Upper Valley Mobility Study

June 2017

Prepared by

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REVISION SUMMARY

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Contents

APPENDICES

FIGURES

TABLES

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ACRONYMS

AADT	annual average daily traffic
ADA	Americans with Disabilities Act
APM	automated people mover
APTA	American Public Transportation Association
BRT	bus rapid transit
CDOT	Colorado Department of Transportation
CIG	Capital Investment Grant
CIS	Corridor Investment Study
CNG	compressed natural gas
DEIS	Draft Environmental Impact Statement
DMU	diesel multiple unit
DOT	Department of Transportation
DSEIS	Draft Supplemental Environmental Impact Statement
EMU	electric multiple unit
EOTC	Elected Officials Transportation Committee
ETR	embedded third rail
FAST	Fixing America's Surface Transportation
FASTER	Funding Advancement for Surface Transportation and Economic Recovery
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GO	general obligation
GTFS	Generalized Transit Feed Specification
GPS	global positioning system
HOV	high-occupancy vehicle
HUD	head-up display
ITDP	Institute for Transportation and Development Policy
ITS	intelligent transportation system
ITSP	Integrated Transportation System Plan
LOS	level of service
LRT	light rail transit
MPGe	miles per gallon gasoline equivalent
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act of 1970
O&M	operations and maintenance
OBS	on-board storage
OCS	overhead contact system
P3	public-private partnership
RDA	redevelopment area
RFTA	Roaring Fork Transportation Authority

ROD	Record of Decision
ROW	right-of-way
RTA	Rural Transportation Authority
RTD	Regional Transportation District
SH	State Highway
SID	special improvement district
TAC	Technical Advisory Committee
TCRP	Transit Cooperative Research Program
TIF	tax increment financing
TIGER	Transportation Investment Generating Economic Recovery
TDM	travel demand management
TOR	top of rail
TPSS	traction power substation
TSP	transit signal priority
UMTA	Urban Mass Transportation Administration (predecessor agency to the Federal Transit Administration (FTA)
UVMS	Upper Valley Mobility Study
VMT	vehicle miles traveled
YOE	Year of Expenditure

EXECUTIVE SUMMARY

The Project As a supplement to Roaring Fork Transportation Authority's Integrated Transportation System Plan, a premium level transit service is being considered and analyzed for potential implementation in the 6.1-mile corridor along State Highway 82 between the Brush Creek Intercept Lot and the Rubey Park Transit Center in Downtown Aspen, Colorado.

This Upper Valley Mobility Study analyzes the viability of a fixed guideway system (either light rail transit [LRT] or bus rapid transit [BRT]) in terms of ridership, capital expenditures, and operations and maintenance costs. The study was commissioned by the Upper Valley's Elected Officials Transportation Committee, a board that represents Pitkin County, the City of Aspen, and the Town of Snowmass Village.

The purpose of this study is fourfold:

- Improve mobility between Brush Creek and Rubey Park
- Reduce number of buses and congestion in Aspen
- Enhance transit service to make it faster, more reliable, and more attractive for users
- Support City of Aspen, Town of Snowmass Village, and Pitkin County transportation plans and policies

The Alternatives The alternatives include one LRT alternative and one BRT alternative, with several alignment and configuration options for each mode. Each mode also includes several technology options such as diesel-electric or onboard battery-electric propulsion with charging stations for LRT, and compressed natural gas or onboard battery-electric propulsion with charging stations for BRT.

Both modal alternatives would generally follow the ROD modified-direct alignment improvements. The modified-direct alignment approved in the 1998 FHWA SH 82 Entrance to Aspen ROD includes realignment of SH 82 with a four-lane cross section plus dedicated transitway to accommodate either LRT or BRT from just south of the Maroon Creek roundabout, across the Marolt easement within a cut-and-cover tunnel, across a new Castle Creek bridge, and connecting with Main Street at 7th Street in Aspen. This alignment was developed to meet all 10 community consensus objectives in the 1998 Record of Decision and to allow for a phased transit solution that allows for a dedicated transit way and separates transit and non-transit vehicles.

The Main/Galena end-of-line station option could serve as the line haul/commuter end-of-line station for either LRT or BRT. Rubey Park would continue its role as the major hub for the local bus services. The Galena Street pedestrian/transit-way mall concept could provide an attractive, convenient link between the two stations.

The Costs The estimated capital cost range of the LRT alternative is $428.0 million (base) to $527.8 million (prime). The total annual O&M cost for the minimum LRT alternative ranges from $6 million to $9 million. The estimated capital cost range of the BRT alternative is $159.1 million (base) to $200.5 million (prime). The total annual O&M cost for the minimum BRT alternative is approximately $3.2 million.

The Evaluation Ridership is virtually the same for the LRT and BRT. The LRT option would reduce the number of buses at Rubey Park and would improve air and noise quality more than the BRT option. However, LRT's capital cost is more than twice the BRT capital cost. Similarly, the LRT O&M cost is also twice the BRT O&M cost. For the BRT option, bus service refinement would help reduce the number of buses and improve efficiency (i.e., higher passenger loads). In addition, using electric buses would improve the air and noise quality at Rubey Park.

The BRT improvements, when phased in over time, can also set the stage for, and not preclude, future LRT if desired. All the proposed options would improve sustainability (including energy usage/saving, and noise/air quality improvements) and the greatest benefit to sustainability would come from the LRT and Phased BRT options. Because the Phased BRT with refined service plan option would maintain one-seat rides for the six routes in the UVMS corridor and does not require transfers, that option provides the best overall transit user experience.

The Recommendation It is recommended that the BRT alternative be phased in as summarized below:

OPERATIONAL PHASES

Phase 1

- Consider opportunity to optimize service plan for six "interceptible" corridor routes (such as for mid-day non-peak hours of service), while meeting contractual service agreements and considering a wide variety of factors including weather, congestion, peak directional volumes, and maintaining the quality of service the users of the transit system have come to expect.

Phase 2

- Replace one Buttermilk and two Snowmass Village route buses with 40-foot electric buses, $ 5.6 million (7 buses x $800k each)
- As technology allows, replace BRT and Valley/SH 82 buses with 60-foot (or high-capacity) electric buses, $ 30 million (25 buses x $1M each plus $5M battery recharging equipment for all 32 total buses)
- Replace remaining route buses with electric buses, $15 million

Phase 3

- As technology allows, retrofit buses to autonomous control, $ 4.9 million plus $0.33 million per bus retrofit

BUILD PHASES

Phase 1

- Design ($11 million) and ROW acquisition ($10 million) for preferred alignment across Marolt easement, $21 million

Phase 2

- Build preferred alignment across Marolt easement with New Castle Creek bridge, $81.6 million
- Build continuous dedicated bus lanes from Brush Creek to Buttermilk, $ 3.4 million

A hypothetical funding solution is given in the table below and may involve the following elements to pay for this recommended alternative. FTA and the local jurisdictions will need to expand on this initial funding options analysis to identify a specific funding package and determine financing strategies as appropriate. Currently no decision has been made from the EOTC pending further meetings/discussion that are scheduled for September 2017, after the conclusion of this report.

Table ES-1: Hypothetical Funding Scenario

Phase	Cost	Funding Source
Operational Phase One – System Improvements	N/A	Use existing funding sources
Operational Phase Two - BRT Electric Buses with On Board Storage	$31.0M	FTA Section 5339 Discretionary Bus & LoNo grants – pay for 60% ($21.6M) Property tax – new 1-mil levy pays $3M per year; five years would cover 40% gap ($14.4M)
Operational Phase Two - BRT Electric Bus Charging System	Brush Creek to Aspen = $5.0M	
Operational Phase Three – BRT Autonomous Control Infrastructure	$4.9 M	Additional funding to be identified in future years.
Operational Phase Three – BRT Autonomous Control Bus Retrofits	$0.3M each ($3M total)	
Build Phases One and Two – Design and construction of Marolt easement crossing with cut-and-cover tunnel and New Castle Creek Bridge. Continuous Dedicated Bus Lanes from Brush Creek to Buttermilk.	$106.0M	Would need to issue $110-$111M construction bond, requiring $10M annual revenue stream. Potential local sources: • SH82 BRT lane usage fee - $0.18M per year • Parking revenue (Aspen Parking Fund) - $1M per year • Lodging tax (1.0% in Aspen) - $1.4-$1.7M per year • EOTC surplus - $0.5M per year • Property tax (1-mil levy) - $3M per year • Sales tax (0.5% in Aspen) - $3-$4M per year • Utility fee ($3.50-$4.00 per household in RFTA service area) - $3-$4M per year

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1 Introduction

As a supplement to Roaring Fork Transportation Authority's (RFTA's) Integrated Transportation System Plan (ITSP), a premium level transit service is being considered and analyzed for potential implementation in the 6.1-mile corridor along State Highway 82 (SH 82) between the Brush Creek Intercept Lot and the Rubey Park Transit Center in Downtown Aspen, Colorado, as depicted in Figure 1-1. This Upper Valley Mobility Study (UVMS) analyzes the viability of a fixed guideway system (light rail transit [LRT] and bus rapid transit [BRT]) in terms of ridership, capital expenditures, and operations and maintenance (O&M) costs. The study was commissioned by the Upper Valley's Elected Officials Transportation Committee (EOTC), a board that represents Pitkin County, the City of Aspen, and the Town of Snowmass Village.

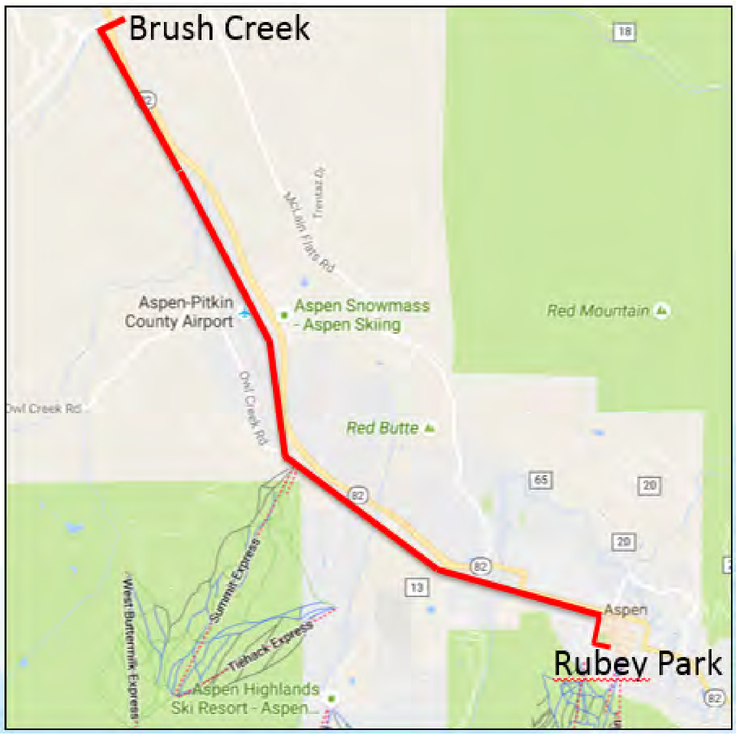

Figure 1-1: UVMS Corridor – Brush Creek to Rubey Park

In August 1998, as part of the *SH 82 Entrance to Aspen Record of Decision*, the City of Aspen set a goal of maintaining traffic volumes and levels of service (LOS) comparable to those in 1993. This resulted in the significant expansion of transit services provided by the RFTA to respond to growing population and employment and the corresponding increases in travel demand throughout the Roaring Fork Valley.

In addition to adding bus and BRT services, RFTA also worked with the local jurisdictions and other stakeholders to improve pedestrian and bicycle facilities as alternate modes of transportation. Recently, the RFTA Board of Directors and the EOTC determined that further improvement may be needed — specifically the development of a high-capacity, fixed guideway transit solution to connect the Rubey Park Transit Center in Aspen and the Brush Creek Intercept Lot and reduce the number of buses entering and leaving Aspen. This led to the development of this Upper Valley Mobility Study (UVMS).

1.1 Purpose and Need

The purpose of this study is fourfold:

- Improve mobility between Brush Creek and Rubey Park
- Reduce number of buses and congestion in Aspen
- Enhance transit service to make it faster, more reliable, and more attractive for users
- Support City of Aspen, Town of Snowmass Village, and Pitkin County transportation plans and policies

1.2 Objectives

The objective of this UVMS is to analyze and summarize the following components:

- LRT and BRT descriptions, including design guidelines, alignments, airport expansion interfaces, station locations, and maintenance facility needs
- LRT and BRT ridership and service plans
- Impacts to traffic on SH 82 for both the LRT and BRT alternatives, including at the intersection of SH 82 and Brush Creek Road, at the Maroon Creek roundabout, and at local city street intersections in Aspen
- LRT and BRT technology scans
- Cost and funding opportunities and constraints
- Sustainability for the LRT and BRT alternatives
- Evaluation of the alternatives
- Stakeholder input

This document does not include analysis of any mode of transportation other than LRT and BRT, and only along the 1998 ROD preferred alignment. It does not include identification and screening of any other alternatives and/or alignments.

1.3 EOTC Guidance

The following input was received from the EOTC to guide the UVMS:

- Consider a multimodal approach, including (but not limited to):
  - Prioritizing the reduction of vehicular transportation and improving bicycle and pedestrian facilities and use

  - The need for bike and pedestrian connection between Brush Creek and Aspen Airport Business Center (AABC)
- The City of Aspen is currently at a tipping point for number of buses
- Integrate BRT better with the local bus systems
- Consider a better use of the Brush Creek Intercept Lot
- Explore rail into Aspen with Brush Creek as the pivot point for bus/train connection
- Explore how autonomous transit vehicles will play a part

These issues were studied within the overall UVMS project.

1.4 Previous Studies and Reports

1.4.1 State Highway 82 Entrance to Aspen Final Environmental Impact Statement and Record of Decision (1997, 1998)

In January 1994, the National Environmental Policy Act of 1970 (NEPA) process began for the SH 82 Entrance to Aspen to fulfill a commitment made in the Record of Decision (ROD) for SH 82 east of Basalt to the Buttermilk Ski Area (dated December 21, 1993). According to the ROD for SH 82 Entrance to Aspen (1998), the Draft Environmental Impact Statement (DEIS) evaluated three alternatives between Buttermilk Ski Area and Maroon Creek Road and seven alternatives between Maroon Creek Road and the intersection of 7th Street and Main Street. Following the release of the DEIS in August 1995 and the Public Hearing Open House, new alternatives were presented by the City of Aspen and local citizens for improvements to SH 82. A Draft Supplemental Environmental Impact Statement (DSEIS) was released in July 1996, which evaluated four additional alternatives between Pitkin County Airport and Rubey Park in downtown Aspen. The Final Environmental Impact Statement (FEIS) was prepared and released in August 1997. The official Public Hearing Open House for the FEIS was also conducted in August, and more than 950 comment letters were received during the official public comment period (which was extended twice and remained open until November 6, 1997). A ROD for this project (Project STA 082A-008) was signed on August 3, 1998, and documented the Federal Highway Administration's (FHWA) Preferred Alternative, which was a combination of highway and intersection improvements, a transit system, and an incremental transportation management (TM) program.

The FEIS stated that the purpose of the EIS process was to "develop solutions that will improve transportation and safety along the SH 82 corridor between the airport and Aspen while avoiding or minimizing adverse environmental effects." The Preferred Alternative in the ROD met the ten Objectives of the project, which were developed based on community consensus of known problems and concerns in the area:

- Community-Based Planning
- Transportation Capacity
- Safety

- Environmentally Sound Alternative
- Community Acceptability
- Financial Limitations
- Clean Air Act Requirements
- Emergency Access
- Livable Communities
- Phasing

The highway component of the Preferred Alternative consisted of a two-lane parkway that generally follows the existing alignment (except at Maroon Creek crossing and across the Marolt-Thomas property in a transportation easement) and has a direct connection to Main Street at 7th Street. Figures 1-2 and 1-3 are taken from the 1998 ROD and show the Preferred Alternative Alignment. The transit component included an LRT system that could be developed initially as exclusive bus lanes if local support and/or funding were not available. The transit platform had to be of adequate width to allow the exclusive bus lanes to continue in operation during the construction of the LRT. The Preferred Alternative also included multimodal facilities at the Pitkin County Airport and Buttermilk Ski Area as part of the locally funded LRT component, a new Marron Creek Bridge crossing, a roundabout at Maroon Creek Road, and a cut-and-cover tunnel across the Marolt-Thomas property easement.

According to the ROD, the LRT alignment was to leave from a new maintenance facility near Service Center Road and cross SH 82. At this point, the LRT would be parallel to and on the south side of SH 82 and then would leave parallel near Owl Creek Road to enter the Buttermilk LRT Station and multimodal facility. Once it leaves the station, the alignment then returns to the south side and parallel to SH 82, crosses Maroon Creek on the then existing bridge, and shifts to the south as it approaches the roundabout to bypass the intersection. After crossing Maroon Creek and Castle Creek roads, the alignment returns to the south side alignment. The LRT parallels the proposed highway alignment across the Marolt-Thomas Property easement, through a cut and cover tunnel to the intersection of 7th Street and Main Street. Finally, the LRT alignment would run along the south side of Main Street to Monarch Street, turn south onto the east side of Monarch Street, and at Durant Avenue turn east along the north side of the street to end at Rubey Park. Figures 1-2 and 1-3 from the 1998 ROD depict this alignment. The ROD identified transit stations at the Airport Terminal, Buttermilk Ski Area, Moore Property, 7th Street, 3rd Street, Monarch Street, and Rubey Park. In the FEIS, the capital construction cost for the LRT was listed as $32.7 million and the line consisted of double track except for six specific areas of single track:

- LRT Maintenance Facility to the Pitkin County Airport
- Maroon Creek Bridge
- Just west of the cut and cover tunnel to the intersection of 7th Street and Main Street
- 7th Street LRT Station

- 3rd Street LRT Station
- Intersection of Monarch Street and Main Street to Rubey Park

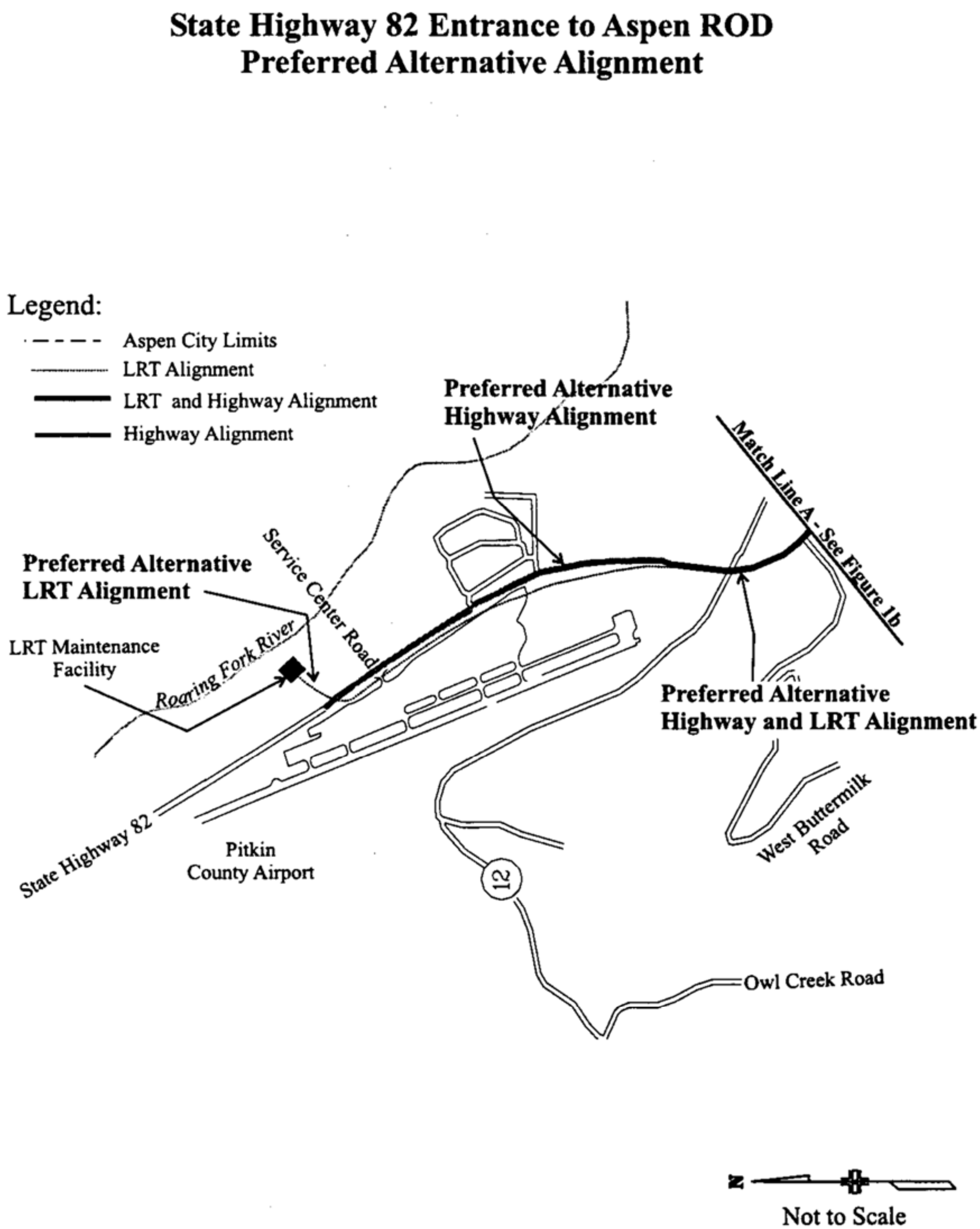

Figure 1-2: State Highway 82 Entrance to Aspen ROD Preferred Alternative Alignment

Source: Record of Decision, 1998.

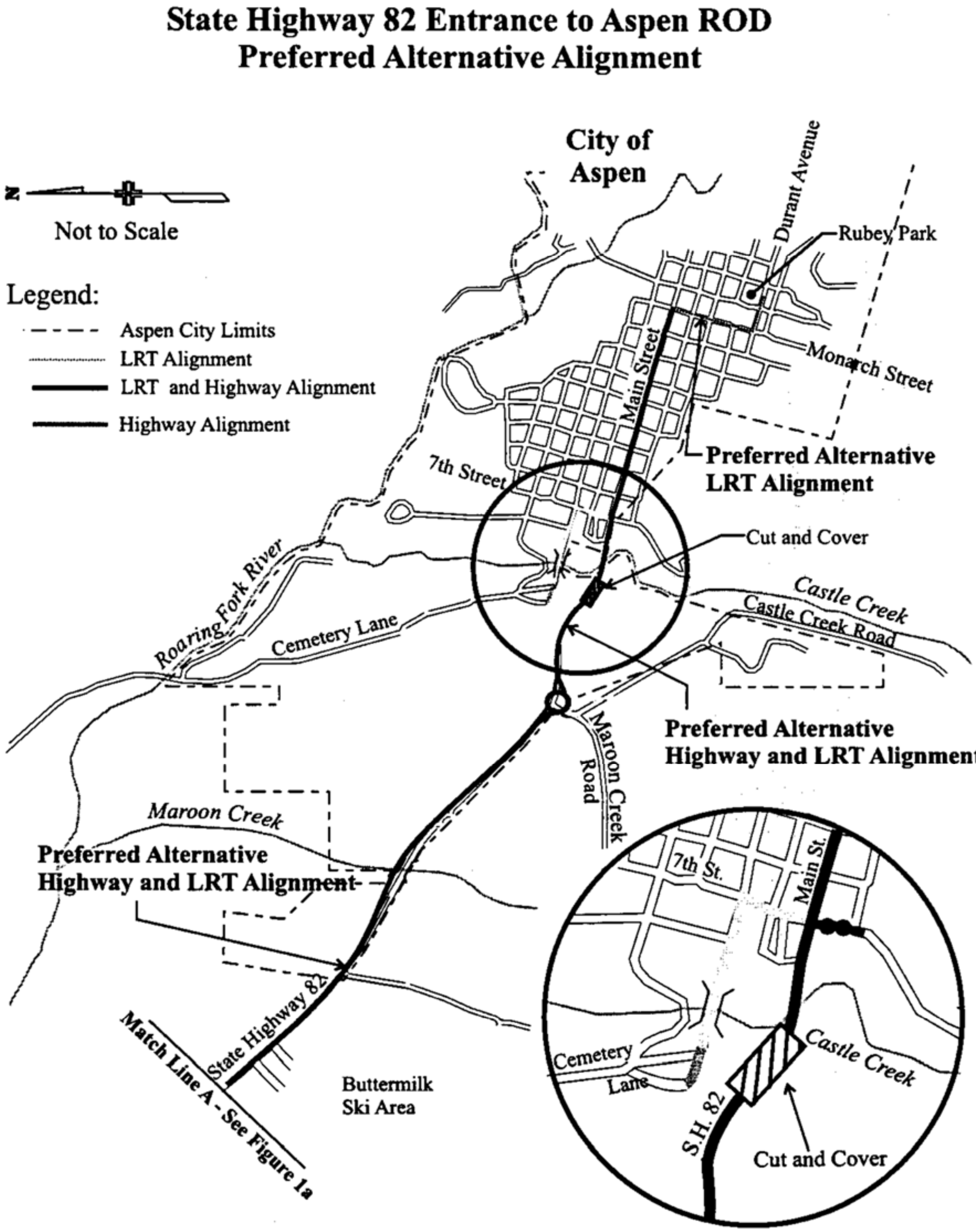

Figure 1-3: State Highway 82 Entrance to Aspen ROD Preferred Alternative Alignment

Source: Record of Decision, 1998.

1.4.2 Entrance to Aspen Supplemental O&M Analysis (1999)

In 1999, the Aspen City Council requested the following additional information:

- Future O&M costs of light rail
- Present and future O&M costs of the interim busway alternative
- Number of rail vehicles and buses on Main Street in future years
- Staff requirements for each alternative
- Impacts of each alternative on traffic and parking in Aspen

Although previous studies and presentations had been prepared for the Entrance to Aspen in 1995, 1996, and 1998, the information was conceptual in nature; the 1999 analysis considered costs and other issues at a greater level of detail. This analysis also considered changes in assumed minimum service frequency in the corridor, a new relationship between ridership and needed system capacity, updated future ridership projection, changes in estimated costs, revised estimates of transit vehicles on Main Street, and the tolerance of standees on the light rail. Three main scenarios were studied: Light Rail, Busway, and No-Build. Results were presented for each scenario with the assumption of the use of articulated buses.

1.4.2.1 Assumptions

The assumed opening year for the light rail was 2003. Tables 1-1 and 1-2 list the headway assumptions used for the analysis.

Table 1-1: Light Rail Headway Assumptions

Season	Period	Time (hours)	Time Span		Headway (minutes)
Winter	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. – 6:30 p.m.	15
	Shoulder (evening)	6.5	6:30 p.m. – 1 a.m.		15
	Off-peak	5.5	5:30 a.m. – 6 a.m.;	10 a.m. – 3 p.m.	30
	Late-night bus	2	1 a.m. – 3 a.m.		30
Summer	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. – 6:30 p.m.	15
	Shoulder	7.5	10 a.m. – 3 p.m.;	6:30 p.m. – 9 p.m.	30
	Off-peak	4.5	5:30 a.m. – 6 a.m.;	9 p.m. – 1 a.m.	30
Off-season	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. –6:30 p.m.	15
	Shoulder	7.5	10 a.m. – 3 p.m.;	6:30 p.m. – 9 p.m.	30
	Off-peak	4.5	5:30 a.m. – 6 a.m.;	9 p.m. – 1 a.m.	30

Table 1-2: Busway Headway Assumptions

Season	Period	Time (hours)	Time Span		Headway (minutes)
Winter	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. –6:30 p.m.	15
	Shoulder (evening)	6.5	6:30 p.m. – 1 a.m.		15
	Off-peak	5.5	5:30 a.m. – 6 a.m.;	10 a.m. – 3 p.m.	30
	Late-night bus	2	1 a.m. – 3 a.m.		30
Summer	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. –6:30 p.m.	15
	Shoulder	7.5	6:30 p.m. – 9 p.m.		30
	Off-peak	4.5	5:30 a.m. – 6 a.m.;	9 p.m. – 1 a.m.	30
	Late-night bus	1.5	1 a.m. – 2:30 a.m.		30
Off-season	Peak	7.5	6 a.m. – 10 a.m.;	3 p.m. –6:30 p.m.	15
	Shoulder	7.5	6:30 p.m. – 9 p.m.		30
	Off-peak	4.5	5:30 a.m. – 6 a.m.;	9 p.m. – 1 a.m.	30
	Late-night bus	1.5	1 a.m. – 2:30 a.m.		30

The total capacity of the two-car light rail vehicles was assumed to be 300 people in winter and 340 people in summer and off-season; the articulated bus capacity was assumed to be 95 people during all seasons. Tables 1-3, 1-4, and 1-5 show the ridership projections.

Table 1-3: Existing and Projected Person Trips over Castle Creek Bridge (transit and auto)

Season	Days in Season	Mode	Average Daily Person Trips				Growth Rate % 1998–2030
			1998	2003	2015	2030	
Summer	92	Transit	5,300	6,900	13,400	30,000	5.57
		Auto	45,100	45,100	45,100	45,100	0.00
		Transit + Auto	50,400	52,000	58,500	75,100	1.25
		Transit Mode Share, %	10.5	13.3	22.9	39.9	–
Winter	150	Transit	12,600	14,100	18,500	25,900	2.28
		Auto	36,800	36,800	36,800	36,800	0.00
		Transit + Auto	49,400	50,900	55,300	62,700	0.75
		Transit Mode Share, %	25.5	27.7	33.5	41.3	–
Off	123	Transit	3,900	4,700	7,400	13,200	3.88
		Auto	31,900	31,900	31,900	31,900	0.00
		Transit + Auto	35,800	36,600	39,300	45,100	0.72
		Transit Mode Share, %	10.9	12.8	18.8	29.3	–

Sources: Transit trips for 1998 from December 30, 1998, memo from Todd Chanes and Roger Millar to Randy Ready, Table 1. Transit trips for 2015 are estimated from the 95th percentile value shown in the Entrance to Aspen FEIS. Transit trips for 2003 and 2030 are extrapolations of the 2000–2015 growth projected in the FEIS. Auto trips are based on traffic count data for 1998 and assume an average vehicle occupancy of 1.77 persons in summer, 1.71 in winter, and 1.70 in the off season for all years.
Traffic counts do not include heavy vehicles (i.e., trucks and buses). These were assumed to total 2,000 in summer, 1,500 in winter, and 1,500 in the off season.

Table 1-4: Projected Annual Ridership — ETA Corridor

Year	Annual Ridership (million)
2003	3.3
2015	4.9
2030	8.3

Source: Entrance to Aspen FEIS.
Note: The values for 2003 and 2030 are extrapolations of the 2000–2015 trend

Table 1-5: Projected Peak-Hour Ridership

Season	Year	Castle Creek Bridge	
		Northbound	Southbound
Winter	2003	1,165	1,322
	2015	1,256	1,528
	2030	2,049	2,438
Summer	2003	488	539
	2015	1,243	1,360
	2030	2,848	3,206
Off	2003	360	421
	2015	683	770
	2030	1,244	1,411

Source: Gordon Shaw, LSC. Memo to Todd Chase, Otak. April 13, 1999. Table 2. The winter 2003 values were estimated by Otak and the City of Aspen assuming 1.2 percent annual growth from 2000 ridership.

1.4.2.2 Results

The analysis concluded that operating and maintaining light rail would have an annual cost of approximately $2.06 million in 2003 and that this cost would rise to approximately $2.07 million by 2015 and to $2.33 million by 2030. The number of travelers using the light rail system was projected to increase faster over this period than the increase in cost. This means that the cost per rider was projected to decline. In 2003, the cost per rider for the light rail system was projected to be approximately $0.62. This falls to about $0.42 by 2015 and to about $0.28 by 2030.

1.4.3 West Glenwood Springs to Aspen Corridor Investment Study (2003)

This 2003 Corridor Investment Study (CIS) was commissioned by RFTA as a long-range planning tool to analyze a No Action/Committed Projects Alternative, a BRT Alternative, and a Rail Alternative for travel between West Glenwood Springs and Aspen. Social, economic, and environmental impacts of the alternatives, along with mitigation measures and financing options, were all detailed in the study. The CIS commenced shortly after the Entrance to Aspen ROD (1998) and assumes the findings, such as the highway alignment, from the ROD. The study focused on evaluating the alternatives; a preferred alternative was not selected as part of this study. However, the RFTA Board adopted resolution 2002-05, in which the Board resolved that BRT would be the near term goal and rail would be the long term goal. Although the CIS does not affect the Entrance to Aspen ROD, it expands on the ROD by including analysis throughout the entire valley and evaluating travel demand between 2015 and 2025.

1.4.4 Entrance to Aspen Activity from 2006 to 2009 as summarized in the Aspen Area Community Plan (2012)

The Aspen Area Community Plan of 2012 included a brief discussion of the activity involving the Entrance to Aspen from 2006 to 2009. Per the report, the City of Aspen initiated a comprehensive public process on the Entrance to Aspen in 2006 because, although the number of vehicles going in and out of town remained at 1993 levels (largely because of the continual improvement and expansion of mass transit service), the down-valley population grew over the years and congestion expanded farther up and down the SH 82 corridor. The congestion also lasted longer during the day. An outcome of this public process was a May 2007 City-wide vote that approved the addition of two dedicated bus lanes from the airport to the roundabout. This vote reflected public support for improving the reliability and efficiency of the mass transit system. The dedicated buslane project was completed in 2009. Valley-wide voters also approved funding to begin implementing the concept of BRT in November 2008. At the same time, free bus service began operating year-round from Aspen to Snowmass. In 2009, the City expanded paid parking into neighborhoods around the Commercial Core to encourage the use of mass transit.

1.4.5 Capital Cost Technical Report State Highway 82/Entrance to Aspen Environmental Reevaluation (2007)

While maintaining the calculated quantities from the 1998 ROD, a review of the assumptions and cost estimate was presented in 2007 to bring the unit costs and total price up to year 2005. The technical report also based the dollar amounts used for the light rail unit costs on Regional Transportation District (RTD) T-REX 2005 unit costs. The Design and Construction cost estimate for the roadway improvement of the preferred alternative increased from $24.8M in 1996 to $74.4M in 2005. Table 1-6 is taken from this Technical Report and compares the LRT cost elements in year 1996 and 2005 dollars.

1.4.6 State Highway 82 Bus Lanes Operation Study (2008)

The SH 82/Aspen Busway project was opened to traffic in 2008. Although the preferred alternative from the 1998 ROD for the Entrance to Aspen study included an LRT component, the busway project was also described in and allowed for in the ROD as a phased approach for the transit component. The design for the highway/busway segment from the SH 82 Owl Creek Road to Maroon Creek Roundabout started in February 2007 at the direction of the EOTC. The Operation Study collected travel data during the inbound peak during a summer weekday. The calculated ridership was 36% to 40% during this peak time compared to an estimated 7% rideshare in 1993.

Table 1-6: State Highway 82 Entrance to Aspen Conceptual Cost Estimate

Item Description	Approx. Qty.	Unit	Unit Cost, $		Total Cost, $	
			1996	2005	1996	2005
Light Rail - Tie, Ballast, and Rail	28,850	TF	250	300	7,213,000	8,655,000
Utility Relocation	1	LS	0	1,000,000	0	1,000,000
Light Rail - Embedded Track	7,850	TF	550	570	4,318,000	4,474,500
Utility Relocation	1	LS	0	1,000,000	0	1,000,000
Special Track Work (switches)	9	EA	120,000	160,000	1,080,000	1,440,000
Maintenance Facility	25,000	SF	146	500	3,650,000	12,500,000
Electrification	6.95	TM	834,244	1,500,000	5,798,000	10,425,000
LRT Control Systems	6.95	TM	292,266	1,200,000	2,031,000	8,340,000
LRT Wheel Truing Lathe	1	EA	980,714	1,300,000	981,000	1,300,000
Retrofit Maroon Creek for LRT	1	LS	1,500,000	2,000,000	1,500,000	2,000,000
Traffic Control - New Signals w/ LRT Pre-empts	5	EA	125,000	290,000	625,000	1,450,000
Traffic Control - LRT Crossing Gates	8	EA	200,000	250,000	1,600,000	2,000,000
Traffic Control - Install LRT Pre-empt for ex. Signals	3	EA	25,000	100,000	75,000	300,000
Miscellaneous LRT Items	1	EA	148,000	192,400	148,000	192,400
Ticket Vending Machines	1	LS	501,000	1,200,000	501,000	1,200,000
Overall LRT Subtotal					29,520,000	56,277,000
Traffic Control (for Construction), 4%					1,181,000	2,251,000
Mobilization, 5%					1,476,000	2,814,000
Subtotal					32,177,000	61,342,000
Allowance for Unlisted Items, 5%					1,608,850	N/A
Level of Design Contingencies, 20%					N/A	12,268,000
Construction Subtotal					33,785,850	73,610,000
Design Engineering, 10%					3,379,000	7,361,000
Construction Management, 10%					3,379,000	7,361,000
LRT Design & Construction Total					40,544,000	88,332,000

EA = each TF = track foot SF = square feet
LS = lump sum TM = track mile

1.5 Existing Conditions

As stated earlier, the intent of this UVMS is to identify the circumstances in which a fixed guideway BRT or LRT service would be appropriate for the following purposes:

- Increase transit capacity to meet ridership demand in the corridor;
- Replace some of the bus routes traveling in/out of Aspen, and thereby
- Reduce the number of existing buses traveling in/out of Aspen where traffic congestion is a concern and the perception is that “too many loud buses” are exacerbating traffic operations.

Consequently, this analysis focused on which current bus services operating between those two corridor end points would be most logical to replace with fixed guideway BRT or LRT service to reduce the number of buses in the City of Aspen.

To define the problem to be solved and determine the magnitude of that problem, the first task was to identify existing conditions in terms of existing transit services in the Brush Creek to Rubey Park corridor. This helped to quantify the problem in specific terms that can be analyzed and improved with appropriate solutions. The solutions were then expanded and refined to address future conditions and growth. However, it was important to start with the big picture first and drill down through the details to understand the crux of the issue and its actual significance. The perceived problem is that there are “too many buses” in the City of Aspen and that they are contributing to poor traffic operations, congestion, and travel delay, as well as noise and air quality issues. This analysis examined that perception in detail as described in the following sections.

1.5.1 Current Bus Operations

RFTA currently operates a large number and wide variety of bus and BRT routes throughout its large, system-wide service area. Specifically, RFTA operates a fleet of 93 buses on 21 daily bus routes over varying distances, as shown in Table 1-7.

With the existing fleet of 93 buses and its 21 routes, RFTA provides 1,436 system-wide bus trips during the average winter weekday as shown by route in Table 1-8; however, not all are operating in the Brush Creek to Rubey Park corridor or in the City of Aspen.

Table 1-7: RFTA System-Wide Fixed Bus Routes and Lengths

Route		Route Length/Distance (One-way Miles)		
Code	Name	Down Valley	Up Valley	Total
BG	Burlingame Shuttle	4.10	4.80	8.90
BRT	Bus Rapid Transit	44.04	44.91	88.95
BM	Buttermilk Ski	3.07	3.07	6.14
CCR	Carbondale Circulator	1.09	1.26	2.36
CM	Castle Maroon Shuttle	4.04	4.26	8.29
CL	Cemetery Lane Shuttle	2.24	2.60	4.84
DR	Dial-a-Ride Mountain Valley	NA	NA	NA
XT	Cross Town Shuttle	2.94	4.15	7.09
GSS	Galena Street Shuttle	1.64	1.19	2.83
HD	Highlands Direct	3.08	3.04	6.12
HYSKI	Highlands Ski	3.08	3.04	6.12
HOG	Hogback – Glenwood/Rifle	29.92	29.92	59.83
HC	Hunter Creek Shuttle	1.22	1.48	2.70
RGW	Ride Glenwood	7.23	5.50	12.73
SMS	SM Ski	11.92	11.82	23.74
SMA	Snowmass/Aspen	11.91	11.82	23.73
SMV	Snowmass/Down valley	44.19	45.30	89.49
SMI	Snowmass/Intercept	5.41	5.68	11.09
VALL_EX	Valley Express	44.06	31.56	75.62
VAL	Valley/82 corridor	47.29	48.47	95.75
WC	Woody Creek	6.12	7.14	13.26
	Grand Total	278.57	271.00	549.57

Source: RFTA Generalized Transit Feed Specification (GTFS) Database.

