CHAPTER 2 TABLE OF CONTENTS

Page No.

LIST OF FIGURES

LIST OF TABLES

1

2.0 ALTERNATIVES

2.1 INTRODUCTION

The National Environmental Policy Act (NEPA) and its implementing regulations as contained in 23 Code of Federal Regulations (CFR) and 40 CFR requires that the Environmental Impact Statement (EIS) process rigorously explore and objectively evaluate all reasonable alternatives to the proposed action. Reasonable alternatives are those that are practical and feasible from a technical and economic standpoint, achieve the Purpose and Need for the project, and do not create unacceptable environmental impacts when compared to other alternatives.

This chapter summarizes the range of alternatives considered for the Study and the process used to identify and screen the alternatives to identify the reasonable alternatives fully evaluated in this document.

The *Alternatives Development and Screening* report (RTC, 2012) is incorporated by reference per Council on Environmental Quality (CEQ) 40 CFR 1502.21 and available under separate cover. It provides additional detailed information about the alternatives development and evaluation process conducted in support of this Study. The screening report outlines the three levels of alternatives development and screening that took place as part of the Draft EIS study process—Level 1, Level 2, and Level 3. It describes how alternatives were developed and how they were evaluated on their ability to meet the Purpose and Need for the project, their environmental impact, and their practicality. It also describes how the alternatives were combined to create the four build alternatives that were evaluated in the 2013 Draft EIS (referred to as Freeway Alternatives in this Final EIS). Further, it also provides information on why the alternatives that were not carried forward for detailed evaluation were eliminated. Section 2.2 *Alternatives Development and Screening Process* and Section 2.3 *Alternatives Considered* summarize this screening process.

This chapter then summarizes project changes that occurred after the Draft EIS was distributed that lead to the design changes made to the build alternatives that are fully evaluated in Chapter 3.0 of this Final EIS (referred to as Arterial Alternatives). The project changes include reductions in forecasted traffic as a result of updated traffic data that became available after the Draft EIS, and the build alternatives reevaluation and rescreening that was conducted and design changes made as a result of the reduced traffic forecasts. The most notable design changes made to the build alternatives after the Draft EIS was distributed include changing the proposed roadways from freeway-type facilities to arterial-type facilities, reducing the build alternative footprints in some areas, and eliminating some grade-separated interchanges previously proposed under the build alternatives evaluated in the Draft EIS.

The design changes did not result in alignment changes for any of the build alternatives. For more detail on design changes made after the Draft EIS, please refer to the *Alternatives Development and Screening Update: Identification of a Preferred Alternative for the Pyramid Highway and US 395 Connector* (RTC, 2017).

This Final EIS refers to the build alternatives evaluated in the Draft EIS as "Freeway Alternatives" and the build alternatives evaluated in this Final EIS as "Arterial Alternatives."

Chapter 6.0 evaluates the alternatives fully analyzed in this document in light of the results of the detailed analyses presented in Chapters 3.0 and 5.0. Chapter 6.0 summarizes how each alternative analyzed meets or does not meet the project's purpose and need, and the principal advantages and disadvantages of each alternative. Chapter 6.0 then summarizes how consideration of the analysis results in Chapters 3.0 and 5.0 led to the identification of the Preferred Alternative, and provides a full description of the Preferred Alternative.

2.2 Alternatives Development and Screening Process

A wide range of reasonable alternatives was initially developed that included multiple transit technologies on feasible alignments and highway improvements on both existing and new alignments. The process of developing and screening alternatives took into account the following:

- The Purpose and Need for the project, described in Chapter 1.0 *Purpose and Need*
- Ability to avoid or minimize environmental impacts
- The regional planning context
- The reasonableness of an alternative
- Stakeholder input
- Public input
- State and federal requirements

The Study team used a four-step alternatives development and screening process to identify the candidate alternatives to be studied in detail in the Draft EIS, as shown on Figure 2-1. The four steps included:

1. Develop preliminary alternatives
2. Conduct screening based on Purpose and Need and fatal flaws (Level 1)
3. Conduct screening based on preliminary comparative analysis (Level 2)
4. Conduct screening based on detailed comparative analysis (Level 3)

The process involved numerous stakeholders and the public. A Technical Advisory Committee (TAC) was formed that provided input from 32 stakeholders from a range of organizations and agencies representing a variety of goals and interests. The TAC included representatives of the City of Reno, City of Sparks, U.S. Bureau of Land

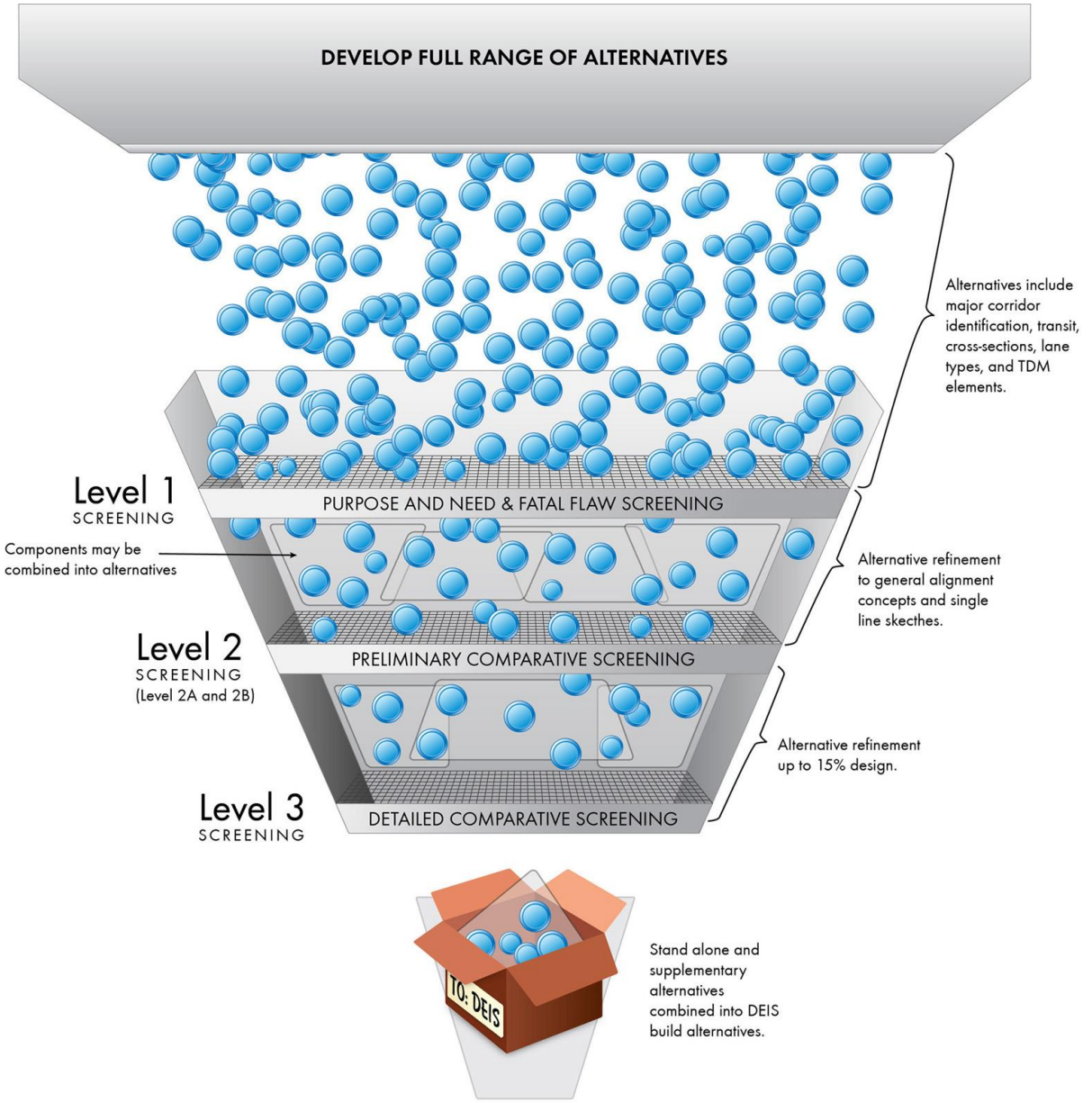


Figure 2-1. Alternatives Screening Process

Management (BLM), U.S. Environmental Protection Agency (EPA), Federal Highway Administration (FHWA), Nevada Department of Transportation (NDOT), Reno-Sparks Indian Colony, Regional Transportation Commission (RTC) Washoe, Washoe County, and Study team members. Also, the public provided comments on alternatives via the extensive public involvement program described in Chapter 4.0 *Comments and Coordination*. The Study team used input from the stakeholders and public to develop screening criteria, develop alternatives, and screen alternatives.

2.2.1 Decision-Making Process

The Study team used a collaborative decision making process to develop consensus among the communities and agencies, including NDOT and FHWA, on the elements in the Draft EIS alternatives. A collaborative decision making process was used because of the need for broad community support and to make the most informed use of limited financial resources available for transportation improvements in the region. Broad community support sets the stage for local agency participation, partnerships, and commitment to implementation through policies, zoning, and adoption of complementary land use and transportation plans. The collaborative decision making process is the mechanism for achieving broad community support for a Preferred Alternative that addresses the Purpose and Need Statement in a manner that allows FHWA and NDOT to take responsibility for the decision and implement it.

The process guidelines were developed through collaboration with stakeholders so that they understood how consensus was to be achieved during the Study. To develop a consensus agreement, the parties must recognize that, given the combination of gains and tradeoffs, the agreement reached is the best one the parties can make at that time.

Throughout the process, stakeholders present were asked to indicate their level of support for the decision. If consensus was not possible, the level of support and dissention was noted, and all deliberations and products of the collaboration were considered by NDOT and FHWA as they made decisions about that particular discussion.

The discussion process that led to the Draft EIS alternatives entailed the consideration by the TAC and other stakeholders of the Purpose and Need of the project weighed against environmental and other constraints. In support of this effort, the Study team provided data describing these transportation needs to the stakeholders, such as traffic demand and environmental data. The TAC meetings served as the forum for an iterative discussion process involving review and screening of conceptual alternatives based on increasingly detailed design and criteria.

In addition to the TAC meetings, the public outreach activities included five public meetings, agency involvement through five Stakeholder Working Group meetings, and several smaller group meetings that were held as necessary. In this way, a wide range of stakeholders contributed to the development of the Draft EIS alternatives.

2.2.2 Screening Criteria

The screening criteria reflected the elements of Purpose and Need Statement and environmental considerations. They evolved throughout the alternatives evaluation process to meet the level of analysis necessary at each screening level. For each successive level of screening, the criteria used to determine comparative advantages and disadvantages of the various alternatives were more focused and detailed than the prior levels.

2.2.2.1 Level 1 Screening

The Level 1 screening evaluated alternatives on a basic level by examining fatal flaw criteria.

	What Happened In Level 1 Screening?
LEVEL 1 ↓ LEVEL 2 ↓ LEVEL 3 ↓ Draft EIS	The Study team evaluated the full range of reasonable alternatives, based on ability to meet project Purpose and Need and whether an alternative had any fatal flaws If an alternative could not meet project purpose and need, it was eliminated as a "stand-alone alternative" but could still be a part of the final alternatives as a supplementary element. If an alternative had any fatal flaws, it was eliminated from consideration.

At this level of screening, the Study team considered numerous alternatives at a very conceptual level. Many of the alternatives had been identified in the *Pyramid Highway Corridor Management Plan* (CMP) approved in 2002. The CMP had similar goals as this Study and identified a set of improvements to be included in RTC's current regional transportation plan at the time, which was the 2030 *Regional Transportation Plan* (2030 RTP). Additional alternatives were identified through the scoping process and by the Study team. Alternatives included "system alternatives," transit alternatives, roadway improvements, and alternative lane types. System alternatives are those that involved a comprehensive set of regional improvements that could potentially reduce the specific needs for improvements on Pyramid Highway.

The Level 1 screening evaluated alternatives on a basic level by examining fatal flaw criteria. If an alternative had a fatal flaw, it was eliminated from consideration during Level 1 screening. The fatal flaw criteria for Level 1 screening were the following:

- Does the alternative have a fatal flaw of irresolvable environmental impacts?
- Does the alternative have a fatal flaw of exorbitant costs?
- Does the alternative have a fatal flaw of an unproven technology?
- Does the alternative have a fatal flaw of not being constructible?

If an alternative could not meet the project Purpose and Need, it was eliminated from consideration as a stand-alone alternative during Level 1 screening. The Purpose and Need criteria for Level 1 screening were the following:

- Could the alternative meet the Purpose and Need element of providing improvements to serve existing and future growth areas?
- Could the alternative meet the Purpose and Need element of providing direct and efficient travel routes to address existing inefficiencies by improving east-west connections and access to the Spanish Springs and northern Sparks area?
- Could the alternative meet the Purpose and Need element of alleviating traffic congestion?
- Does the alternative meet the Purpose and Need element of responding to regional and local plans for (1) the Pyramid corridor, and (2) improving multimodal options?

Again, the Study team evaluated the alternatives as "stand-alone" alternatives, based on an alternative's sole ability to meet the Purpose and Need for the project. If an alternative did not meet any of the above Purpose and Need criteria, it was screened out and did not continue onto later stages of analysis and evaluation, implying it could not become the Preferred Alternative. However, the Study team recognized that some alternatives that were screened out at Level 1 could ultimately become a part of a build alternative. These alternatives were then considered not as stand-alone solutions, but were recognized as supplemental elements to be considered as an element of one or more of the build alternatives.

2.2.2.2 Level 2 Screening

The Level 2A screening focused primarily on evaluating alternatives based on traffic demand and an initial review of environmental impacts.

What Happened In Level 2 Screening?

The Study team refined the alternatives from Level 1 and evaluated them based on more detailed criteria.

During Level 2A screening, general alignment concepts were evaluated based on preliminary traffic analysis and environmental review.

During Level 2B screening, the general alignment concepts were refined into more specific alignments and evaluated in greater detail, with special attention given to environmental constraints and specific relocations and acquisitions.

The Level 1 alternatives carried forward were refined into general alignment concepts, meaning that specific alignments were determined at a more detailed level. The Study team evaluated both North-South and East-West alignments at this level. In addition to the roadway concepts the Study team refined and evaluated further the supplemental elements identified in Level 1 (alternatives that the Study team determined could not meet Purpose and Need as stand-alone alternatives, but could be part of the build alternatives). The supplemental elements included pedestrian and bicycle facilities, transit services, congestion management practices, and alternative lane types.

Level 2A Traffic Demand Analysis

For the traffic demand analysis, the Study team tied specific criteria to each of the Purpose and Need elements and identified metrics available from the regional travel demand model. The Study team performed the traffic demand analysis after the highway alternatives were run in RTC's regional travel demand model. This model focuses on demand and performance based on demand, volumes, trip characteristics and volume-based performance criteria. The base year of analysis was 2040, consistent with RTC's latest draft Regional Transportation Plan at the time of screening. For modeling purposes, all segments were designated as freeway segments unless otherwise noted in the alternative definitions. Table 2-1 lists the traffic criteria used for Level 2 screening.

Table 2-1. Level 2A Traffic Screening Criteria

P&N Element	Criterion	Analysis Location(s)	Measure
Serve existing and future growth areas	Travel Demand	Representative locations	Average Daily Traffic (ADT) of alternative meets freeway level of demand
Provide Direct and Efficient Travel Routes	East-West Connections	East-West screenline from McCarran to North Valley Connector, including McCarran Blvd.	ADT to determine level of demand served by alternative
	System Efficiency (Mobility)	Study Area	Vehicle Miles Traveled (VMT) – an indication of overall travel mobility
Alleviate Existing Congestion	Traffic Operations	Pyramid Highway corridor	Vehicle Hours of Delay (VHD) – an indication of travel speeds and mobility
Alleviate Existing Congestion	Travel Time	Pyramid Highway and Eagle Canyon Dr. to Pyramid Way/I-80	Peak period travel time – an indication of mobility and congestion
		Pyramid Highway and Eagle Canyon Dr. to US 395 and East Golden Valley Rd.	
		Pyramid Highway and Eagle Canyon Dr. to US 395/I-80	
		Pyramid Highway and Eagle Canyon Dr. to I-80 & Vista	
	Study Area Level of Service (LOS)	Representative Study Area segments	Peak hour LOS – an indication of congestion
Respond to Local and Regional Plans	Consistent?	N/A	Yes/No

Level 2A Environmental Review

The alternatives screening considered those environmental resources that had the potential to influence the screening results listed in Table 2-2. For the environmental review, existing data sets and available resources, such as aerial photography, were used to determine the potential environmental impacts of each alternative. To calculate this information, the Study team used a corridor width of potential impact of 250 feet in urbanized, constrained areas (i.e., 125 feet from the proposed roadway centerline), and used 500 feet in open, unconstrained areas to account for cut and fill impacts. Table 2-2 lists the environmental criteria used in Level 2A screening.

