Final Design Concept Report Update for Lake Pleasant Parkway

Westwing Parkway to State Route 74

Project Number: P-0908
Solicitation Number: EN 0024

May 2010

Prepared For & Approved By:

CITY OF PEORIA

Prepared By:

PB 100 YEARS

FINAL DESIGN CONCEPT REPORT UPDATE FOR LAKE PLEASANT PARKWAY

WESTWING PARKWAY TO SR 74

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Prepared For and Approved By:

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Expires: 9/30/2010

This signature acknowledges receipt of final report

For Engineering Director 3/11/10 Date

Prepared By:

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Executive Summary

Introduction

PB Americas is contracted by the City of Peoria to prepare a Design Concept Report (DCR) Update and Categorical Exclusion (CE) for Lake Pleasant Parkway from Westwing Parkway to State Route (SR) 74. This project is located in the City of Peoria within Maricopa County. A project location and vicinity map is shown in Figure 1. This section of Lake Pleasant Parkway is classified as a Parkway according to the 2005 City of Peoria Street Classification Map and the 2008 General Plan. Lake Pleasant Parkway connects the cities of Peoria and Phoenix to Lake Pleasant Regional Park. Within the study limits of this DCR, Lake Pleasant Parkway is a two-lane rural roadway that provides regional access to SR 74 and the Lake Pleasant Parkway Regional Park. The majority of land within the area in currently undeveloped and is owned by the Arizona State Land Department (ASLD).

Background

This segment of Lake Pleasant Parkway has been previously addressed in the *Phase III of Lake Pleasant Parkway DCR (Williams Road to SR 74)*, prepared in 2001 by Kirkham Michael. The limits of this DCR extended from Williams Road to SR 74. Since the publication of the original DCR, major changes have occurred and discoveries have been made, including:

- ⇒ The City of Peoria has upgraded Lake Pleasant Parkway to a parkway section from Williams Road to Westwing Parkway. The roadway is currently a four-lane divided roadway with planned future widening to a six-lane section.
- ⇒ Arizona Department of Transportation (ADOT) is currently constructing the SR303L, Happy Valley Road to Lake Pleasant Parkway, which includes the construction of a traffic interchange at Lake Pleasant Parkway.
- ⇒ There is no existing public right-of-way for the existing roadway from a location 480’ north of the intersection of Westwing Parkway to SR 74.

Need for the Project

The Lake Pleasant Parkway DCR will address a critical need for improved roadway circulation and access in the City of Peoria along the corridor. The City of Peoria anticipates rapid growth within the project limits driven by the construction of the SR303L at Lake Pleasant Parkway and by general development trends of increased development in North Phoenix and Peoria.

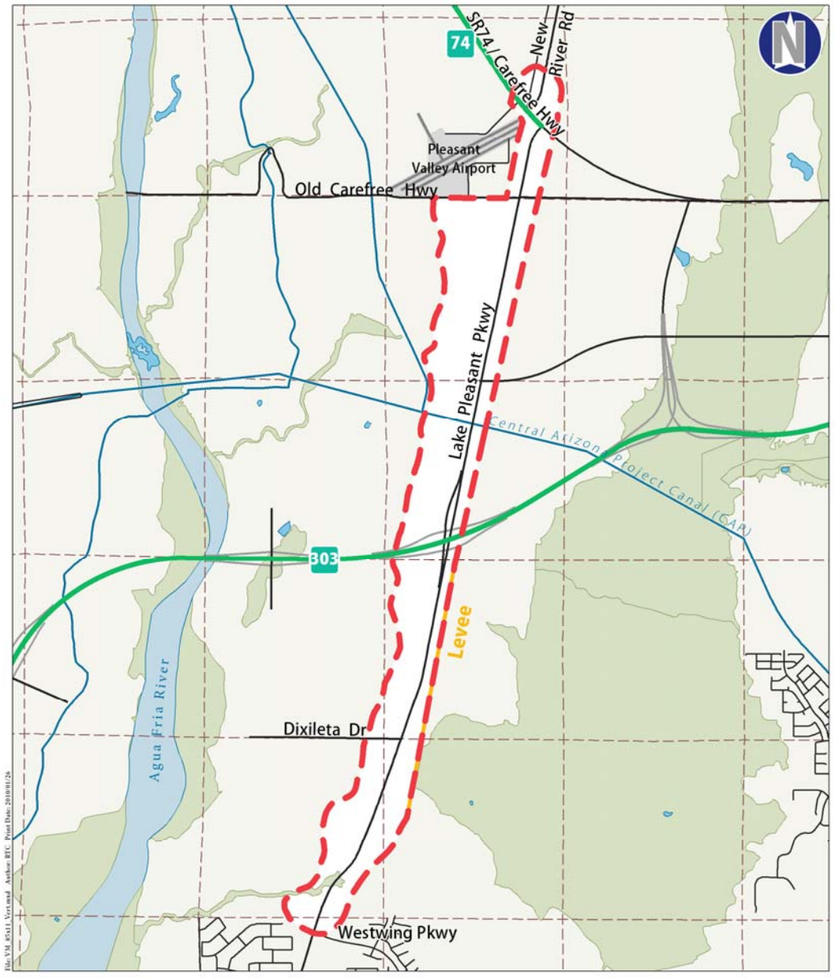
Purpose and Scope

The primary purpose of this DCR Update is to establish a recommended alternative for a new parkway section from Westwing Parkway to SR 74 based upon the following:

- ⇒ Incorporate the ADOT SR303L interchange with Lake Pleasant Parkway which will be open for traffic in the fall of 2011.
- ⇒ Provide sufficient capacity to accommodate 2035 travel model projections from the Maricopa Association of Governments (MAG).
- ⇒ Accommodate future development plans from the City of Peoria and ASLD
- ⇒ Accommodate the City’s “open space” and sustainability visions
- ⇒ Develop final access management strategies for Lake Pleasant Parkway
- ⇒ Evaluate the re-configuration of the Lake Pleasant Parkway, New River Road and SR 74 intersections.

An environmental document in the form of a Categorical Exclusion (CE) will be submitted to the City as a separate document with the Final DCR Update document. The intent of the CE is to describe the study area in terms of its social, economic, and environmental character, and identify any potential impacts that may result from project construction. It is anticipated that the proposed construction activities proposed with this project do not induce significant impacts to growth or land use and do not have significant impacts on natural, cultural, or biological resources, and have no significant environmental impacts.

Figure 1 Location and Vicinity Map



The project goals have been established through technical analysis, agency involvement and public input. The project goals for Lake Pleasant Parkway DCR Update include:

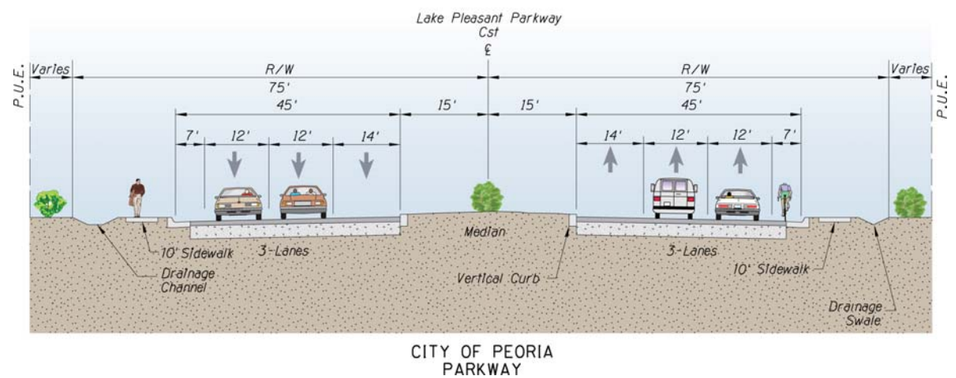
- ⇒ Providing sufficient capacity and improved operational characteristics on Lake Pleasant Parkway to meet the traffic needs of the design year 2035.
- ⇒ Addressing the critical transportation concerns of the local community, the City of Peoria and other key stakeholders.
- ⇒ Establishing the project definition with an associated cost estimate to compete for public funding in the City of Peoria Capital Improvement Plan (CIP).
- ⇒ Providing the City of Peoria with a supportable basis for facilitating contributions from development toward transportation solutions in the area.
- ⇒ Provide an implementation plan for the need for improvements for the South and North Segments, for both the Interim and Ultimate improvements based on traffic volumes, anticipated development and pavement conditions.

Design Concept Alternatives

Several alternatives were developed and evaluated during the DCR study process based on the City's vision for the parkway through collaboration with major stakeholders and based on engineering analyses. The various City groups (Management, Engineering, Planning, Utilities, and Economic Development), as well as key stakeholders including ASLD, Central Arizona Project (CAP), and Flood Control District of Maricopa County (FCDMC) actively participated in providing critical input that was considered in developing the DCR alignments.

Based on the current City CIP funds, the limits of the project have been divided into two independent segments: the South Segment extending from Westwing Parkway to the southern ramp terminals of the SR303L, and the North Segment extending from the northern terminals of the SR303L to SR 74. All of the alternatives utilize the City of Peoria standard parkway section as shown in Figure 2 which includes a six-lane section with a 30' raised median and a minimum of 150 feet of right-of-way. This section also provides for curb and gutter, sidewalk, and bike lanes. The South Segment alternatives are independent of the North Segment alternatives. The South Segment and North Segment Alternatives are shown in Figure 3.

Figure 2 City of Peoria Parkway Typical Section (Ultimate Section)



CITY OF PEORIA PARKWAY

South Segment Alternatives:

Alternative 1S – Reconstruct Roadway on Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) following the existing roadway alignment from Westwing Parkway to the SR303L. This alternative requires the relocation of the El Paso Natural Gas (EPNG) line at one location. This alternative impacts the existing 12 kV overhead power line and will require its relocation from Westwing Parkway to SR303L. Based on conversations with the City and APS, it is anticipated these lines will be undergrounded and potentially upgraded. The main intersection along this alignment is at Dixileta Drive.

Alternative 2S – Shift Roadway to the West; Close to the Bluff

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by shifting the new roadway to the west of the existing alignment and to the east of the bluff from Westwing Parkway to the south end of the SR303L. This alternative may require the relocation of the EPNG line at one location. This alternative does not impact the existing 12 kV overhead power line and will therefore not require any relocations of APS facilities. The main intersection along this alignment is at Dixileta Drive.

Alternative 3S – Shift Roadway to the East of the Existing Alignment; Close to the New River Levee

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by shifting the new roadway to the east of the existing alignment and west of the New River Levee from Westwing Parkway to the SR303L.The horizontal alignment for this alternative is set to provide sufficient clearance between the proposed roadway right-of-way and the New River Levee so that the integrity of the levee is not compromised. The offset between the levee and the roadway is based on guidelines provided by the FCDMC. This alternative may require the relocation of the EPNG line at one location. This alternative impacts the existing 12 kV overhead power line and will require its relocation from Westwing Parkway to SR303L. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded. The main intersection along this alignment is at Dixileta Drive.

Alternative 4S – Gas Line Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by following the EPNG alignment from Westwing Parkway to the SR303L. This alternative may require the relocation of the EPNG line at one location. The main intersection along this alignment is at Dixileta Drive. This alternative does not impact the existing 12 kV overhead power line and will therefore not require its relocation.

Alternative 5S – No Build Alternative

The "No-Build" Alternative is provided for comparison purposes. It provides no improvements to traffic capacity, motorist or pedestrian safety, or operational features of the existing roadway. Traffic models forecast significant traffic volume increases, and this demand is not met by the "No-Build" Alternative.

North Segment Alternatives:

Alternative 1N – Reconstruct Roadway on Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by reconstructing the new roadway on the existing alignment from the SR303L to SR 74. This alternative assumes that the existing structure over the CAP canal will be widened to accommodate the additional traffic lanes. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated that this line will be undergrounded and potentially upgraded.

Alternative 2N – Shift Roadway to the West of the Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by shifting the new roadway to the west of the existing roadway from SR303L to north of the CAP canal, and then back onto the existing roadway alignment south of the Old Carefree Highway intersection. This alternative requires the construction of a new 105' long and 140' wide bridge over the CAP to accommodate the new six-lane facility. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

Alternative 3N – Shift Roadway to the East of the Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) by shifting the new roadway to the east of the existing roadway from the from SR303L to north of the CAP canal, and then back onto the existing alignment south of the Old Carefree Highway intersection. This alternative requires the construction of a new 105' long and 140' wide bridge over the CAP to accommodate the new 6 lane facility. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

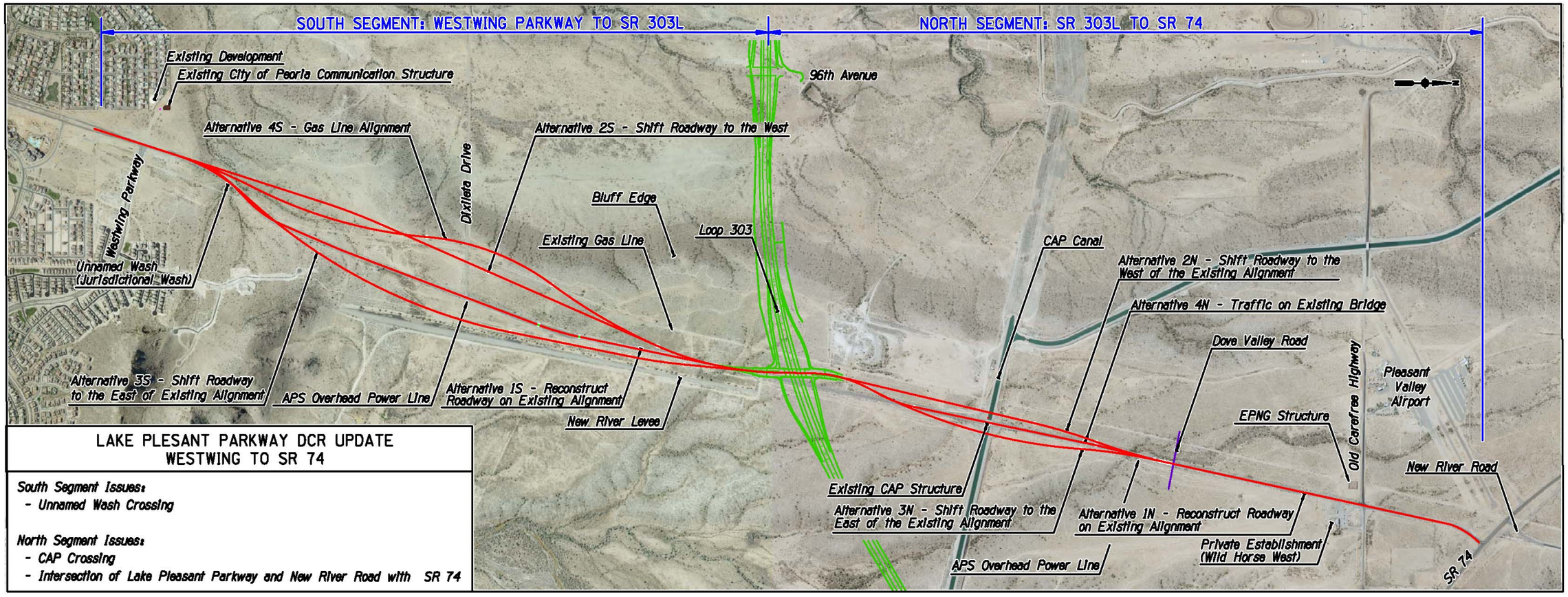
Alternative 4N – NB Traffic on Existing Bridge

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 2) from the SR303L to SR 74. This alternative typically follows the existing alignment. This alternative was developed based on discussions with the CAP. As a result of the discussions, it was determined that grade separation between the proposed mainline and the CAP Operation and Maintenance (O & M) roads could be made by tunneling the O & M roads, and constructing the mainline at grade. This alternative assumes that the existing structure over the canal is utilized for northbound traffic, and a new 105' long and 53'-10" wide bridge is constructed to carry the southbound traffic. Due to grade difference between the existing structure and the new structure, this alternative provides for a wider median between the southbound and northbound traffic at the CAP. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

Alternative 5N – No Build Alternative

The "No-Build" Alternative is provided for comparison purposes. It provides no improvements to traffic capacity, motorist or pedestrian safety, or operational features of the existing roadway. Traffic models forecast significant traffic volume increases, and this demand is not met by the "No-Build" Alternative.

Figure 3 South and North Segments Alternatives



Recommended Alternatives

Alternative 3S: Shift the Roadway to the East of the Existing Alignment; Close to the New River Levee was selected as the recommended alternative for the South Segment. This alternative is consistent with the City of Peoria's vision of "open space", it allows for the most area of developable land, it minimizes remnant parcels and it is compatible with the ASLD vision for development in the area.

Alternative 4N: Northbound Traffic on Existing Bridge was selected as the recommended alternative for the North Segment. This alternative allows for the utilization of the existing bridge over the CAP for northbound traffic, and it requires the construction of a new bridge over the CAP that is narrower than those of Alternatives 2N and 3N. This alternative implements the concept of grade separation between the mainline and the CAP O & M roads via underpass crossings and it minimizes the limitation of access between Lake Pleasant Parkway and the adjacent land due to a favorable mainline profile.

The major features of the recommended alternatives are summarized in Table 1.

Table 1 Major Features of the Recommended Alternatives

Design Feature	South Segment Alternative 3S	North Segment Alternative 4N
Typical Section	City of Peoria Parkway typical section	City of Peoria Parkway typical section
New Right-of-Way	88.4 Acres	105.5 Acres
Drainage Features	4 Reinforced Concrete Box Culverts	2 Reinforced Concrete Box Culverts
Special Features	Primary Trail at the Unnamed Wash (12'x12' RCBC or equivalent structure)	Primary Path at the CAP (12'x10' RCBC or equivalent structure)
Structures	None	1) Structure spanning the CAP canal: 53'-10" wide and 105' long

Design Feature	South Segment Alternative 3S	North Segment Alternative 4N
		2) Two Equipment Underpasses for CAP Access (20'x14.5' Structures)
Jurisdictional Water of the US Wash	Unnamed Wash; 404 permit required	None
Potential Impacts to Cultural Sites	None	None
Major Utility Relocations	EPNG line at one location (potential relocation); APS 12kV overhead power line	APS 12kV overhead power line

Both ultimate and interim project objectives have been identified during the development of this DCR for the recommended alternatives. The ultimate improvements involve upgrading Lake Pleasant Parkway to typical City of Peoria six-lane parkway section that includes raised median, bike lanes, curb and gutter, and sidewalk. This section meets identified local and regional transportation needs. The Interim improvements involve constructing a four-lane facility that can be expanded to a six-lane parkway. The interim phase includes constructing the outside lanes of the northbound and southbound lanes. The existing roadway will be removed except at the CAP canal crossing where the existing structure will be utilized for the northbound lanes. The on-site drainage system, reinforced concrete box culverts (RCBCs) and the southbound CAP Canal bridge are designed to meet the needs of the ultimate condition. Because the outside lanes will be constructed first, the utility relocations and new right-of-way needs will be addressed during the interim phase.

The interim traffic conditions (2018) were evaluated for a four-lane section of Lake Pleasant Parkway. The four-lane roadway segments of Lake Pleasant Parkway will operate within four-lane capacity in 2018. Traffic projections were then applied utilizing an annual growth rate of 5 percent (derived from MAG 2018 and 2035 ADT volumes) to the 2018 ADT volumes to determine the time when a four-lane facility will have traffic volumes beyond its four-lane roadway capacity. Lake Pleasant Parkway should be widened to six-lanes by 2023 to accommodate the increase growth in traffic demand from anticipated development.
The six-lane segments of Lake Pleasant Parkway will operate at acceptable levels through 2035 with the exception of two roadway segments to north of SR303L (SR303L to Dove Valley Road and Old Carefree Highway to SR 74).

The preliminary costs for the Interim improvements for the South and North Segments are summarized in Table 2.

Table 2 Recommended Alternatives Preliminary Costs (Interim Improvements)

Description	South Segment Alternative 3S (Note 1)	North Segment Alternative 4N (Note 1)
Construction	$26,003,143	$34,453,298
Design (10% of Construction Value)	$2,600,314	$3,445,330
Construction Management (12% of Construction Value)	$3,120,377	$4,134,396
New Right-of-Way	$5,346,500	$4,560,000
Utility Relocation (APS, EPNG and 1% of Construction Value)	$3,307,277	$2,784,607
Administration (8% of Construction Value)	$2,080,251	$2,756,264
TOTAL COST	$42,457,862	$52,133,895

Note 1: The preliminary costs provided in Table 2 include sewer line and water line construction and contingencies. Section 6.0 provides a detailed breakdown of construction costs per CIP funding source.

Project Funding

Funding for final design, right-of-way acquisitions and construction for the South Segment from Westwing Parkway to the SR303L have been identified in the current City CIP totaling $35.5 Million between FY 2010 to FY 2015. The City of Peoria CIP FY 2010-2015 also lists $4.4 Million for a sewer line construction and $8.3 Million for the water line construction. Funding for the North Segment has not yet been identified.

Due to recent cost savings on the City of Peoria Beardsley Connector project, Maricopa Association of Governments (MAG) re-appropriated the remainder of the unused federal funds for the Lake Pleasant Parkway project, with approximately $2.7M to be allocated for right-of-way acquisitions and $2.6M to be allocated for design.

Considerations for Future Development

A list of considerations has been compiled to assist with the future development of the Lake Pleasant Parkway corridor. The DCR Update and CE will provide the necessary information for specific design and construction projects to be funded in the appropriate improvement programs. Projects may be advanced with developer participation.

⇒ ***Right-of-Way Preservation*** – A DCR level document is sufficient to preserve the right-of-way requirements for the Lake Pleasant Parkway corridor. The City of Peoria will be responsible for obtaining new right-of-way and/or preserving the corridor during future development.

⇒ ***Environmental Impacts*** – The environmental documentation for this study includes a Categorical Exclusion. The study considerations include biological resources, hazardous materials, recorded cultural sites, jurisdictional waters, noise impacts, and Section 4(f) resources. Section 4(f)

resources include schools, parks, cemeteries, and similar culturally important sites. Because more than one acre of land will be disturbed, an Arizona Pollutant Discharge Elimination System (AZPDES) Permit and Storm Water Pollution Prevention Plan (SWPPP) will be required.

⇒ ***Utilities for Future Development*** – The City is evaluating the feasibility of installing conduits for future private utilities from Westwing Parkway to SR303L. As this evaluation is on-going and has not been concluded, this DCR assumes that private utilities will be installed within the City's right-of-way and that no P.U.E will be required.

⇒ ***Utility Relocations*** – Utility relocations will be required to implement the corridor improvements. Coordination with existing utility owners will be required as well as the preparation of utility designating and pothole activities to confirm the locations and depths of the existing utilities. An APS 12kV overhead power line will need to be relocated and undergrounded**.** It is anticipated that the existing EPNG line may need to be relocated at one location along the South Segment. Determination of the need for relocations will be done during final design based on pothole information.

⇒ ***Landscaping Plans*** **–** Final project design will specify the type of landscaping and aesthetic treatments to the structural elements to be used to enhance the roadway corridor and its relationship to adjacent land uses. The project landscape enhancement costs include enhanced landscaping at a cost of $5 per square foot for the median areas and less extensive landscaping at a cost of $3 per square foot for the roadway slopes. The landscaping theme established by the City along Lake Pleasant Parkway south of Westwing Parkway shall be continued on this project as described in the Lake Pleasant Parkway landscaping Theme Manual.

⇒ ***Drainage*** – The recommended alternatives do not conflict with the delineated 100-year floodplains. It is anticipated that no Conditional Letters of Map Revision (CLOMR) will be required for the construction of proposed improvements.

⇒ ***Structures*** – Major structures are included as part of the recommended improvements for the Lake Pleasant Parkway corridor. Details of the bridge over the CAP canal are included with this document. A bridge type selection report has been prepared and will be provided in the Final DCR Update document.

⇒ ***Geotechnical Investigation*** – Seismic refraction surveys were performed between Westwing Parkway and State Route SR 74 to assess the existing surface and subsurface for the preferred alternative corridor and to provide preliminary recommendations for design and construction. The investigation noted the existence of heavily cemented soils in relatively shallow excavation depths. A preliminary Geotechnical Report was included with the Draft DCR and will be provided with the Final DCR Update. A detailed geotechnical investigation will be required during the preparation of the final design documents.

⇒ ***Traffic Signals*** – New traffic signals are proposed at the intersections of Lake Pleasant Parkway with: Westwing Parkway, Dixileta Drive, Unnamed Street between SR303L and the CAP canal, Dove Valley Road, Old Carefree Highway and SR 74.

1.0 Introduction

The City of Peoria is preparing a Design Concept Report (DCR) Update and Categorical Exclusion (CE) for a section of Lake Pleasant Parkway. The corridor is approximately four and a half miles in length extending from Westwing Parkway to SR 74. The project location and vicinity map is shown in Figure 1.1. This section of Lake Pleasant Parkway lies within the jurisdiction of the City of Peoria with the exception of the intersection of Lake Pleasant Parkway and SR 74 and the SR303L, that are within the ADOT jurisdiction.

This segment of Lake Pleasant Parkway has been previously addressed in the *Phase III of Lake Pleasant Parkway DCR (Williams Road to SR 74)*, prepared in 2001 by Kirkham Michael. The limits of this DCR extended from Williams Road to SR 74. The primary purpose of this DCR Update and CE is to establish a recommended alternative for a new parkway section from Westwing Parkway to SR 74 based upon the following:

- ⇒ Incorporate the ADOT SR 303 interchange with Lake Pleasant Parkway which will be open for traffic in the fall of 2011.
- ⇒ Provide sufficient capacity to accommodate 2035 travel model projections from the Maricopa Association of Governments (MAG).
- ⇒ Accommodate future development plans from the City of Peoria and ASLD
- ⇒ Accommodate the City's "open space" and sustainability visions
- ⇒ Develop a final access management strategies for Lake Pleasant Parkway
- ⇒ Evaluate the re-configuration of the intersections of Lake Pleasant Parkway, New River Road and SR 74

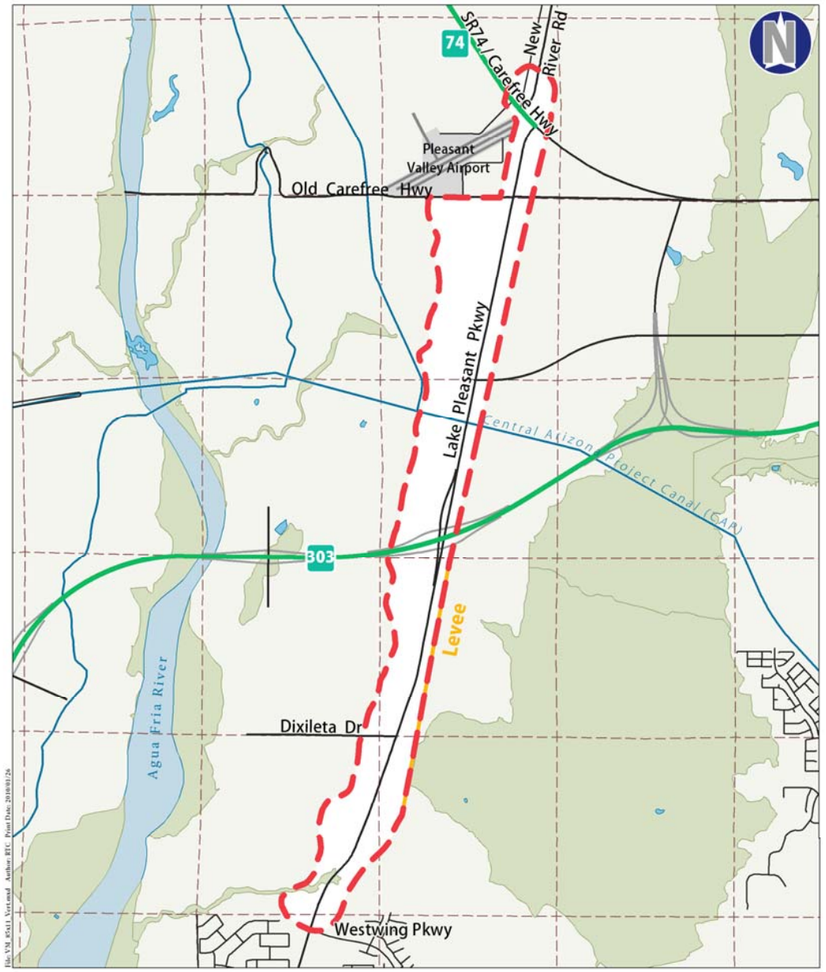
This section of Lake Pleasant Parkway is classified as a Parkway according to the City of Peoria Street Classification Map (Rev Sep 2005) and the 2008 General Plan. Lake Pleasant Parkway connects the cities of Peoria and Phoenix to Lake Pleasant Regional Park. Within the study limits of this DCR, Lake Pleasant Parkway is a two-lane rural roadway that provides regional access to SR 74 and the Lake Pleasant Parkway Regional Park. The majority of land within the area is currently undeveloped and is owned by the ASLD.

This DCR Update will define the project scope, identify issues, develop and evaluate improvement alternatives, review and document the environmental conditions, provide a recommended alternative design and estimate of the improvement costs as well as an implementation plan. The CE will be submitted to the City as a separate document with the Final DCR Update document. The intent of the CE is to describe the study area in terms of its social, economic, and environmental character, and identify any potential impacts that may result from project construction. It is anticipated that the proposed construction activities proposed with this project do not induce significant impacts to growth or land use and do not have significant impacts on natural, cultural, or biological resources, and have no significant environmental impacts. Preliminary typical sections and plans will be provided with the Final DCR Update for the recommended alternative, including roadway, drainage, traffic and structural improvements.

1.1 Need for the Project

The Lake Pleasant Parkway DCR will address a critical need for improved roadway circulation and access in the City of Peoria along the corridor. The City of Peoria anticipates rapid growth within the project limits driven by the construction of the SR303L at Lake Pleasant Parkway and by general development trends of increased development in North Phoenix and Peoria. In addition to anticipated growth, the existing pavement is in poor condition due a small structural number and heavy truck volumes. The City has performed maintenance work to the existing roadway consisting of mostly patch work in an attempt to extend the pavement life and serviceability of the roadway.

Figure 1.1 Location and Vicinity Map



1.2 Description of the Project

The project limits extend from the Westwing Parkway intersection at the south terminus to SR 74 at the north terminus. The southern approach of the intersection of Lake Pleasant Parkway and Westwing Parkway will require widening to match the City of Peoria Parkway Typical Section that is utilized for this project.

Due to the availability of City funds this DCR assumes the project is divided into two segments: the South Segment extends from Westwing Parkway to the southern ramp terminals of the SR303L, and the North Segment extends from the northern terminals of the SR303L to SR 74. The South Segment alternatives are independent of the North Segment Alternatives.

The improvements associated with the ultimate project include constructing a new six-lane parkway with three travel lanes in each direction separated by a 30 foot median. Pedestrian and bicycle traffic are accommodated on both sides of the roadway. One new structure is proposed within the limits of the North Segment to span the CAP canal. Drainage improvements, City water and sewer improvements, the identification of a private utility corridor, and the establishment of access control strategy for the corridor are also discussed in this DCR.

1.3 Project Goals and Objectives

The project goals have been established through technical analysis, agency involvement and public input. The project goals for Lake Pleasant Parkway DCR Update include:

- ⇒ Providing sufficient capacity and improved operational characteristics on Lake Pleasant Parkway to meet the traffic needs of the design year 2035.
- ⇒ Addressing the critical transportation concerns of the local community, the City of Peoria and other key stakeholders.
- ⇒ Establishing the project definition with an associated cost estimate to compete for public funding in the City of Peoria CIP.
- ⇒ Providing the City of Peoria with a supportable basis for facilitating contributions from development toward transportation solutions in the area.

Both ultimate and interim project objectives have been identified during the development of this DCR. The ultimate improvement involves upgrading Lake Pleasant Parkway to a six-lane parkway that meets local and regional transportation needs. The interim improvement is a phased approach of the ultimate solution that meets the needs of the design year. The objectives of the project are to:

- ⇒ Provide a roadway design that meets current City standards
- ⇒ Meet City of Peoria drainage requirements for a roadway that traverses a floodplain
- ⇒ Manage access along the corridor
- ⇒ Define right-of-way needs for the ultimate improvements
- ⇒ Accommodate the CAP requirements for the proposed structure
- ⇒ Design improvements that are environmentally sensitive
- ⇒ Provide a recommendation and time for the need for improvements for the South and North Segments, for both the Interim and Ultimate improvements based on traffic volumes, anticipated development and pavement conditions.

The Interim improvements involve constructing a four-lane facility that can be expanded to a six-lane parkway. The interim phase includes constructing the outside lanes of the northbound and southbound lanes. The interim design seeks to minimize throwaway improvements when the six lane facility is warranted and therefore, intersections will be constructed to their ultimate width.

1.4 Characteristics of the Corridor

Within the study limits, Lake Pleasant Parkway is a paved two-lane roadway. The paved width is 28 feet with no curb and gutter, bike lanes or sidewalk. Pavement conditions are considered poor due to a low structural number and heavy truck traffic volumes. The intersections of Westwing Parkway, Old Carefree Highway and SR 74 are stop-controlled. ADOT completed the installation of a signal at the intersection of Lake Pleasant Parkway and SR 74 in the fall of 2009.

The existing horizontal alignment of Lake Pleasant Parkway is relatively straight and includes six horizontal curves based on the recorded survey centerline of the roadway. The vertical alignment follows the existing terrain. There are several low water crossings within the limits of the project, most noticeably at the Unnamed Wash, located approximately 1700’ north of the intersection of Westwing Parkway.

The Lake Pleasant Parkway right-of-way is limited and only exists from the south project terminus to approximately 480’ north of the intersection of Westwing Parkway. Within this area, the right-of-way varies from 150’ to 170’. From 480’ north of the intersection of Westwing Parkway to SR 74, public right-of-way does not exist for the existing roadway. Adjacent land ownership includes ASLD, Flood Control District of Maricopa County (FCDMC) and Private.

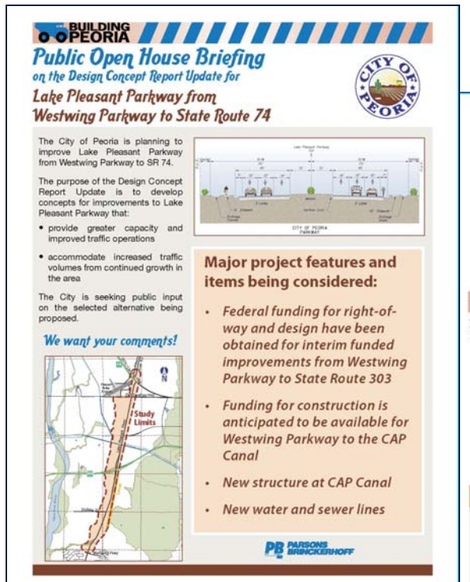
Looking South at Lake Pleasant Parkway over the CAP Canal

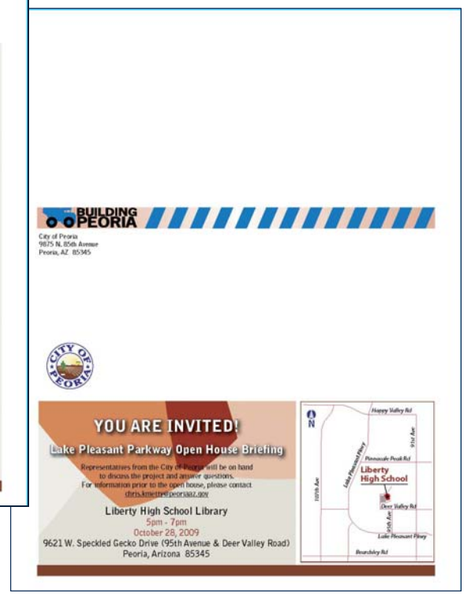
1.5 Public Involvement

Two public involvement meetings were conducted for the DCR development, one held on October 28, 2009 and the other on February 25, 2010. Both public involvement meetings were conducted at Liberty High School in Peoria to present the alternatives (October 28, 2009) and to advise the public of project updates and the recommended alternative for the project (February 25, 2010). Public Meeting notices were mailed to over 800 mailing addresses for each meeting. The distribution area was bound by 91st Avenue on the east, 103rd Avenue on the west, Jomax Road on the south and State Route 74 on the north. In addition the meetings were advertised on the City of Peoria website, in advertisements in the local news papers as well as the Arizona Republic.

Both meetings were attended by approximately 15 people and no adverse comments were provided by the attendees. The meetings were conducted in an open house format providing a free exchange of information between attendees and the project team members. The City of Peoria project manager made a presentation that provided background information, described the project need and scope of work. The presentation was followed by a question and answer period.

Appendix G shows the flyers for both public meetings as well as the display boards for Public Meeting Number 2.





1.6 Programmed Improvements

Funding for final design, right-of-way acquisitions and construction for the South Segment from Westwing Parkway to the SR303L has been identified in the current 2010 City CIP totaling $35,400,000. The current City CIP also lists $4.4 Million for a sewer line construction (Dynamite Road to SR303L) and $8.3 Million for the water line construction (Dynamite Road to SR303L). Funding for the North Segment has not yet been identified. Due to recent cost savings on the City of Peoria Beardsley Connector project, Maricopa Association of Governments (MAG) re-appropriated the remainder of the unused federal funds for the Lake Pleasant Parkway project, with approximately $2.7M to be allocated for right of way acquisitions and $2.6M to be allocated for design.

1.7 Previous Studies of the Project Area

Several previous studies have been prepared for the project area as described below:

City of Peoria CIP Prioritization Review/ Analysis, Year 2007 Update, Final Report (Wilson & Company, March 28, 2008)

The report ranks the segment of Lake Pleasant Parkway between SR 74 and SR303L as a top priority for capacity improvements based on the forecasted (2028) daily traffic volumes in the study area. The study assumes that the segment south of SR303L will be a four-lane facility by 2010 and is ranked anticipated to operate at acceptable levels with the 2028 forecasted daily traffic volumes.

The report recommends widening Lake Pleasant Parkway (north of SR303L) to four lanes by utilizing Proposition 400 Phase II (2011-2014) funds

The report recommends widening the intersection of Lake Pleasant Parkway and Westwing Parkway with two travel lanes in each direction, dual left turns on northbound and southbound approaches, and right turn lanes on all approaches.

The report recommends an additional westbound left turn lane at the intersection of Lake Pleasant Parkway and Carefree Highway.

City of Peoria General Plan: Circulation Plan (Revision: December 13, 2006)

City of Peoria Circulation identifies Lake Pleasant Parkway as an arterial street between Loop 101 and SR 74. The major roadways within the project limits shown in the circulation plan are Westwing Parkway, Dixileta Drive (west of Lake Pleasant Parkway), SR 303L (freeway with a traffic interchange at Lake Pleasant Parkway), Dove Valley Road, Old Carefree Highway (west of Lake Pleasant Parkway), and SR 74.

City of Peoria Street Classification Map (Revision: September 28, 2005)

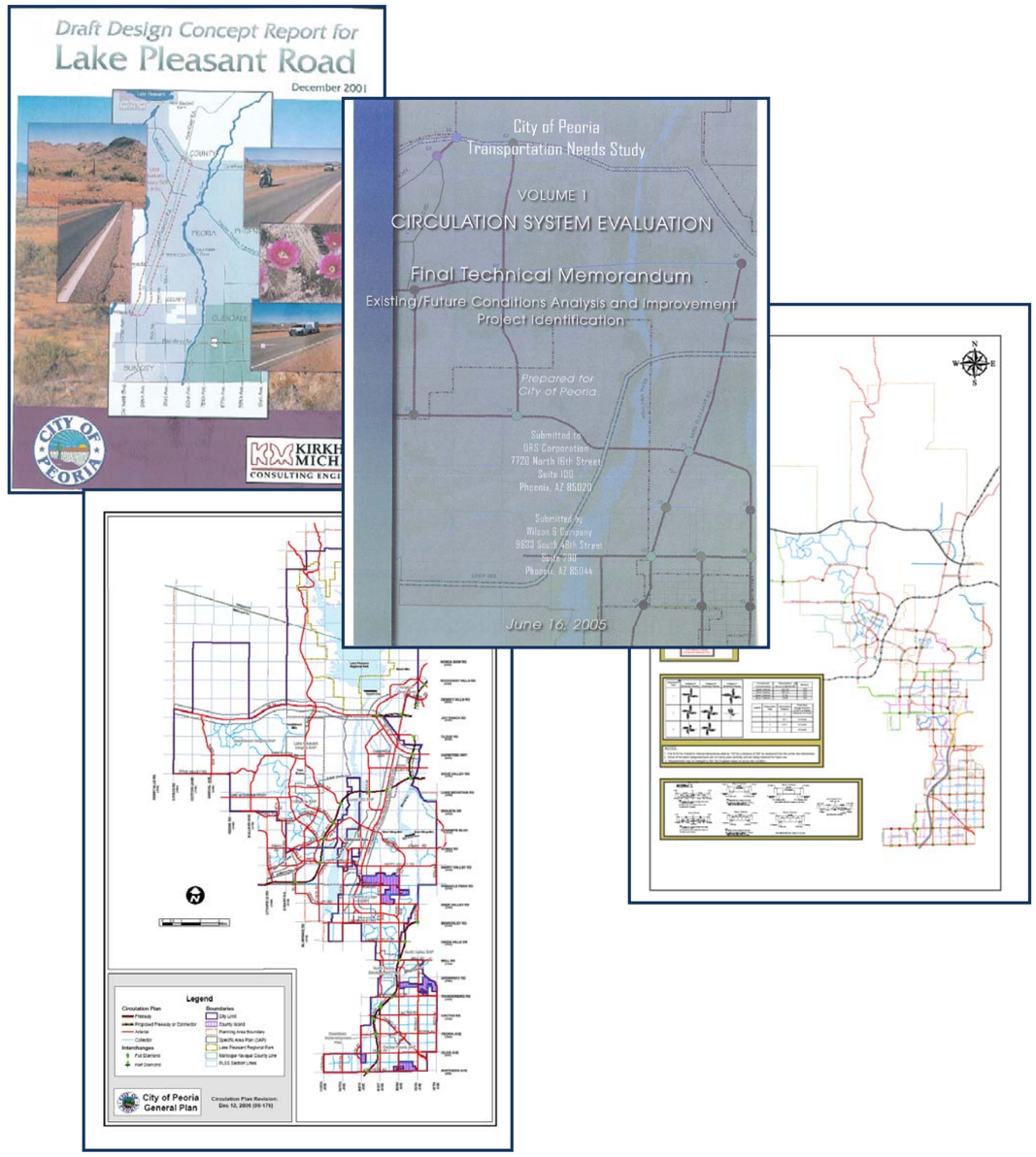
City of Peoria Street Classification Map classifies Lake Pleasant Parkway as a “Parkway” with 150 feet right of way, three travel lanes, bike lane and sidewalk in each direction. The identified major streets include Westwing Parkway, SR303L (traffic interchange with Lake Pleasant Parkway), Dove Valley Road, Old Carefree Highway, and SR 74.

City of Peoria Transportation Needs Study, Final Report, April 2005

City of Peoria Transportation Needs Study recommends construction of Lake Pleasant Parkway to an ultimate six-lane facility (from Dynamite Road to SR 74) as identified in the Street Classification Map. The report recommends the project to be completed as part of the Capital Improvements Program (CIP) and utilize the Proposition 400 funds.

Lake Pleasant Parkway Draft Design Concept Report (Kirkham Michael Consulting Engineers, December 2001)

This Design Concept Report (DCR) covers an 8.3-mile corridor of Lake Pleasant Road from Williams Road north to the Carefree Highway (SR 74). The purpose of the Draft DCR was to establish an alignment for a two-lane interim roadway, an ultimate six-lane roadway and delineate the right-of-way requirements for these alternatives.



2.0 Traffic Analysis

This chapter presents the existing and future traffic conditions for Lake Pleasant Parkway corridor from Westwing Parkway to SR 74 (Carefree Highway). This section includes a summary of existing conditions, the results of the future traffic conditions analysis, and recommendations for the roadway and intersection improvements.

2.1 Existing Roadway Characteristics

The existing roadway configuration within the project area is shown in Figure 2.1. The major roadway network as defined in this section consists of one-mile arterial roadways intersecting Lake Pleasant Parkway.

Lake Pleasant Parkway: Lake Pleasant Parkway is mostly a two-lane north-south roadway without curb and gutter within the project limits. Lake Pleasant Parkway, south of Westwing Parkway exists as a four-lane roadway with raised median and curb and gutter.

Westwing Parkway: Westwing Parkway exists as a four-lane east-west roadway with raised median, curb and gutter. Currently, Westwing Parkway exists only to the east of Lake Pleasant Parkway. Westwing Parkway is stop-controlled at its intersection with Lake Pleasant Parkway

Dixileta Drive: Dixileta Drive exists as a dirt road providing access to a gravel pit located west of Lake Pleasant Parkway.

Old Carefree Highway: Old Carefree Highway exists as a two-lane east-west paved roadway without curb and gutter. Old Carefree Highway is stop-controlled at its intersection with Lake Pleasant Parkway.

SR 74 (Carefree Highway): SR 74 exists as a two-lane east-west paved roadway without curb and gutter. Lake Pleasant Parkway intersects SR 74 to form a stop-controlled intersection. Arizona Department of Transportation (ADOT) is currently in construction phase of signalizing this intersection and will be completed by the time this DCR is finalized.

New River Road: New River Road exists as a two-lane paved roadway to north of SR 74 without curb and gutter. New River Road is stop-controlled at its intersection with SR 74. New River Road intersects SR 74 approximately 650 feet west of Lake Pleasant Parkway intersection with SR 74.

All the roadways within the study area are owned and maintained by City of Peoria with the exception SR 74. SR 74 is owned and maintained by ADOT.

2.2 Existing Traffic Volumes

The existing traffic volume data was obtained from the City of Peoria Annual Daily Traffic Map for 2008 and ADOT Traffic Counts for 2008. Figure 2.1 and Table 2.1 show the existing Average Daily Traffic (ADT) volumes in the study area.

Lake Pleasant Parkway in 2008 carried approximately 6,000 vehicles per day. Truck traffic constituted approximately six (6) percent of the daily traffic on Lake Pleasant Parkway.

