the review area. Over time, the territories recognized by the various groups have shifted under pressures of population movements, conflict among neighbors, the advent of Spanish, Mexican, and Anglo competition for land and resources, and the more recent resettlement policies of the federal government; however, many groups still maintain traditional ties to the larger region.

Although large portions of the review area have yet to be surveyed for the presence of cultural materials, the review area has the potential to be of high cultural sensitivity. Of particular importance are often indistinct or obscure surface features such as rock rings, rock alignments, and rock piles, present at several of the prehistoric sites within the review area; quarries; geoglyphs and petroglyphs; trails; and shrines associated with the area's prehistoric and protohistoric occupation. These sites have the potential to inform on land use and subsistence activities, settlement patterns, and trade and exchange networks. Rock art, intaglios, and "earth figure" sites may reveal aspects of tribal organization and integration as well as provide insights

regarding possible links between mythology, oral histories, and cultural practices. All of these site types may be considered eligible under one or more of the applicable criteria. In addition to the known archaeological sites that have been documented along the proposed 163rd Avenue corridor, any future undertaking needs to take into consideration the area's potential for containing Traditional Cultural Properties (TCPs) and other significant cultural landscapes.

The document review findings suggest that historic properties are likely to occur in the review area. Evidence of historic trails and wagon roads, many of which are shown on GLO maps dating to the late nineteenth and early twentieth centuries, are present in the review area. Some of these sites played an important role in the region's history of transportation and settlement, while others may be related to important persons; therefore, they may be eligible under some of the cultural resource criteria. The review indicates that at least 27 previously recorded cultural resource sites are within the 1.0-mi radius review area. Of these, 20 are considered eligible for listing on the NRHP, five are considered not eligible, and two require further research to decide eligibility or were otherwise not evaluated. Only one known site, a historic road recommended as not eligible, overlaps with any of the proposed alignments.

Section 5
Drainage Analysis

5 Drainage Analysis

The Conceptual Drainage Report, see Appendix C for the Technical Memorandum, summarizes data collected from the previously completed CAR, studies by the FCDMC, and field reviews. The data include points of concentration, peak flows and field conditions. Evaluation of the data is the basis for identification of drainage impacts of proposed roadway improvement alternatives and the planning of future enhancements.

The report identifies major points of concentration and estimates 100-year and 50-year peak flow data based upon existing drainage reports. Hydrologic data were used in the preliminary hydraulic design of proposed culverts.

In addition to the findings in the Conceptual Drainage Report, an assessment was made of the opportunities to combine the flood control element of the roadway project with broader flood protection of the overall area. The development of regional drainage solutions in the Padelford Wash area has been explored by the project partners. Further coordination and additional studies will be required to define and quantify in more detail the benefits to the transportation grid that could also improve flood protection for the area's residents.

5.1 163rd Avenue Candidate Assessment Report

The *163rd Avenue Candidate Assessment Report* was completed by MCDOT in 2004. The purpose of the report was to identify a regional arterial street plan and to identify a preferred alignment for the development of 163rd Avenue between US 60 (Grand Avenue) and SR 74. Drainage improvements for the preferred alternative (referred in this report as the CAR Alternative) were identified by using a factor of 800 cfs per square mile of contributing watershed at major wash crossings. Drainage data from the CAR are not used in this report, as new data have been developed based on studies completed by the FCDMC.

5.2 Padelford Wash Floodplain Delineation Study (FDS)

The FCDMC completed the *Padelford Wash Floodplain Delineation Study* (FDS) in 2002. Subsequently, a Letter of Map Revision was issued with an effective date of October 12, 2005, by which FEMA accepted the proposed floodplain delineation for the reach of Padelford Wash between the CAP canal and SR 74. Flow data from the Padelford Wash FDS are used in this report for the estimation of peak flows at potential roadway wash crossings.

5.3 Wittmann Area Drainage Master Study (ADMS) Update

The *Wittmann ADMS Update* was completed in 2004. The study covered the area bounded by the Hieroglyphic Mountains to the north and northeast, the White Tank Mountains and McMicken Dam and its outlet channel to the south, the Agua Fria River to the east, and the Hassayampa River basin to the west. The 163rd Avenue CIS project area is a subset of the ADMS' area. Basin delineation and flow data from the ADMS are used in this report to estimate peak flows at potential roadway wash crossings.

Preparation of the *Wittmann Area Drainage Master Plan* (ADMP) is underway. The drainage system through this area includes many features and conditions that are very sensitive to human activity and in particular to linear features such as roadways. These include sheet flow, alluvial fans, split flow, erodible soils, and others. In order to insure that the drainage does not have an adverse affect on the road, and that the road does not have an adverse affect on the drainage, cooperation between the two agencies will be advantageous. MCDOT and FCDMC have recognized the opportunity to collaborate on their respective studies and investigate the potential to provide a regional drainage solution to protect the roadway and benefit the area which is currently engulfed with flood plains that reflect the severity of flooding potential in the area. Several meetings have been held during the CIS/DCR process to understand the drainage challenges of the area and strategize potential solutions. The FCDMC has played an integral role in developing the corridor alignment of 163rd Avenue.

The concept of coordinated regional drainage system and transportation system solutions is advantageous to MCDOT, the FCDMC, the Cities of Surprise and Peoria, as well as the local property owners currently residing in the floodplain. The process to arrive at the solution will be initiated by MCDOT by requesting the FCDMC to consider regional features in the vicinity of the 163rd alignment as part of the *Wittmann ADMP*. The FCDMC will then conduct a more thorough investigation and make recommendations. An Intergovernmental Agreement (IGA) between the agencies will be required to implement the improvements. After regional flood control improvements have been defined, other drainage requirements for 163rd Avenue can be adjusted to reflect the effect of regional improvements which most likely will reduce flows in Padelford Wash.

5.4 Hydrology

5.4.1 Contributing Basins and Existing Drainage Systems

The delineation of major contributing basins was completed in the Wittmann ADMS Update. A map of the watersheds that contribute flows to the project area is included in Figure 5.4. The basin delineation was taken from the ADMS, as well as flow data for basin runoff, points of concentration and routing segments. Padelford Wash is the most significant natural drainage feature of the area, traversing it in a north-south direction. Several other washes follow the general direction of Padelford Wash.

The CAP canal and its protection levees cut across the study area, intersecting all drainage ways. The CAP levees create impoundment pools that store flood waters and meter their outfall through overchutes (pipes under the levees and crossing over the CAP canal). Storage capacity behind the CAP levees is sufficient to store the 100-year storm without overtopping for the section within this project's limits.

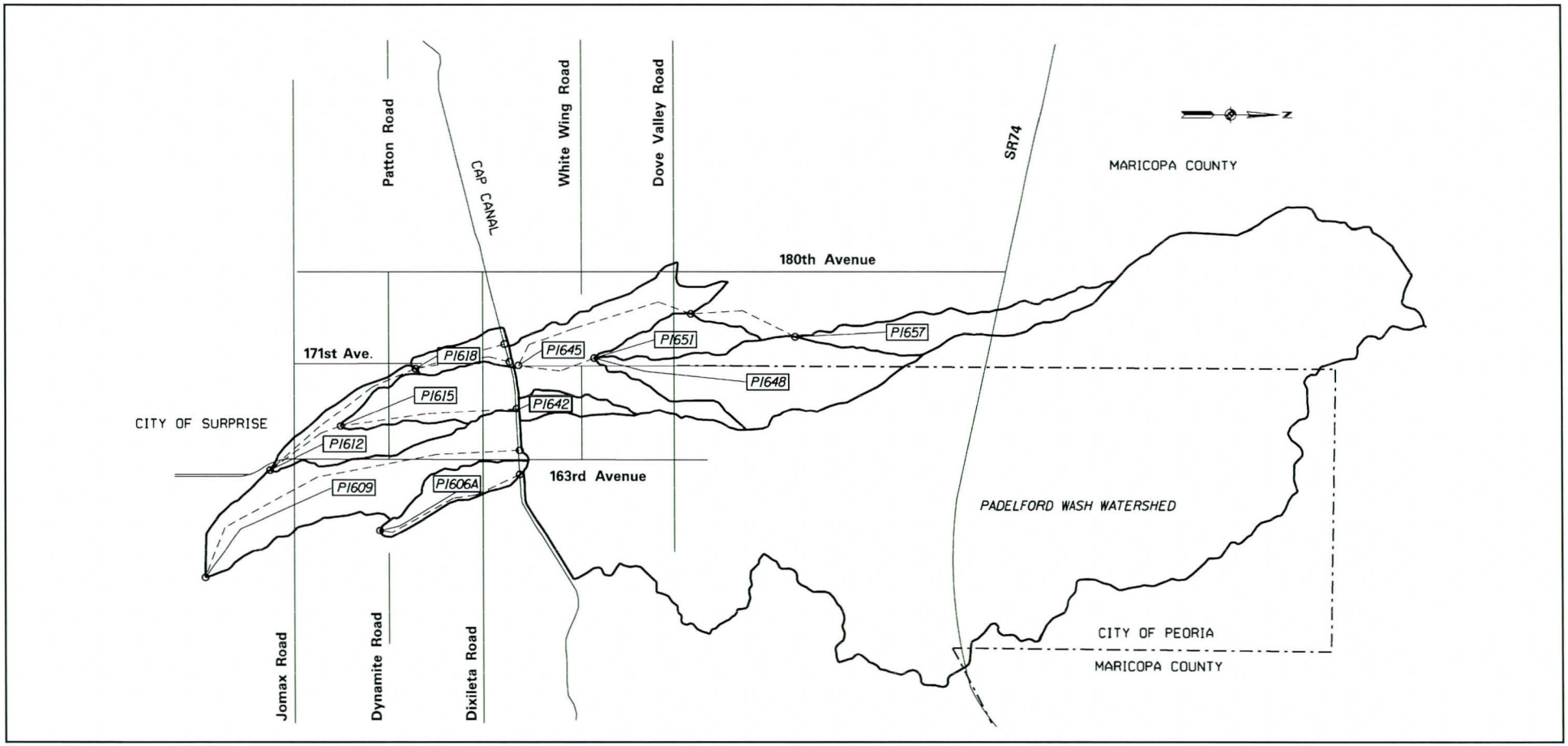


Figure 5.4
Contributing Watersheds

Legend

- P1657 Basin ID
- Point of Concentration
- Schematic Routing Path

Not to Scale

Source: Wittmann Area Drainage Master Study Update

5.4.2 CAP Canal at the Intersection with 163rd Avenue

The CAP canal structures and a box culvert at the intersection of 163rd Avenue and Jomax Road are the only significant man-made drainage features in the study area. Existing roads south of Dove Valley Road have rolling alignments that allow at grade passage of storm flows. Flooding of the roadways occurs during rainfall events at dip wash crossings and in sections of the road where washes flow along the pavement.

5.4.3 Padelford Wash- Typical Shallow Alluvial Fan Channel

The main channel of Padelford Wash is well defined and incised from its origin north of SR 74 to a point approximately 0.5 miles north of the Dove Valley Road alignment, where it opens onto an alluvial fan. The fan splits into several channels with shallow banks that are overtopped during significant events. The base of the alluvial fan is about one mile wide at the intersection with the CAP canal, continuing its expansion to the south. The CAP levees make the alluvial fan inactive downstream of the canal, given the controlled release of flows through overchutes.

Alluvial Fan of Padelford Wash

5.5 Delineated Floodplains and Waters of the U.S.

The 100-year floodplains have been delineated in the study area for Padelford Wash and are shown on Figure 5.5. Base flood elevation lines have been developed for the inactive alluvial fan. Most natural channels in the study area may be considered to fit the criteria for designation as jurisdictional waters of the United States, and would therefore be regulated by the United States Army Corps of Engineers (USACOE). In recent times, streams that are tributaries to waterways of regional significance, such as the Agua Fria River, have been given a "Jurisdictional Waters of the US" (jurisdictional waters) designation. Construction of roadway improvements within delineated jurisdictional waters will require permits issued by the USACOE.

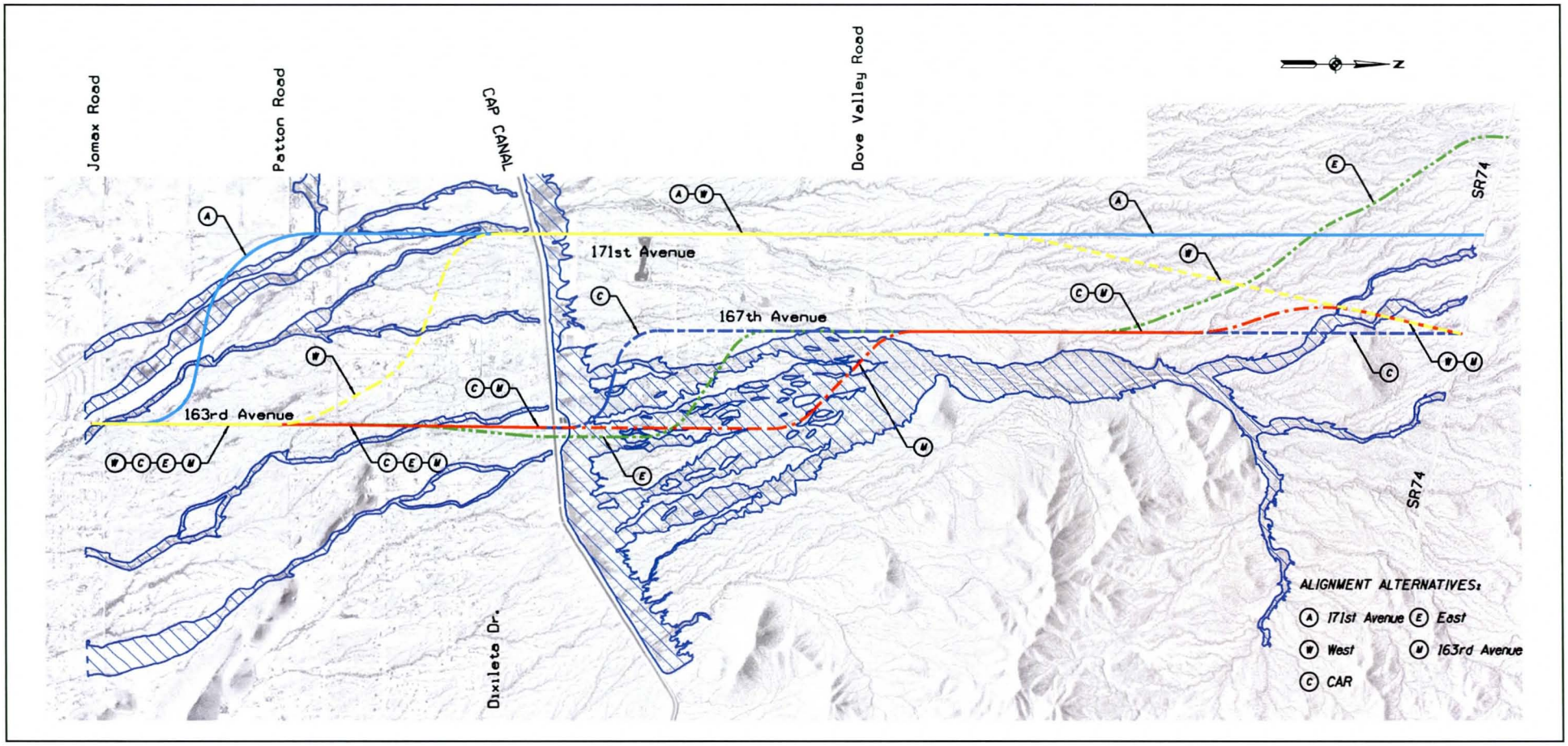


Figure 5.5
Delineated FEMA Floodplains

Legend

100-Year Delineated Floodplain

Alignment Alternatives (typical)

Not to Scale

Sources: Wittmann Area Drainage Master Study Update
Padelford Wash Flood Delineation Study