Table 2-2. Level 2A Environmental Screening Criteria

Criteria	Description	Measure
Relocations	Residential and business displacements	Numbers of estimated residential and business relocations
Environmental Justice (EJ)	Effects to disadvantaged populations	Qualitative assessment using U.S. Census Bureau data
Critical Habitat	Critical wildlife and/or plant habitat	Status and qualitative assessment of impact
Wetlands	Impacts to wetlands	Approximate acreage
Water Resources	Impacts to water resources	Approximate linear footage
Floodplains	Impacts to floodplains	Approximate acreage
Historic Resources	Impacts to sites of historic importance*	Number and acreage of sites impacted
Recreation, including Section 4(f) and BLM	Impacts to recreational areas	Approximate acreage

*Based on records search.

After completing the Level 2A screening, the Study team, with concurrence from the TAC, identified a need to conduct additional screening before moving to the more-detailed Level 3 screening. The Study team further refined the general alignment concepts from Level 2A into more specific alignments with greater detail to be analyzed. The Level 2B screening focused on:

- Engineering feasibility.
- Refinement of the traffic demand analysis.
- Environmental impacts.

Level 2B Engineering Feasibility

The engineering screening criteria considered the ability for conceptual alternatives to meet basic the American Association of American Association of State Highway and Transportation Officials (AASHTO) roadway design criteria, particularly for horizontal geometry. Qualitative criteria included assessments of interchange operations, impacts to adjacent roadway networks, spacing of adjacent interchanges, constructability, and flexibility to accommodate future potential improvements.

Level 2B Traffic Demand Analysis Refinement

For the traffic demand analysis, comparative metrics from the regional travel demand model were used. Table 2-3 lists Level 2B screening design and traffic criteria.

Table 2-3. Level 2B Design and Traffic Screening Criteria

Criteria	Description	Measure
Interchange Operations	The functional ability for an interchange to operate at acceptable levels of service (LOS D or better)	Qualitative assessment of the operability and likely level of service of an interchange
Existing Road Network Cohesion	Impacts to the existing or planned roadway network	Qualitative assessment of impacts requiring realignment and/or closure of existing roadways
Interchange Spacing	The distance to adjacent system and service interchanges to allow for proper merging and weaving operations to occur	Physical distance between interchanges
Ability to Meet Design Criteria	Ability to meet pertinent state and federal geometric criteria	Quantitative assessment of the horizontal and vertical geometry with respect to AASHTO and NDOT design criteria
Future Flexibility	Ability to incorporate potential future improvements to the existing and planned infrastructure	Qualitative assessment based on likely locations of future improvement needs and planned projects
Construction Traffic Control	Ability to reasonably accommodate existing traffic during construction	Qualitative assessment based on likely construction methods, sequencing, and travel patterns
Traffic Demand	Ability of the alternative to accommodate traffic volumes	ADT at representative locations

Level 2B Environmental Impacts

Analysis focused on residential and business relocations; utility displacements; and potential impacts to Section 4(f) parks and recreation properties since these resources are of known importance to the immediate communities, to the overall NEPA process and, in the case of Section 4(f) resources, are protected by federal law. Table 2-4 lists the Level 2B screening environmental criteria.

Table 2-4. Level 2B Environmental Screening Criteria

Criteria	Description	Measure
Relocations	Residential, business, and utility displacements	Number of estimated residential, business, and utility relocations
Environmental Justice	Effects to low income and minority populations	Number of estimated residential and business relocations located in areas determined to be of environmental justice concern; Qualitative assessment of potential impacts
Critical Habitat	Critical wildlife and/or plant habitat	Status and qualitative assessment of impact
Wetlands	Impacts to wetlands	Approximate acreage
Water Resources	Impacts to water resources	Approximate linear footage
Floodplains	Impacts to floodplains	Approximate acreage
Historic Resources	Impacts to sites of historic importance	Number and acreage of sites impacted
Recreation, including Section 4(f) and BLM	Impacts to recreational areas	Approximate acreage

2.2.2.3 Level 3 Screening Criteria

Level 3 screening involved greater design, traffic, and environmental detail.

LEVEL 1
LEVEL 2
LEVEL 3
Draft EIS

What Happened In Level 3 Screening?

The Study team refined the alternatives from Level 2 and evaluated them based on more detailed criteria.

During Level 3 screening, alternatives were developed into designs and evaluated in greater detail. With more detailed designs, alternatives could be evaluated with greater precision. Alternatives carried forward from Level 3 screening became part of the Draft EIS Build Alternatives.

Level 3 Engineering

The engineering screening criteria considered the ability for conceptual alternatives to meet basic AASHTO roadway design criteria, particularly for horizontal and vertical geometry. Qualitative criteria included assessments of interchange operations, impacts to adjacent roadway networks, spacing of adjacent interchanges, constructability, and flexibility to accommodate future potential improvements. Level 3 criteria resembled those used in Level 2B. Since the alternatives had undergone refinement to minimize potential impacts, the Study team provided greater detail in the analysis of alternatives. The design level included an analysis of both horizontal and vertical alignment. Roadway alignments were combined to include both north-south and east-west improvements, and supplemental alternatives were evaluated in greater detail.

Level 3 Traffic Demand Analysis

For the traffic demand analysis, the Study team used comparative metrics from the updated RTC regional travel demand model. After the time Level 2B screening was conducted, the RTC changed from a 2040 model horizon year to a 2030 model horizon year in May 2010. At this level of screening, the Study team used results from the 2030 regional travel demand model factored up to 2035 for comparative purposes. The Level 3 analysis focused in greater detail on the refined Level 3 alternatives. Table 2-5 shows the design and traffic criteria used.

Table 2-5. Level 3 Design and Traffic Screening Criteria

Criteria	Description	Measure
Interchange and Freeway Operations	The functional ability for an interchange or freeway to operate at acceptable levels of service	Qualitative assessment of the operability and likely level of service of an interchange or freeway
Existing Road Network Functionality and Accessibility	Impacts to the existing or planned roadway network or access	Qualitative assessment of impacts requiring realignment and/or closure of existing roadways, or closure of access points
Interchange Spacing	The distance upstream and downstream of adjacent system and service interchanges	Physical distance between interchanges to allow for proper merging and weaving operations to occur
Ability to Meet Design Criteria	Ability to meet pertinent state and federal geometric criteria	Quantitative assessment of the horizontal and vertical geometry with respect to AASHTO and NDOT design criteria
Future Flexibility	Ability to incorporate potential future improvements to the existing and planned infrastructure	Qualitative assessment based on likely locations of future improvements to satisfy needs and accommodate existing and planned projects
Traffic Demand	Ability to accommodate 2035 traffic volumes	Comparative ADT at representative locations
Travel Routes	Ability to provide efficient travel routes	Qualitative assessment of out-of-direction travel
Alternative Lane Type Operation	Ability to effectively serve 2035 demand, with lane types that are in accordance with State Law	Comparative alternative lane type and general purpose lane peak period volume
Transit Demand	Ability and suitability to accommodate 2035 person trip demand	Daily ridership estimation
Construction Traffic Control	Ability to reasonably maintain traffic conditions during construction	Qualitative assessment based on likely construction methodologies, sequencing, and travel patterns

Environmental

Similar to the Level 2 screening, the environmental criteria focused on important impacts that could easily be measured using existing information sources and data. However, biological field studies helped inform the Level 3 screening by confirming

general wetland locations and the absence of protected species. Table 2-6 lists the Level 3 screening environmental criteria.

Table 2-6. Level 3 Environmental Screening Criteria

Criteria	Description	Measure
Relocations	Residential, business, and utility displacements	Number of estimated residential, business, and utility relocations
Environmental Justice	Effects to low income and minority populations	Number of estimated residential and business relocations located in areas determined to be of environmental justice concern; Qualitative assessment of potential impacts
Recreation, including Section 4(f) and BLM	Impacts to designated recreational areas or BLM-owned land	Approximate acreage
Local Plans	Local plan consistency	Qualitative assessment of alternative's ability to respond to local and community plans

2.3 ALTERNATIVES CONSIDERED

The range of alternatives considered during the first three levels of screening generally fell into the following types of alternatives:

- Arterial Expansion Alternatives
- North-South Alignment Alternatives
- East-West Alignment Alternatives
- Cross-Section Alternatives
- Interchange Locations
- Bicycle and Pedestrian Alternatives
- Transit Alternatives
- Lane Type Alternatives
- Congestion Management Alternatives

While most alternatives considered were not categorized in this way for the actual screening process, they have been grouped together for purposes of clarity in this chapter. The Study team evaluated the alternatives comparatively both together and separately throughout the screening process and either (1) eliminated them from consideration or (2) combined and advanced as parts of the four Build Alternatives. The *Pyramid Highway/US 395 Connector Alternatives Development Report* (RTC, 2012) provides greater detail regarding all of the considered alternatives in the Draft EIS (including various combinations not depicted herein) and their screening. For a graphic showing street and subdivision names referenced in this chapter, please refer to Figure 1-1.

2.3.1 Arterial Expansion Alternatives

The Study team considered two arterial expansion alternatives (or system alternatives) during Level 1 screening. This refers to system-wide efforts to address the purpose and

need by adding capacity to arterials throughout the Study Area and included two separate alternatives that were previously evaluated in the CMP, which are described in Section 2.2.2.1. Table 2-7 shows these alignments and the results of the screening process.

Table 2-7. Arterial Expansion Alternatives

Alternative	Description	Screening
Arterial Widening to Obtain LOS C	Roadway widening occurs in addition to projects contained in the RTP to achieve the adopted level of service C (LOS C), the design standard at the time of the CMP analysis.	**ELIMINATED** in Level 1 because it would not meet the purpose and need elements of improving east-west connections and responding to regional and local plans. This alternative would also have high and irresolvable community and right-of-way impacts (relocations).
Arterial Widening to Obtain LOS E	Widening occurs in addition to projects contained in the RTP to achieve a community wide minimum LOS E.	**ELIMINATED** in Level 1 because it would not meet the purpose and need elements of improving east-west connections, resolving traffic congestion, and responding to regional and local plans. This alternative would also have high and irresolvable community and right-of-way impacts (relocations).

2.3.2 North-South Alignment Alternatives

The Study team considered highway improvements along several alignments to enhance north-south travel in the Study Area that would address the Purpose and Need elements serving growth areas, providing direct and efficient routes and alleviating congestion on Pyramid Highway. Table 2-8 and Figure 2-2 show these alignments and the results of the screening process.

Table 2-8. North-South Alignment Alternatives Screening Summary

Alternative/Map ID No.	Description	Screening
Pyramid Freeway/Expressway Figure 2-2, 6	This alignment would expand or upgrade the existing Pyramid Highway and Pyramid Way to I-80.	**ELIMINATED** in Level 1 because of high and irresolvable community and right-of-way impacts (relocations).
Pyramid On Alignment Figure 2-2, 1	This alignment would expand or upgrade the existing Pyramid Highway through the Study Area.	**INCLUDED** as part of each Draft EIS Build Alternative north of Sparks Boulevard; and as part of Alternatives 2 and 4.
Pyramid Off Alignment Figure 2-2, 2	This alignment would be constructed west of the existing Pyramid Highway south of Sparks Boulevard.	**INCLUDED** as part of Alternative 1.
Ridge Alignment Figure 2-2, 3	This alignment would be constructed along the ridge to the west of the existing Pyramid Highway south of Sparks Boulevard.	**INCLUDED** as part of Alternative 3.
Sparks Boulevard Figure 2-2, 1	This alignment would include improvements to the existing Sparks Boulevard corridor.	**ELIMINATED** in Level 1 because of high and irresolvable community and right-of-way impacts (relocations).
West Sun Valley Figure 2-2, 2	This alignment would include the construction of a new facility to the west of Sun Valley.	**ELIMINATED** in Level 1 because it would not address key Purpose and Need elements, including reducing traffic congestion

Table 2-8. North-South Alignment Alternatives Screening Summary

Alternative/Map ID No.	Description	Screening
Vista Boulevard Figure 2-2, 3	This alignment would include improvements to the existing Vista Boulevard corridor.	**ELIMINATED** in Level 1 because it would not address key Purpose and Need elements, including the need to accommodate the anticipated traffic demand.
Pyramid/Sparks Boulevard Couplet Figure 2-2, 5	This alignment would include the conversion of Pyramid and Sparks to one-way streets through the Study Area.	**ELIMINATED** in Level 1 because it would not address key Purpose and Need elements, including reducing traffic congestion.
Pyramid/Rock Boulevard Couplet Figure 2-2, 4	This alignment would include the conversion of Pyramid and Rock to one-way streets through the Study Area.	**ELIMINATED** in Level 1 because it would not address key Purpose and Need elements, including reducing traffic congestion, and would have high and irresolvable community impacts.

Three of the north-south alignment alternatives were retained and incorporated into the build alternatives. They are illustrated on Figure 2-2.

Pyramid On alignment. Would be on the existing Pyramid Highway. For areas north of Sparks Boulevard, it is included as part of all build alternatives. For the segment between the proposed US 395 Connector/Pyramid Highway interchange and Sparks Boulevard, it is included as part of Alternatives 2 and 4.

Pyramid Off alignment: Would be constructed west and off of the existing Pyramid Highway. It extends from the proposed US 395 Connector to Sparks Boulevard, traveling behind Walmart, where it joins the existing highway. This alignment is included as part of Alternative 1.

Ridge Alignment. Would be constructed along the ridge west of Pyramid Highway. It extends from the proposed US 395 Connector to Sparks Boulevard, where it joins the existing Pyramid Highway. This alignment is included as part of Alternative 3.

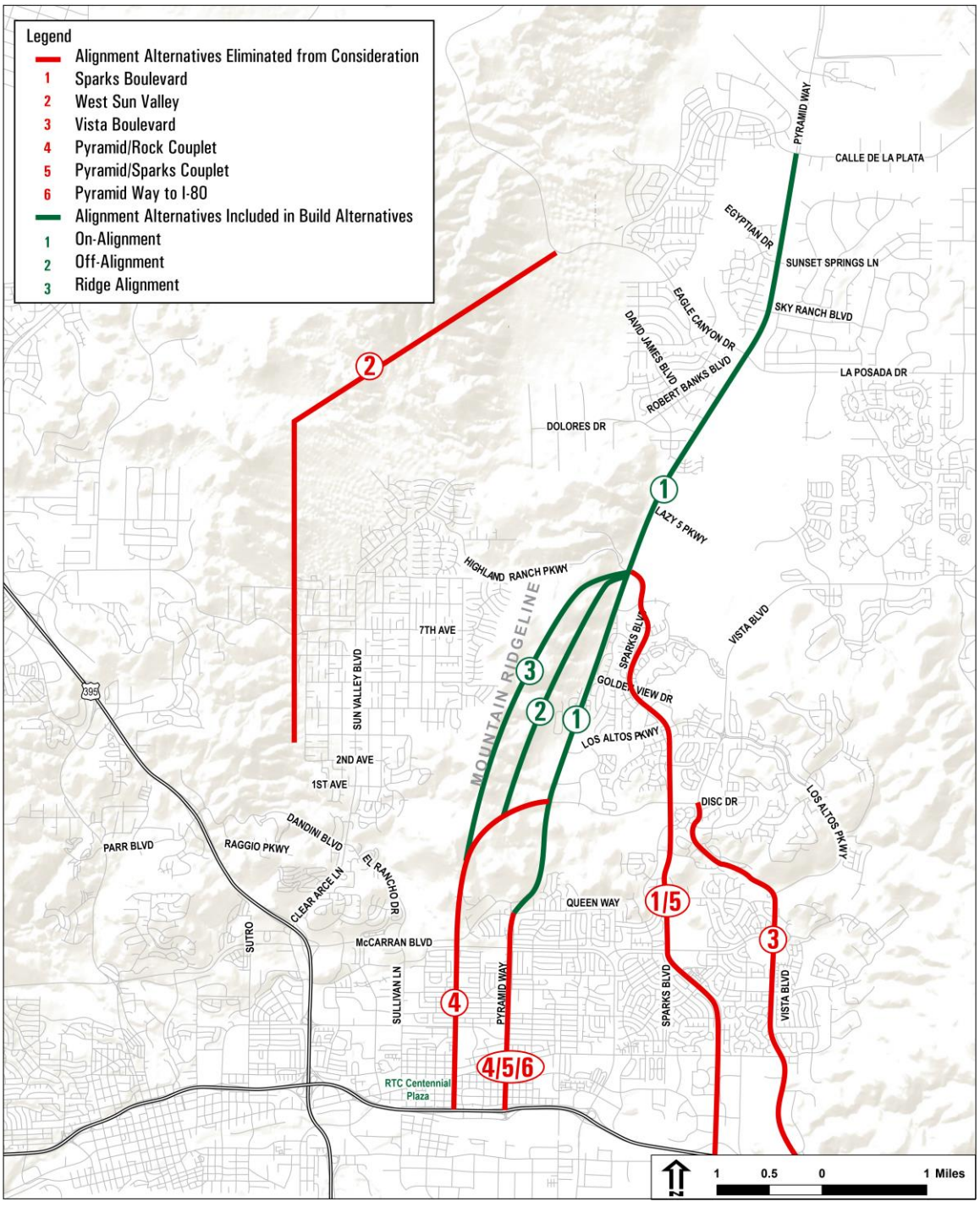


Figure 2-2. North-South Alignment Alternatives

2.3.3 East-West Alignment Alternatives

The Study team considered highway improvements along several alignments to enhance east-west connectivity to US 395 in the Study Area, and that would address the several Purpose and Need elements. Alternatives included improvements to existing facilities and the construction of a new limited-access facility. The alignments considered are listed below in Table 2-9 and presented on Figure 2-3.