The daily capacity of the existing roadway segments was analyzed using the capacity threshold volumes presented in *City of Peoria CIP Prioritization Review/Analysis Year 2007 Update Final Report (Wilson and Company, March 28, 2008)*. These threshold volumes are presented in Table 2.2. This table is a planning tool to determine the expected average daily level of service (LOS) for a roadway. The capacities are categorized for each type of roadway and functional classification.

Based on the criteria defined in Table 2.2 and reviewing the data in Table 2.1, the existing traffic volume on Lake Pleasant Parkway (two-lane minor arterial) is well below its two lane roadway capacity.

Table 2.1 Existing Average Daily Traffic Volumes

Roadway	Segment	2008 ADT
Lake Pleasant Pkwy	South of Westwing Parkway	5,980
Lake Pleasant Pkwy	North of Westwing Parkway	6,240
Westwing Parkway	East of Lake Pleasant Parkway	5,990
SR 74	West of Lake Pleasant Parkway	9,110
SR 74	East of Lake Pleasant Parkway	11,850

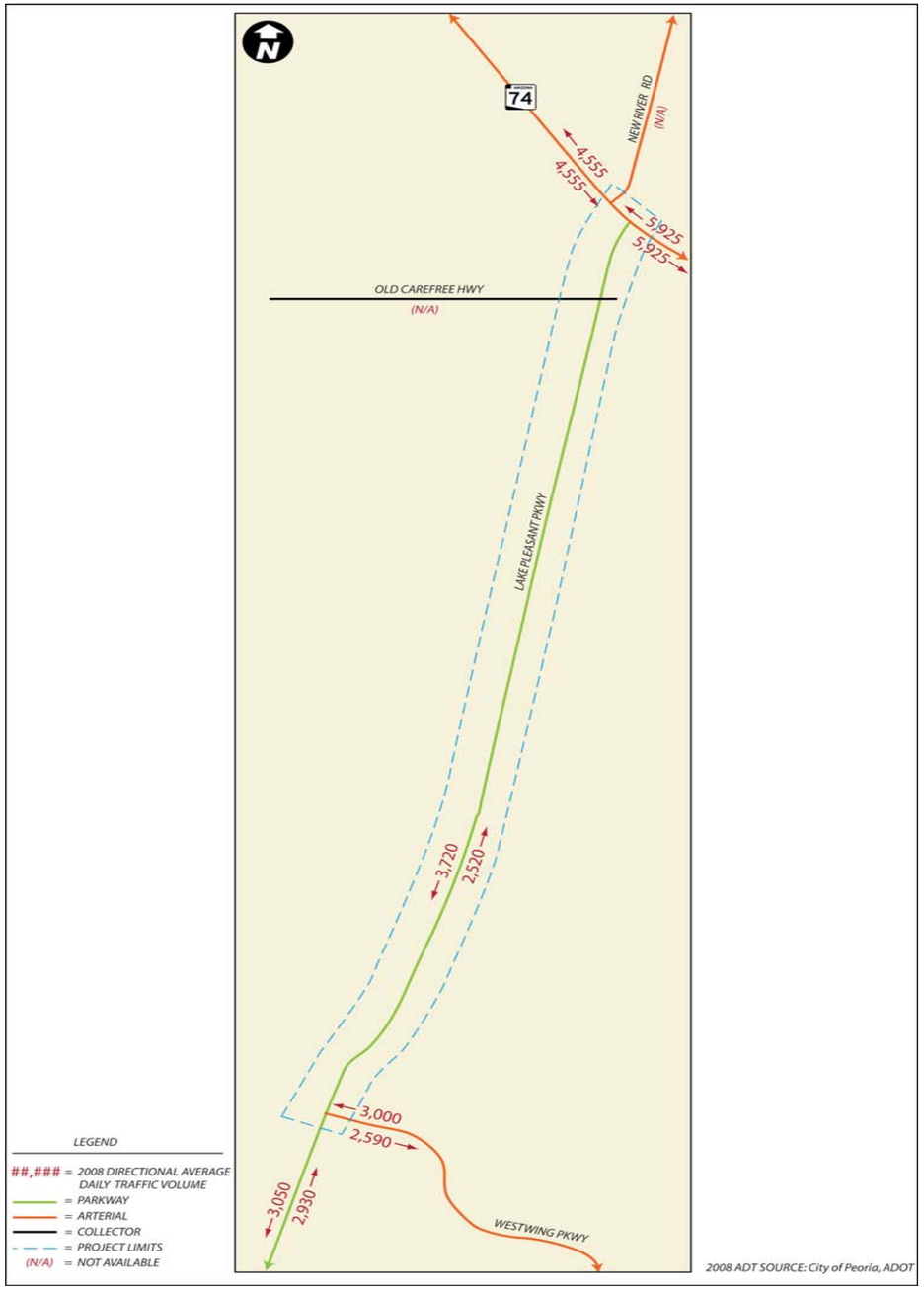
Source: City of Peoria, ADOT

Table 2.2 Roadway Segment Capacity by Facility Type

Facility Type	Number of Thru Lanes	Maximum Daily Volume Threshold (LOS E)
Principal Arterial	Six-Lanes	49,300
Major Arterial	Four-Lanes	32,900
Minor Arterial	Two-Lanes	15,600
Major Collector	Four-Lanes	25,200
Minor Collector	Two-Lanes	12,600

Source: Daily Capacity Threshold Values (LOS E) derived from City of Peoria CIP Prioritization Review/Analysis Year 2007 Update Final Report, Wilson and Company, March 28, 2008 (Table 2-1, Page 2-2).

Figure 2.1 Existing Roadway Network and Average Daily Traffic Volumes



2.3 Accident Data

The accident data presented in this DCR was obtained from City of Peoria and ADOT Traffic Records Section. Crash data was obtained for a three-year time period from January, 01, 2006 to December 31, 2008. Crash data was reviewed and multiple records from different agencies were consolidated to summarize the data for the project area. Crash data indicated a total of 49 reported accidents within the project limits. Majority of the crashes occurred at the Lake Pleasant Parkway intersections with SR 74 and Westwing Parkway. Table 2.3 summarizes the crashes by year and type of accidents.

As shown in Table 2.3, majority of accidents in the project area were recorded at the two intersections of Lake Pleasant Parkway with SR 74 and Westwing Parkway. The predominant types of accidents were angle (45%) collisions. There were three fatal accidents in the study time period. The intersections of Lake Pleasant Parkway with Westwing Parkway and SR 74 recorded one fatality at each location. The intersection of SR 74 and New River Road also recorded one fatality.

Table 2.3 Accidents Summary

Description	2006	2007	2008	Percent
TOTAL NUMBER OF CRASHES	**22**	**11**	**16**	**100%**
SR 74 and Lake Pleasant Parkway	16	4	10	61%
SR 74 and New River Road	5	3	1	18%
Lake Pleasant Parkway and Westwing Parkway	1	4	5	20%
MANNER OF COLLISION				
Angle	4	4	7	31%
Right Angle	4	2	1	14%
Left Turn	1	0	1	4%
Rear End	3	1	5	18%
Sideswipe Opposite	1	0	0	2%
Sideswipe Same	3	0	1	8%
Single Vehicle	6	4	1	22%
INJURY SEVERITY				
Fatal	2	0	1	6%
Incapacitating Injury	3	0	0	6%
No Injury	13	8	10	63%
Non Incapacitating Injury	3	3	5	22%
Unknown Severity	1	0	0	2%

Description	2006	2007	2008	Percent
TIME OF DAY				
Darkness	5	2	2	9%
Dawn	2	0	0	2%
Daylight	15	9	14	38%

Source: City of Peoria, ADOT Traffic Records

2.4 Future Traffic Conditions

2.4.1 Future Roadway Classifications

The proposed Lake Pleasant Parkway between Westwing Parkway and SR 74 is classified as a Parkway in the City of Peoria Street Classification Map (Rev 28 Sep 2005). A typical Parkway cross-section consists of three through lanes and a bike lane in each direction with detached sidewalk and landscape buffer.

A Parkway is an enhanced Major Arterial and typically provides increased mobility with restricted access to the cross streets. The Parkways are intended to move large volumes of traffic with moderate speed. The Parkways also provide limited access to adjacent properties with major signalized intersections at the mile and half-mile spacing, whenever sufficient cross street demand exists. City of Peoria Access Management guidelines restrict the number of right-in/right-out access points along a Parkway facility to three per mile in each direction.

Table 2.4 provides functional classification of the arterial streets within the study area as defined in *City of Peoria Circulation Plan (Dec 12, 2006 (06-176))*. The future conditions analysis was completed for the following study area roadways.

Table 2.4 Functional Classification of Major Streets

Roadway	Jurisdiction	Classification
Lake Pleasant Parkway	City of Peoria	Parkway
Westwing Parkway	City of Peoria	Arterial
Dixileta Drive	City of Peoria	Arterial
SR303L	ADOT	Freeway
Dove Valley Road	City of Peoria	Arterial
Old Carefree Highway*	City of Peoria	Arterial
SR 74	ADOT	Arterial (State Highway)
New River Road	City of Peoria	Arterial

Source: City of Peoria General Plan, Circulation Plan Dec 12, 2006 (06-176)
* Old Carefree Highway is a collector street to east of SR 74 and ends as a cul-de-sac street

In addition to the City of Peoria arterial street improvements, regional improvements within the study area include a new freeway (SR303L) across Lake Pleasant Parkway that connects Interstates I-10 and I-17. A service interchange provides access to Lake Pleasant Parkway from SR303L. Currently, ADOT is constructing SR303L between Happy Valley Road and I-17. SR303L will be constructed as an interim four-lane highway with a traffic interchange at Lake Pleasant Parkway. SR303L will be widened to six-lane freeway facility in Phase II (2016-2020) as identified in the MAG Regional Transportation Plan.

2.4.2 MAG Travel Demand Model

The Maricopa Association of Governments Travel Demand Model was utilized to obtain the traffic forecasts for the study area. MAG utilized the land use elements of the adopted general comprehensive plans for the Cities and Towns within the metropolitan planning area to determine the travel patterns and traffic volumes. A series of geographic areas was used to locate the incremental population and employment growth within the Phoenix Metropolitan Area. These areas included Municipal Planning Areas (MPAs), which typically correspond with the incorporated boundaries of cities and towns; Regional Analysis Zones (RAZs), which are geographical subsets of the MPAs; and Traffic Analysis Zones (TAZs), which can be as small as one square mile.

2.4.3 Future Traffic Volumes

MAG Travel Demand Model was used to obtain the traffic projections for the 2018 and 2035 horizon years. The public agencies within MAG region plan their infrastructure improvements for 2030 horizon year socioeconomic conditions as detailed in the MAG Regional Transportation Plan. MAG also developed travel forecasts for 2035 socioeconomic conditions. The 2035 traffic forecasts were used to determine the study intersection capacity and required lane configurations. The 2018 MAG Model traffic forecasts were used to analyze the interim traffic conditions on Lake Pleasant Parkway.

Figure 2.2 shows the 2035 roadway network and Average Daily Traffic (ADT) volumes in the study area. The functional classification of the roadways within the MAG Model is consistent with the *Circulation Plan of City of Peoria General Plan*. For traffic modeling purposes, New River Road and Lake Pleasant Parkway approaches were aligned with SR 74 to form a four-leg intersection.

Tables 2.5 and 2.6 show the ADT forecasts on Lake Pleasant Parkway roadway segments for the No Build (two-lane Lake Pleasant Parkway) and Build (four or six-lane Lake Pleasant Parkway) conditions, respectively. Lake Pleasant Parkway ADT forecasts for the study years were compared with the capacity threshold volumes presented in Table 2.2 to determine the future volume/ capacity ratio for the Lake Pleasant Parkway roadway segments with the existing two-lane, interim four-lane and ultimate six-lane Lake Pleasant Parkway.

As shown in Table 2.5, the traffic volumes on existing two-lane Lake Pleasant Parkway will exceed its current capacity (two-lanes) throughout the study corridor by 2018. The SR303L regional facility with a traffic interchange at Lake Pleasant Parkway will increase the traffic on Lake Pleasant Parkway beyond its two-lane roadway capacity of 15,600 vehicles per day.

The interim traffic conditions (2018) were evaluated for a four-lane section of Lake Pleasant Parkway. The roadway segments will operate below the four-lane capacity of 25,200 vehicles per day in 2018. An annual

growth rate of 5 percent (derived from MAG 2018 and 2035 ADT volumes) was applied to the 2018 ADT volumes to determine the time when this four-lane facility will have traffic volumes beyond its four-lane roadway capacity. After the analysis, it was determined that Lake Pleasant Parkway should be widened to six-lanes by 2023 to accommodate the increase growth in traffic demand.

Lake Pleasant Parkway should ultimately be widened to a six-lane facility to accommodate the increased traffic demand from the anticipated development in the study area. As shown in Table 2.6, the six-lane segments of Lake Pleasant Parkway will operate at acceptable levels by 2035 with the exception of two roadway segments to north of SR303L (SR303L to Dove Valley Road and Old Carefree Highway to SR 74).

Table 2.5 Lake Pleasant Parkway No-Build Future ADT Volumes and V/C Ratio

From	To	2018 2 - lanes		2035 2 - lanes	
		ADT	Volume/ Capacity Ratio	ADT	Volume/ Capacity Ratio
Westwing Pkwy	Dixileta Dr	22,070	1.42	17,600	1.13
Dixileta Dr	SR303L	14,910	0.96	20,500	1.31
SR303L	Dove Valley Rd	22,140	1.42	27,350	1.75
Dove Valley Rd	Old Carefree Hwy	16,920	1.08	19,170	1.23
Old Carefree Hwy	SR 74	19,640	1.26	24,880	1.59

2018 and 2035 ADT Volumes Source: MAG Travel Demand Model
Capacities compared against Table 2.2 threshold ADT volumes

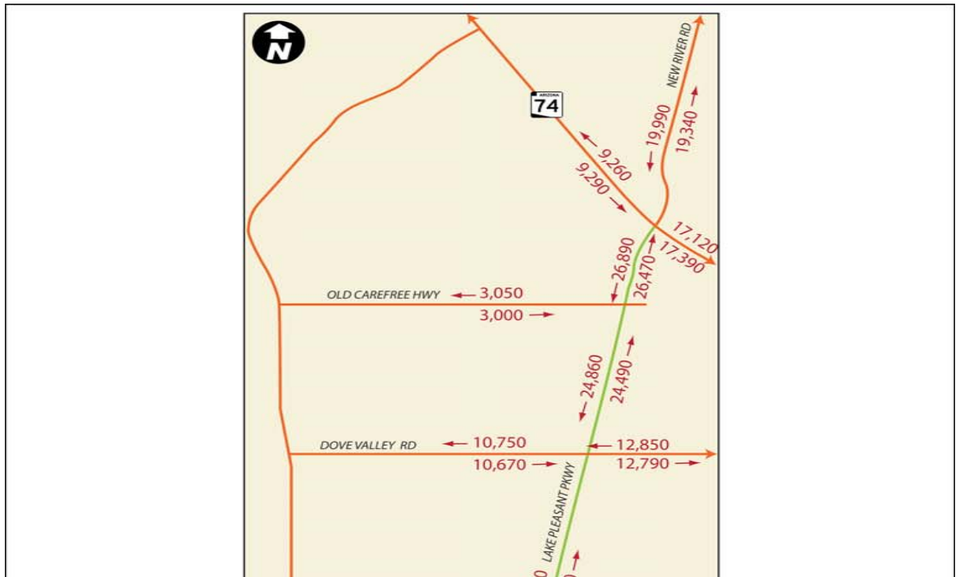
Table 2.6 Lake Pleasant Parkway Build Future ADT Volumes and V/C Ratio

From	To	2018 4 - lanes		2035 6 - lanes	
		ADT	Volume/ Capacity Ratio	ADT	Volume/ Capacity Ratio
Westwing Pkwy	Dixileta Dr	25,170	0.77	35,630	0.72
Dixileta Dr	SR303L	19,010	0.58	37,970	0.77
SR303L	Dove Valley Rd	28,880	0.88	59,620	1.21
Dove Valley Rd	Old Carefree Hwy	19,140	0.58	49,350	1.00
Old Carefree Hwy	SR 74	21,920	0.66	53,350	1.08

2018 and 2035 ADT Volumes Source: MAG Travel Demand Model
Capacities compared against Table 2.2 threshold ADT volumes

These results are a general planning level summary of the proposed improvements. Detailed peak hour traffic analysis was completed to determine the capacity at and required lane configurations for the study area intersections.

Figure 2.2 2035 Roadway Network and Average Daily Traffic Volumes



2.5 Future Intersection Level of Service

The capacity of the study intersections was analyzed using the concept of Level of Service (LOS).

The LOS of an intersection is a measure of driver delay, and is a function of traffic volumes, traffic composition, roadway geometry, and the traffic control at the intersection. The methodology utilized to estimate LOS is described in the *Transportation Research Board's Highway Capacity Manual, Fourth Edition, 2000 Update*. LOS is reported as a letter designation of A through F, and are generally defined as follows:

- ⇒ Level of Service A represents free flow.
- ⇒ Level of Service B is in the range of stable flow, but marks 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 or pedestrian experiences a generally poor level of comfort and convenience.
- ⇒ Level of Service E represents operating conditions at or near the capacity level. All speeds are reduced to a low but relatively uniform value.
- ⇒ Level of Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point.

The 2035 design peak hour volumes were obtained by post-processing the 2035 ADT forecasts. The daily peak hour traffic content (AM & PM combined K-factor: 16 %) and the peak directional distribution (D-factor: 55 %) were applied to the ADT forecasts to obtain the segment peak hour traffic volumes.

The intersection turning movements were assigned by using the peak hour turning movement percentages from the MAG Travel Demand Model. The MAG model turning movement percentages were used in the absence of existing intersection turning movement percentages. The existing travel patterns within the study area will change with addition of future roadways (arterial street connections and future regional facility SR303L). Hence, MAG travel demand model will provide better traffic distribution as the model includes all the future roadway improvements within the study area.

The 2035 design peak hour traffic volumes are shown in Figure 2.3. The study intersections were assumed to be signalized and coordinated for signal progression along Lake Pleasant Parkway corridor. These intersections were evaluated using *Synchro 7.0* signal timing program, which uses *Highway Capacity Manual 2000 (HCM)* methodologies to evaluate the intersection operations.

Table 2.7 shows the 2035 AM and PM peak hour signalized intersection LOS for the study intersections. The signalized intersections within the study area will operate at LOS D or better during both peak hours. Figure 2.4 shows the overall intersection and turning movement LOS for the study intersections.

Figure 2.3 2035 Peak Hour Intersection Traffic Volumes

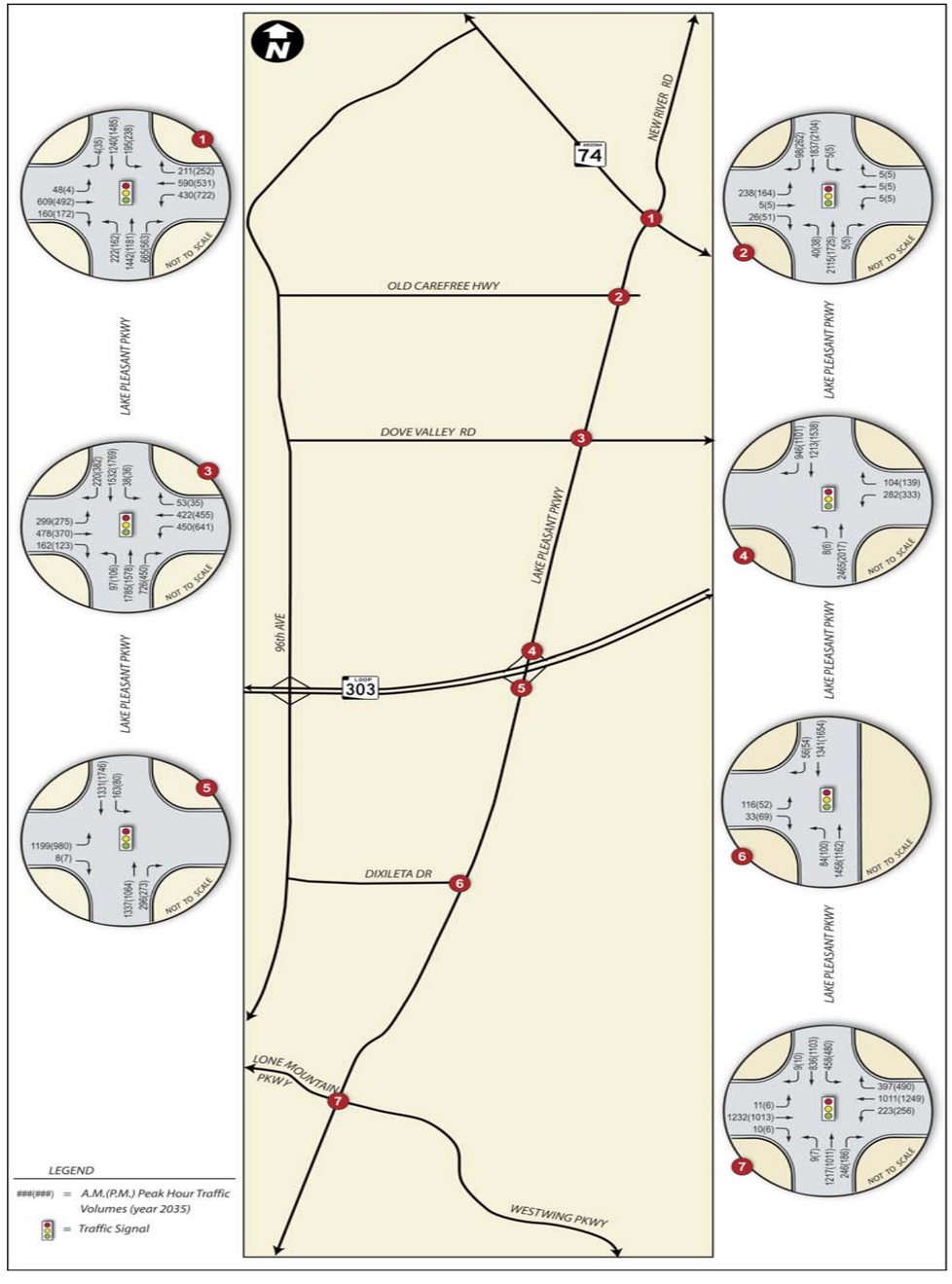


Figure 2.4 2035 Peak Hour Signalized Intersection Level of Service

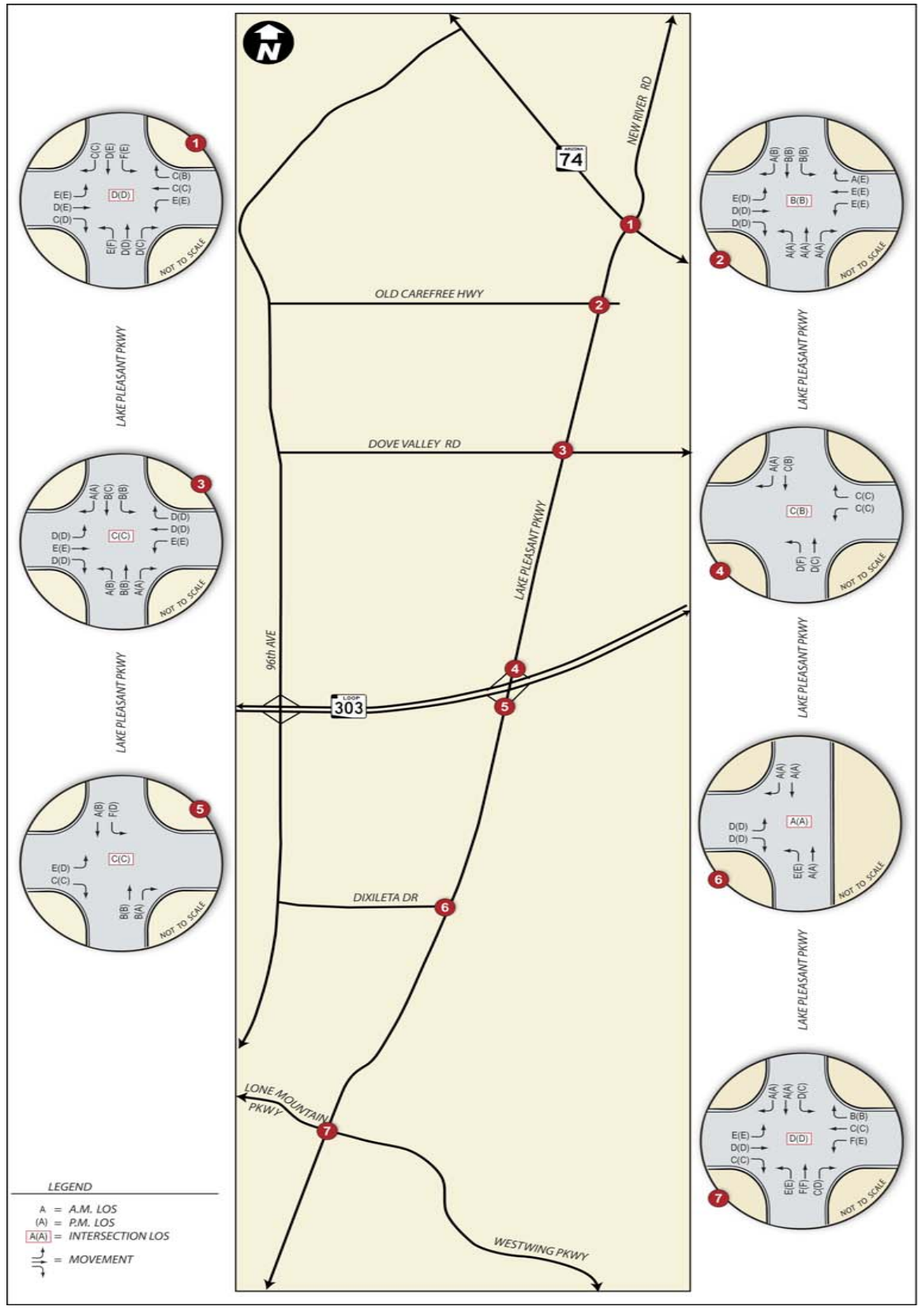


Table 2.7 2035 Peak Hour Intersection LOS

Signalized Intersection		2035 AM	2035 PM
Lake Pleasant Pkwy	Westwing Parkway	D	D
Lake Pleasant Pkwy	Dixileta Drive	A	A
Lake Pleasant Pkwy	SR303L East Ramps	C	C
Lake Pleasant Pkwy	SR303L West Ramps	C	B
Lake Pleasant Pkwy	Dove Valley Road	C	C
Lake Pleasant Pkwy	Old Carefree Highway	B	B
Lake Pleasant Pkwy	SR 74	D	D

Intersection LOS determined using Synchro 7.0 and Highway Capacity Manual Methodologies

The analysis showed that majority of the study area intersections will operate at acceptable LOS (LOS D or better) by 2035. Lake Pleasant Parkway intersections with Westwing Parkway and SR 74 will operate at or near capacity (LOS D) with some turning movements operating at reduced LOS. *Synchro 7.0* intersection analysis reports are presented in the Appendix.

2.6 Intersection of Lake Pleasant Parkway and SR 74

A detailed analysis was performed to determine the future traffic operations of SR 74 intersections with Lake Pleasant Parkway and New River Road. Currently, Lake Pleasant Parkway intersects SR 74 as a T-intersection. New River Road intersects SR 74 as a T-intersection, approximately 650 feet west of Lake Pleasant Parkway. The peak hour traffic analysis was completed for different intersection configurations for the forecast year (2035). Table 2.8 shows the alternatives considered for the analysis.

Table 2.8 SR 74 Intersection Alternatives

Alternative	Intersection Configuration with SR 74
1	Offset signalized intersections
2	Four-leg intersection with realigned New River Road
3	Offset intersections with roundabouts
4	Wide Roundabout

The traffic analysis included evaluation of the following measures of effectiveness (MOEs):

- ⇒ *Highway Capacity Manual (HCM)* signalized intersection (LOS) for the signalized intersections
- ⇒ Approach Queue Lengths at the intersections
- ⇒ Network Performance Measure: average delay per vehicle

Synchro 7.0 and *VISSIM 5.1* traffic analysis software programs were used to determine the HCM LOS and network MOEs, respectively.

The following assumptions were made for the 2035 traffic analysis:

- ⇒ Lake Pleasant Parkway is a six-lane arterial south of SR 74.
- ⇒ New River Road is a six-lane arterial north of SR 74.
- ⇒ SR 74 is a four-lane arterial within the study area.
- ⇒ The traffic analysis was performed for the evening (PM) peak hour which constituted the highest peak hour traffic among the morning and evening peak hours.

The following notes summarize the results of the traffic analysis:

Alternative 1: Offset signalized intersections

Alternative 1 shown in Figure 2.5 assumes that both Lake Pleasant Parkway and New River Road remain as offset T intersections, but both are signalized. Table 2.9 shows the HCM signalized intersection LOS for the study intersections. SR 74 and New River Road intersection will operate at acceptable LOS during both peak hours. SR 74 and Lake Pleasant Parkway also will operate at an acceptable LOS D during both peak hours. Some turning movements at this intersection will operate at reduced LOS E or F.

Table 2.9 Alternative 1 HCM Signalized Intersection LOS

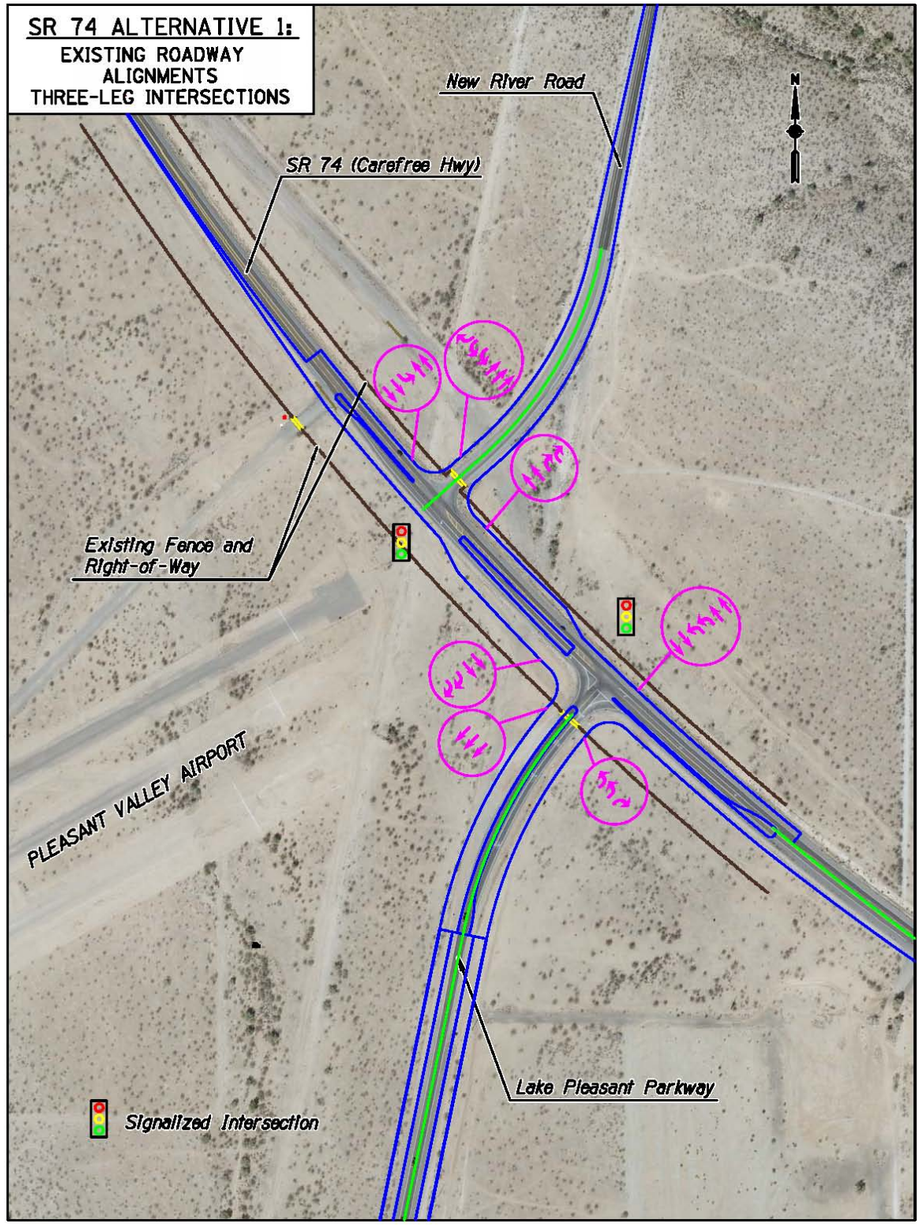
Intersection	Peak Hour	Eastboun			Westboun			Northboun			Southboun			
		L	T	R	L	T	R	L	T	R	L	T	R	Intersection
SR 74 and New River Road	AM	C	D	--	--	D	C	--	--	--	C	A	--	**C**
	PM	D	C	--	--	B	A	--	--	--	C	B	--	**B**
SR 74 and Lake Pleasant Parkway	AM	--	D	B	F	C	--	E	A	--	--	--	--	**D**
	PM	--	F	A	F	C	--	F	A	--	--	--	--	**D**

L: Left, T: Through, R: Right

The *VISSIM* queuing analysis for the PM peak hour showed maximum queue lengths of 1235 and 580 feet on the southbound and northbound approaches of New River Road and Lake Pleasant Parkway, respectively (Table 2.10). These queues on the side streets were higher compared to the queues on SR 74.

The northbound and southbound left turn traffic from one cross-street has to weave into the right turn lanes on SR 74 to access the other cross-street. In addition to increased delay for these movements, the weaving patterns into the right turn lanes may result in potential side-swipe collisions at the intersections.

Figure 2.5 Alternative 1: Offset Signalized Intersection



Alternative 2: Four-leg Intersection with realigned New River Road

Alternative 2 shown in Figure 2.6 assumes a four-leg intersection at SR 74 and Lake Pleasant Parkway. New River Road is realigned to Lake Pleasant Parkway as a fourth-leg north of SR 74. The overall intersection operates at LOS D both during AM and PM peak hours. Some turning movements will operate at reduced LOS E or F as shown in Table 2.10.

Table 2.10 Alternative 2 HCM Signalized Intersection LOS

Intersection	Peak Hour	Eastboun			Westboun			Northboun			Southboun			
		L	T	R	L	T	R	L	T	R	L	T	R	Intersection
SR 74 and Lake Pleasant Parkway	AM	E	D	C	E	C	C	E	D	D	F	D	C	**D**
	PM	E	E	D	E	C	B	F	D	C	E	E	C	**D**

L: Left, T: Through, R: Right

The *VISSIM* queuing analysis for the PM peak hour showed maximum queue lengths of 400 and 360 feet on the southbound and northbound approaches of Lake Pleasant Parkway and New River Road, respectively. This alternative provides the least network travel time and the best improved overall network performance.

Alternative 3: Offset intersections with roundabouts

Alternative 3 shown in Figure 2.7 assumes three-leg multi-lane roundabouts at both intersections of SR 74. The by-pass lanes were considered for all right turn movements to increase the approach capacity on the entrance legs of the roundabouts.

The Federal Highway Administration (FHWA) publication *"Roundabouts: An Informational Guide" (2000)* was used to determine the planning level maximum daily service volumes for a three-leg multi-lane roundabout. FHWA guide suggests that the average daily entering traffic volume for a three-leg multi-lane roundabout should not be greater than 30,000 vehicles (with 50 percent left turns on side-street). The 2035 MAG model forecasts higher ADT volumes for the study intersections than suggested in the FHWA guide (39,350 and 52,780 vehicles per day for SR 74 intersections with Lake Pleasant Parkway and New River Road, respectively). The higher ADT values result in volume-capacity ratio of greater than 0.85 on the entrance legs which is undesirable for the roundabout operation.

A PM peak hour operational analysis was also completed for this alternative. The *VISSIM* queuing analysis showed longer queues on SR 74 approaches compared to the cross streets as shown in Table 2.10. The *VISSIM* queuing analysis showed maximum queue lengths of 1180 and 1675 feet on the entrance approaches of SR 74 at New River Road (eastbound) and Lake Pleasant Parkway (westbound SR 74), respectively.

The relatively low entering traffic volume on the internal legs of the roundabouts provides sufficient gaps for the traffic on the cross street to enter the roundabout with minimal opposing traffic flow. However, this reduces the available gaps for the SR 74 traffic and increases the delay to the SR 74 approach traffic.

Figure 2.6 Alternative 2: New River Road Realigned to Form a Four-leg Intersection

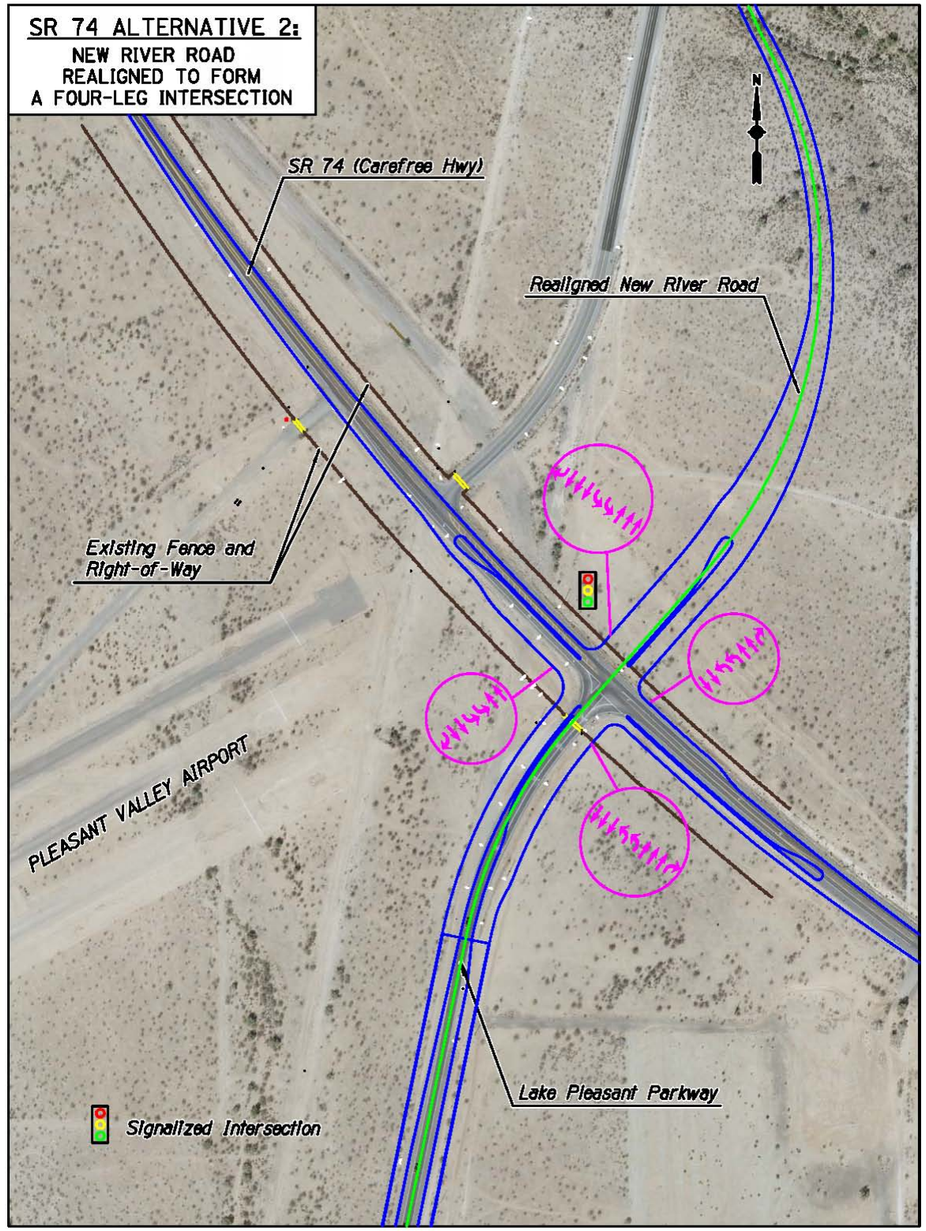
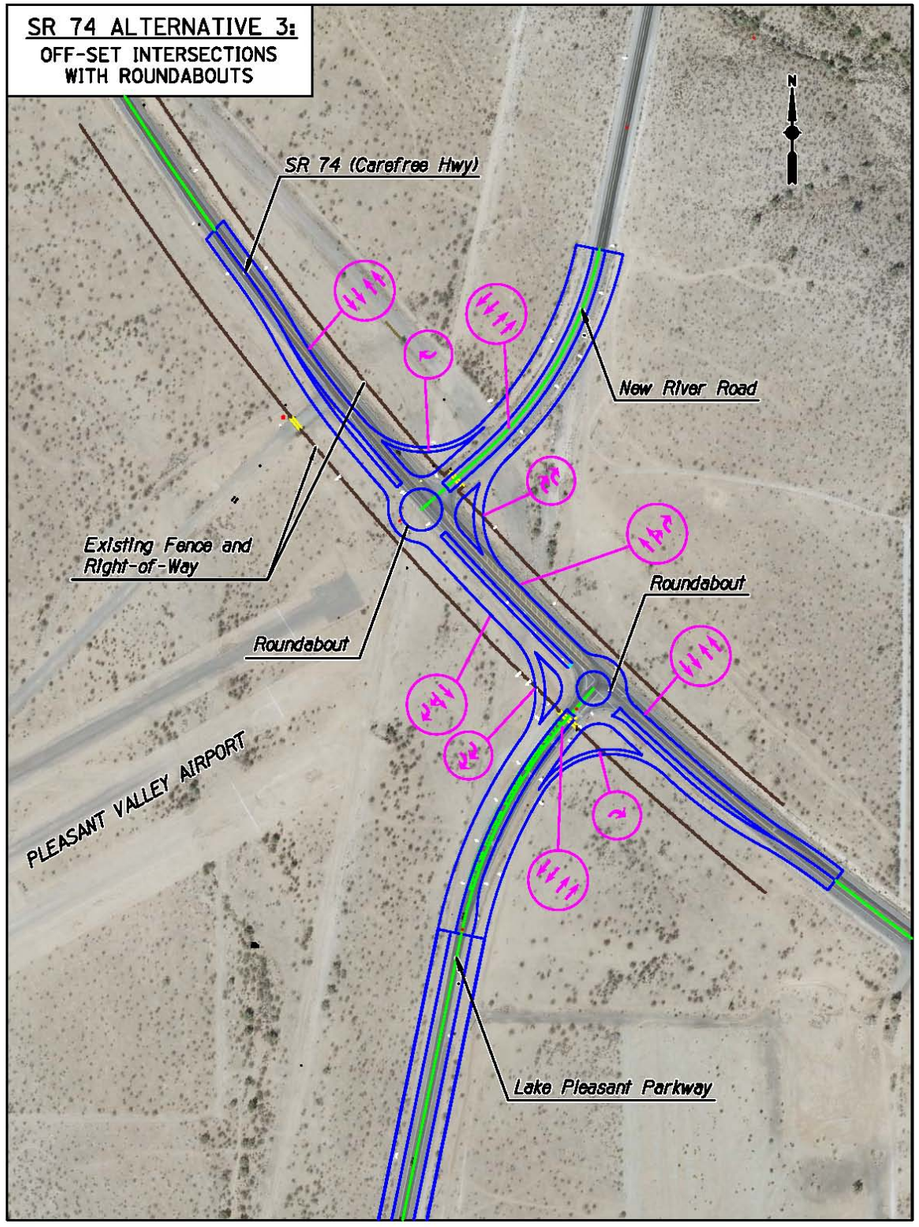


Figure 2.7 Alternative 3: Offset Intersections with Roundabouts



Alternative 4: Wide Roundabout:

Alternative 4 shown in Figure 2.8 assumes a wide roundabout on SR 74 between the approaches of New River Road and Lake Pleasant Parkway. The traffic operations for this alternative were similar to the roundabouts at the intersections. The relatively low traffic flow on the inside of the roundabout provides sufficient gaps for the traffic on the cross street to enter the roundabout with minimal opposing traffic flow. However, this reduces the available gaps for the SR 74 traffic and increases the delay to the SR 74 approach traffic.

The *VISSIM* queuing analysis for the PM peak hour showed maximum queue lengths of 1180 and 1675 feet on the eastbound and westbound approaches of SR 74 at New River Road and Lake Pleasant Parkway, respectively.

Table 2.11 shows the summary of approach queue lengths for each alternative. The four-leg intersection will have relatively shorter queues compared to the alternatives considered. The roundabout alternatives show long queues for east-west SR 74 traffic due to the reduced gaps available to enter the roundabout.

The network performance measures generated with VISSIM simulation for each alternative were compared to determine the operational performance of each alternative. VISSIM can generate network performance measures such as total network delay (hours), average delay per vehicle (seconds), emissions etc. The average delay per vehicle (seconds) was chosen as the network performance measure to compare the overall delay anticipated with each alternative. As shown in Figure 2.9, Alternative 2 (four-leg intersection) provides overall best network performance with least delay expected by each vehicle of all alternatives evaluated.

