Sun Valley Boulevard Corridor Study

FINAL

Corridor Report

February 2015

Prepared by:

Wood Rodgers, Inc.

With:

Traffic Works

Nelson-Nygaard

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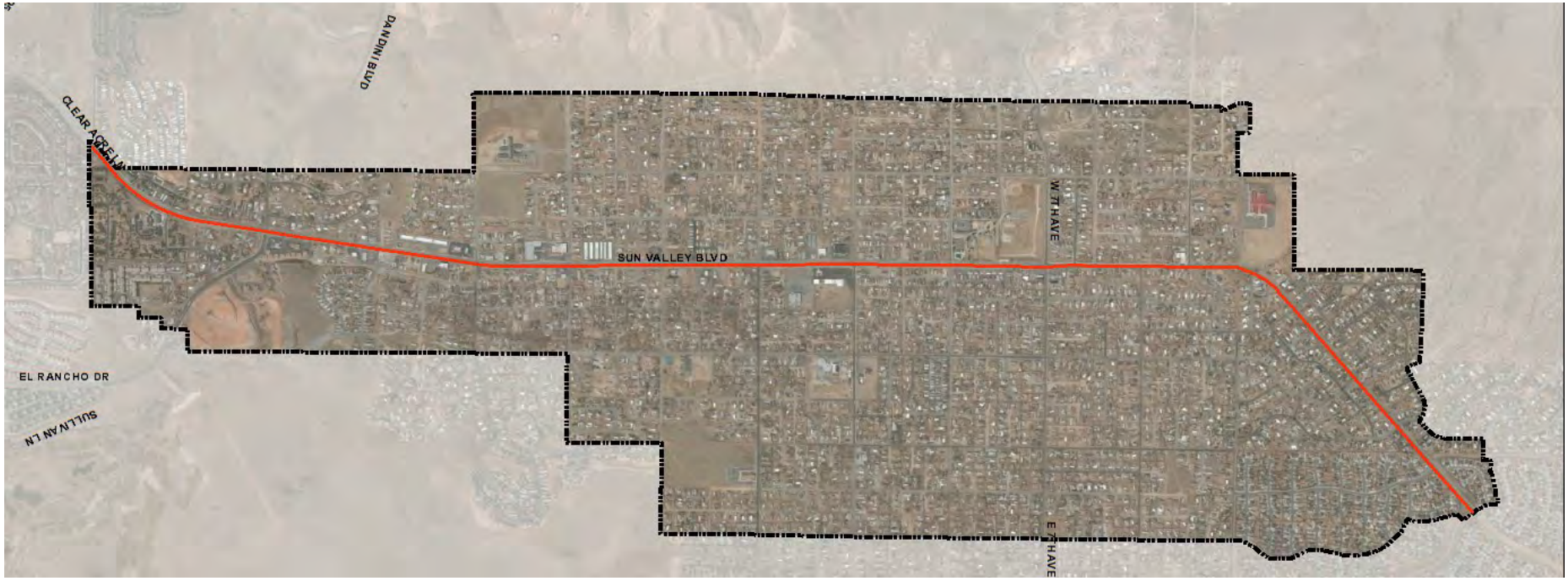
Executive Summary

Introduction

Sun Valley Boulevard is the main corridor for Sun Valley and serves as an important north/south connector to residential neighborhoods, schools, community services, and commercial businesses. Sun Valley Boulevard acts as the primary access to US 395 and the gateway to the community of Sun Valley. Transit ridership and pedestrian activity are prevalent in Sun Valley however there is currently limited pedestrian infrastructure along Sun Valley Boulevard and within the valley to serve pedestrian needs. Pedestrian safety and access are concerns among users and the community.

Project Area

The Sun Valley Boulevard Corridor study area includes Clear Acre Lane/Sun Valley Boulevard from Scottsdale Road to Highland Ranch Parkway in the North/South direction and Chocolate Drive to Yukon Drive in the East/West direction.



Project Area

Project Overview

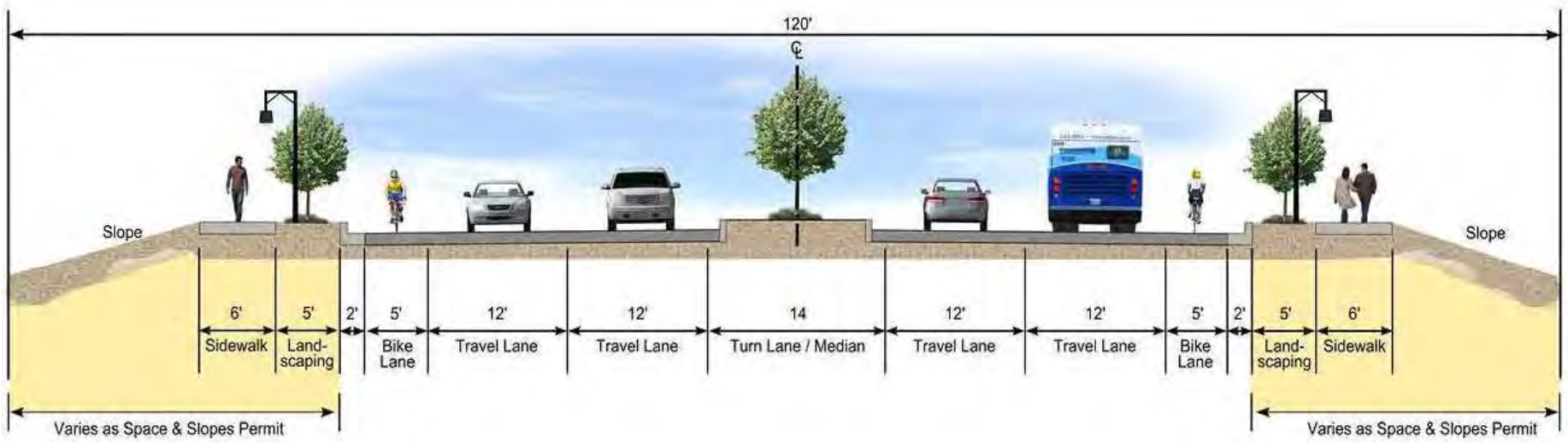
The public engagement approach for the Sun Valley Boulevard Corridor Study promoted a collaborative environment for the corridor presented by the Technical Advisory Committee, Stakeholders, and the Public. The preferred alternative was developed to include pedestrian, bicycle, transit, and traffic improvements along the corridor. The proposed alternatives maintain the existing four lane and two lane configurations, respectfully, and utilize the ample existing right of way to provide sidewalk, bicycle, landscaped medians and parkway planters (where available width exists). A sample cross section for the area of Sun Valley Boulevard that has the greatest "main street" characteristics, between 1st Avenue and 7th Avenue is provided below.

A Complete Streets approach was utilized throughout the corridor, with pedestrian and wheelchair facility improvements and continuous access along Sun Valley Boulevard being high priorities according to public input. Roadside ditches convey storm water along Sun Valley Boulevard and community streets. In many cases, pedestrians have to choose to walk along/in the roadside ditches or along the edge of the roadway. As a result, continuous sidewalk on both sides of Sun Valley Boulevard is included as part of the preferred alternatives. In most cases, the addition of sidewalk will involve replacing the existing roadside ditch with curb, gutter, sidewalk, and installation of piping to convey the storm water. This plan is consistent with the Sun Valley Area Plan (SUN 2.4). Where right of way widths are ample, detached or separated sidewalk is preferred.

Furthermore, side streets which connect to a signalized intersection on Sun Valley Boulevard also are proposed to receive sidewalk along at least one side of the street to provide pedestrian connectivity to Sun Valley Boulevard, which is the primary mobility corridor within the community (SUN 2.7). In addition to sidewalk improvements, several pedestrian crossings are proposed to be improved with a rapid flashing beacons and pedestrian refuge islands to increase pedestrian safety and access across Sun Valley Boulevard at unsignalized intersections (SUN 2.10).

Sun Valley Boulevard currently has a discontinuous bicycle network consisting of a mix of striped bicycle lanes, paved shoulders, and a limited shoulder that requires a bicyclist to ride in the travel lane. Improved bicycle facilities are included with each of the preferred options to provide safe bicycle travel along Sun Valley Boulevard (SUN 2.4 & 2.16).

Transit improvements are included as part of this corridor study and consist of transit stop improvements (SUN 2.4) and a conceptual "Dial 'N' Ride" service (SUN 2.15).



Proposed Cross Section—1st Avenue to 7th Avenue

Traffic improvements were considered for areas with elevated crash frequencies and intersection configurations, which will help alleviate existing traffic congestion and improve safety. Sun Valley Boulevard traffic patterns will largely remain the same as lane neither reductions nor widening are proposed as part of this study (SUN 2.1 & 2.5).

Implementation Strategy

This planning effort for the Sun Valley Boulevard Corridor Study seeks to cast a 20 year vision for transportation improvements in the community. Due to funding constraints, all of the conceptual improvements will not likely occur at once. Rather, the improvements will likely occur incrementally and, as a result, the project has developed the following implementation strategy. This implementation strategy was generated considering preliminary cost estimates, public opinion of need, and potential future funding. The following summary of improvements provides an overview of segment improvements, preliminary cost and targeted implementation time period:

Note: The Summary of Improvements provided below utilizes the targeted implementation of Short-Term (±1-5 years), Mid-Term (±5-15 years), and Long-Term (15+ years). The summary of Improvements table below has been color coded to help communicate the timing of each project.

Short-Term ±1-5 years	Mid-Term ±5-15 years	Long-Term 15+ years

Program of Project	Project Cost & Timing	Description of Improvements
SCOTTSDALE TO CRYSTAL		
SCOTTSDALE TO CRYSTAL	$200,000	FILL IN GAP IN EXISTING SIDEWALK - EXISTING ROAD TO REMAIN
CRYSTAL TO EL RANCHO	$3,100,000	NEW SIDEWALK (EAST SIDE ONLY) - NEW SIDEWALK AND BIKE ROUTE ON LEONESIO DRIVE, PAVEMENT REHAB
EL RANCHO TO 1STREET	$4,800,000	EXISTING ROADSIDE DITCHES PIPED, ADDED SIDEWALK AND LANDSCAPING WITH LIGHTING, BIKE LANE, PAVEMENT REHAB
1ST TO 7TH - OPTION 1	$12,700,000	EXISTING ROADSIDE DITCHES PIPED, ADDED SIDEWALK AND LANDSCAPING WITH LIGHTING, BIKE LANE, PAVEMENT REHAB
7TH TO QUARTZ	$2,000,000	ADDED SIDEWALK AND CURB & GUTTER, BIKE LANE, PAVEMENT REHAB
QUARTZ TO MIDDLE FORK	$1,600,000	NEW SIDEWALK (WEST SIDE ONLY), BIKE LANE, PAVEMENT REHAB
MIDDLE FORK TO LEON	$2,100,000	NEW SIDEWALK (EAST SIDE ONLY), BIKE LANE, PAVEMENT REHAB
LEON TO HIGHLAND RANCH	$1,700,000	ADDED SIDEWALK AND CURB & GUTTER, BIKE LANE, PAVEMENT REHAB
BREAKOUT PROJECTS		
SKAGGS CIRCLE INTERSECTION	$240,000	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL
GEPFORD PARKWAY INTERSECTION	$240,000	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL
6TH AVENUE INTERSECTION	$240,000	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL
1ST AVENUE	$390,000	REALIGNMENT OF INTERSECTION, MILL & FILL, AND SIGNAL MODIFICATIONS
7TH AVENUE - PH 1	$510,000	REALIGNMENT OF NORTHBOUND MERGE ALONG SUN VALLEY BOULEVARD ONLY, MILL&FILL, AND SIGNAL MODIFICATIONS
7TH AVENUE - PH 2	$1,770,000	ADDITIONAL DEDICATED LEFT TURN LANES ON 7TH, MILL & FILL, AND SIGNAL MODIFICATIONS
EL RANCHO DRIVE	$160,000	DRAINAGE, STRIPING, TRANSIT, AND SIDEWALK IMPROVEMENTS (NO SIGNAL MODIFICATIONS NEEDED)
EAST-WEST PEDESTRIAN CONNECTIVITY		
OUTBOUND STATION(S)	$100,000	UPGRADE OUTBOUND STATIONS WITH LARGE NUMBER OF DEPARTURES CURRENTLY LACKING A PAD, SHELTER, AND BENCH AT 5 LOCATIONS (EST $20K EACH)
EAST-WEST PEDESTRIAN CONNECTIVITY	$12,310,000	ADD SIDEWALK FOR EAST-WEST CONNECTIVITY ON MAJOR CROSS STREETS
DIAL A RIDE	$TBD	DEMAND RESPONSE TRANSIT SERVICE

Summary of Improvements

Corridor Vision

Introduction

Sun Valley Boulevard is the main corridor for Sun Valley and serves as an important north/south connector to residential neighborhoods, schools, community services, and commercial businesses. Sun Valley Boulevard acts as the primary access to US 395 and the gateway to the community of Sun Valley. Transit ridership and pedestrian activity are prevalent in Sun Valley however there is currently limited pedestrian infrastructure along Sun Valley Boulevard and within the valley to serve pedestrian needs. Pedestrian safety and access are concerns among users and the community.

This report is divided into two chapters: Chapter 1 discusses community wide and general project items such as existing conditions, public outreach, and traffic conditions and Chapter 2 focuses on the preferred alternatives by road segment and project recommendations for Sun Valley Boulevard.

Project Area

The Sun Valley Boulevard Corridor study area includes Clear Acre Lane/Sun Valley Boulevard from Scottsdale Road to Highland Ranch Parkway in the North/South direction and Chocolate Drive to Yukon Drive in the East/West direction.

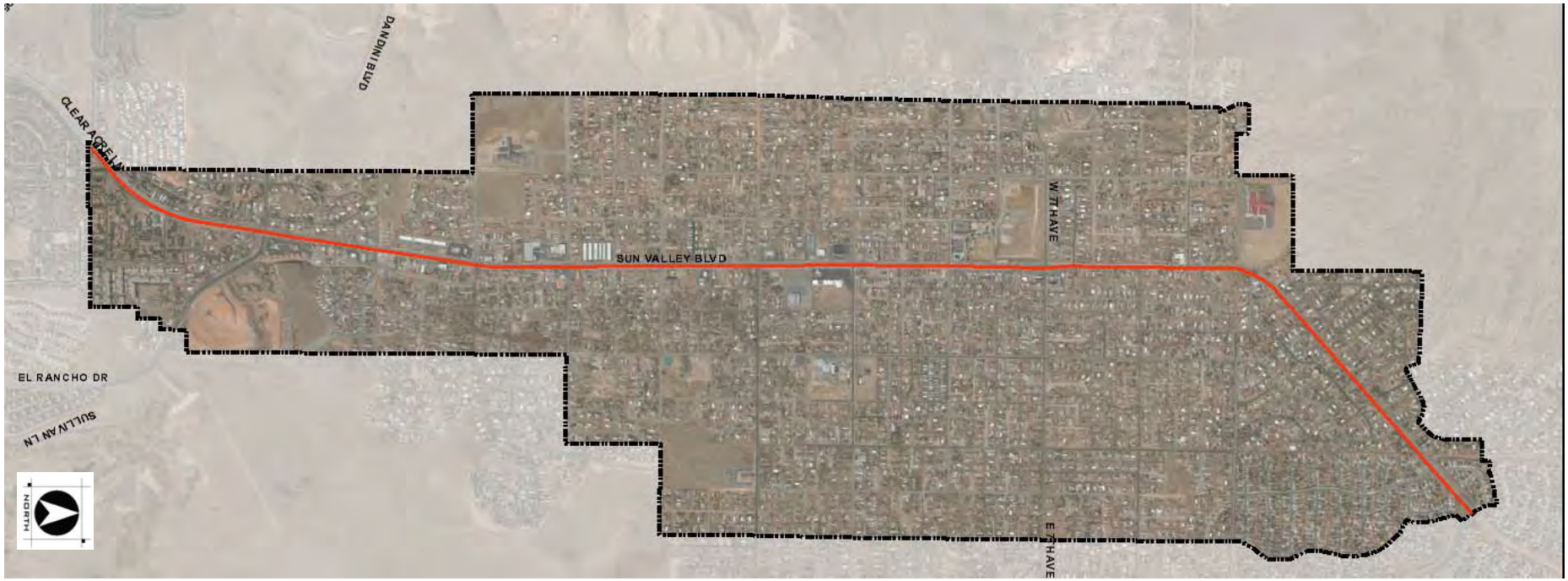


Figure 1 - Project Map

Purpose

The purpose of the Sun Valley Boulevard Corridor Study is to identify multimodal transportation (bicycle, pedestrian, transit, auto) needs, solutions, and opportunities which can provide better improved access, safety, and community pride for the residents and visitors within Sun Valley.

Goals

Project goals were identified and refined with the project Stakeholder Group, Technical Advisory Committee, open house and Charette design workshop. The following community goals were taken from public comment during these meetings:

- Improve pedestrian access with new sidewalk
- Provide safe crossing opportunities for pedestrians
- Increase pedestrian safety with improved street lighting
- Create safer streets that are more inviting for families, pedestrians, and bicycles
- Improve localized flooding and drainage constraints
- Allow for all travel modes to move smoothly and safely through the corridor
- Expand transit service and improve transit facilities
- Maintain community pride with landscaping and lighting
- Eliminate roadside ditches
- Improve bicycle facilities
- Increase access to adjacent neighborhoods for greater pedestrian circulation
- Infrastructure improvements that could generate private investment in the community

Sun Valley Stakeholder Goal Setting Meeting

Sun Valley Open House #1

Washoe County Land Use and Transportation Master Plan

Consistent with the project goals, the Washoe County Master Plan for Sun Valley Boulevard identifies a goal to create a multimodal corridor along Sun Valley Boulevard to provide travel access to connect with the regional transportation system. The following goals and policies are identified in the County's Master Plan and Sun Valley Area Plan:

[from Washoe County Master Plan, Land Use and Transportation Element]
Goal Thirty-one: Washoe County shall create a multimodal corridor along Sun Valley Boulevard to provide travel access to connect with the regional transportation system.

Policies:

LUT.31.1 The multimodal corridor will be created to accommodate auto, bus, bicycle and pedestrian traffic to facilitate the linkage between these different modes.

LUT.31.2 Washoe County should consider proposing improvements along the Sun Valley Boulevard multimodal corridor for all the various modes of transportation.

a. Roadway improvements should be considered that support multi-occupant vehicle use and priority corridors, while signal coordination is optimized based on current traffic flow patterns.
b. For pedestrians, segments of missing sidewalks should be completed to provide direct and continuous connections between destinations and to transit, to continue adding enhanced pedestrian crossings at strategic locations; and continue installation of pedestrian signals and crossing countdown heads.
c. Complete missing bicycle trails and lanes to provide direct and continuous connections; consider constructing needed underpasses at high volume locations to provide safe connections; and provide bicycle route signals.
d. Transit should construct enhancements at key high-frequency transit stops including shelters, benches and trash receptacles and operational system efficiency improvements, such as bus bypass lanes, bus signal prioritization and other improvements to increase the efficiency of the bus network.

[from Washoe County Master Plan, Sun Valley Area Plan]
Goal Two: The regional and local transportation system in the Sun Valley planning area will be a safe, efficient, multi-modal system providing significant connections to the greater region, and access to commercial services, public lands and public services available in the community. The system will contribute to the preservation and implementation of the community character as described in the Sun Valley Vision and Character Statement.

Policies (filtered to those that apply to this project)

SUN.2.1 Level of service "C" or above is the desired level for all regional roads in the Sun Valley planning area.

SUN.2.3 New construction or redevelopment of commercial properties along Sun Valley Boulevard shall combine vehicle entrances with adjacent properties to provide combined parking and landscaping. If contiguous commercial properties are not developed at the same time, then the vehicle access point to Sun Valley Boulevard will be located close to the property line between adjacent parcels.

SUN.2.4 Remaining right-of-way along Sun Valley Boulevard should be utilized to establish an "edge" that includes covered ditches, public transit improvements, bicycle/pedestrian paths and landscaping.

SUN.2.5 The number of traffic signals on Sun Valley Boulevard shall be kept to the minimum number required to provide for safe and efficient traffic flow.

SUN.2.7 The Nevada Department of Transportation, Regional Transportation Commission and Washoe County shall jointly seek funding to construct sidewalks or paved paths along both sides of Sun Valley Boulevard and main streets such as: 4th, 5th, 6th and 7th Avenues when the safety of pedestrians and children walking to and from schools requires such facilities.

SUN.2.10 The Nevada Department of Transportation, Regional Transportation Commission, Sun Valley General Improvement District and Washoe County shall continue to work with the local community to implement traffic/pedestrian safety improvements within Sun Valley.

SUN.2.11 Needed infrastructure improvements to streets and drainage ditches that are required for improved pedestrian safety, transit stops and expanded bus

service within the entire valley, shall be included in the Washoe County Capital Improvements Program following the completion of a joint study between the Washoe County Public Works Department and the Regional Transportation Commission.

SUN.2.13 The Regional Transportation Commission is urged to locate a multi-modal transit stop (parking, bicycle racks, shelters, concessions) on Sun Valley Boulevard.

SUN.2.15 Washoe County will advocate for the expansion of transit services to and within the Sun Valley planning area pursuant to the Regional Transportation Commissions updated 2030 Plan.

SUN.2.16 Improvements listed in the Regional Transportation Commission's Sun Valley Bikeway Plan shall be incorporated into the Washoe County Capital Improvements Program. The bikeway plan will be integrated with the local and regional trails system and provide access to commercial and public services (See Recreational Opportunities Plan map).

These policies have been incorporated into the Sun Valley Boulevard Corridor Study. Policy SUN 2.16 mentions the RTC's Sun Valley Bikeway Plan, which to date has not been published. The RTC's Bike Map/Master Plan show bicycle facilities along Sun Valley Boulevard which is consistent with the bicycle facilities proposed as part of this study.

Furthermore, within the County's Downtown Sun Valley Design Guidelines following requirement is listed,

> "*Along Sun Valley Boulevard, there will be a minimum 20-foot wide landscaped common area easement along the property line within the setback. The developer shall construct an 8- to 10-foot wide multi-purpose trail within this easement that meanders through the landscaped area.*"

Meandering paths, consistent with the Master Plan requirements, are present along on Sun Valley Boulevard in limited areas as most of the developments predate the current requirement. In order to provide contiguous pedestrian access along Sun Valley Boulevard this study has included bicycle and pedestrian facilities within the right-of-way. It is recommended that the County reconsider this requirement with future development along Sun Valley Boulevard.

Summary of Preferred Alternatives and Overall Mobility

The public engagement approach for the Sun Valley Boulevard Corridor Study promoted a collaborative environment for the corridor presented by the Technical Advisory Committee, Stakeholders, and the Public. The preferred alternative was developed to include pedestrian, bicycle, transit, and traffic improvements along the corridor. The proposed alternatives maintain the existing four lane and two lane configurations, respectfully, and utilize the ample existing right of way to provide sidewalk, bicycle, landscaped medians and parkway planters (where available width exists). Individual segment cross sections are provided in corridor specific discussion the following pages.

Pedestrian and wheelchair facility improvements and continuous access along Sun Valley Boulevard are high priorities according to public input. Roadside ditches convey storm water along Sun Valley Boulevard and community streets. In many cases, pedestrians have to choose to walk along/in the roadside ditches or along the edge of the roadway. As a result, continuous sidewalk on both sides of Sun Valley Boulevard is included as part of the preferred alternatives. In most cases, the addition of sidewalk will involve replacing the existing roadside ditch with curb, gutter, sidewalk, and installation of piping to convey the storm water. This plan is consistent with the Sun Valley Area Plan (SUN 2.4). Where right of way widths are ample, detached or separated sidewalk is preferred.

Sun Valley Boulevard - Conceptual Roadside Ditch Retrofit to accommodate sidewalk

Furthermore, side streets which connect to a signalized intersection on Sun Valley Boulevard also are proposed to receive sidewalk along at least one side of the street to provide pedestrian connectivity to Sun Valley Boulevard, which is the primary mobility corridor within the community (SUN 2.7). In addition to sidewalk improvements, several pedestrian crossings are proposed to be improved with a rapid flashing beacons and pedestrian refuge islands to increase pedestrian safety and access across Sun Valley Boulevard at unsignalized intersections (SUN 2.10).

Sun Valley Boulevard currently has a discontiguous bicycle network consisting of a mix of striped bicycle lanes, paved shoulders, and a limited shoulder that requires a bicyclist to ride in the travel lane. Improved bicycle facilities are included with each of the preferred options to provide safe bicycle travel along Sun Valley Boulevard (SUN 2.4 & 2.16).

Transit improvements are included as part of this corridor study and consist of transit stop improvements (SUN 2.4) and a conceptual "Dial 'N' Ride" service (SUN 2.15).

Sun Valley Boulevard - Conceptual Bus Stop Retrofit

Traffic improvements were considered for areas with elevated crash frequencies and intersection configurations, which will help alleviate existing traffic congestion and improve safety. Sun Valley Boulevard traffic patterns will largely remain the same as lane reductions or widening are not proposed as part of this study (SUN 2.1 & 2.5).

Implementation Strategy

This planning effort for the Sun Valley Boulevard Corridor Study seeks to cast a 20 year vision for transportation improvements in the community. Due to funding constraints, all of the conceptual improvements will not likely occur at once. Rather, the improvements will likely occur incrementally and, as a result, the project has developed the following implementation strategy. This implementation strategy was generated considering preliminary cost estimates, public opinion of need, and potential future funding. The following implementation terminology and time periods were used:

Short-Term ±1-5 years	Mid-Term ±5-15 years	Long-Term 15+ years

Near-Term:
Typically viewed as possible within the next 5-years, near-term improvements are smaller in scope and cost. These improvements tend to be spot locations, which may include improvements to striping, signage, individual transit stop improvements, or small sidewalk and drainage improvements. Near-term projects will not likely include major reconstruction efforts.

Mid-Term:
Within the 5 to 15 year horizon, mid-term improvements can include larger construction projects and may include construction of several blocks or intersection improvements. Some sidewalk improvements on local side streets could be included, strategic connections could be made to transit or to provide safe routes to school for students. Pilot studies of additional transit services may occur in this time frame.

Long-Term:
Long-term projects look at improvements that may occur in the 15 to 20 year planning horizon. This time frame includes completion of major improvements, as well as possible implementation of significant transit service improvements.

The funding matrix and cost estimate provided on the following pages are based on 2014 construction dollar values. The quantities are based on planning level conceptual designs and are not intended to include all bid items that would be expected as part of final construction documents.

The unit prices utilized for this project started with standard RTC planning level estimates which have a long history of overall accuracy within the RTC Program of Projects (POP). Planning level unit prices were then compared against 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 unit costs have been increased to fall in line with the current construction environment.

The conceptual improvements identified as part of this study involve full width corridor, spot location, transit facility, and transit service improvements. Many of the spot location improvements address safety concerns and therefore are proposed as near-term improvements.

Descriptions of the recommendations by segment are included in the Preferred Alternatives chapter of this report.

Program of Project	Near-Term (±1-5 years)	Mid-Term (±5-15 years)	Long Term (15+ years)	Potential Funding Sources
SCOTTSDALE TO CRYSTAL				
SCOTTSDALE TO CRYSTAL		$200,000		Local Fuel Tax, STP Local, RRIF, Discretionary
CRYSTAL TO EL RANCHO		$3,100,000		Local Fuel Tax, STP Local, RRIF, Discretionary
EL RANCHO TO 1STREET		$4,800,000		Local Fuel Tax, STP Local, RRIF, Discretionary
1ST TO 7TH - OPTION 1		$12,700,000		Local Fuel Tax, STP Local, RRIF, Discretionary
7TH TO QUARTZ			$2,000,000	Local Fuel Tax, STP Local, RRIF, Discretionary
QUARTZ TO MIDDLE FORK			$1,600,000	Local Fuel Tax, STP Local, RRIF, Discretionary
MIDDLE FORK TO LEON			$2,100,000	Local Fuel Tax, STP Local, RRIF, Discretionary
LEON TO HIGHLAND RANCH			$1,700,000	Local Fuel Tax, STP Local, RRIF, Discretionary
BREAKOUT PROJECTS				
SKAGGS CIRCLE INTERSECTION	$240,000			Local Fuel Tax, STP Local, RRIF, Discretionary
GEPFORD PARKWAY INTERSECTION	$240,000			Local Fuel Tax, STP Local, RRIF, Discretionary
6TH AVENUE INTERSECTION	$240,000			Local Fuel Tax, STP Local, RRIF, Discretionary
1ST AVENUE	$390,000			Local Fuel Tax, STP Local, RRIF, Discretionary
7TH AVENUE - PH 1	$510,000			
7TH AVENUE - PH 2	$1,770,000			Local Fuel Tax, STP Local, RRIF, Discretionary
EL RANCHO DRIVE		$160,000		Local Fuel Tax, STP Local, RRIF, Discretionary
EAST-WEST PEDESTRIAN CONNECTIVITY				
OUTBOUND STATION(S)	$100,000			Local Fuel Tax, STP Local, RRIF, Discretionary
EAST-WEST PEDESTRIAN CONNECTIVITY	$12,310,000			
DIAL A RIDE			$TBD	Local Fuel Tax, STP Local, RRIF, Discretionary

Figure 2 - Conceptual Funding Matrix

Figure 3 - Cost Estimate

SUN VALLEY BOULEVARD CORRIDOR - COST ESTIMATE - RECONSTRUCT

CONSTRUCTION UNIT COSTS

MATERIAL	PRICE	UNIT
AC PAVING	$ 3.00	SF
COLD MILLING AND OVERLAY	$ 3.00	SF
CURB & GUTTER	$ 30.00	LF
PCC SIDEWALK	$ 10.00	SF
SLOPE GRADING	$ 500.00	LF
K-RAIL	$ 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

ADDITIONAL CONSTRUCTION COSTS

MATERIAL	PRICE	UNIT
SOFT COSTS (INCLUDED IN COSTS)	23%	
CONTINGENCY	25%	
INTX SIGNAL IMPROVEMENTS	$ 150,000	EA
PEDESTRIAN CROSSING TREATMENT (RRFB)	**$ 25,000**	**EA**

INTERSECTION SIGNAL IMPROVEMENTS

LOCATION	PRICE	UNIT
EL RANCHO DRIVE	$ 150,000	EA
1ST AVENUE	$ 150,000	EA
2ND AVENUE	$ 150,000	EA
4TH AVENUE	$ 150,000	EA
5TH AVENUE	$ 150,000	EA
7TH AVENUE	$ 150,000	EA

SEGMENTS - SUN VALLEY BOULEVARD			COST/LF	LF/SEGMENT	COST/SEGMENT
SCOTTSDALE TO CRYSTAL		NEW SIDEWALK ONLY - EXISTING ROAD TO REMAIN	$ 200	800	$ 200,000
CRYSTAL TO EL RANCHO		NEW SIDEWALK (EAST SIDE) - NEW SIDEWALK (WEST SIDE) ON LEONESIO DRIVE, PAVEMENT REHAB	$ 2,200	1400	$ 3,100,000
EL RANCHO TO 1ST		ROADSIDE DITCHES PIPED, ADD SIDWALK AND LANDSCAPING WITH LIGHTING, PAVEMENT REHAB	$ 1,600	3000	$ 4,800,000
1ST TO 7TH	OPTION 1	ROADSIDE DITCHES PIPED, ADD SIDWALK AND LANDSCAPING WITH LIGHTING, PAVEMENT REHAB	$ 1,600	7900	$ 12,700,000
	OPTION 2	ADD SIDEWALK AND LANDSCAPING WITHOUT LIGHTING, PAVEMENT REHAB	$ 1,300		$ 10,300,000
7TH TO QUARTZ		ADD SIDEWALK AND CURB & GUTTER, PAVEMENT REHAB	$ 1,000	2000	$ 2,000,000
QUARTZ TO MIDDLE FORK		NEW SIDEWALK (WEST SIDE), PAVEMENT REHAB	$ 900	1700	$ 1,600,000
MIDDLE FORK TO LEON		NEW SIDEWALK (EAST SIDE), PAVEMENT REHAB	$ 900	2300	$ 2,100,000
LEON TO HIGHLAND RANCH		ADD SIDEWALK AND CURB & GUTTER, PAVEMENT REHAB	$ 1,000	1700	$ 1,700,000

SEGMENT COST SUMMARY

SEGMENTS AND INTERSECTION SELECTION - CRYSTAL LANE TO HIGHLAND RANCH PARKWAY	SUBTOTAL	CONTINGENCY	TOTAL
SEGMENT SUBTOTAL	$ 28,200,000	$ 7,050,000	**$ 35,250,000**
SIGNAL IMPROVEMENTS SUBTOTAL	$ 1,050,000	$ 263,000	**$ 1,313,000**
		TOTAL	**$ 36,563,000**

BREAKOUT PROJECTS		TOTAL
SKAGGS CIRCLE INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	$ 240,000
GEPFORD PARKWAY INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	**$ 240,000**
6TH AVENUE INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	$ 240,000
1ST AVENUE	REALIGNMENT OF INTERSECTION, MILL & FILL, AND SIGNAL MODIFICATIONS	**$ 390,000**
7TH AVENUE - PH 1	REALIGNMENT OF NORTHBOUND MERGE ALONG SUN VALLEY BOULEVARD ONLY, MILL&FILL, AND SIGNAL MODIFICATIONS	$ 510,000
7TH AVENUE - PH 2	ADDITIONAL DEDICATED LEFT TURN LANES ON 7TH, MILL & FILL, AND SIGNAL MODIFICATIONS	**$ 1,770,000**
EL RANCHO DRIVE	DRAINAGE, STRIPING, TRANSIT, AND SIDEWALK IMPROVEMENTS (NO SIGNAL MODIFICATIONS NEEDED)	$ 160,000

COMMUNITY WIDE IMPROVEMENTS		TOTAL
OUTBOUND STATION ($20,000 EACH)	UPGRADE OUTBOUND STATIONS WITH LARGE NUMBER OF DEPARTURES CURRENTLY LACKING A PAD, SHELTER, AND BENCH	$ 300,000
EAST-WEST PEDESTRIAN CONNECTIVITY	ADD SIDEWALK FOR EAST -WEST CONNECTIVITY ON MAJOR CROSS STREETS	**$ 12,310,000**
CALL "N" RIDE	DEMAND RESPONSE TRANSIT SERVIC	$ TBD

Existing Conditions

As part of this study the project team completed an existing conditions analysis of the study area including review of applicable plans/studies, mapping, bicycle and pedestrian counts, crash analysis, and evaluation of existing drainage.

Field Audit of Existing Features

A walking field audit was completed to document existing features along Sun Valley Boulevard. Existing conditions were recorded using GIS Mobile Technology. Items recorded included, but not limited to, drainage features, transit stop locations, transit amenities, driveway locations, traffic and signal configurations, pedestrian and bicycle facilities, and utilities. The field audit maps are provided as part of Appendix E.