Table 1-8: RFTA System-Wide Fixed Route Bus Trips (average weekday – winter season)

Route		System-wide Bus Trips		
Code	Name	Down Valley	Up Valley	Total
BG	Burlingame Shuttle	35	35	70
BM	Buttermilk Ski	36	35	71
BRT	Bus Rapid Transit	77	72	149
CCR	Carbondale Circulator	66	66	132
CM	Castle Maroon Shuttle	60	60	120
CL	Cemetery Lane Shuttle	39	39	78
XT	Cross Town Shuttle	23	26	49
DR	DIAL A RIDE – Mountain Valley	39	39	78
GSS	Galena Street Shuttle	60	46	106
HD	Highlands Direct	25	25	50
HYSKI	Highlands Ski	27	27	54
HOG	Hogback – Glenwood/Rifle	8	10	18
HC	Hunter Creek Shuttle	59	59	118
RGW	Ride Glenwood	25	25	50
SMS	Snowmass Ski	36	37	73
SMA	Snowmass/Aspen	34	36	70
SMV	Snowmass/Down valley	7	8	15
SMI	Snowmass/Intercept	7	8	15
VALL_EX	Valley Express	8	4	12
VAL	Valley/82 corridor	42	41	83
WC	Woody Creek	13	12	25
	Grand Total	726	710	1,436

Source: RFTA GTFS Database.

The first step in identifying the most appropriate bus trips to intercept was to determine the service area type for each route and the likely opportunity to intercept those buses and transfer the passengers to the fixed guideway service. The service area types listed in Table 1-9 classify the RFTA routes into service areas distinguished by the following criteria: (1) whether Rubey Park is served, (2) whether the route crosses Castle Creek Bridge, (3) whether the Brush Creek Intercept Lot is served, and (4) the reasonableness of intercepting the bus route and transferring passengers to a fixed guideway service between Brush Creek and Rubey Park.

Table 1-9: Service Area Types

Service Area Type		Description	Serves Rubey Park?	Potential Intercept/Transfer Opportunity
1	Valley	Routes between Aspen and locations down-valley of Brush Creek Intercept Lot	Yes	Highest
2	Snowmass–Aspen	Routes between Aspen and Snowmass	Yes	Medium
3a	Local Crosses Bridge	Aspen routes that cross the Castle Creek bridge and offer a guideway transfer opportunity down valley of the bridge	Yes	Low
3b	Local Crosses Bridge – No Transfer Down Valley	Aspen routes that cross the Castle Creek bridge but do not have a fixed guideway transfer opportunity down valley of the bridge	Yes	Lowest (near-zero probability)
4a	Local Internal Rubey Park	Aspen shuttle routes that do not cross Castle Creek bridge but serve Rubey Park	Yes	N/A
4b	Local Internal Ineligible	Routes ineligible for intercept by fixed guideway service	Yes	N/A
4c	Local Internal Non-Rubey	Aspen shuttle routes that do not cross Castle Creek bridge and do not serve Rubey Park	No	N/A
5	Brush Creek Intercept Lot Non-Aspen	Routes serving Snowmass Village and Brush Creek Intercept Lot, but not Aspen	No	N/A
6	Down Valley Only	Routes that operate entirely down valley of Brush Creek Intercept Lot, and do not serve the Intercept Lot	No	N/A
Source: Parsons analysis.				

The bus routes by service area type are listed in Table 1-10.

Table 1-10: RFTA Bus Routes by Service Area Type

Service Area Type	RFTA Route		Serves Rubey Park	Potential Intercept and Transfer Opportunity
	Code	Name		
1	BRT	Bus Rapid Transit	Yes	Highest
1	VALL_EX	Valley Express	Yes	Highest
1	VAL	Valley/SH 82 corridor	Yes	Highest
2	SMS	Snowmass Ski	Yes	Medium
2	SMA	Snowmass/Aspen	Yes	Medium
3a	BM	Buttermilk Ski	Yes	Medium
3a	BG	Burlingame–Aspen Shuttle	Yes	Low
3a	CM	Castle/Maroon–Aspen Shuttle	Yes	Low
3a	HD	Highlands Direct	Yes	Low
3a	HYSKI	Highlands Ski	Yes	Low
3b	CL	Cemetery Lane Shuttle	Yes	Lowest (Near-Zero Probability)
4a	XT	Cross Town Shuttle	Yes	NA
4a	HC	Hunter Creek Shuttle	Yes	NA
4b	DR	Aspen Dial-A-Ride	Yes	NA
4c	GSS	Galena Street Shuttle	No	NA
5	SMV	Snowmass/Down Valley	No	NA
5	SMI	Snowmass/Intercept	No	NA
5	WC	Woody Creek	No	NA
6	CCR	Carbondale Circulator	No	NA
6	HOG	Hogback	No	NA
6	RGW	Ride Glenwood	No	NA
Source: Parsons analysis.				

The 14 routes that serve Rubey Park provide 1,056 bus trips per day, or 528 bus trips to Rubey Park and 528 bus trips from Rubey Park each day. However, not all of those trips can logically be intercepted and have passengers transferred to a fixed guideway service; many are local Aspen shuttles and many others do not cross the Castle Creek bridge or operate in the Brush Creek to Rubey Park corridor.

Table 1-11 lists the number of winter season average daily bus trips by route that cross Castle Creek going into/out of Aspen and serve Rubey Park directly. On an average winter weekday, there are 371 bus trips up valley into Aspen and 381 bus trips down valley out of Aspen, for a total of 752 bus trips per day crossing the Castle Creek bridge into/out of Aspen. However, not all of these routes are appropriate for possible intercept/replacement with a fixed guideway service.

Table 1-11: RFTA Fixed Bus Routes that serve Rubey Park and cross Castle Creek Bridge

Route			Bus Trips		
Service Area	Code	Name	Down Valley	Up Valley	Total
1	BRT	Bus Rapid Transit	77	72	149
1	VALL_EX	Valley Express	8	4	12
1	VAL	Valley/82 corridor	42	41	83
2	SMS	Snowmass Ski	37	36	73
2	SMA	Snowmass/Aspen	35	35	70
3a	BG	Burlingame-Aspen Shuttle	35	35	70
3a	BM	Buttermilk Ski	35	36	71
3a	CM	Castle/Maroon-Aspen Shuttle	60	60	120
3a	HD	Highlands Direct	25	25	50
3a	HYSKI	Highlands Ski	27	27	54
		Grand Total	381	371	752
Source: RFTA GTFS Database.					

For example, the Burlingame, Castle–Maroon, Highlands Direct, and Highlands Ski routes are very short (3 to 4 miles each way) and would not serve their passengers well by forcing transfers to a fixed guideway service midway between Rubey Park and the intended destinations. Consequently, those four bus routes were dropped from further consideration for potential intercept with fixed guideway service. Although the Buttermilk service is in the same service area (type 3a) as the other four short routes mentioned, it could easily be replaced with the fixed guideway service, terminating at the Buttermilk station, which is only about 200 yards from the Buttermilk Ski Area base, an easy walking distance. The Snowmass bus routes could be intercepted and replaced by fixed guideway service between Rubey Park and Brush Creek, but would still be required for the 6-mile connection between Brush Creek and Snowmass Village. The resulting cost savings of the truncated bus service would support the new fixed guideway service.

1.5.2 Bus Trips to be Intercepted with Fixed Guideway

The next step in the analysis was to determine how many bus trips per day could be intercepted and replaced with fixed guideway service. Based on the analysis above, the remaining six routes listed in Table 1-12, along with the number of bus trips on those routes, are the most appropriate to be intercepted and passengers transferred to fixed guideway service. As shown, on an average winter weekday, there are 224 bus trips up valley to Rubey Park from Brush Creek and 234 bus trips down valley from Rubey Park to Brush Creek, for a total of 458 bus trips per day that could be intercepted.

Table 1-12: Bus Trips per Day to be Intercepted

Route		Bus Trips		
Code	Name	Down Valley	Up Valley	Total
BRT	Bus Rapid Transit	77	72	149
VALL_EX	Valley Express	8	4	12
VAL	Valley/SH 82 corridor	42	41	83
SMS	Snowmass Ski	37	36	73
SMA	Snowmass/Aspen	35	35	70
BM	Buttermilk Ski	35	36	71
	Grand Total	234	224	458

Figure 1-4 illustrates these six bus routes and their respective number of weekday bus trips between Brush Creek and Rubey Park that could be intercepted with fixed guideway service (total 458 trips per weekday). Figure 1-4 also indicates that an additional 598 bus trips per weekday would continue to serve Rubey Park because they include local shuttles and short bus routes that are not appropriate for interception with fixed guideway service.

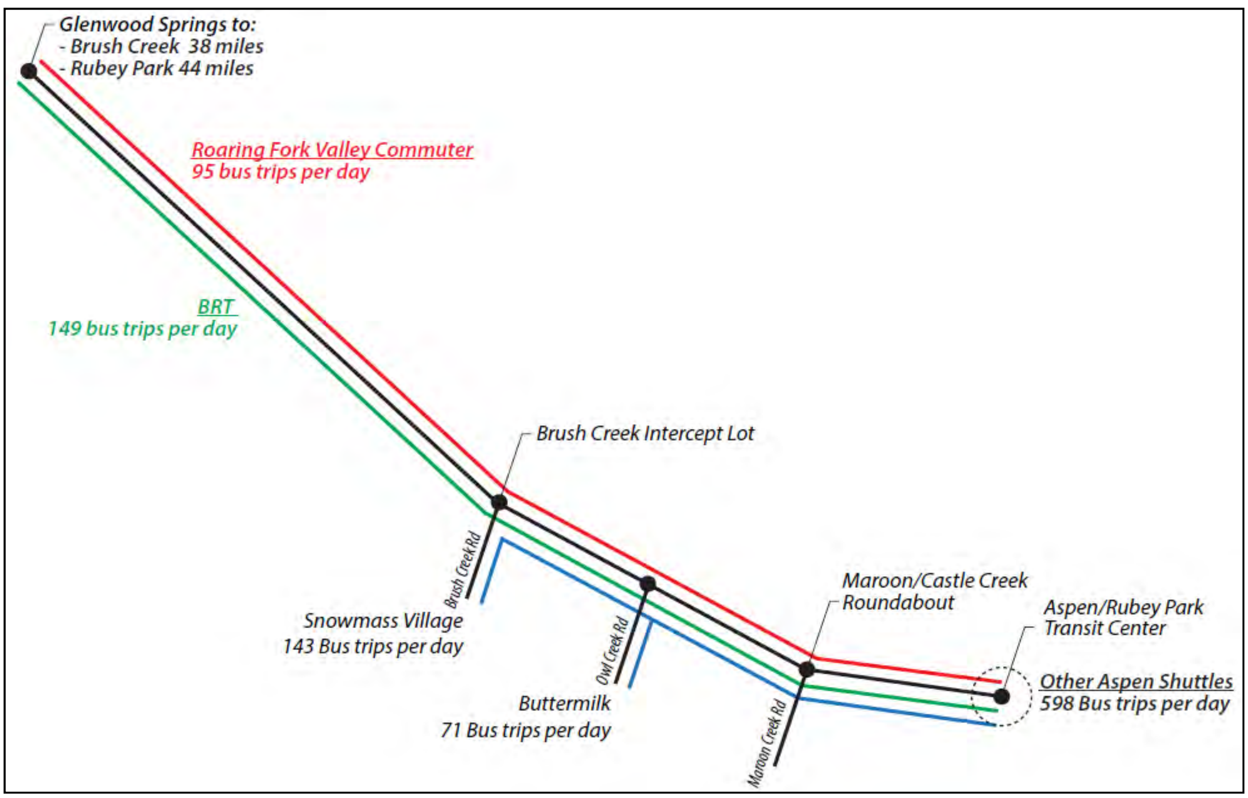

Figure 1-4: RFTA Bus Routes to be Intercepted

Figure 1-5 shows a summary breakdown of the total 1,436 RFTA system-wide bus trips per day, the 1,056 bus trips serving Rubey Park, the 752 bus trips serving Rubey Park and crossing the Castle Creek bridge, and the 458 bus trips that would be appropriate for replacement with fixed guideway transit in the Brush Creek to Rubey Park corridor.

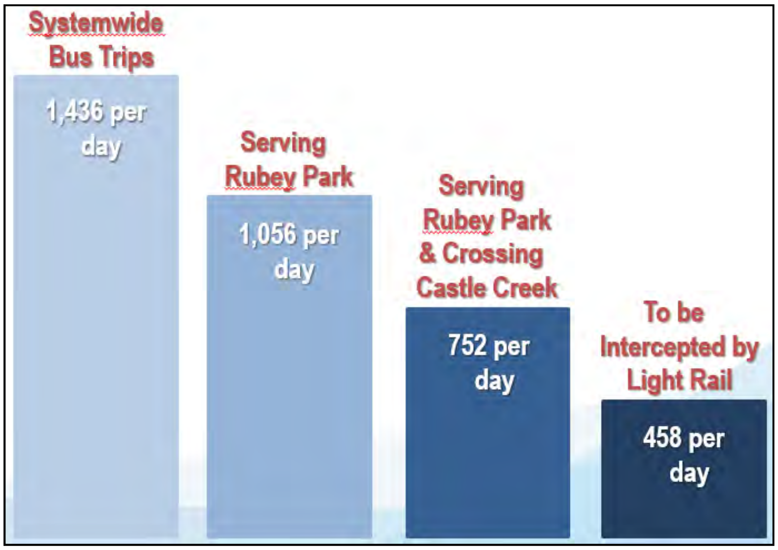

Figure 1-5: Breakdown of RFTA Bus Trips to be Intercepted

The next step in the analysis was to determine the number of bus trips per hour between Brush Creek and Rubey Park that could be intercepted by the fixed guideway service. Based on the number of weekday bus trips, Figure 1-6 illustrates the actual number of buses operating on the six routes by hour of the day based on their respective headways, which vary from 10 minutes to 30 minutes. For example, during the morning peak hours of 6 a.m.to 8 a.m. and during the afternoon peak hours of 3 p.m. to 6 p.m., the BRT service operates at 10-minute headways or six buses per hour per direction. Over the course of each of those hours, six BRT vehicles are travelling up valley and arriving at Rubey Park, and six are leaving Rubey Park and travelling down valley, for a total of 12 BRT vehicles into/out of Rubey Park during each peak hour. The same logic applies to each of the other routes and bus trips, with their respective headways by time of day.

As shown in Figure 1-6, the greatest number of inbound and outbound buses on all routes serving Rubey Park occur between 8 a.m. and 9 a.m. (32 buses; 16 in and 16 out) and between 4 p.m. and 5 p.m. (34 buses; 17 in and 17 out). During the midday period between 9 a.m. and 3 p.m., there are 28 (14 inbound and 14 outbound) buses at Rubey Park every hour. These buses could be replaced by fixed guideway service, either at Brush Creek or at an intermediate station in the Brush Creek to Rubey Park corridor.

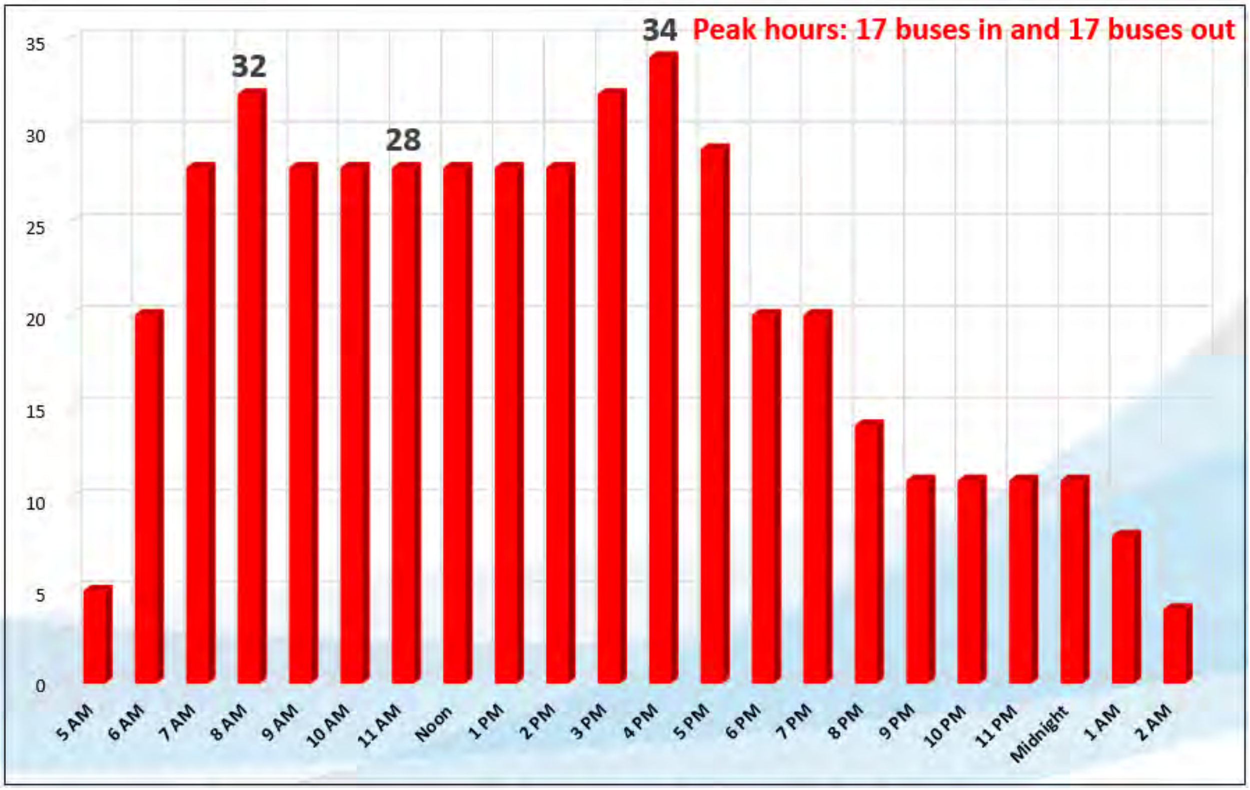

Figure 1-6: Bus Trips per Hour to be Intercepted

The next step in the analysis was to determine how many fixed guideway vehicle trips might be needed to replace the various bus trips under a minimum service plan scenario based on vehicle capacity, for comparison of the LRT and BRT options. A typical light rail vehicle has 60 to 80 seats per car; thus a typical two-car trainset (two light rail vehicles coupled together) would carry 120 to 160 seated passengers. A typical bus or BRT vehicle would carry 45 to 60 seated passengers. Consequently, a 2-car light rail train would provide the same capacity as 3 to 4 BRT vehicles.

Over the course of an average winter season weekday, 3,400 passengers inbound (up valley) and 3,400 passengers outbound (down valley) use the six bus routes that could be intercepted with LRT or BRT service. Figure 1-7 shows the typical hourly passenger loading on the existing bus routes that could be intercepted by light rail service in the Brush Creek to Rubey Park corridor. As shown, the morning peak inbound (up valley) passenger loads total 319 passengers and the afternoon peak outbound (down valley) passenger loads total 360 passengers. With a two-car train capacity of 120 to 160 seated passengers, three LRT trains per hour per direction would provide sufficient capacity (360 to 480 seats); this equates to 20-minute headway service. However, because passengers are accustomed to the convenience of 10- to 15-minute service, the minimum light rail service assumption could also be set at 15-minute headway service. This would provide even more seating capacity (480 to 640 seats per hour per direction) to accommodate ridership growth in the future.

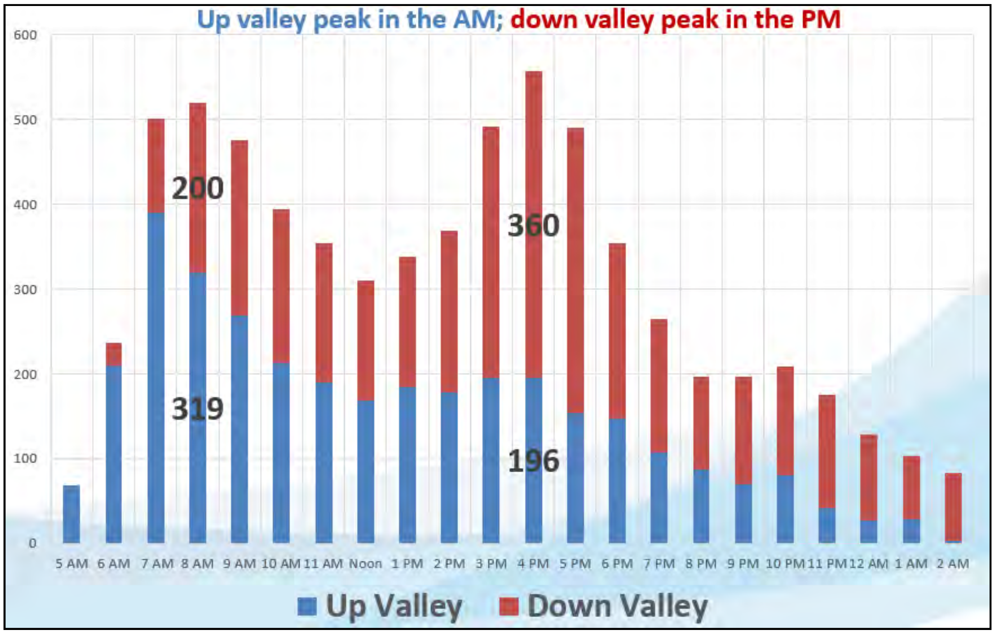

Figure 1-7: Bus Passenger Loading by Hour

It should be noted that, although buses and light rail have room for standees (15 to 20 per bus and 40 to 50 per light rail vehicle) in addition to seated passengers, RFTA has an established policy of providing seats for all passengers, particularly on the long-distance routes, to make the ride more attractive and comfortable. In addition, with implementation of fixed guideway service and the forced transfer to/from the six intercepted bus routes, providing a seat for each passenger becomes even more important. Consequently, this assumption was included in the estimates of capacity-based service requirements.

With the assumption of minimum 15-minute headway LRT service (4 trains per hour per direction for a total of 8 trains per hour) during the busiest 12 hours of each day, the total number of train trips required to replace the current bus trips was calculated, as summarized in Figure 1-8.

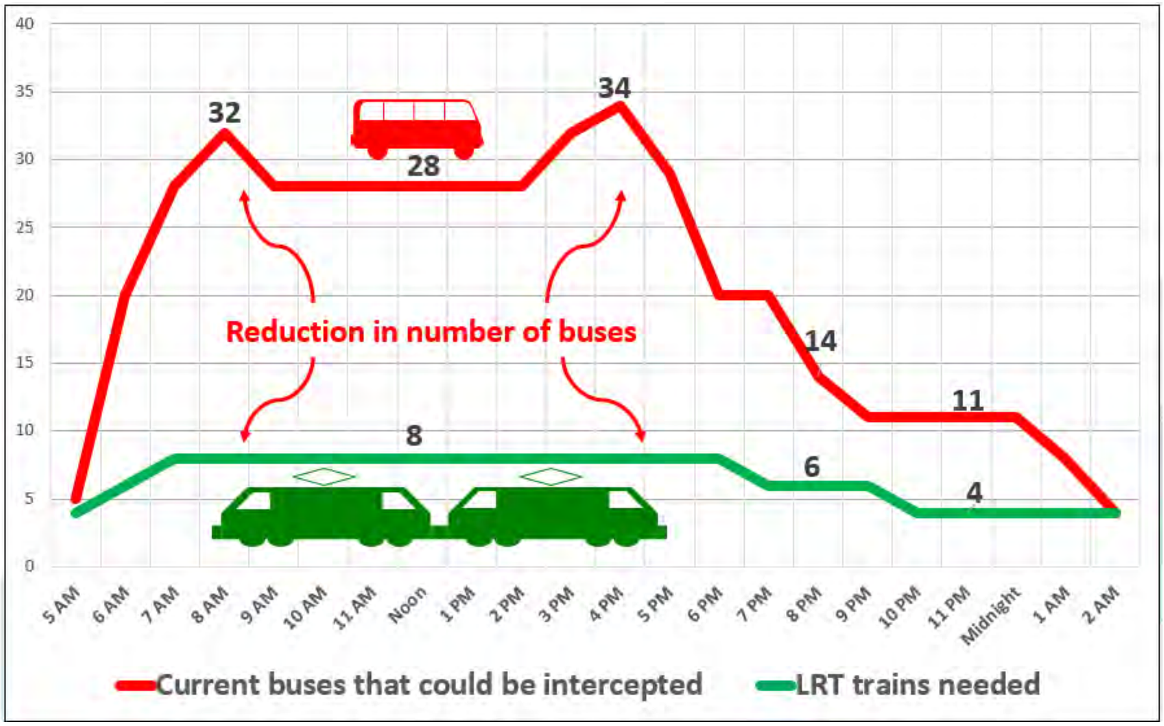

Figure 1-8: Buses vs Trains at Rubey Park

As shown, 8 trains per hour (4 trains inbound and 4 trains outbound) during the busiest hours of the day would replace 28 to 34 bus trips per hour. Under the minimum service plan, the current 458 bus trips per day could be replaced by 144 train trips — a substantial savings. With the assumption of minimum 10-minute headway BRT service (6 buses per hour per direction for a total of 12 buses per hour) during the busiest 12 hours of each day, the total number of bus trips was calculated at 224 bus trips per day, also a substantial savings over the existing condition. However, the minimum service plan may not meet service level expectations or existing service contract requirements; this issue must be resolved before significant service changes are made. In addition, the specific vehicle technology appropriate for the Brush Creek to Rubey Park corridor must be based on analysis of the ridership demand, operating plans, capital and O&M cost comparisons, cost effectiveness, and available funding, as described in the following sections.

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2 The Alternatives

This section defines the high-capacity transit alternatives (referred to as “fixed guideway” alternatives that are being analyzed to determine which would be most effective in reducing the number of buses in the UVMS corridor between Brush Creek and Rubey Park. These alternative definitions provide the basis for the service/operating plans, ridership forecasts, and capital and O&M cost estimates in other sections of this report. The alternatives include one basic LRT alternative and one BRT alternative, with several alignment and configuration options for each mode. A third, lower cost alternative is also considered and described below. Each mode also includes several technology options such as diesel-electric or onboard battery-electric propulsion with charging stations for LRT, and compressed natural gas (CNG) or onboard battery-electric propulsion with charging stations for BRT. The alternatives and technology options being considered are based on initial feedback from the Technical Advisory Committee (TAC) and EOTC. Both modal alternatives would generally follow the ROD modified-direct alignment improvements. The modified-direct alignment approved in the 1998 FHWA SH 82 Entrance to Aspen ROD includes realignment of SH 82 with a four-lane cross section plus dedicated transitway to accommodate either LRT or BRT from just south of the Maroon Creek roundabout, across the Marolt easement within a cut-and-cover tunnel, across a new Castle Creek bridge, and connecting with Main Street at 7th Street.

The new idea of the Main/Galena end-of-line station option could serve as the line haul/commuter end-of-line station for either LRT or BRT. Rubey Park would continue its role as the major hub for the local bus services. The new idea of the Galena Street pedestrian/transit-way mall concept could provide an attractive, convenient link between the two stations. These concepts are described later in this section.

2.1 Light Rail Transit Alternative

The LRT alternative assumes single-track operation with passing tracks at all stations and at a location just north of Aspen Airport in the SH 82 right-of-way (ROW) to ensure timely operation with minimal delay. Onboard battery (plus OCS at stations for recharging) and diesel-electric light rail vehicles are the two technology/propulsion options being considered. For aesthetic reasons, the intent is to avoid the need for overhead contact system (OCS) wires as much as possible in the corridor.

The primary advantage of LRT (due to higher capacity vehicles that can be coupled together) is that it reduces the number of buses in Aspen, which is one of the EOTC’s original goals. The number of intercepted buses (458 bus trips per day) would be replaced with 144 two-car train trips per day. The disadvantages of LRT are the higher capital and O&M costs, and the transfer penalty associated with the bus intercepts that increase travel time and may reduce ridership.

2.1.1 LRT Conceptual Alignments

Starting at the Brush Creek Intercept Lot and heading up-valley, this chapter provides general descriptions of the conceptual LRT alignments depicted in Appendix A. Assumed geometric design guidelines are taken from the Transit Cooperative Research Program (TCRP) Report 155: *Track Design Handbook for Light Rail Transit, Second Edition*.

2.1.1.1 Brush Creek to Aspen Airport

Appendix C contains station renderings of ideas for the Brush Creek Intercept Lot development. Appendix A, Sheet 1, presents the following options for the crossing of SH 82 at Brush Creek:

- Option A: From an elevated platform just south of the existing park and ride, the LRT alignment crosses over both Brush Creek Road and SH 82 on structure. As the alignment begins to parallel SH 84, the bridge ends and the tracks are placed on fill as they approach Shale Bluffs. A retaining wall is required along the southbound shoulder of SH 82. A 16'-6" vertical clearance is maintained below the bridge, placing the top of rail (TOR) approximately 20 feet above the existing roadway surface.
- Option A-1: From a depressed platform just south of the existing park-and-ride, the LRT alignment crosses under Brush Creek Road and SH 82 in a tunnel. A retaining wall is required along the southbound shoulder of SH 82 as the tracks climb to meet existing grade. The TOR is approximately 30 feet below the roadway surface.
- Option B: This option was eliminated from further analysis due to traffic impacts associated with the location of the at-grade crossing.
- Option C: Starting at grade on the property on the southeast quadrant, the LRT alignment climbs to cross over SH 82 on structure. The beginning of the bridge is located to keep the sloped abutment outside the SH 82 corridor. A retaining wall is required on the east side of the alignment to avoid impacts to the existing gas compressor station. A 16'-6" vertical clearance is maintained below the bridge, placing the TOR approximately 20 feet above the existing roadway surface.
- Option C-1: The Brush Creek Station platform is shifted further south to allow for future development to the north. Heading south, the alignment follows that of Option C as it approaches and crosses over SH 82.
- Option D: This option was eliminated from further analysis due to traffic impacts associated with the location of the at-grade crossing.
- Option D-1 (Base): The Brush Creek Station platform is shifted to the east end of the property to avoid interfering with traffic operations at the park and ride facility. The LRT alignment crosses SH 82 just south of Brush Creek Road, which presents the least impact to the operation of the intersection. Approaching Shale Bluffs, the tracks are at grade and parallel to SH 82.

Appendix A, Sheets 1 through 5, show the LRT alignment west of SH 82 and generally following the existing roadway corridor within the existing ROW. Two options are considered for the profile at Shale Bluffs: at-grade or on viaduct. The top of rail (TOR) profile of the viaduct option is approximately

15 feet above the existing roadway surface with no overhang of the proposed SH 82 southbound shoulder. Two existing culverts are crossed in this segment.

2.1.1.2 Aspen Airport to Maroon Creek

Appendix A, Sheets 5 and 6, present the following two options at the Aspen Airport:

- Option A (Base): The alignment continues west of and parallel to SH 82 into the Airport Station. An automated people mover connects the Airport Station to the future airport terminal.
- Option B: Just north of Baltic Ave, the LRT leaves the existing roadway alignment and enters an S-curve before continuing south to the Airport Station platform adjacent to the future airport terminal. The LRT leaves the terminal and heads southeast to join back up with the existing SH 82 alignment north of the Owl Creek pedestrian underpass. An automated people mover connects the airport terminal to the existing pedestrian underpass at the Aspen Airport Business Center. Since a portion of this alignment is on Airport property, FAA approval is needed to construct this Option.

Appendix A, Sheets 6 through 10, show the LRT alignment west of SH 82 and generally following the existing roadway corridor within the existing ROW. The at-grade Buttermilk Station is located just south of Owl Creek Road. A future pedestrian underpass project is planned at this location. The LRT alignment heads southeast, over Maroon Creek on the existing bridge and into the Truscott/Aspen Golf Course Station, north of Truscott Place.

2.1.1.3 Maroon Creek to 7th Street and Main Street

Appendix A, Sheet 11, Presents the following two options at the Maroon Creek roundabout:

- Option A: Continuing southeast from the Truscott/Aspen Golf Course Station, the LRT parallels SH 82 and crosses the existing pedestrian underpass before curving south and into the at-grade Maroon Creek Station west of the roundabout. From the station, the alignment crosses Maroon Creek and Castle Creek Roads at grade south of the roundabout. Heading east, the tracks join back with the proposed roadway.
- Option B (Base): The LRT leaves the Truscott/Aspen Golf Course Station and runs adjacent to SH 82. A trench section begins 400’ northwest of the depressed Maroon Creek Station. The station connects to the existing pedestrian underpass. The alignment leaves the station, immediately enters a 250’ cut and cover under the Maroon Creek roundabout, and then meets up with the proposed roadway. The TOR in the tunnel is located approximately 20’ below the existing roadway surface.

Both roadway and LRT cross the Marolt-Thomas property easement on the Modified Direct (Preferred Alternative) alignment. The LRT and roadway enter a 400’ cut and cover tunnel and cross Castle Creek on a 500’ bridge before arriving at the intersection of 7th Street and Main Street.

2.1.1.4 7th Street and Main Street to Rubey Park

Appendix A, Sheets 12 through 13 show the LRT running along the south side of Main Street, from 7th/Main Station Street to Garmisch Street. Section B shows a conceptual two-way roadway section for Main Street within the existing 100' of existing right-of-way.

Appendix A, Sheet 14 presents the following two options from Garmisch Street to Galena Street:

- Option A (Base): The LRT alignment makes a 90-degree turn from the south side of Main Street to the west side of Monarch Street. Section C shows a conceptual one-way roadway section for Monarch Street within the existing 75' of right -of-way. The tracks continue south on the west side of Monarch Street and then make another 90-degree turn onto the north side of Durant Ave. Once on Durant Ave, the alignment heads east into the Rubey Park end-of-line station.
- Option B: The tracks remain on Main Street and continue east to the Main/Galena Station. A connection to the Rubey Park Transit Center is maintained via Galena Street.

2.2 Bus Rapid Transit Alternative

The automated BRT guideway and BRT vehicles includes the following design features:

- The existing (and new) dedicated bus lanes and areas of mixed traffic are mapped with centimeter-level accuracy.
- BRT vehicles have dual-mode operational ability.
- BRT vehicles have global positioning system (GPS) satellite technology and an on-board map database of the bus route to continuously identify the location of the bus on the roadway.
- In automated portions of the guideway, the vehicle is self-driving.
- For mixed traffic, the vehicle has driver assist. A head-up display (HUD) mounted between the driver's face and the windshield shows the location of lane boundaries, which helps drivers remain safely on the roadway even when roads are snow covered or visibility is low.
- Information about other vehicles or objects on the roadway, detected by laser sensors mounted on the front and sides of the bus, is also displayed on the HUD to help drivers avoid potential collisions in mixed traffic.
- If desired, BRT vehicles can include other automation such as automatic docking at stations

The BRT alternative has lower capital and O&M costs than LRT and would reduce travel time via the automated guideway, but it would not reduce the number of buses in the UVMS corridor or at Rubey Park due to their limited capacity, assuming no changes in the current service/operating plan. With changes to the current service/operating plan as explained in Section 4, the number buses could be reduced.

2.2.1 BRT Conceptual Alignments

The following list summarizes the alignment for the BRT depicted in Appendix B.

- Brush Creek end-of-line station (station renderings are included in Appendix C)
- BRT crosses SH 82 at-grade at Brush Creek Road (transit signal preference)
- BRT follows SH 82 up valley (in SH 82 peak hour high-occupancy vehicle [HOV] lanes to Aspen Airport Road signal) (option: convert HOV lane to dedicated bus lane, add automated guideway)
- BRT follows up-valley from Airport signal in existing dedicated bus lane to Maroon Creek roundabout (option: convert bus lane to automated guideway)
- BRT station at-grade near Aspen Airport adjacent to SH 82 with APM to the terminal
- BRT station at-grade at Buttermilk/Owl Creek Road. BRT in existing dedicated bus lane (option: convert bus lane to automated guideway)
- BRT station at-grade at Truscott Place. BRT in existing dedicated bus lane (option: convert bus lane to automated guideway)
- BRT station at-grade at Maroon Creek. BRT in existing dedicated bus lane (option-convert bus lane to automated guideway). BRT in mixed traffic through Roundabout
- ROD modified-direct alignment with cut-and-cover tunnel plus Castle Creek bridge. BRT in new dedicated bus lane (option-construct dedicated bus lane as automated guideway).
- BRT station at grade at 7th/Main streets.
- BRT in mixed traffic on Main Street (options: 1. Eliminate Main Street parking [both sides] and add new dedicated bus lanes. 2. Convert bus lane to automated guideway.).
- Rubey Park end-of-line station (option: Galena/Main Street station with Galena Street pedestrian/transit mall to connect the two stations (renderings of station ideas are shown in Appendix C)

2.3 Lower Cost Alternative

A third, lower cost alternative is the simple reduction in the LOS and number of buses that RFTA currently operates in the corridor during the midday hours. The current service headways and corresponding bus capacity exceed the passenger loads during the midday hours; i.e., there is excess capacity. With a structured reduction in LOS, the number of buses in the corridor and at Rubey Park could be reduced by 100 to 110 bus trips per day. The current high service level is a policy issue and is based on existing service agreements to ensure customer convenience and to make transit an attractive alternative to the automobile. Service level changes would require renegotiation of the service agreements. Another aspect of the lower cost alternative is the replacement of existing CNG and diesel buses with battery-electric powered buses that would improve noise and air quality in Aspen. This alternative is described in more detail in subsequent sections.

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3 Alternative Transit Technologies

The two transit technologies considered capable improving the LOS in the corridor are BRT or LRT in a fixed guideway. This section summarizes these transit technologies by documenting their operational characteristics and presenting a snapshot of emerging technologies for both bus and rail systems that could be considered for the corridor.

BRT and LRT systems have many common features: each mode offers a premium level of transit service to attract riders. Table 3-1 lists some key distinguishing characteristics of BRT and LRT systems. The key difference is the vehicle capacity, which is considerably higher for light rail vehicles, especially because they can be coupled.

Table 3-1: Operating Characteristics of BRT and LRT

BRT operates similar to LRT but has:	LRT operates similar to BRT but offers:
Lower capital construction costs for corridor development	Higher capital construction costs for corridor infrastructure
More flexibility for route changes and detours	Higher O&M cost but lower O&M cost per passenger
Lower passenger capacity and ridership	Higher passenger capacity and ridership
Longer travel times and ADA accessibility issues	Shorter travel times and easier ADA accessibility
40- to 60-foot vehicles carrying 45 to 60 passengers	66- to 90-foot vehicles carrying 60 to 80 passengers, but LRT vehicles can be coupled together as two-car trainsets with twice as much capacity (120 to 160 passengers)
ADA = Americans with Disabilities Act	

3.1 LRT

3.1.1 LRT Overview

The term *Light Rail Transit* (LRT) was coined in 1972 by the U.S. Urban Mass Transportation Administration (UMTA; the precursor to the current Federal Transit Administration [FTA]) to describe modern streetcar transformations that were taking place in Europe and the United States, and to differentiate it from the “heavy” rail systems such as New York’s subway system, BART in San Francisco, or the MARTA system in Atlanta. Light rail transit is further differentiated from electric and diesel multiple units (EMU and DMU), which are heavier passenger rail vehicles that meet certain Federal Railway Administration requirements for “crashworthiness,” allowing them to operate in freight railroad ROWs.

The American Public Transportation Association (APTA), in its 2015 Glossary of Transit Terminology, defines light rail transit as follows:

> *...a mode of transit service (also called streetcar, tramway, or trolley) operating passenger rail cars singly (or in short, usually two-car or three-car, trains) on fixed*

> *rails in right-of-way that is often separated from other traffic for part or much of the way. Light rail vehicles are typically driven electrically with power being drawn from an overhead electric line via a pantograph; driven by an operator on board the vehicle; and may have either high platform loading or low level boarding using steps.*

As shown in Figure 3-1, light rail vehicles can be coupled together to form two-car (or more) consists or trainsets if additional capacity is required. Only one operator is required for each LRT trainset, regardless of length, which reduces the operating cost per passenger in high ridership corridors. The vehicles are usually “double-ended,” meaning they can be operated/driven from either end, thereby eliminating the need for a turnaround at end-of-line stations. It should be noted that, for purposes of this analysis, light rail vehicle and modern streetcar can be used interchangeably because they have very similar characteristics and specifications.

Clockwise from top left: METRO Blue Line Minneapolis, MN; TRAX Salt Lake City, UT; METRO Phoenix, AZ; Link Seattle, WA

Figure 3-1: Sample LRT Vehicles Operating in the United States

3.1.2 LRT Case Studies

Light rail has been a popular transit technology since the early 1980s. Starting with the San Diego Trolley, LRT lines began to open in cities throughout the United States. In almost all cases, the initial LRT line in a given city evolved to become an integrated system or network with new lines added over time. Table 3-2 lists recent examples of U.S. LRT systems from 14 states and their operating characteristics.

Table 3-2 illustrates significant LRT implementation and expansion activity from the 1980s to the present. The example systems have multiple lines ranging in length from 6 to 17 miles, with station spacing ranging from 0.5 mile to 1.4 miles with an average of 0.82 mile between stations. Systems with three or more lines have recent ridership between 35,200 and 200,000 per day. The ridership variation is also attributable to the size of the total transit market in each metropolitan area. Vehicle suppliers vary but the most common are either Siemens based in Germany or Kinkisharyo based in Japan.

