Regional Transportation Commission
of Washoe County

SPARKS BOULEVARD
MULTI-MODAL CORRIDOR STUDY

This is Sparks Boulevard - Providing Safe and Enjoyable Connections to Residents on Two Wheels, Four Wheels, and Their Own Two Feet

Final Report - June 24, 2015

Prepared for:

RTC

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EXECUTIVE SUMMARY

What a great street! Sparks Boulevard is one of few roadways in the Truckee Meadows that offers an outstanding recreational multi-use path in a corridor that currently carries over 35,000 daily vehicle trips. Does any other local major arterial have a recreational path, with seating benches, and grade separation too, traversing through a wide landscaped median along a "creek"? Walk or bike to work, school, shopping, or a transit stop? Yes, please!

The corridor embodies mixed use planning with the vibrant Legends at Sparks Marina (commercial center) and Wild Island water park (recreation) on the south end, Reed High School (institutional) in the center, and the Kiley Ranch large scale master-planned development (residential) in the north with relatively higher density housing. A wide variety of residential housing types and neighborhood-scale commercial centers are scattered throughout. Land use intensity will continue to increase with planned development in Legends, at Kiley Ranch, and at a few other undeveloped sites along the corridor. Recent announcements of large-scale industrial development in the East Truckee River Canyon (Tesla, TRIC, etc.) remind us that population growth in Sparks is a reality that should be planned for. So that brings us to "planning", and the question that started this comprehensive multi-modal corridor study.

What traffic conditions should be anticipated on Sparks Boulevard in association with 1) continued development along Sparks Boulevard, 2) the SouthEast Connector tie-in at Greg Street, and 3) future conversion of Pyramid Highway to a freeway type facility, and what capacity improvements will be needed on Sparks Boulevard to serve travel demand over the next 20 years?

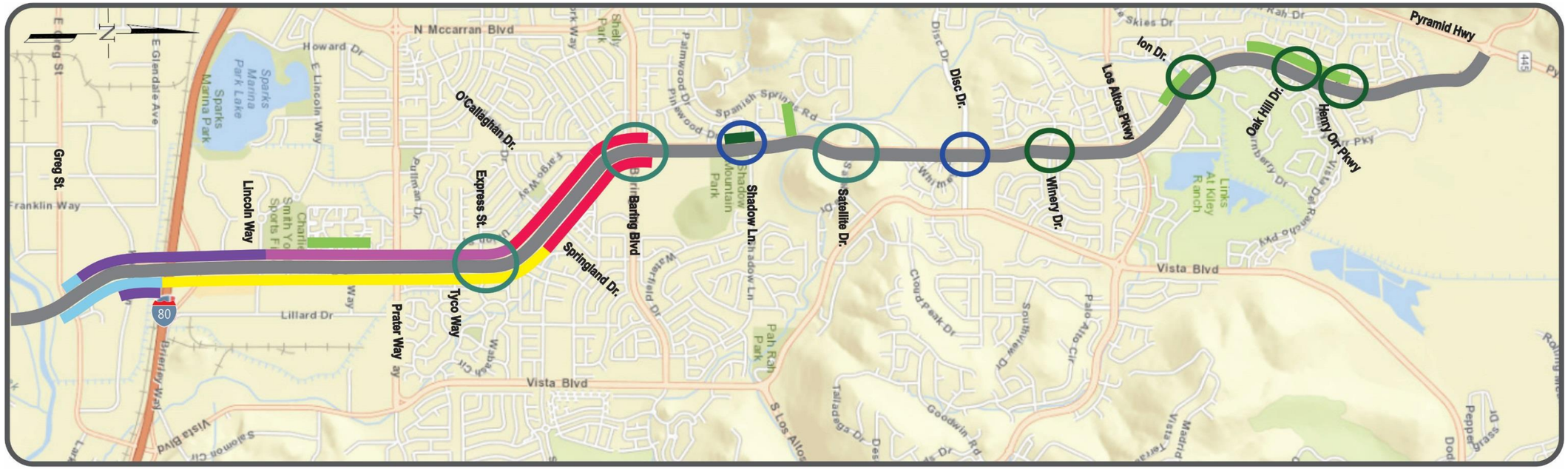
After walking the entire corridor, counting cars, cyclists, and pedestrians, modeling traffic flows in 2035, evaluating transit routes, performing countless traffic operations calculations, considering advice of the project's Technical Advisory Committee, and talking with citizens at hosted public meetings, the project team developed a set of phased, and community supported, multi-modal improvements that will manage traffic flows through the 20-year horizon and enhance the transportation infrastructure for every roadway user.

At the latter of two public open house meetings held during this study, Sparks' citizens unanimously selected a "Roadway Widening" alternative rather than living with significant levels of congestion and delay (No Action alternative). Other capacity expanding alternatives, including Compact Grade Separation and Unconventional Intersections, were considered in an attempt to reduce the overall future roadway footprint. These alternatives were dismissed by the Technical Advisory Committee and/or consultant team since elevated structures were deemed inconsistent with the surrounding neighborhood and unconventional intersections posed a variety of design or convenience issues.

Simply stated, the recommended "Roadway Widening" alternative will widen Sparks Boulevard, to 6 lanes, between Greg Street and Prater Way, lanes are carried further to Express Street and Springland Drive to make intelligent transitions back to 4 lanes south of Baring Boulevard. Only spot improvements (turn lanes at certain intersections, spot safety enhancements, and sidewalk gap closures) are proposed north of Baring Boulevard. Bike lanes, sidewalks, and multi-use path improvements are included through the full corridor length (Greg Street to Pyramid Way). The recommended improvement package will provide acceptable levels of service at intersections and on studied roadway segments through the 20-year horizon, and addresses the interests of community members who participated during the public outreach process. The top three community priorities are: improving bike/ped facilities, increasing safety, and maintaining roadway capacity. The full list of improvements, illustrations, and estimated costs are presented in Chapter 12 and summarized in the Program of Projects table.

So what's next? Page 11-25 presents an implementation table with phasing recommendations and potential funding sources. It was created for direct plug-in to the Regional Transportation Improvement Program (RTIP). Now is the time to program the carefully developed packages and begin securing funding for this roadway that becomes more important (and a little more congested) every year, eventually expected to serve more than 60,000 travelers on a daily basis. In the meantime, walk the Sparks Boulevard path – do it, take a break at the park bench a little south of Express Street, and consider how a great boulevard can be made even better.

Sparks Boulevard - Program of Projects	**Total Project Cost**		
	Near-Term	**Mid-Term**	**Long-Term**
Preliminary Engineering & NEPA	$4,500,000		
Pedestrian Improvements (Near-Term 1)	$980,000		
Pedestrian Improvements (Near-Term 2)	$1,250,000		
Greg to I-80 Widening (Mid-Term 1)		$770,000	
East side Widening, I-80 to Springland (Mid-Term 2)		$17,800,000	
Realignment at Springland (Mid-Term 3)		$17,440,000	
Intersection Improvements (Mid-Term 4)		$920,000	
West side Widening, Lincoln to Express (Long-Term 1)			$4,970,000
West side Widening, Greg to I-80 (Long-Term 2)			$27,190,000
Other Improvements	$485,000		
Total of All Phases	**$76,305,000**		



Near-Term 1

COST: $980,000

SCOPE: Includes sidewalk gap closures and upgrade of the Park Vista Apartment transit stop and crosswalk.

Near-Term 2

COST: $1,250,000

SCOPE: Includes a new pedestrian / bike bridge at Shadow Lane and spot crosswalk improvements.

Mid-Term 1

COST: $770,000

SCOPE: Includes restriping from Greg to I-80 WB Ramps to provide 3 NB lanes and bike lanes. Widen Sparks Blvd just north of Greg to provide proper number of lanes and alignment, widen and improve path this segment.

Mid-Term 2

COST: $17,800,000

SCOPE: Includes realigning and widening Sparks Blvd, constructing new multi-use path, adding a section of sidewalk, and intersection modifications at Lincoln Way and Prater Way.

Mid-Term 3

COST: $17,440,000

SCOPE: Includes realigning Sparks Blvd and combining the Springland and O'Callaghan intersections. Construct a new section of multi-use path and a section of sidewalk.

Mid-Term 4

COST: $920,000

SCOPE: Includes intersection modifications at Disc Drive and Shadow Lane.

Long-Term 1

COST: $4,970,000

SCOPE: Includes widening Sparks Blvd in the SB direction to 3 thru lanes and adding a section of sidewalk.

Long-Term 2

COST: $27,190,000

SCOPE: Includes widening 3 major structures to construct 3 SB thru lanes and modifications of both I-80 ramp terminals.

Other Improvements

COST: $485,000

SCOPE: Safety projects at specific intersections

ACKNOWLEDGEMENTS

The Sparks Boulevard Corridor Study was administered by the Regional Transportation Commission of Washoe County (RTC), on behalf of the City of Sparks, for the benefit of Spark's residents and every community member who will walk, cycle, ride a bus, or drive on Sparks Boulevard in the next 20 years and beyond. Planning the future of a regionally significant major arterial roadway, anticipated to be utilized by over 60,000 people per day, is no easy task. The project team is therefore sincerely grateful for every citizen, stakeholder, technical advisor, and agency representative that gave of their personal time and knowledge, to guide the study process and identify a set of well rounded multi-modal improvements that will serve our community well into the future. Thank you for helping shape the future of Sparks Boulevard!

Technical Advisory Committee:

Member	Agency
Lee Gibson	RTC Executive Director
Amy Cummings	RTC Director of Planning
Jeff Hale	RTC Director of Engineering
David Jickling	RTC Director of Public Transportation
Ed Park	RTC Public Transportation
Debra Goodwin	RTC Planning
Christina Leach	RTC Planning
Judy Althoff	RTC Planning
Roger Hanson	RTC Planning
Michael Moreno	RTC Planning
Xuan Wang	RTC Planning
Doug Maloy	RTC Engineering
Julie Masterpool	RTC Engineering
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Jon Ericson	City of Sparks
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Tom Garrison	City of Sparks
Brian Allen	City of Sparks
Danny Hamlin	City of Sparks
Tracy Domingues	City of Sparks
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Jason VanHavel	NDOT Planning
Coy Peacock	NDOT Planning
Anita Lyday	NDOT District II
Leah Sirmin	FHWA
Yann Ling-Barnes	Washoe County Air Quality
Kelli Seals	Washoe County Health District
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1 INTRODUCTION

1.1 Purpose and Priorities

The Regional Transportation Commission of Washoe County (RTC) prepares short and long range transportation plans for the region, programs highway and public transportation improvements through the Regional Transportation Improvement Program (RTIP) process and develops and carries out the Unified Planning Work Program (UPWP). The Sparks Boulevard Corridor study is a part of the RTC's Unified Planning Work Program (UPWP) and was selected for in-depth study due to its regional importance. Sparks Boulevard is a major north-south corridor through Sparks and will become even more important within the greater context of the Truckee Meadows region with the construction of planned regional roadway improvements such as the SouthEast Connector and Pyramid Highway - US 395 Connection. Once the SouthEast Connector is completed, Sparks Boulevard will become a key link connecting North Sparks to South Reno.

This study identifies recommendations for multi-modal transportation improvements on Sparks Boulevard between Greg Street and Pyramid Highway with a focus on long-term capacity considering the SouthEast Connector and Pyramid Highway - US 395 Connection projects. The study provides a strategy for developing "Complete Streets" improvements that are coordinated with adjacent planned and existing land use. The goal of this study is to identify deficiencies and potential solutions with respect to roadway capacity and safety issues, environmental considerations, projected land use, and future right-of-way needs and constraints.

Based on the input received from stakeholders, interested citizens, and a Technical Advisory Committee (TAC), the priorities for the Sparks Boulevard Corridor are:

- Vehicular Capacity:
  - Address how Sparks Boulevard fits into the future overall regional roadway network
  - Plan for potential affects and coordination needs associated with the SouthEast Connector completion
  - Prioritize necessary capacity improvements in conjunction with alternative mode improvements
- Safety:
  - Improve overall corridor crosswalk safety and crosswalk application
  - Address vehicle safety issues throughout the corridor by improving geometry and controls
- Pedestrian & Bicycle Network
  - Maintain trail connectivity and increase safety – the trail is an asset to the community that provides vital alternative mode connectivity and is utilized for various recreational special events
  - Provide better pedestrian connectivity with adjacent neighborhoods
  - Provide bike lanes to the extent possible
- Transit:
  - Incorporate transit improvements and facilities into the plan
- Amenities:
  - Provide better wayfinding and information signage for the Sparks Path – consider better branding of the path to make it more identifiable

1.2 Study Area

The study area consists of the entire 6.6 mile length of Sparks Boulevard from Greg Street (south end) to Pyramid Highway (north end). The corridor contains an interchange with Interstate 80 near the southern end. Sparks Boulevard is classified as a Medium Access Control (MAC) arterial in the 2035 Regional Transportation Plan (RTP). Sparks Boulevard is currently a four-lane divided roadway throughout, except between the I-80 Ramps and E. Lincoln Way. Between Lincoln Way and the I-80 WB ramps, the configuration is a six-lane divided roadway and between the I-80 WB Ramps and the I-80 EB Ramps intersections it is a five-lane divided roadway with three northbound and two southbound lanes. The land use surrounding Sparks Boulevard south of E. Prater Way is predominantly commercial and retail. The land use surrounding Sparks Boulevard north of Prater Way is predominantly residential with a few commercial pockets. The posted speed limit on Sparks Boulevard is 40 mph. The study limits and the project area are shown in **Figure 1-1**.

FIGURE 1-1. STUDY AREA

2 PROJECTS THAT AFFECT SPARKS BOULEVARD

The study area has two major planned developments and two major roadway projects that serve as bookends to the corridor. Kiley Ranch North and the Pyramid Highway - US 395 Connection are significant in the north portion of the corridor. The Legends at Sparks Marina development and the SouthEast Connector are important in the south. Following is a summary of each of these major projects.

2.1 SouthEast Connector (SEC)

The SouthEast Connector project is an important investment in the Truckee Meadows that addresses long-term transportation needs and improves the mobility of people, goods and services throughout northern Nevada. The SEC provides an additional, and much needed, regional north-south route between Sparks and the South Meadows area. The SEC is a partially constructed north-south arterial to be located along the east side of South Reno and Sparks. Once completed, the new roadway will stretch 5.5 miles from the intersection of Greg Street and Sparks Boulevard at the northern end, to Geiger Grade at the southern end. The road will be three lanes in each direction. The design speed of this facility is 55 miles per hour. Six major roadways will intersect the proposed facility. Some of the benefits of the SouthEast Connector include: improved connectivity for north/south travel by relieving traffic on regional roads such as I-580 and McCarran Boulevard, accommodation of future commercial and residential development, and enhanced safety. This project will be built in two phases over a period of several years. The first phase of work, at the most northern end of the project includes the construction of a bridge over the Truckee River and completes the roadway from Sparks Boulevard to just south of Clean Water Way. Phase 1 is already complete. The second phase consists of building a new roadway from Clean Water Way to Veterans Parkway as shown in **Figure 2-1**. The portions of the roadway south of S. Meadows Parkway (to Geiger Grade) are complete.

The SouthEast Connector is a new regional facility and therefore would significantly change travel patterns in the study area. The anticipated effects on Sparks Boulevard are:

- The SouthEast Connector when completed will significantly divert traffic off of I-80, I-580, and McCarran Boulevard which will result in increased traffic volumes on the southern portions of Sparks Boulevard with the new connection to Reno.
- The Sparks Boulevard/Greg Street intersection will become a four-legged intersection.
- Sparks Boulevard and the SouthEast Connector may become a regional bicycle route because of the desirable north-south connectivity and high quality planned facilities on the SouthEast Connector.

2.2 Pyramid Highway - US 395 Connection

The Pyramid Highway - US 395 Connection Study is an environmental and engineering study being prepared by the RTC on behalf of the Nevada Department of Transportation and in cooperation with the Federal Highway Administration. The purpose is to evaluate alternatives to relieve traffic congestion on Pyramid Highway and provide improved east/west community connectivity from Pyramid Highway to US 395 and east to Vista Boulevard. The project will redirect traffic originating from north Spanish Springs, and beyond, destined for the Reno urban core to the south and west, away from Pyramid Way through Sparks. This connection will greatly benefit people living and/or working in Reno, Sparks and Washoe County by providing much needed capacity and connectivity improvements. Wide ranges of alternatives were developed that included multiple transit technologies on feasible alignments, and highway improvements on both existing and new alignments. After various levels of alternatives screening, the RTC selected a preferred alternative in May 2014, and is in the process of performing a Final Environmental Impact Study (FEIS). Currently, the RTC is collecting public input regarding the preferred alternative and is expected to make a final design decision in 2015. The preferred alternative for the Pyramid Highway - US 395 Connection is shown in **Figure 2-2**. A brief overview of the Pyramid Highway - US 395 Connection is as follows:

- A new freeway connection between Pyramid Highway (starting at Eagle Canyon Drive) and US 395 including:
  - Three through lanes in each direction between Eagle Canyon Drive and Dolores Drive with one-way frontage roads
  - Three through lanes plus one auxiliary lane in both directions between Dolores Drive and Lazy 5 Parkway
  - Three through lanes in each direction between Lazy 5 Parkway and Sparks Boulevard with one-way frontage roads
  - Three through lanes in both directions with one southbound/eastbound truck lane between Sparks Boulevard and Dandini Boulevard
  - Three through lanes in each direction plus one westbound auxiliary lane between Dandini Boulevard and US 395.
- Widening Pyramid Highway to a six-lane arterial between Sunset Springs Lane and Eagle Canyon Drive, and between Los Altos Parkway and Queen Way.
- New Interchanges at: US 395, Sun Valley Boulevard, Disc Drive, Sparks Boulevard, Lazy 5 Parkway, Dolores Drive, and Eagle Canyon Drive.
- A shared used path between Calle de la Plata and Disc Drive that runs parallel to Pyramid Highway.

Building the Pyramid Highway-US 395 Connector will likely affect Sparks Boulevard in following ways:

- Disc Drive will be widened to be a six-lane arterial between Pyramid Highway and Sparks Boulevard, and a five-lane arterial between Sparks Boulevard and Vista Drive – Increased traffic volumes at the Sparks Boulevard and Disc Drive intersection.
- Frontage Roads in the northern portion of the study area along the proposed freeway – In combination with the proposed transit route along Pyramid Highway and Disc Drive, could shift some traffic off of Sparks Boulevard providing a parallel alternative route in the northern section of the study area.
- Proposed interchanges at Sparks Boulevard, Disc Drive, and Lazy 5 Parkway – Could create changes in travel patterns along Sparks Boulevard.
- Transit/Carpool lot at Pyramid Highway/Los Altos Parkway – Could create changes in travel patterns along Sparks Boulevard.

2.3 The Legends at Sparks Marina

Located on the southwest quadrant of E. Lincoln Way and Sparks Boulevard, The Legends at Sparks Marina ("Legends") is master planned as a major shopping and tourism destination for the greater Truckee Meadows region. The Legends at Sparks Marina Planned Unit Development (PUD) Handbook originally approved in 2006 included a destination retail, hotel casino,

restaurant, entertainment and residential uses, in addition to a sports stadium. The following **Table 2-1**, taken from The Legends PUD summarizes the uses, acreages and building area for the development. Note that the land use mix has varied due to the market conditions.

Table 2-1. The Legends Land Use Details

Project Component	Land Use	Acres	Area (sq ft)
Main Retail Center	Retail/Restaurant/ Entertainment /Hotel/Condo/Retail-Health Club	107.03	1,373,680
Baseball Stadium	Baseball Stadium – Includes Field	Included Above	224,240
Northeast Anchor Tenant	Retail/Restaurant	34.19	203,319
Luxury Motor Coach Dealer	Retail	8.31	35,200

In addition to the above uses specified in the Legends PUD, the areas surrounding The Legends project to the north are located in the City of Sparks Transit Oriented Development (TOD) corridor and have master planned uses which include over 25 acres of undeveloped Tourist Commercial and just over 10 acres of undeveloped multifamily residential. It should also be noted that over 560± acres of existing industrial properties are located adjacent to Legends to the east and south. This industrial area also includes the 18± acre Wild Island water play park and entertainment venue.

2.4 Kiley Ranch North

Kiley Ranch North is an 834± acre master planned community that is predominantly located north and east of the Sparks Boulevard/Pyramid Highway intersection. Approximately 72± acres on Sparks Boulevard, south of Kiley Parkway, commenced with development of multifamily and single family lots. The majority of Kiley Ranch North, however, remains undeveloped at this time. The original Kiley Ranch North tentative development handbook included 4,463 residential units of varying densities, over 2,000,000 square feet of commercial, over 3,000,000 square feet of office/business park, and 400,000 square feet of public facility. The tentative development handbook, originally approved in 2004, has undergone many augmentations since its original approval. Development of the Kiley Ranch North project is a phased implementation and, as such, with each final development handbook, the overall development plan can change slightly. The most recent amendment to the Kiley Ranch North Phase 2 Final Handbook (recorded March, 2014) includes 3,989 residential units, over 3.9 million square feet of commercial, 3.3 million square feet of office/business park, and 335,892 square feet of public facility. While it is unclear as to whether additional non-residential land could be included in the future, it is safe to assume that the residential density will not exceed 4,463 units without a wholesale change of the development.

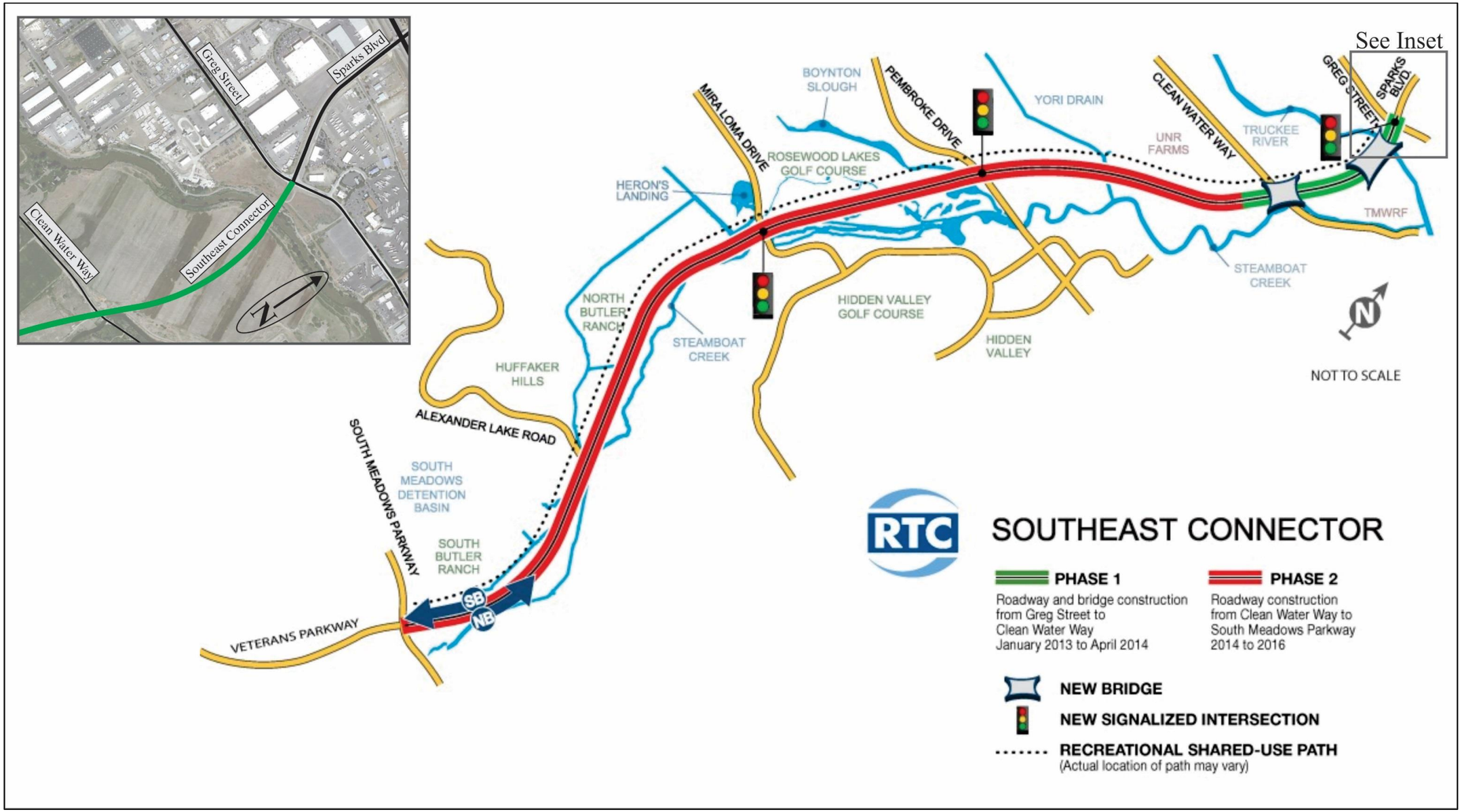


Figure 2-1. Southeast Connector

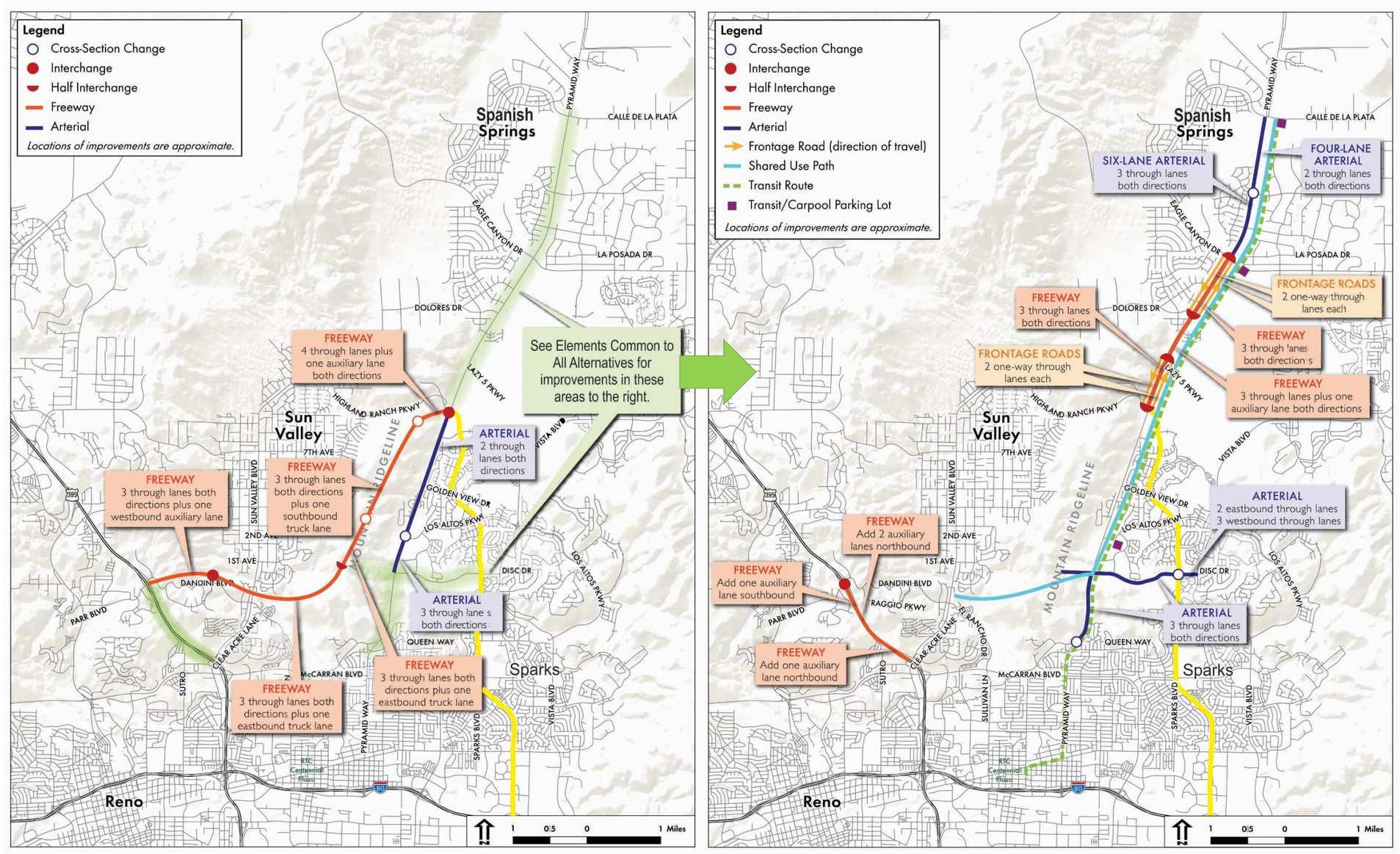


Figure 2-2. Pyramid Highway - US 395 Connection Preferred Alternative

3 PUBLIC OUTREACH

A key part of any successful corridor study is interweaving public involvement throughout the duration of the study. The Sparks Boulevard Corridor Study project team sought to engage interested citizens and key stakeholders whenever possible and incorporate their feedback throughout the study process. The project team has reached out to key stakeholders including business owners throughout the corridor, adjacent neighborhood associations, Kiley Ranch, and the owners of the Baring West shopping center, in an effort to identify current and future needs as well as gauge favorability of potential alternatives. The project team has engaged key agencies throughout the study process by meeting multiple times with the Technical Advisory Committee (TAC) established for this project. Three TAC meetings were held during the study preparation. The first meeting was held in October 2013, followed by a second TAC meeting in January 2014, and a third TAC meeting in June 2014.

Committee members attended TAC meetings throughout the course of the project, reviewed documents and material presented to them and provided their input. The committee included staff from the City of Sparks, the RTC, the Nevada Department of Transportation (NDOT), the Federal Highway Administration, the Washoe County Health District, the Washoe County School District, Air Quality Management Division, and the Truckee Meadows Regional Planning Agency. The RTC and the City of Sparks are the lead agencies for this study. Other agencies and organizations provided significant input throughout the project. In addition to conducting TAC meetings, the consulting team met multiple times with RTC and City of Sparks staff to discuss specific issues and find consensus based solutions to various challenges.

The study process included a significant public outreach effort to identify key issues and concerns regarding the corridor from the public's perspective, and have the public shape potential corridor improvements. Public involvement was sought via attendance at two public meetings that were conducted on February 20, 2014 and October 2, 2014 at Reed High School which is located on the study corridor.

3.1 TAC Meetings

Kick-Off Meeting

During the initial stages of the project, the consulting team organized a Kickoff Meeting, which was attended by staff members from the RTC and the City of Sparks, to discuss the overall project, schedule, client needs, preliminary interests, and study goals. Primary interests and study goals identified during the kick-off meeting were:

- Traffic Safety Issues, like sight distance
- Traffic Operations after the SEC is opened
- Operations analysis and recommendations for signalized intersections
- Roadway alignment issues between I-80 and Lincoln Way
- Multi-use path connectivity and continuity
- Safety associated with the bike/ped environment
- Lighting along the corridor

This meeting also helped identify key members to be invited to the Technical Advisory Committee and stakeholders in this project. Key stakeholders identified for this project include:

- Kiley Ranch
- Reed High School
- Scolari's – McKenzie Properties
- Alamo
- Red Development
- Prologis
- Wild Island
- Sierra Freightliner
- Tanamera
- Morey Distributing

TAC Meeting 1

The first Technical Advisory Committee meeting was conducted in October 2013. The meeting began with a presentation by the project consulting team, followed by a question-and-answer session. This meeting served as an introduction between the consulting team staff, lead agency staff, and the TAC members. The main purpose of this meeting was to introduce the project to the committee members and inform them of the start of the study. While introducing the project, the TAC was presented with the project overview, Scope of Work of the project, corridor study approach, preliminary goals and objectives, public engagement and outreach process, and the project timeline. The TAC team was also presented with the details of current regional projects in the vicinity of Sparks Boulevard and their relationship to the project.

Preliminary Walking Audit findings, field observations, an inventory of existing conditions in the corridor and non-motorized (bicycle and pedestrian) data was also presented to the TAC during this meeting. A discussion session was conducted after the presentation to gain feedback and suggestions for goals and objectives of the study. The priorities and goals for the study were finalized based on the comments received during this discussion and then presented to the committee in TAC Meeting 2.

Figure 3-1. A Sample Slide from the TAC Meeting #1 Presentation

TAC Meeting 2

The second Technical Advisory Committee meeting was conducted in January 2014. Similar to the first TAC meeting, the project team began by making a presentation, followed by a question-and-answer session. The primary purposes of this meeting were to update the TAC on the progress of the project, present the existing conditions technical analysis, and solicit comments for a vision statement. Detailed technical information presented during this meeting included:

- Analysis of the crash history summaries and trends along the corridor
- Existing deficiencies in bike/pedestrian facilities
- Existing Level of Service analysis
- Review of existing access compared to access standards
- Land use details
- The final list of goals and objectives based on the input received from TAC meeting 1

Figure 3-2. A Sample Slide Showing Potential Vision Statements discussed at TAC Meeting #2

After receiving the technical information, the TAC was shown various Vision Statement ideas that were developed for the Sparks Boulevard Corridor by the project team members. The TAC was asked to critique the potential vision statements and offer new ones. After some discussion, a statement blending the ideas shown in Figure 3-2 was advanced for public comment.

The TAC was also informed about the first open house (public meeting) where the material from TAC meeting 2 would be presented to the public.

TAC Meeting 3

A third Technical Advisory Committee meeting was conducted in June 2014, after the first public meeting. The first half of the presentation included a recap of the material presented in the first two TAC meetings and the summary of outcomes and comments from the first public meeting. The final community selected vision statement was presented to the TAC, and was then made the official vision statement for this corridor study (see Section 3.2). The comments received during Public Meeting 1 were also presented.

The second half of the presentation informed the TAC about the:

- Methodology used to develop future horizon year 2035 traffic volumes using the outputs obtained from the RTC regional travel demand model
- Horizon year 2035 traffic volumes and operations
- Year 2035 deficiencies (both motorized and non-motorized)
- Improvement alternatives

The methodology used to develop 2035 traffic volumes is discussed in detail in Chapter 5 and improvement alternatives are discussed in Chapter 6. The following four alternatives were presented to the TAC for consideration:

- No Action
- Roadway Widening
- Compact Grade Separation
- Unconventional Intersections

The primary goal of this meeting was to solicit feedback from the TAC on the various alternatives and to potentially eliminate alternatives that do not meet the goals and priorities of the project. The best alternative would then be analyzed in detail and later presented to the public at Public Meeting 2. The presentation was followed by a question-and-answer session and discussion to select an early recommended/refined alternative.

This meeting resulted in consensus on the alternative that should be advanced. The No Action alternative was eliminated early in the process as it would result in unacceptable traffic operations for both motorized and non-motorized traffic. However, this alternative was still presented to the public and held open as an option. By the end of the discussion, the Compact Grade Separation and Un-conventional Intersections alternatives were dismissed. Grade Separation was eliminated as it could result in “dividing” the neighborhood and “create a freeway feel through residential neighborhood”. The Un-conventional Intersections alternative was eliminated as it could create driver confusion and would require improvements away from Sparks Boulevard. These two alternatives were deemed not to fit within the character of Sparks Boulevard. Roadway Widening was unanimously selected as the recommended alternative by the Technical Advisory Committee members, RTC staff, and City of Sparks representatives. Following this meeting, the Road Widening alternative was further refined and analyzed for formal presentation at Public Meeting 2.

3.2 Public Meetings

This section provides a summary of the activities undertaken to directly engage local residents and the general public. Community supported plans cannot be established without a free exchange of information and public input at all stages of the planning process. In order for the public input process to be effective, the project team organized proactive public meetings and provided complete information for public review and comment. Timely public notices were sent to ensure the public's awareness of these meetings. Citizens were encouraged to provide input toward decisions: an approach that began early and continued throughout the process.

The project team engaged the general public through two Open House format Public Meetings. These meetings allowed the public to interact with the project team, voice questions or concerns about the current or future state of the Sparks Boulevard Corridor, and submit written comments. Questions and concerns were gathered through public comment cards. Voting chips and other interactive tools were used to gain input and guide decisions. Attendees were also asked to write comments on display maps that showed the entire length of the corridor.

Public Meeting 1

The first open house style public meeting was held on February 20, 2014 at Reed High School. The meeting was attended by approximately 30 community members.

The purpose of this open house was to introduce the study purpose and solicit feedback from the public on their concerns regarding the corridor. The project team presented the details of the study including study limits, project goals and objectives, existing traffic volumes and traffic operations, existing non-motorized infrastructure deficiencies, existing transit operations, and existing challenges in the corridor. In addition to presenting information, this public meeting was designed to encourage attendees to provide feedback on various issues and questions posed to them on the display boards.

At a station dedicated to the project goals and priorities, attendees were asked to vote to define their two most important priorities for this corridor. **Figure 3-3** shows the question that was posed to the attendees and **Figure 3-4** shows their collective preferences.

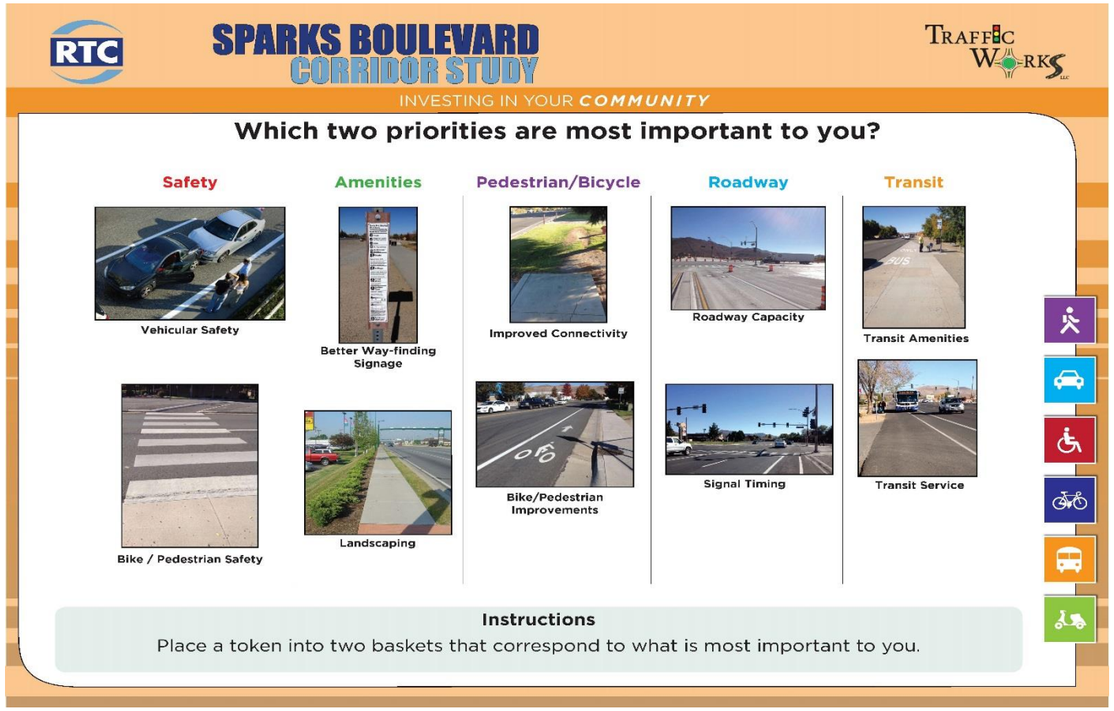


Figure 3-3. Display Seeking Public Input on Priorities

Priority	#Votes
Safety	17
Amenities	2
Bike/Ped	17
Roadway	8
Transit	7

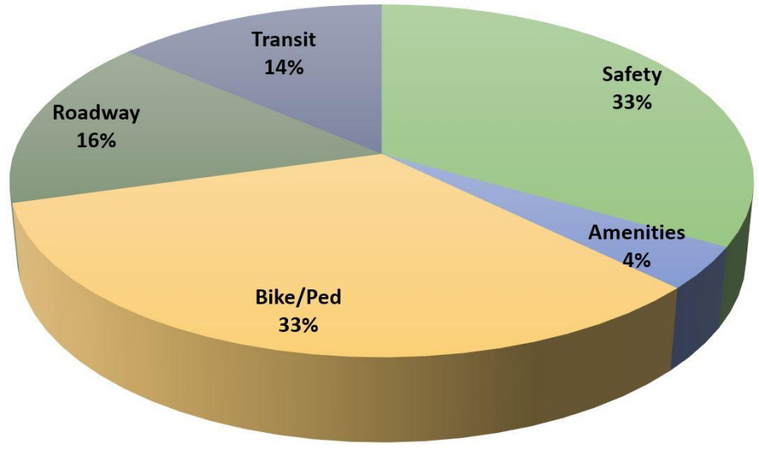


Figure 3-4. Community Priorities Results

At another station, participants were shown various Vision Statements for the corridor that were developed using the input received during TAC Meeting 2. The attendees were asked to vote for the statement they thought was most appropriate for this study. The participants were asked to place a sticker next to the vision statement they most agree with. **Figure 3-5** shows the vision statements that were presented to the public.

Figure 3-5. Display Seeking Public Input on the Vision Statement

The statement that received the highest number of votes was selected as the vision statement for this corridor study. The selected vision statement was:

This is Sparks Boulevard – Providing Safe and Enjoyable Connections to Residents on Two Wheels, Four Wheels, and Their Own Two Feet

At each display station, a project team member was available to interact with participants, answer any questions they might have, and direct them to corridor aerial maps that allowed participants to write their ideas, concerns, and comments. An example of comments received on the maps is shown in **Figure 3-6**.

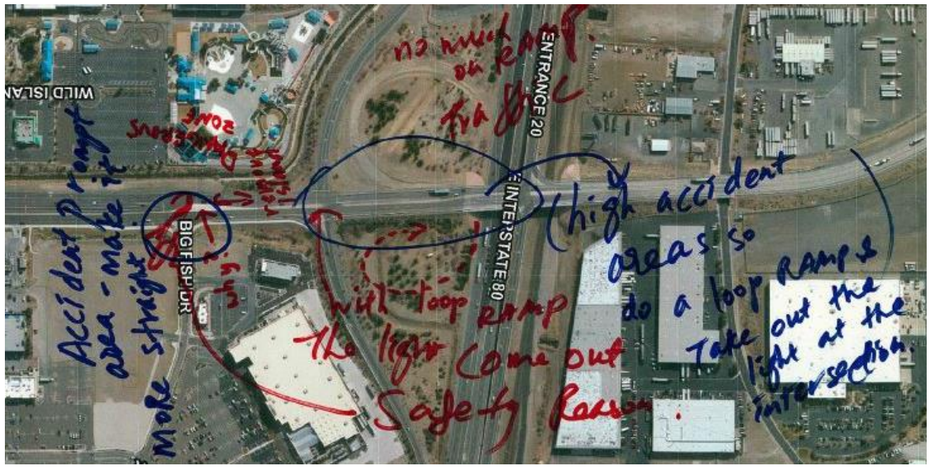


Figure 3-6. Sample Comments

The primary concerns voiced at the first public meeting centered on safety along the corridor for all modes, a need for bicycling and pedestrian connectivity & safety improvements, the desire for transit connectivity & bus shelter improvements, and noise reduction (traffic related noise). The comments received on the overall corridor map mainly included safety and bike/pedestrian issues.

Generalized public comments/opinions received were:

- More transit connections with improved bus shelters
- More pedestrian signals with better pedestrian crossings
- Safer bike facilities
- Sidewalks on both sides of Sparks Boulevard
- No bike lanes, more car lanes
- Slower speed limits on Sparks Boulevard
- More Roundabouts
- Traffic noise issues

Location specific public comments/opinions received included:

- More lighting on Sparks (specifically between Baring and Lincoln)
- Bike connectivity to Legends and south of I-80
- Sound walls between Baring Boulevard and Springland Drive
- Sidewalk needed between Henry Orr Parkway and Oak Hill Drive
- Sidewalk needed between Ion Drive and Village Knoll Drive
- Issues with vehicles turning into and out of Satellite Drive
- Safety concerns at Big Fish Drive and I-80 WB Ramps intersections

Public Meeting 1

Public Meeting 2

The second, and final, public meeting was held on October 2, 2014 again at Reed High School. 21 community members attended. Similar to the first public meeting, the second was also an open house format with various displays and a roll-out aerial map for attendees to write comments on. The roll-out aerial map showed all the original comments marked by the attendees during Public Meeting 1 and the consulting team's corresponding response to each of the comments. Upon entering the meeting, attendees were handed the "Questionnaire/Comment Card" shown in **Figure 3-7.** They were asked to fill out the Questionnaire/Comment Card as they made their journey through the display stations.

The purpose of this workshop was to educate the public regarding 2035 traffic volumes and operations, all the improvement alternatives that were considered, the detailed list of improvements in the Widening Alternative, and the proposed bike/pedestrian improvements. The goal was to identify the recommended alternative for the roadway improvements, transit improvements, and non-motorized improvements.

Within the Widening Alternative, the participants were presented with multiple options, on which they were asked to vote for their preference. The feedback on these options was collected using a specially designed "Comment Form" that allowed polling for each option.

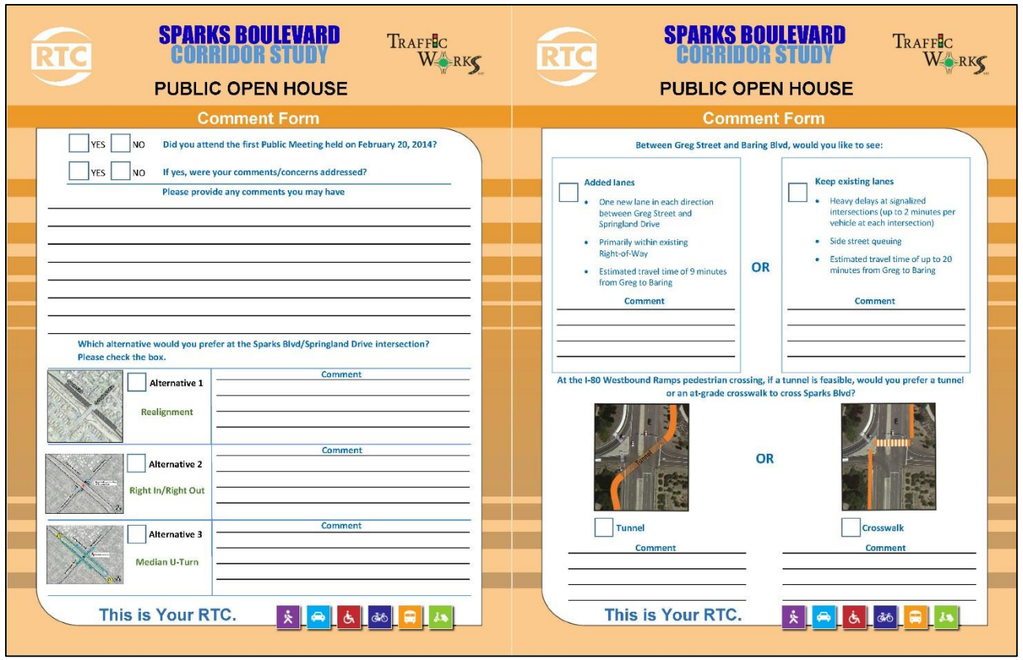


Figure 3-7. Public Meeting 2 Comment Forms

Public Meeting 2

Public Meeting 2

Public Meeting 2

The first question on the comment card asked participants if they had attended the first public meeting and if their comments from the first public meeting were addressed. 100% of the participants who wrote a comment in the first public meeting said that their comments were answered. The second question in the Comment Form asked participants to identify their preference between three different design alternatives at the Sparks Boulevard/Springland Drive intersection (discussed in detail in Chapter 6):

- Alternative 1: Realignment (to combine into one intersection)
- Alternative 2: Right In/Right Out Access
- Alternative 3: Median U-Turn

Figure 3-8 shows the outcome of the voting.