Figure 2.8 Alternative 4: Wide Roundabout

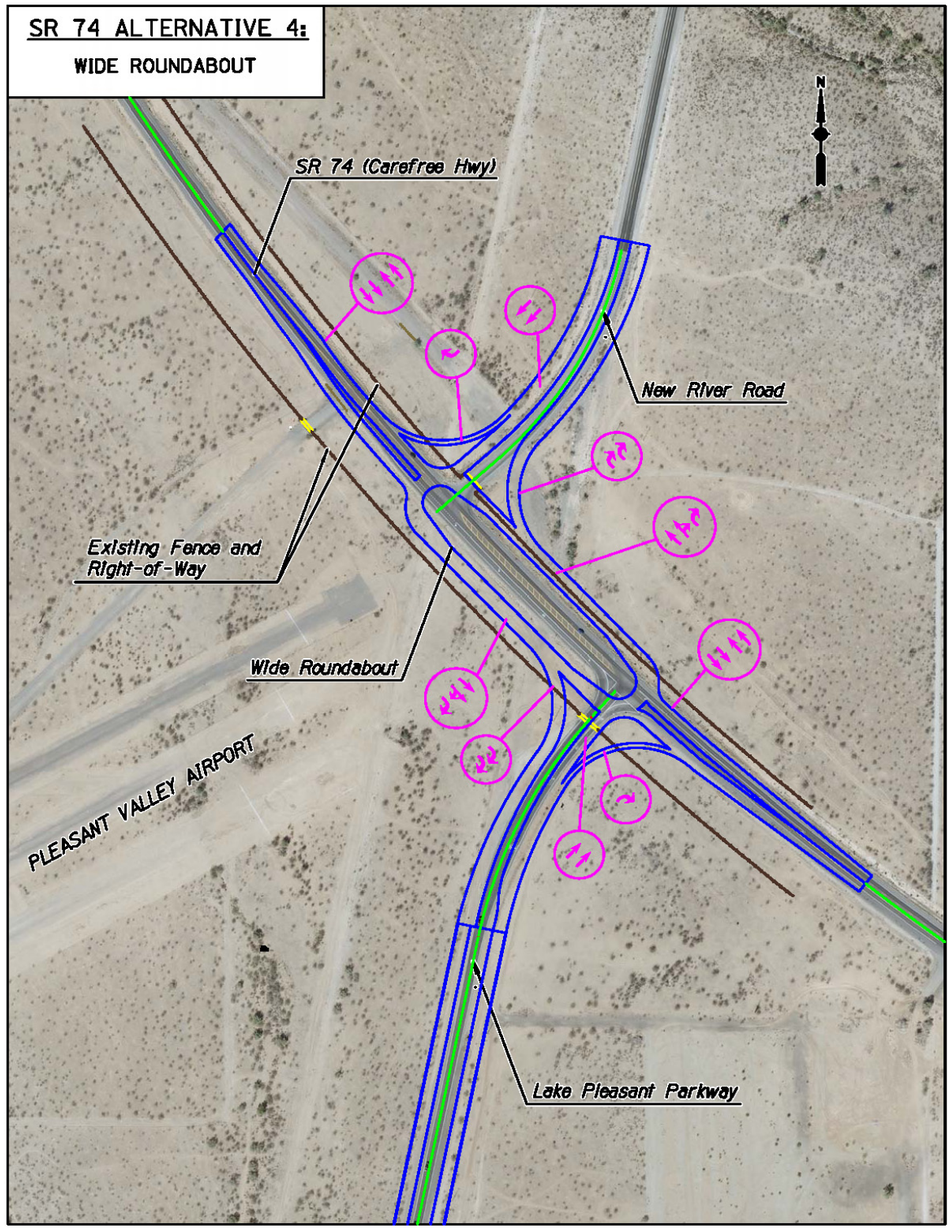
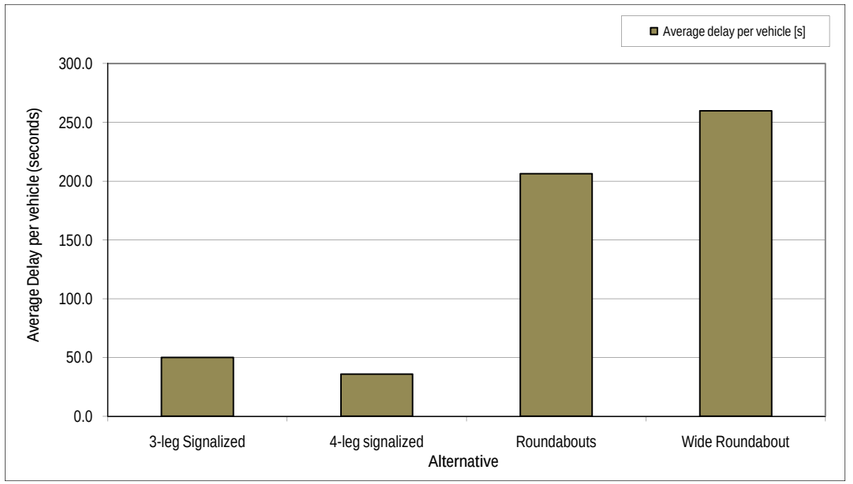


Table 2.11 PM Peak Hour Maximum Queue Lengths

Maximum Queue Lengths (feet)	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	3-leg Signalized	4-leg Signalized*	Roundabouts	Wide Roundabout
SR 74 and New River Road				
SB	1235	--	538	1192
NB	--	--	--	--
EB	522	--	1177	1178
WB	660	--	0	0
SR 74 and Lake Pleasant Parkway				
SB	--	400	--	--
NB	578	359	179	326
EB	680	250	99	0
WB	374	306	1673	1674

* New River Road Realigned to form a 4-leg intersection

Figure 2.9 PM Peak Hour Network Average Delay per Vehicle



The following notes summarize the traffic analysis for SR 74 intersections with Lake Pleasant Parkway and New River Road:

- ⇒ A four-leg intersection with realigned New River Road approach at SR 74 will operate at LOS D during both peak hours. This alternative has the best overall performance of all the alternatives that were analyzed.
- ⇒ The existing roadway alignment (offset intersections) with improved number of traffic lanes and traffic signals will provide acceptable LOS. The north-south traffic has to make left turns onto SR 74 resulting in undesirable weaving movements with potential for side-swipe collisions.
- ⇒ The roundabout alternatives result in long queues on the SR 74 approaches and result in increased average delay per vehicle and network travel times.

Based on the traffic analysis, a four-leg signalized intersection (Alternative 2) is recommended at the intersection of SR 74 and Lake Pleasant Parkway. The New River Road leg should be re-aligned with Lake Pleasant Parkway to form a four-leg intersection.

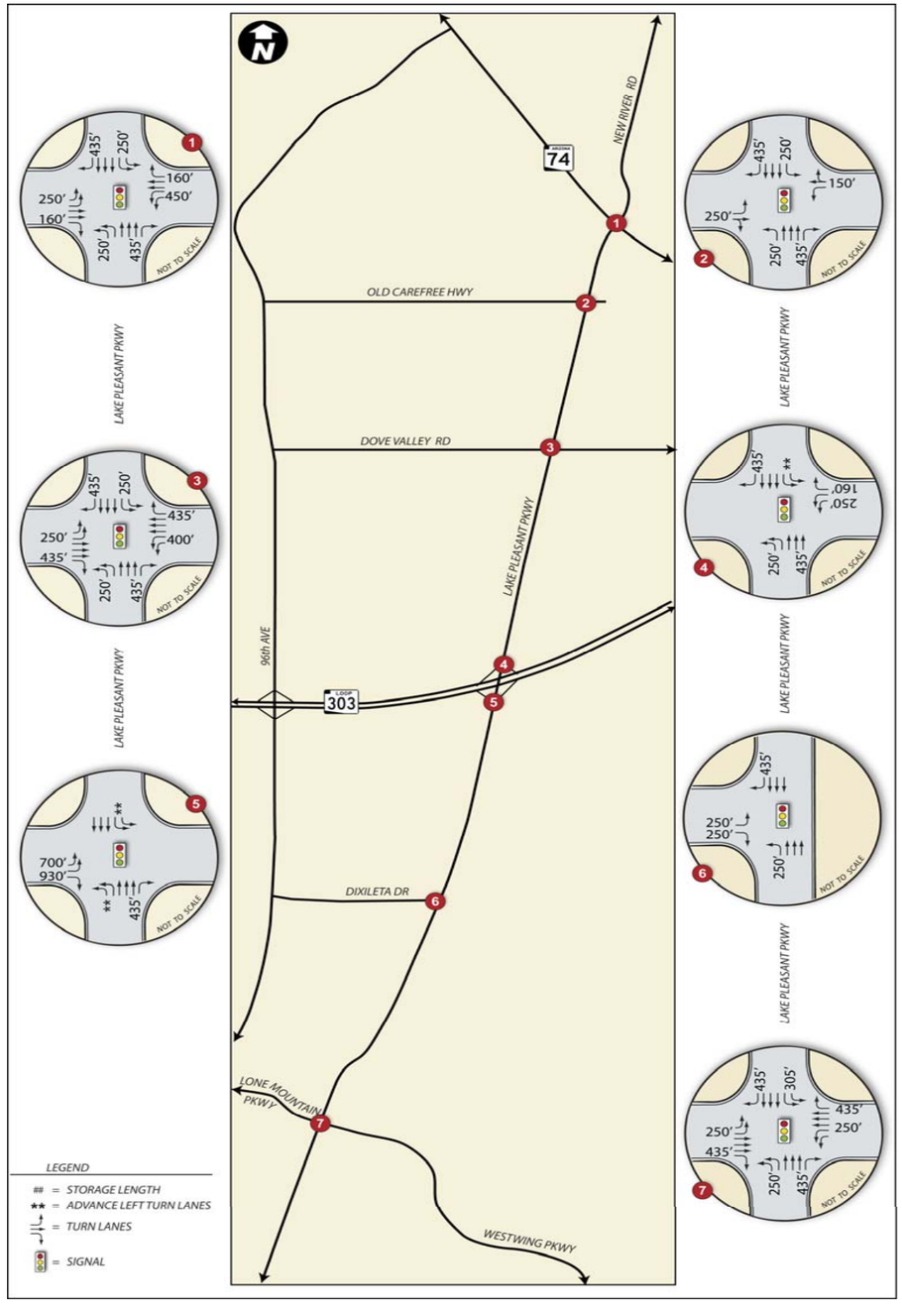
2.7 Intersection Turn Lanes

The turn lanes at the intersections were recommended after completing the capacity analysis for the 2035 design hour traffic volumes and by applying the guidelines shown below:

- ⇒ *City of Peoria Street Classification Map (September 28, 2005)* was consulted for lane configuration at the major arterial-major arterial intersections.
- ⇒ *City of Peoria Deceleration Lane Criteria (March 31, 2003)* was used to determine the right turn lane (deceleration lanes) storage length at arterial intersections. According to the criteria, a 435 feet long deceleration lane is required for a design speed of 50 mph.
- ⇒ *City of Peoria Infrastructure Design Guidelines (April 01, 2009),* dual left turn lanes are required when the peak hour left turn volume is greater than 200 vehicles and opposing through traffic is greater than 1000 vehicles OR the left turn delay is greater than 45 seconds.
- ⇒ *MCDOT Traffic Impact Procedures* were used to determine the required storage lengths for the left turn lanes at the signalized intersections. The storage length was calculated using the cycle length and the arrival rate.
- ⇒ A minimum of 250 feet of left turn storage length is recommended for the left turn lanes.
- ⇒ Intersection improvements being completed by ADOT for SR303L and Lake Pleasant Parkway were recommended as these provide sufficient storage for the turning traffic.

Figure 2.10 shows the recommended lane configuration and storage lengths at the arterial intersections.

Figure 2.10 2035 Intersection Lane Configuration



2.7.1 Recommendations in Previous Studies

The recommendations in the DCR were compared against *the City of Peoria CIP Prioritization Review/ Analysis study Year 2007 Update, (Wilson and Company, March 28, 2008)*. The study used 2030 MAG Travel Demand Model forecasts. The study included recommendations for Lake Pleasant Parkway intersections with SR 74 and Westwing Parkway. ADOT improvements for the traffic interchange of Lake Pleasant Parkway with SR303L were also compared against the 2035 intersection capacity analysis.

Lake Pleasant Parkway and Westwing Parkway Intersection

The *Wilson and Company study* recommended construction of two travel lanes in each direction on Lake Pleasant Parkway and Westwing Parkway, dual left turns on northbound and southbound Lake Pleasant Parkway, single left turns for eastbound and westbound left turns on Westwing Parkway, and right turns on all approaches. The 2035 peak hour analysis for the DCR showed a need for dual left turns on eastbound and westbound approaches of Westwing Parkway.

City of Peoria Street Classification Map (Rev 28 Sep 05) identifies this intersection as a Type 1- Category A Full Major Arterial to Major Arterial intersection. This classification includes three thru lanes, dual left turn lanes and a right turn lane on each approach of the intersection. Acquiring the required right-of-way for the ultimate intersection foot-print provides significant cost savings in the future and prevents additional cost of widening at a later stage. Therefore a Type 1 – Category A intersection is recommended for this location.

Lake Pleasant Parkway and SR 74 Intersection

The *Wilson and Company study* recommended construction of westbound dual left turn lanes, northbound and southbound left turn lane at the T-intersection of Lake Pleasant Parkway and SR 74.

A detailed analysis was completed in this DCR to identify the optimal intersection configuration for Lake Pleasant Parkway with SR 74. As described in section 2.6, a four-leg intersection that realigns New River Road with Lake Pleasant Parkway at SR 74 to form a four-leg intersection is recommended at this location. Based on the traffic analysis completed in this DCR, dual left turns and right turn lane on each approach are recommended.

Lake Pleasant Parkway and SR303L

ADOT is currently constructing the traffic interchange at Lake Pleasant Parkway and SR303L. The improvements planned by ADOT will accommodate the anticipated 2035 traffic volumes. Therefore, no additional improvements were recommended for this interchange as part of this DCR. The improvements by ADOT include dual left turn lanes from Lake Pleasant Parkway to SR303L on-ramps, advance left turn storage lanes, dual left turns and a right turn lane on the off-ramps, and right turn lanes from Lake Pleasant Parkway to the on-ramps.

2.8 Intelligent Transportation Systems (ITS)

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

As the Lake Pleasant Parkway corridor and regional roadway infrastructure is developed, consideration should be given to deploying intelligent transportation systems. It is recommended that the following elements be considered for design and implementation on the Lake Pleasant Parkway corridor:

- ⇒ Centrally controlled signal system management plan for the corridor.
  - o The traffic signals along the corridor should be integrated with the respective signal system software, fiber optic network (including communication vaults and pull boxes), synchronize clocks and implement corridor signal timing plans.
- ⇒ Implement adequate traveler information system. The Dynamic Message Sign (DMS) advises the motorists of the real time traffic conditions and travel times on the freeway. The location of DMS signs include:
  - o Northbound Lake Pleasant Parkway, between Dixileta Drive to SR303L
  - o Southbound Lake Pleasant Parkway, between Dixileta Drive and SR303L
  - o Northbound Lake Pleasant Parkway, between Old Carefree Highway and SR 74
- ⇒ Traffic detection and counting capabilities to achieve efficient real-time signal operations. The following permanent count stations should be installed on Lake Pleasant Parkway:
  - o Between Dixileta Drive and SR303L
  - o Between SR303L and Dove Valley Road
- ⇒ Instrument the corridor for appropriate closed circuit TV (CCTV) for real-time traffic monitoring by the operators at the traffic management center. Install at CCTV
  - o South of SR303L
- ⇒ 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 an Inter Governmental Agreement (IGA) that will detail the roles and responsibility of each agency.

Currently, fiber optic conduit exists along east side of Lake Pleasant Parkway from Happy Valley Parkway to Westwing Parkway. Fiber Optic cables should be installed in this conduit to connect to the recommended fiber optic network within the project limits. The City of Peoria ITS plan also requires an additional DMS sign on northbound Lake Pleasant Parkway, south of Westwing Parkway. The costs for these improvements to south of project limits are included in the project cost estimate.

3.0 Design Concept Alternatives

Several alternatives were developed and evaluated during the DCR study process based on the City's vision for the parkway, through collaboration with major stakeholders and based on engineering analyses. The various City groups (Management, Engineering, Planning, Utilities, and Economic Development), as well as key stakeholders including ASLD, CAP, and FCDMC actively participated in providing critical input that was considered in developing the DCR alignments that are presented in this section.

The conceptual alternatives evaluated were based on compatibility with the City's development vision, stakeholder input, engineering advantages and disadvantages. The alternatives were either discontinued based upon lack of potential or advanced to a more detailed level of design and analysis. Based on meetings with the City of Peoria Management, Engineering Group, Economic Development Group, and Planning Group, and major stakeholders, the recommended alternatives for the South and North Segments were developed in greater detail and will 30% plans will be provided as a part of the Final DCR Update.

3.1 Corridor Development Considerations & Major Constraints

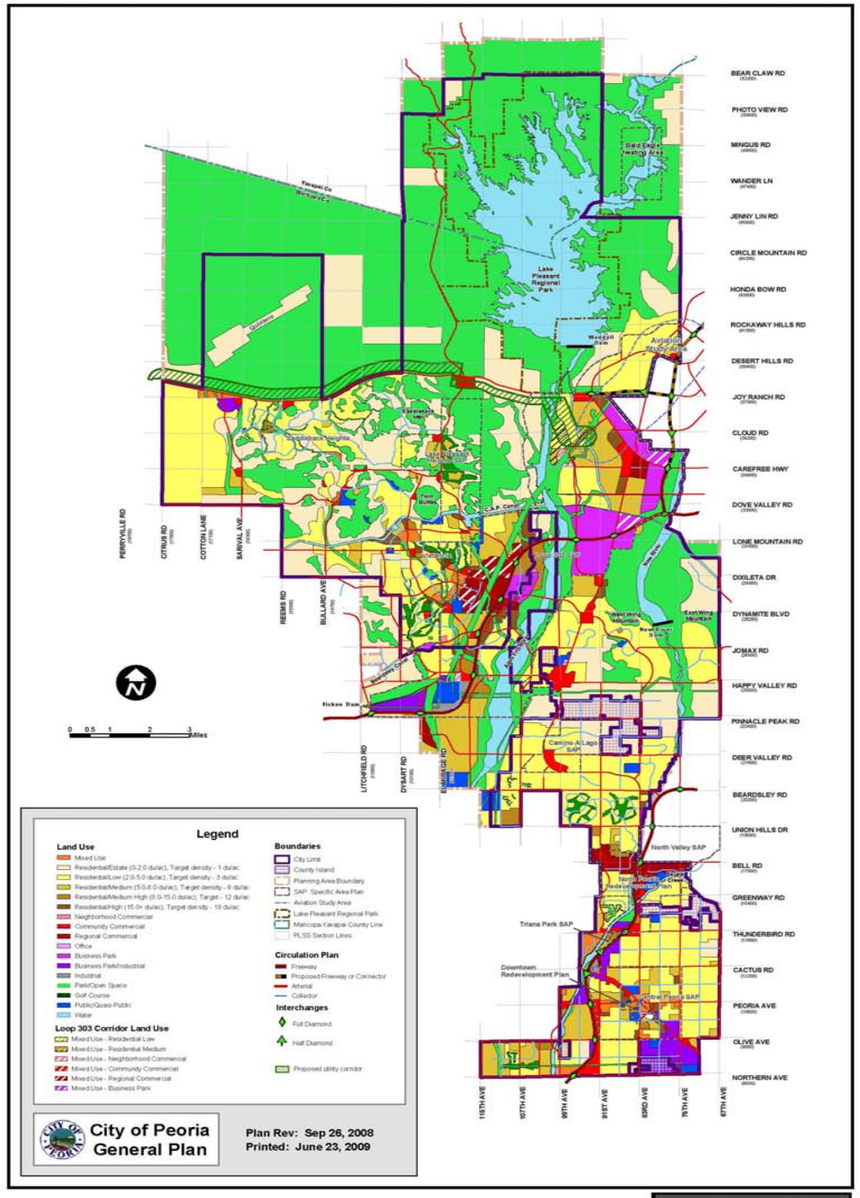
3.1.1 Future Development

Although there is limited existing development within the project limits, the City of Peoria anticipates rapid growth within the project limits driven by the construction of the SR303L at Lake Pleasant Parkway and by general development trends of increased development in North Phoenix and Peoria. This corridor is viewed by the City as the economic engine with the anticipation that development within the project area will be a major revenue generator. Maximizing the area of developable land and minimizing remnant parcels were major considerations in developing the alternatives and evaluating their advantages and disadvantages. Providing an alternative that could best attract development within the project limits was also a key element for consideration for the ASLD, who owns the majority of right of way along the corridor. Developing consensus between the City and ASLD on the evaluated alternatives and potential land use are key elements to identifying the preferred alternatives in the DCR document. The current City Land Use Map, shown as Figure 3.1 identifies large areas in the south Segment as Open Space areas, with some areas being designated for Residential development. Most the land between Dixileta Drive and Dove Valley Road are designated as Business Park, and north of Dixileta Drive to SR 74, the land use designation includes Residential, Commercial and Business Parks. It is important to note that the City is currently implementing a separate project to evaluate land use issues and designations bound by the Land Use map.

3.1.2 Project Termini

All the alternatives assumed similar project limits. The south terminus is located 1,300 feet to the south of the intersection of Westwing Parkway, where Lake Pleasant Parkway has been developed to its ultimate width. The midpoint of the project is the ADOT SR303L with an anticipated completion of construction date in the fall of 2011. The reconfiguration of the intersection of Lake Pleasant Parkway and SR 74 identifies the north terminus of the project.

Figure 3.1 City of Peoria Land Use Map



3.1.3 CAP Canal Crossing

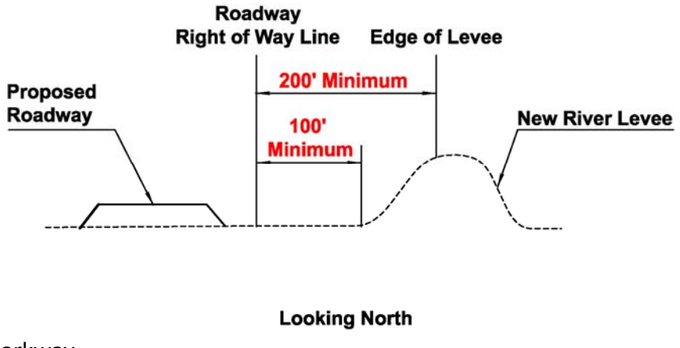
The CAP crosses the Lake Pleasant Parkway approximately 3,250'north of the SR303L within the limits of the North Segment. An existing structure spans the canal at Lake Pleasant Parkway. Along with the crossing structure, several other CAP canal components required consideration. Access to the canal exists 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 canal on the south side. The trail must be accommodated under any new bridge or roadway meeting the design requirements that are specified in the City of Peoria guidelines.

The CAP is a key stakeholder in this project. Throughout the DCR process, several meetings were held with the CAP to understand the relationship of the project improvements with their facilities and identify the design requirements. Phasing the implementation of the project improvements was discussed in detail. Several of the candidate alternative profiles were set with the criterion of providing grade separation as a guide. During the alternative evaluation process, an "at-grade" concept was also developed and presented as the preferred alternative in the Draft DCR. Comments from the CAP regarding the selection of the "at-grade" alternative yielded the development of an additional alternative that allowed for the utilization of the existing structure for northbound traffic and the construction of a new structure to carry the southbound traffic, while providing equipment underpasses for the CAP O & M roads.

3.1.4 New River Levee

The New River Levee is located within the South Segment to the east of the existing roadway alignment, and is owned and maintained by the FCDMC. One of the alternatives that was evaluated for the South Segment shifted the roadway to the east of the existing alignment toward the levee. This alternative was designed based on design criteria provided by the FCDMC to assure that the integrity of the structure is not compromised by the proposed improvements. The criteria used to set the horizontal location were as follows:

- ⇒ Maintain a minimum of 200' from the levee control line to the roadway eastern right-of-way line. The levee control line is defines as the western edge of the top of berm.
- ⇒ Provide an access road for the south side of the levee connecting to Lake Pleasant Parkway
- ⇒ Provide full access from the access road onto Lake Pleasant Parkway



The FCDMC is a key stakeholder in this project and throughout the DCR process, several meetings were held with the FCDMC to assure that design requirements are met, and that the proposed alignment shifting the roadway towards the levee is a viable alternative.

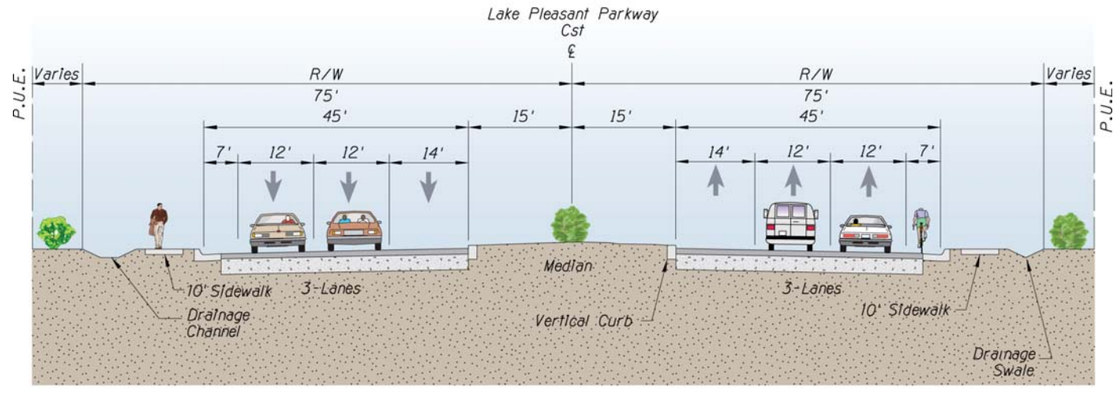
3.1.5 Pleasant Valley Airport

The Pleasant Valley Airport is located at west of the existing roadway between Old Carefree Highway and SR 74. This DCR did not evaluate the impacts to the airport; however, it appears that the recommended alternative for the North Segment does not adversely impact the airport. A separate meeting was held with the Pleasant Valley Airport owner to discuss the proposed improvements, and no opposing comments were made. It is recommended that further evaluation be conducted during the final design stages for the North Segment.

3.2 Typical Sections

All of the alternatives utilize the City of Peoria standard parkway section as shown in Figure 3.2 which includes a six-lane section with a 30' raised median and a minimum of 150 feet of right-of-way. This section also provides for curb and gutter, sidewalk, and bike lanes. The right-of-way width was increased to account for the varying roadway fill slopes and drainage features, as well as for the inclusion of a Public Utility Easement (P.U.E.) located outside of the roadway right-of-way.

Figure 3.2 Parkway Typical Section (Ultimate Section)



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PARKWAY

3.3 Conceptual Alternatives

Four preliminary conceptual alternatives were developed for the South Segment including the "No Build" alternative. Three alternatives were developed for the North Segment, including the "No Build" alternative. As a result of consensus building meetings with the CAP, a fourth alternative was developed for the North Segment, detailed as Alternative 4N: NB Traffic on Existing Bridge.

The South Segment alternatives concentrated on maximizing the area of developable land between the New River Levee on the east and the steep bluff on the west. The North Segment alternatives concentrated on the crossing of the CAP canal and access management strategies to Lake Pleasant Parkway between the SR303L and the CAP canal.

3.4 Candidate Alternatives

3.4.1 South Segment Alternatives

The South Segment extends from Westwing Parkway to the SR303L. Generally, all of the South Segment alternatives were designed using the typical section shown in Figure 3.2 and considered the following critical design features. Figure 3.3 show the South Segment alternatives.

South Segment Features:

1. Roadway Designation: Designation of Lake Pleasant Parkway as a Parkway per the City Classification Map.
2. Construction of SR303L: The construction of the ADOT SR303L at Lake Pleasant Parkway will be completed and open to traffic in the fall of 2011. It was assumed that the SR303L is an existing condition for this project. All the alternatives were developed to connect to the SR303L improvements on the north end, where the ultimate roadway section will be constructed as a part of the ADOT project.
3. Existing right-of-way: Since public right-of-way does not exist for the existing roadway, all the alternatives will require new right of way for all the proposed improvements. For conceptual purposes, 150' new right of way width was used for all the alternatives shown in Figure 3.3.
4. Existing El Paso Natural Gas line: EPNG Company has prior rights for the El Paso gas line that is typically located to the west of the existing roadway. The alternatives were developed to avoid encroachment into the EPNG easement. Costs associated with the relocations (vertical or horizontal) of the gas line when crossed by the proposed roadway were added to the project construction estimate.
5. Design Speed: Design speed for Lake Pleasant Parkway is typically 55 mph, with the exception of approximately 900' approaching the south ramp terminals of the SR303L bridge, where the design speed is 45 mph. Discussion of the selected design speed is provided under Section 4.1.2.
6. Crossing of the Unmanned Wash: Four alternatives for crossing the Unnamed Wash are included as a part of the DCR presented under Section 3.4.2.
7. New River Levee: Alignments eastern right-of-way line must maintain a minimum of 200' from the levee control line defined as the western edge of the top of berm.
8. Cross Road Intersection: One cross road intersection will be provided at Dixileta Drive. Dixileta Drive is designated as a Minor Arterial.

3.4.1.1 Alternative 1S – Reconstruct Roadway on Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) following the existing roadway alignment. The south terminus of this alternative is located 1,300' south of the Westwing Parkway intersection, where Lake Pleasant Parkway has been constructed to its ultimate configuration. The north terminus of this alternative is located approximately 575' south of the SR303L structure at Lake Pleasant Parkway. This alignment contains five (5) horizontal curves, three (3) of which require superelevation. This alternative may require the relocation of the EPNG line at one location. This alternative impacts the existing 12 kV overhead power line and will require its relocation from Westwing Parkway to SR303L. Based on conversations with the City and APS, it is anticipated these lines will be undergrounded and potentially upgraded. The main intersection along this alignment is at Dixileta Drive located approximately 6,400' north of the Westwing Parkway intersection.

3.4.1.2 Alternative 2S – Shift Roadway to the West; Close to the Bluff

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by shifting the new roadway to the west of the existing roadway and to the east of the bluff. The south terminus of this alternative is located 1,300' south of the Westwing Parkway intersection, where Lake Pleasant Parkway has been constructed to its ultimate configuration. The north terminus of this alternative is located approximately 575' south of the SR303L structure at Lake Pleasant Parkway. This alternative contains two (2) horizontal curves, none of which require superelevation. This alternative may require the relocation of the EPNG line at one location. This alternative does not impact the existing 12 kV overhead power line and will therefore not require its relocation. The main intersection along this alignment is at Dixileta Drive located approximately 6,400' north of the Westwing Parkway intersection.

3.4.1.3 Alternative 3S – Shift Roadway to the East of the Existing Alignment; Close to the New River Levee

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by shifting the new roadway to the east of the existing roadway and west of the New River Levee. The south terminus of this alternative is located 1,300' south of the Westwing Parkway intersection, where Lake Pleasant Parkway has been constructed to its ultimate configuration. The north terminus of this alternative is located approximately 575' south of the SR303L structure at Lake Pleasant Parkway. The horizontal alignment consists of three (3) horizontal curves, none of which requires superelvation. The horizontal alignment for this alternative is set to provide sufficient clearance between the proposed roadway right of way and the New River Levee so that the integrity of the levee is not compromised based on guidelines provided by the FCDMC. Typically, the eastern roadway right-of-way line is located 200' to the west of the top of the berm of the levee. An access point from the upgraded roadway to the New River Levee is provided for the FCDMC at the south end of the levee. This alternative may require the relocation of the El Paso gas line at one location. This alternative impacts the existing 12 kV overhead power line and will require its relocation from Westwing Parkway to SR303L. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded. The main intersection along this alignment is at Dixileta Drive located approximately 6,400' north of the Westwing Parkway intersection.

3.4.1.4 Alternative 4S – Gas Line Alignment

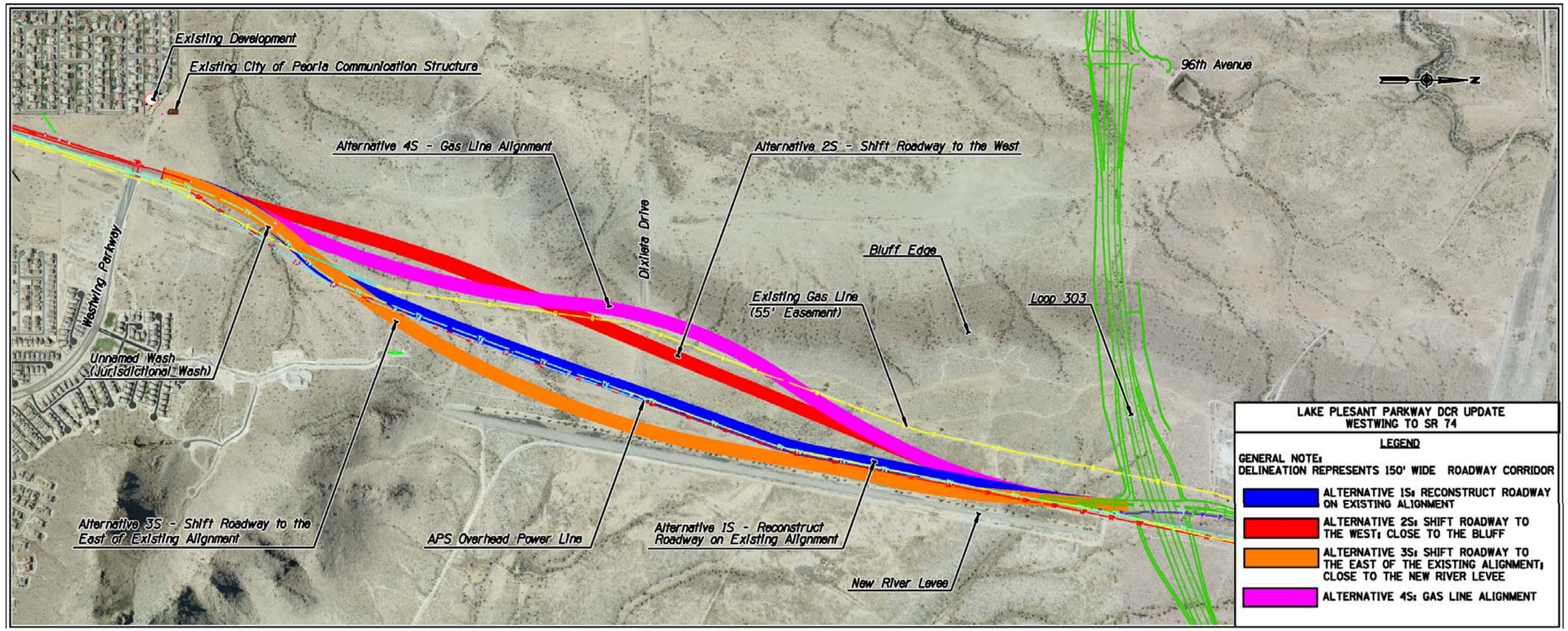
This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by following the EPNG alignment.. The south terminus of this alternative is located 1,300' south of the Westwing Parkway intersection, where Lake Pleasant Parkway has been constructed to its ultimate configuration. The north terminus of this alternative is located approximately 575' south of the SR303L structure at Lake Pleasant Parkway. The horizontal alignment for this alternatives contains five (5) horizontal curves, one (1) of which require superelevation. This alternative may require the relocation of the EPNG line at one location. The main intersection along this alignment is at Dixileta Drive located

approximately 6,400' north of the Westwing Parkway intersection. This alternative does not impact the existing 12 kV overhead power line and will therefore not require its relocation.

3.4.1.5 Alternative 5S – No Build Alternative

The "No-Build" Alternative is provided for comparison purposes. It provides no improvements to traffic capacity, motorist or pedestrian safety, or operational features of the existing roadway. Traffic models forecast significant traffic volumes increase, and this demand is not met by the "No-Build" Alternative.

Figure 3.3 South Segment Alternatives



3.4.2 Unnamed Wash Crossing

Four alternatives were developed for evaluating the crossing of the Unnamed Wash located north of Westwing Parkway. The design elements considered for the alternative analysis were the conveyance of drainage at the wash, the accommodation of a primary trail to cross the wash and the installation of a 21" City gravity sewer line that parallels the proposed roadway. The primary trail is identified in the City of Peoria Parks Recreation Open Space and Trail Master Plan Update (PPROSTPU), presented as Figure 3.4. As specified in the PPROSTPU, a primary trail is defined as a multi-use trail, 8-10' wide and provides at least 12' vertical clearance. The gravity sewer line is a City utility and preliminary layout for the sewer line was shown as a part of the 15% project plans presented in Appendix A of the Draft DCR, and will be included with the Final DCR.

Additional assumptions that were made were during the analysis are as follows:
1) Provide a minimum of two feet vertical clearance for the sewer line and structures.
2) Raise the roadway to flatten the existing "dip" crossing at the Unnamed Wash. Since all the alternatives required the roadway to be raised, earthwork was not an item for consideration in the evaluation.
3) Provide for lighting at the primary trail.

Alternative 1: Separate Drainage Culverts and Primary Trail Culvert, with Sewer Line Between Drainage Culvert and Primary Trail: (Figure 3.5 and Figure 3.6)

This alternative utilizes two 6'x6' reinforced concrete box drainage culverts, and one 12'x 12' reinforced concrete box culvert as a primary trail. The sewer line is located between the drainage culverts and the primary trail culvert. Minimal channelization would be required. The estimated construction cost for this alternative is $781,000.

Alternative 2: Separate Drainage Culverts and Primary Trail Culvert, with Sewer Line Above Drainage Culvert and Primary Trail: (Figure 3.7 and Figure 3.8)

This alternative is similar to Alternative 1, with the exception that the sewer line is located above the drainage culverts and the primary trail culvert. Two 6'x6' reinforced concrete box culverts are still needed for drainage purposes, and one 12'x12' reinforced concrete box culvert is needed for the primary trail. The Minimal channelization would be required with this alternative, and the estimated construction cost for this alternative is $781,000.

Alternative 3: Shared Drainage Culvert and Primary Trail (Figure 3.9 and Figure 3.10)

This alternative utilizes one 6'x6' drainage culvert, and one 12'x12' shared drainage and primary trail reinforced concrete box culvert. The invert of the 6'x 6' drainage culvert is lower than the invert of the 12'x12' culvert in order to pass nuisance flows. The sewer line is located above the two culverts. Minimal channelization would be required with this alternative, and the estimated construction cost for this alternative is $572,000.

Alternative 4: Bridge Over the Unnamed Wash: (Figure 3.11 and Figure 3.12)

This alternative requires the construction of a 65' long and 140' wide bridge (AASHTO Type III Girder) over the unnamed wash. The drainage will be conveyed through the bridge opening and will require extensive channelization. The primary trail will be located approximately 4' above the bottom of the drainage channel. A minimum of 12' vertical clearance would be provided from the primary trail to the bottom of the bridge superstructure. The sewer line would be exposed and located between the bridge girders. The estimated construction cost for this alternative is $1,500,000.

Figure 3.4 Paths, Trails, and Trailheads (City of Peoria Parks, Recreation, Open Space and Trail Master Plan

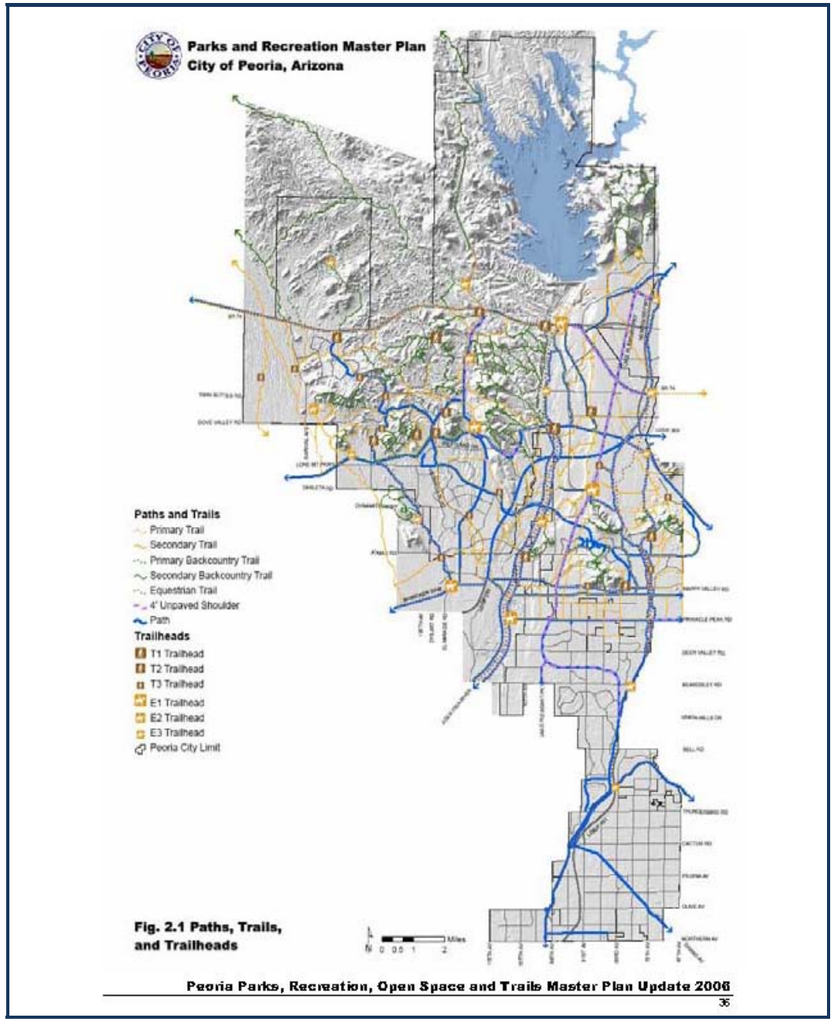


Figure 3.5 Alternative 1: Separate Drainage Culverts and Primary Trail (Sewer Line Between Drainage Culvert and Primary Trail (Plan View)

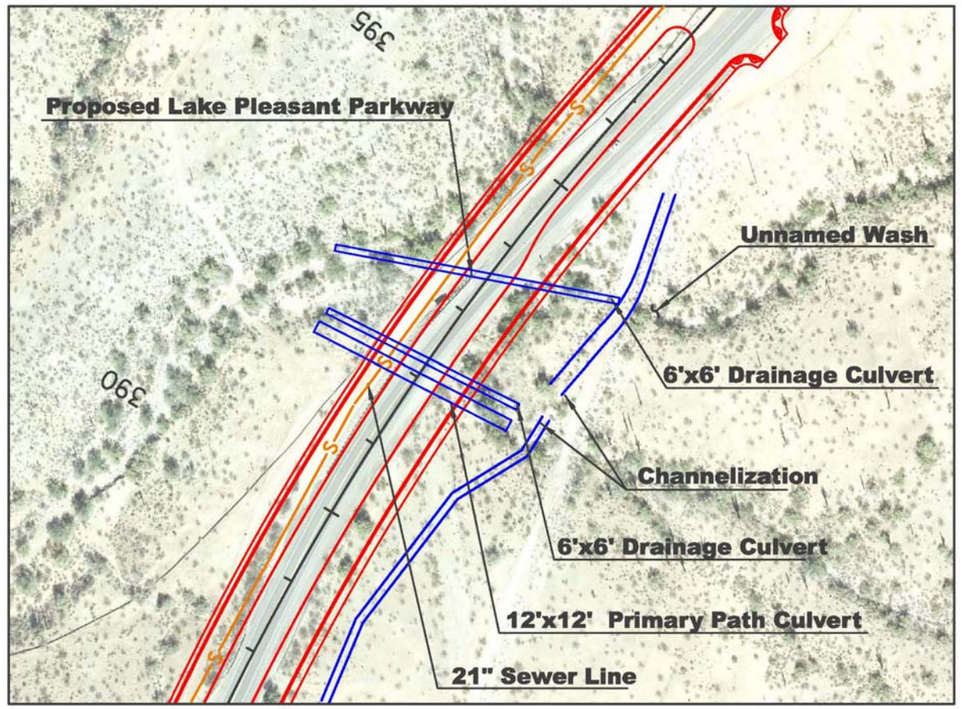
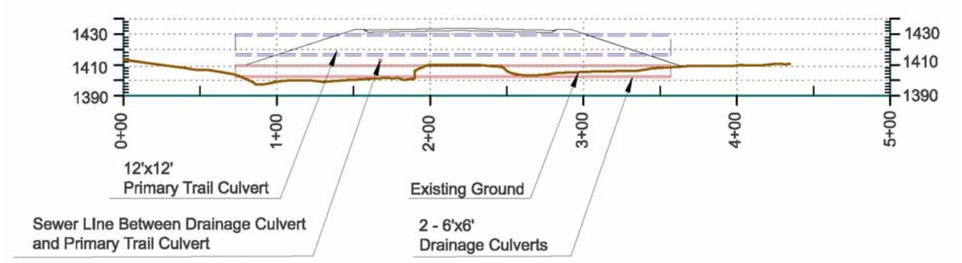


Figure 3.6 Alternative 1: Separate Drainage Culverts and Primary Trail (Sewer Line Between Drainage Culvert and Primary Trail (Profile View)



Notes:
- Two 6'x6' drainage culverts will be provided.
- One 12'x12' Primary Path culvert will be provided.
- Sewer line located between drainage culverts and primary trail culvert.
- Primary Trail culvert located at a horizontal offset from the drainage culvert. Primary trail culvert shown on drainage culvert profile to clarify layout of critical design elements.

Figure 3.7 Alternative 2: Separate Drainage Culverts and Primary Trail Culvert, with Sewer Line Above Drainage Culvert and Primary Trail (Plan View)

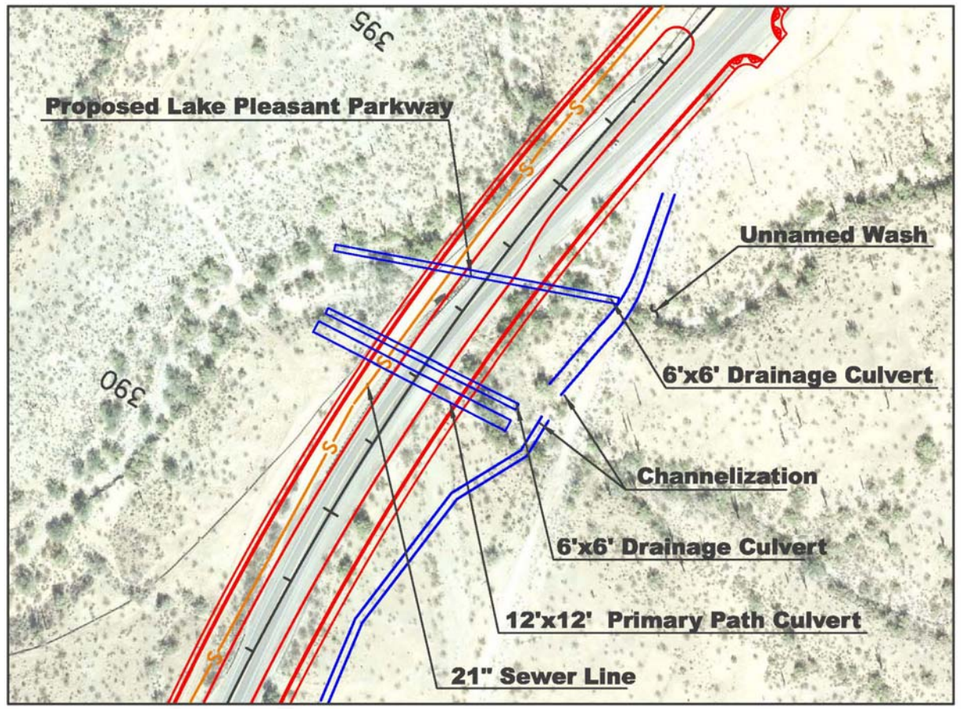
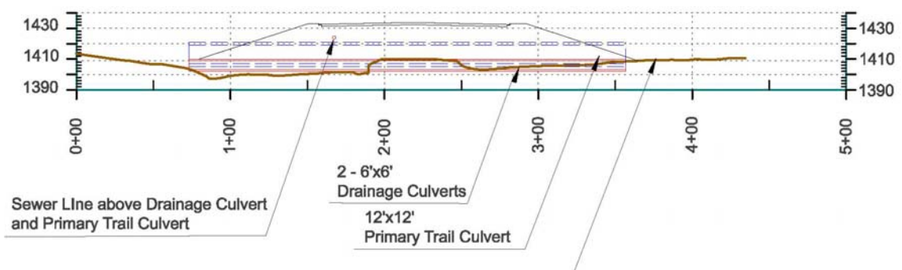


Figure 3.8 Alternative 2: Separate Drainage Culverts and Primary Trail Culvert, with Sewer Line Above Drainage Culvert and Primary Trail (Profile View)



Notes:
- Two 6'x6' drainage culverts will be provided.
- One 12'x12' Primary Path culvert will be provided.
- Sewer line located above the drainage culverts and primary trail culvert.
- Primary Trail culvert located at a horizontal offset from the drainage culvert. Primary trail culvert shown on drainage culvert profile to clarify layout of critical design elements.