Table 2-9. East-West Alignment Alternatives Screening Summary

Alternative/Map ID No.	Description	Screening
West of Pyramid Highway		
McCarran Boulevard Figure 2-3, 1	This alignment would include improvements along the existing McCarran Boulevard alignment.	**ELIMINATED** during Level 2 screening because of environmental impacts along McCarran Boulevard, including a high number of residential and commercial property relocations and interchange operations issues at US 395.
Wedekind Road Figure 2-3, 2	This alignment would include improvements along the existing Wedekind Road alignment.	**ELIMINATED** during Level 2 screening because of environmental impacts along Wedekind Road, including a high number of residential and commercial property relocations.
US 395 Connector with Far Northern Sun Valley Crossing Figure 2-3, 3	This alignment would connect to US 395 through Sun Valley near 1st Avenue.	**ELIMINATED** during Level 3 because of a high number of residential and EJ relocations in Sun Valley.
US 395 Connector with Northern Sun Valley Crossing Figure 2-3, 1	This alignment would connect to US 395 through Sun Valley near Rampion Way.	**INCLUDED** as part of Alternatives 1 and 4.
US 395 Connector with Southern Sun Valley Crossing Figure 2-3, 2	This alignment would connect to US 395 through Sun Valley near El Rancho Drive.	**INCLUDED** as part of Alternatives 2 and 3.
East of Pyramid Highway		
Disc Drive Figure 2-3, 3	This alignment would include improvements along the existing Disc Drive alignment.	**INCLUDED** as part of Alternatives 1, 2, 3, and 4.
South of Disc Drive Figure 2-3, 4	This alignment would be constructed on a new alignment south of Disc Drive.	**ELIMINATED** in Level 3 because of Section 4(f) impacts to Wedekind Park.

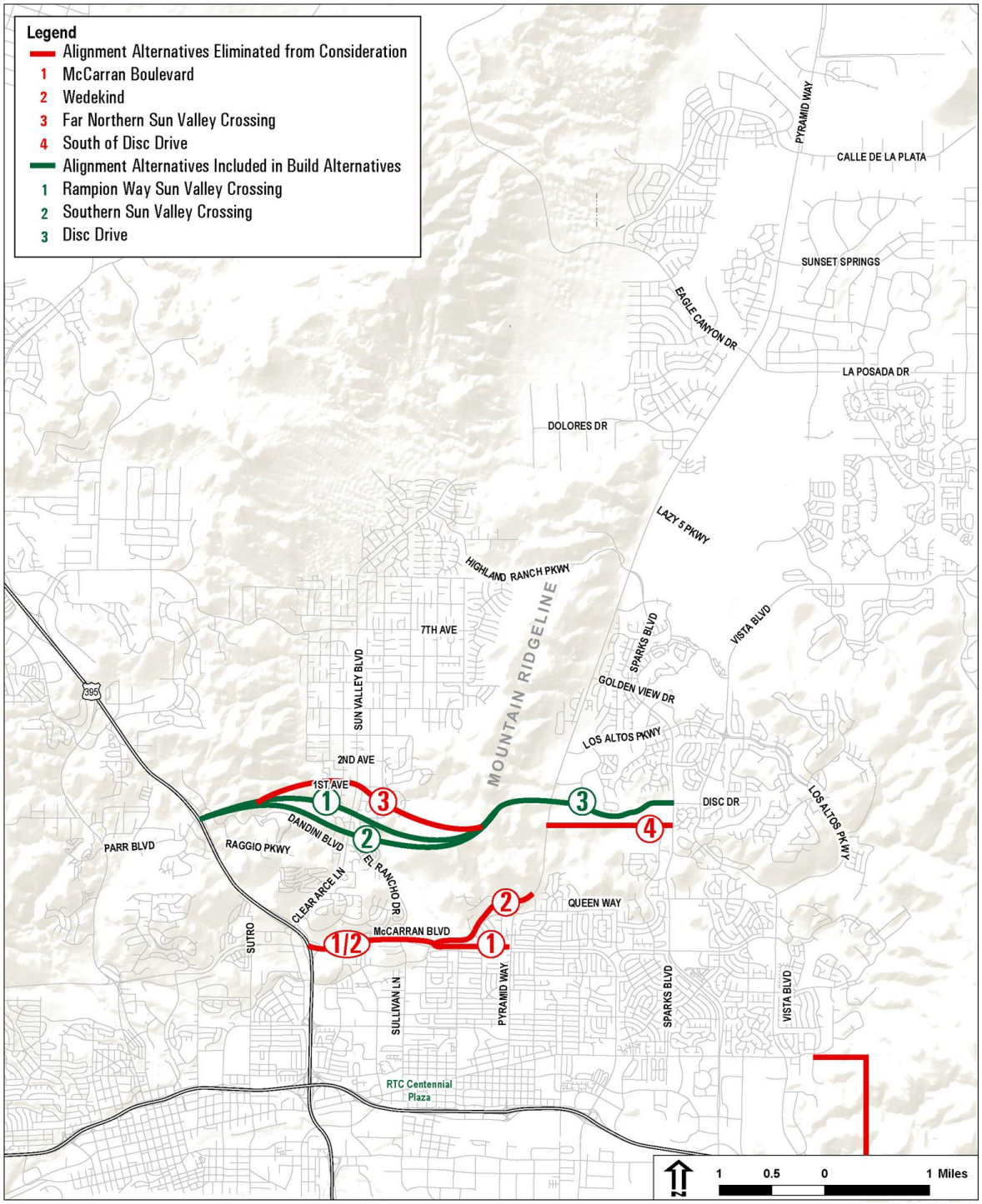


Figure 2-3. East-West Alignment Alternatives

2.3.4 Cross-Section Alternatives

The Study team developed several typical cross-sections to be considered throughout the screening process. These can be simplified into the following categories:

1. Four-lane Arterial
2. Six-lane Arterial
3. Four-lane Freeway
4. Six-lane Freeway
5. Four-lane Freeway with Frontage Roads (one-way and two-way)
6. Six-lane Freeway with Frontage Roads (one-way and two-way)

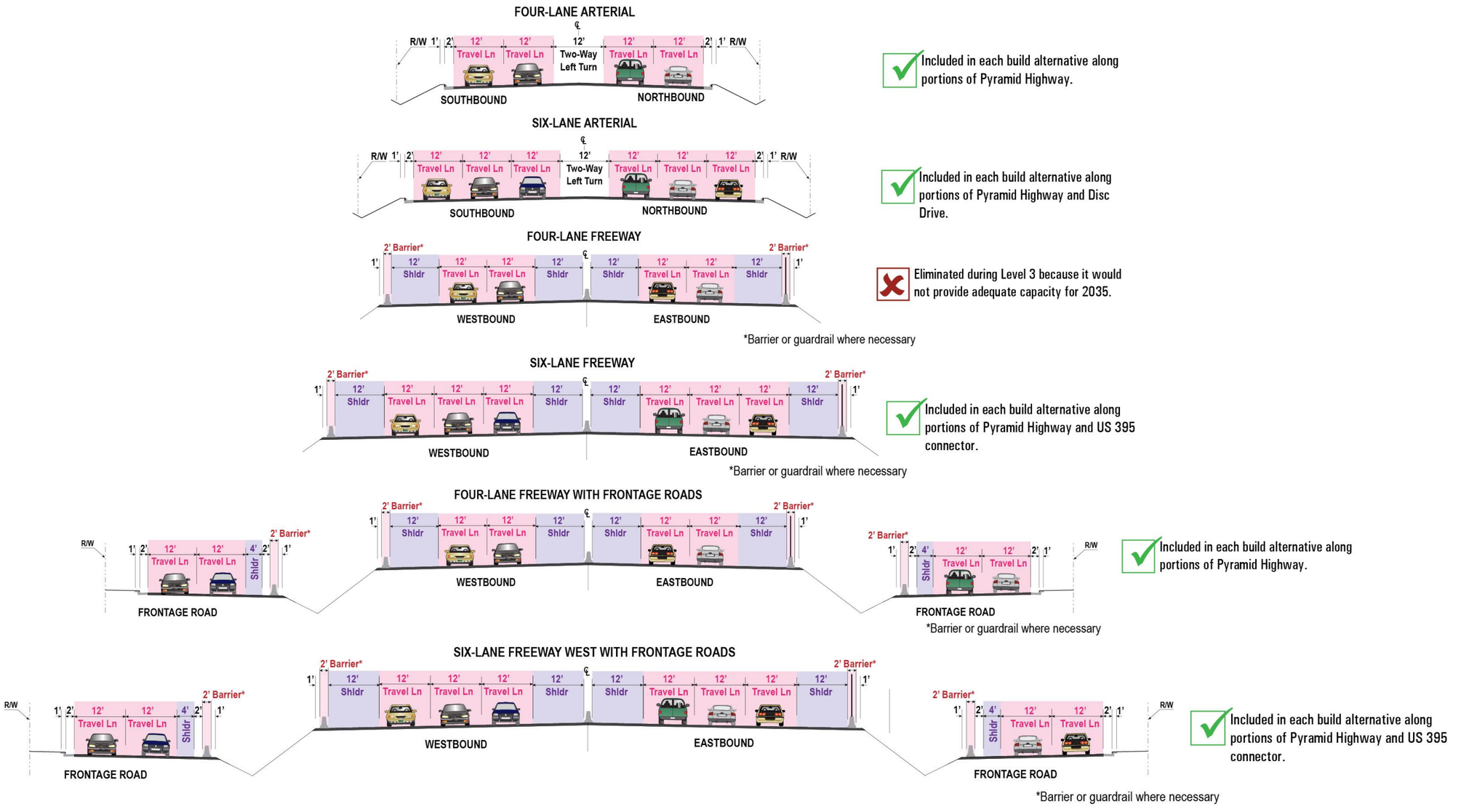
Travel demand forecasts helped to determine the necessary roadway capacity for each segment of the project. Using NDOT design standards, cross-sections were considered for each major segment along the alignment alternatives throughout the screening process, both north-south and east-west. This process involved balancing capacity needs with environmental constraints to determine appropriate cross section alternatives. Figure 2-4 summarizes the roadway cross-sections and the screening recommendations for the length of the corridor. For simplicity, bicycle and pedestrian facilities are not included in these cross-section illustrations; they are discussed in Section 2.3.6 *Bicycle and Pedestrian Alternatives*.

Along the main alignments of Pyramid Highway and the US 395 Connector, six-lane freeway cross-sections were needed to accommodate the projected 2035 travel demand. Arterial cross-sections (both four and six lane) were analyzed but it was found that these would not accommodate the demand, and, therefore, would not meet the project need to relieve congestion. It was also found that arterials on these main alignments would not reduce traffic on nearby facilities, such as McCarran Boulevard and Pyramid Way. Figure 2-5 displays the level of service "E" or worse conditions resulting from arterial cross-sections along Pyramid Highway and the US 395 Connector. However, along the alignments of Disc Drive, Pyramid Way, and along Pyramid Highway at the north end of the Study Area, traffic analysis determined that arterial cross-sections would accommodate the projected travel demand.

Conditions of congestion are described in terms of level of service (LOS). LOS can range from "A" through "F", where LOS A indicates free flow conditions and LOS F describes conditions where traffic volumes exceed capacity.

2.3.5 Interchange Locations and Configurations

The Study team determined that for safety and to reduce congestion the proposed roadway warranted greater access control than would be provided by at-grade intersections along an arterial. Therefore, partial and full system and service interchanges were considered for each facility along the study corridors. Interchange locations and the types of interchanges considered are as follows.



Note: For simplicity, proposed bicycle and pedestrian facilities are not shown on this figure; refer to Section 2.3.6 *Bicycle and Pedestrian Alternatives*.

Figure 2-4. Cross-Section Alternatives

This page left intentionally blank

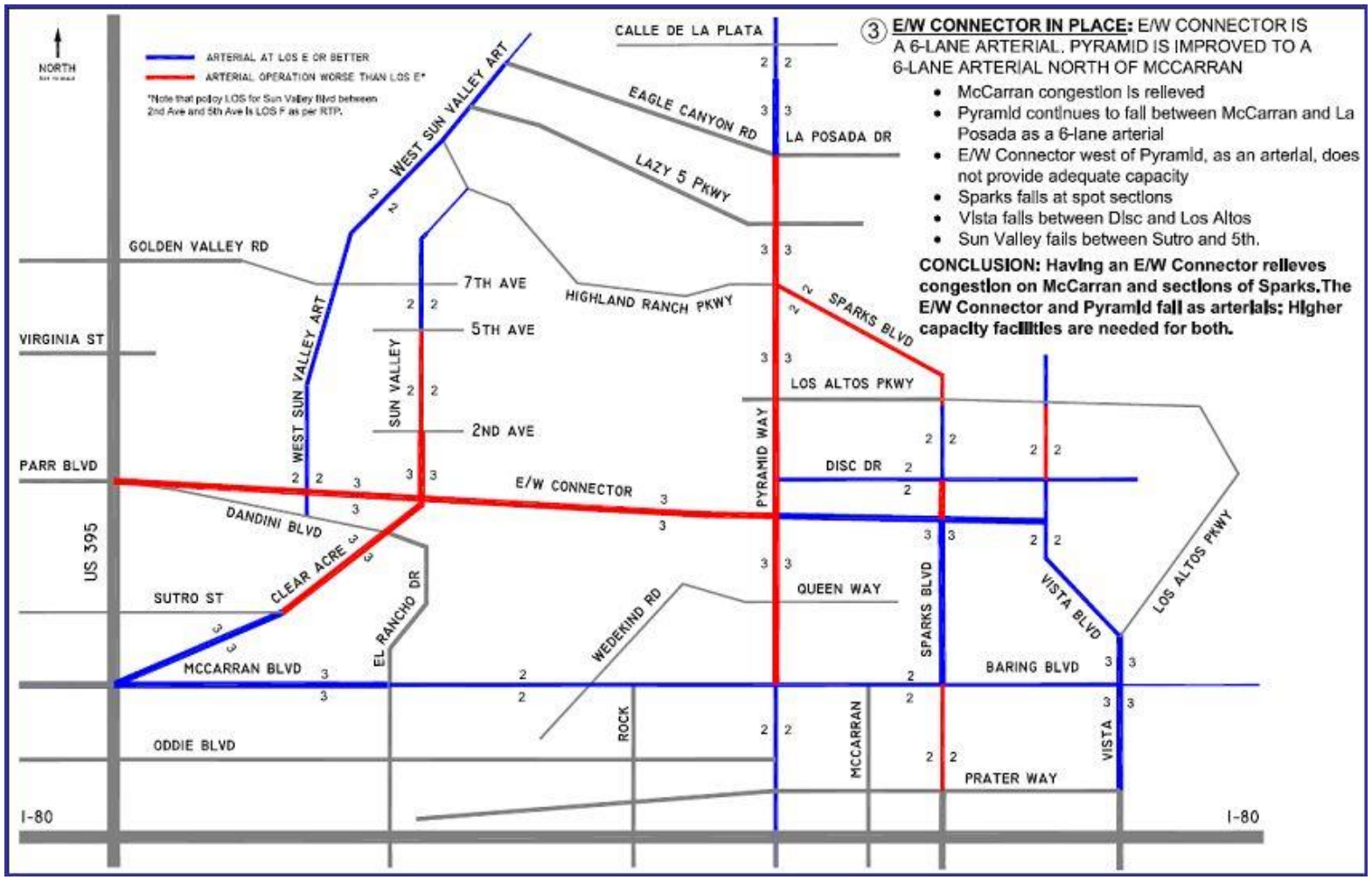


Figure 2-5. LOS with Arterial Cross-Sections

System Interchange at US 395/Parr Boulevard/Sutro Street

- At Parr Boulevard—**INCLUDED** in each build alternative because it provides adequate operations and connectivity relative to other options; includes modifications to the Parr Boulevard service interchange.
- North of Parr Boulevard—**ELIMINATED** during Level 3 because it generates the most out-of-direction travel compared to other alternatives.
- South of Parr Boulevard—**ELIMINATED** during Level 3 because of proximity to US 395/North McCarran/Clear Acre interchange creating traffic operational impacts to US 395, has the most relocations of any system interchange alternative, and severely impacts the Desert Research Institute (DRI) master plan.
- Braided (flyover) Southbound Entrance Ramp from westbound connector to southbound US 395—**ELIMINATED** during Level 3 because it is not needed from a traffic standpoint. The slight improvements to freeway operations (weaving) do not outweigh the increased roadway impacts and larger footprint.