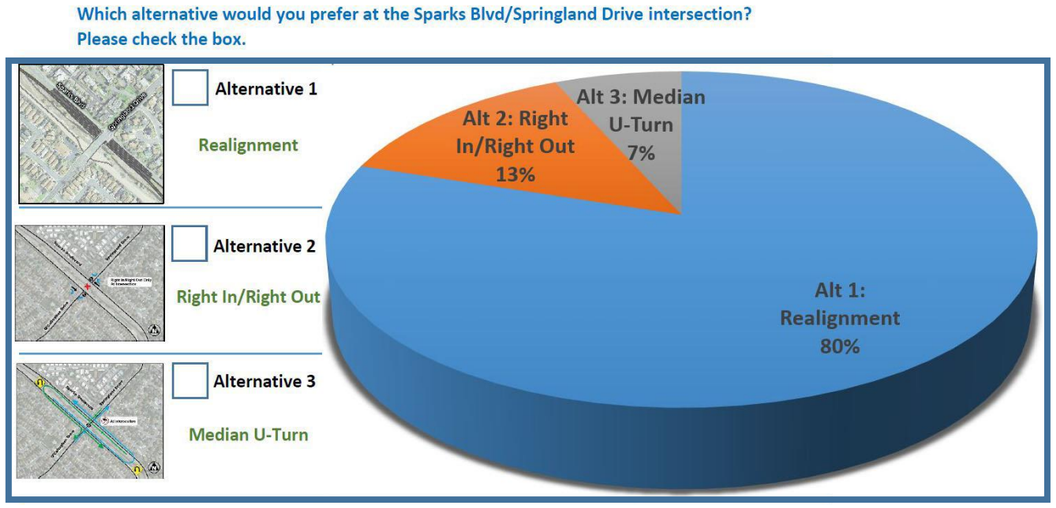


Figure 3-8. Public Preferences for Sparks Boulevard/Springland Drive Intersection

The "Realignment" alternative, which received the highest vote share was subsequently included in the recommended improvements. Participants were also asked to pick between "Keep Existing Lanes" and "Added Lanes" alternatives between Greg Street and Baring Boulevard. "Keep Existing Lanes" was the no action alternative where no capacity improvements would be made on Sparks Boulevard. The participants were informed of the potential long travel times and queues with this alternative. "Added Lanes" was the unanimously participant preferred alternative. **Figure 3-9** shows the outcome of the preference voting by the participants. Finally, the last question on the Comment Form asked the participants to choose between an at-grade crossing or a tunnel (if feasible) at the I-80 WB Ramps pedestrian crossing. The preference of the participants is shown in **Figure 3-10**. Although the "Tunnel" option received slightly more than 50% vote share, the recommended improvements include an at-grade crossing because the tunnel construction was deemed not feasible due to utility conflicts.

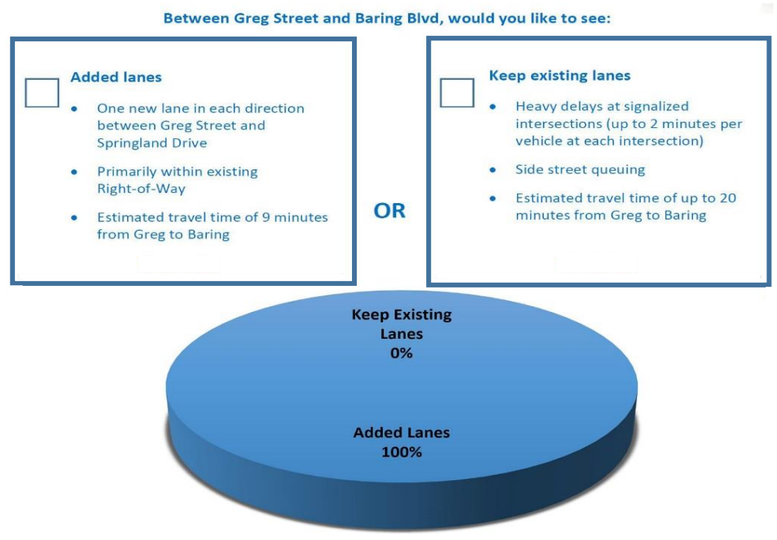


Figure 3-9. Public Preferences for Adding Capacity on Sparks Boulevard

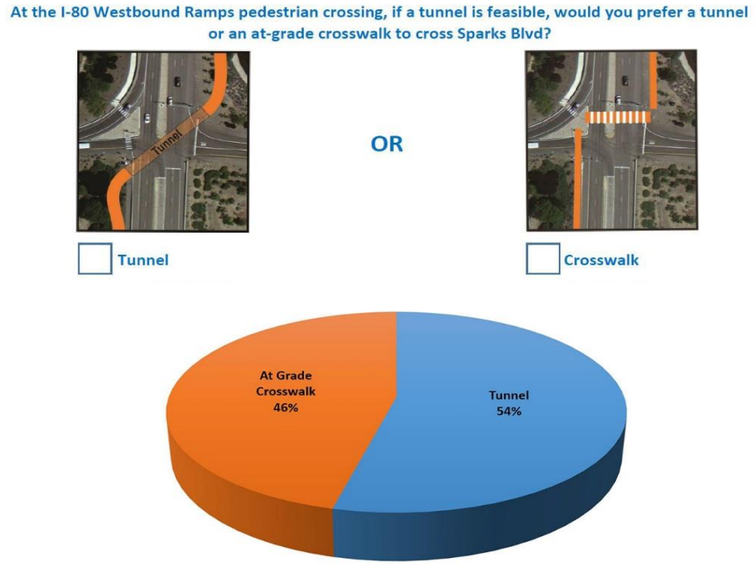


Figure 3-10. Public Preferences for Pedestrian Crossing at I-80 WB Ramps

4 EXISTING CONDITIONS

This portion of the report discusses the existing conditions on Sparks Boulevard for different modes of transportation, such as auto mode (cars, trucks etc.), transit mode (bus/rail/car pool), and non-motorized travel (pedestrian and bicycle modes).

4.1 Existing Functional Classification and Roadway Characteristics

Identification of the roadway function classification is the basis for planning roadway improvements and appropriate standards (e.g., right-of-way requirements, roadway width, design speed etc.,) that apply to each roadway facility. A brief description of the major roadways within the study area is provided below. These descriptions are for the portions of the roadways within the study area only and may be not applicable for the roadway as a whole.

- Pyramid Highway – Pyramid Highway is a major thoroughfare in the City of Sparks and connects the Reno/Sparks metropolitan area to Pyramid Lake. The RTP classifies this roadway as a High Access Control (HAC) arterial. NDOT classifies the roadway as a Principal Arterial. The posted speed limit on Pyramid Way in the study area is 55 mph. This route is designated as a Nevada Scenic Byway.
- Sparks Boulevard – Sparks Boulevard is a major north-south corridor in northeast Sparks that enables north-south travel. The RTP classifies this roadway as a Medium Access Control (MAC) arterial. The number of lanes varies from four to six, and the posted speed limit is 40 mph.
- Greg Street - This roadway is classified as a Medium Access Control (MAC) arterial in the RTP. Two lanes are provided for each direction of travel and the posted speed limit is 35 mph.
- Lincoln Way – Lincoln Way serves as one of the main access points to the Legends at Sparks Marina commercial center. This roadway is classified as a Low Access Control (LAC) arterial in the RTP. The number of lanes vary from one to three in each direction.
- Prater Way – Prater Way runs perpendicular to Sparks Boulevard and provides east-west travel. The RTP classifies this roadway as a Low Access Control (LAC) arterial. Two lanes are provided for each direction of travel and the posted speed limit is 35 mph.
- Baring Boulevard – Baring Boulevard is a four-lane roadway that provides east-west travel. It is classified as a Medium Access Control (MAC) arterial in the RTP. The posted speed limit is 30 mph.
- Shadow Lane – Shadow Lane provides access to residential communities located east and west of Sparks Boulevard. One lane is provided for each direction of travel and the posted speed limit is 25 mph.
- Disc Drive – This roadway is classified as a Medium Access Control (MAC) arterial. Two lanes are provided for each direction of travel and the posted speed limit is 40 mph.
- Los Altos Parkway - Los Altos Parkway, to the west of Sparks Boulevard, has two lanes in each direction of travel. The posted speed limit is 35 mph. Los Altos Parkway, to the east of Sparks Boulevard, is a three-lane roadway with one lane in each direction and a two-way left turn lane with a 30 mph posted speed limit. This roadway is classified as a Medium Access Control (MAC) arterial.

4.2 Land Use

The study area can be characterized by two major developments located at the north and south ends, with predominantly suburban single family residential between. The Kiley Ranch North development anchors the north end of the study area, while The Legends at Sparks Marina development anchors the south. The existing single family residential throughout the remainder of the corridor has a range of densities between 3 to 8 dwelling units per acre. There are three major nodes of existing non-residential development located at Baring Boulevard, Disc Drive, and Los Altos Parkway. The Baring Boulevard node has a shopping center and Reed High School that anchor the east side of Sparks Boulevard. An existing shopping center on the east side of Sparks Boulevard and a large area (155± acres) of vacant land master planned for multifamily residential on the west side of Sparks Boulevard dominate the Disc Drive node. The Los Altos Parkway node contains approximately 70± acres of commercial and office properties.

With the exception of the undeveloped 155± acre multifamily residential parcels located at Disc Drive, the majority of the Sparks Boulevard Corridor, outside of The Legends at Sparks Marina and Kiley Ranch North developments, is predominantly built out. With the large concentration of single family residential throughout the corridor, any wholesale changes, redevelopment or intensification within the study area is not anticipated. The existing land uses are shown in **Figure 4-1.**

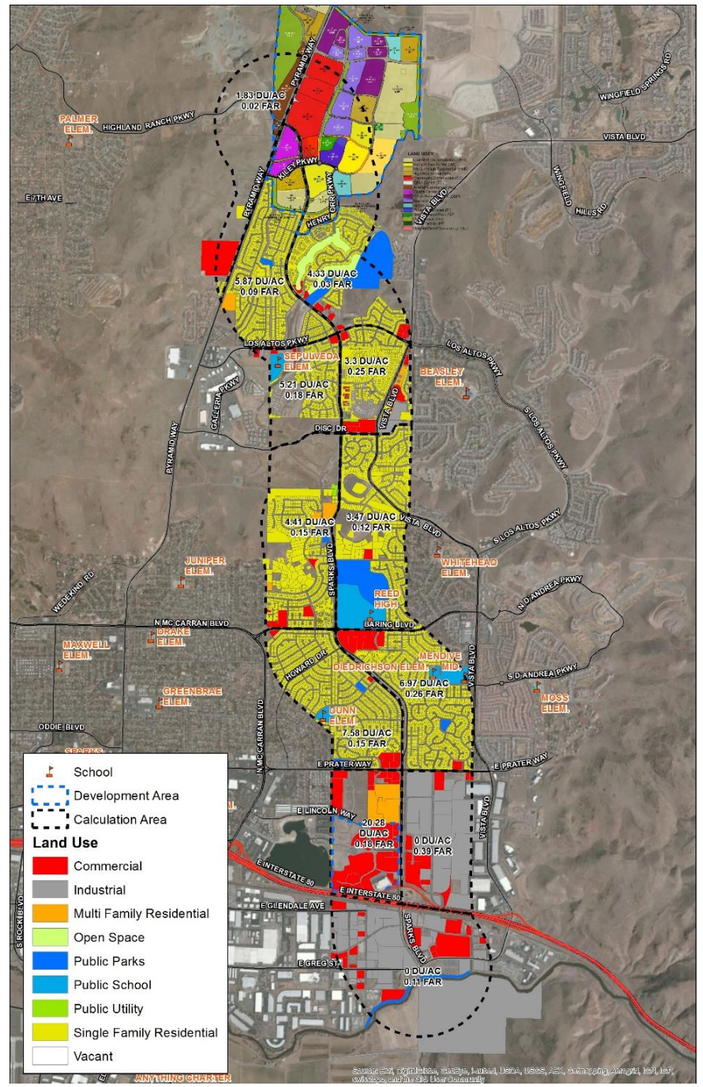


Figure 4-1. City of Sparks Existing Land Use Map

4.3 Existing Non-Motorized Facilities

Non-motorized travel, such as walking and biking, are important elements of the transportation system and the provision, extent, and quality of non-motorized facilities affect mode choice.

One of the corridor's most remarkable assets is the existing pedestrian and bicycle facilities. Sparks Boulevard boasts approximately 3.1 miles of shared use path (Sparks Boulevard Bike Path), 2.65 miles of wide sidewalks (8' to 12' wide), 4.06 miles of typical sidewalks (4' to 5' wide), and 7.68 miles of bike lanes (3.84 miles of roadway length).

Data Collection

Pedestrian and bicycle turn movement data was collected at all signalized intersections throughout the corridor. Data was collected for each movement at the intersection, in 15 minute periods, during both the AM and PM peak hours, to obtain a consistent data set and for comparison with roadway traffic volumes.

Coordinating with the RTC's Bicycle, Pedestrian, and Wheelchair Data Collection Program, pedestrian and bicycle screen line counts were obtained at two locations on Sparks Boulevard, just south of Prater Way and just south of Baring Boulevard. These counts were conducted during the weekday AM and PM peak periods, 10 AM – 12 PM and 5 PM – 7 PM, and on Saturday, 12 PM – 2 PM in both September, 2013 and January, 2014.

Pedestrian and Bicycle count data is shown in **Figures 4-2, 4-3** and **4-4**.

Notable Findings (Overall Movements)

The Sparks Boulevard/Baring Boulevard intersection was found to have the highest pedestrian/bicycle volumes during the AM peak hour with 110 total movements. The intersection of Sparks Boulevard with O'Callaghan Drive had the highest PM peak hour with 22 total movements.

Pedestrians consistently outnumber bicycles 4:1 on average throughout the corridor on weekdays, and the mode split among "self-propelled" modes is 71% Pedestrians, 29% Bicycles, and less than 1% of Wheelchair users. On the weekends, the ratio of pedestrians to cyclists is much closer at 1.3:1, due to the decrease in overall pedestrian activity and the increase in bicycle activity. The splits are shown graphically in **Figures 4-2, 4-3** and **4-4**.

Notable Findings (Pedestrians)

Consistent with the overall data, the intersection of Baring Boulevard had the highest recorded pedestrian volumes (130 total AM and PM peak hours). The high pedestrian volumes are attributed to Reed High School which is located proximate to the intersection. The O'Callaghan Drive intersection was the second highest location for pedestrian movements with a total of 65 during the combined AM and PM peak hours. The heavy pedestrian volumes were mostly observed during the AM peak hour at this location and a sizable portion could be credited to the Child's World Preschool located on the corner. Two locations were tied for the third highest pedestrian volumes, they were the intersections of Shadow Lane and Prater Way. The pedestrian volumes recorded at Shadow Lane are speculatively associated with foot traffic to and from Reed High due to this location's proximity to the school grounds.

The collected pedestrian data shows a significant spike in volume during the AM peak hour. Roughly 74 percent of the pedestrian turn movement volumes collected were observed during the AM peak hour. This finding is consistent with common pedestrian behavior near schools. The schools along the corridor, Reed High School and Child's World Preschool, likely generated the largest amount of the observed pedestrian activity with 72 percent of the total pedestrian activity being observed at the Baring Boulevard and O'Callaghan Drive intersections.

The screen line counts show that there is a relatively high level of pedestrian activity south of the Baring Boulevard intersection on weekends. The number of pedestrians observed during the weekend peak hours in September, 2013 and January, 2014 were 14 and 12 respectively. This is likely due to pedestrians utilizing the multi-use path located on the western side of Sparks Boulevard for recreational purposes. This same level of weekend pedestrian activity was not reflected in the screen line counts at the location south of Prater Way.

Notable Findings (Bicycles)

Of the counted locations, Baring Boulevard had the highest bicycle volumes with 19 total bicycle movements during the AM peak hour. During the turn movement data collection, no bicycle movements were observed during the PM peak hour, however during the screen line counts, 2 cyclists were observed during the peak PM hour both in September, 2013 and January, 2014. The second highest bicycle volume observed was again at the O'Callaghan Drive intersection with 16 total movements during the combined AM and PM peak hours. It was found that there was substantially more bicycle activity along Sparks Boulevard on Saturday compared to midweek.

The findings from the screen line counts reinforce this conclusion and show that there is a consistently higher presence of cyclists on Sparks Boulevard, especially at the Prater Way intersection during weekends. At the count location near Prater Way, 7 cyclists were observed during the peak hour on a Saturday in September, 2013. This number increased to 10 cyclists during the same peak hour during a Saturday in January of 2014. This trend was not shown in the data collected at the Sparks Boulevard/Baring Boulevard intersection count location as the number of cyclists observed at this location during the peak hour in September, 2013 and January, 2014 were 2 and 3 respectively.

The number of weekday cyclists in the corridor were consistently low with an average of 2.25 cyclists being observed during the AM and PM peak weekday hours of September 2013, and January, 2014. This corresponds with a similar average of 1.75 cyclists observed during the AM and PM weekday peak hours at the Sparks Boulevard/Baring Boulevard count location. These findings from the screen line counts and the turn movement counts indicate that the corridor is currently used more by recreational cyclists on the weekend rather than by commute cyclists during the peak weekday commuting periods.

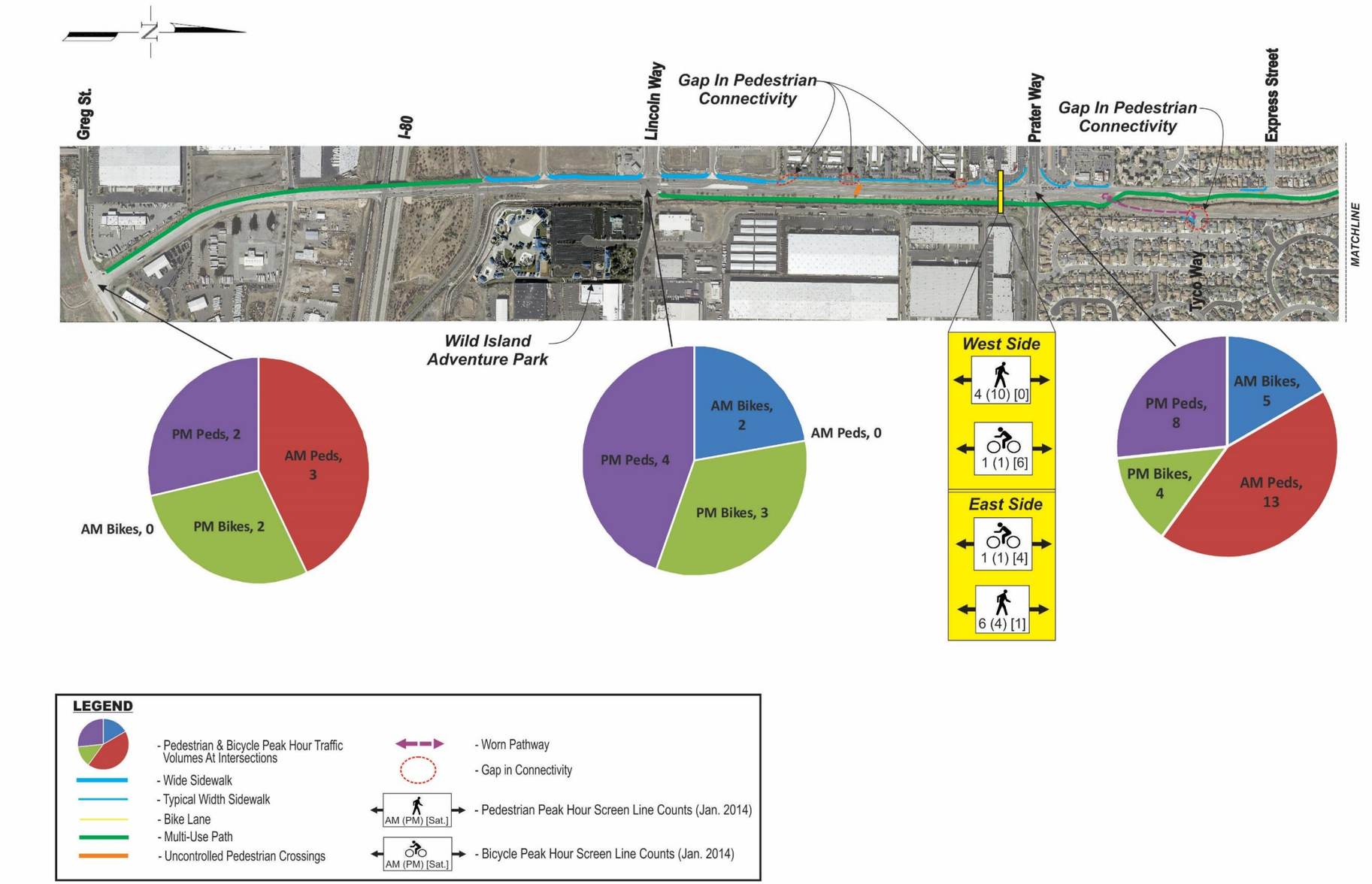


Figure 4-2. Bike and Pedestrian Counts and Existing Facilities (Panel 1)

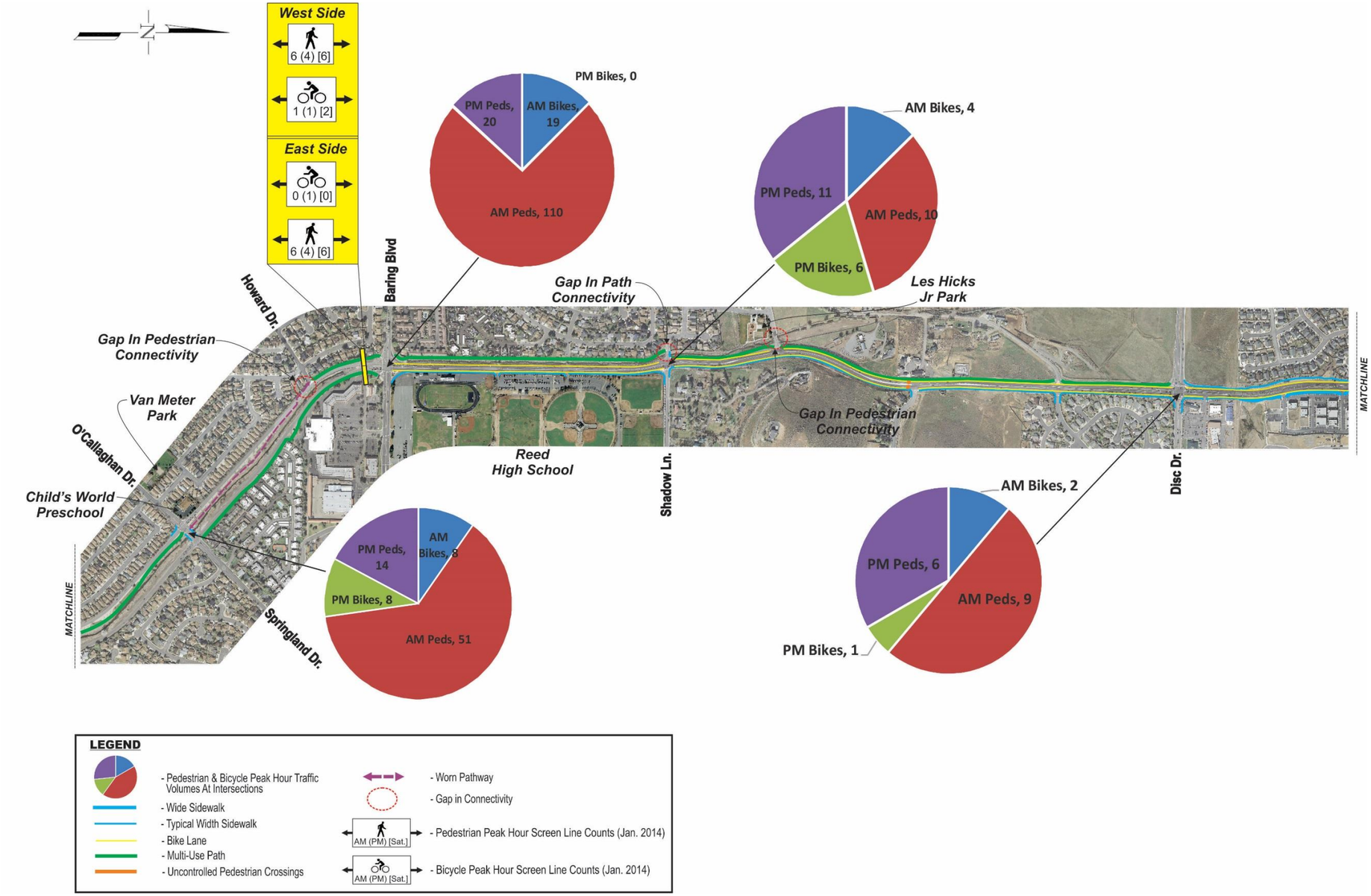


Figure 4-3. Bike and Pedestrian Counts and Existing Facilities (Panel 2)

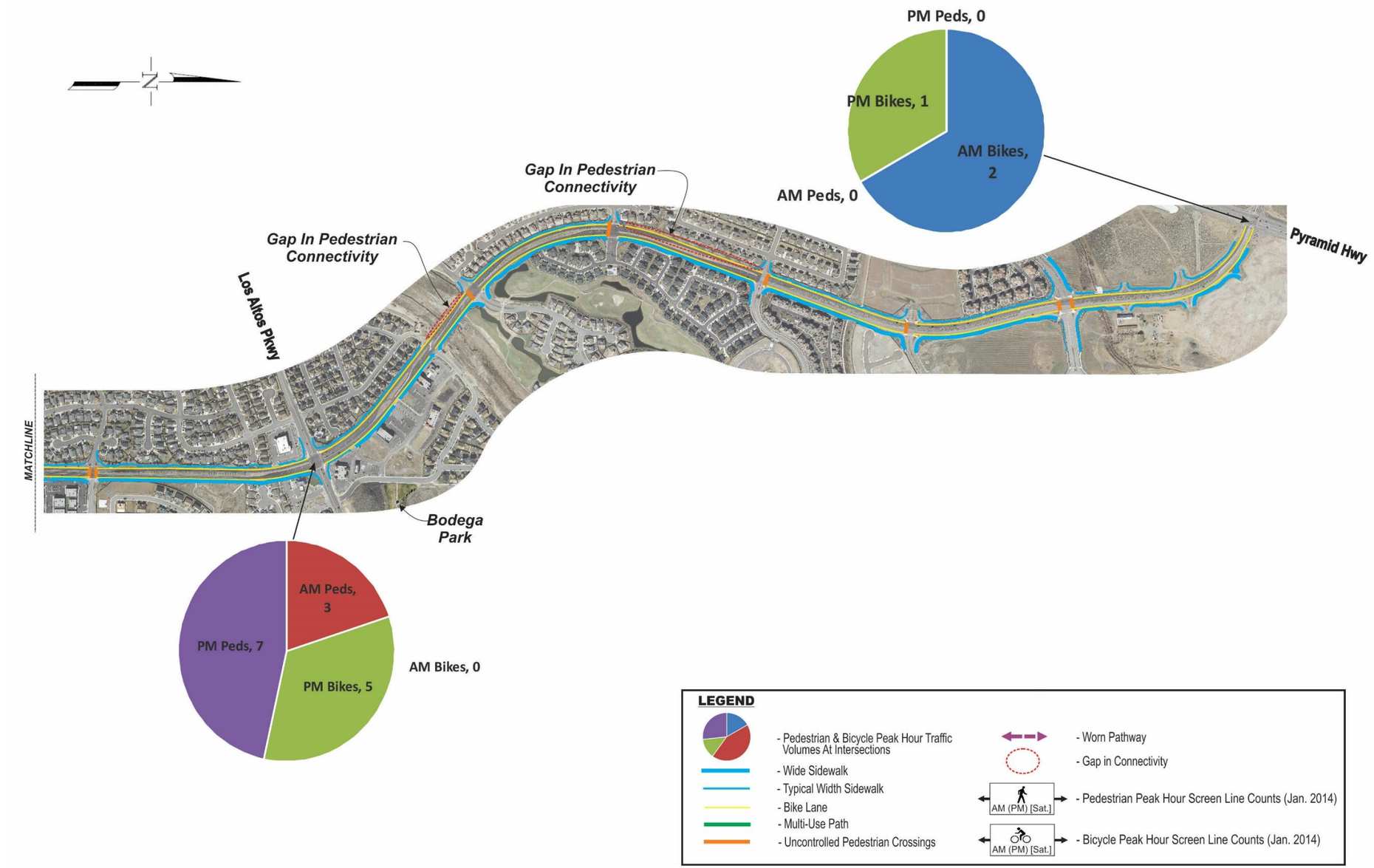


Figure 4-4. Bike and Pedestrian Counts and Existing Facilities (Panel 3)

Identified Trends

There is presently an average pedestrian to bicycle ratio of approximately 4:1 throughout the corridor. Bicycle traffic tended to be greater on the weekends, representing a greater split of bicycle traffic attributed to recreational cycling. With the higher number of bicyclist on the weekends, the weekend pedestrian to bicycle ratio changes to 1.3:1. The greater use of the facility for recreational cycling is consistent with the RTC Bicycle and Pedestrian Master Plan findings where the corridor is called out as a "popular ride route".

The highest pedestrian and bicycle volume locations corresponded with school locations. These locations should be set as the top priorities for improvements to pedestrian and bicycle facilities within the corridor.

Walking Audit Observations

The project team conducted a walking audit of the entire corridor, focusing on existing pedestrian and bicycle facilities. The corridor consists of a mix of multi-use paths, wide sidewalks (8' to 12'), typical width sidewalks (4' to 5'), and bike lanes. The walking audit concentrated on the condition of the existing facilities and the overall connectivity of the pedestrian and bicycle facility network throughout the corridor. Existing facilities and deficiencies are shown in **Figures 4-2, 4-3** and **4-4**. Following are some key findings:

- Along the length of the corridor, the 6.71 total miles of sidewalks contain 253 pedestrian ramps. Of these pedestrian ramps, 94 should be upgraded in the future.
- Although the pedestrian and bicycle facilities provided along the corridor are quite good, there are a few connectivity issues. One main issue observed is the lack of connectivity from Howard Drive to pedestrian facilities to the south. Multiple users were observed crossing Sparks Boulevard and walking down the median along the Truckee River Drain. In the past, the multi-use path continued north from O'Callaghan Drive along this section, however, it was removed due to lack of connection at the north end. Pedestrians were stranded in the median without proper crossing facilities to assist them in crossing Sparks Boulevard to Howard Drive.
- There is a lack of pedestrian connectivity from existing pedestrian facilities to Tyco Way. A worn foot trail was found showing that pedestrians cross Sparks Boulevard at Tyco Way then travel south along the edge of Sparks Boulevard and cross over the multi-use underpass, circling around to the path.
- There is a gap in sidewalk along the west side of Sparks Boulevard between Prater Way and Lincoln Way. Existing sidewalk is provided for the Park Vista Apartments, that runs along the length of this section of Sparks Boulevard, however, there is no connectivity to the existing public sidewalks.
- There is a gap in connectivity of the multi-use path at Shadow Lane. The path transitions from the west side of the Truckee Drain to the east side of the drain and a narrow sidewalk over the bridge is all that is provided to make this connection.
- There is no connection between the multi-use path and the Les Hicks Junior Park located on Vintage Hills Parkway. The bridge crossing the ditch has wide lanes and it appears to have adequate width for sidewalks.
- There is a gap in sidewalk on the west side of Sparks Boulevard between Tioga Pass Drive and Cathedral Peak Drive. An existing, wide, landscape strip is provided along this section of roadway. Similarly, there is a gap in sidewalk along the west side of Sparks Boulevard between Ion Drive and Village Meadows Drive. The section of Sparks Boulevard between Ion Drive and Village Meadows crosses over a drainage way and is restricted by an existing bridge and guardrail. However, a shoulder is provided and the installation of a sidewalk with curb and cutter appears to be feasible.
- The overall condition of the multi-use path is fair but needs scheduled maintenance. The section of the path from Springland Drive to Baring Boulevard is poor, especially the section fronting the Baring Village Shopping Center.

4.4 Existing Transit Service and Facilities

This section documents the existing public transportation infrastructure that serves the Sparks Boulevard Corridor.

RTC's fixed-route services consist of RTC RIDE (23 routes), RTC RAPID (bus rapid transit service), RTC INTERCITY, and the SIERRA SPIRIT (downtown Reno circulator). RTC also provides complimentary ADA paratransit service, RTC ACCESS, and has a growing vanpool program, RTC VANPOOL, with 70 van pools in operation. **Figure 4-5**, shows the three RTC fixed-routes providing service in the study area. RTC RIDE is the only fixed-route bus service operating within the study area. RTC RIDE is the public transit bus system for the greater Sparks, Reno, and Washoe County areas. The fixed-route system operates in a 90 square-mile service area, based on a 0.75 mile distance from each fixed route (excluding RTC INTERCITY).The fixed-route system includes a fleet of 72 buses with more than 1,000 bus stops.

In addition to fixed-route service the RTC also provides ACCESS service to area surrounding Sparks Boulevard Corridor. RTC ACCESS is the para-transit service that provides door-to-door, prescheduled, trips for individuals with access and functional needs who meet the eligibility criteria of the Americans with Disabilities Act (ADA). Trips are reserved from one to three days in advance and the service operates 24 hours a day, seven days a week.

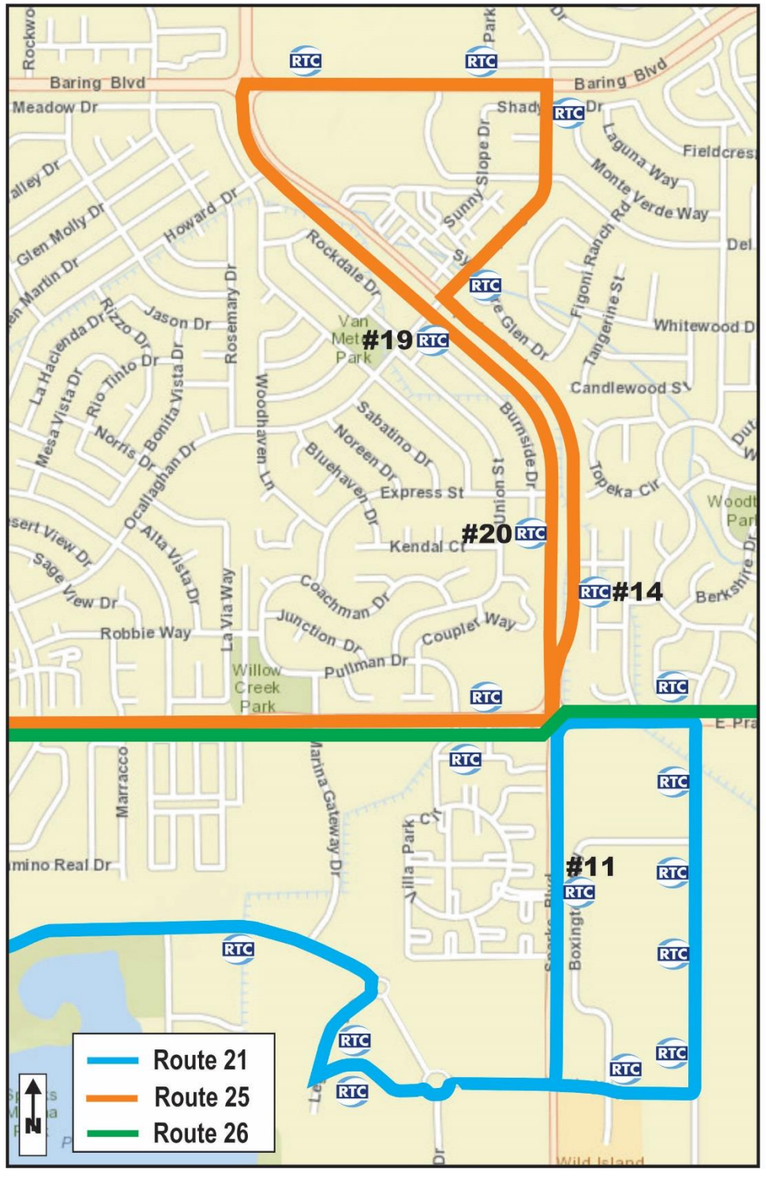
Fixed Routes

Routes 21 and 25 are the only primary routes (routes traveling along Sparks Boulevard) serving the corridor. Both routes serve a small portion of the corridor on their way to and from the Centennial Plaza Transit Center. Route 21 travels along the corridor for approximately a half mile from Lincoln Way to Prater Way. Route 25 travels along Sparks Boulevard for approximately 1.25 miles from Prater Way to Baring Boulevard. Currently there is no RTC Ride service to the north end of the corridor.

Route 26 crosses Sparks Boulevard at Prater Way on its way between the Centennial Plaza Transit Center and the Northern Nevada Medical Center. This route intersects with both Route 21 and Route 25 at Lillard Drive and Sparks Boulevard, respectively.

Service Frequency

- Route 21 – Is a fairly high frequency route, operating 365 days a year with a service span of roughly 19 hours during the day. The route is in service between the hours of 4:35 AM and 11:45 PM. The route operates every half hour during the day with 1 hour headways during early morning and late evening hours.
- Route 25 - Operates 307 days a year, the service is not provided on Sundays. The route operates for 12 hours during the day between the hours of 6:30 AM and 6:30 PM with 1 hour headways throughout.



ROUTE 25 - STOP #19 - SPRINGLAND

Amenities
- ☑ Concrete Pad
- ☐ Bench
- ☐ Trash Can
- ☐ Shelter
- ☑ Reflective Bus Signal

Average Monthly Boarding Activity By Time of Day

ROUTE 25 - STOP #20 - EXPRESS

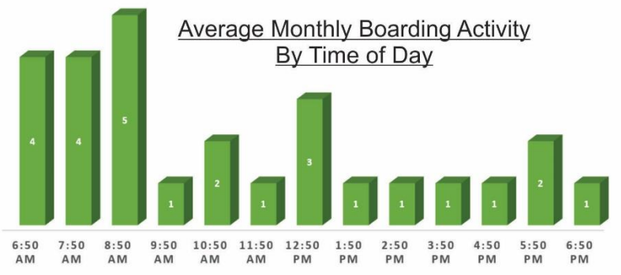
Amenities
- ☑ Concrete Pad
- ☐ Bench
- ☐ Trash Can
- ☐ Shelter
- ☑ Reflective Bus Signal

Average Monthly Boarding Activity By Time of Day

ROUTE 25 - STOP #14 - TYCO

Amenities
- ☑ Concrete Pad
- ☐ Bench
- ☑ Trash Can
- ☐ Shelter
- ☐ Reflective Bus Signal

Average Monthly Boarding Activity By Time of Day



ROUTE 21 - STOP #11 - PARK VISTA

Amenities
- ☑ Concrete Pad
- ☑ Bench
- ☑ Trash Can
- ☐ Shelter
- ☐ Reflective Bus Signal

Average Monthly Boarding Activity By Time of Day

Figure 4-5. RTC Bus Routes and Monthly Boardings in Study Area

- Route 26 – This route operates 365 days a year from 5:20 AM to 11:40 PM with 1 hour headways through most of the day. This route intersects three other routes, the 2, 25, and 21 while traveling down a portion of Prater Way between Rock Boulevard and Vista Boulevard.

Existing Transit Facilities and Amenities

There are a total of four bus stops along the corridor, one for Route 21 and three for Route 25. The bus stop associated with Route 21 has a concrete pad, bench, and trash can. Of the three stops associated with Route 25, all three have concrete pads, two have reflective bus signals (used by riders to signal the bus driver at night), and one has a trash can available. All four of the bus stops should be upgraded to meet current ADA requirements for passenger pick up. Pictures of the bus stops and the amenities provided are shown in **Figure 4-5.**

The RTC Centennial Plaza is located on the west side of Victorian Square on Victorian Avenue between 14th Street and 15th Street. All routes serving the study area originate at this location and end here as well. Other than at the Centennial Plaza, there are no stops along the corridor that riders have the ability to transfer to another route. The only possible route transfer is if a rider desired to transfer between Routes 21, 25, and 26. They could walk between stops located at the Prater Way/Sparks Boulevard intersection where the three routes cross each other.

Corridor Ridership

Corridor Boarding Activities

Figure 4-6 shows the monthly boarding and alighting activity for the two transit routes operating on the study corridor, based on transit data collected in October, 2013. The orange signifies the total boarding and alightings for stops within the study corridor, yellow for boardings and alightings at the Centennial Plaza and green quantifies the total for each route.

Route 21 has the higher boarding and alighting activity of the two routes with nearly 1,800 boardings and alightings. Note that Route 21 provides longer service hours than Route 25. Of the nearly 1,800 boardings and alightings recorded during the month for Route 21 only 2.5 percent occurred on the study corridor. Route 25 had just over 700 total boardings and alightings for the month of October with 3.3 percent occurring on Sparks Boulevard.

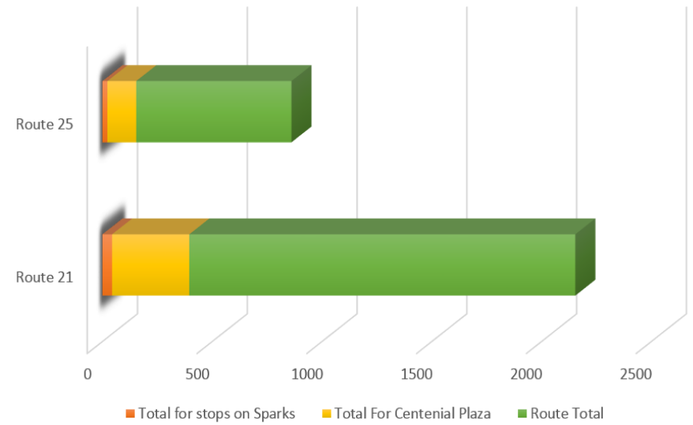


Figure 4-6. Average Monthly Boarding Activities by Route (October, 2013)

Ridership by Time of Day

Transit ridership data for four consecutive months, October 2013 through January 2014, was analyzed for each bus stop within the study corridor. Although Route 21 only has one bus stop along Sparks Boulevard, it has more activity than all three stops for Route 25 combined. The Park Vista Apartments bus stop shows typical peak behavior with morning, and mid-day peaks. The highest boarding volume occurs at 10:45 PM, the second highest is the mid-day peak (11:20 AM).

The stops along Sparks Boulevard for Route 25 have fairly consistent daily ridership trends with a significant peak during morning hours and fairly flat low volumes throughout the rest of the day. Route 25 does not operate late into the evening and interviews with bus operators revealed that transit riders would utilize Route 21 and walk when Route 25 was not available in later hours. This could explain the flat evening ridership volumes on Route 25 and the higher late night ridership volumes on Route 21.

Figure 4-5, shows the average monthly boarding activity by time of day for each bus stop along the Sparks Boulevard corridor.

Transit Performance

Service Productivity

Of the three routes that serve the study area, Route 25 had the highest productivity rating between November 2012 and October 2013 with 31.5 Annual Passengers/Revenue Vehicle Hours. Routes 21 and 26 had lower ratings of 21.4 and 21.1 respectively over the same time period. Compared to all other RTC routes, Route 25 ranked 10th in productivity, Route 21 ranked 23rd, and Route 26 ranked 24. Compared to the previous 12 months, the productivity of Routes 25 and 26 increased by 11.8% and 8% respectively, whereas Route 21 decreased in overall productivity by 3.1%. Similarly, the overall ridership on Routes 25 and 26 increased by 10.7% and 9% compared to the previous year. The ridership on Route 21 decreased over the same time period by 3.7%. The number of revenue vehicle hours for all three routes stayed fairly consistent from the previous year, with Routes 21 and 25 decreasing by 0.6% and 1% respectively while Route 26 increased by 0.9%. More information about the performance of each route is shown in **Table 4-1**.

Table 4-1. Transit Route Performance

November, 2012 - October, 2013	Route 21	Route 25	Route 26
Total Ridership	**149,820**	**75,588**	**97,118**
Previous 12 Months	155,549	68,277	89,117
Change	-3.70%	10.70%	9.00%
Average Daily Ridership	410	246	266
Days Route Operated	365	307	365
Revenue Vehicle Hours (RVH)	**6,989.80**	**2,395.90**	**4,598.90**
Previous 12 Months	7,032.10	2,420.60	4,555.90
Change	-0.60%	-1.00%	0.90%
Productivity (Passengers/RVH)	**21.4**	**31.5**	**21.1**
Previous 12 Months	22.1	28.2	19.6
Change	-3.10%	11.80%	8.00%
Revenue Vehicle Miles (RVM)	**85,046**	**32,042**	**54,150**
Passengers / RVM	**1.76**	**2.36**	**1.79**
Previous 12 Months	1.9	2.11	1.66
Change	-7.10%	11.80%	7.80%
One-Way Trips	21,610	7,566	13,725
Deadhead Miles	3,819	1,304	4,952
Deadhead Hours	157.57	53.93	176.27
Est. Gross Operating Costs	$732,072	$250,932	$481,662
Est. Cost per RVH	$104.73	$104.73	$104.73
Est. Cost per RVM	$8.61	$7.83	$8.90
Est. Cost per Passenger	$4.89	$3.32	$4.96

Source: RTC Operating Statistics Report, October 2013

Schedule Adherence

Of the three routes serving the Sparks Boulevard corridor, Route 25 had the best schedule adherence during calendar year 2013 with an average of 95.17% of boardings occurring on-time. Route 26 had an average schedule adherence of 94.2% and Route 21 had the lowest overall adherence with 88.75% of boardings occurring on-time. It should be noted that 46.1% of the data for Route 21 was missing. This large amount of missing data makes the overall schedule adherence partially unreliable as the true adherence could be much higher or lower. The breakdown of the on-time and late boardings are shown in **Figures 4-7** and **4-8**.

Compared to all other RTC routes, Routes 25 and 26 have better schedule adherence than the 2013 average percent of on-time boardings, which was 91.13% for the year. In contrast, Route 21 fell below the average by nearly 3 percentage points. Out of the 28 RTC routes measured for time-point crossings, Route 25 ranked 11th, Route 26 ranked 13th, and Route 21 ranked 22nd based on the overall percentages of on-time boardings for 2013.

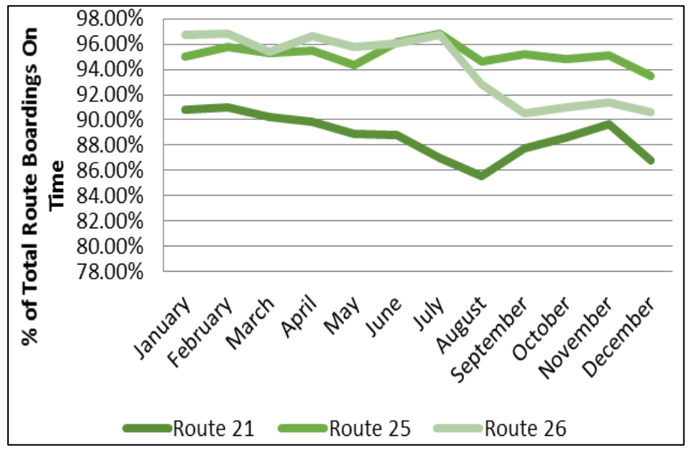


Figure 4-7. On Time Boarding - 2013

Operator Feedback

As part of our existing conditions documentation, interviews were conducted with bus operators for Routes 21 and 25. The bus operators were asked for feedback on typical daily operations of the route within the corridor. For the most part, operators had positive feedback of the existing transit operations within the corridor, their notable comments are as follows:

- Route 21 Operators frequently reported difficulty pulling completely off the road at Stop 11. The concrete pad is not wide enough for the bus to get completely out of the travel lane. This is especially difficult when there is a need to deploy the ramp for users with functional or access needs. Drivers reported multiple occurrences (near misses) where there were conflicts with drivers trying to squeeze around them.
- Regarding Route 25, it was mentioned that congestion around the school zone (Reed High School) during dismissal, results in a fairly significant delay, often routes tend to operate 15 minutes behind schedule during this time period.
- The Legends Bay Drive Stop for Route 21 may be more beneficial if located closer to Target as this is where the majority of riders are coming from. This may be different with future development.
- Operators reported that the reflective devices used for signaling the driver works very well and that they would like to see them at all stops that operate at night. The only issue is that they are very rarely used.
- It was mentioned that transit riders would utilize Route 21 in the late evening when Route 25 was no longer operating.

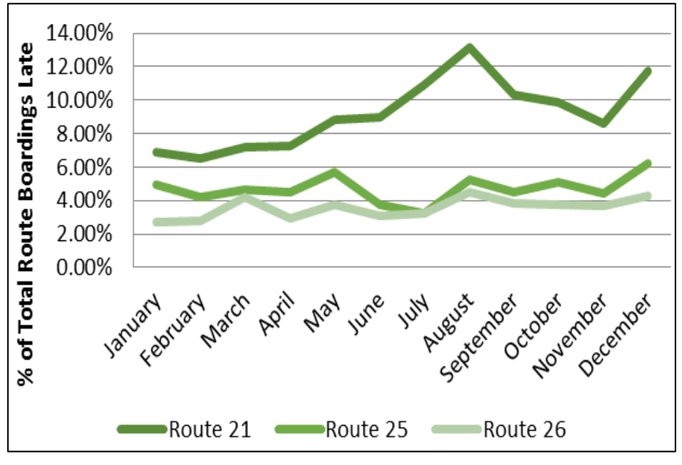


Figure 4-8. Late Boarding - 2013

RTC ACCESS

As of December 2013, there were 184 RTC ACCESS active clients living within a half mile of the Sparks Blvd corridor. For the month of November 2013, there were approximately 1,475 one way trips made by clients residing within a half mile buffer surrounding Sparks Blvd. **Figure 4-9**, illustrates the number of clients organized by sub-regions along the corridor.