Figure 3.9 Alternative 3: Shared Drainage Culvert and Primary (Plan View)

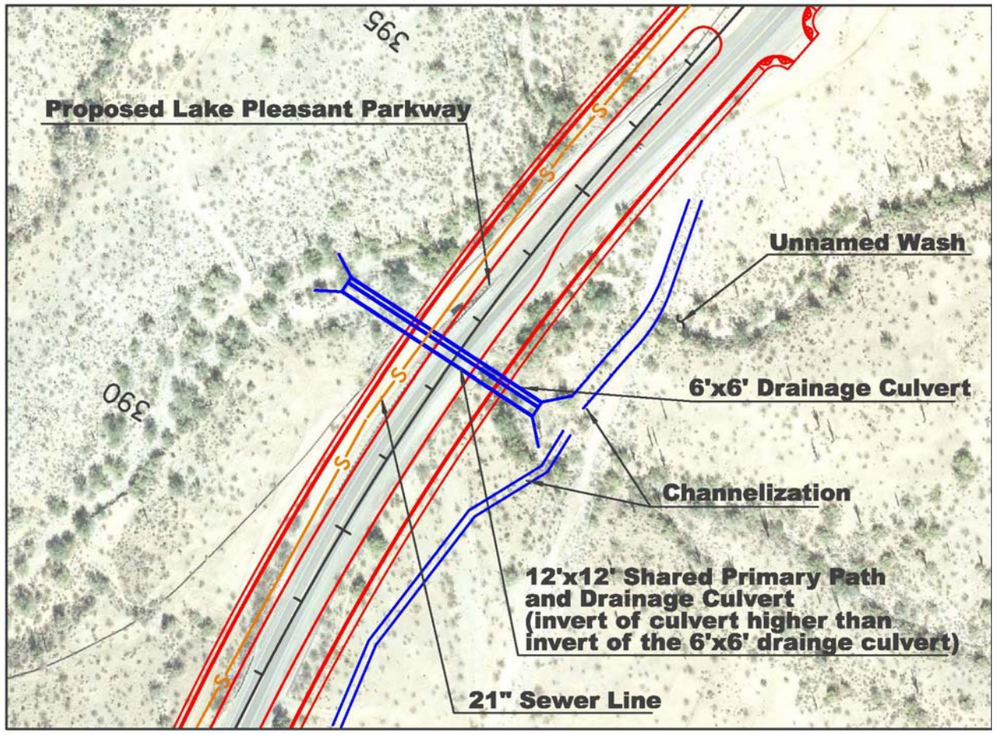
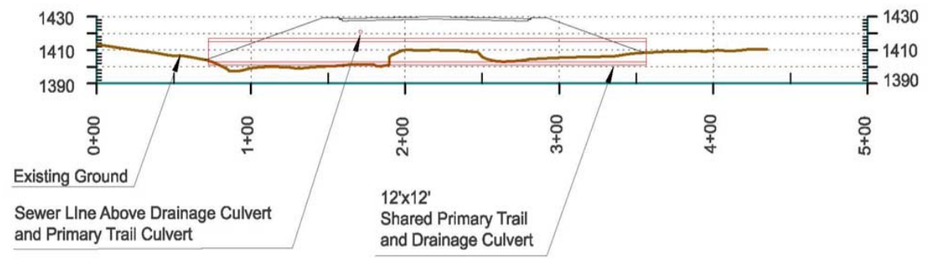


Figure 3.10 Alternative 3: Shared Drainage Culvert and Primary (Profile View)



Notes:
- One 12'x12' culvert will be provided for the Primary Path.
- Two 6'x6' drainage culverts will be provided.
- Invert of 6'x6' culvert will be lower than the invert of the 12'x12' culvert.
- Sewer line located above the drainage and primary trail culverts.

Figure 3.11 Alternative 4: Bridge Over the Unnamed Wash (Plan View)

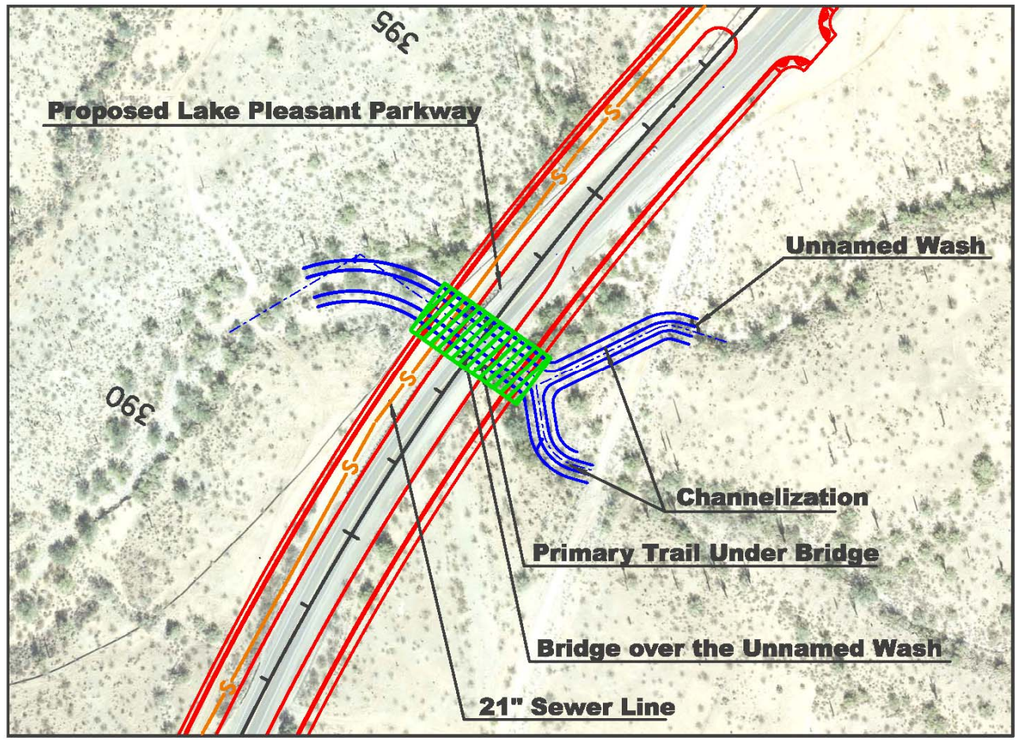
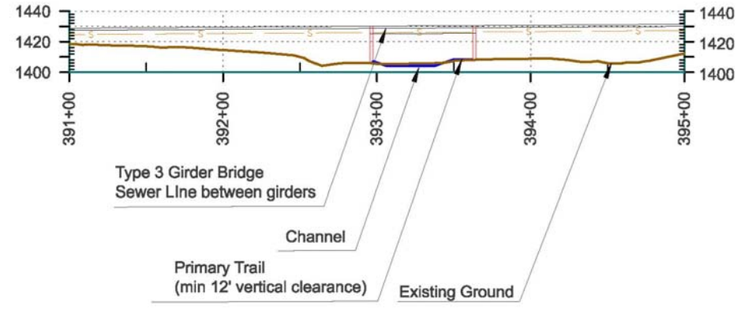


Figure 3.12 Alternative 4: Bridge Over the Unnamed Wash (Profile View)



Note:
- Sewer line located between bridge girders.

An alternative matrix was developed to summarize the design features and estimated construction costs for each alternative as shown in Table 3.1.

Table 3.1 Unnamed Wash Evaluation Matrix

Alternative	Main Features	Itemized Items	Construction Cost	Comments
Alternative 1: Separate Drainage Culverts and Primary Trail Culvert (Sewer Line Between Drainage Culverts and Primary Trail Culvert)	• Two culverts required to convey drainage at the wash o 2 – 6'x6'x 265' o Minimum channelization • One culvert to be utilized as primary trail o 12'x12'x 265' culvert o Min 12' vertical clearance o Culvert invert above sewer line o Culvert needs to have lights • **21" sewer line above drainage culverts and below primary trail culvert (invert ~ 1413')**	Two 6'x6'x 265' Culverts: One 12'x12'x 265' Culvert: 10% Contingency for trail:	$380,000 $330,000 $71,000 **Total: $781,000**	Min Roadway Elev~1434' (Preferred Elev~1430') Sewer Inv~1413'
Alternative 2: Separate Drainage Culvert and Primary Trail (Sewer Line Above Drainage Culverts and Primary Trail Culvert)	• Two culverts required to convey drainage at the wash o 2 – 6'x6'x 265'' o Minimum channelization • One culvert to be utilized for the primary trail o 12'x12'x 265' culvert o Min 12' vertical clearance o Culvert invert set at a higher elevation than the drainage culvert invert (assume 4' above drainage culvert invert for elevation calculations) o Culvert needs to have lights • **21" sewer line above drainage culverts and primary trail culvert (Invert ~ 1423')**	Two 6'x6'x 265' Culverts: One 12'x12'x265' Culvert: 10% Contingency for trail:	$380,000 $330,000 $71,000 **Total: $781,000**	Min Roadway Elev~1429' (Preferred Elev~1430') Sewer Inv~1423'
Alternative 3: Shared Drainage Culvert and Primary Trail	• Two culverts required to convey drainage at the wash • One of the drainage culverts oversized to accommodate primary trail o 1 – 6'x6'x 265' and 1-12'x12' x350' o Invert of 6'x6' culvert lower than 12'x12' culvert to capture nuisance flows o Larger culvert needs to have lights o Minimum channelization • **21" sewer line above culverts (invert ~ 1420')**	One 6'x6'x265' Culverts: One 12'x12'x 265' Culvert: 10% Contingency for trail:	$190,000 $330,000 $52,000 **Total: $572,000**	Min Roadway Elev~1424' (Preferred Elev~1430') Sewer Inv~1420'
Alternative 4: Bridge Over Unnamed Wash	• 65' bridge over the wash (AASHTO Type III Girder Bridge) • No culverts needed • **Exposed sewer line under the bridge slab (between girders) (Invert ~ 1422')** • Extensive channelization • Lighting for trail required under the bridge	140' wide x 65' long bridge over wash Channelization (15% cost of bridge) 10% Contingency for bridge	$1,200,000 $180,000 $120,000 **Total: $1,500,000**	Min Roadway Elev~1430' (Preferred Elev~1430') Sewer Invert ~1422'

Summary and Recommendations:

Through discussions with the City of Peoria Management and Planning Group, Alternative 4: Bridge Over Unnamed Wash was eliminated from consideration due to high construction costs and due to a general preference of equestrians to not utilize overpasses as means to cross roadways. Alternative 3: Shared Drainage Culvert and Primary Trail is the preferred alternative due to lower construction costs.

The City requested that alternatives to a standard reinforced box culvert be evaluated. Three options compatible with a box culvert could be utilized at this location providing the same purpose as the box culvert. The first alternative, referred to as a "Precast Con Span", is a modular component system that meets standard AASHTO and AASHTO LRFD specifications. This alternative offers an arch configuration at the top of the structure, providing more of an "open space" feel. In order to provide for the desired 12'x12' opening, the structure width would be 14' and its height measured from the floor of the channel would be 13'6".

The second alternative for a standard box culvert is a Multi Plate Super Span Arch Structure, consisting of a round pipe that is field bolted and made of galvanized steel. In order to provide the desired 12'x12' opening, the structure height would be 14'-9" measured from the floor of the channel. The pipe diameter would be 19'-8". The third alternative for a standard box culvert is a Multi Plate Super Span Arch Structure, consisting of an elliptical pipe that is field bolted and made of galvanized steel. This alternative is typically less costly than the standard box culvert or Con Span but more expensive than the steel round pipe as its installation is more complex than a standard round pipe.

All of the above mentioned alternatives are viable options for the shared drainage and primary trail facility as they meet the requirements of conveying drainage, meeting the primary path requirements, and they do not conflict with the proposed gravity sewer line.

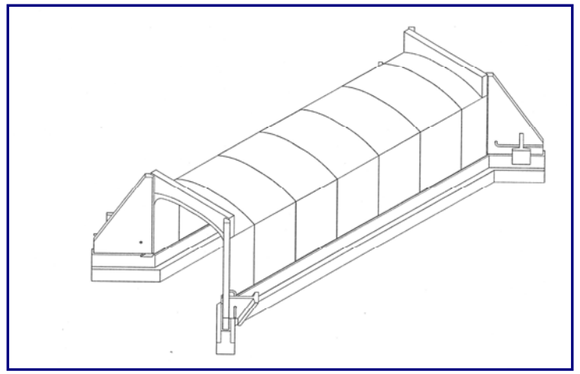
A summary of the estimated costs of each alternative is provided below:

Table 3.2 Estimated Costs for Shared Drainage and Primary Trail Structure

Alternative	Size	Length	Cost
Standard Reinforced Box Culvert	12'x12'	265'	$330,000
Precast Con Span	16' x 15.6'(includes 2' for buried footing)	265'	$410,500
Multi Plate Span Arch (Round Pipe)	19'-8" Diameter Pipe (Approx. 4.6' buried)	265'	$263,500
Multi Plate Span Arch (Elliptical Pipe)	27' x 16'-2" Elliptical Pipe (2.58' buried)	265'	$357,750

At the time of the submission of this Final DCR, a preferred alternative for the shared drainage and primary trail structure has not been identified. At the direction of the City, the cost estimate for this project utilizes the most expensive alternative. It is anticipated that final resolution on the preferred structure alternative will be determined during the final design stage for the project.

Example of Precast Con Span



Perspective View of a Precast Con Span

Example of Multi Plate Super Span Arch

3.4.3 North Segment Alternatives

The North Segment of the project extends from the SR303L to SR 74. Generally, all of the North Segment alternatives were designed using the typical section shown in Figure 3.2 and considered the following critical design features. Figure 3.13 shows the North Segment Alternatives.

North Segment Features:

1. Roadway Designation: Designation of Lake Pleasant Parkway as a Parkway per the City Classification Map.
2. Construction of SR303L: The construction of the SR303L at Lake Pleasant Parkway will be completed and open to traffic in the fall of 2011. It was assumed that the SR303L is an existing condition for this project. All the alternatives were developed to connect to the SR303L improvements on the south end, where the ultimate roadway section will be constructed with the SR303L project.
3. Crossing of the CAP canal: Grade separation requirement must be provided between the North Segment Alternatives for the upgraded Lake Pleasant Parkway and the operation and maintenance (O & M) roads of the CAP.
4. Existing private establishment ("Wild Horse West") on the south-east corner of Lake Pleasant Parkway and Old Carefree Road and EPNG structure at the south-west corner of Old Carefree Highway and Lake Pleasant Parkway must be maintained.
5. Existing right-of-way: Since public right-of-way does not exist for the existing roadway, all the alternatives will require new right of way for all the proposed improvements. For conceptual purposes, 150' new right of way width was used for all the alternatives shown in Figure 3.9.
6. Existing EPNG line: EPNG Company has prior rights for the El Paso gas line that is typically located to the west of the existing roadway. The alternatives were developed to avoid encroachment onto the EPNG easement. Costs associated with the relocations (vertical or horizontal) of the gas line when crossed by the proposed roadway were added to the project construction estimate.
7. Design Speed: Design speed for Lake Pleasant Parkway is typically 55 mph, with the exception of from the SR303L to north of the CAP canal, where the design speed is 45 mph. Detailed discussion of selected design speed is provided under Section 4.1.2.
8. Vertical profile alternatives are discussed under Section 3.4.3.6.
9. CAP access alternatives are described under Section 3.4.4.
10. Intersection of Lake Pleasant Parkway and SR 74: Alternatives for the intersection configuration are independent of the North Segment alternatives, and are presented in Section 2.6.

3.4.3.1 Alternative 1N – Reconstruct Roadway on Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by reconstructing the new roadway on the existing roadway alignment. The south terminus of this alternative is located approximately 575' north of the SR303L structure at Lake Pleasant Parkway, where the roadway has been constructed to its ultimate width by the ADOT SR303L project. The north terminus of this alternative is located at the intersection of Lake Pleasant Parkway and SR 74. The exact northern limits of this project will depend on the selected alternative for this intersection. This alternative assumes that the existing structure over the CAP canal will be widened to accommodate the six-lane radway. This alignment contains three (3) horizontal curves that do not require superelevation between SR303L and SR 74. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated that this line will be undergrounded and potentially upgraded.

3.4.3.2 Alternative 2N – Shift Roadway to the West of the Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by shifting the new roadway to the west of the existing roadway from SR303L to north of the CAP canal, and then back onto the existing roadway alignment south of the Old Carefree Highway intersection. The south terminus of this alternative is located approximately 575' north of the SR303L structure at Lake Pleasant Parkway, where the roadway has been constructed to its ultimate width by the ADOT SR303L project. The north terminus of this alternative is located at the intersection of Lake Pleasant Parkway and SR 74. The exact northern limits of this project will depend on the selected alternative for this intersection. This alternative requires the construction of a new 105' long and 140' wide bridge over the CAP to accommodate the new six-lane facility. This alignment contains four (4) horizontal curves between SR 303L and SR 74 that do not require superelevation. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

3.4.3.3 Alternative 3N – Shift Roadway to the East of the Existing Alignment

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) by shifting the new roadway to the east of the existing roadway from SR303L to north of the CAP canal, and then back onto the existing roadway alignment south of the Old Carefree Highway intersection. The south terminus of this alternative is located approximately 575' north of the SR303L structure at Lake Pleasant Parkway, where the roadway has been constructed to its ultimate width by the ADOT SR303L project. The north terminus of this alternative is located at the intersection of Lake Pleasant Parkway and SR 74. The exact northern limits of this project will depend on the selected alternative for this intersection. This alternative requires the construction of a new 105' long and 140' wide bridge over the CAP to accommodate the new six-lane facility. This alignment contains four (4) horizontal curves between SR 303L and SR 74 that do not require superelevation. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from SR303L to SR 74. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

3.4.3.4 Alternative 4N – NB Traffic on Existing Bridge

This alternative consists of upgrading the existing two-lane facility to an ultimate parkway section (per Figure 3.2) from the SR303L to SR 74. This alternative typically follows the existing roadway alignment. The south terminus of this alternative is located approximately 575' north of the SR303L structure at Lake Pleasant Parkway, where the roadway has been constructed to its ultimate width by the ADOT SR303L project. The north terminus of this alternative is located at the intersection of Lake Pleasant Parkway and SR 74. The exact northern limits of this project will depend on the selected alternative for this intersection. This alternative was developed based on discussions with the CAP. As a result of the discussions, it was determined that grade separation can be provided by the utilization of underpass crossings for the O & M roads in lieu of raising the mainline. A detailed discussion regarding CAP access is provided in Section 3.4.4. This alternative assumes that the existing structure over the canal will be utilized for northbound traffic, and a new 105' long and 53'-10" wide bridge will be constructed to carry the southbound traffic. Due to grade difference between the existing structure and the new structure, this alternative provides for a wider median between the southbound and northbound traffic at the CAP. This alignment contains five (5) horizontal curves between SR 303L and SR 74 and two (2) for the realigned New River Road. None of the curves require superelevation. The main intersections along this alignment are at Dove Valley Road, Old Carefree Highway, a new intersection located between the north ramp terminals of the SR303L and the CAP and SR 74. This alternative does not impact the EPNG line to the west. The 12 kV overhead APS power line to the east of this alignment will be relocated from Loop 303 to SR 74. Based on conversations with the City and APS, it is anticipated this line will be undergrounded and potentially upgraded.

3.4.3.5 Alternative 5N – No Build Alternative

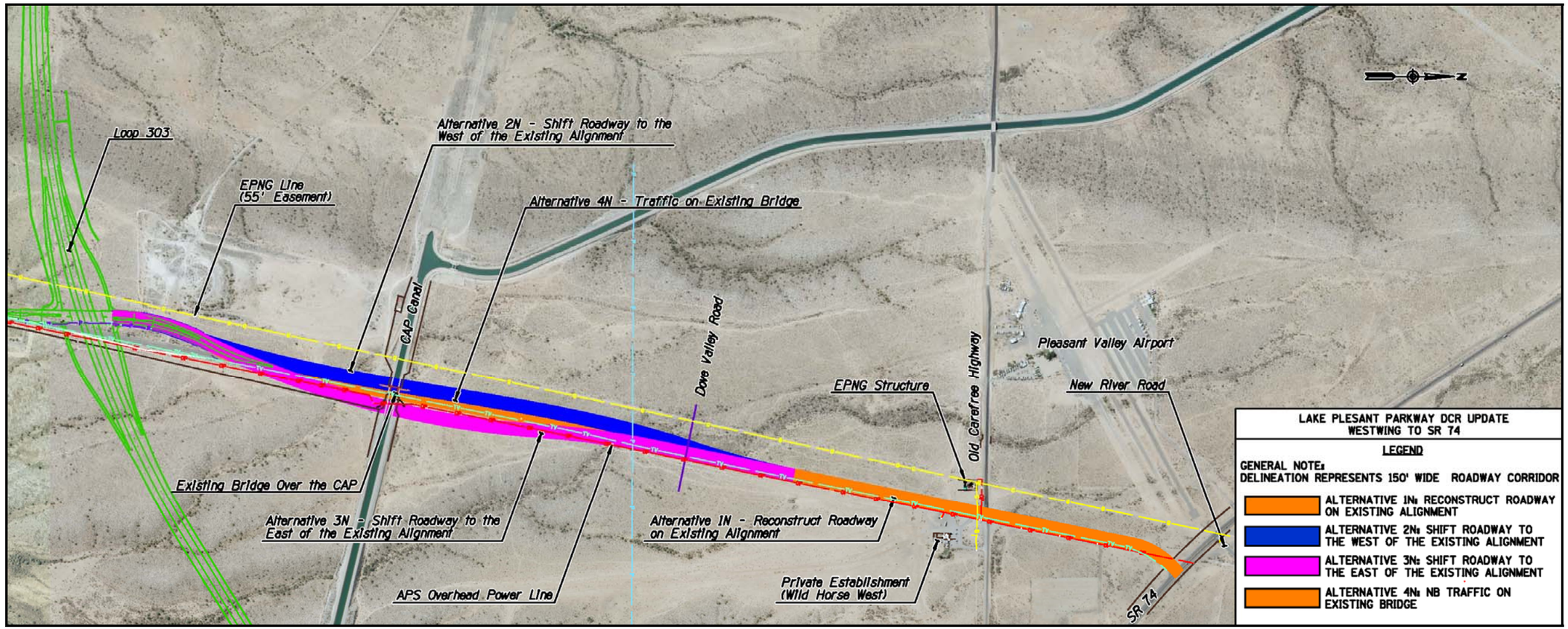
The "No-Build" Alternative is provided for comparison purposes. It provides no improvements to traffic capacity, motorist or pedestrian safety, or operational features of the existing roadway. Traffic models forecast significant traffic volumes increase, and this demand is not met by the "No-Build" Alternative.

Structure at the CAP Canal

Lake Pleasant Parkway Approaching SR 74

Lake Pleasant Parkway at SR 74

Figure 3.13 North Segment Alternatives



3.4.3.6 North Segment Vertical Alignments

As the North Segment alternatives were developed, the key element for consideration and evaluation was the vertical geometrics for the upgraded roadway, specifically, at the CAP crossing. The preliminary assumption made for the CAP crossing was that grade separation will be required between the mainline and the O & M roads for the canal. For Alternatives 2N and 3N, which assume that a new six-lane bridge will be constructed to the west and east of the existing roadway, respectively, three mainline profile alternatives that provide for grade separation were developed and evaluated. Two key design criterions were applied when creating the profiles:

1) CAP criteria require that 14.5' clearance be provided between the O & M roads and the new structure. Clearance can be achieved by elevating the mainline over the O & M roads, tunneling the mainline under the O & M roads, or tunneling the O & M roads under the roadway.
2) Maximum grade for the mainline should be limited to 3% due to the inclusion of sidewalk as a part of the design.

The main consideration when evaluating the profiles was the impact the vertical geometry of the mainline had on access to the adjacent land. The City considers the land in close proximity to the SR303L valuable and attractive for development and as an important revenue source.

The profile alternatives that were developed are presented below:

Profile 1 - Mainline Over CAP with Lowered O & M Roads (Figure 3.14 - as shown on Page 38)

This alternative assumes that the mainline will go over the CAP canal, and the maintenance and operation roads will be lowered by 4.5' to minimize the elevation the mainline will have to be raised to. This alternative will require the construction of retaining walls between the canal and the lowered O & M roads. The stationing shown in Figure 3.14 is based on the centerline alignment that was established for Alternative 2N.

Profile 2 - Mainline Over CAP with O & M Roads at Grade (Figure 3.15 - as shown on Page 38)

This alternative is similar to Profile 1, with the exception that the O & M roads will remain at grade. This alternative will require the mainline to be raised higher than the elevations proposed for Profile 1 as needed to provide for the 14.5' clearance. The stationing shown in Figure 3.15 is based on the centerline alignment that was established for Alternative 2N.

Profile 3 - Mainline Under CAP (Figure 3.16 – as shown on Page 39)

This alternative provides for the required clearances by tunneling the mainline under the CAP canal, while the O & M roads remain at grade. The stationing shown in Figure 3.16 is based on the centerline alignment that was established for Alternative 2N.

Profile 4 – Mainline At Grade (Figure 3.17 - as shown on Page 39)

This alternative was developed when North Segment Alternative 4N was created. This profile assumes that the existing bridge will be used to carry northbound traffic, and a new structure over the CAP be constructed to carry the southbound traffic. The new structure would be at grade and would be set to provide the minimum 4' clearance between the bottom of the superstructure to the top of the canal lining, as required by the CAP. The stationing shown in Figure 3.17 is based on the centerline alignment that was established for Alternative 4N. Southbound Alignment and Northbound Alignment were created to accommodate the difference in grade between the existing and proposed structures over the CAP as shown in Figure 3.18. The profile shown in Figure 3.17 is a projected profile along the centerline alignment for Alternative 4N.

Figure 3.18 Southbound and Northbound Centerlines

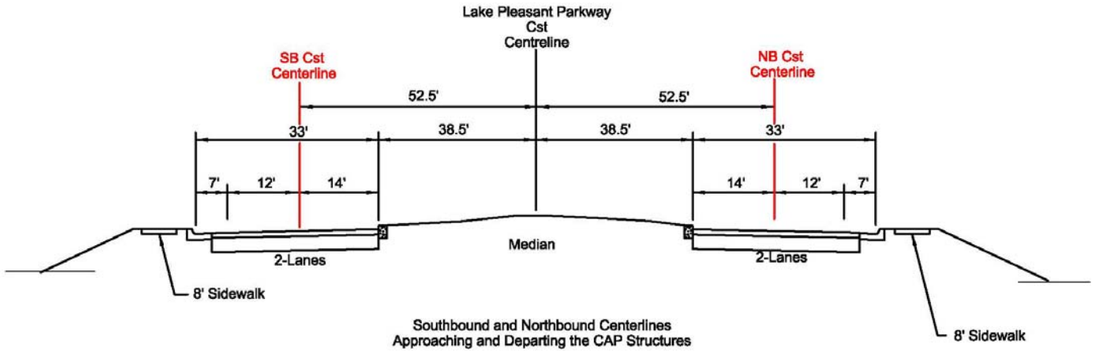


Figure 3.14 Profile 1 - Mainline Over CAP with Lowered O & M Road

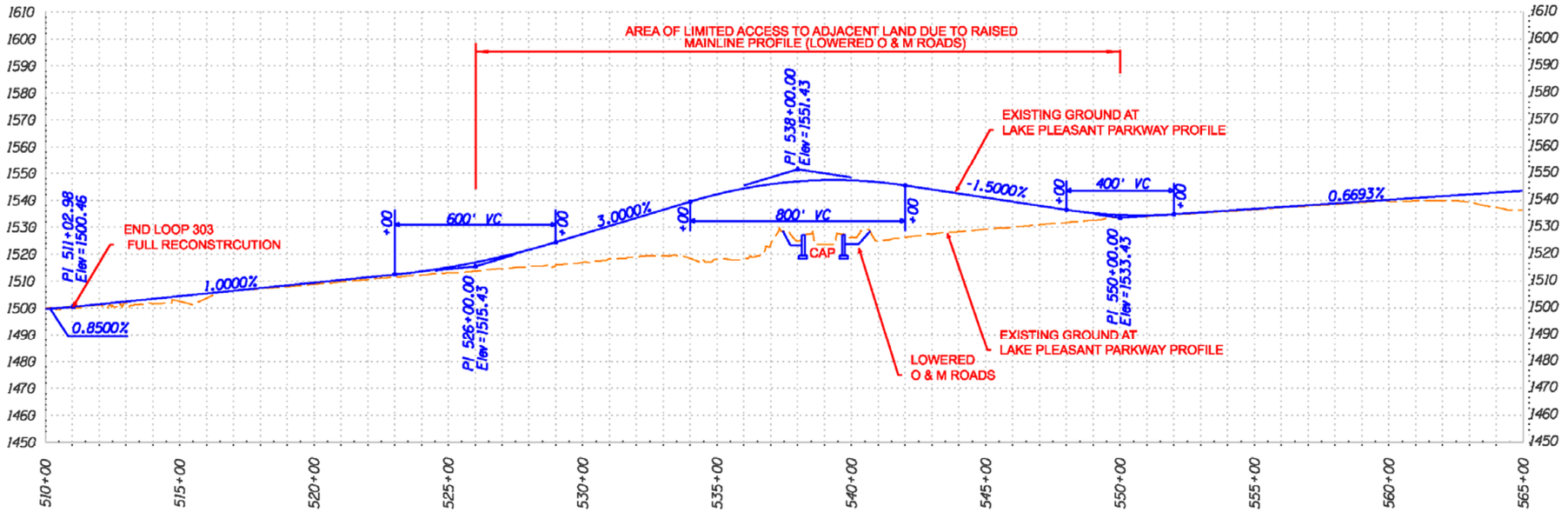


Figure 3.15 Profile 2 - Mainline Over CAP with O & M Roads at Grade

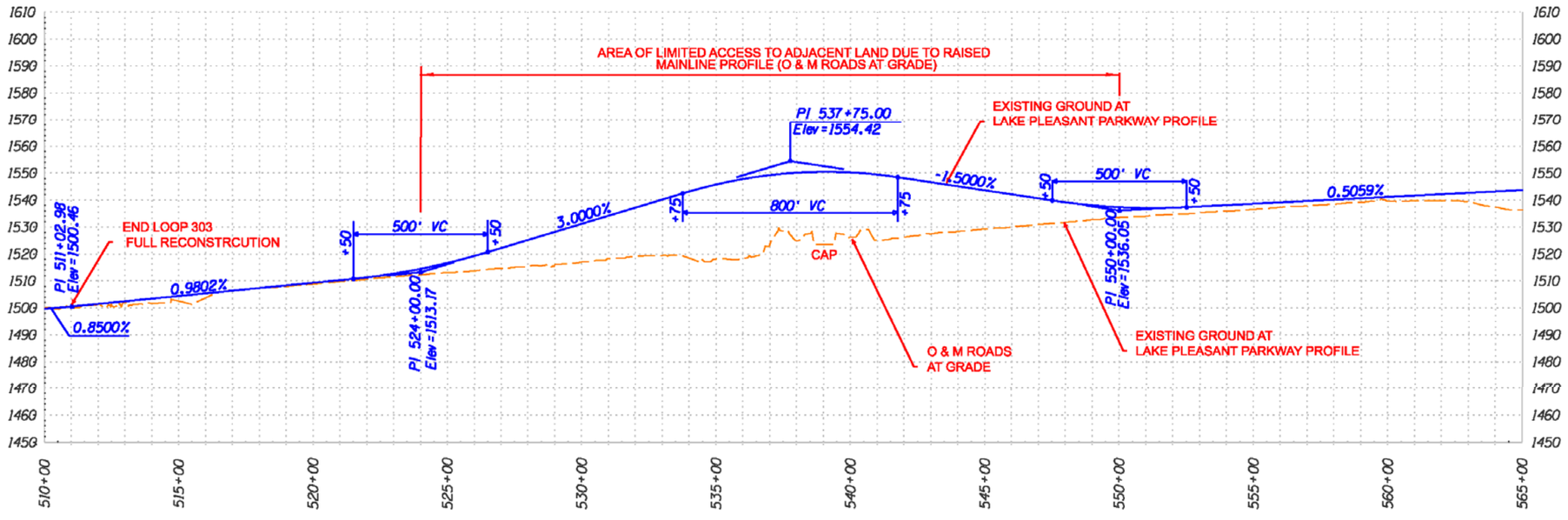


Figure 3.16 Profile 3 - Mainline Under CAP

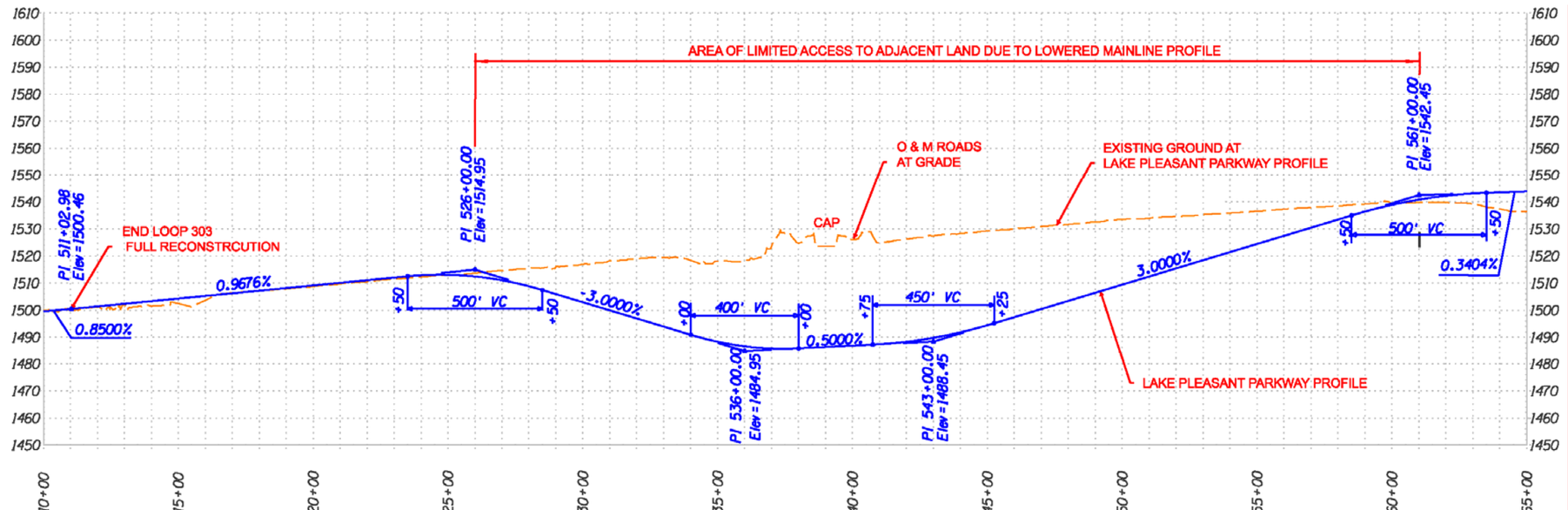
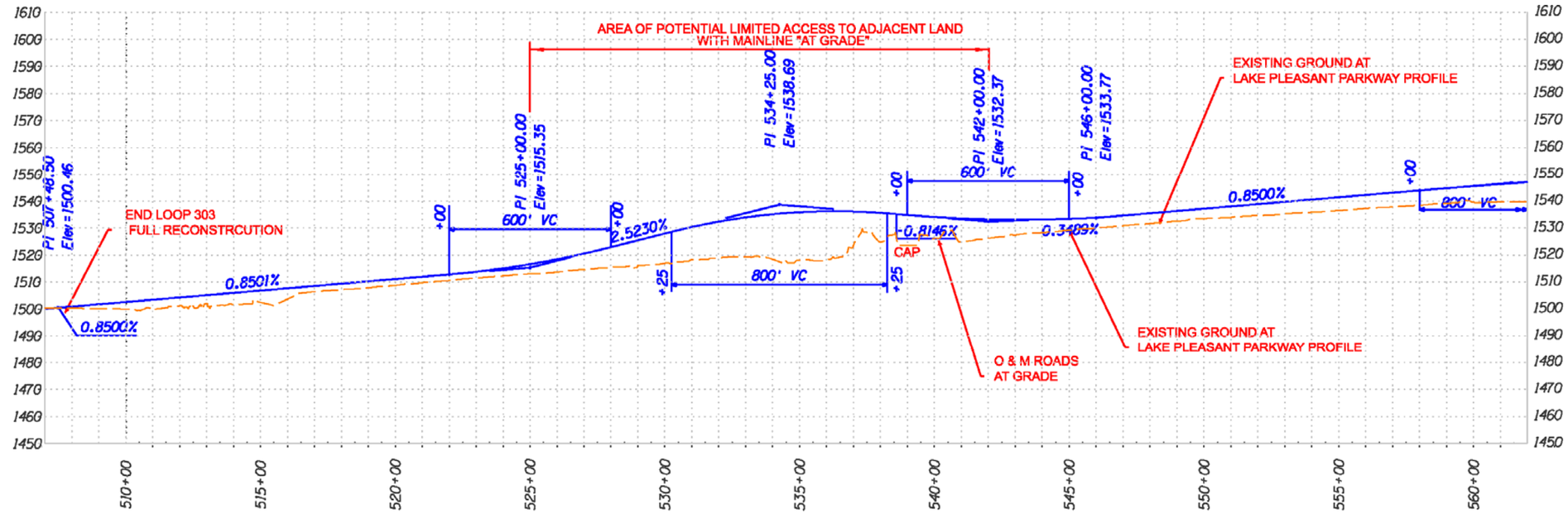


Figure 3.17 Profile 4 - Mainline at Grade



3.4.4 CAP Access Alternatives

The CAP is a key stakeholder of the project. Coordination with the CAP will need to be continued into final design and construction. During the preliminary stages of the DCR, several alternatives were developed to provide access from the upgraded roadway to the CAP canal O & M roads. CAP Alternatives 1 through 4 were based on the assumption that grade separation will be required between the mainline and the CAP O & M roads. CAP Alternative 5 was developed after North Segment Alternative 4N was introduced as a viable alternative. Based on comments to the Draft DCR by the CAP, CAP Alternative 6 was developed and was introduced as the recommended alternative for the Draft Final DCR. CAP Alternatives 7 and 8 were developed based on comments to the Draft Final DCR and are presented as the recommended alternative in the Final DCR.

Access to the CAP facilities is a critical element for consideration. Grades on the access roads should not exceed 6% without prior approval and access to the canal must accommodate a 65' long low-boy trailer delivering maintenance equipment. It is important to note that this particular section o f the canal has high amount of maintenance activity due to several features in the immediate vicinity of the lake Pleasant Parkway crossing (Agua Fria Tunnel, Agua Fria Siphon, the start of the Waddell Canal, and the New River Siphon). A brief description of these Alternatives is provided below:

CAP Alternative 1: Local Street Access (Figure 3.19)

This alternative assumes that mainline is constructed over the CAP utilizing North Segment Profiles 1 or 2 as described in Section 3.5.3.5. It requires the construction of a longer bridge over the CAP to accommodate the operation and maintenance roads and "local streets". It is assumed that the local streets will be constructed by adjacent developers. The local streets are separated from the O & M roads as required by the CAP. Due to the raised mainline profiles, the access point from the local street onto Lake Pleasant Parkway south of the CAP canal is located approximately 1,700' south of the proposed structure over the CAP, and has only have right-in right-out access from and onto Lake Pleasant Parkway. Based on traffic analysis, it has been determined that signalization of the access point will degrade the traffic flow along the mainline within this stretch of roadway. This is the only alternative that provides for future local street access along Lake Pleasant Parkway between the SR303L and the CAP canal.

CAP Alternative 2: Access on Existing Roadway (Figure 3.20)

This alternative assumes that mainline is constructed over the CAP utilizing North Segment Profiles 1 or 2 as described in Section 3.4.3.6 and those turnouts are constructed to connect existing Lake Pleasant Parkway to the upgraded roadway. The existing roadway serves as an access road for the CAP. This alternative assumes that the structure over the CAP spans that canal but does not provide for the accommodation of future local streets.

CAP Alternative 3: Conventional Access (Figure 3.21)

This alternative assumes that mainline is constructed over the CAP utilizing North Segment Profiles 1 or 2 as described in Section 3.4.3.6 and that connector roads are required to provide access off the mainline to the CAP O & M roads. This alternative provides for the conventional access road configuration that is similar to the existing CAP access roads.

CAP Alternative 4: Tunnel O & M Roads (Figure 3.22)

This alternative assumes that mainline remains at grade and that the existing roadway will be widened to accommodate the additional traffic lanes. To provide for grade separation, this alternative requires that the operation and maintenance roads be tunneled under the widened roadway.

CAP Alternative 5: Access Roads at Grade (Figure 3.23)

This alternative was developed for North Segment Alternative 4N, and North Segment Profile 4. It assumes that left turn lanes are provided for the southbound traffic onto the north-east access road, and for the northbound traffic onto the south-west access road. Extra wide outside lanes are provided approaching the turnouts onto the access roads to assure the safe turn movement of the CAP maintenance vehicles. The accommodation of the extra wide outside lanes without designation of right turn lanes is intentional and is done in order to try and minimize right turn movements by the traveling public onto the CAP access roads and to minimize safety concerns by such right turn movements. This alternative was presented as the preferred alternative in the Draft DCR. Review comments to the Draft DCR by the CAP resulted in the elimination of this alternative from further consideration as it did not provide for grade separation between the upgraded Lake Pleasant Parkway and the O & M Roads.

CAP Alternative 6: Access Roads at Grade with Underpass Crossings (Figure 3.24)

This alternative was developed as a result of comments provided by the CAP to the Draft DCR, specifically, to Alternative 5, which was designated as the preferred alternative in the Draft DCR. Similar to Alternative 5, Alternative 6 assumes that a new structure be constructed to the west of the existing structure over the CAP to accommodate the southbound traffic. Northbound traffic will be traveling on the existing structure. Equipment underpasses are provided on both sides of the canal to provide for grade separation between the roadway and CAP O & M roads. The mainline roadway configuration approaching and departing the CAP is similar to CAP Alternative 5 by providing left turn lanes and extra wide outside lanes onto the CAP access roads.

CAP Alternative 7: Four Quadrants Access Roads & Underpass Crossings (No U-Turn) (Figure 3.25)

This alternative was developed as a result of comments provided by the CAP to the Draft Final DCR. Similar to Alternatives 5 & 6, Alternative 7 assumes that a new structure be constructed to the west of the existing structure over the CAP to accommodate the southbound traffic. Northbound traffic will be traveling on the existing structure. Equipment underpasses are provided on both sides of the canal to provide for grade separation between the roadway and CAP O & M roads. Access roads are provided on four quadrants of Lake Pleasant Parkway and the CAP canal, however, this alternative does not allow for direct movements from the access roads to the new underpasses.

CAP Alternative 8: Access Quadrants Access Roads & Underpass Crossings (U-Turn) (Figure 3.26)

CAP Alternative 8 is similar to CAP Alternative 7 as it provides equipment underpasses on both sides of the canal to provide for grade separation between the roadway and CAP O & M roads and access roads are provided on four quadrants of Lake Pleasant Parkway and the CAP canal. This alternative differs from CAP Alternative 7 as it allows for direct movements from the access roads to the new underpasses.