West of Sun Valley Boulevard Service Interchange

- Partial Cloverleaf—**INCLUDED** in Alternatives 3 and 4 because it provides access to the Sun Valley area while minimizing the grade issues presented in the other alternatives.
- Diamond Options—**ELIMINATED** during Level 3 because the grade is too steep to meet design criteria.
- Loop Options—**ELIMINATED** during Level 3 because the grade is too steep to meet design criteria.
- Separate Roadways—**ELIMINATED** during Level 3 because the grade is too steep to meet design criteria.

Sun Valley Boulevard Service Interchange

- Tight Diamond or Single Point Urban Interchange—**INCLUDED** in Alternatives 1 and 2 because it provides access to the Sun Valley area while minimizing environmental impacts and grade issues in the other alternatives.
- Split-Diamond with West Arterial—**ELIMINATED** during Level 3 because the grade is too steep to meet design criteria.
- Traditional Diamond—**ELIMINATED** during Level 3 because it would have increased relocation impacts compared to a tight diamond alternative.
- Partial Cloverleaf Options—**ELIMINATED** during Level 3 because they would have increased relocation impacts compared to a tight diamond alternative.
- Direct Connect—**ELIMINATED** during Level 3 because it would have increased relocation impacts compared to a tight diamond alternative.

Disc Drive Service/System Interchange

- Service/System Interchange for Connector/Pyramid Highway/Disc Drive—**INCLUDED** in alternatives (Service interchange for Alternatives 1 and 3; System interchange for Alternatives 2 and 4) because providing the connection between Pyramid Highway, US 395 Connector, and Disc Drive is a key element of the project.

Los Altos Parkway & Golden View Service Interchange

- Tight Diamond without Frontage Roads—**ELIMINATED** during Level 3 because it would not maintain crucial access points along the corridor.
- Split Diamond (ramp pairs at each arterial with connecting one-way frontage roads)—**INCLUDED** in Alternatives 2 and 4. The tight diamond configuration minimizes impacts to adjacent properties while maintaining access to the on alignment section of Pyramid Highway.
- Alternatives 1 and 3 would not provide an interchange to the Los Altos/Golden View area because the off alignment and the ridge alignment do not connect to these roadways and access would be maintained to the existing Pyramid Highway as an arterial street.

Pyramid Highway System Interchange

Directional System interchange—**INCLUDED** in Alternatives 1 and 3. An interchange south of Sparks Boulevard with the existing Pyramid Highway provides directional connection between the off- or ridge alignments of the new freeway, for northbound and southbound Pyramid Highway vehicles.

Sparks Boulevard and Lazy 5 Parkway

- Split Diamond (ramp pairs at each arterial with connecting one-way frontage roads)—**INCLUDED** in each build alternative because it minimizes impacts to adjacent properties while maintaining access to adjoining properties along Pyramid Highway.

Dolores Drive and Eagle Canyon/La Posada Drive

- Separate Diamond Interchanges without Frontage Roads—**ELIMINATED** during Level 3 because the interchange spacing would cause weaving problems and local access would be impacted.
- Partial Cloverleaf Interchange Options—**ELIMINATED** during Level 3 because of inability to meet traffic operations design criteria for frontage roads and impacts to adjoining properties.
- Split-Diamond Interchange (ramp pairs at each arterial with connecting one-way frontage roads)—**INCLUDED** in each build alternative because it maintains good access along the corridor, reduces volumes on Dolores and Eagle Canyon Drive/La Posada Drive, and minimizes right-of-way impacts.

2.3.6 Bicycle and Pedestrian Alternatives

RTC, the cities of Reno and Sparks, and Washoe County have identified community goals to develop and enhance the bicycle and pedestrian network throughout the community. RTC's *Reno Sparks Bicycle & Pedestrian Master Plan* and RTC's 2030 RTP established the goal of developing a continuous regional network of safe and convenient bikeways connected to other transportation modes and local bikeway systems; and to provide pedestrian access to existing and planned land uses as part of all transportation projects.

The Study team considered both on-street and off-street facilities throughout the Study Area as part of each build alternative to remain consistent with the 2030 RTP. During each level of screening, pedestrian and bicycle facilities were part of the alternatives considered. While unable to meet the Purpose and Need as stand-alone alternatives, they were carried forward as supplemental elements. Figure 2-6 and Figure 2-7 show the types of bicycle facilities considered. As the screening process progressed, these facility types were considered along each roadway segment and **INCLUDED** based on their ability to best serve each type.

2.3.7 Transit Alternatives

The 2030 RTP identified a goal to provide multimodal alternatives to increase the percentage of trips in the region made by transit to six percent by 2030. Washoe County and the cities of Sparks and Reno also identified a community desire to provide a greater range of multimodal travel options. The Study team, responding to this stakeholder input, included multimodal improvements as part of the Purpose and Need and evaluated several transit alternatives throughout the screening process, ranging from local bus service enhancements to fixed guideway rail systems. Table 2-10 provides a description of each type of transit alternative with a brief explanation for their inclusion or elimination.

On-street bicycle lanes with sidewalks would provide a sidewalk at least five feet wide, and a five-foot bicycle lane. This option works well along slower-speed roadways.

Figure 2-6. On-Street Bicycle Lanes with Sidewalks

Shared-use paths provide a path along roadways shared by all non-motorized traffic. This option works well along faster-speed, limited-access roadways.

Figure 2-7. Shared-Use Paths

Table 2-10. Transit Alternative Screening Summary

Alternative	Description	Screening
Regional Bus	Two major regional bus routes were considered. Both would operate along Pyramid Highway with commuter service. One alternative considered a separate line along the US 395 Connector.	**INCLUDED** the regional bus along Pyramid Highway only, as part of each Alternative
Bus Rapid Transit (BRT)	BRT elements considered for the corridor included slip ramps, queue jumps, frequent service, median stations, and signal priority.*	**ELIMINATED** during Level 3 because the projected ridership of a regional bus (1,000 riders per day) is too low to be suitable for BRT.
Light Rail	Light rail service would run along Pyramid Highway in the north and terminate in downtown Reno.	**ELIMINATED** during Level 1 because corridor density is low so Light Rail would not alleviate congestion, and would have high community impacts.

*Slip ramps = A diagonal ramp, more properly called a cross connection, which connects with a parallel frontage road.
Queue jumps = A type of roadway geometry used to provide priority crossings for buses at intersections, allowing buses to move through intersections before other vehicles.
Frequent service = Bus systems with a lower capacity per vehicle need to provide more frequent services, leading to relatively good timing availability of bus systems.
Median stations = Bus rapid transit center median station with dual outside platforms located in the median at the far side of an intersection.
Signal priority = Designing traffic signals to turn green as transit vehicles approach.

2.3.8 Alternative Lane Types

The Study team considered alternative lane types to general purpose lanes, as follows:

1. High Occupancy Vehicle (HOV) Lanes—**ELIMINATED** during Level 3 because of low peak period demand, minimal travel time savings, and additional impacts.
2. Toll Lanes—**ELIMINATED** during Level 3 because tolling of public facilities is prohibited by State of Nevada law.
3. Reversible Lanes—**ELIMINATED** during Level 3 because of ineffectiveness at serving demand due to the relatively low magnitude of directional traffic imbalance and additional impacts.
4. HOV/Toll Lanes—**ELIMINATED** during Level 3 because tolling of public facilities is prohibited by State of Nevada law
5. Express Lanes—**ELIMINATED** during Level 3 because of ineffectiveness at serving demand due to excessive demand for the express lane, resulting in no travel time advantage and additional impacts.
6. Fast and Intertwined Regular (FAIR) Lanes—**ELIMINATED** during Level 3 because tolling of public facilities is prohibited by State of Nevada law.
7. Truck Lanes—**ELIMINATED** during Level 1 because of low demand, and would not meet the purpose and need element of resolving traffic congestion in the general purpose lanes.

2.3.9 Congestion Management Alternative

The Congestion Management Alternative included strategies to reduce travel demand or improve transportation conditions without physically increasing the roadway capacity. The Study team conducted a thorough analysis of congestion management strategies, which can be viewed in the *Pyramid Highway/US 395 Alternatives Development and Screening Report*. The Congestion Management Alternative would not meet the study Purpose and Need alone, but elements from the alternative would help reduce congestion when implemented in conjunction with the build alternatives.

The following congestion management strategies were included as supplemental elements to enhance the Draft EIS Build Alternatives:

- **Transit Service**. Each build alternative would provide regional bus service along Pyramid Highway to serve corridor demand consistent with the service standards of RTC. This bus service would include local stops and major stops at Park and Ride lots. It would operate throughout the day, with 30-minute peak and 60-minute off-peak frequencies.
- **Park and Ride Lots**. Each build alternative would provide Park and Ride lots to serve both transit users and carpoolers along Pyramid Highway at Calle de la Plata, Eagle Canyon Drive/La Posada Drive, and Los Altos Parkway.
- **Bicycle Facilities**. Each build alternative would provide bicycle facilities along the proposed alignment throughout the Study Area.
- **Carpool Lots**. Each build alternative would accommodate carpoolers at the proposed Park and Ride lots.
- **Incident Management Program**. Each build alternative would provide an enhanced incident management program along the new facility by NDOT.
- **Advanced Traffic Management**. Each build alternative would provide variable message signs (VMS) and other advanced traffic management strategies, to be determined during final design.
- **Signal Timing**. Each build alternative would provide improved signal timing, to be analyzed during final design.
- **Ramp Metering**. Each build alternative would provide ramp metering as needed, to be determined during final design.

2.4 Alternatives Advanced and Fully Evaluated in the Draft EIS

Alternatives that advanced through the alternatives screening process were combined into a set of reasonable build alternatives that were analyzed in greater detail and presented to the various stakeholders and the public for review and comment in the August 2013 Draft EIS. The No-Action Alternative and the four build alternatives (Freeway Alternatives) that were evaluated in the Draft EIS are summarized in Section 2.4.2 *No-Action Alternative* and Section 2.4.3 *Freeway Alternatives Summary*, respectively. Please refer to the *Alternatives Development Technical Report* (RTC, 2012) for detailed descriptions and illustrations of the build alternatives (Freeway Alternatives) evaluated in the Draft EIS. For a graphic showing street and subdivision names referenced in this chapter, please refer to Figure 1-1.

This Final EIS refers to the build alternatives evaluated in the Draft EIS as "Freeway Alternatives," and the build alternatives evaluated in this Final EIS as "Arterial" Alternatives."

Alternatives advanced for full evaluation in the Draft EIS were:

- **No-Action**
- **Freeway Alternative 1**: Pyramid Off Alignment with Sun Valley Blvd. Interchange
- **Freeway Alternative 2**: Pyramid On Alignment with Sun Valley Blvd. Interchange
- **Freeway Alternative 3**: Pyramid Ridge Alignment with West Sun Valley Blvd. Interchange
- **Freeway Alternative 4**: Pyramid On alignment with West Sun Valley Blvd. Interchange

2.4.1 Logical Termini

The Study team identified logical termini or end points for improvements at the onset of the Study. Although the need to consider all reasonable alternatives resulted in alternatives that extended beyond these logical termini, the alternatives advanced in the Study have end points similar to those termini defined early in the process.

The following termini serve as rational end points for transportation improvements and for review of the environmental impacts:

- **Western Terminus**. Just west of US 395 near the US-395/Parr-Dandini interchange, encompassing improvements needed to that interchange from a US 395 Connector.
- **Southern Terminus**. Pyramid Highway/Queen Way Intersection. Queen Way serves as the northern terminus for the McCarran Boulevard/Pyramid Highway Intersection EIS. South of Queen Way, the Pyramid Way corridor is in a physically constrained, residential/commercial area where considerable access is needed. North of Queen Way, the character of the corridor changes significantly, transitioning to a more open, less developed area that would accommodate more access control.

- **Northern Terminus**. Intersection of Pyramid Highway with Calle de la Plata. Considerable traffic feeds into Pyramid Highway from this major arterial crossing, thus providing a logical terminus.
- **Eastern Terminus**. Vista Drive, an arterial servicing the eastern portion of the Study Area.

These logical termini allow for development of a project that can be constructed alone, serving a significant purpose, without requiring implementation of other future transportation projects.

2.4.2 No-Action Alternative

The No-Action Alternative assumed completion of those reasonably foreseeable transportation, development, and infrastructure projects that were already in progress; were programmed by NDOT or FHWA, Washoe County, the cities of Reno and Sparks; or were included in the fiscally constrained 2040 RTP, with the exception of improvements proposed in conjunction with this Study. This alternative was fully evaluated and was used as a baseline comparison for environmental analysis purposes. The Draft EIS No-Action Alternative is very similar to the No-Action Alternative evaluated in the Final EIS, which is described in Section 2.7.2. The *Alternatives Development Technical Report* (RTC, 2012) provides details on the Draft EIS No-Action Alternative.

2.4.3 Freeway Alternatives Summary

When identifying the build alternatives to fully evaluate in the Draft EIS, the Study team understood that combining the various design elements into all possible combinations would result in many different alternative variations. It would have been difficult to present all those alternative variations and assessment of impacts to the public in a way that would facilitate effective decision making. Therefore, the Study team took elements of alternatives that were considered in the Level 1, 2, and 3 screening processes and further advanced, and grouped them into four different combinations, resulting in the four freeway-type build alternatives evaluated in the Draft EIS (which are referred to as Freeway Alternatives in this Final EIS). Please refer to Figure 2-8 and Table 2-11.

Each of the Freeway Alternatives included:

- A similar set of improvements along 7.7 miles of Pyramid Highway from Queen Way north to Calle de la Plata Drive through the communities of Sparks and Spanish Springs. However, the alternatives differed regarding alignments for the US 395 Connector, interchange locations, and cross-sections through much of the Study Area.