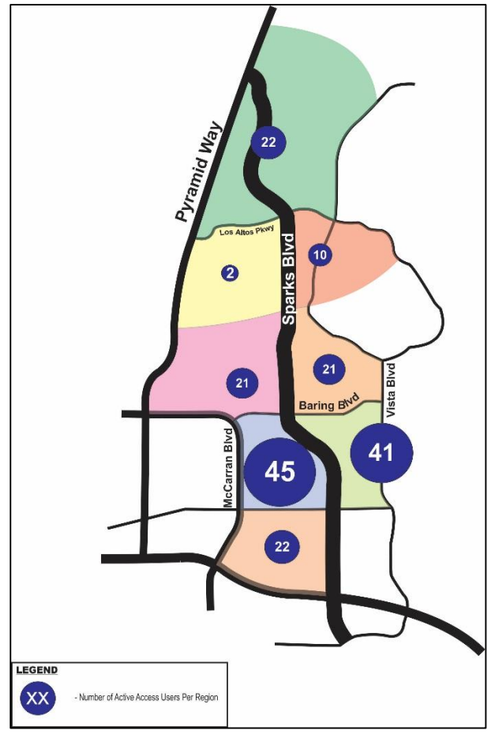


Figure 4-9. ACCESS Map

4.5 Collision History

Crash data obtained from the Nevada Department of Transportation (NDOT) for the previous five year period (January 2008 to June 2013) was used to help identify high-crash locations and attempt to identify trends. Crash data at all the major intersections was obtained. Identifying crash types can assist in the choice of safety countermeasures and in evaluations of countermeasure effectiveness. From the data obtained, crash summaries were prepared. **Table 4-2** shows the summary of crashes at each intersection during the past five years.

Based on the data obtained, a total of 481 crashes were reported between January 2008 and June 2013. The majority of the crashes were Property Damage Only (PDO) crashes, accounting for 57% of the total accidents. 42% of the accidents resulted in injuries and 1% resulted in a fatality. About 2% of the accidents (10 out of 481) involved bikes or pedestrians. The locations with highest bicycle and pedestrian crashes are Sparks Boulevard/Baring Boulevard and Sparks Boulevard/Mesa Meadows Drive. **Figure 4-10** shows the distribution of previous five year period crashes at intersections on Sparks Boulevard.

Any intersection with over 30 accidents in a 3 year period is considered by NDOT to be a High Crash Location. The Sparks Boulevard/Baring Boulevard intersection is the only study intersection with over 30 accidents in a 3 year time period. Note that the numbers shown in **Figure 4-10** are for a five year period.

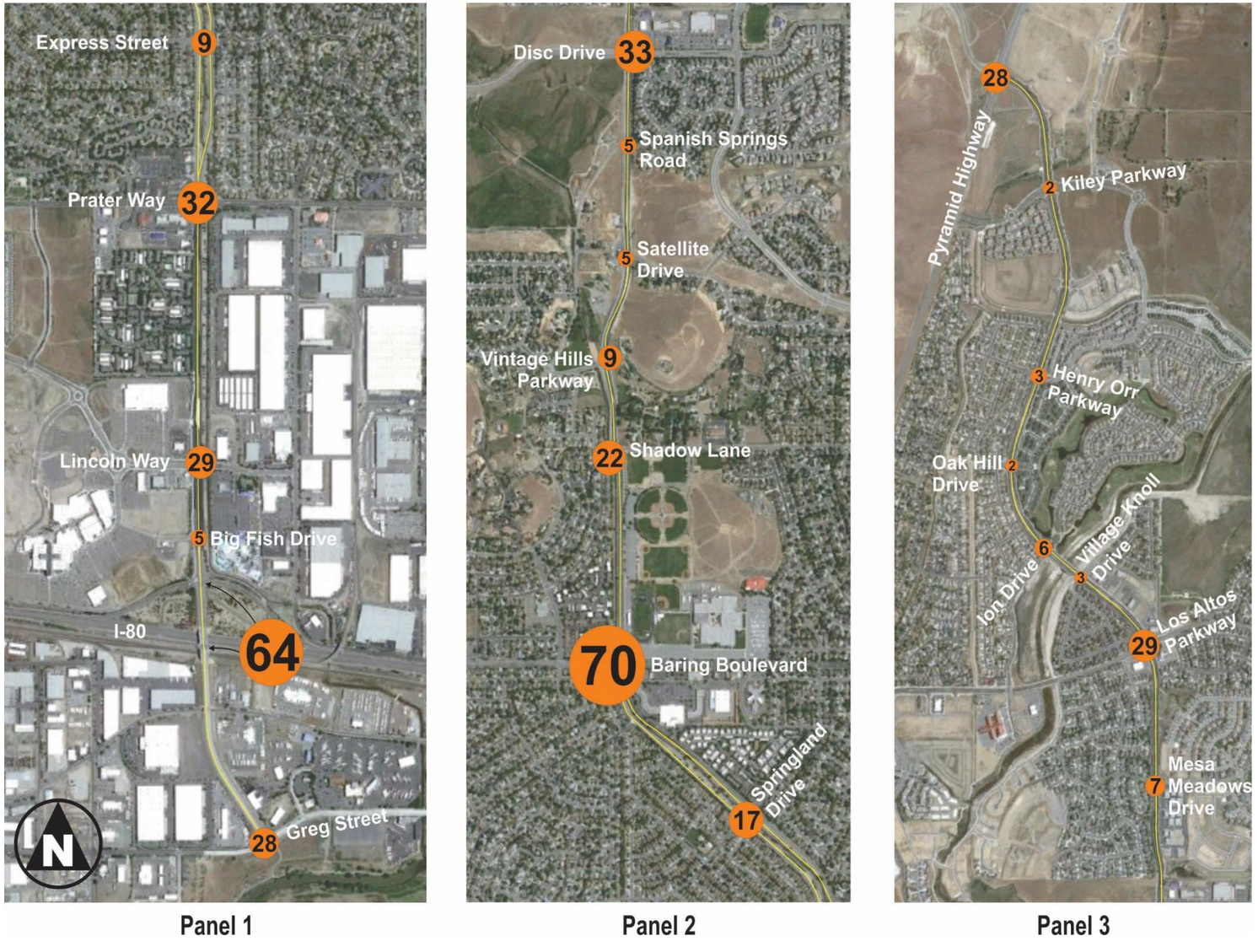


Figure 4-10. Distribution of Crashes - Five Year Period (Jan 2008 – June 2013)

Table 4-2. Crash Summary from January 2008 to June 2013

Location	Mode			Severity			Total
	Vehicle	Bicycle	Ped	Fatality	Injury	PDO	
Greg St	28				13	15	28
I-80 Ramp Intersections	63	1			27	37	64
Big Fish	5				1	4	5
Lincoln	28	1			10	19	29
Prater	32				13	19	32
Tyco	0				0	0	0
Express	9				2	7	9
O'Callaghan/ Springland	17				7	10	17
Baring*	**67**	**3**			**29**	**41**	**70**
Shadow	22				9	13	22
Vintage Hills	9				6	3	9
Satellite	5				0	5	5
Spanish Springs	5				2	3	5
Disc	32	1		1	17	15	33
Mesa Meadows**	4	**1**	**2**		5	2	7
Los Altos	29				12	17	29
Village Meadow	3				3	0	3
Sawgrass	6				3	3	6
Cathedral Peak/Oakhill	2				1	1	2
Henry Orr/ Tioga	3				1	2	3
Eagle Pass/ Nightlatch	2			1	1	0	2
Kiley	2				1	1	2
Pyramid	28				10	18	28
Road Segments	70	1		3	28	40	71
TOTAL	**471**	**8**	**2**	**5**	**201**	**275**	**481**

* High Crash Location ** Area of interest

Sparks Boulevard/Baring Boulevard

Seventy crashes were reported at the Sparks Boulevard/Baring Boulevard intersection. **Table 4-3** summarizes all the reported crashes at this location between January 2008 and June 2013.

Table 4-3. Summary of Crashes at Sparks Boulevard/Baring Boulevard

Crash Type	Number	PDO	Injury	Fatality	# Ped/Bike Related
Angle (16%)	11	4	7	0	3
Head-On (6%)	4	2	2	0	0
Rear End (60%)	42	23	19	0	0
Side Swipe, Meeting (3%)	2	2	0	0	0
Side Swipe, Overtaking (13%)	9	9	0	0	0
Non-Collision (3%)	2	1	1	0	0
TOTAL	70	41	29	0	3

Based on the data obtained, of the 70 crashes at this location, 16 were reported in 2008, 23 were reported in 2009, 13 were reported in 2010, 8 were reported in 2011, 6 were reported in 2012, and only 4 crashes were reported in 2013. The historic trend shows that the number of crashes has been declining.

The majority of crashes were rear-end collisions accounting for 60% of all the crashes, followed by angle crashes (16%), side swipe overtaking crashes (13%), head-on crashes (6%), side swipe meeting crashes (3%), non-collision (3%). Of all the reported crashes, the majority of them were property damage only accidents that accounted for 59% of the total.

Of the seventy crashes at this location, three accidents involved a bicycle. Two of them occurred in 2008 and one was in 2011. Of the three bicycle related crashes, two of them reported the bicyclist at-fault. According to the reports, the two bicycle related crashes reported in 2008 resulted due to "Failure to obey traffic signs, signals or officer" by the non-motorized vehicle. The bicycle related crash in 2011 was due to the vehicle failing to yield to right-of-way to the cyclist. **Figure 4-11** shows the number of crashes by type of accident.

Attempts were made to identify crash trends or consistent contributing factors. Consideration was given to northbound direction crashes (due to the northbound approach curvature), to young drivers (due to the proximity to Reed High) and to a variety of other factors, but no trends were identified.

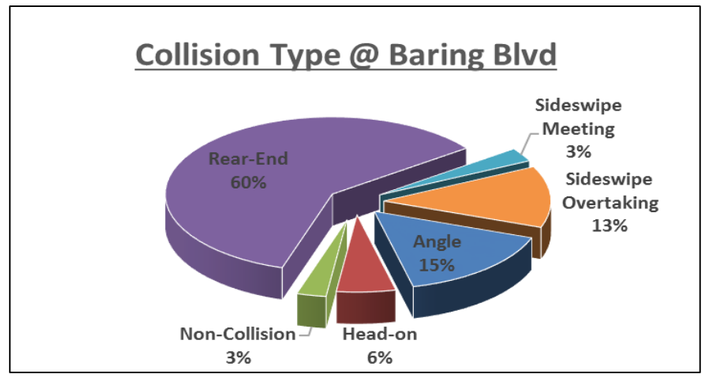


Figure 4-11. Crashes by Type at Sparks Boulevard/Baring Boulevard

Sparks Boulevard/Mesa Meadows Drive/Winery Drive

The Sparks Boulevard/Mesa Meadows Drive/Winery Drive intersection is an area of interest due to a high percentage of bike and pedestrian related crashes. A total of seven crashes were reported at this intersection between January 2008 and June 2013. Of the seven, four crashes (57%) involved a pedestrian or a bicycle. **Table 4-4** summarizes all the reported crashes at this location between January 2008 and June 2013.

Table 4-4. Summary of Crashes at Sparks Boulevard/Mesa Meadows Drive

Crash Type	Number	PDO	Injury	Fatality	# of Ped/Bike Related
Angle (57%)	4	1	3	0	2
Head-On (14%)	1	1	0	0	1
Rear End (14%)	1	0	1	0	0
Non-Collision (14%)	1	1	0	0	1

Of the 7 crashes at this location, one was reported in 2008, three in 2009, none in 2010, two in 2011, none in 2012, and only one crash in 2013. Of the four pedestrian bike crashes reported at this location, one was reported in 2008, two in 2011 and one in 2013. **Table 4-5** summarizes all the four pedestrian and bike related collisions.

Table 4-5. Summary of Crashes Involving Pedestrians or Bicycles

Year	Ped or Bike	Type of Crash	PDO/ Injury	At-Fault	Reason(s)
2008	Bike	Angle	Injury	Vehicle & Bike	Vehicle - Failed to yield right of way
					Bike - Improper crossing
2011	Pedestrian	Angle	Injury	Vehicle	Vehicle - Failed to yield right of way
2011	Bike	Non-Collision	Injury	Bike	Bike - Failed to yield right of way
2013	Pedestrian	Head-on	PDO	Vehicle	Vehicle - Failed to yield right of way

As shown in **Table 4-5**, the four bike or pedestrian related crashes occurred due to failure to yield right-of-way. Only two of the reported crashes were due to the vehicle failing to yield right of way to the bicycle. No crash trends were identified at this intersection.

4.6 Existing Traffic Operations

Existing Traffic Volumes

Existing daily traffic volume data for the Sparks Boulevard corridor was obtained from the Nevada Department of Transportation (NDOT) Annual Traffic Report and 24-hour vehicle counts performed by Traffic Works. The source data was primarily from NDOT's 2010 Annual Traffic Report. Turning movement counts were collected at all the study intersections on a typical weekday, from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. This data was used to identify the heaviest morning and evening traffic conditions. At each of the study intersections, the one-hour period with the heaviest traffic volumes (referred to as the peak hour) was determined from the morning and evening data. The existing AM and PM peak traffic volumes and existing lane configurations are shown in **Figures 4-12, 4-13 and 4-14**.

Level of Service Methodology

Level of Service (LOS) is an estimate of the quality and performance of the transportation system operations. The industry standard for evaluating traffic conditions is based on the Transportation Research Board's (TRB) methodology outlined in the Highway Capacity Manual (HCM), Special Report 209 (TRB 2000). Using this methodology, traffic conditions are assessed with respect to the average intersection delay (seconds/vehicle). The letter "A" is used to describe the least amount of congestion and best operations, and the letter "F" indicates the highest amount of congestion and worst operations. The HCM LOS criteria for signalized and un-signalized intersections are shown in **Table 4-6**.

Table 4-6. LOS Criteria for Signalized and Un-signalized Intersections

LOS Rating	Brief Description	Average Delay for Signalized Intersections (seconds/vehicle)	Average Delay for TWSC Intersections (seconds/vehicle)
A	Free flow conditions.	0-10	0-10
B	Stable conditions with some affect from other vehicles.	>10-20	>10-15
C	Stable conditions with significant affect from other vehicles.	>20-35	>15-25
D	High density traffic conditions still with stable flow.	>35-55	>25-35
E	At or near capacity flows.	>55-80	>35-50
F	Over capacity conditions.	> 80	> 50

Source: HCM 2000; TWSC: two-way stop control; LOS ratings for TWSC and three-legged stop-control intersections are based on the worst movement average delay; LOS is not defined for the overall intersection

Roadway segments were analyzed using the Average Daily Traffic Thresholds as outlined in the RTC's 2035 Regional Transportation Plan. Using this methodology, level of service is estimated by comparing average daily traffic volumes to the LOS threshold values shown in **Table 4-7**.

Level of Service Policy

The 2035 Regional Transportation Plan (2035 RTP) establishes level of service criteria for regional roadway facilities in Washoe County, the City of Reno, and City of Sparks. The current Level of Service policy is:

- "All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better."
- "All regional roadway facilities projected to carry 27,000 or more ADT at the latest RTP horizon – LOS E or better."
- "All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting roadways".

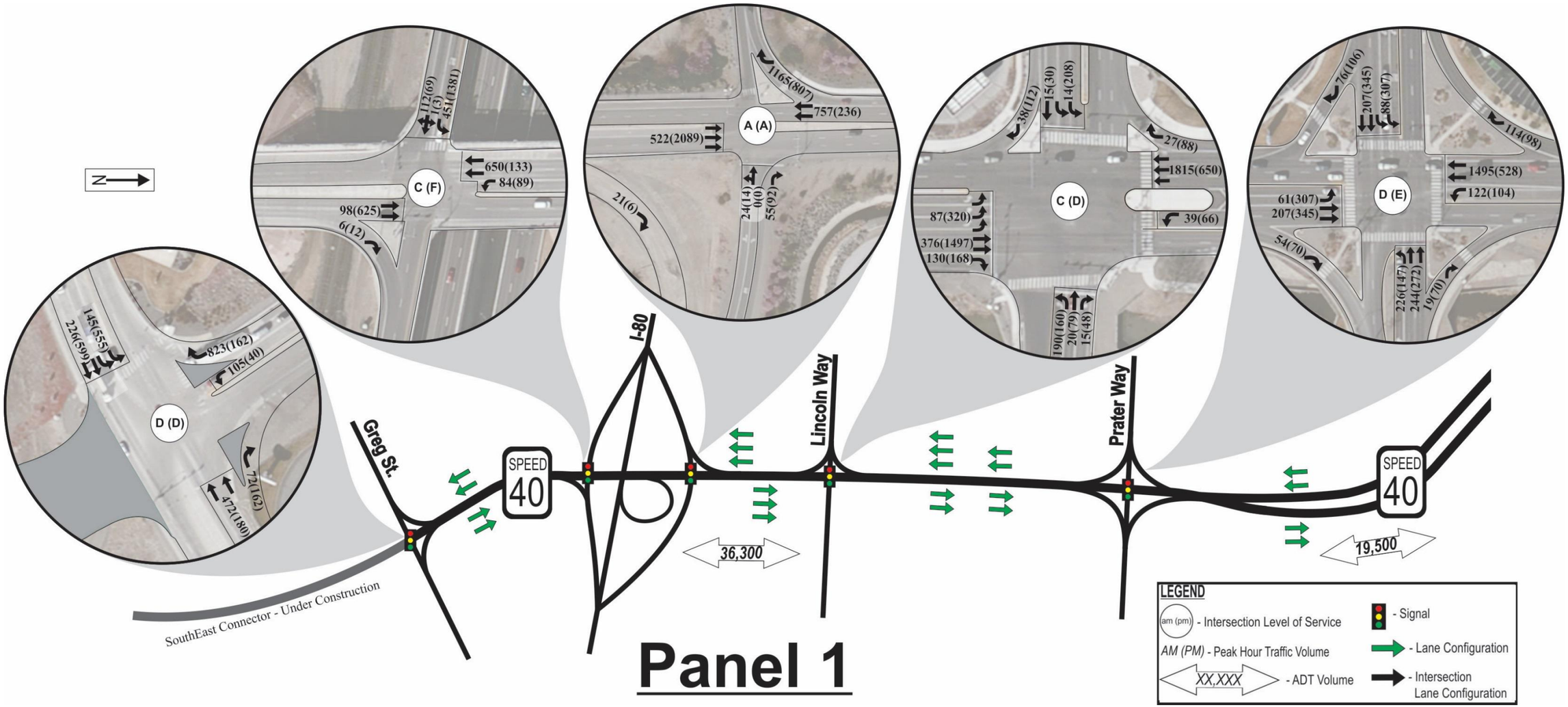
Applying the current standards to the study corridor, using the future traffic volume projections developed through this study, the level of service criteria specific for this project are:

- Sparks Boulevard (Greg Street to Disc Drive) – LOS E
- Sparks Boulevard (Disc Drive to Pyramid Highway) – LOS D
- Intersections – LOS D or E, or better, consistent with the segment LOS standard shown above

Table 4-7. Average Daily Traffic LOS Thresholds by Facility Type

Facility Type	Maximum Service Flow Rate (daily for given service level)				
# of Lanes	LOS A	LOS B	LOS C	LOS D	LOS E
Freeway					
4	≤ 28,600	42,700	63,500	80,000	90,200
6	≤ 38,300	61,200	91,100	114,000	135,300
8	51,100	81,500	121,400	153,200	180,400
10	63,800	101,900	151,800	191,500	225,500
Arterial-High Access Control					
2	n/a	9,400	17,300	19,200	20,300
4	n/a	20,400	36,100	38,400	40,600
6	n/a	31,600	54,700	57,600	60,900
8	n/a	42,500	73,200	76,800	81,300
Arterial-Moderate Access Control					
2	n/a	5,500	14,800	17,500	18,600
4	n/a	12,000	32,200	35,200	36,900
6	n/a	18,800	49,600	52,900	55,400
8	n/a	25,600	66,800	70,600	73,900
Arterial/Collector-Low Access Control					
2	n/a	n/a	6,900	13,400	15,100
4	n/a	n/a	15,700	28,400	30,200
6	n/a	n/a	24,800	43,100	45,400
8	n/a	n/a	34,000	57,600	60,600
Arterial/Collector-Ultra-Low Access Control					
2	n/a	n/a	6,500	13,300	14,200
4	n/a	n/a	15,300	27,300	28,600
6	n/a	n/a	24,100	41,200	43,000
8	n/a	n/a	33,300	55,200	57,400

Source: Washoe County RTP Table 3-4.



Panel 1

Figure 4-12. Existing LOS and Turn Movements (Panel 1)

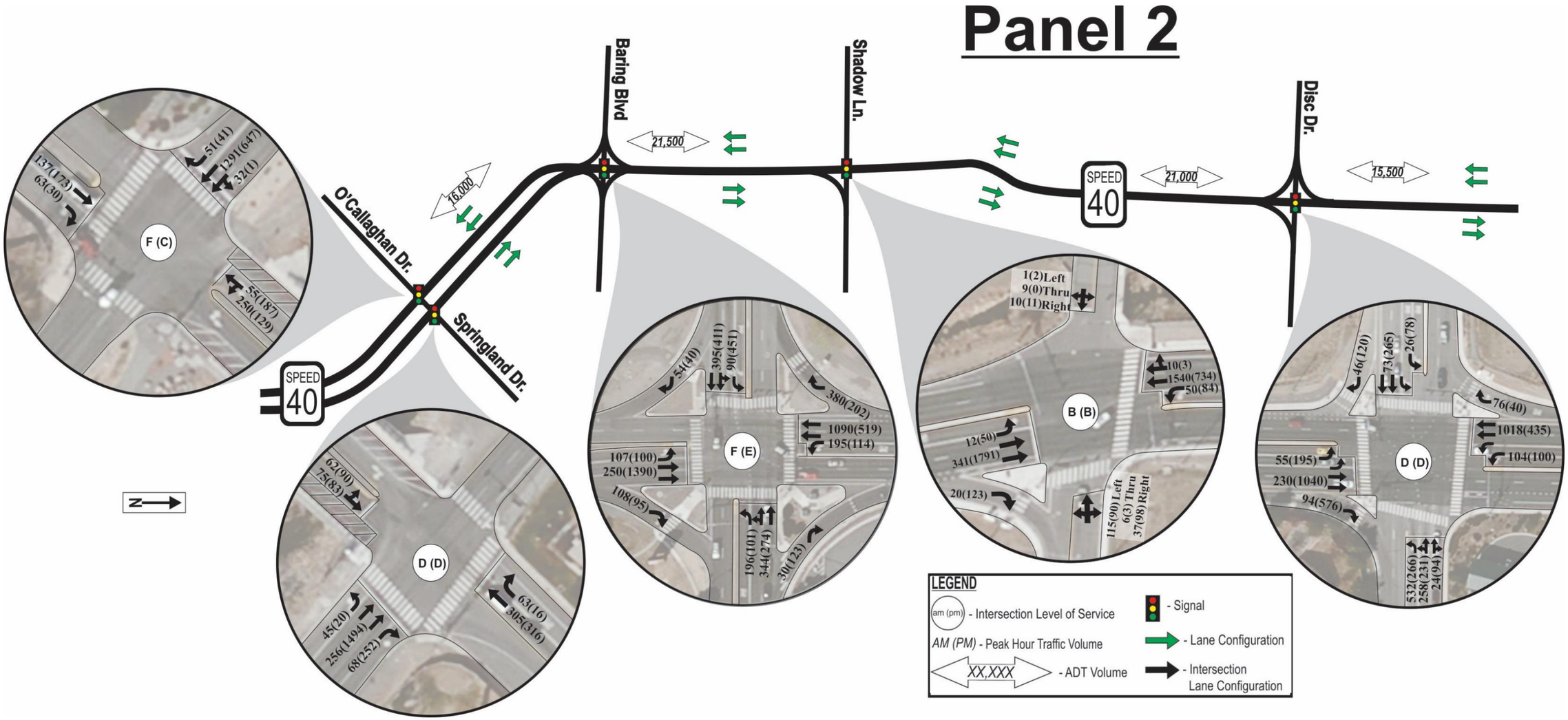


Figure 4-13. Existing LOS and Turn Movements (Panel 2)

Panel 3

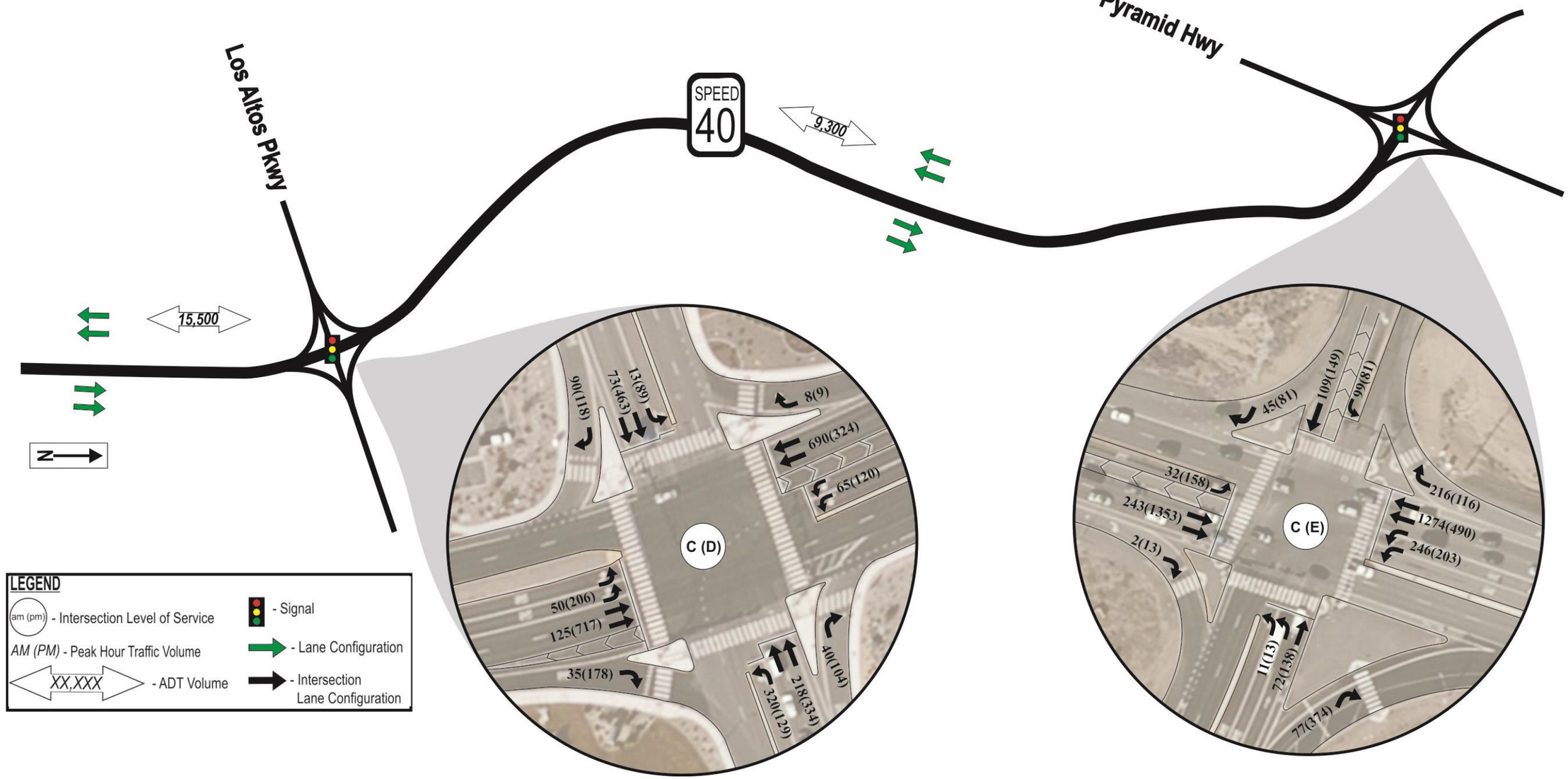


Figure 4-14. Existing LOS and Turn Movements (Panel 3)

Level of Service Analysis

The existing average daily traffic volumes were compared to the daily volume thresholds (**Table 4-7**) to determine existing roadway segment level of service. The results are shown in **Table 4-8**.

Table 4-8. Existing Roadway Segment Level of Service

Roadway Segment	Class	Lanes	Access Control	ADT	LOS
Greg Street to I-80 Ramps	Arterial	4	MAC	13,500	C
I-80 Ramps to Lincoln Way	Arterial	6	MAC	36,300	C
Lincoln Way to Springland Drive	Arterial	4	MAC	19,500	C
Springland Drive to Baring Boulevard	Arterial	4	MAC	16,000	C
Baring Boulevard to Shadow Lane	Arterial	4	MAC	21,500	C
Shadow Lane to Disc Drive	Arterial	4	MAC	21,000	C
Disc Drive to Los Altos Parkway	Arterial	4	MAC	15,500	C
Los Altos Parkway to Pyramid Highway	Arterial	4	MAC	9,300	B

As shown in **Table 4-8**, each of the studied roadway segments is currently operating at an acceptable level of service based on average daily traffic volumes.

The signalized intersections on Sparks Boulevard were analyzed using the HCM modules for signalized intersections in Trafficware's software program, Synchro 8.0 (Build 804). Level of service calculations were performed using the existing condition intersection configurations and traffic volumes collected. The intersection Level of Service and delay results are presented in **Table 4-9**.

As shown in **Table 4-9**, two of the 12 study intersections currently operate worse than the LOS D/E standard during the AM peak hour. During the PM peak hour, two of the 12 study intersections operate at worse than the acceptable LOS standards. The existing LOS results are also shown in **Figures 4-12, 4-13, and 4-14**.

Table 4-9. Existing AM and PM Peak Hour LOS Summary

Intersection		Existing	
		AM Peak	PM Peak
Sparks Blvd and Greg St	**LOS**	D	D
	Delay (sec/veh)	48.7	53.1
Sparks Blvd and I-80 EB Ramps	**LOS**	C	F
	Delay (sec/veh)	32.2	>100
Sparks Blvd and I-80 WB Ramps	**LOS**	A	A
	Delay (sec/veh)	8.8	4.7
Sparks Blvd and E Lincoln Way	**LOS**	C	D
	Delay (sec/veh)	29.7	38.4
Sparks Blvd and Prater Way	**LOS**	D	E
	Delay (sec/veh)	42.5	72.5
Sparks Blvd and Springland Dr	**LOS**	D	D
	Delay (sec/veh)	45.4	41.8
Sparks Blvd and O'Callaghan Dr	**LOS**	F	C
	Delay (sec/veh)	>100	32.2
Sparks Blvd and Baring Blvd	**LOS**	F	E
	Delay (sec/veh)	>100	71.4
Sparks Blvd and Shadow Ln	**LOS**	B	B
	Delay (sec/veh)	16.1	14.9
Sparks Blvd and Disc Dr	**LOS**	D	D
	Delay (sec/veh)	40.8	36.1
Sparks Blvd and Los Altos Pkwy	**LOS**	C	D
	Delay (sec/veh)	22.8	42.2
Sparks Blvd and Pyramid Way	**LOS**	C	E
	Delay (sec/veh)	28.7	56.2

The following intersections currently operate at unacceptable LOS:

- Sparks Boulevard and I-80 EB Ramps
- Sparks Boulevard and O'Callaghan Drive
- Sparks Boulevard and Baring Boulevard

4.7 Access Management Review

The goal of access management is to control the location, quantity, spacing, and design of access points along a major roadway while encouraging alternate access points and shared driveways between adjacent parcels. Maintaining access standards and promoting improved access results in a roadway that operates safely and more efficiently for all users.

The RTC established access management guidelines for all regional roadways in the 2035 Regional Transportation Plan (RTP). Sparks Boulevard is classified as Moderate Access Control (MAC) Arterial. The MAC access standards are shown in **Table 4-10**.

An overview comparison was performed between the MAC standards and existing conditions on Sparks Boulevard to identify any driveways or access points that do not conform to the standards.

The majority of the study corridor meets or exceeds the MAC access standards. The few exceptions are:

- Driveway north of O'Callaghan Drive – The spacing between the signal and the driveway on southbound Sparks Boulevard located north of O'Callaghan Drive (A Child's World) is less than 200 ft.

This driveway is an informal access and should be closed. Reasonable alternative access is available on O'Callaghan Drive. The location of this driveway is shown in **Figure 4-15**.

- Driveway north of Disc Drive – The spacing between the signal and the driveway on northbound Sparks Boulevard located north of Disc Drive is less than 200 ft. The location of this driveway is shown in **Figure 4-16.**

- Driveways north of Prater Way – Driveways located on southbound Sparks Boulevard, located north of E. Prater Way are slightly less than 300 ft apart. The location of these driveways is shown in **Figure 4-17.**

All these driveways have right-in/right-out only access. Each of these driveways is a critical access to commercial centers located on corner parcels. Each location was reviewed and deemed acceptable by the consulting team considering the lack of other good access location options and the desire for continued business vitality.

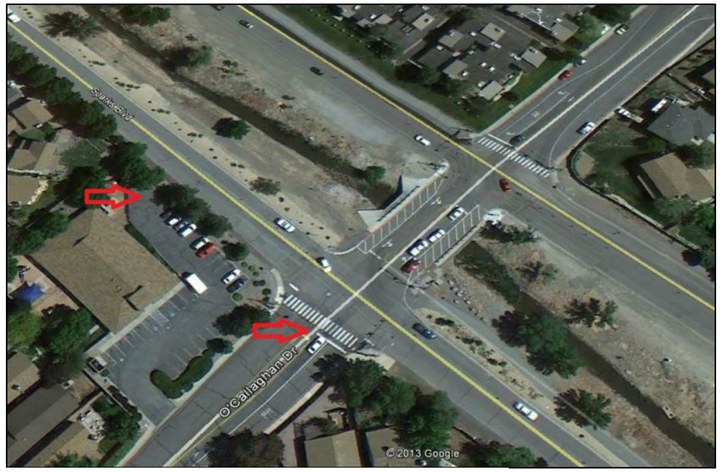


Figure 4-15. Driveway North of O'Callaghan Drive

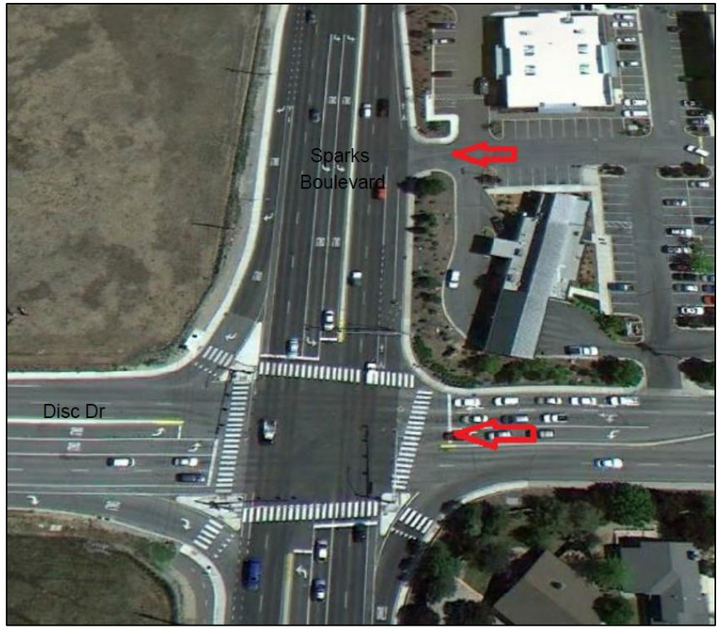


Figure 4-16. Driveway North of Disc

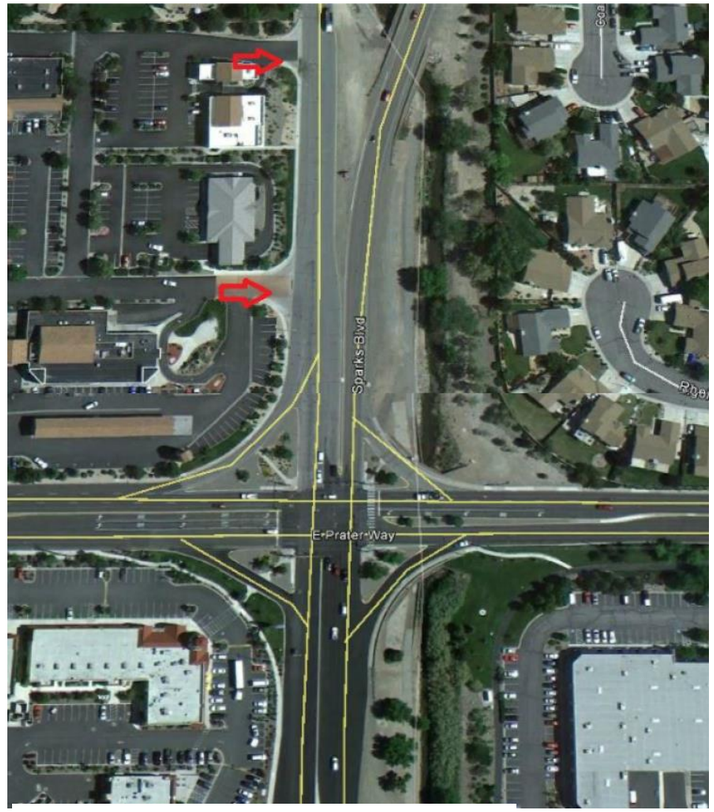


Figure 4-17. Driveways North of Prater Way

Table 4-10. RTC Access Management Standards-Arterials[1] and Collectors

Access Management Class	Posted Speeds	Signals Per Mile and Spacing[2]	Median Type	Left From Major Street? (Spacing from signal)	Left From Minor Street or Driveway?	Right Decel Lanes at Driveways?	Driveway Spacing[3]
High Access Control	45-55 mph	2 or less Minimum spacing 2350 feet	Raised w/channelized turn pockets	Yes 750 ft. minimum	Only at signalized locations	Yes[4]	250 ft./500 ft.
Moderate Access Control	40-45 mph	3 or less Minimum spacing 1590 feet	Raised or painted w/turn pockets	Yes 500 ft. minimum	No, on 6- or 8-lane roadways w/o signal	Yes[5]	200 ft./300 ft.
Low Access Control	35-40 mph	5 or less Minimum spacing 900 feet	Raised or painted w/turn pockets or undivided w/painted turn pockets or two-way, left-turn lane	Yes 350 ft. minimum	Yes	No	150 ft./200 ft.
Ultra-Low Access Control	30-35 mph	8 or less Minimum spacing 560 feet	Raised or painted w/turn pockets or undivided w/painted turn pockets or two-way left-turn lane	Yes 350 ft. minimum	Yes	No	150 ft./200 ft. 100 ft./100 ft.[6]

[1] On-street parking shall not be allowed on any new arterials. Elimination of existing on-street parking shall be considered a priority for major and minor arterials operating at or below the policy level of service.

[2] Minimum signal spacing is for planning purposes only; additional analysis must be made of proposed new signals in the context of existing conditions, planned signalized intersections, and other relevant factors impacting corridor level of service.

[3] Minimum spacing from signalized intersection/spacing from other driveways.

[4] If there are more than 30 inbound, right-turn movements during the peak-hour.

[5] If there are more than 60 inbound, right-turn movements during the peak-hour.

[6] Minimum spacing on collectors.

5 2035 FUTURE CONDITIONS

This section of the report describes the future horizon year (2035) planned roadway network, projected traffic volumes, and anticipated traffic operations if no improvements were made. Year 2035 was selected as a future horizon year because it is consistent with the longest planning horizon in the 2035 RTP, travel demand model outputs are available, and projecting realistic turn movements at intersections would be difficult beyond this time frame.

5.1 Planned Improvement Projects

The Washoe County 2035 Regional Transportation Plan (RTP) was reviewed to identify improvement projects that would affect the future transportation system in the study area. Programmed or planned improvements assumed to be in-progress or completed by 2035, as identified in 2035 RTP, are as follows:

- SouthEast Connector – New 6 lane road from South Meadows Parkway to Greg Street
- Greg Street – Widen to 6 lanes from Deming Way to I-80
- Kiley Ranch Road – New 2 lane road from Lazy 5 Parkway to Henry Orr Drive
- Pyramid Highway - US 395 Connection – New 6 lane freeway from US 395 to Calle de la Plata

Note that the RTP also identifies multi-modal improvements and widening on Sparks Boulevard. The purpose of this corridor study is to determine what those specific improvements should be.

5.2 Functional Classifications and Roadway Characteristics

Depending on the amount of growth and development within the study area, it is possible that some roadways could warrant a change in functional classification to be consistent with capacity needs. Substantial increases in traffic volumes could result in minor designations being changed to major classifications. However, land use in the study area is expected to remain consistent with current land uses. Moreover, future residents are expected to utilize the transportation system in a similar fashion as occurs today. Since the need for substantial capacity improvements would likely be limited to Sparks Boulevard, it is unlikely that the functional classifications would require changes.

The nature of roadways within the study area are also expected to generally remain similar. However, as described in Section 5.1, there are several significant planned roadway projects in the study area. Elements of these projects generally consist of road widening, pedestrian improvements, shoulder widening, and paving activities. As such, these projects could generally improve the safety and comfort of the local roadway system, but would not have a substantial affect on roadway feel or function for local residents. This is supported by the City of Sparks Proposed Land Use Map (**Figure 5-1**) that shows no significant change in land uses surrounding the corridor compared to existing land uses.

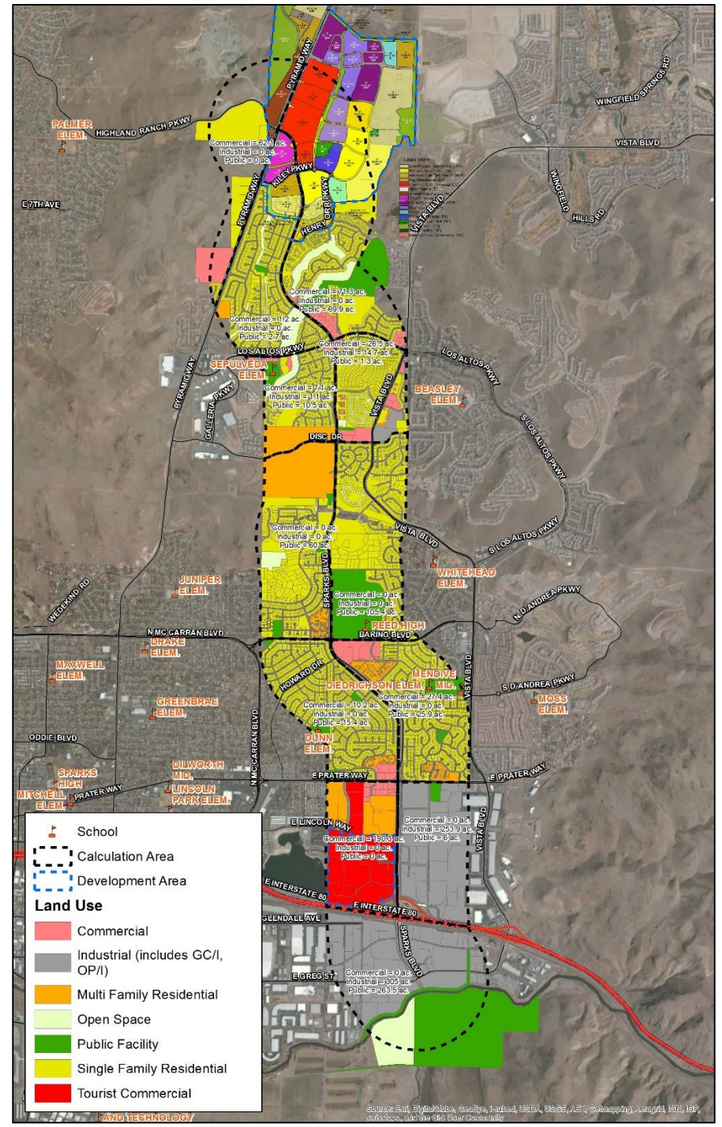


Figure 5-1. Proposed Land Use Map

5.3 2035 Daily Traffic Volumes

With the current planned roadway improvement projects and continued land use intensification, traffic volumes on Sparks Boulevard are anticipated to increase in the future. The RTC's travel demand model was used to estimate the future traffic volumes for the 2035 horizon year. The travel demand model is the only source for travel forecasts that can accurately project shifts in traffic flow associated with a new regional major arterial (SouthEast Connector) added to the network. Traffic Works worked interactively with RTC and City of Sparks staff while developing the methodology of estimating 2035 volumes and obtained their approval on both the methodology and traffic volumes. 2035 daily traffic volumes were developed using the following approach:

Step 1: Determine the existing 2013 average daily traffic volumes (ADT) from new tube counts and the Nevada Department of Transportation traffic count data base.

Step 2: Obtain RTC travel demand model ADT outputs for the 2010 base year and future year (2035) scenarios.

Step 3: Using RTC travel demand model outputs, calculate the difference between the 2010 and 2035 daily traffic volumes.

Step 4: Determine the percent change, and percent per year change, over the 25 year model range.

Step 5: Review the growth trends and make adjustments for general consistency throughout the corridor. It was assumed that declines in traffic volume are not appropriate for this planning effort, therefore all negative values were increased to a 0.0% per year growth rate. Similarly, extraordinarily high growth rates on individual road segments were reduced to be consistent with adjacent road segments. The adjusted annual growth rates are shown on the "adjusted %/year" line of **Table 5-1**.

Step 6: Multiply the adjusted growth rate times 22 years to obtain the 22 year growth multiplier (2013 to 2035).

Location -->	SE Conn	N/O Greg	N/O I-80 WB	N/O Lincoln	N/O Prater	N/O Springland	N/O Baring	N/O Shadow	S/O Disc	N/O Disc	S/O Los Altos	N/O Los Altos	S/O Pyramid	N/O Pyramid
2012 Existing Conditions	**0**	**13,600**	**36,300**	**23,100**	**19,500**	**16,000**	**21,500**	**21,000**	**21,000**	**15,500**	**15,500**	**9,300**	**9,300**	**8,800**
2010 (Demand Model)														
2010 Model Volumes	**0**	**5,417**	**22,386**	**16,275**	**14,238**	**15,400**	**17,226**	**21,510**	**22,913**	**11,797**	**10,735**	**12,061**	**11,995**	**8,192**
2035 (Demand Model)														
2035 Model Volumes	**38,473**	**27,364**	**38,224**	**28,393**	**24,141**	**23,025**	**23,060**	**27,786**	**29,061**	**15,747**	**14,736**	**15,773**	**15,779**	**7,861**
Growth Rates														
Model Difference 2010-2035		21,947	15,838	12,118	9,903	7,625	5,834	6,276	6,148	3,950	4,001	3,712	3,784	-331
% per year		16.2%	2.8%	3.0%	2.8%	2.0%	1.4%	1.2%	1.1%	1.3%	1.5%	1.2%	1.3%	-0.2%
Adjusted %/year		**6.0%**	**2.8%**	**2.8%**	**2.0%**	**2.0%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**0.0%**
22 years growth factor		**2.5**	**1.6**	**1.62**	**1.44**	**1.44**	**1.29**	**1.29**	**1.29**	**1.29**	**1.29**	**1.29**	**1.29**	**1.00**
NDOT Highest Reported				*22,000*	*23,100*	*18,000*	*23,000*	*22,000*	*22,000*	*16,000*	*16,000*	*9,000*	*9,000*	*8,800*
2035 Adjusted Volumes	**50,000**	**34,000**	**58,700**	**37,400**	**28,100**	**23,100**	**27,700**	**27,100**	**27,100**	**20,000**	**20,000**	**12,000**	**12,000**	**8,800**
New Development Trips	1,020	1,020	1,835	1,835	1,020	815	475	475	475	135	135	135	135	0
2035 Design Volumes	**51,000**	**35,000**	**60,500**	**39,200**	**29,100**	**23,900**	**28,200**	**27,600**	**27,600**	**20,100**	**20,100**	**12,100**	**12,100**	**8,800**

Table 5-1. Estimation of 2035 Daily Traffic Volumes (Vehicles per day)

Step 7: Apply the 22 year multiplier to the existing (2013) daily traffic volumes to calculate the "2035 Adjusted Volumes".