Figure 3.19 CAP Alternative 1: Local Street Access

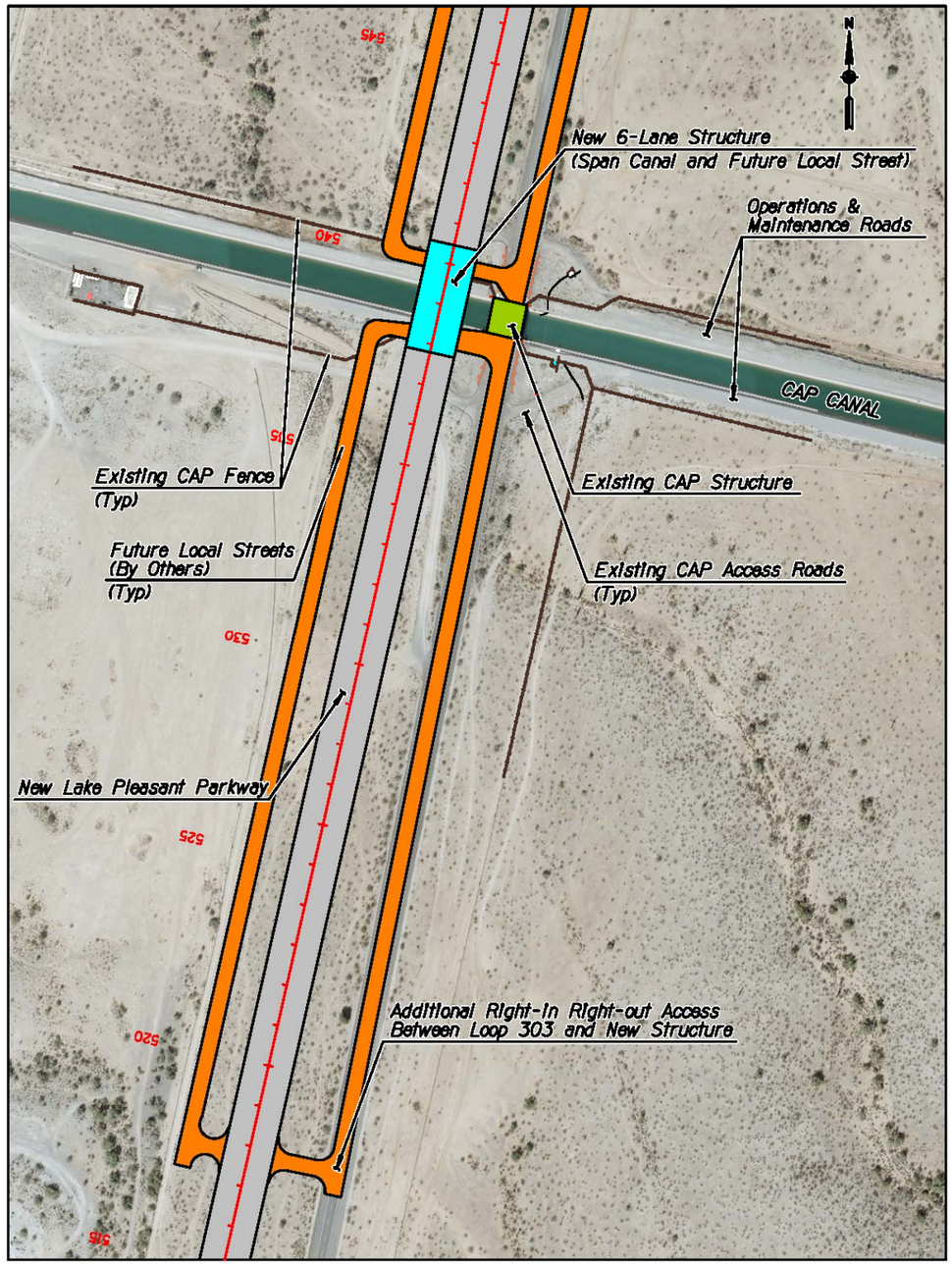


Figure 3.20 CAP Alternative 2: Access on Existing Roadway

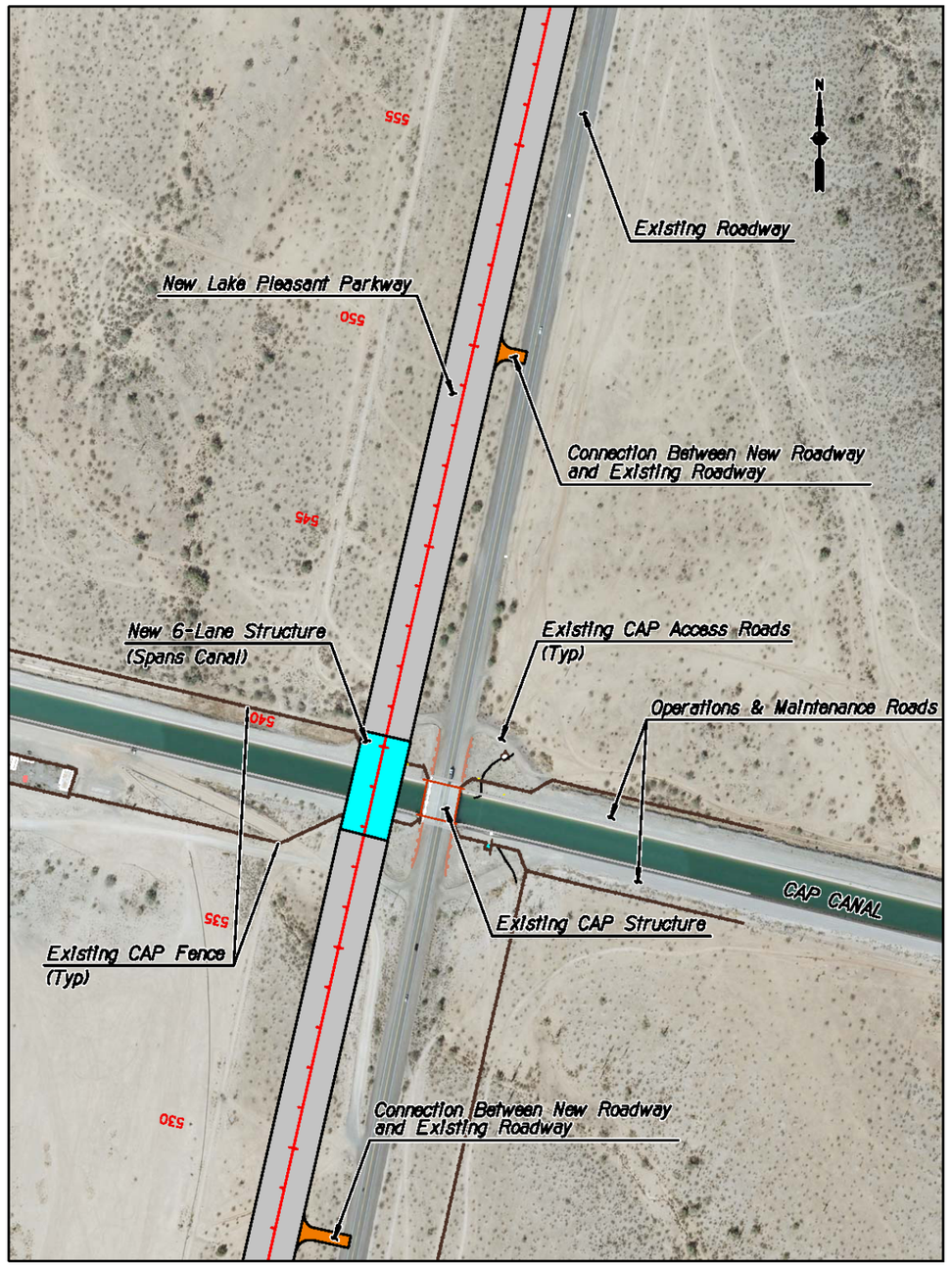


Figure 3.21 CAP Alternative 3: Conventional Access

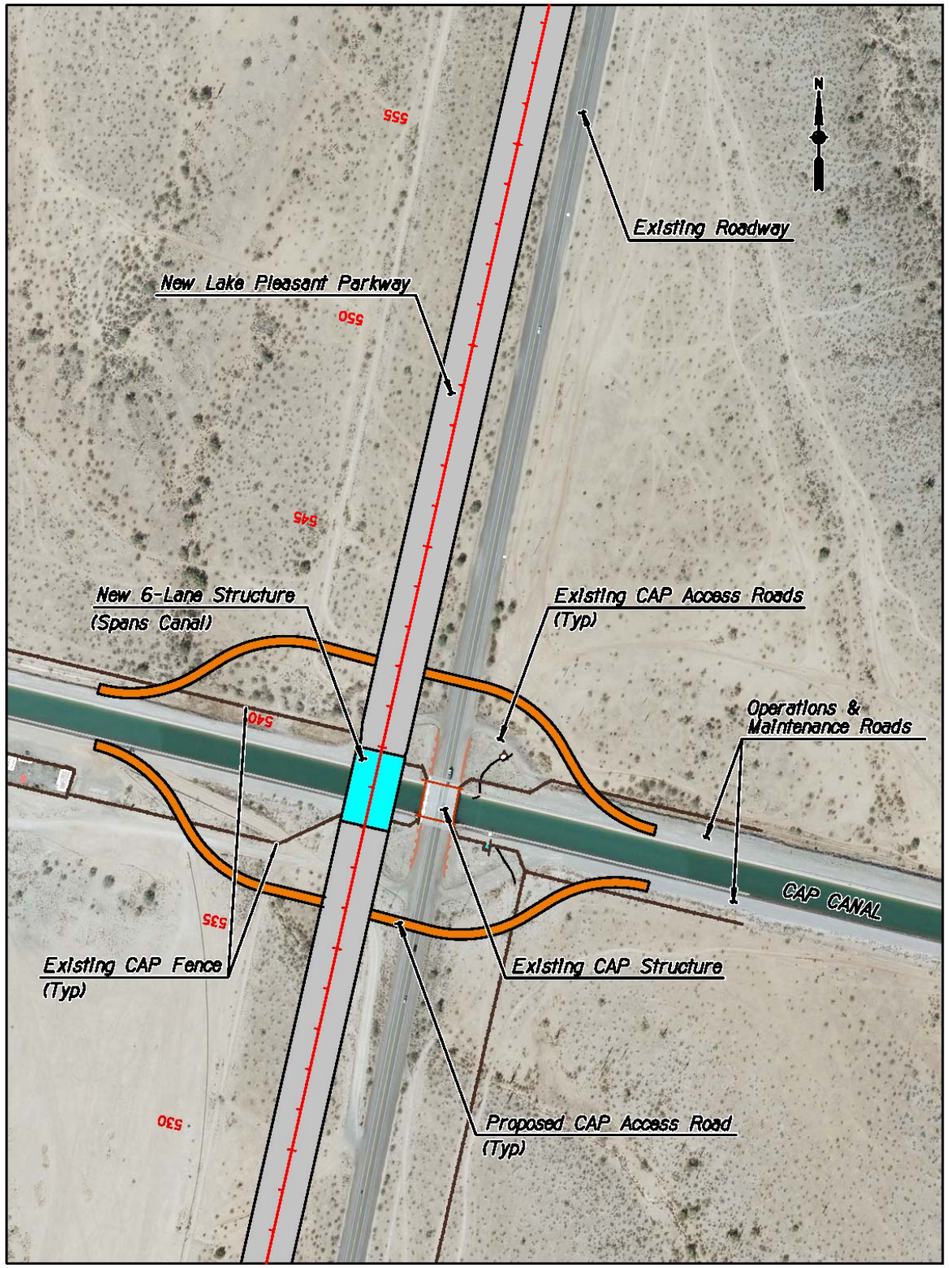


Figure 3.22 CAP Alternative 4: Tunnel O & M Roads

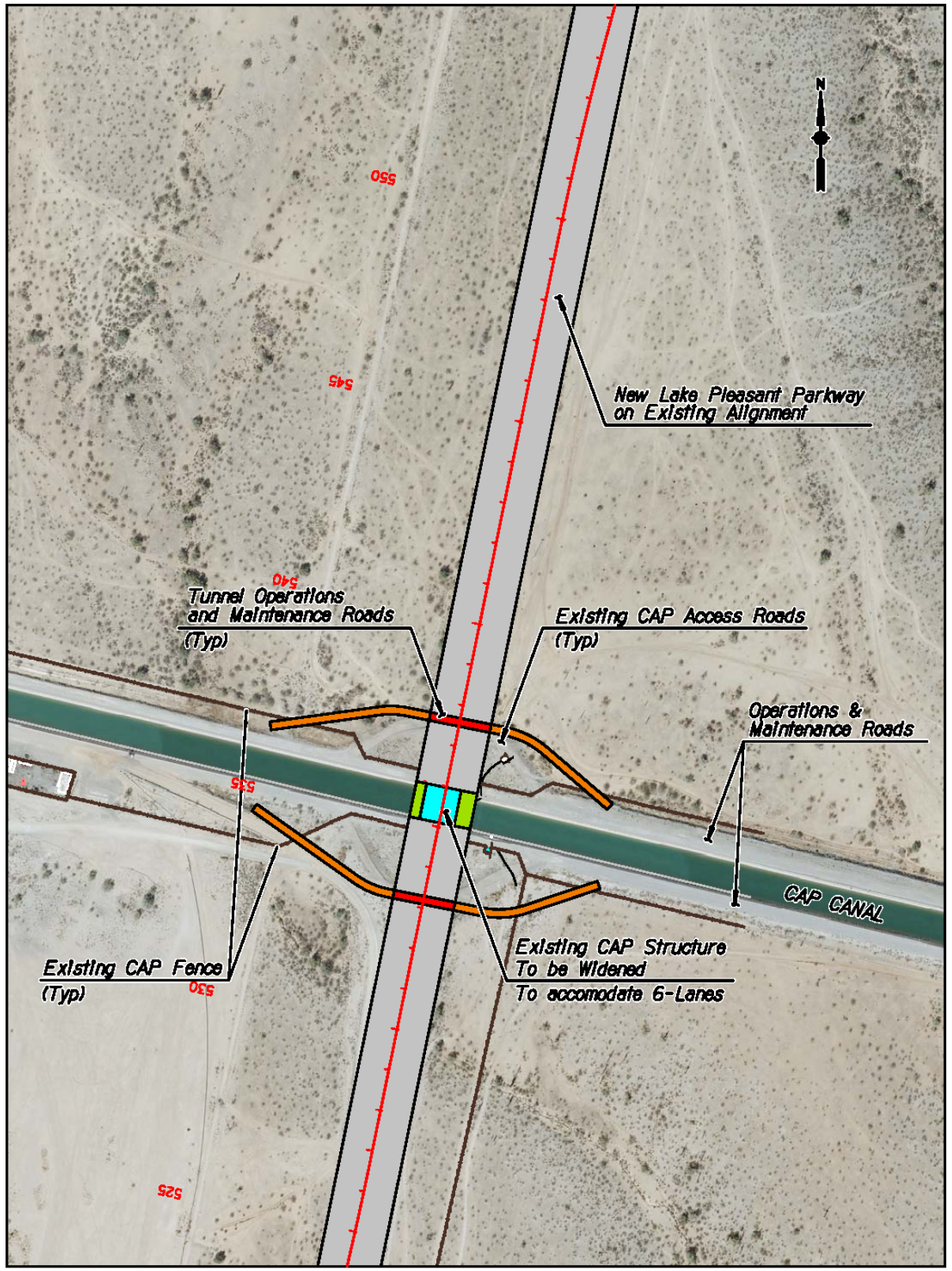


Figure 3.23 CAP Alternative 5: Access Roads at Grade

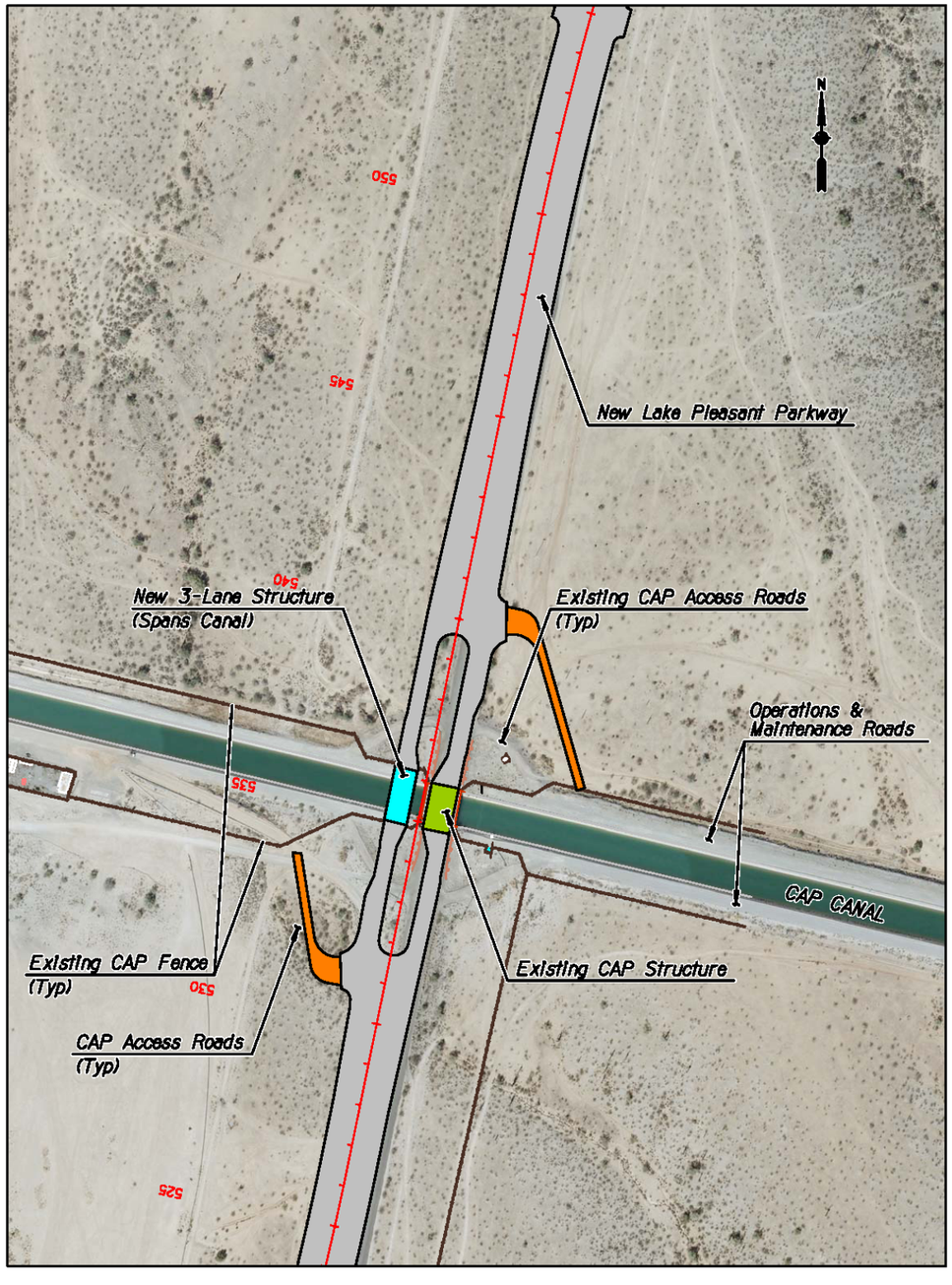


Figure 3.24 CAP Alternative 6: Access Roads at Grade with Underpass Crossings

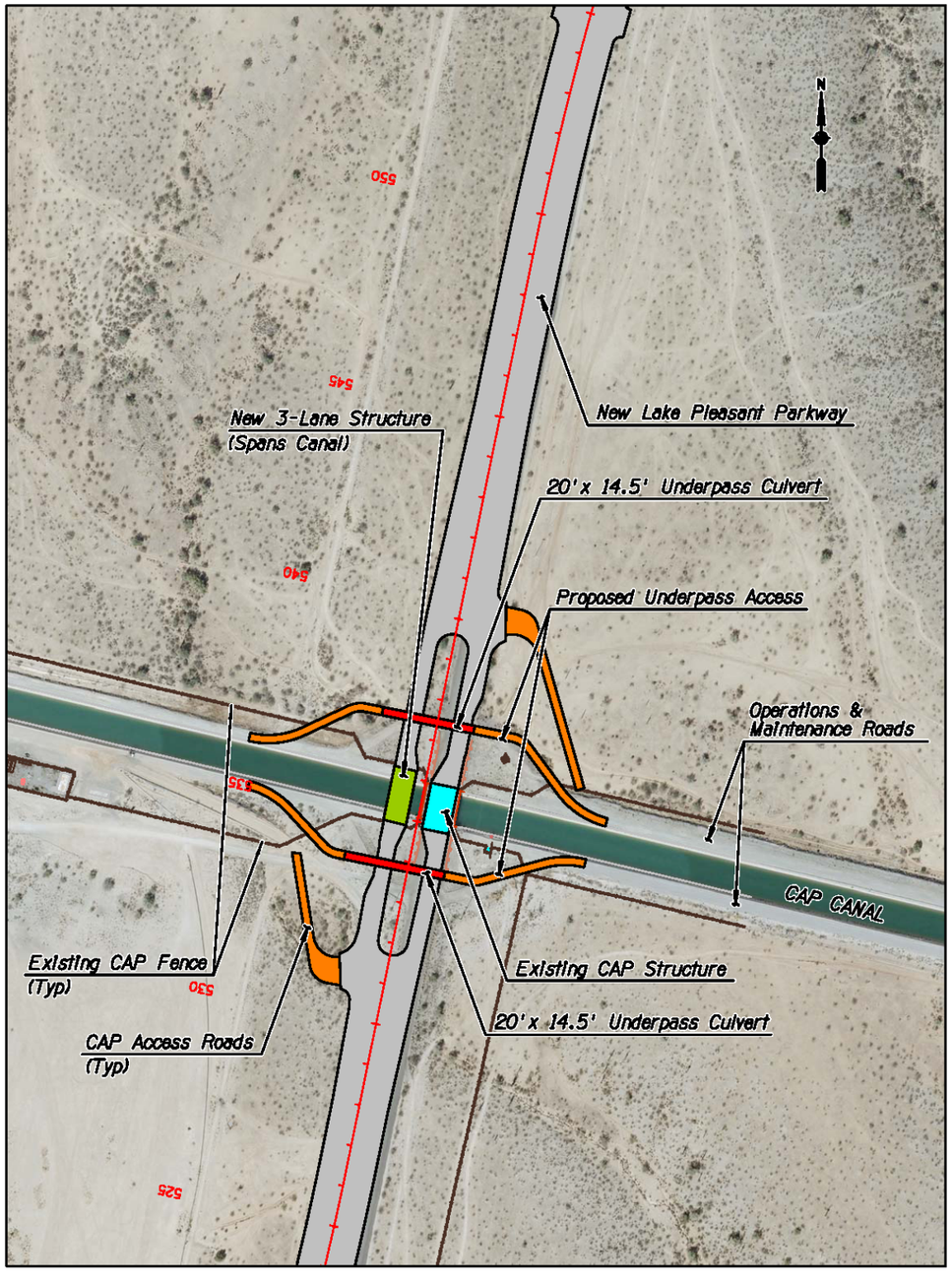


Figure 3.25 CAP Alternative 7: Four Quadrants Access Roads and Underpass Crossings (No U-Turn)

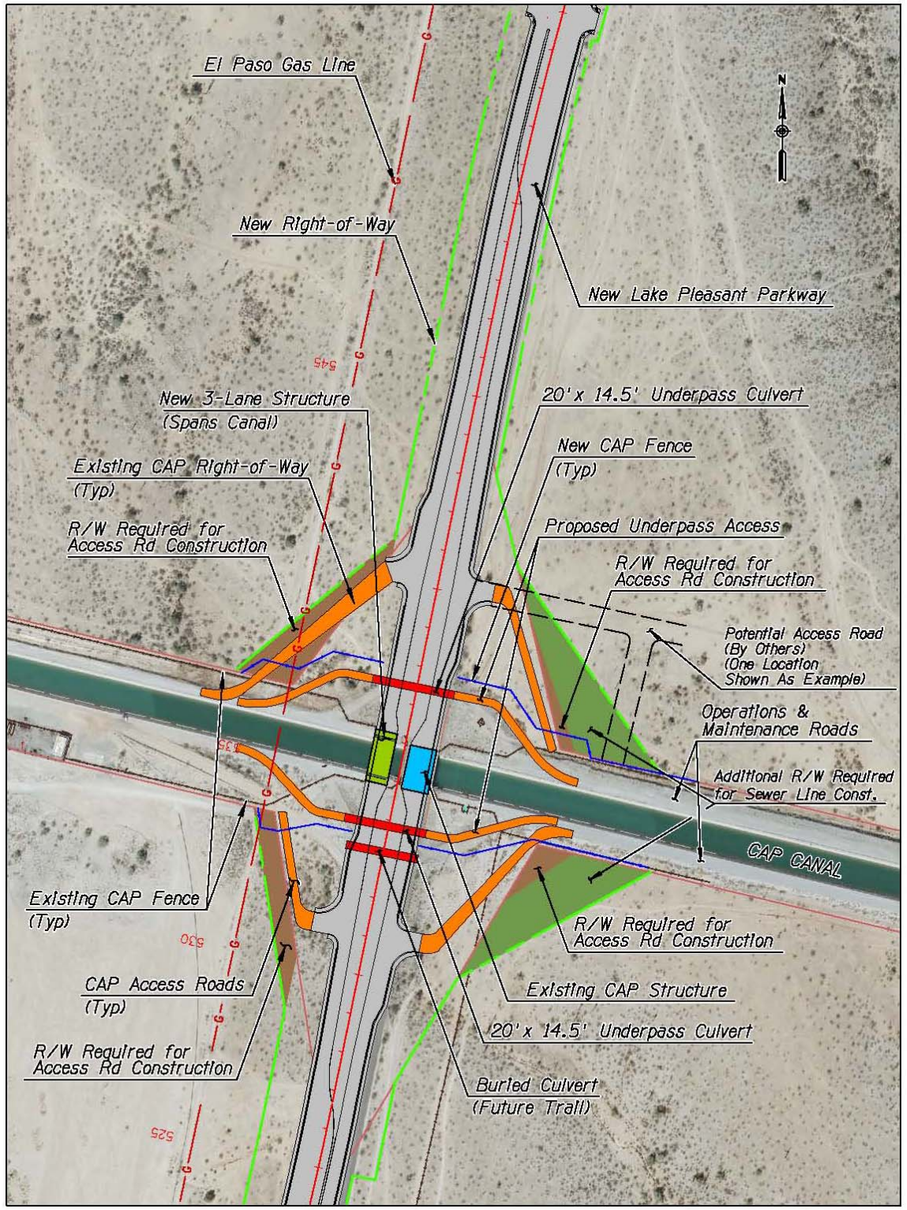
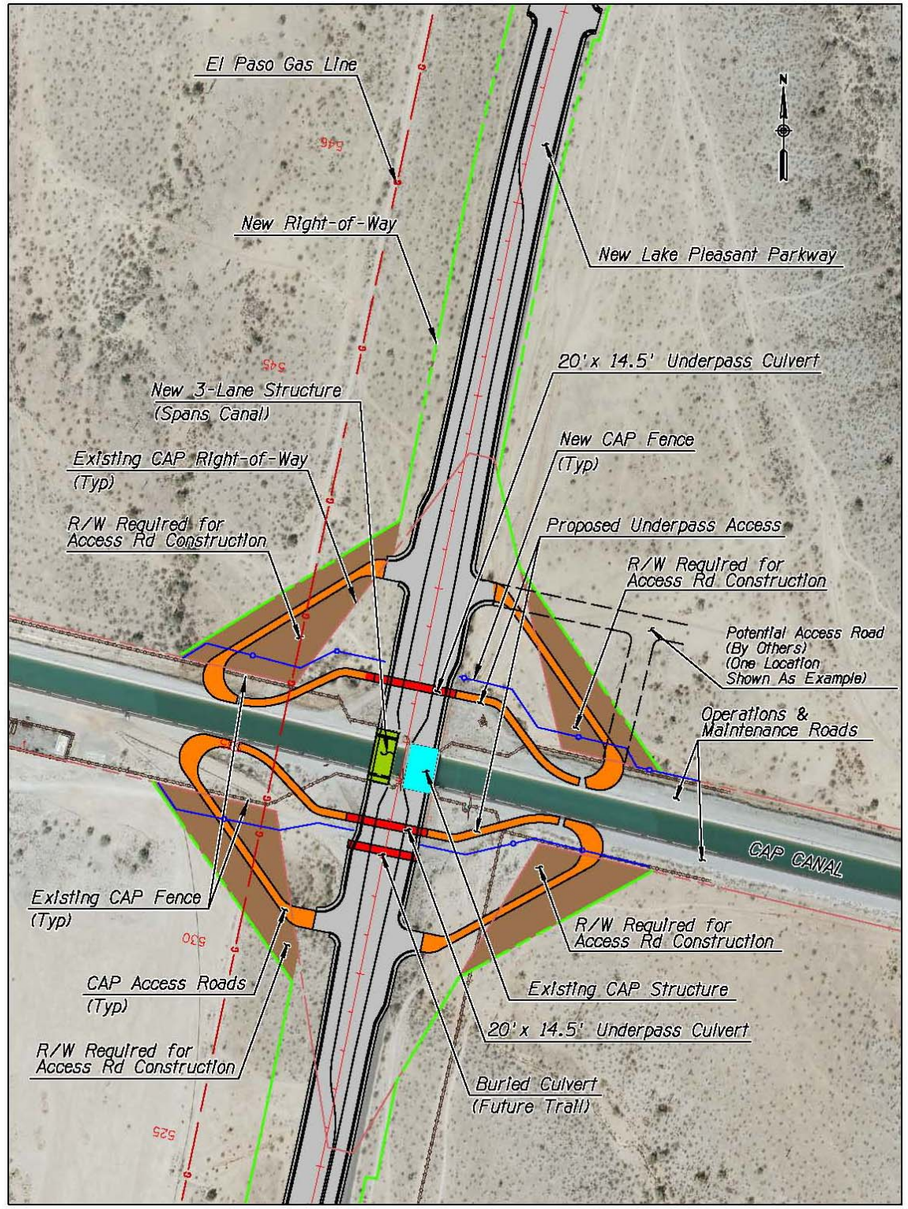


Figure 3.26 CAP Alternative 8: Four Quadrants Access Roads & and Underpass Crossings (U-Turn)



CAP Alternatives Summary and Recommendations:

An existing at-grade structure spans the canal at Lake Pleasant Parkway. Six alternatives were initially developed to provide access to the CAP facilities. Per the CAP, the requirement to provide 14.5' of clearance between the O & M roads and new structures arose from CAP concerns that when narrow roadways are widened to accommodate additional travel lanes, the CAP's ability to maintain the canals diminishes as it becomes more difficult for the maintenance equipment to safely cross the widened roadways in order to access the canals.

CAP Alternatives 1 through 3 assume that a new 140' wide structure designed to accommodate a six-lane roadway facility will be constructed over the CAP, providing grade separation between the O & M roads and the mainline. Alternative 4 assumes that the existing structure will be widened to accommodate the additional travel lanes and the O & M roads will be tunneled under the mainline to provide for grade separation. Alternative 5 assumes that a new at-grade structure will be constructed to the west of the existing structure designed to carry southbound traffic, while northbound traffic will utilize the existing structure. With this alternative, access to the O & M roads will be provided via at grade access roads. Alternative 6 was introduced based on the CAP comments to the Draft DCR specifying that the CAP requires grade separation between the upgraded roadway and the O & M roads, but would allow for equipment underpasses to be constructed at both sides of the canal in lieu of raising the roadway profile. The underpasses must provide for 14.5' vertical clearance and be 20' wide in order to accommodate a typical CAP maintenance vehicle.

With the City's interest of developing the land along the corridor, and with the land in close proximity to the SR303L being deemed very valuable and attractive for development, access to this land was a major item for consideration and discussion during the evaluation of the alternatives. Prior to the development of Alternative 4N and mainline Profile 4, the City and the ASLD preferred the CAP Access Alternative 1 – Local Streets as it provides for the construction of future local roads between the SR303L and the CAP by constructing a longer bridge over the canal. It was assumed that the local streets would be constructed by developers. CAP Alternative 1 was the least favorable by the CAP as it "mixed" CAP traffic with local street traffic. This posed safety concern to the CAP due to their heavy utilization of the access roads and O & M roads. The CAP preferred Alternatives 3 and 4, as they separate the CAP O & M roads from the future local traffic.

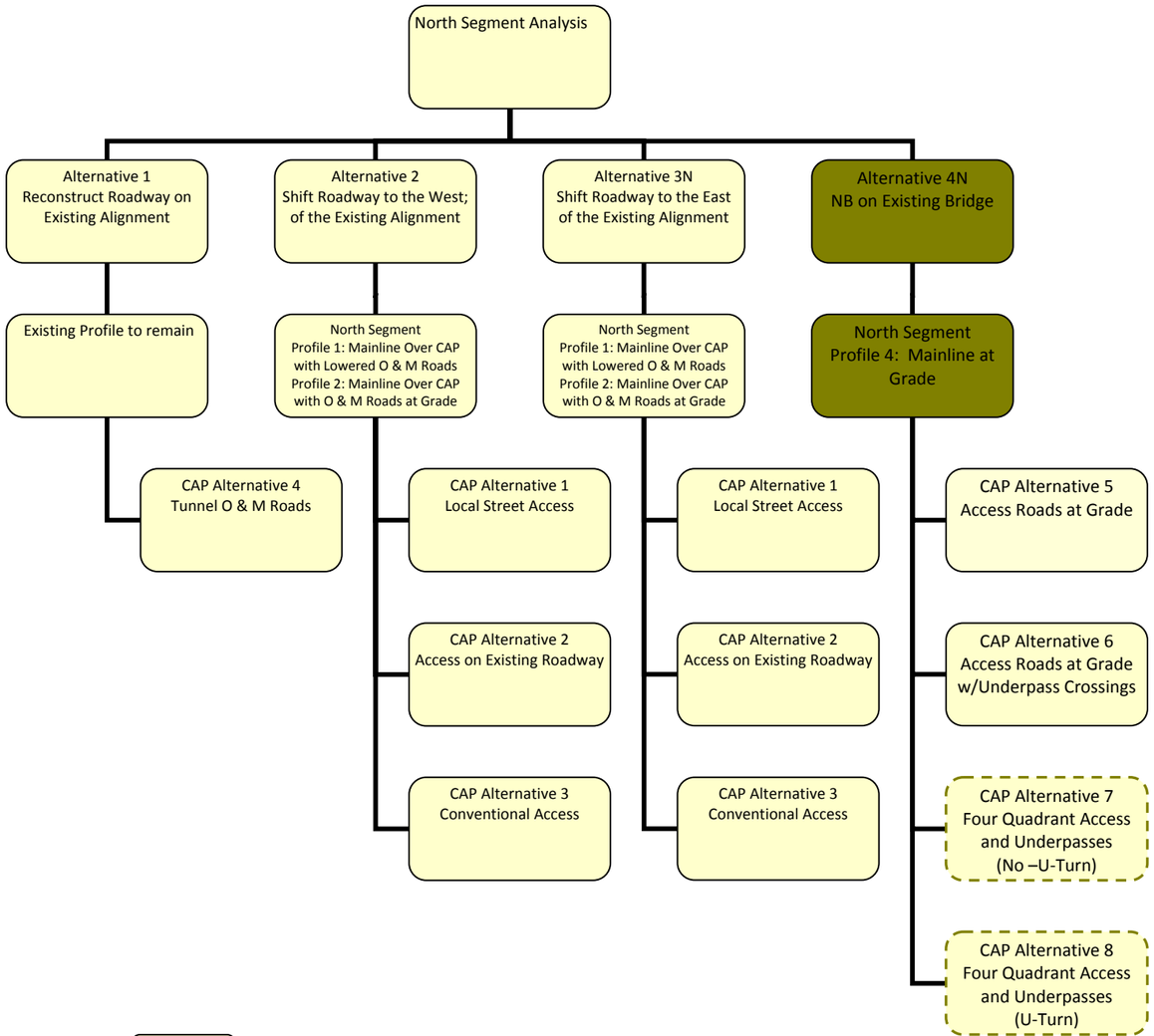
As North Segment Alternative 4N: Northbound on Existing Structure was developed, CAP Alternative 5 was established providing conventional access from the mainline to the O & M roads. CAP Alternative 5 was designated as the preferred alternative in the Draft DCR. However, upon review of the Draft DCR, the CAP commented that they did not view this alternative as safe or desirable as it does not provide for unimpeded movement along the canal.

With the City's preference of selecting North Segment Profile 4, CAP Alternative 6 was created to address the CAP concerns for safe and continuous access along the canal. Alternative 6 has been carried forward as the recommended alternative in the Draft Final DCR. Prior to the submission of this Draft Final DCR, this alternative was discussed in detail in a meeting with the CAP. The purpose of the meeting was to review the concept proposed with this alternative and assure that all the CAP safety concerns have been properly addressed and negated. Cap representatives commented that although underpasses are proposed with CAP Alternative 6, it is the CAP's preference that access from Lake Pleasant Parkway be provided at the four quadrants of the roadway and the CAP canal. At the conclusion of the meeting it was decided that the DCR will evaluate two additional alternatives; CAP Alternative 7 will provide for access at the four quadrants and provide two underpasses. It is assumed that direct movement from the access roads onto to underpasses will not be accommodated. CAP Alternative 8 also provides for access roads and the four quadrants as well as two underpasses. Differing from CAP Alternative 7, this alternative does accommodate movements from the new access roads into the underpasses. CAP Alternative 8 requires the acquisition of additional right-of-way in comparison to CAP Alternative 7.

Figure 3.27 summarizes the North Segment alternatives and delineate the recommended alternatives in a flow-chart diagram for clarification. It is important to note that at the time of completion of the DCR, a final decision regarding the recommended CAP access alternative has not been made and will need to be decided upon during the final design stage of the project.

**Photo Simulation (CAP Alternative 6)
Lake Pleasant Parkway at the CAP Canal
(Looking South)**

Figure 3.27 North Segment Analysis Diagram



3.4.5 SR 74 and Lake Pleasant Parkway Intersection

The existing Lake Pleasant Parkway and New River Road are two lane facilities that intersect SR 74 as offset "T" intersections, with a separation of approximately 650'. The two intersections operate as side-street stop controlled intersections. SR 74 exists as a two-lane roadway in the study area. SR 74 is owned and operated by ADOT. ADOT planning to install traffic signal at SR 74 and Lake Pleasant Parkway intersection in the summer of 2009. Alternatives for the configuration of the intersections of Lake Pleasant Parkway
It is important to note that according to the ADOT Final Alignment Selection Report for the Loop 303, Happy Valley Road to I-17 (URS 2005), ADOT and the City of Peoria do not have plans for a grade separated intersection at Lake Pleasant Parkway and SR 74.

Lake Pleasant Parkway and New River Road are identified as six-lane facilities (Lake Pleasant Parkway as a Parkway and New River Road as an Arterial) in the City of Peoria Street Classification Map. The City of Peoria requested recommendation for the future roadway configurations of these two major roadways intersecting SR 74 highway. The following design alternatives were considered to define the roadway alignments for the study intersections.

Alternative 1: Offset Signalized Intersections:

This alternative assumes that the current intersection configurations will remain and that both intersections will be signalized.

Alternative 2: New River Parkway Realigned to Form a Four-leg Intersection:

This alternative assumes that the New River Parkway is re-aligned with Lake Pleasant Parkway at SR 74 to form a traditional four-leg intersection.

Alternative 3: Off-set intersections with Roundabouts:

The alternative assumes three-leg multi-lane roundabouts at both intersections of SR 74.

Alternative 4: Wide Roundabout:

This alternative assumes a wide roundabout on SR 74 between the approaches of New River Parkway and Lake Pleasant Parkway.

Traffic analysis was completed for the study intersections using the MAG RTP travel demand model 2035 traffic forecasts. Detailed analysis is presented in the Traffic Section 2.6. Table 3.3 summarizes the traffic operational characteristics of each alternative.

Table 3.3 SR 74 Intersection Alternative Evaluation Matrix

Evaluated Criterion	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	Offset Signalized Intersections	Four-leg Signalized Intersection	Off-set Intersections with Roundabouts	Wide Roundabout
2035 PM Peak Hour Level Of Service	Both intersections operate at LOS D or better. Some turning movements operate at reduced LOS E and F	The four-leg signalized intersection operates at LOS D or better. Some turning movements operate at reduced LOS E and F	Not evaluated as this is not a signalized alternative	Not evaluated as this is not a signalized alternative
2035 PM Peak Hour Queue Lengths	Longer queues on approaches of Lake Pleasant Parkway and New River Road to turn left onto SR 74	Shorter queues on all approaches compared to other alternatives	Longer queues on the entry approaches of SR 74 to the roundabouts.	Longer queues on the entry approaches of SR 74 to the roundabouts.
2035 PM Peak Hour Travel Time	Second to shortest travel time	Shortest travel times	Longer travel time	Longest travel time
2035 PM Peak Hour Average Delay Time per Vehicle	Second to shortest delays	Least average delay per vehicle	Increased average delay per vehicle when compared to Alternatives 1 & 2	Highest average delay per vehicle

Source: Traffic Analysis Section 2.6

Summary and Recommendations:

Traffic analysis was performed to evaluate the design alternatives for SR 74 intersection with New River Parkway and Lake Pleasant Parkway. The following conclusions were derived from the traffic analysis:

- A four-leg intersection with realigned New River Road approach at SR 74 will operate at LOS D during both AM and PM peak hours. This alternative has the best overall performance of all the alternatives that were analyzed.
- The existing roadway alignment with improved number of traffic lanes and traffic signals will provide acceptable LOS with 2035 traffic volumes and increased number of traffic lanes. The north-south traffic has to make left turns onto SR 74 resulting in undesirable weaving movements with potential for side-swipe collisions.
- The roundabouts alternatives result in longer queues on the SR 74 approach entrance legs and reduced overall intersection performance with increased average delay per vehicle and travel times.

Based on the traffic analysis, a four-leg signalized intersection is recommended at the intersection of SR 74 and Lake Pleasant Parkway. The New River Road leg can be re-aligned to the Lake Pleasant Parkway intersection as the fourth leg.

3.4.6 National Primary Path at the CAP

A national path has been designated within the CAP right-of-way, typically 20’ from the southern right-of-way line, with the anticipation that ten additional feet will be dedicated to the path by developers of the adjacent land. This path will ultimately connect Tucson to the Colorado River. Per the Peoria guidelines, a primary path should be paved (concrete or asphalt) and it should be 10’-12’ wide. A minimum of 10’ vertical clearance must also be provided. Since the City of Peoria does not have plans that delineate the path alignment within the project area, this DCR includes the construction of a structure that meets the primary path design requirements. The structure will be located 200’ south of the CAP canal and it will be “buried” until a path delineated and constructed in the future.

The City requested that alternatives to a standard reinforced box culvert be evaluated. Four (4) options compatible with a box culvert could be utilized at this location providing the same purpose as the box culvert. The first alternative, referred to as a “Precast Con Span”, is a modular component system that meets standard AASHTO and AASHTO LRFD specifications. This alternative offers an arch configuration at the top of the structure, providing more of an “open space” feel. In order to provide for the desired 12’x10’ opening, the structure height would be 13.5’ measured from the floor of the paved path.

The second alternative for a standard box culvert is a Multi Plate Super Span Arch Structure, consisting of a round pipe that is field bolted and made of galvanized steel. The bottom 4.5’ of the pipe will be buried.

The third alternative for a standard box culvert is a Multi Plate Super Span Arch Structure, consisting of an elliptical pipe that is field bolted and made of galvanized steel. This alternative is typically less costly than the standard box culvert or Con Span but more expensive than the steel round pipe as its installation is more complex than a standard round pipe.

Example of a Precast Con Span

Table 3.4 summarizes the construction costs associated with each of the alternatives.

Table 3.4 Construction Costs for Primary Path Structure Alternatives

Alternative	Size	Length	Cost
Standard Re-reinforced Box Culvert	12'x10'	215'	$120,000
Precast Con Span	16'x 15.6'(includes 2' for footing)	215'	$315,000
Multi Plate Span Arch (Round Pipe)	19.8" Diameter Pipe (Approx. 4.6' buried)	215'	$162,000
Multi Plate Span Arch (Elliptical Pipe)	27' x 16'-2" Elliptical Pipe (2.58' buried)	215'	$215,000

At the time of the submission of this Draft Final DCR, a preferred alternative for the primary path structure has not been identified. At the direction of the City, the cost estimate for this project utilizes the most expensive alternative. It is anticipated that the selection of the preferred structure alternative will be made during the final design stage of the project.

3.5 Evaluation of Candidate Alternatives

The roadway alternatives were evaluated using criteria established from the project goals and objectives listed in Section 1.3. The advantages and disadvantages along with key alternative features are summarized in the Alternative Matrices presented in Tables 3.5 and 3.6 for the South Segment and North segment, respectively.

All the alternatives share several commonalities. All of the alternatives achieve the objective of improving capacity and operational characteristics of the existing roadway by providing the ultimate parkway roadway section, except for the "No Build" alternatives for both the South and North Segments. Another similarity between all the alternatives, with the exception of the "No Build" alternatives, is the ability to phase the implementation of constructing the 4-lane interim improvements to be followed by the 6-lane ultimate section build-out for the year 2035. The geometries of the each alternative meet the 55 mph from Westwing to SR303L, 45 mph from SR303L to the CAP canal, and 55 mph from the CAP canal to SR 74. The realigned New River Road is designed to meet 50 mph meeting the City design speed requirement for an arterial roadway. Each alternative will provide raised median, bike lanes, eight-foot sidewalks, and a minimum of 150 feet of right-of-way.

South Segment Evaluation

Distinct differences between the alternatives relate to the observation of the City of Peoria vision for a parkway facility within the corridor. Alternatives 2S and 4S were considered undesirable due to potential geotechnical concerns as they are associated with being at the edge of the bluff. In addition, these alternatives result in an undesirable vertical profile for Dixileta Drive due to their close proximity to the drop off.

The conceptual alternatives were reviewed and discussed in detail. City of Peoria officials representing the City's Management Group, Planning Group and the Economic Development Group as well as representatives of ASLD selected Alternatives 3S as the preferred alternative for the South Segment for the following reasons:

- ⇒ This alternative provides for the largest area of developable land between the steep bluff on the west and the New River Levee on the east.
- ⇒ This alternative minimizes the area of remnant parcels between the Levee and the proposed roadway.
- ⇒ With this configuration, no development can occur to the east of the proposed Lake Pleasant Parkway as the roadway borders the levee, and Dixilita Drive will be designed as a "T" intersection.
- ⇒ This alternative does not impact any potential cultural sites.

The FCDMC noted that they had no preliminary objections to this alternative as long as the proposed improvements do not impact the levee's structural integrity.

North Segment Evaluation

With the original assumption that grade separation must be provided between the mainline and the CAP O & M roads, the main concern of the City and ASLD was the limitation of access from the new Lake Pleasant Parkway onto the adjacent land due to the elevated mainline as required for North Segment Profiles 1 and 2. Preliminarily, Profile 1 was preferred over Profile 2 because it required the mainline to be raised significantly lower than Profile 2 by the lowering the O & M roads by 4.5'. Tunneling the mainline under the CAP, as required for North Segment Profile 3 was not preferred by the City or the Stakeholders. In addition, the CAP conveyed many concerns regarding this profile as this design poses safety risks during construction, as well as Homeland Security concerns once construction is completed. Due to these concerns, Profile 3 was eliminated from further consideration.