Regional Mapping

In conjunction with the field audit, regional mapping was completed in the following area and is included as part of Appendix E:

- Current Zoning
- Land Use (existing and planned)
- Historic resources
- Redevelopment Opportunities
- Existing bicycle and pedestrian facilities

Drainage

Sun Valley Boulevard primarily utilizes roadside ditches and culverts to convey both localized and regional drainage. The existing drainage infrastructure was mapped as part of the field audit process. In addition, NDOT provided record information along Sun Valley Boulevard. The existing drainage infrastructure was mapped using these two data sources and are included as Appendix D of this report.

Existing Drainage Ditch and Culvert along Sun Valley Boulevard

The Sun Valley areas receives runoff from the surrounding hills and the valley. Drainage generally flows from north to south in the historic Wild Creek. As such the western and northern sides of Sun Valley Boulevard receives concentrated flows which are either conveyed along Sun Valley Boulevard or across the road at culvert crossing locations. The Sun Valley Skate Park located at Sun Valley Boulevard and 7th Avenue is a regional storm water detention facility.

It was evident in the public comment and during our field audit that many of the culverts along the corridor backup and overflow during large storm events. It is recommended to complete hydrologic and hydraulic analysis with future design phases or reconstruction efforts to identify drainage capacity issues.

Crash & Safety Analysis

Crash data was provided by the Nevada Department of Transportation (NDOT) for a three and a half year period (January 2010 – June 2013) for the Sun Valley

Boulevard Corridor (Clear Acre Lane) between Scottsdale Road and Highland Ranch Parkway. The NDOT data includes incidents reported by the Nevada Highway Patrol, Reno Police Department, and the Washoe County Sheriff. Incidents associated with the intersection of adjacent side streets were also included in the data analysis. A total of two-hundred and forty-six (246) incidents were reported along the corridor.

Crash rates for Sun Valley Boulevard were calculated and compared against the Minor Arterial Functional Crash Rate for the State of Nevada. The section of Sun Valley Boulevard between Scottsdale Road and 7th Avenue has a high rate of incidents when compared to the state functional classification rate. Signalized intersections within the project area were evaluated to identify intersections with a high rate of incidents. The 1st and 5th Avenue intersections experienced a higher rate of incidents compare to the other intersections within the corridor. The full crash analysis is included in Appendix B.

In addition to evaluating total incidents along the corridor, the crash analysis looked specifically at incidents involving a bicyclist or pedestrian occurring over a 5 year period. There were twenty-one (21) incidents involving a pedestrian or bicycle and resulted in twenty (20) injury accidents, no fatalities, and one (1) property damage only crash. Pedestrian and bicycle safety is a goal of this study.

Figure 4 - Calculated Crash Rates by Segment

Roadway Section	RMVM (Fatal)	RMVM (Injury)	RMVM (PDO)	RMVM (Overall)
2011 Functional Classification for Nevada (Minor Arterial)	0.026	1.14	1.50	2.66
Scottsdale Road to Gepford Parkway	0.020	1.53	1.76	3.31
Gepford Parkway to 7th Avenue	0.05	0.80	1.95	2.80
7th Avenue to 9th Avenue	0.00	0.32	1.25	1.60
9th Avenue to Highland Parkway	0.00	0.40	1.32	1.71
RMVM (rate per million vehicle miles)				

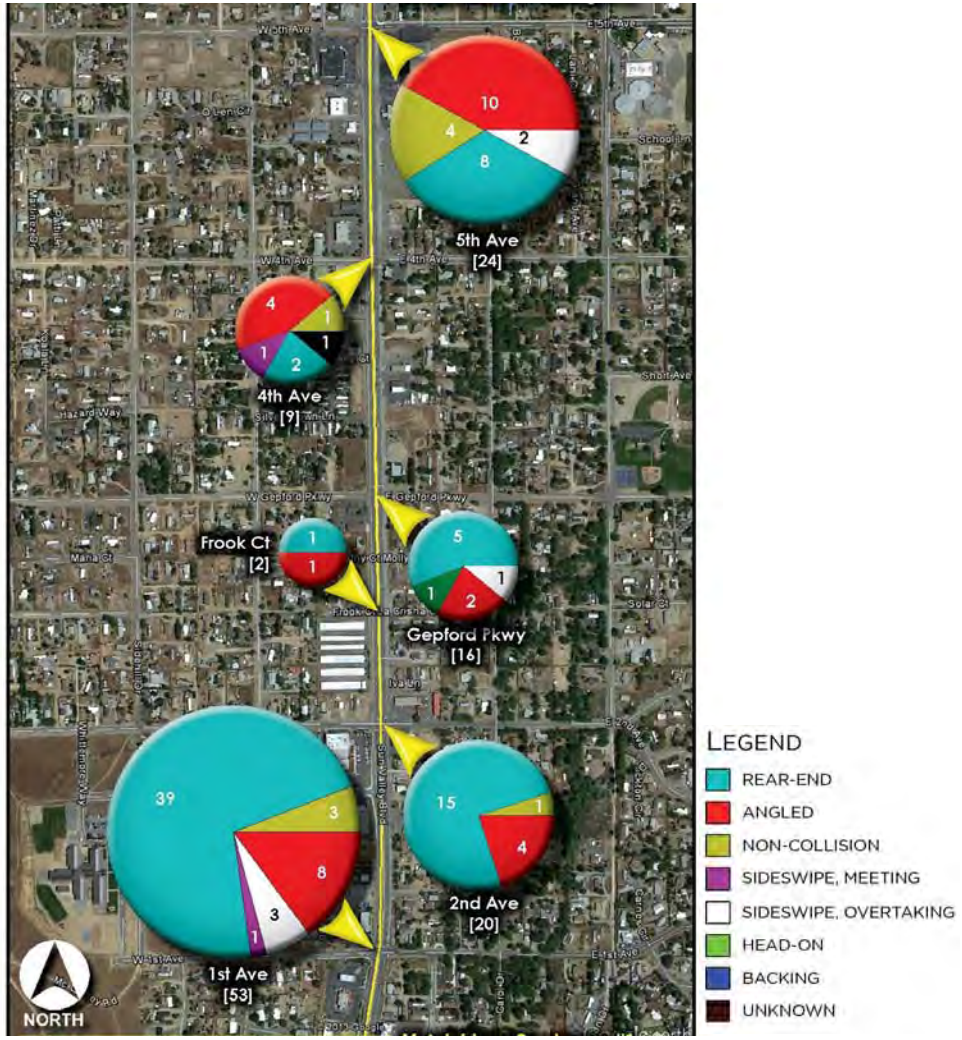


Figure 5- Intersection Collisions

Bicycle and Pedestrian Counts

Twelve hour bicycle, pedestrian, and wheelchair counts were taken for the El Rancho, 2nd Avenue, and 6th Avenue intersections. Counts were recorded on February 5th, 2014.

Dandini Blvd / El Rancho Dr [77 Total Movements]

2nd Ave [192 Total Movements]

6th Ave [166 Total Movements]

Figure 6 - Pedestrian Volumes

Public Engagement

The project team conducted a widespread public outreach campaign for the Corridor Study. The project team regularly met with a project Stakeholder Group and a Technical Advisory Committee (TAC) throughout the progression of the study. The TAC consisted of representatives from the Regional Transportation Commission (RTC), the City of Reno, Washoe County, the Nevada Department of Transportation (NDOT), and Sun Valley General Improvement District (SVGID) while the Stakeholder Group included representatives of local business and community leaders.

Public Engagement included two Community Open House meetings, a Design Charrette Workshop, and open comment on the project website (www.sunvalleyblvd.com) and RTC social media. Public outreach for each meeting/workshop was completed over many forms of media including:

- 6,000 Sun Valley GID Utility Bill Flyers
- 3,000+ Postcards (mailed to resident outside the SVGID)
- 2,300 Postcards at 4 Elementary Schools
- 2 Message Boards the week prior to the meetings (Scottsdale/Clear Acre and Hobey's Casino)
- Flyers on the RTC 5 & 15 Bus Routes
- Posters around the community and at local businesses
- Flyers posted on www.sunvalleyblvd.com, and on the RTC and SVGID websites
- Posts on the RTC Facebook and Twitter pages
- KOLO "Road Ahead" segments
- General press releases

Public Meeting #1

Community Open House #1 (February 13, 2014)

Following is a summary of the first Community open house.

The initial community open house was held on February 13, 2014 at the Sun Valley Community Center located at 6th Avenue and Sun Valley Boulevard. Sixty-one (61) participants signed in at this meeting.

The meeting was set up as a self-guided tour with ten different presentation boards and RTC and/or design team staff at each station to answer questions. A general description of each board follows:

- *Purpose* – a board showing the study area and the general purpose of the study which includes general safety improvements, pedestrian/bicycle infrastructure improvements, transit service needs, and integration of the Washoe County's efforts to promote sustainable development.

- *Overall Corridor Goals* – This interactive board provided a list of potential corridor goals where members of the public could place a sticker along the three goals they most agreed with. This board was utilized to set the project priorities. In addition, comment cards were available so that the public could add a goal not shown on the board.

- *What's Important to You?* – This station was another opportunity to receive public input. Attendees were able to vote for two top priorities from the following list: Accessibility, Bicycle Safety, Safe Traffic Flow, Transit, Pedestrian Safety, and Amenities.

- *Complete Streets* - This board presented the "Complete Streets" concept, which is a street that accommodates multi-modal (vehicular, pedestrian, bicycle, and transit) transportation along the corridor and is a main focus of this study.

- *Existing Intersections, Level of Service* – As part of the existing conditions portion of this study, each intersection was analyzed for current traffic conditions. A level of service grade (A-F) was calculated for each intersection with a LOS A being the best and LOS F the worst. The existing corridor didn't receive a LOS below C.

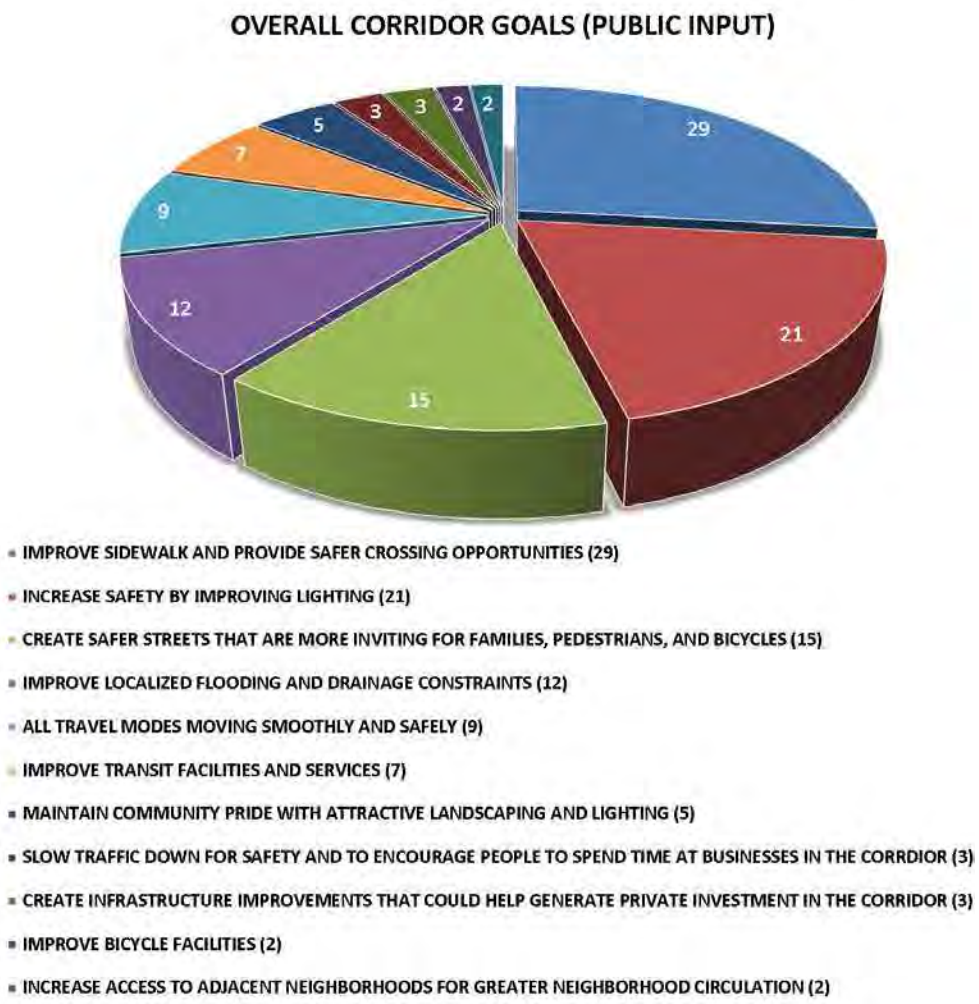


Figure 7 - Results from interactive station polling the public on their overall corridor goals.

- *Collisions at Intersections* – A collision study was completed for the past three and half years. Collisions (reported by Nevada Highway Patrol, WC Sheriff, and Reno PD) for each intersection were reviewed by type and location. This process identified locations which have shown to have a high rate of accidents and potential trends identified.

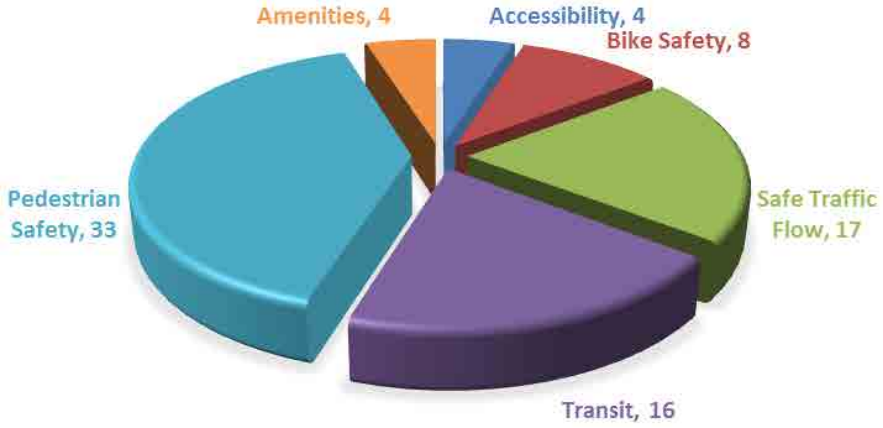


Figure 8 – Results from interactive station asking, "What's Important to You?"

- *Bicycle and Pedestrian Volumes* – 12 hour bicycle, pedestrian, and wheel-chair counts were completed at 3 locations (El Rancho Drive/Dandini Boulevard, 2nd Avenue, and 6th Avenue) and charted on this meeting board.
- *Transit Service* – The existing ridership for Routes 5 and 15 were evaluated within the project area. This board shows the existing route and ridership numbers. As part of this station, the public was asked for transit related improvements they would like to see on Sun Valley Boulevard
- *Sun Valley Master Plan* - The Washoe County Master Plan was shown.
- *Public Participation is Key!* – The Sun Valley Boulevard Corridor Study utilized a "charrette" process. This board showed a traditional project work flow which typically takes a twelve month (or so) time period. The "charrette" process was utilized to reduce the timeline and allow the public to provide input on project alternatives, the design team processed the input and came back with draft alternatives for the public to review/ comment and refine. This took place in a 4 day period.

During an informal question and answer period the public was able to look at the project presentation boards, ask questions, and provide their input on the "What's Important to You?" and "Corridor Goals" boards. In addition, open input was provided on the "Goals – Did we miss something?" comment cards, general comment cards, and the "Corridor Mark-up" table. The "Corridor Markup" table allowed participants to write their comments, concerns, and/or recommendations on a large aerial photo of the project area.

Comments from "GOALS – Did We Miss Something?":

- The flashing pedestrian light at 6th Avenue is a little too long.
- Do not reduce lanes to 1 in each direction.
- Skaggs Circle / Sun Valley Boulevard – Major crossing for pedestrians, and traffic from 3-4 businesses. We don't need another pedestrian death like the one that happened on Sun Valley Boulevard between 6th and 7th Avenue, involving two kids. Night guards (street lighting) is **desperately** needed in this, and other, **dark** intersections.
- Concern about SB Sun Valley turning out. SB El Rancho Drive. Two left turn lanes on Sun Valley Blvd turns to one lane on El Rancho Drive.
- Problem with pedestrians crossing at El Rancho Drive.
- An alternate way in and out of Sun Valley besides Sun Valley Boulevard which is high traffic during "rush hours." Both Leon on the East side and Chocolate on the West go pretty far; could they be extended to McCarran or 395.
- Bus Service to Spanish Springs where there is the primary shopping for this area, and many people can't get there.

Public Meeting #1

- Bus Service to Fernley; had high growth, and Amazon, a large employer.
- Crosswalk safety – especially close to Winco/CVS, Northtowne Lane.
- Improved transit – a bus route directly to Sparks.
- The accidents at Sun Valley Boulevard/Clear Acre Drive/Dandini Boulevard and El Rancho Drive seem low when compared to 1st Avenue & Scottsdale. Are you sure you got them all? There are 4 street names at that intersection.
- Bus shelter needs plastic all around so we don't get wet.
- Give us back our bus route and proper shelters for each stop. We have older bus riders walking 1.5 miles each way. Route #5 used to be the highest yield, now #2, so cutting 1/3 has cost you money!
- Put in turn lanes on upper Sun Valley Boulevard for safety sake. Maybe even a couple of roundabouts.
- Any rear-end collision should require attendance at driving school.
- Bus #5 snow route needs two temporary bus stops on N. McCarran and advanced road sanding on the diverted section.
- Bus #5 & #15 needs increased schedules. Keep ½ hour later into about 7pm. Weekend 1 hour is not adequate service.
- I live on Sun Valley Boulevard and Leon Drive. I don't use the bus but I drive. I see females walking at 5:00 am so they can be by 7-11C to get the bus at 5:20 am.

Corridor Mark-up General Trends (refer to full markup for specific comments):

- Pedestrian Safety
  a. Lighting
  b. Crosswalks
  c. Safer crossings (multiple locations)
  d. Add Sidewalk
  e. Provide separation between traffic, bicycle, and pedestrians. Possibly a landscaped buffer.
- Bicycle Safety
  a. No Bicycles on roads above 30 mph; use parallel streets

- Drainage
  a. Sediment Issues

- Vehicle Safety
  a. Paint speed on pavement at speed limit change limits
  b. Improve transition from 4 to 2 lanes at 7th

- Aesthetics
  a. Underground utilities to improve view of corridor
  b. Add landscaping
  c. Bus stops should be more artistic (similar to S. Virginia St)

- Traffic
  a. Don't reduce the number of traffic lanes
  b. Improved signals and striping at identified locations for turning movement conflicts & delays

- Transit Service
  a. Add more bus stops
  b. Add bus shelters
  c. Add a park & ride location
  d. Restore bus service to north of 6th Avenue.

- Increased signage for "Way-finding"

A Design Charrette Workshop was utilized to streamline the development of project alternatives and allow for direct participation from the public. During the Charrette the design team worked with an intensive schedule consisting of meetings and workshops with the project TAC, Stakeholders Group, and public to develop project alternatives in a week's time frame. This intensive scheduled allowed for a community driven plan and direct public participation and comment during the development of the project alternatives.

Design Charette Summary: (June 23 – 26th, 2014)

The Charette public meetings took place at Hobey's Casino on Sun Valley Boulevard at 2nd Avenue and at the Wood Rodgers' office for technical working group meetings. Public meetings were held on Monday, June 23, 2014 and on Thursday, June, 26, 2014 from 6:00 to 8:00 pm.

Monday:

The purpose of the Monday evening meeting was to get additional information from the residents on the needs they see in the corridor and to locate the areas that need the most improvements. The project team provided a presentation summarizing the purpose of the project and providing information about the work that had been completed to get the planning team to this point. Following the presentation, attendees were asked to divide themselves into groups of eight; this created a total of five groups. These five groups were each given a large drawing of the corridor, with each drawing having different areas of focus. These focus topics included safety improvements, bicycle and pedestrian safety improvements, lighting and beautification, and transit facilities. The five groups each had a representative from either RTC or Wood Rodgers to help guide the exercise and provide technical assistance. The groups spent about 35 minutes discussing their assigned topic and answering specific questions the planning team had developed for each area of focus. At the end of the working period each group was asked to present what they had deemed was the most important issues for their focus topic.

Tuesday/Wednesday:

The planning team spent the next two days going through the issues that were identified and developing multiple alternatives that were to be presented to the public on Thursday, June 26, 2014. During the two day work period, the design team had regular consultation with the technical advisory committee and Stakeholder Group, as well as major stakeholders like NDOT and Washoe County. The purpose was to develop and test alternatives very quickly in order to present realistic opportunities back to the public.

Thursday:

The second public open house was to present the different alternatives that the planning team developed from the information collected from the public comments accumulated at the previous stakeholder and public meetings. The project team presented the information that was collected from the June 23, 2014 meeting which lead to the development of the alternatives that were presented on large boards throughout the room. Following the presentation, attendees were able to walk around and preview the displayed alternatives.

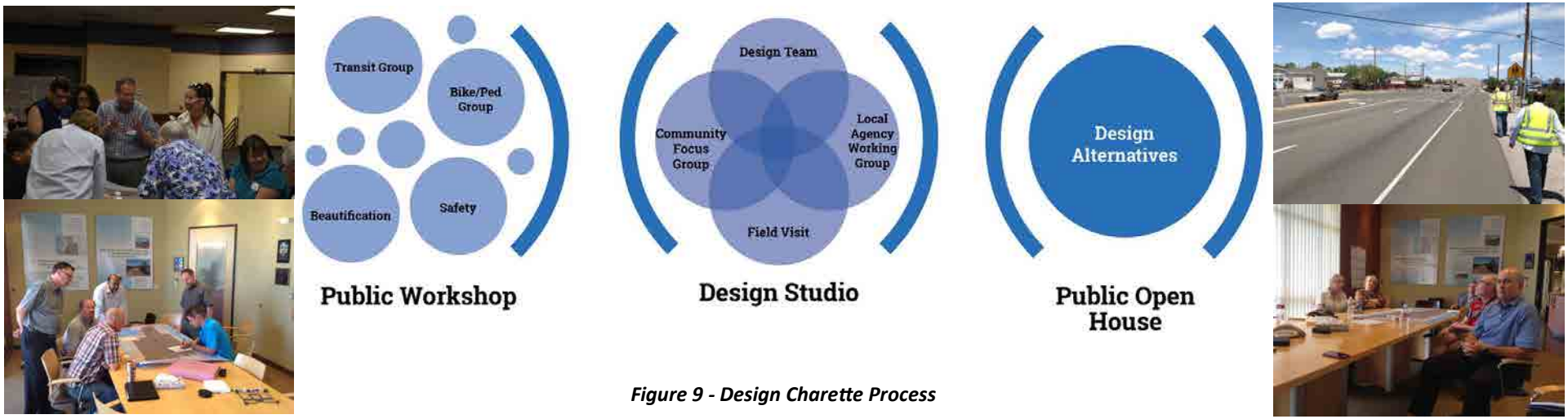


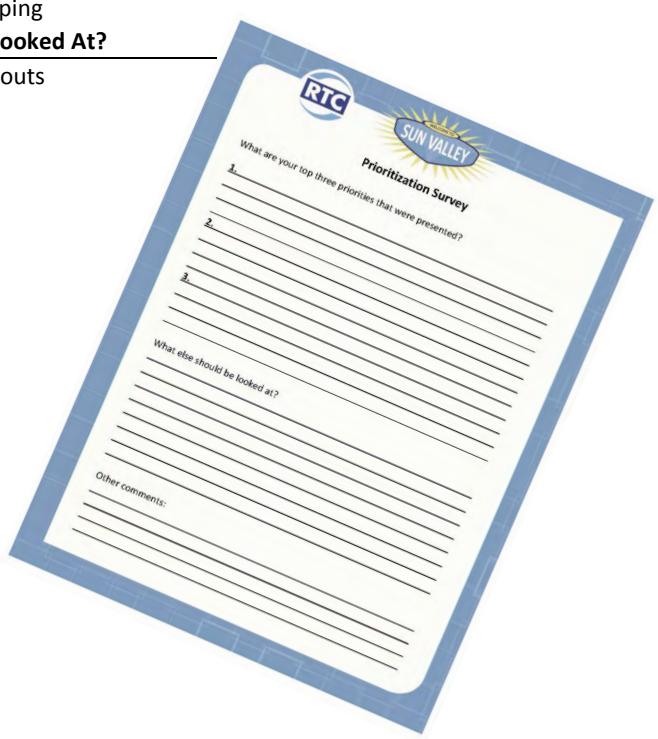
Figure 9 - Design Charette Process

The planning team then asked the attendees to prioritize the proposed improvements on provided comment sheets. The goal was to understand what alternatives are the most important to the Sun Valley residents and what improvements need to be focused on first.

Prioritization Survey Summaries:

Top Priorities	
1	Sidewalks (Pedestrian Safety)
2	Lighting (Pedestrian Safety)
3	1st Avenue intersection improvement, left turn lane needed
4	Additional bus service and extended bus service
5	Crosswalk at 6th Street needs improvement
6	7th Avenue where 2 lanes go to 1 needs improvement
7	Additional crossing options
8	Trees and Landscaping

What Else Should Be Looked At?
Off street bus turnouts
Drainage issues
Landscaping
Mini bus option



Additional general comments from attendees were also provided and included:

- Please do not put a roundabout at 7th Street
- Gepford Park needs sidewalks and crosswalks to provided additional safety for children.
- I like the idea of a community bus that provides access to the outside areas of Sun Valley
- Northbound on Sun Valley Boulevard at 1st Avenue there should be a right hand turn lane onto 1st Avenue. There is available land available to create this which would eliminate traffic backing up at this point.
- I have found that getting from 395 onto Clearacre Lane to be very dangerous. Traffic that is already on Clearacre Lane going north are consistently cutting off traffic that is coming off of 395 to turn right on to Eply Lane.
- Please don't extend Sun Valley Boulevard any further north. I live right at the corner of Sun Valley Boulevard and Highland Ranch Road. It is so noisy as it is, unless you outlaw booming stereos and noisy engines, don't create more traffic in that nice residential area.
- I am impressed by the thought that went into this presentation. Sidewalks, bicycles paths are unheard of in Sun Valley. I really liked the 1st Avenue Widening options. School children are forced to walk in the streets as there are no current side path only deep ditches. The Crosswalk between Dandini and 1st, it is very unsafe. No lights, crossing there can be quite an adventure. I hope all or some of these ideas come to fruition.
- No roundabouts.
- Desperately, need to raise grade on east bound approaches at intersection (1st Avenue, 2nd Avenue and Skaggs).
- Spanish Springs to 395 still needs to be fixed. Does not make sense to make more traffic on 395 without fixing congestion already there. Does not help or support actual resident in Sun Valley.

Community Open House #2:
(September 4th, 2014)

The final community meeting was held on September 4, 2014 at the Sun Valley Community Center located at 6th Avenue and Sun Valley Boulevard. Twenty-four (24) participants signed in at this meeting.

An open house format was used to discuss and illustrate an implementation strategy for the improvements developed during the Design Charrette. Display boards were used to show conceptual improvements, estimated cost, and planned implementation period (near-term, mid-term, or long-term). Participants were asked to comment on high priority projects within each implementation period. The project team received verbal and written comment from the public during this meeting. Many of the attending public chose not to submit a written comment prioritizing the improvements, therefore the higher priority items identified include both verbal and written comment.

Sun Valley Community Open House #2

Sun Valley Community Open House #2

The following trends/opinions were gathered for each implementation period:

Near-Term:

The near term improvements primarily included spot location improvements that the public brought up to the design team during the public outreach process. As a result, the near term items were well received and equally desired by the public. The 6th Avenue enhanced pedestrian crossing was identified as one of the higher priority projects as it serves the community center and has a high utilization by children and the elderly in the community. Subsequently, the El Rancho Bus Improvements, the Skaggs Circle enhanced pedestrian crossing, 7th Avenue Phase 1 Intersection, and general transit amenities all received positive input. Of the near-term items the 1st Avenue intersection and Gepford Way enhanced pedestrian crossing were of the lowest priority, but generally well received during public meetings.

Mid-Term:

The mid-term items incorporate roadway improvements, and the section between 1st Avenue and 7th Avenue was identified as the high priority.

Long-Term:

Two highest priority long-term items identified were the roadway improvements between 7th Avenue and Quartz Ln and the "Dial 'N' Ride" program.

Figure 10 - Results from Public Comment on Implementation Priorities

In addition, to asking for public input of the prioritization of the project improvements, a Community input summary was put together which outlined the public comments received throughout the project and also identified how the project team was able to incorporate that comment into the corridor plan. In a few cases, where the public comment wasn't incorporated directly a response was provided.

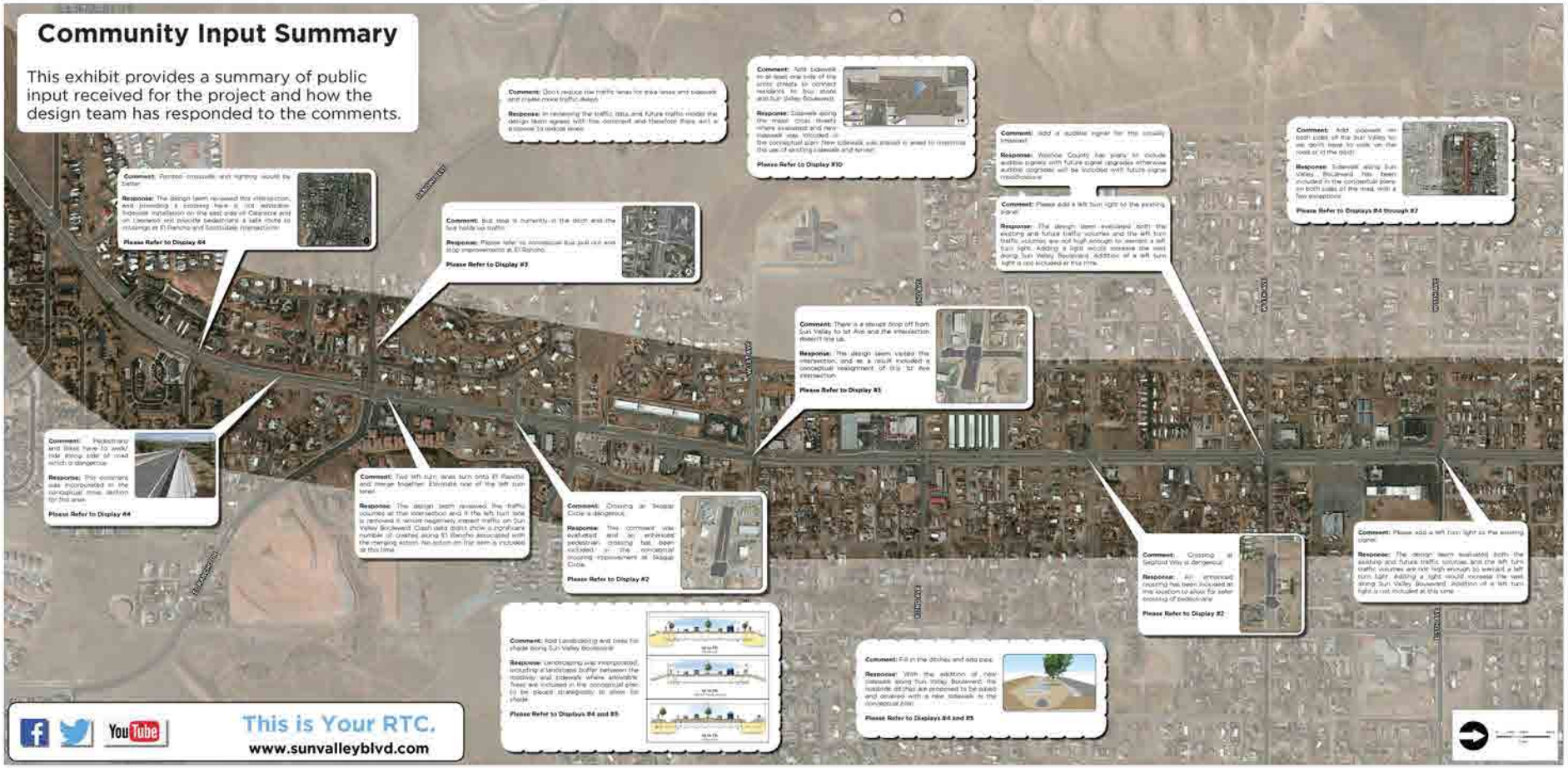


Figure 11 - Community Input Summaries (Refer to Appendix F)

Traffic Considerations

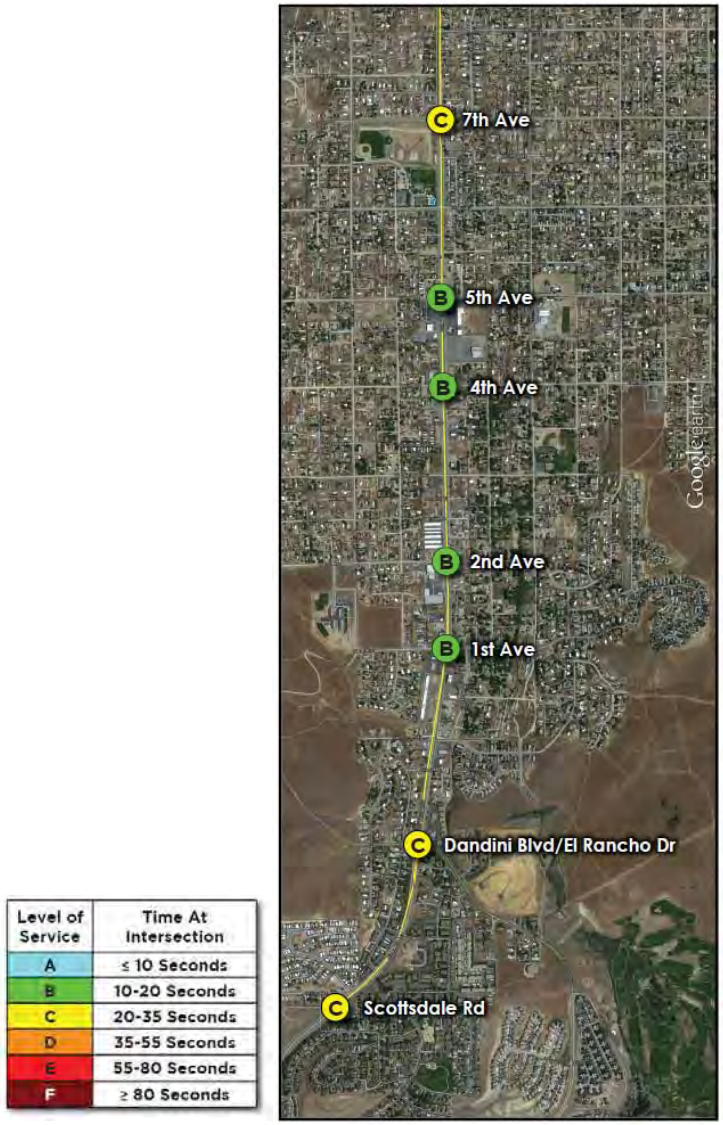
Sun Valley Boulevard is classified as a minor arterial by the Nevada Department of Transportation (NDOT) and has an existing average daily traffic volume ranging between 7,000 and 30,000 vehicles. The existing traffic conditions were evaluated and are shown in Appendix C. The existing traffic was modeled and a level of service calculated for each intersection. The existing intersections, within the study area, were found to operate at acceptable levels of service during both the AM and PM peak hours.