Step 8: The 2035 adjusted volumes from Step 7 were compared to historic counts from the Nevada Department of Transportation database. If any historic count within the past 10 years was found to be higher than the 2035 adjusted volume, that segment volume was replaced by the historic high number as recorded in the past.

Step 9: Approved Development Trips – The current RTC travel demand model (at the time of writing this report) did not include the trips generated by all the approved project elements within Legends (such as the proposed Wal-Mart). Trips generated by the proposed Wal-Mart project were added to the 2035 adjusted volumes from Step 8 to calculate **2035 Design Volumes**, which were used for the traffic analysis.

Step 10: SouthEast Connector: Since there is no existing volume on SouthEast Connector, the 2035 volume was estimated based on the difference between the 2035 travel demand model outputs and the design volumes from Step 9 for adjacent segments. The SouthEast Connector volume estimate was verified against previous approved studies performed for the SouthEast Connector project, and found to be within an acceptable 5% range.

The 2035 "Design Volumes" are shown in **Table 5-1**. The traffic volumes along Sparks Boulevard are expected to increase by approximately 1.3 to 2.8 percent annually between 2010 and 2035. The 6% growth on Sparks Boulevard south of I-80 is primarily due to an anticipated diversion of regional (South Meadows to Sparks) traffic to the SouthEast Connector.

5.4 2035 Peak Hour Intersection Volumes

2035 peak hour turning movement volumes were estimated by combining the methodology described in Section 5.3 with NCHRP Report 255 procedures. NCHRP Report 255, Highway Traffic Data for Urbanized Area Project Planning and Design, is a document published by the Federal Highway Administration that discusses post processing of travel demand model outputs and developing turning movement volumes. NCHRP 255 has standardized procedures to translate travel demand outputs into information to support project development decisions. These procedures account for variance in the detail and precision of forecasts and uncertainty in land-use forecasts by improving consistency and analytic quality of input data and output forecasts. The growth rates obtained through the methodology described in Section 5.3 were further refined by applying these principles in developing peak hour turning movement counts. To develop 2035 peak hour turning movements, Turns W32 a turning movement volumes balancing tool that incorporates NCHRP 255 procedures was used. 2035 peak hour turning movements were developed based on existing turning movement counts and growth rates obtained from daily volume forecasts. Turns W32 can calculate future year turning movement volumes and balance future turning movement distribution based on current turning movement counts and the growth rates on all the approaches of intersection. A screenshot of the Turns W32 input page is shown in **Figure 5-2**.

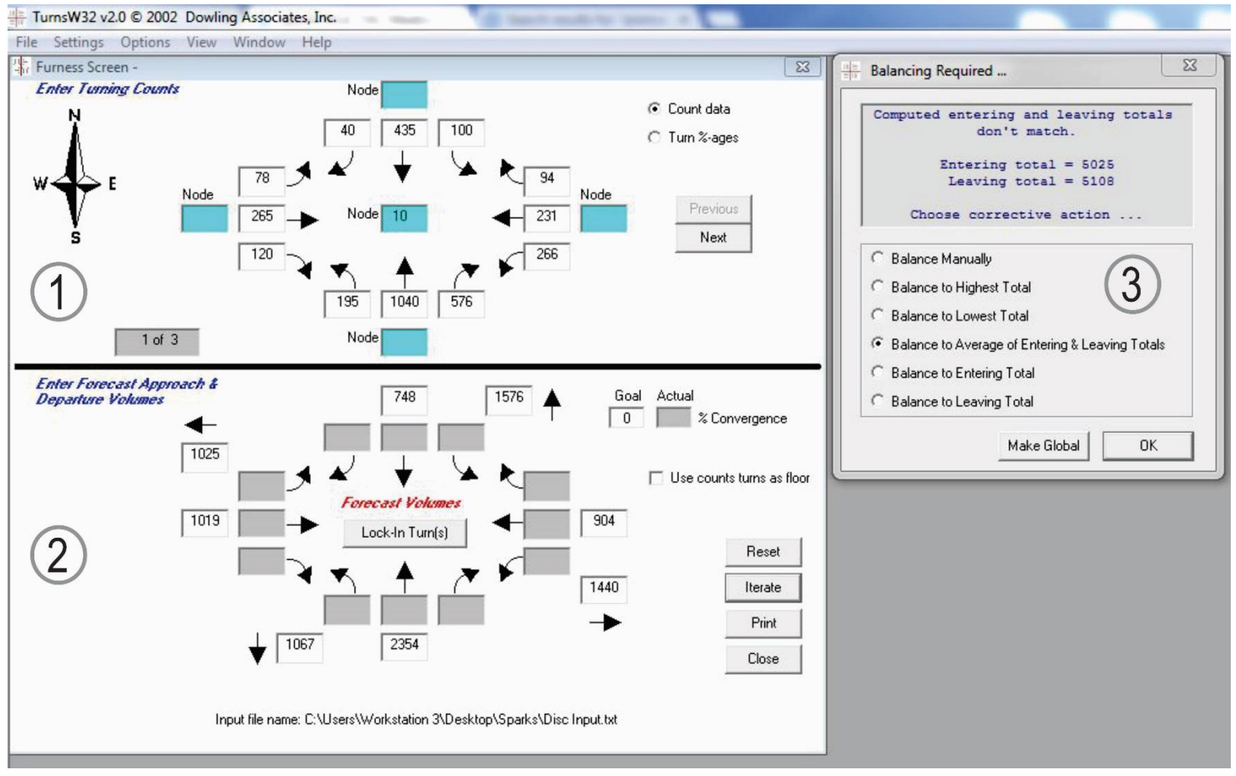


Figure 5-2. Example Screenshot of Turns W32

The first step is to enter existing turning movement volumes in the top right panel named "*Enter Turning Counts*". Next, enter the 2035 peak hour directional approach and departure volumes (by leg), calculated based on the growth rates determined in Section 5.3, in the bottom panel named "*Enter Forecast Approach & Departure* Volumes". The program then calculates and balances different movements based on the growth of each approach and departure volume. Turns W32 runs several iterations until the turning movements are balanced, to the provided approach and departure volumes. There are several options for balancing the volumes that are presented in the "*Balancing Required*" panel on the right. Option of "Balance to Average of Entering & Leaving Totals" was used to calculate peak hour turning movement counts at all the intersections. The 2035 PM peak hour turning movement volumes are shown in **Figures 5-3, 5-4 and 5-5**.

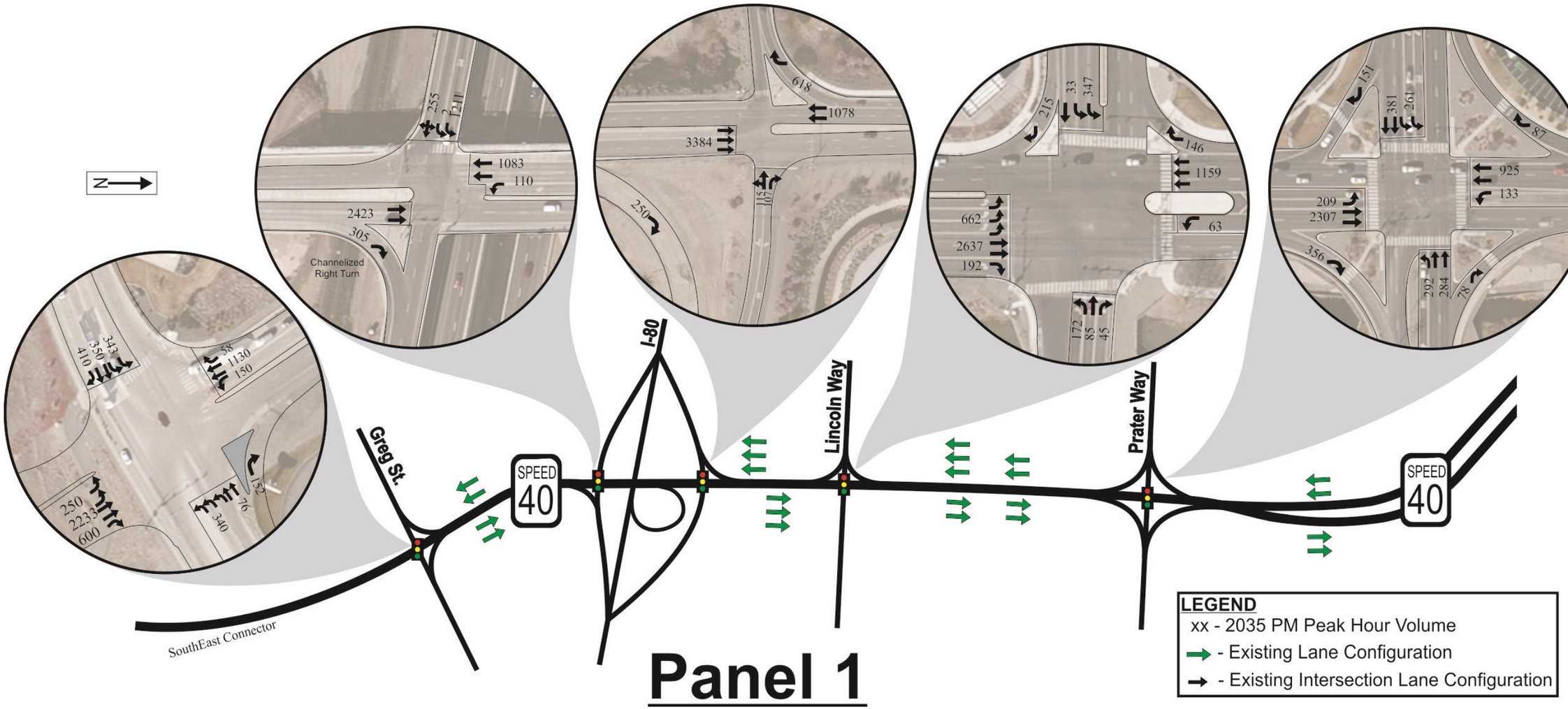


Figure 5-3. 2035 Turn Movement Forecasts (Panel 1)

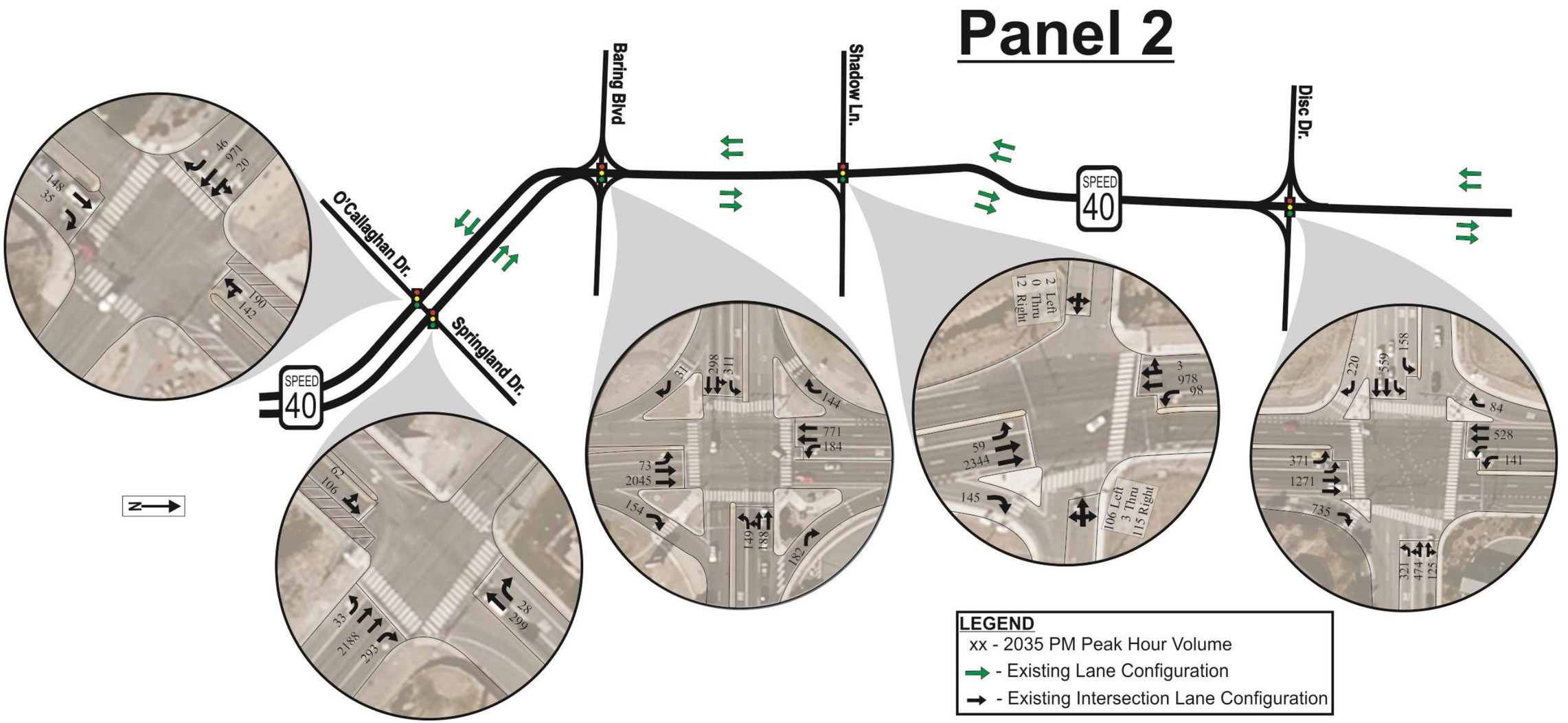


Figure 5-4. 2035 Turn Movement Forecasts (Panel 2)

Panel 3

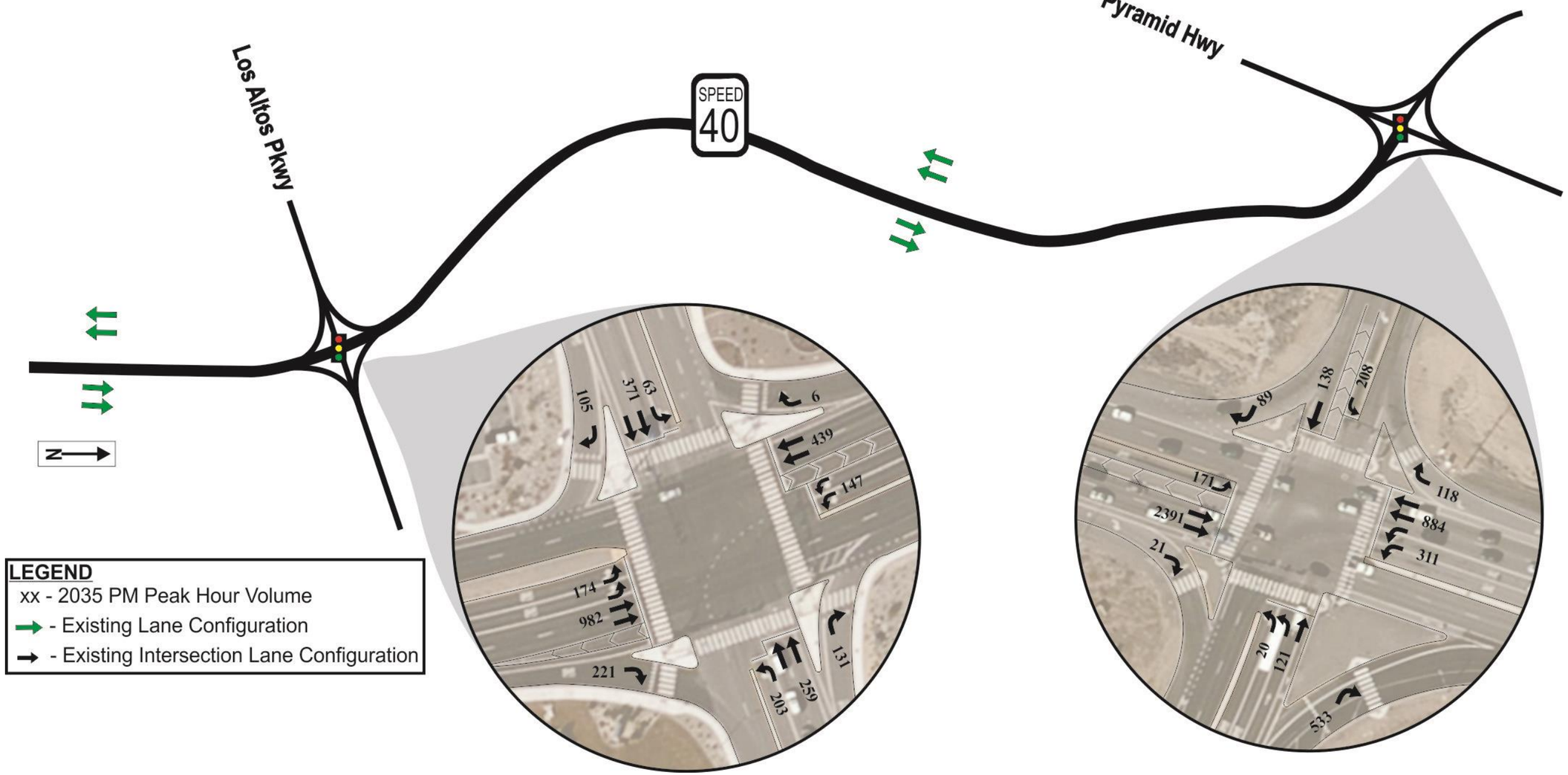


Figure 5-5. 2035 Turn Movement Forecasts (Panel 3)

5.5 Year 2035 Traffic Operations

Roadway Level of Service

The projected 2035 average daily traffic volumes (**Table 5-1**) were compared to the daily volume thresholds to determine the 2035 roadway segment level of service. The results are shown in **Table 5-2**, assuming existing lane configurations.

Table 5-2. 2035 Roadway Segment Level of Service Summary

Roadway Segment	Class	Lanes	Access Control	2013		2035	
				ADT	LOS	ADT	LOS
Greg Street to I-80 Ramps	Arterial	4	MAC	13,500	C	51,000	F
I-80 Ramps to Lincoln Way	Arterial	6	MAC	36,300	C	60,500	F
Lincoln Way to Prater Way	Arterial	4	MAC	23,100	C	39,200	F
Lincoln Way to Springland Drive	Arterial	4	MAC	19,500	C	29,100	C
Springland Drive to Baring Boulevard	Arterial	4	MAC	16,000	C	23,900	C
Baring Boulevard to Shadow Lane	Arterial	4	MAC	21,500	C	28,200	C
Shadow Lane to Disc Drive	Arterial	4	MAC	21,000	C	27,600	C
Disc Drive to Los Altos Parkway	Arterial	4	MAC	15,500	C	20,100	C
Los Altos Parkway to Pyramid Highway	Arterial	4	MAC	9,300	B	12,100	C

As shown in **Table 5-2**, in the year 2035, all the Sparks Boulevard roadway segments north of Prater Way will operate at LOS "C" which is better than the Level of Service policy. The roadway segments between Greg Street and Prater Way are anticipated to degrade to LOS "F". These are the only three segments where, in 2035, the roadway Level of Service worsens compared to existing conditions and operates at unacceptable LOS conditions. Additional capacity (travel lanes) will be needed in these segments.

Intersection Level of Service

Accounting for planned improvements, land use development assumptions, and traffic volume forecasts, the year 2035 PM peak hour traffic operations were analyzed in detail. All signal timings were optimized for cycle lengths, phase splits and offsets since most jurisdictions update signal timings every 3 to 6 years. Additionally, as a result of traffic volume growth, existing peak hour factors (PHF) below 0.95 were adjusted to 0.95, or assumed to remain the same if currently above 0.95. Only the PM peak hour was chosen for 2035 intersection LOS analysis, since the PM peak hour has the highest volumes compared to any other hour during the day and thus represents the worst case scenario. The 2035 intersection Level of Service and delay results, with the existing lane configurations, are presented in **Table 5-3**.

Table 5-3. 2035 Intersection Level of Service Summary

Intersection		2013	2035 - (Existing Config)
		PM Peak	PM Peak
Sparks Blvd and Greg St	**LOS**	D	F
	Delay (sec/veh)	53.1	>100
Sparks Blvd and I-80 EB ramps	**LOS**	F	F
	Delay (sec/veh)	>100	>100
Sparks Blvd and I-80 WB Ramps	**LOS**	A	A
	Delay (sec/veh)	5.2	7.0
Sparks Blvd and E. Lincoln Way	**LOS**	D	F
	Delay (sec/veh)	38.4	95.5
Sparks Blvd and Prater Way	**LOS**	E	F
	Delay (sec/veh)	72.5	>100
Sparks Blvd and Springland Dr	**LOS**	D	F
	Delay (sec/veh)	41.8	>100
Sparks Blvd and O'Callaghan Dr	**LOS**	C	C
	Delay (sec/veh)	32.2	34.0
Sparks Blvd and Baring Blvd	**LOS**	E	F
	Delay (sec/veh)	74.5	>100
Sparks Blvd and Shadow Ln	**LOS**	B	D
	Delay (sec/veh)	14.9	42.5
Sparks Blvd and Disc Dr	**LOS**	D	E
	Delay (sec/veh)	36.1	62.2
Sparks Blvd and Los Altos Pkwy	**LOS**	D	D
	Delay (sec/veh)	42.2	38.2
Sparks Blvd and Pyramid Way	**LOS**	E	F
	Delay (sec/veh)	56.2	>100

The 2035 PM peak hour LOS and delay at all the study intersections deteriorate compared to existing conditions except at the Sparks Boulevard/Los Altos Parkway intersection, where the traffic operations are not expected to change significantly. As shown in **Table 5-3**, the number of intersections that will operate at unacceptable levels of service during the PM peak hour increase from two in 2013 to seven in 2035. The intersections that can be expected to operate below the LOS standards (all at LOS "F") include:

- Sparks Boulevard/Greg Street
- Sparks Boulevard/I-80 EB ramps
- Sparks Boulevard/E Lincoln Way
- Sparks Boulevard/Prater Way
- Sparks Boulevard/Springland Drive
- Sparks Boulevard/Baring Boulevard
- Sparks Boulevard/Pyramid Way

All the intersections anticipated to operate at LOS "F" have heavy side street volumes during the PM peak hour except for the Sparks Boulevard/Springland Drive intersection. The Sparks Boulevard/Springland Drive/O'Callaghan Drive intersection operates at LOS "F" due to the current intersection configuration with two-signal operation. This configuration would need very long clearance intervals (Yellow + All Red) in order to avoid vehicles getting stuck between the two signals. This would reduce the available green time for the major movements on Sparks Boulevard, resulting in poor traffic operations.

It should be noted that each of the intersections expected to operate at LOS "F" (several with delay exceeding two minutes each) will cumulatively contribute to very long travel times through the corridor unless improvements are made. It is estimated the travel times between Greg Street and Baring Boulevard could increase to 20 minutes during the PM peak hour.

6 ALTERNATIVES DEVELOPMENT (TRAFFIC)

As discussed in Section 5.5, numerous intersections (mainly in the southern portion of the corridor) will operate at LOS "F" with intersection delay greater than 100 seconds per vehicle. To put that in perspective, any vehicle arriving at one of these intersections will experience a delay on an average of nearly 2 minutes. In addition, the roadway segments south of Prater Way are expected to operate at LOS "F". The 2035 future year traffic operations analysis clearly demonstrates a need for additional capacity on Sparks Boulevard.

The project team developed and evaluated three different alternatives to manage traffic growth through 2035:

- Road Widening – Increasing capacity by adding more lanes and improving intersection operations
- Compact Grade Separation
- Unconventional Intersection Design

The three alternatives were presented to the Sparks Boulevard Technical Advisory Committee during TAC Meeting #3 on May 19, 2014 with their corresponding advantages and disadvantages. All the three alternatives achieve goals of providing increased capacity along Sparks Boulevard, improving bike/pedestrian connectivity, and increasing safety. The lead agencies (RTC and City of Sparks), stake holders and the TAC team have identified the recommended alternative based on a variety of factors.

After a thorough review of all the alternatives, the "Widening Alternative" was selected as the recommended alternative. This alternative can be constructed almost entirely within existing right-of-way, can provide acceptable level of service, is entirely at-grade (except at the I-80 interchange), and does not displace left-turn movements. The disadvantage is wide roadways (10 lanes on the south side of Lincoln Way) and the long crosswalks that result. The "Widening" alternative allows phased implementation and is scalable based on need. Traffic operations on Sparks Boulevard and at the study intersections, with the recommended improvements included, are discussed in detail in Chapter 7. The two other dismissed alternatives are discussed in detail in **Appendix B**.

6.1 Recommended Alternative

Additional capacity could be created by constructing more through travel lanes and adding turn pockets at intersections. For the purpose of discussing this alternative, the study corridor is divided into two segments. The "South Segment" of Sparks Boulevard extends from Greg Street to north of Prater Way. The study intersections included in this segment are:

- Sparks Boulevard/Greg Street
- Sparks Boulevard/I-80 Eastbound Ramps
- Sparks Boulevard/I-80 Westbound Ramps
- Sparks Boulevard/Lincoln Way
- Sparks Boulevard/Prater Way

The "North Segment" of Sparks Boulevard extends from south of Springland Drive to Pyramid Way. The study intersections included in this segment are:

- Sparks Boulevard/Springland Drive/O'Callaghan Drive
- Sparks Boulevard/Baring Boulevard
- Sparks Boulevard/Shadow Lane
- Sparks Boulevard/Disc Drive
- Sparks Boulevard/Los Altos Parkway
- Sparks Boulevard/Pyramid Highway

These segments were divided based on the projected traffic volumes on Sparks Boulevard and the anticipated level of service conditions on roadway segments and at study intersections. As described in Section 5.5, all the roadway segments south of Prater Way are anticipated to operate at LOS "F" in the year 2035. Roadway segments north of Prater Way are shown to operate at acceptable LOS conditions in the year 2035. Prater Way therefore becomes a logical point for division of the study corridor. The improvements within this alternative are achieved by:

- Increasing Segment capacity (adding through travel lanes) and
- Improving intersections (adding turn lanes, removing split phasing, optimizing signal timings, etc.)

South Segment Improvements

The 2035 level of service analysis indicates the need for increasing roadway and intersection capacity on Sparks Boulevard between Greg Street and Prater Way. The following roadway improvements are proposed to increase capacity and improve the traffic operations in the south segment of Sparks Boulevard:

- Six-lanes (three travel lanes in each direction) on Sparks Boulevard between Greg Street and Prater Way:
  - Re-stripe the northbound approach of the SouthEast Connector at Greg Street to have three northbound through lanes. There is sufficient width available on this approach to accommodate two northbound lefts, three northbound throughs and one northbound right.
  - Provide three through lanes in each direction between Greg Street and Prater Way
  - The third northbound through lane would be carried past the Prater Way intersection up to Springland Drive. This lane would then become a right-turn drop lane to Springland Drive.
  - The third southbound through lane would begin at Express Street, which works well geometrically and enables development of the lane well in advance of Prater Way.

In addition to the road widening improvements, certain additional intersection specific improvements are also recommended at several study intersections. The following intersection improvements are proposed in the south segment of Sparks Boulevard:

- Sparks Boulevard/I-80 EB Ramps: Currently the outside northbound lane at this intersection is a combination lane serving both through and right-turn (onto I-80 eastbound) movements. In the future conditions, with the construction of the SouthEast Connector, the northbound right-turn traffic at this intersection is expected to increase considerably compared to existing conditions. A northbound right-turn pocket will be needed at this intersection. Since Sparks Boulevard is a high volume roadway, it is important that the right-turn vehicles do not get delayed behind the through movement queue.
- Sparks Boulevard/I-80 WB Ramps: Currently there are three lanes on the southbound approach at this intersection; one southbound right-

turn drop lane and two southbound through lanes. With the widening of Sparks Boulevard to 6 lanes, the existing southbound right-turn drop lane would be converted to a through lane. Considering the high southbound right-turn volume (onto I-80 westbound), a southbound right-turn lane would be needed.

- Sparks Boulevard/Prater Way: Northbound and eastbound right-turn pockets would be needed in this alternative. On a high volume/high speed arterial like Sparks Boulevard, it is desirable to have right-turn pockets that serve as deceleration lanes. Right-turn pockets improve safety by removing the slow moving right turning vehicles from the fast moving through lane. Right-turn pockets also help the right turning vehicles avoid the through lane queue.

North Segment Improvements

The north segment of Sparks Boulevard extends from north of Prater Way to Pyramid Highway. All the Sparks Boulevard roadway segments north of Prater Way operate at acceptable level of service conditions and hence no roadway widening is recommended north of Springland Drive. A four-lane section would provide enough capacity for 2035 average daily volumes. However, some intersections in this segment operate at unacceptable levels of service. The following intersection improvements are recommended:

- Sparks Boulevard/Springland Drive/O'Callaghan Drive: Realign Sparks Boulevard to combine the two existing intersections into one. The improvements at this intersection are explained in detail in the following section.
- Sparks Boulevard/Baring Boulevard: This intersection currently has a shared through-left lane on both the eastbound and westbound approaches. This lane configuration requires the signal control to operate with split phasing on the Baring Boulevard approaches. Split phasing is not efficient as it takes away a lot of green time from the Sparks Boulevard movements. Adding a second left-turn lane on the westbound Baring Boulevard approach and changing the side street left-turn phasing from "Split" to "Protected" is recommended. This will optimize the traffic operations at this intersection by assigning more green time to Sparks Boulevard. Adding a northbound right-turn lane is also recommended.
- Sparks Boulevard/Shadow Lane: Add a northbound right turn pocket to remove the right turning vehicles from the fast moving through lane.
- Sparks Boulevard/Disc Drive: Similar to the Baring Boulevard intersection, the westbound approach on Disc Drive has a shared through-left lane requiring a split phasing for side street movements. Adding a second westbound left-turn lane, eliminating split phasing and introducing protected left turn phasing are recommended.
- Sparks Boulevard/Pyramid Highway: This intersection is anticipated to operate at LOS "F" during the 2035 PM peak hour. However, this intersection will become a new interchange with the proposed Pyramid Highway – US 395 Connection. Please refer to the Pyramid Highway – US 395 Connection study for proposed improvements at this intersection.

The additional lanes and configurations are sketched in **Figure 6-1** and **Figure 6-2**. These figures show the differences between the existing and future lane configurations throughout the entire corridor.

Springland Drive/O'Callaghan Drive Intersection

At the Springland Drive/O'Callaghan cross streets, the northbound and southbound approaches of Sparks Boulevard are currently separated by the North Truckee Drain (flood channel). The Springland Drive intersection (east of the channel) and O'Callaghan Drive intersection (west of the channel) are approximately 100 feet apart with a storage space of approximately three to four passenger cars. With such a small storage space between these two intersections, absolute coordination between the two intersections would become critical. In addition, these split intersections require long clearance interval (significant Yellow + All Red time) to safely clear all the traffic and avoid vehicles getting trapped between the intersections. This would result in shorter green times for the dominant traffic movements on Sparks Boulevard. Three different concepts for this intersection were contemplated as discussed below:

1. Realigned Intersection: Combine and consolidate the two intersections into one intersection by realigning southbound Sparks Boulevard to the east side of the Truckee Drain. This will eliminate all the traffic issues caused by two closely spaced intersections and provide a higher degree of safety. The proposed realignment is shown in **Figure 6-3**.
2. Right In-Right Out Access: Change the intersection control from a signal to side street STOP control and restrict access to/from the side streets. This concept would allow only right-in and right-out movements to and from Springland Drive and O'Callaghan Drive. Traffic operations would improve on Sparks Boulevard since the movements on Sparks Boulevard would be uninterrupted. Some traffic using this intersection would be rerouted to other intersections due to the right-in/right-out access restriction. It is assumed that the majority of this traffic would divert to the Sparks Boulevard/Baring Boulevard intersection. The right in/right out alternative is shown in **Figure 6-4**.
3. Median U-Turns: A Median U-turn is an at-grade intersection design that replaces each left turn with a U-turn and a right turn. For example, with a median U-Turn, a vehicle making a northbound left turn from Sparks Boulevard to O'Callaghan Drive, would instead go past the intersection, make a U-Turn at a downstream location, travel southbound, and make a right turn at O'Callaghan Drive. This concept would enable two-phase signal operation with only through and right-turn movements allowed at the intersections as shown in **Figure 6-5**.

These three Springland/O'Callaghan alternatives were presented at the second Public Meeting on October 2, 2014 and participants were asked to vote for their preferred alternative. Realigned Intersection (Concept 1) received the most votes with 80% of the participants choosing this alternative. The Right In/Right Out option (Concept 2) received the second highest share with 13% of the votes. The Median U-Turns concept received only 7% of the votes. The consulting team also prefers the Realigned Intersection option since it retains full access in and out of Springland Drive and O'Callaghan Drive without the need to reroute traffic or restrict access.

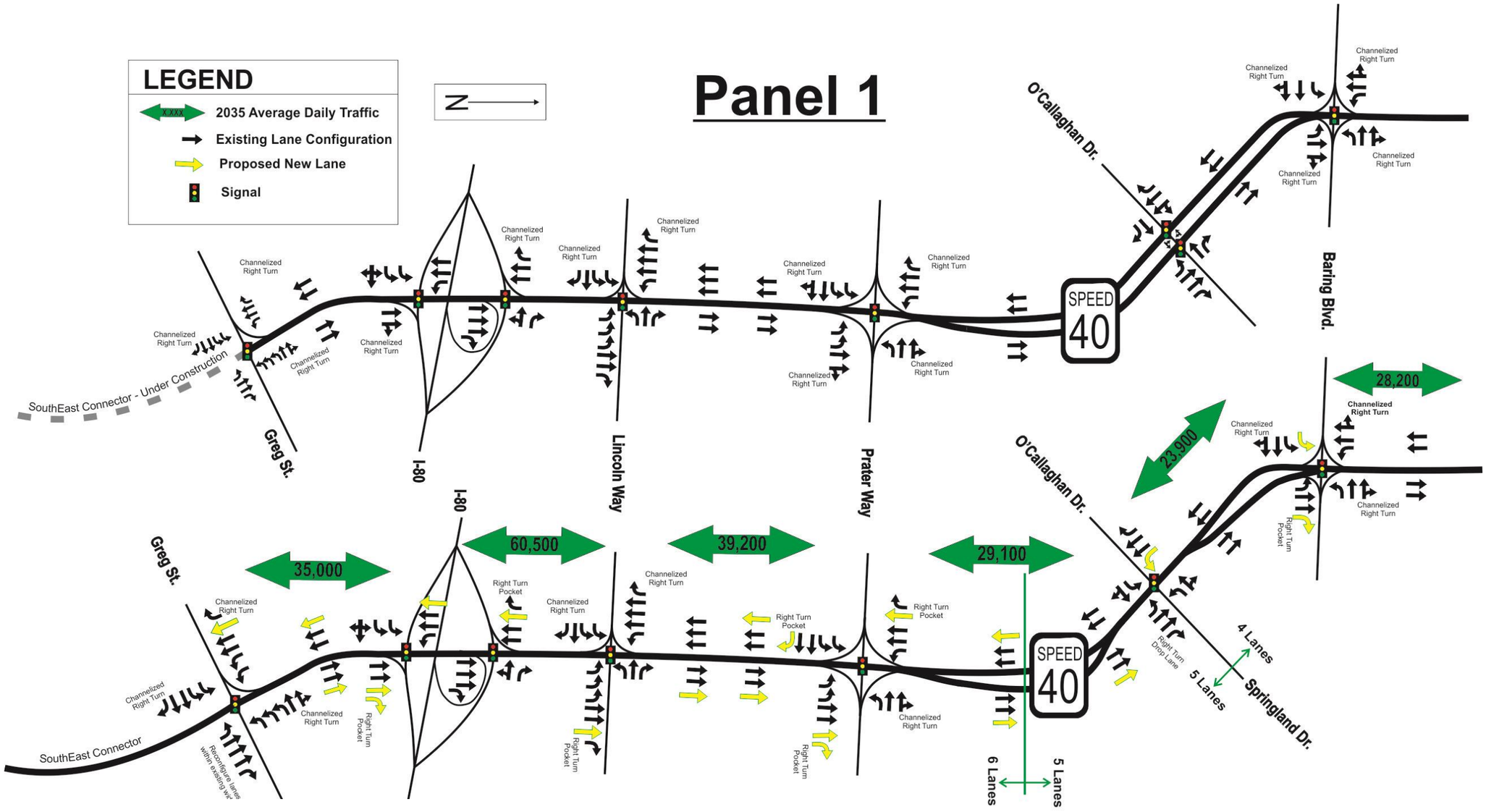


Figure 6-1. Existing vs 2035 Recommended Configuration (Panel 1)

Panel 2

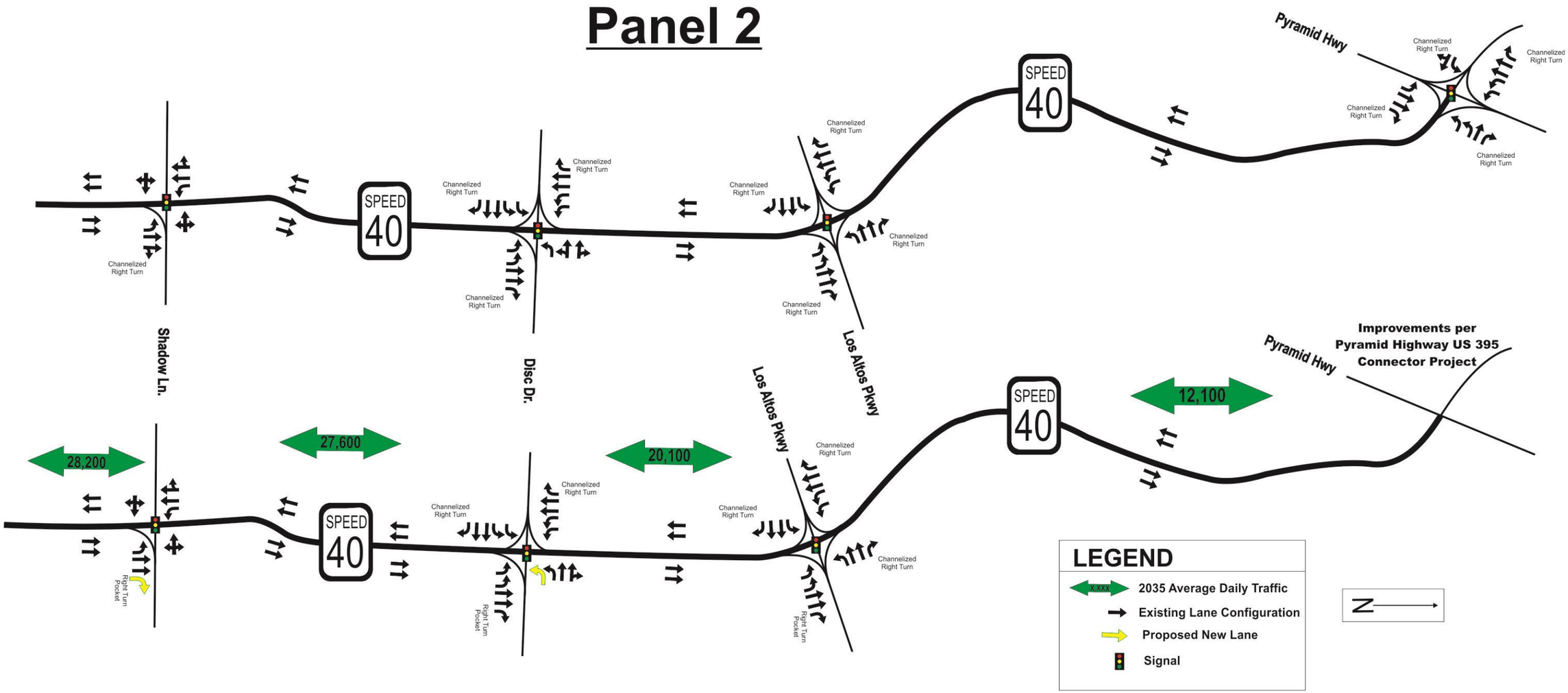


Figure 6-2. Existing vs 2035 Recommended Configuration (Panel 2)

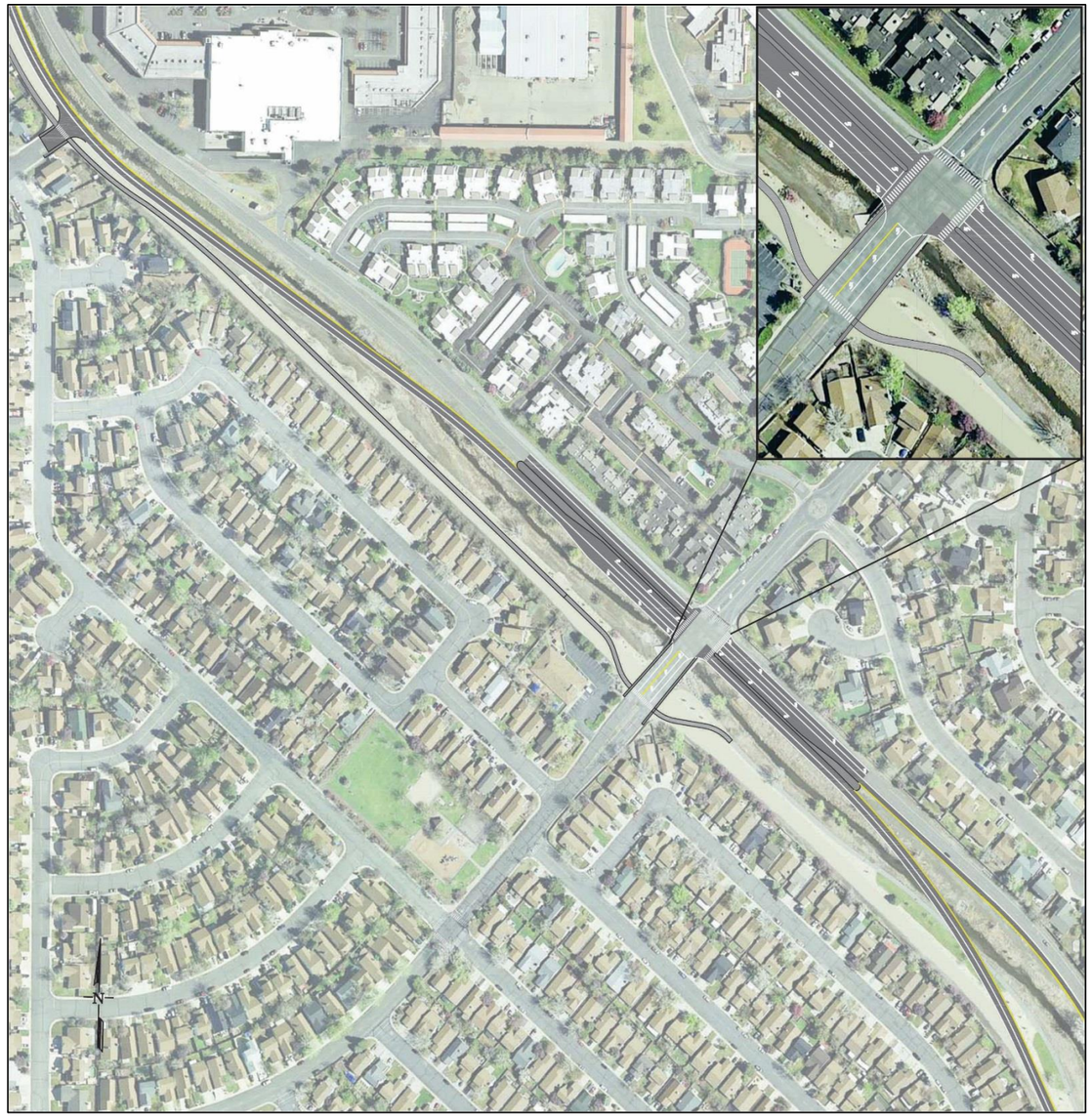


Figure 6-3. Concept 1: Realigned Sparks Blvd/Springland Dr Intersection

Figure 6-4. Concept 2: Right In/Right Out at Sparks Blvd/Springland Dr

Figure 6-5. Concept 3: Median U-Turn at Sparks Blvd/Springland Dr

7 RECOMMENDED ALTERNATIVE TRAFFIC OPERATIONS

Detailed traffic operations analysis was performed for the recommended "Widening" alternative. The level of service analysis utilized the 2035 Design Volumes from Chapter 5 and included all the recommended improvements from the "Widening" alternative outlined in Chapter 6. The 2035 Average Daily Traffic volumes are shown in **Table 5-1** and the PM peak hour turning movement volumes can be found in **Figures 5-3, 5-4** and **5-5**. The Level of Service policy and the methodology used to estimate the LOS are described in Section 4.6.

7.1 Roadway Segment Level of Service Analysis

2035 horizon year roadway segment level of service was determined by comparing the 2035 Design Volumes from **Table 5-1** to the Average Daily Traffic Thresholds as outlined in the RTC's 2035 Regional Transportation Plan (**Table 4-7**). The results are shown in **Table 7-1**.

Table 7-1. 2035 Roadway Segment Level of Service

Roadway Segment	Class	ADT	Access Control	2035 No Build		2035 Widening	
				Lanes	LOS	Lanes	LOS
Greg Street to I-80 Ramps	Arterial	51,000	MAC	4	F	6	D
I-80 Ramps to Lincoln Way	Arterial	60,500	MAC	6	F	6	F
Lincoln Way to Prater Way	Arterial	39,200	MAC	4	F	6	C
Prater Way to Express Street	Arterial	29,100	MAC	4	C	6	C
Express Street to Springland Drive	Arterial	29,100	MAC	4	C	4	C
Springland Drive to Baring Boulevard	Arterial	23,900	MAC	4	C	4	C
Baring Boulevard to Shadow Lane	Arterial	28,200	MAC	4	C	4	C
Shadow Lane to Disc Drive	Arterial	27,600	MAC	4	C	4	C
Disc Drive to Los Altos Parkway	Arterial	20,100	MAC	4	C	4	C
Los Altos Parkway to Pyramid Highway	Arterial	12,100	MAC	4	C	4	C

With the "Widening" alternative improvements, all the roadway segments on Sparks Boulevard are expected to operate at acceptable level of service with the exception of the road segment between the I-80 Ramps and Lincoln Way. Even with a six-lane configuration, the I-80 Ramps to Lincoln Way segment is anticipated to operate at LOS "F" in the year 2035. The ADT threshold between LOS "E" and LOS "F" on a six-lane MAC arterial is 55,400 vehicles per day. The 2035 projections show an average daily traffic volume of 60,500 vehicles per day in this segment which is only about 9.5% higher than the LOS "E" threshold. The RTC currently has a policy that restricts the number of through lanes to six lanes on all surface arterials. Although this roadway segment would theoretically operate at LOS "F", all the study intersections within this segment operate at acceptable levels of service as described in the following section.

7.2 Intersection Level of Service Analysis

The Year 2035 PM peak hour traffic operations were analyzed including all the recommended improvements from the "Widening" alternative. The signal timings were optimized for cycle lengths, phase splits and offsets. The phasing sequence was also modified at certain intersections based on the recommended improvements, to optimize the signal operations. The intersection Level of Service and delay results with the recommended lane configurations are presented in **Table 7-2**.

Table 7-2. 2035 Intersection Level of Service Summary

Intersection		2035 - (Existing Configuration)	2035 - (w/ Widening)
		PM Peak	PM Peak
Sparks Blvd and Greg St	**LOS**	F	D
	Delay (sec/veh)	>100	51.9
Sparks Blvd and I-80 EB ramps	**LOS**	F	C
	Delay (sec/veh)	>100	31.1
Sparks Blvd and I-80 WB Ramps	**LOS**	A	B
	Delay (sec/veh)	7.0	12.3
Sparks Blvd and E Lincoln Way	**LOS**	F	D
	Delay (sec/veh)	95.5	40.2
Sparks Blvd and Prater Way	**LOS**	F	D
	Delay (sec/veh)	>100	47.7
Sparks Blvd and Springland Dr	**LOS**	F	C
	Delay (sec/veh)	>100	29.5
Sparks Blvd and O'Callaghan Dr	**LOS**	C	
	Delay (sec/veh)	34.0	
Sparks Blvd and Baring Blvd	**LOS**	F	E
	Delay (sec/veh)	>100	72.6
Sparks Blvd and Shadow Ln	**LOS**	D	D
	Delay (sec/veh)	38.2	38.2
Sparks Blvd and Disc Dr	**LOS**	E	D
	Delay (sec/veh)	62.2	45.9
Sparks Blvd and Los Altos Pkwy	**LOS**	C	C
	Delay (sec/veh)	34.2	34.2
Sparks Blvd and Pyramid Way	**LOS**	F	Pyramid Hwy - US 395
	Delay (sec/veh)	>100	Connection Study

With the recommended improvements in place, all the study intersections are anticipated to operate at acceptable levels of service during the 2035 PM peak hour as shown in **Table 7-2**. No improvements were recommended and 2035 traffic operations were not analyzed at the Sparks Boulevard/Pyramid Way intersection as this intersection will be reconstructed as a grade separated interchange with the Pyramid Highway – US 395 Connection project.