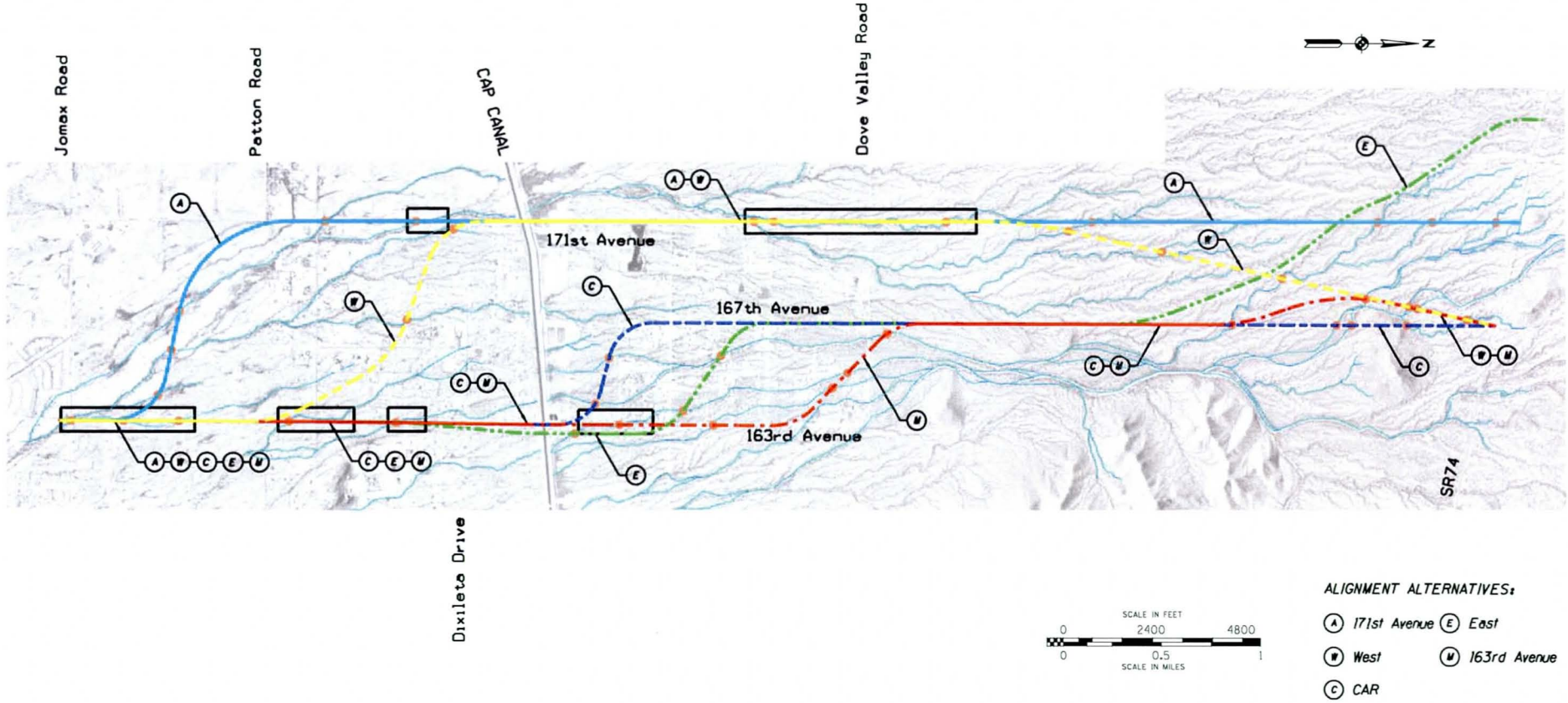


Figure 5.6
Wash Realignment Requirements

Legend

- Reach of Wash Realignment
- Wash Crossings
- Alignment Alternatives

5.6 Drainage Impacts of Alternative Alignments

All proposed alternatives require considerable drainage improvements given the mostly undisturbed character of the project area. The timing of construction of roadway improvements in relation to urban development of the area will define the need for structural improvements. Urban development is expected to maintain major drainage patterns and eliminate minor channels as the land is regraded and structures are built, thus reducing roadway improvements to major culvert crossings and disposal of pavement runoff. Collector channels would otherwise be needed along the upstream side of the roadway should the roadway be constructed prior to urban development of the area.

A new bridge crossing over the CAP canal will be required for all alternatives. Crossing the canal and associated facilities must be designed and constructed following CAP guidelines. The guidelines address horizontal and vertical clearance requirements for the canal and maintenance roads. Crossing of the canal protection levees shall also follow Bureau of Reclamation (BOR) and Federal Emergency Management Agency (FEMA) guidelines and standards.

Some washes may need to be realigned at several locations given the proximity of the roadway to the channel and the very shallow angle of approach to the intersection. An approximation of wash realignment needs is depicted on Figure 5.6. The segment immediately north of Jomax Road is an existing problem area common to all alternatives. More than 300 cfs are calculated to flow immediately along the roadway for nearly half-a-mile during the 100-year event. It should be noted that wash realignments have regulatory implications that pertain to environmental permits, generally require right-of-way or easements in addition to what is dedicated to the roadway cross section, and tend to increase life-cycle operation and maintenance costs.

5.7 Existing Structures

There are two drainage structures existing within the study area. A 5-7'x3' CBC is located beneath the 163rd Avenue and Jomax Road intersection. The second structure is an existing bridge structure within the project limit, the Sarival Avenue (163rd Avenue) Bridge crossing Granite Reef Aqueduct (CAP canal).

The Sarival Avenue CAP Canal Bridge was constructed in 1980 by the BOR at the same time as construction of the CAP canal. The crossing is a one span pre-cast pre-stressed concrete I-Girder bridge with a reinforced concrete deck. The out-to-out roadway is 48 feet. The overall width is 59'-7". The superstructure is supported by abutments founded on spread footings. The bridge crosses the canal with a skew of approximately 4.5 degrees and with a total length of about 88 feet.

Section 6
Utilities Overview

6 Utilities Overview

The Utility Overview describes the existing utilities, planned utilities and potential utility conflicts located within the study area, see Appendix D for the Technical Memorandum.

6.1 Existing Utilities

The existing utilities and contact information are provided in Table 6.1. The majority of the utilities are concentrated in the southern portion of the study area between Jomax Road and Dove Valley Road as shown in Figure 6.1. Both public and private utilities are present. The existing utilities include overhead power, underground electric, water, sewer, well fill, effluent, gas, telephone, fiber optic and coaxial cable. Only one known utility exists north of Dove Valley Road, which is a water line that serves the Quintero Golf Course located north of SR 74.

Table 6.1: Utility Contacts

Utility	Facility	Contact	Information
Arizona American Water Company	Water , Sewer	Mike Conilin	105626 North Dell-Webb Boulevard Sun City, AZ (623) 445-2450
Arizona Department of Transportation	Water, Sanitary Sewer, Storm Drain, Traffic Signals, Fiber Optics, Telephone, Electric	Janet Doerstling	1109 Commerce Drive Prescott, AZ 86305 (928)777-5877
Arizona Public Service	Electric	Cary Deice	(602) 250-1232
City of Peoria	Water, Wastewater	Shawn Kreuziesner	8401 West Monroe Street Peoria, AZ 85345 (623) 773-7643
City of Surprise	Water, Wastewater	Engineering: Todd Gilham	12425 West Bell Road Surprise, AZ 85374 (623)583-6025
Central Arizona Water Conservation District	Electric, Fiber Optics, Coaxial	Tom Fitzgerald Abe Sahli	23636 North 7th Avenue Phoenix AZ 85024 (623) 869-2209
Cox Communications	Cable TV, Fiber Optics	Terran Gutierrez	1550 West Deer Valley Road Phoenix, AZ 85027 (623) 328-3569
Quintero Golf Course	Water	Rod Meyers	(928) 501-1580
QWest Local Networks	Fiber Optics, Telephone	Steffan Cline	6350 South Maple Avenue Room 125 Tempe, AZ 85283 (602) 630-1435
Saguaro Acres CFD	Water	Robert Chentfant	(623) 584-3467
Saguaro View Management	Water	Rick Malero	623-546-2840 623-546-2840 (fax)
Southwest Gas	High Pressure Natural Gas, Low Pressure Natural Gas	Claudia Fisher	9 South 43rd Avenue Phoenix, AZ 85009 (602) 484-5294

163rd Avenue CIS
Jomax Road to SR 74

Figure 6.1-1
Existing Utilities

- Overhead Primary
- Conduit/Duct/Direct Buried
- Gas
- Water
- Reclaimed Water
- Sewer
- Cable Television
- Telephone
- Study Area

N 171st Ave (Cotton Ln)
N 167th Ave
N 167th Ave
W Jomax Rd
N Dale Ln
N 163rd Ave
W Dixileta Dr
W Montgomery Rd
W White Wing Rd
W Quail Run Rd
N 155th Ave (Reems Rd)
Match Line - Figure 6.1-2

0 0.1 0.2 0.3 0.4 0.5 Miles

Source:
Electric Power– Arizona Public Service (APS)

Note:
This map is provided solely for display and reference purposes. The utility locations shown on this map are approximate only and are not reliable for construction purposes. In addition, there may be facilities in existence due to recent construction that are not shown.

163rd Avenue CIS
Jomax Road to SR 74

Figure 6.1-2
Existing Utilities

- Overhead Primary
- Conduit/Duct/Direct Buried
- Gas
- Water
- Reclaimed Water
- Sewer
- Cable Television
- Telephone
- Study Area

0 0.1 0.2 0.3 0.4 0.5 Miles

Source:
Electric Power – Arizona Public Service (APS)

Note:
This map is provided solely for display and reference purposes. The utility locations shown on this map are approximate only and are not reliable for construction purposes. In addition, there may be facilities in existence due to recent construction that are not shown.

W Dove Valley Rd

N 171st Ave

N 167th Ave

N 163rd Ave

SR 74

Match Line - Figure 6.1-1

6.1.1 Electric

Arizona Public Service (APS) is the owner of the electric power lines within the study area. These lines service the local residences and consist of overhead primary and secondary lines, direct buried lines and underground secondary lines. No transmission lines are located within the study area.

Overhead primary lines have been installed along most streets between Jomax Road and Dove Valley Road. Conduit/direct buried lines have been installed along Jomax Road, White Wing Road and a few other shorter segments along the local residential streets.

Power Lines on 163rd Avenue

6.1.2 Water and Wastewater

Most residents within the study area obtain water from groundwater wells and utilize septic systems for waste. The City of Surprise owns minimal water and sewer lines within the study area. According to As-Built Maps, the City of Peoria does not have any water or sewer facilities within the study area. However, during conversations with Quintero Golf Course it was mentioned that the City of Peoria is in the process of acquiring the existing private water line that exists between the CAP canal and SR 74.

6.1.3 Pipelines

Along Jomax Road, a 16" water line, 15" sewer line, a well fill line and an effluent line have been recently installed for the City of Surprise to service the Desert Oasis development. An existing private water line has been installed from the CAP canal to SR 74. The 18" water line services the Quintero Golf Course located north of SR 74. The line originates at the CAP canal and proceeds north along the 163rd Avenue alignment. At Dove Valley Road, the water line bends west to 167th Avenue along the Dove Valley Road alignment. The water line then continues north to SR 74 along the 167th Avenue alignment. Representatives of Quintero Golf Course mentioned that this line will be acquired by the City of Peoria.

6.1.4 CAP Canal Facilities

The CAP Hayden-Rhodes Aqueduct bisects the study area between the Dixileta Drive and White Wing Road (Lone Mountain Road) alignments. A CAP canal crossing structure exists at 163rd Avenue. Access roads are provided from 163rd Avenue to the maintenance roads located on the northern and southern banks of the canal.

CAP Canal with Overchute

On the north side of the canal, a levee system protects the canal from drainage runoff. Several 72" diameter overchutes span the canal. An existing recharge project utilizes two sets of retention basins between 171st Avenue and 163rd Avenue. Several green-up areas exist along the canal within the study area.

The Quintero Turnout is located in the northwest quadrant of the canal and 163rd Avenue. Water is piped from the turnout to the Quintero Golf Course north of SR 74.

6.1.5 Gas

Southwest Gas supplies gas to the project area. Gas service is limited to a 6" polyethylene line that runs along Jomax Road between 171st Avenue and 163rd Avenue. The gas line provides service to the Desert Oasis residential development.

6.1.6 Communications

Both Qwest Local Networks and Cox Communications have underground facilities within the project area, see Figure 16. These facilities consist of telephone lines, fiber optic cables and cable television (CATV) that provide service to local residents.

6.1.7 Telephone Lines

The primary distribution lines run along 163rd Avenue and Jomax Road. Service lines are located on Dale Road, Dixileta Drive, White Wing Road, 171st Avenue, 167th Avenue, 165th Avenue, and other fragmented segments.

6.1.8 Fiber Optic Cables

The existing maps received by the utility companies did not show fiber optic lines, however during field reconnaissance, evidence of fiber optic infrastructure was present. A splice box was located on 163rd Avenue near Dixileta Drive. Fiber optic equipment likely belongs to QWest Local Networks. When contacted after the field investigation, QWest Local Networks still did not have any information about the splice box. Follow-up is required.

6.1.9 CATV

Cox Communication owns CATV lines along Jomax Road between 170th Avenue alignment to east of 163rd Avenue. According to the provided maps, these are the only Cox facilities in the study area.

6.2 Planned Utilities

Planned utilities within the study area include new water and sewer facilities for the Cities of Surprise and Peoria, a new gas pipeline by Southwest Gas and a serving area interface by Qwest, see Figure 6.2. The Arizona Department of Transportation, APS and CAP do not have any new facilities planned for the study area.

The City of Surprise is involved with the future planning of water and wastewater facilities between Jomax Road and Dove Valley Road. While a specific plan is not yet available, it is anticipated that the new water and sewer facilities will installed in the three to five year time-frame.

City of Peoria maps from the Water Master Plan (October 2006) show that a network of 12", 16" and 24" water mains along with a reservoir to be installed between Dove Valley Road and SR 74 by the year 2010. By the year 2015, the system will be expanded with several 16" water mains and a pump station. Additional 12" water mains have been planned for the year 2030. As indicated in the City of Peoria Wastewater Master Plan, new infrastructure will be installed within the project area. The Padelford Wastewater Treatment Plant and a lift station are planned to be installed near 163rd Avenue and Cloud Road. Wastewater lines connecting to these facilities include a 6" force main and 8", 10", 12", and 15" gravity lines.

Both Southwest Gas and Qwest will continue to respond to service demand for the developing area. In addition, Southwest Gas plans to install a 16" pipeline along SR 74 within the next three years and Qwest will install a Serving Area Interface near the intersection of 163rd and White Wing Road for a new distribution area.

163rd Avenue CIS
Jomax Road to SR 74

Figure 6.2-1
Planned Utilities

- Planned Gas
- Planned Water
- Planned Sewer
- Planned Telephone
- Serving Area Interface
- Study Area

N 171st Ave (Cotton Ln)
N 167th Ave
N 167th Ave
W Jomax Rd
N Dale Ln
N 163rd Ave
W Dixileta Dr
W Montgomery Rd
W White Wing Rd
W Quail Run Rd
N 155th Ave (Reems Rd)
Match Line - Figure 6.2-2

0 0.1 0.2 0.3 0.4 0.5 Miles

Note:
This map is provided solely for display and reference purposes. The utility locations shown on this map are approximate only and are not reliable for construction purposes. In addition, there may be facilities in existence due to recent construction that are not shown.

163rd Avenue CIS
Jomax Road to SR 74

Figure 6.2-2
Planned Utilities

- Gas
- Water
- Sewer
- Telephone
- PS — Water Pump Station
- LS — Wastewater Lift Station
- Padelford Wastewater Treatement Plant
- Water Reservoir
- Study Area

W Dove Valley Rd

N 171st Ave

N 167th Ave

N 163rd Ave

SR 74

PS

LS

Match Line - Figure 6.2-1

0 0.1 0.2 0.3 0.4 0.5 Miles

Note:
This map is provided solely for display and reference purposes. The utility locations shown on this map are approximate only and are not reliable for construction purposes. In addition, there may be facilities in existence due to recent construction that are not shown.

Section 7
Alternatives Development and Evaluation

7 Alternatives Development and Evaluation

Seven corridor alignments were identified during the study process. The alignments considered generally range east/west from 163rd Avenue to 175th Avenue and are limited to varying degrees by common or fixed points at the southerly and northerly termini of the alignment. In between the project termini, the alignments sought to maintain good design standards and to avoid impacts. The evaluation of all the alignments compared the performance of each against a common set of technical evaluation measures and public input to arrive at a preferred option.

The CAR prepared by MCDOT in 2002 established one alignment that served as a basis of comparison for the CIS options. The alignment in the CAR was chosen after evaluation of multiple routes, but given the level of analysis, was not able to fully account for some of the impacts. The CIS used CAR information as a starting point to determine a preferred corridor alignment that would serve the purpose and need of the project, but that would also respect the sensitive activities and features in the study area.

7.1 Corridor Development Considerations & Major Constraints

The CIS alignments were developed with key corridor considerations and major constraints in mind. This section describes the key considerations and major constraints.