Future Traffic

Traffic volumes on Sun Valley Boulevard are anticipated to increase in the future due to employment growth, population growth, development, and to a small extent, with the new Pyramid Highway/US 395 Connector. The traffic volumes on the portion of Sun Valley Boulevard south of the Pyramid Highway/ US 395 Connector are expected to grow at a higher rate than the volumes on Sun Valley Boulevard north of the Pyramid Highway/US 395 Connector. Through the year 2035, traffic volumes on Sun Valley Boulevard south of the proposed Pyramid Highway/US 395 Connector are anticipated to grow at a rate of about 2% per year. The traffic volumes on Sun Valley Boulevard north of the proposed Pyramid Highway/US 395 Connector are anticipated to grow at a rate of 1.5% per year. The capacity analysis conducted in this study assumes that the proposed Pyramid Highway/US 395 Connector has an interchange at the planned West Sun Valley Arterial rather than directly to Sun Valley Boulevard. Under that basis, the current lane configurations on Sun Valley Boulevard and the existing intersection configurations are anticipated to adequately serve the traffic growth through the 2035 horizon.

Pyramid Highway / US 395 Connector

At the time of this study, the Pyramid Highway / US 395 Connector Study is completing traffic and design refinements following publication of the Draft Environmental Impact Statement (DEIS). The Pyramid Highway / US 395



Level of Service	Time At Intersection
A	≤ 10 Seconds
B	10-20 Seconds
C	20-35 Seconds
D	35-55 Seconds
E	55-80 Seconds
F	≥ 80 Seconds

Figure 12 - Existing Intersection Level of Services

Connector proposes capacity improvements to Pyramid Highway and a new roadway connection from US 395 to Vista Drive. The preferred alternative for the Pyramid Highway / US 395 Connector includes an interchange west of Sun Valley Boulevard at the planned West Sun Valley Arterial.

The proposed phasing plan for the Pyramid Highway / US 395 Connector constructs the east-west connection from US 395 to Pyramid Highway and high-speed movements to/from the south before any connection to the Sun Valley area is considered. With this approach, the travel time savings for drivers from Sparks and Spanish Springs to US 395 and/or the metropolitan core will be significant which will discourage cut-through traffic through Sun Valley. The connection to Sun Valley Boulevard will service mostly local traffic and Sun Valley traffic destined for the commercial areas of Sparks. For these reasons, it is unlikely the proposed Pyramid / US 395 Connector will significantly affect future traffic volumes on Sun Valley Boulevard.

Access Management

Sun Valley Boulevard currently has a high density of driveways and a two-way left turn lane for much of the corridor, especially within the commercial district between El Rancho Drive and 5th Avenue. Open access across a four lane facility increases the potential for accidents.

During discussions with the Stakeholder Group, as well as the Nevada Department of Transportation there was a desire to place a center median to limit the left in/out turning movements to strategic areas. In order to increase road safety. The proposed access management measures are consistent with the Washoe County Master Plan goals.

In addition to increasing road safety, a center median provides an opportunity for beautification. A center median concept was discussed with the Stakeholder Group and during the public meetings. The increased safety and beautification opportunities were well received and therefore are incorporated in the design alternatives presented with this project.

Sun Valley Boulevard Current Conditions

Sun Valley Boulevard Visual Simulation

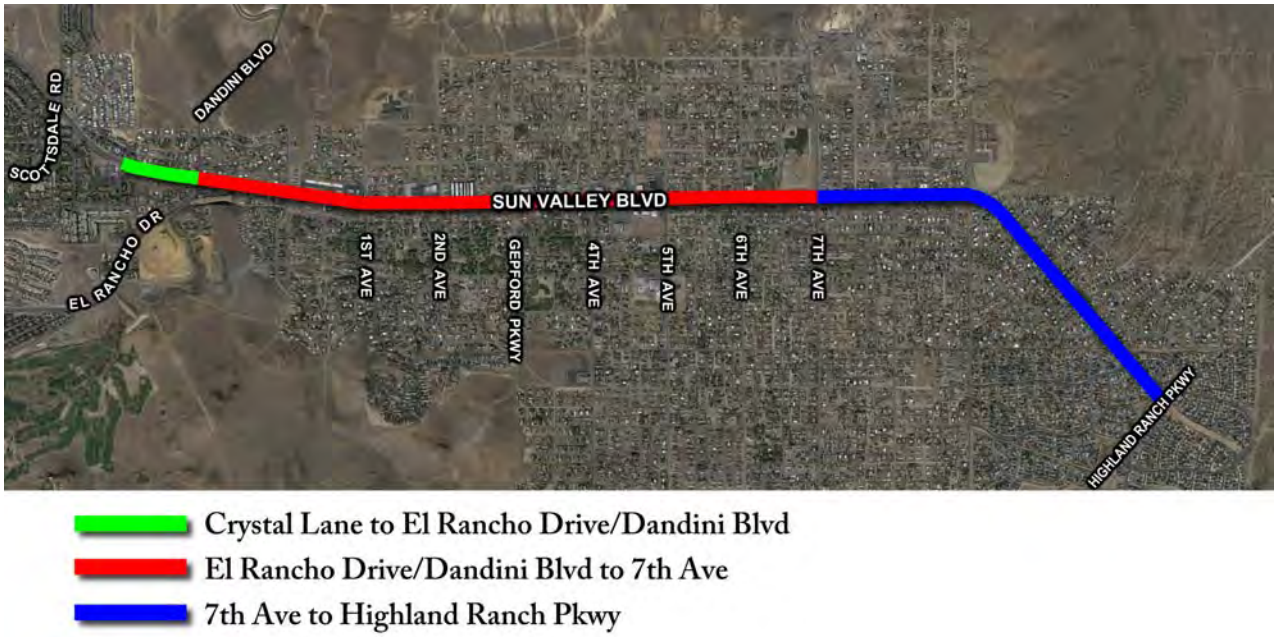
Chapter 2 - Preferred Alternative

Approach

The following pages outline the proposed preferred roadway alternatives that have been generated as a part of this study. A segment-by-segment approach was utilized to discuss the proposed multi-modal improvements and identify an implementation strategy.

Proposed improvements include cross sections illustrating bicycle, pedestrian, and vehicle facilities. In addition to cross sections, location specific improvements are discussed including transit improvements, community wide pedestrian facilities, intersection realignments, and pedestrian crossing enhancements to name a few.

Each segment has items which are proposed for implementation in the near, mid, or long term periods. Funding availability may only allow for many of the proposed items to be completed as stand-alone projects or as part of smaller safety improvements. These opportunities are discussed in the implementation strategy sections.



Sun Valley Boulevard Segment Overview

Crystal Lane to El Rancho Drive / Dandini Boulevard

The Clear Acre Lane section between Crystal Lane and El Rancho Drive serves as the gateway into Sun Valley Boulevard. The primary challenge within this section of the corridor is the lack of both bicycle and pedestrian access and the existing topography limits the available space for improvements. There was an overwhelming consensus during the public comment period that this stretch of roadway is in need of improvement. Pedestrians must choose to walk along the road between traffic and a concrete barrier rail or walk along a narrow dirt path behind the barrier rail that is perched atop of large embankment, neither of which are safe options. Northbound cyclists must ride along the narrow shoulder but have the benefit of a steep downgrade, while southbound traffic must climb the grade along the narrow shoulder which increases their exposure to adjacent traffic.

Pedestrian & Wheelchair Facilities

Installation of sidewalks along both sides of Clear Acre Lane is very costly due to the existing topography, however pedestrian and bicycle mobility along this stretch of the corridor is needed. The following improvements are recommended to resolve existing deficiencies and improve pedestrian mobility in this roadway segment.

Installation of sidewalk along the east side of the road will provide residents, to the east, access to the El Rancho intersection to serve as a safe pedestrian route on Clear Acre Lane / Sun Valley Boulevard and access to the transit transfer point for Routes 5 and 15 located on the northwest corner. To accommodate new sidewalk, excess median width will need to be utilized to narrow the road to provide a 6-foot sidewalk along the east side of Clear Acre Lane.

Installation of sidewalk along Leonesio Drive will serve pedestrians and residents on the west side of Clear Acre Lane. Leonesio Drive currently has

Figure 13 - Crystal Lane to El Rancho Drive Aerial

sidewalk along the multi-family development. The proposed plan is to construct new sidewalk along the east side of Leonesio Drive to tie into the existing sidewalk to the north, the proposed Dandini Transit Stop, and sidewalk at the Dandini Boulevard/Sun Valley intersection. This connection, like it's counterpart on the west side of Sun Valley Boulevard, will provide pedestrian access to Routes 5 and 15 and provide a safe travel and crossing opportunities for pedestrians.

This will result in a continuous pedestrian route from Scottsdale Road to the El Rancho Drive/Dandini Boulevard intersection. The above mentioned pedestrian and wheelchair improvements are currently identified for a mid-term implementation.

Clear Acre Lane Pedestrian Visual Simulation

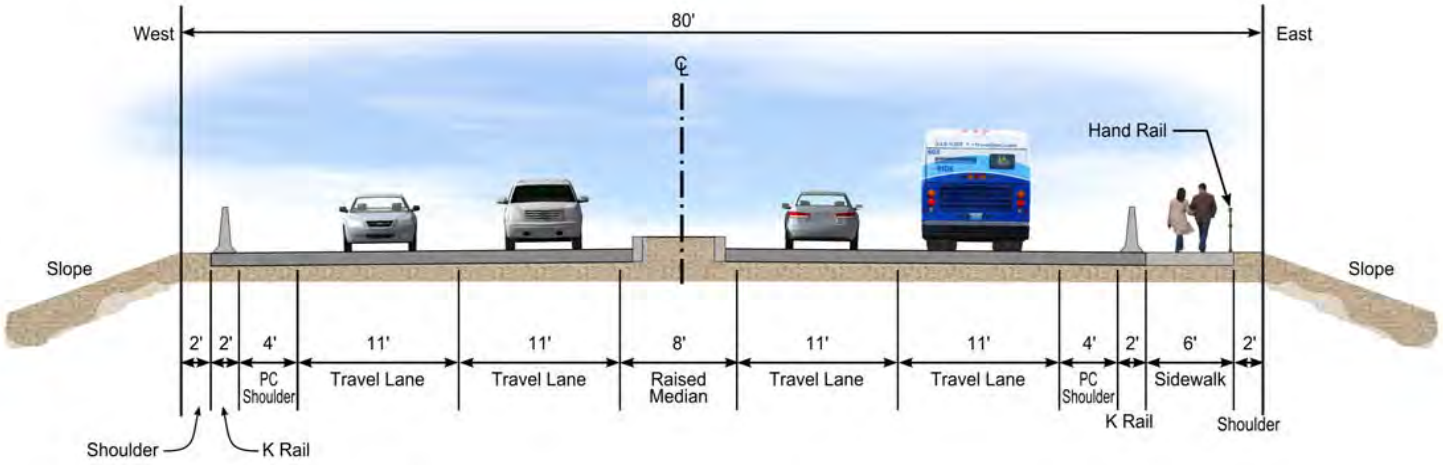


Figure 14 - Crystal Lane to El Rancho Drive Cross Section

Bicycle Facilities

It is recommended that Leonesio Drive be designated as a bicycle route to provide a low volume – low speed bicycle route for the cyclists heading south on Sun Valley Boulevard. Existing topography forces southbound bicycle traffic to climb a hill between Dandini Boulevard and Crystal Lane. Leonesio Drive will provide a safer environment for bicycle traffic as they climb at a slower speed.

Dandini Boulevard Transit Stop(s)

During the charette workshop, the public identified that the existing transit stop located on Dandini Boulevard was currently located in a roadside ditch and further, when the bus is loading/unloading passengers, traffic backs up into the intersection. To alleviate this situation, it is recommended that a new transit stop and bus turnout is installed west of the Dandini Boulevard/Sun Valley Boulevard intersection. In addition to the new stop location, the roadside ditch will be piped and sidewalk installed on this block. Additionally, there is excess paved area outside of the current travel lanes that will be striped as a bus only lane. This will allow the buses to be outside of the flow of traffic and safely enter the travel way with the benefit of the signal. This not only reduces the transfer distance for transit riders, but will also improve traffic congestion on Dandini Boulevard when a bus is present.

Implementation Strategy

The Dandini Transit stop and designation of Leonesio Drive as a bicycle route are each lower costs item and can be constructed as a standalone project as funding becomes available.

The improvements to the roadway cross section, including sidewalk, bicycle lanes, and slight roadway realignment are identified as mid-term improvements. These improvements involve substantial design and construction and as a result require significant funding.

Figure 15 - Dandini Boulevard Transit Stop Improvements

El Rancho Drive / Dandini Boulevard to 7th Avenue

This portion of Sun Valley Boulevard serves as the primary commercial district or "main street" of Sun Valley. This portion of the corridor currently lacks continuous sidewalk and bicycle lanes. Furthermore there are several spot location improvements that were identified during the public outreach portion of this project.

Pedestrian and Wheelchair Facilities

The following improvements are recommended to resolve existing deficiencies and improve pedestrian mobility in this roadway segment.

Continuous sidewalk is proposed along Sun Valley Boulevard in this portion of the corridor. In areas where roadside topography and right of way are adequate, a separated sidewalk with a landscaping buffer is preferred. In limited locations, there will be some areas where roadside or right of way constraints will require an attached sidewalk.

This portion of the corridor is the "main street" and commercial district of the Sun Valley community and is a high priority, development of this portion of the corridor will provide proper access to transit stops and adjacent commercial businesses. Improvement of this area can aid in attracting future economic development of this commercial district and add vitality to the existing businesses. If lack of funding limits the feasibility of the preferred option, it is recommended that the alternate conceptual plan be considered as a lower cost option where the existing roadside ditches are maintained which will reduce the cost associated with underground storm drain piping.

Figure 16 - El Rancho Drive to 1st Street Aerial

Bicycle Facilities

It is recommended that a bicycle lane is added to this section of the roadway. The existing roadway has sufficient pavement width to add bicycle lane striping. The addition of bicycle lanes will increase bicycle safety along the corridor.

The Sun Valley Area Plan lists a goal to locate a multi-modal transit stop providing parking, bicycle racks, shelters, and concessions. The existing commercial properties located between 4th and 5th Avenue have large parking areas which could serve a location for a “park n’ ride” and/or bicycle lockers. This location is central to the valley with multiple stops located to the north and south.

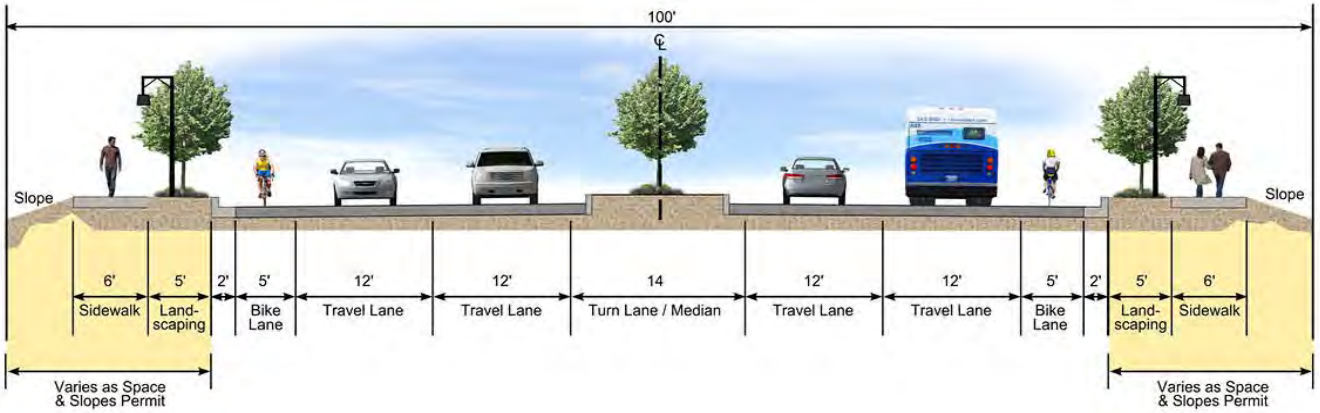


Figure 17 - El Rancho Drive to 1st Avenue Cross Section

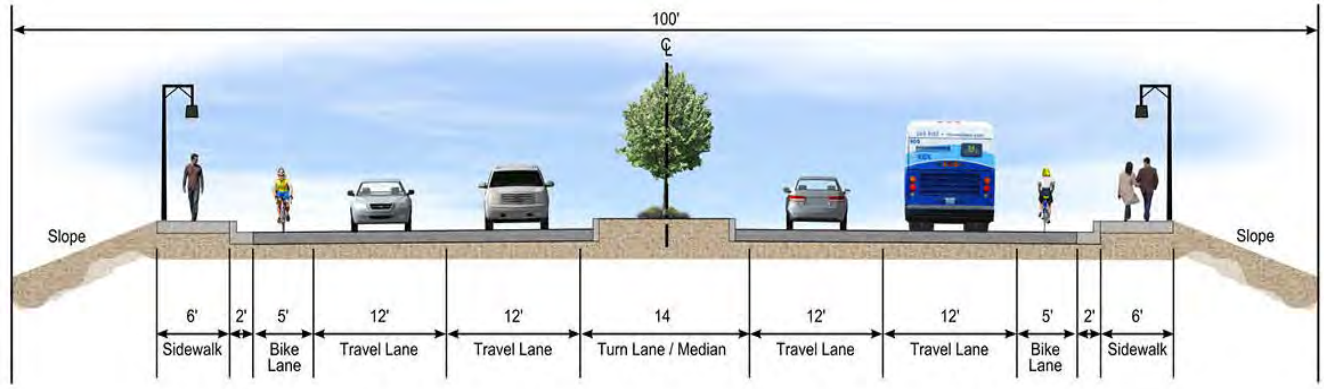


Figure 18 - El Rancho Drive to 1st Avenue Cross Section
(Where Slopes are Constrained)

Figure 19 - 1st Avenue to 7th Avenue Aerial

$12.7 M

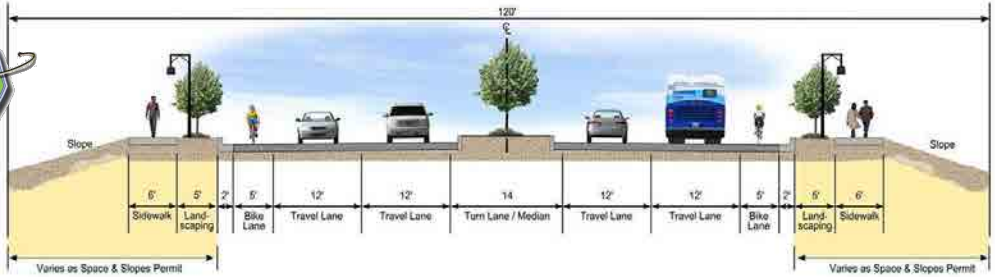


Figure 20 - 1st Avenue to 7th Avenue Cross Section (Preferred Option)

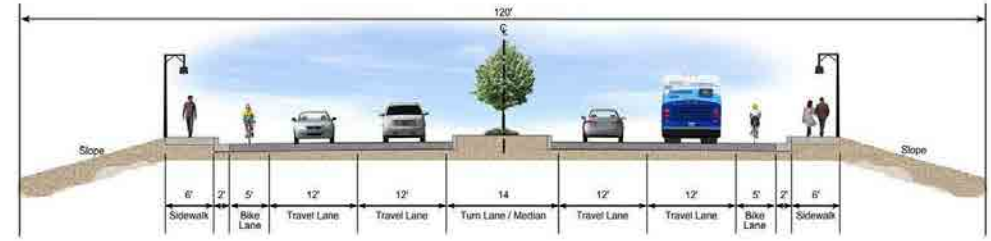


Figure 21- 1st Avenue to 7th Avenue Cross Section (Where Slopes are Constrained)

$10.3 M

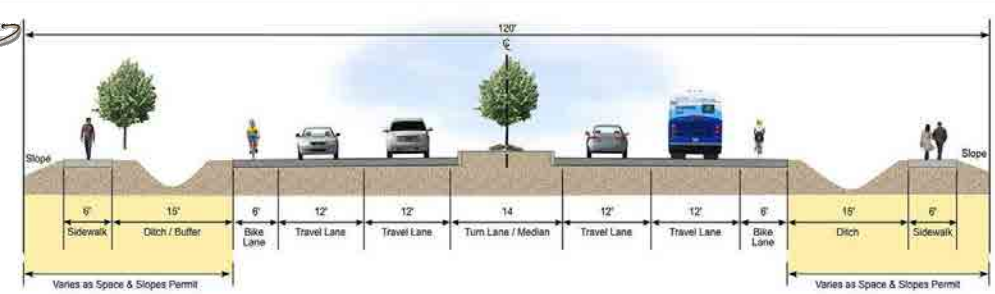


Figure 22 - 1st Avenue to 7th Avenue Cross Section (Alternate)

Pedestrian Crossings

There are two unsignalized pedestrian crossings (Skaggs Circle and Gepford Parkway) and one crossing with an existing pedestrian flasher (6th Avenue) within this section of the corridor. Sun Valley Boulevard within this section of the corridor is a major arterial with significant traffic volumes and moderate travel speeds. Pedestrians must cross five lanes of traffic and experience limited visibility during periods of low-light.

The 6th Avenue crossing has an existing overhead pedestrian flasher. Over time this flasher has become less effective for several reasons. The timing on the existing flasher is much too long and as a result many drivers have become accustomed to the light flashing without the presence of a pedestrian in the crosswalk. It was reported by the public and witnessed by the design team that drivers drive through the intersection, with the flasher activated, without stopping and many without even slowing. In addition, it was reported that during the hours before sunset the light gets washed out by the horizon making it difficult to even see the existing flasher.

Through the public outreach efforts, it was recommended that rectangular rapid flashing beacons (RRFB) be installed at these locations. The RRFB proposed are mounted lower, like a stop sign, and therefore will have less likelihood to lack visibility due to the horizon.

In areas of high pedestrian or vehicular volumes and/or on multi-lane roadways, flashing beacons can be used to draw particular attention to the presence of a crossing. Flashing lights are actuated by pressing a button before crossing. Flashing beacons can be mounted adjacent to the outside sidewalk on standard vertical sign posts as well as in the median for larger crossings. The flashing beacons are a high intensity flashing light located on the side and median of the roadway near the driver's eye level. These crossings have had success both nationally and locally in similar situations.

It is recommended that a rapid flashing beacon crossing with a pedestrian refuge island be considered at Skaggs Circle, Gepford Parkway, and 6th Avenue.

Figure 23 - 6th Avenue Improvements

Figure 24 - Photo Simulation of 6th Avenue Intersection RRFB Crossing

1st Avenue Intersection

The 1st Avenue intersection had the highest rate of accidents within the study area. The east-west leg of the intersection is offset and there is also a significant grade change on the east side of the intersection. The combination can cause poor visibility and driver apprehension, which could be a factor causing this intersection to experience such a high rate of accidents compared to the other signalized intersection along the corridor.

A realignment of the east leg of the intersection is recommended with this report. There is limited right of way along East 1st Avenue however the southeast parcel is owned by the Sun Valley General Improvement District (GID) and therefore a grading easement may be considered by the Sun Valley GID without the need for purchasing right of way. In this scenario the intersection can be realigned within the existing right of way with a grading easement on the southeast corner.

Figure 25 - 1st Avenue Intersection Existing Offset (East-West)

Figure 26 - 1st Avenue Intersection Improvement

7th Avenue Intersection

The 7th Avenue intersection improvements are proposed to both north-south and east-west movements. Based on public comment, the northbound merge causes problems with speeding and aggressive lane changes on Sun Valley Boulevard north of 7th Avenue. Existing traffic volumes show that two through lanes (northbound) are not warranted and therefore it is recommended that Sun Valley Boulevard lane configuration at the 7th Avenue northbound approach be adjusted to a single left turn lane, through lane, and a right turn lane (trap lane). Traffic volumes show that about half of the traffic is turning left or right onto 7th Avenue, therefore eliminating the second through lane should not negatively impact the traffic patterns of this intersection and furthermore will eliminate the merging requirement north of the intersection. North of 7th Avenue one through lane will be provided, with the excess pavement width dedicated to a transit only lane.

Figure 27- 7th Avenue Intersection Improvements, Phase 1

Figure 28 - 7th Avenue Intersection Improvements, Phase 2

The second component of improvements to this intersection will require a widening of 7th Avenue, potential utility relocations, and includes adding a dedicated left turn lane on 7th Avenue. Traffic volumes support the addition of the dedicated turn lanes and therefore this has been included in this recommendation.

Each of these improvements can be completed independently as funding become available. As such the 7th Avenue improvements have been shown as separate phases.

Implementation Strategy

The three enhanced pedestrian crossings (Skaggs Circle, Gepford Parkway, and 6th Avenue) can be completed as standalone projects with immediate benefits to the user and therefore are identified as near-term items. During the public outreach, the public was asked to weigh in on the priority between the three pedestrian crossings, however the feedback received was limited and therefore a clear conclusion wasn't obtained. The 6th Avenue intersection was verbally discussed throughout the public outreach process but if the existing flasher timing was updated, it may improve the existing condition and therefore make the other crossings which don't have any existing pedestrian signal higher priorities.

The first phase of the 7th Avenue intersection and the 1st Avenue intersection realignment can be completed within the footprint of the existing roadway. Similar to the pedestrian crossings, these safety improvements can have an immediate impact to the existing facility and are identified in the near-term. The second phase of the 7th Avenue intersection requires some additional funding and utility coordination and as a result has been identified as a mid-term improvement.

The improvements to the roadway cross section, including sidewalk, bicycle lanes, and slight roadway realignment are identified as mid-term improvements. These improvements involve substantial design and construction and as a result require significant funding.

7th Avenue to Highland Ranch

The portion of Sun Valley Boulevard north of 7th Avenue represents a residential and rural environment. Significant topography and roadside drainage facilities generally limit the feasibility of placing sidewalk along both sides of the road. As such sidewalk connectivity is included for this segment, however, providing sidewalk along both sides of the road is not practical.

The following improvements are recommended to resolve existing deficiencies and improve pedestrian mobility in this roadway segment.

Pedestrian and Wheelchair Facilities

The 7th Avenue to Quartz Lane section of Sun Valley Boulevard currently has sidewalk along both sides of the street; attached Portland Concrete Cement sidewalk on the west and a detached asphalt concrete path on the east. As such it is recommended that this sidewalk is maintained and replaced as necessary to accommodate improvements and realignments of Sun Valley associate with the 7th Avenue intersection work. There is an existing pedestrian crossing at Quartz Lane.

The Quartz Lane to Leon Drive section of Sun Valley Boulevard is very challenging due to topography. As such it is recommended that a pedestrian path be placed on the west side of Sun Valley Boulevard from Quartz Lane to Middle Fork Drive across the existing drainage and tie back into Sun Valley Boulevard as topography allows. American Disability Act slope requirements will govern the location and meandering of this section of the path across the existing terrain. Some earthwork and a low flow culvert may also be necessary for this section.

To avoid regional drainage constraints on the north side of Sun Valley Boulevard, it is recommended that sidewalk is installed along the south side of Sun Valley Boulevard from Middle Fork Drive to Leon Drive.

Photo Simulation of Improvements between

Sun Valley Boulevard from Leon Drive to Highland Ranch Parkway can accommodate sidewalk on both side of the road and therefore it is recommended that sidewalk is installed along both sides of this segment of Sun Valley Boulevard.

Pedestrian crossings will be necessary at Quartz Lane, Middle Fork Drive, and Leon Drive to connect the pedestrian route(s) which are located on different sides of Sun Valley Boulevard.

Bicycle Facilities

Sun Valley Boulevard from 7th Avenue to Highland Ranch is signed for 35 mph and has significantly lower traffic volumes than the southern portion of Sun Valley Boulevard. The existing pavement is wide enough to place a bicycle lane on both sides of the road. It is recommended that a bicycle lane is added along this portion of Sun Valley Boulevard.

Implementation Strategy

The improvements to the roadway cross section, including sidewalk, bicycle lanes, and slight roadway realignment are identified as long-term improvements.