Table 3-2: Operational Characteristics of LRT Systems in the United States

Location	System	Year Opened / Last Expanded	Length / No. of Lines	No. of Stations / Average spacing (miles)	Avg. Weekday Boardings Q4 - 2014	Vehicle Supplier
Seattle, WA	Link	2003 / 2009	17.3 mi / 2	18 / 1.0	35,200	Kinkisharyo
Portland, OR	MAX	1986 / 2009	52.0 mi / 4	87 / 0.60	113,900	Siemens SD660 & S70
San Jose, CA	VTA	1987 / 2005	42.2 mi / 3	62 / 0.68	35,200	Kinkisharyo
Sacramento, CA	RT	1987 / 2012	38.6 mi / 3	50 / 0.77	45,200	NA
Los Angeles, CA	Metro	1990 / 2012	70.3 mi / 4	65 / 1.08	200,800	Siemens P2000
San Diego, CA	San Diego Trolley	1981 / 2005	53.5 mi / 4	53 / 1.0	119,800	Siemens S70
Phoenix, AZ	METRO	2008 / NA	20 mi / 1	28 / 0.71	44,800	Kinkisharyo
Salt Lake City, UT	UTA TRAX	1999 / 2013	44.8 mi / 3	50 / 0.89	68,500	Siemens S70, S100
Denver, CO	The RIDE	1994 / 2013	47 mi / 6	46 / 1.02	86,300	Siemens SD100, SD160
Dallas, TX	DART	1996 / 2014	85 mi / 4	61 / 1.39	101,800	Kinkisharyo
Houston, TX	METRO Rail	2004 / 2013	12.8 mi / 2	24 / 0.53	45,300	Siemens S70
St. Louis, MO	Metrolink	1993 / 2006	46.0 mi / 2	37 / 1.24	49,900	Siemens SD400, SD460
Minneapolis, MN	METRO	2004 / 2014	21.8 mi / 2	37 / 0.59	62,500	Bombardier & Siemens S70
Pittsburgh, PA	Pittsburgh Light Rail	1984 / 2012	26.2 mi / 2	53 / 0.49	27,700	Siemens SD 400, CAF
Baltimore, MD	Baltimore Light Rail	1992 / 1997	33.0 mi / 3	33 / 1.0	27,100	ABB Traction Co.
Buffalo, NY	Buffalo Metro Rail	1984 / NA	6.4 mi / 1	14 / 0.46	16,500	Tokyu Car Corporation
Jersey City, NJ	Hudson-Bergen	2000 / 2006	17 mi / 3	24 / 0.71	54,400	Kinkisharyo
Charlotte, NC	LYNX Rapid Transit	2007 / NA	9.6 mi / 1	15 / 0.64	15,800	Siemens S70

Sources: FTA National Transit Database; American Public Transit Association; Transit Agency websites.

LRT capital costs are best provided on a line item basis with recognition that system cost elements vary in terms of location, type of terrain, and the amount of and type of exclusive guideway. The opening year also affects cost; Table 3-3 illustrates the effect of inflation.

Table 3-3: Capital Costs of LRT Systems in the United States

Location	System	Light Rail Line	Year Opened	Length, mi	Capital Cost, YOE$M	Cost per Mile, $M
Portland, OR	MAX	Red & Blue	1998	17.6	963	54.7
Portland, OR	MAX	Yellow	2004	5.8	350	60.3
Phoenix, AZ	METRO	Central Ave	2008	20	1,400	70.0
Salt Lake City, UT	UTA TRAX	Green Line	2013	6	350	58.3
Denver, CO	The RIDE	Southeast Corridor	2006	19	879	46.2
Dallas, TX	DART	Starter System - 3 Lines	1996	20	960	48.0
Dallas, TX	DART	Phase 2 Expansion	2010	45	2,500	55.5
Houston, TX	METRO Rail	CBD to Univ. Starter Line	2004	7.5	324	43.2
Houston, TX	METRO Rail	Red Line	2013	12.8	900	70.3
St. Louis, MO	Metrolink	Initial system	1994	14	465	33.0
Minneapolis, MN	METRO	Hiawatha Line	2004	12	715	59.5
Minneapolis, MN	METRO	Green Line	2013	11	957	86.5
Charlotte, NC	LYNX Rapid Transit	Current line	2007	9.6	463	48.2

Sources: FTA National Transit Database; American Public Transit Association; Transit Agency websites.
YOE = Year of Expenditure

On a per mile basis, systems opened in the 1990s range from $33 million per mile (St. Louis) to $54.7 million per mile (Portland). For systems opened in the 2000s, the cost per mile ranges from $43.2 million per mile (Houston) to $70.0 million per mile (Phoenix). Since 2010, cost per mile has ranged from $55.5 million per mile (DART) to $86.5 million per mile (Minneapolis). Accounting for relative similarities in the number of grade separations and exclusive guideway with the sample taken and excluding examples such as Seattle that have major subway and elevated segments, the median capital cost per mile for LRT has clearly risen from $44 million per mile in the 1980s to $56.5 million per mile in the 1990s, and up to $71 million per mile since 2000.

3.1.2.1 LRT Vehicles

As indicated in Table 3-2, the US market has two prominent LRT vehicle suppliers: Siemens and Kinkisharyo. Basic characteristics of their vehicles are provided below; the average cost per vehicle is approximately $4.5 million. Figure 3-2 and Table 3-4 provide images and specifications for the Siemens LRT model S70 in Portland, Oregon.

Figure 3-2: Siemens S70 LRT Vehicle Exterior and Interior Views

Table 3-4: Siemens S70 LRT Vehicle Specifications

Performance and Capacity	
Maximum Operating Speed	55 mph
Seated Capacity	60 per single unit
Maximum Capacity	225 per single unit with standees
Maximum Operational Grade	7%
Catenary Supply Voltage	750 Vdc
Vehicle Dimensions and Weight	
Length over Coupler	81.4 ft
Width	8.7 ft
Height to Top of Roof	12.3 ft
Vehicle Empty Weight	96,500 lb
Minimum Turning Radius	82 ft
Track Gauge	4.7 ft
Source: Siemens.	

Figure 3-3 and Table 3-4 provide images and specifications for Kinkisharyo LRT vehicle in Dallas, Texas, respectively.

Figure 3-3: Kinkisharyo LRT Vehicle Exterior and Interior Views

Table 3-5: Kinkisharyo LRT Vehicle Specifications

Performance and Capacity	
Maximum Operating Speed	70 mph
Seated Capacity	76 per single unit
Maximum Capacity	140 per car
Maximum Operational Grade	7%
Catenary Supply Voltage	750 Vdc
Vehicle Dimensions and Weight	
Length over Coupler	92.6 ft
Width	9 ft
Height to Top of Roof	12.6 ft
Vehicle Empty Weight	108,000 lb
Minimum Turning Radius	82 ft
Track Gauge	4.7 ft
Source: Kinkisharyo LRT vehicle specifications.	

3.1.2.2 LRT Propulsion Technology

Over the past decade rail vehicle manufacturers have made significant advances in rail vehicle technology, challenging the traditional infrastructural needs for new LRT and streetcar systems. A primary driver for new research and development is to alleviate the need to construct continuous OCS infrastructure, the traditional power source for rail vehicles. Construction of OCS is a costly component of rail systems, and OCS poses visually aesthetic implications for LRT lines. Two broad categories of technologies are being developed that enable OCS-free systems: on-board power storage (OBS) and embedded third rail (ETS).

3.1.2.3 Overhead Contact System

OCS has traditionally been the power source for LRT systems. OCS is deployed on virtually all LRT and streetcar systems in operation throughout the United States. Strictly defined, OCS is that part of the traction power system comprising the overhead conductors (e.g., a single contact wire), aerial feeders, OCS supports, foundations, balance weights, and other equipment and assemblies (as shown in Figure 3-4) that deliver electrical power to non-self-powered electric vehicles. The construction and accommodation of OCS components is a significant consideration both in cost and in aesthetics. In urban settings, existing structures can sometimes be used to provide supplementary support of the OCS.

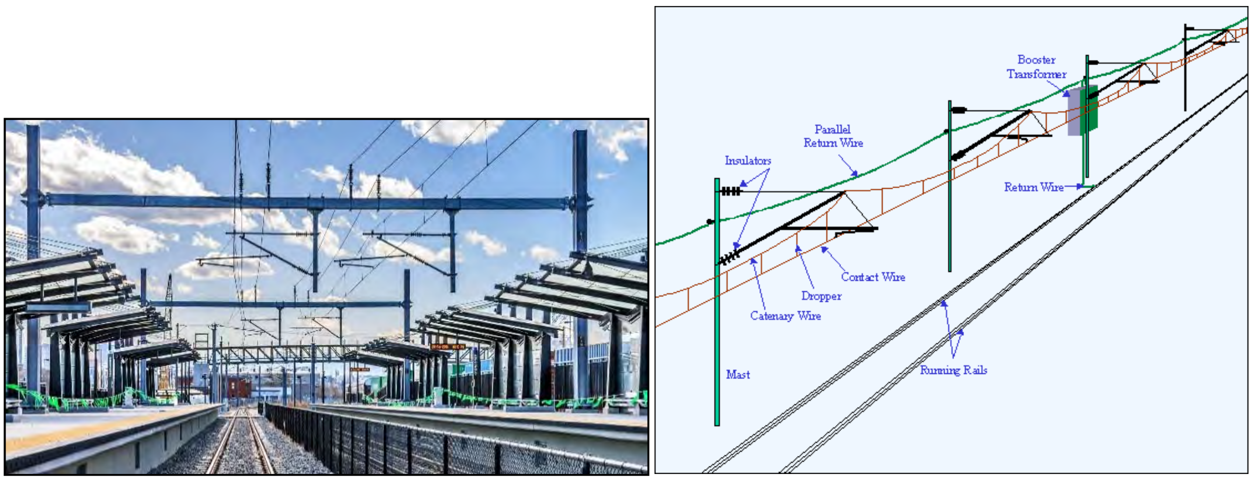

Figure 3-4: Overhead Contact System

3.1.2.4 On-Board Storage Systems

Emerging rail vehicle technologies for on-board storage of electric energy alleviate the need for a continuous running electric conductor, whether it be OCS or embedded third rail (ETR). Manufacturers have developed on-board energy storage technologies by employing a combination of batteries, supercapacitors, and flywheels as shown in Figures 3-5 and 3-6.

Figure 3-5: CAF Streetcar in Seville, Spain (left); CA Supercapacitor (right)

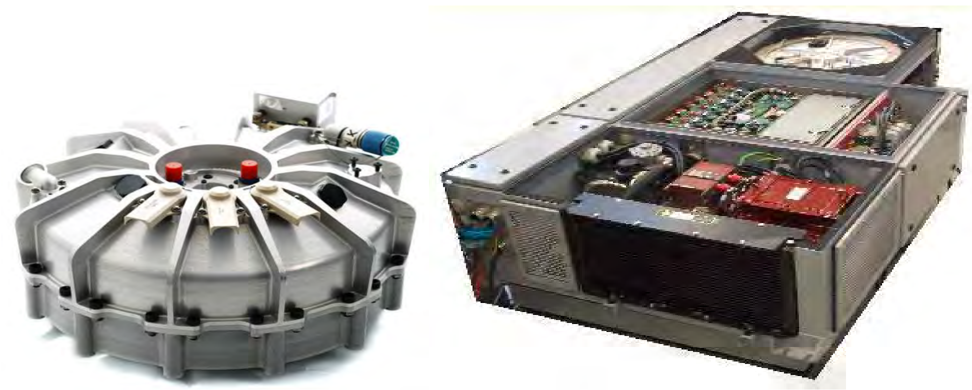

Figure 3-6: Williams Hybrid Flywheel (left) integrated into Alstom CCM Flywheel package (right)

Electric-only on-board storage systems must be paired with the infrastructure to charge the system, typically while the rail vehicles are momentarily stopped at inline stations and termini. Supercapacitors can accept a high-amperage rapid charge, then transfer their stored energy to the on-board batteries at a lower amperage and while the rail vehicle is between charging locations. Flywheels work by converting braking energy into electric energy, supplementing the power drawn from other sources.

Rapid charging systems come in various forms and have achieved varying levels of development. Rapid charging systems can resemble localized OCS segments as shown in Figure 3-7, where vehicles connect to electrified infrastructure above the rail vehicle while stopped. The systems can also resemble ETR: vehicles are charged inductively or by direct contact with a surface-mounted conductor. The charging infrastructure is typically installed at stations ("station charging") and termini/maintenance facilities ("depot charging") of the LRT or streetcar line, allowing enough time (typically 20 to 30 seconds) to conduct a full rapid charge of the on-board storage system (OBS). Between stations, the rail vehicle is powered exclusively from its on-board storage system.

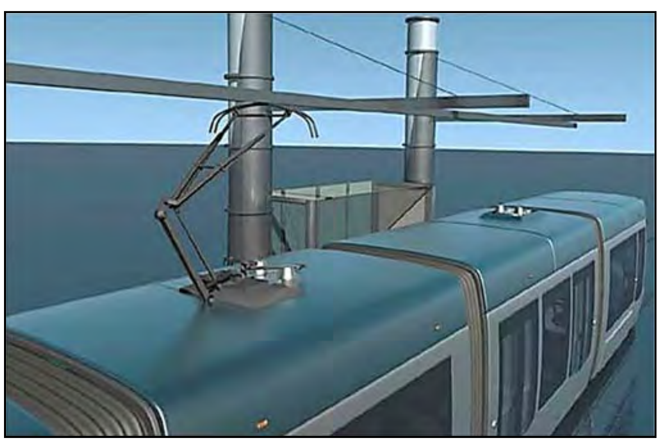

Figure 3-7: Onboard Battery Charging via Short Rigid OCS at Station

3.1.2.5 Embedded Third Rail

ETR is a set of emerging technologies allowing LRT and streetcar systems to draw their traction power from a surface-running conductor instead of from an OCS. Although third rail technology is common among subway systems throughout the world, drawing power from a surface-running conductor presents special challenges for LRT and streetcar systems that run along the public ROW and, particularly, in city streets. To make ETR safe, the surface running conductor is activated in localized segments and only when the rail vehicle is physically present over the conductor. Manufacturers have developed two types of third rail technologies: electrically activated and mechanically activated.

Alstom developed the Citadis Tram in Bordeaux, France, which draws traction power from an electrically activated ETR that runs between the tracks as shown in Figure 3-8. Bombardier’s PRIMOVE technology draws traction inductively as shown in Figure 3-9, but the system has yet to be deployed in revenue operation.

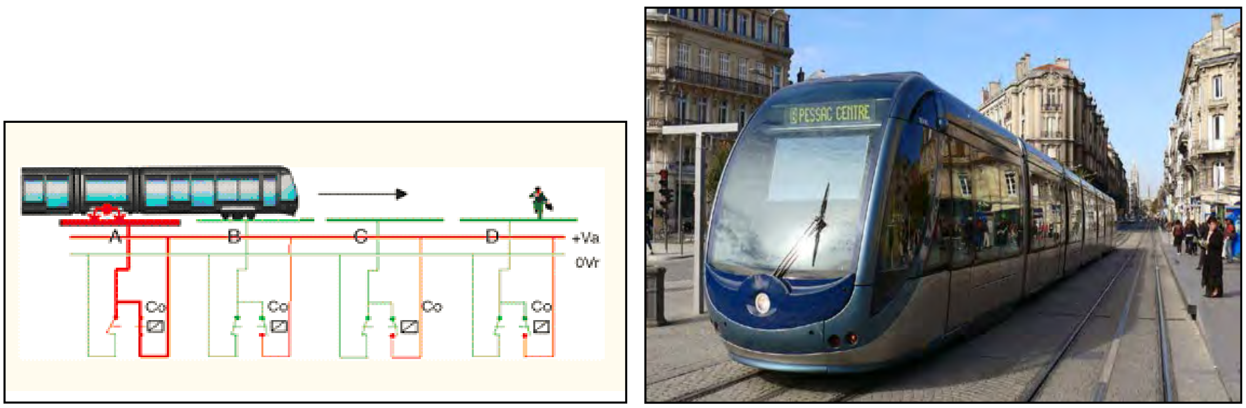

Figure 3-8: Alstom Citadis Tram with Electrically Activated ETR in Bordeaux, France

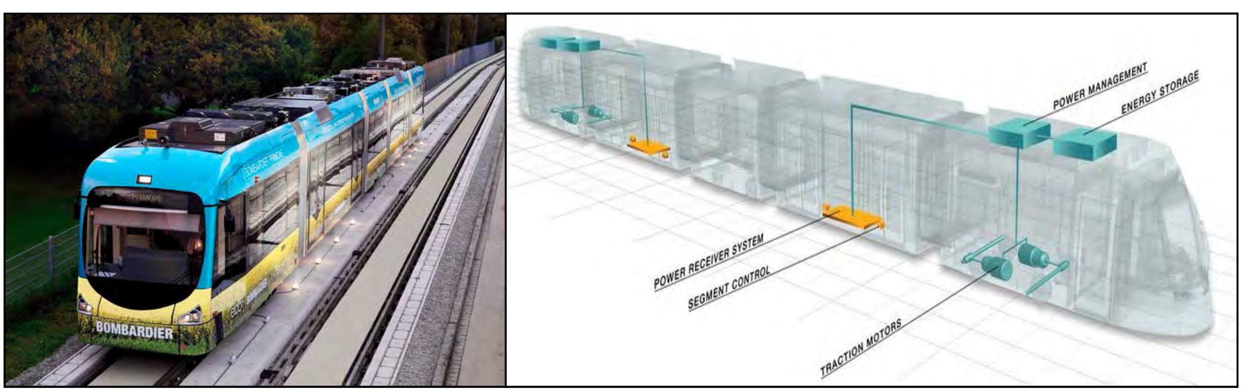

Figure 3-9: Bombardier PRIMOVE Contactless Energy Transfer Technology

3.1.2.6 Alternate/HYBRID Power Systems

Two primary alternatives to the electric-only on-board storage vehicles are hydrogen fuel cell systems and diesel-electric hybrid systems. Both fuel cell and diesel-electric hybrid vehicles eliminate the requirement for the rapid charging infrastructure needed for electric-only systems.

Spanish operator FEVE has unveiled a tram powered by two hydrogen fuel cells that can carry between 20 and 30 passengers at up to 12 mph. The prototype, illustrated in Figure 3-10, was built at the company's Pravia workshops by Fenit Rail (in which FEVE holds a 37.5% stake), and it is hoped that it will enter service in Asturias next year. Developed at a cost of €1 million using a 14.3 meter Series 3400 car originally built for SNCV of Belgium and later operated by FEVE in Valencia, the prototype vehicle weighs 20 tons. It is powered by two 12-kW fuel cells that are supplied with hydrogen from a rack of 12 canisters. Electric current is fed to four asynchronous alternating current (AC) traction motors, each rated at 30 kW. Energy produced during regenerative braking is stored in three Maxwell HTM125 supercapacitor modules or lithium-ion batteries rated at 95 kW.

Figure 3-10: FEVE Hydrogen Fuel Cell Streetcar

In diesel hybrid vehicles, the diesel engine is connected to an electrical generator, creating electricity that powers electric traction motors. In some high-efficiency applications, electrical energy may be stored in rechargeable batteries, in which case these vehicles can be considered as a class of hybrid electric vehicle. Stadler diesel-electric hybrid rail vehicles are a proven technology in revenue service in a number of U.S. markets as shown in Figures 3-11 and 3-12.

Figure 3-11: New Jersey Diesel-Electric LRT (Stadler)

Figure 3-12: Austin, TX Diesel-Electric LRT (Stadler)

3.1.2.7 Vehicle Manufacturers

A wide variety of BRT and rail manufacturers are producing a wide range of vehicle types and sizes appropriate for various corridor applications. It is important to note that the non-US manufacturers have US-based manufacturing facilities and meet Buy America provisions. For example, Siemens and Kinkisharyo have delivered hundreds of light rail vehicles to transit agencies throughout the United States. All vehicles considered for this study are currently in revenue service:

- Bus/BRT Vehicle Manufacturers
  - Gillig – USA
  - M.A.N. – Germany
  - New Flyer – USA
  - Motor Coach Industries – USA
  - NABI – USA
  - Novabus – USA
  - Orion Bus – Canada
  - Proterra – USA
  - Rich Electric – USA
  - Volvo Bus – Sweden
  - Wright Bus – Great Britain
- Rail Vehicle Manufacturers
  - Alstom – France
  - Bombardier – Canada
  - Brookville Equipment Corporation – USA
  - CAF – Spain
  - Inekon – Czech Republic
  - Kawasaki – Japan
  - Kinkisharyo – Japan
  - Siemens – Germany
  - Skoda – Czech Republic
  - Stadler –Switzerland

3.2 BRT

BRT comes in a wide range of applications but generally refers to rubber-tire transit lines that use different combinations of techniques to improve bus service, such as dedicated bus-only lanes, off-board or pre-boarding fare collection, transit priority at traffic signals, stylish vehicles with extra doors, bus stops that are "branded" more like rail stations, and high frequency, limited stop service.

3.2.1 BRT Overview

The range of BRT options allow transit agencies to match physical infrastructure with operating requirements. For example, a BRT service can combine operations in mixed flow lanes with dedicated lanes (side or center running) in areas where congestion is greatest. Unlike rail transit, BRT vehicles can operate both on and off the guideway, extending the corridors in which passengers are offered a one-seat ride with no transfer required. Transit agencies also can select specific BRT components and strategies, such as traffic signal priority and increased stop spacing, and apply them to existing local bus operations to increase bus speeds and reduce operating costs.

Over the past 10 to 15 years, BRT projects have proliferated throughout the United States, North America, and internationally. International standards for what constitutes a BRT project were first developed in 2012. The Institute for Transportation and Development Policy (ITDP) BRT Standard is an evaluation tool for BRT corridors around the world and is based on international best practices. The Standard establishes a common definition for BRT and identifies BRT best practices, as well as functioning as a scoring system to allow BRT corridors to be evaluated and recognized for their superior design and management aspects. Projects are rated as Gold, Silver, or Bronze based on the criteria. To date, one US project — Cleveland's HealthLine (center-running line) — has received a silver rating, and five other US systems — including Las Vegas' Strip and Downtown Express (SDX) line and Omnitrans' sbX (center-running line in San Bernardino), both of which are shown in Figure 3-13 — have received a Bronze rating.

Figure 3-13: Cleveland Euclid Corridor HealthLine BRT (left) and Omnitrans sbX BRT (right)

3.2.2 BRT Case Studies

Several US BRT projects are summarized in Table 3-6. Compared to more traditional bus service, BRT has been implemented and has often applied the ITDP BRT Standard with a variety of unique route level travel time savings features, including:

- dedicated lanes and traffic signal priority;
- special passenger amenities at stations to speed up access (e.g., level boarding and off-vehicle fare collection);
- new special-purpose vehicles with additional capacity;
- extended service hours and increased service frequency; and
- specialized branding.

As shown in Table 3-6, the typical BRT corridor ranges from 5 to 20 miles with peak headways between 5 and 10 minutes; stations located approximately 1 to 3 miles apart ($^{1}/_{3}$- to 1-mile station spacing; average of 0.58 mile); daily ridership between 4,000 and 25,000; and capital costs between $22 million and $377 million. Although costs are in different years based on project implementation, the variability also reflects the number of stations and level of station amenities, amount of exclusive guideway/running way, type of vehicle, and length of project. Table 3-6 also shows the cost per mile to normalize for project length. Cost per mile ranges from a low of $1.8 million per mile (Swift BRT) to $ 26.2 million per mile for the LA Orange Line, which includes 100% dedicated lanes in exclusive ROW.

Table 3-6: BRT Systems in the United States

Agency	Location	Line/Year Completed	Length, mi	Peak Headway, min	No. of Stations/ Spacing, mi	Number of Vehicles	Average Weekday Boardings	Capital Cost, $M ($M/mi)
Lane Transit District	Eugene, OR	Franklin EMX 2007	4	10	10 / 0.4	6	6,000	22 (5.5)
Lane Transit District	Eugene, OR	Springfield EMX 2011	7.8	10	15 / 0.52	NA	NA	42 (5.4)
Community Transit	Everett, WA	Swift BRT, SR 99 2009	16.7	10	29 / 0.58	15	4,300	30 (1.8)
King County Metro	Seattle, WA	C Line 2012	12	10	37 / 0.32	15	NA	190 (15.8)
King County Metro	Seattle, WA	F Line 2014	10	10	19 / 0.53	13	7,500	37 (3.7)
LA County Metro	Los Angeles, CA	Orange Line 2005	14.4	4	18 / 0.8	23	23,000	377 (26.2)
Foothill Transit	West Covina, CA	El Monte Busway 1973	11	10	20 / 0.55	NA	4,700	28 (2.5)
Omnitrans	San Bernardino, CA	SBX 2014	15.7	10-15	160.98	14	NA	192 (12.2)
City of Ft. Collins	Ft. Collins CO	Mason St. Corridor MAX 2013	5	10	12 / 0.42	5	4,000	82 (16.4)
VIA Metropolitan Transit	San Antonio, TX	PRIMO, Fredericks-burg Rd. 2012	20	10	25 / 0.8	16	NA	70 (3.5)
K.C. Area Transportation Auth.	Kansas City, KS	Kansas City MAX-Troost 2011	10	10	22 / 0.45	14	5,000	55 (5.5)
Greater Cleveland RTA	Cleveland, OH	Euclid Ave. Health line 2008	9.4	5	38 / 0.25	24	10,500	200 (21.2)
Port Authority/ Allegheny County	Pittsburgh PA	MLK East Busway 1983	9.1	6-15	10 / 0.91	NA	25,000	115 (12.6)
Miami Dade Transit	Miami FL	S. Miami Dade Busway 1997	20	3	30 / 0.67	57	25,000	54 (2.7)

Sources: National BRT Institute, Center for Urban Transportation Research, University of South Florida; various transit agency project websites

O&M costs of running a BRT system are generally lower than light rail, although the exact comparison varies. In the study conducted by the Government Accountability Office, BRT systems usually had lower costs based on operating cost per vehicle revenue hour, operating cost per revenue mile, and operating cost per passenger trip. O&M costs vary considerably for BRT systems around the United States, ranging from $70 to $210 per vehicle revenue hour.

3.2.2.1 BRT Vehicles

A wide variety of BRT vehicles makes and models are deployed throughout the United States. A fairly typical size is the 60-foot articulated bus, which provides higher carrying capacity than typical 40-foot coaches. A growing number of US and international manufacturers offer BRT vehicles. One example is the New Flyer 60-foot articulated bus illustrated in Figure 3-14, which was designed in 2013 for Omnitrans' E Street sbX BRT line and includes left-side doors to accommodate the center platform stations with level boarding.

Figure 3-14: Omnitrans E Street BRT Vehicles, San Bernardino, CA

RFTA's VelociRFTA™ BRT corridor between Glenwood Springs and Aspen is the first rural BRT corridor in the United States. It began operations on September 3, 2013, and includes CNG-powered buses (as shown in Figure 3-15) operating in side-running BRT/bus-only lanes along SH 82 (as shown in Figure 3-16). The corridor has 13 stations.

Figure 3-15: VelociRFTA BRT Vehicles

Figure 3-16: VelociRFTA BRT/Bus Lanes on SH 82

3.2.2.2 Propulsion Technology

The bus industry is seeing emerging growth in alternative technologies for powering vehicles. Although the traditional diesel-powered bus still predominates among US transit agencies, there is increasing demand for vehicles that relied less on petrochemical fuel sources, with a particular interest in electric-only systems. Four primary options are currently available for bus propulsion; RFTA has operating experience with the first three and is considering the fourth:

- Diesel
- CNG
- Hybrid
- Electric

CNG and hybrid buses are proven technologies that offer lower carbon emissions than do diesel models. However, many manufacturers are turning their attention toward zero-emissions, electric-only buses. Typically, on electric buses, energy is stored in roof-mounted batteries. Batteries can be charged during short station stops ("station charging") and during longer layovers at terminus stations/maintenance facilities ("depot charging"). ABB and Arriva, for example, have developed systems that inductively charge buses via a raised antenna system and a floor-mounted plate, respectively, as shown in Figure 3-17. Capital costs are associated with developing the charging infrastructure to bring in the power for electric buses, particularly at stations/maintenance facilities and electric power substations.

Figure 3-17: ABB Energy Transfer System (left) and Arriva Streetlite EV Bus Charging Plate (right)

Proterra also manufactures extended range, zero emissions electric buses as shown in Figure 3-18. They offer 35- and 40-foot coaches with 28 and 40 seats, respectively. The 40-foot coach has a range of 250 to 350 miles, but it requires 3.5 to 5 hours to fully recharge its batteries. Overhead fast-charging systems are available for a partial battery recharge in 5 to 13 minutes (e.g., during an end-of-line layover); spare/replacement battery packs can be installed in approximately 30 minutes, if needed.

Figure 3-18: Proterra Electric Bus and Overhead Fast-charging System

In addition to being efficient and generating nearly zero emissions, electric buses are also very quiet in their operation, all of which are attractive features for potential fixed guideway service in the Brush Creek to Rubey Park corridor, as well as for other City of Aspen shuttle bus routes.

3.2.2.3 Autonomous Vehicles

The development of technology for autonomous (driverless) transit buses is in its nascent stages. Several US companies are actively developing driverless vehicles and associated technologies, most notably Tesla, Apple, and Google, as well as several European companies such as Mercedes-Benz, EasyMile, and Lutz. In Europe, small autonomously driven transit vehicles are in demonstration applications in the Netherlands, Switzerland, and other countries, primarily to serve first/last mile connections to/from line haul transit hubs, or to serve short routes on business campuses. In some respects, autonomously driven buses hold more promise than private vehicles, because the bus corridor — a typically fixed route — can receive the associated infrastructure improvements and control systems to enable safe autonomous travel, such as road striping, optical markers, and other features.

A driverless bus developed by French firm EasyMile™ started operation at the Bishop Ranch business park in San Ramon, California, and at Gardens by the Bay Park in Singapore in December 2016. The EZ10, illustrated in Figure 3-19, is operated entirely autonomously and does not even have a steering wheel or brake pedal. Other EZ10s have already been deployed in Finland, France, Italy, Spain and Switzerland, and the firm hopes to have 100 to 200 EZ10 autonomous buses in operation by 2017.

Figure 3-19: EasyMile™ EZ10 "WEpods" Autonomous Buses

Although the potential of autonomous bus vehicles has generated much interest, it may be several years before the technology reaches maturity for broad application in the United States. The currently limited capacity and speed of the available autonomous buses also limits their application, primarily to first/last mile service connections to/from major transit hubs rather than directly serving high ridership demand line-haul corridors such as Brush Creek to Rubey Park.

3.2.2.4 Technology Summary

Both BRT and urban rail systems are proven technologies in the operation of high-performing, high-capacity transit corridors. The capital costs associated with developing and deploying BRT are less than for urban rail systems. Rail systems, although more expensive, have a significant advantage in attracting ridership, operating reliably (regardless of weather), and offering higher capacity than BRT. The specific vehicle technology appropriate for the Brush Creek to Aspen corridor will be identified based on analysis of the ridership demand, operating plans, capital and O&M cost comparisons, available funding, and the information in the remainder of this report. It is important to note that only light rail using coupled vehicles could provide sufficient capacity to reduce the number of buses at Rubey Park.

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4 Alternative Transit Service Plans and Phasing

This section details the alternative service operating plans for the Brush Creek-to-downtown Aspen corridor. This information provides the important basis for future ridership forecasting (Section 5) and for development of O&M costs (Section 6). Operating plan parameters, presented in Section 4.1, are the foundation for service plan development. These parameters facilitate the development of travel times and service schedules for the premium service alternatives within the corridor (Section 4.2). This, in turn, directly feeds into the service plan development for the modal options along with service plan changes to the background bus system (Section 4.3). Lastly, Section 4.4 presents phasing opportunities for the BRT and LRT alternatives.

4.1 Operating Plan Parameters

The design and operating plans for proposed premium transit service in the Brush Creek to Rubey Park corridor include various input variables that drive the development of the service planning which, in turn, affect the O&M cost model discussed in Section 6. These plans include the operating speeds in the corridor, the cycle time to complete a round trip, including layover/recovery time and transfer delays, headways by hour of the day, and span (days and hours) of service. The following assumptions govern the operation of the premium service and influence transit travel times and therefore operating costs:

- BRT or LRT would connect the Brush Creek Intercept Lot with either Rubey Park or Galena/Main as the end-of-line station; the BRT or LRT could serve Galena/Main station with a transit/ pedestrian connection to Rubey Park, which would continue to serve all local routes.
- BRT would operate through most of the corridor in bi-directional, curbside dedicated lanes that would allow other vehicles to make right turns.
- LRT would operate along a single track through the corridor along the west/south sides within the SH 82 alignment ROW, with double track at all stations and a short double track segment just north of the airport to facilitate passing trains and minimize operating delays.
- LRT would operate along single track embedded in a dedicated curbside lane (two-way operation) along the south side of Main Street that would allow other vehicles to make right turns.
- BRT and LRT would have transit signal priority (TSP) at key intersections.
- LRT would have level boarding at station platforms.
- BRT would require wheelchair ramp deployment for mobility-impaired passengers and would require driver assistance in securing wheelchair-bound passengers.
- Station dwell time of 30 seconds is assumed for both BRT and LRT.
- LRT would have at least 2 minutes of layover time at one end-of-line station and at least 5 minutes of layover time at the other end-of-line station. The 2-minute minimum allows the

operator to transfer direction of the train at each end; the 5-minute minimum layover provides for additional operator break and schedule recovery. The longer layover period would switch between end-of-line stations depending on time of day and directional demand (i.e., the 5-minute layover would occur at Brush Creek in the morning and at Rubey Park (or at Main/Galena Street) in the afternoon. This maximizes the opportunity for passengers to wait on board the train rather than on the platform.

- BRT would accelerate/decelerate to/from stations at 2.25 mph per second (mphps)
- LRT would accelerate/decelerate to/from stations at 1.50 mphps.
- LRT would operate with two-car trainsets to maximize capacity for 120 seated passengers.
- BRT vehicles would have capacity for 45 to 60 seated passengers, depending on the selected vehicle.
- BRT or LRT would serve the same five stations along the 6.1-mile route (besides the end-of-line stations), including Aspen Airport/ABC, Buttermilk, Truscott, Maroon/Castle Creek, and 7th/Main, resulting in average station spacing of 0.87 mile.
- BRT or LRT service would provide convenient transfer connections with the following six routes:
  - Valley BRT
  - Valley Express
  - Valley/SH 82 Corridor
  - Snowmass Ski
  - Snowmass/Aspen Shuttle
  - Buttermilk Ski

4.2 Premium Service Travel Times and Schedules

The development of station-to-station travel times for both BRT and LRT alternatives use the operating plan parameters identified in the previous section. The travel time calculations are planning-level estimates appropriate for this level of study detail; they do not represent detailed vehicle-based simulations. The estimates rely on the basic equations of motion (kinematic equations) and log-point information along the alignments such as locations of stations/stops, horizontal curvature, and other factors that could affect operating speed.

4.2.1 LRT

Given the minimal double-track footprint for LRT, the possibility for up-valley- and down-valley-bound trains to pass each other at a single-track location is considered. Because the location of this passing point varies by train headway, the analysis examines various headways. If the analysis indicates that two trains would pass each other along a section of single track, the assumed lighter demand train incurs an amount of delay upstream of the passing point, which results in the trains passing within a section of double track. The train assumed to be carrying the heavier demand never incurs additional passing-related delay. This helps ensure that the LRT is as time-competitive as possible. For example, if in the AM peak hour an up-valley- and a down-valley-bound train would pass each other within a section of single-track, the down-valley-bound train is delayed so that the passing occurs within a double-track section. The general strategy for assessing the delay consists of first increasing the layover time (to keep end-to-end travel time unchanged) and then adding dwell time at upstream stations, as necessary. Note that in actual operation, the trains designated for delay would follow a schedule based on known directional demand patterns (i.e., down-valley-bound trains on weekday mornings, up-valley-bound trains weekday afternoons).

Tables 4-1 and 4-2 illustrate the LRT travel times for the AM peak period under various headway scenarios. Table 4-1 presents the Rubey Park option; Table 4-2 presents the Galena Street end-of-line options. Given the end-to-end travel times and end-of-line layovers, the roundtrip cycle time is calculated. This cycle time permits the calculation of the number of LRT train sets required to operate the service at a given service frequency (headway). The last row in Tables 4-1 and 4-2 specify the number of train sets required for various headway scenarios.

Table 4-1: LRT Travel Time Estimates for Rubey Park Option, AM Peak

Segment or Characteristic	Headway (mm:ss)		
	10	20	30[a]
Brush Creek to Rubey Park Travel Time	15:39	15:39	15:39
Layover at Rubey Park	3:42	2:00	2:17
Rubey Park to Brush Creek Travel Time	20:23	16:22	15:39
Round-trip Time (Brush Creek to Rubey Park to Brush Creek)	39:44	34:01	33:35
Layover at Brush Creek	10:16	5:59	26:25
Delay Imposed by Passing Restrictions	4:44	0:43	0:00
Number of Train Sets Required (Excludes Spares)	5	2	2

[a] A nominal delay (not included) would be associated with trains meeting at the passing track between the Brush Creek and Airport stations. Trains would slow and/or stop when approaching this section.

Table 4-2: LRT Travel Time Estimates for Galena Street Option, AM Peak

Segment or Characteristic	Headway (mm:ss)		
	10	20	30[a]
Brush Creek to Galena Street Travel Time	14:45	14:45	14:45
Layover at Galena Street	5:00	4:15	4:00
Galena Street to Brush Creek Travel Time	19:58	14:45	14:45
Round-trip Time (Brush Creek to Galena Street to Brush Creek)	39:43	33:45	33:30
Layover at Brush Creek	10:17	6:15	26:30
Delay Imposed by Passing Restrictions	5:13	0:00	0:00
Number of Train Sets Required (Excludes Spares)	5	2	2

[a] A nominal delay (not included) would be associated with trains meeting at the passing track between the Brush Creek and Airport stations. Trains would slow and/or stop when approaching this section.

It is interesting to note that Table 4-1 indicates the one-way LRT travel time between Brush Creek Intercept Lot and Rubey Park stations is 15:39 (achievable in either direction, but not both directions simultaneously due to the single-track restrictions). By comparison, the current (winter season) VelociRFTA BRT service has scheduled travel times between Brush Creek Intercept Lot and Rubey Park stations of 18 minutes up valley and 13 minutes down valley.

There may be opportunities to reduce the LRT travel time and make it more competitive with existing VelociRFTA service. Specifically, per the operating plan parameters (Section 4.1), the LRT travel time assumes a 30-second dwell time at each of the five intermediate stations, amounting to 2.5 minutes of station stop time en route. Stations serving lower passenger demand could see reduced dwell times, thereby shortening the overall travel time. Regardless of the exact travel time differences between LRT and the existing VelociRFTA BRT, LRT will more consistently achieve its scheduled travel time because it is less prone to delays caused by traffic or weather.

Tables 4-3 and 4-4 illustrate sample schedules for LRT operations in the Brush Creek-to-downtown Aspen corridor.

4.2.2 BRT

The development of travel times for the BRT operating in the Brush Creek-to-downtown Aspen corridor are based on consultation with RFTA operations staff. The discussions indicate that the only tangible savings in travel time would occur along the realigned SH 82 corridor across the Marolt-Thomas easement. The provision of dedicated bus-only lanes and the more direct routing into downtown Aspen will save about 2 minutes of travel time compared to current operations. In addition, the Galena Street end-of-line option saves an additional 1 minute in travel time relative to terminating at Rubey Park because it is a shorter route.

These savings in travel time are not significant enough to alter transit operations per se. In other words, buses benefitting from the savings would not have their headways altered to run more/fewer buses. The current 18-minute ride from Brush Creek to Rubey Park would become 16 minutes (or 15 minutes if terminating at Galena Street); the 13-minute ride in the opposite direction may reduce to 11 or 10 minutes. However, the reduction in BRT travel time due to the incorporation of the SH 82 bus way across the Marolt easement will nearly neutralize any time penalties incurred due to the transfer at the Brush Creek station. Section 5.1.1, Ridership Tool, includes further discussion on the transfer penalties as related to the BRT travel times.

4.3 Service Planning

The service planning considers the span of service (operating days and hours), headways by time of day, and transit supply and demand conditions to portray how the transit alternative will operate in the future. Because the alternatives effectively reduce the number of bus trips on certain routes, the impact to the background transit service is also included.

4.3.1 Existing Transit Supply and Demand Characteristics

Section 1 described the six bus routes operating in the corridor and their respective numbers of bus trips per day that could be intercepted and replaced with either BRT or LRT service, as summarized in Table 4-5.