With the recommended capacity improvements and signal timing optimizations, the PM peak travel time between Greg Street and Baring Boulevard would be approximately 9 minutes as opposed to 20 minutes without the "Widening" improvements.

Queuing at Baring Boulevard

8 PEDESTRIAN AND BICYCLE IMPROVEMENTS

8.1 Overall Design Concepts

The high quality existing bicycle and pedestrian facilities are a key feature of this corridor and the public has expressed its desire to maintain and further improve bicycle and pedestrian facilities throughout the corridor. Bike lanes are proposed throughout the length of the corridor and a combination of multi-use paths and sidewalks will provide pedestrian connectivity throughout. **Figure 8-1**, shows the recommended overall pedestrian and bicycle connectivity for the corridor.

The following are general design guidelines for bicycle and pedestrian facilities that should be considered during future improvement projects.

Sidewalks

Sidewalks will be provided throughout the majority of the corridor to assure pedestrian connectivity between adjacent neighborhoods, schools, and commercial developments. Sidewalks should be at least 6 feet wide wherever possible. **Figure 8-2** shows how the bike lane serves as a 6 foot buffer from the edge of the motor vehicle travel lane.

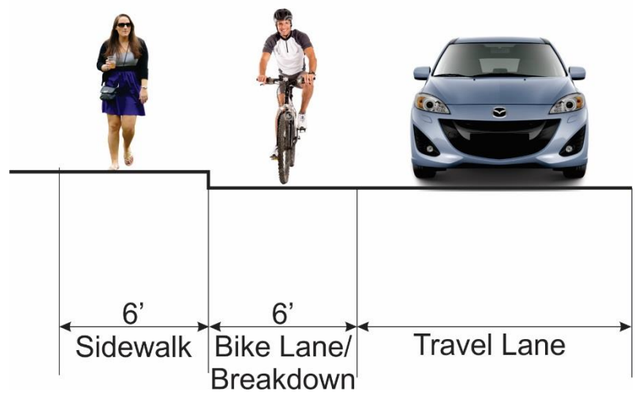


Figure 8-2. Typical Sidewalk

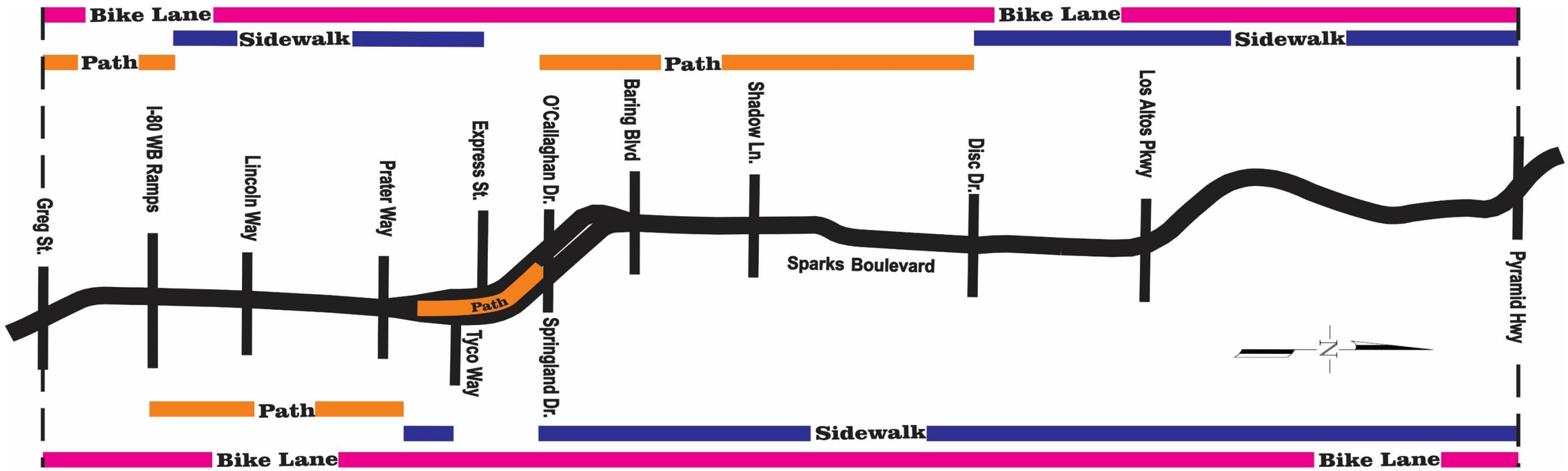


Figure 8-1. Overall Bicycle and Pedestrian Connectivity for the Corridor

Multi-Use Path

The existing multi-use path is a great feature of this corridor and is proposed to be perpetuated through the widening improvements. New and/or modified sections of multi-use path should be 10 foot wide minimum and have a 6 foot minimum buffer between it and motor vehicle traffic where space is available. **Figure 8-3** shows a typical cross-section of the multi-use path.

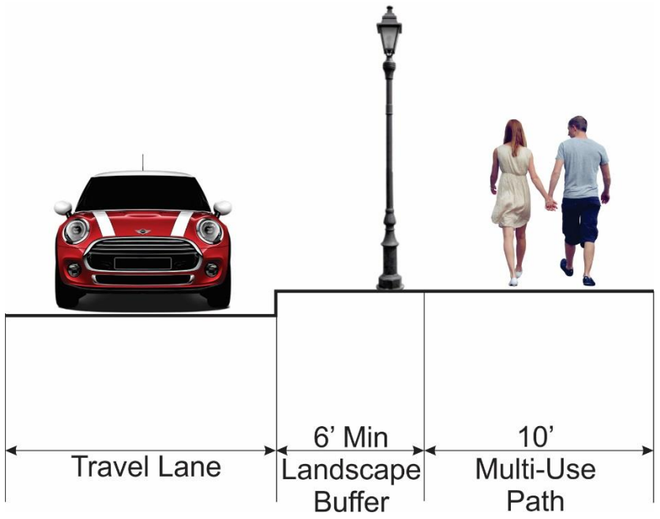


Figure 8-3. Typical Multi-Use Path

Pedestrian Crossing Treatments

At wide signalized intersections and at un-signalized crossing locations throughout the corridor, pedestrian refuge islands should be provided when space allows.

Pedestrian refuge islands provide a safe location for pedestrians to wait in the center of the roadway. This reduces the crossing distance, allows pedestrians to cross the roadway in two stages, and reduces the delay to vehicular traffic by dividing the pedestrian crossing times into two cycles.

At locations where enhanced pedestrian crossing safety measures are warranted, pedestrian activated Rectangular Rapid Flashing Beacons (RRFB) systems should be used. To promote consistency throughout the corridor all crosswalk warning systems should be pedestrian activated and modeled after the recently constructed RRFB system on Sparks Boulevard at Express Street. **Figure 8-4** shows an example of a raised median pedestrian refuge and a pedestrian activated RRFB system. **Appendix A** illustrates recommended improvements at un-signalized intersections.

Figure 8-4. Example of Pedestrian Refuge Median Island with Pedestrian Activated RRFB System

Bicycle & Pedestrian Tunnels

Existing tunnels, and any new tunnels should include the following features: adequate drainage, lighting, and graffiti resistant interior treatment. Existing tunnels should be improved with new lighting, repaired and painted interior walls, and better drainage.

Figure 8-5. Example of Better Pedestrian & Bicycle Tunnel

Bike Lanes

Bicycle lanes are proposed throughout the length of Sparks Boulevard. From Greg Street to Baring Boulevard a 6 foot bike lane will be provided; from Baring Boulevard to Pyramid Highway, the existing bike lanes will be maintained. **Figure 8-6**, shows the typical bike lane cross-section for proposed bike lanes from Greg Street to Baring Boulevard.

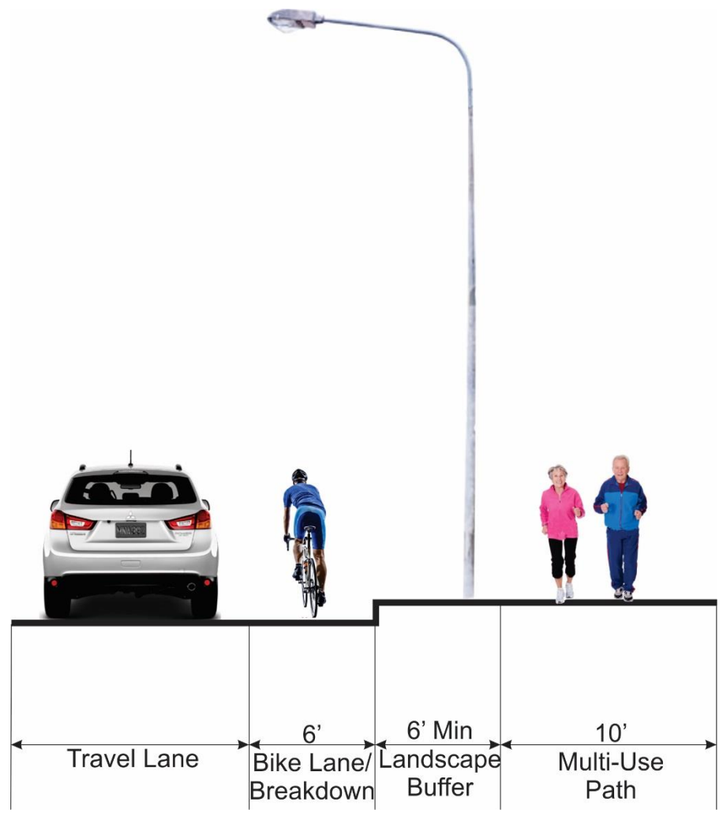


Figure 8-6. Typical Proposed Bike Lanes

8.2 Bicycle and Pedestrian Wayfinding

With the proposed bicycle and pedestrian improvements, a comprehensive walking and cycling wayfinding plan should be adopted that coordinates with the regional Bicycle and Pedestrian Master Plan and City of Sparks standards. There are many options that effectively integrate bicycle and pedestrian wayfinding signage with the rest of the transportation infrastructure while reducing sign clutter. Examples are shown in **Figure 8-7**.

Figure 8-7. Examples of Potential Wayfinding Signage

8.3 Improvements by Segment

Graphical illustrations of the recommended improvements are presented in **Figures 8-8, 8-9, 8-10, and 8-11**.

Greg Street to Lincoln Way

In order to provide a connected on-street bicycle facility network, 6 foot wide bicycle/breakdown lanes are proposed through this section of the corridor in both the northbound and southbound directions.

The multi-use path will remain on the west side of Sparks Boulevard to provide a smooth transition to the multi-use path on the SouthEast Connector and the access to the Tahoe/Pyramid Bikeway. The multi-use path will be improved by widening to 10 feet minimum throughout this section. With the reconstruction of the I-80 interchange the sight lines at both the WB and EB I-80 ramp terminals will be improved to provide minimum sight distance per *AASHTO's A Policy on Geometric Design of Highways and Streets*, latest edition. An at-grade crossing will be provided at the Interstate 80 WB ramp terminal, transitioning the multi-use path from the west side of Sparks Boulevard to the east side. A new 10 foot wide multi-use path is proposed on the east side of Sparks Boulevard from the I-80 WB ramp terminal through the Lincoln Way/Sparks Boulevard intersection, connecting with the existing multi-use path north of Lincoln Way. An at-grade crossing for the multi-use path is proposed for both the I-80 WB Ramps/Sparks Boulevard and Lincoln Way/Sparks Boulevard intersection crossings. The use of tunnels at these locations was considered, but dismissed, due to conflicts with underground utilities and the Truckee River Drain.

Lincoln Way to Express Street

Bicycle/breakdown lanes are proposed to continue through this section of the corridor in both the northbound and southbound directions.

New 6 foot wide sidewalk is proposed along the west side of Sparks Boulevard, closing the gap in pedestrian connectivity between the existing sidewalk south of Prater Way and the existing sidewalk fronting Target. Coordinating new sidewalk with the Vista Park Apartments will avoid two sidewalks running parallel to each other and provide a better, more aesthetic, use of space. The construction of 6 foot sidewalks is proposed along the west side of Sparks Boulevard connecting Express Street to Prater Way and on the east side connecting Tyco Way to Prater Way. Providing sidewalks along both sides of the road and a multi-use path through this section is a better option than constructing pedestrian bridges or tunnels to provide access to Express Street and Tyco Way. The existing tunnels on the multi-use path are proposed to remain and be improved. At a minimum, the tunnels should be upgraded to include improved safety lighting, patched and painted graffiti resistant interiors, and improved drainage.

Upgrading the pedestrian crossing at McCabe Park Street to meet current ADA standards, removing/modifying the existing pedestrian flashing system, and installing a pedestrian activated RRFB system would promote a safer pedestrian environment to the bus stop on the east side of the roadway.

Springland Drive / O'Callaghan Drive to Disc Drive

Within this section it is recommended that the multi-use path be transitioned from the center of the divided median to the west side of Sparks Boulevard. This will provide access to Howard Drive and create better alignment with the path north of Baring Boulevard. Constructing sidewalk from Springland Drive to Baring Boulevard along the east side of Sparks Boulevard would enhance pedestrian connectivity to the shopping center and Reed High School.

The multi-use path transitions from the west side of the Truckee River Drain to the east side at Shadow Lane. Installing a pedestrian/bicycle bridge at this location will increase the safety and performance of the path by maintaining a 10 foot width across Shadow Lane in direct alignment.

Providing sidewalk on Vintage Hills Parkway is a simple addition that would connect the Sparks Boulevard multi-use path to the Les Hicks Park.

Disc Drive to Pyramid Highway

The existing pedestrian and bicycle facilities are proposed to remain the same in this section except that two segments of new sidewalk are needed to fill in gaps. Upgrading the pedestrian crossings at un-signalized intersections per **Figure 8-11** would promote a safer pedestrian environment. The improvements include adding pedestrian refuge median islands, improved pedestrian ramps, and the installation of pedestrian activated RRFB systems (where warranted).

Greg Street to Lincoln Way

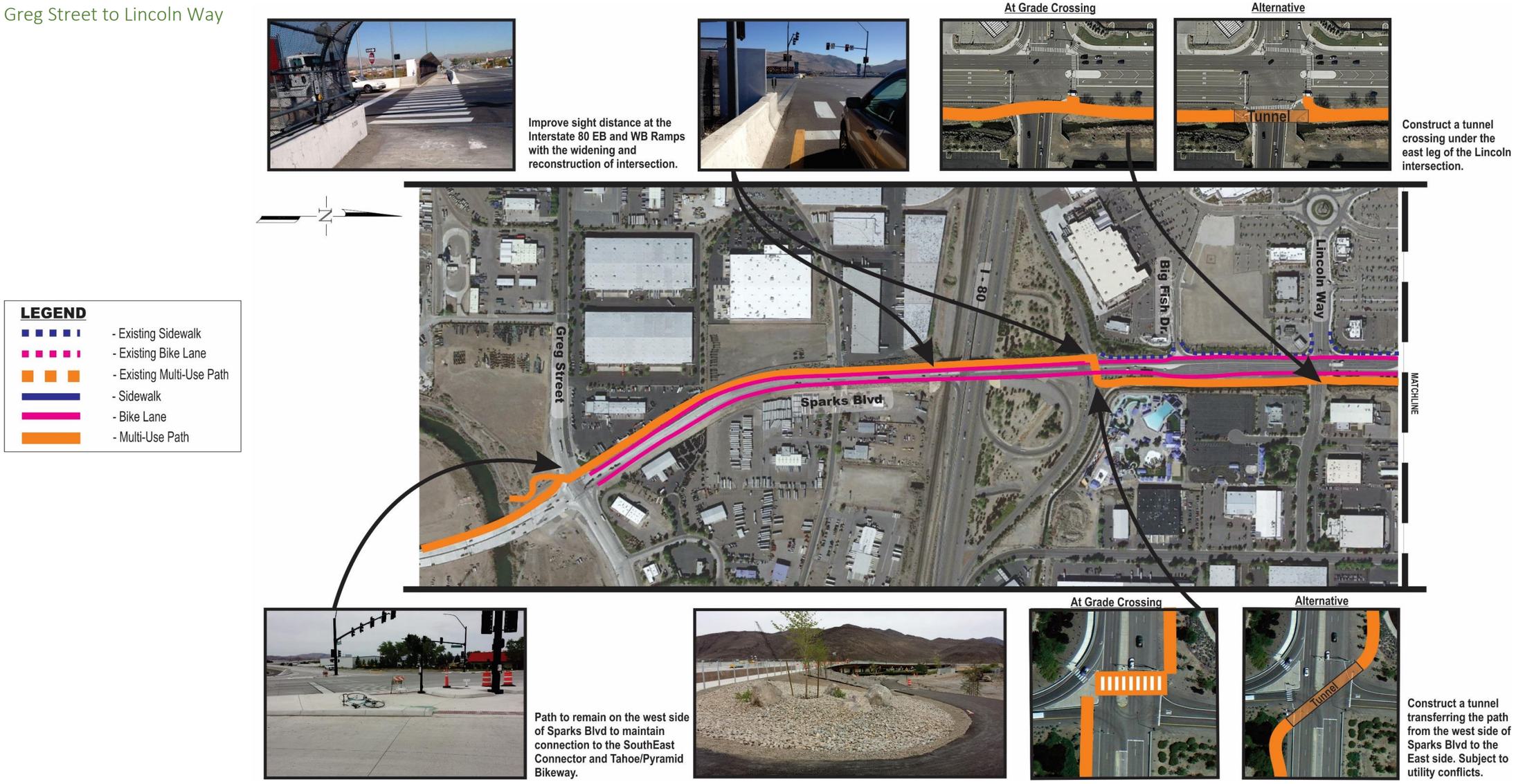
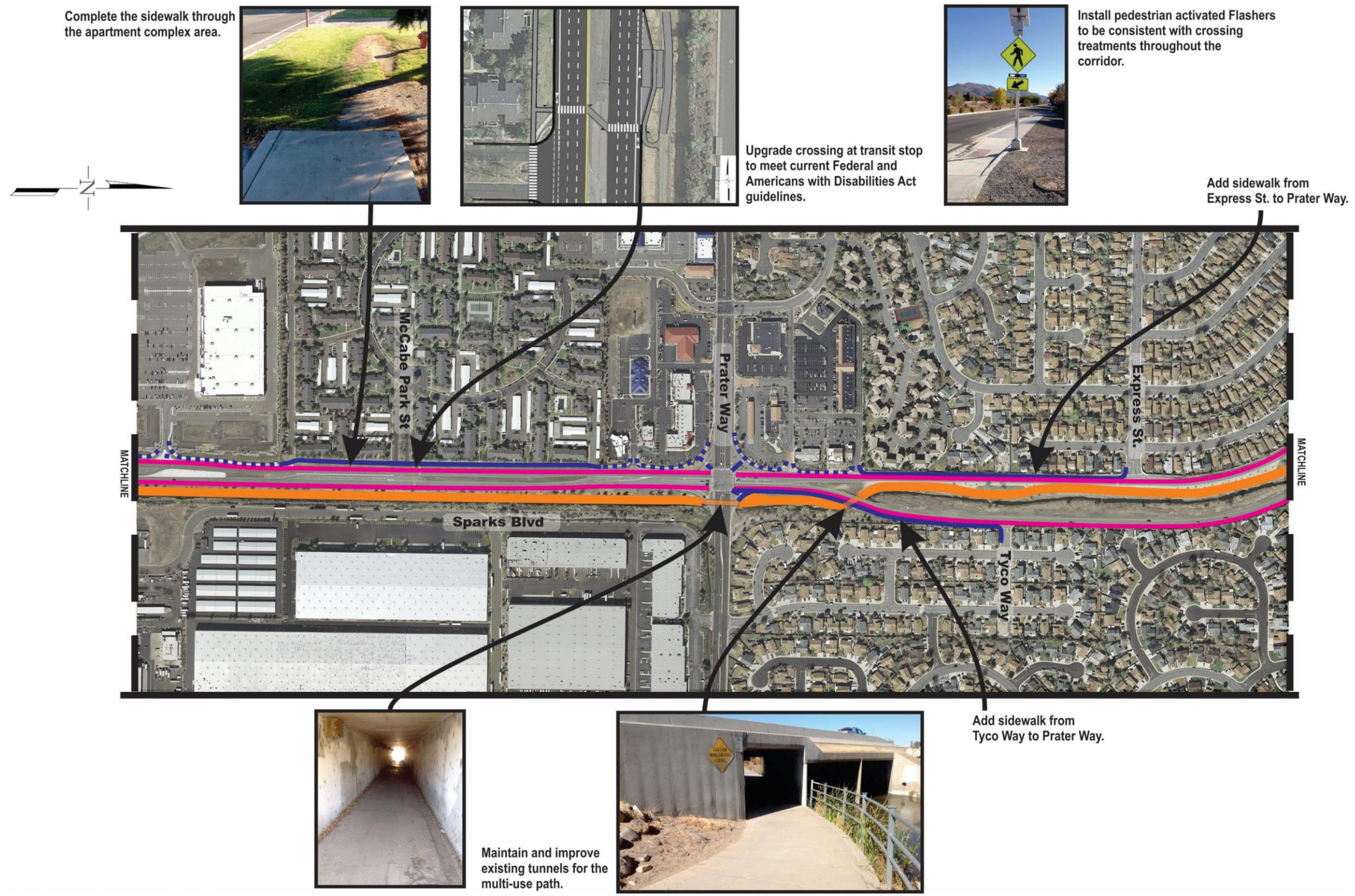


Figure 8-8. Proposed Improvements from Greg Street to Lincoln Way

Lincoln Way to Express Street



LEGEND

- Existing Sidewalk
- Existing Bike Lane
- Existing Multi-Use Path
- Sidewalk
- Bike Lane
- Multi-Use Path

Figure 8-9. Proposed Improvements from Lincoln Way to Express Street

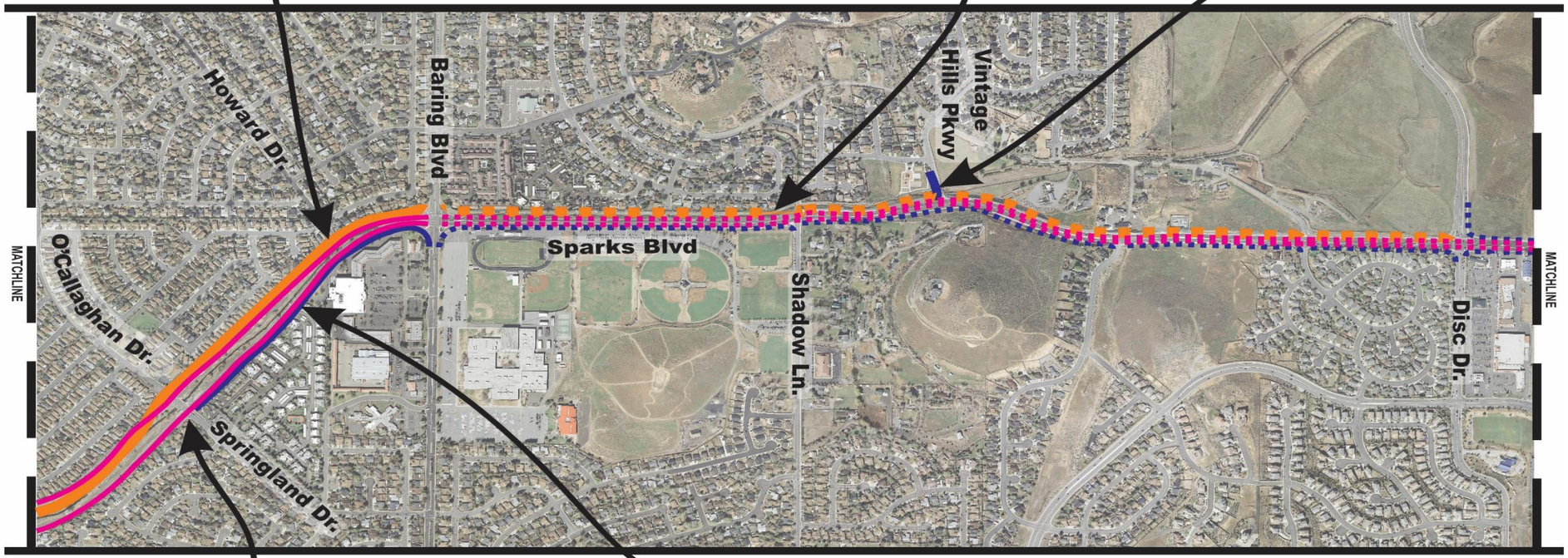
Springland Drive to Disc Drive

Ped/Bike bridge example

Construct ped/bike bridge creating a smooth transition for the path across the Truckee Drain.

Extend the multi-use path on west side of Sparks Blvd to connect with Howard Drive.

Construct sidewalk connecting the multi-use path to Les Hicks Jr Park.



LEGEND

- Existing Sidewalk
- Existing Bike Lane
- Existing Multi-Use Path
- Sidewalk
- Bike Lane
- Multi-Use Path

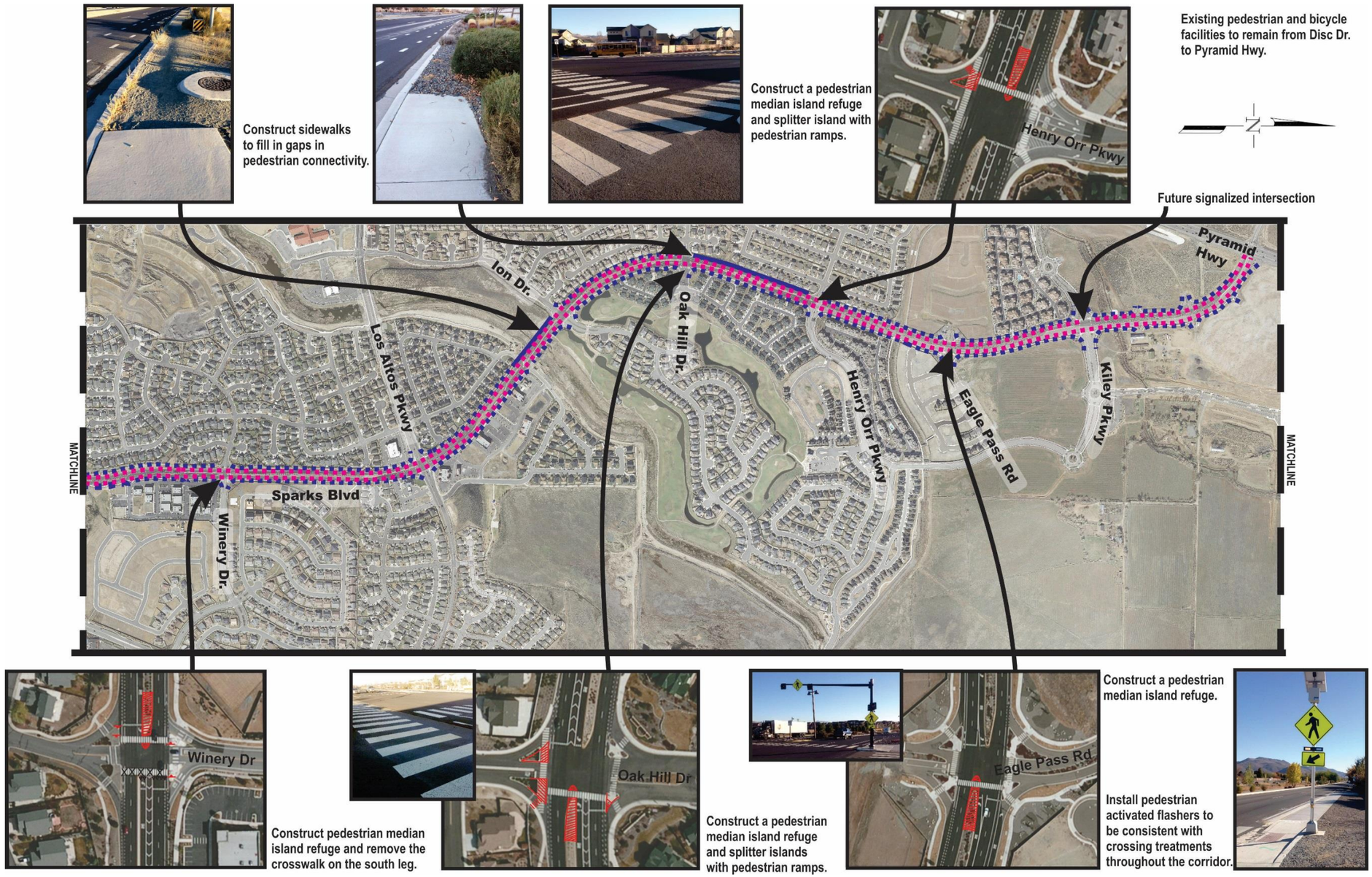
Path will transition to the west side of Sparks Blvd with the road realignment at the Springland/ O'Callaghan intersection.

Construct sidewalk along the east side of Sparks Blvd from Springland Dr. to Baring Blvd to enhance pedestrian connectivity.

Existing Pedestrian and Bicycle facilities to remain from Baring Blvd to Disc Dr.

Figure 8-10. Proposed Improvements from Springland Drive to Disc Drive

Disc Drive to Pyramid Highway



LEGEND

- Existing Sidewalk
- Existing Bike Lane
- Existing Multi-Use Path
- Sidewalk
- Bike Lane
- Multi-Use Path

Figure 8-11. Proposed Improvements from Disc Drive to Pyramid Highway

9 TRANSIT

This chapter recommends improvements that would increase safety and promote greater use of public transit services along Sparks Boulevard. Based on the existing transit service, existing transit performance, public and operator input, and planned future development along the corridor; enhancement objectives were defined and specific improvements are identified.

9.1 Transit Enhancement Objectives

The following transit enhancement objectives are intended to address existing deficiencies in the transit system along Sparks Boulevard, create safe accessible infrastructure, and guide expansion of transit services with the construction of new development.

The primary enhancement objectives include:

- Safety
- Upgrading existing transit stops to meet current ADA guidelines
- Provide accessible routes to all stop locations
- Provide/improve amenities at existing stop locations
- Expand transit services throughout the corridor as demand increases

9.2 Bus Stop Improvements

General Guidelines

The aim should be to provide, at a minimum, the following features at all transit stop locations:

- ADA accessible sidewalk providing connectivity to the transit stop, the shelter, and the boarding area
- Appropriate roadway crossing treatments near the transit stop
- A clear line of sight for bus operators to see the stop and passengers waiting
- Shelters and seating (based on demand)
- Readable bus stop signs
- Reflective Bus Signal

Stop #19 – Route 25

The Springland Drive / O'Callaghan Drive stop (see **Figure 4-5**) would benefit from the addition of a larger concrete pad that meets the 5 feet by 8 feet requirements for an ADA boarding area. Providing a shelter and trash can would promote a more passenger friendly waiting area.

Stop #25 – Route 25

Passengers waiting at the Express Street stop location (see **Figure 4-5**) would benefit from the installation of a shelter, trash can, and bench.

Stop #14 – Route 25

The Tyco Way stop (see **Figure 4-5**) is located on the near side of the intersection and the buses stop in the right turn lane while passengers load. The location of the stop against the existing wall does not allow for a concrete pad to meet minimum size requirements or the installation of a shelter.

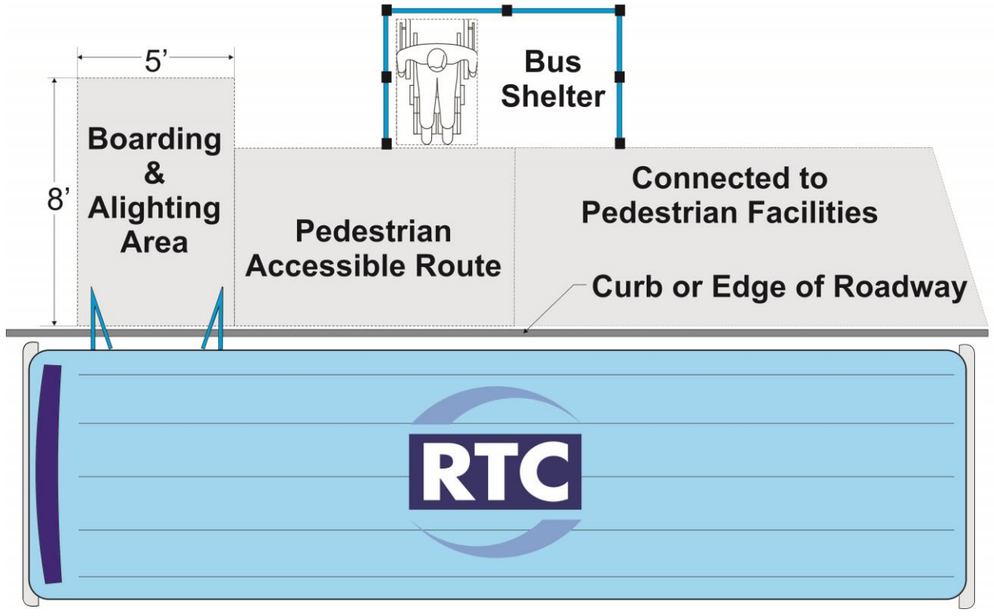


Figure 9-1. Proposed Transit Stop Layout

The stop serves the neighborhood accessed by Tyco Way. By relocating the stop to the north side of the intersection, service to the neighborhood can be maintained and a safer, more efficient bus stop can be constructed. With the relocation, the stop should be upgraded to include the features shown in **Figure 9-1**.

Stop #11 – Route 21

Based on interviews with bus operators, a wider pullout at the Park Vista Apartment stop (see **Figure 4-5**) would improve safety by providing sufficient room for buses to pull completely out of the travel way, reducing the conflicts with motor vehicles. Along with widening the pullout, the construction of a new waiting area with adequate space for ADA boarding and alighting is needed. The construction of sidewalk connecting the stop to the crosswalk and the adjacent multi-use path would be beneficial. The largest population of ACCESS clients, within the corridor, are located within one half mile of this stop, upgrading this stop to ADA standards could potentially reduce the number of people reliant on ACCESS services.

Amenities To Be Provided

Concrete Pad
Bench
Trash Can
Shelter (Based on Demand)
Solar Lighting (Based on Demand)
Reflective Bus Signal

9.3 Long-Term Service Enhancements

Analysis of transit ridership in the corridor conducted during this study determined that expansion of existing services is not warranted within the near future.

With the build out of the northern region of the Sparks Blvd Corridor (Kiley Ranch) the RTC may deem it necessary or beneficial to enhance services to this area. The following are potential improvements that could be implemented if transit ridership demands significantly increase and funding becomes available**.** **Figure 9-2**, depicts the potential long-term improvements.

Currently, convenient access to transit is limited to the southern portion of Sparks Boulevard. There are no fixed routes north of Baring Boulevard. The RTC will monitor the potential for increase in ridership as the planned developments to the north are constructed. If warranted, fixed route service could be provided by extending Route 25 north from Baring Boulevard to Los Altos Parkway. With the extension of Route 25, new transit stops would be needed. New stop locations can be determined when need arises, however, locating stops near major intersections such as Disc Drive and Los Altos Parkway would be beneficial because of adjacent land use and population density. Stops should also be considered adjacent to high density housing developments.

The future roadway connection to South Meadows via the SouthEast Connector and the contemplated future park and ride located near Pyramid Highway / Los Altos Parkway (*proposed as part of the Pyramid Highway - US 395 Connection Project*) could prime Sparks Boulevard to be ideal for a Express Bus service. An Express Bus route could originate at the future park and ride location, travel down Sparks Boulevard, make only a few stops within the study area (possibly at the Legends development) and continue south to South Meadows by means of the SouthEast Connector. Future analysis of potential stops within the greater corridor would need to be conducted, however, to maintain the appeal of "Express" style service it is recommended that no more than two stops be made between Pyramid Way and Greg Street.

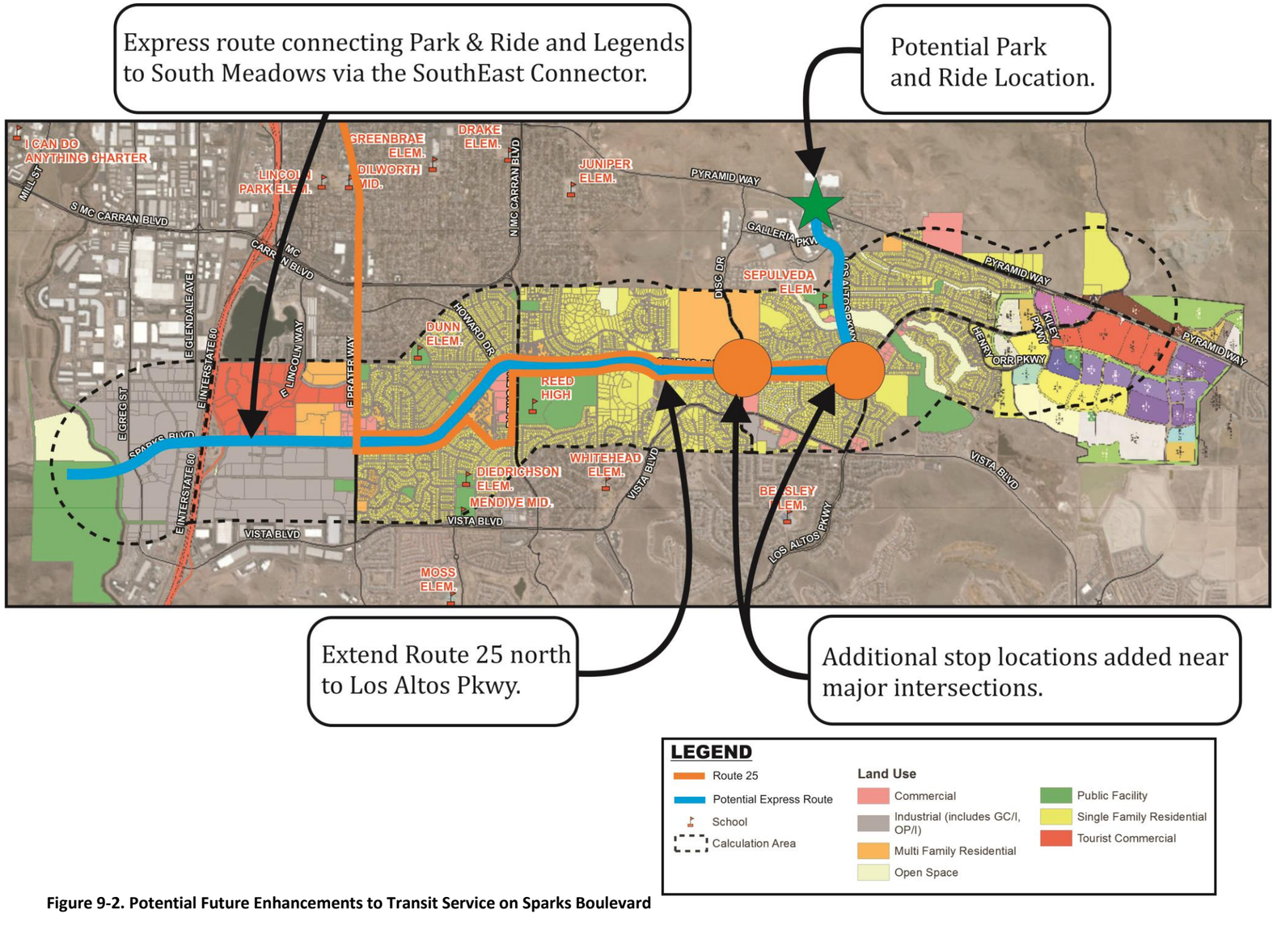


Figure 9-2. Potential Future Enhancements to Transit Service on Sparks Boulevard

10 ENVIRONMENTAL LINKAGES & PERMITTING

10.1 NEPA Considerations

The Sparks Boulevard Corridor Study was completed with the input of pertinent stakeholders and the public. The goals, objectives, and needs serve to inform future advancement of projects in the corridor. This includes advancement through the National Environmental Policy Act (NEPA) process. This corridor study defines a framework to inform future decisions and will link the planning process with following endeavors. The result is the progressive refinement of the transportation decision-making process and continued advancement from the perspective of stakeholders and the public. Other benefits of the planning and environmental framework include:

- Preliminary development of NEPA requirements such as the "Purpose and Need" and alternatives analysis processes
- Clarity in corridor needs identification and alternative screening
- Reduced duplication of efforts during project development
- Encourages environmental stewardship and streamlining
- Improves overall project delivery

Three important aspects of linking the planning and environmental phases are; documenting the alternatives considered and dismissed, providing clear evidence of how the public and stakeholders shaped decisions, and how environmental resources were considered in the process. Much of this is discussed elsewhere in this document.

Sparks Boulevard traverses through a wide variety of geographical features, human and natural resources, water conveyances (Truckee River Drain), development types (commercial and residential), and existing infrastructure (Union Pacific Railroad, Interstate 80, bridge structures, and public utility corridors). Construction of the improvements recommended in this study will require detailed coordination with numerous agencies and public utility entities. Several potential actions are foreseeable that would require federal agency review and provide a nexus for future NEPA processes. The exact federal triggers and resulting NEPA class of action will be determined as phases advance. However, at this early planning stage, three potential significant elements that should be considered were identified. They are:

- Modification of the Truckee Drain – The Truckee Drain is designated "Waters of the United States" and is therefore under the jurisdiction of the US Army Corps of Engineers. Work elements within the designated limits of the drainage way will require coordination with the Army Corps and likely require a Section 404 permit for wetland modification. US Army Corps of Engineers permits are a federal nexus.
- Modification of the I-80 / Sparks Boulevard Interchange – Interstate 80 is part of the federal interstate system managed by the Federal Highway Administration (FHWA). The Nevada Department of Transportation (NDOT) provides day to day administration and maintenance of I-80, but must forward all major actions to the FHWA for approval. Revisions of the interchange design would require a Change of Access Report, again a federal nexus.
- Use of Federal Funding Sources – The use of federal funds for project elements is a federal nexus and requires that the NEPA process be completed.

Generally speaking, regardless of the class of action, several resources will need to be considered to differing degrees of thoroughness. The typical NEPA environmental study areas include but are not limited to:

- Air Quality
- Noise
- Biological
- Threatened and Endangered Species
- Energy Resources and Minerals
- Floodplains and Water Resources/Quality
- Hazardous Materials
- Land Use
- Geology, Soils, and Paleontology
- Cultural Resources (Section 106)
- Native American Religions Concerns
- Section 4(f) / 6(f) Property
- Social and Economic Conditions (Environmental Justice)
- Visual Resources
- Wetlands/Riparian Zones
- Prime Farmlands

No resource impact assessments or environmental analysis has been completed as part of this study. The information provided above is intended to inform future decision-makers as to the potential project development considerations that may be encountered.

10.2 Programming Recommendations

Following adoption of the Sparks Boulevard Corridor study, the next step would be programming the preliminary engineering and environmental clearance for the Sparks Boulevard Corridor. Considering logical termini and overall independent utility, the most efficient approach would be including the entire limits of the potential project improvements within one environmental document. However, the RTC/lead agency would be required to show fiscal constraint for the improvements in their entirety. The overall Sparks Boulevard improvements would likely be phased, with perhaps some portions beyond the fiscally constrained horizon, but this approach would have to be reviewed within current federal guidelines and developed carefully. The environmental and NEPA process can take anywhere from three months to well over five years depending on the complexity and class of action, however, for the scope of the improvements described in this study, 18 to 24 months can be assumed.

Truckee River Drain

11 RECOMMENDATIONS & PHASING

This chapter presents a phasing plan for the recommended improvements along Sparks Boulevard described in Chapters 6, 8, 9 and 10. The phasing plan was developed based on the consideration of multiple factors including:

- Current (and future) needs and deficiencies,
- Urgency of the improvements for traffic operations and safety,
- Urgency of the improvements for better bike and pedestrian connectivity and safety,
- Geographic location of the proposed improvements, and
- Construction costs (recognizing it may be longer to assemble funding for higher cost improvements)

Based on the combination of above stated factors, the phasing plan for implementation of the recommendations:

- Near-Term Improvements: These projects collectively represent the improvements that are recommended in the 1 to 5 year range.
- Mid-Term Improvements: The need for these projects is not immediate but they should be programmed for the 5-10 year timeframe.
- Long-Term Improvements: These projects are not immediately necessary and will require lead-time for planning, design and funding. The time frame for these improvements will likely exceed 10 years.

Figure 11-1 shows the recommended improvements by location and timeline category, with planning level cost estimates.

11.1 Cost Estimate Development

The cost estimates provided throughout this chapter are presented in 2014 construction dollar values. The quantities have been generalized based on planning level conceptual designs. It is not feasible at this time to address all the bid items that would be included in construction documents.

The unit prices utilized for these estimates are founded on the standard RTC planning level estimates which have a long history of overall accuracy within the RTC Program of Projects (POP) amounts. Planning level unit prices were then compared to recent construction bid results and adjusted as necessary to account for current construction costs. Generally speaking, construction costs have been on the rise over the past few years, therefore many of the units costs have been increased to fall in line with the current construction environment. Soft costs (engineering, specialty consultant services, construction administration, etc.) and contingency were added to the total to complete the budget. Should these prices be extended into future years, it would be advisable to include a 4% per year increase to allow for inflation and other pricing fluctuations. The assumed planning level unit costs for major work elements are presented in **Table 11-1.**

The conceptual improvements identified in the following project lists involve full width corridor, spot location, transit facility, and pedestrian improvements. Many of the improvements addressed within a larger scope of the work are assumed to be included as part of large scale projects. Improvements that are isolated as part of a smaller project would likely be comparatively more expensive that those that are grouped into larger packages.

Since it is difficult to predict whether or not soundwalls would be desired by adjacent property owners, or justified in future environmental assessments, no soundwall improvements are included in the cost estimates at this time.

The existing right-of-way on Sparks Boulevard is for the most part wide enough to contain the recommended improvements. Significant right-of-way acquisition is not anticipated. Minor acquisitions should be anticipated at spot locations (Prater, Baring, Shadow, Disc) where additional turn pockets are recommended. The cost estimates include partial takes and right-of-way services only for these few locations.

Very long-term potential transit improvements identified Section 9.3 are dependent on future demand and further analysis. The costs for these are not included in in the cost estimates at this time.