7.1.1 Existing Residential Development

The existence of residential development in the project area was a major consideration in developing alignments. Low density development was limited to the area between Jomax Road and Dove Valley Road. Where possible, alignments were moved away from property lines to avoid any impact on occupied residential parcels.

7.1.2 Project Termini

Logical alignment termini locations for 163rd Avenue were defined by other developments and studies. At the southerly end of the project, construction of 163rd Avenue by developers south of the Jomax Road intersection essentially prevents moving the road from its current alignment. At the northern end, at SR 74, ADOT has designated the intersection of SR 74 with 167th Avenue as a future grade separated traffic interchange. Movement from these locations would result in significant throwaway improvements, realignment of approach roadways and concurrence by several outside agencies.

7.1.3 CAP Canal Crossing

The CAP Hayden-Rhodes Aqueduct bisects the study area between the Dixileta Drive and White Wing Road (Lone Mountain Parkway) alignments. An existing structure spans the canal at 163rd Avenue at grade. The CAP now requires all crossing structures to be grade separated with a minimum vertical clearance of 14'-10" above the O&M roads. Along with the crossing structure, several other components of the canal impacted the alignment development. The Quintero Turnout is located at the northwest corner of the existing crossing and the basins are located immediately west of the turnout. The turnout itself could not be impacted. Access to the canal exists at four locations and full access must be maintained as part of the alignment

improvements. In addition, a national trail has been designated adjacent to the canal on the south side. The trail must be accommodated under bridge with a 20-foot width for the trail and 10-foot donated extra space. Several 'green-up' areas are located along the canal. The alignments can not cut through the green-up areas. The 'green-up' areas were set up by the Bureau of Reclamation as areas to mitigate the loss of habitat from the construction of the aqueduct. The CAP owns levees along the north side of the canal for water retention. No drainage can enter the canal with the alignment improvements. Reconstruction of any levees will involve meeting the new federal standards developed by FEMA.

7.1.4 Padelford Wash

The Padelford Wash is the primary drainage course within the study area. Minimizing the crossing of washes where possible or at least minimizing the crossing of major drainage ways where more significant and costly structural solutions would be required were key strategies in alignment development.

7.2 Alignment Corridor Alternatives Considered and Discontinued

Of the seven alignments identified, two were eliminated at the first study stakeholder meeting held October 18, 2006. Both options featured 163rd Avenue traversing the area east of the 167th Avenue alignment between Dove Valley Road and SR 74. The 167th Avenue alignment essentially falls on the ridge line for the Padelford Wash drainage area and the area to the east of the ridge line is fully within the 100-year floodplain. The FCDMC recommended eliminating these alignments from the study alternatives based upon their analysis of the area.

7.3 Alignment Corridor Alternatives Studied

Five primary alignment corridor alternatives were studied. Each alternative consists of an urban six-lane typical section. From Jomax Road to the south approach of the Dove Valley Road intersection, the City of Surprise Parkway Typical Section is utilized which has a 60 foot median to accommodate the indirect left turn intersection concept. Between Dove Valley Road and SR 74, the City of Peoria Parkway Typical Section is utilized.

Points of drainage concentration for five alignment alternatives were identified by plotting the proposed corridors on the basin areas taken from the Wittmann ADMS Update. Intersections between the corridor alignments and main channels were designated as points of concentration. A preliminary approach to sizing the cross drainage structures was to quantify the number of 6'x5' concrete box culvert (CBC) barrels needed to pass the 100-year flow. The 6'x5' CBC is the size of the existing Padelford Wash CBC at SR 74. Each CBC barrel is assumed to have a capacity of 200 cfs, using an inlet control calculation with headwater equal to barrel height (hw=5'). For comparison purposes, a bridged crossing (vs. a culvert crossing) is assumed at any concentration point requiring more than 15-6'x5' CBC barrels. Also, for simplicity of comparison, a single barrel is the minimum culvert size (some concentration points have flows lower than 200 cfs).

Alternative 1A, West Alignment – The horizontal alignment begins at the Jomax Road intersection and follows the existing 163rd Avenue alignment northward for about one mile where it turns northwesterly to join the alignment of 171st Avenue just south of the CAP canal. Alternative 1A remains on 171st Avenue until approximately one mile north of Dove Valley Road where it turns northeasterly and follows a straight line to the intersection of SR 74 and the entrance to the Quintero development.

The alignment crosses 16 washes for a total of 71 6'x5' reinforced concrete box culvert barrels. The impact to the floodplains is minor. There is a moderate need for wash realignment in the vicinity of Dove Valley Road.

The minimum required right-of-way width is 200 feet for the City of Surprise typical section and 150 feet for the City of Peoria typical section, which results in approximately 150 acres of new right-of-way. Approximately 4 residential homes will be impacted by this alternative.

Utility relocations are required to accommodate the improvements associated with this alternative. The primary utility impacted is APS overhead power.

Alternative 2D, CAR Alignment – The CAR alignment follows the routing defined in the CAR completed in 2002. The alignment follows the existing 163rd Avenue roadway between Jomax Road and Montgomery Road, which is located immediately north of the CAP crossing. At Montgomery Road small radii reverse curves realign the roadway onto the 167th Avenue alignment. The alignment continues along 167th Avenue to SR 74.

The alignment crosses 11 washes for a total of 66 6'x5' reinforced concrete box culvert barrels. The impact to the floodplains is significant. There is a moderate need for wash realignment along the existing 163rd Avenue roadway.

The minimum required right-of-way width is 200 feet for the City of Surprise typical section and 150 feet for the City of Peoria typical section, which results in approximately 138 acres of new right-of-way. Approximately 19 residential homes will be impacted by this alternative.

Utility relocations are required to accommodate the improvements associated with this alternative. The primary utility impacted is APS overhead power. Also, the Quintero waterline is located between the CAP canal and SR 74 along the 163rd Avenue/Dove Valley Road/167th Avenue alignment. More information is needed before determining if the waterline is in conflict.

Alternative 3B, East Alignment – Alternative 3B follows the existing 163rd Avenue roadway to Dixileta Drive where it moves slightly to the east of the alignment as it crosses the CAP canal. It remains east of the 163rd Avenue section line until White Wing Road where it returns westward to align with 167th Avenue. It remains on this alignment until about one and a half miles north of Dove Valley Road where it follows a ridge to 175th Avenue at SR 74.

The alignment crosses 12 washes for a total of 57 6'x5' reinforced concrete box culvert barrels. The impact to the floodplains is significant. There is a moderate need for wash realignment along the existing 163rd Avenue roadway and White Wing Road.

The minimum required right-of-way width is 200 feet for the City of Surprise typical section and 150 feet for the City of Peoria typical section, which results in approximately 145 acres of new right-of-way. Approximately 8 residential homes will be impacted by this alternative.

Utility relocations are required to accommodate the improvements associated with this alternative. The primary utility impacted is APS overhead power. Also, the Quintero waterline is located between the CAP canal and SR 74 along the 163rd Avenue/Dove Valley Road/167th Avenue alignment. More information is needed before determining if the waterline is in conflict.

Alternative 4C, 163rd Avenue Alignment – This route follows 163rd Avenue until about one half mile south of Dove Valley Road where it moves northeasterly toward the 167th Avenue alignment and remains there until its intersection with SR 74. The alignment shifts for a short distance to accommodate drainage and topography just south of SR 74. This alignment has minimal impact on homes and manages drainage crossings effectively.

The alignment crosses 13 washes for a total of 98 6'x5' reinforced concrete box culvert barrels. The impact to the floodplains is significant. There is a significant need for wash realignment along the existing 163rd Avenue roadway and White Wing Road.

The minimum required right-of-way width is 200 feet for the City of Surprise typical section and 150 feet for the City of Peoria typical section, which results in approximately 137 acres of new right-of-way. Approximately 2 residential homes will be impacted by this alternative.

Utility relocations are required to accommodate the improvements associated with this alternative. The primary utility impacted is APS overhead power. Also, the Quintero waterline is located between the CAP canal and SR 74 along the 163rd Avenue/Dove Valley Road/167th Avenue alignment. More information is needed before determining if the waterline is in conflict.

Alternative 7C, 171st Avenue Alignment – Is similar to Alternative 1A, but moves westward to 171st Avenue within a half mile of the intersection with Jomax Road. It remains on the 171st alignment until it intersects SR 74. This option affects residential properties and does not have an acceptable northerly terminus at SR 74.

The alignment crosses 15 washes for a total of 84 6'x5' reinforced concrete box culvert barrels. The impact to the floodplains is moderate. There is a significant need for wash realignment in the vicinity of Dove Valley Road.

The minimum required right-of-way width is 200 feet for the City of Surprise typical section and 150 feet for the City of Peoria typical section, which results in approximately 150 acres of new right-of-way. Approximately 3 residential homes will be impacted by this alternative.

Utility relocations are required to accommodate the improvements associated with this alternative. The primary utility impacted is APS overhead power.

7.4 Evaluation of Alignment Alternatives

To aid in understanding impact evaluation, the alignments were divided into three segments. At the larger scale, many impacts become clear by observation. Dividing the study area into segments also allowed for a more rigorous technical assessment of the engineering details of the proposed roadway plan. The three segments were defined (from south to north) as follows:

- Segment 1 – Jomax Road to the CAP Canal (Figure 7.4-1)
- Segment 2 – CAP Canal to Dove Valley Road (Figure 7.4-2)
- Segment 3 – Dove Valley Road to SR 74 (Figure 7.4-3)

The alignments within each segment were evaluated based on the following criteria categories:

- Engineering Features
- Traffic/Transportation Planning
- Environmental Impacts
- Utility Considerations
- Right-of-Way Requirements
- Socio-Economic Data
- Public Opinion

Several components of each category were identified then rated as minimally, moderately or significantly impacted as a result of the alignment alternative. Features of the alignments that could not be mitigated were identified as "Fatal Flaws". These technical assessments were complemented by a public outreach process that helped further narrow the options and, ultimately, select a preferred alignment. The results of the evaluation process are shown in Tables 7.4-1, 7.4-2 and 7.4-3.

Within Segment 1, three alignments follow the existing 163rd Avenue roadway and two alignments curve westerly from 163rd Avenue to 171st Avenue. The five alignments impose few impacts within this segment. However, by realigning 163rd Avenue onto the 171st Avenue alignment, future arterials with six-lane capacity (163rd Avenue) plus four-lane capacity (171st Avenue) become just one six-lane facility. Alternatives 1A – West Alignment and 7C – 171st Avenue Alignment were eliminated as fatally flawed because they reduce north-south capacity in the northwest region of Maricopa County.

Alternatives 2D, 3B and 4C curve westerly to the 167th Avenue alignment at different locations and skews after crossing the CAP in Segment 2. Alternative 2D has the most dramatic shift using reverse curvature, thereby requiring the greatest roadway superelevation. Though Alternative 2D requires relatively few drainage structures, this alternative impacts the largest number of residential homes. Alternative 3B impacts fewer homes and requires fewer drainage structures than Alternative 2D, but it crosses westerly in the vicinity of the future Lone Mountain Parkway intersection with 163rd Avenue creating undesirable intersection geometrics.

Figure 7.4-1: Segment 1 Alignment Alternatives

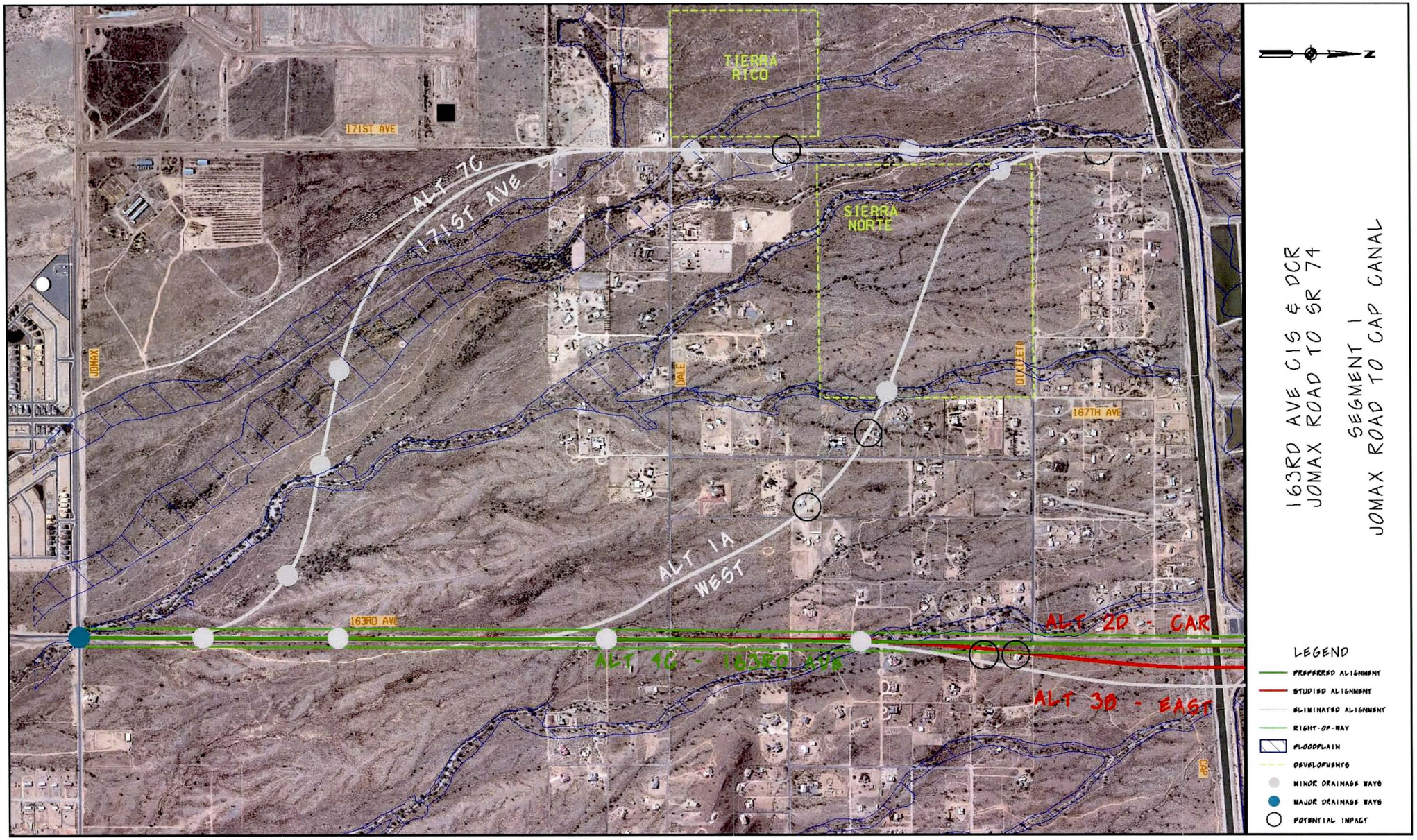


Table 7.4-1: Segment 1 Evaluation

Segment 1: Jomax Road to CAP Canal **Roadway Alignment Alternatives**					
Criterion	**1A** West Alignment	**2D** CAR Alignment	**3B** East Alignment	**4C** 163rd Ave Alignment	**7C** 171st Ave Alignment
Engineering Features					
Typical Section	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway
New Drainage Structures Requirements	⊙ 4 Minor Crossings 1 Major Crossing	⊙ 4 Minor Crossings 1 Major Crossing	⊙ 4 Minor Crossings 1 Major Crossing	⊙ 4 Minor Crossings 1 Major Crossing	● 6 Minor Crossings 1 Major Crossing
Earthwork Requirements	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain
Approach to Dale Rd & Dixileta Rd Intersections	● 163rd Ave is NW-SE Consider skew	O 163rd Ave is North-South	O 163rd Ave is North-South	O 163rd Ave is North-South	O 163rd Ave is North-South
Traffic /Transportation Planning					
City of Surprise Traffic Circulation Element	☒ Significant diversion from 163rd Ave	O On or near 163rd Ave	O On or near 163rd Ave	O On or near 163rd Ave	☒ Significant diversion from 163rd Ave
Access Mgmt Strategies Required	⊙ Local access needs	⊙ Local access needs	⊙ Local access needs	⊙ Local access needs	⊙ Local access needs
Environmental Impacts					
Negative Impact on Biological Resources	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.
Evidence of Hazardous Materials	O No hazardous materials identified.	O No hazardous materials identified	O No hazardous materials identified	O No hazardous materials identified	O No hazardous materials identified
Impact to 4f Properties	⊙ CAP Trail is 4(f) property.	⊙ CAP Trail is 4(f) property.	⊙ CAP Trail is 4(f) property.	⊙ CAP Trail is 4(f) property.	⊙ CAP Trail is 4(f) property.
Presence of Recorded Cultural Sites	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.
Utility Considerations					
Utility Relocation or Accommodation	⊙ New CAP Crossing Overhead Power, Underground Tele.	⊙ New CAP Crossing Overhead Power, Underground Tele.	⊙ New CAP Crossing Overhead Power, Underground Tele.	⊙ New CAP Crossing Overhead Power, Underground Tele.	● New CAP Crossing Most Overhead Power Relocation
Right-of-Way (ROW) Requirements					
New Public ROW Requirements	● 200 ft ROW (Surprise)	● 200 ft ROW (Surprise)	● 200 ft ROW (Surprise)	● 200 ft ROW (Surprise)	● 200 ft ROW (Surprise)
Socio-Economic					
Impact to State Land	● South of Dale Rd	O Minimal	⊙ North of Dixileta Rd	O Minimal	O None
Impact to Improved Properties	⊙ 3 Residential Impacts	⊙ 2 Residential Impacts	⊙ 2 Residential Impact	⊙ 2 Residential Impacts	⊙ 2 Residential Impacts
Impact to Proposed Development	● Sierra Norte (Preliminary Plat)	O No adjacent developments	O No adjacent developments	O No adjacent developments	⊙ Tierra Rico (Final Plat)
Existing & Future Land Use/Zoning Compatibility	☒ Not Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	☒ Not Compatible with General Plans