Table 4-3: Sample AM Peak Schedule for LRT Operating on 10-Minute Headways, Rubey Park Option

Sample AM Peak Schedule (for Illustration Only) *Note: Indication of time in seconds is for planning-level schedule development and quality control purposes. It does not imply that level of precision.*

Train Set #										Train Set #						
1	2	3	4	5	1	2				1	2	3	4	5	1	2
UPVALLEY (Read Down)								Station/Event		DOWNVALLEY (Read Up)						
-	-	-	-	-	-	-	Arr	Brush Creek	Dp	-	-	-	-	-	-	-
7:00:00 AM	7:10:00 AM	7:20:00 AM	7:30:00 AM	7:40:00 AM	7:50:00 AM	8:00:00 AM	Dp	Brush Creek	Arr	7:39:44 AM	7:49:44 AM	7:59:44 AM	8:09:44 AM	8:19:44 AM	8:29:44 AM	8:39:44 AM
7:01:45 AM	7:11:45 AM	7:21:45 AM	7:31:45 AM	7:41:45 AM	7:51:45 AM	8:01:45 AM	Arr	Passing Track_North Switch	Dp	7:37:59 AM	7:47:59 AM	7:57:59 AM	8:07:59 AM	8:17:59 AM	8:27:59 AM	8:37:59 AM
7:01:50 AM	7:11:50 AM	7:21:50 AM	7:31:50 AM	7:41:50 AM	7:51:50 AM	8:01:50 AM	Dp	Passing Track_South Switch	Arr	7:37:54 AM	7:47:54 AM	7:57:54 AM	8:07:54 AM	8:17:54 AM	8:27:54 AM	8:37:54 AM
7:04:52 AM	7:14:52 AM	7:24:52 AM	**7:34:52 AM**	7:44:52 AM	7:54:52 AM	8:04:52 AM	Arr	Airport	Dp	**7:34:52 AM**	7:44:52 AM	7:54:52 AM	8:04:52 AM	8:14:52 AM	8:24:52 AM	8:34:52 AM
7:05:22 AM	7:15:22 AM	7:25:22 AM	**7:35:22 AM**	7:45:22 AM	7:55:22 AM	8:05:22 AM	Dp	Airport	Arr	**7:32:26 AM**	7:42:26 AM	7:52:26 AM	8:02:26 AM	8:12:26 AM	8:22:26 AM	8:32:26 AM
7:06:53 AM	7:16:53 AM	7:26:53 AM	7:36:53 AM	7:46:53 AM	7:56:53 AM	8:06:53 AM	Arr	Buttermilk	Dp	7:30:55 AM	7:40:55 AM	7:50:55 AM	8:00:55 AM	8:10:55 AM	8:20:55 AM	8:30:55 AM
7:07:23 AM	7:17:23 AM	7:27:23 AM	7:37:23 AM	7:47:23 AM	7:57:23 AM	8:07:23 AM	Dp	Buttermilk	Arr	7:30:25 AM	7:40:25 AM	7:50:25 AM	8:00:25 AM	8:10:25 AM	8:20:25 AM	8:30:25 AM
7:08:54 AM	7:18:54 AM	**7:28:54 AM**	7:38:54 AM	7:48:54 AM	7:58:54 AM	8:08:54 AM	Arr	Truscott/Aspen Golf Course	Dp	**7:28:54 AM**	7:38:54 AM	7:48:54 AM	7:58:54 AM	8:08:54 AM	8:18:54 AM	8:28:54 AM
7:09:24 AM	7:19:24 AM	**7:29:24 AM**	7:39:24 AM	7:49:24 AM	7:59:24 AM	8:09:24 AM	Dp	Truscott/Aspen Golf Course	Arr	**7:25:36 AM**	7:35:36 AM	7:45:36 AM	7:55:36 AM	8:05:36 AM	8:15:36 AM	8:25:36 AM
7:10:26 AM	7:20:26 AM	7:30:26 AM	7:40:26 AM	7:50:26 AM	8:00:26 AM	8:10:26 AM	Arr	Maroon Creek	Dp	7:24:34 AM	7:34:34 AM	7:44:34 AM	7:54:34 AM	8:04:34 AM	8:14:34 AM	8:24:34 AM
7:10:56 AM	7:20:56 AM	7:30:56 AM	7:40:56 AM	7:50:56 AM	8:00:56 AM	8:10:56 AM	Dp	Maroon Creek	Arr	7:24:04 AM	7:34:04 AM	7:44:04 AM	7:54:04 AM	8:04:04 AM	8:14:04 AM	8:24:04 AM
7:12:15 AM	**7:22:15 AM**	7:32:15 AM	7:42:15 AM	7:52:15 AM	8:02:15 AM	8:12:15 AM	Arr	Main / 7th St	Dp	**7:22:45 AM**	7:32:45 AM	7:42:45 AM	7:52:45 AM	8:02:45 AM	8:12:45 AM	8:22:45 AM
7:12:45 AM	**7:22:45 AM**	7:32:45 AM	7:42:45 AM	7:52:45 AM	8:02:45 AM	8:12:45 AM	Dp	Main / 7th St	Arr	**7:22:15 AM**	7:32:15 AM	7:42:15 AM	7:52:15 AM	8:02:15 AM	8:12:15 AM	8:22:15 AM
7:15:39 AM	7:25:39 AM	7:35:39 AM	7:45:39 AM	7:55:39 AM	8:05:39 AM	8:15:39 AM	Arr	Rubey Park	Dp	7:19:21 AM	7:29:21 AM	7:39:21 AM	7:49:21 AM	7:59:21 AM	8:09:21 AM	8:19:21 AM
-	-	-	-	-	-	-	Dp	Rubey Park	Arr	-	-	-	-	-	-	-

Note: Blue shading indicates a location at which trains pass one another. Bold text denotes the timeframe in which down-valley train set #1 passes an up-valley train.

Table 4-4: Sample AM Peak Schedule for LRT Operating on 10-Minute Headways, Galena Street Option

Sample AM Peak Schedule (for Illustration Only) *Note: Indication of time in seconds is for planning-level schedule development and quality control purposes. It does not imply that level of precision.*

Train Set #										Train Set #						
1	2	3	4	5	1	2				1	2	3	4	5	1	2
UPVALLEY (Read Down)								Station/Event		DOWNVALLEY (Read Up)						
-	-	-	-	-	-	-	Arr	Brush Creek	Dp	-	-	-	-	-	-	-
7:00:00 AM	7:10:00 AM	7:20:00 AM	7:30:00 AM	7:40:00 AM	7:50:00 AM	8:00:00 AM	Dp	Brush Creek	Arr	7:39:44 AM	7:49:44 AM	7:59:44 AM	8:09:44 AM	8:19:44 AM	8:29:44 AM	8:39:44 AM
7:01:45 AM	7:11:45 AM	7:21:45 AM	7:31:45 AM	7:41:45 AM	7:51:45 AM	8:01:45 AM	Arr	Passing Track_North Switch	Dp	7:37:59 AM	7:47:59 AM	7:57:59 AM	8:07:59 AM	8:17:59 AM	8:27:59 AM	8:37:59 AM
7:01:50 AM	7:11:50 AM	7:21:50 AM	7:31:50 AM	7:41:50 AM	7:51:50 AM	8:01:50 AM	Dp	Passing Track_South Switch	Arr	7:37:54 AM	7:47:54 AM	7:57:54 AM	8:07:54 AM	8:17:54 AM	8:27:54 AM	8:37:54 AM
7:04:52 AM	7:14:52 AM	7:24:52 AM	**7:34:52 AM**	7:44:52 AM	7:54:52 AM	8:04:52 AM	Arr	Airport	Dp	**7:34:52 AM**	7:44:52 AM	7:54:52 AM	8:04:52 AM	8:14:52 AM	8:24:52 AM	8:34:52 AM
7:05:22 AM	7:15:22 AM	7:25:22 AM	**7:35:22 AM**	7:45:22 AM	7:55:22 AM	8:05:22 AM	Dp	Airport	Arr	**7:29:09 AM**	7:39:09 AM	7:49:09 AM	7:59:09 AM	8:09:09 AM	8:19:09 AM	8:29:09 AM
7:06:53 AM	7:16:53 AM	**7:26:53 AM**	7:36:53 AM	7:46:53 AM	7:56:53 AM	8:06:53 AM	Arr	Buttermilk	Dp	**7:27:38 AM**	7:37:38 AM	7:47:38 AM	7:57:38 AM	8:07:38 AM	8:17:38 AM	8:27:38 AM
7:07:23 AM	7:17:23 AM	**7:27:23 AM**	7:37:23 AM	7:47:23 AM	7:57:23 AM	8:07:23 AM	Dp	Buttermilk	Arr	**7:27:08 AM**	7:37:08 AM	7:47:08 AM	7:57:08 AM	8:07:08 AM	8:17:08 AM	8:27:08 AM
7:08:54 AM	7:18:54 AM	7:28:54 AM	7:38:54 AM	7:48:54 AM	7:58:54 AM	8:08:54 AM	Arr	Truscott/Aspen Golf Course	Dp	7:25:37 AM	7:35:37 AM	7:45:37 AM	7:55:37 AM	8:05:37 AM	8:15:37 AM	8:25:37 AM
7:09:24 AM	7:19:24 AM	7:29:24 AM	7:39:24 AM	7:49:24 AM	7:59:24 AM	8:09:24 AM	Dp	Truscott/Aspen Golf Course	Arr	7:25:07 AM	7:35:07 AM	7:45:07 AM	7:55:07 AM	8:05:07 AM	8:15:07 AM	8:25:07 AM
7:10:26 AM	7:20:26 AM	7:30:26 AM	7:40:26 AM	7:50:26 AM	8:00:26 AM	8:10:26 AM	Arr	Maroon Creek	Dp	7:24:05 AM	7:34:05 AM	7:44:05 AM	7:54:05 AM	8:04:05 AM	8:14:05 AM	8:24:05 AM
7:10:56 AM	7:20:56 AM	7:30:56 AM	7:40:56 AM	7:50:56 AM	8:00:56 AM	8:10:56 AM	Dp	Maroon Creek	Arr	7:23:35 AM	7:33:35 AM	7:43:35 AM	7:53:35 AM	8:03:35 AM	8:13:35 AM	8:23:35 AM
7:12:15 AM	**7:22:15 AM**	7:32:15 AM	7:42:15 AM	7:52:15 AM	8:02:15 AM	8:12:15 AM	Arr	Main / 7th St	Dp	**7:22:16 AM**	7:32:16 AM	7:42:16 AM	7:52:16 AM	8:02:16 AM	8:12:16 AM	8:22:16 AM
7:12:45 AM	**7:22:45 AM**	7:32:45 AM	7:42:45 AM	7:52:45 AM	8:02:45 AM	8:12:45 AM	Dp	Main / 7th St	Arr	**7:21:46 AM**	7:31:46 AM	7:41:46 AM	7:51:46 AM	8:01:46 AM	8:11:46 AM	8:21:46 AM
7:14:46 AM	7:24:46 AM	7:34:46 AM	7:44:46 AM	7:54:46 AM	8:04:46 AM	8:14:46 AM	Arr	Galena St	Dp	7:19:46 AM	7:29:46 AM	7:39:46 AM	7:49:46 AM	7:59:46 AM	8:09:46 AM	8:19:46 AM
-	-	-	-	-	-	-	Dp	Galena St	Arr	-	-	-	-	-	-	-

Note: Blue shading indicates a location at which trains pass one another. Bold text denotes the timeframe in which down-valley train set #1 passes an up-valley train.

Table 4-5: Number of Bus Trips per Day that May be Intercepted by BRT/LRT

Route		Bus Trips		
Code	Name	Down Valley	Up Valley	Total
BRT	Bus Rapid Transit	77	72	149
VALL_EX	Valley Express	8	4	12
VAL	Valley/82 Corridor	42	41	83
SMS	Snowmass Ski	37	36	73
SMA	Snowmass/Aspen	35	35	70
BM	Buttermilk Ski	35	36	71
	Grand Total	234	224	458

Figure 4-1 illustrates the aggregated information from Table 4-5 by time of day. The peak bus trips occur between 8 and 9 a.m. and between 4 and 5 p.m. A high level of service is maintained throughout the midday hours as well, with average headways of 2 to 3 minutes.

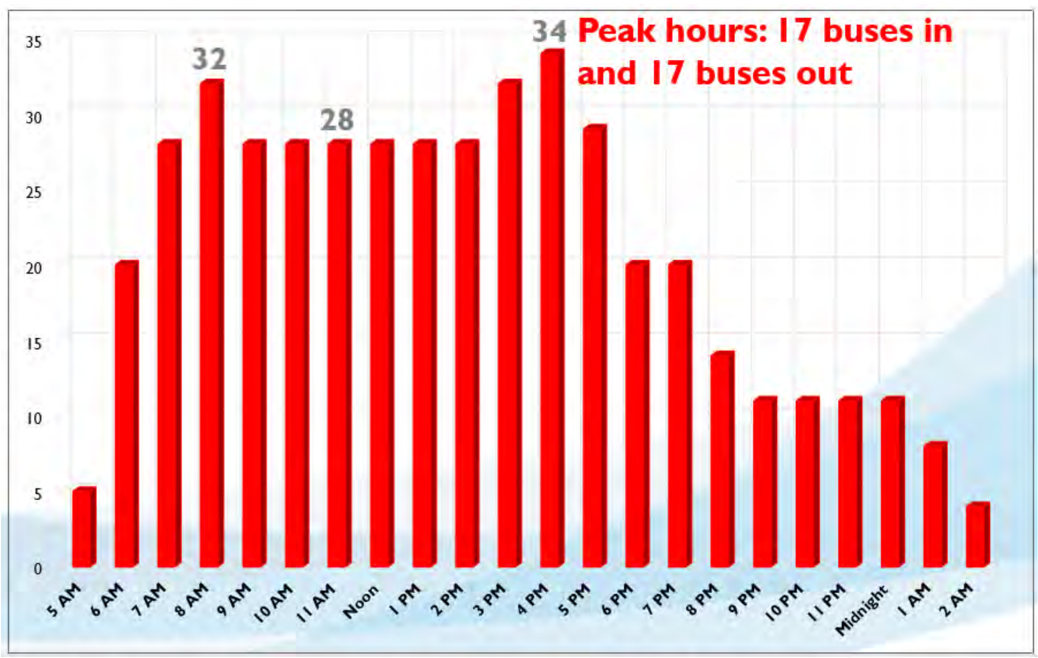

Figure 4-1: Number of Bus Trips per Hour that May be Intercepted by BRT/LRT

The passenger loads per hour on the six bus routes are summarized in Figure 4-2. The peak loads correspond to the peak headway service described in Figure 4-1, i.e., between 8 and 9 a.m. and between 4 and 5 p.m. It is important to note that, although high service levels are maintained throughout the midday hours, passenger loads are reduced during the midday hours, suggesting a possible opportunity to reduce the number of bus trips during those hours. The average passenger load varies by route and by time of day, but in general, the BRT route average passenger loads range from 11 to 36 passengers per trip, the Snowmass routes have passenger loads ranging from 9 to 31 passengers per trip, and the average Buttermilk route passenger load is 10 passengers per trip.

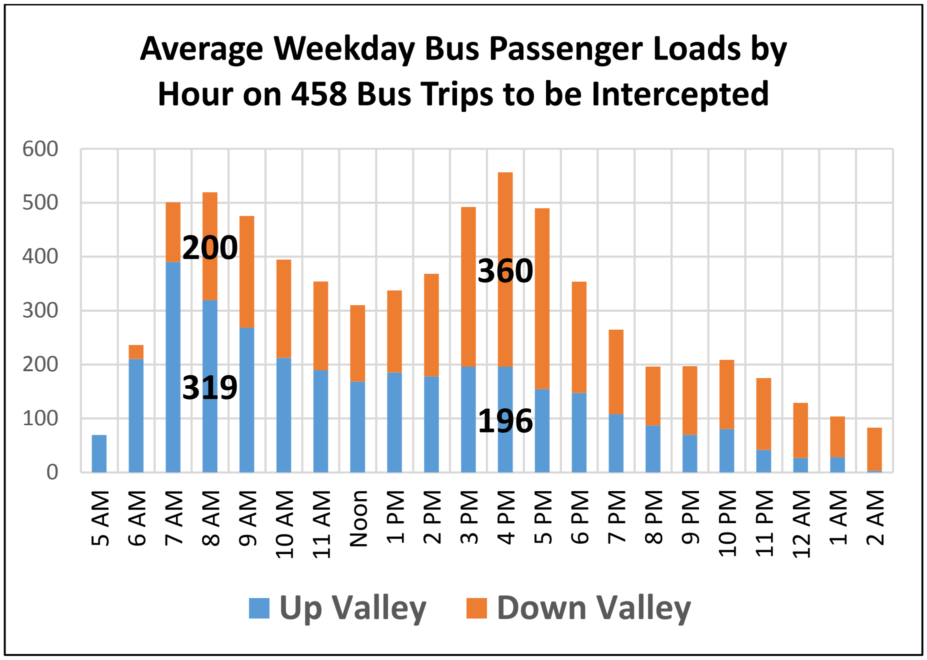

Figure 4-2: Current Bus Passenger Loadings per Hour

4.3.2 Minimum Service Plan

To provide sufficient capacity to meet the current and future passenger loading, the BRT or LRT service would continue to operate 22 hours per day (5 a.m. to 3 a.m.), seven days per week with the following minimum headways:

- BRT minimum service plan:
  - 16 hours of peak and midday service (10-minute headways) from 7 a.m. to 11 p.m.
  - 2 hours of morning and evening service (15-minute headways) from 6 a.m. to 7 a.m. and from 11 p.m. to midnight
  - 4 hours of early morning and late night service (30-minute headways) from midnight to 3 a.m. and from 5 a.m. to 6 a.m.
- LRT minimum service plan:
  - 12 hours of peak and midday service (15-minute headways), from 7 a.m. to 7 p.m.
  - 4 hours of morning and evening service (20-minute headways), from 6 a.m. to 7 a.m. and from 7 p.m. to 10 p.m.
  - 6 hours of early morning and late night service (30-minute headways), from 5 a.m. to 6 a.m. and from 10 p.m. to 3 a.m.

These days, times, and headways represent a typical winter season; operating days and hours would vary by season. This service plan would generate 224 bus trips per day or 144 LRT train trips per day, compared with the current 458 trips with the six routes, as shown in Table 4-6, or a reduction of 234 or 314 bus trips per day with BRT or LRT, respectively. Figure 4-3 shows the existing bus trips compared with the minimum LRT service plan trips by hour.

Table 4-6: Minimum BRT/LRT Service Plan Comparison

	Existing	BRT	LRT
Headway, peak hours and midday (minutes)	2–3 (BRT and locals)	10	15
Trips per day	458	224	144
Seated passenger capacity	40–57[a]	62[b]	120[c]
Daily capacity (passengers)	20,610[d]	13,888	17,280
Current / Potential Future Ridership Demand (passengers)	6,800	13,600	13,600

[a]Gilligs/MCIs.
[b]60-ft articulated bus.
[c]2-car train.
[d]Average weekday during winter season on six corridor routes.

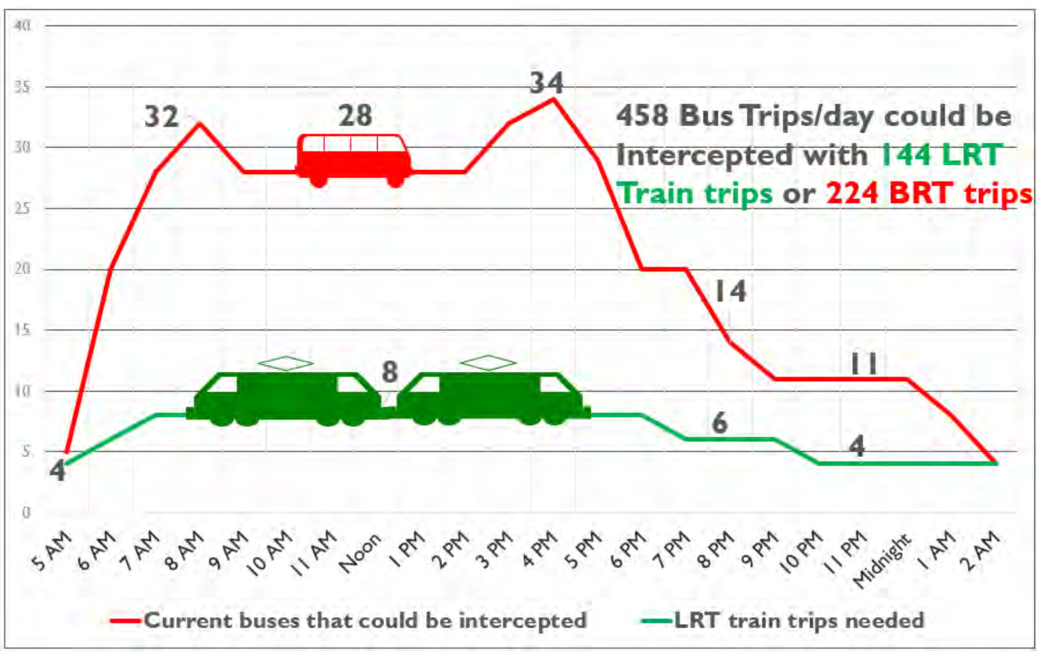

Figure 4-3: Buses vs. Trains at Rubey Park

4.3.3 Refined Service Plan

The minimum service plan headways described above would provide sufficient capacity for the existing passenger loads and future growth, even if the current ridership doubled by 2036. The minimum service plan headways would also significantly reduce the number of bus trips to/from Rubey Park. **However, RFTA has contractual service agreements with various entities that require certain levels of service and minimum headways to establish frequent, high-quality service. Consequently, the minimum service plan headways are not likely to be acceptable to RFTA's clients. A refined service plan for the mid-day, non-peak times would modify the bus headways somewhat to meet the contractual requirements but would more closely align capacity with demand. Optimizing is now possible, as the FTA grant requirements that have been in place since the start of the BRT are no longer applicable. The refined plan, based on a theoretical, technical evaluation, and as described below, could be modified only if it meets the contractual service agreements that RFTA has in place. Additionally, a wide variety of factors should be considered prior to making any service plan changes: weather, congestion, peak directional volumes, and quality of service.**

The theoretical, technical evaluation of the refined plan is defined as follows. By adjusting the six bus route service headways to a point between the existing headways and the minimum service plan headways, a high level of service would still be maintained but the number of bus trips at Rubey Park would also be reduced. Table 4-7 summarizes the headways for the refined bus service plan that would accomplish both objectives. The refined service plan would retain approximately 75% of the current bus trips on the six corridor routes. This would reduce the number of bus trips to/from Rubey Park by 102 bus trips per day, a 22% reduction, but it would still provide ample capacity for all passengers, both now and in the future. This refined service plan would also increase average passenger loads on the various routes by 25% to 50%, thereby making them more efficient and potentially reducing annual O&M costs.

Table 4-7: Refined Bus Service Plan

Route	Bus Trips per Day	
	Existing	Refined Service Plan*
BRT	149	112
Valley Express	12	8
Valley/82 Corridor	83	72
Snowmass/Aspen	73	54
Snowmass Ski	70	56
Buttermilk	71	54
Total bus trips/day	**458**	**356**
*Theoretical, technical evaluation only.		

Dynamics of demand (shifts from hour-to-hour, day-to-day, week-to-week, month-to-month, seasons to seasons, etc.) combined with the distance or routes, peak direction flows, weather, and traffic congestion make specific optimization recommendations difficult at this time. Theoretically, adjusting the six bus route service headways to meet the predicted demand could result in 102 less bus trips per day that are in Table 4-7, but due to the reasons listed above the actual number of buses that could be optimized in reality is a substantial degree less. **As they currently do, RFTA should continue to evaluate the effectiveness and efficiency of its services to make whatever reductions in bus trips that can be made without adversely affecting the quality and convenience of its services.**

A similar refined service plan could be developed for the LRT option if that mode is selected as the preferred alternative. One of the key advantages of the BRT option is that the six existing routes could continue operating as they do today, with seamless, one-seat rides for their passengers between Rubey Park and their destinations. The LRT option would require the bus passengers to transfer from bus to rail or rail to bus at Brush Creek to complete the remainder of those trips, which would increase the overall travel time and reduce passenger convenience, both of which could affect ridership as discussed in Section 5. Clearly, the details of a refined service plan will require careful analysis by RFTA and possible renegotiation of its various service contracts, but the result of that effort could help to meet the purpose of this study and could have additional benefits as described above.

The use of battery-electric powered buses on the six corridor routes, as described in Section 3, could also incorporate the refined service plan, reduce the number of buses at Rubey Park, and eliminate the need for transfers to/from any of the routes. In addition, electric buses would dramatically improve air quality and noise conditions along the corridor and at Rubey Park. This option is discussed further in subsequent sections.

4.4 Phasing of Alternatives

This section describes how to implement or phase into operation each modal alternative.

The LRT Alternative cannot be effectively phased into operation due to the significant capital construction associated with the track, stations, and systems placement. It would have to be implemented along the preferred alignment all at one time, thereby incurring the full development cost at the outset and requiring full funding support.

The BRT Alternative consists of many independent elements, any of which are implementable either on their own or as a package. This provides maximum flexibility to advance the BRT Alternative incrementally as funding resources or other policy concerns allow. The elements of the BRT Alternative in the approximate order of implementation are:

- Optimize service plan for Buttermilk, Snowmass, BRT and Valley routes.
- Buy electric buses for Buttermilk and Snowmass Village routes.
- Buy electric buses for BRT and Valley routes.
- Continue replacing additional diesel and CNG buses with electric buses.

- Build preferred modified direct alignment across the Marolt easement with new Castle Creek Bridge.
- Build continuous dedicated bus lanes from Brush Creek to Buttermilk.
- Retrofit buses to autonomous control.

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5 Current and Future Transit Ridership in the Corridor

This section describes the current (2016) and future (2036) transit ridership in the Brush Creek-to-downtown Aspen Corridor. The future transit ridership is presented in terms of a base condition and an alternative condition, characterized as follows:

- **Future base** represents year 2036 transit demand with 2036 transit supply. The demand reflects the planned underlying changes in population and employment within the RFTA service area, and the supply represents the existing service kept in a state of good repair. This service level may be characterized by RFTA continuing to operate in a manner consistent with their past so that change in ridership stays proportional to the change in overall person-trip demand (all modes). In effect, future transit shares remain relatively unchanged from the 2016 base year.
- **Future alternative** represents the future base condition modified by a transit alternative(s) to be tested. The demand reflects the forecast changes in transit ridership associated with the transit alternative(s) added to the future base demand.

An overview of the transit ridership forecasting methodology is presented in Section 5.1; the results are presented in Section 5.2.

5.1 Ridership Methodology Summary

Ridership for the premium transit service alternatives in the Brush Creek-to-downtown Aspen corridor are developed using the *RFTA Ridership Tool*[1] supplemented by off-line analysis. The Ridership Tool grows the existing transit ridership to the future (2036) base condition in accordance with planned changes to population and employment in the region and then adjusts this future base condition according to the anticipated changes in service levels (changes in travel times) associated with the premium transit alternatives. The Ridership Tool uses elasticity measures to calculate the change in transit ridership in response to a change in service level. Because the Ridership Tool organizes trips between specific origins and destinations, the alternative service level changes are targeted to the specific origin–destination pairs affected by the proposed change. For example, if travelers from down valley to Aspen benefit from an alternative differently than travelers from Snowmass to Aspen, the change in ridership is calculated separately according to the service-related benefits unique to each pair.

Two off-line (i.e., outside the Ridership Tool) analyses were performed to supplement the Ridership Tool's forecast ridership. These reflect some conditions specific to the analysis of the alternatives:

- Planned expansion of Aspen-Pitkin County Airport effect on transit usage in the corridor

[1] A set of customized Microsoft Office Excel workbooks designed to estimate transit ridership using a streamlined set of procedures rather than an elaborate ridership estimation model. It was developed as part of the RFTA Integrated Transportation System Plan (ITSP), which is a process to create a vision and long-range plan that further guides RFTA toward providing preferred transportation choices that connect and support vibrant communities. Detailed information about the Ridership Tool may be found in *Ridership Tool Documentation and User Guide (v1.0)*, dated March 2017.

- Constraint on the number of vehicles entering Aspen per the *SH 82 Entrance to Aspen Record of Decision* summarized in Section 1

5.1.1 Ridership Tool

The Ridership Tool's primary role in developing the forecast ridership for the BRT and LRT Alternatives was to document the future base year transit trips, based on the projected population and employment growth throughout the region, and to ascertain how many new trips may be anticipated based on each alternative's LOS changes afforded the potential transit user.

Table 5-1 documents the changes in population and employment both within and down valley of the Brush Creek-to-Downtown Aspen Corridor. The portion of the region generally down valley of the Brush Creek Intercept Lot is forecast to increase both population and employment at a rate faster than within the Corridor. The projected rate of population increase in both Woody Creek and Aspen is similar to the rate of employment increase in Snowmass Village, and the projected rate of population increase in Snowmass Village is similar to the rate of employment increase in Woody Creek and Aspen.

Table 5-1: 2016 and Projected 2036 Population and Employment in the Region

General Area	2016		2036		Ratio, 2036/2016	
	Population	Winter (March) Employment	Population	Winter (March) Employment	Population	Winter Employment
Down Valley	80,486	27,418	120,150	36,163	1.49	1.32
Snowmass Village	3,218	3,592	3,591	4,763	1.12	1.33
Woody Creek	1,542	169	2,124	182	1.38	1.08
Aspen	8,094	12,009	11,153	12,905	1.38	1.07
Total	**93,340**	**43,188**	**137,018**	**54,013**	**1.47**	**1.25**
Source: Land Use Memo, November 15, 2016. Zones outside UVMS Corridor are designated as down valley for representation here.						

The *Ridership Tool* translates these projected population and employment increases into a 20% ridership increase system-wide (over 2016 levels) and a nearly 16% increase in transit trips crossing Castle Creek. These increases are shown in Table 5-2 for the winter season. The reported changes represent growth in transit trips independent of the alternatives being studied.

Table 5-2: 2016 and Forecast 2036 Base Average Weekday Transit Trips (Winter Season)

Ridership Condition	Existing Base (2016)	Future Base (2036)	Change	Percent Change
Ridership, System-wide	17,600	21,200	3,600	20
Ridership, Crossing Castle Creek	8,300	9,600	1,300	16

To estimate the change in ridership specific to each study alternative, the changes in transit level of service experienced by the passenger both with and without the alternative are recorded for every origin–destination pair. For this study, LOS changes are limited to travel time changes only, which include both in-vehicle and out-of-vehicle time, with the latter comprising both transfer and additional wait time. The study alternatives do not result in a change in fare; therefore, monetary cost is excluded from the LOS calculation. In addition, no attempt has been made to give preference to one mode over the other (modal bias) based on a perceived user bias between the two modes. Reasons often cited for users preferring LRT over BRT may not be as convincing 20 years out, particularly as BRT technology advances and recognizing that the user would likely not have a choice between the two modal options.

Summarized below are the travel time changes for the two LRT end-of-line alternatives, recognizing that all affected passengers must transfer between LRT and bus at the Brush Creek Intercept Lot:

- Trips between locations down-valley of the Brush Creek Intercept Lot and the portion of the UVMS Corridor between the Airport and Castle Creek would experience a 5-minute increase in travel time owing to a transfer penalty at Brush Creek Intercept Lot. This time penalty is 2 minutes greater than the penalty assessed for the BRT alternative and is due to the greater distance that transferring passengers must travel between bus and LRT modes. Like the BRT Alternative, it is assumed that connecting bus services would have their schedules modified to provide a timed transfer at the Brush Creek Intercept Lot.
- Trips between locations down-valley of the Brush Creek Intercept Lot and Rubey Park would experience a net 3-minute increase in travel time. The same 5-minute transfer penalty applies; however, the LRT produces a 2-minute in-vehicle time savings over the existing bus, resulting in a net 3-minute increase in overall time. For the Galena Street end-of-line option, the net change in travel time is reduced by 1 to 2 minutes because of the shorter route.

Summarized below are the travel time changes for the two BRT end-of-line alternatives:

- Trips traveling across the modified direct alignment and the new Castle Creek Bridge will save 2 minutes. The savings increases to 3 minutes if one trip end is Galena Street rather than Rubey Park, because Galena Street is a shorter route.
- Trips using any of the SH 82 Valley services (BRT, Express, and Local) would incur 3 minutes of transfer time at the Brush Creek Intercept Lot. This is the amount of time that passengers are estimated to need to transfer between SH 82 Valley and UVMS Corridor transit services at the Intercept Lot, assuming that the buses are immediately adjacent to one another (such as a cross-platform transfer). In addition, the SH 82 Valley services would have their schedules adjusted to provide a timed transfer with the UVMS Corridor BRT service, resulting in no additional wait time. (Note that the BRT Alternative does include phasing for eventually electrifying the SH 82 Valley services so that the 3-minute transfer penalty is negated. However, complete electrification was not assumed for purposes of this analysis).

- Trips between Snowmass Village and Aspen would not incur a transfer penalty at Brush Creek Intercept Lot. Instead, this would continue to be a one-seat ride, with passengers afforded the 2- or 3-minute travel time savings if traversing the modified direct alignment and the new Castle Creek bridge as outlined above.

An elasticity factor was then applied to the alternative-specific travel time changes to yield the corresponding changes in ridership. The elasticity factor used in this study was –0.3, which translates to a 10% travel time savings producing a 3% increase in transit ridership. The factor is based on a review of national information. Note that, as a percentage of the overall travel time, a long-duration trip will realize a relatively small amount of travel time savings. This will in turn result in a smaller percent increase in ridership. A 2-minute savings realized on a 120-minute trip (Rifle to Aspen) is likely not great enough to sway ridership in this travel market. In this sense, the elasticity is logical.

Table 5-3 summarizes the change in ridership in response to the travel time changes specific to each of the study alternatives. Overall, the increases are rather small, with BRT producing slightly more riders than LRT. This is because the travel time benefits are greater for BRT (specifically, the bus-LRT transfer penalty negates the LRT in-vehicle travel time savings more so than for BRT).

Table 5-3: Change in Ridership Resulting from Travel Time Changes of Alternatives, Average Weekday (Winter Season)

Alternative	Change in Ridership
BRT, Rubey Park End-of-Line Option	200
BRT, Galena Street End-of-Line Option	300
LRT, Rubey Park End-of-Line Option	0
LRT, Galena Street End-of-Line Option	100

5.1.2 Supplemental Ridership

This section discusses the two off-line analyses identified in Section 5.1 that supplement the Ridership Tool's forecasts. Some unique conditions not specifically addressed by the Ridership Tool justify their need.

5.1.2.1 Planned Improvements at the Aspen-Pitkin County Airport

The Aspen-Pitkin County Airport is currently preparing an Environmental Assessment document for several planned improvements. These improvements include development of a new passenger terminal as well as relocating and widening the runway. These projects have two separate purposes. The reasons for replacing the existing passenger terminal are primarily related to deficiencies in the current terminal and in the apron area where commercial aircraft are parked. The new terminal is being sized to meet existing and future projected activity based on growth projections obtained from the FAA-approved forecast of aviation activity.

The airfield requires modifications to meet changing conditions, including a changing commercial aircraft fleet. This issue was studied in detail during the Future Air Services Study, which was completed in 2015. This study found that airlines are changing their aircraft fleet in response to air travel demand and it is expected that the aircraft serving the Aspen-Pitkin County Airport, which meet the County's current wingspan and weight limit, will eventually be retired from service in favor of larger aircraft with greater wingspan and passenger seating. These new aircraft will not meet the wingspan and weight criteria, which govern the Airport based on the current airfield configuration and FAA standards. As a result, the Airport risks the loss/reduction of commercial passenger service as it stands today. Before the new generation of aircraft will be allowed to operate at the Aspen-Pitkin County Airport, the FAA will require that the airfield be brought into compliance with current airfield design standards.

The project's Environmental Assessment document assumes that RFTA will maintain its existing approximately 3% share of airport trips in the future, resulting in an increase of about 40 airport-related transit trips for the average weekday during the winter season. Each proposed alternative would serve these additional transit trips to/from the airport.

5.1.2.2 SH 82 Entrance to Aspen Record of Decision Constraint on the Number of Vehicles Entering Aspen

A by-product of the Ridership Tool analysis is a forecast of person-trips (all modes) across the Castle Creek Bridge in Aspen. Subtracting the forecast transit trips crossing the bridge from the person-trip totals and then applying a reasonable average auto occupancy factor to the remaining person-trips yields an estimate of the forecast number of vehicle-trips across the Castle Creek Bridge. The number of vehicle-trips exceeding the 1993 target represents a market that is likely to shift to transit as a result of more stringent travel demand management measures (although some of the excess will continue as vehicle-trips at higher auto occupancies). The vehicle-trips exceeding the 1993 target are converted back to (transit) person-trips by using the same average auto occupancy factor. An estimated 800 additional weekday transit trips (winter season) would be generated by the forecast vehicle-trip demand across the Castle Creek Bridge exceeding the stated 1993 goal. Each proposed alternative would serve these 800 additional trips.

5.2 BRT and LRT Ridership

Tables 5-4 and 5-5 illustrate the ridership forecast for the proposed BRT and LRT alternatives, system-wide and crossing the Castle Creek Bridge, respectively. Each row in the tables represents a component in the ridership estimation discussed in Section 5.1. The tables indicate little ridership difference among the four alternatives, which is consistent with the relatively small changes in travel time anticipated within the corridor. They also show that the alternatives themselves contribute relatively little to the overall increase in ridership on the corridor. The bulk of the increase is expected to come from projected growth in population and employment in the region and which would use existing transit services absent any of the proposed project alternatives. Another significant contributing factor to the corridor ridership is the shift to transit brought about by the effects of Aspen's travel demand management program on keeping traffic volumes at 1993 levels. Figure 5-1 illustrates the relative contributions to the increase in transit ridership across the Castle Creek Bridge from existing (2016) levels to 2036 with BRT/LRT.

Table 5-4: Forecast System-wide Ridership for BRT and LRT Alternatives (Average Weekday, Winter Season)

	2036 BRT		2036 LRT	
Ridership Element	Rubey	Galena	Rubey	Galena
2036 Base (System-wide)	21,200			
Alternative: Travel Time Changes	200	300	0	100
Airport Special Generator (3%)	30	30	30	30
ETA Vehicle Constraint	800[a]	800[a]	800[a]	800[a]
Total (System-wide)	22,200	22,300	22,000	22,100

[a] Estimated.
Note. The 2016 Base system-wide ridership is 17,600.

Table 5-5: Forecast Ridership for BRT and LRT Alternatives Crossing Castle Creek Bridge (Average Weekday, Winter Season)

	2036 BRT		2036 LRT	
Ridership Element	Rubey	Galena	Rubey	Galena
2036 Base (System-wide)	9,600			
Alternative: Travel Time Changes	200	300	0	100
Airport Special Generator (~3%)	30	30	30	30
ETA Vehicle Constraint	800[a]	800[a]	800[a]	800[a]
Total (System-wide)	10,600	10,700	10,400	10,500

[a] Estimated.
Note. The 2016 Base ridership crossing the Castle Creek Bridge is 8,300.

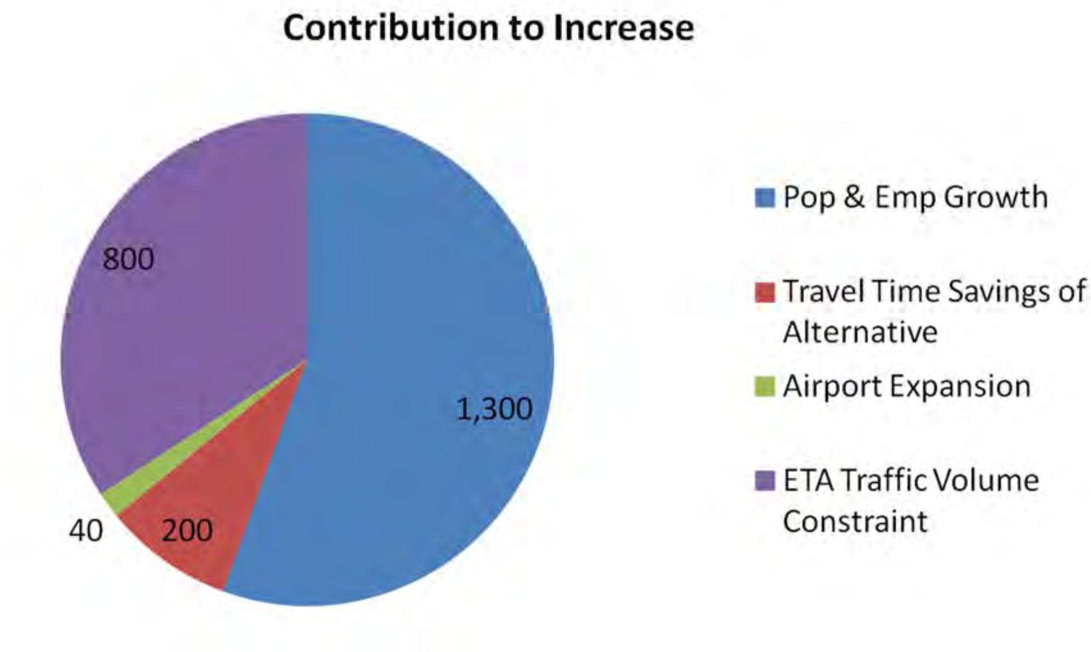

Figure 5-1: Figure 29. Contributions to Increase in Transit Ridership Crossing Castle Creek Bridge: 2016 to 2036 with BRT to Rubey Park (Average Weekday, Winter Season)

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6 Costs

The Brush Creek to Rubey Park corridor is planned for premium transit service in a fixed guideway using either LRT or BRT technology. This section describes the methodology used to calculate opinions on capital and O&M costs for each alternative technology. It includes opinions on the conceptual level capital and O&M costs for LRT and BRT technologies for the 6.1-mile corridor with a total of seven stations under a variety of alternative alignment, configuration, and operating variations.