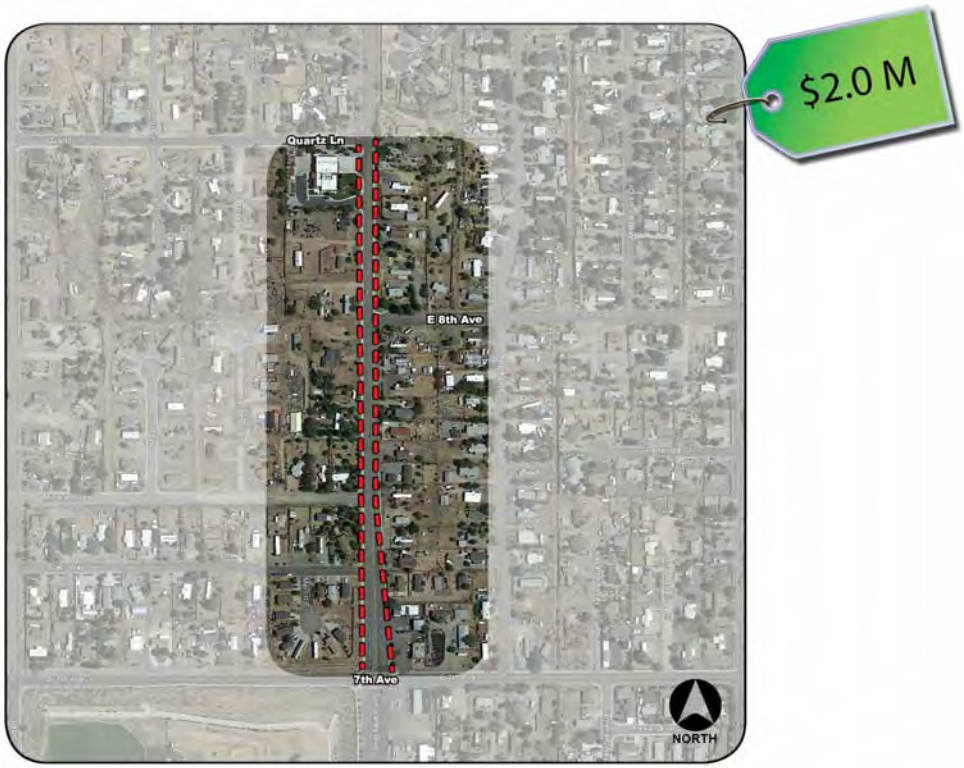


Figure 29 - 7th Avenue to Quartz Lane Aerial

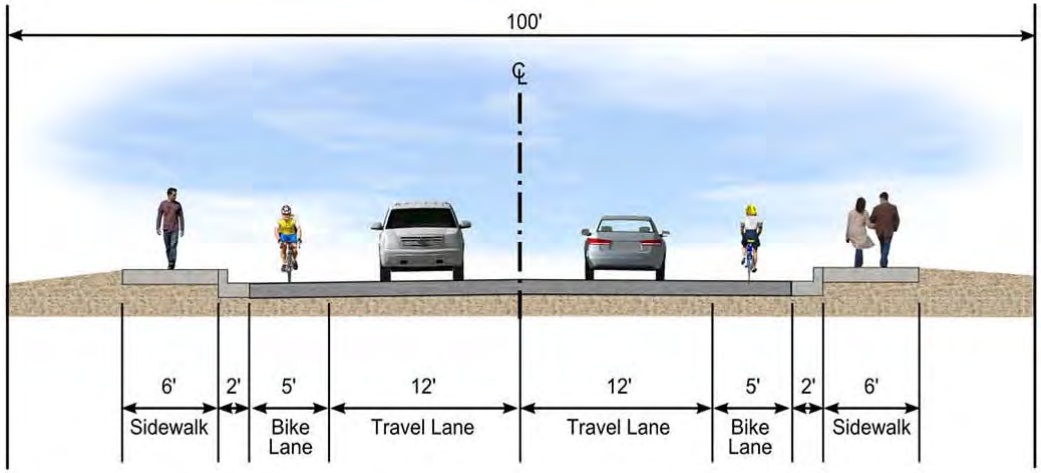


Figure 30 - 7th Avenue to Quartz Lane Cross Section

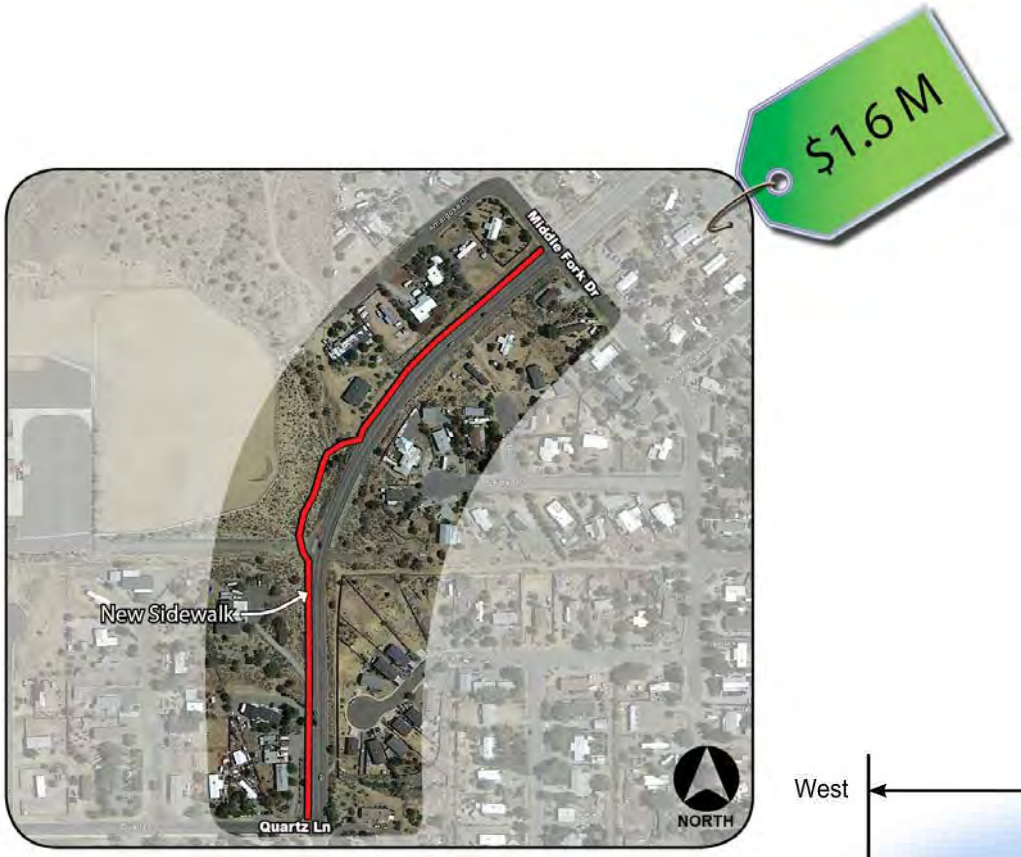


Figure 31 - Quartz Lane to Middle Fork Drive Aerial

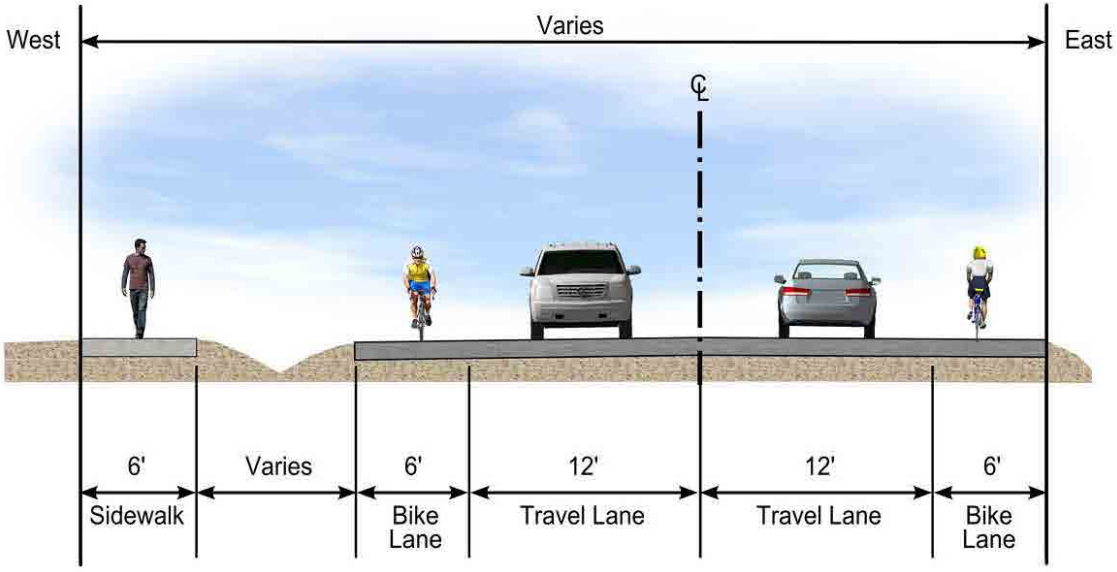


Figure 32 - Quartz Lane to Middle Fork Drive Cross Section

Figure 33 - Middle Fork Drive to Leon Drive Aerial

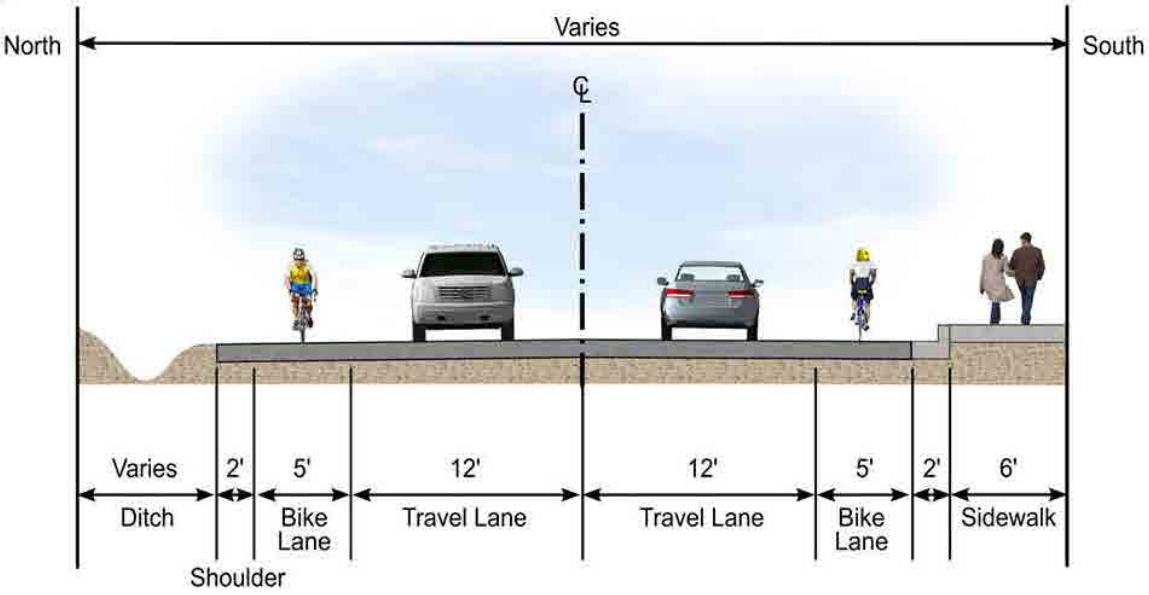


Figure 34 - Middle Fork Drive to Leon Drive Cross Section

Community Wide Pedestrian and Wheelchair Facilities

Pedestrian and Wheelchair Facilities

The addition of continuous sidewalk along Sun Valley Boulevard not only provides a safe pedestrian environment but also provides access to and from transit stops located along Sun Valley Boulevard. Pedestrian facilities along Sun Valley Boulevard are the primary focus of this study, however proper pedestrian facilities along adjacent side streets is an important second step. Sun Valley transit riders will ultimately need to utilize pedestrian facilities to get to and from their home or final destination. As a result, it is recommended that sidewalk is installed on major cross streets on at least one side of the street, with the north side being preferred to maximize natural snow melt from the sun. The side streets provide access to Sun Valley Boulevard which is the major pedestrian corridor. The major cross streets identified connect to a signalized intersection, on Sun Valley Boulevard those intersections provide a safe crossing location for pedestrians. Pedestrian facilities are recommended to be placed on the north side of the cross street; however, in some cases existing pedestrian facilities may be on the south side of the street and in these locations installation of new facilities to connect with the existing is recommended.

Figure 35 - Conceptual Sidewalk Installation over Existing Ditch

Implementation Strategy

The overall implementation of the community wide pedestrian and wheelchair facilities is a long-term priority while any single segment may be a near or mid-term priority as funding becomes available. Due to the scale of this work, a piece by piece approach is anticipated over the next fifteen-plus years to provide the necessary pedestrian access throughout the Sun Valley community.

Figure 36 - Pedestrian Network Concepts (Refer to Appendix G for Full Size)

Landscape and Lighting

During the public outreach efforts, the public spoke to the need for lighting and aesthetic improvements on Sun Valley Boulevard. The residents of Sun Valley take pride in their community and voiced their desire for Sun Valley Boulevard to be the community "main street" that the community could be proud of and be attractive to future Sun Valley businesses. The existing corridor is nearly devoid of landscaping or street trees. The existing corridor does not compel drivers, pedestrians, or cyclists to have a sense of comfort while utilizing the corridor. The addition of landscaping and aesthetics along Sun Valley Boulevard will drastically change the look and feel of the corridor.

It is recommended that decorative pedestrian scale street lights are included with the proposed sidewalk improvements to Sun Valley Boulevard. Pedestrian scale lighting will improve pedestrian safety during period of low light for both personal safety, as well as, improved visibility of the pedestrians to the vehicles traveling along Sun Valley Boulevard and the many driveways and side streets. High-mast street lights should be included at intersections as part of the signal improvements, however, high mast lighting is not preferred along the length of Sun Valley Boulevard.

All of the preferred alternatives include sidewalk, separated or attached, and median within the roadway which offer opportunities to add street trees to Sun Valley Boulevard. Discussion with the public and advisory committees included the addition of ground covering and strategically placed trees or other shade structures to provide some relief from the elements for pedestrians along the corridor and improve the look and feel of the corridor.

In addition to landscaping, it is anticipated that a general aesthetic theme will be adopted for the corridor by a collaboration between the RTC, NDOT, Washoe County, and SVGID. The aesthetic theme will tie together the landscaping, lighting fixtures, street furniture, and potentially transit stops.

Additional Landscaping Visual Simulation

Transit Strategies

Community Input

During the public outreach efforts community members expressed their desire for transit improvements and an opportunity to provide feedback on recommendations suggested as part of the charrette process. Common themes heard from Sun Valley residents included:

- Expanded service to the north, especially for commuters, many of which walk to northern-most stops on Route 5.
- Intra-community connections to support circulation within Sun Valley
- Linkages to regional shopping (including N. McCarran Boulevard and the Spanish Springs area) without traveling to downtown Reno

Transit Stop Capital Improvements

To support the current RTC fixed routes, bus shelters are needed at some existing transit stops. Stops with high passenger boarding levels are identified for new shelters. There are five stops with more than 20 daily boardings that currently lack a shelter. It is recommended that these stops are upgraded with a pad and shelter.

Figure 35 - Transit Stop with Shelter

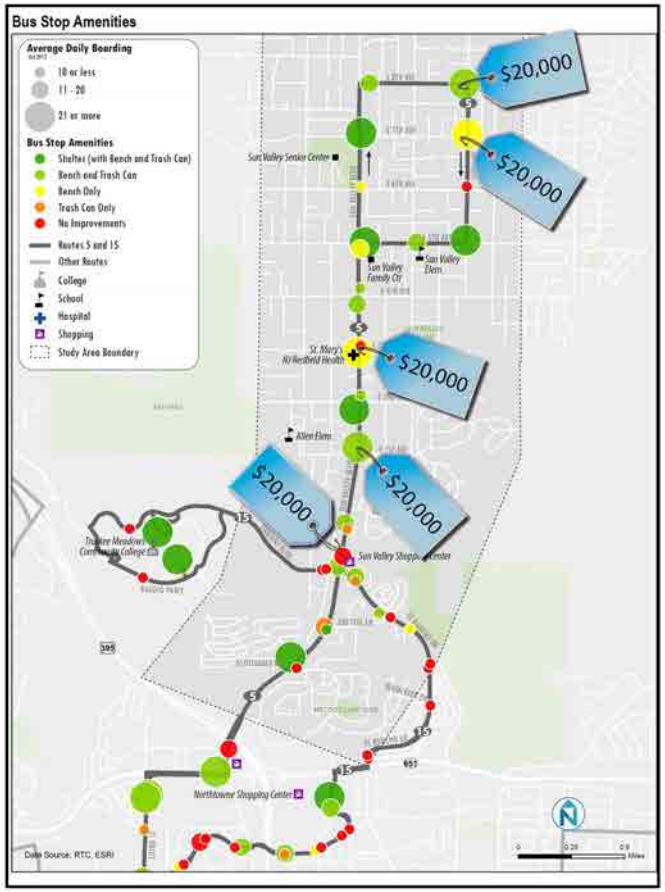


Figure 36 - New Bus Pads & Shelters

Constraints to Fixed Route Service Expansion

Making changes to Route 5 to meet Sun Valley service expansion needs is not a viable option. Route 5 is a long regional route that is having difficulty remaining on schedule due to heavy boarding activity and traffic congestion. In the past, RTC shortened the route to provide some slack in its travel time. Further extensions or deviations to the route cannot be considered unless a major restructuring of the route were to take place, which is not part of the plans for the foreseeable future.

Options for new fixed-route service to address the identified community goals are also limited. The population and employment densities in Sun Valley do not currently support all-day fixed route service and the demand for cross-region travel to/from Sun Valley is also limited at this time; the distances involved are relatively long without a transit market in-between, especially to Spanish Springs.

"Dial 'N' Ride" Solution

A point-deviation or "Dial 'N' Ride" service is proposed to address the identified gaps in Sun Valley transit brought forward during the charrette process. This approach provides a great deal of flexibility in meeting community needs while acknowledging the limitations of current RTC fixed routes in doing so.

Figure 17 illustrates the suggested service, highlighting three demand-response service areas.

- Greater Sun Valley
- Northtowne shopping center
- Sparks Galleria shopping center

This conceptual service would serve Sun Valley on weekdays with a focus on bringing employees and students to and from Route 5 during peak commute periods (6 a.m. – 9 a.m. and 4 p.m. – 6 p.m.). During these periods scheduled stops would be available at one of the northern-most Route 5 stops allowing transfer to/from the fixed route, effectively extending the range of the existing route. The stop at Sun Valley Boulevard and East 7th Avenue is a likely candidate for these transfers based on current land uses.

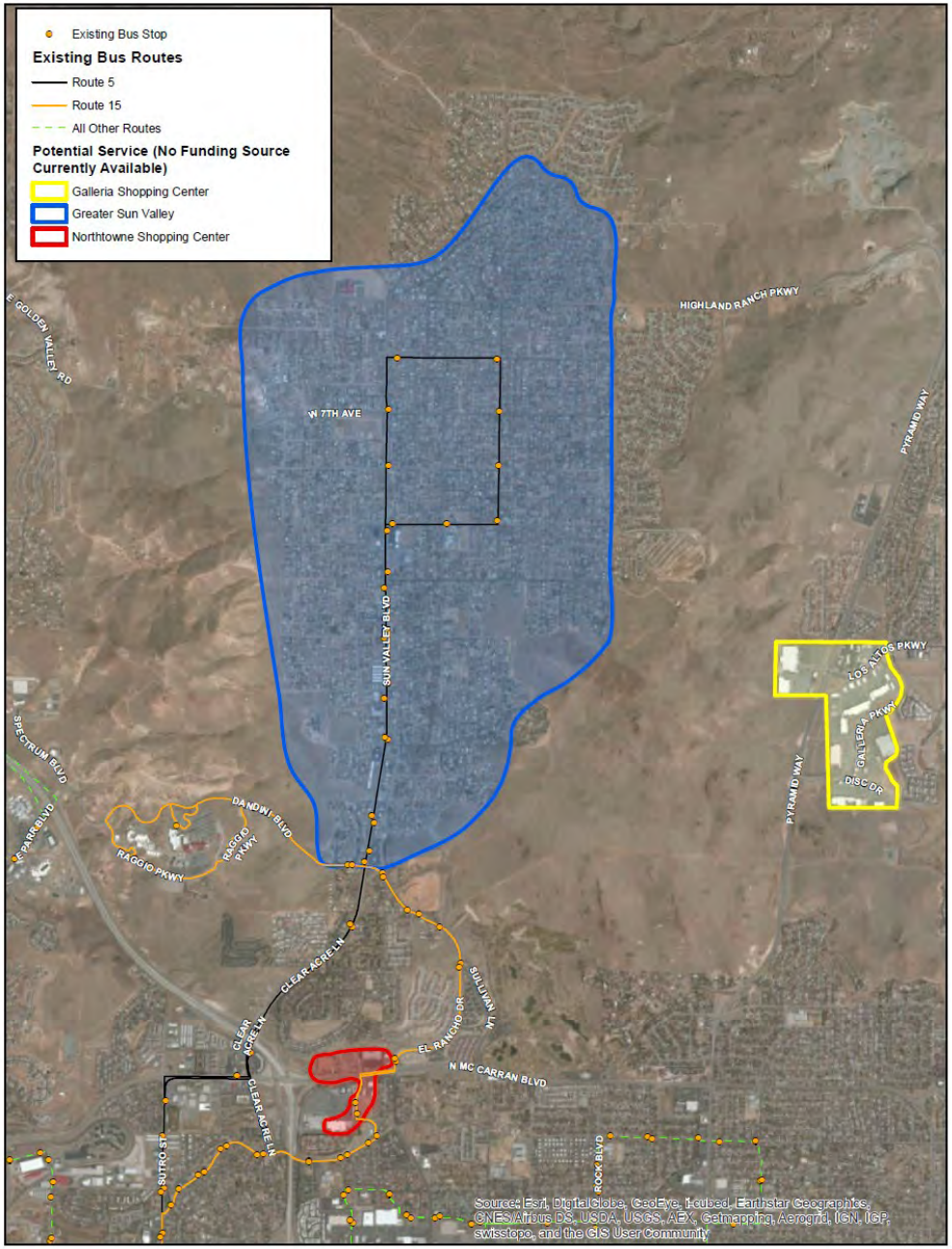


Figure 37 - Dial 'N' Ride Service Area

During the midday (9 a.m. – 4 p.m.) the service will provide general circulation around Sun Valley and make occasional, but scheduled, trips to either Northtowne shopping area on North McCarran Boulevard or the Galleria shopping area in the Spanish Springs area (no more than once an hour and probably serving the two shopping areas on alternate days). Service to the Galleria will likely be limited to a day or two a week, as the time required for travel to/from and within the Galleria will limit the time available to make trips internal to Sun Valley.

Service would be on a first-come, first-served basis but subscription reservations could be considered to facilitate reoccurring commute trips. This type of service will likely be adjusted after a trial period and would be dependent on available funding. In addition, programs such as this could be hosted and operated by any number or combination of the RTC, Community, or Volunteer Programs to name a few.

Implementation Strategy

Capital improvements can be addressed during the near-term as these items can be completed and utilized as standalone projects.

The Dial 'N' Ride program could possibly be implemented in the near-term if a volunteer, community, or SVGID program is proposed or if grant funding for a pilot program is secured. As this program is dependent on a funding source that is currently not available, the overall permanent implementation of the Dial 'N' Ride program has been identified as a long-term priority.

Sun Valley Boulevard Final Corridor Study Report

Appendices

Appendix A - Project Summary

Project Area	Description of Improvements	Near-Term (±1-5 years)	Mid-Term (±5-15 years)	Long Term (15+ years)
LONGITUDIAL CORRIDOR IMPROVEMENTS				
SCOTTSDALE TO CRYSTAL	FILL IN GAP IN EXISTING SIDEWALK - EXISTING ROAD TO REMAIN		$200,000.00	
CRYSTAL TO EL RANCHO	NEW SIDEWALK (EAST SIDE ONLY) - NEW SIDEWALK AND BIKE ROUTE ON LEONESIO DRIVE, PAVEMENT REHAB		$3,100,000.00	
EL RANCHO TO 1ST	EXISTING ROADSIDE DITCHES PIPED, ADDED SIDEWALK AND LANDSCAPING WITH LIGHTING, BIKE LANE, PAVEMENT REHAB		$4,800,000.00	
1ST TO 7TH - OPTION 1	EXISTING ROADSIDE DITCHES PIPED, ADDED SIDEWALK AND LANDSCAPING WITH LIGHTING, BIKE LANE, PAVEMENT REHAB		$12,700,000.00	
7TH TO QUARTZ	ADDED SIDEWALK AND CURB & GUTTER, BIKE LANE, PAVEMENT REHAB			$2,000,000.00
QUARTZ TO MIDDLE FORK	NEW SIDEWALK (WEST SIDE ONLY), BIKE LANE, PAVEMENT REHAB			$1,600,000.00
MIDDLE FORK TO LEON	NEW SIDEWALK (EAST SIDE ONLY), BIKE LANE, PAVEMENT REHAB			$2,100,000.00
LEON TO HIGHLAND RANCH	ADDED SIDEWALK AND CURB & GUTTER, BIKE LANE, PAVEMENT REHAB			$1,700,000.00
SPOT LOCATION BREAKOUT PROJECTS				
SKAGGS CIRCLE INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	$240,000.00		
GEPFORD PARKWAY INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	$240,000.00		
6TH AVENUE INTERSECTION	RECTANGULAR RAPID FLASHING BEACON, SIGNAGE, REFUGE ISLAND, AND MILL & FILL	$240,000.00		
1ST AVENUE	REALIGNMENT OF INTERSECTION, MILL & FILL, AND SIGNAL MODIFICATIONS	$390,000.00		
7TH AVENUE - PH 1	REALIGNMENT OF NORTHBOUND MERGE ALONG SUN VALLEY BOULEVARD ONLY, MILL&FILL, AND SIGNAL MODIFICATIONS	$510,000.00		
7TH AVENUE - PH 2	ADDITIONAL DEDICATED LEFT TURN LANES ON 7TH, MILL & FILL, AND SIGNAL MODIFICATIONS	$1,770,000.00		
EL RANCHO DRIVE	DRAINAGE, STRIPING, TRANSIT, AND SIDEWALK IMPROVEMENTS (NO SIGNAL MODIFICATIONS NEEDED)		$160,000.00	
COMMUNITY WIDE IMPROVEMENTS (BEYOND SUN VALLEY BLVD)				
OUTBOUND STATION(S)	UPGRADE OUTBOUND STATIONS WITH LARGE NUMBER OF DEPARTURES CURRENTLY LACKING A PAD, SHELTER, AND BENCH AT 5 LOCATIONS (EST $20K EACH)	$100,000.00		
EAST-WEST PEDESTRIAN CONNECTIVITY	ADD SIDEWALK FOR EAST-WEST CONNECTIVITY ON MAJOR CROSS STREETS	$12,310,000.00		
DIAL A RIDE	DEMAND RESPONSE TRANSIT SERVICE			$TBD

WOOD RODGERS

November 12, 2014

Ms. Debra Goodwin
Regional Transportation Commission of Washoe County
1105 Terminal Way, Suite 211
Reno, NV 89502

8312.016

Re: Sun Valley Boulevard Corridor Study
Existing Conditions - Crash Data Analysis

Dear Ms. Goodwin;

Wood Rodgers conducted a crash data analysis as part of the Sun Valley Boulevard Corridor Study and the findings are summarized below. Auto, bicycle, and pedestrian crash data were analyzed for locational trends and suggestions made to improve safety within the corridor.

Data Collection

Crash data was provided by the Nevada Department of Transportation (NDOT) for a three and a half year period (January 2010 – June 2013) for the Sun Valley Boulevard Corridor (Clear Acre Lane) between Scottsdale Road and Highland Ranch Parkway. The NDOT data includes reported incidents by the Nevada Highway Patrol, Reno Police Department, and the Washoe County Sherriff. Incidents associated with the intersection of adjacent side streets were also included in the data analysis. A total of (246) two-hundred and forty-six incidents were reported along the corridor and are quantified below in Table 1.1. An intersection crash schematic map is shown as Figure 2 and has been included for reference.

Table 1.1 - Corridor Crash Summary

Accident Severity	Accident Type						
	Angle	Head On	Non-Collision	Rear End	Sideswipe / Overtaking	Other	Total
Fatal	0	1	0	0	1	0	2
Injury	27	1	10	51	9	0	98
PDO*	36	1	18	80	9	2	146
Total	63	3	28	131	19	2	246

**PDO = Property Damage Only*

Two fatalities were reported for the period of January 2010 – June 2013, one at the intersection of Sun Valley Blvd and 7th Ave and the second at Sun Valley Blvd and Gepford Parkway. The 7th Ave accident was a head on collision between a motorcycle and pickup truck. The pickup truck was turning left while the motorcycle was proceeding northbound on Sun Valley Blvd. The motorcycle was reported to have been operating the vehicle in an erratic, reckless, careless, negligent or aggressive manner. The second fatal accident was at the Gepford Parkway intersection and involved an overtaking movement which results in a vehicle rollover and included 4 total vehicles. Drugs are listed as factor to this incident. These fatal accidents are considered to be due to driver error and not because of a roadway deficiency.

Pedestrian/Bicycle Incidents

In addition to evaluating total incidents along the corridor, incidents involving a bicycle or pedestrian were evaluated over 5 year crash data provided by NDOT.

The 5-yr reported crash data reported (17) seventeen incidents involving a pedestrian and (4) four involving a bicyclist. A breakdown of the pedestrian and bicycle incidents are shown in Table 1.2.

Table 1.2 – Pedestrian/Bicycle Incidents

Intersection	Bicycle	Pedestrian	Total
1st Ave	0	4	**4**
2nd Ave	0	1	**1**
4th Ave	1	0	**1**
5th Ave	0	3	**3**
6th Ave	0	2	**2**
7th Ave	1	0	**1**
Crystal Ln	0	1	**1**
Gepford Pkwy	0	2	**2**
Frook Ct.	1	0	**1**
Rampion Way	0	1	**1**
Skaggs Cir	1	2	**3**
Mineral	0	1	**1**
Total	**4**	**17**	**21**

The (21) twenty-one incidents involving a pedestrian or bicycle resulted in (20) twenty injury accidents, no fatalities, and (1) one property damage only crash. The crash data is unclear if the pedestrian was hit by a vehicle or if they were a cause of an incident. The 5th Ave, 6th Ave, and Skaggs Circle intersections had multiple incidents therefore a more detailed discussion for each is below.

About half of the pedestrian incidents were during dark or low light conditions. Improved lighting at pedestrian crossings could increase pedestrian visibility and aid in reducing pedestrian-auto incidents. Sidewalk connectivity along the corridor and to and from the existing transit stops is lacking. Providing sidewalk along the corridor will provide separation from traffic and provide pedestrians with a safe route along the corridor.

Much of the corridor lacks proper bike lane, or bike route, signage and striping. Proper signage and striping will provide awareness to vehicular traffic and provide bike access along the corridor.

The 1st Ave intersection experienced (4) pedestrian incidents and (3) three pedestrian incidents reported for the 5th Ave intersection. The crash data provided little detail as to the factors leading to the crash or if the pedestrian was a factor of the incident or was hit by a vehicle. News records however show a number of incidents over the years, including a few recently, where pedestrians have been injured or kill along Sun Valley Boulevard.

The 6th Ave intersection is currently equipped with a flashing pedestrian crossing; however two incidents were seen during the data period with the signal. The signal timing has been reported to be longer than needed and this can cause regular traffic to ignore the signal if they are used to seeing a flashing signal without a crossing pedestrian. With a flashing crossing already in place the intersection could be upgraded with a HAWK signal which contains a solid red phase to stop traffic as needed. While upgraded improvements may not be necessary, it is recommended that timing intervals are evaluated to ensure excessive flashing phases are not currently used, which as mentioned can cause traffic to ignore the flashing signal.

The Skaggs Circle and Gepford Parkway intersections are non-signalized two-way stop intersections with a crosswalk on the north side if the intersection. Four pedestrian incidents and (1) one bicycle incident were reported for these intersections. In addition, existing transit stops are located on the each side of the intersections and street lighting is not present. The addition of street lighting, a flashing pedestrian crossing, and sidewalk could improve pedestrian safety. Upgrading these intersections to a signalized intersection, if traffic warrants, would also provide a safety improvement.

Crash Rates

The 2011 Minor Arterial Functional Classification Crash Rate for Nevada per million vehicle miles traveled (RMVM) is 2.41. The Functional Classification Crash Rate is considered to be a reasonable rate of crashes to be expected for that type of facility.

Crash rates for the Sun Valley Boulevard Corridor were calculated using the crash data and traffic counts from the NDOT 2012 Annual Traffic Report. Traffic count stations and the associated traffic counts for the project area are shown in Table 2.1 and the calculated crash rates are shown in Table 2.2.

Table 2.1 - NDOT Traffic Counts

NDOT Count Station	Location	AADT		
		2010	2011	2012
310344	SR 443, Sun Valley Drive, 420 ft So El Rancho Dr	22,000	22,000	21,500
310345	SR 443, Sun Valley Drive, 0.1 mi No El Rancho Dr	32,000	30,000	29,500
310346	SR 443, Sun Valley Drive, 405 ft No 7th Ave	17,000	16,000	15,500
310600	SR443, Sun Valley Dr, 0.1 mi N of Gepford Pk.	24,000	23,000	21,000
311123	Sun Valley Bl, No of 9th St.	10,000	9,900	7,300
311125	Clear Acre Ln, 500ft E of US-395 and 150ft W of Epley Ln	25,000	26,000	25,000

Numbers from NDOT 2012 Annual Traffic Report for Washoe County

Table 2.2 - Calculated Crash Rates

Roadway Section	RMVM (Fatal)	RMVM (Injury)	RMVM (PDO)	RMVM (Overall)
2011 Functional Classification for Nevada (Minor Arterial)	0.026	1.14	1.50	2.66
Scottsdale Rd to Gepford Pkwy	0.020	1.53	1.76	3.31
Gepford Pkwy to 7th Ave	0.05	0.80	1.95	2.80
7th Ave to 9th Ave	0.00	0.32	1.25	1.60
9th Ave to Highland Pkwy	0.00	0.40	1.32	1.71

RMVM (rate per million vehicle miles)= [(number of crashes) * 1,000,000]/[(Avg daily traffic)*365*length of road]

Scottsdale Road to 7th Ave has a high rate of incidents compared to the state functional classification rate. Safety improvements along this stretch of the corridor should be considered to bring the crash rate below the functional classification rate.

Intersection Analysis

An intersection crash rate, reported in Rate per Million Entering Vehicles (RMEV), was calculated for each of the intersections along the corridor to identify intersections with a high rate of incidents. Intersection crash rates are shown in Figure 1 and are included for your reference.
Intersection crash diagrams are included as Figure 2 and a discussion, including crash trends and potential safety improvements for each high rate intersection are included below.

<u>Scottsdale Road / Vallee Way</u>

The Scottsdale intersection is a signalized intersection with the Vallee Way "T" intersection approximately 200' to the north. This intersection experienced (25) twenty-five total incidents including (18) eighteen rear-end, (5) five angle, (1) one non-collision, and (1) one sideswipe crash.
The majority of the incidents at this intersection were rear-end type accidents. Many of the accidents are credited to following too closely and excessive speed.

Optimizing signal change intervals and signal coordination can reduce rear-end accident rates at an intersection. Signal coordination along Sun Valley Boulevard was recently completed could result in a reduction in incidents however this possible reduction is not reflected in the current crash data. In addition, advanced warning of the upcoming intersection could also assist in reducing the rear-end incidents since this signal has an increase separation from the other signals on the corridor.

El Rancho Drive / Dandini Boulevard
The El Rancho/Dandini intersection is a signalized intersection. This intersection experienced (24) twenty-four total incidents including (14) fourteen rear-end, (6) six angle, (2) two sideswipe-overtaking, (1) one sideswipe, and (1) one non-collision crash.

The majority of the incidents at this intersection were rear-end type accidents. Many of the accidents are credited to following too closely and excessive speed. In addition, a fair amount of angle type, related left turn and through movement conflicts, and sideswipe incidents, related to lane merging, were reported.

The recent signal coordination along Sun Valley Boulevard could reduce the rear-end incidents, however possible reductions are not reflected in the current crash data. Optimizing signal change intervals will also aid in reducing the angle type accidents. Adding advanced intersection signage may aid in reducing the sideswipe/merging type accidents.

1st Avenue
The 1st Avenue intersection is a signalized intersection and experienced (54) fifty-four total incidents including (39) thirty-nine rear-end, (8) eight angle, (3) three sideswipe-overtaking, (3) three non-collision, and (1) one sideswipe crash.

This intersection experienced more than double the accidents than other high-rate intersection along the corridor. The vast majority of the incidents at this intersection were rear-end accidents and of the rear-end accidents most are credited to following too closely and excessive speed.
The recent signal coordination along Sun Valley Boulevard could reduce the rear-end incidents, however possible reductions are not reflected in the current crash data. In addition, optimizing signal change intervals and signal coordination can reduce rear-end accident rates at intersection.

2nd Avenue
The 2nd Avenue intersection is a signalized intersection and experienced (20) twenty total incidents including (15) fifteen rear-end, (4) four angle, and (1) one non-collision crash.
This intersection is with the Scottsdale to 7th high rate portion of the corridor and the majority of the incidents at this intersection were rear-end type accidents. Many of the accidents are credited to following too closely and excessive speed. The other trending accident at this intersection involved a left turn-through movement conflict.

The recent signal coordination along Sun Valley Boulevard could reduce the rear-end incidents, however possible reductions are not reflected in the current crash data. In addition, optimizing signal change intervals and signal coordination can reduce rear-end accident rates and the angle type incidents between the left turn and through movements at this intersection.

Skaggs Circle

The Skaggs Circle intersection is a two-way stop intersection and experienced (16) sixteen total incidents including (10) ten rear-end, (4) four non-collision, and (2) two angle crashes. While the majority of the incidents were rear-end type accidents, most conflicts at this intersection can be credited to merging and accelerating traffic from Skaggs Circle.

Possible improvements to this intersection include the addition of a new signal or eliminating the left turn movements and reducing a merging/acceleration movement. As previously mentioned, a mid-block pedestrian crossing may also warrant a signalized crossing.

5th Avenue

The 5th Avenue intersection is a signalized intersection and experienced (24) twenty-four total incidents including (10) ten angle, (8) eight rear-end, (4) four non-collision, and (2) two sideswipe-overtaking crashes. The majority of incidents were angle type incidents and merging conflicts.

There are multiple driveway entrances and exits for adjacent commercial properties. Possible improvements could be reducing driveways to reduce points of conflict.

7th Avenue

The 7th Avenue intersection is a signalized intersection Fand experienced (15) fifteen total incidents including (6) six angle, (4) four non-collision, (2) two rear-end, (1) one head-on, (1) one sideswipe-overtaking, and (1) one sideswipe crash. While a higher rate of incidents were experienced at this intersection the accidents don't trend.

Optimizing signal change intervals and adding this signal into the signal coordination recently completed could reduce the incidents at this intersection. In addition, increasing the northbound right turn pocket could aid in reducing some of the non-collision accidents seen at this intersection.

Middle Fork Drive

Middle Fork Drive intersection is a two-way stop intersection and experienced (9) nine total incidents including (4) four angle, (2) two rear-end, (1) non-collision, (1) sideswipe-overtaking, and (1) sideswipe crash.

The volume at the Middle Fork Drive intersection is significantly less than much of the corridor while experiencing a similar number of incidents and as such the intersection accident rate is high compared to much of the corridor. The angle type incidents involved vehicles turning left and could be a result of the two-way stop configuration. A four-way stop could alleviate this conflict. There were (4) four run-off incidents, (3) three are credited towards inclement weather and the fourth incident lacked a cause.

The addition of curb and gutter could assist in reducing the run-off incidents due to the reduced speed of 35 mph in this area otherwise guardrail or barrier rail should be considered with roadside ditches allowing minimal shoulder widths. While the intersection experienced a higher rate of incidents, this portion of the corridor is below the state functional classification crash rate.

Conclusion

The incidents along the corridor were primarily located at the intersections and as a result it is recommended that the existing signal system is evaluated for optimal signal change intervals and continued signal coordination along the corridor which may reduce the potential for rear-end incidents which were identified as the primary accident trend within the corridor. The recent signal coordination along the corridor may reduce the rear-end accidents to an acceptable level; however the impacts won't be realized until a year or two of crash data can be collected.

In addition, it is recommended that pedestrian connectivity and safety is considered. Additional sidewalk/pathways can provide safe access along the length of the corridor and it largely unavailable in the existing condition. Proper lighting at intersections can improve public safety and help reduce pedestrian and vehicle conflicts during low light conditions.

The speed along the corridor is 45 mph south of Rampion Way and 35 mph north of Rampion Way. Excessive speed was found to be a common catalyst within the crash data. A speed survey should be considered to evaluate if traffic calming, lane reductions, or other speed reduction measures are appropriate to reduce the traveled speeds throughout the corridor.

Please feel to contact us should you have any questions or concerns.

Sincerely,

WOOD RODGERS, INC.