LEGEND: O No/Minimal Impact/Issue ⊙ Modest Impact/Issue ● Significant Impact/Issue ☒ Fatal Flaw

Figure 7.4-2: Segment 2 Alignment Alternatives

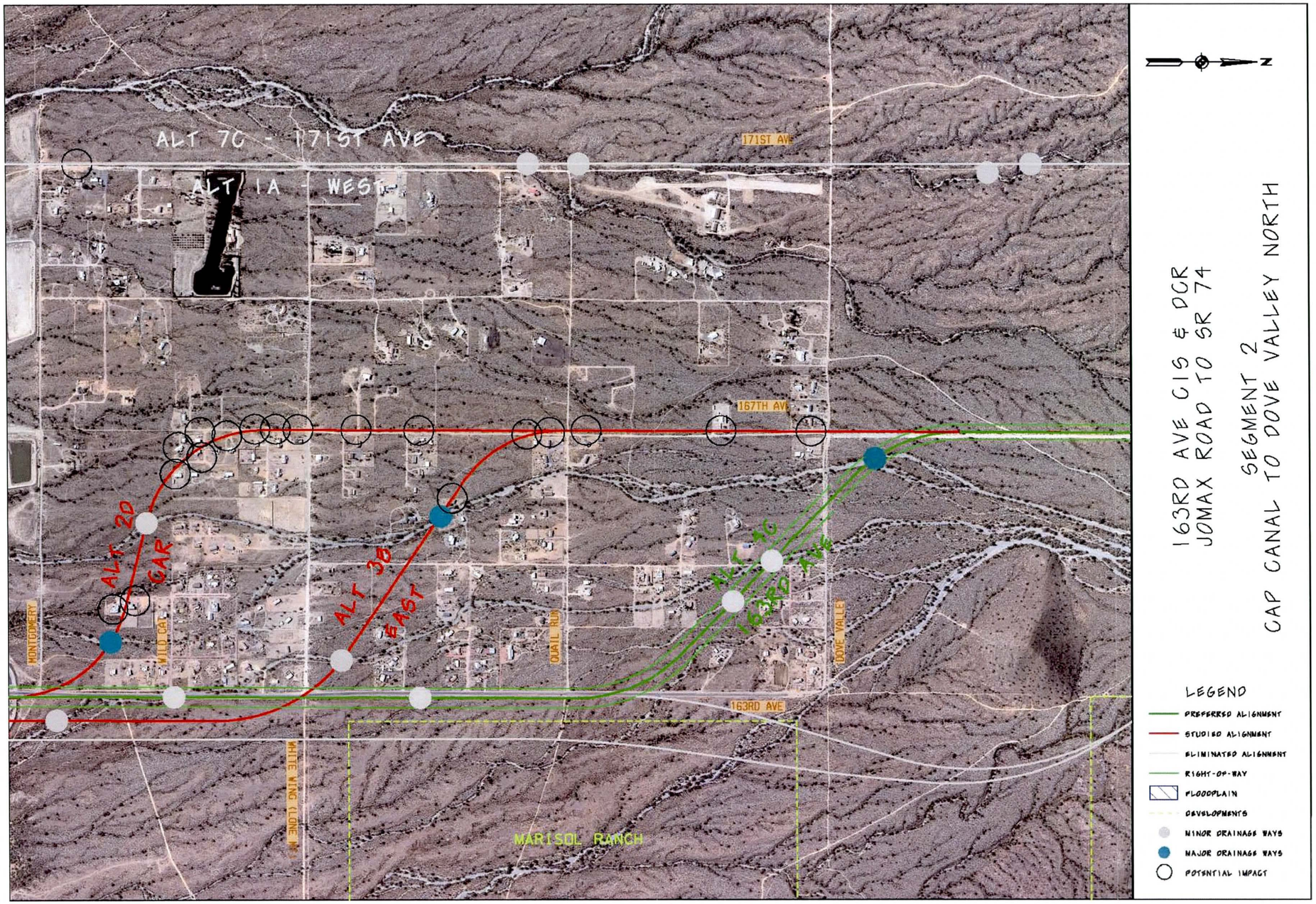


Table 7.4-2: Segment 2 Evaluation

Segment 2: CAP Canal to Dove Valley Road North **Roadway Alignment Alternatives**					
Criterion	**1A** **West Alignment**	**2D** **CAR Alignment**	**3B** **East Alignment**	**4C** **163rd Ave Alignment**	**7C** **171st Ave Alignment**
Engineering Features					
Typical Section	●6-Lane Parkway	●6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway
New Drainage Structures Requirements	⊙ 4 Minor Crossings	● 1 Minor Crossings 1 Bridge	● 2 Minor Crossings 1 Bridge	● 4 Minor Crossings 1 Bridge	⊙ 4 Minor Crossings
Earthwork Requirements	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain
Approach to Dove Valley Rd Intersection	O 163rd Ave is North-South	O 163rd Ave is North-South	O 163rd Ave is North-South	● 163rd Ave is NW-SE Consider skew	O 163rd Ave is North-South
Intersection Compatibility with Future Lone Mountain Road	O 163rd Ave is North-South	O 163rd Ave is North-South	● 163rd Ave is NW-SE Consider skew	O 163rd Ave is North-South	O 163rd Ave is North-South
Traffic /Transportation Planning					
City of Peoria General Plan	☒ Significant diversion	O Compatible with 163rd Ave alignment	O Compatible with 163rd Ave alignment	O Compatible with 163rd Ave alignment	☒ Significant diversion
City of Surprise Traffic Circulation Element	☒ Diversion needed	O Compatible with 163rd Ave alignment	O Compatible with 163rd Ave alignment	O Compatible with 163rd Ave alignment	☒ Diversion needed
Access Mgmt Strategies Required	⊙ Local access needs	● Significant access	⊙ Local access needs	⊙ Local access needs	⊙ Local access needs
Environmental Impacts					
Negative Impact on Biological Resources	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.
Evidence of Hazardous Materials	O No hazardous materials identified	O No hazardous materials identified	O No hazardous materials identified	O No hazardous materials identified	O No hazardous materials identified
Impact to 4f Properties	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified
Presence of Recorded Cultural Sites	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.
Utility Considerations					
Utility Relocation or Accommodation	⊙ Overhead Power	⊙ Overhead Power, Water	⊙ Overhead Power, Water	⊙ Overhead Power, Water	⊙ Overhead Power
Right-of-Way (ROW) Requirements					
New Public ROW Requirements	● 200 ft ROW (Surprise) 150 ft ROW (Peoria)	● 200 ft ROW (Surprise) 150 ft ROW (Peoria)	● 200 ft ROW (Surprise) 150 ft ROW (Peoria)	● 200 ft ROW (Surprise) 150 ft ROW (Peoria)	● 200 ft ROW (Surprise) 150 ft ROW (Peoria)
Socio-Economic					
Impact to State Land	O Minimal	O None	⊙ S/O Marisol Ranch	O Minimal	O None
Impact to Improved Properties	⊙ 1 Residential Impact	● 17 Residential Impacts	⊙ 6 Residential Impacts	O 0 Residential Impacts	⊙ 1 Residential Impacts
Impact to Proposed Development	⊙ Does not abut Marisol Ranch	⊙ Does not abut Marisol Ranch	⊙ Does not abut Marisol Ranch	O Direct access to Marisol Ranch	⊙ Does not abut Marisol Ranch
Land Use/Zoning Compatibility	☒ Not Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	☒ Not Compatible with General Plans

LEGEND: O No/Minimal Impact/Issue ⊙ Modest Impact/Issue ● Significant Impact/Issue ☒ Fatal Flaw

Figure 7.4-3: Segment 3 Alignment Alternatives

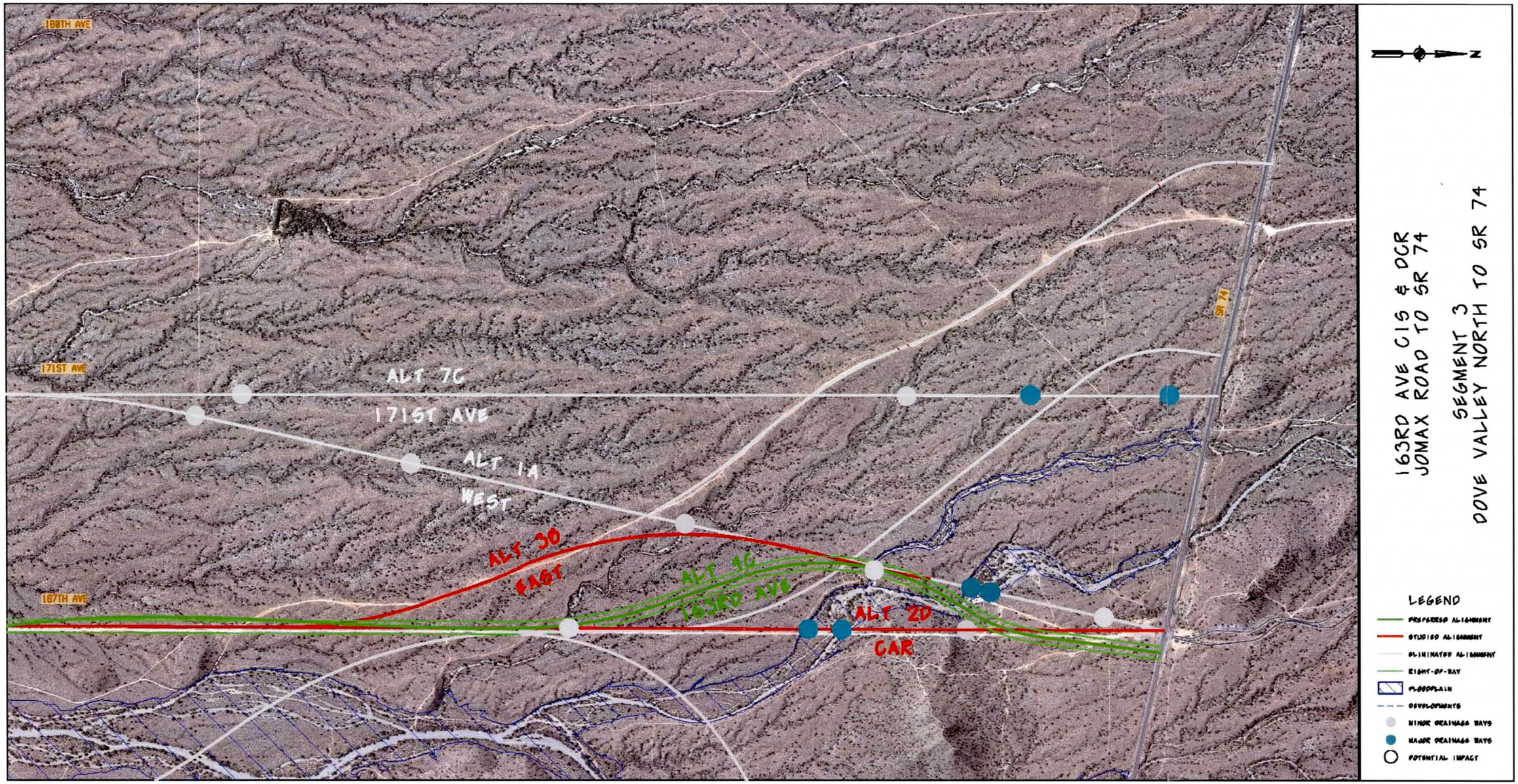


Table 7.4-3: Segment 3 Evaluation

Segment 3: Dove Valley Road North to SR 74 Roadway Alignment Alternatives					
Criterion	**1A** **West Alignment**	**2D** **CAR Alignment**	**3B** **East Alignment**	**4C** **163rd Ave Alignment**	**7C** **171st Ave Alignment**
Engineering Features					
Typical Section	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway	● 6-Lane Parkway
New Drainage Structures Requirements	●5 Minor Crossings 2 Major Crossings	● 2 Minor Crossings 2 Major Crossings	● 2 Minor Crossings 2 Major Crossings	● 2 Minor Crossings 1 Major Crossings	● 2 Minor Crossings 2 Major Crossings
Earthwork Requirements	O Minimal Cut and Fill Level Terrain	● Significant Excavation Cuts into hill	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain	O Minimal Cut and Fill Level Terrain
Quintero Rd Access	O No Impact	O No Impact	● Realign or add TI on SR 74	No Impact	● Realign or add TI on SR 74
Traffic /Transportation Planning					
Meets Existing SR 74 Connection Plans	O Yes	O Yes	● No; Poor SR 74 TI spacing	O Yes	⊙ No; Requires adjustment
City of Peoria General Plan	O OK	O OK	O OK	O OK	☒ Requires adjustment
Access Mgmt Strategies Required	O No access	O No access	O No access	O No access	O No access
Environmental Impacts					
Negative Impact on Biological Resources	⊙ No federally listed species identified. Desert tortoise may be present.	O No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.	⊙ No federally listed species identified. Desert tortoise may be present.
Evidence of Hazardous Materials	O No hazardous materials identified	O No hazardous materials identified. Household waste dumping on 167th Ave.	O No hazardous materials identified. Household waste dumping on 167th Ave.	O No hazardous materials identified. Household waste dumping on 167th Ave.	O No hazardous materials identified
Impact to 4f Properties	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified	O No 4(f) properties identified
Presence of Recorded Cultural Sites	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.	⊙ Numerous sites in area. Class III survey needed to determine impacts.
Utility Considerations					
Utility Relocation or Accommodation	⊙ Future water & wastewater coordination	⊙ Existing water; Future water & wastewater coordination	⊙ Existing water; Future water & wastewater coordination	⊙ Existing water; Future water & wastewater coordination	⊙ Future water & wastewater coordination
Right-of-Way (ROW) Requirements					
New Public ROW Requirements	● 150 ft ROW (Peoria)	● 150 ft ROW (Peoria)	● 150 ft ROW (Peoria)	● 150 ft ROW (Peoria)	● 150 ft ROW (Peoria)
Socio-Economic					
Impact to State Land	O Minimal	O None	⊙ S/O Marisol Ranch	O Minimal	O None
Impact to Improved Properties	O 0 Residential Impacts	O 0 Residential Impacts	O 0 Residential Impacts	O 0 Residential Impacts	O 0 Residential Impacts
Impact to Proposed Development	⊙ ¼ mile west of developments	O Direct access to developments	● ½ mile+ west of developments	⊙ ¼ mile west of developments	● ½ mile west of developments
Land Use/Zoning Compatibility	O Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	O Compatible with General Plans	☒ Not Compatible with General Plans

LEGEND: O No/Minimal Impact/Issue ⊙ Modest Impact/Issue ● Significant Impact/Issue ☒ Fatal Flaw

North of Dove Valley Road in Segment 3, the three viable alternatives, Alternatives 2D, 3B and 4C, traverse the rolling terrain along the 167th Avenue alignment. There are presently no homes within Segment 3 so critical impacts generally relate to drainage and environmental concerns. Alternatives 2D and 3B stay on 167th Avenue to the project termini at SR 74. Alternative 4C introduces a series of reverse curves south of SR 74 to avoid a large cut section and cross the Padelford Wash Tributary B drainage perpendicular where the wash is defined. This alignment also provides a perpendicular approach to SR 74, which will simplify the future traffic interchange geometrics. Within Segment 3, the previous two alignments eliminated as fatally flawed in Segment 1 are also eliminated in this segment because they could not meet the basic requirement of a logical terminus at the north end. The alignments intersected SR 74 at 175th Avenue and 171st Avenue. ADOT, in partnership with the local jurisdictions, has identified the future traffic interchanges along SR 74 and determined that 167th Avenue alignment is the preferred location due to environmental concerns. This location aligns with improvements made north of SR 74 by the Quintero Development.