Several sources were referenced for developing opinions of conceptual costs for both LRT and BRT system alternatives. Sources included past transit studies and projects in the area, CDOT cost data, RFTA actual costs, and similar completed projects in the United States. Consideration was given to the location of the project and the potential effects on the resort business.

For this cost estimation, the project delivery was assumed to be a design-bid-build rather than a design-build or public–private partnership (P3). This assumption was based on the need to gather consensus from the various entities and jurisdictions that would be involved in the project.

6.1 Capital Costs

Capital costs are one-time, up-front costs associated with the construction and implementation of a project. The methodology used to estimate the capital costs for the Brush Creek to Rubey Park corridor LRT and BRT alternatives included first defining the alignment, configurations, and operations of the systems. The cost build-up for capital expenditures included construction items that can be readily identified and measured, expected allowances for construction items that cannot readily identified, anticipated design and construction management costs, and ROW allowances. Because the design of the alternatives is of a conceptual nature and to account for unknown risks and market conditions, a contingency of 30% was added. All costs are expressed in 2016 dollars.

Alignment plans, profiles, typical cross sections, and associated item quantities generated in this study for LRT and BRT provided the basis for the infrastructure identifiable and measurable items. Parametric quantities from similar projects were used in the absence of detailed design plans. Unit costs for these items were derived from recent CDOT cost data, local project data, and Parsons' recent experience on similar LRT and BRT projects in the United States. A 20% escalation was applied to the Marolt easement crossing and the cut-and-cover costs developed in the 2008 Study. Percentages on the sum of these identifiable construction items were used for allowances for construction items not readily identifiable, given the current level of design. Allowances, typical industry percentage ranges, and the percentages used in these costs are shown in Table 6-1.

Table 6-1: Capital Cost Assumptions

Allowance	Percentage Range	Percentage Used
Environmental Mitigation and NEPA Compliance	1.5 – 3.0	3.0
Utilities (Relocations)	0.5 – 1.0	0.5
Drainage	3.0 – 5.0	3.0
Signing and Striping	0.5 – 1.0	0.5
Construction Staging & Traffic Control	5.0 – 15	7.0
Mobilization	5.0 – 15	7.0

Rolling stock costs for LRT vehicles were largely developed though manufacturer contacts and assessment of other systems in the United States. The estimates include an O&M facility for the LRT vehicles at the Brush Creek Intercept Lot. As some of the items discussed, in particular autonomous operation equipment, have not been fully developed, a speculative allowance was assigned. Rolling stock costs for BRT include consideration of actual RFTA vehicle costs and manufacturer contacts.

Design costs were generally based on the construction costs and range from 7% to 12%. For this project, 10% was added to account for preliminary and final design. Construction management costs are highly variable depending how they are assessed. CDOT typically uses 22% to cover the field costs and overall administration costs. Projects managed by consultants typically range from 5% to 15% depending on the project. For this study, 15% was applied to the construction costs for construction engineering and management.

ROW costs in the project area are relatively high, and speculative allowances were made for the areas needed for infrastructure.

These opinions on estimated costs were prepared using best practices, skill, and care typical of similar projects and estimating standards. They will be refined during subsequent phases of design development.

6.1.1 LRT Capital Costs

The primary capital cost elements of the light rail system include the following:

- Running ways are fixed guideway, curbside-running lanes dedicated for LRT operations. The LRT running ways include embedded track for street-running operation in the City of Aspen, ballasted track adjacent to SH-82, direct fixation track on the bridges and viaducts, switches and turnouts as required, and noise and vibration dampening.
- Structures include the cut-and-cover tunnels under the Maroon Creek Roundabout and on the Marolt easement and the new Castle Creek bridge. Several variations of the LRT system would include grade-separated crossing of SH-82 at Brush Creek, a separate viaduct along Shale Bluffs, and the undergrounding of the LRT station at the Airport Terminal. Rehabilitation of the existing Maroon Creek Bridge for LRT and the existing Castle Creek Bridge for local traffic is included in the estimates.

- Stations include seven stations in the corridor and 200-foot-long platforms for light rail (to accommodate two-car trainsets) that are 15 to 20 feet wide. The center platforms would be straddled by double (passing) tracks on either side and would typically include a 6- to 10-foot-wide side platform/sidewalk for bus transfer and pedestrian access. Station costs include platforms, canopies, lighting, stationary and variable message signs, benches, trash containers, art, emergency telephones, landscaping, electrical connections, and materials. The estimates include at-grade stations and elevated/depressed stations. If a grade-separated crossing of SH 82 at Brush Creek is required, an elevated or a depressed station would be needed at Brush Creek. If the intent is to have a LRT station at the airport terminal, an underground station would be necessary. Due to the concerns expressed regarding traffic interruptions at the Maroon Creek roundabout, the station at the roundabout is assumed to be depressed in order to allow the LRT to pass under the area of the roundabout (grade separated solution).
- Vehicles are the required number of LRT vehicles based on the service operating plan. Assuming 10-minute peak period service, a total of 10 new LRT vehicles (five 2-car trainsets) would be required, including a 20% spare vehicle ratio, based on the peak vehicle requirement.
- Support facilities include yards, shops, administration, and O&M facilities. For the LRT, a new O&M facility will be required at Brush Creek.
- Systems include transit signal priority (TSP) technology and crossing gates/traffic signal coordination to ensure public safety, improve operations, and reduce LRT travel time; this is applicable at most intersections within the City of Aspen and at the signalized intersections along SH 82. Systems also include communications and off-board fare collection for LRT, signals, as well as the OCS at stations and traction power substations (TPSS) for electrical propulsion of the LRT vehicles.
- ROW includes acquisition of additional land to accommodate all proposed transit improvements. This applies primarily to the acquisition of additional land near Castle Creek for the new bridge connecting to Main Street. Variations in the system for the underground airport station and Main and Galena station are included, as appropriate.

The 48 variations for technology, alignment, and station locations for the LRT system from Brush Creek to Aspen include the following:

- Technology:
  - Diesel-electric
  - Battery-Electric Onboard storage (OBS)
- SH 82 Crossing at Brush Creek:
  - At grade
  - Grade separated over SH 82
  - Grade separated under SH 82

- Shale Bluffs Alignment:
  - At-grade
  - On new viaduct
- Airport Station:
  - On SH 82 with moving walkway to terminal
  - Underground station at terminal
- Aspen Terminal:
  - At Rubey Park
  - On Main Street at Galena Street with shuttle to Rubey Park

To best represent these variations, a Base Case is developed as a functional system at the least cost, and elements of the variations are added to derive a Prime Case, the highest cost.

The Base Case considers diesel-electric power trainsets, an at-grade crossing of SH 82 at Brush Creek, and at grade along SH 82 to the Maroon Creek roundabout. The alignment tunnels under the Maroon Creek roundabout onto the Marolt easement across Castle Creek on a new bridge to Main Street at 7th Street and along Main Street to Monarch Street, up Monarch Street to Durant Street, and terminates at Rubey Park. Costs to rehabilitate the old Maroon Creek Bridge for LRT and the existing Castle Creek Bridge for local traffic are included. The following 7 LRT station locations are included:

- Brush Creek Intercept Lot
- SH 82 Airport Station with moving walkway to Airport Terminal
- Buttermilk
- Truscott/Aspen Golf Course
- Maroon Creek Roundabout Kiss-n-Ride
- 7th and Main
- Rubey Park

The estimated cost of the LRT Base Case is $428.0 million.

The Prime Case considers electric powered trainsets with OBS, grade separation of SH 82 at Brush Creek and on a viaduct along Shale Bluffs, and back on grade along SH 82 to the Airport. The alignment diverts from SH 82 and trenched to provide an underground station at the Airport Terminal. The alignment merges back onto SH 82 near Buttermilk and continues along SH 82 to the Maroon Creek roundabout. The alignment tunnels under the Maroon Creek roundabout onto the Marolt easement across Castle Creek on a new bridge to Main Street at 7th Street and along Main Street to its terminal at Galena Street An allowance is made for an improved Galena streetscape, and a shuttle system is provided along Galena Street to Rubey Park. Costs include rehabilitating the old Maroon Creek Bridge for LRT and the existing Castle Creek Bridge for local traffic. The following 7 LRT station locations are included:

- Brush Creek Intercept Lot
- Underground Station at Airport Terminal
- Buttermilk
- Truscott/Aspen Golf Course
- Maroon Creek Roundabout Kiss-n-Ride
- 7th and Main
- Main Street at Galena Street

The estimated cost of the Prime Case is $527.8 million.

Table 6-2 compares the Base and Prime Cases and provides the added cost (in parentheses) of each of the variations to add to the Base Case to arrive at the Prime Case.

Table 6-2: Base and Prime Case LRT Cost Comparisons

Feature	Base Case $ 428.0M	Prime Case $ 527.8M
Power	Diesel-Electric	Battery-Electric OBS ($30.5M)
SH 82 Crossing at Brush Creek	At-Grade	Grade Separated ($17.0M)
Shale Bluffs Alignment	At-Grade	On new Viaduct ($20.6M)
LRT Stations	All at or near existing bus stops; New station at 7th & Main	All at or near existing bus stops except airport station; new station at 7th & Main
Airport Station	At or near existing bus stop; moving walkway connects SH 82 airport station to airport terminal	Underground station at airport Terminal ($21.6M)
End-of-Line in Aspen	Rubey Park	Main & Galena St. w/ Galena streetscape and shuttle to Rubey Park ($10.1M)

The detailed cost build-ups for LRT are included in Appendix E.

For comparison, the LRT capital cost estimate for the Brush Creek to Rubey Park corridor is approximately $70.2 million per mile for the Base Case and approximately $86.5 million per mile for the Prime Case (both in 2016 dollars). The project team tested the reasonableness of this estimate by comparing it with other LRT projects built by other US agencies since 2008; these projects have ranged from $46 million to $232 million per mile in 2016 dollars as shown in Table 6-3, depending on the overall project complexity.

Table 6-3: Other Agencies' LRT Capital Costs per Mile

City	Project	Revenue Service Date	Owner	Length (mi)	Capital Cost, YOE ($M)	Capital Cost per Mile, YOE ($M)	Capital Cost per Mile, 2016 ($M)	Difficulty/ Complexity with Structures
Phoenix, AZ	Starter Line	Dec-08	Valley Metro	20.0	1,400.00	70.00	79.36	
Seattle, WA	Link LRT South Segment	Jul-09	Sound Transit	15.6	2,570.00	164.74	186.05	extensive
Portland, OR	MAX Green Line to Clackamas	Sep-09	Tri-Met	8.3	575.70	69.36	78.33	
Los Angeles, CA	Gold Line East	Nov-09	LAMTA	5.9	898.80	152.34	172.04	extensive
Dallas, TX	Northwest/Southeast lines	Dec-10	DART	21.0	1,406.00	66.95	74.23	
Salt Lake City, UT	Mid-Jordan line	Aug-11	UTA	10.6	535.37	50.51	54.10	
Norfolk, VA	The Tide	Aug-11	Hampton Roads Transit	7.4	318.50	43.04	46.11	
Los Angeles, CA	Expo Line - Phase 1	Jun-12	LAMTA	8.6	978.90	113.83	119.29	significant
Denver, CO	West Rail Line	Apr-13	RTD	12.1	707.00	58.43	60.31	
Salt Lake City, UT	Green Line – Airport Extension	Apr-13	TRAX	6.0	350.00	58.33	60.21	
Salt Lake City, UT	Blue Line – Draper Extension	Aug-13	TRAX	3.8	193.64	50.96	52.59	
Houston, TX	North Line	Dec-13	Metro	5.3	756.00	142.64	147.22	extensive
Minneapolis, MN	Green Line	Jun-14	Metro Transit	9.8	957.00	97.65	99.13	
Dallas, TX	Orange Line	Aug-14	DART	18.7	2,000.00	106.95	108.57	significant
Portland, OR	Milwaukie line	Jun-15	Tri-Met	7.3	1,228.00	168.22	170.56	extensive
Los Angeles, CA	Expo Line - Phase 2	Jan-15	LAMTA	6.6	1,511.20	228.97	232.15	extreme
Phoenix, AZ	Central Mesa Extension	Dec-15	Valley Metro	3.1	199.00	64.19	65.09	
Houston, TX	Southeast Line	Dec-15	Metro	6.6	822.00	125.30	127.05	significant

City	Project	Revenue Service Date	Owner	Length (mi)	Capital Cost, YOE ($M)	Capital Cost per Mile, YOE ($M)	Capital Cost per Mile, 2016 ($M)	Difficulty/ Complexity with Structures
Phoenix, AZ	Northwest Extension	Mar-16	Valley Metro	3.2	327.00	102.19	102.19	significant
Los Angeles, CA	Gold Line extension	May-16	LAMTA	11.3	957.00	84.69	84.69	
Denver, CO	I-225 Rail Line	Nov-16	RTD	10.5	687.00	65.43	65.43	
Charlotte, NC	Blue Line Extension	2018	Lynx	9.3	1,160.00	124.73	117.57	significant
Minneapolis, MN	Southwest line	2019	Metro Transit	15.8	1,650.00	104.43	95.57	significant
Denver, CO	Southeast Rail Line Extension	2019	RTD	2.3	236.00	102.61	93.90	significant
Montgomery County, MD	Purple Line	2020	MTA	16.3	2,200.00	134.97	119.92	significant
Average of all 25 LRT projects						102.06	104.47	
Average of 12 LRT projects without significant issues						64.96	68.30	
YOE = Year of Expenditure								

Every project was unique and many have involved complex construction issues, high ROW costs, and multiple bridges and/or tunnel segments — all of which have a large impact on the cost per mile. Construction costs and escalation rates also vary across the country, and if anything, were quite low during the recent Great Recession years. The criterion used to judge the complexity was a basic understanding of the projects from published material and first-hand experience, for example, the number/length of bridges and tunnels (as in Seattle and Los Angeles), complexity of construction (e.g., within an operating freeway ROW as for the Los Angeles Gold Line), and amount of ROW that was purchased.

These conditions were compared with more straightforward projects such as several in Denver that involved some bridges but reflected an environment similar to the Brush Creek to Rubey Park corridor with a primarily at-grade alignment. For example, the total length of LRT bridges/aerial segment on the Denver RTD I-225 line was about half of the bridge length on the Denver RTD Southeast line, one of which crosses the eight-lane I-25. Similarly, the Seattle line includes a significant tunnel under a portion of downtown (shared with buses) and a long elevated segment including the portion of the alignment going into SEA-TAC airport. To some degree, the assessment is qualitative, but it is the best available until the Brush Creek to Rubey Park corridor design is advanced with more details.

The group of 12 relatively straightforward LRT projects in the table that are similar to the Brush Creek to Rubey Park corridor have an average cost of $68.3 million per mile in 2016 dollars, compared with the full 25 projects that average $104 million per mile. The conclusion is that the 2016 costs per mile calculated for the Brush Creek to Rubey Park corridor are reasonable. The capital cost estimates will be further refined at each stage of design and engineering development.

6.1.2 BRT Capital Costs

The primary capital cost elements include the following:

- Route (or Running ways) for the BRT are generally on SH 82. From Buttermilk to the Maroon Creek roundabout, buses currently travel on dedicated bus lanes. Consideration is given to extending the dedicated lanes into Aspen and down valley to Brush Creek in the variations of the system. The dedicated BRT lanes are generally 12 feet wide. Extension of the running ways include reconstruction of the existing general-purpose lanes, including grading, base course, and steel-reinforced concrete pavement, as well as curb and gutter replacement, where appropriate.
- Structures include the cut-and-cover tunnel across the Marolt easement and the new Castle Creek Bridge. Rehabilitation of the existing Castle Creek Bridge as per the ROD for local traffic is included in the estimates.
- Seven locations are included in the corridor with station platforms measuring 100 feet long by 15 feet wide on each side of the roadway. A variation of the end-of-line station is included on Main Street and Galena Street. The costs include platforms, canopies, lighting, stationary and variable message signs, benches, trash containers, art, emergency telephones, landscaping,

electrical connections, and materials. The estimates include all at-grade stations. The BRT will include 12 station platforms because the BRT station platforms are located on both sides of the roadway for service (five locations with two platforms at each), except for the two end-of-line stations, which would have single platforms.

- Vehicles are the required number of buses based on the service operating plan. Assuming a 10-minute peak period service, 10 new buses would be required, including a 20% spare vehicle ratio based on the peak vehicle requirement.
- Support facilities include yards, shops, administration, and O&M facilities. For the BRT, RFTA's existing maintenance facilities are considered sufficient to accommodate the additional BRT vehicles; no added cost is included for these facilities.
- Systems include communications and off-board fare collection for BRT, and the charging system (including both station charging and depot charging costs)in the variation to use battery-powered buses. For the variation using autonomous bus operation, precision mapping and on-bus equipment is included in the estimates.
- ROW includes acquisition of additional land to accommodate all proposed transit improvements. This applies primarily to the acquisition of additional land at Castle Creek for the new bridge connecting to Main Street. The easement across Marolt Open space is already in-place, so no costs are included for that. Variations in the system for the Main and Galena station are included, as appropriate.

The 16 variations for technology, alignment, station locations, and operation control for the BRT system from Brush Creek to Aspen include the following:

- Technology:
  - CNG
  - Battery-Electric OBS
- Alignment:
  - On SH 82
  - On dedicated bus lanes
- Aspen Terminal:
  - At Rubey Park
  - On Main Street at Galena Street with shuttle to Rubey Park
- Operation:
  - Operator Controlled
  - Autonomous Control

As for the LRT, a Base Case is developed for BRT as a functional system at the least cost, and elements of the variations are added to derive a Prime Case, the highest cost.

The Base Case considers CNG power, at-grade along SH 82 to and across the Marolt easement, across Castle Creek on a new bridge to Main Street at 7th Street and along Main Street to Monarch Street, up Monarch to Durant Street and a terminal at Rubey Park. Costs include rehabilitating the existing Castle Creek bridge for local traffic. The following BRT stations are included:

- Brush Creek Intercept Lot
- SH 82 Airport Station with moving walkway to Airport Terminal
- Buttermilk
- Truscott/Aspen Golf Course
- Maroon Creek Kiss-n-Ride
- 7th and Main
- Rubey Park

The estimated cost of the Base Case is $159.1 million.

The Prime Case considers autonomous electric-powered buses with onboard storage/depot charging, at-grade along dedicated bus lanes on SH 82 to and across the Marolt easement, across Castle Creek on a new bridge to Main Street at 7th Street, and along Main Street to its terminal at Galena Street. An allowance is made for an improved Galena streetscape, and a shuttle system is provided along Galena Street to Rubey Park. Costs include rehabilitating the existing Castle Creek bridge for local traffic. BRT stations are the same as in the Base Case except for the terminus at Main and Galena streets.

The estimated cost of the Prime Case is $200.5 million.

Table 6-4 compares the Base and Prime Cases; the added cost of each variation added to the Base Case to constitute the Prime Case is shown in parentheses.

Table 6-4: BRT Base vs. Prime Case

Feature	Base Case $ 159.1M	Prime Case $ 200.5M
Power	CNG	Electric OBS ($19.7M)
Alignment	At-grade on SH-82 to roundabout	Dedicated bus lanes ($3.4M)
End-of-Line in Aspen	Rubey Park	Main & Galena w/Galena shuttle to Rubey Park ($10.1M)
Control	Operator	Autonomous ($8.2M)

The detailed cost build-ups for BRT are provided in Appendix F.

6.1.3 BRT Phasing Capital Costs

As described in Section 4.4, consideration is given to phasing in electric buses for the BRT system between the Brush Creek Intercept Lot and Aspen. The anticipated costs of each of the elements for the phasing are as follows:

- Marolt easement crossing with New Castle Creek Bridge: $102.6 million
- BRT Dedicated Bus Lanes Brush Creek Intercept Lot to Buttermilk: $3.4 million
- BRT Electric Bus Charging System - Brush Creek to Aspen: $13.0 million
- BRT Electric Buses with On Board Storage: $1.3 million each
- BRT Autonomous Control Infrastructure: $4.9 million
- BRT Autonomous Control Bus Retrofits: $0.3 million each

The detailed cost build-ups for the items listed above are provided in Appendix F. The estimates for BRT autonomous control infrastructure and bus retrofits are speculative at this time because the technology is still emerging. Currently, by state law, even with autonomous control, an operator must be behind the wheel.

6.2 Operations and Maintenance Cost

O&M costs were developed using the best available information from various sources and represent average yearly costs that can be expected for these systems. Note that for both LRT and BRT systems, infrastructure for O&M is included in the capital costs.

6.2.1 LRT Operation and Maintenance

As shown in Table 6-5, LRT O&M cost per hour varies widely across the United States, with an average of $274.66 per hour in 2016.

Table 6-5: LRT O&M Costs

City	Cost, $/hr
Los Angeles	385.59
San Diego	151.05
Sacramento	278.21
San Francisco	375.39
Portland	219.60
Denver	190.15
Charlotte	212.00
Salt Lake City	160.00
St. Louis	294.46
Dallas	372.47
Houston	277.54
Minneapolis	155.00
Cleveland	248.36
Baltimore	329.32
Boston	295.62
Seattle Sound Transit	449.85
Average	274.66

Based on this average cost of $274.66 per hour and the minimum LRT service plan, the total annual O&M cost for the LRT system envisioned for the Brush Creek Intercept Lot to Aspen would be approximately $6.0 million. Some of this cost would be offset by savings from the reduction in bus service O&M, which assumes 15-minute headway during peak and midday hours. LRT O&M cost would increase to $8.4 million per year with 10-minute peak/midday service and would require one additional two-car trainset at a cost of approximately $9.0 million.

6.2.2 BRT Operations and Maintenance

As with LRT, BRT O&M cost per hour varies widely across the United States as shown in Table 6-6 with an average of $137.06 per hour in 2016. A review of the 2016 RFTA O&M costs shows $120.06 per hour.

Table 6-6: BRT O&M Costs

City	Cost, $/hr
Los Angeles	145.71
San Diego	91.11
Sacramento	144.61
San Francisco	200.99
Portland	139.19
Denver	117.24
Charlotte	101.32
Salt Lake City	109.05
St. Louis	115.66
Dallas	111.98
Houston	122.87
Minneapolis	151.14
Cleveland	135.48
Baltimore	162.72
Philadelphia	162.42
Boston	188.54
Seattle King County	166.74
Las Vegas	100.24
Average	137.06

Based on RFTA's average cost per hour and the minimum BRT service place, the total annual O&M cost for the minimum BRT system envisioned for the Brush Creek Intercept Lot to Aspen would be approximately $3.2 million. Some of this cost would be offset by savings from the reduction in other bus service O&M costs. This assumes 10-minute bus service during peak/midday hours.

6.3 Cost Effectiveness of the Alternatives

The LRT system considered for the Brush Creek Intercept Lot to Aspen does not provide a cost-effective solution (i.e., benefit to cost) for the area because of its high capital cost, high O&M cost, inability to effectively phase the base system, and lack of sufficient funding.

The BRT system, however, is cost effective, especially in terms of phasing in battery-electric powered buses. Beyond the buses themselves, the highest initial capital cost for this alternative would be the charging system. Depending on RFTA service coming into the Brush Creek station, the refined BRT option could also allow one-seat rides on the same vehicle, rather than the forced transfer between existing buses and light rail vehicles. The electric buses would also provide the same improvement in air and noise quality as the LRT option.

Construction of the preferred modified direct alignment across the Marolt easement and the dedicated bus lanes continuous from Brush Creek to Buttermilk could occur when funding is available. Those improvements would further reduce travel times, increase ridership, reduce O&M costs, and improve the overall transit operation and rider experience.

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7 Opportunities and Effects of the Alternatives

7.1 LRT Opportunities

Given the high capital and O&M costs and the lack of funding, LRT does not appear to be an affordable option in the near term between the Brush Creek Intercept Lot and Aspen. In the future, there may be an opportunity for LRT service connecting Aspen with down-valley communities and beyond if there is sufficient funding to support such a system. However, if this system were built, the LRT could potentially reduce the number of buses at Rubey Park to a greater degree, and improve air and noise quality more than a BRT system.

7.2 BRT Opportunities

Opportunities exist for optimized BRT between the Brush Creek Intercept Lot and Aspen, especially in terms of phasing in battery-electric buses, dedicated bus lanes, and the Marolt easement crossing. The envisioned system would reduce the number of buses in Aspen and, if the buses are battery-electric, the system would present an opportunity for cleaner air and less noise.

Bus service refinements for Buttermilk, Snowmass, BRT, and Valley routes would help reduce the number of buses and improve efficiency with higher passenger loads. However, any refinements need to meet RFTA's current service agreements and should be made without adversely affecting the quality and convenience of its services. These opportunities would extend down valley to other communities if electric buses were to replace the current CNG, hybrid, and diesel buses.

The system would also present an opportunity to reduce congestion in and out of Aspen if the dedicated bus lanes and crossing of the Marolt easement were built. By increasing ridership and including the Marolt crossing improvements, phased BRT improvements could set the stage for a future LRT system — especially with the connection between the Maroon Creek roundabout and 7th and Main streets.

7.3 Traffic Impacts of the Alternatives

7.3.1 Existing Conditions (Year 2016)

The SH 82 corridor is generally regarded as one of the most congested rural highway corridor in Colorado, and the Upper Valley (from Brush Creek Road through downtown Aspen) has been the most affected portion of the corridor.

The level of service (LOS) of signalized intersections is based on control delay, with thresholds for LOS determinations shown in Table 7-1; less delay equates to better/higher level of service, as labeled with letter grades of A-F.

Table 7-1: Levels of Service Criteria for Signalized Intersections

LOS	Control Delay (seconds/vehicle)
A	<=10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80
Source: 2010 Highway Capacity Manual (HCM)	

Turning movement counts were collected for eight signalized intersections along the SH 82 corridor. These counts were taken on Wednesday, November 9, 2016, for the peak periods of 7 to 9 a.m. and 3 to 5 p.m. Uniform peak hours of 7:15 to 8:15 a.m. and 3:45 to 4:45 p.m. were used when analyzing these eight intersections. The peak hour volumes, results of the counts for each leg of the intersections, and the analysis methodology are provided in Appendix D. Table 7-2 shows the overall LOS results for the eight intersections during the morning and afternoon peak periods.

Table 7-2: Levels of Service, Existing Summer Conditions

Location	2016 AM	2016 PM
Brush Creek	C	D
Airport/Baltic	D	C
Harmony Road	B	A
Owl Creek Road	C	C
Truscott Place	D	C
Aspen Street	A	B
Monarch Street	A	B

The Roaring Fork Valley — and the Upper Valley in particular — experiences a high degree of seasonality in its traffic patterns. Both winter and summer seasons are known to have higher volumes than the traffic counts that were taken in November. The City of Aspen maintains a permanent traffic counter at the intersection of Cemetery Lane and SH 82 and provided the project team with the hourly counts for Year 2015 and partial Year 2016. To determine the impact of seasonality on the volume of traffic, the weekdays (Tuesday to Thursday) between July 12 and August 10, 2016, and February 10 to March 10, 2016, were compared to the weekdays of November 3 to 12, 2015. This November 2015 period is the 2-week period surrounding the one year prior to the collection of turning movement counts and was used because the November 2016 Cemetery Lane hourly volumes were not available at the time of analysis. The ratios of summer/winter volumes to the fall conditions were then determined, as shown in Table 7-3.

Table 7-3: Seasonality Ratio

Period	24-Hour Volume	AM Peak Period	PM Peak Period
Winter 2016	1.04	0.93	1.04
Summer 2016	1.19	1.06	1.05

In this case, a ratio greater than 1.0 indicates a 2016 summer or winter condition exceeding the fall volumes. As shown in Table 7-3, both the summer and winter conditions exceed the fall conditions in terms of 24-hour volumes, but only the summer conditions are consistently higher during both the morning and afternoon peak periods. Because the summer peak period conditions are higher than both the fall and winter conditions, the remaining analysis in this study will use volumes expanded to assumed summer conditions.

Although winter traffic volumes in the area appear to be lower than summer, this period is obviously the only one in which the area ski resorts are in full operation. This is likely to have an effect on the direction of traffic flow in the study area, in addition to the differences in traffic volumes.

7.3.2 Future Year Projections

This section explores the historical changes in traffic patterns and projects these changes to the long-term planning horizon of Year 2036. The Aspen area has shown a great sensitivity to traffic volumes on the SH 82 corridor and has tied the performance of the *Entrance to Aspen Record of Decision, 1998* (ROD) to maintaining traffic volumes at the Castle Creek Bridge at or below 1993 volumes. Figure 7-1 shows actual average annual daily traffic (AADT) volumes as compared to the Year 1993 benchmark provided by the City of Aspen.

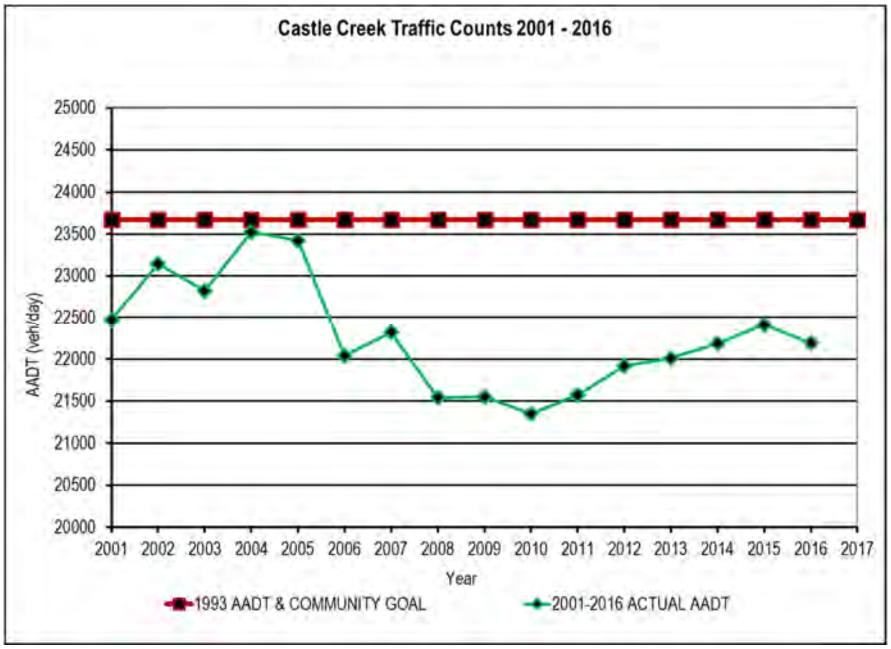

Figure 7-1: Castle Creek Bridge AADT by Year

Volumes at this location have been variable, nearing the ROD threshold in 2004, then reducing until 2010. This trend may be due to an increased share of transit ridership in the area and the decline in the economy during much of that period. Since 2010, traffic volumes have been on the rise, and in Year 2015, the AADT volumes at Castle Creek rose to 22,411 vehicles per day.

Although Travel Demand Management (TDM) programs in the Valley are expected to work to maintain traffic volumes at or below 1993 values, a sensitivity analysis should be performed to gauge the impact of exceeding the ROD criteria. For Year 2036 conditions, the Year 2016 summer expansion volumes were given an annual growth rate of 0.25%, which equates to Year 2036 AADT volumes at Castle Creek approximately 3% higher than the ROD criteria. The application of the summer expansion and 20-year growth rate to the peak hour turning movement counts are provided in Appendix D (Figures 4-2 and 4-3). Table 7-4 shows the resulting LOS for the intersections for 2036 (no build alternative) compared to the results from 2016.

Table 7-4: Existing and Future Summer Conditions Level of Service (LOS)

Location	2016 AM	2016 PM	2036 AM	2036 PM
Brush Creek	C	D	C	E
Airport/Baltic	D	C	E	D
Harmony Road	B	A	B	A
Owl Creek Road	C	C	D	C
Truscott Place	D	C	E	D
Aspen Street	A	B	A	B
Monarch Street	A	B	A	B

7.3.3 LRT Traffic Impacts

7.3.3.1 LRT Traffic Impacts at Brush Creek

Figure 7-2 presents several options that were considered for crossing SH 82 in the vicinity of the Brush Creek Intercept Lot. The grade-separated crossing options would have no permanent impact on the operation of the Brush Creek intersection. However, these options all have a much higher cost compared to Option D-1, the at-grade option. The intersection of Brush Creek Road with SH 82 currently has side-street split phasing, in which each minor direction of traffic is released into the intersection separately. The primary direction from Snowmass Village is actuated and is currently allowed to take up to 35 seconds of green time during both the morning and afternoon peak periods. Of this 35 seconds of potential green time, Travel time estimating software (Synchro) estimates that during the higher delay PM peak, the phase used an average of 17.5 seconds during the 2016 fall conditions and 18.5 seconds when the counts are expanded to summer conditions. If a train can cross SH 82 during this green time (180 feet at an average of 7 mph), the only movement to be substantially affected during afternoon peak conditions would be the right turn movement from Brush Creek Road to up-valley SH 82. This movement (generally running free) would have to be stopped when trains approach.

The LRT traffic impacts at Brush Creek can be summarized as follows:

- LRT grade-separated options — no traffic impacts but significantly higher cost
  - 57% increase in delay with 6 closures/hour
- Option D-1 (recommended): at-grade crossing of SH 82 only
  - No traffic impacts
  - Integrates train crossing within existing signal timing
  - Allows Brush Creek through movements, eastbound and westbound right turns during train crossing
  - Eliminates cost and visual impacts of rail bridge over SH 82

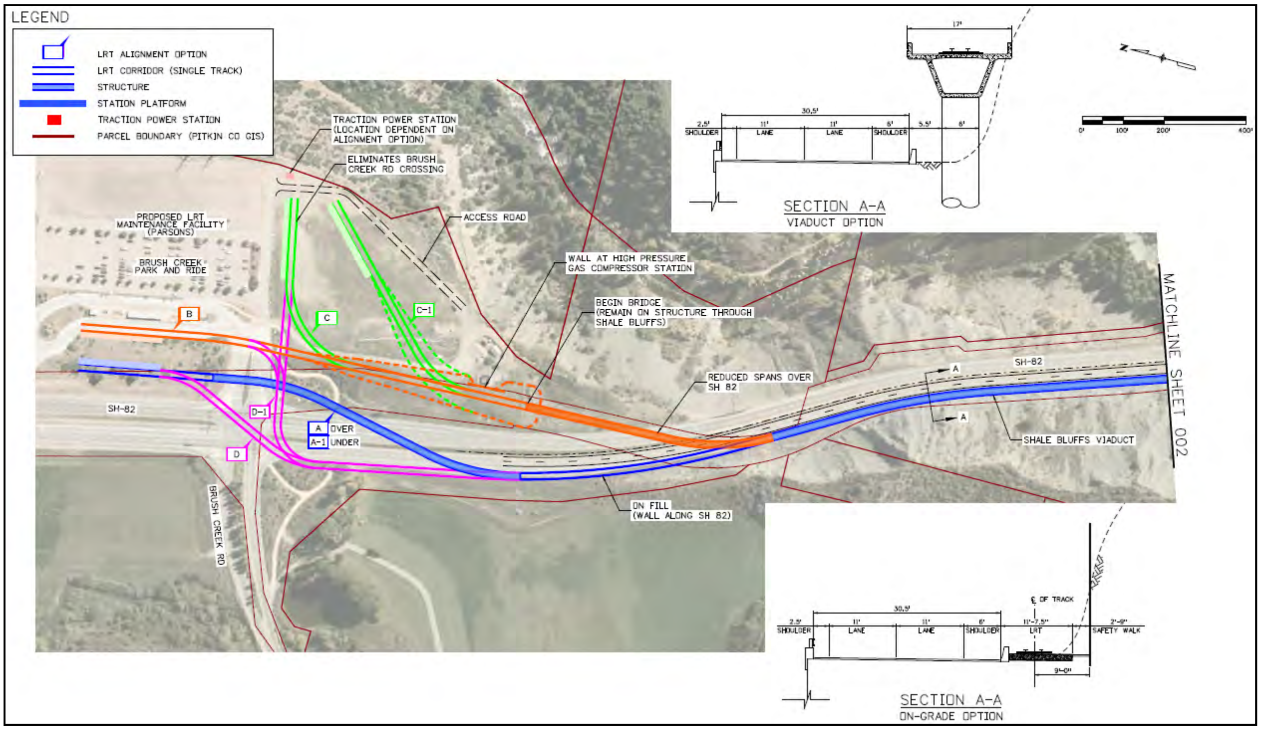

Figure 7-2: Proposed Options at Brush Creek

7.3.3.2 LRT Traffic Impacts at Maroon Creek Roundabout

The first analysis assumes that crossing gates have been constructed in multiple locations, but the physical geometry of the roundabout is not affected. In addition to constructing crossing gates on both directions of Maroon Creek Road and Castle Creek Road at the LRT crossing, safety concerns regarding queuing within the roundabout would also require the outside (through-right) lane of up-valley SH 82 and inside (through-left) lane of down-valley SH 82 to be gated prior to entering the roundabout.

Retaining the existing geometry of the roundabout results in substandard (LOS F) conditions in the down-valley direction, with maximum queues approaching 3,000 feet. During the afternoon peak period, this reduces the overall LOS from LOS B to LOS E in Year 2036.

To mitigate the concerns of using an at-grade LRT crossing, the second option, shown as Option A in Figure 7-3, takes the previous assumptions and adds an exclusive down-valley SH 82 left turn lane. It also adjusts the circulating lanes of the roundabout to accommodate this geometry, resulting in uninterrupted down-valley through traffic at this roundabout.

When Year 2036 summer expansion volumes are applied to this lane geometry, it results in model conditions improved over the no-build condition during both peak hours analyzed. The down-valley approach of SH 82 improves from LOS C to LOS B, and the average overall delay for the roundabout improves by 5 seconds per vehicle during both the AM and PM peak periods.

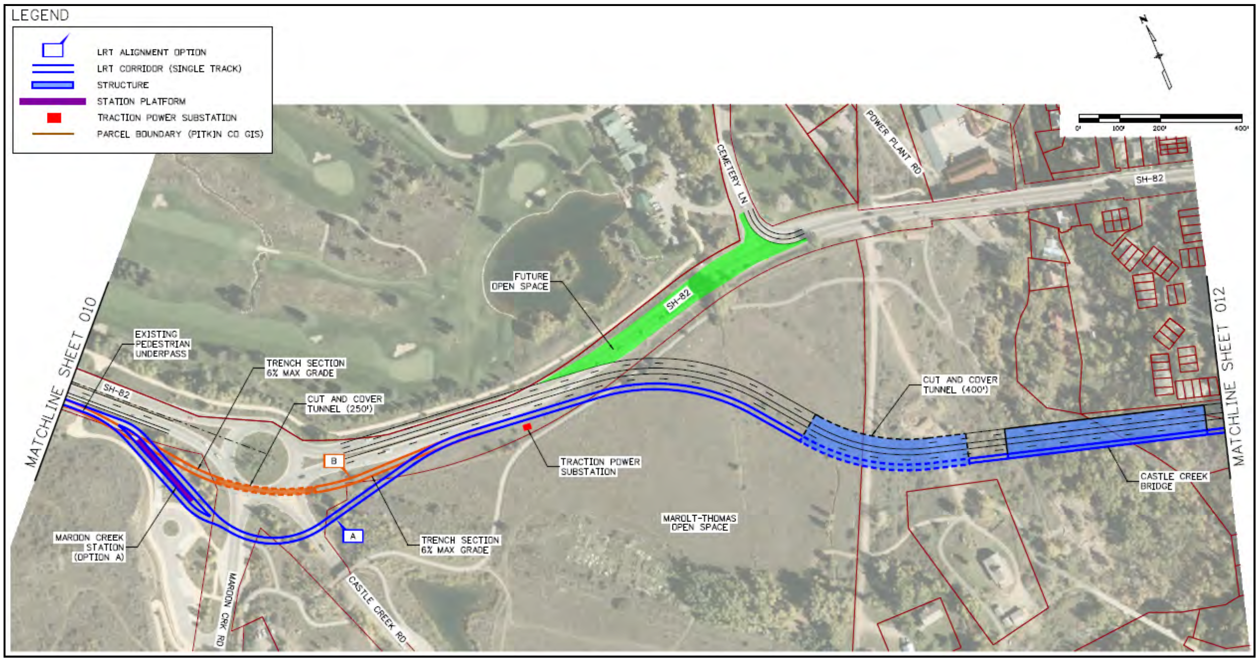

Figure 7-3: Proposed Changes at Maroon Creek Roundabout

This option would require widening the down-valley SH 82 approach to accommodate this geometry and would likely require additional ROW.