Brian Martinezmoles, P.E.
Project Engineer

Sun Valley Boulevard Corridor Study
Intersection Crash Rate Calculation

Road Section	Distance (mi)	AADT	Intersection	Number of Injury	RMEV (Injury)	RMVM (Injury)	2011 Functional Classificaiton for Nevada (Minor Arterial)	Number of Fatal	RMEV (Fatal)	RMVM (Fatal)	2011 Functional Classificaiton for Nevada (Minor Arterial)	Number of PDO	RMEV (PDO)	RMVM (PDO)	2011 Functional Classificaiton for Nevada (Minor Arterial)	Number of Incidents	RMEV	RMVM	2011 Functional Classificaiton for Nevada (Minor Arterial)
Scottsdale to Gepford	1.90	24,250	CRYSTAL LN	2	0.08	1.53	1.14	0	0.00	0.02	0.026	0	0.00	1.76	1.5	**2**	**0.08**	**3.31**	**2.41**
			DANDINI BLVD / El Rancho	7	0.26			0	0.00			17	0.64			**24**	**0.90**		
			LEONESIO WAY	2	0.08			0	0.00			0	0.00			**2**	**0.08**		
			SCOTTSDALE RD / VALLEE WAY	10	0.38			0	0.00			15	0.56			**25**	**0.94**		
			1ST AVE	26	0.98			0	0.00			28	1.05			**54**	**2.03**		
			2ND AVE	9	0.34			0	0.00			11	0.41			**20**	**0.75**		
			FROOK CT	2	0.08			0	0.00			0	0.00			**2**	**0.08**		
			E GEPFORD PKWY	4	0.15			1	0.04			4	0.15			**9**	**0.34**		
			RAMPION WAY	6	0.23			0	0.00			7	0.26			**13**	**0.49**		
			SKAGGS CIR	9	0.34			0	0.00			7	0.26			**16**	**0.60**		
Gepford to 7th	1.00	18,250	4TH ST	3	0.15	0.80		0	0.00	0.05		6	0.30	1.95		**9**	**0.45**	**2.80**	
			5TH AVE	9	0.45			0	0.00			15	0.75			**24**	**1.20**		
			6TH AVE	2	0.10			0	0.00			6	0.30			**8**	**0.40**		
			7TH AVE	2	0.10			1	0.05			12	0.60			**15**	**0.75**		
7th to 9th	0.50	11,400	8TH AVE	2	0.16	0.32		0	0.00	0.00		1	0.08	1.28		**3**	**0.24**	**1.60**	
			QUARTZ LN	0	0.00			0	0.00			6	0.48			**6**	**0.48**		
			STACI WAY	0	0.00			0	0.00			1	0.08			**1**	**0.08**		
9th to Highland	0.95	7,300	ARAPAHO DR	0	0.00	0.40		0	0.00	0.00		1	0.13	1.32		**1**	**0.13**	**1.71**	
			HIGHLAND RANCH PKWY	0	0.00			0	0.00			1	0.13			**1**	**0.13**		
			LEON DR	0	0.00			0	0.00			2	0.25			**2**	**0.25**		
			MIDDLE FORK DR	3	0.38			0	0.00			6	0.75			**9**	**1.13**		
			MID-BLOCK		0.00				0.00				0.00			**0**	**0.00**		

COLLISIONS @ SCOTTSDALE INTERSECTION:
(18) REAR-END COLLISIONS
(3) ANGLE COLLISION
(1) NON-COLLISION
(1) SIDE SWIPE

COLLISIONS @ VALLEE INTERSECTION:
(2) ANGLE COLLISIONS

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2A
SCOTTSDALE ROAD & VALLEE WAY

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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Reno, NV. 89511 Fax 775.823.4066

COLLISIONS @ EL RANCHO INTERSECTION:
(14) REAR-END COLLISIONS
(6) ANGLE COLLISIONS
(1) NON-COLLISION
(3) SIDESWIPE/OVERTAKING

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2B
EL RANCHO DRIVE & DANDINI BLVD

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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Reno, NV. 89511 Fax 775.823.4066

COLLISIONS @ SKAGGS CIRCLE INTERSECTION:
(2) ANGLE COLLISIONS
(10) REAR-END COLLISIONS
(4) NON-COLLISIONS

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2C
SKAGGS CIRCLE

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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COLLISIONS @ 1ST AVE INTERSECTION:
(8) ANGLE COLLISIONS
(39) REAR-END COLLISIONS
(4) SIDE SWIPE, OVERTAKING COLLISIONS
(3) NON-COLLISIONS

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2D
1ST AVE

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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COLLISIONS @ 2ND AVENUE INTERSECTION:
(4) ANGLE COLLISIONS
(15) REAR-END COLLISIONS
(1) NON-COLLISIONS

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2E
2ND AVENUE

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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COLLISIONS @ 5TH AVENUE INTERSECTION:
(10) ANGLE COLLISIONS
(8) REAR-END COLLISIONS
(4) NON-COLLISIONS
(2) SIDE SWIPE

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2F
5TH AVENUE

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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COLLISIONS @ 7TH AVE INTERSECTION:
(6) ANGLE COLLISIONS
(1) HEAD-ON COLLISIONS
(2) REAR-END COLLISIONS
(2) SIDE SWIPE, OVERTAKING COLLISIONS
(4) NON-COLLISION

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2G
7TH AVE

NORTH

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
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Reno, NV. 89511 Fax 775.823.4066

COLLISIONS @ MIDDLE FORK DR. INTERSECTION:
(4) ANGLE COLLISIONS
(2) REAR-END COLLISIONS
(1) NON-COLLISIONS
(2) SIDE SWIPES

Sun Valley Boulevard Corridor Study
Crash Data Summary
Intersection Crash Schematic

FIGURE 2H
MIDDLE FORK DR

NORTH

WOOD RODGERS
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SUN VALLEY BOULEVARD CORRIDOR STUDY

Traffic Operations Report

Prepared For:

Wood Rodgers

Prepared by:

TRAFFIC WORKS LLC

Date: 10/07/2014

Study Area

The project study area includes 2.6 miles of the Sun Valley Boulevard corridor from Scottsdale Road (south end) to 7th Avenue (north end). Sun Valley Boulevard, within the study limits, is classified as a Minor Arterial by the Nevada Department of Transportation (NDOT), who has jurisdiction over this portion of the roadway. The major study intersections (those with existing traffic signals) included in this traffic analysis are:

- Sun Valley Boulevard (Clear Acre Lane) / Scottsdale Road
- Sun Valley Boulevard / El Rancho Drive / Dandini Boulevard
- Sun Valley Boulevard / 1st Avenue
- Sun Valley Boulevard / 2nd Avenue
- Sun Valley Boulevard / 4th Avenue
- Sun Valley Boulevard / 5th Avenue
- Sun Valley Boulevard / 7th Avenue

The study area and the study intersections are shown in **Figure 1**.

Level of Service

Level of service (LOS) is an estimate of the quality and performance of transportation system operations. The industry standard for evaluating traffic conditions is 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 2000 HCM level of service criteria for signalized and un-signalized intersections are shown in **Table 1**.

Level of Service Policy

Washoe County and NDOT strive to maintain Level of Service "D" or better for all intersections (signalized and un-signalized). This is also the LOS policy outlined in the 2035 Regional Transportation Plan (2035 RTP) for roadways carrying less than 27,000 ADT. 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".

Since all the roadway segments currently carry less than 27,000 vehicles per day, LOS "D" was therefore used as the criteria and threshold for determining acceptable vs. substandard conditions during existing conditions. The LOS threshold would become LOS "E" if the ADT on Sun Valley Boulevard were to exceed 27,000 vehicles per day in the future.

Applying the current standards to the study corridor, the level of service criteria specific for this project are:

- Sun Valley Boulevard (Scottsdale Road to El Rancho Drive) – LOS D
- Sun Valley Boulevard (El Rancho Drive to 1st Avenue) – LOS D
- Sun Valley Boulevard (1st Avenue to 4th Avenue) – LOS D
- Sun Valley Boulevard (4th Avenue to 7th Avenue) – LOS D
- Sun Valley Boulevard (7th Avenue to Highland Ranch Parkway) – LOS D

Table 1. Level of Service 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, modified from Exhibits 16-2 and 17-2; 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.

Existing Traffic Volumes

Turning movement volumes at all the study intersections for morning and evening peak hours were obtained from the RTC traffic count online database. 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 analyzed using the morning and evening data. Pedestrian crossing volumes and heavy vehicle (trucks, buses, etc.) data were also obtained from the same source. Peak hour volume data indicates that the Sun Valley Boulevard experiences directional peaking with the vast majority of traffic travelling southbound during the morning peak and northbound during evening peak. The existing peak hour volumes are shown in **Figure 2**. The existing average daily traffic volumes, obtained from NDOT and RTC online sources, are shown in **Figure 3**.

Intersection Analysis

The intersections 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 intersection configurations and traffic volumes. The Level of Service and delay results are presented in **Table 2** and the calculation sheets are provided in **Appendix A**, attached.

As shown in **Table 2**, all the study intersections currently operate at acceptable levels of service (LOS "D" or better) during both the AM and PM peak hours.

Table 2. 2013 Existing AM and PM Peak Hour LOS Summary

Intersection	Signal Control		AM Peak Existing	PM Peak Existing
Sun Valley Blvd & Scottsdale Rd	Signalized	LOS	B	A
		Delay (sec/veh)	18.7	16
Sun Valley Blvd & El Rancho Dr	Signalized	LOS	C	C
		Delay (sec/veh)	33.9	31.6
Sun Valley Blvd & 1st Ave	Signalized	LOS	B	B
		Delay (sec/veh)	13.3	18.2
Sun Valley Blvd & 2nd Ave	Signalized	LOS	B	B
		Delay (sec/veh)	17.5	16.7
Sun Valley Blvd & 4th Ave	Signalized	LOS	A	A
		Delay (sec/veh)	8.0	11.7
Sun Valley & 5th Ave	Signalized	LOS	B	B
		Delay (sec/veh)	11.9	11.8
Sun Valley Blvd & 7th Ave	Signalized	LOS	C	B
		Delay (sec/veh)	24.4	18.7

Road Segment Levels of Service

Roadway segments were analyzed using the Average Daily Traffic Thresholds as outlined in the Washoe County Regional Transportation Commission's 2035 Regional Transportation Plan **Table 3**. Level of service is estimated by comparing the existing average daily traffic volumes to the LOS threshold values shown in the table.

Table 3. Average Daily Traffic LOS Thresholds by Facility Type for Roadway Planning

Facility Type	Maximum Service Flow Rate (daily for given service level)				
Number 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.					

The existing average daily traffic volumes were compared to the daily volume thresholds (**Table 3**) to determine existing roadway segment level of service. The results are shown in **Table 4**. This

analysis shows that the roadway segments are functioning within policy level of service requirements.

Table 4. Existing Roadway Daily Segment Level of Service

Roadway Segment	Class	Lanes	Access Control	ADT	LOS
Sun Valley Boulevard (Scottsdale Road to El Rancho Drive)	Arterial	4	MAC	21,500	C
Sun Valley Boulevard (El Rancho Drive to 1st Avenue)	Arterial	4	MAC	29,500	C
Sun Valley Boulevard (1st Avenue to 4th Avenue)	Arterial	4	MAC	21,000	C
Sun Valley Boulevard (4th Avenue to 7th Avenue)	Arterial	4	MAC	15,500	C
Sun Valley Boulevard (7th to Highland Ranch Parkway)	Arterial	2	MAC	7,300	B

Planned Projects and Future Conditions

The proposed Pyramid Highway/US 395 Connection provides improved east/west connectivity by connecting Pyramid Highway to US 395. The proposed Pyramid Highway/US 395 Connection passes over Sun Valley Boulevard at a location north of El Rancho Drive and south of 1st Street, and connects to Sun Valley Boulevard with a freeway interchange at the West Sun Valley Arterial. The proposed alignment and location of the Pyramid Highway/US 395 Connection new interchange is shown in **Figure 4**. This proposed east/west connection will result in slightly increased traffic volumes and changed traffic patterns on Sun Valley Boulevard. The effect of Pyramid Highway/US 395 Connection would be higher on portion of the Sun Valley Boulevard south of the connection compared to northern portion of the corridor. The following sections describe the anticipated long term growth and roadway capacity needs.

2035 Roadway Segment Volumes and Level of Service Analysis

Traffic volumes on Sun Valley Boulevard are anticipated to increase in the future due to employment growth, population growth, development, and to a small extent, the new Pyramid Highway/US 395 Connection. The traffic volumes on the portion of Sun Valley Boulevard south of Pyramid Highway/US 395 Connection are expected to grow at a higher rate than the volumes on Sun Valley Boulevard north of Pyramid Highway/US 395 Connection. The Washoe County Regional Transportation Commission (RTC) travel demand model associated with the Pyramid

Highway/US 395 Connection is currently still in the process of development and refinement. We obtained the latest iteration of the travel demand model to estimate the growth rates along Sun Valley Boulevard. The current and latest iteration (at the time of writing this report) of the model assumes a new interchange connection with the Pyramid Highway/US 395 Connection directly on Sun Valley Boulevard between El Rancho Drive and 1st Avenue. Year 2035 growth rates were calculated based on the projected growth shown in this travel demand model. The model estimates a traffic volume growth rate of approximately 3% per year on Sun Valley Boulevard south of the Pyramid Highway/US 395 Connection and approximately 1% to 1.5% per year on Sun Valley Boulevard north of the Pyramid Highway/US 395 Connection.

However, the location of the new interchange with Pyramid Highway/US 395 Connection was altered in the Pyramid Highway/US 395 Connection preferred alternative. The preferred alternative assumes that the Pyramid Highway/US 395 Connection makes connection to the Sun Valley community at the planned West Sun Valley Arterial which is located west of Sun Valley Boulevard. The location of the new interchange is shown in **Figure 4**. At the time of writing this report, the RTC was in the process of updating the travel demand model to incorporate the changes associated with the preferred alternative. With the location of the new interchange moving away from the Sun Valley Boulevard, the growth rates on Sun Valley Boulevard are expected to be lower than what the model anticipates. With the preferred alternative configuration shown in **Figure 4**, through the year 2035, traffic volumes on Sun Valley Boulevard south of the proposed Pyramid Highway/US 395 Connection are anticipated to grow at a rate of about 1.5% per year to 2% per year. The traffic volumes on Sun Valley Boulevard north of the proposed Pyramid Highway/US 395 Connection are anticipated to grow at a rate of 1% per year to 1.5% per year. Assuming the worst case scenario, this analysis estimates a growth rate of 2% per year south of the Pyramid Highway/US 395 Connection and a growth rate of 1.5% per year north of the Pyramid Highway/US 395 Connection to calculate the estimated future year 2035 Average Daily Traffic volumes and intersection turning movement counts. Estimated 2035 Average Daily Traffic volumes along various sections of Sun Valley Boulevard are shown in **Figure 5** and corresponding Level of Service values are shown in **Table 5**.

As shown in **Table 5**, the Average Daily Traffic Volumes south of 4th Avenue are higher than 27,000 vehicles per day and hence, according to 2035 Regional Transportation Plan (2035 RTP) adopted by the Washoe County Regional Transportation Commission (RTC), the Level of Service standard changes to LOS “E” (as compared to LOS “D” for 2013 existing conditions).

Table 5. 2035 Roadway Segment Level of Service

Roadway Segment	Class	Lanes	Access Control	2013 ADT	2013 LOS	2035 ADT	2035 LOS
Sun Valley Boulevard (Scottsdale Road to El Rancho Drive)	Arterial	4	MAC	21,500	C	31,400	D
Sun Valley Boulevard (El Rancho Drive to 1st Avenue)	Arterial	4	MAC	29,500	C	39,700	F
Sun Valley Boulevard (1st Avenue to 4th Avenue)	Arterial	4	MAC	21,000	C	28,300	C
Sun Valley Boulevard (4th Avenue to 7th Avenue)	Arterial	4	MAC	15,500	C	20,900	C
Sun Valley Boulevard (7th to Highland Ranch Parkway)	Arterial	2	MAC	7,300	B	9,900	B

The year 2035 Level of Service criteria are:

- Sun Valley Boulevard (Scottsdale Road to El Rancho Drive) – LOS E
- Sun Valley Boulevard (El Rancho Drive to 1st Avenue) – LOS E
- Sun Valley Boulevard (1st Avenue to 4th Avenue) – LOS E
- Sun Valley Boulevard (4th Avenue to 7th Avenue) – LOS D
- Sun Valley Boulevard (7th Avenue to Highland Ranch Parkway) – LOS D

All the roadway segments operate at better than the Level of Service standards except for the roadway segment between the El Rancho Drive and 1st Avenue (see **Table 5**). The 2035 roadway analysis indicates that all the roadway segments, with the exception of Sun Valley Boulevard between El Rancho Drive and 1st Avenue, have sufficient capacity to accommodate the anticipated traffic volume growth of 1.5% to 2% per year with some additional capacity left for further traffic volume growth beyond the assumed 1.5% to 2% growth per year.

In the year 2035, the Average Daily Traffic volume on Sun Valley Boulevard between El Rancho Drive and 1st Avenue is estimated to be 39,700 vehicles per day which is only 2,800 vehicles per day higher than the LOS "E" threshold. Since this analysis is conservative and the future traffic volumes are only slightly over the LOS "E" threshold, we recommend re-evaluating the traffic volumes and level of service conditions in this particular segment in the future to more accurately estimate the future LOS conditions. All the roadway segments are anticipated to meet LOS standards for at least the next 10 to 15 years.

2035 Intersection Level of Service Analysis

Future year 2035 AM and PM peak hour turning movements at all the study intersections were obtained by applying growth rates to existing turning movements. Similar to the roadway segment traffic volume estimates, growth rates of 2% per year south of the Pyramid Highway/US 395 Connection and 1.5% per year north of the Pyramid Highway/US 395 Connection were used to estimate 2035 turning movements. This results in highly conservative estimates for turning movements as the side street volume was grown at the same rate as Sun Valley Boulevard. In reality, the side streets typically grow at a lower rate than the mainline. Estimated 2035 turning movements at all the signalized study intersections are shown in **Figure 6**, attached. The peak hour Level of Service results are shown in **Table 6** and detailed calculations are shown in **Appendix B**.

Table 6. 2035 Intersection Level of Service

Intersection	2035 LOS Standard		Existing		2035	
			AM Peak	PM Peak	AM Peak	PM Peak
Scottsdale Rd & Sun Valley Blvd	E	**LOS**	B	B	B	B
		Delay (sec/veh)	18.7	16	13.8	18.4
El Rancho Dr. & Sun Valley Blvd	E	**LOS**	C	C	C	E
		Delay (sec/veh)	33.9	31.6	33.6	64.8
1st Ave & Sun Valley Blvd	E	**LOS**	B	B	B	B
		Delay (sec/veh)	13.3	18.2	10.8	10.5
2nd Ave & Sun Valley Blvd	E	**LOS**	B	B	B	B
		Delay (sec/veh)	17.5	16.7	15.0	13.8
4th Ave & Sun Valley Blvd	D	**LOS**	A	B	A	A
		Delay (sec/veh)	8.0	11.7	8.1	6.8
5th Ave & Sun Valley Blvd	D	**LOS**	B	B	B	A
		Delay (sec/veh)	11.9	11.8	14.3	8.3
7th Ave & Sun Valley Blvd	D	**LOS**	C	B	D	C
		Delay (sec/veh)	24.4	18.7	39.1	24.7

As shown in **Table 6**, all the study intersections would operate at or better than the Level of Service thresholds even with the conservative growth estimates. The level of service analysis shows that the current roadway and intersection capacity would be sufficient to accommodate the growth rates of 2% per year and 1.5% per year south and north of the Pyramid Highway/US 395 Connection, respectively, without significant adverse impacts.

Conclusion

The capacity analysis conducted in this study assumes that the proposed Pyramid Highway/US 395 Connection makes a connection to the Sun Valley community at the planned West Sun Valley Arterial rather than directly to Sun Valley Boulevard. Under that basis, the current lane configurations on Sun Valley Boulevard and the existing intersection configurations are anticipated to adequately serve the traffic growth through the 2035 horizon. However, if the Pyramid Highway/US 395 Connection had a direct interchange with Sun Valley Boulevard, additional travel lanes could be necessary on Sun Valley Boulevard between the Pyramid Highway/US 395 Connection and US 395.

TRAFFIC WORKS LLC

NO SCALE

LEGEND

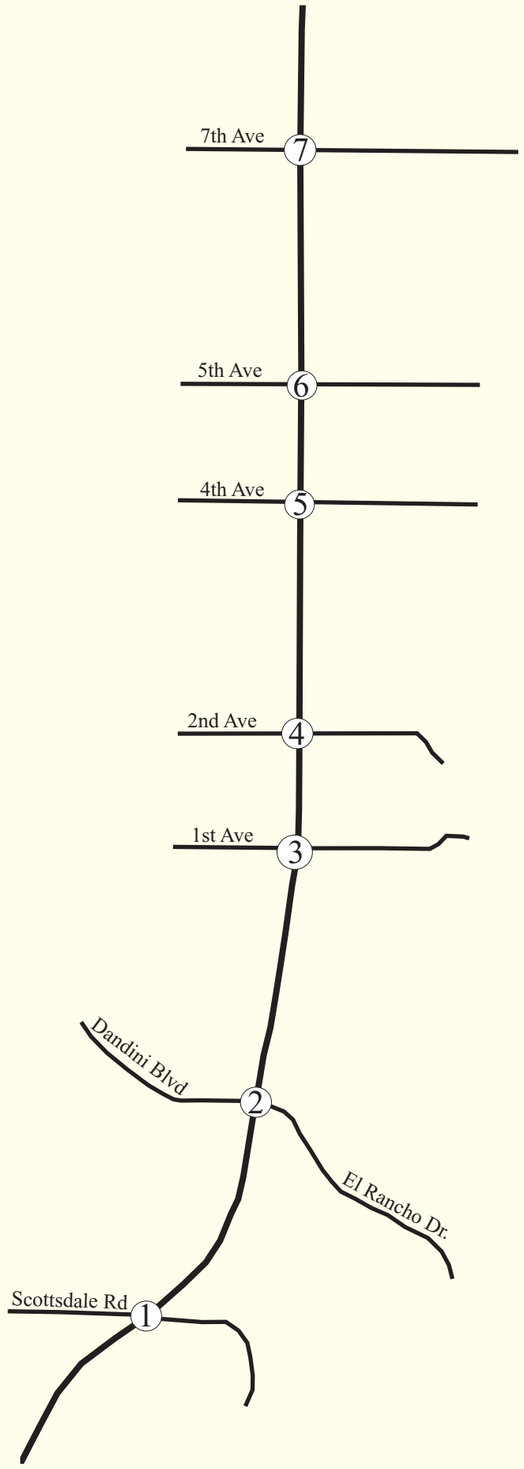
- Project Area

(X) - Study Intersection

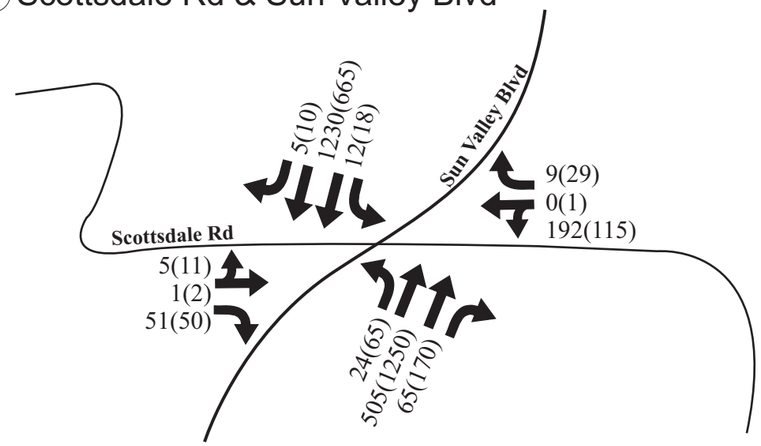
FIGURE 1

Sun Valley Blvd Corridor Study

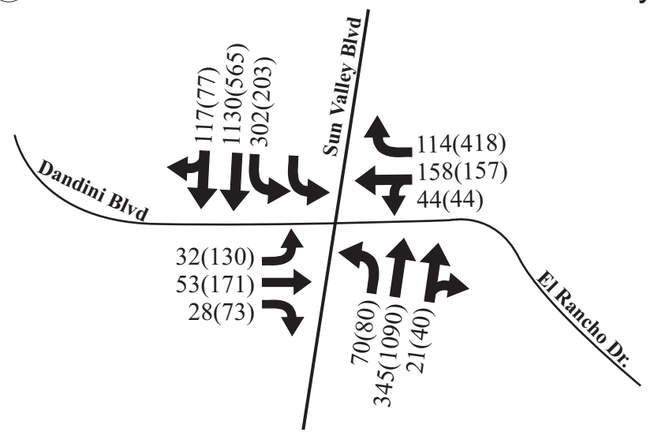
Vicinity Map



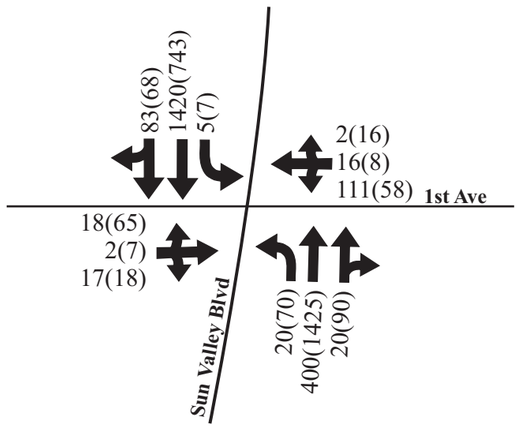
① Scottsdale Rd & Sun Valley Blvd



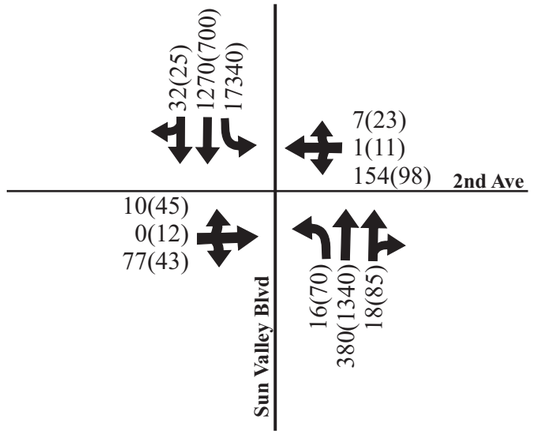
② Dandini Blvd / El Rancho Dr. & Sun Valley Blvd



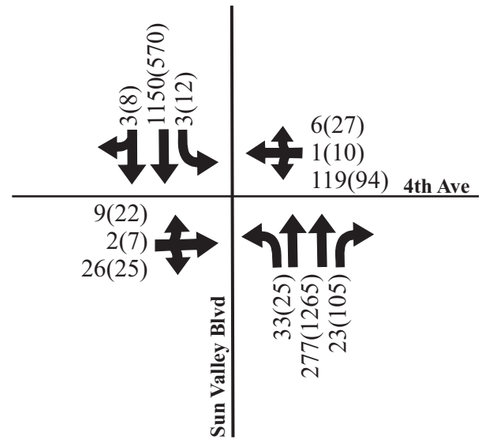
③ 1st Ave & Sun Valley Blvd



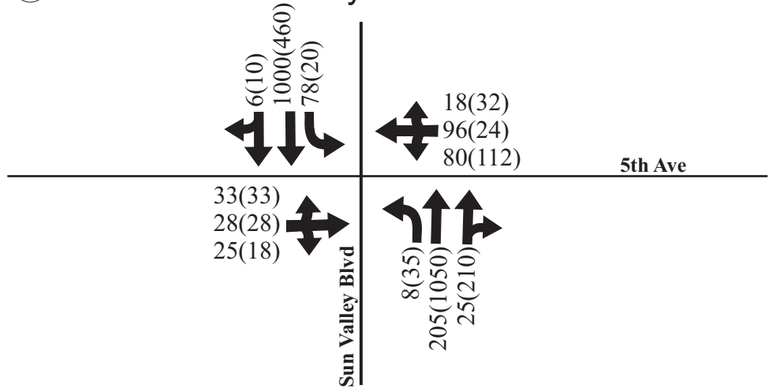
④ 2nd Ave & Sun Valley Blvd



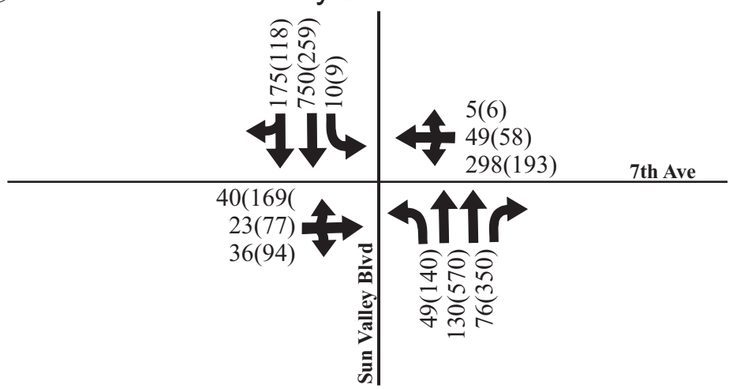
⑤ 4th Ave & Sun Valley Blvd



⑥ 5th Ave & Sun Valley Blvd



⑦ 7th Ave & Sun Valley Blvd



TRAFFIC WORKS LLC

NO SCALE

LEGEND

(X) - Study Intersection

AM(PM) - Turn Movement Volumes

- Turn Movement

FIGURE 2

Sun Valley Blvd Corridor Study

Existing Turn Movement Volumes

TRAFFIC WORKS LLC

N

NO SCALE

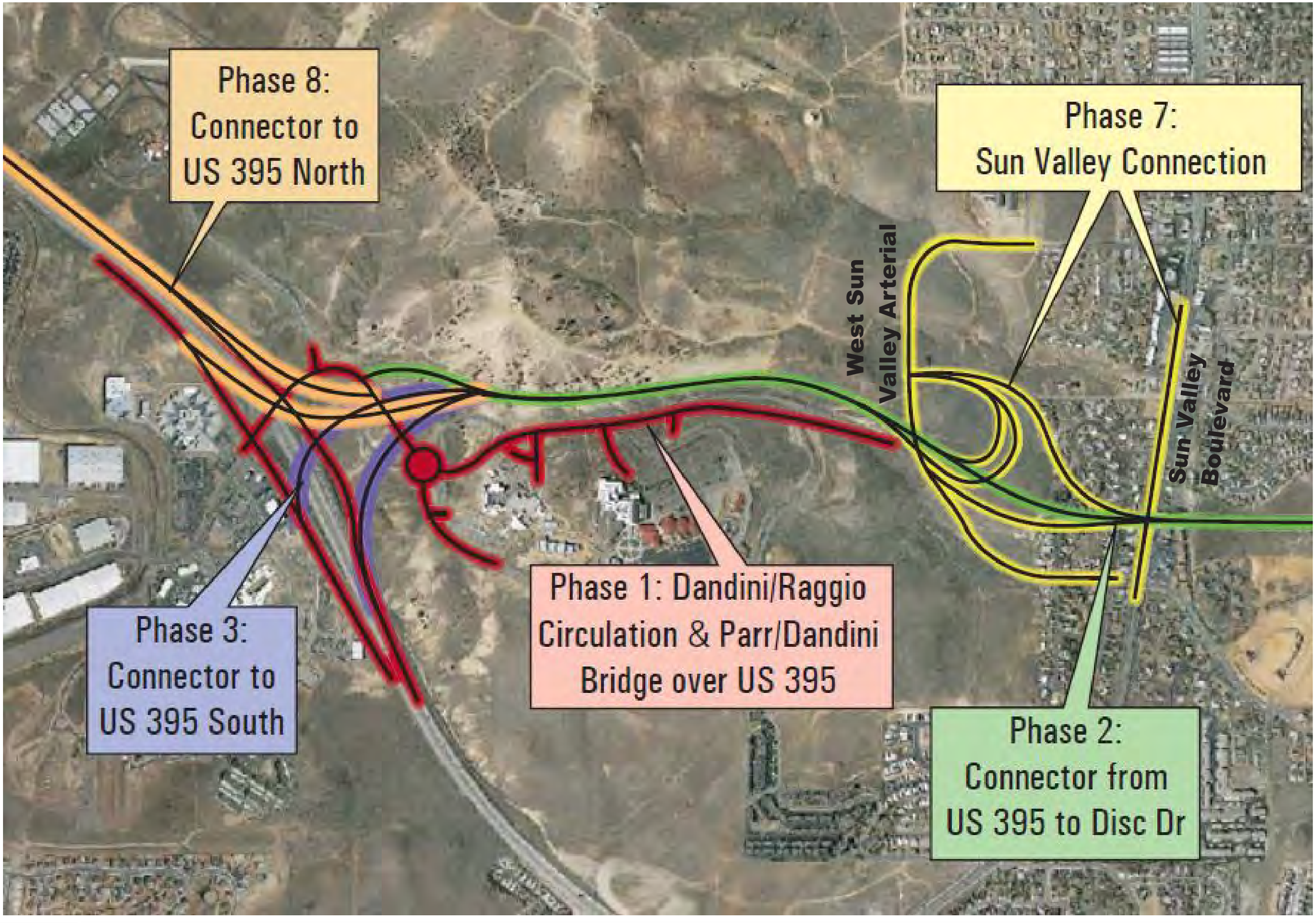
LEGEND

XX,XXX - ADT Volumes

FIGURE 3

Sun Valley Blvd Corridor Study

Existing Average Daily Traffic Volumes



TRAFFIC WORKS LLC

NO SCALE

FIGURE 4

Sun Valley Blvd Corridor Study

Pyramid Highway/US 395 Connection Preferred Alternative

TRAFFIC WORKS LLC

N

NO SCALE

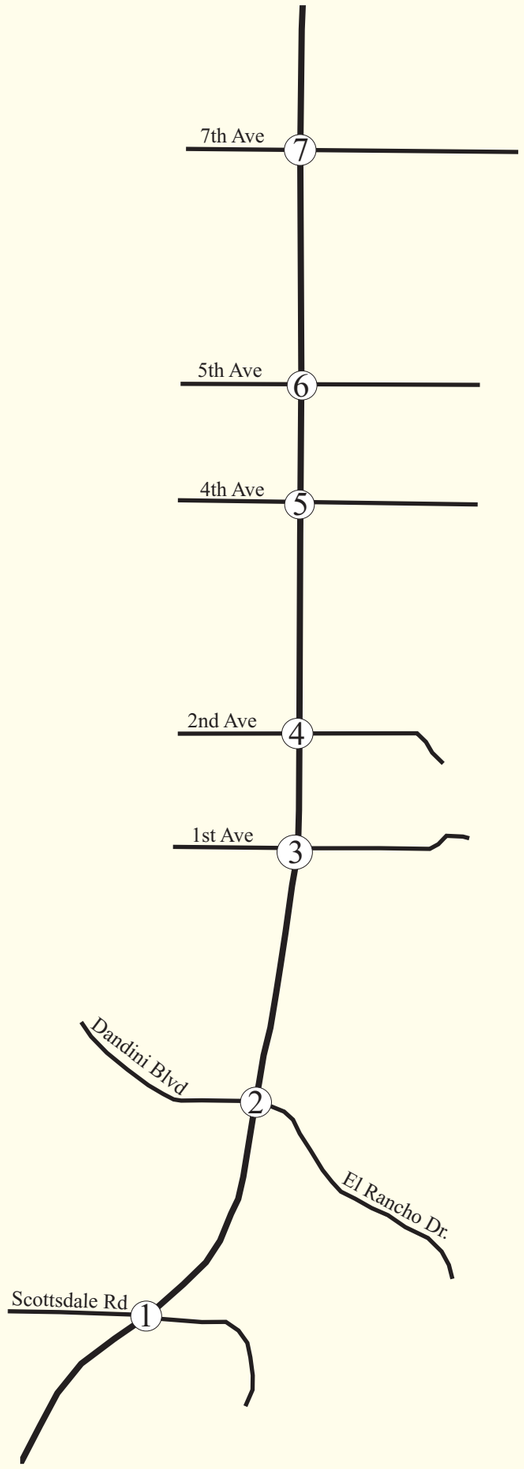
LEGEND

XX,XXX - ADT Volumes

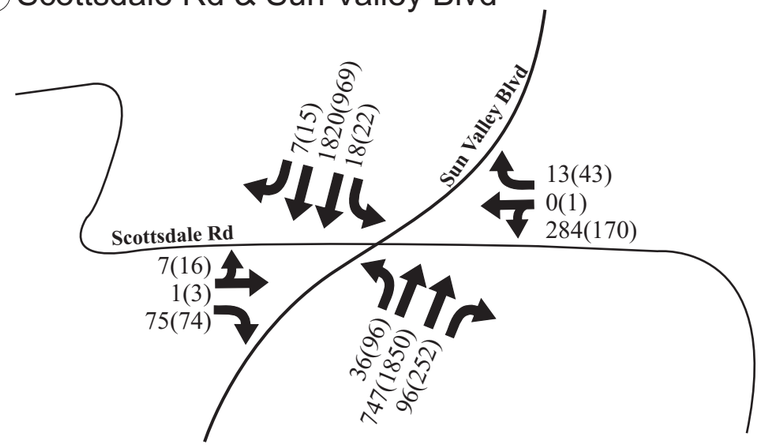
FIGURE 5

Sun Valley Blvd Corridor Study

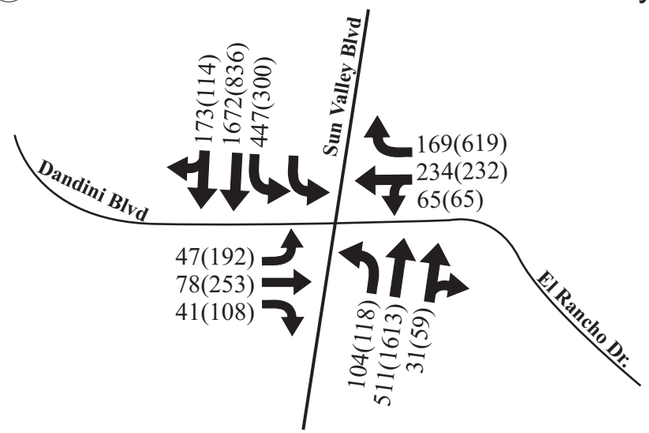
2035 Average Daily Traffic Volumes



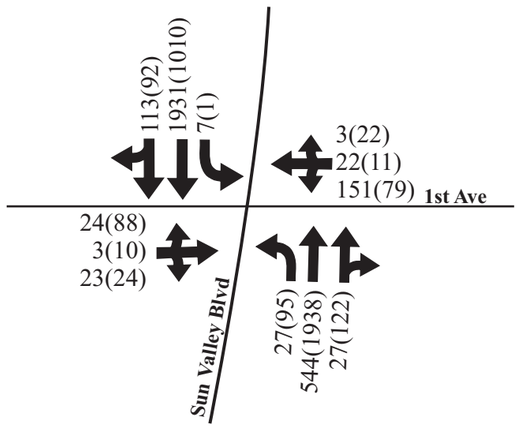
① Scottsdale Rd & Sun Valley Blvd



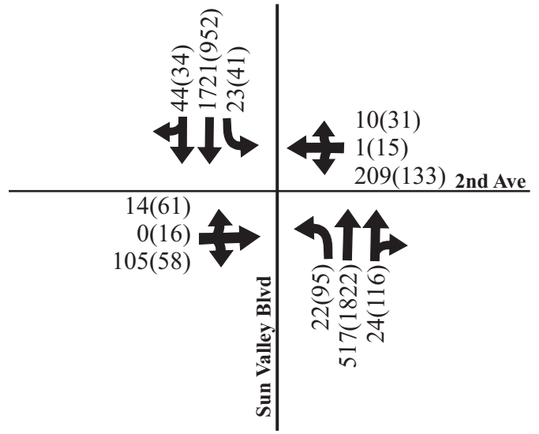
② Dandini Blvd / El Rancho Dr. & Sun Valley Blvd