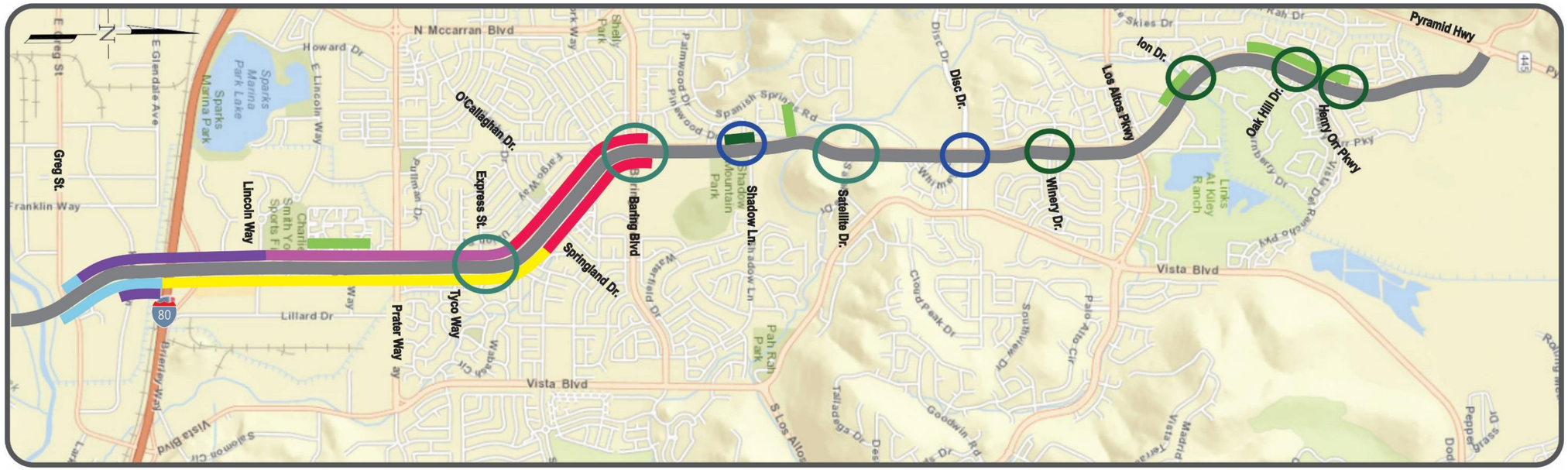
Units of Measurement:
SF – Square Feet
LF – Lineal Feet
EA – Each
LS – Lump Sum

Table 11-1. Planning Level Unit Costs

CONSTRUCTION UNIT COSTS			
MATERIAL	**PRICE**		**UNIT**
AC PAVING	$	8.00	SF
AC PAVEMENT REHAB	$	6.00	SF
CURB & GUTTER	$	30.00	LF
PCC SIDEWALK	$	10.00	SF
SLOPE GRADING	$	500.00	LF
K-RAIL / GUARDRAIL	$	150.00	LF
STREET LIGHTING	$	200.00	LF
LANDSCAPE	$	40.00	LF
DRAINAGE IMPROVEMENTS	$	300.00	LF
PEDESTRIAN RAMPS	$	30.00	LF
MEDIAN CURB	$	20.00	LF
UNDERGROUND OVERHEAD UTILITIES	$	500.00	LF
MEDIAN ISLAND	$	10.00	SF
BRIDGE / STRUCTURE WIDENING	$	650.00	SF
BOX CULVERT/TUNNEL	$	300.00	LF
PCC PAVING	$	15.00	SF
BUS PAD WITH SHELTER	$	25,000.00	EA
PEDESTRIAN CROSSING TREATMENT (RRFB)	$	50,000.00	EA

ITEM	PRICE		UNIT
SOFT COSTS (INCLUDED IN COSTS)	23%		
CONTINGENCY	25%		
PERMITTING	$	75,000.00	LS
R/W ENGR/APPRAISAL/JUST COMPENSATION (I-80 / UPRR)	$	150,000.00	LS
R/W ENGR/APPRAISAL/JUST COMPENSATION (DISC DR/PRATER WAY)	$	175,000.00	LS/EA

INTERSECTION SIGNAL IMPROVEMENTS			
LOCATION	**PRICE**		**UNIT**
Sparks Blvd and Springland Dr/O'Callagan	$	300,000	LS
Sparks Blvd and Disc Dr	$	100,000	LS
Sparks Blvd and Greg St	$	100,000	LS
Sparks Blvd and Baring Blvd	$	300,000	LS
Sparks Blvd and I-80 Interchange	$	600,000	LS
Sparks Blvd and Prater	$	300,000	LS
Sparks Blvd and Lincoln Way	$	100,000	LS



Near-Term 1

COST: $980,000

SCOPE: Includes sidewalk gap closures and upgrade of the Park Vista Apartment transit stop and crosswalk.

Near-Term 2

COST: $1,250,000

SCOPE: Includes a new pedestrian / bike bridge at Shadow Lane and spot crosswalk improvements.

Mid-Term 1

COST: $770,000

SCOPE: Includes restriping from Greg to I-80 WB Ramps to provide 3 NB lanes and bike lanes. Widen Sparks Blvd just north of Greg to provide proper number of lanes and alignment, widen and improve path this segment.

Mid-Term 2

COST: $17,800,000

SCOPE: Includes realigning and widening Sparks Blvd, constructing new multi-use path, adding a section of sidewalk, and intersection modifications at Lincoln Way and Prater Way.

Mid-Term 3

COST: $17,440,000

SCOPE: Includes realigning Sparks Blvd and combining the Springland and O'Callaghan intersections. Construct a new section of multi-use path and a section of sidewalk.

Mid-Term 4

COST: $920,000

SCOPE: Includes intersection modifications at Disc Drive and Shadow Lane.

Long-Term 1

COST: $4,970,000

SCOPE: Includes widening Sparks Blvd in the SB direction to 3 thru lanes and adding a section of sidewalk.

Long-Term 2

COST: $27,190,000

SCOPE: Includes widening 3 major structures to construct 3 SB thru lanes and modifications of both I-80 ramp terminals.

Other Improvements

COST: $485,000

SCOPE: Safety projects at specific intersections

Figure 11-1. Improvement Phasing Summary

11.2 Near-Term Improvements

Table 11-2 provides a list of the recommended near-term improvements along with the estimated cost associated with each major work item. Most of the improvements categorized as Near-Term are ones that are relatively inexpensive and can be constructed within a short period of time. All of the near-term improvements listed below are bike/pedestrian, safety and connectivity improvements or transit improvements. These improvements fall in line with the feedback received from the public regarding their most important priority being improvement of bike/pedestrian safety and facilities.

Near-term improvements are further prioritized into phases (Near-Term 1 and Near-Term 2) based on the needs and deficiencies. Within the Near-Term timeline, Near-Term 1 would have the first priority, and then Near-Term 2. The priority assigned to a particular recommended improvement was based on multiple factors such as the need, constructability in terms of cost and resources needed, and construction time.

Most of the near-term improvements are in the northern section of Sparks Boulevard (north of Baring Boulevard) and would retain their value even when Sparks Boulevard is widened or realigned during the mid-term and long-term periods.

Near-Term 1

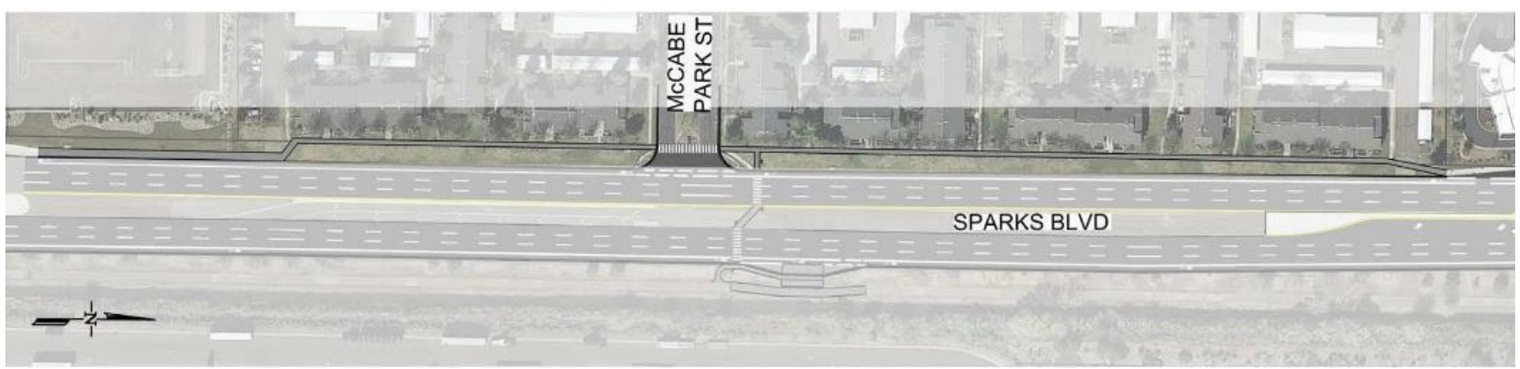


Figure 11-2. Near-Term 1 Improvements, Sidewalk Gap Closure at Park Vista Apartments

Intersection specific improvements are shown in **Figures 11-4** through **11-**7 and in **Appendix A**. **Figures 11-8**, **11-9** and **11-10** show the Sparks Boulevard cross-sections between Baring Boulevard and Pyramid Highway. These are the existing cross-sections and do not include any capacity improvements or roadway segment widening.

Table 11-2. Near-Term Improvements

Phasing Category	Segment/Intersection	Mode	Recommended Improvement	Cost Estimate
Near-Term 1	Prater Way to Lincoln Way	Bike/Pedestrian	Complete sidewalk on the west side of Sparks Blvd through the Park Vista Apartment Complex area (1,500') (Near Mc Cabe Park St)	$300,000.00
		Bike/Pedestrian/Transit	Upgrade crossing at transit stop south of Prater Way to meet the current ADA requirements. Upgrade transit stop; widen pullout, construct 20 SQ FT concrete pad, install shelter, remove ex. Flasher system, and install new RRFB sytem.	$240,000.00
	Baring Blvd to Pyramid Hwy	Bike/Pedestrian	Construct sidewalk on Vintage Hills Pkwy connecting multi-use path to Les Hicks Jr Park (175')	$40,000.00
			Construct sidewalk to fill in gap between Ion Dr and Village Meadows Dr (430')	$170,000.00
			Construct sidewalk on west side of Sparks Blvd between Henry Orr Pkwy and Cathedral Peak Dr (1,120')	$230,000.00
Near-Term 2	Springland Dr to Pyramid Hwy	Bike/Pedestrian	Construct ped/bike bridge creating a smooth transition for the path across the Truckee Drain near Shadow Ln	$910,000.00
			Construct a pedestrian median island refuge and remove the crosswalk on the south leg @ Winery Dr	$20,000.00
			Construct a pedestrian median island refuge and splitter islands with pedestrian ramps @ Oak Hill Dr	$70,000.00
			Construct a pedestrian median island refuge and splitter islands with pedestrian ramps @ Henry Orr Pkwy	$130,000.00
			Construct a pedestrian median island refuge @ Eagle Pass Rd	$40,000.00
			Remove existing flasher system @ Eagle Pass Rd and install RRFB system	$80,000.00

Near-Term 2

Figure 11-3. Near-Term 2 Improvements, Bicycle / Pedestrian Bridge @ Shadow Ln

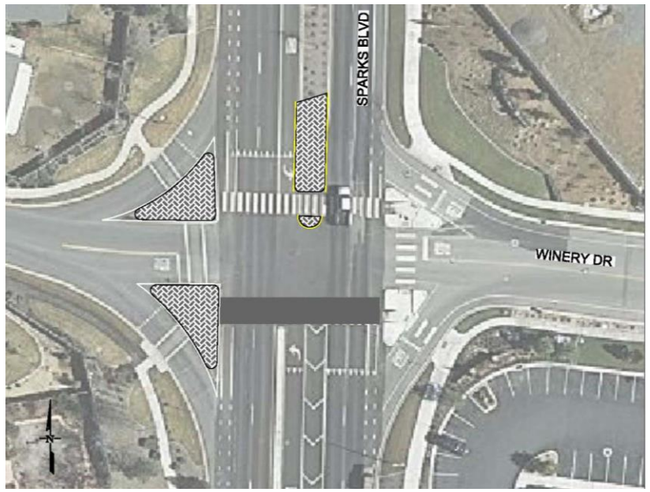


Figure 11-4. Near-Term 2 Improvements, Island Improvements for Pedestrian Access at Winery Drive

Figure 11-5. Near-Term 2 Improvements, Island Improvements for Pedestrian Access at Oak Hill Drive

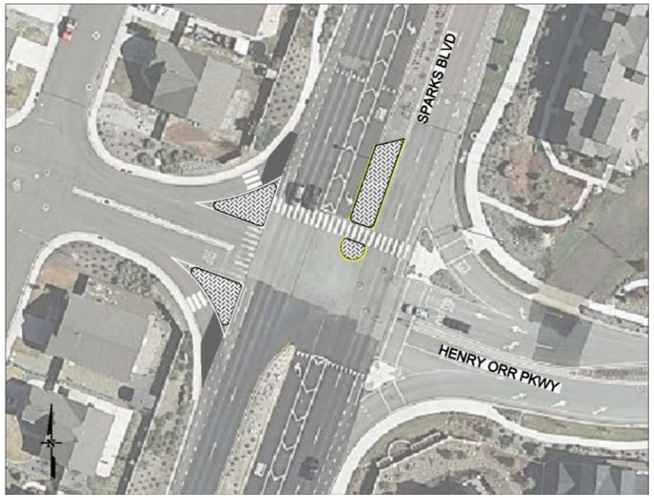


Figure 11-6. Near-Term 2 Improvements, Island Improvements for Pedestrian Access at Henry Orr Pkwy

Figure 11-7. Near-Term 2 Improvements, Island Improvements for Pedestrian Access at Eagle Pass Road

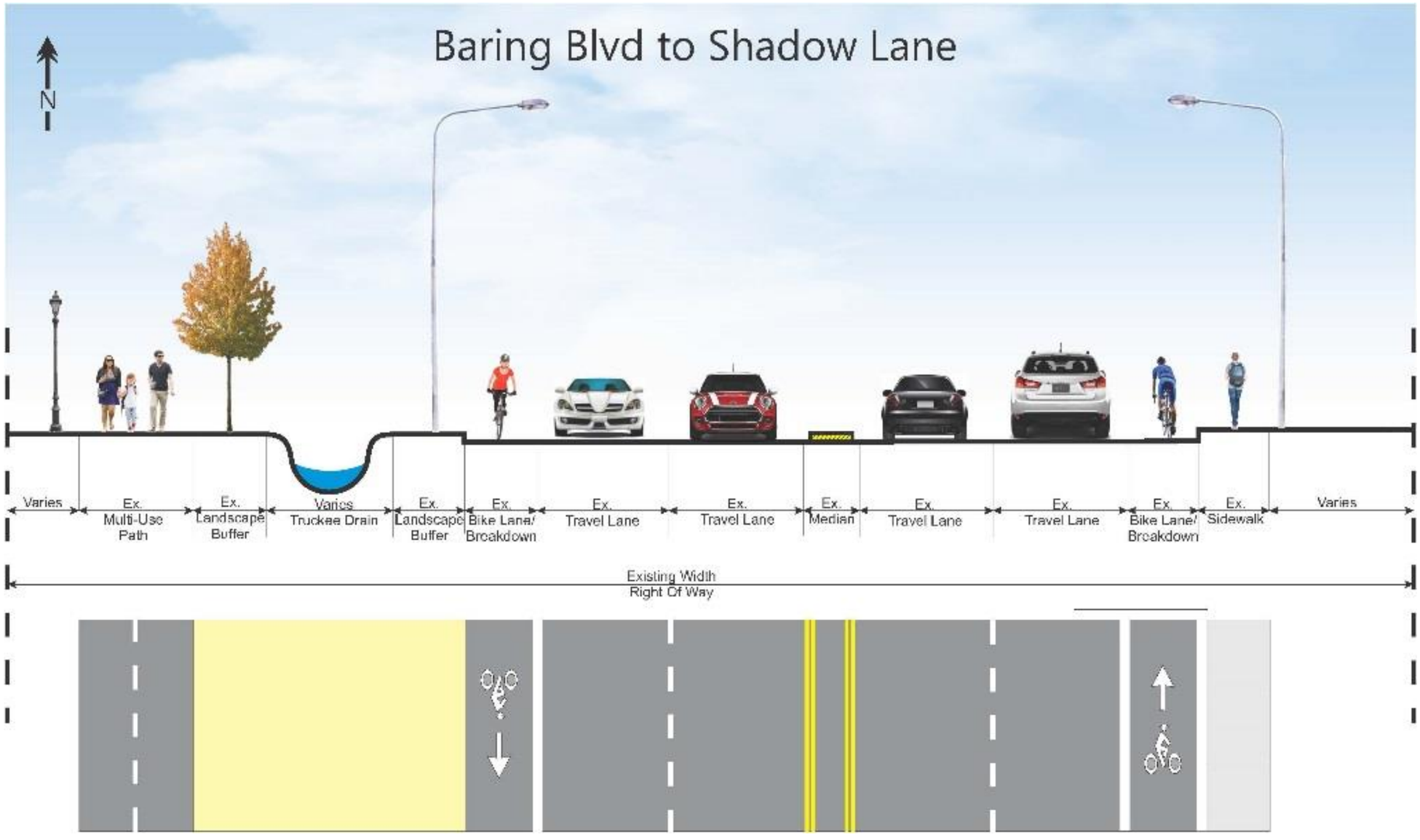


Figure 11-8. Existing Cross-section of Sparks Blvd between Baring Blvd and Shadow Ln

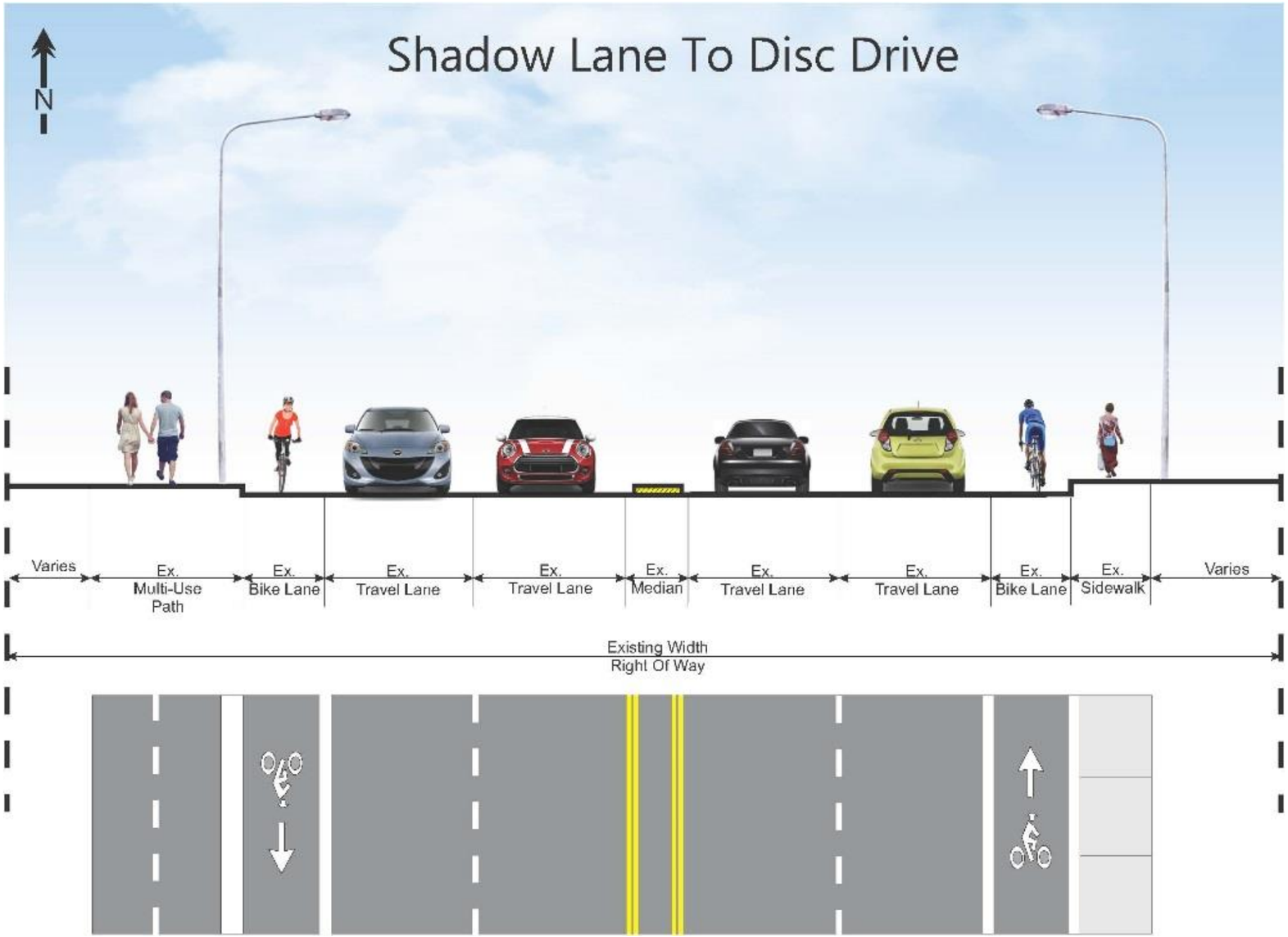


Figure 11-9. Existing Cross-section of Sparks Blvd between Shadow Ln and Disc Dr

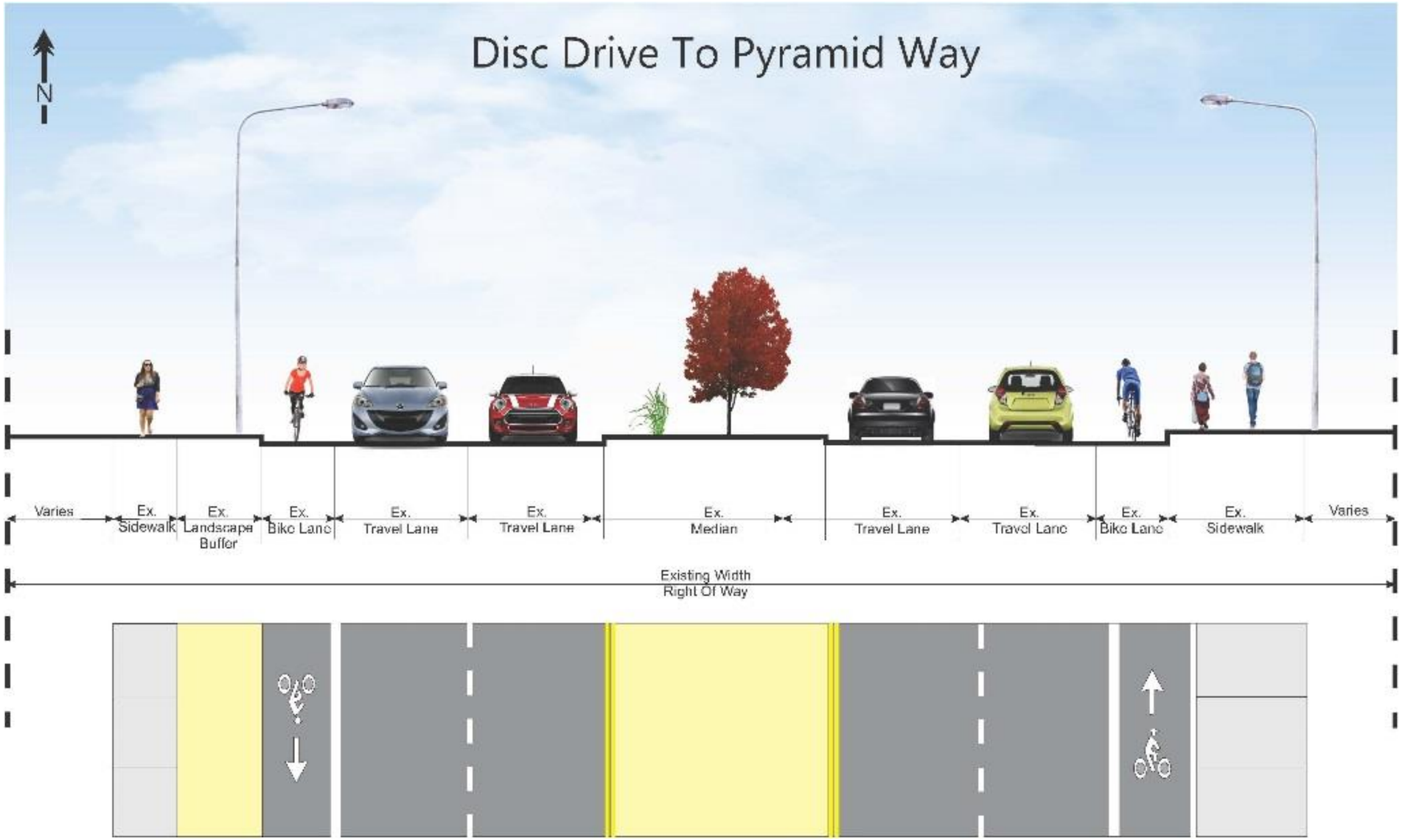


Figure 11-10. Existing Cross-section of Sparks Blvd between and Disc Dr and Pyramid Way

11.3 Mid-Term Improvements

Mid-term improvements are further prioritized into four sub-phases (Mid-Term 1, Mid-Term 2 etc.) based on the needs, deficiencies, and a logical roadway construction phasing that maximizes efficiency. Within the Mid-Term timeline, Mid-Term 1 would have the first priority, followed by Mid-Term 2 etc. All the phases are divided to build off each other as they are being completed. The majority of the mid-term improvements occur between Greg Street and Baring Boulevard. Most of the traffic/capacity related mid-term improvements are for the northbound Sparks Boulevard approaches as the traffic volumes occurring during the PM peak hour (worst of the 24-hours) are highest in the northbound direction. These improvements can be constructed without the need to widen any structures on Sparks Boulevard and will provide the benefits of increased capacity for the worst traffic movements.

Mid-Term 1

Table 11-3 provides a list of recommended improvements for the Mid-Term 1 phase. These improvements extend from Greg Street to the I-80 Ramps. With construction of the SouthEast Connector, a significant amount of traffic is anticipated to divert from I-80 to the SouthEast Connector, making capacity improvements in this segment a first logical step in addressing future capacity deficiencies.

Recommended improvements in the Mid-Term 1 phase include restriping the northbound approach of the SouthEast Connector at Greg Street to have three northbound through lanes and widening the Sparks Boulevard to six lanes north of Greg Street (to a location south of the Kleppe Lane structure) as shown in **Figure 11-11**. A bike lane in both the northbound and southbound directions would be added on Sparks Boulevard corresponding to the adjacent roadway widening.

Mid-Term 1 also includes improving and widening the multi-use path along with this roadway widening as shown in **Figure 11-11**. To the north of this location, up to I-80 EB Ramps, Sparks Boulevard should be restriped to include three northbound lanes, two southbound lanes and bike lanes in both directions. Restriping will be performed within the roadway width. This section is shown in **Figure 11-12** and **Figure 11-13.**

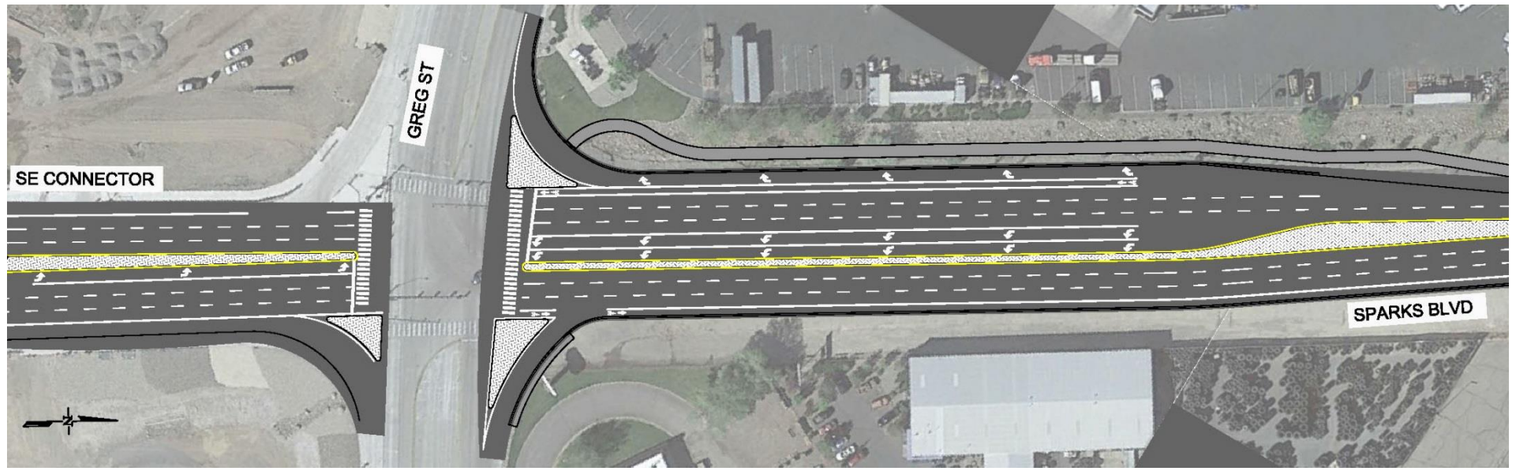


Figure 11-11. Mid-Term 1 Improvements at Sparks Boulevard/SouthEast Connector/Greg Street

Table 11-3. Mid-Term 1 Improvements

Phasing Category	Segment/Intersection	Mode	Recommended Improvement	Cost Estimate
Mid-Term 1	Sparks Blvd/Greg St/SouthEast Connector	Traffic	Widen Sparks Blvd to 6-lanes north of Greg St approximately upto the limits shown in **Figure 11-11** (Approximately 1,000 feet north of Greg St) (No Structures)	$770,000.00
			Restripe NB SouthEast Connector approach to have 3 NB through Lanes	
		Bike/Pedestrian	Add bike lanes in NB and SB directions corresponding to adjacent roadway widening	
			Improve and widen the multi-use path (west side of Sparks Blvd) corresponding to the adjacent roadway widening	
	North of Greg St to I-80 EB Ramps	Traffic	Restripe to include 3 NB lanes, 2 SB lanes and bike lanes within existing roadway width	

Figure 11-12. Sparks Boulevard Structure @ Kleppe Lane

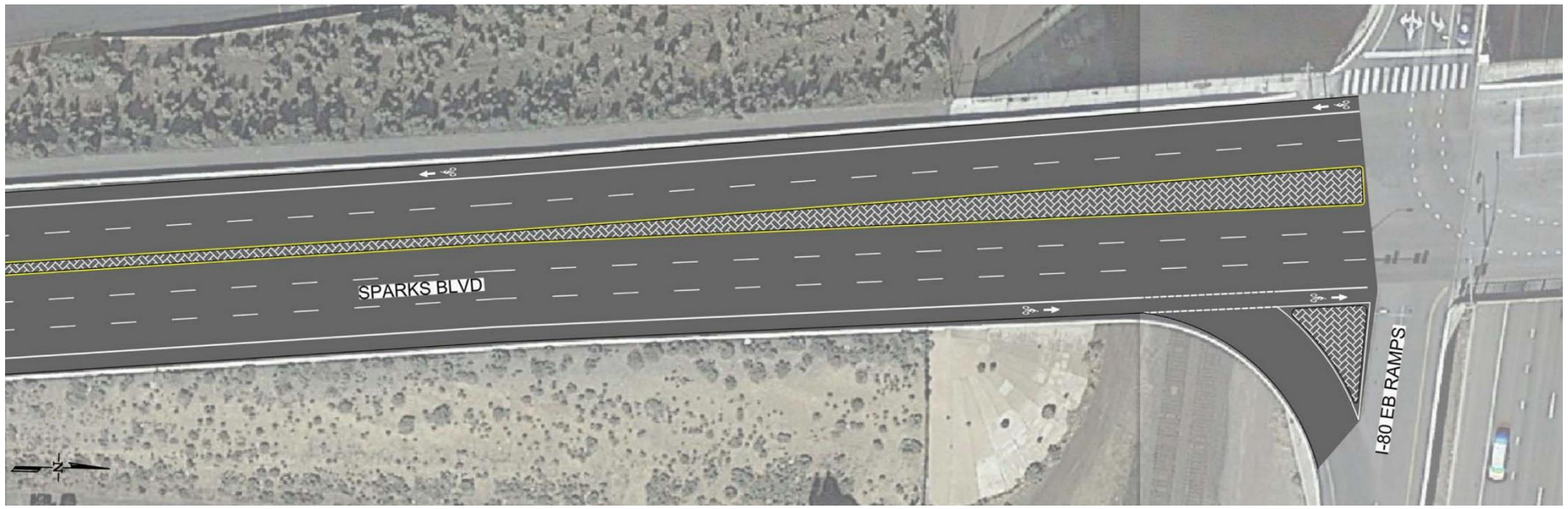


Figure 11-13. Mid-Term 1 Improvements on Sparks Boulevard North of Kleppe Lane Structure

Mid-Term 2

Table 11-4 provides a list of recommended improvements for the Mid-Term 2 phase. These improvements extend from the I-80 Ramps to Springland Drive. Improvements in this phase are a direct continuation of Mid-Term 1. Most of the improvements in this phase include improving/adding the capacity for northbound movements on Sparks Boulevard. The estimated cost for this phase is $17,800,000.

Improvements in this phase include adding a third northbound lane on Sparks Boulevard between the I-80 WB Ramps and Springland Drive, where the outside lane becomes a right-turn drop lane. This work includes a northbound bike lane and a multi-use path on the east side of Sparks Boulevard corresponding to this widening and adding a crosswalk at I-80 EB ramps to transition the multi-use path from the east side to the west side of Sparks Boulevard. The transit stop south of Tyco Way should be relocated to the north side of intersection. The new transit stop will include amenities such as a Concrete Pad, Bench, Trash Cans, Shelter (Based on demand), Solar Lighting (Based on Demand), and Reflective Bus Signal.

Safety improvements in this phase include realignment of northbound lanes between the I-80 WB Ramps and Lincoln Way to eliminate the existing awkward lane shift and adding a northbound right-turn pocket at the Lincoln Way and Prater Way intersection.

Table 11-4. Mid-Term 2 Improvements

Mid-Term 2	I-80 WB Ramps to Springland Dr (NB Only)	Traffic	Widen NB Sparks Blvd to have three through lanes. (Third through lane becomes a right-turn drop lane at Springland Dr). Includes installation of northbound Barrier Rail	$14,980,000.00
		Bike/Pedestrian	Construct multi-use path east side of Sparks Blvd from I-80 WB Ramps to Lincoln Way (1,350')	$300,000.00
			Add a NB bike lane with roadway widening	$670,000.00
			Improve existing tunnels for multi-use path (update lighting, wall repair, graffiti resistant paint and drainage)	$400,000.00
			Add sidewalk on the east side between Prater Way and Tyco Way (1,200')	$200,000.00
		Transit	Relocate and upgrade the bus stop at Tyco Way to align with the pedestrian crossing	$150,000.00
	Sparks Blvd/I-80 WB Ramps	Bike/Pedestrian	Add a crosswalk at I-80 EB Ramps intersection to transition the multi-use path from the east side to west side	$30,000.00
	I-80 WB Ramps to Lincoln Way	Safety	Realign the NB lanes to eliminate the awkward curvature and offset approaching Lincoln Way	$150,000.00
	Sparks Blvd/Lincoln Way	Traffic	Add a NB right turn pocket @ Lincoln Way	$270,000.00
		Bike/Pedestrian	At-grade crossing for multi-use path across east leg of Lincoln Way	$360,000.00
	Sparks Blvd/Prater Way	Traffic	Add a NB right turn pocket @ Prater intersection	$290,000.00

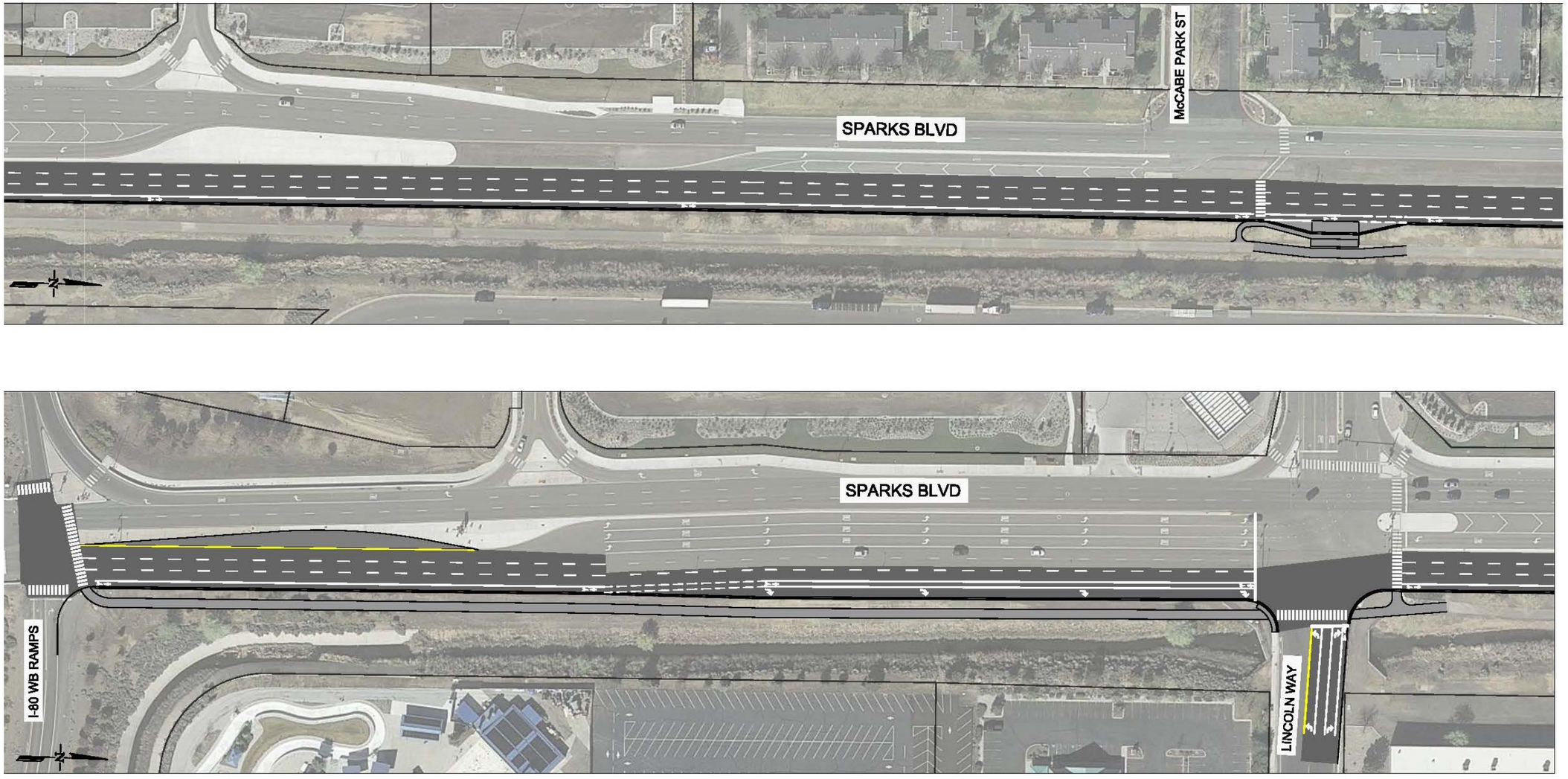


Figure 11-14. Mid-Term 2 Improvements, I-80 WB Ramps to McCabe Park Street

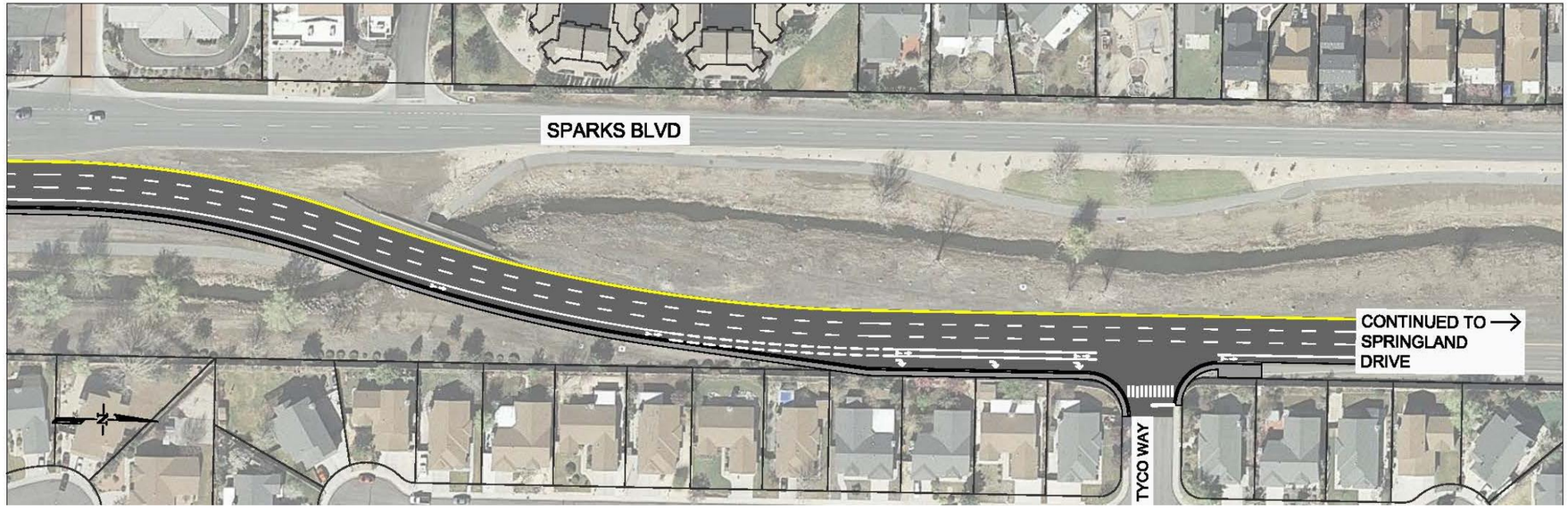


Figure 11-15. Mid-Term 2 Improvements, Prater Way to Tyco Way

Mid-Term 3

Table 11-5 provides a list of recommended improvements for the Mid-Term 3 phase. All the improvements in this phase occur at the Sparks Boulevard/Springland Drive and Sparks Boulevard/Baring Boulevard intersections. The estimated cost for this phase is $17,440,000.

Improvements at the Sparks Boulevard/Springland Drive intersection include realigning Sparks Boulevard to combine the Springland Drive and O'Callagan Drive intersections. The multi-use path transitions from the median of Sparks Boulevard to the west side at the Springland Drive intersection. The realigned Sparks Boulevard/Springland Drive intersection with the multi-use path on the west side is shown in **Figure 11-16**. With the realignment of the roadway, the transit stop at Express Street will need to be relocated as well. Improvements at Baring Boulevard include adding a northbound right-turn pocket and a second eastbound left-turn pocket. Pedestrian improvements including adding sidewalk on the east side of Sparks Boulevard between Springland Drive and Baring Boulevard are also included in this phase.

Figure 11-16. Mid-Term 3 Improvements at Sparks Blvd/Springland Dr

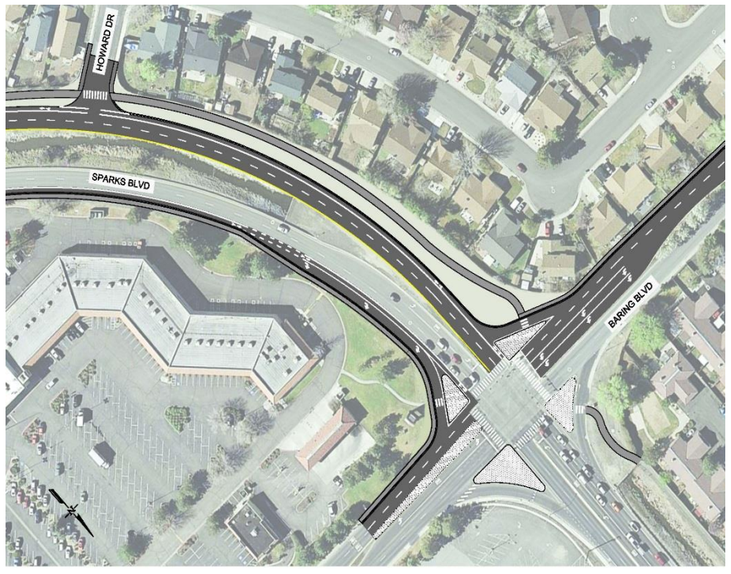


Figure 11-17. Mid-Term 3 Improvements at Baring Blvd

The improvements at Baring Boulevard are shown in **Figure 11-17**. The ultimate cross-sections of Sparks Boulevard between Express Street and Baring Boulevard with all the improvements included, are shown in Figure **11-18** and Figure **11-19.**

Table 11-5. Mid-Term 3 Improvements

Phasing Category	Segment/Intersection	Mode	Recommended Improvement	Cost Estimate
Mid-Term 3	Sparks Blvd/Springland Dr and Sparks Blvd between Prater Way and Baring Blvd	Traffic	Realign Sparks Blvd to combine the Springland Dr and O'Callagan Dr intersections	$13,450,000.00
		Bike/ Pedestrian	Multi-use path improvements - Transition the path from the west side to the east side of Sparks Blvd (tunnel with overpass)	$390,000.00
			Add NB and SB bike lanes with roadway widening	$610,000.00
			Construct multi-use path on the west side of Sparks Blvd from O'Callagan Dr to Howard Dr (2,500')	$540,000.00
			Add sidewalk on the east side between Springland Dr and Baring Blvd (2,500')	$450,000.00
	Sparks Blvd/Baring Blvd	Traffic	Add a second EB left turn pocket and eliminate split signal phasing @ Baring Blvd	$2,000,000.00
			Add a NB right turn pocket @ Baring Blvd	

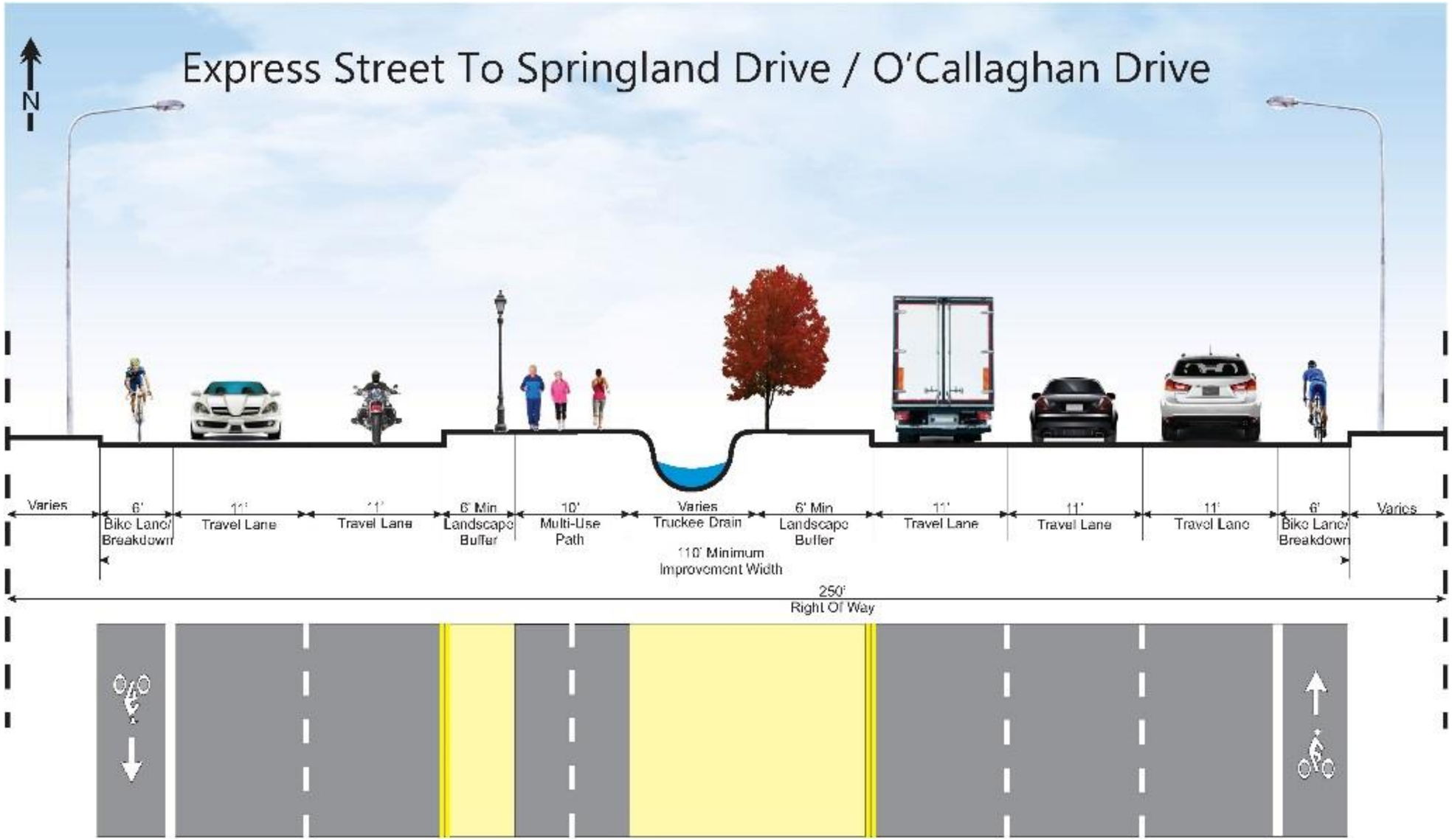


Figure 11-18. Recommended cross-section of Sparks Blvd between Express St and Springland Dr

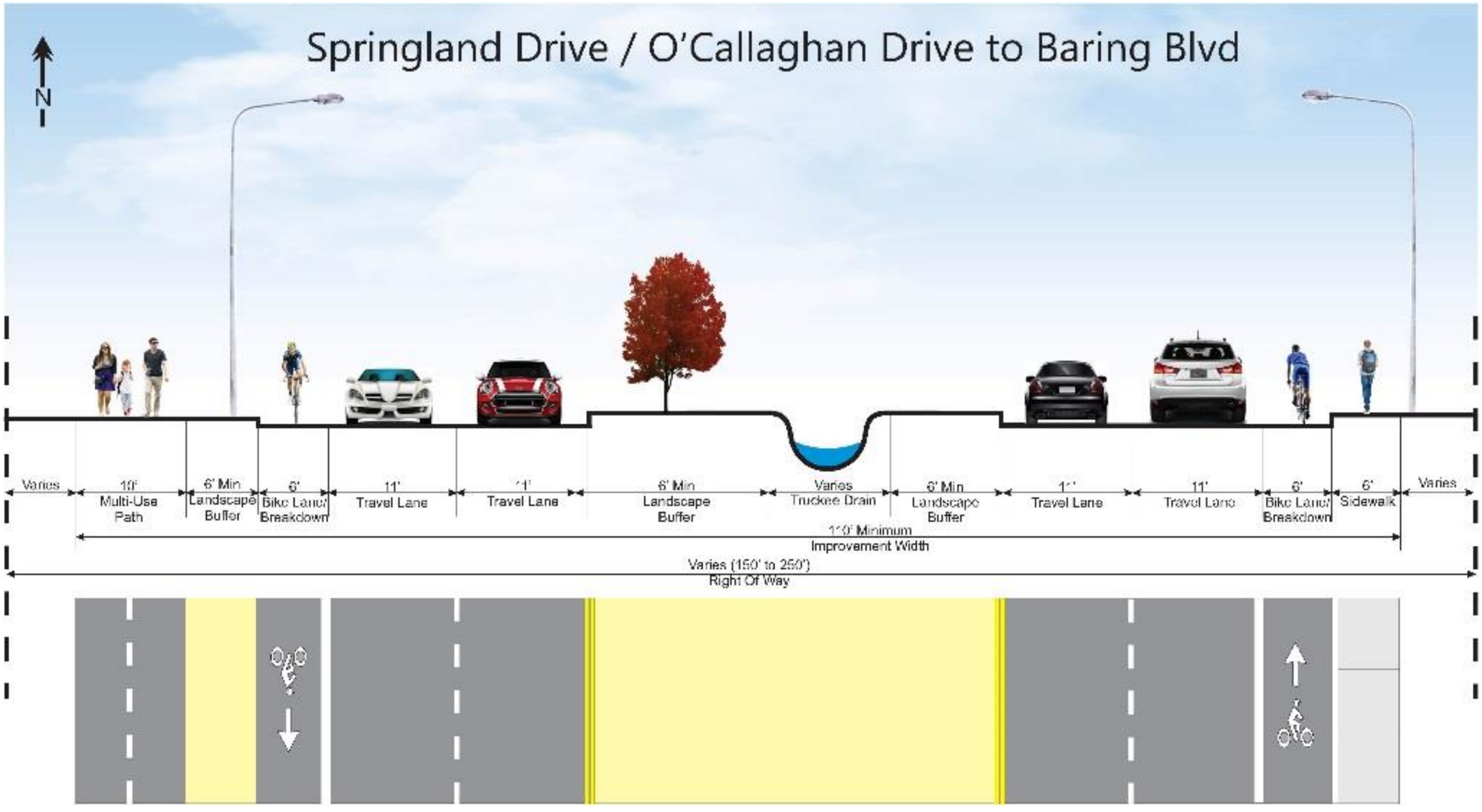


Figure 11-19. Recommended cross-section of Sparks Blvd between Springland Dr and Baring Blvd

Mid-Term 4

The Mid-Term 4 phase includes traffic improvements at the Sparks Boulevard/Shadow Lane intersection and the Sparks Boulevard/Disc Drive intersection. The improvements are listed in **Table 11-6**. These improvements are illustrated in **Figure 11-20** and **Figure 11-21.** The total estimated cost for Mid-Term 4 improvements is $920,000.