The primary benefit of another option, grade-separating LRT traffic from automobile traffic at the Maroon Creek roundabout, will be the elimination of any direct, permanent impact on the flow of vehicular traffic. This is shown as Option B in Figure 7-3 and results in LOS conditions at the roundabout that should be the same as those modelled under the no-build conditions.

The LRT traffic impacts at the Maroon Creek Roundabout can be summarized as follows:

- Option A: At-grade crossing of Maroon and Castle Creek
  - Adds 4 seconds per vehicle of delay during peak hours
  - LRT-induced queues dissipate prior to next LRT arrival
  - <u>May</u> warrant closure of entries to roundabout

    Southbound traffic to Maroon/Castle Creek queue within roundabout and block eastbound SH 82 traffic

    Northbound traffic from Maroon/Castle Creek queues over tracks
  - Fine-tuning and investigation of alternative mitigation is warranted before concluding closure of all entries
- Option B: LRT underpass option
  - No traffic impacts
  - Higher cost

7.3.4 BRT Traffic Impacts

Several key improvements have been made to the SH 82 in support of exclusive bus lanes in the study area:

- From the Brush Creek Road intersection to the vicinity of Harmony Road, a time-of day restricted bus/HOV lane has been constructed with a queue jump lane at the AABC intersection.
- VelociRFTA, a BRT system, has been implemented throughout the Roaring Fork Valley.
- A bus-only lane has been built from AABC up to the Maroon Creek Roundabout in the up-valley direction.
- A bus-only lane has been built from the Maroon Creek Roundabout to Harmony Road in the down-valley direction.
- A time-of-day dependent down-valley bus lane has been built from Garmisch Street to 6th Street in Downtown Aspen.
- Improved bus shelters and adjacent pedestrian crossings have been installed at several locations.
- The Rubey Park Transit Center has been renovated and reconstructed.

Assuming the continued development of the bus system rather than the construction of LRT infrastructure, the largest remaining component of the exclusive bus system is to complete the modified direct alignment across the Marolt easement and connect SH 82 directly to downtown via a new bridge crossing Castle Creek.

Referred to by the ROD as the “Modified Direct Alternative,” SH 82 would leave its existing alignment up-valley of the Maroon Creek Roundabout, traverse the Marolt easement via a cut-and-cover tunnel (maintaining existing wildlife corridor connectivity), and connect directly to Main Street via a new bridge over Castle Creek. These improvements are shown in Appendix D, Figure 8-3. Although this would remove the capacity constraints of the Hallam Street/7th Street/Main Street S Curves, it would have little effect on the intersections analyzed as part of this study.

For the BRT Alternative, the expected cross section within the Modified Direct Alternative alignment would consist of one general-purpose lane in each direction and a bus-only lane in each direction of SH 82. This bus-only lane could be converted into an LRT lane in the future.

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8 Funding

This section reviews RFTA's existing funding sources and evaluates a variety of other possible sources and mechanisms that might support the alternative transit improvements in the UVMS corridor, particularly for new capital costs. RFTA's current funding sources to support O&M costs are expected to continue and presumably could be expanded to cover additional O&M costs associated with UVMS corridor service improvements. When key decisions have been made regarding the preferred characteristics of the UVMS Corridor transit investment, RFTA will expand on this initial funding options analysis to identify a specific funding package and determine financing strategies, as appropriate.

It should be noted that the buses currently operating in the UVMS corridor, along with many of RTFA's other buses, are scheduled for replacement over the next 10 years, as shown in Table 8-1.

Table 8-1: RFTA Bus Replacement Schedule

	2016	2017	2018	2010	2020	2021	2022	2025	Total
Capital Outlay, $	4,464,264	9,134,296	4,609,190	11,780,638	1,137,028	1,489,696	6,110,279	15,511, 925	54,237,316
Quantity	6	14	8	21	2	2	8	22	83

The Phased BRT Implementation option would replace the existing buses with battery-electric powered buses that are approximately 20% to 30% more expensive than CNG buses of the same size. The electric buses, however, have significantly lower energy costs over their useful life, thereby lowering the O&M costs and offsetting the initial capital cost.

8.1 RFTA Organizational/Financial Background

RFTA is guided by a Board of Directors that was formed in 2000 and consists of elected officials from the City of Aspen, Town of Basalt, Town of Carbondale, Eagle County, City of Glenwood Springs, Town of New Castle, Pitkin County, and Town of Snowmass Village. RFTA is supported by a variety of revenue sources: sales and use tax, service contracts, fare revenues, grant revenue, and local government contributions. As expressed in RFTA's core values, the organization offers affordable and competitive transportation options to the public, and therefore fare increases are kept to a minimum to encourage ridership.

Each jurisdiction provides funding to RFTA through sales and use taxes dedicated to transit. RFTA also provides contract service under specific service agreements. An overview of the various jurisdictions and their funding allocations are shown in Tables 8-2 and 8-3.

Table 8-2: RFTA and its Regional Members

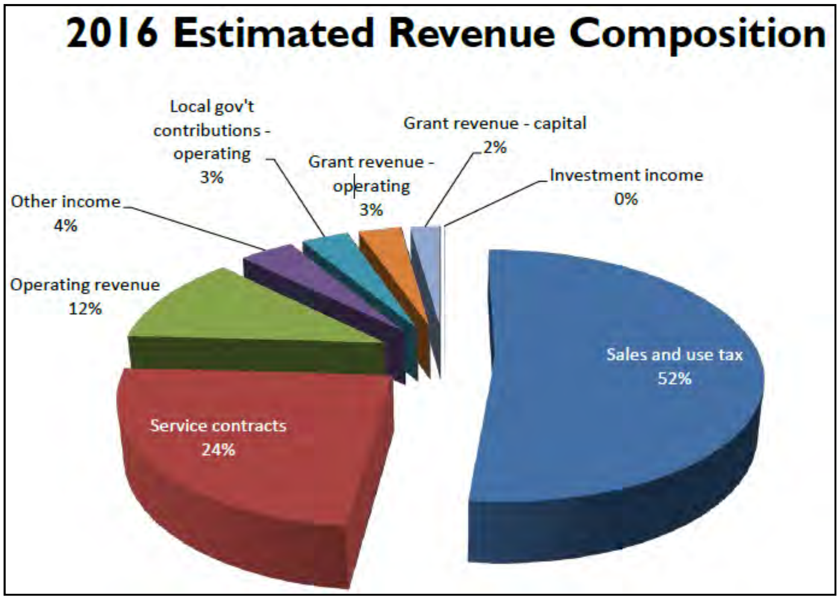
Relationship	Regional Jurisdiction	Current Overall Effective RFTA Tax Rate, %	Description
Regional RFTA Member Jurisdictions	Pitkin County	1.805	One-cent mass transit tax, 0.4% of half-cent mass transit tax, 0.4% RTA sales tax
	City of Aspen	1.165	0.36% of one-cent mass transit tax, 0.4% of half-cent mass transit tax, 0.4% RTA sales tax, service agreement
	Snowmass Village	1.165	0.36% of one-cent mass transit tax, 0.4% of half-cent mass transit tax, 0.4% RTA sales tax, service agreement
	Basalt	1.3	Contributes to Pitkin and Eagle County 0.5% mass transit tax, 0.8% RTA sales tax
	Eagle County	1.1	Contributes 0.5% of Eagle County Mass Transit Tax collected in the Eagle County portion of the Roaring Fork Valley, 0.6% RTA Sales Tax
	Carbondale	1.0	RTA Sales Tax
	Glenwood Springs	1.0	Ride Glenwood Springs Contract + Traveler Agreement + 1.0% RTA Sales Tax
	Town of New Castle	0.8	0.8% RTA Sales Tax
RTA = Rural Transportation Authority			

Table 8-3: RFTA Service Agreements with other Regional Jurisdictions and Organizations

Relationship	Regional Jurisdiction	Source of Funding Allocated from Contract Agreements
Non-Members – RFTA Provides Service under Separate Transit Agreements	Garfield County	Hogback Service Contract + Traveler
	City of Rifle	Grand Hogback
	EOTC (City of Aspen, Town of Snowmass Village, Pitkin Co)	No-Fare Subsidy Agreement
	Aspen Skiing Company (ASC)	Aspen Ski Contract
	City of Aspen, City of Glenwood Springs, Music Associates of Aspen	Transit Service Agreements

8.2 RFTA Existing Revenue Resources

In 2016, sales and use tax revenues funded more than half of RFTA's operating and capital costs, as shown in Figure 8-1. Revenues from service contract agreements covered about one-fourth of the cost; fare revenues, local government contributions, operating grant revenues, and other income covered the remainder.



Source: RFTA

Figure 8-1: RFTA Revenue Sources, 2016

RFTA's dedicated sales and use tax revenues consist of the Pitkin County mass transit tax and the Rural Transportation Authority (RTA) sales and use tax, as shown in Table 8-4. As its primary revenue stream, sales and use tax revenues have allowed RFTA to develop its services and facilities to best serve the region. Prior to the RTA tax, the main funding source for RFTA was from Pitkin County's mass transit sales tax. In November 2000, Pitkin County voters dedicated a portion of the Pitkin County mass transit sales tax to RFTA, and the RTA tax rate was approved in Glenwood Springs, Carbondale, and Basalt. As part of the RFTA Formation Intergovernmental Agreement, Eagle County agreed to remit to RFTA the portion of its 0.5% county transportation sales tax collected in the Roaring Fork Valley. These taxes and agreements became effective in 2001. The RTA sales tax was increased in November 2004 and became effective in 2005; it was increased again in November 2008 and became effective in 2009. No additional changes have been made to the sales tax percentages since 2008.

Table 8-4: RTA Sales Tax Rate Totals Provided to RFTA

	% Approved				
Jurisdiction	**Nov. 2000**	**Nov. 2004**	**Nov. 2008**	**Other Tax Provided**	**Total %**
Unincorporated Pitkin County	–	-	0.4	Pitkin Co 1-cent mass transit tax + 0.4% of ½-cent mass transit tax	1.805
Aspen	–	-	0.4	0.36% of Pitkin Co 1-cent mass transit tax + 0.4% of ½-cent mass transit tax	1.165
Snowmass Village	–	-	0.4		1.165
Basalt	0.2	0.2	0.4	Pitkin & Eagle Co 0.5% mass transit tax	1.3
Unincorporated Eagle County	–	0.2	0.4	0.5% of Eagle Co Mass transit tax for Eagle Co portion of RF Valley to RFTA	1.1
Carbondale	0.5	0.2	0.3	–	1.0
Glenwood Springs	0.4	0.2	0.4	–	1.0
New Castle	0.0	0.4	0.4	–	0.8

As indicated in Table 8-4, unincorporated Pitkin County, Aspen, and Snowmass Village also provide funding to RFTA through portions of the pre-existing Pitkin County transportation sales tax dedicated to RFTA by Pitkin County voters in November 2000. In 1986, Pitkin County voters passed a $0.01 transit tax; and in 1993 this was increased to a $0.015 transit tax. No additional changes have been made to the Pitkin County transit tax since 1993.

The Upper Valley's Elected Officials Transportation Committee (EOTC), a board that represents Pitkin County, the City of Aspen, and the Town of Snowmass Village has transit project funding as shown in Table 8-5. As shown, the EOTC cumulative surplus fund balance is expected to remain at around $7M, with growth up to $11M by 2021. Whether, and how much of, that surplus may be available to help support the additional capital costs associated with implementation of the recommended, phased BRT alternative will be decided by the EOTC. However, additional funding sources such as those described below and/or an expanded revenue stream from the existing sales and use tax would also be required to support construction bonds for the full capital cost of the Phased BRT alternative.

Table 8-5: EOTC Transit Project Funding Budget

EOTC Transit Project Funding	Actual 2015	Estimate or Budget 2016	Budget 2017	Plan 2018	Plan 2019	Plan 2020	Plan 2021
FUNDING SOURCES:							
a) Pitkin County 1/2% sales tax	4,929,637	*5,033,000*	**5,159,000**	5,288,000	5,460,000	5,637,000	5,820,000
b) Pitkin County 1/2% use tax	1,462,424	*1,293,000*	**1,225,000**	1,262,000	1,300,000	1,339,000	1,379,000
c) Investment income & misc.	56,747	79,000	**60,000**	84,000	76,000	102,000	141,000
d) Federal Lands Access Program (FLAP) grant				1,900,000			
Total Funding Sources	6,448,808	6,405,000	**6,444,000**	8,534,000	6,836,000	7,078,000	7,340,000
FUNDING USES:							
1) Use tax collection costs	63,538	70,432	**56,257**	57,945	59,683	61,474	63,318
2) Administrative cost allocation & meeting costs	21,383	21,311	**24,394**	25,126	25,880	26,656	27,456
3) Cab ride in-lieu of bus stop safety imprvs	3,561	9,000	**6,000**	6,000	6,000	6,000	6,000
4) X-Games transit subsidy	115,000	115,000	**115,000**	115,000	115,000	115,000	115,000
5) Brush Creek Intercept Lot operating costs	15,046	36,000	**30,000**	30,900	31,800	32,800	33,800
6) RFTA contribution (81.04% of 1/2% sales tax)	3,994,977	4,078,743	**4,180,854**	4,285,395	4,424,784	4,568,225	4,716,528
7) No-fare Aspen-Snowmass-Woody Creek bus service - year-round	621,658	621,658	**615,726**	640,400	666,000	692,600	720,300
8) Grand Ave Bridge construction - transit mitigation funding			**335,000**				
9) Buttermilk lot paving	233,007	46,993					
10) Valley parking study - RFP scoping	7,957						
11) Basalt pedestrian underpass		750,000					
Projects funded from Savings for greater Aspen Area							
12) Rubey Park final design, land use & permitting	142,292	16,078					
13) Rubey Park construction	4,168,777	731,223					
14) Entrance-to-Aspen transportation options study		414,004					
15) Cell phone transportation data collection		70,000					
New Budget Request							
16) WE-cycle operational support			**100,000**				
Future projects							
17) Brush Creek Park and Ride improvements (FLAP grant)				3,900,000			
18) Buttermilk pedestrian crossing design & preliminary engineering				800,000			
Total Uses	9,387,196	6,980,442	**5,463,231**	9,860,766	5,329,147	5,502,755	5,682,401
EOTC ANNUAL SURPLUS/(DEFICIT)	(2,938,388)	(575,442)	**980,769**	(1,326,766)	1,506,853	1,575,245	1,657,599
EOTC CUMULATIVE SURPLUS FUND BALANCE	7,225,318	6,649,876	7,630,645	6,303,879	7,810,733	9,385,978	11,043,577

Revenue projections:							
a) sales tax	7.9%	2.1%	2.5%	*2.5%*	*3.25%*	*3.25%*	*3.25%*
b) use tax	44.9%	-11.6%	-5.3%	*3.0%*	*3.0%*	*3.0%*	*3.0%*
c) investment earnings rate	*0.5%*	*0.7%*	*0.9%*	*1.1%*	*1.2%*	*1.3%*	*1.5%*

It should be noted that, while RFTA has a robust financial basis for its operations as detailed above, additional funding will be required for replacement buses over the next ten years, to support any expansion of service, and to support implementation of the recommended UVMS Corridor improvements, including the phased BRT alternative, the preferred modified direct alignment across the Marolt easement, and the new Castle Creek bridge. Potential, additional funding sources are described in the following sections. At the end of this chapter, there is a hypothetical funding scenario that describes a potential mix of funding sources to support implementation of the recommended, phased BRT alternative, for consideration by the EOTC and RFTA.

8.3 Potential Funding Sources

Beyond RFTA's and EOTC's current funding sources, various federal, state and local/regional funding sources can be considered to support the UVMS corridor transit improvements, as described in the following sections.

8.3.1 Federal Sources

8.3.1.1 New/Small Starts

The FTA's New Starts/Small Starts discretionary grant program is the primary grant program for major transit capital investments. Many major investments in transit systems in large cities in the

United States are made in coordination with, and with financial backing from, the FTA Capital Investment Grant (CIG) Program, which is very competitive. Agencies must demonstrate that their projects perform well against the FTA's criteria to award grants. RFTA received a $25 million Small Starts grant (then colloquially referred to as "Very Small Starts") for the SH 82 BRT project.

Rapid rail, light rail, BRT, commuter rail, and ferry capital projects are eligible for the program funding. Projects are considered Small Starts if the net capital cost is under $300 million and the CIG request is under $100 million. Projects that do not meet the Small Start criteria (e.g., their costs exceed $300 million) are considered New Starts and require a lengthier application process (two phases) to receive funding.

The New Start and Small Start grant applications are evaluated based on the following criteria:

- Mobility improvements
- Environmental benefits
- Congestion relief
- Economic development
- Land use
- Cost effectiveness (cost per trip)
- Acceptable degree of local financial commitment including evidence of stable and dependable financing sources

The UVMS corridor transit project might score reasonably well on the New Starts/Small Starts evaluation criteria, but further evaluation would be required.

8.3.1.2 FTA Section 5339 Bus Program and Low or No Emission Vehicle Deployment Program

The FTA Section 5339 discretionary program provides formula funding to urbanized area recipients of Section 5307 funding for purchase of new or replacement buses and related equipment.

In addition to the formula program, the FTA Section 5339 discretionary program provides funding for purchase of new or replacement buses and related equipment. Under the Fixing America's Surface Transportation (FAST) Act, the bus program includes funding of approximately $211 million per year until Fiscal Year 2020. Grants are awarded on a competitive basis (up to 80% federal/20% local match) including the following criteria:

- Demonstration of need
- Demonstration of benefits
- Planning and local/regional prioritization
- Local financial commitment
- Project implementation strategy

- Technical, legal, and financial capacity

A second discretionary grant program under the Section 5339 bus program is the Low or No Emission Vehicle Deployment program (LoNo), which provides funding specifically to transition transit fleets to the lowest polluting and most energy efficient transit vehicle technologies. FTA is also interested in projects that use up to 0.5% of the grants for workforce development activities and 0.5% for training at the National Transit Institute.

Under the FAST Act, the LoNo Program includes funding of approximately $55 million per year until Fiscal Year 2020. Grants are awarded on a competitive basis (up to 85% federal/15% local match) including the following criteria:

- Demonstration of need
- Demonstration of benefits
- Planning and local/regional prioritization
- Local financial commitment
- Project implementation strategy
- Technical, legal, and financial capacity

Eligible applicants include Section 5307 Urbanized Area Formula Program recipients, states, and Indian Tribes. Rural areas must submit as part of a consolidated application with other eligible applicants. For example, RFTA could apply in concert with the Denver RTD or the State of Colorado.

The LoNo program is competitive; in 2016, a total of 50 applicants requested grants totaling $200 million, or nearly four times the available funding. FTA gave priority to proposals ready to fund the difference between a standard bus and a LoNo bus. RFTA's interest in replacing all or part of the existing fleet with battery-electric powered buses would be an eligible use of the program funds. The difference in cost of RFTA's current buses and electric buses is approximately $200,000 to $250,000 per bus, which represents 20% to 25% of the cost of electric buses and is well within the program match requirements.

8.3.1.3 TIGER

The US Department of Transportation's (DOT's) Transportation Investment Generating Economic Recovery (TIGER) grant program provides funding for a wide range of transportation projects. Funds are available for road, rail, transit, and port projects, and grants may be awarded to cities, counties, port authorities, and Metropolitan Planning Organizations(MPOs). The UVMS corridor project could qualify for a TIGER grant, but it would have to be awarded to one of the local jurisdictions.

In 2015, Congress allocated $500 million for the seventh round of the TIGER program. In the previous six rounds, dating back to 2009, Congress had provided $4.1 billion in funding for TIGER grants. During that time, the DOT has received more than 6,000 grant applications, requesting more than $124 billion in transportation funding. In other words, the demand for TIGER grants has typically been more than 30 times the amount of available funding.

Given this level of competition, it is important to understand the evaluation criteria used for TIGER grants. The program identifies both primary and secondary selection criteria:

- Primary criteria:
  - State of good repair
  - Economic competitiveness
  - Livability
  - Environmental sustainability
  - Safety
  - Job creation and economic stimulus
- Secondary criteria:
  - Innovation
  - Partnerships

The maximum TIGER grant award is $200 million, although the maximum grant award can only be achieved for a multi-state project because the program limits the total amount of funding for all projects in a single state to no more than $125 million. To date, the largest TIGER grant ever awarded was $105 million; the average grant has been $14.5 million. Generally, the funding amounts are relatively small and the competition is very high. For example, under the 2015 TIGER VII program, 39 projects were awarded a total of nearly $500 million in grants. Of those projects, 18 were transit related, receiving a total of $245 million, or an average of $14 million per project. The grant requests for that program totaled $10.1 billion, or 20 times the available funding.

As of this writing, the current administration is considering the discontinuation of the TIGER program; Congress will make the ultimate decision by fall 2017. Another consideration is that federal grant programs have many administrative requirements, and these requirements should be evaluated.

8.3.2 State Sources

The primary source of funding from the State of Colorado that is likely to be applicable capital expenditures for the UVMS Corridor transit project is the FASTER (Funding Advancement for Surface Transportation and Economic Recovery) program, which was enacted in 2009. The FASTER program generates approximately $200 million per year, approximately $15 million of which is allocated for transit projects. FASTER transit funds are split between local transit grants ($5 million per year) and statewide projects ($10 million per year). The $5 million in local transit grants is awarded competitively by CDOT regional offices; statewide funds are awarded by the CDOT Division of Transit and Rail (DTR) to statewide, interregional, and regional projects.

The program provides capital grants to agencies statewide for local transit projects, with FASTER providing 80% of the total cost and local entities providing the remaining 20% match. The discretionary grant program provides funds projects on a competitive basis with consideration of project need and readiness, level of mobility improvement, financial need, and viability over the long term. Approximately 50% of the grants to date have been for the purchase of new or replacement buses. RFTA has received several FASTER grants totaling more than $3 million for vehicles, intelligent transportation system (ITS) equipment, and the SH 82 AABC Pedestrian Underpass project. The program does not sunset and could potentially provide some additional funding support to RFTA, but primarily for small capital projects.

8.3.3 Local Sources

Local funding sources and mechanisms used to support transit capital projects and ongoing O&M costs vary considerably throughout the United States; some are appropriate for consideration of RFTA's funding needs and some less so. The following potential sources are briefly described to provide a reasonably comprehensive review of the range of funding and their likelihood for the UVMS Corridor project. The overall funding categories are as follows:

- Transportation related: mechanisms in which the ultimate source of funds is tied to the use of the transportation system.
- Value capture: mechanisms in which the ultimate source of funds is generated from economic activity or new development in the Corridor.
- Other: all other mechanisms that are not directly tied to the transportation system or properties in the Corridor, including generic taxes and fees that are typically applied city- or countywide.

8.3.4 Options Considered but Eliminated

The following funding mechanisms were considered but were eliminated from further consideration:

- Tolls are the most familiar form of a transportation access charge. Transportation access charges are most appropriate for auto-oriented, high-speed, limited-access corridors that serve high-demand corridors and bypass facilities to avoid congested areas. The UVMS Corridor has none of these characteristics. Although tolls have been implemented at various highway locations in the Denver area, this application has not been considered appropriate for the UVMS Corridor. Vehicle Miles Traveled (VMT) Tax is generally viewed as an alternative to gas tax; it charges drivers based on the distance traveled rather than on the gasoline consumed. No system exists for imposing a VMT tax in the state of Colorado. Establishing such a system at the local level, without simultaneous adoption of a statewide system, would be prohibitively costly and politically contentious. Other political and technical obstacles to implementation of a VMT tax include privacy concerns and the difficulty charging non-local vehicles. For these various reasons, a VMT tax is excluded from further consideration for the Corridor transit project.
- Weight mile tax is a tax paid by trucks instead of traditional gas tax. The tax more equitably charges freight for their impacts to the transportation system, given the substantial wear and

tear that heavy trucks cause to roadways. Colorado, a member of the International Fuel Tax Agreement, requires truckers to pay a special fuel tax based on miles driven in each state. However, such a tax would be prohibitively difficult to impose on a local level. In addition, such a small tax base would have relatively low revenue-generating capacity at reasonable tax rates, and would raise significant questions of fairness applying a tax on a specific subset of drivers (heavy trucks) that have no direct connection to the transit investment being made. For these reasons, a local weight mile tax is excluded from further consideration for the Corridor transit project.

- Gas tax is a tax on the sale of gasoline and other fuels, typically levied as a fixed dollar amount per gallon. State statute restricts the use of gas tax revenue to transportation projects, and the statutory definition excludes public transit projects from gas tax funding. Therefore, gas tax was excluded from further consideration for the Corridor transit project.
- Vehicle registration fee is a recurring charge on individuals that own cars, trucks, and other vehicles. State statute restricts the use of these funds to highway purposes. The statutory definition excludes the use of these funds for public transit projects, and therefore vehicle registration fees were excluded from further consideration for the Corridor transit project.
- Development impact fees are one-time charges on new development intended to mitigate the increased demand on infrastructure as a result of the development. In Colorado, local governments are authorized to impose impact fees for various capital facilities, including water, stormwater, sanitary sewer, parks, police, fire, and transportation. The use of transportation impact fees, however, is restricted by statute to arterial or collector streets and highways, including traffic signals on those facilities. This definition precludes the use of impact fees on public transit projects; therefore, impact fees were excluded from further consideration for the Corridor transit project.
- Tax increment financing (TIF) allows tax revenues generated from growth in assessed property value in a designated area to be diverted from other taxing districts and instead invested in capital projects within the area. Redevelopment areas (RDAs) allow for funding of public transit projects, but cities and counties must first establish a redevelopment agency that has the authority to establish an RDA, and the creation of an RDA depends on findings of blight. Tax increment revenues are generated by new development in an area, but significant redevelopment efforts are unlikely to occur until after the investment in a high-capacity transit line is complete. The timing of available TIF revenue is thus poorly suited to contribute to upfront funding of capital costs. The tool can be contentious because it diverts property tax revenue away from other local government and is not widely used in the State of Colorado. Therefore, TIF was excluded from further consideration for the Corridor transit project.

8.3.5 Other Potential Local Sources

Other possible funding mechanisms with more promise that are currently being used in other cities to support transit improvements are described below.

8.3.5.1 Lane Usage fee

Given the typical RFTA bus headways SH 82 corridor, there is significant unused capacity in the SH 82 dedicated bus lane that could be utilized (at a cost) for certain permitted vehicles (e.g., hotel vans). This would be a limited/modified application of tolls that may be worth further consideration for the Corridor transit project. For example, a hotel could purchase a monthly pass/sticker for each of its vans/shuttles that would allow them to use the SH82 dedicated bus lanes and realize travel time savings, which would increase convenience for their customers. The appropriate lane usage fee would be determined by RFTA and assessed on a monthly basis. When this lane is considered for autonomous BRT operations, vehicles allowed to use this lane would also need to be autonomous.

8.3.5.2 Utility fee

A utility fee is assessed of all businesses and households in a jurisdiction to support specified types of infrastructure or public utilities, based on the amount of use. Many jurisdictions charge water and sewer utility fees, but utility fees can be applied to other types of government activities as well (both capital projects and O&M). For example, many jurisdictions charge street utility fees to pay for transportation projects.

With approximately 40,000 households in the RFTA service area, a utility fee of only $2.00 per month on residential customers would generate nearly $1 million per year. If an equal or greater amount were assumed to be generated from commercial and industrial customers, then the annual revenue that could be generated at a relatively low rate could be at least $2 million. The annual revenue would grow as the population and employment increases. Utility fee revenue would be generated immediately once the fee was adopted, and it would not be contingent upon new development occurring in the Corridor.

Local governments and utilities in the corridor counties already charge customers monthly fees for services such as water, sanitary sewer, and electricity. RFTA would have to explore partnerships with these local governments and utilities to use the existing billing systems to collect an additional utility fee for the Corridor transit project. Because the fee would typically be levied as a flat amount per household (or per square foot or a similar measure for businesses), revenue from the fee would be fairly stable and predictable, and it would be less volatile than other taxes and fees that are based on different measures of economic activity.

One negative aspect of this mechanism is that everyone in the service area would be charged even if they do not directly benefit from the new transit investment; therefore, a utility fee for public transit may suffer from additional public opposition.

8.3.5.3 Special Improvement District

A Special Improvement District (SID) is a special assessment district in which property owners are assessed a fee to pay for capital improvements, such as streetscape enhancements, underground utilities, or shared open space. Colorado authorizes counties and cities to form and assess SIDs, allowing for the sale of bonds to finance the construction and maintenance of eligible projects. Property owners within the district are assessed based on their benefited share of improvements.

Once an agreement is reached on the portion of funding to come from the SID, the jurisdiction would sell bonds to finance the project, and affected property owners within the SID would repay the bonds through annual payments. Capital projects such as the proposed UVMS Corridor transit improvements are eligible to receive funding from SIDs.

The revenue capacity for a SID is more of a political question than a technical question. If a SID covered a large area and was imposed at a high rate, it could generate substantial revenue. The willingness of local property owners to pay limits the revenue capacity. SIDs allow for local governments to issue bonds, providing upfront funding for construction. The process for establishing SIDs is well defined; once a SID is established, it is fairly easy to administer and does not require expensive new systems to collect revenues.

In most situations, SIDs are a stable and predictable revenue source. However, the funding is generated by a limited number of property owners. If those property owners struggle to make their payments in a timely fashion or are unable to pay, it adversely affects the stability and predictability of the mechanism. If the SID is implemented on the basis of assessed value, it could further affect predictability, because it is unknown how property values in the corridor will change over time as new development occurs and market conditions change.

SIDs can be used for a wide range of infrastructure projects, including public transit investments. SIDs generate revenue from property owners that are closest to the infrastructure improvement and are likely to be the property owners that benefit most from the investment. The general public typically supports the use of SIDs because the tax is not assessed citywide or countywide, but only on those properties benefiting the most. Support from individual property owners varies depending on the perceived benefit of the project relative to the costs.

8.3.5.4 Sales & Use Tax and Mass Transit Tax

The local jurisdictions in the RFTA service area have well-established sales and use taxes, as well as the mass transit tax already in place as described previously. Increases in these taxes may provide an opportunity for additional funding for the UVMS Corridor improvements and for the bus replacement program, but this would require additional evaluation and negotiations with each jurisdiction. Any increases in these taxes would also require voter approval.

8.3.5.5 Lodging Tax

Otherwise known as a visitor benefit tax, a lodging tax is a charge on hotels and other transient lodging facilities. In Colorado, the tax is charged as a percentage of gross lodging revenues. Cities and counties are both authorized to collect lodging tax. The City of Aspen has a lodging tax totaling 2.0%. For comparison, the City of Las Vegas imposes a lodging tax of 12%, while Clark County imposes a lodging tax ranging from 10% to 12% in unincorporated areas of the county, including the Las Vegas Resort Corridor ("the Strip"). The amount that can be charged and the use of the funds generated by the tax are governed by state statutes. RFTA could pursue this funding mechanism with the UVMS Corridor jurisdictions.

8.3.5.6 Property Tax

Property taxes in Colorado are predominantly used to fund the permanent operations of local government services, including cities, counties, school districts, and other special districts for services such as fire, water, and 911 communications. In addition to permanent property tax rates, temporary property tax increases are also allowed for the payment of debt service on general obligation (GO) bonds. A temporary tax rate could be imposed to fund a capital project such as the Corridor transit project or some of its elements (e.g., bus purchases) with a general obligation bond. Bonds requiring a tax rate for 10 years or less can be approved directly by cities and counties. Bonds requiring a tax rate for more than 10 years require approval by voters in a general election.

Because general obligation bonds allow for the tax to be imposed citywide or countywide, the relatively large tax base allows for substantial revenue capacity at relatively low tax rates. The county assessors already have the necessary systems in place to collect property taxes, thus requiring minimal administrative cost for the imposition of new general obligation bonds. GO bonds result in an agreed-upon debt service schedule with specific payment amounts due each year. The county assessor then establishes the necessary tax rate each year to generate sufficient tax revenue to make the debt service payment. Because the rate is changed each year, it can account for changes in property values, making it a very stable and predictable funding mechanism. GO bonds are allowed for a wide range of capital projects, including public transit investments.

One negative aspect is that this mechanism charges everyone citywide or countywide, and the basis of the tax on the value of property has no direct connection to the benefits received from the new transit investment. However, RFTA staff members have evaluated property tax and have determined that it is a viable mechanism in accordance with HB 09-1034 to help provide a more stable funding source for future bus replacements. Their analysis determined that imposing a uniform mill levy of 1 mil on all taxable property within the territory of the Authority would generate approximately $3 million of additional revenue per year, assuming that taxable property is assessed in 2017 and revenue collection begins in 2018.

8.3.5.7 Parking Revenues

The City of Aspen, Pitkin County, and Town of Snowmass Village all have parking programs and facilities that either generate revenue or have the potential to generate revenue. Paid parking is closely tied to the Aspen Transportation Demand Management Program, and it is one of the most important tools to manage congestion and transit demand in the Upper Valley.

A comprehensive parking plan for the Upper Valley that encompasses all local programs can be developed in partnership. This plan could pool revenues from parking fees. From this fund, a dedicated revenue stream could be identified for both capital and O&M costs.

8.3.5.8 Naming Rights/Private Contributions

Pitkin County has one of the highest per capita incomes of any county in the state of Colorado. Both full-time and part-time residents have a history of philanthropy. In addition, companies may find value in purchasing naming rights to specific system components (e.g., stations, rolling stock) to associate themselves with the Aspen “brand.”

At this time, it is challenging to identify the potential proceeds from this component. However, with the value of associating with the Aspen brand, and the well-known philanthropic bent of Upper Valley residents, this local funding component is worthy of consideration.

8.3.5.9 Public-Private Partnerships

Public-private partnerships (P3) include a variety of legal and financial arrangements. The typical P3 arrangement for transit and highway projects includes design, build, finance, operation, and maintenance, whereby a private entity provides all or a portion of the upfront capital required to design and construct the project sooner than might otherwise be possible, and signs a long-term contract to provide operations and maintenance of the facility.

A typical highway example is managed/toll lanes that generate toll revenue that is used to pay back the private entity for its upfront investment and/or the cost of ongoing O&M costs. A typical transit example is the Eagle P3 project in Denver, which facilitated construction of the commuter rail line between Union Station and Denver International Airport. It included a 35-year concessionaire agreement whereby the private entity provides ongoing O&M for a guaranteed monthly payment to cover the cost of the upfront capital for design, construction, and purchase of rolling stock, as well as the cost of the annual O&M functions.

The P3 project delivery approach has the following advantages:

- Project acceleration, bringing construction (jobs and economic activity) forward
- Budget and schedule certainty in delivery, enabling fiscal planning certainty
- Enables public sector to focus on outcomes, performance, and core business
- Cost savings through quality and innovation

- Whole life asset approach – design for constructability and long-term maintenance
- Ensuring assets are properly maintained and returned at the concession expiry with an agreed remaining useful life
- Accountability – "pay for performance"
- Private sector has the flexibility and reactivity necessary to manage complex risks
- Private equity and debt imposes strict discipline in terms of risk management

If RFTA and other local jurisdictions so desire, a more detailed evaluation could be completed to determine whether P3 is an appropriate delivery model from both a qualitative and quantitative perspective for the UVMS Corridor project, including the following factors:

- Public and stakeholder awareness and understanding
- Higher cost of capital
  - Do the benefits outweigh the higher capital cost?
  - Can the cost be mitigated with public subsidies?
- Need for significant upfront resources in procurement process
  - Extended procurement periods
  - Complex contractual structure requires staff expertise
  - Cost of experienced advisors
  - Due diligence required to establish an effective procurement and risk allocation
- Shifts government's basis in delivering infrastructure from prescriptive to performance requirements
- Market capacity and competitiveness
- Potential revenue generating capacity to help offset guaranteed payments

Given the limited fare revenue generated by the Corridor project, community-desired design/aesthetic considerations, and the limitations of RFTA's other funding to support a P3 guaranteed payment, this may not be an appropriate funding mechanism for the UVMS corridor. However, other private funding may be generated from selling naming rights to stations, advertising and bus wraps, and other similar means used by other transit agencies.

8.4 Conclusions

State and federal sources are insufficient to fund the project. The FASTER program continues to be available but it is primarily for lower cost projects. With limited funding available, CDOT tends to distribute the transit funding around the state. Depending on the outcome of the Colorado Legislature's action on HB 1242, some state funding may be available for the UVMS Corridor project, but the bill's status and potential level of funding are currently unknown.

Federal programs are limited to FTA New Starts/Small Starts grants, Section 5339 bus grants, and TIGER grants. All three are very competitive programs, but the payoff for success in obtaining funds is significant. New/Small Starts, for example, could provide up to 50% funding from the federal government, provided that local sources provide the 50% matching funds. Similarly, the LoNo program could provide up to 80% of the funding required for the cost of replacement buses, particularly the battery-electric powered buses that RFTA is considering. But many administrative requirements are associated with any federal grant programs; those requirements should also be considered.

Many potential local mechanisms are ill-suited for the project. This report considered a variety of local mechanisms, several of which were eliminated from consideration as major sources of local funding. Several sources are restricted in use by state statute to a narrow definition of transportation projects, which excludes public transit investments. Other sources were found to have fatal flaws, including practical, legal, and political constraints.

The remaining local mechanisms require further evaluation. This evaluation identified several local funding mechanisms that could be used to fund transit projects in the UVMS Corridor. To determine their applicability to the project, each source requires further evaluation when a preferred alternative is more completely specified. Continued, and possibly expanded, use of sales and use taxes, dedicated parking revenues, and possibly expansion of the use of lodging taxes, are several of the viable funding options. The most promising option appears to be implementation of a new property tax in the RFTA service area to support the cost of replacement buses. P3 project delivery may not be the right answer for the UVMS corridor transit improvements, but it could be analyzed further if RFTA and the other local jurisdictions so desire.

In conclusion, when key decisions have been made on the preferred characteristics of the UVMS Corridor transit investment, RFTA and the local jurisdictions will expand on this initial funding options analysis to identify a specific funding package and determine financing strategies, as appropriate. To provide a starting point for that discussion, following is a hypothetical funding scenario that describes a potential mix of funding sources to support implementation of the recommended, phased BRT alternative, for consideration by the EOTC and RFTA.

Hypothetical Funding Scenario

Based on a decision by the EOTC and RFTA, a hypothetical funding scenario might include the following elements of the recommended, phased BRT alternative improvements.

- Operational Phase 2: BRT Electric Buses with On Board Storage for $31M ($800,000 each x 7 40' buses + $1M each x 25 60' buses)
- Operational Phase 2: BRT Electric Bus Charging System - Brush Creek to Aspen for $ 5M
- Operational Phase 3: BRT Autonomous Control Infrastructure for $ 4.9 M
- Operational Phase 3: BRT Autonomous Control Bus Retrofits for $ 0.3 M each ($ 3M total)

- Build Phases 1 and 2: Design and build Marolt easement crossing with cut-and-cover tunnel and New Castle Creek Bridge for $102.6M
- Build Phase 2: BRT Dedicated Bus Lanes - Brush Creek Intercept Lot to Buttermilk for $ 3.4M

For the first elements of the recommended phased improvements, RFTA should pursue FTA Section 5339 discretionary bus and LoNo grants to support 60% of the $36M cost for the battery-electric buses and charging system, leaving a required local share of $14.4M. Funding likelihood is high, especially given RFTA's history of excellent, highly efficient and effective transit service over many years, as well as the local emphasis on sustainability, renewable energy, strong TDM program, and attempts to minimize emissions. The local share could be supported by a new 1-mill levy property tax, as described in Section 8.3.5, which might generate $3M per year. Five years of that revenue would provide the necessary local match for the LoNo grant for the UVMS buses, and subsequent year revenue from that source would be available for additional bus replacements as described at the beginning of this chapter.

Given the highly competitive nature of the FTA Small Starts grant program and the relatively small increase in forecasted ridership associated with the UVMS improvements, that source is not a very good candidate, either for the electric buses or for the second phase Marolt crossing elements. Since the Marolt crossing improvements are clearly focused on local desire for transit operational improvements and elimination of traffic delay, and therefore would not be competitive for a Small Starts grant, they should be supported with local funding sources, if and when the community can provide the required funding.

The $106M capital cost of the Marolt easement crossing elements and the BRT dedicated lanes between Brush Creek and Buttermilk could be provided via a construction bond that would include financing costs of an additional 4-5% for a total bond issue of $110-111M. The construction bond issue would require an annual revenue stream of approximately $10M that could potentially be supported by a mix of funding sources comprised of the following:

- SH82 BRT Lane usage fees – potentially up to $0.18M per year, assuming 50 hotel/lodging properties paying a $300 per month fee for their shuttles to use the dedicated lanes
- Parking revenues – potentially up to $1M per year dedicated for transit from the Aspen Parking Fund total revenue of approximately $6M per year
- Lodging tax – an additional 1.0% tax in Aspen dedicated for transit might generate $1.4M to $1.7M per year
- EOTC surplus – dedication of $0.5M per year for UVMS improvements of the total annual surplus of approximately $1.5M per year
- Additional 1-mill levy property tax to generate $3M per year dedicated for transit
- Additional Aspen sales tax of 0.5% to provide the remaining $3-4M per year dedicated for UVMS improvements; alternatively, a utility fee of $3.50 to $4.00 per month for households and

commercial/industrial properties in the RFTA service area could provide the remaining $3-4M per year

The third phase elements of autonomous bus control infrastructure and bus retrofits would only apply after implementation of the Marolt crossing elements and the dedicated lanes. Additional funding would have to be identified for those improvements. Table 8-6 shows this hypothetical funding scenario.