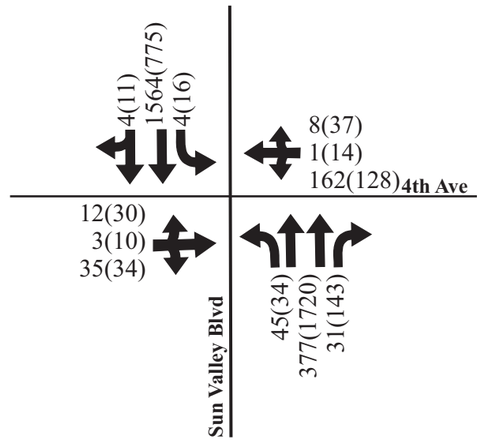
③ 1st Ave & Sun Valley Blvd



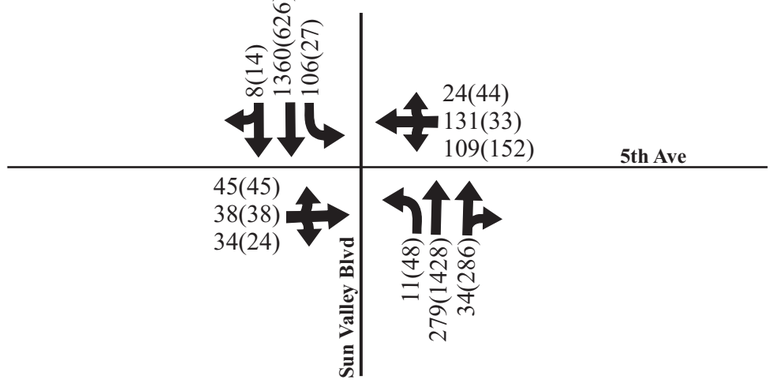
④ 2nd Ave & Sun Valley Blvd



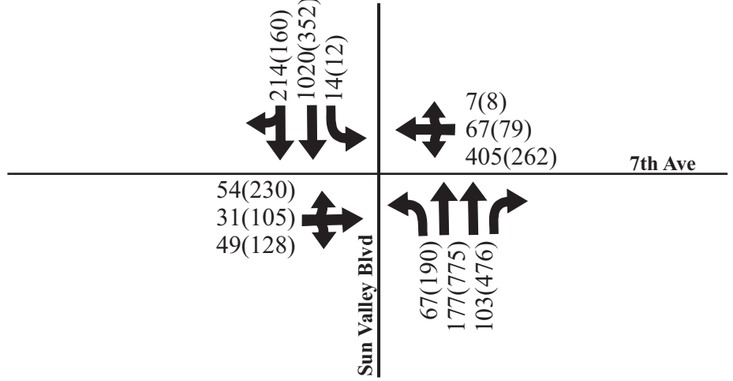
⑤ 4th Ave & Sun Valley Blvd



⑥ 5th Ave & Sun Valley Blvd



⑦ 7th Ave & Sun Valley Blvd



TRAFFIC WORKS LLC

NO SCALE

LEGEND

(X) - Study Intersection

AM(PM) - Turn Movement Volumes

- Turn Movement

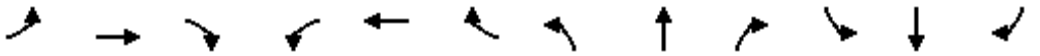
FIGURE 6

Sun Valley Blvd Corridor Study

2035 Turn Movement Volumes

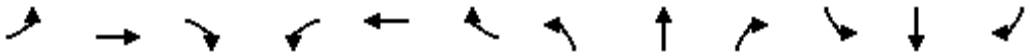
Appendix A

Existing AM Peak and PM Peak LOS Calculations



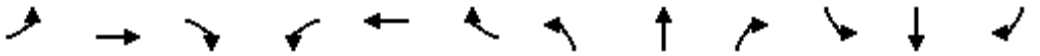
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	51	192	0	9	24	505	65	12	1230	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.85			0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.95		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1588			1767		1770	3539	1583	1770	3539	1583
Flt Permitted	0.85	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1583	1588			1278		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.84	0.84	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80
Adj. Flow (vph)	6	1	61	237	0	11	30	623	80	15	1538	6
RTOR Reduction (vph)	0	49	0	0	48	0	0	0	26	0	0	2
Lane Group Flow (vph)	6	13	0	0	200	0	30	623	54	15	1538	4
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	23.2	23.2			23.2		5.2	80.7	80.7	3.1	78.6	78.6
Effective Green, g (s)	23.2	23.2			23.2		5.2	80.7	80.7	3.1	78.6	78.6
Actuated g/C Ratio	0.19	0.19			0.19		0.04	0.67	0.67	0.03	0.65	0.65
Clearance Time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	306	307			247		76	2379	1064	45	2318	1036
v/s Ratio Prot		0.01					c0.02	0.18		0.01	c0.43	
v/s Ratio Perm	0.00				c0.16				0.03			0.00
v/c Ratio	0.02	0.04			0.81		0.39	0.26	0.05	0.33	0.66	0.00
Uniform Delay, d1	39.2	39.4			46.3		55.9	7.8	6.7	57.4	12.6	7.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1			18.0		3.4	0.3	0.1	4.3	1.5	0.0
Delay (s)	39.2	39.4			64.3		59.2	8.1	6.8	61.8	14.1	7.2
Level of Service	D	D			E		E	A	A	E	B	A
Approach Delay (s)		39.4			64.3			10.0			14.6	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



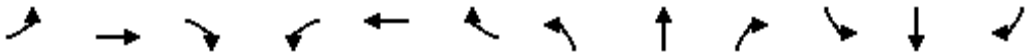
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	53	28	44	158	114	70	345	21	302	1130	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00			1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1801			1880	1594	1805	3579		3502	3552	
Flt Permitted	0.39	1.00			0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	748	1801			1729	1594	1805	3579		3502	3552	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.86	0.86	0.86	0.80	0.80	0.80
Adj. Flow (vph)	40	66	35	55	198	142	81	401	24	378	1412	146
RTOR Reduction (vph)	0	25	0	0	0	113	0	4	0	0	8	0
Lane Group Flow (vph)	40	76	0	0	253	29	81	421	0	378	1550	0
Confl. Peds. (#/hr)	1					1	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	25.9	24.8			18.3	18.3	8.8	37.7		14.1	43.0	
Effective Green, g (s)	25.9	24.8			18.3	18.3	8.8	37.7		14.1	43.0	
Actuated g/C Ratio	0.29	0.28			0.20	0.20	0.10	0.42		0.16	0.48	
Clearance Time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	496			351	324	176	1499		548	1697	
v/s Ratio Prot	0.01	c0.04					0.04	0.12		c0.11	c0.44	
v/s Ratio Perm	0.04				c0.15	0.02						
v/c Ratio	0.16	0.15			0.72	0.09	0.46	0.28		0.69	0.91	
Uniform Delay, d1	29.7	24.7			33.5	29.1	38.4	17.2		35.9	21.8	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.88	1.39	
Incremental Delay, d2	0.3	0.1			7.1	0.1	1.9	0.5		2.9	7.6	
Delay (s)	30.0	24.8			40.6	29.2	40.3	17.7		34.4	37.9	
Level of Service	C	C			D	C	D	B		C	D	
Approach Delay (s)		26.3			36.5			21.3			37.2	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



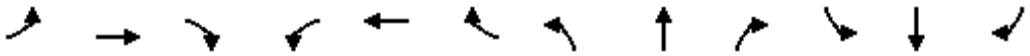
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	2	17	111	16	2	20	400	20	5	1420	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86			1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1609			1782		1770	3514		1770	3510	
Flt Permitted	0.95	1.00			0.96		0.07	1.00		0.46	1.00	
Satd. Flow (perm)	1770	1609			1782		134	3514		849	3510	
Peak-hour factor, PHF	0.84	0.84	0.84	0.87	0.87	0.87	0.81	0.81	0.81	0.91	0.91	0.91
Adj. Flow (vph)	21	2	20	128	18	2	25	494	25	5	1560	91
RTOR Reduction (vph)	0	19	0	0	1	0	0	3	0	0	3	0
Lane Group Flow (vph)	21	3	0	0	147	0	25	516	0	5	1648	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	3.0	3.0			12.8		59.6	57.0		56.8	55.6	
Effective Green, g (s)	3.0	3.0			12.8		59.6	57.0		56.8	55.6	
Actuated g/C Ratio	0.03	0.03			0.14		0.66	0.63		0.63	0.62	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	59	53			253		136	2225		548	2168	
v/s Ratio Prot	c0.01	0.00			c0.08		c0.01	0.15		0.00	c0.47	
v/s Ratio Perm							0.12			0.01		
v/c Ratio	0.36	0.05			0.58		0.18	0.23		0.01	0.76	
Uniform Delay, d1	42.6	42.1			36.1		10.5	7.1		6.1	12.4	
Progression Factor	1.00	1.00			1.00		0.39	0.91		1.46	0.83	
Incremental Delay, d2	3.7	0.4			3.4		0.6	0.2		0.0	2.0	
Delay (s)	46.2	42.5			39.5		4.7	6.7		9.0	12.3	
Level of Service	D	D			D		A	A		A	B	
Approach Delay (s)		44.3			39.5			6.6			12.3	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



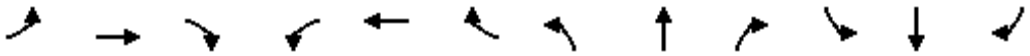
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	0	77	154	1	7	16	380	18	17	1270	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.95		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1630			1768		1770	3515		1770	3526	
Flt Permitted		0.96			0.63		0.10	1.00		0.50	1.00	
Satd. Flow (perm)		1576			1172		195	3515		925	3526	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	12	0	96	192	1	9	17	413	20	20	1460	37
RTOR Reduction (vph)	0	75	0	0	2	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	33	0	0	200	0	17	431	0	20	1496	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.8			19.8		58.1	55.6		58.1	55.6	
Effective Green, g (s)		19.8			19.8		58.1	55.6		58.1	55.6	
Actuated g/C Ratio		0.22			0.22		0.65	0.62		0.65	0.62	
Clearance Time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		346			257		169	2171		620	2178	
v/s Ratio Prot							c0.00	0.12		0.00	c0.42	
v/s Ratio Perm		0.02			c0.17		0.06			0.02		
v/c Ratio		0.10			0.78		0.10	0.20		0.03	0.69	
Uniform Delay, d1		28.0			33.0		8.6	7.5		5.7	11.4	
Progression Factor		1.00			1.00		0.78	0.51		1.65	1.34	
Incremental Delay, d2		0.1			13.7		0.3	0.2		0.0	1.5	
Delay (s)		28.1			46.7		6.9	4.0		9.4	16.9	
Level of Service		C			D		A	A		A	B	
Approach Delay (s)		28.1			46.7			4.2			16.8	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	2	26	119	1	6	33	277	23	3	1150	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.90			0.99		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.95		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1630			1745		1752	3505	1529	1747	3503	
Flt Permitted		0.93			0.70		0.15	1.00	1.00	0.54	1.00	
Satd. Flow (perm)		1530			1288		269	3505	1529	1001	3503	
Peak-hour factor, PHF	0.80	0.80	0.80	0.84	0.84	0.84	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	11	2	32	142	1	7	41	346	29	4	1438	4
RTOR Reduction (vph)	0	26	0	0	2	0	0	0	8	0	0	0
Lane Group Flow (vph)	0	19	0	0	148	0	41	346	21	4	1442	0
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.6			15.6		65.2	65.2	65.2	65.2	65.2	
Effective Green, g (s)		15.6			15.6		65.2	65.2	65.2	65.2	65.2	
Actuated g/C Ratio		0.17			0.17		0.72	0.72	0.72	0.72	0.72	
Clearance Time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		265			223		194	2539	1107	725	2537	
v/s Ratio Prot								0.10			c0.41	
v/s Ratio Perm		0.01			c0.11		0.15		0.01	0.00		
v/c Ratio		0.07			0.66		0.21	0.14	0.02	0.01	0.57	
Uniform Delay, d1		31.1			34.7		4.0	3.8	3.5	3.4	5.8	
Progression Factor		1.00			1.00		0.50	0.33	0.19	1.02	0.81	
Incremental Delay, d2		0.1			7.2		2.4	0.1	0.0	0.0	0.8	
Delay (s)		31.2			41.9		4.5	1.4	0.7	3.5	5.6	
Level of Service		C			D		A	A	A	A	A	
Approach Delay (s)		31.2			41.9			1.6			5.6	
Approach LOS		C			D			A			A	

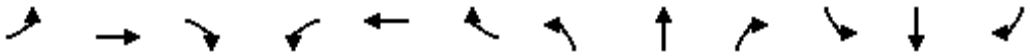
Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	28	25	80	96	18	8	205	25	78	1000	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.99	1.00	
Frt		0.96			0.99		1.00	0.98		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1800		1770	3469		1752	3536	
Flt Permitted		0.80			0.82		0.18	1.00		0.58	1.00	
Satd. Flow (perm)		1424			1500		335	3469		1062	3536	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	41	35	31	100	120	22	10	256	31	98	1250	8
RTOR Reduction (vph)	0	21	0	0	5	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	86	0	0	237	0	10	280	0	98	1258	0
Confl. Peds. (#/hr)	4		1	1		4			4	4		
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.4			19.4		62.0	62.0		62.0	62.0	
Effective Green, g (s)		19.4			19.4		62.0	62.0		62.0	62.0	
Actuated g/C Ratio		0.22			0.22		0.69	0.69		0.69	0.69	
Clearance Time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		306			323		230	2389		731	2435	
v/s Ratio Prot								0.08			c0.36	
v/s Ratio Perm		0.06			c0.16		0.03			0.09		
v/c Ratio		0.28			0.73		0.04	0.12		0.13	0.52	
Uniform Delay, d1		29.5			32.9		4.5	4.7		4.8	6.8	
Progression Factor		1.00			1.00		0.52	0.38		1.00	1.00	
Incremental Delay, d2		0.5			8.3		0.4	0.1		0.4	0.8	
Delay (s)		30.0			41.2		2.7	1.9		5.2	7.5	
Level of Service		C			D		A	A		A	A	
Approach Delay (s)		30.0			41.2			1.9			7.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

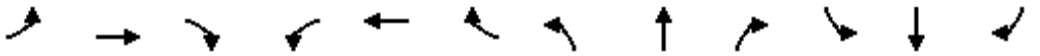
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	23	36	298	49	5	49	130	76	10	750	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.95			1.00		1.00	1.00	0.85	1.00	0.97	
Flt Protected		0.98			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1736			1783		1770	3539	1548	1767	3447	
Flt Permitted		0.82			0.69		0.14	1.00	1.00	0.65	1.00	
Satd. Flow (perm)		1448			1273		261	3539	1548	1208	3447	
Peak-hour factor, PHF	0.80	0.80	0.80	0.86	0.86	0.86	0.80	0.80	0.80	0.83	0.83	0.83
Adj. Flow (vph)	50	29	45	347	57	6	61	162	95	12	904	189
RTOR Reduction (vph)	0	25	0	0	1	0	0	0	48	0	18	0
Lane Group Flow (vph)	0	99	0	0	409	0	61	162	47	12	1075	0
Confl. Peds. (#/hr)	2					2			1	1		
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		29.9			29.9		45.1	41.7	41.7	39.9	39.1	
Effective Green, g (s)		29.9			29.9		45.1	41.7	41.7	39.9	39.1	
Actuated g/C Ratio		0.35			0.35		0.53	0.49	0.49	0.47	0.46	
Clearance Time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		512			450		200	1746	763	575	1595	
v/s Ratio Prot							c0.01	0.05		0.00	c0.31	
v/s Ratio Perm		0.07			c0.32		0.15		0.03	0.01		
v/c Ratio		0.19			0.91		0.30	0.09	0.06	0.02	0.67	
Uniform Delay, d1		18.9			26.0		12.0	11.4	11.2	11.9	17.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			22.0		0.9	0.1	0.2	0.0	2.3	
Delay (s)		19.1			48.0		12.9	11.5	11.3	11.9	20.0	
Level of Service		B			D		B	B	B	B	C	
Approach Delay (s)		19.1			48.0			11.7			19.9	
Approach LOS		B			D			B			B	

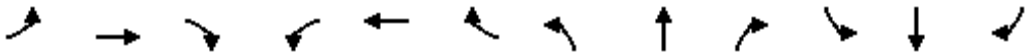
Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	12.1
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



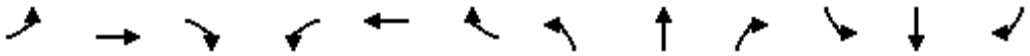
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	2	50	115	1	29	65	1250	170	15	655	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.85			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1592			1743		1770	3539	1583	1770	3539	1583
Flt Permitted	0.73	1.00			0.73		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1365	1592			1318		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.81	0.81	0.81	0.83	0.83	0.83	0.87	0.87	0.87
Adj. Flow (vph)	13	2	60	142	1	36	78	1506	205	17	753	11
RTOR Reduction (vph)	0	50	0	0	8	0	0	0	58	0	0	4
Lane Group Flow (vph)	13	12	0	0	171	0	78	1506	147	17	753	7
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	20.7	20.7			20.7		9.3	83.1	83.1	3.2	77.0	77.0
Effective Green, g (s)	20.7	20.7			20.7		9.3	83.1	83.1	3.2	77.0	77.0
Actuated g/C Ratio	0.17	0.17			0.17		0.08	0.69	0.69	0.03	0.64	0.64
Clearance Time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	274			227		137	2450	1096	47	2270	1015
v/s Ratio Prot		0.01					c0.04	c0.43		0.01	0.21	
v/s Ratio Perm	0.01				c0.13				0.09			0.00
v/c Ratio	0.06	0.05			0.75		0.57	0.61	0.13	0.36	0.33	0.01
Uniform Delay, d1	41.5	41.4			47.2		53.4	9.9	6.3	57.4	9.8	7.7
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1			13.1		5.3	1.2	0.3	4.7	0.4	0.0
Delay (s)	41.6	41.5			60.3		58.8	11.0	6.5	62.1	10.2	7.8
Level of Service	D	D			E		E	B	A	E	B	A
Approach Delay (s)		41.5			60.3			12.6			11.3	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



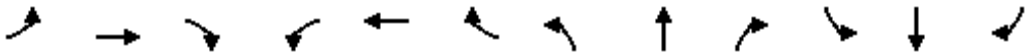
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	171	73	44	157	418	80	1090	40	203	565	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00			1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1815			1880	1594	1805	3591		3502	3535	
Flt Permitted	0.44	1.00			0.70	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	835	1815			1329	1594	1805	3591		3502	3535	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.94	0.94	0.94	0.87	0.87	0.87
Adj. Flow (vph)	155	204	87	52	187	498	85	1160	43	233	649	89
RTOR Reduction (vph)	0	19	0	0	0	220	0	2	0	0	10	0
Lane Group Flow (vph)	155	272	0	0	239	278	85	1201	0	233	728	0
Confl. Peds. (#/hr)	1					1	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	29.7	28.6			20.0	20.0	7.4	37.4		10.6	40.6	
Effective Green, g (s)	29.7	28.6			20.0	20.0	7.4	37.4		10.6	40.6	
Actuated g/C Ratio	0.33	0.32			0.22	0.22	0.08	0.42		0.12	0.45	
Clearance Time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	336	576			295	354	148	1492		412	1594	
v/s Ratio Prot	0.03	c0.15					0.05	c0.33		c0.07	c0.21	
v/s Ratio Perm	0.12				c0.18	0.17						
v/c Ratio	0.46	0.47			0.81	0.78	0.57	0.80		0.57	0.46	
Uniform Delay, d1	28.8	24.6			33.2	33.0	39.8	23.1		37.5	17.1	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.71	1.49	
Incremental Delay, d2	1.0	0.6			15.4	10.9	5.3	4.7		1.7	0.9	
Delay (s)	29.8	25.3			48.6	43.9	45.1	27.8		28.5	26.3	
Level of Service	C	C			D	D	D	C		C	C	
Approach Delay (s)		26.8			45.4			29.0			26.8	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



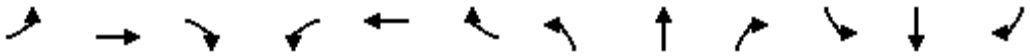
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	7	18	58	8	16	70	1425	90	1	743	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89			0.97		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1660			1752		1770	3508		1770	3495	
Flt Permitted	0.95	1.00			0.97		0.24	1.00		0.08	1.00	
Satd. Flow (perm)	1770	1660			1752		440	3508		154	3495	
Peak-hour factor, PHF	0.84	0.84	0.84	0.87	0.87	0.87	0.81	0.81	0.81	0.91	0.91	0.91
Adj. Flow (vph)	77	8	21	67	9	18	86	1759	111	1	816	75
RTOR Reduction (vph)	0	18	0	0	13	0	0	4	0	0	6	0
Lane Group Flow (vph)	77	11	0	0	81	0	86	1866	0	1	885	0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	10.9	10.9			8.4		58.1	53.5		49.6	48.5	
Effective Green, g (s)	10.9	10.9			8.4		58.1	53.5		49.6	48.5	
Actuated g/C Ratio	0.12	0.12			0.09		0.65	0.59		0.55	0.54	
Clearance Time (s)	4.0	4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	214	201			163		374	2085		104	1883	
v/s Ratio Prot	c0.04	0.01			c0.05		c0.02	c0.53		0.00	0.25	
v/s Ratio Perm							0.13			0.01		
v/c Ratio	0.36	0.05			0.50		0.23	0.90		0.01	0.47	
Uniform Delay, d1	36.3	35.0			38.8		7.1	15.8		15.7	12.8	
Progression Factor	1.00	1.00			1.00		0.59	1.13		0.34	0.39	
Incremental Delay, d2	1.0	0.1			2.4		0.2	4.7		0.0	0.8	
Delay (s)	37.4	35.1			41.2		4.4	22.6		5.4	5.8	
Level of Service	D	D			D		A	C		A	A	
Approach Delay (s)		36.8			41.2			21.8			5.8	
Approach LOS		D			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.1
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



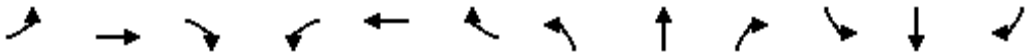
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	12	43	98	11	23	70	1340	85	30	700	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.94			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1716			1754		1770	3508		1770	3521	
Flt Permitted		0.84			0.68		0.33	1.00		0.09	1.00	
Satd. Flow (perm)		1474			1239		612	3508		177	3521	
Peak-hour factor, PHF	0.86	0.86	0.86	0.92	0.92	0.92	0.95	0.95	0.95	0.84	0.84	0.84
Adj. Flow (vph)	52	14	50	107	12	25	74	1411	89	36	833	30
RTOR Reduction (vph)	0	39	0	0	11	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	77	0	0	133	0	74	1497	0	36	861	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.1			14.1		60.8	59.7		53.9	53.9	
Effective Green, g (s)		14.1			14.1		60.8	59.7		53.9	53.9	
Actuated g/C Ratio		0.16			0.16		0.68	0.66		0.60	0.60	
Clearance Time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		230			194		540	2326		178	2108	
v/s Ratio Prot							0.02	c0.43		0.01	c0.24	
v/s Ratio Perm		0.05			c0.11		0.08			0.11		
v/c Ratio		0.34			0.69		0.14	0.64		0.20	0.41	
Uniform Delay, d1		33.8			35.9		5.4	8.9		10.6	9.6	
Progression Factor		1.00			1.00		1.97	1.68		1.05	1.19	
Incremental Delay, d2		0.9			9.6		0.1	0.8		0.6	0.6	
Delay (s)		34.6			45.5		10.7	15.7		11.6	12.0	
Level of Service		C			D		B	B		B	B	
Approach Delay (s)		34.6			45.5			15.5			12.0	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	7	25	94	10	27	25	1265	105	12	570	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.94			0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1684			1723		1752	3505	1529	1751	3497	
Flt Permitted		0.86			0.79		0.41	1.00	1.00	0.18	1.00	
Satd. Flow (perm)		1482			1403		763	3505	1529	327	3497	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.94	0.94	0.94
Adj. Flow (vph)	28	9	31	118	12	34	26	1304	108	13	606	9
RTOR Reduction (vph)	0	26	0	0	13	0	0	0	13	0	1	0
Lane Group Flow (vph)	0	42	0	0	151	0	26	1304	95	13	614	0
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.4			15.4		65.4	65.4	65.4	65.4	65.4	
Effective Green, g (s)		15.4			15.4		65.4	65.4	65.4	65.4	65.4	
Actuated g/C Ratio		0.17			0.17		0.73	0.73	0.73	0.73	0.73	
Clearance Time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		253			240		554	2546	1111	237	2541	
v/s Ratio Prot								c0.37			0.18	
v/s Ratio Perm		0.03			c0.11		0.03		0.06	0.04		
v/c Ratio		0.17			0.63		0.05	0.51	0.09	0.05	0.24	
Uniform Delay, d1		31.8			34.6		3.5	5.4	3.6	3.5	4.1	
Progression Factor		1.00			1.00		1.83	1.79	2.14	1.36	1.47	
Incremental Delay, d2		0.3			5.1		0.1	0.6	0.1	0.4	0.2	
Delay (s)		32.1			39.7		6.5	10.2	7.8	5.2	6.2	
Level of Service		C			D		A	B	A	A	A	
Approach Delay (s)		32.1			39.7			9.9			6.2	
Approach LOS		C			D			A			A	

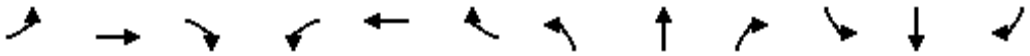
Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	28	18	112	24	32	35	1050	210	20	460	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.97		1.00	0.98		1.00	1.00	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1757			1743		1770	3437		1770	3528	
Flt Permitted		0.84			0.74		0.45	1.00		0.16	1.00	
Satd. Flow (perm)		1509			1340		840	3437		291	3528	
Peak-hour factor, PHF	0.82	0.82	0.82	0.80	0.80	0.80	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	40	34	22	140	30	40	38	1141	228	23	523	11
RTOR Reduction (vph)	0	14	0	0	12	0	0	12	0	0	1	0
Lane Group Flow (vph)	0	82	0	0	198	0	38	1357	0	23	533	0
Confl. Peds. (#/hr)	8		8	8		8			1	1		
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.2			18.2		63.2	63.2		63.2	63.2	
Effective Green, g (s)		18.2			18.2		63.2	63.2		63.2	63.2	
Actuated g/C Ratio		0.20			0.20		0.70	0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		305			270		589	2413		204	2477	
v/s Ratio Prot								c0.39			0.15	
v/s Ratio Perm		0.05			c0.15		0.05			0.08		
v/c Ratio		0.27			0.73		0.06	0.56		0.11	0.22	
Uniform Delay, d1		30.3			33.6		4.2	6.6		4.3	4.7	
Progression Factor		1.00			1.00		0.51	1.18		1.00	1.00	
Incremental Delay, d2		0.5			9.9		0.2	0.8		1.1	0.2	
Delay (s)		30.8			43.5		2.3	8.6		5.5	4.9	
Level of Service		C			D		A	A		A	A	
Approach Delay (s)		30.8			43.5			8.4			4.9	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



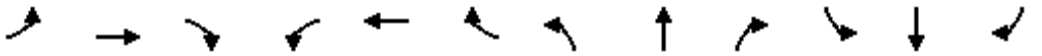
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	77	94	193	58	6	140	570	350	9	259	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.97	1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.96			1.00		1.00	1.00	0.85	1.00	0.95	
Flt Protected		0.98			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1740			1784		1769	3539	1528	1765	3349	
Flt Permitted		0.75			0.58		0.42	1.00	1.00	0.42	1.00	
Satd. Flow (perm)		1336			1070		783	3539	1528	780	3349	
Peak-hour factor, PHF	0.96	0.96	0.96	0.83	0.83	0.83	0.93	0.93	0.93	0.91	0.91	0.91
Adj. Flow (vph)	176	80	98	233	70	7	151	613	376	10	285	130
RTOR Reduction (vph)	0	20	0	0	1	0	0	0	180	0	51	0
Lane Group Flow (vph)	0	334	0	0	309	0	151	613	196	10	364	0
Confl. Peds. (#/hr)			11	11			1		7	7		1
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		25.3			25.3		39.2	35.0	35.0	27.6	26.9	
Effective Green, g (s)		25.3			25.3		39.2	35.0	35.0	27.6	26.9	
Actuated g/C Ratio		0.35			0.35		0.54	0.48	0.48	0.38	0.37	
Clearance Time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		462			370		538	1694	731	303	1232	
v/s Ratio Prot							c0.03	c0.17		0.00	0.11	
v/s Ratio Perm		0.25			c0.29		0.12		0.13	0.01		
v/c Ratio		0.72			0.83		0.28	0.36	0.27	0.03	0.30	
Uniform Delay, d1		20.9			22.0		8.8	12.0	11.4	14.2	16.4	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.6			14.9		0.3	0.6	0.9	0.0	0.6	
Delay (s)		26.4			36.8		9.1	12.6	12.3	14.3	17.0	
Level of Service		C			D		A	B	B	B	B	
Approach Delay (s)		26.4			36.8			12.0			16.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	12.1
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

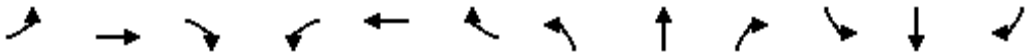
Appendix B

2035 AM Peak and PM Peak LOS Calculations



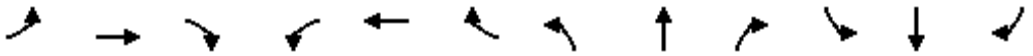
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	1	75	284	0	13	36	747	96	18	1820	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.85			0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.95		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1587			1767		1770	3539	1583	1770	3539	1583
Flt Permitted	0.87	1.00			0.65		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1617	1587			1210		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	7	1	79	299	0	14	38	786	101	19	1916	7
RTOR Reduction (vph)	0	59	0	0	86	0	0	0	34	0	0	2
Lane Group Flow (vph)	7	21	0	0	227	0	38	786	67	19	1916	5
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	25.2	25.2			25.2		4.1	79.8	79.8	2.0	77.7	77.7
Effective Green, g (s)	25.2	25.2			25.2		4.1	79.8	79.8	2.0	77.7	77.7
Actuated g/C Ratio	0.21	0.21			0.21		0.03	0.66	0.66	0.02	0.65	0.65
Clearance Time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	339	333			254		60	2353	1052	29	2291	1024
v/s Ratio Prot		0.01					c0.02	0.22		0.01	c0.54	
v/s Ratio Perm	0.00				c0.19				0.04			0.00
v/c Ratio	0.02	0.06			0.89		0.63	0.33	0.06	0.66	0.84	0.00
Uniform Delay, d1	37.6	37.9			46.1		57.2	8.7	7.0	58.7	16.3	7.5
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	0.68	0.10	1.00
Incremental Delay, d2	0.0	0.1			30.1		19.8	0.4	0.1	19.3	1.6	0.0
Delay (s)	37.6	38.0			76.2		77.0	9.0	7.1	59.5	3.2	7.5
Level of Service	D	D			E		E	A	A	E	A	A
Approach Delay (s)		38.0			76.2			11.6			3.7	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