Table 11-6. Mid-Term 4 Improvements

Phasing Category	Segment/Intersection	Mode	Recommended Improvement	Cost Estimate
Mid-Term 4	Sparks Blvd/Shadow Ln	Traffic	Add a NB right turn pocket @ Shadow Ln	$250,000.00
	Sparks Blvd/Disc Dr	Traffic	Add a second EB left turn pocket and eliminate split signal phasing @ Disc Dr	$670,000.00

Figure 11-20. Mid-Term 4 Improvements at Sparks Blvd/Shadow Ln

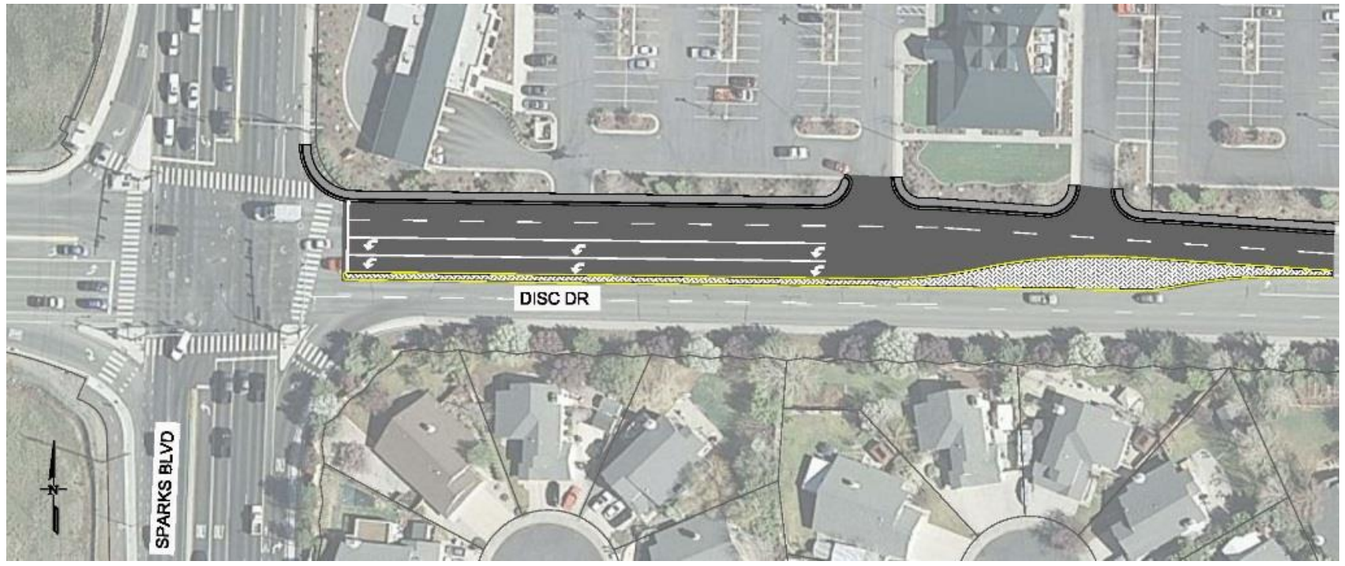


Figure 11-21. Mid-Term 4 Improvements at Sparks Blvd/Disc Dr

11.4 Long-Term Improvements

Similar to mid-term improvements, long-term improvements are also further prioritized into categories based on the needs, deficiencies, continuity from previous phases and logical roadway construction phasing to maximize efficiency. The long-term timeline is split into two phases. Within the long-term timeline, Long-Term 1 would have the first priority, and then Long-Term 2. Improvements categorized as long-term are some of the most expensive (compared to near-term and mid-term improvements) of all the proposed improvements and may require more time to obtain funding. Also, from a traffic operations perspective, these improvements are needed only in the long-term horizon, when traffic levels have passed specific thresholds.

Long-Term 1

Table 11-7 provides a list of recommended improvements in the Long-Term 1 phase. The improvements in this phase include construction of additional capacity for southbound Sparks Boulevard. The improvements in this phase connect directly with the Sparks Boulevard/Springland Drive intersection improvements that would have been completed in the Mid-Term 4 phase. Long-Term 1 phase includes widening Sparks Boulevard to three through lanes between Express Street and Lincoln Way and adding a southbound bicycle lane. The third southbound through lane begins at Express Street, as shown in **Figure 11-22,** and extends south until it connects with the existing three southbound through lanes located south of Prater Way, as shown in **Figure 11-23**. The final cross-sections of Sparks Boulevard between Prater Way and Express Street with all the improvements included are shown in **Figure 11-25** and **Figure 11-26**.

Other non-motorized improvements in this phase include adding a sidewalk from Express Street to Prater Way. The estimated cost for this phase is $4,970,000.

Table 11-7. Long-Term 1 Improvements

Phasing Category	Segment/ Intersection	Mode	Recommended Improvement	Cost Estimate
Long-Term 1	North of Prater Way to North of Lincoln Way	Traffic	Widen SB Sparks Blvd to 3-lanes	$4,410,000.00
			Add an EB right turn pocket on Prater Way	$400,000.00
		Bike/ Pedestrian	Add sidewalk from Express St to Prater Way (1,100')	$160,000.00
			Add SB bike lane with roadway widening	Included

Figure 11-22. Ultimate Configuration, Tyco Way to Express St

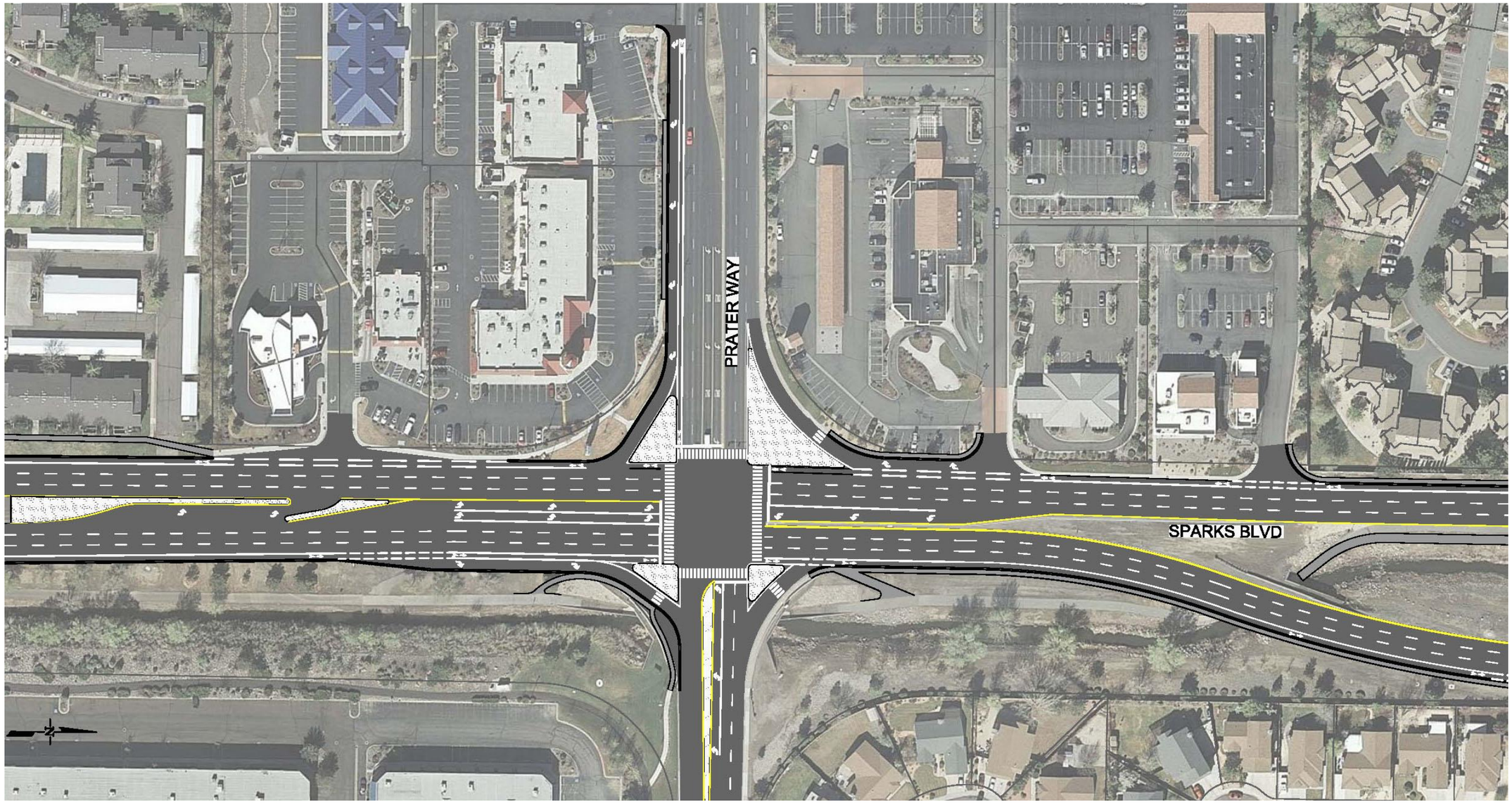
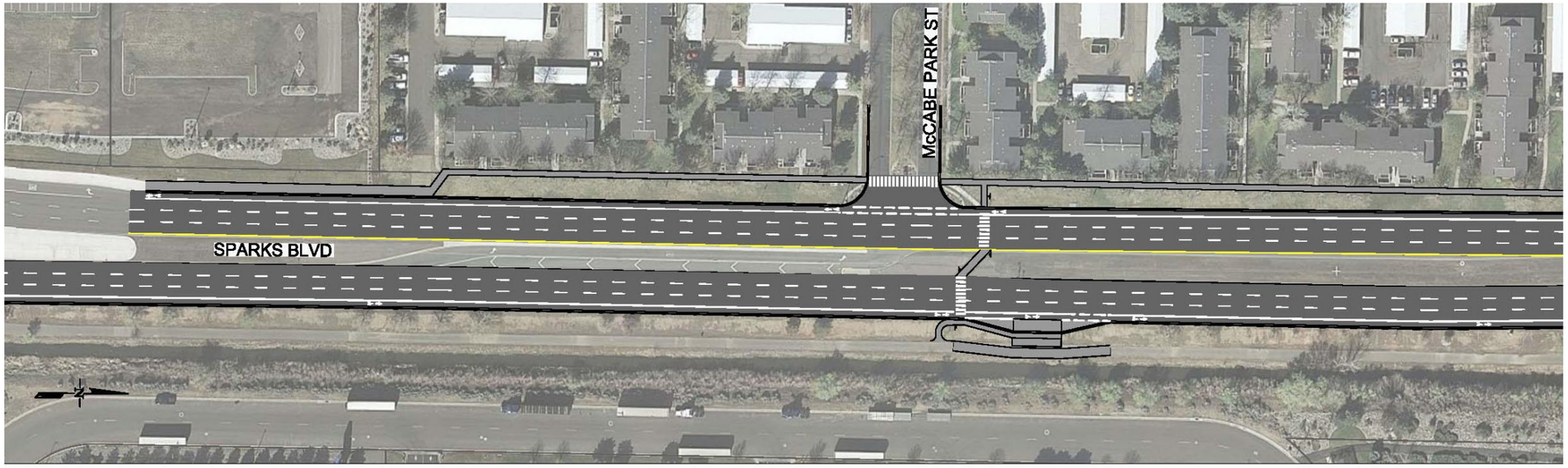


Figure 11-23. Ultimate Configuration at Sparks Boulevard/Prater Way



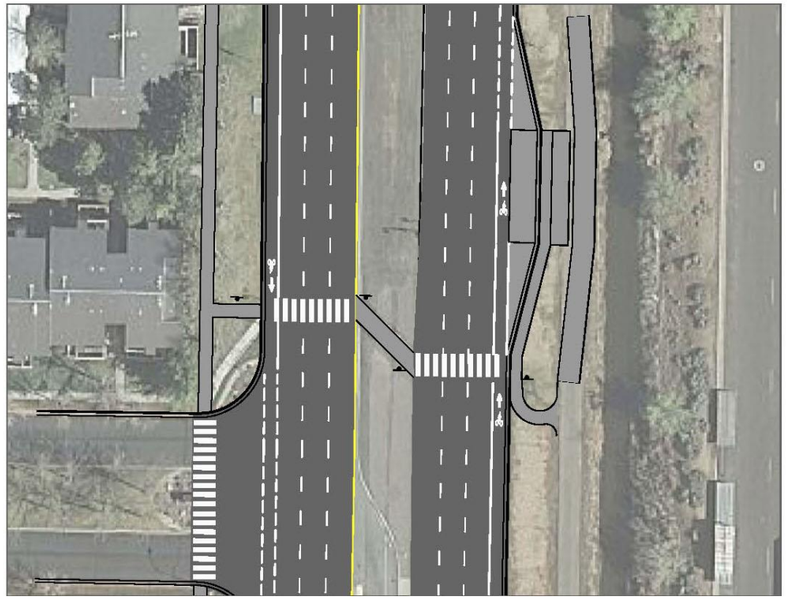


Figure 11-24. Ultimate Configuration South of Prater Way

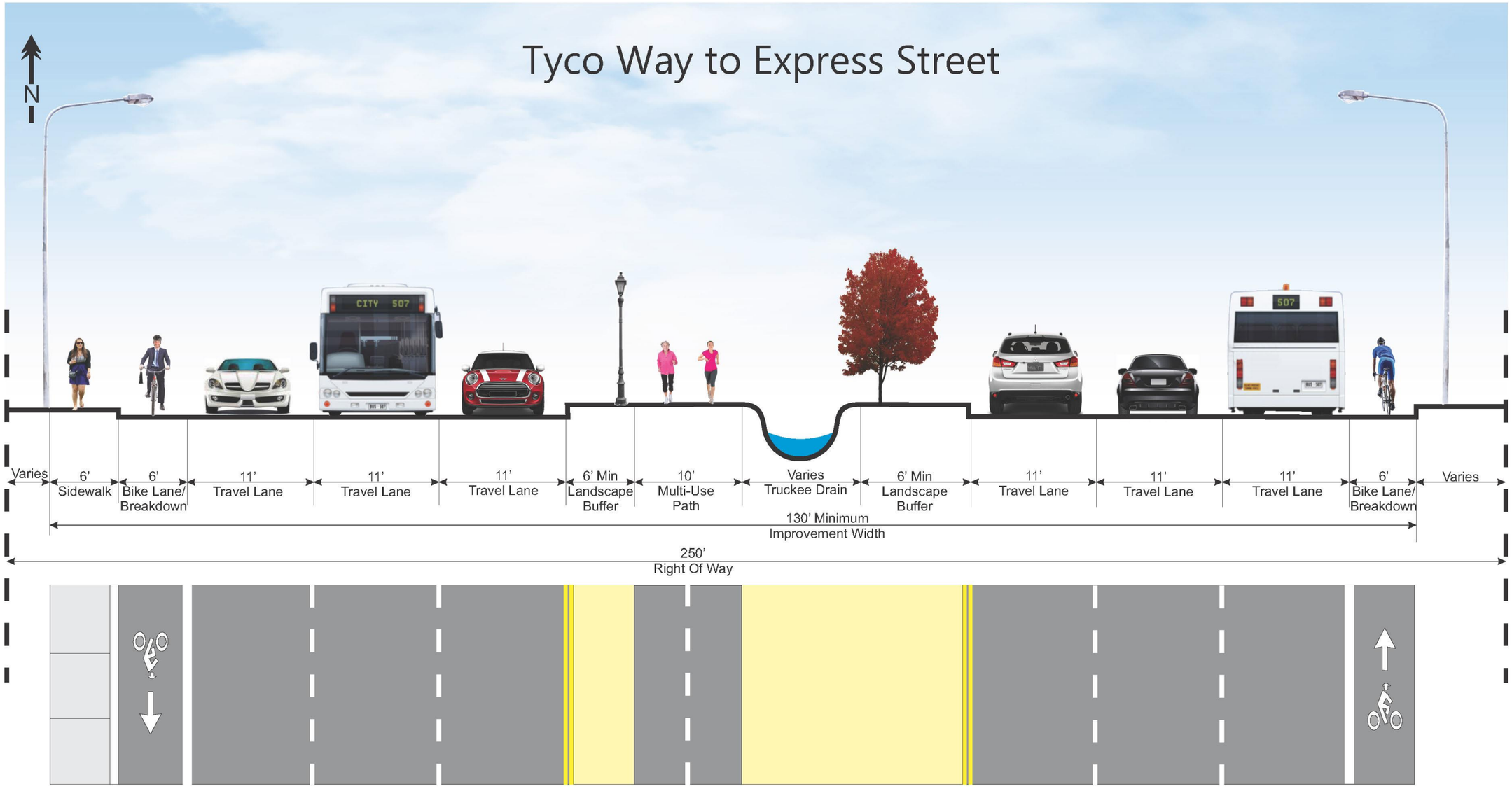


Figure 11-25. Recommended cross-section of Sparks Blvd between Tyco Way & Express Street

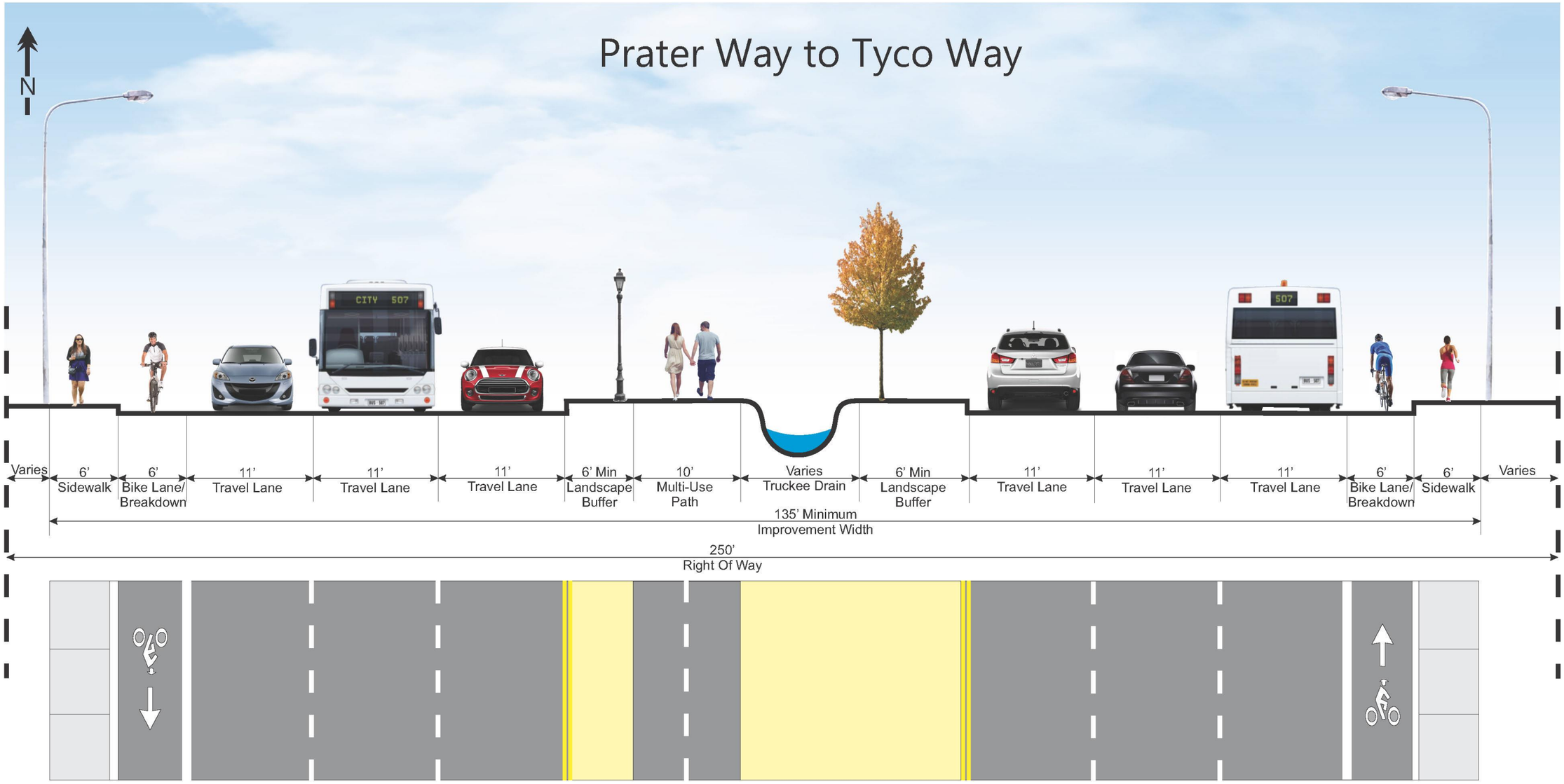


Figure 11-26. Recommended cross-section of Sparks Blvd between Prater Way and Tyco Way

Long-Term 2

Table 11-8 provides a list of recommended improvements in the Long-Term 2 phase. Long-Term 2 improvements consist of adding a third southbound lane between the I-80 westbound and eastbound ramps, and extending the third southbound through lane to a location north of Greg Street where it connects to the third southbound lane built in Mid-Term 1 phase. The improvements in this phase also include adding a third southbound lane from the I-80 WB Ramps to a location north of Greg Street which connects to the southbound improvements finished in Mid-Term 2 phase, as shown in **Figure 11-27**. Long-Term 2 is the most expensive phase as the improvements in this phase involve widening three structures between I-80 and Kleppe Lane.

Non-motorized improvements include adding a southbound bicycle lane with the road widening. Other improvements include adding a southbound right-turn pocket at the Sparks Boulevard/I-80 WB Ramps intersection and a northbound right-turn pocket at the Sparks Boulevard/I-80 EB Ramps intersection, which are also shown in **Figure 11-27**. The final cross-sections of Sparks Boulevard between Greg Street and Prater Way, with all the improvements, included are shown in **Figure 11-28** and **Figure 11-29.** The estimated cost for this phase is $27,190,000.

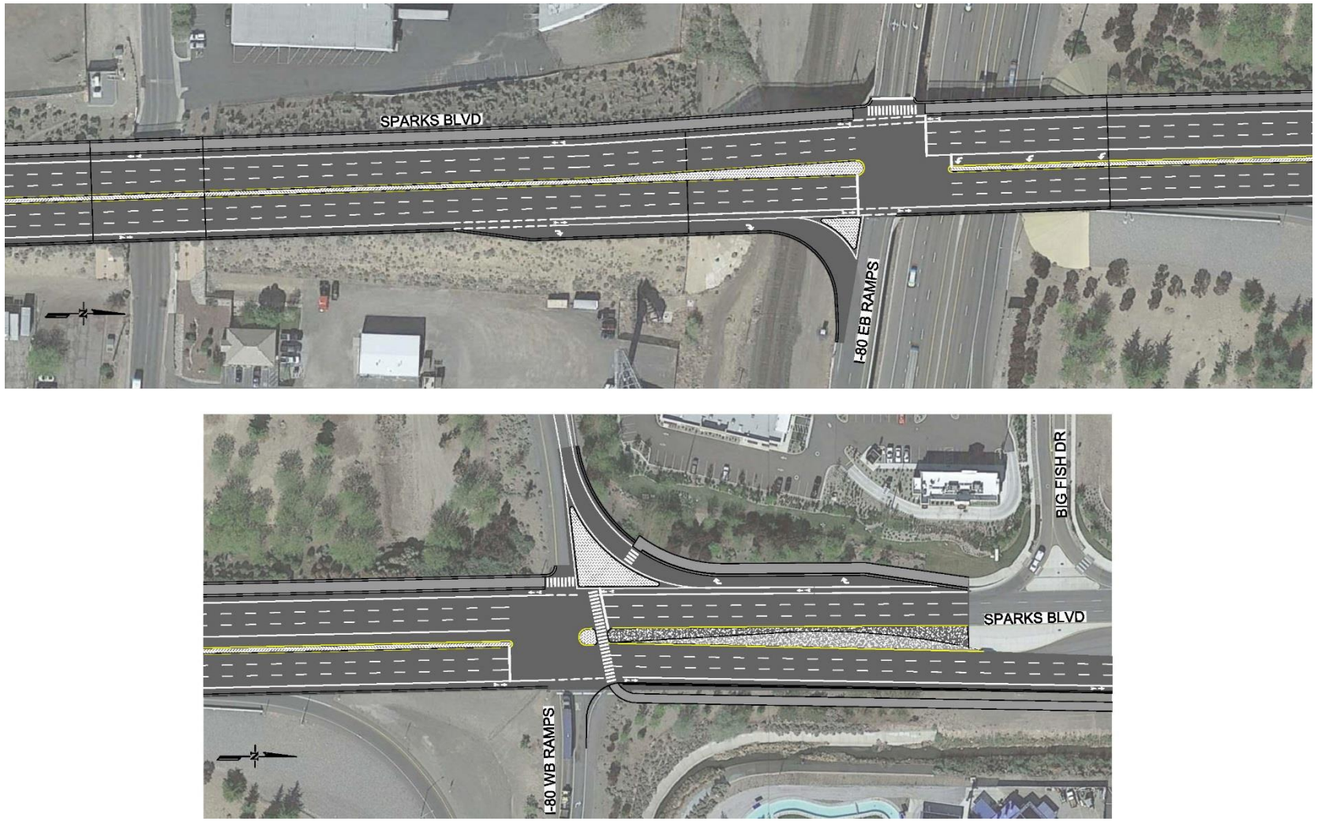


Figure 11-27. Long-Term 2 Improvements

Table 11-8. Long-Term 2 Improvements

Long-Term 2	I-80 WB Ramps to South of I-80 EB Ramps	Traffic	Add third SB through lane between the WB ramps and EB ramps intersections (widening of the I-80 bridge structure and structure over Kleppe Ln)	$26,800,000.00
		Bike/Pedestrian	Add SB bike lane with roadway widening	
	North of Lincoln Way to I-80 EB Ramps	Bike/Pedestrian	Add SB bike lane with roadway widening	$390,000.00
	Sparks Blvd/I-80 WB Ramps	Traffic	Add a SB right turn pocket @ I-80 WB Ramps	Included
	Sparks Blvd/I-80 EB Ramps	Traffic	Add a NB right turn pocket @ I-80 EB Ramps	Included

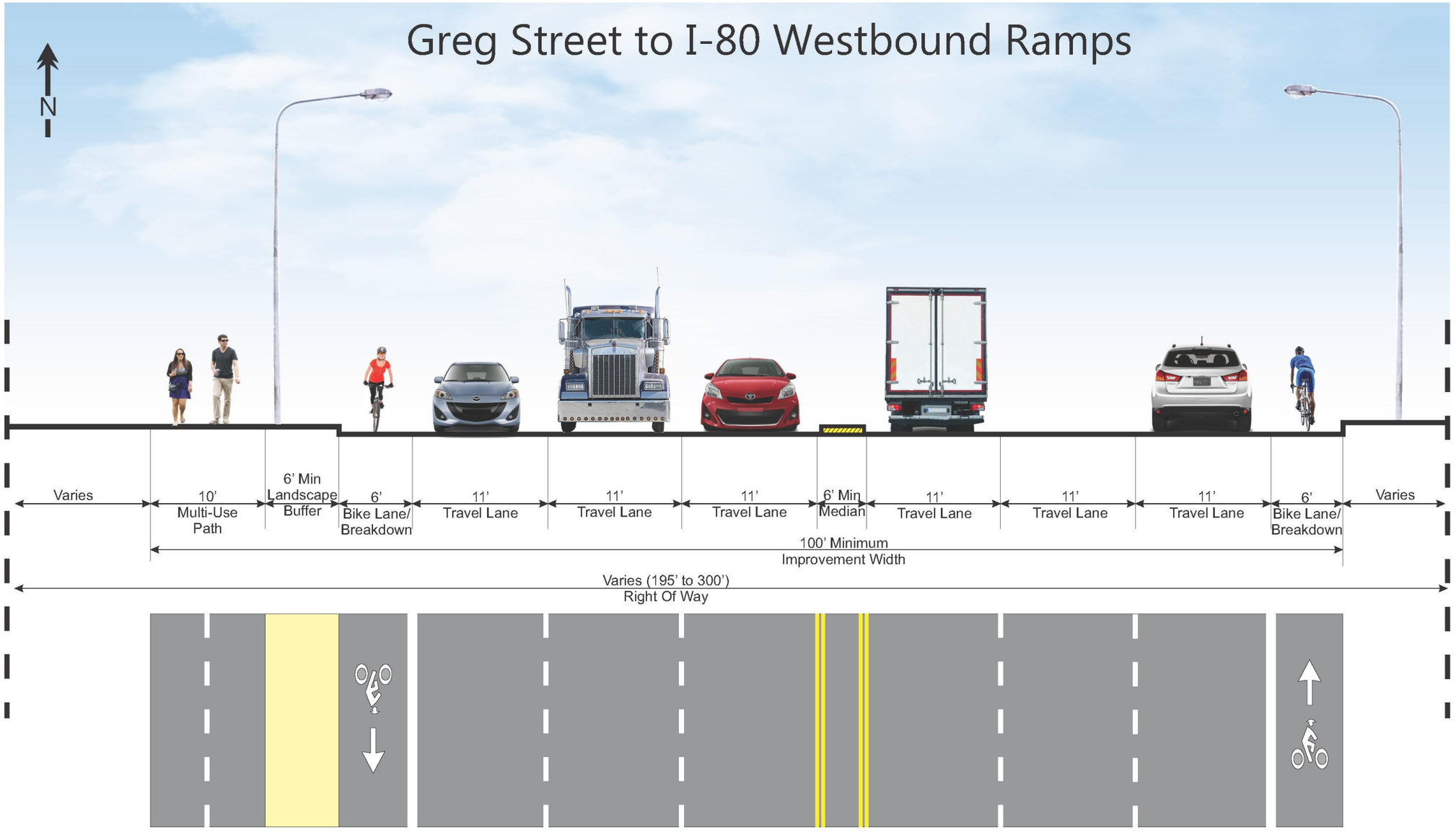


Figure 11-28. Recommended cross-section of Sparks Blvd between Greg St and I-80 WB Ramps

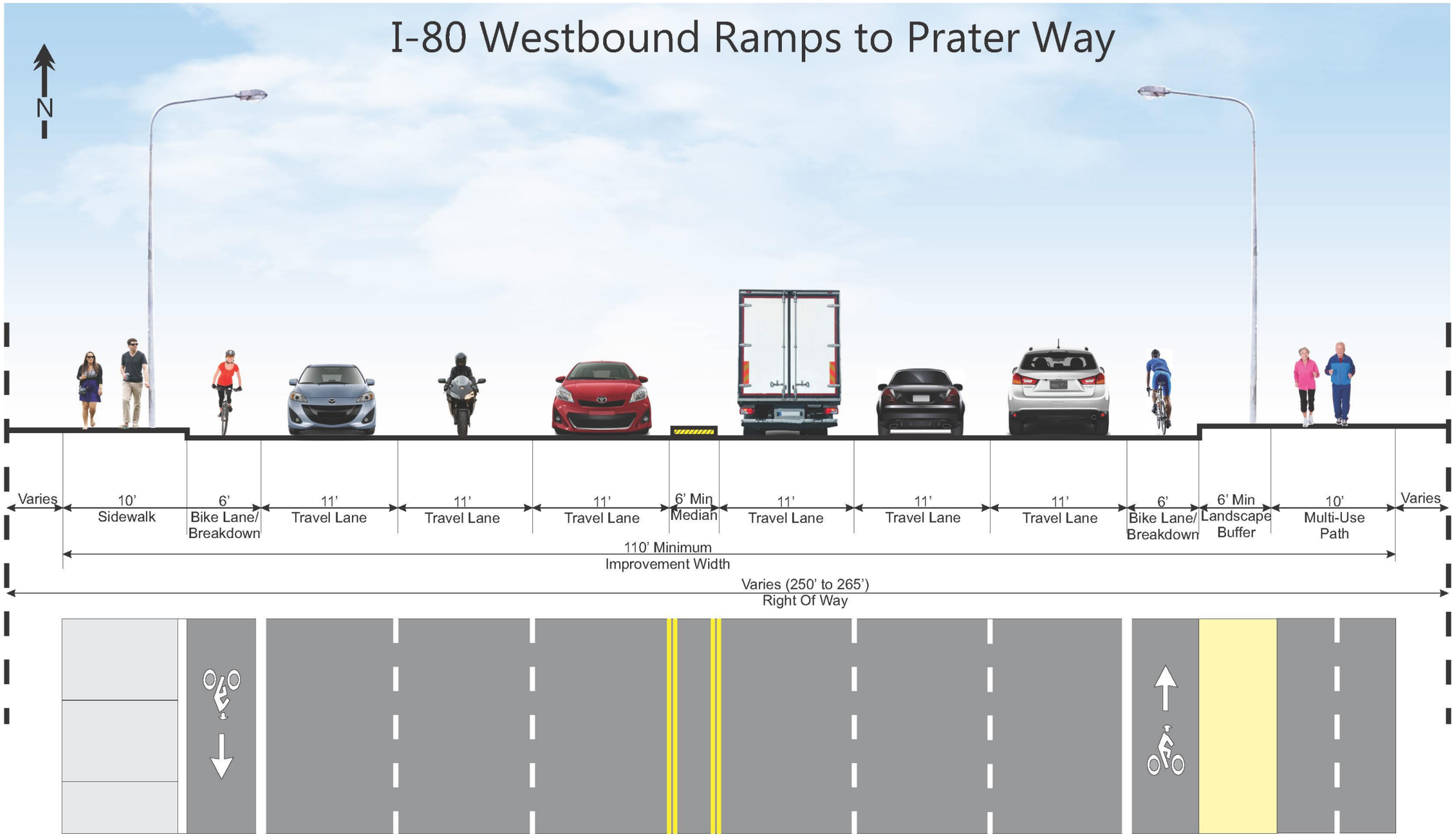


Figure 11-29. Recommended cross-section of Sparks Blvd between I-80 WB Ramps and Prater Way

11.5 Other Improvements

Projects included in this category are not time dependent, or tied to other phases, and therefore could be implemented either with the major packages or individually. The work elements are primarily safety related improvements at spot locations. The transit stop amenity upgrades at Express Street and Springland Drive are included in this category and can be addressed when demand occurs and funding is available. Improvements at the other two transit stops, Park Vista Apartments and Tyco Way, are included in the Near-Term 1 and Mid-Term 2 phases, respectively. The list of improvements in this category are listed in **Table 11-9**.

Table 11-9. Other Improvements

Phasing Category	Segment/Intersection	Mode	Recommended Improvement	Cost Estimate
Other Improvements	Transit stops on Sparks Blvd (2 locations)	Transit	Provide amenities such as Concrete Pad, Bench, Trash Cans, Shelter (Based on demand), Solar Lighting (Based on Demand) and Reflective Bus Signal	$100,000.00
	Express St	Safety	Intersection Safety Lighting	$75,000.00
	Baring Blvd	Safety	Pedestrian barrier @ Baring Blvd	$10,000.00
	Satellite Dr	Safety	Soundwall Modification @ Satellite Dr	$300,000.00

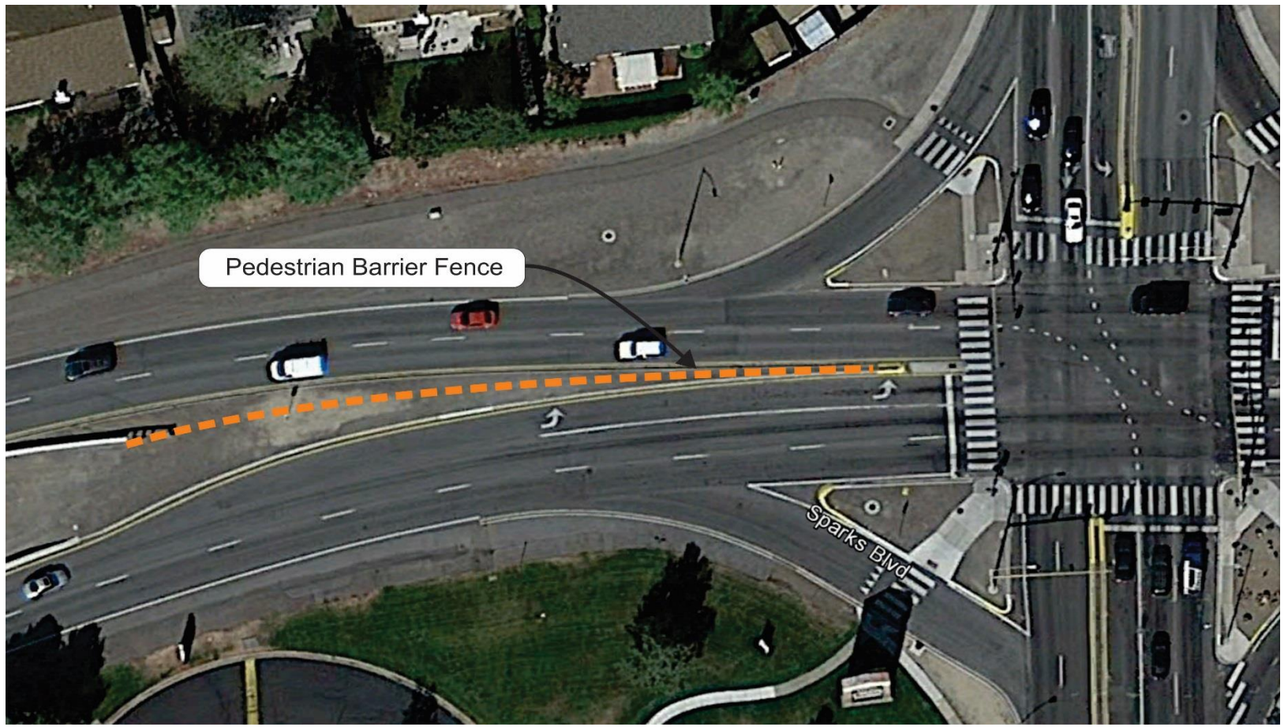


Figure 11-30. Median Fence at Baring Boulevard

11.6 Implementation Plan & Funding Sources

The broad range of recommended improvements throughout the corridor were grouped into packages for programming and funding purposes, with the goal of creating intelligent phases that:

- Order the Improvements Based on Need: Safety issues that can be addressed quickly (lower cost and less difficult to implement) should be positioned in early phases. Similarly, intersections and road segments that reach unacceptable operating conditions should be addressed first, while others which operate better, can wait. Note that the sequence (as shown in **Figure 11-1**) is essentially south to north along the east side of Sparks Boulevard, then north to south on the west side of Sparks Boulevard. This sequence is a direct reflection of the needed order of capacity increases.
- Deliver Simple/Inexpensive Projects Without Undue Delay: Closing a needed short sidewalk gap is reasonable in the near-term even if an adjacent large scale project is programmed later. Small projects (sidewalk gap closures for example) can be grouped to form a corridor wide project that would also obtain construction efficiency, by lumping together similar work items.
- Minimize Rework: To the extent possible, the recommended phasing scheme does not reconstruct areas previously constructed during earlier phases. No widening, sidewalk, or multi-use path work is "thrown away" in later phases.
- Position Expensive Elements in Later Years: Interchange reconstruction and widening structures is expensive, and it takes longer to program and obtain larger amounts of funding. Through creative construction phasing, the following program of projects places the most expensive improvement packages in the longest range horizon.
- Allow Flexibility: While there is solid logic behind the phasing plan, very few of the individual packages are absolutely dependent on early packages. As long as the Mid-Term 1 and Mid-Term 2 projects are delivered in earlier years, there is flexibility in the other areas.

Table 11-10 presents the Implementation Plan packages in a format similar to the RTC's "Program of Projects" for simple insertion into the Regional Transportation Improvement Program (RTIP). Potential funding sources for each project grouping are presented to begin discussions and help the RTC program the Sparks Boulevard improvements in the overall regional funding strategy.

Construction of the recommend improvements will provide high quality pedestrian and bicycle facilities, infrastructure that compliments and supports public transit service, and adequate vehicular capacity such that traffic operation are within policy Level of Service, through the 2035 horizon year. With new industrial development in the East Truckee Canyon, continued growth within the Legends at Sparks Marina and Kiley Ranch North developments, completion of the SouthEast Connector, and Pyramid Freeway-US 395 Connection improvements, Sparks Boulevard will soon become an even more critical asset in the regional roadway network. Considering that traffic operations are already falling below policy level of service at several key intersections, improvements on Sparks Boulevard should be high on the priority list of future regional roadway projects.

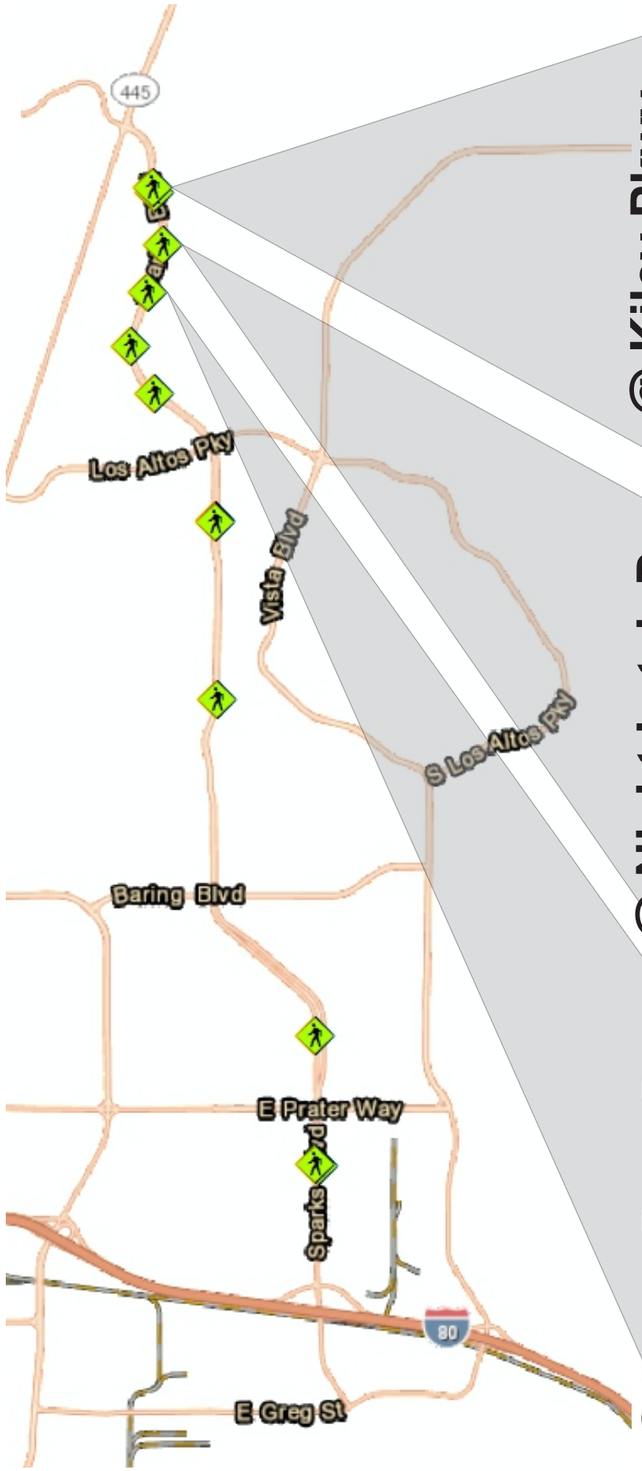
Table 11-10. Implementation Plan

Sparks Boulevard - Program of Projects	Objective	Total Project Cost			Potential Funding Source(s)
		Near-Term	Mid-Term	Long-Term	
Preliminary Engineering & NEPA	Environmental Clearance	$4,500,000			RTC Fuel Tax, STP Local, RRIF
Pedestrian Improvements (Near-Term 1)	Pedestrian Connectivity / ADA Access / Transit	$980,000			RTC Fuel Tax, CMAQ, Transporation Alternatives
Pedestrian Improvements (Near-Term 2)	Pedestrian Safety / Multi-Use Path Enhancement	$1,250,000			RTC Fuel Tax, CMAQ, HSIP, Transporation Alternatives
Greg to I-80 Widening (Mid-Term 1)	Capacity Improvements		$770,000		RTC Fuel Tax, STP Local, RRIF, Discretionary
East side Widening, I-80 to Springland (Mid-Term 2)	Capacity Improvements		$17,800,000		RTC Fuel Tax, STP Local, RRIF, Discretionary
Realignment at Springland (Mid-Term 3)	Capacity Improvements		$17,440,000		RTC Fuel Tax, STP Local, RRIF, Discretionary
Intersection Improvements (Mid-Term 4)	Capacity Improvements		$920,000		RTC Fuel Tax, STP Local, RRIF, Discretionary
West side Widening, Lincoln to Express (Long-Term 1)	Capacity Improvements			$4,970,000	RTC Fuel Tax, STP Local, RRIF, Discretionary
West side Widening, Greg to I-80 (Long-Term 2)	Capacity Improvements			$27,190,000	RTC Fuel Tax, STP Local, RRIF, Discretionary, NDOT Bridge
Other Improvements	Safety and Transit System Enhancements	$485,000			RTC Fuel Tax, STP Local, FTA Discretionary
		TOTAL OF ALL PHASES		**$76,305,000**	

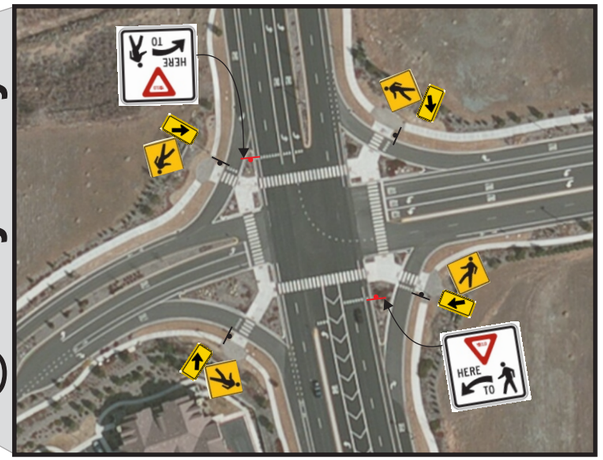
*Table is color-coded to match overall phasing strategy laid out in **Figure 11-1.**

APPENDICES

A. RECOMMENDED IMPROVEMENTS AT UNCONTROLLED CROSSWALKS



@ Kiley Pkwy



RECOMMENDATIONS

- Install "Yield Here to pedestrians" Sign (R1-5) at yield line. **(MUTCD - *SHALL*)**
- Install advance "Pedestrian" warning signs (W11-2) with "AHEAD" plaque (W16-9p), 200' from yield line. **(MUTCD - *MAY*)**
- All crosswalks to remain for future signalization.