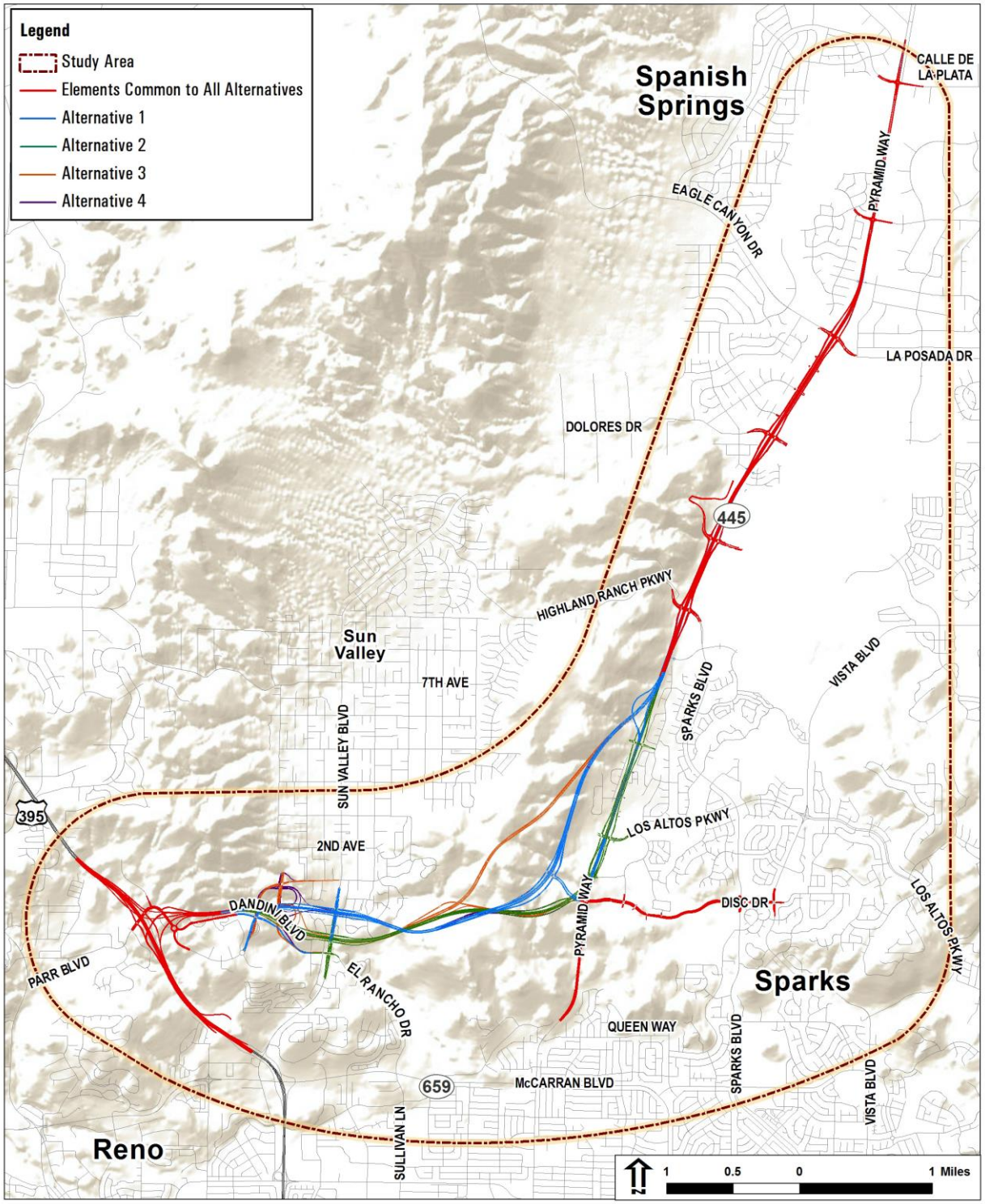


Figure 2-8. Freeway Alternatives Evaluated in the Draft EIS

- A new freeway facility and ancillary improvements from Pyramid Highway to US 395, through the Sun Valley area. Both the US 395 Connector and Pyramid Highway north to Eagle Canyon Drive/La Posada Drive would be constructed as limited-access freeway facilities, with interchanges at major intersecting roadways. Pyramid Highway from Eagle Canyon Drive/La Posada Drive to Calle de la Plata Drive was proposed as a primary arterial highway.
- Grade-separated interchanges at Eagle Canyon Drive/La Posada Drive, Dolores Drive, Lazy 5 Parkway, Highland Ranch Parkway, and US 395 Connector/US 395/Parr Boulevard.
- Construction of auxiliary lanes on US 395 between the US 395 Connector and McCarran Boulevard.
- The following cross-sections:
  - Four- or six-lane arterial along portions of Pyramid Highway
  - Five- or six-lane arterial along portions of Disc Drive
  - Four- or six-lane freeway with frontage roads along other portions of Pyramid Highway.

Common elements for all Freeway Alternatives included the US 395 interchange and the configuration of Pyramid Highway north of Sparks Boulevard. The three design elements that differed amongst the Freeway Alternatives included the US 395 Connector alignment, the Sun Valley crossing location, and the Sun Valley interchange location. Table 2-11 summarizes these major design elements, which are shown on Figure 2-8. For the US 395 Connector, the on alignment would connect west of Sun Valley to existing Disc Drive. The off alignment would connect to Pyramid Highway farther north near Highland Ranch Parkway and run just below the ridgeline separating Sun Valley and Spanish Springs. The ridge alignment generally would follow this ridgeline before dropping to connect to Pyramid Highway.

Table 2-11. Major Design Elements of the Freeway Alternatives

Freeway Alternative	US 395 Connector	Sun Valley Crossing	Sun Valley Interchange
Alternative 1	Off Alignment	North Crossing	At Sun Valley Blvd.
Alternative 2	On Alignment	South Crossing	At Sun Valley Blvd.
Alternative 3	Ridge Alignment	South Crossing	West of Sun Valley
Alternative 4	On Alignment	North Crossing	West of Sun Valley

In addition to roadway improvements, supplemental elements included in the Freeway Alternatives included bicycle and pedestrian facilities; increased transit services, including park-and-rides; and Intelligent Transportation Systems. North of Sparks Boulevard, the Freeway Alternative 1 would consist of an off alignment just west of Pyramid Highway between the US 395 Connector and Highland Ranch Parkway, and run just below the ridgeline of the mountains west of Walmart. Freeway Alternative 1 would follow the Rampion Way crossing through Sun Valley.

ITS (Intelligent Transportation Systems) uses advanced applications of electronics and communications, such as enhanced traveler information and variable message signs, to improve traffic operations and increase roadway effectiveness.

Freeway Alternative 2 would consist of an alignment following the existing Pyramid Highway between the US 395 Connector and Sparks Boulevard/Highland Ranch Parkway, and would include a freeway between Disc Drive and US 395 and frontage roads between Disc Drive and Golden View. The US 395 Connector alignment would follow the south of Rampion Way crossing of Sun Valley and include an interchange at Sun Valley Boulevard.

Freeway Alternative 3 would consist of an alignment along the mountain ridgeline between the US 395 Connector and Highland Ranch Parkway. It included a directional interchange at the Disc Drive extension and a directional system interchange with Pyramid Highway south of Sparks Boulevard/Highland Ranch Parkway. The US 395 Connector alignment would follow the south of Rampion Way crossing and would include an interchange immediately west of Sun Valley Boulevard.

Freeway Alternative 4 would consist of an alignment following the existing Pyramid Highway between the US 395 Connector and Sparks Boulevard/Highland Ranch Parkway. Frontage roads would be included between Disc Drive and Golden View. The US 395 Connector alignment would follow the Rampion Way crossing and would include an interchange immediately west of Sun Valley Boulevard.

2.5 Initial Identification of the Preferred Alternative

2.5.1 Draft EIS Public Comment Period

The August 2013 Draft EIS was distributed for a 60-day public and agency review and comment period. RTC and NDOT accepted public and agency comments from September 13, 2013 through November 12, 2013, including comments received at public hearings held on October 9 and 10, 2013 (please refer to Section 4.4 and 4.5 for more information). Following the comment period, all public and agency comments were reviewed and considered in identifying the Preferred Alternative. In general, the public was concerned over property acquisitions, changes in traffic patterns (rerouting, congestion, etc.), and effects to homes adjacent to alignments. There was no clear preference for or against a particular alignment or alternative segment.

Agencies that provided comments on the Draft EIS included the National Park Service, Nevada State Historic Preservation Officer, U.S. Fish and Wildlife Service, and U.S. Environmental Protection Agency. Comments related to topics such as greenhouse gas emissions, wetlands, environmental justice, and protected species were received. The comments did not indicate a preference for or against a particular alternative.

2.5.2 Initial Identification of Preferred Alternative after Draft EIS

Identifying a Preferred Alternative involved a deliberative decision-making process that involved the following steps:

- Consider other potential build alternatives than those evaluated in the Draft EIS.
- Identify major differentiators between alternatives.
- Evaluate alternatives based on these differences to identify a Preferred Alternative.
- Seek concurrence on the results of this analysis from key decision makers.

After considering all these factors, RTC and NDOT initially identified Freeway Alternative 3 as the Preferred Alternative. At a February 19, 2014 meeting, the Study team presented the process used to identify the Preferred Alternative to the Technical Advisory Committee (TAC), and recommended proceeding with Freeway Alternative 3 as the Preferred Alternative. The TAC approved of this process and concurred with this recommendation. In the subsequent months, the Preferred Alternative was presented to the RTC Board, the councils for the cities of Reno and Sparks, and the Washoe County Commissioners. Identification of the Preferred Alternative was revisited due to design changes made after the Draft EIS, as described in the following sections, and was presented to the TAC in June 2017 (see Chapter 6.0 *Evaluation of Alternatives* for more information).

2.6 CHANGES TO THE PROJECT AFTER THE DRAFT EIS

This section describes project changes that occurred after the Draft EIS was distributed.

2.6.1 Revised Traffic Forecasts

While the Preferred Alternative was being identified and vetted with elected officials as described in Section 2.5, RTC was in the process of adopting a new regional traffic model. This new model used updated population and employment projections from a new Consensus Forecast from the Truckee Meadows Regional Planning Agency that replaced the Interim Consensus Forecast (ICF) used for the Draft EIS traffic analysis. In general, the projected population and employment in the region are forecasted to be lower, and the areas of population and employment growth have changed to be more consolidated than the prior ICF estimates. As a result, the forecasted volumes from the updated travel demand models were also generally lower than the previously forecasted volumes documented in the Draft EIS.

The reduction in traffic forecasts was significant enough for the Study team to revisit the selection and design of Freeway Alternative 3 as the Preferred Alternative. This warranted a review of prior decisions made as part of the Draft EIS process. First, the Study team verified that the Purpose and Need for the project had not changed based on the new traffic data, and then rescreened the alternatives to make sure that the best performing alternatives were carried forward for full evaluation in the Draft EIS. The identification of Freeway Alternative 3 as the Preferred Alternative was then reevaluated based on design changes that would occur to all Freeway Alternatives evaluated in the Draft EIS as a result of reduced traffic forecasts. This process and results are discussed in more detail in the following sections.

2.6.2 Validation of Purpose and Need

Each Purpose and Need element described in Chapter 1.0 *Purpose and Need* was reevaluated. The Study team concluded that the Purpose and Need remains valid and does not require revision, as summarized in Table 2-12.

Table 2-12. Purpose and Need Confirmation

Purpose and Need Element	Confirmation
Provide improvements to serve existing and future growth.	Growth is still projected, although the growth rate is not as robust as previously forecasted. The existing roadway network would not serve existing and future growth and additional capacity is still necessary.
Alleviate existing congestion problems on Pyramid Highway	The revised traffic data still shows failing intersections along Pyramid Highway both now and in 2035.
Provide direct and efficient travel routes to address existing travel inefficiencies	The revised traffic data show that north-south and east-west capacity remain limited and confirm the need for more direct and efficient travel routes
Respond to regional and local plans.	The updated 2035 RTP includes plans to improve Pyramid Highway and east-west connectivity, provide additional multimodal options, and improve bike/pedestrian facilities.

2.6.3 Rescreening of Alternatives

2.6.3.1 Level 1, Level 2, and Level 3 Screening Validation

The Draft EIS considered more than 20 alternatives (alignments), as discussed in Section 2.3. After validating the Purpose and Need, the Study team rescreened each of the build alternatives, and examined the rationale used to eliminate alternatives in Level 1, Level 2A, Level 2B, and Level 3 screening. If an alternative was eliminated based on reasons other than failing to provide sufficient vehicle capacity (such as irresolvable environmental impacts, not constructible, etc.) the original screening decision was confirmed. If the alternative was eliminated for multiple reasons, including lack of capacity, the lack of capacity was eliminated as a rationale for elimination and the remaining reasons were reviewed to ensure there were still sufficient reasons for eliminating the alternative. This analysis confirmed the findings of the previous

alternatives analysis process and concluded that the build (freeway) alternative alignments carried forward for full evaluation in the Draft EIS still represented the best solutions in terms of meeting the project's Purpose and Need and minimizing impacts. Revisions to the alternatives screening are documented in Appendix A of the *Alternatives Development and Screening Update: Identification of a Preferred Alternative for the Pyramid Highway and US 395 Connector* (RTC, 2017).

2.7 ALTERNATIVES ADVANCED IN THIS FINAL EIS

After the Draft EIS was distributed and the updated traffic data was found to result in a reduction in forecasted traffic, the Study team completed a detailed reevaluation of the four Freeway Alternatives evaluated in the Draft EIS. The reduced traffic demand changed the type of highway facility needed; the Study team concluded that an arterial facility in lieu of a freeway facility (which was included in the build alternatives evaluated in the Draft EIS) could provide adequate capacity for the projected traffic volumes. Because the design criteria for an arterial facility are different from those required for a freeway facility, the Study team modified the design criteria for the build alternatives to those of an arterial facility, including the cross-section width, design speed, access control, and acceptable grades. This effort resulted in a cumulative reduction in the facility design footprint of the build ("freeway") alternatives that were fully evaluated in the Draft EIS.

Design speeds for arterial facilities are typically lower than those associated with a freeway, allowing for a tighter geometric design. Therefore, a design speed of 55 miles per hour (mph) was used for Pyramid Highway, the US 395 Connector would have a design speed of 60 mph, and the Disc Drive Extension would be designed for 45 mph. Slight reductions to the design speeds allowed for development of a narrower roadway, which would reduce costs and impacts. The Study team also considered adjusting the maximum grade allowed for the roadway to potentially reduce cut/fill required, but opted to adhere to the 6 percent maximum grade standard.

Options were then considered to resize components of the Freeway Alternatives evaluated in the Draft EIS to meet traffic demand. This included conducting a traffic analysis at each intersection to confirm if grade-separated interchanges were still necessary. All revised build ("arterial") alternatives would still require grade-separated interchanges at: US 395, at or near Sun Valley Boulevard, and Highland Ranch Parkway/Sparks Boulevard. The revised off alignment and ridge alignment (Arterial Alternatives 1 and 3, respectively) each would require a directional interchange where they connect with Pyramid Highway. The revised on alignment (Arterial Alternatives 2 and 4) would require additional interchanges at Disc Drive, Los Altos Parkway, Golden View Drive, and Sparks Boulevard.

The sections below describe the following:

- Logical termini confirmed for the proposed improvements.

- Updated description of the No-Action Alternative based on current planned and programmed projects within the Study Area.
- Description of the four build alternatives (referred to as Arterial Alternatives in this Final EIS) that were modified after the Draft EIS was distributed as a result of reduced traffic forecasts.
- Preliminary planning level construction cost estimates for the Arterial Alternatives.

2.7.1 Logical Termini

The logical termini for the proposed improvements, as outlined in Section 2.4.1, were revisited in light of the updated traffic data, revised traffic forecasts, and associated changes to the design of the build alternatives. The Study team determined that the logical termini as described in Section 2.4.1 remain valid.

2.7.2 No-Action Alternative

The No-Action Alternative evaluated in the Draft EIS was updated to reflect current reasonably foreseeable transportation, development, and infrastructure projects that are already in progress; are programmed by NDOT or FHWA, Washoe County, the cities of Reno and Sparks; or are included in the fiscally constrained 2035 RTP, with the exception of improvements proposed in conjunction with this Study. These improvements would be made whether or not any other improvements are made in conjunction with this Study and were included as the base case for all analyses, including traffic analyses. The updated No-Action Alternative is fully evaluated in this Final EIS and is used as a baseline comparison for environmental analysis purposes. Under the No-Action Alternative, improvements within the Study Area would consist of planned roadway modifications and additions. The improvements would be locally or regionally funded, and are reasonably foreseeable.

In the Study Area, notable projects included in the updated No-Action Alternative are listed below and shown on Figure 2-9.

- Pyramid Way/McCarran Boulevard intersection improvements.
- West Sun Valley Arterial as a new four-lane arterial.
- Sun Valley Boulevard Corridor multimodal improvements.
- North Connector, as a new two-lane road between Eagle Canyon Drive and Lemmon Drive.
- Widening of various segments of US 395 to six, eight, or ten lanes.