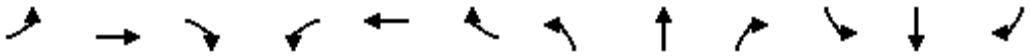
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	78	41	65	234	169	104	511	31	447	1672	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00			1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1802			1880	1594	1805	3579		3502	3552	
Flt Permitted	0.17	1.00			0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	323	1802			1707	1594	1805	3579		3502	3552	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	49	82	43	68	246	178	109	538	33	471	1760	182
RTOR Reduction (vph)	0	16	0	0	0	141	0	3	0	0	6	0
Lane Group Flow (vph)	49	109	0	0	314	37	109	568	0	471	1936	0
Confl. Peds. (#/hr)	1					1	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	31.2	31.2			25.0	25.0	8.3	51.7		23.7	67.1	
Effective Green, g (s)	31.2	31.2			25.0	25.0	8.3	51.7		23.7	67.1	
Actuated g/C Ratio	0.26	0.26			0.21	0.21	0.07	0.43		0.20	0.56	
Clearance Time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	124	468			355	332	124	1541		691	1986	
v/s Ratio Prot	c0.01	0.06					0.06	0.16		c0.13	c0.55	
v/s Ratio Perm	0.09				c0.18	0.02						
v/c Ratio	0.40	0.23			0.88	0.11	0.88	0.37		0.68	0.97	
Uniform Delay, d1	35.4	35.0			46.1	38.5	55.4	23.1		44.7	25.6	
Progression Factor	1.00	1.00			1.00	1.00	1.14	0.64		0.93	0.60	
Incremental Delay, d2	2.1	0.3			22.0	0.1	44.2	0.7		1.7	10.9	
Delay (s)	37.5	35.2			68.1	38.6	107.3	15.3		43.3	26.2	
Level of Service	D	D			E	D	F	B		D	C	
Approach Delay (s)		35.9			57.5			30.1			29.5	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	3	23	151	22	3	27	544	27	7	1931	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.94			1.00		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1706			1782		1770	3514		1770	3510	
Flt Permitted		0.87			0.74		0.05	1.00		0.42	1.00	
Satd. Flow (perm)		1524			1383		91	3514		791	3510	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	3	24	159	23	3	28	573	28	7	2033	119
RTOR Reduction (vph)	0	20	0	0	1	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	32	0	0	184	0	28	599	0	7	2150	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.5			21.5		85.7	85.7		82.6	82.6	
Effective Green, g (s)		21.5			21.5		85.7	85.7		82.6	82.6	
Actuated g/C Ratio		0.18			0.18		0.71	0.71		0.69	0.69	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		273			247		119	2509		550	2416	
v/s Ratio Prot							0.01	c0.17		0.00	c0.61	
v/s Ratio Perm		0.02			c0.13		0.16			0.01		
v/c Ratio		0.12			0.75		0.24	0.24		0.01	0.89	
Uniform Delay, d1		41.3			46.7		23.0	5.9		5.9	15.0	
Progression Factor		1.00			1.00		1.42	0.52		0.33	0.30	
Incremental Delay, d2		0.2			11.6		1.0	0.2		0.0	3.4	
Delay (s)		41.5			58.2		33.7	3.3		2.0	7.8	
Level of Service		D			E		C	A		A	A	
Approach Delay (s)		41.5			58.2			4.6			7.8	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

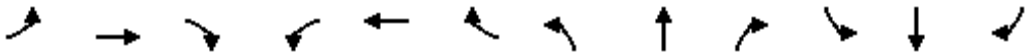


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	0	105	209	1	10	22	517	24	23	1727	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.99		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.95		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1632			1767		1770	3516		1770	3526	
Flt Permitted		0.96			0.57		0.05	1.00		0.39	1.00	
Satd. Flow (perm)		1571			1059		101	3516		733	3526	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	15	0	111	220	1	11	23	544	25	24	1818	46
RTOR Reduction (vph)	0	67	0	0	2	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	59	0	0	230	0	23	566	0	24	1863	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		28.5			28.5		77.7	76.6		76.7	76.7	
Effective Green, g (s)		28.5			28.5		77.7	76.6		76.7	76.7	
Actuated g/C Ratio		0.24			0.24		0.65	0.64		0.64	0.64	
Clearance Time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		373			251		102	2244		492	2253	
v/s Ratio Prot							0.01	c0.16		0.00	c0.53	
v/s Ratio Perm		0.04			c0.22		0.14			0.03		
v/c Ratio		0.16			0.92		0.23	0.25		0.05	0.83	
Uniform Delay, d1		36.2			44.6		32.2	9.4		8.2	16.6	
Progression Factor		1.00			1.00		0.61	0.38		0.56	0.37	
Incremental Delay, d2		0.2			35.2		1.1	0.3		0.0	2.9	
Delay (s)		36.4			79.8		20.8	3.8		4.6	9.0	
Level of Service		D			E		C	A		A	A	
Approach Delay (s)		36.4			79.8			4.5			9.0	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	3	35	162	1	8	45	377	31	4	1564	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.99		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.95		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1632			1744		1752	3505	1527	1746	3504	
Flt Permitted		0.93			0.74		0.11	1.00	1.00	0.52	1.00	
Satd. Flow (perm)		1540			1345		202	3505	1527	952	3504	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	13	3	37	171	1	8	47	397	33	4	1646	4
RTOR Reduction (vph)	0	30	0	0	2	0	0	0	8	0	0	0
Lane Group Flow (vph)	0	23	0	0	178	0	47	397	25	4	1650	0
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		21.2			21.2		89.6	89.6	89.6	89.6	89.6	
Effective Green, g (s)		21.2			21.2		89.6	89.6	89.6	89.6	89.6	
Actuated g/C Ratio		0.18			0.18		0.75	0.75	0.75	0.75	0.75	
Clearance Time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		272			237		150	2617	1140	710	2616	
v/s Ratio Prot								0.11			c0.47	
v/s Ratio Perm		0.01			c0.13		0.23		0.02	0.00		
v/c Ratio		0.08			0.75		0.31	0.15	0.02	0.01	0.63	
Uniform Delay, d1		41.3			46.9		5.0	4.3	3.9	3.9	7.3	
Progression Factor		1.00			1.00		1.21	0.55	0.77	0.36	0.25	
Incremental Delay, d2		0.1			12.7		5.3	0.1	0.0	0.0	1.0	
Delay (s)		41.4			59.6		11.3	2.5	3.0	1.4	2.8	
Level of Service		D			E		B	A	A	A	A	
Approach Delay (s)		41.4			59.6			3.4			2.8	
Approach LOS		D			E			A			A	

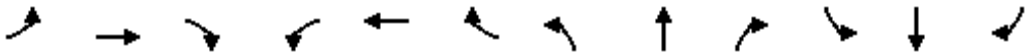
Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	38	34	109	131	24	11	279	34	106	1360	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.99	1.00	
Frt		0.96			0.99		1.00	0.98		1.00	1.00	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1747			1799		1770	3466		1747	3536	
Flt Permitted		0.76			0.78		0.14	1.00		0.55	1.00	
Satd. Flow (perm)		1355			1428		255	3466		1016	3536	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	47	40	36	115	138	25	12	294	36	112	1432	8
RTOR Reduction (vph)	0	14	0	0	3	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	109	0	0	275	0	12	324	0	112	1440	0
Confl. Peds. (#/hr)	4		1	1		4			4	4		
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		27.5			27.5		83.9	83.9		83.9	83.9	
Effective Green, g (s)		27.5			27.5		83.9	83.9		83.9	83.9	
Actuated g/C Ratio		0.23			0.23		0.70	0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		310			327		178	2423		710	2472	
v/s Ratio Prot								0.09			c0.41	
v/s Ratio Perm		0.08			c0.19		0.05			0.11		
v/c Ratio		0.35			0.84		0.07	0.13		0.16	0.58	
Uniform Delay, d1		38.8			44.2		5.7	6.0		6.1	9.2	
Progression Factor		1.00			1.00		0.48	0.48		0.68	0.65	
Incremental Delay, d2		0.7			17.4		0.7	0.1		0.2	0.5	
Delay (s)		39.5			61.6		3.5	3.0		4.4	6.4	
Level of Service		D			E		A	A		A	A	
Approach Delay (s)		39.5			61.6			3.0			6.3	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

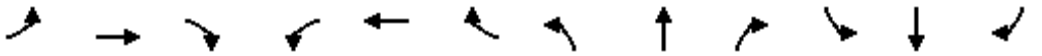
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	31	49	405	67	7	67	177	103	14	1020	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.95			1.00		1.00	1.00	0.85	1.00	0.97	
Flt Protected		0.98			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1735			1784		1770	3539	1546	1767	3447	
Flt Permitted		0.77			0.66		0.08	1.00	1.00	0.59	1.00	
Satd. Flow (perm)		1369			1223		147	3539	1546	1097	3447	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	57	33	52	426	71	7	71	186	108	15	1074	225
RTOR Reduction (vph)	0	18	0	0	1	0	0	0	59	0	14	0
Lane Group Flow (vph)	0	124	0	0	503	0	71	186	49	15	1285	0
Confl. Peds. (#/hr)	2					2			1	1		
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		51.4			51.4		55.8	54.7	54.7	51.5	51.5	
Effective Green, g (s)		51.4			51.4		55.8	54.7	54.7	51.5	51.5	
Actuated g/C Ratio		0.43			0.43		0.46	0.46	0.46	0.43	0.43	
Clearance Time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		586			523		135	1613	704	480	1479	
v/s Ratio Prot							c0.02	0.05		0.00	c0.37	
v/s Ratio Perm		0.09			c0.41		0.22		0.03	0.01		
v/c Ratio		0.21			0.96		0.53	0.12	0.07	0.03	0.87	
Uniform Delay, d1		21.6			33.4		46.2	18.8	18.4	19.8	31.2	
Progression Factor		1.00			1.00		0.69	0.73	0.40	1.00	1.00	
Incremental Delay, d2		0.2			29.9		3.6	0.1	0.2	0.0	7.2	
Delay (s)		21.7			63.2		35.7	13.7	7.5	19.8	38.3	
Level of Service		C			E		D	B	A	B	D	
Approach Delay (s)		21.7			63.2			16.2			38.1	
Approach LOS		C			E			B			D	

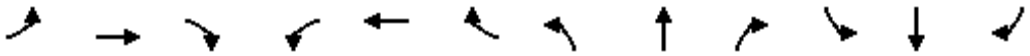
Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



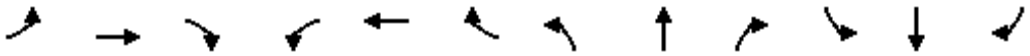
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	3	74	170	1	43	96	1850	252	22	969	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.86			0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.96		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1594			1743		1770	3539	1583	1770	3539	1583
Flt Permitted	0.73	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1355	1594			1259		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	17	3	78	179	1	45	101	1947	265	23	1020	16
RTOR Reduction (vph)	0	62	0	0	9	0	0	0	81	0	0	7
Lane Group Flow (vph)	17	19	0	0	216	0	101	1947	184	23	1020	9
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	21.9	21.9			21.9		10.8	73.3	73.3	1.8	64.3	64.3
Effective Green, g (s)	21.9	21.9			21.9		10.8	73.3	73.3	1.8	64.3	64.3
Actuated g/C Ratio	0.20	0.20			0.20		0.10	0.67	0.67	0.02	0.58	0.58
Clearance Time (s)	3.5	3.5			3.5		4.0	5.5	5.5	4.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	269	317			250		173	2358	1054	28	2068	925
v/s Ratio Prot		0.01					0.06	c0.55		c0.01	0.29	
v/s Ratio Perm	0.01				c0.17				0.12			0.01
v/c Ratio	0.06	0.06			0.86		0.58	0.83	0.17	0.82	0.49	0.01
Uniform Delay, d1	35.7	35.7			42.6		47.5	13.6	6.9	53.9	13.3	9.5
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	0.85	0.38	1.00
Incremental Delay, d2	0.1	0.1			25.2		4.9	3.5	0.4	79.2	0.6	0.0
Delay (s)	35.8	35.8			67.9		52.4	17.1	7.3	125.2	5.7	9.6
Level of Service	D	D			E		D	B	A	F	A	A
Approach Delay (s)		35.8			67.9			17.5			8.4	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



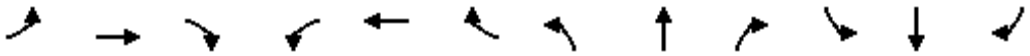
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	253	108	65	232	619	118	1613	59	300	836	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00			1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1814			1880	1594	1805	3591		3502	3535	
Flt Permitted	0.29	1.00			0.74	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	548	1814			1397	1594	1805	3591		3502	3535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	266	114	68	244	652	124	1698	62	316	880	120
RTOR Reduction (vph)	0	14	0	0	0	115	0	2	0	0	9	0
Lane Group Flow (vph)	202	366	0	0	312	537	124	1758	0	316	991	0
Confl. Peds. (#/hr)	1					1	1					1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	36.9	36.9			30.0	30.0	12.3	50.2		9.5	47.4	
Effective Green, g (s)	36.9	36.9			30.0	30.0	12.3	50.2		9.5	47.4	
Actuated g/C Ratio	0.34	0.34			0.27	0.27	0.11	0.46		0.09	0.43	
Clearance Time (s)	3.5	4.6			4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	229	608			381	434	201	1638		302	1523	
v/s Ratio Prot	c0.03	0.20					0.07	c0.49		c0.09	0.28	
v/s Ratio Perm	0.26				0.22	c0.34						
v/c Ratio	0.88	0.60			0.82	1.24	0.62	1.07		1.05	0.65	
Uniform Delay, d1	37.2	30.4			37.5	40.0	46.6	29.9		50.2	24.8	
Progression Factor	1.00	1.00			1.00	1.00	0.96	0.59		0.83	0.61	
Incremental Delay, d2	30.3	1.7			12.8	125.3	3.3	40.5		62.5	2.0	
Delay (s)	67.4	32.1			50.3	165.3	48.0	58.2		104.1	17.2	
Level of Service	E	C			D	F	D	E		F	B	
Approach Delay (s)		44.4			128.1			57.5			38.1	
Approach LOS		D			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	64.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	116.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



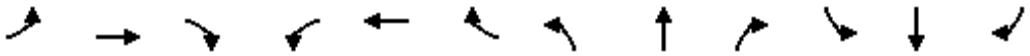
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	10	24	79	11	22	95	1938	122	1	1010	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.97		1.00	0.99		1.00	0.99	
Flt Protected		0.97			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1751			1752		1770	3508		1770	3495	
Flt Permitted		0.74			0.75		0.20	1.00		0.05	1.00	
Satd. Flow (perm)		1347			1366		374	3508		101	3495	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	93	11	25	83	12	23	100	2040	128	1	1063	97
RTOR Reduction (vph)	0	9	0	0	10	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	120	0	0	109	0	100	2166	0	1	1156	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.0			15.0		87.5	82.1		74.7	73.9	
Effective Green, g (s)		15.0			15.0		87.5	82.1		74.7	73.9	
Actuated g/C Ratio		0.14			0.14		0.80	0.75		0.68	0.67	
Clearance Time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		183			186		411	2618		80	2348	
v/s Ratio Prot							c0.02	c0.62		0.00	0.33	
v/s Ratio Perm		c0.09			0.08		0.17			0.01		
v/c Ratio		0.66			0.58		0.24	0.83		0.01	0.49	
Uniform Delay, d1		45.1			44.6		7.7	9.2		28.5	8.9	
Progression Factor		1.00			1.00		0.74	0.82		0.76	0.72	
Incremental Delay, d2		8.3			4.6		0.0	0.3		0.1	0.7	
Delay (s)		53.3			49.2		5.7	7.9		21.8	7.0	
Level of Service		D			D		A	A		C	A	
Approach Delay (s)		53.3			49.2			7.8			7.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.1
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



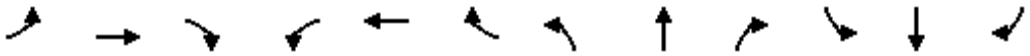
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	16	58	133	15	31	95	1822	116	41	952	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.94			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1716			1754		1770	3507		1770	3521	
Flt Permitted		0.83			0.65		0.25	1.00		0.06	1.00	
Satd. Flow (perm)		1452			1177		462	3507		116	3521	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	64	17	61	140	16	33	100	1918	122	43	1002	36
RTOR Reduction (vph)	0	27	0	0	8	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	115	0	0	181	0	100	2037	0	43	1036	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.5			21.5		73.8	72.7		67.8	67.8	
Effective Green, g (s)		21.5			21.5		73.8	72.7		67.8	67.8	
Actuated g/C Ratio		0.20			0.20		0.67	0.66		0.62	0.62	
Clearance Time (s)		4.0			4.0		3.5	4.6		3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		283			230		412	2317		127	2170	
v/s Ratio Prot							0.02	c0.58		0.01	c0.29	
v/s Ratio Perm		0.08			c0.15		0.14			0.20		
v/c Ratio		0.41			0.79		0.24	0.88		0.34	0.48	
Uniform Delay, d1		38.7			42.1		10.3	15.1		22.4	11.5	
Progression Factor		1.00			1.00		0.40	0.34		1.42	1.08	
Incremental Delay, d2		0.9			16.1		0.2	3.2		1.5	0.7	
Delay (s)		39.6			58.2		4.3	8.3		33.4	13.2	
Level of Service		D			E		A	A		C	B	
Approach Delay (s)		39.6			58.2			8.1			14.0	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	10	34	128	14	37	34	1720	143	16	775	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.94			0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1685			1723		1752	3505	1528	1752	3497	
Flt Permitted		0.85			0.74		0.32	1.00	1.00	0.08	1.00	
Satd. Flow (perm)		1469			1329		591	3505	1528	152	3497	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	11	36	135	15	39	36	1811	151	17	816	12
RTOR Reduction (vph)	0	29	0	0	10	0	0	0	13	0	1	0
Lane Group Flow (vph)	0	50	0	0	179	0	36	1811	138	17	827	0
Confl. Peds. (#/hr)	1		3	3		1			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		19.9			19.9		80.9	80.9	80.9	80.9	80.9	
Effective Green, g (s)		19.9			19.9		80.9	80.9	80.9	80.9	80.9	
Actuated g/C Ratio		0.18			0.18		0.74	0.74	0.74	0.74	0.74	
Clearance Time (s)		4.6			4.6		4.6	4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		265			240		434	2577	1123	111	2571	
v/s Ratio Prot								c0.52			0.24	
v/s Ratio Perm		0.03			c0.13		0.06		0.09	0.11		
v/c Ratio		0.19			0.75		0.08	0.70	0.12	0.15	0.32	
Uniform Delay, d1		38.2			42.7		4.1	8.0	4.2	4.3	5.0	
Progression Factor		1.00			1.00		0.17	0.11	0.02	1.02	1.00	
Incremental Delay, d2		0.3			11.9		0.2	0.8	0.1	2.8	0.3	
Delay (s)		38.5			54.6		0.9	1.7	0.2	7.2	5.4	
Level of Service		D			D		A	A	A	A	A	
Approach Delay (s)		38.5			54.6			1.6			5.4	
Approach LOS		D			D			A			A	

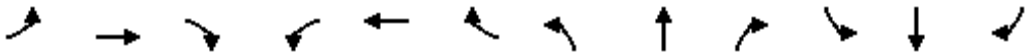
Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.2
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	38	24	152	33	44	48	1428	286	27	626	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.97		1.00	0.97		1.00	1.00	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1758			1741		1770	3437		1770	3527	
Flt Permitted		0.83			0.71		0.38	1.00		0.07	1.00	
Satd. Flow (perm)		1480			1278		702	3437		136	3527	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	47	40	25	160	35	46	51	1503	301	28	659	15
RTOR Reduction (vph)	0	11	0	0	9	0	0	12	0	0	1	0
Lane Group Flow (vph)	0	101	0	0	232	0	51	1792	0	28	673	0
Confl. Peds. (#/hr)	8		8	8		8			1	1		
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		24.7			24.7		76.7	76.7		76.7	76.7	
Effective Green, g (s)		24.7			24.7		76.7	76.7		76.7	76.7	
Actuated g/C Ratio		0.22			0.22		0.70	0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0		4.6	4.6		4.6	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		332			286		489	2396		94	2459	
v/s Ratio Prot								c0.52			0.19	
v/s Ratio Perm		0.07			c0.18		0.07			0.21		
v/c Ratio		0.30			0.81		0.10	0.75		0.30	0.27	
Uniform Delay, d1		35.5			40.5		5.4	10.5		6.4	6.2	
Progression Factor		1.00			1.00		0.12	0.08		0.38	0.40	
Incremental Delay, d2		0.5			16.0		0.3	1.6		6.4	0.2	
Delay (s)		36.0			56.4		1.0	2.4		8.8	2.7	
Level of Service		D			E		A	A		A	A	
Approach Delay (s)		36.0			56.4			2.4			3.0	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.6
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	230	105	128	262	79	8	190	775	476	12	352	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.96			1.00		1.00	1.00	0.85	1.00	0.95	
Flt Protected		0.98			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1738			1784		1769	3539	1517	1768	3349	
Flt Permitted		0.72			0.53		0.37	1.00	1.00	0.22	1.00	
Satd. Flow (perm)		1283			985		681	3539	1517	410	3349	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	242	111	135	276	83	8	200	816	501	13	371	168
RTOR Reduction (vph)	0	14	0	0	1	0	0	0	165	0	42	0
Lane Group Flow (vph)	0	474	0	0	366	0	200	816	336	13	497	0
Confl. Peds. (#/hr)			11	11			1		7	7		1
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		46.9			46.9		55.6	49.4	49.4	41.7	40.1	
Effective Green, g (s)		46.9			46.9		55.6	49.4	49.4	41.7	40.1	
Actuated g/C Ratio		0.43			0.43		0.51	0.45	0.45	0.38	0.36	
Clearance Time (s)		4.0			4.0		3.5	4.6	4.6	3.5	4.6	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		547			419		452	1589	681	175	1220	
v/s Ratio Prot							c0.04	c0.23		0.00	0.15	
v/s Ratio Perm		0.37			c0.37		0.18		0.22	0.03		
v/c Ratio		0.87			0.87		0.44	0.51	0.49	0.07	0.41	
Uniform Delay, d1		28.7			28.9		23.6	21.7	21.4	31.7	26.1	
Progression Factor		1.00			1.00		0.62	0.50	0.55	1.00	1.00	
Incremental Delay, d2		13.5			18.0		0.5	0.8	1.7	0.2	1.0	
Delay (s)		42.2			46.8		15.1	11.7	13.5	31.9	27.1	
Level of Service		D			D		B	B	B	C	C	
Approach Delay (s)		42.2			46.8			12.7			27.2	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

FIGURE 1
SUN VALLEY BLVD. DRAINAGE
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
NOVEMBER, 2014

0 100 200
FEET

- CB Catch Basin
- D Drainage Vault
- D Storm Drain
- Pipes
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

WOOD RODGERS

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FIGURE 2
SUN VALLEY BLVD. DRAINAGE
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
NOVEMBER, 2014

0 100 200
FEET

CB Catch Basin
D Drainage Vault
D Storm Drain
Pipes
Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

WOOD RODGERS

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FIGURE 3
SUN VALLEY BLVD. DRAINAGE
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
NOVEMBER, 2014

0 100 200
FEET

- CB Catch Basin
- D Drainage Vault
- D Storm Drain
- Pipes
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

WOOD RODGERS

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FIGURE 4
SUN VALLEY BLVD. DRAINAGE
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
NOVEMBER, 2014

0 100 200
FEET

- CB Catch Basin
- D Drainage Vault
- D Storm Drain
- Pipes
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

WOOD RODGERS

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SHEET 9

FIGURE 5
SUN VALLEY BLVD. DRAINAGE
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
NOVEMBER, 2014

0 100 200
FEET

- CB Catch Basin
- D Drainage Vault
- D Storm Drain
- Pipes
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

WOOD RODGERS

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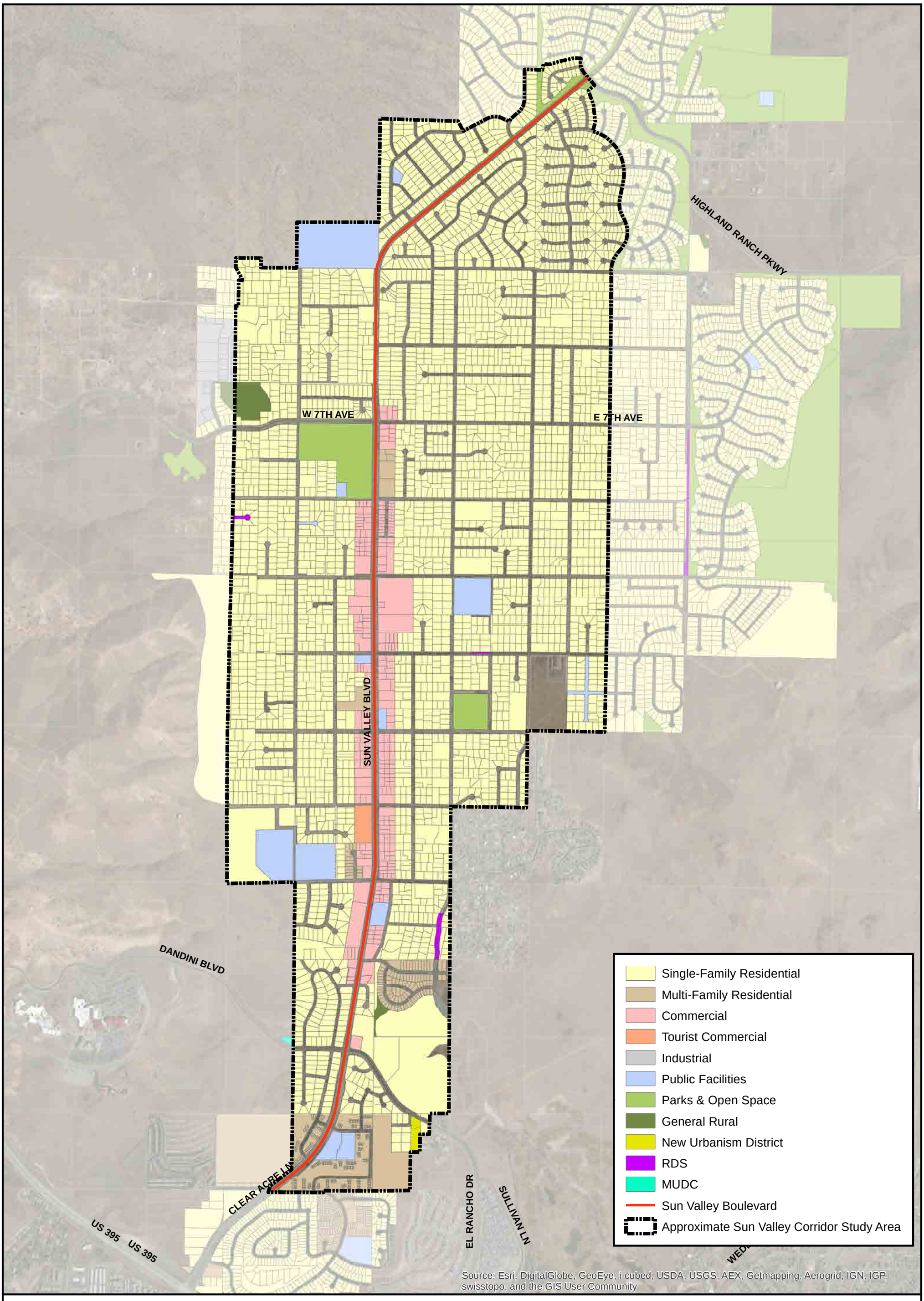

GENERAL LAND USE MAP

SUN VALLEY CORRIDOR STUDY

WASHOE COUNTY, NEVADA

JANUARY 2014

Source: Washoe County GIS Parcels, September 2013.

NORTH

0 750 1,500

FEET

PRELIMINARY

WOOD RODGERS

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FIGURE 1

Underutilized Land

(based on Assessor's improvement value)

<25%

<50%

Vacant Parcels

Approximate Sun Valley Corridor Study Area

Excludes parcels less than a 1/4 acre, and any parcels zoned for public facilities or open space.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

UNDERUTILIZED OR VACANT PROPERTY MAP

SUN VALLEY CORRIDOR STUDY

WASHOE COUNTY, NEVADA

JANUARY 2014

Source: Washoe County GIS Parcels, June 2012.

NORTH

0 750 1,500

FEET

PRELIMINARY

WOOD RODGERS

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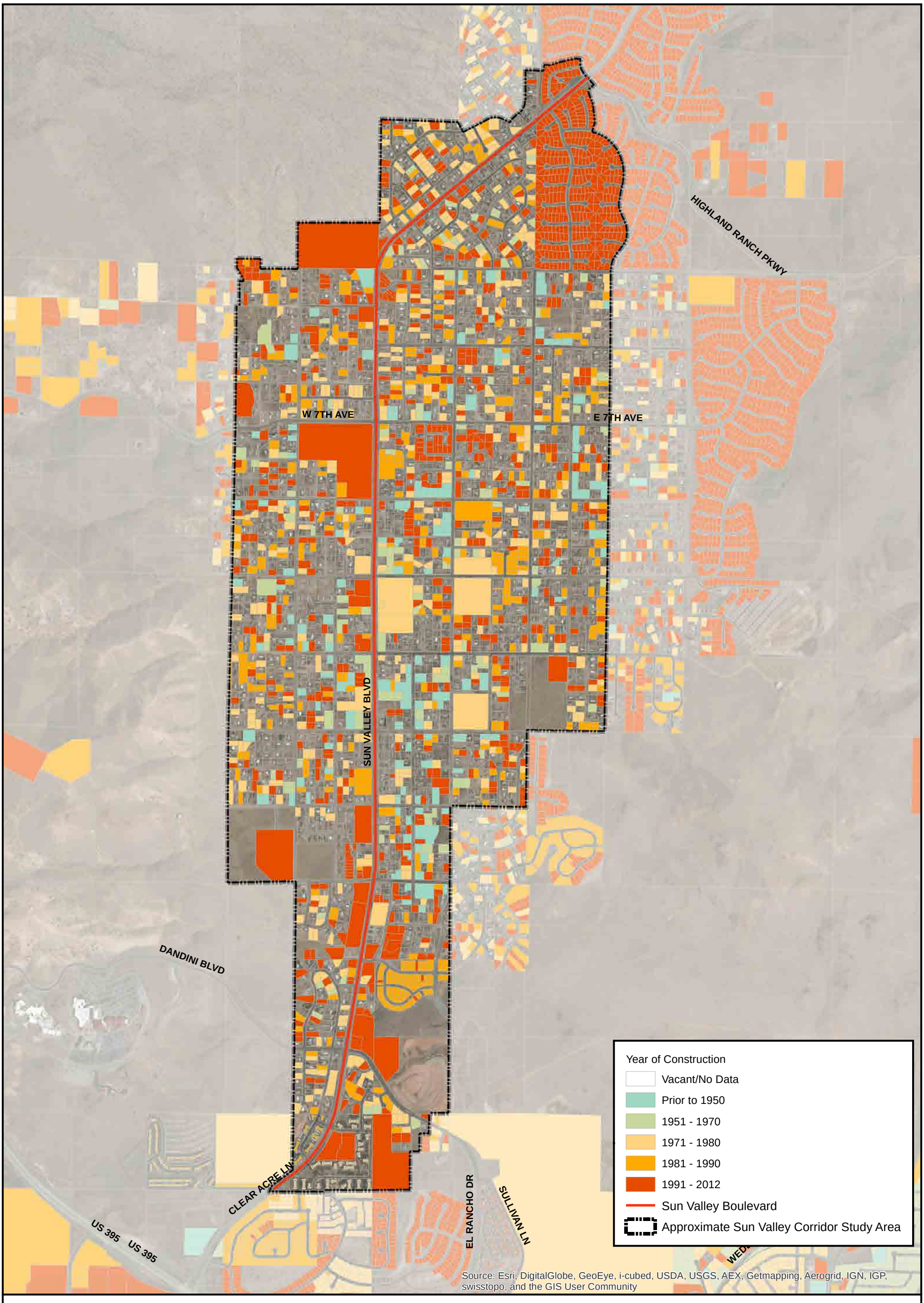
FIGURE 2



DATES OF CONSTRUCTION FOR THE STUDY AREA

SUN VALLEY CORRIDOR STUDY

WASHOE COUNTY, NEVADA

JANUARY 2014

Source: Washoe County GIS Parcels, June 2012.