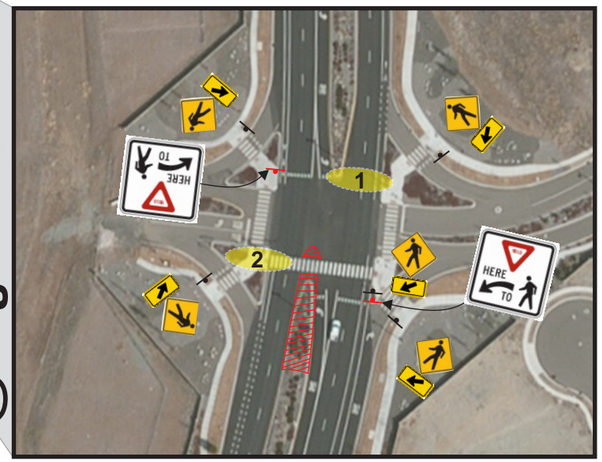
GENERAL NOTE:
MUTCD allows either yellow or fluorescent yellow green for sign backing color. However, color ***shall*** be consistent throughout.

ADVANCE WARNING SIGN ASSEMBLY


(W11-2)

AHEAD (W16-9p)

@ Night Latch Dr

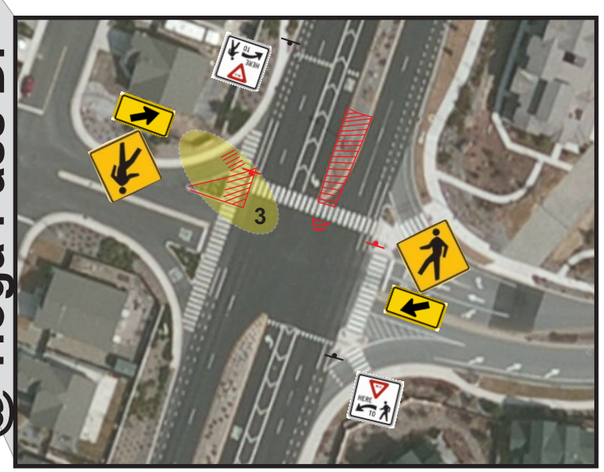


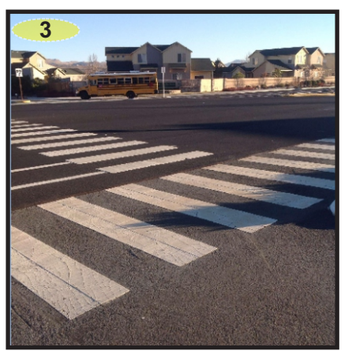
Existing pedestrian activated flashing system.

RECOMMENDATIONS

- Install "Yield Here to pedestrians Sign" (R1-5) at yield line. **(MUTCD - *SHALL*)**
- Install advance "Pedestrian" warning signs (W11-2) with "AHEAD" plaque (W16-9p), 200' from yield line. **(MUTCD - *MAY*)**
- Existing 60 second flashing time for 120' crossing distance. Change flashing time to 35 seconds.
- Long crossing distance crossing Sparks Blvd. Extend median and create median island pedestrian refuge.
- Make sign backing color consistent. Either yellow or fluorescent yellow green, change out signs accordingly.

@ Tioga Pass Dr





RECOMMENDATIONS

- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalk, crossing Sparks Blvd. **(MUTCD - *MAY*)**
- Advance warning signs located at 600' (SB) and 500' (NB) from yield lines. Relocate signs to 200' from yield lines and install "AHEAD" plaque (W16-9p). **(MUTCD - >125' for 40 mph, may)**
- Long crossing distance crossing Sparks Blvd. Extend median and create median island pedestrian refuge.
- Crosswalks intersect. Does not provide a terminus for the Sparks Blvd crossing. Extend island and construct pedestrian ramps.

TRAFFIC WORKS LLC

LEGEND

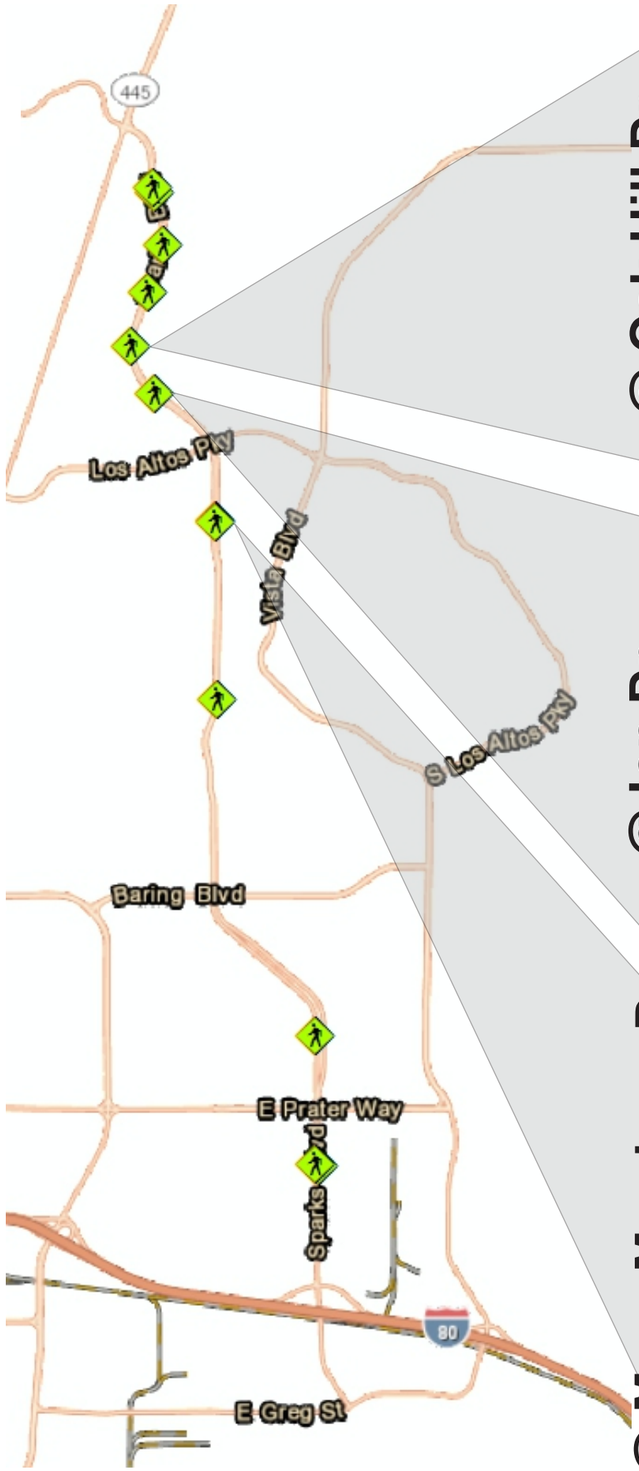
- Existing Signs
- Proposed Signs

Sparks Blvd Corridor Study

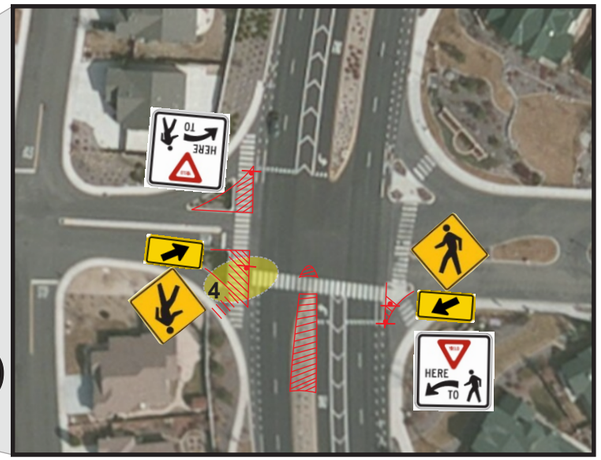
Regional Transportation Commission

FIGURE 1

RECOMMENDED IMPROVEMENTS AT UNCONTROLLED CROSSWALKS



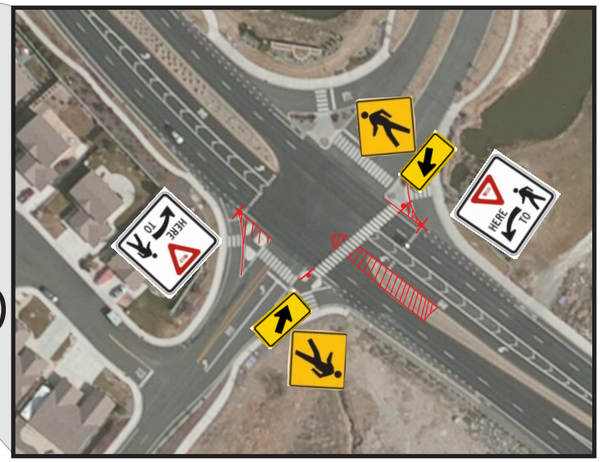
@ Oak Hill Dr



RECOMMENDATIONS

- Install "Yield Here to pedestrians Sign" (R1-5) at yield line. **(MUTCD - *SHALL*)**
  Modifications to existing islands required for placement of signs.
- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalk, crossing Sparks Blvd. **(MUTCD - *MAY*)**
- Install advance "Pedestrian" warning signs (W11-2) with "AHEAD" plaque (W16-9p), 200' from yield line. **(MUTCD - *MAY*)**
- Long Crossing distance crossing Sparks Blvd.
  Extend Median and create median island pedestrian refuge.
- Crosswalks intersect. Does not provide a terminus for the Sparks Blvd crossing. Extend island and construct pedestrian ramps.

@ Ion Dr



RECOMMENDATIONS

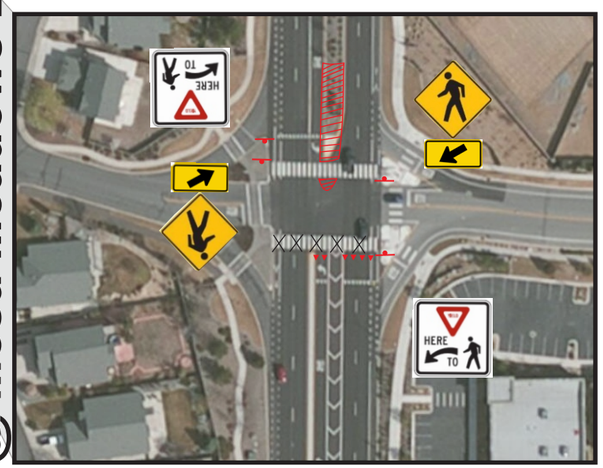
- Install "Yield Here to pedestrians Sign" (R1-5) at yield line. **(MUTCD - *SHALL*)**
  Modification to existing islands required for placement of signs.
- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalks, crossing Sparks Blvd. **(MUTCD - *MAY*)**
- Install advance "Pedestrian" warning signs (W11-2) with "AHEAD" plaque (W16-9p), 200' from yield line. **(MUTCD - *MAY*)**
- Long Crossing distance crossing Sparks Blvd.
  Extend Median and create median island pedestrian refuge.

ADVANCE WARNING SIGN ASSEMBLY

(W11-2)

(W16-9p)

@ Mesa Meadows Dr



RECOMMENDATIONS

- Install "Yield Here to pedestrians Sign" (R1-5) at yield line. **(MUTCD - *SHALL*)**
  Modifications to existing islands required for placement of signs.
- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalk, crossing Sparks Blvd. **(MUTCD - *MAY*)**
- Install advance "Pedestrian" warning signs (W11-2) with "AHEAD" plaque (W16-9p), 200' from yield line. **(MUTCD - *MAY*)**
- Remove crosswalk on south leg.
- Long crossing distance crossing Sparks Blvd.
  Extend median and create median island pedestrian refuge on north leg.
- Relocate "Yield" line for northbound through lanes.

GENERAL NOTE:
MUTCD allows either yellow or fluorescent yellow green for sign backing color. However, color ***shall*** be consistent throughout.

TRAFFIC WORKS LLC

LEGEND

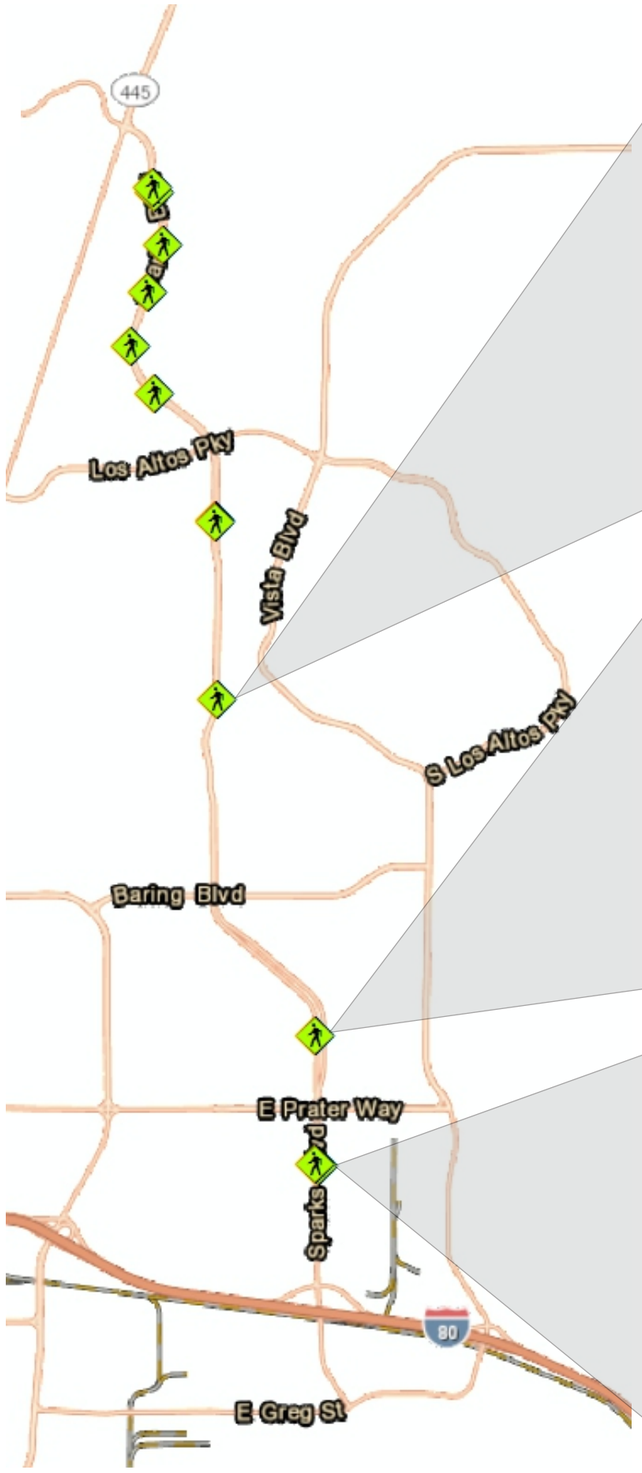
- - Existing Signs
- - Proposed Signs

Sparks Blvd Corridor Study

Regional Transportation Commission

FIGURE 2

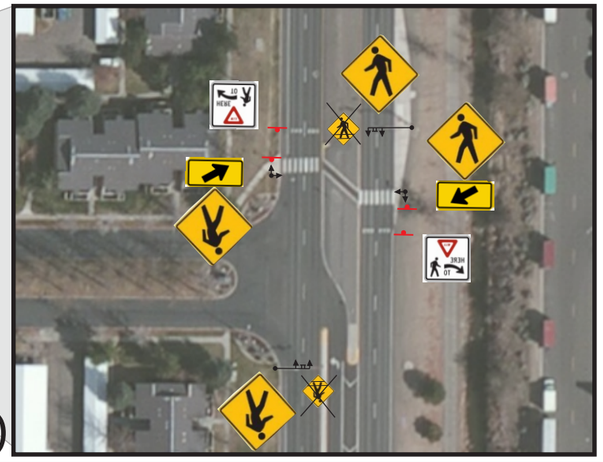
RECOMMENDED IMPROVEMENTS AT UNCONTROLLED CROSSWALKS



@ Satellite Dr

@ Express St

@ McCabe Park St



GENERAL NOTE:
MUTCD allows either yellow or fluorescent yellow green for sign backing color. However, color ***shall*** be consistent throughout.

RECOMMENDATIONS

- Advance warning signs located at 500' from yield lines. Relocate signs to 200' from yield lines, install "AHEAD" plaque (W16-9p). **(MUTCD - >125' for 40 mph, *MAY*)**
- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalk, crossing Sparks Blvd. **(MUTCD - *MAY*)**

ADVANCE WARNING SIGN ASSEMBLY

(W11-2)

(W16-9p)

RECOMMENDATIONS

- Relocate yield line to "Yield Here to pedestrians Sign" (R1-5) location.

RECOMMENDATIONS

- Install "Yield Here to pedestrians Sign" (R1-5) at yield line. **(MUTCD - *SHALL*)**
- Install pedestrian crossing sign (W11-2) with arrow plaque (W16-7P) at marked crosswalk, crossing Sparks Blvd. **(MUTCD - *MAY*)**
- Replace overhead "pedestrian" crossing signs (W11-2) with new MUTCD sign (W11-2).
- Advance warning signs located at 600' from yield lines. Relocate signs to 200' from yield lines, install "AHEAD" plaque (W16-9p). **(MUTCD - >125' for 40 mph, *MAY*)**
- Coordinate crosswalk landings with future bus stop improvements.

TRAFFIC WORKS LLC

LEGEND

- Existing Signs
- Proposed Signs

Sparks Blvd Corridor Study

Regional Transportation Commission

FIGURE 3

RECOMMENDED IMPROVEMENTS AT UNCONTROLLED CROSSWALKS

B. ALTERNATIVES DISMISSED

B. ALTERNATIVES DISMISSED

A few "un-conventional" methods were researched and considered to alleviate 2035 traffic capacity deficiencies with the hope of finding an alternative that would require only four through lanes on Sparks Boulevard.

B.1 Compact Grade Separation Alternative

Compact grade separation is slowly gaining recognition and acceptance as a viable alternative for improving traffic flow. This alternative was developed with the intention of minimizing the "footprint" and bettering the pedestrian/bike environment. These kind of grade separation options can be effective at locations where high volume arterials intersect high volume side streets (or other arterials). Some of the grade separation concepts considered for Sparks Boulevard are described below:

Echelon Interchange

One approach on both the main street and intersecting cross street is elevated as the cross streets intersect while the other approach halves on both the main street and side street intersect at-grade (see **Figure B-1)**. This forms a symmetrical but offset pair of two-phase intersections that are grade separated. Both intersections operate with two-phase signals and all approaches operate as one-way streets. The elevation gain is provided with the help of retaining wall structures. The major advantages of Echelon Interchanges are:

- Higher capacity and less delay than traditional at-grade intersections
- One-Way street operation results in enhanced progression for both streets.

However, Echelon Interchanges have some disadvantages such as high structural costs, no ability to make a U-Turn, and inconvenient crossings for pedestrian and bicycle traffic.

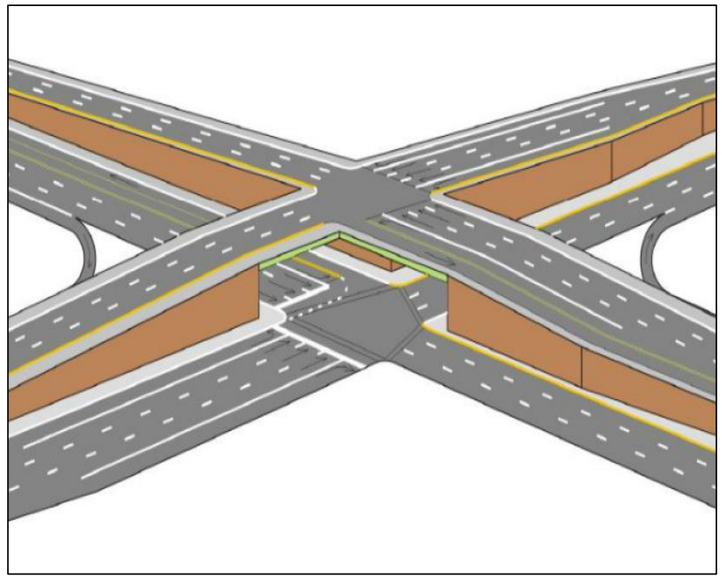


Figure B-1. Echelon Interchange

Center Turn Overpass Interchange

A Center Turn Overpass is similar to the Echelon Interchange except that the grade separation is introduced only for the left turning vehicles. This separates the left-turn movements on all approaches by relocating them to an elevated structure using narrow ramps within the median as shown in **Figure B-2**.

The arterial and cross street through and right-turn movements continue to use the roads at normal elevation. Both the elevated and at-grade intersections are controlled by a simple two-phase signal. The left-turn traffic descends from the elevated intersection and merges into through traffic lanes. In addition to providing all the advantages of an Echelon Interchange, this design also provides direct pedestrian crossing and roadside access to businesses similar to a conventional intersection. However, one of the major disadvantages (in addition to high structural cost) is that this design in patented and can incur high costs for rights to design.

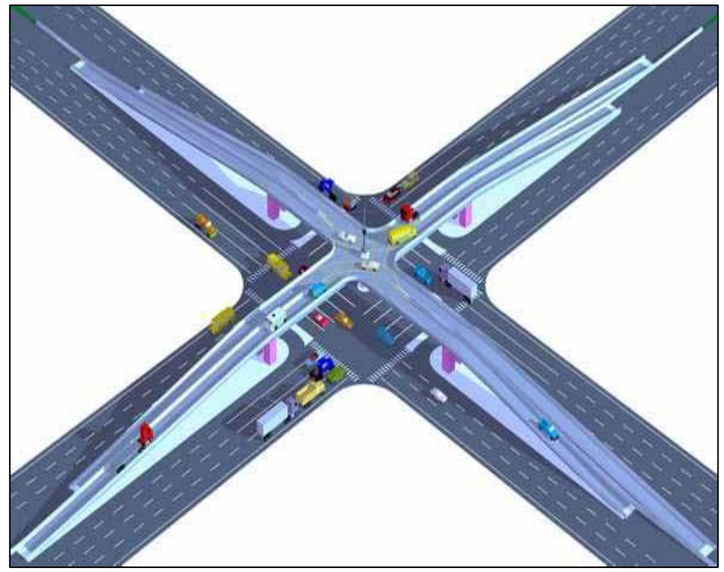


Figure B-2. Center Turn Overpass Interchange

Fly Overs with Signals

Construction of grade separated structures on all four approaches can be expensive and cumbersome to construct in high density areas such as along Sparks Boulevard, so a simplified concept version of compact grade separation was developed that does not require building structures on the side streets. This design could retain the existing access to all land uses on the side streets. Unlike the two previous grade-separated alternatives which require movements from both the main street and side streets to be grade separated, the concept of "Fly Overs" involves grade separation only for movements on Sparks Boulevard. All other movements would occur at a signalized intersection at street level. A conceptual drawing of a Fly Over at the Sparks Boulevard/Prater Way intersection is shown in **Figure B-3**.

This design has four major advantages compared to other grade separated designs:

- Lower cost of grade separation compared to the other alternatives (on only 2 approaches compared to all four approaches).
- Provides uninterrupted and unconstrained flow for through moving traffic on Sparks Boulevard.
- With the major traffic removed from the street level intersection, there is enough capacity for the side streets to function at good levels of service.
- Increased pedestrian and cyclist safety at intersection as a result of grade separation for the high volume and high speed movements.

The "Fly Over" could be aligned to the middle of Sparks Boulevard with the ramps on the outside (as shown by blue lines in **Figure B-3**). Alternatively, the grade separated through lanes could also be aligned along the outside of Sparks Boulevard with the ramps leading to an at-grade intersection on the inside as shown in **Figure B-4**.

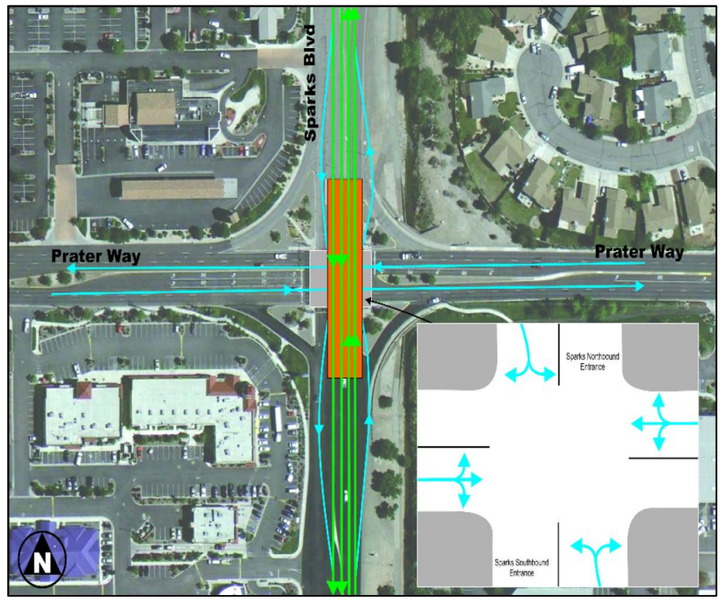


Figure B-3. Fly Over Concept

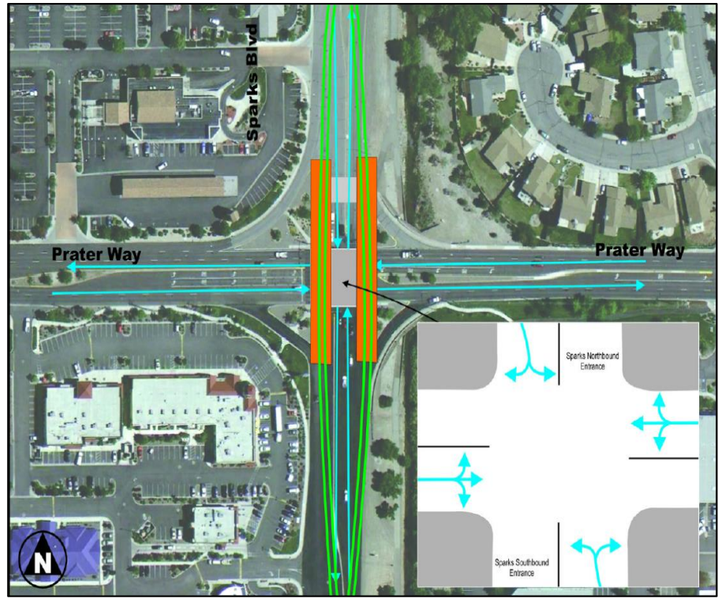


Figure B-4. Fly Over Concept 2

Fly Overs with Roundabouts

The "Fly Over" concept was further refined to provide even better traffic operations and enhance non-motorized safety by replacing the signal under the bridge with a roundabout. An illustration of this concept at the Sparks Boulevard/Prater Way intersection is shown in **Figure B-5**.

Some real world examples of this concept are shown in **Figure B-6** and **Figure B-7**.

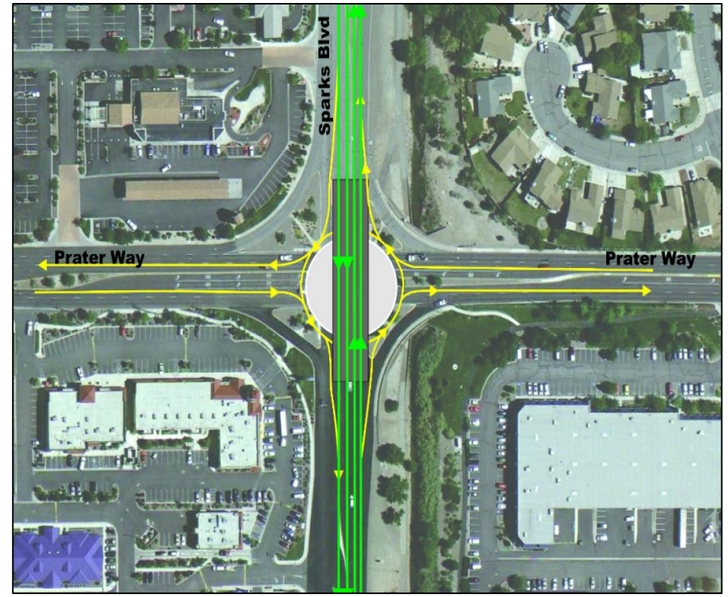


Figure B-5. Fly Over With Roundabout

Figure B-6. Fly Over With Roundabout Underneath

Figure B-7. Real World Example of A Fly Over With Roundabout

The advantages of replacing the signal with the roundabout underneath the flyover are:

- Improved safety for pedestrians
- Improved safety and capacity for vehicles
- Provides a traffic calming affect while moving traffic efficiently
- No traffic signals to operate
- Beautification opportunities

Which Compact Grade Separation Alternative?

All four compact grade separation concepts discussed above would achieve the goals of providing additional capacity, improving traffic operations and increasing safety. The Fly Over design achieves these goals with the fewest structures and the best results by providing uninterrupted flow for the high volume through movements on Sparks Boulevard. Constructing a roundabout underneath the Fly Over would provide additional benefits such as traffic calming and enhanced landscaping opportunities.

B.2 Unconventional Intersections Alternative

Conventional traffic signals have a finite capacity to serve all conflicting movements. Signal operations are the most capacity-limiting factor in overall arterial performance. When two high volume roadways intersect, a traditional signal fails to maintain capacity on both the conflicting streets.

Unconventional intersection designs can overcome these constraints by:

- Re-routing left turns: The primary purpose of arterials like Sparks Boulevard is to serve through vehicles. Moving left turns away from through movements will result in increased capacity at intersections by providing more green time to through movements.
- Reducing signal phases: Fewer phases will result in lower lost time and more green for the mainline.
- Removing and/or separating conflicts: Improves safety.
- Not requiring grade separation.

Different solutions can be adopted for different conditions based on the turning movement patterns, traffic volumes on intersecting approaches, right-of-way considerations and access management considerations. Unconventional intersection concepts were developed for the failing intersections on Sparks Boulevard as presented below.

Median U-Turn at Sparks Blvd/Springland Dr

One potential treatment to reduce intersection congestion and safety concerns is the Median U-Turn intersection. This intersection type eliminates direct left turns from the major and/or minor approaches. Drivers desiring to turn left from the major road onto an intersecting cross street must first travel through the at-grade main intersection and then execute a U-turn at the median opening downstream of the intersection. These drivers then turn right at the cross street. Drivers on the minor street desiring to turn left onto the major road must first turn right at the main intersection, execute a U-turn at the downstream median opening, and proceed back through the main intersection.

This design would be ideally suited to the Sparks Boulevard/Springland Drive/O'Callaghan Drive intersection. There is enough width between the northbound and southbound approaches of Sparks Boulevard to provide a U-Turn. By eliminating left turns at the main intersection, the intersection could operate with a two-phase signal. An illustration of a Median U-Turn at the Sparks Boulevard/Springland Drive intersection is shown in **Figure B-8**.

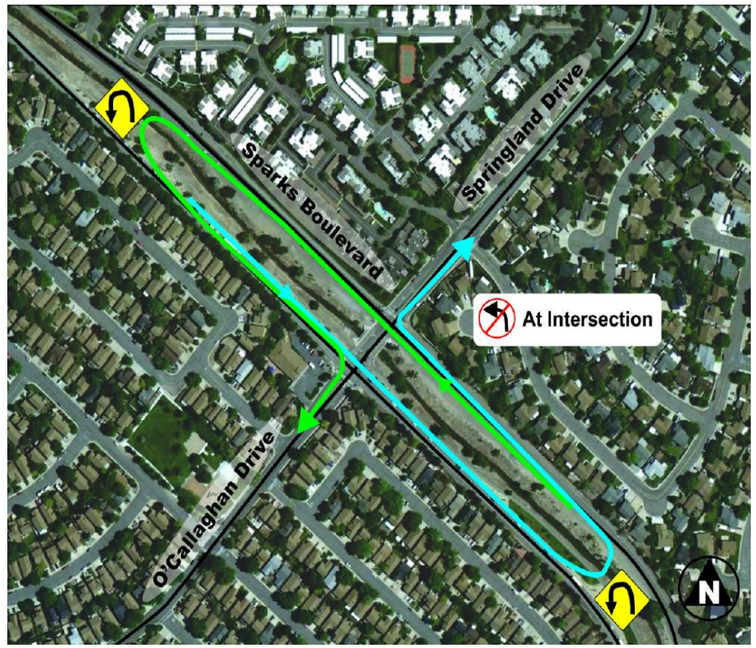


Figure B-8. Median U-Turn at Sparks Blvd/Springland Dr

Displaced Left Turns at Sparks Blvd/Baring Blvd

This is a partial Median U-Turn concept that is specifically applicable at the Sparks Boulevard/Baring Boulevard intersection. Compared to many other intersection locations on Sparks Boulevard, this location has a relatively lower number of left turns from Sparks Boulevard.

In this concept, drivers desiring to left turn from Sparks Boulevard onto an intersecting cross street must instead turn right, then execute a U-Turn at the median opening on the cross street and then travel back through the intersection. Eliminating left turns from Sparks Boulevard could provide significantly higher green times for through movements which carry the most volume at this intersection. The concept is shown in **Figure B-9**.

Figure B-9. Displaced Left Turns at Sparks Blvd/Baring Blvd

Quadrant Roadway Intersection at Sparks Blvd/Prater Way

At a Quadrant Roadway intersection, all four left-turn movements at a conventional four-legged intersection are rerouted to use a connector roadway in one quadrant. **Figure B-10** shows the connector roads (Boxington Way and Lillard Drive) and how all four of the left-turning movements could be rerouted to use it. Left turns from all approaches are prohibited at the main intersection, which consequently allows a simple two-phase signal operation. Each terminus of the connector road is typically signalized. These two secondary signal-controlled intersections usually require three phases. Signal control at all three signals can be coordinated. However, this would require building a new intersection and signal on Sparks Boulevard between Prater Way and Lincoln Way.

Figure B-10. Quadrant Roadway Intersection at Sparks Blvd/Prater Way

Bowtie Intersection at Sparks Blvd/Lincoln Way

The bowtie is an alternative to Median U-Turn intersections that uses roundabouts on the cross street and also has some elements of the displaced left turn concept. Similar to a Median U-Turn, left turns are prohibited at the main intersection, which therefore requires only a two-phase signal.

Drivers desiring to turn left from the minor road onto an intersecting arterial must instead go through the intersection, then make a U-Turn at the downstream roundabout, and then turn right onto the arterial at the main intersection. This configuration would reduce delay on the arterial roadway, increase capacity, and reduce the number of stops required. This configuration would be an ideal solution at the Sparks Boulevard/Lincoln Way intersection but it would require building a new roundabout on the east approach of Lincoln Way. A Bowtie concept at the Sparks Boulevard/Lincoln Way intersection is shown in **Figure B-11**.

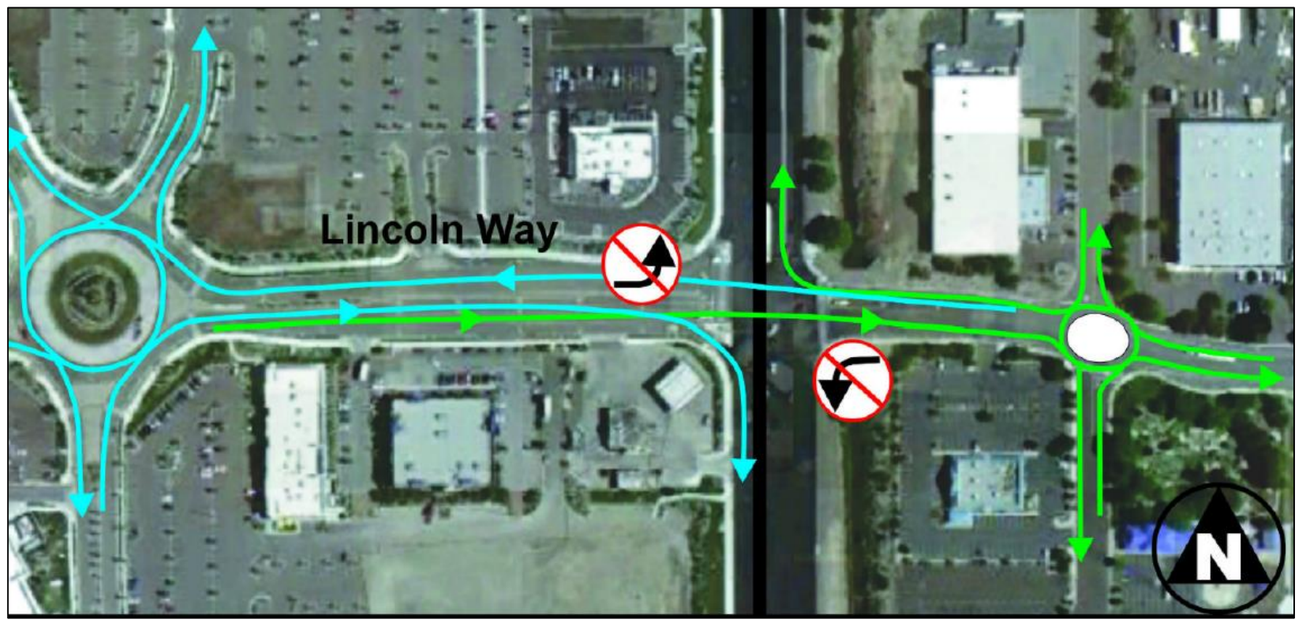


Figure B-11. Bowtie Intersection Concept at Sparks Blvd/Lincoln Way

B.3 Summary

The Widening (Chapter 6), Compact Grade Separation and Unconventional Intersections alternatives have their own advantages and disadvantages. All three alternatives were presented to the Sparks Boulevard Technical Advisory Committee at TAC Meeting #3 on May 19, 2014 with their corresponding advantages and disadvantages. All the three alternatives achieve goals of providing increased capacity along Sparks Boulevard, improving bike/pedestrian connectivity, and increasing safety. The lead agencies (RTC and City of Sparks), stake holders, consulting team and the TAC team have identified the recommended alternative based on a variety of factors. Compact Grade Separation and Unconventional Intersections alternatives were dismissed. The reasons for dismissal of these two alternatives are discussed below.

The important advantage of Compact Grade Separation is that it could provide uninterrupted traffic flow for through traffic on Sparks Boulevard and moves a significant amount of traffic away from the at-grade intersections. However, this alternative was dismissed due to high construction costs and the concern that grade separation may not fit the residential neighborhood feel along Sparks Boulevard.

There was a concern that grade separated fly overs could divide the neighborhood and change the nature of Sparks Boulevard, creating a “freeway” environment through the residential areas. This alternative was deemed not to fit into the current neighborhood character and was dismissed.

The main advantage of unconventional intersection designs is an opportunity to find additional capacity, without the need to widen Sparks Boulevard, by rerouting and/or diverting some turning movements. Since unconventional intersections divert left turning traffic, there would be increased delay for left-turning traffic and possibly cross-street through traffic. This alternative would also increase travel distances and the number of stops for left turning traffic, thereby increasing overall travel time. Although these designs involve relatively fewer modifications on Sparks Boulevard compared to the other two alternatives, they would require additional improvements and/or right-of-way on side streets or connections (such as roundabouts on cross streets, median U-Turns on Sparks Boulevard, etc.,). Another disadvantage of unconventional designs is that they can cause driver confusion and may result in driver disregard for left-turn prohibitions at the main intersection. This alternative was dismissed primarily because of out-of-direction travel and the side-affects associated with displacing left turns.

C. SAFETY

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C.1 Walking Audit Findings

Traffic Works staff walked the entire 6.6 mile corridor length in October 2013, inventorying existing general conditions and giving special attention to potential safety issues related to each travel mode. Hundreds of GPS data points were collected using a mobile app and were downloaded into data layers for use during the study. For example, the 253 existing pedestrian ramps within the corridor were geo-located (with geo-tagged photographs). During the walking audit several safety issues were identified that should be addressed in future construction projects. Ordered south to north, the recommended safety improvements resulting from the walking audit are:

- Create better sight lines, or relocate the multi-use path crossing, at the I-80 westbound ramps where the crosswalk traverses the sweeping southbound to westbound right-turn lane to the pedestrian refuge island. It is currently very difficult for pedestrians and drivers to notice each other at this location. It is recommend the multi-use path be moved to the east side of Sparks Boulevard north of the westbound ramps and having pedestrians and cyclists cross Sparks Boulevard on the north side of the I-80 westbound ramps intersection as shown in **Figure 8-8**. This change is expected to move most pedestrians/cyclists to a safer (certainly more visible) crossing location.
- Correct the poor alignment of the northbound through lanes on Sparks Boulevard between the I-80 WB Ramp and Lincoln Way intersections. The unnecessary curvature creates a full lane-width offset that could contribute to side-swipe type collisions. Improved geometry is illustrated in **Figure C-1**.
- Replace the overhead flashing beacons at the pedestrian crossing between the Park Vista Apartments and the bus stop on the east side of Sparks Boulevard with a Rectangular Rapid Flashing Beacon (RRFB) system. The RRFB system is better at capturing driver attention and indicating the presence of pedestrians. Refer back to Section 8-9 for additional details.

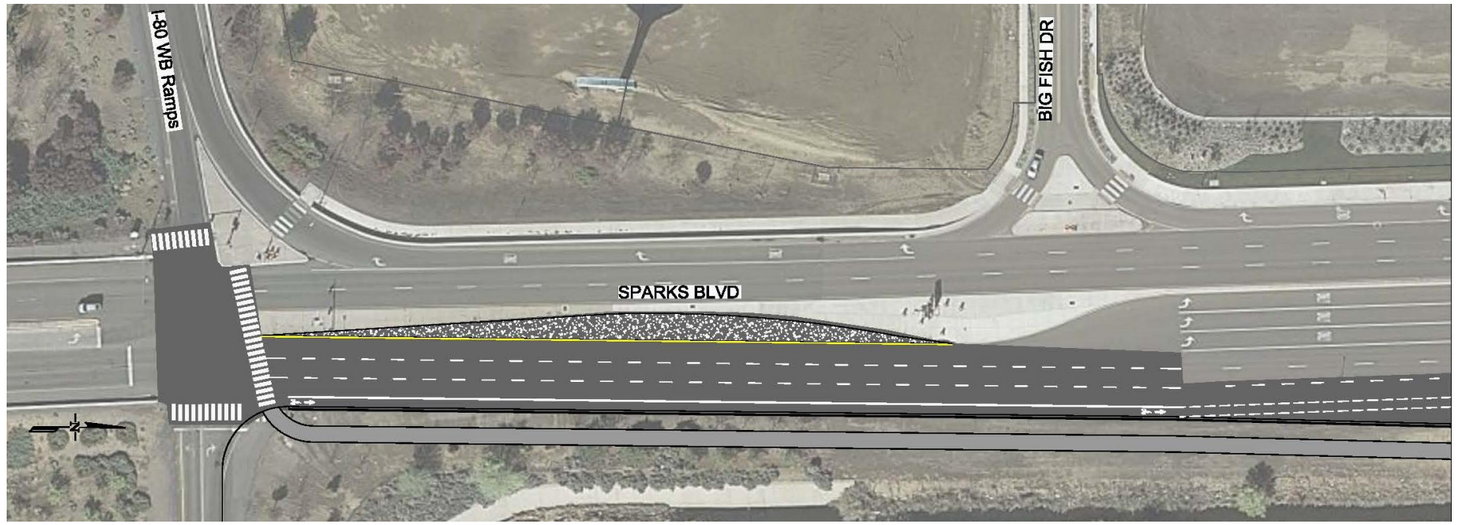


Figure C-1. Realignment of NB Through Lanes on Sparks Blvd

- Increase the lighting levels in the multi-use path tunnels. More lighting fixtures may be needed. New white paint would brighten the walls as well.
- Consider installing a pedestrian barricade fence in the median south side of Baring Boulevard (between Baring and the Truckee Drain). Reed High School students are known to cross Sparks Boulevard at inappropriate locations just south of Baring Boulevard. If this undesirable behavior continues after new sidewalk and an improved path are constructed, the fence may be needed.
- Modify the existing soundwall and/or intersection geometry in the southeast quadrant of the Satellite Drive/Sparks Boulevard intersection to provide appropriate intersection sight distance and stopping sight distance between the northbound approach and the adjacent crosswalk. The subject sound wall is shown in **Figure C-2**.

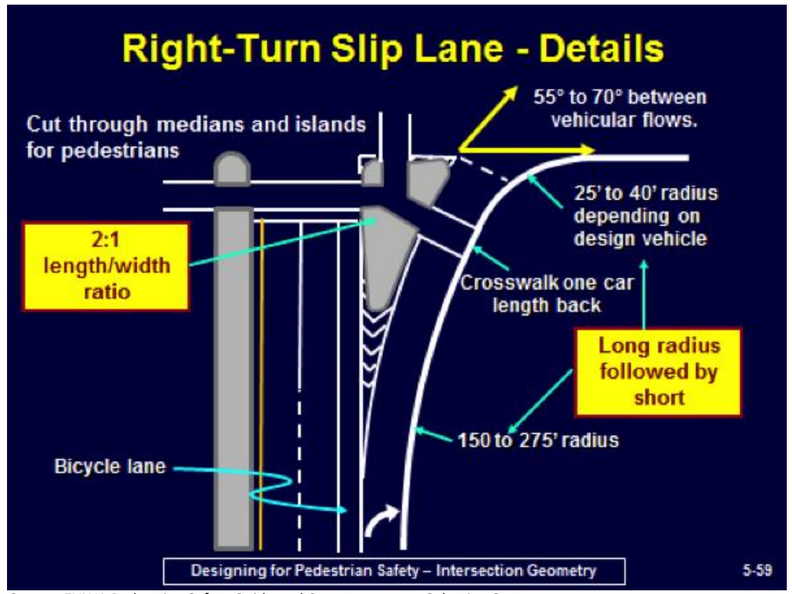
C.2 Design Recommendations

The safety concerns noted above are good reminders that future design efforts must consider the safety of all roadway users. In support of the Zero Fatalities goal adopted by NDOT and most local agencies, future improvement projects should ensure that:

- Designers review and confirm appropriate intersection sight triangles throughout the corridor with all new designs.
- All new channelized right-turn slip lanes should be designed with approximately 70 degree angle approaches rather than long sweeping lanes that require merging. The sweeping right-turn lanes promote higher speeds at crosswalk locations and are difficult for aging drivers who are unable to turn their heads sharply to look for gaps in oncoming traffic. Good geometrics are shown in **Figure C-3** and are required by RTC design standards.
- Objects are removed from the Roadside Clear zones throughout the corridor. A Clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely, or regain control of a vehicle that has left the roadway. As the roadway is widened in the southern portion of the corridor, new travel lanes may be closer to fixed objects

along the shoulder. There will be a temptation to leave the existing objects and features (trees for example) within the clear zones. While roadway design often includes balancing many competing factors, safety is not an element that should be compromised. We recommend changing the roadway alignment to avoid the objects if they are not able to be moved.

Figure C-2. Soundwall @ Satellite Dr



Source: FHWA Pedestrian Safety Guide and Countermeasure Selection System

Figure C-3. Right Turn Slip Lane Design

This is Sparks Boulevard - Providing Safe and Enjoyable Connections to Residents on Two Wheels, Four Wheels, and Their Own Two Feet

RTC

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