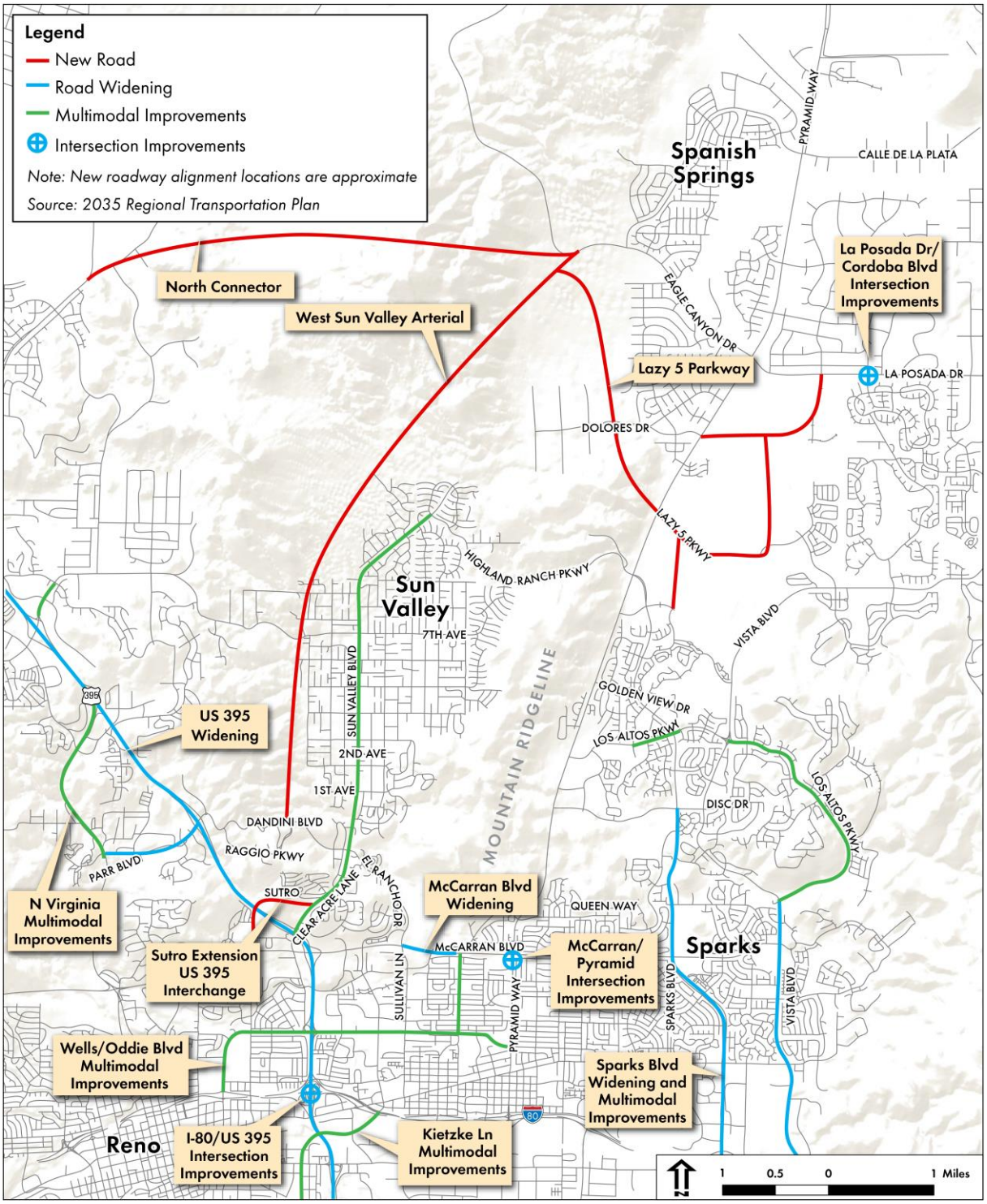


Figure 2-9. No-Action Alternative

- Widening of arterials from four to six lanes, including segments of McCarran Boulevard, Sparks Boulevard, and Vista Boulevard.
- Widening of arterials from two to four lanes, including segments of Parr Boulevard and Sutro Street.
- Lazy 5 Parkway as a new four-lane arterial.
- Kiley Ranch Road and Stone Brook Parkway as new two-lane arterials.
- Sutro Street Extension as a new two-lane road with a new interchange with US 395.

Some of the No-Action improvement projects in the Study Area would directly connect to potential improvements in the Pyramid Highway and US 395 Connector corridors. Notably, the McCarran Boulevard/Pyramid Way intersection project has been determined to have independent utility that will improve the traffic operations at the localized intersection, but does not address the defined purpose and need elements of the Pyramid Highway/US 395 Connection project. Also, the West Sun Valley Arterial at its southern terminus would connect to the potential US 395 east-west connector. The West Sun Valley Arterial does not address the needs of the Pyramid corridor or the east-west US 395 connector needs.

2.7.3 Arterial Alternatives – Common Elements

As noted in Section 2.4.3, when identifying the build alternatives to be fully evaluated in the Draft and Final EISs, the Study team understood that combining the various design elements into all possible combinations would result in many different alternative variations. It would have been difficult to present all those alternative variations and assessment of impacts to the public in a way that would facilitate effective decision making. Therefore, the Study team took elements of alternatives that were considered in the Level 1, 2, and 3 screening processes, advanced the designs, and grouped them into four different combinations, resulting in the four build ("arterial") alternatives evaluated in the Final EIS. As a result of this grouping, there are elements common to each of the four Arterial Alternatives, which are described in this section. Sections 2.7.4 through 2.7.7 describe the differences between each Arterial Alternative.

Each of the Arterial Alternatives would provide improvements along 7.7 miles of Pyramid Highway from Queen Way north to Calle de la Plata Drive through the communities of Sparks and Spanish Springs. The alternatives differ regarding alignments for the east-west US 395 Connector, interchange location, and cross-section through much of the Study Area.

In addition to roadway improvements, supplemental elements included in each Arterial Alternative include bicycle and pedestrian facilities; increased transit services, including park-and-rides; and Intelligent Transportation Systems. North of Sparks Boulevard, the Arterial Alternatives each follow the same alignment along the existing Pyramid Highway. Figure 2-10 illustrates the elements common to all Arterial Alternatives.

ITS (Intelligent Transportation Systems) uses advanced applications of electronics and communications, such as enhanced traveler information and variable message signs, to improve traffic operations and increase roadway effectiveness.

2.7.3.1 Roadway Improvements

Each Arterial Alternative would include a new arterial facility and ancillary improvements from Pyramid Highway to US 395, through the Sun Valley area. Arterial improvements are designed to carry traffic directly to US 395 via the US 395 Connector rather than along the existing Pyramid Highway to McCarran Boulevard. Both the US 395 Connector and Pyramid Highway segments north to Calle de la Plata Drive would be constructed as high speed, access controlled primary arterial highways with a combination of interchanges and at-grade intersections at major intersecting roadways. The term "high speed" refers to a design speed over 45 mph per Sections 3.3.4 and 3.3.6 of the 2011 American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* [commonly referred to as the "Green Book"]).

Arterial design elements along Pyramid Highway include installing a raised median island to separate directions of travel and limit left-turn access. The US 395 Connector includes an unpaved median and barrier rail only at select locations where required to meet clear zone distances. The US 395 connector under all the Arterial Alternatives would be constructed as a limited-access facility mostly due to topographic constraints, with increased use of barrier rail on both the outside shoulders and in the median.

The existing US 395/Parr Boulevard service interchange would be reconstructed and reconfigured to accommodate a new directional system interchange for the US 395 Connector. Raggio Parkway, Dandini Boulevard, and Spectrum Drive would be realigned in this area to accommodate the interchange improvements and provide improved access to the DRI and TMCC campuses.

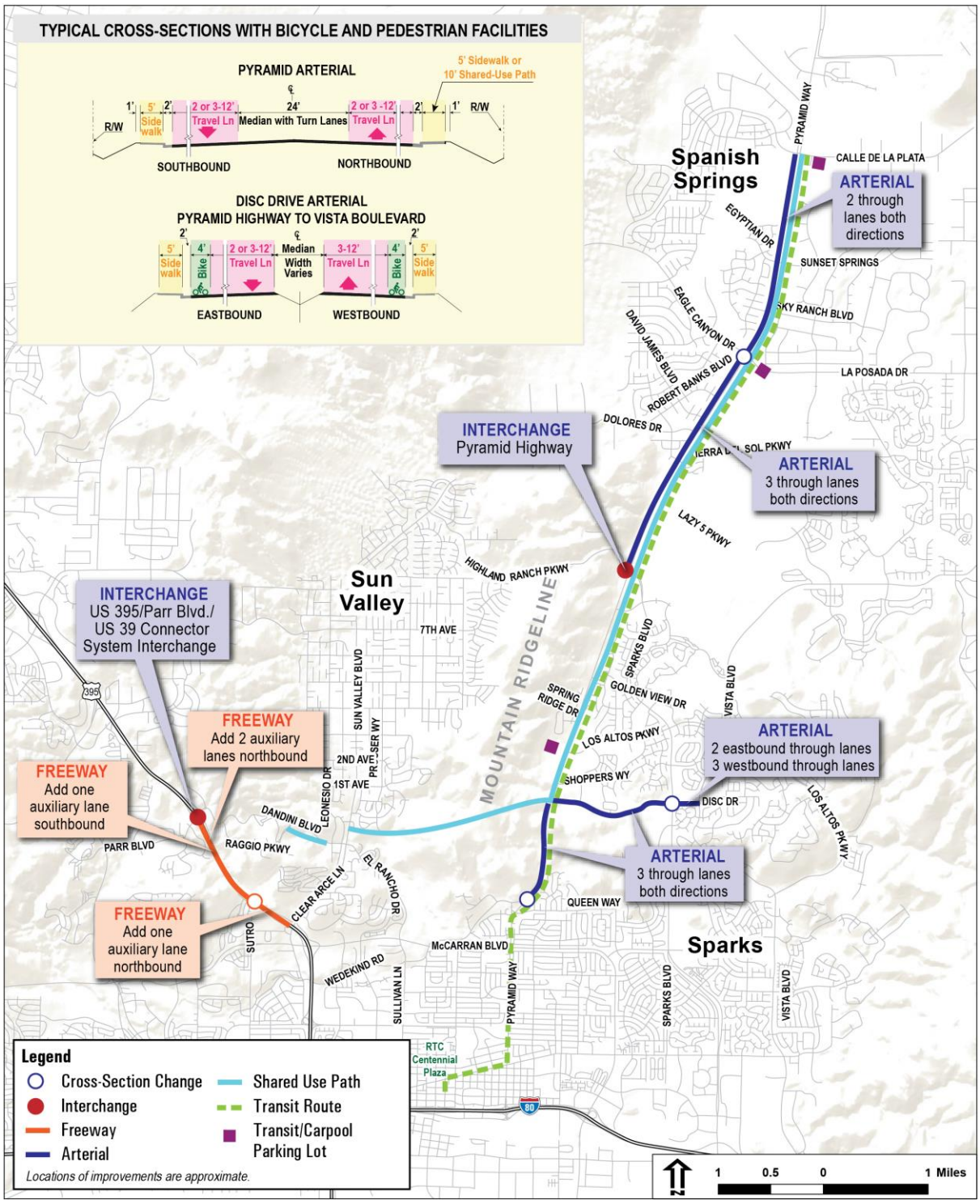


Figure 2-10. Elements Common to All Arterial Alternatives

Each Arterial Alternative would have the following cross-sections:

- Four-lane Arterial
  - Along Pyramid Highway between Calle de la Plata and Eagle Canyon Drive/La Posada Drive.
- Six-lane Arterial
  - Along Pyramid Highway between Eagle Canyon Drive/La Posada Drive and Sparks Boulevard/Highland Ranch Parkway.
  - Along Pyramid Highway between Disc Drive and Queen Way. The proposed lanes would match the improvements currently being constructed for the Pyramid Highway/McCarran intersection under a separate project.
  - Along Disc Drive between Pyramid Highway and Sparks Boulevard.
- Five-lane Arterial
  - Along Disc Drive between Sparks Boulevard and Vista Boulevard.

Each Arterial Alternative would include grade-separated interchanges at the following locations:

- Sparks Boulevard/Highland Ranch Parkway: diamond interchange.
- US 395 Connector/US 395/Parr Boulevard: at the Parr Boulevard location.

To accommodate the proposed Pyramid Highway improvements, each Arterial Alternative would modify the following major roadway accesses at Pyramid Highway, listed north to south:

- Calle de la Plata: Provide full movement signalized intersection with reconfigured lanes.
- Egyptian Drive/Sunset Springs Lane: Provide full movement signalized intersection with reconfigured lanes.
- West Sky Ranch Boulevard: Eliminate left turn access; change to right-in/right-out access only.
- Eagle Canyon Drive/La Posada Drive: Provide full movement signalized intersection with reconfigured lanes.
- Robert Banks Boulevard: Eliminate left turn access; change to right-in/right-out access only.
- David James Boulevard: Eliminate Pyramid Highway access and build cul-de-sac because of proximity to Dolores Drive.
- Dolores Drive: Provide full movement signalized intersection with reconfigured lanes.

- Lazy 5 Parkway: Provide full movement signalized intersection with reconfigured lanes.
- Kiley Parkway: Eliminate Pyramid Highway access and build cul-de-sac because of proximity of the Sparks Boulevard interchange.
- Disc Drive: Provide full movement, signalized intersection with reconfigured lanes.

In addition to changes at major intersecting roadways, access would be changed to right-in/right-out only at the following locations along Pyramid Highway:

- Commercial driveways just north of Eagle Canyon Road
- Driveways between Robert Banks Boulevard and Eagle Canyon Drive
- Various driveways between Lazy 5 Parkway and Tierra del Sol

The existing right-in/right-out access at Tierra Del Sol Parkway and Spanish Springs Library would be maintained. Minor changes would be made at these locations as necessary to tie into the improved Pyramid Highway.

Changes to commercial access along Disc Drive east of Pyramid Highway are also common to all Arterial Alternatives. These changes include eliminating left-turn access to the shopping center located on the north side of Disc Drive between Sparks Boulevard and Vista Boulevard; driveways would become right-in/right-out access only.

Each Arterial Alternative would include construction of auxiliary lanes on US 395 between the US 395 Connector and McCarran Boulevard.

Each Arterial Alternative would also eliminate the existing Dandini Drive connection to Sun Valley Boulevard and provide new connections between Raggio Parkway and Sun Valley Boulevard by extending West 1st Avenue and West 2nd Avenue to the west to intersect Raggio Parkway.

2.7.3.2 Bicycle and Pedestrian Improvements

Each Arterial Alternative would include construction of a shared-use path along Pyramid Highway between Calle de la Plata and Disc Drive. This path would continue west from Disc Drive to Sun Valley Boulevard along the US 395 Connector alignment. At Sun Valley Boulevard, the shared-use path would separate from the US 395 Connector and be accessed using the existing local street facilities along Sun Valley Boulevard and Dandini Drive. The shared-use path would continue west as an extension of Dandini Drive just west of Sun Valley Boulevard to the intersection of Raggio Parkway and Dandini Drive. Bike lanes and sidewalks on both Raggio Parkway and Dandini Drive would be provided to allow bicyclist and pedestrian access to the TMCC and DRI campuses, and Parr Boulevard. The placement of these facilities would improve existing connectivity because Dandini Drive does not currently provide bike lanes or sidewalks.

Other bicycle and pedestrian improvements would be provided along the extensions of West 1st and 2nd Avenues. Both of these streets would be repaved and restriped for bike lanes, and sidewalks would be provided as required to comply with the Americans with Disabilities Act (ADA).

2.7.3.3 Transit Improvements

Each Arterial Alternative would include the addition of regional bus service along Pyramid Highway and Prater Boulevard between Calle de la Plata and the RTC Centennial Plaza, to serve corridor demand consistent with the service standards of RTC. The Arterial Alternatives also would include construction of transit/carpool lots near the Pyramid Highway alignment at Calle de la Plata, Eagle Canyon Drive/La Posada Drive, and Los Altos Parkway. These parking facilities would be open to both transit users and travelers wishing to meet for a carpool. At Calle de la Plata, the lot would be located in the southeast quadrant of the intersection; at Eagle Canyon/La Posada Drive, the lot would be located in the southeast quadrant of the intersection. At Los Altos Parkway, the lot would be shared with the Walmart parking lot, requiring coordination with Walmart. If Walmart does not agree to share the parking lot, an alternate site may be identified during final design.

2.7.3.4 Bridges

Each Arterial Alternative would include the construction of many structures in the Study Area. Bridges and retaining walls would be built or modified to accommodate the proposed improvements.

Because of the high number of bridges and the design effort required for each, bridge design will continue during final design.

Bridges would be required at each interchange along the corridor. The bridges proposed under each Arterial Alternative are listed below in order, beginning at the US 395 interchange in the western portion of the Study Area, then moving east toward Pyramid Highway, then moving north along Pyramid Highway to Calle de la Plata.