While meeting with the CAP, Alternative 1N was discussed in detail. Initially Alternative 1N was the preferred alternative by the City and ASLD as it assumed that grade separation between the mainline and the O & M roads would not be necessary as no such separation currently exists. The existing structure has a pier that penetrates through the canal lining in the middle of the canal. Alternative 1N would require the widening of the existing structure and the construction of additional piers in the canal to match the existing structure cross section. The CAP did not oppose the construction of a pier in the canal. However, complicated construction requirements, such as needing a bypass system to convey 3,000 cfs, limited experience with actual construction of such bypass systems, recent undesirable CAP experiences with less complicated operations, and the high cost of such construction, resulted in the City's decision to eliminate this alternative from further consideration. In addition, it was uncertain whether the existing bridge would have to be raised in order to meet the current CAP requirements of providing 4' of clearance from the canal lining to the base of the structure. These discussions resulted in the development of Alternative 4N which consists of utilizing the existing bridge over the CAP for northbound traffic and constructing a new bridge to span the CAP west of the existing structure for the southbound traffic.

3.6 Recommended Alternatives

Alternative 3S - Shift the Roadway to the East of the Existing Roadway Alignment; Close to the New River Levee was selected as the recommended alternative for the South Segment. This alternative is consistent with the City of Peoria vision of open space, it allows for the most area of developable land, it minimizes remnant parcels and is compatible with the ASLD vision for development in the area.

Alternative 4N - Northbound Traffic on Existing Bridge was selected as the recommended alternative for the North Segment. This alternative allows for the utilization of the existing bridge over the CAP for northbound traffic, it requires the construction of a new narrower bridge over the CAP compared to Alternatives 2N and 3N and it minimizes the limitation of access between Lake Pleasant Parkway and the adjacent land due to a favorable mainline profile. This alternative required the implementation of CAP Alternative 6 in order to provide for grade separation between the roadway and the O & M roads.

Both of the recommended alternatives will allow a phased implementation approach. Major features of the recommended alternatives are described in the next section. Thirty percent (30%) plans for the recommended South Segment and North Segment alternatives are presented in Appendix A.

Photo Simulation
Lake Pleasant Parkway
Approaching the New River Levee
(Looking North)

Table 3.5 South Segment Alternative Matrix

EVALUATED CRITERION	ALTERNATIVE 1S RECONSTRUCT ROADWAY ON EXISTING ALIGNMENT	ALTERNATIVE 2S SHIFT ROADWAY TO THE WEST OF THE EXISTING ALIGNMENT; CLOSE TO THE BLUFF	ALTERNATIVE 3S SHIFT ROADWAY TO THE EAST OF THE EXISTING ALIGNMENT; CLOSE TO THE NEW RIVER LEVEE	ALTERNATIVE 4S ROADWAY ALONG THE GAS LINE ALIGNMENT	"NO BUILD" OPTION
Description	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment follows the existing roadway alignment ▪ New signalized intersection at Dixileta Drive (minor arterial)	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment shifts new roadway the west close to the bluff. ▪ New signalized intersection at Dixileta Drive (minor arterial)	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment shifts the roadway to the east of the existing roadway close to the levee ▪ New signalized intersection at Dixileta Drive (minor arterial)	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment follows the El Paso gas line alignment that is typically located to the west of the existing roadway. ▪ New signalized intersection at Dixileta Drive (minor arterial)	▪ Two-Lane Roadway with 40 foot paved width. ▪ Horizontal alignment does not meet City design criteria for 55 mph.
Advantages	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Minimizes impact to surrounding land as the proposed roadway will be located on the existing alignment. ▪ Will provide for a desirable vertical alignment for Dixileta Drive.	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Does not require the relocations of the APS overhead power line. ▪ Minimizes remnant parcels between the levee, the proposed roadway and the bluff.	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Minimizes remnant parcels between the levee, the proposed roadway and the bluff. ▪ Provides for a desirable vertical alignment for Dixileta Drive. ▪ **Consistent with the City of Peoria and ASLD's vision for maximizing the area of developable land between the bluff and the proposed roadway**	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Follows the gas line alignment (outside of the easement) and provide for developable space to the east and west of the proposed alignment. ▪ Does not require the relocations of the APS overhead power line.	▪ No impact to existing utilities
Disadvantages	▪ Divides the area of developable land between the New River Levee and the Bluff ▪ May require the relocation of the El Paso gas line at one location. ▪ Requires the relocation of the APS overhead power line.	▪ Close proximity to the bluff raises geotechnical concerns. ▪ Due to the close proximity to the bluff, results in an undesirable vertical alignment for Dixileta Drive ▪ May require the relocation of the El Paso Natural Gas line at one location. ▪ Allows for future development only to the east of the proposed roadway ▪ This alternative was unfavorable by the City and key stakeholders.	▪ May require the relocation of the El Paso gas line at one location. ▪ Allows for future development only to the west of the proposed roadway.	▪ Roadway alignment requires superelavation. ▪ May require the relocation of the El Paso Natural Gas line at one location. ▪ This alternative was unfavorable by the City and key stakeholders.	▪ Does not meet capacity requirements for the design year or build-out year. ▪ Does not meet drainage requirements for a principal facility.
Recorded Cultural Sites	Four potential sites	Four potential sites	Four potential sites	Three potential sites	None
Noise Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Section 404/401 Permit	Alternative expected to require an Individual Section 404 permit for the crossing of the	Alternative expected to require an Individual Section 404 permit for the crossing of the	Alternative expected to require an Individual Section 404 permit for the crossing of the	Alternative expected to require an Individual Section 404 permit	No impact to the Unnamed Wash

EVALUATED CRITERION	ALTERNATIVE 1S RECONSTRUCT ROADWAY ON EXISTING ALIGNMENT	ALTERNATIVE 2S SHIFT ROADWAY TO THE WEST OF THE EXISTING ALIGNMENT; CLOSE TO THE BLUFF	ALTERNATIVE 3S SHIFT ROADWAY TO THE EAST OF THE EXISTING ALIGNMENT; CLOSE TO THE NEW RIVER LEVEE	ALTERNATIVE 4S ROADWAY ALONG THE GAS LINE ALIGNMENT	"NO BUILD" OPTION
	Unnamed Wash	Unnamed Wash	Unnamed Wash	for the crossing of the Unnamed Wash	
Compatibility with the City of Peoria Roadway Network	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Not compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.
Compatibility with MAG 2035 Model	Compatible with the MAG model	Compatible with the MAG model	Compatible with the MAG model	Compatible with the MAG model	Not compatible with the MAG model
Impact on Existing Properties	No impact existing properties	No impact existing properties	No impact existing properties	No impact existing properties	No impact existing properties
Impact on Proposed Development	Allows for development on the east and west sides of the roadway; likely to result in remnant parcels	Allows for development east of the roadway	Allows for development west of the roadway	Allows for development on the east and west sides of the roadway; likely to result in remnant	Allows for development on the east and west sides of the roadway
Estimated Cost	**$43,542,570**	**$43,333,632**	**$43,727,844**	**$43,518,825**	**N/A**
Assumptions	1) Drainage needs are similar among alternatives 2) New Right-of-Way costs are similar to all alternative as there is minimal existing Right-of-Way. 3) Right-of-way acreage does not include the right-of-way required for new local streets identified in the Access Management Plan. 4) Items in **red** indicate the elimination of the alternative from further evaluation. 5) Items of most significant in the evaluation are shown in **Bold.**				
Recommended Alternative	**Alternative 3S – Shift Roadway to the East of the Existing Alignment; Close to the New River Levee**				

Table 3.6 North Segment Alternative Matrix

EVALUATED CRITERION	ALTERNATIVE 1N RECONSTRUCT ROADWAY ON EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 2N SHIFT ROADWAY TO THE WEST OF THE EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 3N SHIFT ROADWAY TO THE EAST OF THE EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 4N NORTHBOUND TRAFFIC ON EXISTING BRIDGE	"NO BUILD" OPTION
Description	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment follows the existing roadway alignment with modifications to meet design criteria. ▪ Assumes the widening of the existing structure over the CAP to accommodate additional travel lanes. ▪ Major intersections include Dove alley Road, Old Carefree Highway and SR 74. ▪ Provides at-grade crossing over the CAP canal between the O & M roads and the proposed mainline.	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment shifts new roadway to the west of the existing roadway and east of the El Paso gas line from the tie in with SR303L to north of the CAP canal. North of the canal, the roadway alignment is shifts to the east to align with the existing roadway alignment. ▪ Assumes the construction of a new 140' wide and 105' long structure over the CAP to accommodate parkway section. ▪ Major intersections include Dove alley Road, Old Carefree Highway and SR 74. ▪ Provides grade separation over the CAP canal between the O & M roads and the proposed mainline.	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a 30' median. ▪ Horizontal alignment shifts new roadway to the east of the existing roadway and to the west of the APS overhead power line from the tie in with SR303L to north of the CAP canal. North of the canal, the roadway alignment is shifted west to align with the existing roadway alignment. ▪ Assumes the construction of a new 140' wide and 105' long structure over the CAP to accommodate parkway section. ▪ Major intersections include Dove alley Road, Old Carefree Highway and SR 74. ▪ Provides grade separation over the CAP canal between the O & M roads and the proposed mainline.	▪ Six-Lane Parkway utilizing the City of Peoria Typical Section with a typical 30' median. Median width increased to 77' across the CAP canal. ▪ Horizontal alignment located close to the exiting roadway alignment. ▪ Utilizes the existing structure over the CAP to accommodate northbound traffic. ▪ Assumes the construction of a new structure to span the canal to accommodate southbound traffic only. ▪ Major intersections include Dove alley Road, Old Carefree Highway and SR 74. ▪ Provides at-grade crossing over the CAP canal between the O & M roads and the proposed mainline.	▪ Two-Lane Roadway with 40 foot paved width.
Advantages	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Minimizes impact to surrounding land as the proposed roadway will be located on the existing alignment. ▪ Utilizes the existing structure over the CAP ▪ Provides best access to land adjacent to the proposed roadway between the SR303L and AP as the crossing is at grade. ▪ Does not impact the existing EPNG structure of private establishment.	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Will not require the relocations of the APS overhead power line. ▪ Does not impact the existing EPNG structure of private establishment. ▪ Accommodates Primary Path under the bridge.	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Does not impact the existing EPNG structure of private establishment. ▪ Accommodates Primary Path under the bridge.	▪ Consistent with City of Peoria's vision for a parkway typical section. ▪ Will require the relocations of the APS overhead power line. ▪ New structure width is 53.8' wide and 105' long ▪ Proposed structure shortest and narrowest compared to Alternatives 2N and 3N. ▪ Does not impact the existing EPNG structure or private establishment. ▪ **Minimal access impact to land adjacent to proposed mainline**	▪ No access impact to the land adjacent to the roadway between the SR030L and the CAP.
Disadvantages	▪ **Due to complicated construction requirements, this alternative was eliminated from further evaluation.**	▪ Higher cost of proposed structure compared to alternative 4N. ▪ Considerable access impacts to the land adjacent to the mainline between the SR303L and the CAP canal due to the grade separated structure.	▪ Higher cost of proposed structure compared to alternative 4N. ▪ Requires the relocation of the APS overhead power line. ▪ Considerable access impacts to the land adjacent to the mainline between the SR303L and the CAP canal due to the	▪ Requires the construction of an additional culvert to accommodate the primary path south of the CAP canal. ▪ Grade difference between the northbound and southbound structures.	▪ Does not meet capacity requirements for the design year or build-out year. ▪ Does not meet drainage requirements for a principal facility.

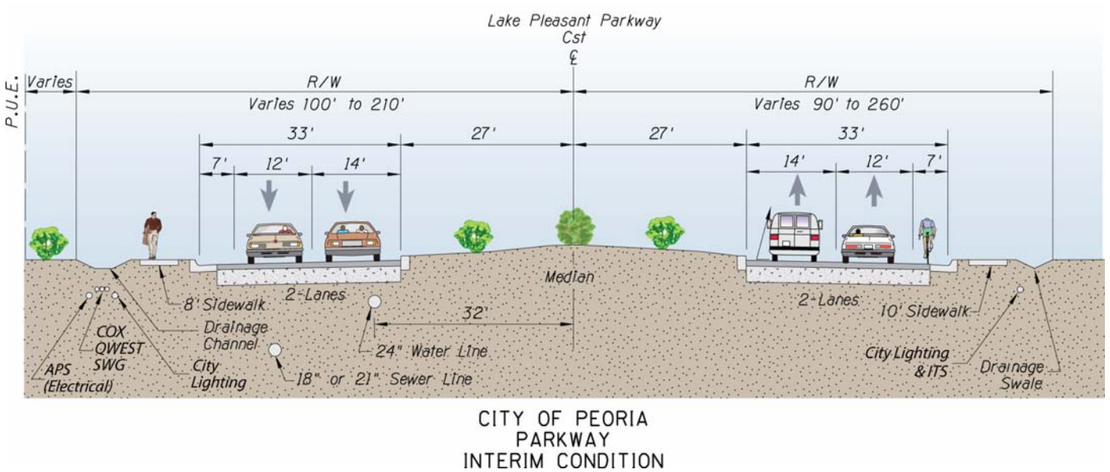
EVALUATED CRITERION	ALTERNATIVE 1N RECONSTRUCT ROADWAY ON EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 2N SHIFT ROADWAY TO THE WEST OF THE EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 3N SHIFT ROADWAY TO THE EAST OF THE EXISTING ROADWAY ALIGNMENT	ALTERNATIVE 4N NORTHBOUND TRAFFIC ON EXISTING BRIDGE	"NO BUILD" OPTION
			grade separated structure ▪ **This alignment was the least favorable by the City and key stakeholders and was eliminated from further evaluation.**		
Recorded Cultural Sites	Two potential sites	Two potential sites	One potential site.	None	None
Noise Impact	No impact	No impact	No impact	No impact	No impact
Section 404/401 Permit	Not required.	Not required	Not required	Not required	Not required.
Compatibility with the City of Peoria Roadway Network	Compatible with t he City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.	Not compatible with the City of Peoria designation of Lake Pleasant Parkway as a Parkway.
Impact on Existing Properties	No impact existing properties	No impact existing properties	No impact existing properties	No impact existing properties	No impact existing properties
Compatibility with MAG 2035 Model	Compatible with the MAG model	Compatible with the MAG model	Compatible with the MAG model	Compatible with the MAG model	Not compatible with the MAG model
Impact on Proposed Development	Allows for development on the east and west sides of the roadway	Allows for development east of the roadway	Allows for development west of the roadway	Allows for development on the east and west sides of the roadway	Allows for development on the east and west sides of the roadway
Estimated Cost	**$52,635,852**	**$55,307,116**	**$55,378,440**	**$53,579,963**	**N/A**
Assumptions	1) Drainage needs are similar among alternatives 2) New Right-of-Way costs are similar to all alternative as there is minimal existing Right-of-Way. 3) Right-of-way acreage does not include the right-of-way required for new local streets identified in the Access Management Plan. 4) Alternatives for crossing the CAP not included in this matrix. 5) Alternatives for the SR 74 intersection configuration not included in this matrix. 6) Text in **red** indicates the elimination of the alternative from further evaluation. 7) Text in **Bold** indicates high significance of item discussed.				
Recommended Alternative	**Alternative 4N – Northbound Traffic on Existing Bridge**				

4.0 Major Design Features of the Recommended Alternative

This section describes the major features associated with the recommended alternatives, South Segment Alternative 3S – Shift Roadway to the East of the Existing Roadway; Close to the New River Levee and North Segment Alternative 4N - NB Traffic on Existing Bridge. The recommended alternatives consist of upgrading the existing roadway to a six-lane roadway section. The typical section considered for this study is classified by the City of Peoria as a Parkway consisting of three through lanes in each direction with a 30' raised median with curb, gutter and sidewalk. Bike lanes are provided in both directions. The total roadway width is 120' feet from face of curb to face of curb (see Figure 3.1 under Section 3.2). The City standards were used for the Parkway with 150 feet minimum of recommended right-of-way.

The interim typical section consists of two travel lanes in each direction separated by a wide, graded median. Curb and gutter will be installed on the outside edge and median curb will be installed on the inside edge. Bike lanes and sidewalk will also be provided on both directions. The interim typical section is shown in Figure 4.1.

Figure 4.1 Interim Typical Section



CITY OF PEORIA
PARKWAY
INTERIM CONDITION

4.1 Design Controls

4.1.1 Design Criteria

The design criteria for this project was established using the City of Peoria *Infrastructure Development Guidelines* (April 1, 2009) and the *AASHTO Policy on Geometric Design of Highways and Streets* (2004). Selective design criterion used for the DCR development is summarized in Table 4.1.
Documents providing background information and a basis for design include the ADOT SR303L Happy Valley Parkway to Lake Pleasant Parkway project plans.

4.1.2 Design Speeds and Posted Speed

Based on discussions with the City of Peoria, the design speed of the Parkway is 55 mph from Westwing Parkway to SR303L, 45 mph from SR303L to the CAP, and 55 mph from the CAP to SR 74. While AASHTO states that the speed of a given road may be posted at the design speed, it is recommended that where vertical curbs are installed, the posted speed limit shall only be 45 mph or less.

45 mph Design Speed Discussion:

The ADOT SR303L, Happy Valley Road to Lake Pleasant Parkway project will include the upgrading of Lake Pleasant Parkway to its ultimate width within the limits of the traffic interchange (TI). Since the SR303L construction precedes the proposed construction of this project, a temporary tie in will connect the upgraded roadway and the existing alignment. Within the limits of the traffic interchange, Lake Pleasant Parkway was designed to meet 45 mph design speed. A one degree (1°00') horizontal curve will connect the temporary tie in to the upgraded roadway at the south end of the TI, and this curve is within the concrete pavement section of the upgraded roadway. A two degree thirty minute (2°30') curve will connect the upgraded roadway to the existing alignment at the north end of the TI, with the curve point of curvature within the limits of the concrete pavement section of the upgraded roadway. These curves are not superelevated, and meet a 45 mph design speed per AASHTO Policy on Geometric Design of Highways and Streets.

The proposed structure over the CAP assumes that on the western side of the bridge, curb and gutter will be constructed adjacent to the bike lines, raised sidewalk be constructed behind the curb and gutter, and that a parapet be constructed behind the sidewalk. With this configuration, the curb and gutter and sidewalk will be continuous approaching the bridge and departing the bridge. Per AASHTO LRFD Bridge Design Specifications, Section C13.7.1.1, such configuration is recommended for speeds of 45 mph or less as it does not provide for a barrier between the travel lanes and the sidewalk.

4.2 Horizontal and Vertical Alignments

Preliminary design plans for the recommended alternative are provided in Appendix B. The horizontal alignment of the south segment ties into the existing Lake Pleasant Parkway at the intersection of Westwing Parkway. North of the Unnamed Wash, the alignment veers to the east of the existing roadway towards the New River Levee, and parallels the levee structure until it ties into the ultimate Lake Pleasant Parkway that will be constructed as a part of the SR303L project. The horizontal alignment of the North Segment ties into the ultimate section of Lake Pleasant Parkway constructed by the SR303L project, and shifts to the east towards the existing roadway alignment as it crosses the CAP canal. The preferred alignment follows the existing roadway alignment to the intersection with SR 74. There is one horizontal curve along the south segment at the Unnamed Wash that requires superelevation. All other curves do not require superelevation based on AASHTO design Criteria for design speeds of 55 mph and 45 mph.

The vertical profile for the roadway was designed to be elevated above the existing ground and to follow the terrain due to the existence of heavily cemented soils at shallow depth within the project limits. In addition, the roadway was elevated as needed to provide for adequate cover over the proposed drainage structures.

Table 4.1 Design Criteria

Design Feature	Criteria
2035 ADT	35,630 to 59,620
Design Vehicle	WB-50 (City of Peoria)
Design Speed	45mph and 55 mph (See Design Speed Section)
Pavement Design Life	20 Years
Pavement Section	5 inches AC, 12 inches ABC (minimum City of Peoria Pavement Structural Section)
Horizontal Alignment	Curve required when tangent centerlines deflect more than 5 Degrees. Curve Length 500 feet Min, e = 4% Max
Vertical Alignment	Vertical curve is required for algebraic grade difference equal to or greater than 0.4% (City of Peoria) (0.2% if Federally Funded)
Longitudinal Profile Grades	0.40% Min (Peoria); < 0.40% (Peoria City Engineer Approval)
Roadway Cross Slope	2%
Lane Widths	Travel Lanes: 12 feet Turn Lanes: 12 feet Bike Lanes: 7 feet
Curb Return Radii (Face of Curb)	35 feet (Peoria Arterials); 30 feet (Peoria Collectors); 20 feet (Peoria Local)
Clear Zone	30 feet - Desirable ; 10 feet from edge of traveled way - Minimum
Cut & Fill Slopes	3:1 Max
Curb and Gutter Median Curb	MAG Standard Detail 220, Type A (Vert. Curb & Gutter) MAG Standard Detail 222, Type A (Vert. Curb & Gutter)
Tapers	Narrowing/Shifting: Design Speed:1 Minimum; Widening: 15:1 Minimum
Right-of-Way	Desirable 150 feet total width (City of Peoria Parkway)
Utilities	City of Peoria Infrastructure Guidelines; MAG details from water lien and sewer line design and construction Peoria guidelines for relocations and the AUCC Public Improvement Project Guide
Off-Site Drainage	• Off-site hydrology was computed using Maricopa County's DDMSW4/HEC-1 program or Rational Method when the drainage basin is smaller than 160 acres. • Precipitation information is from NOAA Atlas 14. • 50-year runoff to be conveyed by culvert with maximum WSE no greater than lowest adjacent road subgrade, and 100-year runoff to be conveyed by culvert with a maximum depth of 6" in vehicular travel lane. • 50-year runoff conveyed by channel with a maximum WSE no greater than the lowest adjacent road subgrade. • Retention basin is sized to retain 100-year, 2-hour storm water volume.
On-Site Drainage	• On-site hydrology was computed using the Rational Method. • Design on-site inlets, scuppers and storm drains using the 10-year storm. During the 10-year event one 12-foot driving lane must be free from flooding in each direction. • The storm drains are sized for the 10-year event for the ultimate roadway section. • First Flush Retention: to provide the storage volumes from first one (1) inch of rainfall falling on the pavement.

4.3 Intersections

Between Westwing Parkway and SR 74, five major crossroads intersect the roadway. The major crossroads include Westwing Parkway, Dixileta Drive, Dove Valley Road, Old Carefree Highway and SR 74. Dixileta Drive and Dove Valley Road are new intersections. The SR303L interchange is located at the project mid point, and will be constructed as a part of the ADOT SR303L, Lake Pleasant Parkway to Happy Valley Road project.

ADOT completed the installation of a signal at the intersection of Lake Pleasant Parkway and SR 74. This signal is maintained by ADOT. It is anticipated that the SR303L interchange will be open for traffic in the fall of 2011, and will be signalized at the ramps. Based on 2035 traffic projections, traffic signals will be required at all the major intersections, and these signals will be installed in the future as warranted by the traffic conditions. The traffic signals along Lake Pleasant Parkway are located at major crossroads to optimize the 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 120 second signal cycle length. Table 4.2 summarizes existing and proposed intersection conditions.

The west leg of Westwing Parkway is designated as a Major Arterial with Bike Lanes per the City of Peoria Classification Map. Due to the presence of existing development on the south side of the proposed Westwing Parkway, and the City of Peoria Communication structure on the north side, the City of Peoria typical section for an Major Arterial with Bike Lanes will need to be modified. The typical 8' sidewalk will need to be reduced to 6' in order to not negatively impact the existing facilities. The taper rate for shifting traffic in order to develop the left turn lanes approaching the intersection is 15:1 due to limited available apace between the existing features and the proposed roadway.

Conceptually, Dixileta Drive and Dove Valley Road have been located along or near their respective section lines. Dove Valley Road is shifted 700' north of the section line to provide for improved traffic flow between the proposed signals at the SR303L ramps, the signal between SR303L and the CAP, and the signal at Old Carefree Highway. The intersection design will also address transit and pedestrian needs through phase-protected pedestrian cross-walks.

Improvements to new crossroads have been identified and are shown to the curb returns of the intersections. All the new intersections are aligned perpendicular to the mainline, with the exception of the Old Carefree Highway intersection, which is an existing intersection at a skew. Due to the close proximity of the existing facilities to Old Carefree Highway, and in order to not negatively impact these facilities, this intersection will remain at a skew. The east leg of Old Carefree Highway was realigned to line up with the west leg to provide for safe through movement. Intersection improvements are shown on the 30% plans (Appendix A).

Table 4.2 Intersections Crossroad Information

Intersection with Lake Pleasant Parkway	Existing Intersection and Type	Functional Classification	Future Intersection and Traffic Control
Westwing Parkway	Yes "T" Intersection	Major Arterial (Parkway) with Pedestrian Path (City of Peoria Street Classification Map)	"+" Signal
Dixileta Drive	Yes "T" Intersection	Major Arterial With Bike Lanes (Input from City of Peoria Management)	"T" Signal
Loop 303	Tight Diamond-Signalized	Interchange	Interchange Signals at ramps
Unnamed Intersection between SR303L and CAP	No	Local Street (Input from City of Peoria Management)	"+" Signal
Dove Valley Rd	No	Major Arterial With Bike Lanes (City of Peoria General Plan Circulation Plan)	"+" Signal
Old Carefree Highway	Yes "+"	Arterial (City of Peoria General Plan Circulation Plan)	"+" Signal
SR 74 *	Yes "T"	Rural Freeway (City of Peoria General Plan Circulation Plan)	"+" Signal

LEGEND
+ Indicates a four leg intersection
T Indicates a three leg intersection
* Detailed evaluation of the intersection of Lake Pleasant Parkway and SR 74 is discussed under Section 2.6

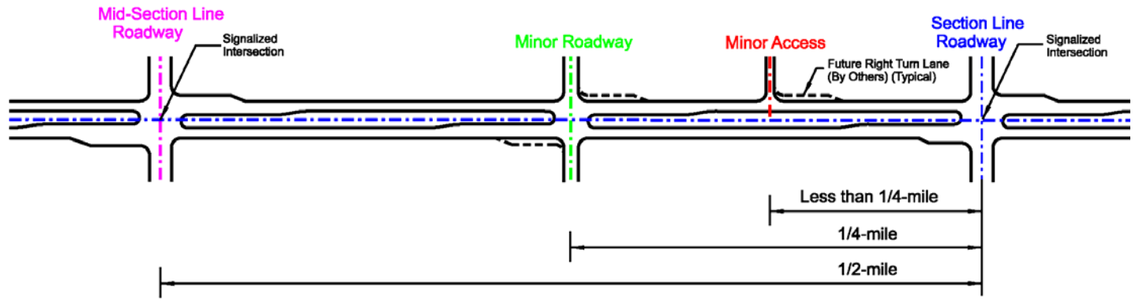
4.4 Access

Lake Pleasant Parkway is designated as a Parkway by the City of Peoria, creating a major north-south connection in the region. With the construction of SR303L and the improvements at Lake Pleasant Parkway, the City envisions this segment of roadway to attract residential and commercial development and the roadway is perceived as the future economic engine of the City. To accommodate future development and improved mobility of through traffic and to meet the City's Parkway definition that of a limited access road, an Access Management Plan is proposed for this roadway. The Access Management Plan includes intersection configurations, median breaks and recommendations to create an outline to properly balance the traffic flow and congestion with land use access needs.

Important access management considerations, as depicted in Figure 4.2, are:

- Bi-directional access at crossroads restricted to signalized intersections every 1 mile to ½ mile
- Minor roadways at every ¼ mile with median breaks.
- Minor access points at every 1/8 mile with no median breaks.
- Additional right-in/right-out curb cut driveways can be constructed but limited to three curb cuts per mile in each direction.
- Future residential and commercial access should utilize provided median breaks.

Figure 4.2 Access Management



4.4.1 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 access points spaced further apart allow for more orderly merging of traffic and present fewer challenges to drivers. Due to the limited existing level of development, this plan recommends standards to use while undergoing future development.

Deceleration lane (right turn lane) criteria shall follow the City of Peoria "Revised Deceleration Lane Criteria" dated March 2003. As stated in the above referenced document, deceleration lanes are required at all street intersections of a parkway. Deceleration lane lengths shall be evaluate on a case-by-case basis and must be approved by the City Engineer. The minimum lengths for a design speed of 50 mph shall be 435 feet.

For a parkway with high traffic volumes, no right-turn access should be permitted within 450 feet of the intersection. This criterion complies with the requirements specified in the City of Peoria Access Management Guidelines-Driveway Criteria, dated April 2001 under Table 2. In addition, no left-turn access within 600 feet of the intersection. Since most of the land along the proposed roadway is owned by ASLD, typical driveway locations at property lines were not included in this plan. It will be encouraged that any future development will access the roadway at location where median breaks or minor roadway intersections are provided.

4.4.2 Median Treatment

Median treatments can restrict access to driveways and local streets, while consequently increasing roadway speed and safety. The Parkway median treatment for the City of Peoria utilizes a raised

landscaped median with periodic breaks to allow for turns. Along Lake Pleasant Parkway, median breaks will typically be located every 1320' to allow for the left turn movements. Additional median breaks have been added for CAP access to the canal. The 30' wide median can serve many purposes, including landscaping, street lights, and interconnect conduits for signals.

4.5 Earthwork

The preferred alternatives for the north and south segments have been modeled using Inroads software. The model utilized typical 4:1 slopes for embankment slopes and 3:1 shallow cut slopes. The earthwork computations do not account for shrink or swell. Geotechnical factors will be determined during the final design phase. No potential borrow sites have been identified at this time. Table 4.3 summarizes the approximated earthwork quantities.

Table 4.3 Approximated Earthwork Quantities

Earthwork Item	South Segment	North Segment
Excavation	63,680 CY	23,815 CY
Embankment	257,555 CY	297,800 CY
Channel and Basin Excavation	85,145	48,130
Imported Borrow	**108,730 CY**	**225,855 CY**

4.6 Geotechnical Overview

Terracon Inc. performed seismic refraction surveys between Westwing Parkway and State Route SR 74 to assess the existing surface and subsurface for the preferred alternative corridor and to provide preliminary recommendations for design and construction.

4.6.1 Field Exploration

The field exploration included performing eleven seismic refraction surveys across the site on September 2, 2009 to aid in the evaluation of the subsurface materials. The seismic refraction survey lines were conducted using a 12-channel, signal enhancement seismograph (Geometrics SmartSeis Model S12) and a 16-pound sledge hammer as the energy source. The survey lines were 60 feet long, and data was retrieved using hammer impacts at 5-foot offsets from the ends of the seismic lines at each survey line spread. The results of the seismic refraction survey have allowed Terracon to obtain additional subsurface data to a depth on the order of approximately 20 feet. The locations of the seismic lines are shown with the Site Plan and Seismic Refraction Line Locations included in Appendix F.

The seismic refraction survey locations were obtained using a handheld Global Positioning System (GPS) device. The accuracy of test locations should only be assumed to the level implied by the method used.

Table 4.4 shows the stationing for each survey as indicated on the PB site plan provided and the latitude and longitude coordinates.

Table 4.4 Seismic Refraction Survey Line Locations

Seismic Refraction Survey Line Locations				
Seismic Line	**Station**	**Location Description**	**Latitude**	**Longitude**
S-1	370	South of Westwing Pkwy.	33º 44' 13"	112º 15' 46"
S-2	393	Unnamed Wash, north of Westwing Pkwy.	33º 44' 34"	112º 15' 36"
S-3	410	Approx. 3500 ft. north of Westwing Pkwy.	33º 44' 47"	112º 15' 27"
S-4	430	Approx. 1000 ft. south of Dixileta Drive	33º 45' 02"	112º 15' 16"
S-5	465	Approx. 2500 ft. north of Dixileta Drive	33º 45' 37"	112º 15' 05"
S-6	500	Future 303L interchange	33º 46' 14"	112º 14' 59"
S-7	530	Approx. 1000 ft. south of CAP Canal	33º 46' 36"	112º 14' 53"
S-8	550	Approx. ¼ mile north of CAP Canal	33º 47' 02"	112º 14' 47"
S-9	575	Approx. ¾ mile north of CAP Canal	33º 47' 26"	112º 14' 40"
S-10	600	South of Old Carefree Hwy.	33º 47' 49"	112º 14' 35"
S-11	630	North of Lake Pleasant Pkwy. and SR 74	33º 48' 18"	112º 14' 22"

4.6.2 Borings

Two test borings were drilled at the CAP Bridge site on March 19, 2010. The borings were drilled to approximate depths of 75 feet below the existing ground surface (bgs). The test borings were advanced using a Becker AP-1000 percussion hammer drill rig. This drill rig uses specialized air percussion drilling equipment to advance a dual-walled 10-inch diameter drill pipe.

The approximate locations of all the test borings advanced at the site during the field exploration are shown on the Site Plan and Boring Locations diagram included as a part of Appendix F. The borings were located in the field by using the proposed site plan, an aerial photograph of the site, and using the existing site features. The accuracy of boring locations should only be assumed to the level implied by the method used.

Continuous lithologic logs of each boring were recorded by the field engineer or geologist during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon (SPT) samplers in general accordance with ASTM Standards. Bulk samples of subsurface materials were also obtained during the drilling.

Penetration resistance measurements were obtained by driving the split-spoon samplers into the subsurface materials with a 140-pound hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency, relative density or hardness of the materials encountered.

4.6.3 Subsurface Conditions

Subsurface soil conditions were based on information from the National Resources Conservation Service (NRCS) website along the roadway alignment consist of stratified deposits of gravelly clay soils with occasional cobbles and varying degrees of cementation. These soil conditions extend to a depth of five feet.

The subsurface conditions along the roadway alignment were also analyzed by interpreting the seismic refraction survey data. The seismic refraction survey data was reduced using Snell's Law. That data developed includes the compressional wave (P-wave) velocity and thickness of each distinct material layer encountered. P-wave velocities are an indication of the material's hardness, i.e. the faster the velocity, the harder the material. The seismic refraction cross sections, and seismic refraction velocity graphs for each test location are included in Appendix F.

Summarized in Table 4.5 are the interpreted velocity zones expressed in terms of depth and velocity for each encountered subsurface layer. The depth interval is assumed constant between the two ends of each refraction line.

Table 4.5 Survey Depth and Velocity Ranges

Survey Depth and Velocity Ranges					
Seismic Line Seismic	Station	Layer 1 Depth Range (feet)	Layer 1 Average Velocity (ft./sec.)	Layer 2 Depth Range (feet)	Layer 2 Average Velocity (ft./sec.)
S-1	370	0-4	3,100	>4	4,100
S-2	393	0-3	3,250	>3	5,850
S-3	410	0-3	2,250	>3	4,700
S-4	430	0-4½	3,000	>4½	6,200
S-5	465	0-3½	2,600	>3½	5,400
S-6	500	0-6	2,000	>6	6,000
S-7	530	0-4	1,950	>4	4,000
S-8	550	0-4½	1,550	>4½	3,600
S-9	575	0-6½	2,900	>6½	4,450
S-10	600	0-5	2,050	>5	5,950
S-11	630	0-5	2,400	>5	4,850

Based on the results of the seismic refraction surveys, the velocities indicate the upper alluvial soils at depths of 3 to 6½ feet generally consist of clay, silt, sand, and gravel. The velocities generally indicate the soils to be medium dense to dense in relative density. The materials below these depths are expected to be strongly cemented soils consisting of clay, silt, sand, and gravel. Strongly cemented soils exposed at the surface were also observed at various locations across the site.

Based upon the compressional wave velocities measured near points of known subsurface conditions (i.e. borings), general ranges of velocities for the material types are shown in Table 4.6:

Table 4.6 Wave Velocities and Material Type

Material Type	Range of Compressional Wave Velocities (ft/s)
Upper Alluvial Soils	1,550 to 3,250
Strongly Cemented Soils	3,600 to 6,200

4.6.4 CAP Bridge

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix F of DCR. Based on the results of the borings, subsurface conditions at the CAP canal bridge were found to be somewhat variable and can be generalized as shown in Table 4.7:

Table 4.7 CAP Bridge Boring Conditions

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency/Density
Stratum 1	4 to 7	Fill - Clayey Sand with Gravel	Dense to Very Dense
Stratum 2	13 to 15	Silty Sand with Gravel	Very Dense
Stratum 3	74½	Poorly Graded Sand, Poorly Graded Sand with Silt and Gravel, Poorly Graded Gravel with Silt and Sand, Well Graded Gravel with Silt and Sand	Dense to Very Dense

The subsurface silty sand with gravel soils encountered between about 4 to 15 feet contained moderate to strong calcium carbonate cementation. The coarse-grained soils below a depth of about four feet also contained various amounts of cobbles and boulders.

4.6.5 Preliminary Pavement Design

Preliminary pavement recommendations for use in the design and construction of proposed new asphalt pavements are presented herein. These recommendations are based on the results of the seismic refraction survey, traffic data presented in the draft PB Traffic Analysis Report, technical requirements of the City of Peoria for street design, and the ADOT Materials Preliminary Engineering and Design Manual.

Based on the traffic loading and anticipated subsurface soil conditions, a structural number (SN) of 3.05 was calculated. Based on the street classification, the city of Peoria's minimum pavement section for Lake Pleasant Parkway is five (5) inches of asphalt concrete (AC) pavement over twelve (12) inches of aggregate base course (ABC). The SN for this city required pavement section is more than the calculated SN, and therefore the minimum pavement section of 5-inches AC over 12-inches ABC as required by the City of Peoria should be constructed.

4.6.6 Preliminary Drilled Shaft Design

The very dense gravel (with variable cobbles and boulders) underlying the site is suitable for founding drilled shafts. A design chart for 3, 4, and 5-foot diameter drilled shafts has been provided in Appendix F of the DCR. The allowable axial capacities shown on the chart include a Factor of Safety of 2.5. These capacities should be reduced by the group reduction factor which depends on shaft spacing. We recommend a minimum drilled shaft length of 20 ft. Drilled shafts designed using these design charts are expected to settle less than 1 inch.

4.6.7 Excavation Conditions

The following recommendations are based on the seismic refraction survey regarding the excavatability of the subsurface materials underlying the site for information purposes. The recommendations are preliminary in nature and more accurate information regarding excavation conditions will need to be evaluated during final design.

⇒ It is expected that shallow excavations for the proposed construction can be accomplished with conventional earthmoving equipment. However, excavations which encounter the cemented soils will likely require the use of heavy-duty and/or specialized rock excavating equipment to facilitate removal of these very dense materials.

⇒ Instability in the form of sloughing, caving, or raveling should be expected in the majority of the excavations and trenches at the site due to the granular nature of the majority of the shallow site soils.

4.7 Constructability and Traffic Control

Due to the low level of existing development, construction of the new Lake Pleasant Parkway facility is relatively straightforward. Lake Pleasant Parkway will be constructed as the interim divided four-lane facility followed by the ultimate six-lane roadway section. The interim improvements consist of constructing the outside lanes of the parkway typical section to provide two travel lanes and bike lanes in each direction. The intersections will be constructed to the ultimate foot print.

The alignment of the new roadway is primarily shifted east of the existing roadway for the South Segment while the new roadway is centered on the existing roadway alignment for the North Segment.
With the proposed construction phasing, one lane of traffic in each direction and access to local business, the FCDMC and the CAP facilities must be maintained at all times. It is assumed that utilities will be relocated prior to roadway construction where feasible, resulting in minimal impact to constructability of the roadway.

The most challenging element of construction for both the South and North Segments is the installation of the new sewer line due to its depth and the existing soil conditions within the project limits. For estimation purposes, it was assumed that the trench required for the construction of the sewer line will be 5' lower than the invert of the sewer line pipe, and 1.5:1 side slopes will be constructed. The method of excavation for the installation of the sewer line will need to be carefully analyzed during final design based on geotechnical investigation and consultation with geotechnical and construction experts.

It is anticipated that temporary pavement will be required to shift traffic from the existing roadway in order to install the sewer line at locations where the proposed roadway is on the same alignment as the existing roadway alignment. A temporary detour will also need to be provided for the construction of the roadway and drainage features at the Unnamed Wash due to the proposed elevated profile of the roadway at this location. Based on preliminary evaluation of construction phasing, it is anticipated that the construction of the sewer line and pavement detours will be accommodated in the delineated new right of way for the project.

4.7.1 Ultimate Parkway Improvements

Traffic volumes on Lake Pleasant Parkway will eventually increase to levels warranting additional travel lanes. When warranted, the ultimate six-lane parkway improvement may be constructed. To upgrade from the interim four-lane facility to the ultimate parkway improvement, temporary closure of the bike lanes and shifting traffic right will be necessary. This will allow two 12-twelve foot lanes in each direction to remain open while the roadway is widened for the inside lanes.

4.8 Right-of-Way

A detailed right of way strip map was prepared for the project based on Maricopa County Assessor's maps, subdivision plots, and available title reports. The right of way strip map is provided as Appendix B of the Final DCR Update. In contrast to the information provided in the *Phase III of Lake Pleasant Parkway DCR (Williams Road to SR 74)*, prepared in 2001 by Kirkham Michael, it has been confirmed that the existing right-of-way for Lake Pleasant Parkway exists to the south of Westwing Parkway, and only extends 480' north of the intersection, terminating at the section line. The existing right of way varies from 150' to 170' along this section of roadway. Proceeding north from this location, public right-of-way for the existing roadway does not exist, and therefore, new right-of-way has been delineated for all the improvement associated with this project, including the roadway improvements, drainage improvements, and the establishment of a utility corridor. The majority of the land within the project limits is owned by the ASLD. Table 4.8 provides a listing of the impacted parcels and areas of impact for the preferred alternatives. The improvements associated with this DCR result in a total of 88.4 acres of new right-of-way for the South Segment and 105.5 acres of new right-of-way for the North Segment. South Segment land ownership is presented in Figure 4.3 and North Segment land ownership is presented in Figure 4.4.

While the standard City of Peoria typical section indicates a 150 foot right-of-way width, additional right-of-way width has been delineated due to an elevated roadway profile and to accommodate drainage features. In general, permanent drainage features should be contained within the right-of-way to ensure

they are being properly maintained. Areas for grading at the culvert inlets and outlets, as well as for berms channelizing flows to the culverts, may be changed from new right-of-way to drainage easements during final negotiations with adjacent land owners.

Table 4.8 Recommended Alternatives Impacted Parcels

Ownership	South Segment Alternative 3S Right of Way Requirements	North Segment Alternative 4N Right of Way Requirements
ASLD	54.57 Acres	77.03 Acres
FCDMC (201-19-008)* (201-19-003-A)	 4.28 Acres 13.84 Acres	-
CAP*	-	21.50 Acres
Pivotal Reality AZ LLC** 201-06-075-C 201-06-075-D 201-06-075-E 201-06-075-F 201-19-007	 1.12 Acres 0.29 Acres 0.40 Acres 0.19 Acres 11.52 Acres	-
Cibola Vista Resort and Spa LLC (201-36-598)	2.18 Acres	-
Lake Pleasant 40 Lender LLC (201-01-033J)		6.99 Acres
Total	**88.39 Acres**	**105.52 Acres**

* Bureau of Land Management (BLM) owns underline fees for parcel. Approval for right of way encroachment must be approved by BLM.