NORTH

0 750 1,500

FEET

PRELIMINARY

WOOD RODGERS

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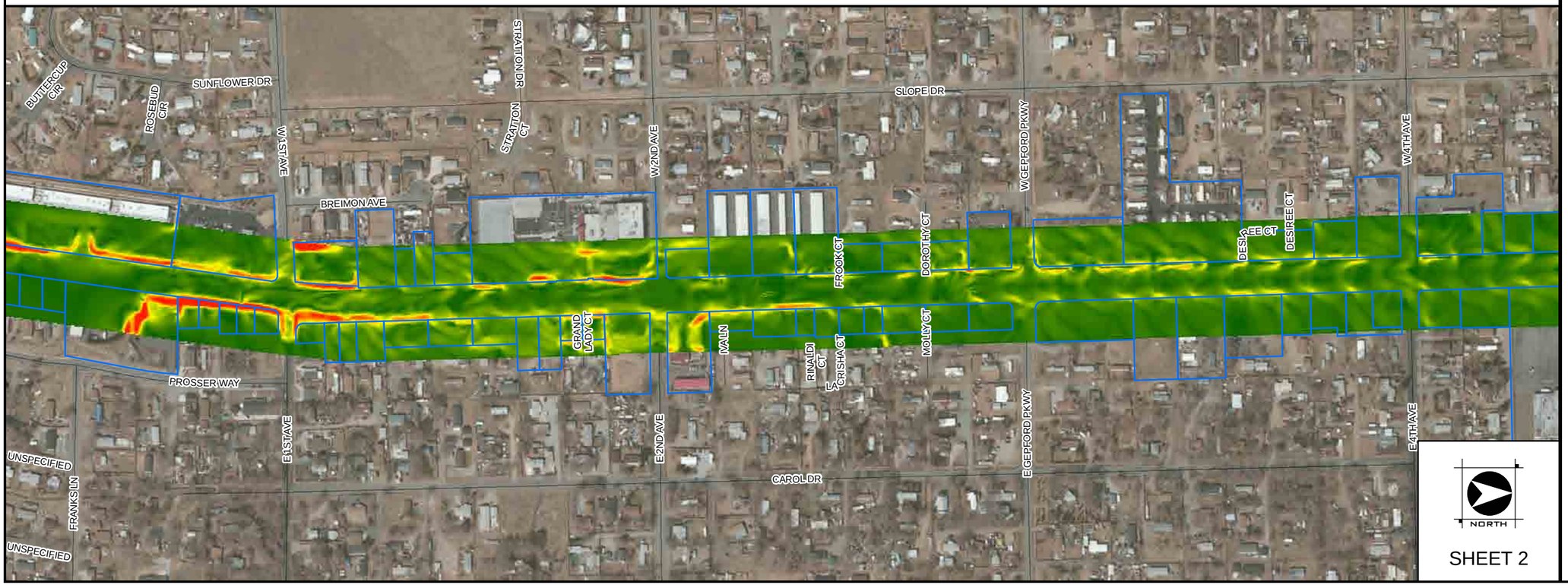
FIGURE 3

FIGURE 1
SUN VALLEY BLVD. SLOPES
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 200 400
FEET

SHEET 1



SHEET 2

Parcel Boundary

Slope

35%

0

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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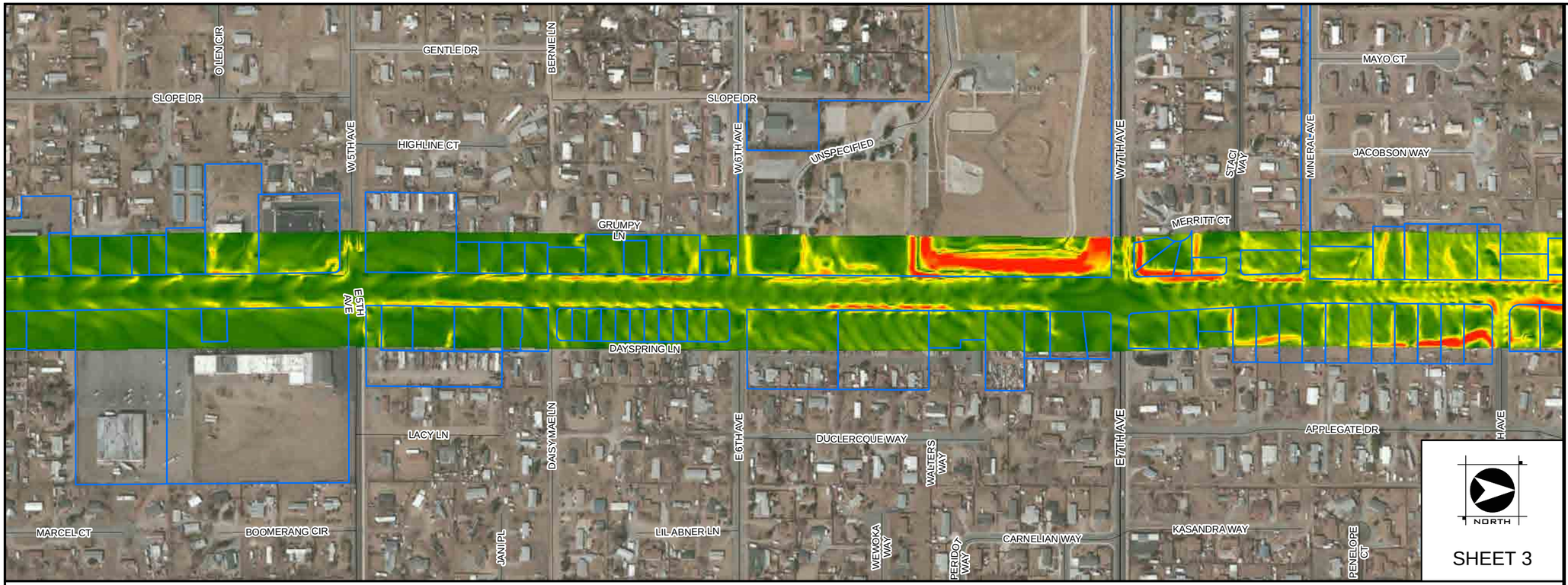
FIGURE 2
SUN VALLEY BLVD. SLOPES
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 200 400
FEET



Parcel Boundary

Slope

35%

0

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 3

SUN VALLEY BLVD. SLOPES

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

OCTOBER, 2013

0 200 400

FEET

Parcel Boundary

Slope

35%

0

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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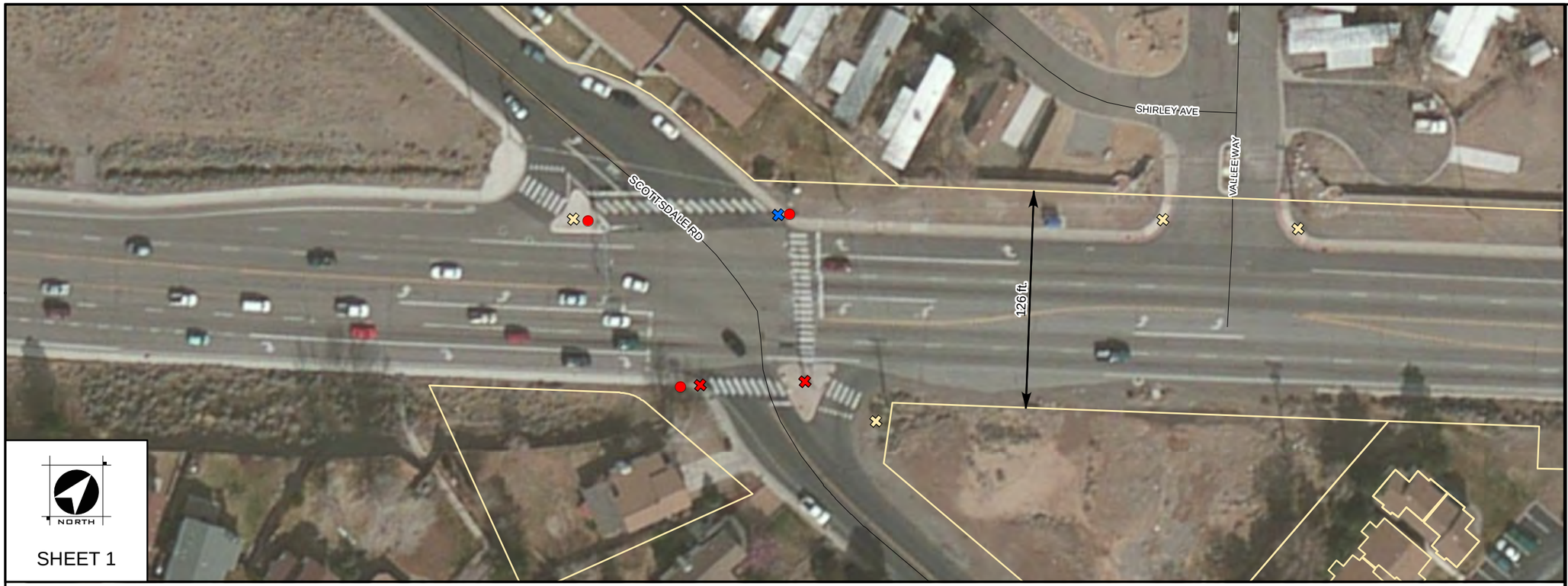

NORTH

SHEET 1

NORTH

SHEET 2

FIGURE 1

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

Ramp
- Other
- Non ADA Compliant
- ADA Compliant

Pole
- Light Pole
- Other
- Signal Pole

Ped Push Button
- Non ADA Compliant
- ADA Compliant

Driveway
- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 2

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

DANDINI BLVD

EL RANCHO DR

120 ft.

120 ft.

100 ft.

NORTH

SHEET 3

SKAGGS CIR

RAMPION WAY

100 ft.

100 ft.

107 ft.

NORTH

SHEET 4

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 3

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

W 1ST AVE

E 1ST AVE

98 ft.

126 ft.

118 ft.

NORTH

SHEET 5

W 2ND AVE

E 2ND AVE

GRAND LADY CT

IVAN

122 ft.

120 ft.

NORTH

SHEET 6

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 4

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 5

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

DESIREE CT

123 ft.

NORTH

SHEET 9

DESIREE CT

W 4TH AVE

E 4TH AVE

121 ft.

120 ft.

NORTH

SHEET 10

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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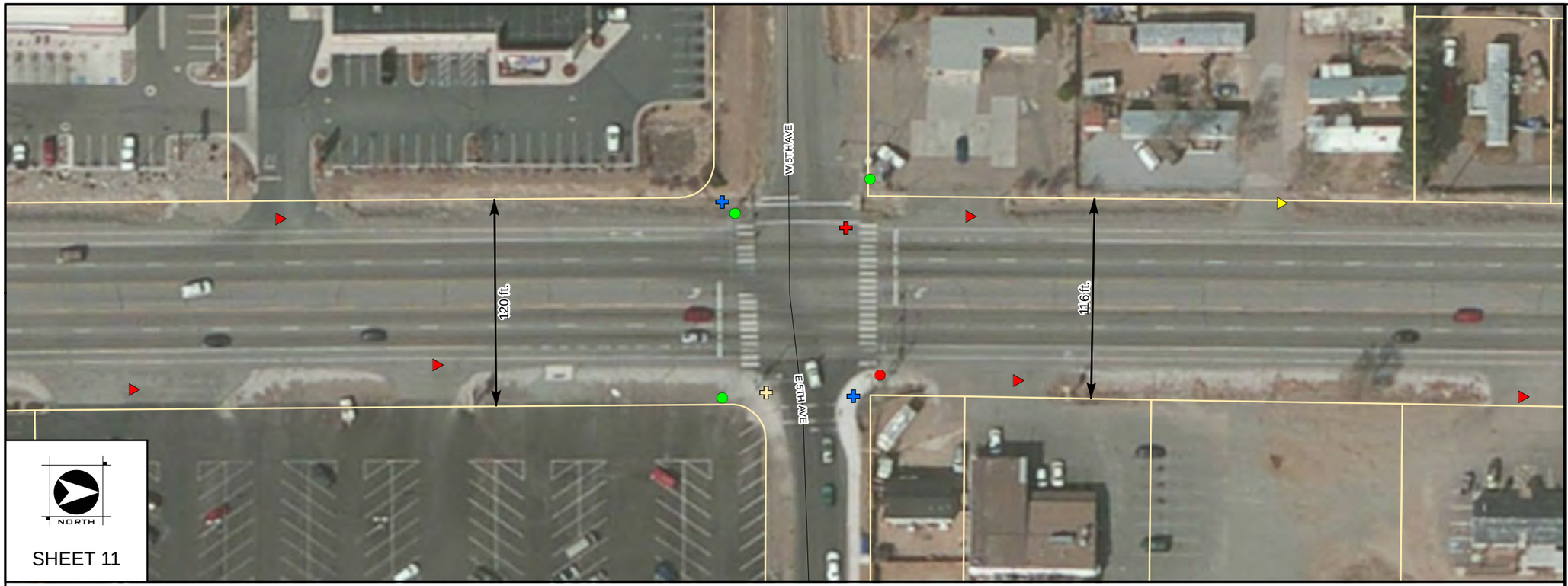
FIGURE 6

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014



NORTH

SHEET 11

NORTH

SHEET 12

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

0 50 100

FEET

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 7

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

GRUMPY LN

W 6TH AVE

E 6TH AVE

119 ft.

120 ft.

NORTH

SHEET 13

W 7TH AVE

E 7TH AVE

STAGWAY

120 ft.

120 ft.

NORTH

SHEET 14

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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NORTH

SHEET 15

NORTH

SHEET 16

FIGURE 8

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 9

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 10

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

JANUARY, 2014

0 50 100

FEET

NORTH

SHEET 19

NORTH

SHEET 20

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 11

SUN VALLEY BLVD. INTERSECTIONS

SUN VALLEY BLVD. CORRIDOR STUDY

WASHOE COUNTY, NV

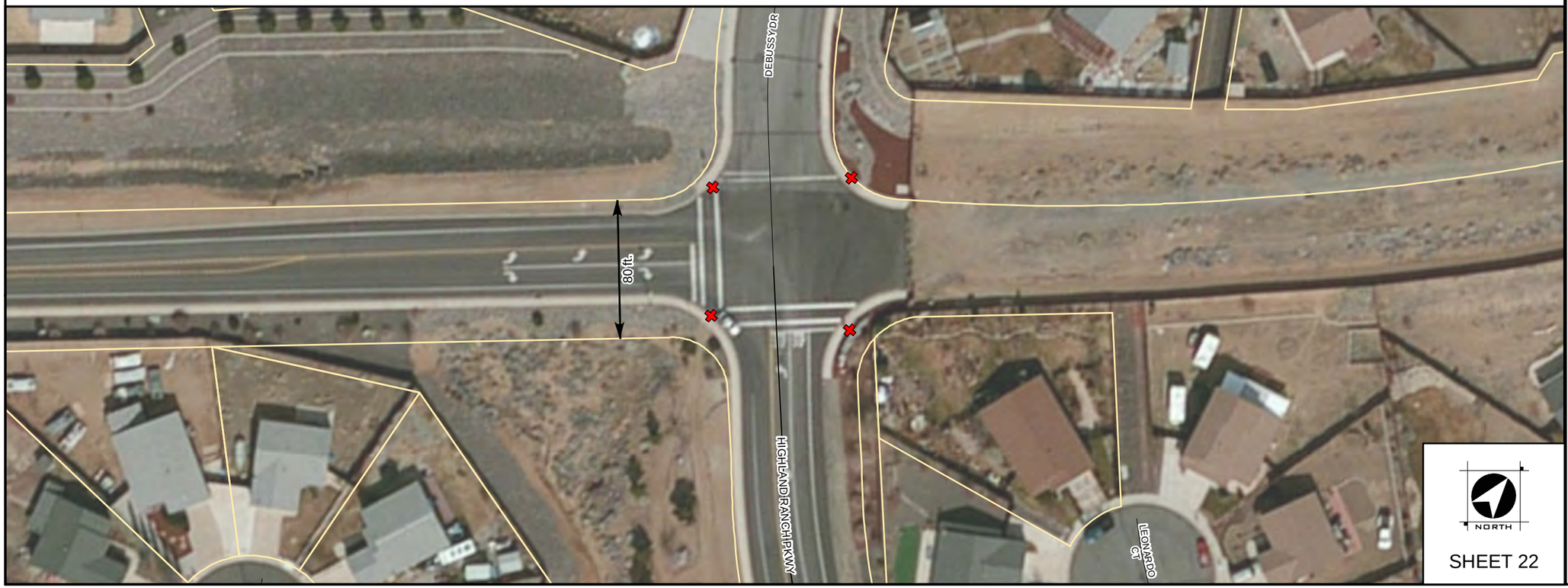
JANUARY, 2014

0 50 100

FEET

NORTH

SHEET 21



NORTH

SHEET 22

Ramp

- Other
- Non ADA Compliant
- ADA Compliant

Pole

- Light Pole
- Other
- Signal Pole

Ped Push Button

- Non ADA Compliant
- ADA Compliant

Driveway

- Commercial
- Other
- Residential
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 1
SUN VALLEY BLVD.
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 100 200
FEET

- Bus Stop
- Sidewalk
- Bike Lane
- Paved Shoulder
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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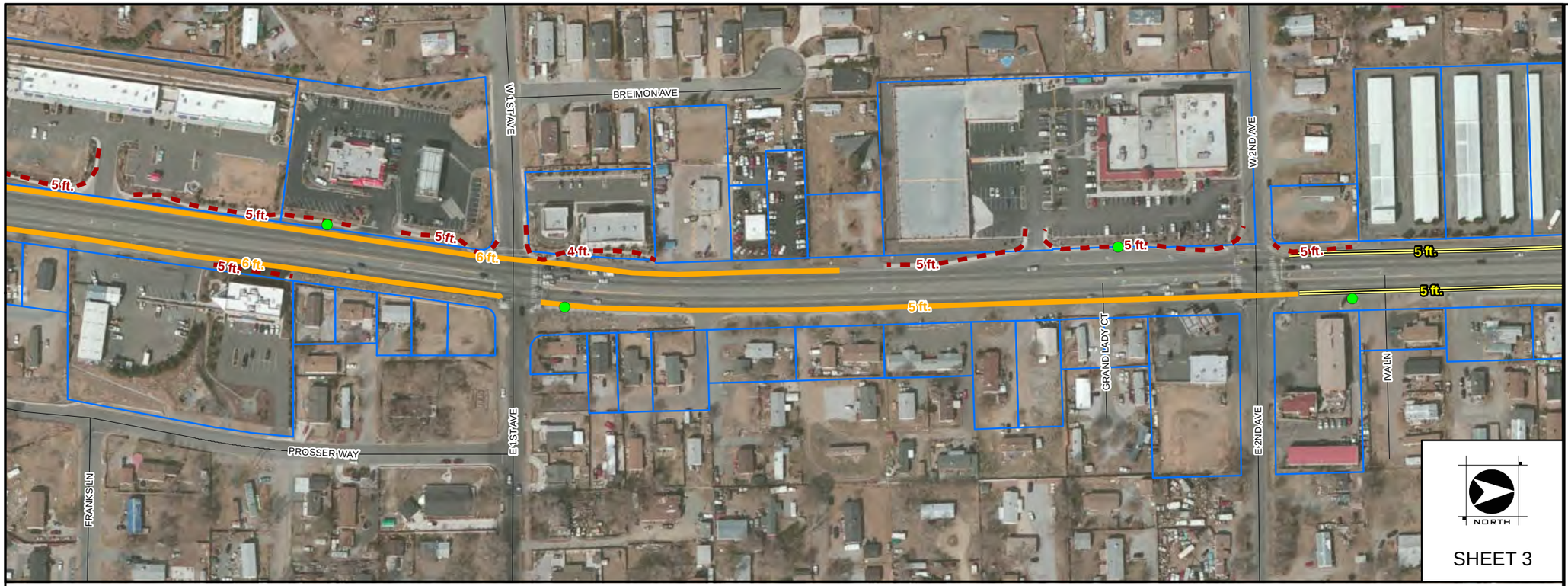
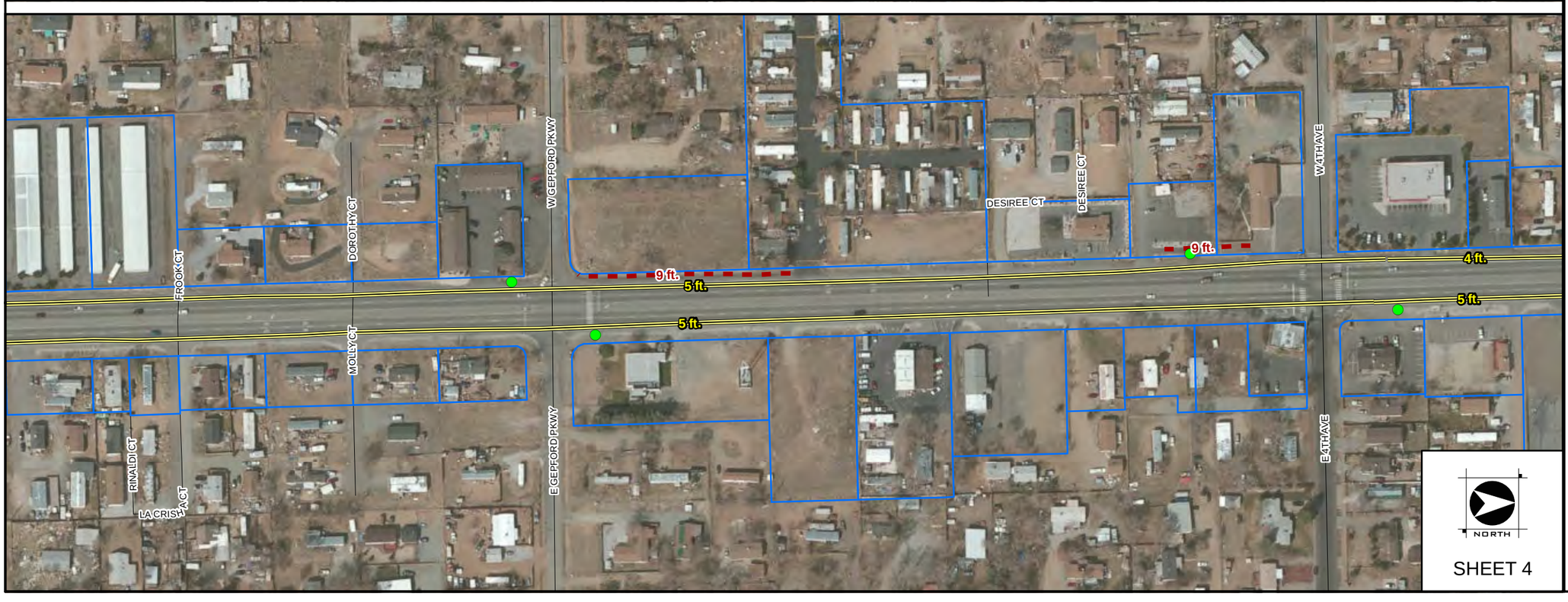
FIGURE 2
SUN VALLEY BLVD.
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 100 200
FEET





- Bus Stop
- Sidewalk
- Bike Lane
- Paved Shoulder
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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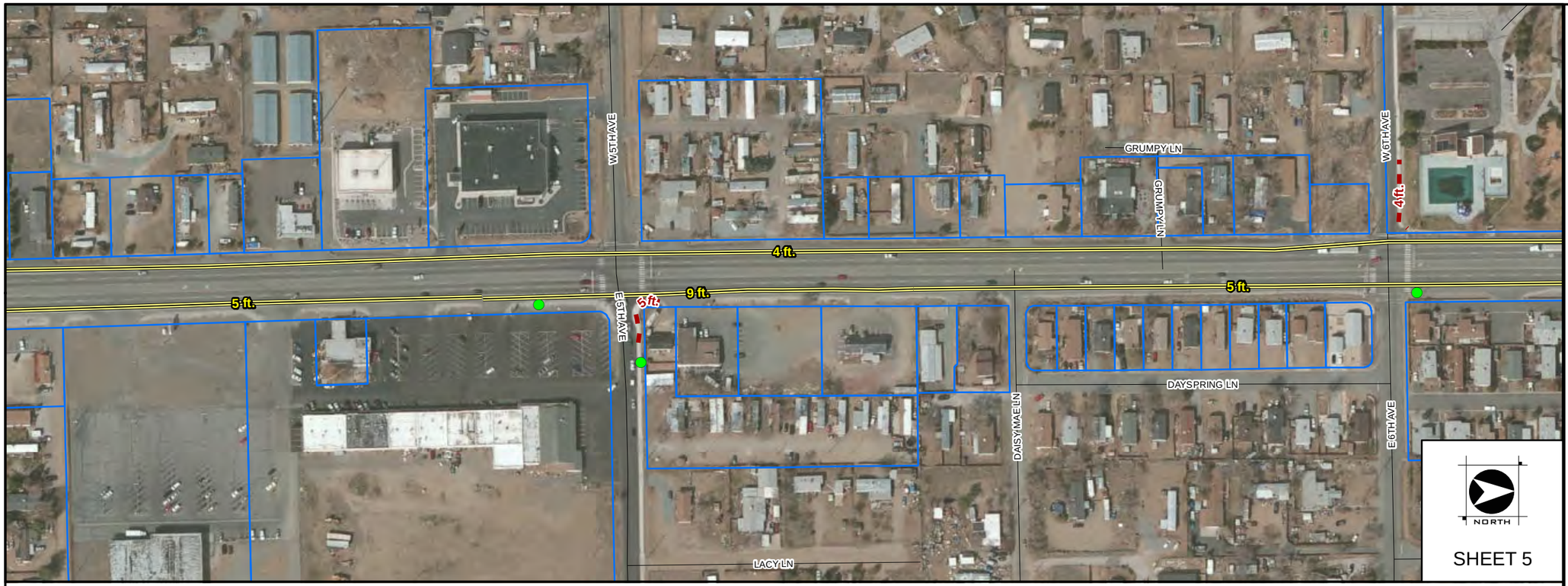
FIGURE 3
SUN VALLEY BLVD.
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 100 200
FEET



- Bus Stop
- Sidewalk
- Bike Lane
- Paved Shoulder
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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FIGURE 4
SUN VALLEY BLVD.
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 100 200
FEET

- Bus Stop
- Sidewalk
- Bike Lane
- Paved Shoulder
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

SHEET 7

SHEET 8

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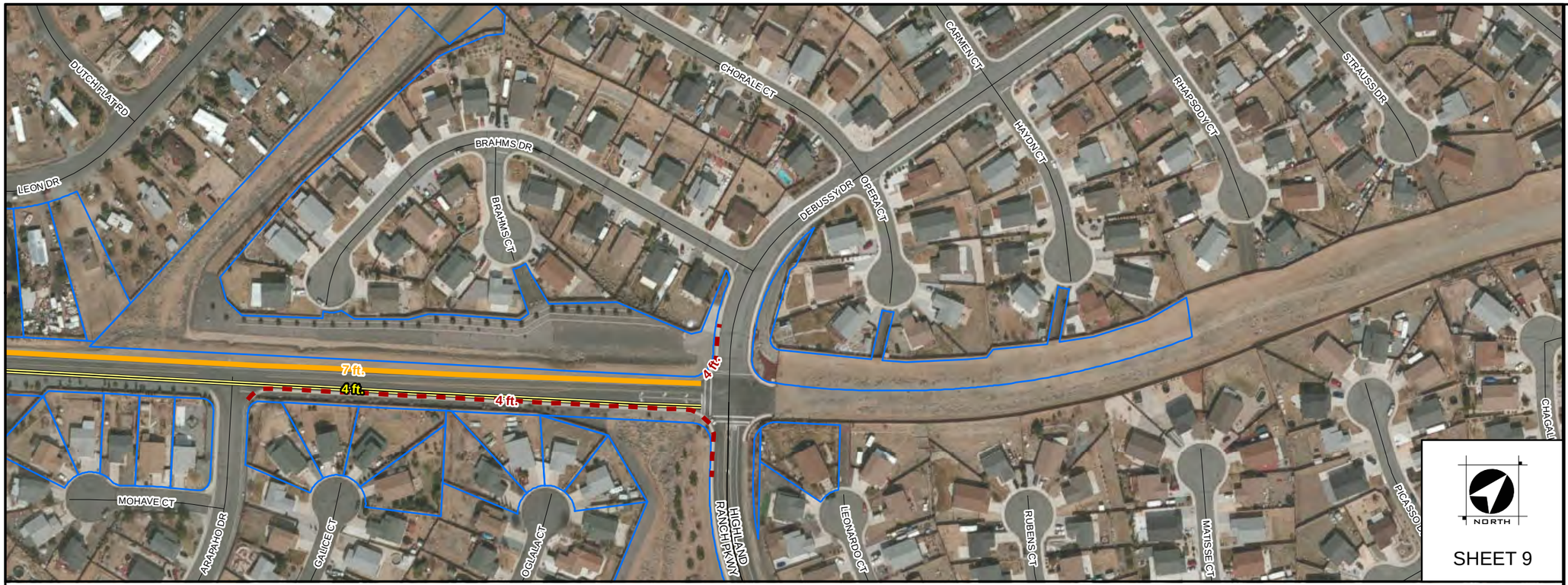

NORTH

SHEET 9

FIGURE 5
SUN VALLEY BLVD.
SUN VALLEY BLVD. CORRIDOR STUDY
WASHOE COUNTY, NV
OCTOBER, 2013

0 100 200
FEET

- Bus Stop
- Sidewalk
- Bike Lane
- Paved Shoulder
- Parcel Boundary

NOTES:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

PRELIMINARY

WOOD RODGERS

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Community Input Summary

This exhibit provides a summary of public input received for the project and how the design team has responded to the comments.

Comment: Painted crosswalk and lighting would be better.

Response: The design team reviewed this intersection, and providing a crossing here is not advisable. Sidewalk installation on the east side of Clearacre and on Leonesio will provide pedestrians a safe route to crossings at El Rancho and Scottsdale intersections.

Please Refer to Display #4

Comment: Don't reduce the traffic lanes for bike lanes and sidewalk and create more traffic delays.

Response: In reviewing the traffic data and future traffic model the design team agrees with this comment and therefore there isn't a proposal to reduce lanes.

Comment: Add sidewalk to at least one side of the cross streets to connect residents to bus stops and Sun Valley Boulevard.

Response: Sidewalk along the major cross streets where evaluated and new sidewalk was inlcuded in the conceptual plan. New sidewalk was placed in areas to maximize the use of existing sidewalk and terrain.

Please Refer to Display #10

Comment: Add a audible signal for the visually impaired.

Response: Washoe County has plans to include audible signals with future signal upgrades otherwise audible upgrades will be included with future signal modifications.

Comment: Please add a left turn light to the existing signal.

Response: The design team evaluated both the existing and future traffic volumes and the left turn traffic volumes are not high enough to warrant a left turn light. Adding a light would increase the wait along Sun Valley Boulevard. Addition of a left turn light is not included at this time.

Comment: Add sidewalk on both sides of the Sun Valley so we don't have to walk on the road or in the ditch.

Response: Sidewalk along Sun Valley Boulevard has been included in the conceptual plans on both sides of the road, with a few exceptions.

Please Refer to Displays #4 through #7

Comment: Bus stop is currently in the ditch and the bus holds up traffic.

Response: Please refer to conceptual bus pull out and stop improvements at El Rancho.

Please Refer to Display #3

Comment: There is a abrupt drop off from Sun Valley to 1st Ave and the intersection doesn't line up.

Response: The design team visited this intersection, and as a result included a conceptual realignment of this 1st Ave intersection.

Please Refer to Display #3

Comment: Pedestrians and Bikes have to walk/ride along side of road which is dangerous.

Response: This comment was incorporated in the conceptual cross section for this area.

Please Refer to Display #4

Comment: Two left turn lanes turn onto El Rancho and merge together. Eliminate one of the left turn lanes.

Response: The design team reviewed the traffic volumes at this intersection and if the left turn lane is removed it would negatively impact traffic on Sun Valley Boulevard. Crash data didn't show a significant number of crashes along El Rancho associated with the merging action. No action on this item is included at this time.

Comment: Crossing at Skaggs Circle is dangerous.

Response: This comment was evaluated and an enhanced pedestrian crossing has been included in the conceptual crossing improvement at Skaggs Circle.

Please Refer to Display #2

Comment: Crossing at Gepford Way is dangerous.

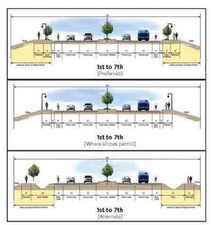
Response: An enhanced crossing has been included at this location to allow for safer crossing of pedestrians.

Please Refer to Display #2

Comment: Please add a left turn light to the existing signal.

Response: The design team evaluated both the existing and future traffic volumes and the left turn traffic volumes are not high enough to warrant a left turn light. Adding a light would increase the wait along Sun Valley Boulevard. Addition of a left turn light is not included at this time.

Comment: Add Landscaping and trees for shade along Sun Valley Boulevard!



Response: Landscaping was incorporated, including a landscape buffer between the roadway and sidewalk where allowable. Trees are included in the conceptual plan to be placed strategically to allow for shade.

Please Refer to Displays #4 and #5

Comment: Fill in the ditches and add pipe.

Response: With the addition of new sidewalk along Sun Valley Boulevard, the roadside ditches are proposed to be piped and covered with a new sidewalk in the conceptual plan.

Please Refer to Displays #4 and #5

DANDINI BLVD
EL RANCHO DR
W 1ST AVE
E 2ND AVE
W 4TH AVE
W 5TH AVE
E 5TH AVE

This is Your RTC.

www.sunvalleyblvd.com

0 100 200 400 FEET

Community Input Summary

This exhibit provides a summary of public input received for the project and how the design team has responded to the comments.

W 4TH AVE

W 5TH AVE

W 7TH AVE

Comment: Add street parking overflow for park events.

Response: 7th Avenue has not been studied specifically with this project. There appears to be adequate right of way, but this item is best if analyzed by Washoe County in the future.

Comment: Add dedicated left turn lane on each side of 7th. Backs up during the day.

Response: The design team evaluated the existing and project traffic volumes and a left turn lane is warranted with the future traffic volumes. A conceptual intersection reconfiguration is included in the 7th Ave Phase 2 improvements.

Please Refer to Display #5

Comment: Traffic ignores the flashing light and this crossing is very dangerous.

Response: The design team evaluated this crossing and found the signal to be long and also noticed traffic not slowing for the flashing light. An enhanced crossing with an intense rapid flashing beacon is included in the conceptual plan to improve this crossing.

Please Refer to Display #2

Comment: Need better transition from 4 to 2 lanes.

Response: This intersection was evaluated in a conceptual plan. The transition is included in the 7th Ave Phase 1 improvements.

Please Refer to Display #3

Comment: Need sidewalk down both sides of 7th Ave for middle school kids.

Response: Sidewalk has been inlcuded along 7th Ave for student access as well as transit riders access to local transit stops.

Please Refer to Display #10

E 4TH AVE

E 5TH AVE

E 6TH AVE

E 7TH AVE

Comment: We need safe travel for pedestrians along Sun Valley. Consider landscape buffers and pedestrian lighting along Sun Valley Boulevard.

Response: Pedestrian imrpovements have been included along Sun Valley and the surrounding area including sidewalk along Sun Valley Blvd and on major cross streets, enhanced pedestrain crossings, and landscape buffers.

Please Refer to Display #10

Comment: Address drainage throughout the area.

Response: Drainage improvements along Sun Valley Boulevard are included with the conceptual plan.

Comment: Include a community circulator bus to provide access within Sun Valley and also take Sun Valley residents to local shopping including Spanish Springs and North McCarran Boulevard.

Response: This idea was included in the "Call 'N' Ride" concept.

Please Refer to Display #8

Comment: Incorporate landscaping, public art, and ways to beautify the corridor. Create a sense of community pride and improve the visual quality of of Sun Valley Boulevard.

Response: Landscaping, lighting, and eliminating roadside ditches have been included in the conceptual plan to create a main street feel.

Comment: Use colored/painted concrete to highlight bike, pedestrian, and vehicle areas.

Response: The conceptual cross sections show curb and gutter to separate sidewalk, striped bike lanes, and refreshed striping for all vehicle lanes. Colored concrete is very expensive and therefore is a funding challenge and not included at this time.

Comment: Need bus stop on north side of Sun Valley Boulevard.

Response: As an alternative to extending fixed route transit service to this area, please refer to the "Call 'N' Ride" concept which would allow transit riders to get to major stops along the southern portion of Sun Valley Boulevard.

Please Refer to Display #8

0 100 200 400
FEET

HIGHLAND RANCH PKWY

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Pedestrian Network Concepts

Instructions:

Place a sticker ● next to the blocks you think will have the greatest impact.

Display
#10

$12,310,000 Total
*Average Block = 700 LF

See Detail "A"

See Detail "B"

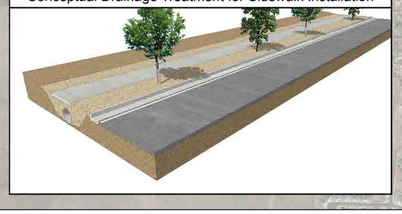
Detail "B"

Detail "A"

Conceptual Drainage Treatment for Bus Pads

Note: Stop locations that may benefit from the above improvements include: Dandini / Sun Valley (Route 15), Lupin / 8th (Route 5), Lupin / 7th (Route 5), 8th / Sun Valley (Route 5).

Conceptual Drainage Treatment for Sidewalk Installation



RTC WOOD RODGERS

- Proposed Bus Stop
- Bus Stop
- Signalized Intersection
- Existing Sidewalk
- Proposed Sidewalk

NORTH
0 150 300 600
FEET

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