Of the five alternatives considered in the segment analysis, two alignments included 'fatal flaw' features. Alignments 1A and 7C were not compatible with the Cities General Plans. These alignments reduced future traffic capacity in the study area and did not comply with access control recommendations for SR 74. Preliminary cost estimates have been prepared for the remaining alignments, Alternatives 2D, 3B and 4C, see Appendix F. The cost estimates are intended to be used for comparative purposes only. Several assumptions have been made since detailed information regarding area survey, topographic features, utilities, etc. were not available.

The costs between alternatives range from $121,650,000 to $127,860,000. Alternative 4C is the low cost option and Alternative 2D is the high cost option.

7.5 Preferred Alignment

Alternative 4C – 163rd Avenue was selected as the preferred alternative of the CIS. This alternative has the least impact on the community and the environment and best meets the project's purpose and need. Alternative 4C follows 163rd Avenue from Jomax Road to near Dove Valley Road, moving west to the alignment of 167th Avenue and continuing north to SR 74 with minor alignment adjustments to accommodate topography. A detailed layout at 200:1 scale is provided in Section 8, Figure 23. The portion of the alignment between Jomax Road and Dove Valley Road (primarily within the City of Surprise planning area) will serve as the basis for the DCR that will further develop the requirements for construction of the roadway.

Section 8
Major Design Features

8 Major Design Features

The key components of Alignment Alternative 4C - 163rd Avenue are described in this section. Technical Memorandum No. 5 *Major Features of the Preferred Corridor Alignment* provides a detailed description, see Appendix E.

8.1 Roadway Features

8.1.1 Design Criteria

The design criteria for this project were established using the MCDOT *Roadway Design Manual* (November 3, 1993) including updates through April 27, 2004, City of Surprise *Transportation Plan*, City of Peoria *Infrastructure Development Guidelines*, ADOT's *Roadway Design Guidelines*, FCDMC *Drainage Design Manual, Volume I, Hydrology and Volume II, Hydraulics* and the *AASHTO Policy on Geometric Design of Highways and Streets* (2001). Selective design criterion used for the CIS development is summarized in Table 8.1.

The design criteria for this project shall be updated in accordance with the *Arizona Parkway Design Guidelines*, expected summer 2008.

8.1.2 Design Speed and Posted Speed

According to the MCDOT *Roadway Design Manual*, the design speed of a Principal Arterial is 55 mph on level terrain. Due to the presence of vertical curb and gutter used in an urban condition, AASHTO recommends that the speed be limited to 45 mph. While AASHTO states that the speed of a given road may be posted at the design speed, MCDOT's design and operating policy states that the posted speed limit shall be 45 mph or less where vertical curbs are installed.

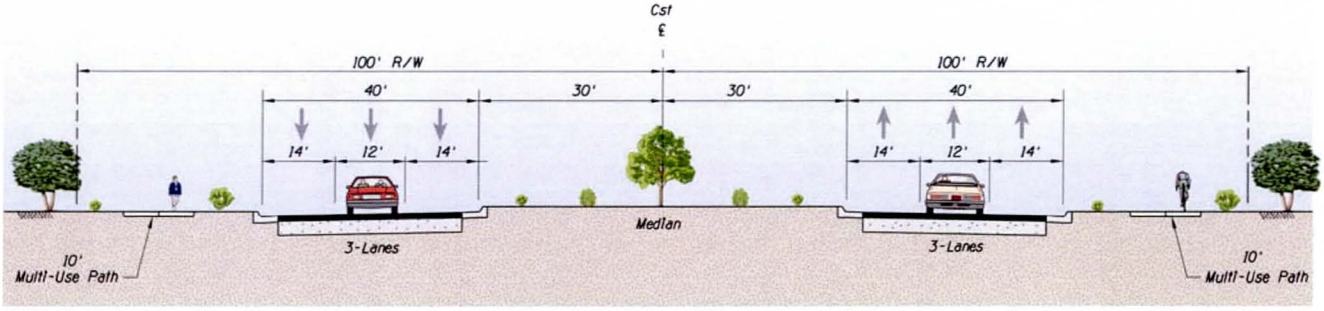
8.1.3 Typical Section

The typical section for the preferred alignment alternative consists of three travel lanes in each direction separated by a raised median. Pedestrian and bicycle traffic will be accommodated on both sides of the roadway. The Parkway Typical Sections developed by the Cities of Surprise and Peoria will be used within their respective jurisdictions as shown in Figures 8.1-1 and 8.1-2. The primary difference between the sections is the median width, which relates to the proposed treatment of intersections in each jurisdiction. Other differing features include right-of-way, bike lane and sidewalk widths.

Table 8.1: Design Criteria

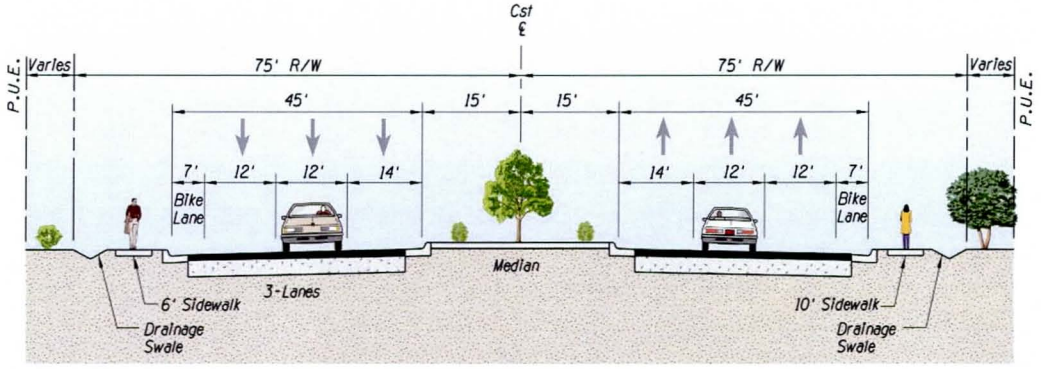
Design Feature	Criteria
Functional Classification	Parkway
LOS	D
Design Year	2030
Design ADT	13,000 to 40,400
Design Vehicle	WB-50
Design Speed	55 mph Min (Urban Principal Arterial)
Pavement Design Life	20 Years
Pavement Section	1.5 inches AR, 4 inches AC (19.0 mm) Superpave, 4 inches AB
Horizontal Alignment	Curve Length 500 feet Min, e = 4% Max
Vertical Alignment	Vertical curve is required for algebraic grade difference equal to or greater than 0.5% (0.2% if Federally Funded). At major street/major street urban intersections, the maximum intersection ride through break-over at signalized intersections shall not exceed 2.5%.
Longitudinal Profile Grades	0.25% Min (MCDOT) 0.15% Absolute Min (MCDOT Special cases) 0.40% Min (Peoria) < 0.40% (Peoria City Engineer Approval)
Roadway Cross Slope	2%
Lane Width	Travel Lanes: 12 feet
Median Width	60 feet
Sidewalk Width	10 feet
Curb & Gutter Type	MAG Std 220, Type A
Curb Return Radii	45 feet (Arterials and Collectors) 30 feet (Local Streets)
Clear Zone	26 feet Minimum (ADOT Roadway Design Guidelines, Table 303.2A)
Cut & Fill Slopes	2:1 Maximum
Tapers	Design Speed:1 Minimum
Flares	15:1 Minimum
Right-of-way	200 feet width Minimum (Surprise) 150 feet width Minimum (Peoria)
Utilities	MCDOT guidelines for relocations and the AUCC Public Improvement Project Guide
On-Site Drainage	▪ Design culverts and bridges for the 50-year event. ▪ Design roadway for 6" maximum depth for the 100-year event. ▪ Size storm drains for the 10-year event and provide 12' of "dry" pavement for both directions of traffic. ▪ On-site hydrology to be computed for the proposed right-of-way limits using the Rational Method procedures outlined in the *Drainage Design Manual for Maricopa County, Hydrology*.

Figure 8.1-1: Surprise Parkway Typical Section



CITY OF SURPRISE
PARKWAY

Figure 8.1-2: Peoria Parkway Typical Section



CITY OF PEORIA
PARKWAY

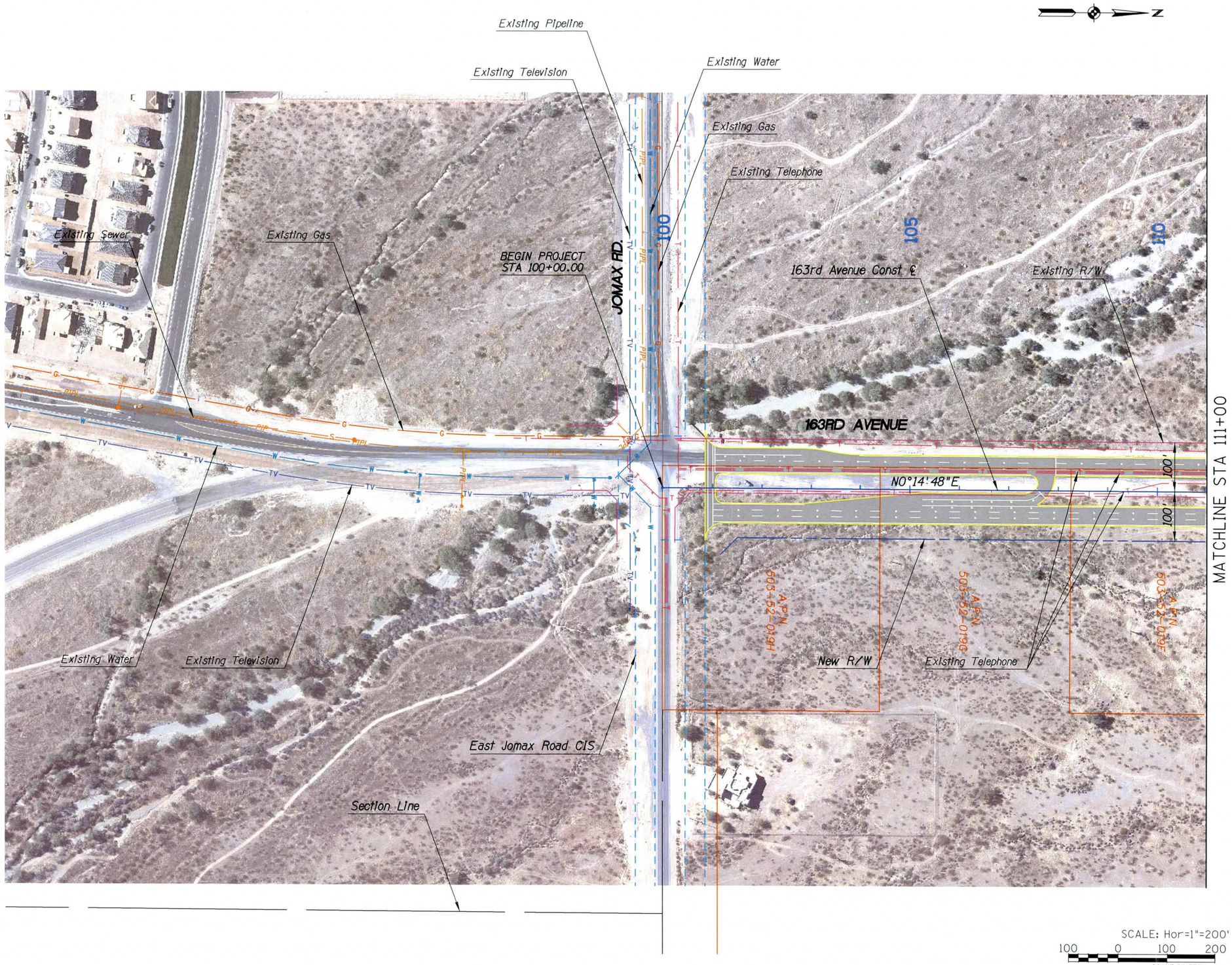
Dove Valley Road to SR 74

8.1.4 Alignment Description

Conceptual plans for the preferred corridor alignment are provided in Figure 8.1-3. From south to north, the alignment follows the existing 163rd Avenue roadway between Jomax Road and Quail Run Road. North of Quail Run Road, the alignment curves northwest to minimize impacts to residential properties and avoid topographic features. Reverse curves of 3,000 foot and 2,000 foot radii are used to shift the alignment from 163rd Avenue to 167th Avenue. The alignment joins the 167th Avenue alignment approximately 7,200 feet north of the existing Dove Valley Road with a 10,000 foot curve and continues on tangent for approximately 2,100 feet. A series of reverse curves (5,000 foot, 2,800 foot and 2,000 foot radii) are used to avoid a hill and cross the Padelford Wash where it is narrowly defined. The alignment terminates at SR 74, south of the Quintero Development entrance, at a proposed future traffic interchange.

Figure 8.1-3: Conceptual Plans

Conceptual plans are presented on the following 17 pages



LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Note:

The East Jomax Road CIS was prepared by MCDOT concurrent with the 163rd Avenue CIS.