- **Bridges Common to all Arterial Alternatives**
  - US 395 interchange at Parr Boulevard
    - Parr Boulevard over US 395 (replacement of existing structure)
    - Raggio Parkway over NE ramp (NE = North to East)
    - WS ramp over US 395
    - WS ramp over Raggio Parkway
    - WS ramp over R-1 ramp (on ramp from Parr Boulevard/Raggio Parkway to the US 395 Connector.
    - WS ramp over P-2 ramp (Parr service interchange north off ramp)
  - Pyramid arterial over Sparks Boulevard
- **Arterial Alterative 1 (Total Structures for Arterial Alternative 1 = 12)**

- Raggio Parkway over US 395 Connector arterial
- US 395 Connector arterial over Sun Valley Boulevard
- US 395 Connector arterial over Leon Drive
- US 395 Connector arterial over Disc Drive westbound on ramp
- US 395 Connector Py-2 (Southbound off ramp to Pyramid)

- **Arterial Alternative 2 (Total Structures for Arterial Alternative 2 = 14)**
  - Raggio Parkway over US 395 Connector arterial
  - US 395 Connector arterial over Sun Valley Boulevard
  - Northbound direct connect ramp over US 395 Connector arterial
  - Northbound direct connect ramp over Pyramid arterial
  - Pyramid arterial over Los Altos Drive
  - Northbound direct connect ramp over Los Altos Parkway
  - Southbound direct connect ramp over Los Altos Parkway

- **Arterial Alternative 3 (Total Structures for Arterial Alternative 3 = 11)**
  - West Sun Valley Interchange:
    - Raggio Parkway over US 395 Connector arterial
  - US 395 Connector arterial over Sun Valley Boulevard
  - US 395 Connector arterial over Disc Drive westbound on ramp
  - US 395 Connector arterial Py-2 (southbound off ramp to Pyramid)

- **Arterial Alternative 4 (Total Structures for Arterial Alternative 4 = 15)**
  - West Sun Valley Interchange:
    - Raggio Parkway over US 395 Connector arterial
  - US 395 Connector arterial over Sun Valley Boulevard
  - US 395 Connector freeway over Leon Drive
  - Northbound direct connect ramp over US 395 Connector arterial
  - Northbound direct connect ramp over Pyramid arterial
  - Pyramid arterial over Los Altos Drive
  - Northbound direct connect ramp over Los Altos Parkway
  - Southbound direct connect ramp over Los Altos Parkway

2.7.3.5 Retaining Walls

Retaining walls would be constructed where necessary along the corridor to allow construction of the interchanges or to eliminate or minimize impacts. Table 2-13 lists and describes the preliminary proposed retaining walls for each Arterial Alternative. This list is not all inclusive. The exact location and design of retaining walls will be determined during final design.

Table 2-13. Proposed Retaining Wall Locations for Arterial Alternatives

Interchange	Arterial Alternative	Location	Approx. Length	Approx. Average Height	Approx. Maximum Height	Comments
US 395/Parr Blvd./US 395 Connector System Interchange	All Arterial Alts.	Along Parr service southbound on ramp	380 feet	16 feet	37 feet	Wall has significant variations in height due to grading of surrounding properties. Placed to minimize right-of-way acquisition.
		Along US 395 westbound to southbound system on ramp	450 feet	5 feet	10 feet	Placed to avoid right-of-way acquisition.
		Along southbound US 395 just north of Sutro Street	640 feet	10 feet	15 feet	Placed to minimize right-of-way acquisition.
		Along southbound US 395 at ramp bridge	260 feet	22 feet	22 feet	Placed along bridge abutment.
		Between two ramps	850 feet	12 feet	35 feet	Placed to separate grade differential between ramps.
Sun Valley	Arterial Alt. 1	Along Sun Valley R1 ramp	1,420 feet	18 feet	35 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 1	Along Sun Valley R2 ramp	420 feet	6 feet	13 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 1	Along Sun Valley R4 ramp	1,175 feet	10 feet	16 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 2	Along Sun Valley R1 ramp	425 feet	33 feet	48 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 2	Along Sun Valley R2 ramp	295 feet	5 feet	8 feet	Placed to avoid right-of-way acquisition.
	Arterial Alt. 2	Along Sun Valley R3 ramp	400 feet	20 feet	35 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 2	Along Sun Valley R4 ramp	750 feet	30 feet	42 feet	Placed to separate grade differential between ramps.
	Arterial Alt. 2	Sun Valley south of Rampion Way Crossing at Leonesio Drive	256 feet	10 feet	18 feet	Placed to avoid right-of-way acquisition.
	Arterial Alt. 3	Wall along R3 ramp	660 feet	30 feet	35 feet	Wall to avoid Prosser Valley Ditch impacts.
	All Arterial Alts.	Wall along W. 1st Avenue at Lois Allen Elementary School for West of Sun Valley Interchange alternatives	320 feet	11 feet	19 feet	Minimizes impacts to playground area and driveway access to Lois Allen Elementary School.
	All Arterial Alts.	Wall along shared-use path	315 feet	15 feet	28 feet	Wall to avoid large cut.

Table 2-13. Proposed Retaining Wall Locations for Arterial Alternatives

Interchange	Arterial Alternative	Location	Approx. Length	Approx. Average Height	Approx. Maximum Height	Comments
Pyramid Highway	Arterial Alt. 1	Wall behind Walmart	435 feet	24 feet	40 feet	Wall height varies significantly to mitigate impacts to existing cut slope behind Walmart.
	Arterial Alts. 1 and 3	Pyramid Highway between Disc Drive and Los Altos Parkway	610 feet	4 feet	6 feet	Placed to avoid right-of-way acquisition.
	Arterial Alts. 1 and 3	Pyramid Highway south of Golden View	800 feet	8 feet	12 feet	Placed to avoid right-of-way acquisition.
	Arterial Alts. 2 and 4	Wall along Pyramid Highway north of Golden View Drive	860 feet	6 feet	13 feet	Placed to minimize right-of-way acquisition.
	Arterial Alts. 2 and 4	Seven individual walls along Los Altos Ramps	Varies	Varies	Varies	All Walls Placed to separate grade differential between ramps.
	Arterial Alternatives 2 and 4	Wall along Disc NB direct connect ramp	280 feet	17 feet	35 feet	Placed to separate grade differential between ramps.
	Arterial Alts. 2 and 4	Wall along Disc NB direct connect ramp	310 feet	15 feet	30 feet	Placed to separate grade differential between ramps.
	All Arterial Alts.	Pyramid Highway just north of Queen Way	200 feet	6 feet	6 feet	This wall protects against impacts to the Orr Ditch.
	All Arterial Alts.	Pyramid Highway just south of Wedekind Park	500 feet	15 feet	28 feet	Placed to avoid right-of-way acquisition.
	All Arterial Alts.	Disc Drive between Sparks Boulevard and Vista Boulevard, south side	1,200 feet	6 feet	10 feet	Wall will likely be higher than indicated but any additional height will be used as traffic noise barrier instead of retaining wall. Placed to avoid right-of-way acquisition.

2.7.3.6 Traffic Noise Barriers

Traffic noise barriers would be constructed to mitigate traffic noise impacts per regulation and policy. See Section 3.9 *Traffic Noise* for details.

2.7.3.7 Screening Walls

Screening walls would be constructed to mitigate visual impacts in Environmental Justice areas caused by construction of proposed roadway improvements, if supported by the affected neighborhoods. Visual screening also could be provided by earthen berms built using excess earthwork material. This visual screening also might provide some traffic noise reduction.

2.7.3.8 Water Quality and Drainage Improvements

Each Arterial Alternative would include construction of water quality and drainage improvements. These would include the construction, or replacement, of culverts, inlets, and ditches along the impacted roadways, as well as the construction of permanent water quality basins. Section 3.10 *Water Resources and Water Quality* and the *Conceptual Drainage Report* provide greater detail on these improvements. The number of facilities required by the Arterial Alternatives is summarized in Table 2-14.

Table 2-14. Water Quality and Drainage Facilities

Arterial Alternative	Culverts	Ditches	Water Quality Ponds—Number (Cumulative Approximate Acre-Feet)	Ditch/Channel Relocation
Alternative 1	37	23	10 (54)	1
Alternative 2	24	22	11 (55)	2
Alternative 3	34	28	10 (57)	1
Alternative 4	27	21	11 (54)	2

In general, water quality ponds would be located at existing low-lying areas along the Arterial Alternatives. These existing low areas include those near the US 395 interchange, in Sun Valley, near the south end of Wedekind Park, along Disc Drive, near Kiley Parkway, north of Lazy 5 Parkway, and south of Eagle Canyon/La Posada Drive.

2.7.3.9 Earthwork

Earthwork refers to the excavation and embankment of earth in connection with an engineering operation. Earthwork quantities for each Arterial Alternative were calculated for the US 395 Connector, the Pyramid Highway corridor, all interchange locations, and any changes to the local roadway network. This included those items typically included in a roadway section, such as travel lanes, bikes lanes, shoulders,

sidewalks, and roadside ditches. The analysis did not account for retaining walls placed as a mitigation measure for impacts to adjacent properties, nor did the analysis account for earthwork quantities associated with permanent water quantity/quality basins. Each Arterial Alternative would result in large quantities of excess earthwork requiring disposal. Table 2-15 shows the approximate net earthwork volumes for each Arterial Alternative.

Table 2-15. Arterial Alternative Net Earthwork Volumes

Arterial Alternative	Net Earthwork Volume (cubic yards)
Alternative 1	2,250,000
Alternative 2	2,600,000
Alternative 3	1,320,000
Alternative 4	1,290,000

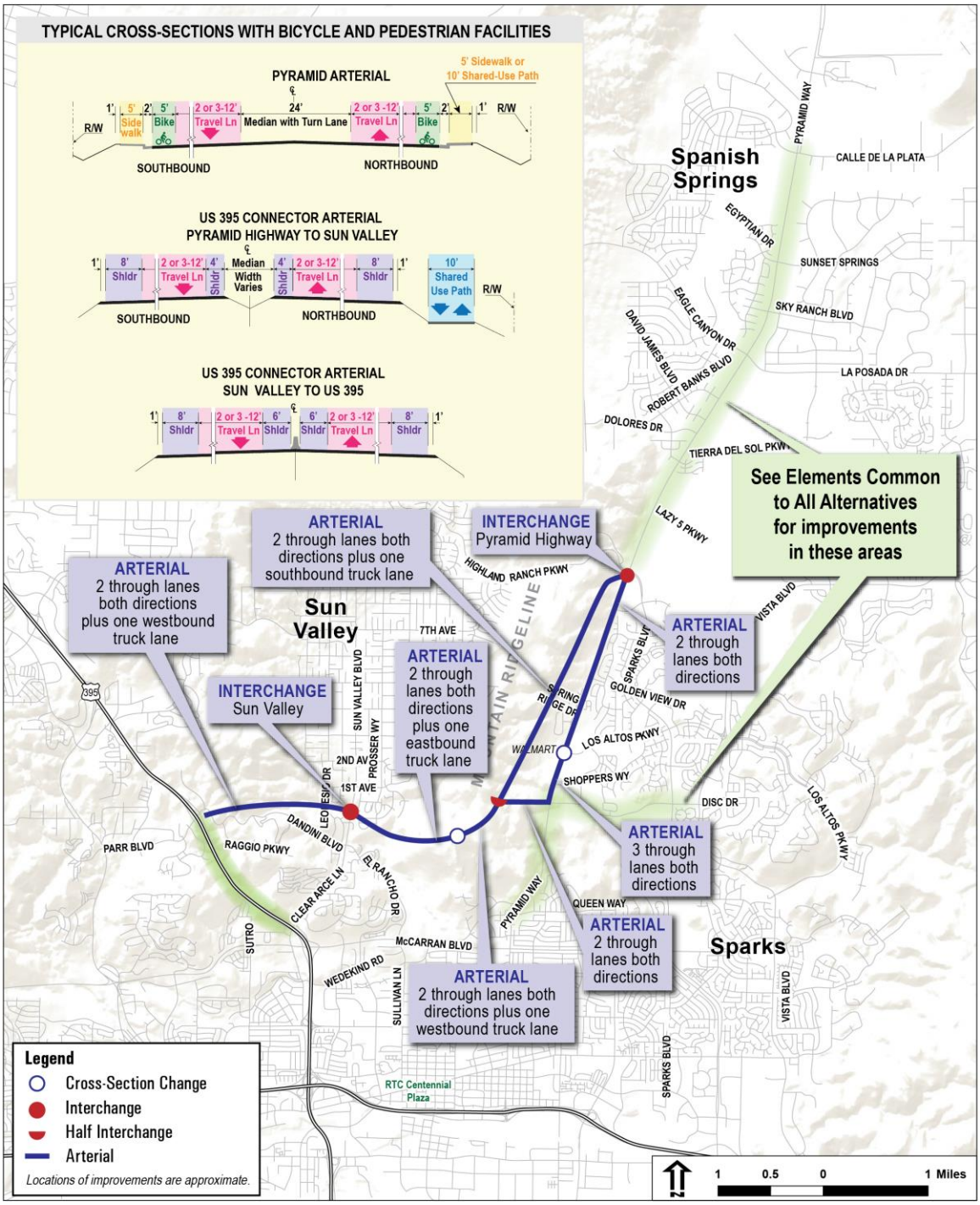
At the current level of preliminary design, specific locations for temporary or permanent storage of excess material have not been identified. It is anticipated that much of the material can be stockpiled or disposed of throughout the project limits using a variety of methods and concepts. Any off-site hauling of excess material is an option but would increase the overall project cost. Storage and/or disposal areas for excess earthwork were factored into the selection of the Preferred Alternative, and will be evaluated further during final design. Concepts for handling or reducing excess material include:

- Using excess material within other areas within the project limits where fill material is needed.
- Flattening major fill slopes along roadways as a way to increase reuse of excess material.
- Steepening cut slopes along roadways where material is found to be stable.
- Placing material along roadside shoulders to create visual screening barriers.
- Placing material within the infield areas between ramps of areas at interchanges.
- Placing material in support of third party master plan developments.
- Using material to develop and advance proposed regional parks.
- Infilling expended portions of material pits located near the project limits.
- Refining roadway alignment elevations as part of future designs.
- Placing walls in strategic locations to reduce major cuts.

2.7.4 Arterial Alternative 1

This section describes the elements included in Arterial Alternative 1 beyond the common elements described in Section 2.7.3 *Arterial Alternatives – Common Elements*.

Arterial Alternative 1, shown on Figure 2-11, would consist of an off alignment just west of existing Pyramid Highway between the US 395 Connector and Highland Ranch Parkway. This alignment would be located just below the mountain ridgeline west of Walmart. Of the two alternative alignments through Sun Valley, Arterial Alternative 1



Note: See Figure 2-10 for elements common to all Arterial Alternatives.

Figure 2-11. Arterial Alternative 1

would follow the more northern Rampion Way crossing and would include an interchange at Sun Valley Boulevard. For the length of the arterial segment from Highland Ranch Parkway and along the new US 395 connector to US 395, the typical cross-section would consist of a four-lane arterial, with auxiliary and/or truck lanes provided where warranted by traffic demand or road grade.

Changes to the local street network in Sun Valley would be required as part of Arterial Alternative 1 and include the widening of Sun Valley Boulevard, the elimination of Rampion Way, and the extension of Leon Drive north to East 1st Avenue. Some driveways along Sun Valley Boulevard would be modified to right-in/right-out only as a result of raised median islands to accommodate the interchange improvements.