Of course, these initial ideas for potential funding to support UVMS improvements will require considerable amounts of discussion and development of consensus among the EOTC and RFTA Board members, as well as voter approval of several of the new or expanded taxes.

Table 8-6: Hypothetical Funding Scenario

<table>
<tr><th>Phase</th><th>Cost</th><th>Funding Source</th></tr>
<tr><td>Operational Phase One – System Improvements</td><td>N/A</td><td>Use existing funding sources</td></tr>
<tr><td>Operational Phase Two - BRT Electric Buses with On Board Storage</td><td>$31.0M</td><td rowspan="2">FTA Section 5339 Discretionary Bus & LoNo grants – pay for 60% ($21.6M)
Property tax – new 1-mil levy pays $3M per year; five years would cover 40% gap ($14.4M)</td></tr>
<tr><td>Operational Phase Two - BRT Electric Bus Charging System</td><td>Brush Creek to Aspen = $5.0M</td></tr>
<tr><td>Operational Phase Three – BRT Autonomous Control Infrastructure</td><td>$4.9 M</td><td rowspan="2">Additional funding to be identified in future years.</td></tr>
<tr><td>Operational Phase Three – BRT Autonomous Control Bus Retrofits</td><td>$0.3M each ($3M total)</td></tr>
<tr><td>Build Phases One and Two – Design and construction of Marolt easement crossing with cut-and-cover tunnel and New Castle Creek Bridge. Continuous Dedicated Bus Lanes from Brush Creek to Buttermilk.</td><td>$106.0M</td><td>Would need to issue $110-$111M construction bond, requiring $10M annual revenue stream.
Potential local sources:
• SH82 BRT lane usage fee - $0.18M per year
• Parking revenue (Aspen Parking Fund) - $1M per year
• Lodging tax (1.0% in Aspen) - $1.4-$1.7M per year
• EOTC surplus - $0.5M per year
• Property tax (1-mil levy) - $3M per year
• Sales tax (0.5% in Aspen) - $3-$4M per year
• Utility fee ($3.50-$4.00 per household in RFTA service area) - $3-$4M per year</td></tr>
</table>

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9 Evaluation of the Alternatives

This section provides a comparative evaluation of the BRT and LRT alternatives, based on various qualitative and quantitative criteria. A key consideration is the overall transit user experience, i.e., how well the alternative improvements serve the existing riders and attract additional riders. Another key consideration is how sustainable the alternative improvements will be over the long term, as discussed in the next section.

9.1 Sustainability

The American Public Transportation Association (APTA) defines sustainability as it relates to public transportation as the practices that make good business sense and good environmental sense including balancing the economic, social, and environmental needs of a community. APTA points out that, for the public transportation industry, sustainability includes the following:

- Employing practices in design and capital construction, such as using sustainable building materials, recycled materials, and solar and other renewable energy sources to make facilities as "green" as possible
- Employing practices in O&M, such as reducing hazardous waste, increasing fuel efficiency, creating more efficient lighting, and using energy-efficient propulsion systems
- Employing community-based strategies to encourage land use and transit-oriented development designed to increase public transit ridership

As adopted by the RFTA Board of Directors in 2011, the RFTA Environmental Sustainability Planning goal states that "RFTA will research and implement innovative, environmentally sustainable practices in all areas of transit and trails management." RFTA is fully committed to environmental sustainability in its transit operations and its capital improvements program. As a winner of the 2014 SHIFT Sustainability Awards, which recognize the most effective, innovative conservation and sustainability initiatives currently under way in communities, RFTA has shown that sustainability is an important part of all agency decisions.

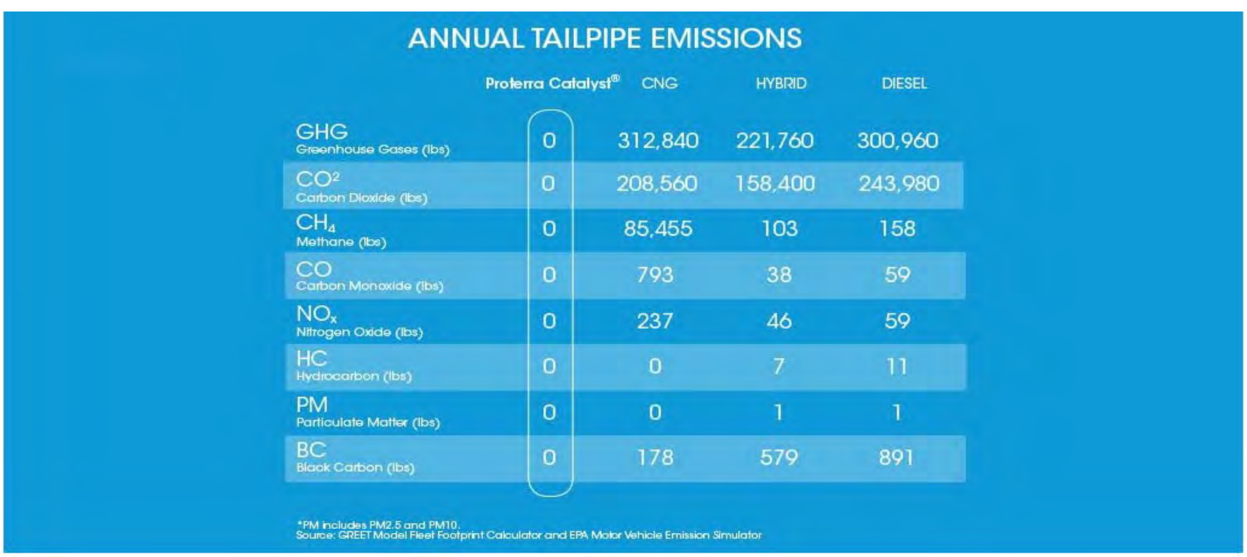
This study evaluates sustainability in terms of the energy usage, air quality benefits, traffic improvements, and safety improvements for each UVMS option, as well as the future no-build scenario (year 2036 summer with anticipated traffic growth) to evaluate sustainability for the transit system improvements being considered.

9.1.1 LRT Sustainability

As described in Section 7, neither LRT grade-separated options nor the at-grade option have any effect on traffic at Brush Creek. At Maroon Creek, the LRT at-grade option adds 4 seconds of delay per vehicle; queues will occur, but they will dissipate before the next LRT vehicle arrives. This option may also warrant closure of entries to the roundabout. The LRT underpass option at this location has no traffic impacts. The LRT option would improve air and noise quality at Rubey Park compared to the no-build scenario because the number of buses would be reduced. By reducing the number of buses, bus and vehicle exposure to accidents would decrease and therefore the LRT option would improve safety compared to the future no-build scenario. In terms of emissions, the electric powered LRT fleet of vehicles will generate fewer (and more controllable at the source) emissions than the bus fleet currently in use.

9.1.2 BRT Sustainability

As described in Section 7, several key improvements have already been made to SH 82 to support exclusive bus lanes. The future BRT scenario will have no significant effect on traffic compared to the no-build scenario. If electric buses are used for the BRT scenario, the air and noise quality at Rubey Park will be dramatically improved compared to the no-build scenario. A refined bus service alternative will also slightly improve safety on the roadway system compared to the future no-build scenario because it would reduce the number of buses and thus reduce vehicle and bus exposure to accidents. In terms of emissions, battery-electric buses would be as efficient as the electric-powered LRT fleet, and is more efficient than the current bus fleet. Figure 9-1 is from Proterra, an electric bus manufacturer, and shows the annual tailpipe emissions for the electric bus (which is zero) compared to other types of buses. Because of the drivetrain and propulsion technology for the electric bus, the miles per gallon gasoline equivalent (MPGe) is superior to standard bus fleets. In fact, one current electric bus manufacturer rates its electric bus efficiency as 21.4 MPGe compared with 4.58 MPGe for hybrid buses, 3.86 MPGe for diesel buses, and 3.27 MPGe for CNG buses. The results are similar for other electric bus manufacturers.



ANNUAL TAILPIPE EMISSIONS

	Proterra Catalyst®	CNG	HYBRID	DIESEL
GHG Greenhouse Gases (lbs)	0	312,840	221,760	300,960
CO² Carbon Dioxide (lbs)	0	208,560	158,400	243,980
CH_4 Methane (lbs)	0	85,455	103	158
CO Carbon Monoxide (lbs)	0	793	38	59
NO_x Nitrogen Oxide (lbs)	0	237	46	59
HC Hydrocarbon (lbs)	0	0	7	11
PM Particulate Matter (lbs)	0	0	1	1
BC Black Carbon (lbs)	0	178	579	891

*PM includes PM2.5 and PM10.
Source: GREET Model Fleet Footprint Calculator and EPA Motor Vehicle Emission Simulator

Figure 9-1: Annual Tailpipe Emissions from Proterra

9.2 Comparison of Alternatives

Table 9-1 compares the alternatives discussed in this report to each other and to the existing RFTA service in the UVMS corridor. All proposed alternatives meet the UVMS project's Purpose and Need, as well as the Goals and Objectives, described in Section 1. Ridership is virtually the same for the LRT and BRT. The LRT option would reduce the number of buses at Rubey Park and would improve air and noise quality more than the BRT option. However, LRT's capital cost is more than twice the BRT capital cost. Similarly, the LRT O&M cost is also nearly twice the BRT O&M cost. For the BRT option, bus service optimization would help reduce the number of buses and improve efficiency (i.e., higher passenger loads). In addition, implementing electric buses would improve the air and noise quality at Rubey Park.

The BRT improvements can also set the stage for, and not preclude, future LRT, if desired. All proposed options would improve sustainability (including energy usage/saving, and noise/air quality improvements), and the greatest benefit to sustainability would come from the LRT and Phased BRT options. Because the Phased BRT with the theoretically-based refined service plan option would remain one-seat rides for the six-routes in the UVMS corridor and does not require transfers, that option provides the best overall transit user experience.

Table 9-1: Comparison of Alternatives

	Existing	BRT Minimum Service Level	LRT Minimum Service Level	Phased BRT with Refined Service Level[1]
Meets Project Purpose and Need, Goals and Objectives	Poor	Good	Good	Excellent
Transit Trips per day [2]	458	224	144	356
Level of Service/Average Headway	3-minute (local and BRT)	6-minute	9.6-minute	4-minute
2016 Six Route[3]/System-wide Ridership/day	6,800 / 17,600	NA	NA	NA
2036 Forecast RFTA System-wide Ridership/day	21,200	22,200	22,200	22,200
Average travel time savings/trip[4]	NA	2–3 minutes	2–3 minutes	2–3 minutes
Constructability	NA	Excellent	Fair	Excellent
Capital costs for Base Case	$25M - $30M	$159.1M	$428.0M	$110M
Capital costs for Prime Case	$25M - $30M	$200.5M	$527.8M	$145M
O&M costs		$3.2M/year	$6.0M/year	Potential savings
Cost Effectiveness (O&M cost per boarding)	Fair	Fair	Poor	Good
Affordability/Funding Availability	Good	Fair	Poor	Good
Service reliability	Fair	Good	Excellent	Good
Traffic operations/LOS	Fair	Good	Good	Good
Energy usage/savings	Fair	Good	Excellent	Excellent
Safety	Fair	Good	Excellent	Good
Noise/Air quality improvements	Poor	Fair	Excellent	Excellent
Legend:	Poor	Fair	Good	Excellent

1 Theoretically-based refined service plan details are based on Table 4-7. However, these efficiencies may not be possible due to service agreements. RFTA should continue to evaluate the effectiveness and efficiency of its services, especially during mid-day, non-peak hours, to make whatever reductions in bus trips that can be made without adversely affecting quality and convenience of its services.

2 458 bus trips/day crossing the Castle Creek bridge could be intercepted at Rubey Park with a minimum of 224 BRT trips or 144 LRT trips.

3 Average weekday during winter season on six corridor routes.

4 Travel time savings shown are for transit trips. There will be no significant travel time savings for automobile trips.

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10 Stakeholder Coordination

The UVMS study sought input throughout the project to help guide alternative development, analysis, and ultimately to help define the recommendation for the study. Three levels of stakeholders provided this input: technical staff, elected officials, and the public. All input was discussed as a team and is reflected in the outcome of this study, as documented in this report. Meeting minutes are included in Appendix G.

The EOTC staff from member jurisdictions formed a Technical Advisory Committee (TAC) to provide direction and oversight for this project. Member jurisdictions include Pitkin County, City of Aspen, and Town of Snowmass Village. The RFTA was also a member of the TAC. In addition, stakeholder agencies and groups (including CDOT Region 3, the Pitkin/Aspen Airport, and the Aspen Ski Company) sent a member to represent their agency or group on the TAC.

Eight TAC meetings were held on the dates listed below. Information was presented at each, discussions occurred, and direction was given to guide the project.

- September 15, 2016 (kickoff)
- October 27, 2016
- December 15, 2016
- January 5, 2017
- February 23, 2017
- March 9, 2017
- April 27, 2017
- June 1, 2017

To keep elected officials informed, the project team made presentations to the EOTC on the following dates:

- October 20, 2016
- January 29, 2017
- March 23, 2017
- June 15, 2017

These presentations were open to the public and were broadcasted live. Questions were asked of the project team at each presentation, and more explanation of the topic items was given. Before each meeting, EOTC members also received handouts that included their committee packets. Currently no decision has been made from the EOTC pending further meetings/discussion that are scheduled for September 2017, after the conclusion of this report.

The project team had a special, small group meeting with Pitkin/Aspen Airport staff to discuss a potential light rail or bus connection from SH 82 to the Airport on November 14, 2016. During this meeting the Airport informed the project team regarding the limitations associated with the FAA grant assurances with respect to locating a segment of the LRT alignment on Airport property and FAA policies related to funding transit facilities. Results and direction are reflected in the outcome of this study.

Finally, the project team held a public workshop in Aspen on May 31, 2017, from 4 to 6 p.m. The project team had prepared exhibits documenting all steps of the process, alternatives considered, and the data used to evaluate those alternatives. Input was solicited and used to help inform the recommendation for the study.

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11 Conclusions, Recommendations, and Next Steps

Both the LRT and BRT alternatives will meet the goals and objectives of the Upper Valley Mobility Study. RFTA currently operates a large number and wide variety of bus and BRT routes throughout its service area. Specifically, RFTA operates a fleet of 93 buses on a total of 21 daily bus routes over varying distances. Based on the theoretical analysis described in the report, it was determined that six routes are the most appropriate to be intercepted with passengers transferred to fixed guideway service. On an average winter weekday, 224 bus trips up valley to Rubey Park from Brush Creek and 234 bus trips down valley from Rubey Park to Brush Creek (a total of 458 bus trips per day) could be intercepted.

The LRT alternative assumes single track operation with passing tracks at all stations and at a location just north of Aspen Airport in the SH 82 ROW to ensure timely operation with minimal delay. Onboard battery (plus OCS at stations for recharging and plug-ins for depot charging) and diesel-electric light rail vehicles are the two technology/propulsion options being considered. For aesthetic reasons, the intent is to avoid the need for continuous OCS wires as much as possible in the corridor.

11.1 Conclusions

The primary advantage of LRT (due to higher capacity vehicles that can be coupled together) is that it reduces the number of buses in Aspen to the greatest degree, which is one of the EOTC's original goals. The number of intercepted buses (458 bus trips per day) would be replaced with 144 two-car train trips per day. The major disadvantages of LRT are the higher capital and O&M costs, and the transfer penalty associated with the bus intercepts that increase travel time and may reduce ridership.

The BRT alternative has lower capital and O&M costs than LRT and would reduce travel time via the construction of the Marolt easement crossing and dedicated bus lanes from Brush Creek to Buttermilk. If the current service/operating plan did not change, the number of buses in the UVMS corridor and at Rubey Park would not be reduced (due to the buses' limited capacity). However, the current service headways and corresponding bus capacity exceed the passenger loads during the midday hours. By reducing the number of buses that RFTA is currently operating in the corridor during the midday hours, the number of buses in the corridor and at Rubey Park could be reduced by 100 to 110 bus trips per day. Service level changes for Buttermilk, Snowmass, BRT, and Valley routes would require renegotiation of the existing service agreements. In addition, the replacement of existing CNG and diesel buses with battery-electric powered buses would dramatically improve noise and air quality in Aspen.

As mentioned previously, this UVMS study is a supplement to RFTA's Integrated Transportation System Plan (ITSP). The ITSP will encompass the totality of issues to be addressed to support RFTA and its constituents in implementing RFTA's long-term vision. Upper valley mobility may be affected by additional items from the ITSP, such as analysis and recommendations for travel demand management, better transit connections to Snowmass Village on Brush Creek Road, improved electronic transit tools, parking management, real time vehicle and transit tracking, and aerial connections between ski mountains.

11.2 Improvement Benefits

As discussed above and shown in Table 9-1 (Section 9.2), if the bus service plan is optimized for the six interceptible routes, the number of buses at Rubey Park would be reduced and the O&M cost would be lower than the BRT minimum service level option. The purchase of 40-foot electric buses for the one Buttermilk and two Snowmass routes and the purchase of 60-foot electric buses for the BRT and two down-valley routes would improve air and noise quality at Rubey Park and would avoid the transfer penalty for passengers at Brush Creek. To further improve air and noise quality, the Aspen shuttle route buses could also be replaced with electric buses.

If capital improvements include the construction across the Marolt easement preferred alignment, it would improve traffic operations, travel times, and safety. This alignment is already cleared by the ROD and does not require a vote from the City of Aspen for approval of the bus lanes. Voters have already approved the LRT alternative. This arrangement also preserves the opportunity to convert the dedicated bus lanes for future LRT.

11.3 Recommendations

It is recommended that the BRT alternative be phased in as summarized below:

OPERATIONAL PHASES

Phase 1

- Consider opportunity to optimize service plan for six "interceptible" corridor routes (such as for mid-day, non-peak hours of service), while meeting contractual service agreements and considering a wide variety of factors including weather, congestion, peak directional volumes, and maintaining the quality of service the users of the transit system have come to expect.

Phase 2

- Replace one Buttermilk and two Snowmass Village route buses with 40-foot electric buses, $ 5.6 million (7 buses x $800k each)
- As technology allows, replace BRT and Valley/SH 82 buses with 60-foot (or high-capacity) electric buses, $ 30 million (25 buses x $1M each plus $5M battery recharging equipment for all 32 total buses)
- Replace remaining route buses with electric buses, $15 million

Phase 3

- As technology allows, retrofit buses to autonomous control, $ 4.9 million plus $0.33 million per bus retrofit

BUILD PHASES

Phase 1

- Design ($11 million) and ROW acquisition ($10 million) for preferred alignment across Marolt easement, $21 million

Phase 2

- Build preferred alignment across Marolt easement with New Castle Creek bridge, $81.6 million
- Build continuous dedicated bus lanes from Brush Creek to Buttermilk, $ 3.4 million

A hypothetical funding scenario was provided in Section 8. However, it will require further consideration and discussion by RFTA and the EOTC, as well as possible approval by the voters, prior to implementation. Currently no decision has been made from the EOTC pending further meetings/discussion that are scheduled for September 2017, after the conclusion of this report.

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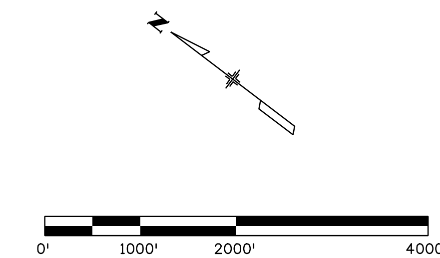
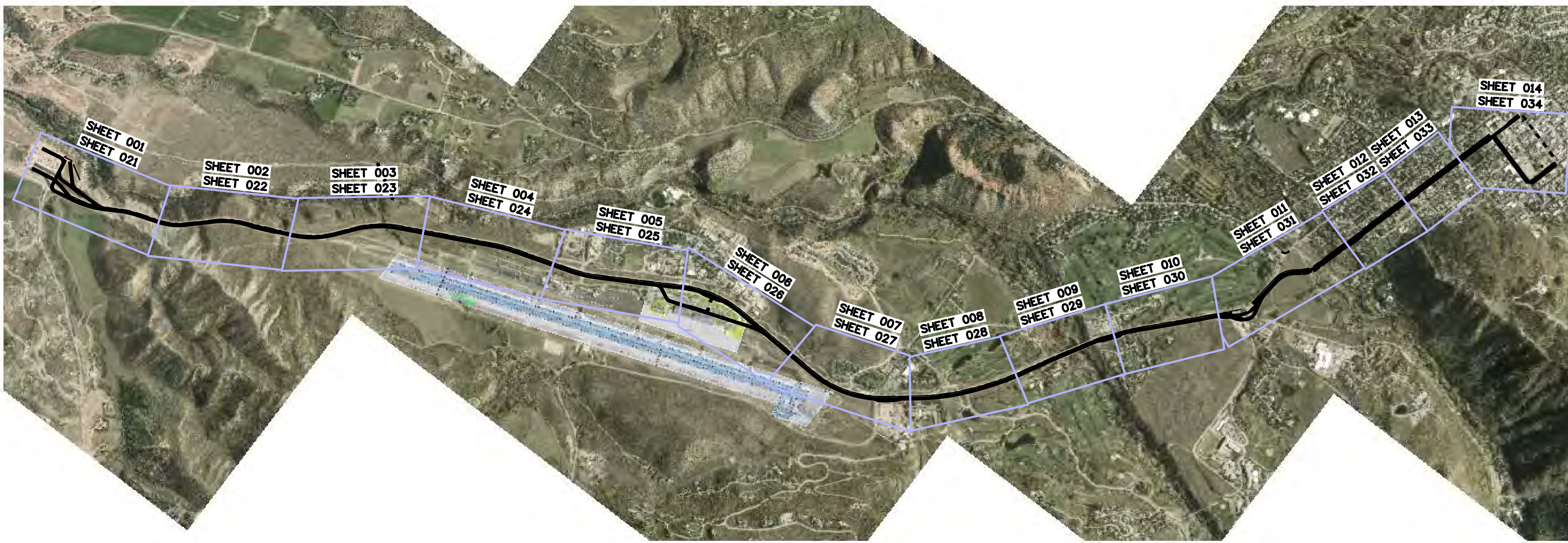
Appendix A LRT Alternative Alignment Drawings





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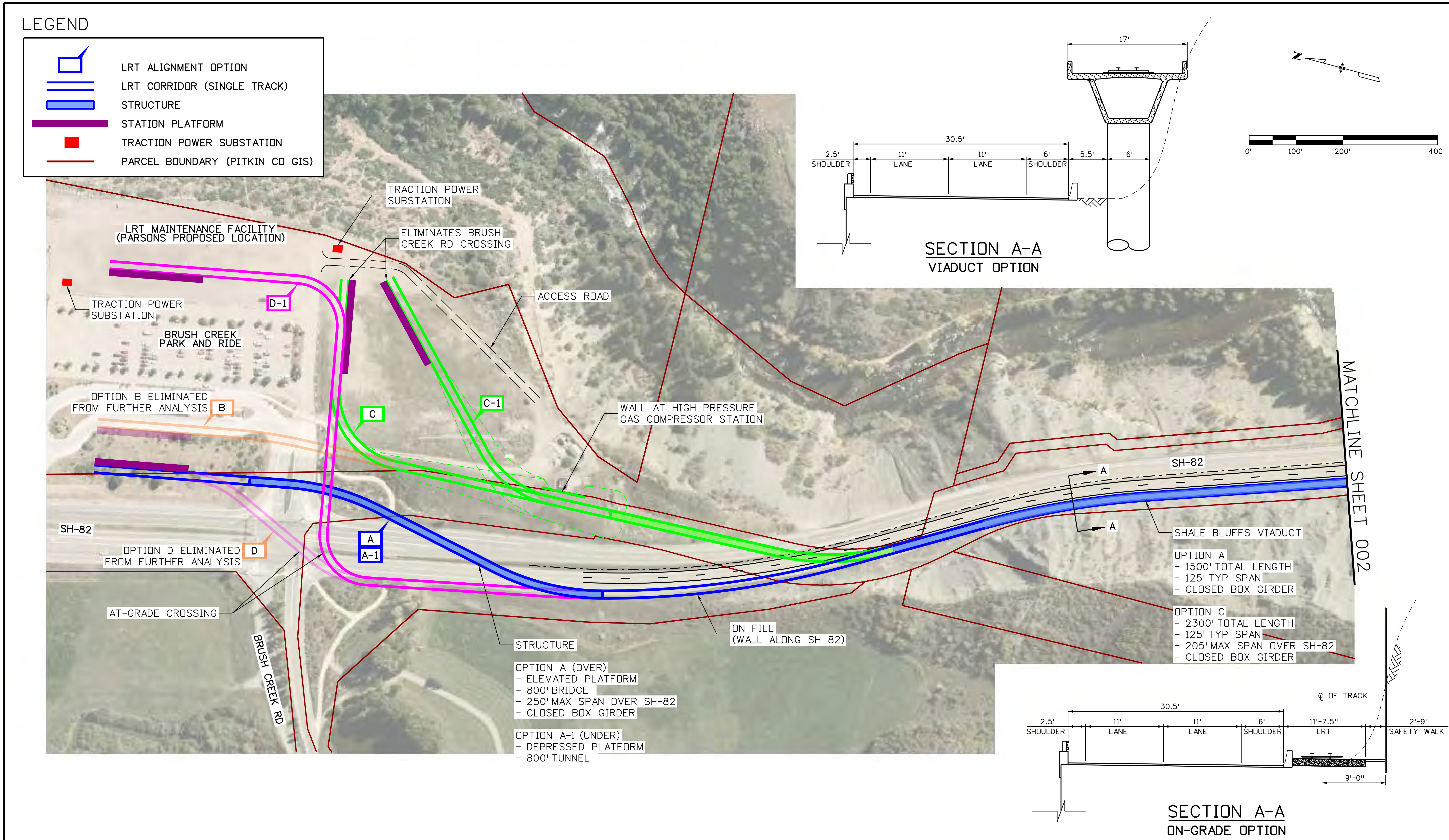

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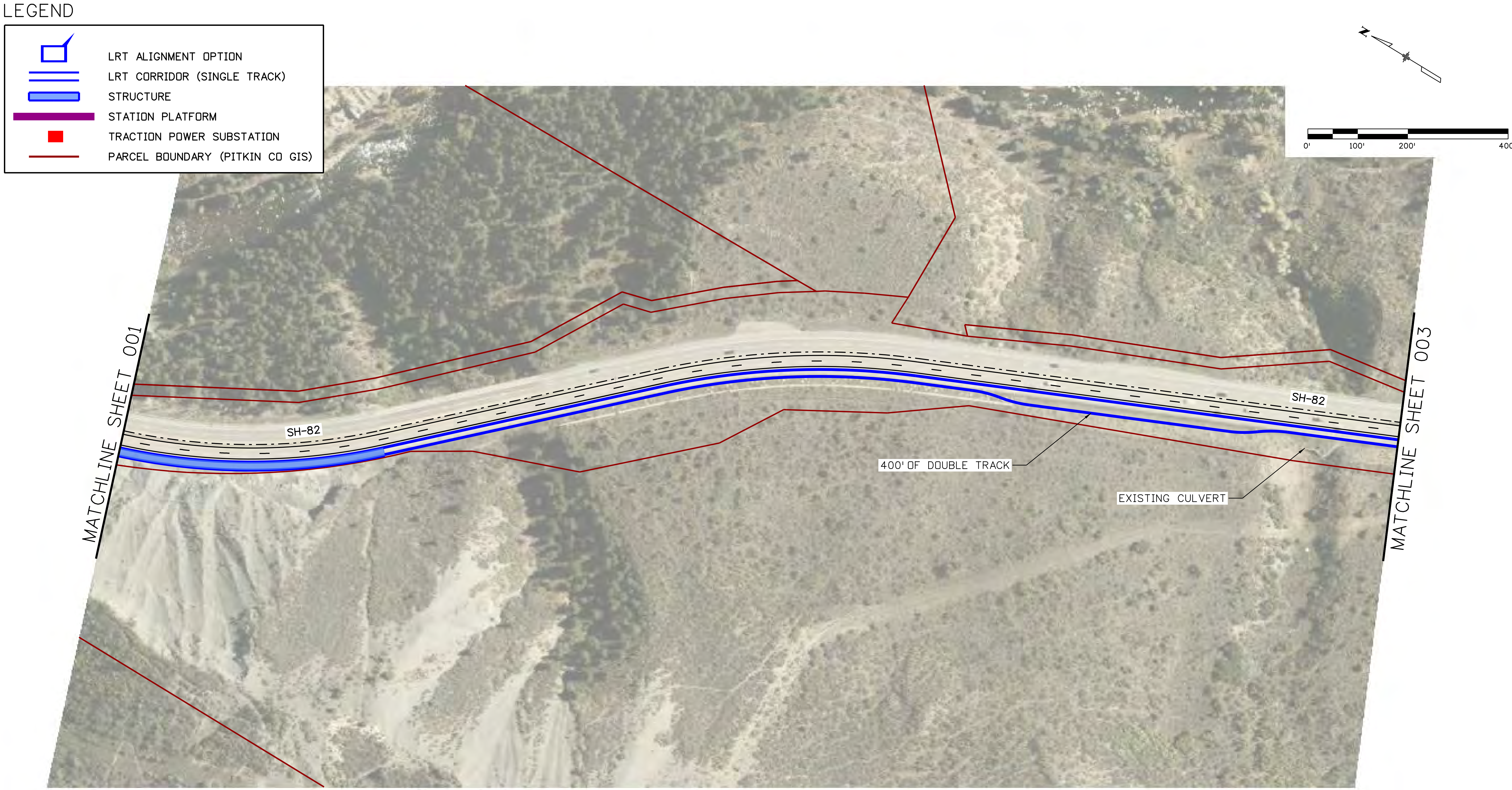

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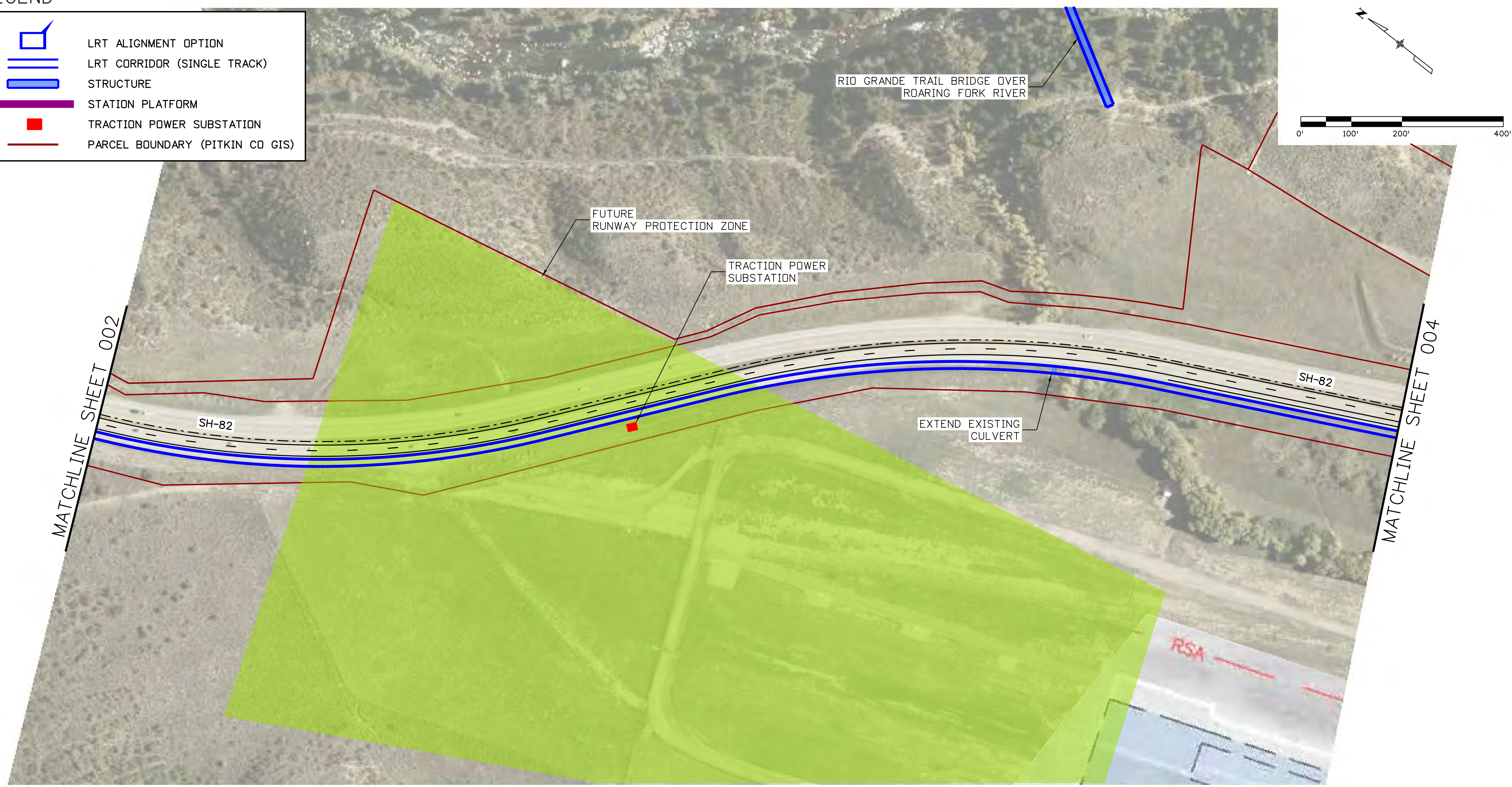
LEGEND

	LRT ALIGNMENT OPTION
	LRT CORRIDOR (SINGLE TRACK)
	STRUCTURE
	STATION PLATFORM
	TRACTION POWER SUBSTATION
	PARCEL BOUNDARY (PITKIN CO GIS)



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LEGEND

- LRT ALIGNMENT OPTION
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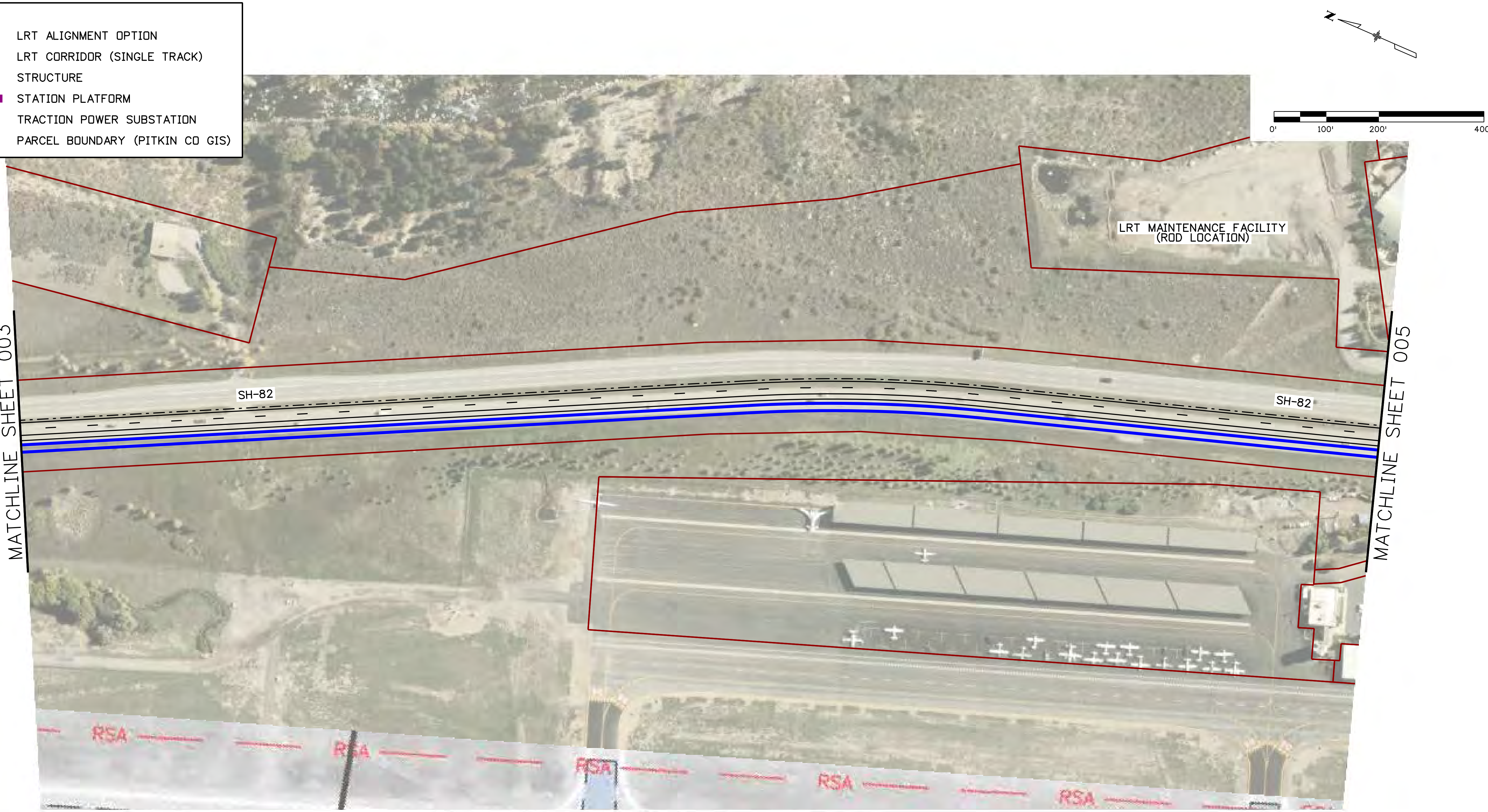
- STRUCTURE
- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)



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	STRUCTURE
	STATION PLATFORM
	TRACTION POWER SUBSTATION
	PARCEL BOUNDARY (PITKIN CO GIS)

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Horiz. Scale: 1:200 Vert. Scale:

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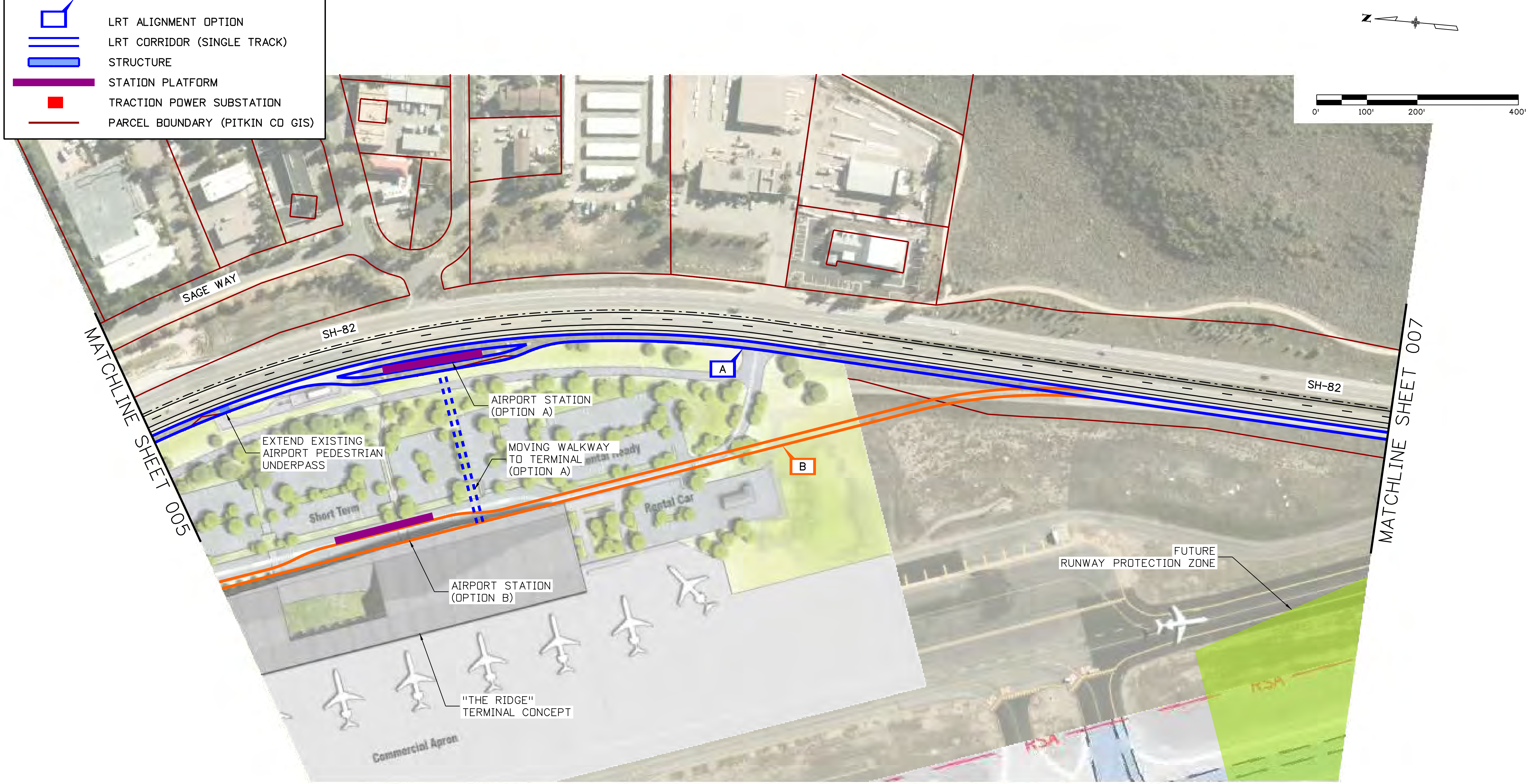
Project No./Code