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

BEGIN PROJECT TO STA 111+00

SHEET 1 OF 17

H:\MCDOT_163rd\All3\Civil\CPI

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY
NOT FOR
CONSTRUCTION

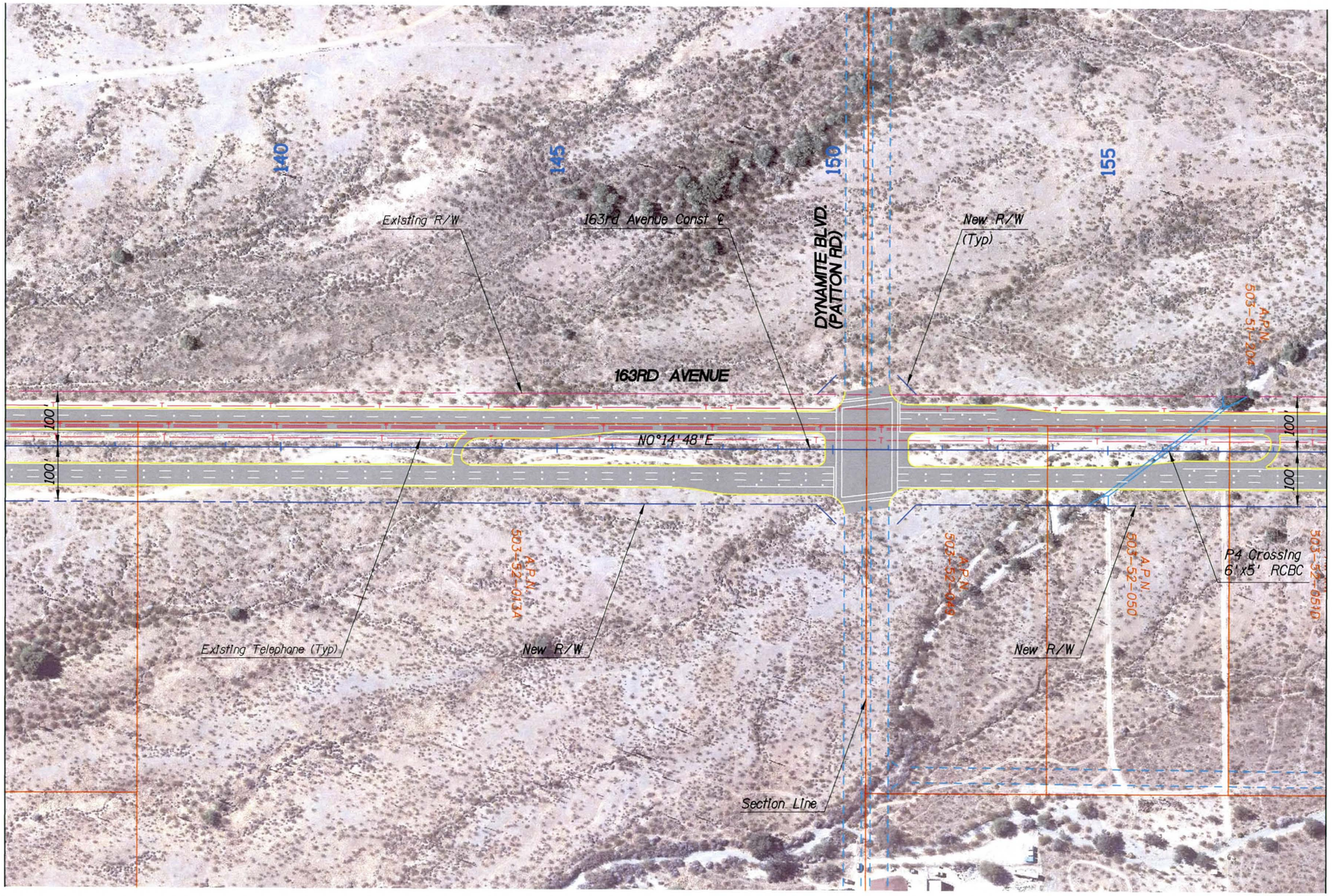
PB PARSONS BRINCKERHOFF

STA 111+00 TO STA 135+00

SHEET 2 OF 17

H:\MCDOT_163rd\Alt3\Civil\Cpl

N



LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY NOT FOR CONSTRUCTION

PB PARSONS BRINCKERHOFF

STA 135+00 TO STA 159+00

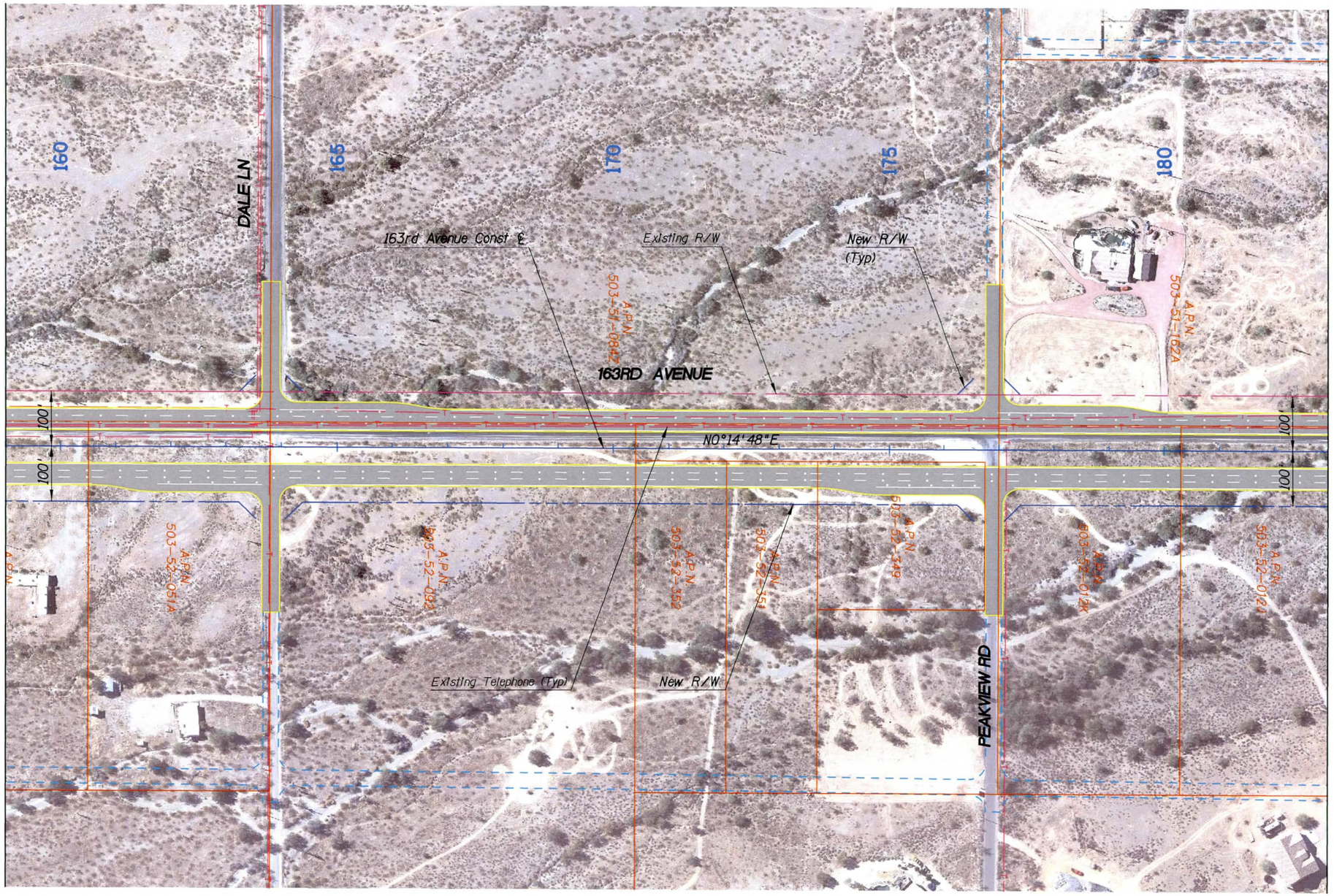
SHEET 3 OF 17

H:\MCDOT_163rd+Alt3+C\ivil*.cpl

N

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway



SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY
NOT FOR
CONSTRUCTION

PB PARSONS BRINCKERHOFF

STA 159+00 TO STA 183+00

SHEET 4 OF 17

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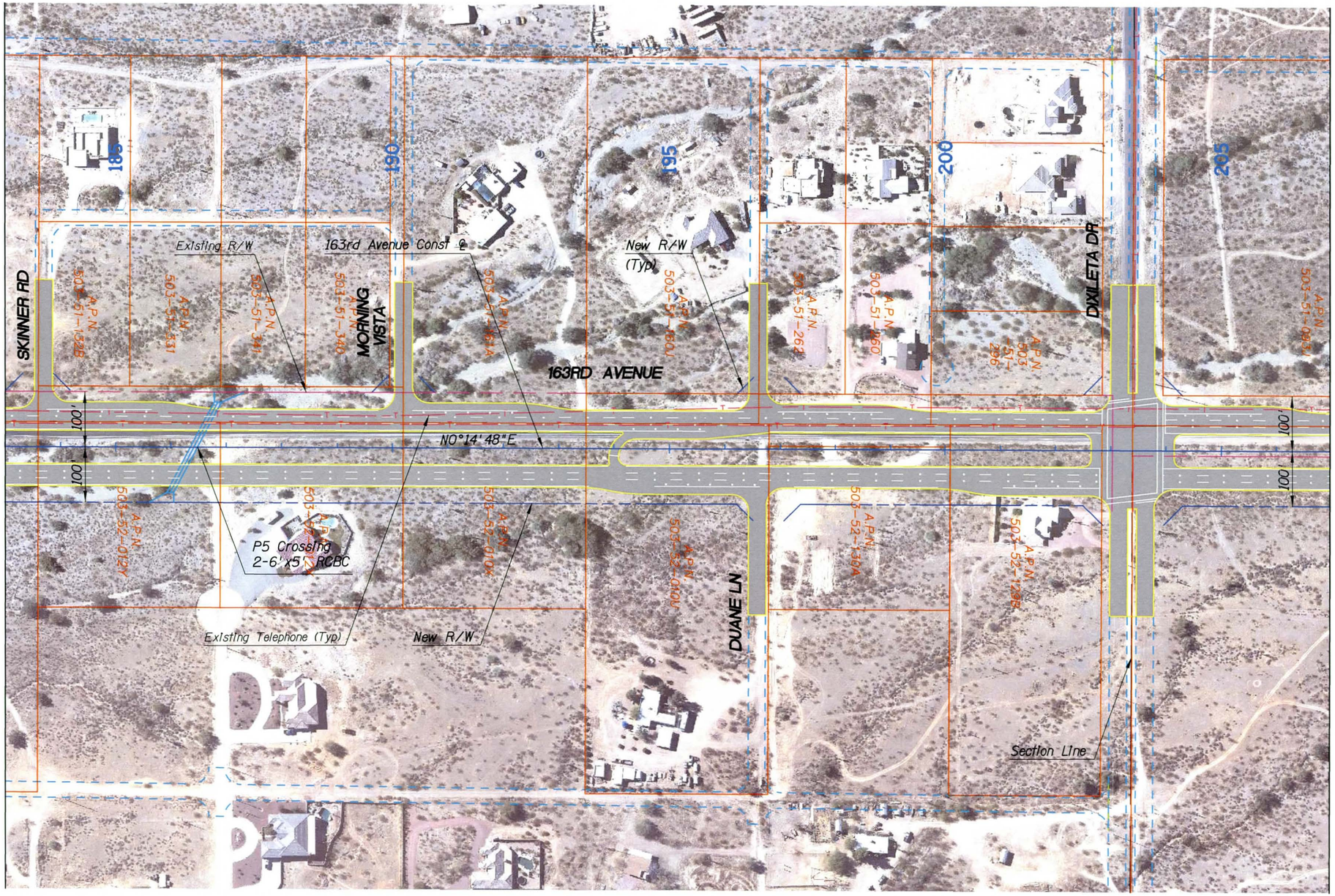

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 183+00 TO STA 207+00

SHEET 5 OF 17

H:\MCDOT_163rd\Alt3\Civil\Cpl

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

Note:

The new CAP crossing structures must adhere to CAP requirements.

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY
NOT FOR
CONSTRUCTION

PB PARSONS BRINCKERHOFF

STA 207+00 TO STA 231+00

SHEET 6 OF 17

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N

MATCHLINE STA 231+00

MATCHLINE STA 255+00

235

240

245

250

163rd Avenue Const. ℄

New R/W

Existing R/W

163RD AVENUE

A.P.N. 503-51-313

A.P.N. 503-51-299

A.P.N. 503-51-298

A.P.N. 503-51-297

A.P.N. 503-51-683

A.P.N. 503-51-684

A.P.N. 503-51-863

A.P.N. 503-51-682

A.P.N. 503-51-279

A.P.N. 503-51-270C

100'

100'

100'

100'

N0°14'48"E

A.P.N. 503-52-084C

New R/W

P6 Crossing
5-8' x5' RCBC

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY
NOT FOR
CONSTRUCTION

PB PARSONS BRINCKERHOFF

STA 231+00 TO STA 255+00

SHEET 7 OF 17

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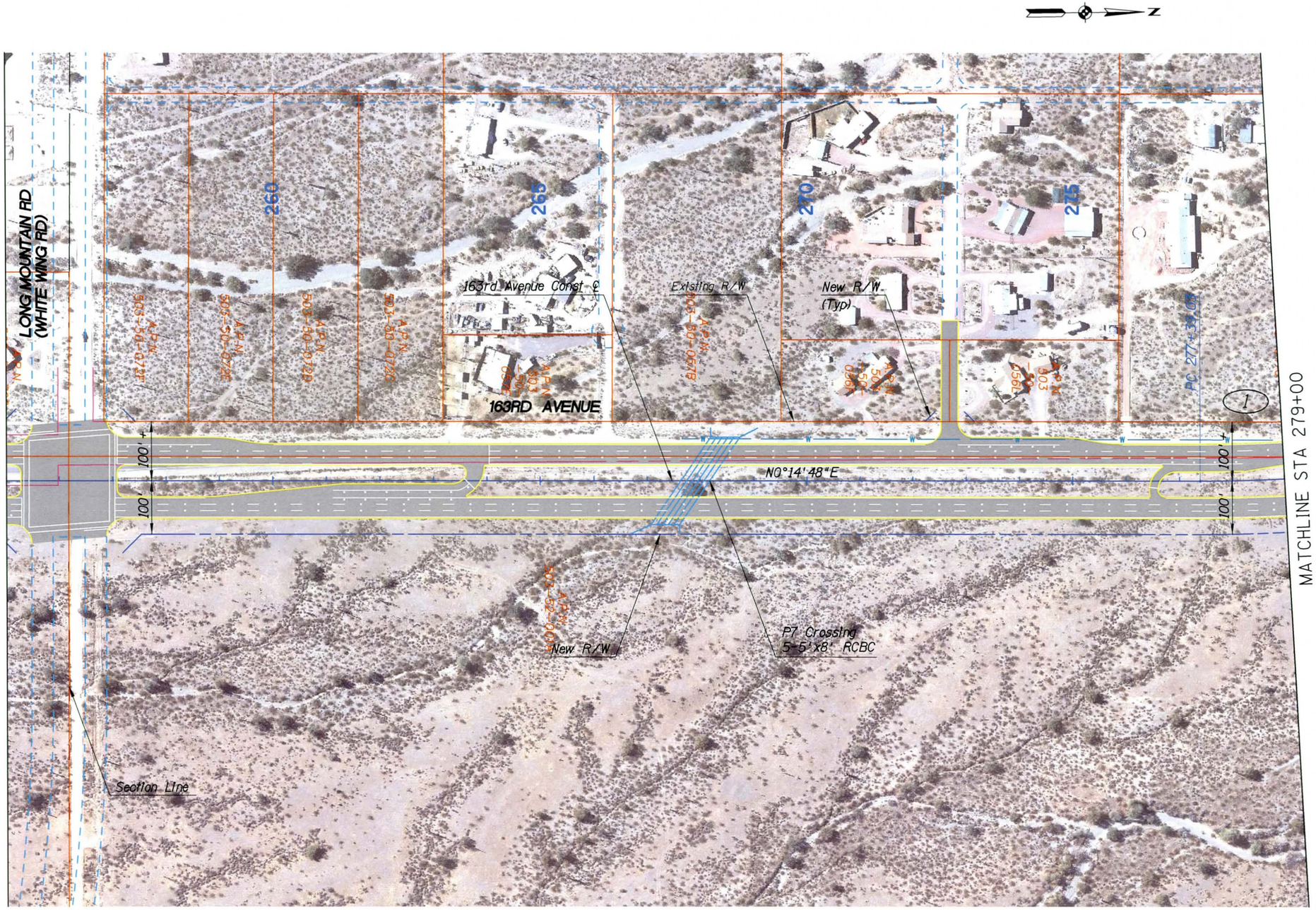

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

(1) Curve Data

PI Sta 292+67.60
Δ=54°00'00" Lt
D=1°54'35"
T=1,528.58'
L=2,827.43'
R=3,000.00'

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 255+00 TO STA 279+00

SHEET 8 OF 17

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LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(1) PI Sta 292+67.60
Δ=54°00'00" Lt
D=1°54'35"
T=1,528.58'
L=2,827.43'
R=3,000.00'

MATCHLINE STA 279+00

MATCHLINE STA 303+00

QUAIL RUN RD

163RD AVENUE

163rd Avenue Const ℄

Existing R/W

New R/W

Section Line

P8 Crossing
5-10'x5' RCBC

280 285 290 295 300

100

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PRELIMINARY
NOT FOR
CONSTRUCTION

PB PARSONS BRINCKERHOFF

STA 279+00 TO STA 303+00

SHEET 9 OF 17

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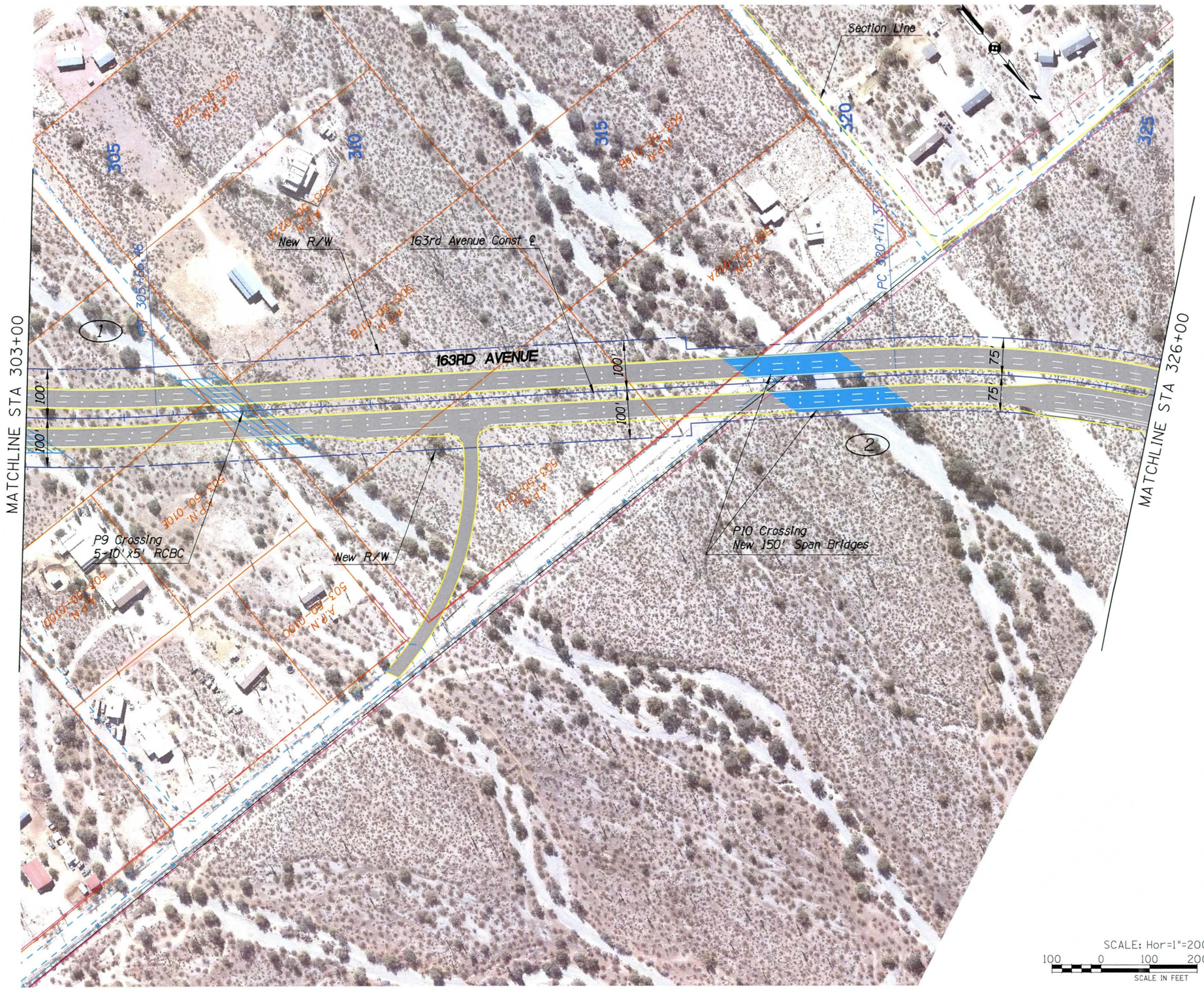