Arterial Alternative 1 would include three interchanges in addition to those common to all Arterial Alternatives at the following locations:

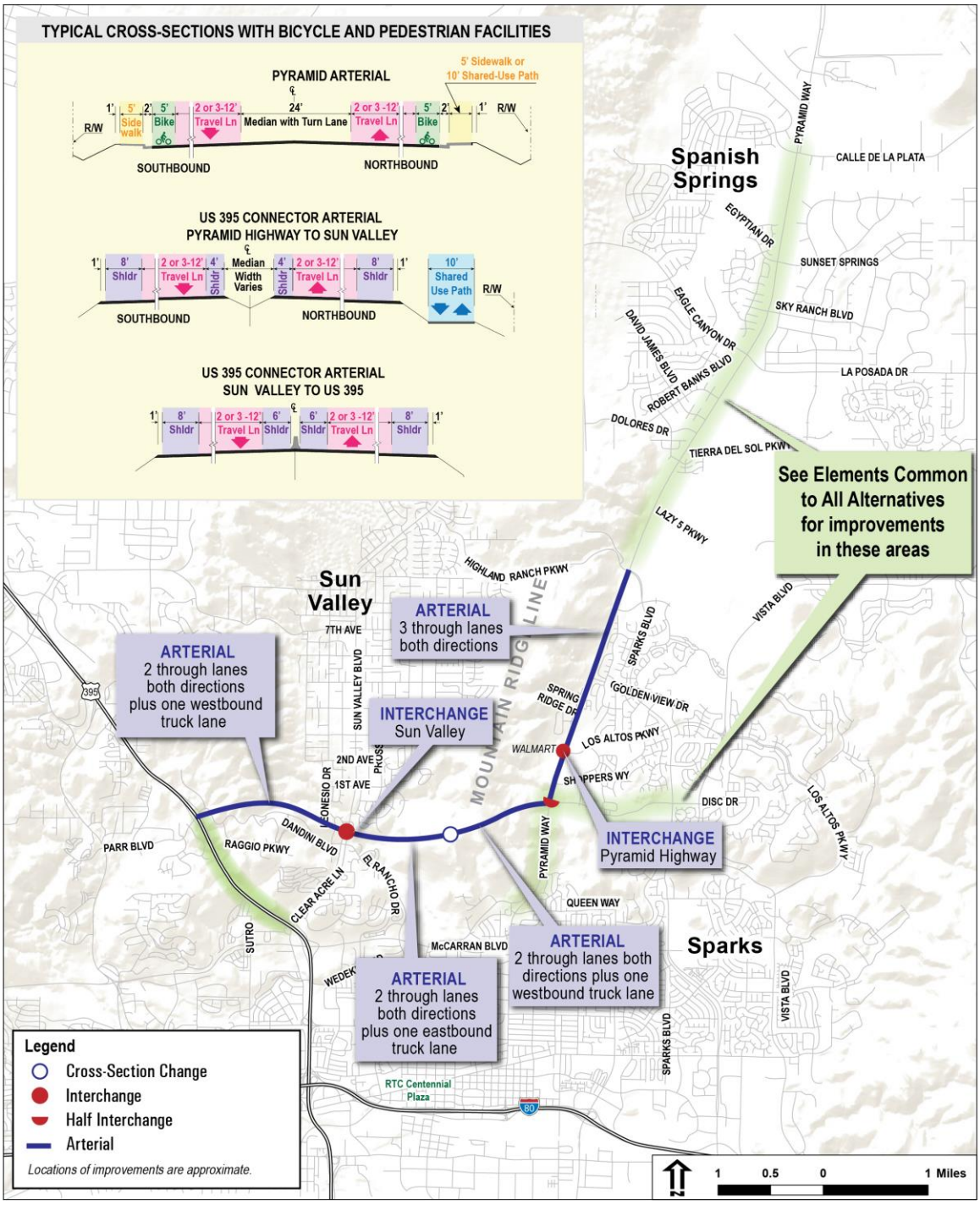
- Sun Valley Boulevard: diamond interchange
- Disc Drive: directional interchange
- Pyramid Highway south of Sparks Boulevard/Highland Ranch Parkway (existing alignment): directional interchange

Along the existing Pyramid Highway alignment south of Sparks Boulevard/Highland Ranch Parkway to Los Altos Parkway, Pyramid Highway would remain a four-lane arterial, but would be modified by installing a raised median island to limit left turns from driveways and cross streets. Driveways affected include those to the Blue Gem and Oasis Mobile Estates mobile home parks as well as the First Baptist Church. Access to Spring Ridge Drive would be changed to right-in/right-out. South of Los Altos Parkway, existing Pyramid Highway would be upgraded to a six-lane arterial to Disc Drive, again with limited left-turn movements. The existing southerly access to the Walmart shopping center and at Shoppers Square would remain, with slight modifications made to connect to the arterial improvements.

2.7.5 Arterial Alternative 2

This section describes the elements included in Arterial Alternative 2 beyond those described in Section 2.7.3 *Arterial Alternatives – Common Elements*.

Arterial Alternative 2, shown on Figure 2-12, would consist of an alignment following existing Pyramid Highway between the US 395 Connector and Sparks Boulevard/Highland Ranch Parkway. This alignment would include a six-lane limited access arterial cross section on Pyramid Highway between Sparks Boulevard/Highland Ranch Parkway and Disc Drive. The US 395 Connector would consist of a four-lane arterial cross-section between Disc Drive and US 395, with auxiliary and truck lanes provided where warranted by traffic demand or road grade. The US 395 Connector



Note: See Figure 2-10 for elements common to all Arterial Alternatives.

Figure 2-12. Arterial Alternative 2

alignment would follow the south of Rampion Way crossing of Sun Valley Boulevard and would include an interchange at Sun Valley Boulevard.

Arterial Alternative 2 would include three interchanges in addition to those common to all Arterial Alternatives at the following locations:

- Los Altos Parkway: diamond interchange
- Disc Drive at Pyramid Highway: at-grade intersection with directional ramps to northbound and from southbound Pyramid Highway tying into the US 395 Connector. These directional ramps would bypass traffic from the Disc Drive intersection.
- Sun Valley Boulevard: diamond interchange

Access changes to driveways and local streets along existing Pyramid Highway would be required as a part of this alternative. The existing Spring Ridge Drive access to Pyramid Highway would be eliminated and two new accesses at the north and south ends of Dorchester Drive would be provided. Other access changes would be required to accommodate the mobile home communities east of Pyramid Highway, including a new access road along the frontage of Pyramid Highway to access the Oasis Mobile Estates mobile home park.

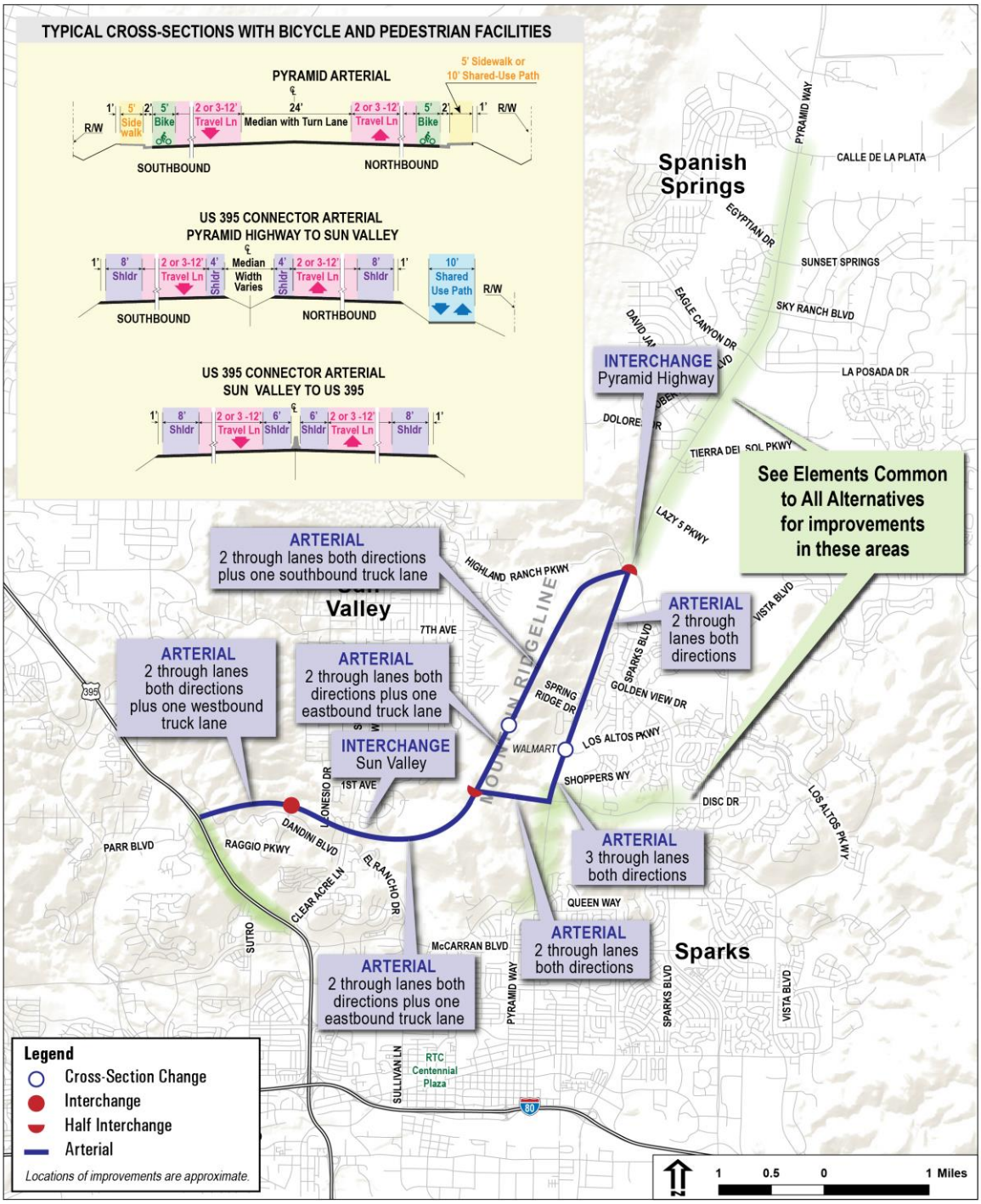
Farther south, the southerly access to the Walmart shopping center and the access to Shoppers Square would be eliminated.

Some driveways along Sun Valley Boulevard would be modified to right-in/right-out only as a result of both the Sun Valley Boulevard widening and placement of raised median islands to accommodate the interchange improvements. Both West and East Leonesio Drives on the west side of Sun Valley would be terminated with cul-de-sacs on both sides of the new US 395 Connector.

2.7.6 Arterial Alternative 3

This section describes the elements included in Arterial Alternative 3 beyond those described in Section 2.7.3 *Arterial Alternatives – Common Elements.*

Arterial Alternative 3, shown on Figure 2-13, would consist of an alignment along the mountain ridgeline between the US 395 Connector and Highland Ranch Parkway. The US 395 Connector alignment would follow the south of Rampion Way crossing through Sun Valley and would include a diamond interchange immediately west of Sun Valley Boulevard at Raggio Parkway rather than directly at Sun Valley Boulevard. The US 395 Connector would consist of a four-lane arterial cross section with auxiliary and truck lanes provided where warranted by traffic demand or road grade.



Note: See Figure 2-10 for elements common to all Arterial Alternatives.

Figure 2-13. Arterial Alternative 3

Aside from the interchange west of Sun Valley Boulevard, this alternative would include two additional interchanges; a directional interchange at the extension of Disc Drive and a directional system interchange with Pyramid Highway south of Sparks Boulevard/Highland Ranch Parkway.

Improvements and access changes along existing Pyramid Highway south of Sparks Boulevard/Highland Ranch Parkway to Disc Drive would be the same as those described for Arterial Alternative 1. In Sun Valley, both West and East Leonesio Drives in Sun Valley would be terminated with cul-de-sacs on both sides of the new US 395 Connector.

2.7.7 Arterial Alternative 4

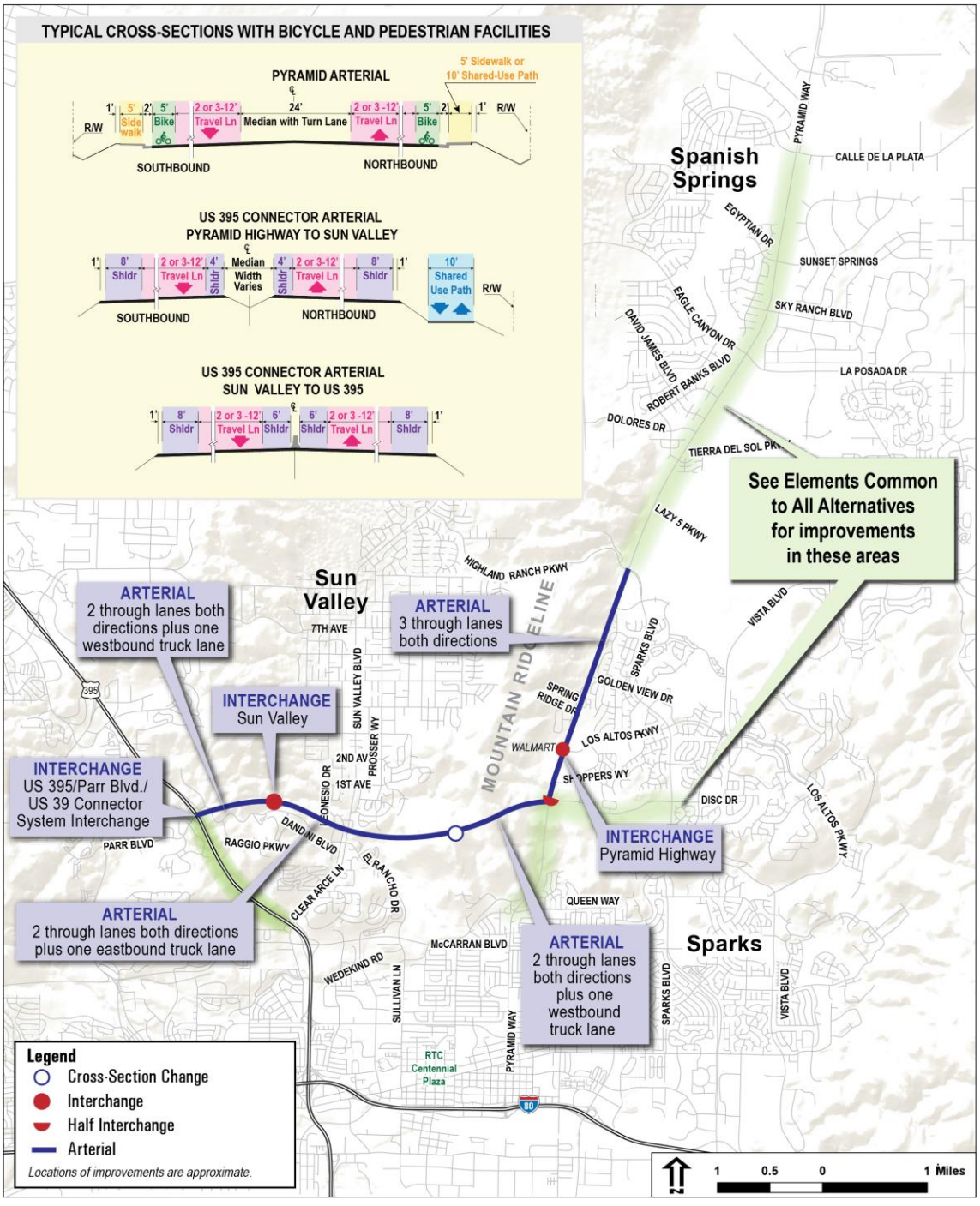
This section describes the elements included in Arterial Alternative 4 beyond those described in Section 2.7.3 Arterial *Alternatives – Common Elements.*

Arterial Alternative 4, shown on Figure 2-14, would consist of an alignment following the existing Pyramid Highway between Sparks Boulevard/Highland Ranch Parkway and the US 395 Connector; the same alignment described under Arterial Alternative 2. This alignment would include a six-lane limited access arterial cross section on Pyramid Highway between the Sparks Boulevard/Highland Ranch Parkway intersection and Disc Drive. The US 395 Connector would consist of a four-lane arterial cross-section between Disc Drive and US 395 with auxiliary and truck lanes provided where warranted by traffic demand or road grade. The US 395 Connector alignment would follow the more northern Rampion Way crossing of Sun Valley and would include an interchange immediately west of Sun Valley Boulevard at Raggio Parkway.

Like Arterial Alternative 2, this alternative would include three additional interchanges at Los Altos Parkway, Disc Drive, and west of Sun Valley Boulevard.

Access changes along Pyramid Highway would be similar to those described for Arterial Alternative 2. Access changes in Sun Valley would be similar to those described for Arterial Alternative 1, except that no impacts to existing driveways would occur because no widening is proposed along Sun Valley Boulevard.

Chapter 3.0 *Environmental Resources, Impacts, and Mitigation* documents the impacts associated with each Arterial Alternative, and lists proposed measures to mitigate impacts.



Note: See Figure 2-10 for elements common to all Arterial Alternatives.

Figure 2-14. Arterial Alternative 4

2.8 ARTERIAL ALTERNATIVE COST RANGES

Preliminary planning level cost estimates were developed for each of the Arterial Alternatives using NDOT software. The costs were estimated in year 2017 construction dollars for this Final EIS. The construction cost estimates include engineering and inspection costs, and costs associated with earthwork, including excavation and hauling. The construction costs also include traffic control, as well as landscaping and aesthetics, but do not include right-of-way acquisition costs.

Right-of-way acquisition costs were estimated using general land and improvement values provided by RTC Right-of-Way staff. These costs include moving and other relocation expenses.

Table 2-16 summarizes the estimated cost ranges for each Arterial Alternative. As a result of design modifications made after the Draft EIS, the construction cost estimates for the Arterial Alternatives are considerably lower (between 40 to 45 percent lower) than the estimated construction costs for the Freeway Alternatives evaluated in the Draft EIS.

Table 2-16. Arterial Alternative Cost Estimates

Alternative	Estimated Construction Cost Range (2017 $)	Estimated ROW Cost (2017 $)
Arterial Alternative 1	$528M to $584M	$133M
Arterial Alternative 2	$577M to $637M	$153M
Arterial Alternative 3	$510M to $564M	$123M
Arterial Alternative 4	$592M to $654M	$157M