** Areas include new right-of-way and easements.

Figure 4.3 South Segment Right Right-of-Way

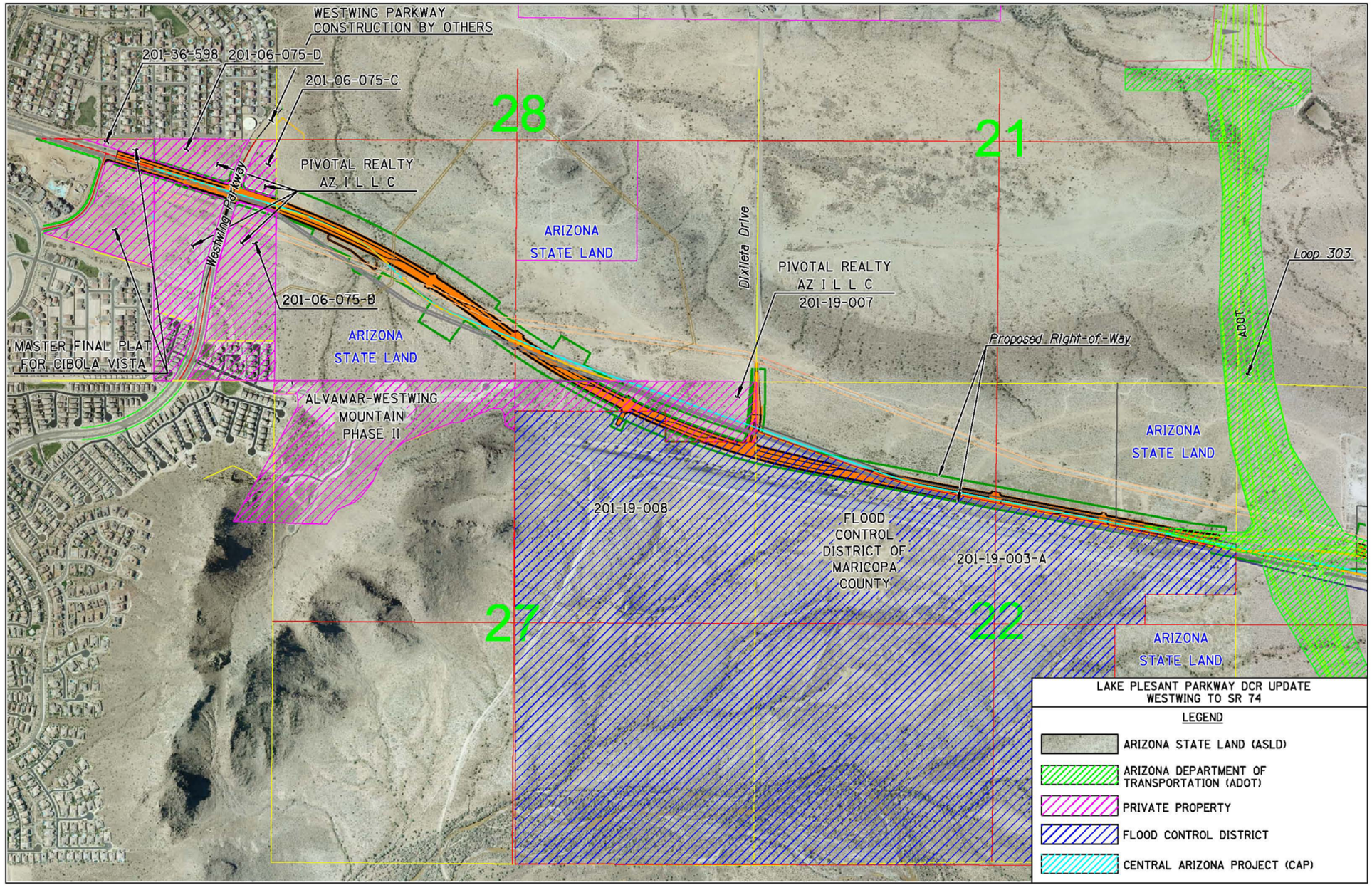
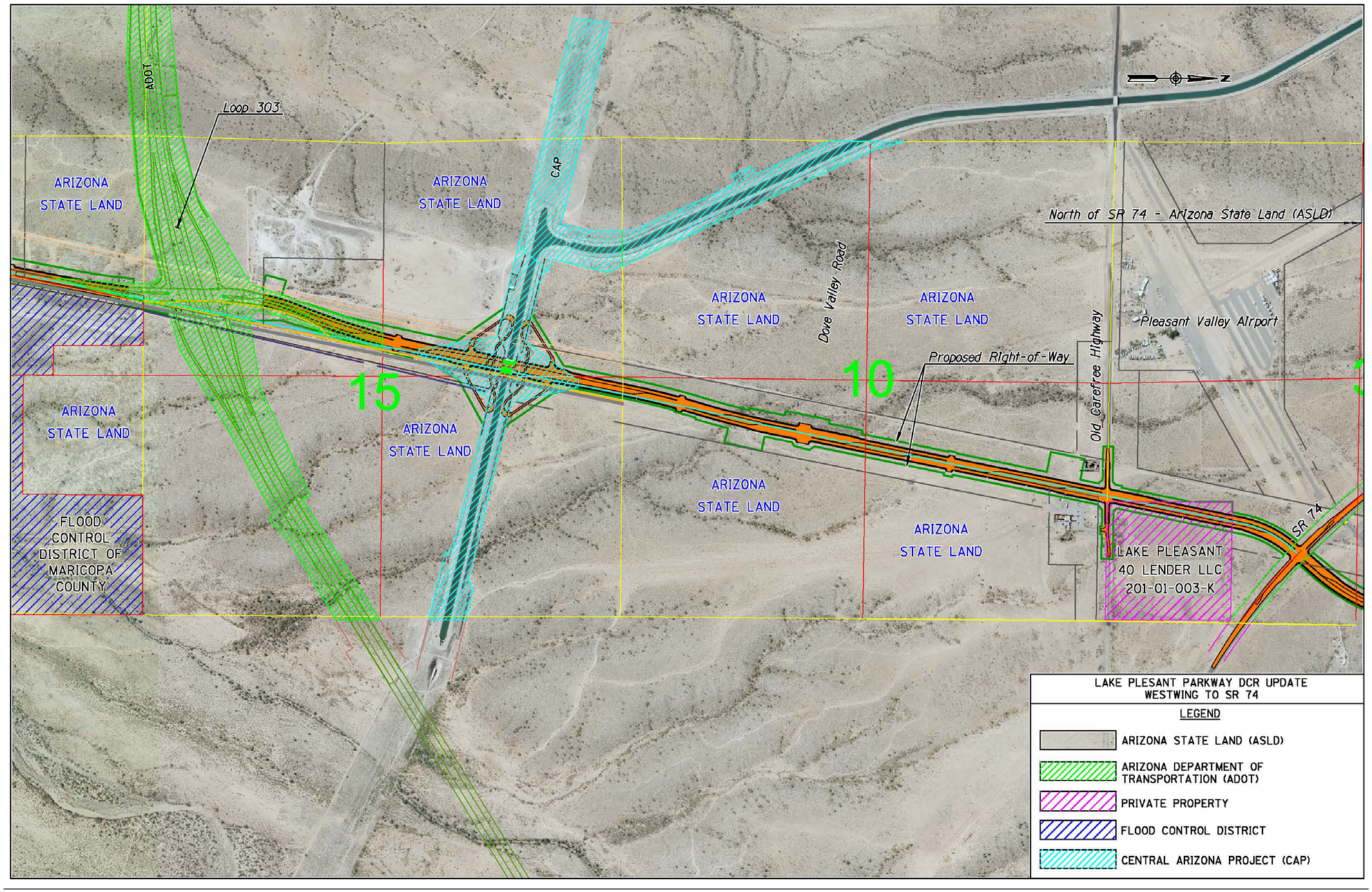


Figure 4.4 North Segment Right-of-Way



4.9 Drainage

This section describes results of drainage analyses and proposed drainage improvements included with the following recommended roadway alignments and alternatives:

1. South Segment Alternative 3S: Shift the Roadway to the East of the Existing Roadway Alignment; Close to the New River Levee;
2. North Segment Alternative 4N: Northbound Traffic on Existing Bridge;
3. North Segment Vertical Alignment Profile 4; and
4. Central Arizona Project (CAP) Canal Access Alternatives 7 or 8.

A set of conceptual off-site, on-site drainage plans and Unnamed Wash crossing plan and profiles, an off-site drainage watershed map, and detailed drainage analyses are included as Appendix E of this DCR.

4.9.1 General

Detailed off-site hydrologic analyses were performed to determine the 50- and 100-year peak flows at the existing and proposed cross culvert locations along the Lake Pleasant Parkway. Hydraulic analyses and drainage design were performed for the off-site drainage crossings, the roadside ditches and channels, one retention basin and the on-site drainage facilities. Although there are multiple roadway alternatives evaluated for the proposed Lake Pleasant Parkway South Segment and North Segment, drainage analyses were only performed for the preferred alternatives listed above. The only U.S. Army Corps of Engineers (USACE) jurisdictional wash within the project limits is the Unnamed Wash, which crosses the existing and proposed Lake Pleasant Parkway at Station 392+85, approximately 1,600 feet of Westwing Parkway. Four drainage alternatives were developed for evaluating the Unnamed Wash crossing. Design elements considered for the drainage alternative evaluations of this Unnamed Wash crossing were flow conveyance, accommodation of a primary trail to cross the proposed roadway, and installation of a new City gravity sewer line that parallels the proposed roadway.

4.9.2 Existing Conditions

The existing roadway of Lake Pleasant Parkway within the project limits is a two-lane paved rural roadway. The project segment is approximately 4.5 miles in length extending from Westwing Parkway to SR 74. The proposed Lake Pleasant Parkway will be tied into the new SR303L TI at Lake Pleasant Parkway between Station 495+00 and Station 505+00, and cross the existing CAP Canal between Sta. 535+00 and 536+00. East of the existing Lake Pleasant Parkway from Station 420+00 to Station 492+75, an existing impoundment levee was located upstream of the New River Dam and parallel to the roadway.

There are three dip sections along the existing roadway for off-site drainage crossings. A 2-54” corrugated metal pipe (CMP) culvert at the Unnamed Wash (Station 392+85) is one of two existing drainage culverts across Lake Pleasant Parkway within the project limits. At the south end of the project, there is a 36” culvert crossing Westwing Parkway at a location approximately 50’ east of the intersection, which drains the off-site flow concentrated at the northeast corner of the intersection into a stormwater retention basin located at south of Westwing Parkway. There is no existing crossing drainage facility observed along Carefree Highway (SR 74) within the project limits. Roadside ditches are observed on both north and south sides of SR 74. An existing cattle guard is located on New River Road just north of SR 74, which also provides drainage across New River Road.

The bridge structure for the SR303L/Lake Pleasant Parkway TI is already open to traffic, and the remaining T.I. construction will be completed by the end of 2010. The drainage improvements associated with the T.I. construction include a drainage channel along the north side of the SR303L, a 6’X6’ RCBC across Lake Pleasant Parkway at Station 505+19, and a two-barrel 6’X6’ RCBC across SR303L east of Lake Pleasant Parkway. The TI drainage systems will collect flows from the north of SR303L, convey them along east of Lake Pleasant Parkway, continue south of the SR303L, and discharge into one of the New River tributaries. These SR303L channel and culverts will be existing facilities when the proposed Lake Pleasant Parkway project moves forward.

The existing CAP Canal within the project area is a concrete-lined trapezoid channel. The existing Lake Pleasant Parkway crosses the canal with a two-span bridge with a spread footing pier at the center of the canal. Based on the field investigation, no existing drainage culvert or overchute crosses the canal in the vicinity of Lake Pleasant Parkway. A ditch along the north side of the canal west of Lake Pleasant Parkway was observed, which intercepts flow from the area north of the canal and drains in a westward direction. Four small retention basins are located at the four intersection corners, which retain flows generated within the intersections and from the canal access roads.

Flow generated from the Lake Pleasant Parkway pavement will sheet flow off the roadway towards the vacant lands on both sides of the roadway. No inlets, scuppers or spillways were found along the existing roadway.

4.9.1 FEMA Floodplain

Lake Pleasant Parkway project was covered by three Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs): Map Nos. 04013C 1160H, 04013C 0745H and 04013C 0765G. Only one flood prone area has been defined by the FIRM No. 04013C 1160H as a FEMA Zone AE 100-year floodplain for the Unnamed Wash. The Unnamed wash crosses the existing Lake Pleasant Parkway at Station 392+85, approximately 1,600 feet north of Westwing Parkway. A FEMA Zone AE 100-year Floodplain indicates an area subject to inundation by the 100-year flood event determined by detailed methods and base flood elevations are shown. An exhibit of the FEMA Map is included in Appendix E.

Based on the floodplain information obtained from the Flood Control District of Maricopa County’s Geographic Information System (GIS), within the project limits, there are three New River West Tributaries within pending floodplains under an ongoing floodplain delineation study (FDS). These three New River West Tributaries cross the Lake Pleasant Parkway at Stations 561+40, 605+50 and 642+50.

4.9.2 Previously Prepared Reports

Six drainage studies and design reports conducted within the project watershed by City of Peoria, Flood Control District o Maricopa County (FCDMC) and Arizona Department of Transportation (ADOT) are described as follows:

Lake Pleasant Parkway Draft Design Concept Report (City of Peoria December 2001):

This Design Concept Report (DCR) covers an 8.3-mile corridor of Lake Pleasant Road from Williams Road north to the Carefree Highway (SR 74). Lake Pleasant Parkway was referred in this report as Lake Pleasant Road. Between Westwing Parkway and SR 74 along the Lake Pleasant Parkway, there are 6 drainage basins (Areas A, B, C, D, E and S726). S726 lies within the study area of North Peoria Area Drainage Master Plan (ADMP), and the ADMP existing condition HEC-1 model was used for the estimate of the 50- and 100-year, 6-hour peak discharges. The Rational Method was used for the other five (5) drainage basins, even though one of the drainage basins (Area B) was larger than 160 acres. Precipitation data used in this study was based on te NOAA Atlas 2. Five (5) cross culverts were proposed for the interim roadway conditions to carry the 50-year flow and pass the 100-year discharge over the road with no more than 6" of overflow depth. Four of cross culverts are multi-barrel CMPs and one is a 2-6'X6' CBC. Roadside ditches and channels are proposed along the roadway to collect off-site drainage and convey runoff to either cross culverts or drainage outlets. Drainage between the New River Dam Impoundment Levee and Lake Pleasant Pkwy (Area E) was assumed to be retained within the area. Since this 2001 DCR was completed several years ahead of the proposed SR303L/Lake Pleasant Parkway T.I., no assessment of impacts by the proposed T.I. on the drainage (Area D) was made.

North Peoria ADMP (FCDMC 2002):

The North Peoria ADMP study area encompasses approximately 73 square miles within unincorporated Maricopa County and the City of Peoria. The watersheds covered by this ADMP generally drain to the Agua Fria River through its numerous tributaries. The southernmost drainage basin (Area S726) from this ADMP falls within the Lake Pleasant Parkway project limits. This drainage basin boundary is formed by the ridges of the Westwing Mountains and Lake Pleasant Parkway.

Upper New River ADMP Hydrology Report (FCDMC October 2007):

The Upper New River ADMP watershed encompasses approximately 175 square miles of the New River watershed above New River Dam in north-central Maricopa County and southern Yavapai County. The ADMP study area is mostly undeveloped and relatively pristine, undisturbed Sonoran Desert. This ADMP covers the two north most drainage basins (Areas A and B) within the Lake Pleasant Parkway project limits. Some of the Sub-Basins of the Area A (ADMP Drainage Basin B) and Area B (ADMP Drainage Basin A) lie across Lake Pleasant Parkway. Therefore, modifications will be necessary in order to utilize the model for the two drainage basins. The two drainage basins covered by the ADMP are within New River West Tributaries Watersheds. Hydrology of the New River West Tributaries Watersheds was generated under the New River West Tributaries Flood Delineation Study (September 26, 2005) and was incorporated into this ADMP hydrology. A single set of rainfall was estimated from isopluvials published in the NOAA Atlas 2 for the entire study watershed and applied to all models using the FCDMC's DDMSW Version 2.1.0. The ADMP HEC-1 models consist of the existing condition models and future condition models with 10-, 50- and 100-year peak discharges for both 6-hour and 24-hour rainfall durations.

Initial Drainage Report, SR303L, Happy Valley Road to I-17 (ADOT September 2006):

Drainage basins boundaries and HEC-1 models (ADOT Method) used were based on the Preliminary Drainage Report for Estrella Freeway, SR303L Happy Valley Road to I-17 (ADOT May 2005). No digital drainage basin boundaries are available, except for small drainage basins along SR303L. Based on the drainage sub-basin boundaries map, the SR303L hydrology covers all of the Lake Pleasant Parkway drainage basins north of SR303L alignment. However, these sub-basins will need to be divided into smaller sub-basins with concentration points along the Lake Pleasant Parkway. The drainage basins (340 and 360) from this report, which are located west of Lake Pleasant Parkway, between the CAP Canal and SR303L alignment covers portion of Drainage Area D (Area D was divided into two by the proposed SR303L alignment). Based on the proposed drainage improvements at the SR303L/Lake Pleasant Parkway T.I., a channel (N3) was designed to collect runoff from Drainage Areas 340 and 360, and conveys flows east across the Lake Pleasant Parkway via a 6'X6' RCBC to the downstream channel (N3), which continuous westward and eventually crosses the SR303L and drains into the New River. The precipitation used in this report was based on the NOAA Atlas 2.

Final Drainage Report, SR303L, Happy Valley Road to Lake Pleasant Parkway (Interim) (ADOT January 2008):

This drainage report is associated with SR303L, Happy Valley Parkway to Lake Pleasant Parkway (Interim) segment project, a 6.6-mile freeway design and construction project. Happy Valley Road was referred to as Happy Valley Parkway in this report. No off-site hydrology was included in this project. The peak flows from the Preliminary Drainage Report (ADOT May 2005) and the Initial Drainage Report (ADOT September 2006) were utilized in the evaluation of the off-site drainage features in this project. Similarly, Channel N3 was designed to collect and convey runoff from Drainage Area 340 and 360. A 6'X6' RCBC was designed to cross LPP just north of the SR 303L intersection with LPP. The channel and culvert hydraulic analysis was performed using HEC-RAS program.

Final Drainage Report, SR303L, Lake Pleasant Parkway to I-17 (Interim) (ADOT October 2008):

This drainage report is an update to the Initial Drainage Report (ADOT September 2006), which documents proposed drainage improvements for SR 303L from Lake Pleasant Parkway to I-17, a 5.8 miles of freeway design and construction project. The HEC-1 model was modified by using the NOAA Atlas 14 precipitation data, and the combined peak discharges from Sub-Basins 340 and 360 were reduced from the models using the NOAA Atlas 2. The off-site drainage design documented in this report is for the area west of the Lake Pleasant Parkway, which is outside the Lake Pleasant Parkway project limits.

4.9.3 Proposed Drainage Improvements

The proposed drainage improvements were designed to comply with the City of Peoria requirements, the Maricopa County's design criteria documented in the FCDMC's *Drainage Design Manual for Maricopa County, Arizona, Volume II - Hydraulics,* November 1991, revised January 1996, and the *Maricopa County Drainage Policies and Standards*, January 2007. Since the Unnamed Wash is the only drainage crossing within the project limits, which lies in an effective FEMA floodplain, Floodplain impact is only assessed at the Unnamed Wash crossing. No floodplain impact analyses were performed for the three New River West Tributaries, which are under an ongoing FDS.

The proposed off-site drainage improvements consist of cross culverts, roadside ditches and channels, and one retention basin at the south end of the project. The off-site flows concentrated in the natural washes that are intercepted by the proposed Lake Pleasant Parkway will be discharged through nine (9) cross culverts to their historical paths. Most of the off-site sheet flows towards the proposed Lake Pleasant

Parkway will be collected by the proposed roadside ditches or channels, and discharged through the proposed cross culverts to the nearby natural washes. For the area west of Lake Pleasant Parkway around the Westwing Parkway alignment, there is no nearby natural wash or manmade channel. A retention basin is proposed at the end of the project limit to drain the area.

The proposed on-site drainage facilities include catch basins, storm drains, and six retention basins to store the first flush volumes. The outlet of the on-site drainage facilities is natural washes, off-site drainage channels or the retention basin at the end of the project limit.

Detailed hydrology/hydraulic analyses and drainage design were performed for the off-site drainage crossings, the roadside ditches and channels, one retention basin and the on-site drainage facilities. The off-site hydrology is based on the existing conditions. The City of Peoria requires a 100-year 2-hour storm water retention for the proposed land development. Future developments within the drainage basins are expected to reduce the peak flows of the proposed off-site drainage facilities, including channels, cross culverts and one retention basin. It should be the future developers' responsibility to construct their own drainage facilities for the on-site retention and storm water conveyance systems which should not increase the peak flows of the proposed off-site drainage facilities for this project. In addition, if the future developments require replacement of the roadside channels and first flush basins or the retention basin with storm drain pipes and underground water treatment or storage facilities, the replacements will be the developer's responsibility. The connection of the pavement drain systems to the underground facilities should be designed to meet City of Peoria and Maricopa County's design standards and guidelines.

Off-Site Hydrology

The existing and proposed roadway is located between the Agua Fria River and New River watersheds. The project watershed generally located at the west side of the Lake Pleasant Parkway, and drains towards the southeast to the New River, except for the drainage basin of the Unnamed Wash that crosses Lake Pleasant Parkway at Station 393+50, and drains southwesterly to Agua Fria River. The major portion of the project drainage basins are within undeveloped State Lands, with small portion covered by the Pleasant Valley Airport's buildings and pavements.

The off-site hydrology was analyzed using procedures outlined in the *Drainage Design Manual for Maricopa County, Volume I, Hydrology (1995)* for the 50- and 100-year peak flows. Precipitation information used for this project is from NOAA Atlas 14. The drainage basins were delineated using the County's 10'-contour map download from Maricopa County's GIS Website, and adjusted based on the 1-foot contour project map. Of the 11 drainage basins that contribute runoff to the nine (9) proposed cross culverts, roadside ditches, channels and the retention basin at the south end of the project, the Rational Method was used to compute the peak flows for the eight (8) drainage basins smaller than or equal to 160 acres in size. The FCDMC's Drainage Design Management System (DDMSW) computer program, which combines Maricopa County's Land Use, Soil Information and HEC-1 program in one platform, was used to compute the peak flows for the remaining three (3) drainage basins greater than 160 acres in size. A watershed map is included in Appendix E.

The soil information was based on the Soil Report for Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties obtained from the USDA Natural Resources Conservation Service website in September 2009. Land use was based on the existing conditions. Table 4.7 shows a summary of the 50- and 100-year peak flows along Lake Pleasant Parkway. Results from the Rational Method calculations and the HEC-1 modeling from the FCDMC's DDMSW are presented in Appendix E.

Table 4.9 Summary of the 50-year and 100-year Peak Discharges

Concentration Point	Area (acre)	Method	Peak Flow (cfs)	
			Q_{50}	Q_{100}
A	522	HEC-1	565	689
B-2	86.4	Rational	133	166
C	307	HEC-1	236	289
D	10.8	Rational	22	27
E	84.6	Rational	116	139
G-1	7.8	Rational	19	22
H-4	61	HEC-1	39	49
H-4-2	12	HEC-1	26	31
H-8	170	HEC-1	290	359

Off-Site Drainage Design Criteria:

The crossing drainage locations were determined to maintain the historic drainage patterns as close as possible. The criteria governing the design of the off-site drainage facilities include:

- Minimum pipe culvert diameter: 24"
- Minimum CBC height: 5' (invert set 6" below stream bed)
- 50-year runoff to be conveyed by culvert with maximum water surface elevation (WSE) no greater than lowest adjacent road subgrade
- 100-year runoff to be conveyed by culvert with a maximum depth of 6" in vehicular travel lane
- Culvert outlet velocity for both 50-year and 100-year peak flow no greater than 15 fps
- 50-year runoff conveyed by channel with a maximum WSE no greater than the lowest adjacent road subgrade

Proposed Off-Site Drainage Improvements:

The proposed off-site drainage improvements include cross culverts at nine (9) locations along Lake Pleasant Parkway, and 14 roadside ditches and channels to collect and convey off-site flows to the proposed cross culvert locations. In addition, cross pipe culverts were designed at 12 turnouts and driveways. All channels were designed to have 3:1 side slope and with the 50-year water depth not greater than 3 feet. The proposed cross culverts for Lake Pleasant Parkway are summarized in Table 4.10 and the proposed culverts for turnouts and Driveways are summarized in Table 4.11.

As discussed under Section 3.4.2, Unnamed Wash Crossing, four drainage crossing alternatives were developed during the study. The preferred drainage crossing at the Unnamed Wash accommodated drainage and a primary trail underpass. Two culverts were designed at this location; one is a 6'X6' RCBC, which will be used for drainage purpose only. The other one is a 12'X12' RCBC located parallel to the 6'X6' RCBC, and have an inlet invert elevated 2 feet above the 6'X6' RCBC invert. This culvert serves dual functions for both drainage and the primary trail underpass, and was designed to keep it dry during small flow events.

Due to the primary trail underpassing and maintenance need, the proposed drainage facilities at the Unnamed Wash is substantially larger the existing drainage structure (2-54" CMP). No adverse FEMA floodplain impact is expected at this crossing. Detailed hydraulic analysis using HEC-RAS program for the Unnamed Wash is included Appendix E.

Table 4.10 Proposed Cross Culvert Summary (Lake Pleasant Parkway)

Culvert No.	Station	Barrel	Size	Type	Length *(ft)*	Q_{50} (cfs)	Q_{100} (cfs)
1a*	393+50	1	12'x12'	RCBC	276	290	359
1b*		1	6'x6'	RCBC	276		
2	409+85	1	36"	CMP	192	26	31
3	431+59	1		RCP	241	39	49
4	529+75	1	36"	CMP	244	19	22
5	538+28	1	42"	RCP	235	116	139
6	561+40	1	6'X5'	RCBC	184	236	289
7**	581+55	1	36"	CMP	200	77	91
8	604+28	2	42"	RCP	206	133	166
9	641+85	1	8'X6'	RCBC	212	565	689

* Shared drainage culvert and primary trail.

Table 4.11 Proposed Cross Culvert Summary (Turnouts and Driveways)

Culvert No.	Station	Barrel	Size	Type	Length *(ft)*	Q_{50} (cfs)	Q_{100} (cfs)
10	400+15 Rt	1	6'x4'	CBC	140	210	258
11	425+60 Lt	3	36"	RCP	126	210	258
12	425+60 Rt	2	30"	CMP	113	39	49
13	439+75	3	36"	RCP	157	104	128
14	453+97	3	36"	CMP	92	104	128
15	466+20	2	30"	CMP	115	51	67
16	479+40	2	30"	CMP	102	51	67
17	523+00	2	36"	CMP	101	72	87
18	540+20	3	36	RCP	115	116	139
19	555+00	3	24"	CMP	115	47	57
20	569+00	1	8'x4'	CBC	208	236	289
21	585+50	4	36"	RCP	114	77	89

At the south end of the project, a stormwater retention basin was proposed at the west side of Lake Pleasant Parkway, which retains the on-site and off-site flows from the 21-acre area (Drainage Sub-Basin I) west of the roadway between Station 361+90 and Station 366+60. This basin does not have an outlet because there is no existing hydrologic or hydraulic information to evaluate the conveyance capacity of the existing roadside ditch south of the project. The needs of this retention basin should be further evaluated during the Final Design, when the downstream (south of the project limits) existing or planning drainage improvements could be determined.

Hydraulic Analyses of Off-Site Drainage Facilities:

All culvert hydraulic analyses were performed using the FHWA's *HY-8 Culvert Analysis* program. For the HY-8 analyses, the design flow is the 50-year peak discharge calculated from the HEC-1 hydrologic model as shown in Table 4.8, while the maximum flow value used was the 100-year peak discharge. Riprap apron and culvert end treatments are proposed for both upstream and downstream ends of all the pipes and RCBCs. Results of HY-8 analyses for cross culverts and turnout cross pipe culverts are included in Appendix E. Bentley System's *FlowMaster* was used to size all of roadside ditches and channels. Table 4.12 shows a summary of hydraulics for the proposed roadside ditches and channels.

Table 4.12 Summary of Hydraulics for Roadside Ditches and Channels

Channel	Shape	Top Width (ft)	Bottom Width (ft)	HW Depth Q50-Yr (ft)	Length (ft)	Q_{50} (cfs)
South Segment						
H1	Tri	21.1	0.00	3.00	2940	90
H2	Trap	22.4	2.00	2.91	2100	104
H3	Trap	22.2	2.00	2.88	518	102
H5	Trap	33.3	15.00	2.61	1586	210
H8	Trap	25.6	5.00	2.93	475	141
H7	Trap	38.8	22.00	1.87	219	161
L	Tri	15.5	0.00	2.20	1400	39
Unnamed Wash	Trap	33.4	15.00	2.63	1586	213
North Segment						
G2	Tri	19.5	0.00	2.80	2228	72
E1	Tri	16	0.00	2.30	887	47
E2	Trap	22.5	2.00	2.90	992	116

D	Trap	21	5.00	2.23	2062	77
A	Tri	18.8	0.00	2.70	1493	66
C7	Trap	31	10.00	3.00	1288	239
C7-S	Tri	7.5	0.00	1.10	250	11

Notes: Tri – Triangular Channel; Tra – Trapezoidal Channel.

4.9.4 Pavement Drainage

On-site pavement drainage is designed for a 10-year storm event and checked with the 100-year storm event. The new roadway will be a 6-lane facility with three lanes on each direction. It will be constructed with curb and gutter on both sides of the northbound and southbound roadway, and will have a 30-foot wide open median with dense landscaping. The on-site drainage facilities consist of catch basins, storm drains, and retention/detention basins. These drainage facilities are provided to intercept and convey pavement drainage while maintaining existing flow patterns as closely as possible. Six (6) detention basins were sized to capture and store the first-flush runoff from the initial one (1) inch of rainfall falling on the on-site paved areas, as required per the City guidelines. One retention basin is proposed to drain the on-site runoff from the north end of the project to Old Carefree Highway as well as provide the first flush storage volume. This retention basin is located south of Old Carefree Highway along the west side of Lake Pleasant Parkway, and there is no nearby natural wash to be its outfall. For the interim 4-lane parkway condition, the open median width increases to 54' and it will provide the 10-year, 24-hour retention volume for the median area.

On-Site Drainage Design Criteria:

Below is a summary of the basic criteria governing the pavement drainage and storm drain design based on the current Flood Control District of Maricopa County (FCDMC) *Drainage Design Manual for Maricopa County, Arizona – Hydraulics* (Reference 10):

- Design Storm Event: 10-year
- Roadway Criteria, 10-year: One 12' dry driving lane maintained in each direction and flow depth not to exceed curb height
- Check Storm Event: 100-year
- Roadway Criteria, 100-year: Maximum flow depth is 6 inches
- Type of gutter: Concrete gutter with asphalt pavement, n = 0.016
- Inlet spacing: Based on Allowable Spread
- Minimum storm drain size: 18" (Trunk Line) and 15" (Lateral Pipe)
- First Flush Retention: Construct small retention basins to provide the storage volumes from first one (1) inch of rainfall falling on the pavement.
- Median Retention Areas: The open median area will be used to provide retention volume for a 10-year, 24-hour storm event for the median areas.

Catch basins and storm drains were designed using the 10-year peak flows. During the 10-year storm event, one 12-foot driving lane must be free from flooding in each direction. This corresponds to an allowable spread width of 20.5 feet.

On-Site Drainage System Alternatives

Two on-site drainage system alternatives were developed and evaluated. These alternatives are a closed drainage system and an open drainage system. The description and evaluation of each alternative are described as follows:

Closed Drainage System

The closed drainage system consists of catch basins, storm drains and manholes. This system is designed to collect the ultimate pavement section runoff for a 10-year storm event. When no convenient outfall exists, a detention basin is proposed and sized to retain the 100-year 2-hour storm runoff.

When a wash or a cross culvert is available as the outfall of the closed drainage system, a detention basin is sized to retain only the first flush volume. The remaining flow will be drained via a pipe into the cross culvert or the wash.

Open Drainage System

The open drainage system consists of scuppers, catch basins, storm drains, spillways and drainage ditches. This system is also designed to collect the ultimate pavement section runoff for a 10-year storm event. The system will collect the on-site runoff with scuppers or catch basins, and drain the flows to either a roadside ditch or an off-site drainage ditches and channels. Small retention basins are proposed along the drainage ditches to satisfy the first flush retention requirements. The remaining on-site flow will drain into the outfall of the drainage ditch.

Recommended On-Site Drainage System

A closed drainage system is recommended for the on-site drainage improvements. Although the closed drainage system will cost approximately $2.5 million more than an open drainage system, the closed system will provide a more reliable, lower maintenance drainage solution. In addition, the closed drainage system is more suitable for a parkway and will not be impacted by any adjacent development plans.

The first one (1) inch of pavement runoff will be captured and either stored or treated to remove most of the annual stormwater pollutant load. A total of 6.2 acre-feet of first flush stormwater storage volume was estimated for the proposed Lake Pleasant Parkway paved areas. Figures 4.5 and 4.6 show the major drainage features for the South Segment and North Segment, respectively.

First Flush Treatment Alternatives:

The City of Peoria has adopted the "first flush" regulations that require all new and developed areas to treat the first one (1) inch of rainfall prior to discharge. This first one (1) inch rule is the basis for providing water quality control in developing areas. The first one (1) inch of pavement runoff will be captured and either stored or treated to remove stormwater pollutants.

A total of 6.2 acre-feet of first flush stormwater runoff volume was estimated for the proposed Lake Pleasant Parkway paved areas. Two common first flush treatment methods were investigated and evaluated. These treatment methods are use of retention/detention basins and hydrodynamic separation devices. The description and evaluation of each treatment method are described as follows:

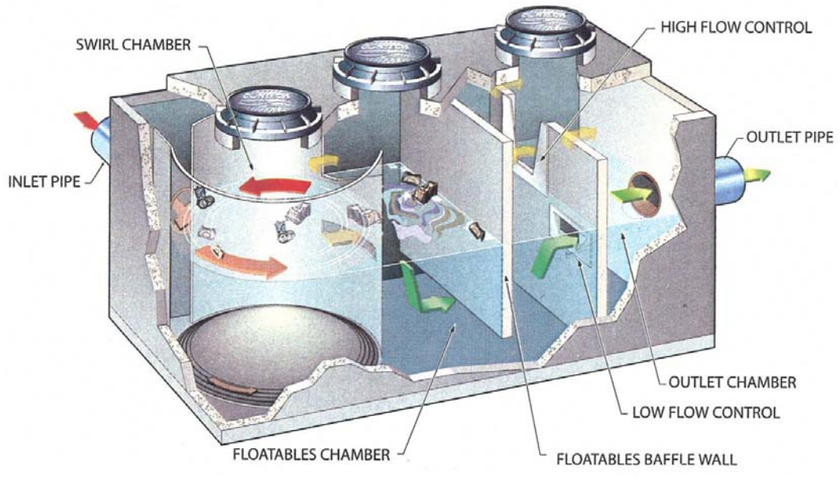
Use of Retention/Detention Basins

Retention (Infiltration) and detention basins can capture and store the first flush runoff, and effectively remove 80% of total suspended solids from stormwater runoff. The use of retention (infiltration) and detention basins can result in a high percentage of pollutant removal. Retention basins can be sized to provide the first flush retention volume. A bypass structure could be used at the basin inlet pipe. Detention basins could be designed by using the bottom portion of the basin for first flush retention and setting the bleed-off pipe above the bottom of the basin.

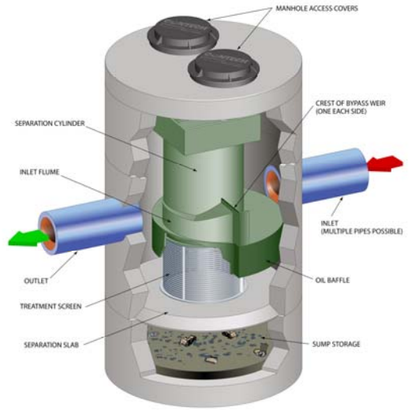
The larger the basin, the more efficient the basin will be at removing pollutants. However, since the larger basin cost more, there will be a point where the additional right-of-way and construction costs will not translate into a significant increase in the efficiency of the basin. The two driving forces in the design of a retention (infiltration) or detention basin are the amount of runoff that will be retained, and the infiltration capacity of the soil. Since infiltration capacity is critical, soils that contain a high percentage of silt of clay cannot be used for infiltration basins. Maintenance of these retention and detention basins is necessary to remove the oil and grease which tend to seal the basin bottom and result in standing water. However, the initial capital costs for these retention basins are cheaper than the stormwater treatment devices

Use of Stormwater Treatment Devices

Stormwater treatment devices are used to reduce stormwater pollutants. These devices are also called hydrodynamic separation products. Two different systems from CONTECH Stormwater Solutions were investigated and evaluated. The Vortechs® system which is a high-performance hydrodynamic separator that effectively removes finer sediment, oil and grease, and floating and sinking debris. This system has three (3) chambers including swirl, floatables and outlet chambers. The first chamber captures sediment, while the second chamber captures the oil and gas films which are eventually absorbed by particles and settle. The pool of water in the first two chambers should be at least four feet deep and is controlled by an inverted elbow. The outlet chamber contains treated water. The separator will have to be cleaned out regularly for it to remain functional. The unique design allows for easy inspection and unobstructed maintenance access. This high-performance system uses an effective combination of swirl-concentrator and flow-control technologies to maximize treatment. Precast models can treat peak design flows up to 25 cfs, and cast-in-place models handle even greater flows.



Another system is the CDS system which uses patented continuous deflective separation technology. The CDS system effectively screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material, without blinding. A unique internal bypass design means higher flows can be diverted without the use of external bypass structures. The system is available in both offline and inline configurations.



Recommended First Flush Treatment Method

The recommended first flush treatment system is the use of retention/detention basins due to the costs. For the Vortechs® system, eight (8) systems will be needed and the cost ranging from $20,000 to $200,000 each for a total cost of $600,000. Using the CDS system, the cost ranging from $50,000 to $320,000 each for a total cost of $1.1 million for eight (4) systems. These costs do not including the bypass structures and additional right-of-way costs.

There are a total of seven retention/detention basins proposed for this project. Six of them will be detention basins which will provide the first flush retention volume at the bottom portion of the basins by elevating the lateral weir or the bleed-off pipe above the pool level. The lateral weir will be used where the detention basin is located adjacent to a roadside ditch or channel. One retention basin is located the south end of the project which will retain the on-site and off-site flows.

Figure 4.5 South Segment Major Drainage Features

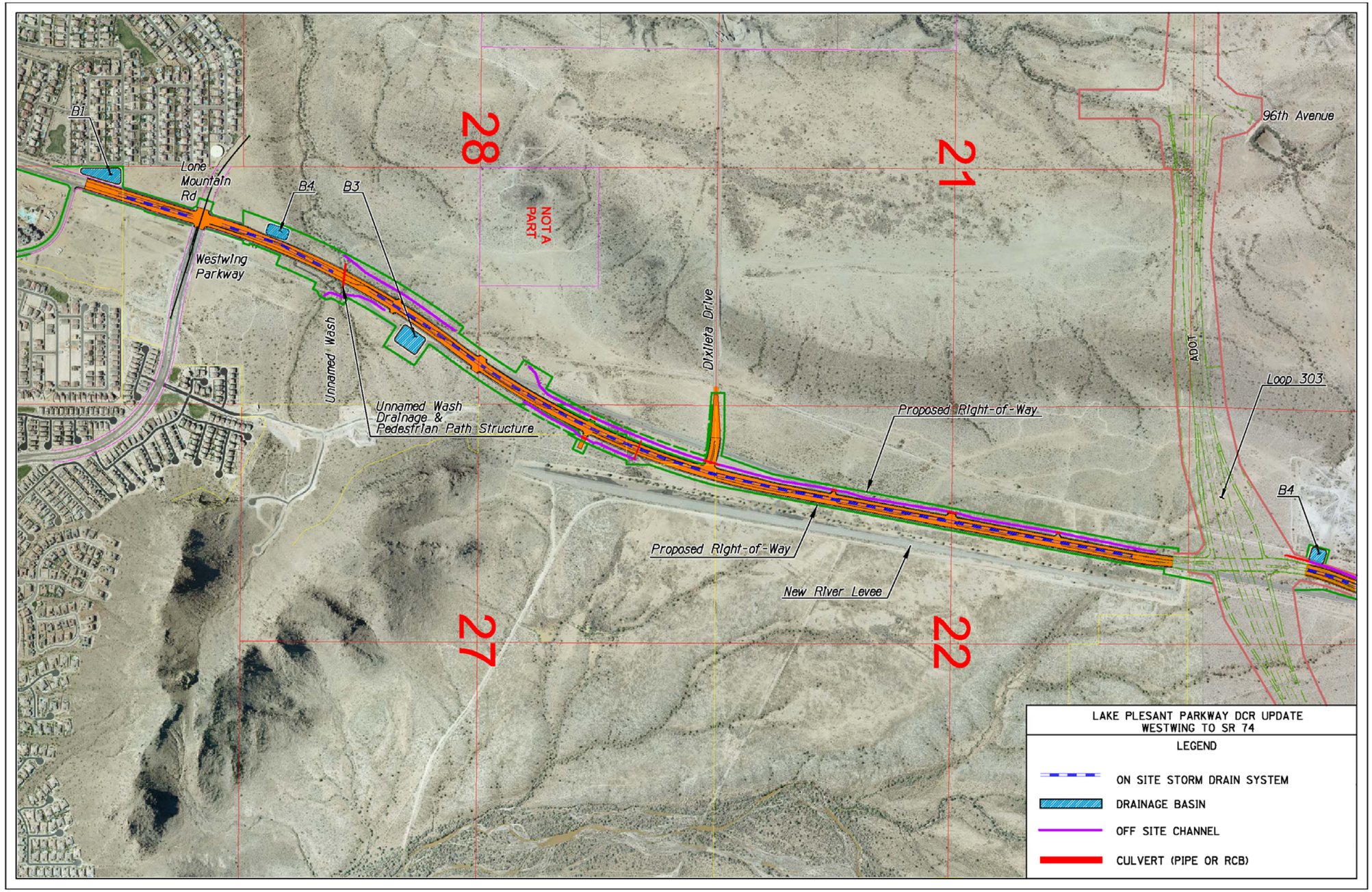
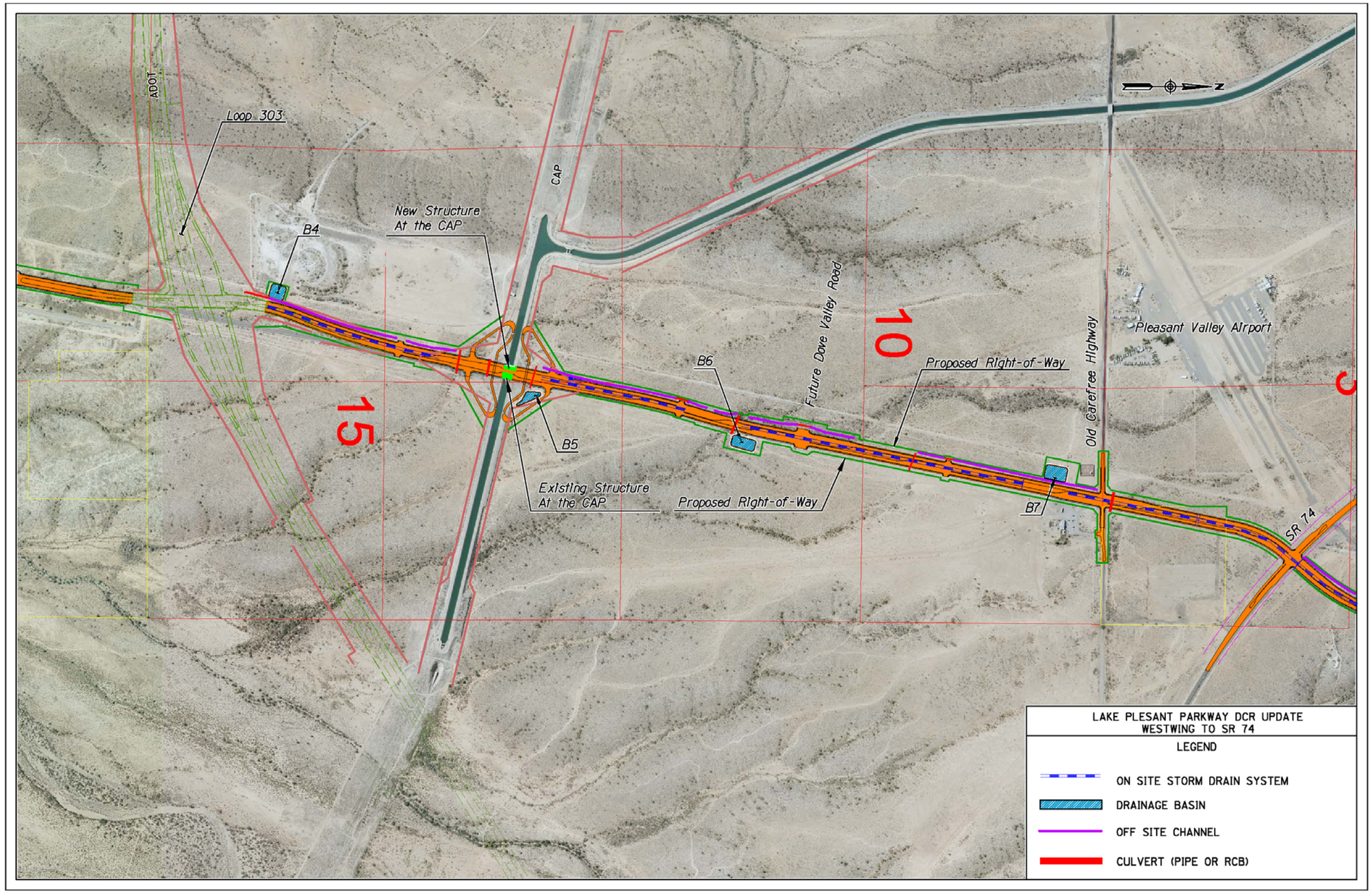


Figure 4.6 North Segment Major Drainage Features



4.10 Structures

4.10.1 New Structure at the CAP Canal

The Lake Pleasant Parkway mainline roadway section approaching the bridges at CAP canal is symmetrical in section about the Lake Pleasant Parkway median construction centerline. In the interim condition, the southbound roadway will consist of a 7'-0" bike lane, two 12'-0" general purpose lanes and a 2'-0" inside shoulder. The ultimate roadway section approaching the bridges will consist of a 7'-0" bike lane, three 12'-0" general purpose lanes and a 2'-0" inside shoulder. An 8'-6" sidewalk is located outside of the southbound bike lane. The southbound bridge will be constructed to a sufficient width to accommodate the ultimate roadway section. The southbound bridge will have a 1'-2" wide 32-inch high vertical face concrete barrier along the inside edge of deck and a 1'-2" wide combination pedestrian-traffic bridge railing with fence along the outside edge behind the sidewalk. The resulting out-to-out total bridge deck width is 55'-10". Within the limits of the bridge the Lake Pleasant Parkway horizontal alignment is on a tangent with a normal crown and cross slope of 2%. The northbound and southbound roadways have independent vertical geometry at the CAP crossing. The profile at the southbound bridge will be on a vertical crest curve and approximately 5'-6" higher than the existing northbound bridge to accommodate the latest CAP requirements, which requires the bridge low chord to be four feet above the canal top concrete lining. The southbound CAP bridge will consist of a single 100'-0" span with a total bridge length of 105'-0". The superstructure will require 9 girders with an approximate spacing of 6'-4 1/4". The approximate structure depth is 5'-4" at the abutments.

4.10.2 Existing CAP Structure

The existing CAP Bridge (Structure No. 9680) is a two span precast prestressed concrete AASHTO Type IV girder bridge that crosses the CAP canal at a skew angle of 2° 05'27". Each span is 44'-0" long, with a total bridge length of 89'-10". The bridge was constructed by the Bureau of Reclamation of US Department of the Interior under Project No. 344-D in 1980. The bridge superstructure is supported by two abutment walls founded on 1'-9" thick by 8'-6" wide concrete spread footings, and a center pierwall founded on a 2'-3" thick by 9'-0" wide spread footing. No substantial concrete cracking or spalling is mentioned in the Bridge Inventory Report. The existing bridge is labeled as "Very Good" condition for the superstructure as well as the substructure with a sufficiency rating of 92.75. The out-to-out bridge width is 83'-5" with a clear roadway width of 72'-0". On the median side of the bridge, an 8'-2 1/2" wide sidewalk was confined between a 32" concrete Jersey barrier on the traffic side and a chain-link fence on the outside edge of the bridge. Another 32" concrete Jersey barrier was placed along the outside edge of the bridge, on the opposite side. All existing bridge railings meet current AASHTO criteria. Currently the existing bridge carries northbound and southbound Lake Pleasant Parkway traffic. The roadway at the bridge will be modified to accommodate northbound traffic only. The new interim approaching northbound roadway will consist of a 7'-0" bike lane, two 12'-0" general purpose lanes and a 2'-0" inside shoulder. The ultimate roadway section approaching the bridge will consist of a 7'-0" bike lane, three 12'-0" general purpose lanes and a 2'-0" inside shoulder. A 10'-6" sidewalk is located outside of the northbound bike lane. The existing bridge has sufficient clear roadway width to accommodate the interim and ultimate roadway width. The existing outside Jersey barrier will be replaced by the new 10'-6" sidewalk with combination pedestrian-traffic bridge railing with fence and the existing 32" F-Shape barrier and fence will be replaced with a concrete parapet. The new ultimate clear roadway width will be 70'-7".