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(1) PI Sta 292+67.60
Δ=54°00'00" Lt
D=1°54'35"
T=1,528.58'
L=2,827.43'
R=3,000.00'

(2) PI Sta 323+60.08
Δ=62°00'03" Rt
D=2°51'53"
T=1,201.74'
L=2,164.23'
R=2,000.00'

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 303+00 TO STA 326+00

SHEET 10 OF 17

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LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(2)

PI Sta 332+73.11
Δ=62°00'03" Rt
D=2°51'53"
T=1,201.74'
L=2,164.23'
R=2,000.00'

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 326+00 TO STA 351+00

SHEET 11 OF 17

H:\MCDOT_163rd+Alt3+Civil+Cpl

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 351+00 TO STA 376+00

SHEET
12 OF 17

H:\MODOT_163rd+Alt3+4C\Vi*.*Cpl

SCALE: Hor=1"=200'

100 0 100 200

SCALE IN FEET

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(3) PI Sta 383+41.43
Δ=8°00'00" Lt
D=0°34'23"
T=699.27'
L=1,396.26'
R=10,000.00'

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 376+00 TO STA 402+00

SHEET 13 OF 17

H:\MCDOT_163rd\Alt3\MCIVil\Cpl

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(4) PI Sta 416+81.23
Δ=18°53'35" Lt
D=1°08'45"
T=831.92'
L=1,648.73'
R=5,000.00'

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. MELITA	03/08
	DRAWN	C. P. GROUP	03/08
	CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 402+00 TO STA 426+00

SHEET 14 OF 17

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LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(4) PI Sta 416+81.23
Δ=18°53'35" Lt
D=1°08'45"
T=831.92'
L=1,648.73'
R=5,000.00'

(5) PI Sta 449+52.90
Δ=50°02'54" Rt
D=2°02'47"
T=1,307.10'
L=2,445.82'
R=2,800.00'

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 426+00 TO STA 450+00

SHEET 15 OF 17

H:\MCDOT_163rd+Alt3+Clvl +Cpl

LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(5) PI Sta 449+52.90
Δ=50°02'54" Rt
D=2°02'47"
T=1,307.10'
L=2,445.82'
R=2,800.00'

(6) PI Sta 468+51.34
Δ=23°53'45" Lt
D=2°51'53"
T=423.21'
L=834.12'
R=2,000.00'

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	J. MELITA	03/08
DRAWN	C. P. GROUP	03/08
CHECKED	S. HOGAN	03/08

PB PARSONS BRINCKERHOFF

STA 450+00 TO STA 474+00

SHEET
16 OF 17

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LEGEND

- Proposed Curbed Roadway Edge
- Potential Access to Local Residences
- New Right of Way
- Existing Right of Way
- Future Roadway

Curve Data

(6) PI Sta 468+51.34
Δ=23°53'45" Lt
D=2°51'53"
T=423.21'
L=834.12'
R=2,000.00'

Note:

Future SR 74 TI location at 163rd Avenue. Entrance to Quintero Golf Course will need to be connected to 163rd Avenue.

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

FIGURE 8.1-3
CIS PREFERRED CORRIDOR ALIGNMENT
163RD AVENUE
JOMAX ROAD TO SR 74 (ALT 4C)

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. MELITA	03/08
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PB PARSONS BRINCKERHOFF

STA 474+00 TO END OF PROJECT

SHEET 17 OF 17

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The vertical profile is envisioned to follow the topography with the exception of the segment between the CAP canal and Dove Valley Road. The profile of the roadway in a delineated floodplain should be such that the base flood elevation is not increased as a result of the construction of the roadway embankment. If the finished grade profile is above the base flood elevation, the system of culverts, bridges and channels should have sufficient capacity and freeboard (the design event may need to be the 100-year storm rather than the 50-year) that will allow the base flood elevation to remain unchanged or be lower. In the opposite case, the profile of the roadway should be such that the base flood elevation is no more than 6" above finished grade, provided that the combined capacity of the offsite drainage system and the overtopping of the roadway do not increase the base flood elevation. A profile will be designed during the DCR phase of this study for 163rd Avenue between Jomax Road and Dove Valley Road.

8.2 Drainage Features

8.2.1 Off-Site Drainage

The preferred alignment crosses fourteen major drainage ways. According to FCDMC Policy, all culverts and bridges shall be designed with capacity for the 50-year event and a maximum of 6" of depth over the paved road for the 100-year event, given the principal arterial/parkway designation of 163rd Avenue. A summary of the flows and conceptual type and size of drainage structures at the waterway crossings is provided in Table 8.2. The 6'x 5' barrel size criterion is used for simplicity during the CIS. Different rise/span configurations may be more efficient.

Table 8.2: Preliminary Drainage Structure Summary

Crossing ID	50-year Flow (cfs)	100-year Flow (cfs)	6'x5' RCBC (# of barrels)	Bridge Span (ft)
P1	864	1080	6	
P2	125	157	1	
P3	118	148	1	
P4	158	197	1	
P5	312	390	2	
P6	1058	1323	7	
P7	1058	1323	7	
P8	1090	1575	8	
P9	1090	1575	8	
P10	3931	4660		150
P11	49	62	1	
P12	964	1215	7	
P13	3439	4506		150
P14	160	200	1	

8.2.2 On-Site Drainage

Options for the collection and disposal of pavement runoff include open and closed drainage systems, assuming that the preferred alternative has curb and gutter along the outside edge of pavement as shown in the typical sections provided by the Cities. In an open system, runoff would be collected at scuppers or catch basins and routed to linear basins or ditches to outfall locations. In a closed system, runoff collected at catch basins would be routed to the system outfall by a network of storm drain laterals and trunk lines. Open systems are typically viable where there is sufficient right-of-way for open channels and/or basins. The design event for a principal arterial is the 10-year storm with at least 12' of "dry" pavement for both directions of traffic. Separation of on-site and off-site flows is not usually required in urban street projects.

8.2.3 Section 404 of the Clean Water Act

Most natural channels in the study area may be considered to fit the criteria for designation as jurisdictional waters of the United States, and would therefore be regulated by the United States Army Corps of Engineers (USACOE). Construction of roadway improvements within delineated jurisdictional waters will require permits issued by the USACOE.

8.2.4 Floodplain Considerations

The 100-year floodplain has been delineated in the study area for the Padelford Wash (see Appendix C). Base flood elevation lines have also been developed for the inactive alluvial fan. The Preferred Alignment Corridor conflicts with the delineated 100-year floodplain, especially between the CAP canal and Dove Valley Road. Maricopa County guidelines state that the base flood water surface elevation in a FEMA delineated floodplain should not be increased as a result of the construction of roadway improvements. Therefore, it may be necessary to provide 100-year capacity at the culvert crossings, construction of guide banks or levees, roadway embankment protection, and sections of wash realignment to minimize changes to the distribution of split flows across the floodplain.

Conditional Letters of Map Revision (CLOMR) may be required for the construction of proposed improvements.

8.3 Structures

8.3.1 Minor Structures

The preferred alignment alternative has six minor structures that are all CBCs. A minor structure is defined as having a span width of less than 20 feet.

8.3.2 Major Structures

A major structure is defined as having a span width of greater than 20 feet. There are nine major structures including six CBCs and three bridges along the preferred alignment corridor. The

CBCs will be standard boxes utilizing the Arizona Department of Transportation Standards Drawings. The three bridges are located at the CAP canal, Padelford Wash Split 3 and Padelford Wash Tributary B.

CAP Canal

The crossing of the Canal itself would require a superstructure length of about 95 feet. The length has been increased compared with the existing bridge in order to satisfy the new horizontal clearance requirements. The crossing of the O&M road with future Trail would require a length of about 50 feet, and the crossing of the O&M road itself about 25 feet. Therefore, the total superstructure span length required would be about 170 feet.

For the proposed crossing, two alternatives are envisioned:

- *Alternative One* - A single bridge structure accommodating 6 lanes of traffic with bike lanes and sidewalks, including a raised median of 14 feet.
- *Alternative Two* - Two separate and parallel bridge structures each accommodating 3 lanes of traffic with combined bike lane and sidewalk, and with a clear out-to-out distance of 60 feet to match the roadway on each side of the bridge.

Bridges crossing the CAP canal must satisfy the following Central Arizona Project requirements:

1) The bridge must span the CAP canal and the O&M roads on both sides. The O&M road on the north side shall be 20 feet wide; the O & M road on the south side shall be 24 feet wide.
2) The bridge must span the future Central Arizona Project Trail. The minimum trail width shall be 20 feet and located on the south side of the canal.
3) The bridge must provide a minimum vertical clearance of 14'-10" to the O & M roads. It may be possible to lower the O & M road elevation below the bridge structure in order to minimize the raising of the bridge elevation of the proposed Sarival Avenue Bridge.
4) The bridge must provide a minimum vertical clearance of 8'-6" to the top of the CAP canal Liner.
5) Bridge piers located on each side of the canal shall not be closer than 5'-0" from the edge of the canal lining.
6) During construction, the O & M roads may be closed one at a time but both roads shall not be closed simultaneously.
7) Material/debris should be prevented from falling into the canal during construction. Any material/debris falling into the canal must be removed per CAP instructions.

Padelford Wash Split 3

Immediately north of the existing Dove Valley Road, a new bridge will be needed to span a branch of the Padelford Wash (approximately Sta 319+00). This bridge will fall within the City of Peoria and will therefore accommodate their Parkway Typical Section. Due to the close proximity of this bridge to the new Dove Valley Road intersection, it is envisioned that one bridge will be constructed instead of two parallel structures so that left turn lane storage can be provided. The bridge width will provide a clear out-to-out distance of 120 feet. The span length will be approximately 150 feet. Guide banks may be required upstream and downstream to align flows with the bridge opening.

Padelford Wash Tributary B

Approximately ½ mile south of SR 74, the Preferred Corridor Alignment crosses the Padelford Wash Tributary B (approximately Sta 462+50). Similar to the other Padelford Wash Split 3 crossing, this structure will accommodate the City of Peoria Parkway Typical Section. However, this location is not near any intersections and two alternatives may be considered:

- *Alternative One* - A single bridge structure accommodating 6 lanes of traffic with bike lanes and sidewalks, including a raised median of 14 feet
- *Alternative Two* - Two separate and parallel bridge structures each accommodating 3 lanes of traffic with combined bike lane and sidewalk separated by approximately 30 feet.

The span length will be approximately 150 feet. Since the existing channel banks are well defined at this crossing location, the anticipated upstream and downstream channel work is minimal.

8.4 Utilities

Potential existing utility conflicts include electric, water and telephone. Underground utility locating has not been performed for this CIS. A complete field investigation, including utility potholing will be required during final design of the roadway.

The existing electric facilities in the vicinity of the preferred alignment consist of overhead and underground power lines in short segments along 163rd Avenue. The total length of overhead power potentially in conflict is approximately 5,280 feet, with the longest stretch installed from Dixileta Drive to Montgomery Road. The underground electric is located between White Wing Road and Quail Run Road for an approximate distance of 500 feet. There are also overhead lines that cross the preferred alignment corridor at 164th and 165th Avenues.

Existing water facilities that may conflict with the preferred alignment include a 16" waterline that extends from the CAP canal at 163rd Avenue to the Quintero Golf Course located north of SR 74. According to as-built maps, this facility has approximately 4 feet of cover. The 163rd Avenue roadway profile can be designed to minimize impact to the waterline, particularly between the CAP and Dove Valley Road where the water line lies within the 100 year flood plain and the roadway grade must be raised from the existing ground elevation.

Existing underground telephone is also located in the vicinity of the preferred alignment corridor. Telephone lines run parallel to 163rd Avenue between Jomax Road and the CAP canal. The preferred alignment also crosses an existing line along 164th Avenue between Quail Run Road and Dove Valley Road. As previously mentioned, the new roadway profile can be designed to minimize impacts to underground facilities.

Several of the utility owners have plans to extend service within the study area as noted in Technical Memorandum No. 4 – *Utility Overview.* Both of the Cities have expansive plans to extend water and sewer service. These plans should be adaptive to the preferred alignment corridor of 163rd Avenue. Other facility owners, like APS, Qwest and Southwest Gas will continue to respond to local growth. Qwest is planning to install a Serving Area Interface near

the intersection of 163rd Avenue and White Wing Road. The results of the CIS will be shared with the utility companies to ensure future compatibility.

8.5 Access Management

8.5.1 Overview

Access management is a tool that can be used by municipalities to shape the nature and usage of a roadway, as well as the neighboring land uses. Access management focuses on techniques that increase the capacity, manage congestion, and reduce crashes. The methods used are:

- Increasing spacing between signals and interchanges;
- Driveway location, spacing, and design;
- Use of exclusive turning lanes;
- Median treatments, including two-way left turn lanes that allow turn movements in multiple directions from a center lane and raised medians that prevent movements across a roadway;
- Use of service and frontage roads; and
- Land use policies that limit right-of-way access to highways

An appropriate level of access is allowed depending on the type and purpose of a roadway. Major regional routes should have less access in order to increase the flow of traffic and minimize accidents.

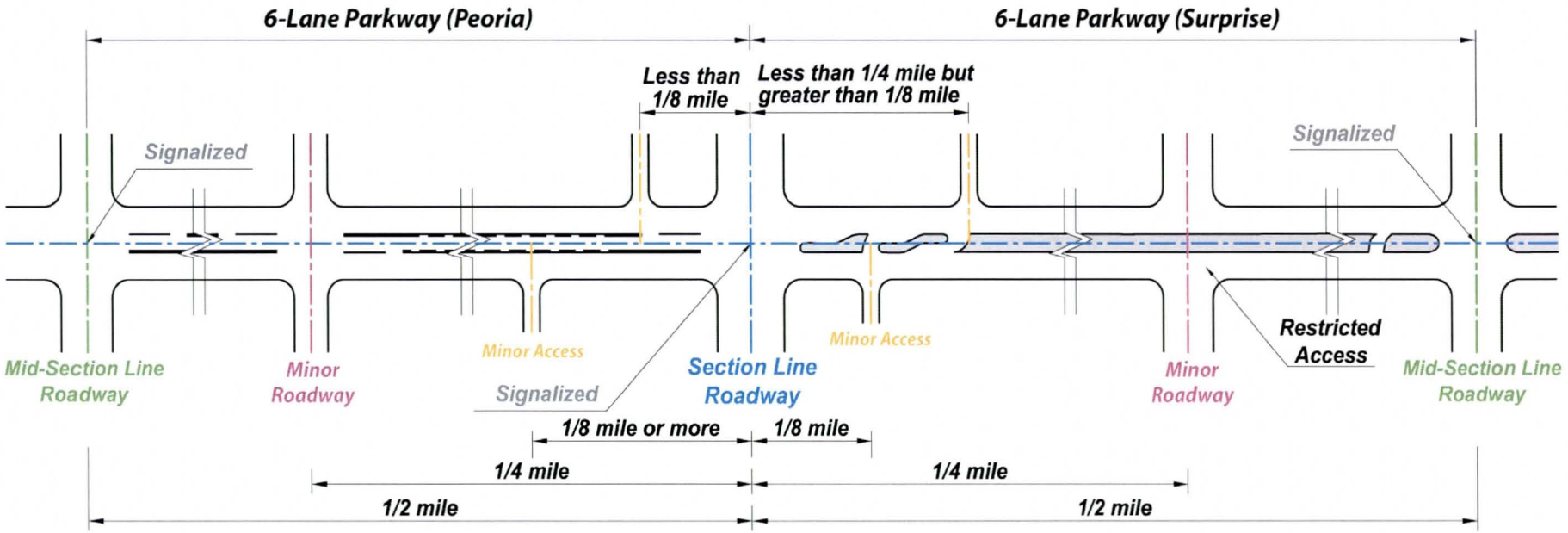
In addition to maintaining flow rates on the roadway, access to adjacent properties is one of the main purposes of the arterial street network. As the 163rd Avenue corridor experiences residential, retail, and commercial growth local access to adjacent land uses will be specifically defined following the guidelines detailed here.

At the CIS stage of development, the roadway plan proposes intersections and driveway locations that preserve traffic flow rates, but makes provisions for driveway locations that can effectively serve adjacent properties. Future design efforts should address concerns of removing direct access onto 163rd Avenue from residential properties and explore options to consolidate driveways and/or create alternate access from adjacent crossroads.

Important access management considerations, as depicted in Figure 8.5-1, are:

- Bidirectional access at crossroads restricted to signalized intersection every 1/2 mile
- Minor roadways at 1/4 and 1/8 mile spacing limited to right in-right out only
- No roadways closer than 1/8 mile
- Residential access encouraged off of crossroads, no residential drives along 163rd Avenue
- Future commercial access should encourage shared drives

Figure 8.5-1: Access Management



This parkway corridor will accommodate a multi-use path, to be utilized by pedestrians and bicyclists, as well as facilitate transit service if necessary. In the indirect left portion of 163rd Avenue, pedestrians safety is actually increase due to fewer movements occurring at the intersection. Due to the wide cross-section, however, the signal cycle length would not be long enough for a pedestrian crossing. Pedestrians need to cross half the street, take refuge in the wide median, and then continue crossing the street in the next signal phase. Bicycle lanes along a parkway with indirect left turns are not recommended due to the high traffic volumes, speed, and high volumes of conflicting right turn movements. A separate sidewalk and multiuse path is recommended adjacent to the roadway. Bicyclists wishing to cross the street should dismount and cross as a pedestrian. Transit is acceptable along a parkway using indirect left turns. The u-turn radius provided in the median is designed to accommodate buses.

Important points to retain as the land uses change along the corridor as the area matures are:

- On Main Roadway
  - Main roadway is divided
  - Left turns at intersection are prohibited
  - U-turn bay approximately 660 feet from intersection (no more than 1/4 mile)
  - Left-turn traffic queues in median lane
  - Ideally, no driveways
- On Minor Roadway
  - Left turns on minor cross-street must turn right and make u-turn through median
- When Two Parkways Intersect
  - Depending on traffic volumes, the u-turn movement may occur on one or both of the parkways.

163rd Avenue is designated as a Parkway by the Cities of Peoria and Surprise within the project study area, creating a major north-south connection in the region. The Surprise portion of the 163rd Avenue alignment will utilize indirect left turns north of Jomax Avenue ending just south of Dove Valley Blvd. The portion of 163rd Avenue within Peoria city limits will utilize standard intersection design. The Access Management Plan for the preferred alignment corridor acknowledges that the corridor will serve to both carry a large volume of traffic through the region but also to destinations along the corridor, such as homes, businesses, and workplaces. The Access Management Plan includes intersection configurations, frontage roads and driveway spacing recommendations to create an outline to properly balance the traffic flow and congestion with land use access needs.

8.5.2 Intersections

One of the critical elements of good access management is proper placement of intersections and intersection traffic controls. This requires a balance between providing adequate access to adjacent property and maintaining good traffic flow on the major roadways. In a residential area, controlling access from the main roadway is less critical than in a retail or employment area. Businesses that depend on visibility and easy auto access often rely on driveways near intersections to maximize accessibility for their patrons.

Between Jomax Road and SR 74, eleven crossroads intersect the preferred alignment. Future roadway classifications in this area, as well as two new intersections along the Patton Road/Dynamite Road alignment have been identified in the *Northwest Adopted General Plans Roadway Network*, which is summarized in Table 8.5-1.

Table 8.5-1: Intersections

Crossroad	Existing Classification	Future Classification	Intersection Type	Future Traffic Control
Jomax Road	Major	Parkway	"+"	Signal
Patton Road (Dynamite Road)	N/A	Minor Arterial	"+"	Signal
Dale Lane	Local Residential	Local Residential	"+"	Two-Way Stop
Peak View Road	Local Residential	Local Residential	"+"	Two-Way Stop
Duane Lane	Local Residential	Local Residential	"T"	One-Way Stop
Dixileta Drive	Local Residential	Minor Arterial	"+"	Signal
Windstone Trail	Local Residential	Local Residential	"T"	One-Way Stop
Montgomery Road	Local Residential	Local Residential	"T"	One-Way Stop
Lone Mountain Road (White Wing Road)	Local Residential	Parkway	"+"	Signal
Quail Run Road	Local Residential	Local Residential	"T"	One-Way Stop
Dove Valley Road	Collector	Minor Arterial	"L"	Signal
Black Mountain Road	N/A	Major Arterial	"T"	Signal
SR 74	Rural Highway	Freeway	Traffic Interchange	Signal

LEGEND:
+ indicates a four leg intersection
T indicates a three leg intersection
L indicates a two leg intersection

Increasing distance between traffic signals improves traffic flow by increasing travel speeds and decreasing congestion. Increasing the distance between signals also reduces the incidence of crashes.

Table 8.5-2: Signal Spacing- Travel Time

Signal Per Mile	Increase in Travel Time (%)
2	-
3	9
4	16
5	23
6	29
7	34
8	39

Source: "Impacts of Access Management Techniques", 1999, NCHRP Report 420, Transportation Research Board

Table 8.5-3: Signal Spacing- Crash Rate

Signal Per Mile	Crashes Per Million, VMT
Under 2	3.53
2 to 4	6.89
4 to 6	7.49
6+	9.11

Source: "Impacts of Access Management Techniques", 1999, NCHRP Report 420, Transportation Research Board

Traffic signals along the 163rd Avenue corridor are located at major crossroads to optimize traffic flow and decrease congestion. This 1/2 to 1 mile spacing will allow signal coordination at the posted speed of 45 mph with a 90 second signal cycle length. The signalized intersections are at:

- Jomax Road
- Patton Road
- Dixileta Drive
- Lone Mountain Road
- Dove Valley Road
- Black Mountain Road
- SR 74 (urban freeway interchange)

Unsignalized intersections along the corridor will provide more localized access to minor roadways in the area. Many of the homes which currently have access off of 163rd will have access from these smaller roadways in the future, which is discussed in further detail in Section 8.5.3. The unsignalized, stop controlled intersections are:

- Dale Lane
- Peakview Road
- Skinner Road
- Morning Vista
- Duane Lane
- Windstone Trail
- Quail Run Road
- Three currently unnamed roadways

The intersection design will also address transit and pedestrian needs through phase-protected pedestrian cross-walks and near or far side bus pullouts. For the pedestrian movement crossing 163rd Avenue, a median refuge may be needed to facilitate a two-phase pedestrian crossing in order to maintain a proper signal progression.

8.5.3 Driveway Location, Spacing, and Design

Driveway access to side activities at inappropriate locations can reduce the carrying capacity of the roadway and create conflicts that can impair motorist safety. Fewer driveways spaced further apart allow for more orderly merging of traffic and present fewer challenges to drivers. Due to the existing level of development, this plan both recommends access management techniques for existing driveway access but also standards to use while undergoing future development.

Driveways are discouraged within 150 feet of the u-turn area, although a distance of 250 feet from the u-turn is preferred. If a driveway is needed within 150 feet, aligning the driveway with the u-turn can be evaluated based on the level of site traffic generated to the driveway.

Due to the speed and capacity requirements of a parkway, acceleration and deceleration lanes are mandatory for all right turns, at both intersections and driveways, which will minimize impact on traffic flow and enhance turning vehicle safety. For a parkway with high traffic volumes, no right-turn access should be permitted within 300 feet of the intersection and no left-turn access within 600 feet of the intersection. In order to meet this distance requirement, driveways in conjunction with future development should be placed at the furthest edge of the property line. An additional consideration to reduce the number of driveways is to combine property access points and provide alternative access, such as from secondary roadways.

Many homes currently have direct driveway access to 163rd Avenue. In order to reduce the number of driveways several of these driveway accesses were consolidated into shared drives or access has been relocated to a series of collector roads offset from 163rd Avenue. Through consolidation several drives have become cul-de-sacs, especially those near future signalized intersections. Preliminary plans shown in Figure 8.1-3 show suggested locations for the consolidated drives and access points. Future detailed plans will outline more detailed design and maintenance for these new routes.

8.5.4 Median Treatments

Median treatments can restrict access to driveways and local streets, while consequently increasing roadway speed and safety. The parkway median treatment for the Cities of Surprise and Peoria utilize a raised landscaped median with periodic breaks to allow for turns. Within the City of Peoria, there are to be breaks in the medians allowing left turns at all signalized intersections. Along the portion of 163rd Avenue utilizing the indirect left turn concept median breaks will be located 660 feet on either side of the intersection to allow for the indirect left turn. Additional median breaks may be considered at driveway access points, either a full median break or a left-in only to improve safety.

8.6 Intelligent Transportation Systems (ITS)

As traffic volumes and congestion increase throughout the metropolitan area, agencies and jurisdictions are seeking ways to operate and manage their infrastructure more efficiently. Traffic congestion, road closures and traffic-related incidents can be better managed through application ITS. ITS tools such as cameras, traffic detectors, dynamic message signs and traffic signal interconnected by fiber-optic lines all help to provide real-time travel information for both travelers and traffic managers.

As the 163rd Avenue corridor and regional roadway infrastructure is developed, consideration should be given to deploying intelligent transportation systems. Partnering agencies will effectively manage the corridor through integration between individual systems, devices and networks. It is recommended that the following elements be considered for design and implementation on the 163rd Avenue corridor:

- Centrally controlled signal system management plan for the corridor. Agencies will integrate the signals to their respective signal system software, synchronize clocks and implement a mutually agreed timing plan.
- Traffic detection and counting capabilities to achieve efficient real-time signal operations.
- Instrument the corridor for appropriate video camera based real-time traffic monitoring by the operators at the traffic management center.
- Implement adequate traveler information system.
- Incident response and on-site incident management through Regional Emergency Action Coordinating Team (REACT)
- All devices, equipment and systems procured per owning agencies or mutually agreed specifications.
- Partnering agencies will develop, implement and maintain an operations plan for the corridor detailing the roles and responsibilities of each agency.

Partnering agencies will enter into a formal (binding) document such as IGA that will detail the roles and responsibility of each agency.

8.7 Right-of-Way

The proposed right-of-way width is a minimum of 200 feet in the City of Surprise and a minimum of 150 feet in the City of Peoria as required by the respective roadway typical sections. 163rd Avenue from Jomax Road to Dove Valley Road will utilize the 200 foot width resulting in 79 acres of additional right-of-way and potential impact to two residential homes. The centerline of the roadway was established based upon the west roadway right-of-way line, which is generally 55 feet west of the section line. Holding this boundary, the centerline was projected 100 feet east to minimize the right-of-way needed on the west side of 163rd Avenue where more residences exist. Between Dove Valley Road and SR 74, the proposed right-of-way width is 150 feet centered about the section line resulting in 58 acres of additional right-of-way.

The Cities typical sections provide a minimal distance from the sidewalks to the proposed right-of-way line, approximately 10 feet. Additional right-of-way may be required within the 163rd Avenue corridor due to turn lanes at the intersections, roadway embankments that exceed 4-5 feet, new drainage crossings and realigned washes.

8.8 Constructability

Construction of a new 163rd Avenue facility along the preferred alignment corridor is relatively straightforward with the existing level of development. The Parkway Typical Section will allow for the northbound roadway to be constructed while the existing roadway remains in use for two-way traffic. Traffic can then be shifted to the new northbound roadway while the existing roadway is obliterated and the new southbound lanes are constructed. Maintaining access to local residences is a key consideration.

8.9 Preliminary Cost Estimate

The preliminary cost estimate for Alternative 4C - 163rd Avenue is $121,650,000, detailed in Table 8.8, which includes estimates for design, construction, utility relocation, new right-of-way and oversight.

Table 8.9: Preferred Corridor Alignment Preliminary Costs (Alternative 4C)

Description	Cost
Construction	$52,080,000
Design (12% of Construction Value)	$6,250,000
Construction Management (15% of Construction Value)	$7,810,000
New Right-of-Way	$49,260,000
Utility Relocation (2% of Construction Value)	$1,040,000
Administration (10% of Construction Value)	$5,210,000
TOTAL COST	$121,650,000

Section 9

Public Involvement Overview

9 Public Involvement Overview

MCDOT *RightRoads* Program conducted a total of three public information meetings during the course of the CIS study process. Public meetings were conducted in an "open house" format which provided a free, open and accurate exchange of information between area residents with specific issues and questions and the project team. A report entitled *Summary of Public Involvement* was prepared by MCDOT, see Appendix H. A brief overview of the public involvement process and meetings is provided in this section.

9.1 Outreach Methods

The following outreach methods were used to inform and notify the general public and impacted residents about the study, public input meeting dates and locations and additional opportunities or means for input:

- Media releases
- Newspaper articles
- Display advertisements in local and regional publications
  - Arizona Republic
  - Daily News Sun
  - Surprise Independent
  - Peoria Independent
  - Peoria Times
  - The Wester
  - Surprise Today
  - Northwest Valley News
- MCDOT website
- Partner agency mediums
- Direct mail flyers to adjacent property owners and previous meeting attendees

9.2 Public Comment

More than 240 people attended four public input meetings conducted through the course of this study. Graphics, aerials and display exhibits presented corridor alternatives and study information. Study Fact Sheets and Comment Sheets were distributed to all those in attendance. A computerized simulation showing the "Indirect Left-Turn" intersection concept and operation was presented at the final DCR public meeting. Public comments received at the meetings are provided in Exhibit C of Appendix H.

9.3 Public Information Meetings

9.3.1 Scoping Phase Public Meeting

Meeting Purpose: Gather public comment regarding the study area, existing conditions, current corridor deficiencies, future transportation needs and public review of overall Study Goals and Objectives.

5:00 – 7:00 p.m., November 2, 2006
Hampton Inn, 14783 W. Grand Avenue, Surprise, AZ 85374
Attendance: 55

9.3.2 Alternatives Analysis Phase Public Meeting

Meeting Purpose: Gather public comment regarding preliminary study findings, traffic analysis and corridor alignment alternatives and future roadway options.

5:00 – 7:00 p.m., March 6, 2007
Hampton Inn, 14783 W. Grand Avenue, Surprise, AZ 85374
Attendance: 85

9.3.3 Findings and Recommendations Phase Public Meeting

Meeting Purpose: Gather public comment regarding study findings and "Preferred Alternative", recommended access management strategies and improvement phasing timeline.

5:00 – 7:00 p.m., July 17, 2007
Hampton Inn, 14783 W. Grand Avenue, Surprise, AZ 85374
Attendance: 65

9.4 Recommendations

It is recommended that future project development build upon the public involvement program established during this study and continue as a comprehensive program progression.

For more information about the study, contact Renee Probst, MCDOT Planning at 602/506-8622 or Roberta Crowe, MCDOT Public Information Officer at 602/506-8003.

Section 10
Appendices

10 Appendices

- Appendix A: Technical Memorandum No. 1 - *Traffic Overview*
- Appendix B: Technical Memorandum No. 2 - *Environmental Overview*
- Appendix C: Technical Memorandum No. 3 - *Conceptual Drainage Report*
- Appendix D: Technical Memorandum No. 4 - *Utility Overview*
- Appendix E: Technical Memorandum No. 5 - *Major Features & Access Management*
- Appendix F: Preliminary Cost Estimates
- Appendix G: Study Meeting Information
- Appendix H: Public Involvement Report