4.11 Utilities

Existing utility information was researched through available documents, listings provided by Blue Stake Center, collection of as-built information provided by utility companies, and through site visits and field observations. The existing utilities and contact information for the area are provided in Table 4.13. At this time, only public utilities are present north of Westwing Parkway. The existing utilities include overhead power, underground electric, water, sewer, gas, telephone, fiber optic and coaxial cable.

Table 4.13 Utility Contacts

Utility	Facility	Contact	Information
Arizona Public Service	Electric	Ron Gandara	P. O. Box 52933 (Station 3876) Phoenix, AZ 85072 (602) 371-7546
City of Peoria	Water, Wastewater	Javier Setovich	9875 N. 85th Avenue Peoria, Arizona 85345 (623)-773-7734
City of Peoria	ITS	Ron Amaya	9875 N. 85th Avenue Peoria, Arizona 85345 (623)773-7602
Central Arizona Project (CAP)	Canal	Aaron Ashcroft	23636 N. 7th Street Phoenix, AZ 85024 (623) 869-2257
Cox Communications	Cable TV, Fiber Optics	Ben Baich	1550 West Deer Valley Road Phoenix, AZ 85027 (623) 322-7248
Qwest Local Networks	Fiber Optics, Telephone	Ronald Floyd	5025 N. Black Canyon Highway Phoenix, Arizona 85015 (602) 630-1392
El Paso Natural Gas	High Pressure Gas Line	Ramon Vega	7776 South Point Parkway, Suite 185 Phoenix, AZ 85044 (602) 438-4224
Southwest Gas	High Pressure Natural Gas, Low Pressure Natural Gas	Jean Pacheco	9 South 43rd Avenue Phoenix, AZ 85009 (602) 484-5277

Potential existing utility conflicts include electric, gas, water, fiber optics and telephone. Underground utility locating has not been performed for this DCR. A complete field investigation, including utility potholing will be required during final design. It is not anticipated that the utility companies will install new facilities to accommodate future development at this time, and therefore, the DCR recommends that a future utility corridor be designated outside of the City's western right of way line.

4.11.1 Electric

The existing electric facilities consist of overhead and underground power lines that run on the east side of the existing roadway. The overhead power lines are located between Westwing Parkway and SR 74, and the underground electric is located between Westwing Parkway and Dixileta Drive.

Due to conflicts with the proposed improvements and due to the desire of the City to have the new segment of the roadway be aesthetically pleasing, the overhead power lines will be removed and new facilities will likely be installed underground. The preference of the City and of the major stakeholders is that the new facilities will be upgraded to accommodate and serve future development. Since the existing roadway is not located within public right-of-way, it is assumed that APS has prior rights and the cost to remove and install the new service lines will be funded partly by the City. Since the overhead lines will need to be relocated prior to the proposed construction, and since it is likely that the City will not acquire the right of way for the future P.U.E, a recommended alternative is to relocate the overhead line underground within the City's right-of-way.

4.11.2 Water

A new City-owned 24" diameter water line will be constructed in Lake Pleasant Parkway from the end of an existing 36" diameter water line north of the intersection with Westwing Parkway to an existing 36" diameter water line installed by ADOT at the SR303L. The water line will be extended in the future from SR303L to SR 74. The pipe material will be class 250 ductile iron pipe.

The water line will be located vertically approximately 6 ft to 7 ft below grade with a minimum 4 ft of cover below existing grade in fill sections in order to protect the pipe during fill construction. The new water line will pass under new drainage culverts under the roadway except at "Unnamed Wash" where there is sufficient room to place the new water line above the proposed drainage culvert and trail culvert. Constructing the water line under the culverts would require excavation through very hard, rocky soil and would place the water line under approximately 30 ft of fill.

The water line will be located horizontally 32-ft from the roadway centerline. This will place the cover of the butterfly valve operator access manhole near the inside lane under the present four-lane roadway configuration. When the roadway is widened to six lanes, the manhole cover will be in the middle travel lane. The water line will be located on the west side of the roadway, as it is at Westwing Parkway. The west side alignment coincides with the location of the 36" water line installed by ADOT at SR303L. Water line stub outs will be provided at proposed crossroads. Stub outs will be 16" diameter at proposed arterial streets and 8" diameter at minor collector streets.

North of the SR303L, the water line must cross the Central Arizona Project (CAP) Canal. The CAP requires the water line to be carried under the canal in a jacked and bored steel casing. The limits of the casing are from right-of-way line to right-of-way line. The minimum distance between the canal invert and the top of the steel casing is 10 ft. The future water line will be installed west of the future southbound bridge. Alternatively, the CAP will allow the water line to be placed in the future southbound bridge if it is carried in a double-walled casing and the water line is turned under the maintenance roads. The choice of going under or over the canal will depend on analysis of the costs and benefits of each method.

4.11.3 Sewer

A new City owned trunk sewer line will be constructed in Lake Pleasant Parkway between the end of an existing sewer line at Westwing Parkway and the CAP canal. A second sewer line will be constructed from north of the CAP canal extending to SR 74. The new trunk sewer, designed per the City of Peoria design criteria, will be 21" diameter between Westwing Parkway and Dixileta Drive and 18" diameter to the end of planned improvements.

The sewer line will be made of vitrified clay pipe (VCP) per the City of Peoria's preference. It will typically be located horizontally 47-ft to the west from the roadway centerline. The Draft DCR depicted the sewer line to the east of the proposed roadway centerline. The location of the sewer line was revised and shifted to the west of the roadway centerline based on comments from the City of Peoria. Just south of the SR303L interchange the sewer will cross from west to east to connect to a section of 18" diameter sewer installed by ADOT as part of construction of the Lake Pleasant Parkway Traffic Interchange. An 18" diameter stub-out for future connection will be provided at the intersection of Lake Pleasant Parkway and Dixileta Drive, and additional 8" stub-outs will be installed at ¼ mile spacing to accommodate future development. At the request of the City of Peoria, it is recommended that additional analysis regarding the stub out spacing will be completed during the final design stage of the project.

Approximately 2,600 ft north of Westwing Parkway, the sewer line crosses the Unnamed Wash. The wash presents an obstacle to a gravity sewer line because it is lower than the existing sewer invert at Westwing Parkway. A report by Carollo Engineers recommended that the sewer be routed to the east to take advantage of the wash's steep slope. Once enough cover over the sewer had been gained, the sewer would turn north parallel to the road for a short distance, and then west to the roadway alignment.

While feasible, the above alignment is on State Land. According to City officials, the Arizona State Land Department does not prefer this alignment because it would encumber the land with an easement, making it less attractive to potential buyers. The crossing of the Unnamed Wash is also complicated by a proposed urban trail parallel to the wash that will cross under the reconstructed roadway. However, since the roadway profile at the wash will be raised by approximately 20 ft, the new sewer can go over a 6' x 6' box culvert needed to pass water under the roadway and a 12-ft high box culvert needed for the urban trail.

There will be a minimum of 2 ft clearance between the top of the box culvert and the bottom of the sewer. Detailed plans for the City sewer line are included in the 30% plans (Appendix A).

4.11.3.1 Sewer Line Design Alternatives

Upon review of the Draft DCR, the proposed layout depicted in the document was reviewed and discussed in detail. Several City officials raised concerns about the construction of a sewer lines at depths exceeding 15 feet. Main concerns were regarding deep excavations in the heavily cemented soils and additional costs of such construction operation and maintenance and access of the sewer line. Two comprehensive meetings were held with City officials from the Management, Engineering, Planning and Operation and Maintenance Groups. During these discussions, four alternatives for the sewer line layout were evaluated and are described below:

⇒ Alternative I assumes that a sewer line extending from Westwing Parkway to SR 74 will be constructed. This alternative requires a jack and bore operation under the CAP canal. This alternative is still under consideration although it is recognized that jacking and boring under the CAP Canal through hard, rock-like material will be difficult and expensive.

⇒ Alternative II assumes the construction of a sewer line extending from Westwing Parkway to the CAP utilizing the pipe that was installed with the ADOT SR303L project. This alternative resulted in sewer line depth exceeding 25' approaching the SR303L. A second sewer line will be constructed from north of the CAP to SR 74.

⇒ Alternative III assumes the construction of a sewer line extending from Westwing Parkway to the CAP with an elevated profile approaching the SR303L. This alternative required the installation of a pump station south of the SR303L. A second sewer line will be constructed from north of the CAP to SR 74.

⇒ Alternative IV assumes that a sewer line extending from Westwing Parkway to the CAP will be constructed utilizing an inverted siphon to cross under the SR303L. A second sewer line will be constructed from north of the CAP to SR 74.

Alternatives III and IV were eliminated from further consideration due to the City's preference to minimize maintenance and operational problems associated with a pump station or a siphon. This DCR recommends Alternative I as the preferred construction alternative for this project, with the acknowledgment that that the jack and bore alternative under the CAP be needs to be further evaluated during final design based on geotechnical information and detailed discussions with experts with such jack and bore operations.

4.11.4 El Paso Natural Gas (EPNG)

EPNG Company owns a 20" gas line that is typically located on the west side of the existing roadway. The line is located within a 50' to 60'easement granted to EPNG by the ASLD. Any costs associated with the relocations of the gas line will bore by the City since EPNG has prior rights. The need to relocate the gas line will be evaluated during the final design stage of the project based on pothole information and communication with EPNG representatives.

4.11.5 Planned Utilities

Limited private utilities currently exist along Lake Pleasant Parkway. The City is currently evaluating the feasibility of installing conduits for private utilities (Qwest, Cox, APS, SWG etc.) to be utilized in the future as warranted by development as a part of the South Segment construction project and within the City's right-of-way. The effort associated with planning for future development is led by the City in partnership with the private utility representatives to ensure the compatibility of planned improvements and utility services. It is important to note that representatives of the utility companies have been involved throughout the preparation of this DCR.

Sleeves for future utility crossing are recommended to be installed every 1,320' (1/4 mile), 100' north of every proposed street crossing. Assuming the private utilities will ultimately be installed on the west side of Lake Pleasant Parkway, no sleeves are recommended to be installed from Dixileta Drive to the SR303L. Sleeves will extend beyond the roadway sidewalk and potential right turn lanes, with the anticipation that right turn lanes at minor roadways may be constructed by developers.

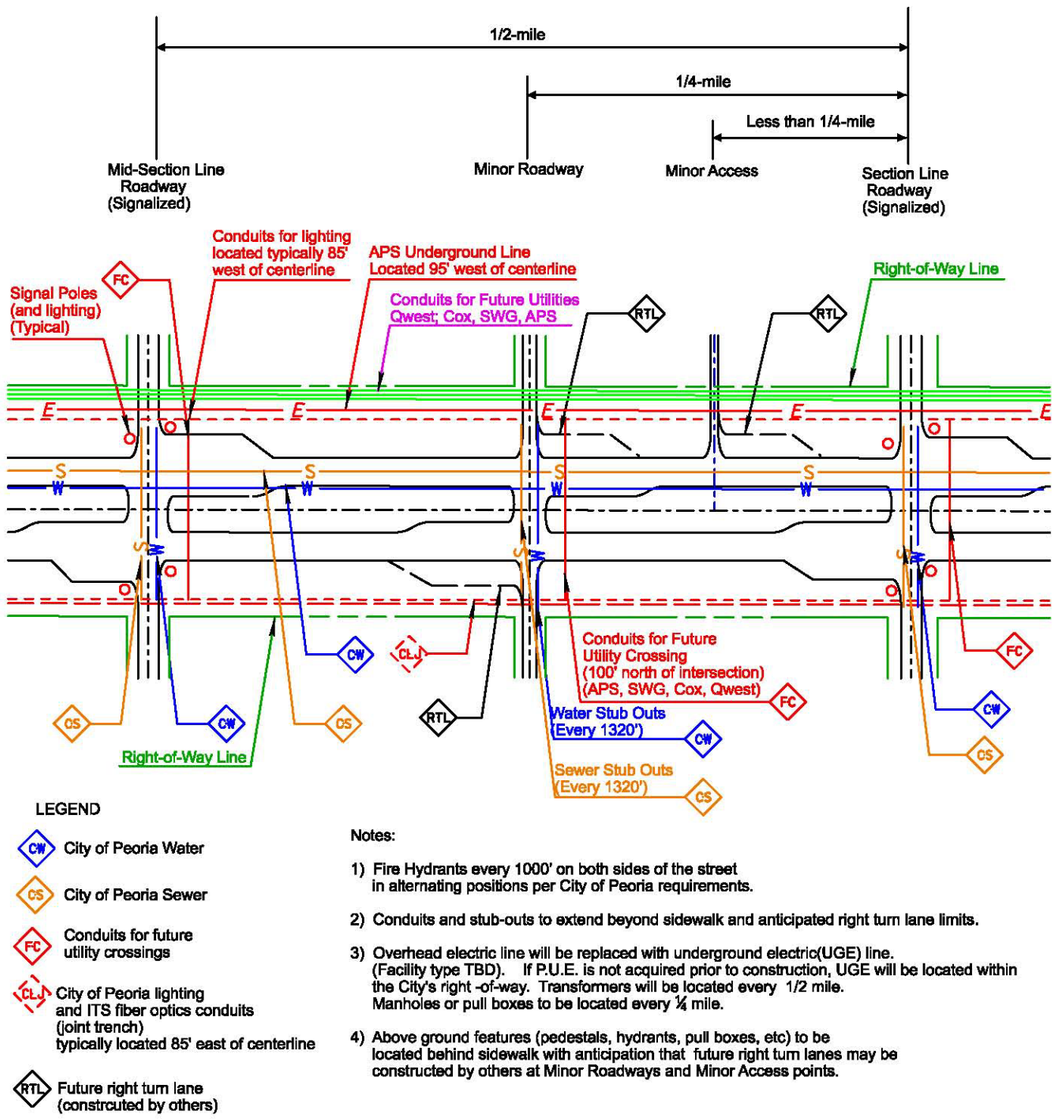
The utility conduits for future crossings include the following sleeves:

- 1-12" sleeve for future 8" SWG line
- 2-8" sleeves for future Cox Fiber Optic lines
- 2-8" sleeves for future 4" Qwest Lines
- 4-5" concrete encased sleeves for future APS electrical lines.

As a part of the DCR, a conceptual utility layout was developed based on input from the City and representatives of the utility companies identifying the recommended location for the installation of future public and City utilities as shown in Figure 4.7. The intent of the conceptual layout is to minimize construction conflicts with future utilities, to identify locations of future utility crossings and stub outs and designate a utility corridor outside of the City's right of way.

The City of Peoria has extensive plans to extend water and sewer service within the project limits. Other facility owners, like APS, Qwest and Southwest Gas will continue to respond to local growth.

Figure 4.7 Conceptual Utility Layout



5.0 Environmental Overview

A Categorical Exclusion will be prepared during final design that will describe the study area in terms of its social, economic, and environmental character, and identify any potential impacts that may result from project construction. The issues and impacts anticipated as a result of implementing the proposed project are summarized in the following sections.

5.1 Biological Resources

The project area supports typical Arizona Upland Subdivision vegetation plants, including creosote bush *(Larrea tridentata),* triangle-leaf bursage *(Ambrosia deltoidea),* brittlebush *(Encelia farinosa),* and various species of cholla, including teddy bear *(Cylindropuntia bigelovii),* chain fruit *(Cylindropuntia fulgida),* buckhorn *(Cylindropuntia acanthocarpa)*, staghorn *(Cylindropuntia versicolor),* and saguaro *(Carnegiea gigantea).* Dominant species associated with washes include blue paloverde *(Parkinsonia florida),* foothill paloverde *(Parkinsonia microphyllum),* Western honey mesquite *(Prosopis glandulosa* var. *torreyana),* velvet mesquite *(Prosopis velutina),* ironwood *(Olneya tesota),* and desert hackberry *(Celtis pallida).*

Plant species protected by the Arizona Native Plant Law include all cacti and most desert trees, including velvet mesquite, blue and yellow paloverde, and ironwood. No Arizona Department of Agriculture Highly Safeguarded plant species have been observed east and west and adjacent to the project site.

No federally listed, proposed, or candidate species of plants or animals are known or expected to occur in the project area. No portion of the site is in or near designated or proposed critical habitat for any listed species (U.S. Fish and Wildlife Service).

During final design, the area will be surveyed for native plants and invasive species.

5.1.1 Water Resources

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 (Waters). The U.S. Army Corps of Engineers (Corps) is the federal agency responsible for authorizing this permit program. The southern portion of the project area, south of the Central Arizona Project (CAP) canal, was previously surveyed for Waters under two separate projects. For the proposed State Route (SR) 303 project, the Arizona Department of Transportation (ADOT) prepared a Preliminary Jurisdictional Delineation that was approved by the Corps in 2007 (File No. SPL-2007-1076-KAT). For the SR 303 East Peoria project, the Arizona State Land Department (ASLD) prepared a Preliminary Jurisdictional Delineation that addressed the remaining southern portion of the project area. The ASLD Preliminary Jurisdictional Delineation was approved by the Corps in 2008 (File No. SPL-2008-1159-RWE). One Water was identified in the southern portion of the project area. During final design, the City of Peoria will review the plans and determine which type of permit would be required from the Corps.

With regard to the northern portion of the project area, the ASLD completed field work for its South Biscuit Flats project, which is located in the northeastern portion of the project area between the CAP canal and SR 74. Based on its preliminary findings, no Waters are anticipated in the northern portion of the project area. However, the ASLD does not anticipate submitting its findings to the Corps in the near future.

5.1.2 Cultural Resources

Cultural resources are properties that reflect the heritage of local communities, states, and nations. Properties judged to be significant and to retain sufficient integrity to convey that significance are termed "historic properties" and are afforded certain protections in accordance with state and federal legislation. The National Historic Preservation Act (NHPA) of 1966, as amended, defines historic properties as sites, buildings, structures, districts, and objects included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), as well as the artifacts, records, and remains related to such properties. Section 106 of the NHPA, as implemented under 36 Code of Federal Regulations Part 800, requires federal agencies to consider the potential effects of their undertakings on historic properties. If the project is locally funded, the Corps, for example, will need to comply with Section 106 when it responds to a Preconstruction Notice of the City of Peoria's intent to use a Nationwide Permit to comply with Section 404 of the Clean Water Act. If the City of Peoria were to obtain federal monies from the Federal Highway Administration (FHWA), the FHWA would need to comply with Section 106 (with assistance from ADOT).

The Arizona State Historic Preservation Act of 1982, as amended through 2000 (Arizona Revised Statutes [ARS] § 41-861-866) largely mirrors the NHPA and requires state agencies, including the Arizona State Land Department and ADOT, to consider the potential effects of their actions on historic properties. The Arizona Antiquities Act of 1973, as amended through 1998 (ARS § 41-841-847), requires that state agencies and political subdivisions of the state, including counties and municipalities, report the discovery of any archaeological, paleontological, or historic site, including human burials that are at least 50 years old, to the Arizona State Museum (ASM).

Research was conducted for this project at the ASM and the Arizona State Historic Preservation Office (SHPO). The AZSITE and NRHP Information System online databases and the General Land Office (GLO) plats also were used to identify surveys and recorded or suspected cultural resources that might be subject to impact from one or more of the alternatives under consideration. Cultural resource inventories conducted to date have covered all of the four alternative including the preferred alternative 1. As shown in Table 1, nine cultural resources are known or suspected to extend within one or more of the alternative corridors.

Table 5.1 Potential Cultural Resources Constraints of Proposed Lake Pleasant Parkway Alternatives

No.	Resource Name/No.	Description	NRHP Eligibility[1]	Alternatives with Potential Impacts	Recommended Measures[2]
1	The Shmoo Site AZ T:3:167 (ASM) *Subsumes AZ T:3:168, 171, 172, 178, 320, and 321 (ASM)*	Prehistoric agricultural and ground stone manufacturing site	Determined eligible, Criterion D (mitigation within 303 corridor)	Alternative 4S	None
2	AZ T:3:335 (ASM)	Prehistoric artifact scatter	Recommended not eligible	Alternatives 2S and 4S	None

No.	Resource Name/No.	Description	NRHP Eligibility[1]	Alternatives with Potential Impacts	Recommended Measures[2]
3	AZ T:4:19 (ASM)	Multi-component: historic trash scatter with a small cluster of prehistoric ceramics	Not evaluated	Alternative 3S	None
4	Road to Frog Tanks AZ T:4:444 (ASM)	Historic road segment	Recommended eligible, Criterion A, non-contributing in area of potential effects for Alternative 1	Alternatives 1N, 2N, and 3N	None
5	AZ T:7:402 (ASM)	Multicomponent: prehistoric ceramics and ground stone manufacturing loci; historic trash scatter with associated rock features	Recommended eligible, Criterion D	Alternative 3S	None
6	AZ T:7:403 (ASM)	Prehistoric lithic and ground stone procurement area	Recommended eligible, Criterion D	Alternative 2S	None
7	AZ T:7:404 (ASM); AZ T:7:35 (ASU)	Prehistoric trail alignment with associated lithic reduction loci, rock features, and petroglyphs	Recommended eligible, Criterion D	Alternative 2S	None
8	EPNG Line 1203	Buried natural gas pipeline constructed between 1956 and 1959	Not subject to Section 106[1]	Alternatives 1N, 1S, 2S, 3S, and 4S	None
9	Unnamed GLO Road	Historic road segment	Recommended not eligible	Alternatives 1S, 3S	None

Properties identified as "determined" eligible or not eligible are those for which documentation of consultation by a federal or state agency with SHPO was obtained. Properties identified as "recommended" eligible or not eligible are those for which no documentation of consultation was obtained or for which consultation has yet to occur. The listed recommendations are those of the properties' recorders.

2 NRHP eligibility and recommended measures pending review and consultation for AZ T:3:335 (ASM), AZ T:7:402 (ASM), AZ T:7:403 (ASM), AZ T:7:404 (ASM), EPNG Line 1203, and Unnamed GLO Road segment.

3 Intensive archival research and formal documentation required prior to gas line abandonment (per Advisory Council on Historic Preservation guidelines).

[1] As of 5 April 2002, natural gas pipelines are exempt from Section 106 of the National Historic Preservation Act consideration, Citation: Notices: Exemption Regarding Historic Preservation Process for Projects Involving Historic Natural Gas Pipelines. *Federal Register* 67(66): 16364, 2002, Advisory Counsel of Historic Preservation.

As project planning progresses, additional cultural resources inventory will be required. Efforts to arrive at definitive eligibility assessments, including assessing whether the portions of eligible properties subject to potential effect are contributing elements of the properties as a whole, will be required. If eligible properties will be affected and preservation is not possible, mitigation measures will need to be developed and implemented prior to construction.

5.2 Hazardous Materials

A Preliminary Initial Site Assessment, which will include a site visit, evaluation of a regulatory database report, and preparation of a technical memorandum, will be completed for the project area. Findings will be included in the environmental clearance.

5.3 Noise

Ambient noise measurements will be collected at four locations with associated traffic counts. These measurements will provide the current noise levels in the project area and provide a baseline should noise modeling be required.

6.0 Preliminary Cost Estimate

The detailed cost estimate for the preferred alternatives, ***South Segment Alternative 3S - Shift Roadway to the East; close to the New River Levee and North Segment Alternative 4N - Northbound Traffic on Existing Bridge*** are provided in this section.

The unit prices were based on recent unit prices used in recent DCR's and project bids. Additional information regarding estimation method is provided for the following items:

- Earthwork: Earthwork has been calculated using Inroads modeling. The earthwork numbers are un-factored.
- Pavement Related Items: The pavement design section is based on the preliminary recommendation provided in Section 4.6.3 of this DCR.
- Box Culverts: Lump sum items are shown for the box culverts. Calculations for each structure will be provided with the Final DCR.
- Landscaping: Landscaping costs were evaluated per square foot with a $5 per square foot for the median areas and $3 per square foot for the roadway slopes areas.
- Construction Water: The cost for this item was assumed to be included with the earthwork related items.
- Sewer line and water line construction costs are estimated separately.
- Right-of-way: The new right-of-way areas were measured using MicroStation. A cost of $50,000 per acre was used to estimate the right-of-way from ASLD. A cost of $75,000 per acre was used to estimate the right-of-way from FCDMC. $10,000 permit fees were used for CAP and BLM. A cost of $100,000 per acre was used to estimate right-of-way from private land.
- Utility Relocation: Due to the high cost of relocating EPNG line and the APS transmission lines separate bid items was used for these relocations. All other utility costs have been estimated as a percentage of the overall construction cost. The percentage used is 1% and will primarily be limited to relocating power, cable, gas and adjusting waterline appurtenances.

Tables 6.1 though 6.8 summarize the preliminary project cost for the South and North segments as described below:

⇒ Table 6.1 provides a preliminary cost estimate for all the South Segment Alternative 3S interim improvements for the roadway, drainage and structures construction, design, construction management and administration.
⇒ Table 6.2 provides a preliminary cost estimate for South Segment Alternative 3S **sewer line** installation, including contingencies, design, construction management and administration.
⇒ Table 6.3 provides a preliminary cost estimate for South Segment Alternative 3S **water line** installation, including contingencies, design, construction management and administration.
⇒ Table 6.4 provides a preliminary cost estimate for all the North Segment Alternative 4N interim improvements for the roadway, drainage and structures construction, design, construction management and administration.
⇒ Table 6.5 provides a preliminary cost estimate for North Segment Alternative 4N **sewer line** installation, including contingencies, design, construction management and administration.
⇒ Table 6.6 provides a preliminary cost estimate for North Segment Alternative 4N **water line** installation, including contingencies, design, construction management and administration.
⇒ Table 6.7 summarizes the preliminary costs estimates for **all the South Segment Alternatives**, and Table 6.8 summarizes the preliminary costs estimates for **all the North Segment Alternatives**.

Table 6.1 South Segment Alternative 3S Preliminary Cost Estimate (Interim)

Item Description	Quantity	Unit	Unit Price	Total
As-Built Preparation And Certification	1	LUMP SUM	$ 5,000.00	$5,000
Construction Survey and Layout	1	LUMP SUM	$ 120,000.00	$120,000
Contractor Quality Control	1	LUMP SUM	$ 125,000.00	$125,000
Community Relations Support	1	ALLOWANCE	$ 5,000.00	$5,000
AZPDES	1	LUMP SUM	$ 25,000.00	$25,000
Type I Engineer's Field Office	1	LUMP SUM	$ 20,000.00	$20,000
Roadway Excavation	63680	CY	$ 6.00	$382,080
Borrow Excavation (Imported)	108730	CY	$ 7.00	$761,110
Remove Existing Roadway, Grade and Seed	2.5	ACRES	$ 22,000.00	$55,000
Channel Excavation	63725	CY	$ 6.00	$382,350
Earthwork for Retention Basins	21420	CY	$ 6.00	$128,520
Plain Riprap, D50=6", 1.5' Depth	333	CY	$ 100.00	$33,300
Plain Riprap, D50=8", 2' Depth	371	CY	$ 100.00	$37,100
Plain Riprap, D50=12", 2'' Depth	2403	CY	$ 100.00	$240,300
Subgrade Preparation	139704	SY	$ 6.00	$838,224
Aggregate Base Course, 12"	82984	Ton	$ 13.00	$1,078,792
Asphalt Concrete Pavement (City of Phoenix Mix C3/4")(High Volume)	36946	Ton	$ 45.00	$1,662,570
Bituminous Tack Coat SS-1h, Diluted	93	Ton	$ 500.00	$46,500
Vertical Curb and Gutter, MAG Det 220, Type A, H=6"	26370	LF	$ 12.00	$316,440
Single Curb, MAG Det. 222, Type B	25628	LF	$ 8.00	$205,024
Concrete Sidewalk, MAG Det 230	223428	SF	$ 3.00	$670,284
Concrete Sidewalk Ramp, City of Phoenix Det P1240	33	EACH	$ 1,500.00	$49,500
Remove Existing Pavement	37595	SY	$ 4.00	$150,380
Remove Existing Concrete Curb and Gutter	1168	LF	$ 10.00	$11,680
Remove Existing Fence	2265	LF	$ 10.00	$22,650
6' High Chain Link Fence, MAG Det 160	2265	LF	$ 15.00	$33,975
Bus Bay	4	EACH	$ 10,000.00	$40,000
Landscaping and Irrigation - (Roadway Slopes)	513743	SF	$ 3.00	$1,541,229
Landscaping and Irrigation - (Median)	392942	SF	$ 5.00	$1,964,710
Traffic Signing & Striping - 5 lanes	13500	LF	$ 6.00	$81,000
Traffic Signal, Full Intersection	2	EACH	$ 230,000.00	$460,000
Traffic Signal, Future "Box-in"	2	EACH	$ 16,000.00	$32,000
Lighting	1	LUMP SUM	$ 500,000.00	$500,000
ITS (DMS, CFTV, Traffic Counter Stations, Communication Vault, Communication Pull Box)	1	LUMP SUM	$ 262,500.00	$262,500
Fiber Optics Trench	12000	LF	$ 55.00	$660,000
Fiber Optics Cable	15000	LF	$ 5.50	$82,500
Catch Basin COP Std P-1569-1 or 2, Type M-1, L=17'	39	EACH	$ 3,000.00	$117,000
Drainage Structure at Unnamed Wash	1	LUMP SUM	$ 430,000.00	$430,000
15" RGRCP, Class IV	2594	LF	$ 50.00	$129,700
24" RGRCP, Class IV	4262	LF	$ 60.00	$255,720
30" RGRCP, Class IV	3378	LF	$ 80.00	$270,240
36" RGRCP, Class IV	4438	LF	$ 100.00	$443,800
30" CMP	664	LF	$ 75.00	$49,800
36" CMP	710	LF	$ 90.00	$63,900
36" RCP	852	LF	$ 100.00	$85,200
6'x4' CBC	1	LUMP SUM	$ 48,500.00	$48,500
6'x6' CBC	1	LUMP SUM	$ 107,500.00	$107,500
Headwalls (Combined all ADOT Type)	1	LUMP SUM	$ 9,100.00	$9,100
Headwalls (Combined all MAG Type)	1	LUMP SUM	$ 26,000.00	$26,000
Storm Drain Manhole, MAG Det. 520 & 522	35	EACH	$ 3,500.00	$122,500
Subtotal Roadway & Structures:				**$15,188,678**
Mobilization\Demobilization @ 5%	1	LUMP SUM	$759,434	$759,434
Traffic Control @ 3.5%	1	LUMP SUM	$531,604	$531,604
Subtotal Construction:				$16,479,716
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$1,647,972	$1,647,972
Subtotal Construction:				**$18,127,687**
Design @ 10%	1	LUMP SUM	$1,812,769	$1,812,769
Construction Management @ 12%	1	LUMP SUM	$2,175,322	$2,175,322
Administration @ 8%	1	LUMP SUM	$1,450,215	$1,450,215
Right-of-Way (Private)	15.7	Acre	$100,000	$1,570,000
Right-of-Way (ASLD)	54.57	Acre	$ 50,000	$2,728,500
Right –of-Way (FCD)	13.84	Acre	$ 75,000	$1,038,000
Right –of-Way (FCD-BLM)	1	LUMP SUM	$10,000	$10,000
EL Paso Gas Line Relocation (Potential Relocation)	1	LUMP SUM	$750,000	$750,000
APS Overhead Relocation (12 kV)	11880	LF	$100	$1,188,000
Trench & Conduit	11880	LF	$ 100	$1,188,000
Utility Relocation @ 1%	1	LUMP SUM	$ 181,276	$ 181,276
Total:				**$32,219,770**

Table 6.2 South Segment Alternative 3S Preliminary Cost Estimate for Sewer Line

Description	Quantity	Unit	Unit Price	Total
Remove Existing Sewer Pipe (12" and 18")	112	LF	$ 90.00	$10,080
18" PVC Sanitary Sewer Pipe (VCP)	6381	LF	$ 320.00	$2,041,920
21" PVC Sanitary Sewer Pipe (VCP)	6276	LF	$ 330.00	$2,071,080
8" Sewer Pipe	1117	LF	$ 125.00	$139,625
60" Dia. Sanitary Sewer Manhole, with "T-lock" PVC Liner, per MAG Std. Det. 420. Manhole Frame and 30" Cover per MAG Std. Det. 424	33	EACH	$ 10,000.00	$330,000
Subtotal Sewer Line:				$4,592,705
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$459,271	$459,271
Subtotal Construction:				**$5,051,976**
Design @ 10%	1	LUMP SUM	$505,198	$505,198
Construction Management @ 12%	1	LUMP SUM	$606,237	$606,237
Administration @ 8%	1	LUMP SUM	$404,158	$404,158
Total:				**$6,567,568**

* CIP UT 00151 Lake Pleasant Parkway - 21/18 inch Sewer/Dynamite-Loop 303

Table 6.3 South Segment Alternative 3S Preliminary Cost Estimate for Water Line

Description	Quantity	Unit	Unit Price	Total
24" Ductile Iron Pipe, Class 250	11270	LF	$ 200.00	$2,254,000
16" Ductile Iron Pipe, Class 250	1060	LF	$ 150.00	$159,000
8" Ductile Iron Pipe, Class 250	440	LF	$ 100.00	$44,000
24" Butterfly Valve	7	EA	$ 9,000.00	$63,000
16" Gate Valve	4	EA	$ 2,400.00	$9,600
8" Gate Valve	6	EA	$ 1,200.00	$7,200
Valve Box and Cover, COP Det. PE-270	10	EA	$ 500.00	$5,000
Butterfly Valve Operator Manhole, COP Det PE-346	7	EA	$ 3,000.00	$21,000
Universal Air Vacuum Valve, COP Det PE-395	4	EA	$ 1,000.00	$4,000
Subtotal Water Line:				$2,566,800
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$256,680	$256,680
Subtotal Construction:				$2,823,480
Design @ 10%	1	LUMP SUM	$282,348	$282,348
Construction Management @ 12%	1	LUMP SUM	$ 338,818	$ 338,818
Administration @ 8%	1	LUMP SUM	$225,878	$225,878
Total:				**$3,670,524**

* CIP UT 00148 Lake Pleasant Parkway – 36 inch Water Line Dynamite- Loop 303

Table 6.4 North Segment Alternative 4N Preliminary Cost Estimate (Interim)

Item Description	Quantity	Unit	Unit Price	Total
As-Built Preparion And Certification	1	LUMP SUM	$ 5,000.00	$5,000
Construction Survey and Layout	1	LUMP SUM	$ 120,000.00	$120,000
Contractor Quality Control	1	LUMP SUM	$ 125,000.00	$125,000
Community Relations Support	1	ALLOWANCE	$ 5,000.00	$5,000
AZPDES	1	LUMP SUM	$ 25,000.00	$25,000
Type I Engineer's Field Office	1	LUMP SUM	$ 20,000.00	$20,000
Roadway Excavation	23814	CY	$ 6.00	$142,884
Borrow Excavation (Imported)	225857	CY	$ 7.00	$1,580,999
Remove Existing Roadway, Grade and Seed	2.5	ACRES	$ 22,000.00	$55,000
Channel Excavation	31588	CY	$ 6.00	$189,528
Earthwork for Retention Basins	16541	CY	$ 6.00	$99,246
Plain Riprap, D50=6", 1.5' Depth	702	CY	$ 100.00	$70,200
Plain Riprap, D50=8", 2' Depth	535	CY	$ 100.00	$53,500
Subgrade Preperation	184220	SY	$ 6.00	$1,105,320
Aggregate Base Course, 12"	109427	Ton	$ 13.00	$1,422,551
Asphalt Concrete Pavement (City of Phoenix Mix C3/4")(High Volume)	48703	Ton	$ 45.00	$2,191,635
Bituminous Tack Coat SS-1h, Diluted	123	Ton	$ 500.00	$61,500
Vertical Curb and Gutter, MAG Det 220, Type A, H=6"	28262	LF	$ 12.00	$339,144
Single Curb, MAG Det. 222, Type B	27940	LF	$ 8.00	$223,520
Concrete Sidewalk, MAG Det 230	233087	SF	$ 3.00	$699,261
Concrete Sidewalk Ramp, City of Phoenix Det P1240	36	EACH	$ 1,500.00	$54,000
Remove Existing Pavement	47382	SY	$ 4.00	$189,528
Landscaping and Irrigation - (Back of Sidewalk)	660807	SF	$ 3.00	$1,982,421
Landscaping and Irrigation - (Median)	275529	SF	$ 5.00	$1,377,645
Traffic Signing & Striping - 5 lanes	16000	LF	$ 6.00	$96,000
Traffic Signal, Full Intersection	3	EACH	$ 230,000.00	$690,000
Traffic Signal, Future "Box-in"	1	EACH	$ 16,000.00	$16,000
Lighting	1	LUMP SUM	$ 500,000.00	$500,000
ITS (DMS, CFTV, Traffic Counter Stations, Communication Vault, Communication Pull Box)	1	LUMP SUM	$ 226,000.00	$226,000
Fiber Optics Trench	16000	LF	$ 55.00	$880,000
Fiber Optics Cable	18000	LF	$ 5.50	$99,000
Structure Over CAP	1	LUMP SUM	$ 865,000.00	$865,000
Retrofit Existing Structure	1	LUMP SUM	$ 100,000.00	$100,000
Catch Basin COP Std P-1569-1 or 2, Type M-1, L=17'	48	EACH	$ 3,000.00	$144,000
Pedestrian Underpass at CAP	1	LUMP SUM	$ 315,000.00	$315,000
Equipment Pass for CAP (South)	1	LUMP SUM	$ 690,000.00	$690,000
Equipment Pass for CAP (North)	1	LUMP SUM	$ 690,000.00	$690,000
Drainage Pump for CAP Equipment Pass	2	LUMP SUM	$ 25,000.00	$50,000
15" RGRCP, Class IV	2768	LF	$ 50.00	$138,400
24" RGRCP, Class IV	3385	LF	$ 80.00	$270,800
30" RGRCP, Class IV	5534	LF	$ 75.00	$415,050
36" RGRCP, Class IV	2582	LF	$ 90.00	$232,380
48" RGRCP, Class IV	276	LF	$ 100.00	$27,600
24" CMP	348	LF	$ 70.00	$24,360
36" CMP	848	LF	$ 90.00	$76,320
36" RCP	804	LF	$ 140.00	$112,560
42" RCP	648	LF	$ 160.00	$103,680
6'x5' CBC	1	LUMP SUM	$ 63,850.00	$63,850
8'x4' CBC	1	LUMP SUM	$ 85,500.00	$85,500
8'x6' CBC	1	LUMP SUM	$ 100,000.00	$100,000
Headwalls (Combined all ADOT Type)	1	LUMP SUM	$ 29,550.00	$29,550
Headwalls (Combined all MAG Type)	1	LUMP SUM	$ 13,600.00	$13,600
Storm Drain Manhole, MAG Det. 520 & 522	37	EACH	$ 3,500.00	$129,500
Subtotal Roadway & Structures:				$19,322,032
Mobilization\Demobilization @ 5%	1	LUMP SUM	$966,102	$966,102
Traffic Control @ 3.5%	1	LUMP SUM	$676,271	$676,271
Subtotal Construction:				$20,964,405
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$2,096,440	$2,096,440

Item Description	Quantity	Unit	Unit Price	Total
			Total Construction Costs	**$23,060,845**
Design @ 10%	1	LUMP SUM	$2,306,085	$2,306,085
Construction Management @ 12%	1	LUMP SUM	$2,767,301	$2,767,301
Administration @ 8%	1	LUMP SUM	$1,844,868	$1,844,868
Right-of-Way (Private)	7	Acre	$100,000	$700,000
Right of Way (ASLD)	77	Acre	$50,000	$3,850,000
Right Of way (CAP)	1	LUMP SUM	$10,000	$10,000
APS Overhead Relocation (12 kV)	12770	LF	$100	$1,277,000
Trench & Conduit	12770	LF	$100	$1,277,000
Utility Relocation @ 1%	1	LS	$230,608	$230,608
Total:				**$37,323,707**

Table 6.5 North Segment Alternative 4N Preliminary Cost Estimate for Sewer Line

Item Description	Quantity	Unit	Unit Price	Total
Remove Existing Sewer Pipe (18")	12	LF	$ 90.00	$1,080
18" PVC Sanitary Sewer Pipe (VCP)	16123	LF	$ 320.00	$5,159,360
8" Sewer Pipe	2337	LF	$ 125.00	$292,125
60" dia. sanitary sewer manhole, with "T-lock" PVC liner, per MAG Std. Det. 420. Manhole frame and 30" cover per MAG Std. Det. 424	37	EACH	$ 10,000.00	$370,000
48" dia. sanitary sewer manhole, with "T-lock" PVC liner, per MAG Std. Det. 420. Manhole frame and 24" cover per MAG Std. Det. 424	6	EACH	$ 8,000.00	$48,000
Drop Connection per MAG Det 426	6	EACH	$ 3,200.00	$19,200
jack And Bore 42" Casing	235	LF	$ 2,766.00	$650,010
			Subtotal Sewer Line:	$6,539,775
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$653,978	$653,978
			Subtotal Construction:	**$7,193,753**
Design @ 10%	1	LUMP SUM	$719,375	$719,375
Construction Management @ 12%	1	LUMP SUM	$863,250	$863,250
Administration @ 8%	1	LUMP SUM	$575,500	$575,500
Total:				**$9,351,878**

Table 6.6 North Segment Alternative 4N Preliminary Cost Estimate for Water Line

Item Description	Quantity	Unit	Unit Price	Total
24" Ductile Iron Pipe, Class 250	15890	LF	$ 200.00	$3,178,000
16" Ductile Iron Pipe, Class 250	720	LF	$ 150.00	$108,000
8" Ductile Iron Pipe, Class 250	4000	LF	$ 100.00	$400,000
24" Butterfly Valve	8	EA	$ 9,000.00	$72,000
16" Gate Valve	6	EA	$ 2,400.00	$14,400
8" Gate Valve	8	EA	$ 1,200.00	$9,600
Valve Box and Cover, COP Det. PE-270	14	EA	$ 500.00	$7,000
Butterfly Valve Operator Manhole, COP Det PE-346	8	EA	$ 3,000.00	$24,000
Universal Air Vacuum Valve, COP Det PE-395	4	EA	$ 1,000.00	$4,000
			Subtotal Water Line:	$3,817,000
Contingencies for Unknown Items @ 10%	1	LUMP SUM	$381,700	$381,700
			Subtotal Construction:	$4,198,700
Design @ 10%	1	LUMP SUM	$419,870	$419,870
Construction Management @ 12%	1	LUMP SUM	$503,844	$503,844
Administration @ 8%	1	LUMP SUM	$335,896	$335,896
Total:				**$5,458,310**

Table 6.7 South Segment Alternatives Preliminary Cost Estimates (Ultimate)

COST CATEGORIES	Preferred Alternative 3S Interim Improvements (4-lanes)	Preferred Alternative 3S Interim to Ultimate (2 additional Lanes)	Alternative 1S Reconstruct Roadway on Existing Alignment	Alternative 2S Shift Roadway to the West of the Existing Alignment; Close to the Bluff	(Preferred) Alternative 3S Shift Roadway to the East of Existing Alignment; Close to the New River Levee	Alternative 4S Gas Line Alignment
Construction Roadway & Structures	$18,127,687	$1,857,022	$18,992,550	$18,878,890	$19,097,139	$18,979,483
Design (10%)	$1,812,769	$185,702	$1,899,255	$1,887,889	$1,909,714	$1,897,948
Construction Management (12%)	$2,175,322	$222,843	$2,279,106	$2,265,467	$2,291,657	$2,277,538
Right-of-Way	$5,346,500	$0	$5,346,500	$5,346,500	$5,346,500	$5,346,500
Utility Relocation	$3,307,277	$0	$3,302,326	$3,284,389	$3,316,971	$3,300,395
Administration (8%)	$1,450,215	$148,562	$1,519,404	$1,510,311	$1,527,771	$1,518,359
Engineers Estimate of Probable Project Cost	**$32,219,770**	**$2,414,128**	**$33,339,141**	**$33,173,446**	**$33,489,752**	**$33,320,222**
Sewer Line Total Cost (Includes Design, Cons. Mgmt., Admin)	$6,657,568	$0	$6,532,905	$6,489,662	$6,567,568	$6,528,079
Water Line Total Cost (Includes Design, Cons. Mgmt., Admin)	$3,670,524	$0	$3,670,524	$3,670,524	$3,670,524	$3670,524
Engineers Estimate of Total Probable Project Cost	**$42,457,862**	**$2,414,128**	**$43,542,570**	**$43,333,632**	**$43,727,844**	**$43,518,825**

Table 6.8 North Segment Alternatives Preliminary Cost Estimates (Ultimate)

COST CATEGORIES	Preferred Alternative 4N: Northbound on Existing Bridge Interim Improvements (4-lanes)	Preferred Alternative 4N: Northbound on Existing Bridge Interim to Ultimate (2 additional Lanes)	Alternative 1N: Reconstruct Roadway on Existing Alignment	Alternative 2N: Shift Roadway to the West of the Existing Alignment	Alternative 3N: Shift Roadway to the East of Existing Alignment	(Preferred) Alternative 4N: Northbound On Existing Bridge
Construction Roadway & Structures	$23,060,845	$1,997,972	$23,444,018	$25,483,151	$25,537,596	$24,164,713
Design (10%)	$2,306,085	$199,797	$2,344,402	$2,548,315	$2,553,760	$2,416,471
Construction Management (12%)	$2,767,301	$239,757	$2,813,282	$3,057,978	$3,064,512	$2,899,766
Right-of-Way	$4,560,000	$0	$4,560,000	$4,560,000	$4,560,000	$4,560,000
Utility Relocation	$2,784,608	$0	$2,788,440	$2,808,832	$2,809,376	$2,795,647
Administration (8%)	$1,844,868	$159,838	$1,875,521	$2,038,652	$2,043,008	$1,933,177
Engineers Estimate of Probable Project Cost	**$37,323,707**	**$2,597,363**	**$37,825,664**	**$40,496,927**	**$40,568,251**	**$38,769,774**
Sewer Line Total Cost (Includes Design, Cons. Mgmt., Admin)	$9,351,878	$0	$9,351,878	$9,351,878	$9,351,878	$9,351,878
Water Line Total Cost (Includes Design, Cons. Mgmt., Admin)	$5,458,310	$0	$5,458,310	$5,458,310	$5,458,310	$5,458,310
Engineers Estimate of Total Probable Project Cost	**$52,133,895**	**$2,597,363**	**$52,635,852**	**$55,307,116**	**$55,378,440**	**$53,579,963**