Sheet Number 005

LEGEND

- LRT ALIGNMENT OPTION
- LRT CORRIDOR (SINGLE TRACK)
- STRUCTURE
- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)



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Project No./Code

Sheet Number 006

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(symbol)	STATION PLATFORM
(symbol)	TRACTION POWER SUBSTATION
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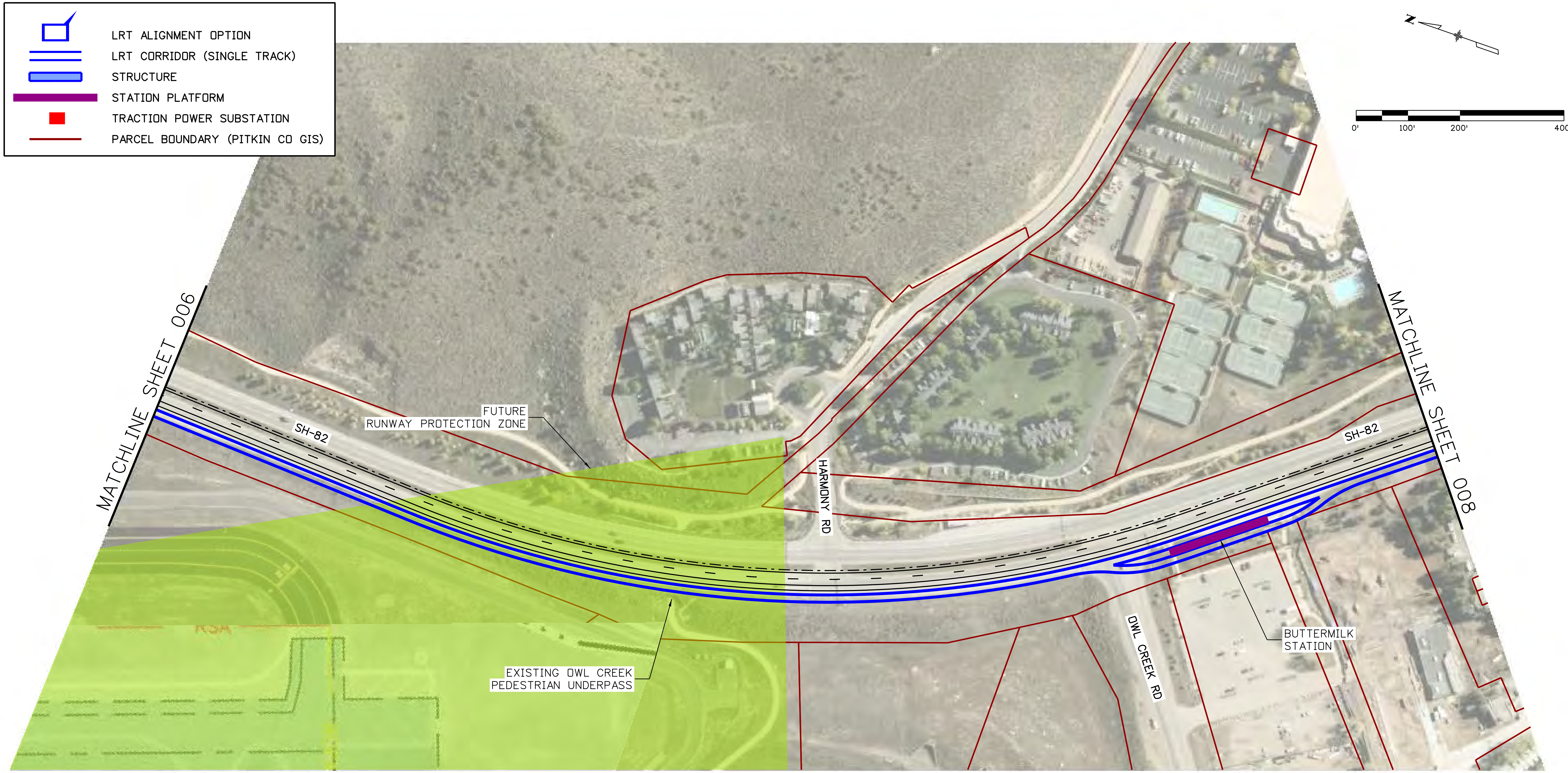

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Sheet Number 007

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- LRT CORRIDOR (SINGLE TRACK)
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- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)

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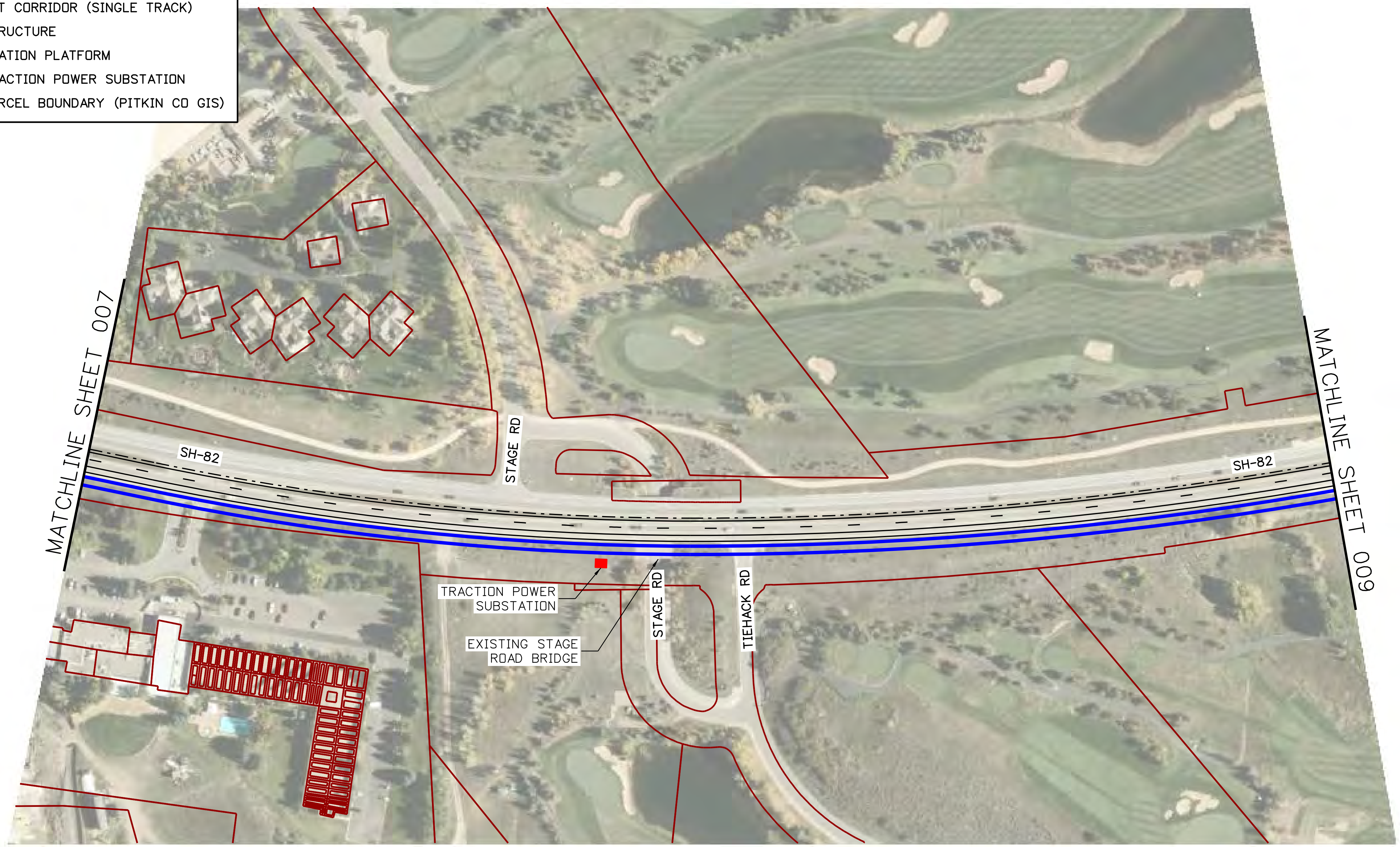

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(symbol)	STRUCTURE
(symbol)	STATION PLATFORM
(symbol)	TRACTION POWER SUBSTATION
(symbol)	PARCEL BOUNDARY (PITKIN CO GIS)

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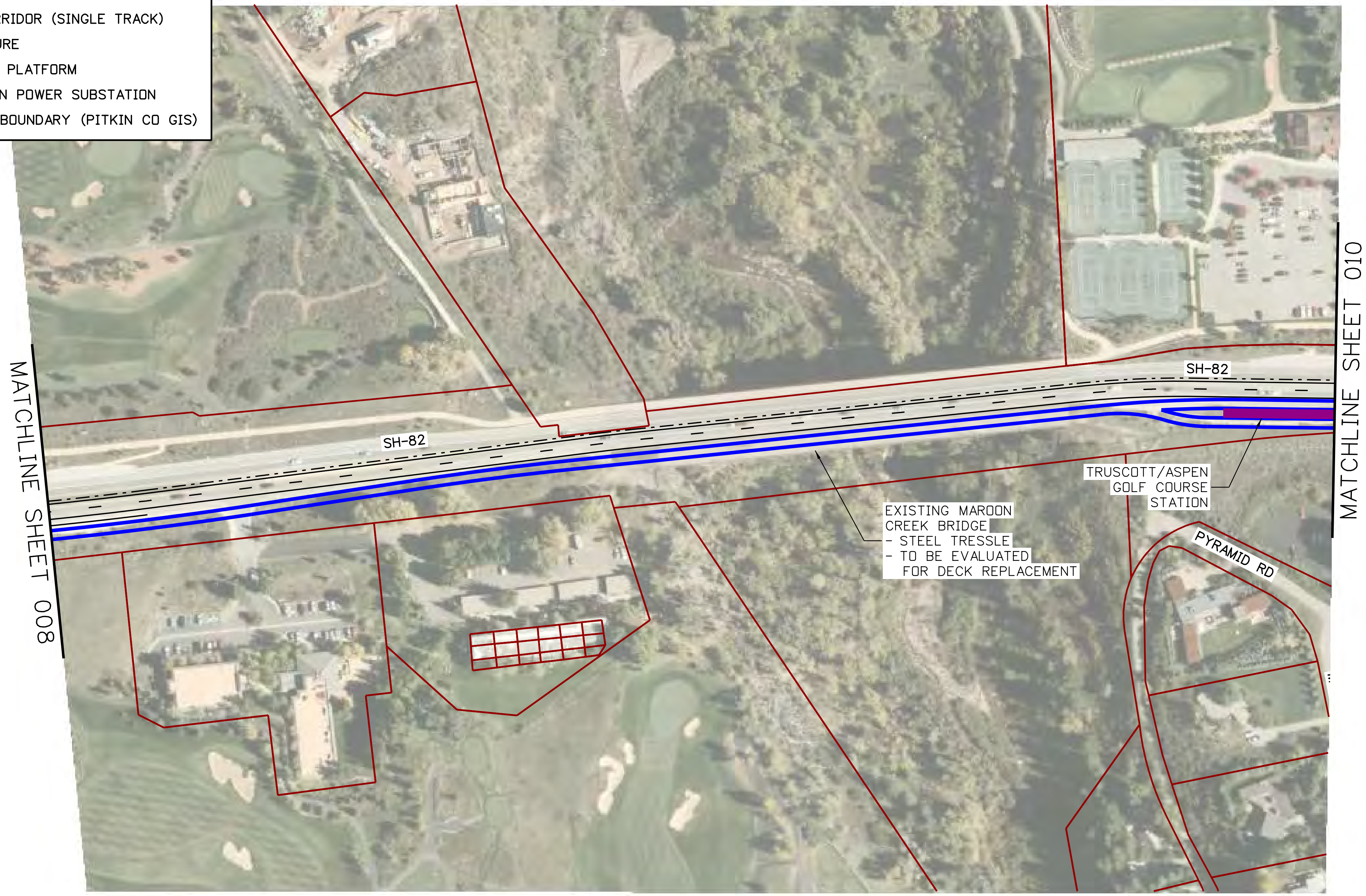

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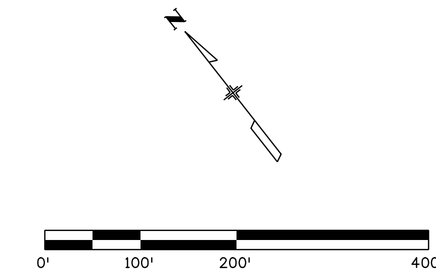
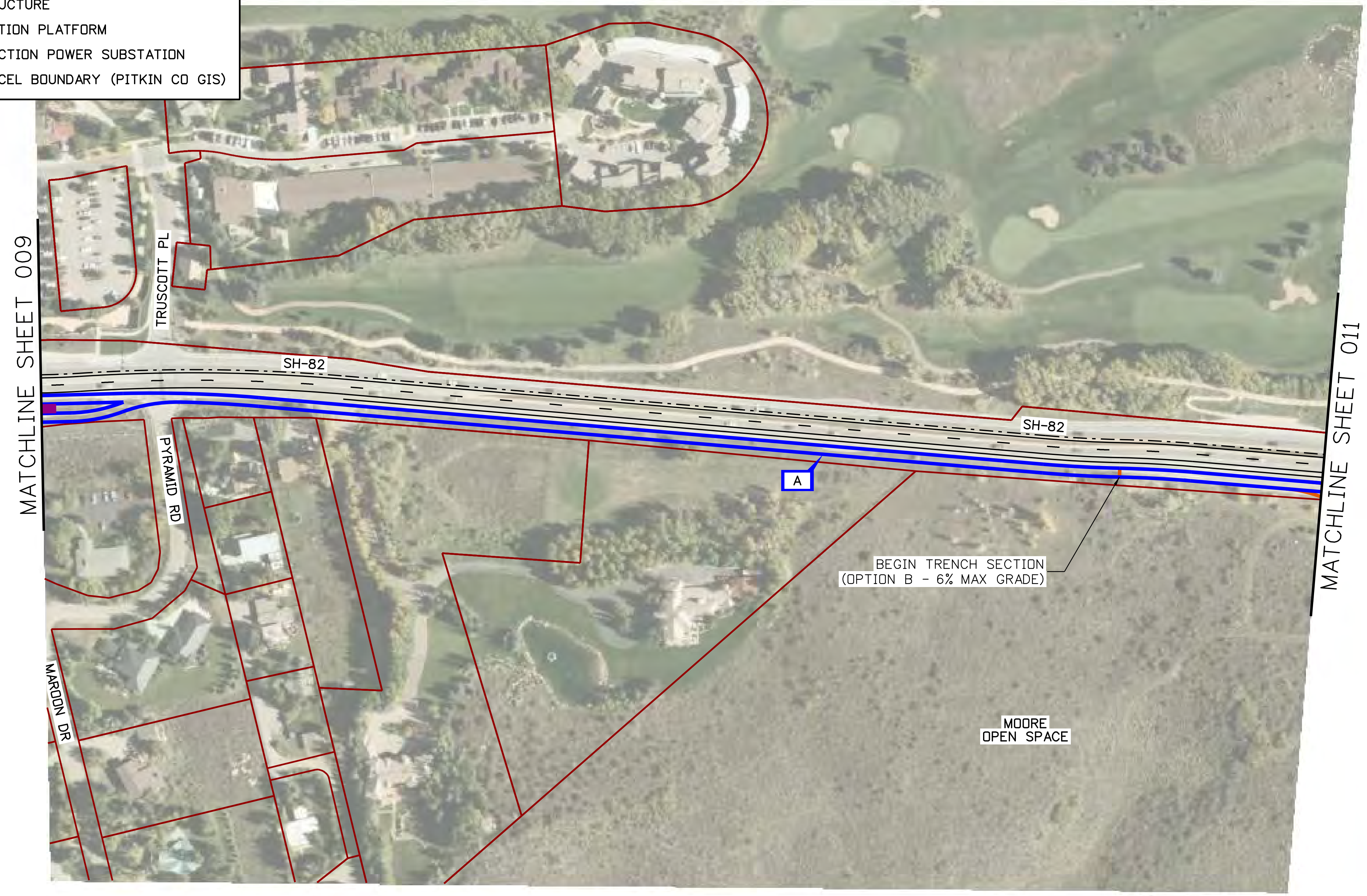
(symbol)	STATION PLATFORM
(symbol)	TRACTION POWER SUBSTATION
(symbol)	PARCEL BOUNDARY (PITKIN CO GIS)





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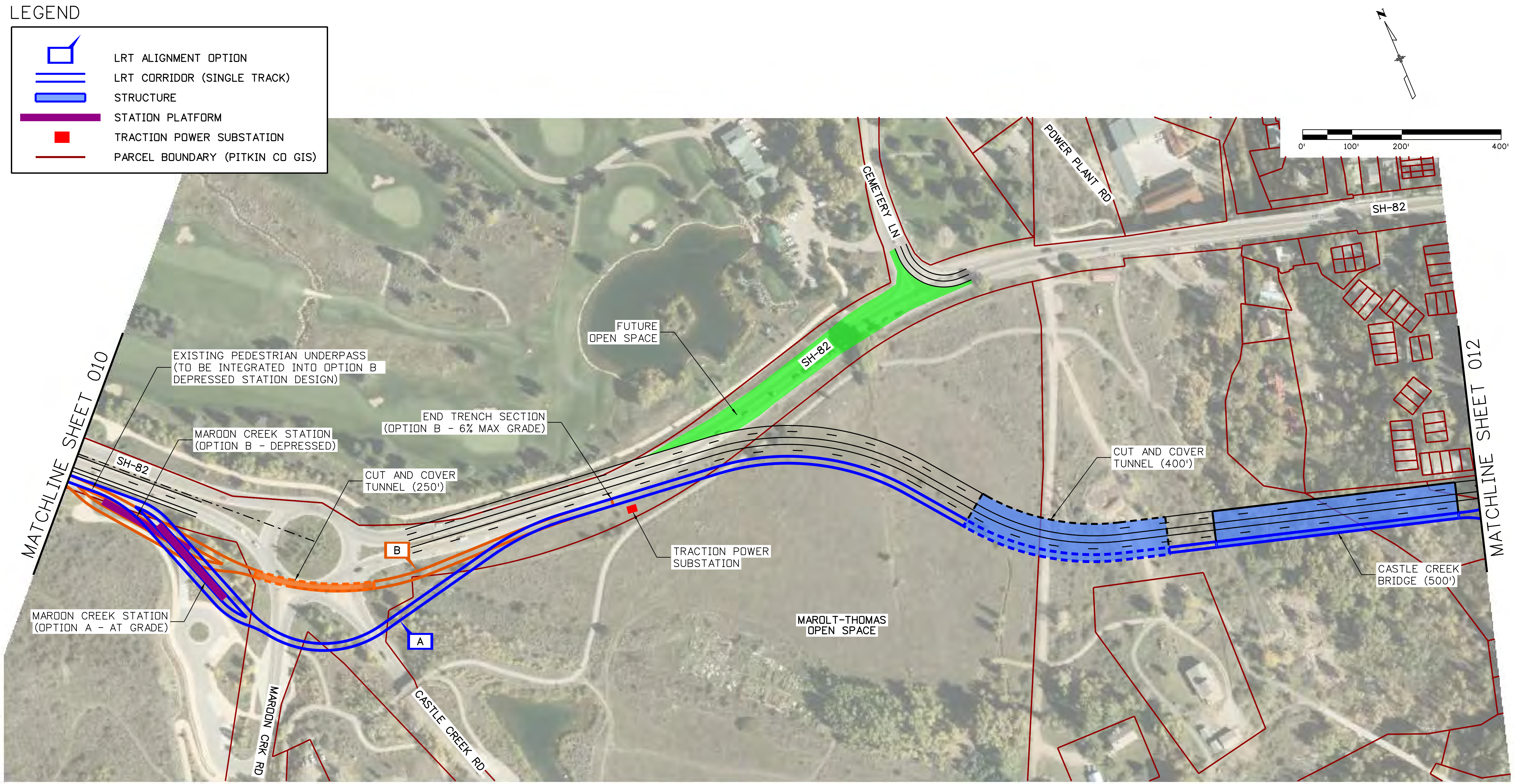

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Project No./Code
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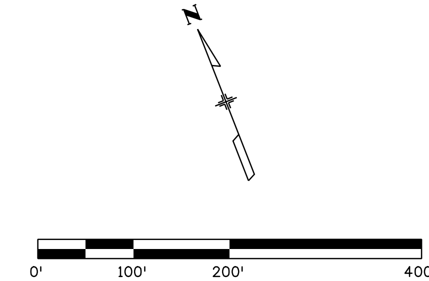
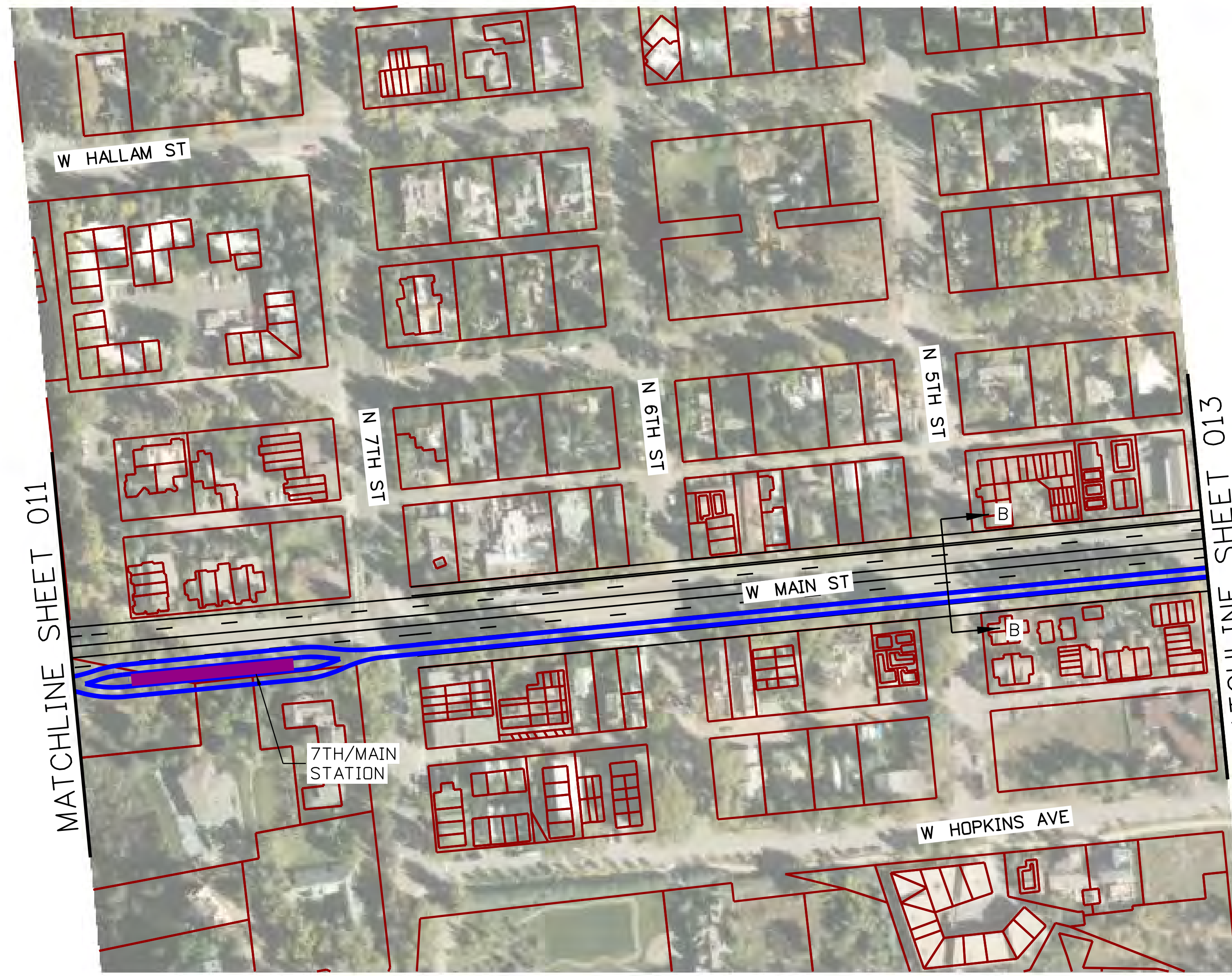
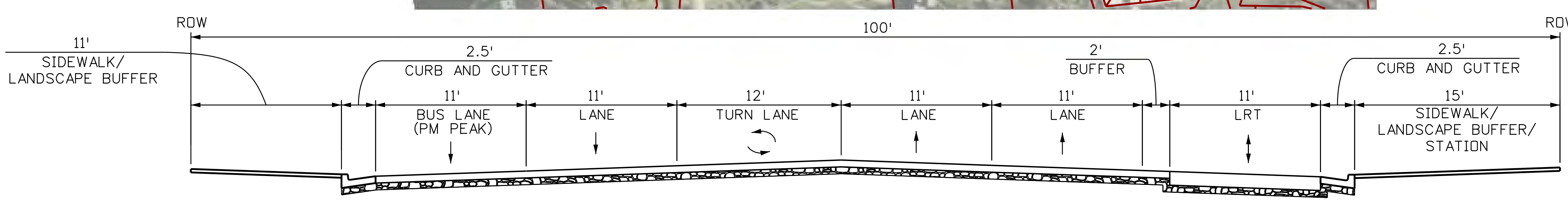
	STRUCTURE
	STATION PLATFORM
	TRACTION POWER SUBSTATION
	PARCEL BOUNDARY (PITKIN CO GIS)







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MAIN STREET

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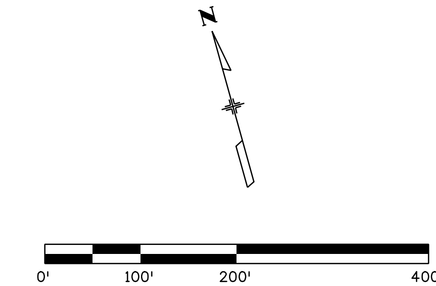
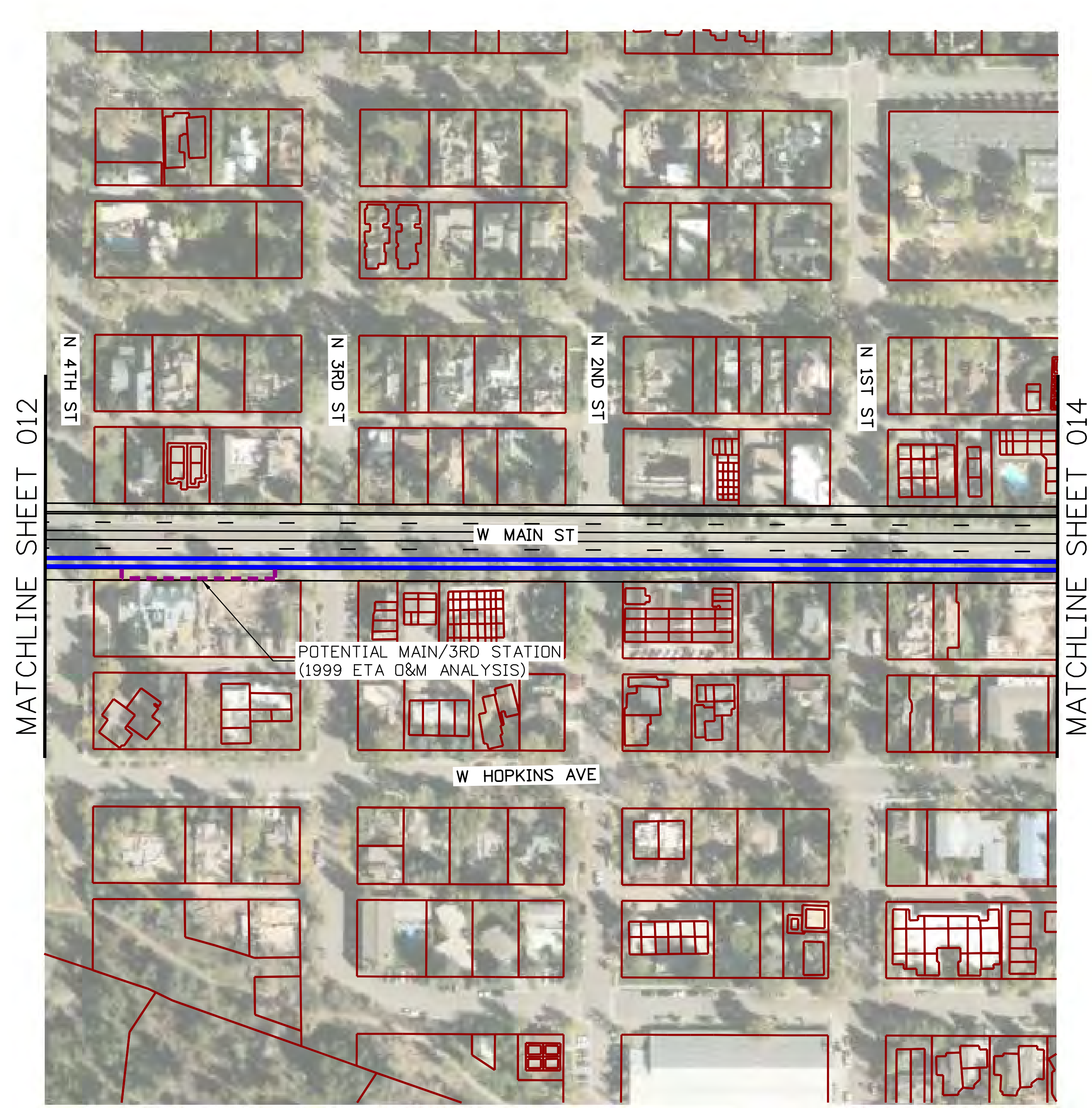
	STRUCTURE
	STATION PLATFORM
	TRACTION POWER SUBSTATION
	PARCEL BOUNDARY (PITKIN CO GIS)





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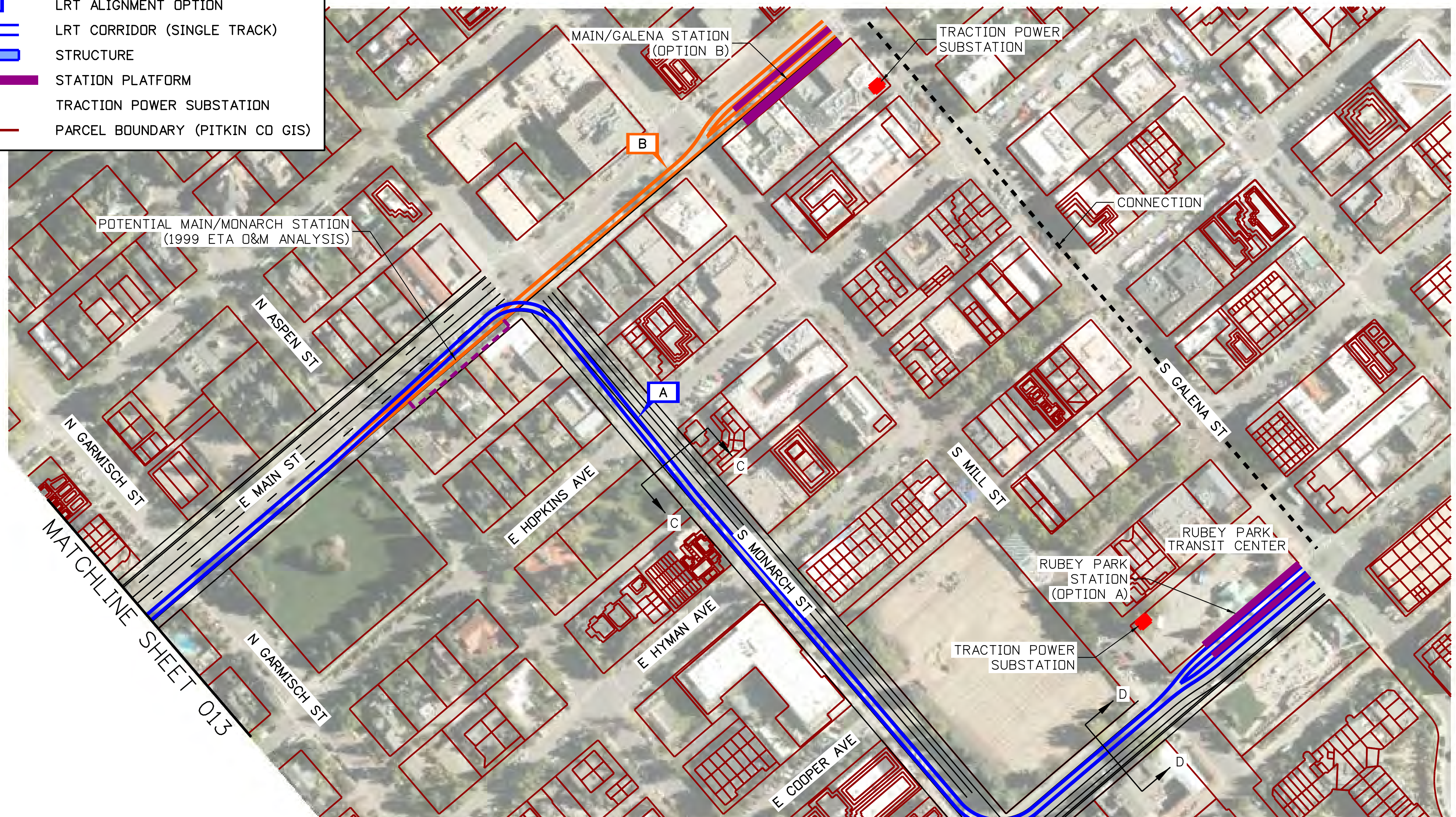
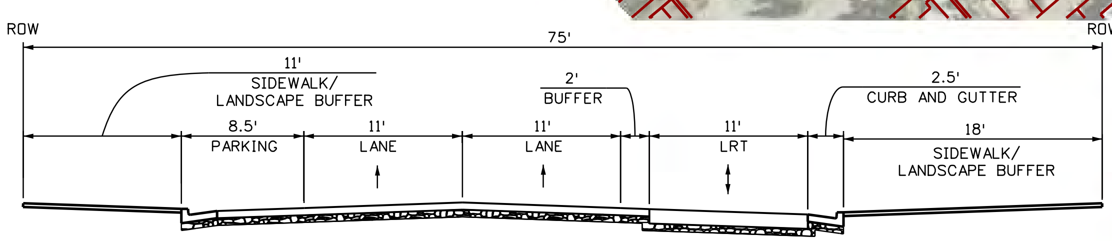
Sheet Number	013

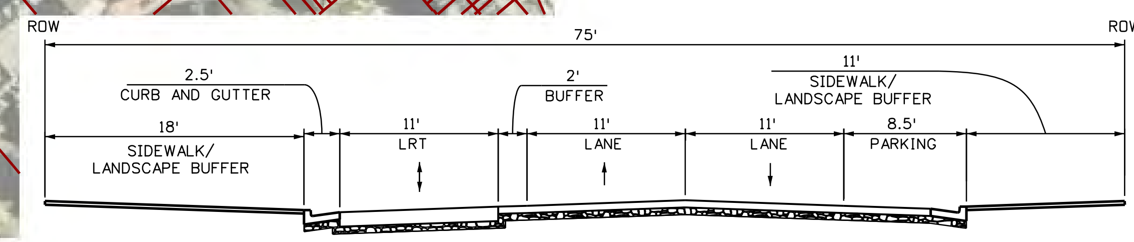
LEGEND

- LRT ALIGNMENT OPTION
- LRT CORRIDOR (SINGLE TRACK)
- STRUCTURE
- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)





SECTION C-C
MONARCH STREET



SECTION D-D
DURANT AVENUE

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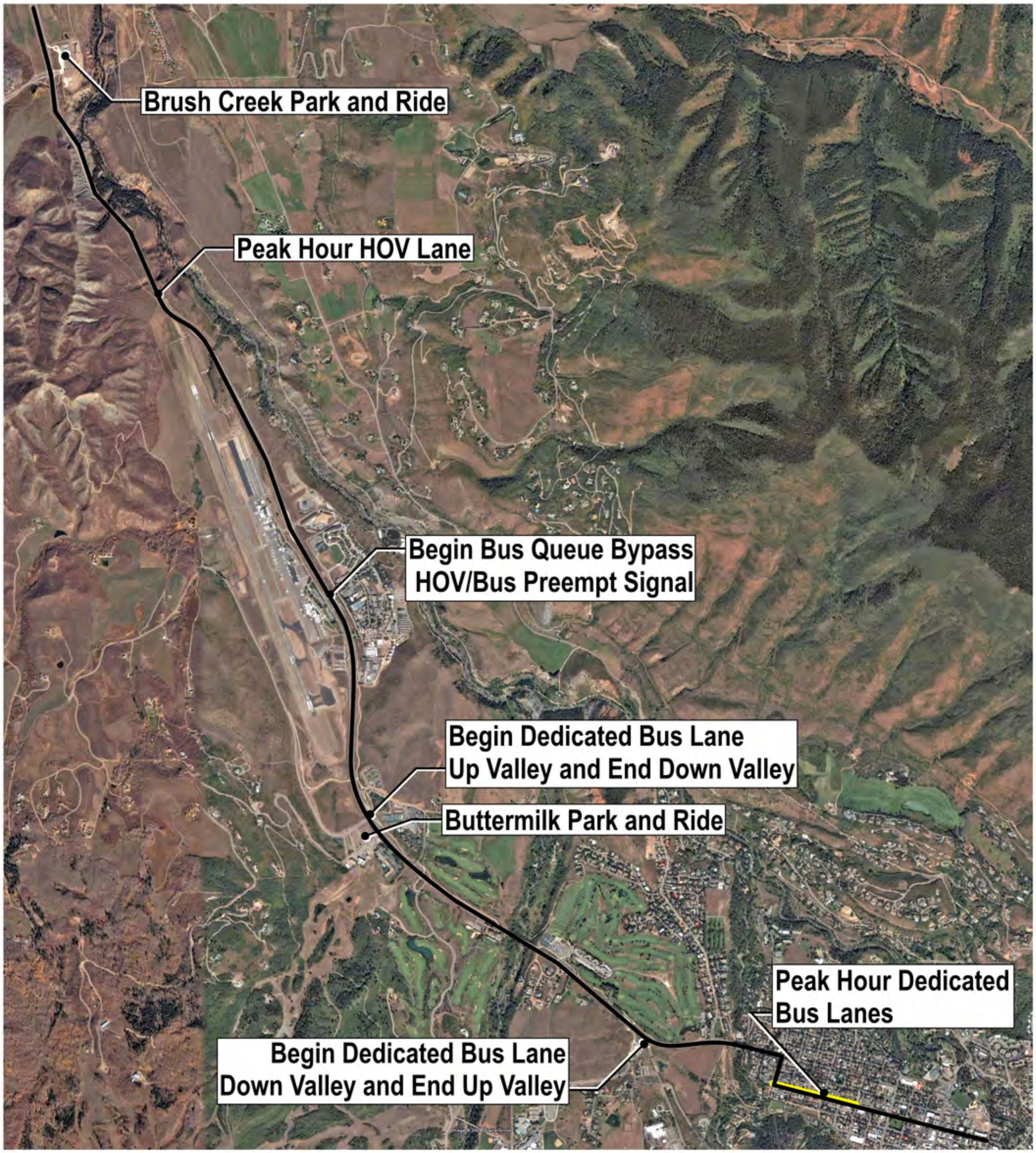
Appendix B BRT ALTERNATIVE ALIGNMENT DRAWINGS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Peak Hour HOV Lane
Begin Bus Queue Bypass
HOV/Bus Preempt Signal
Begin Dedicated Bus Lane
Up Valley and End Down Valley
Buttermilk Park and Ride
Peak Hour Dedicated
Bus Lanes
Begin Dedicated Bus Lane
Down Valley and End Up Valley

Figure 2

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Project No./Code
Sheet Number 021

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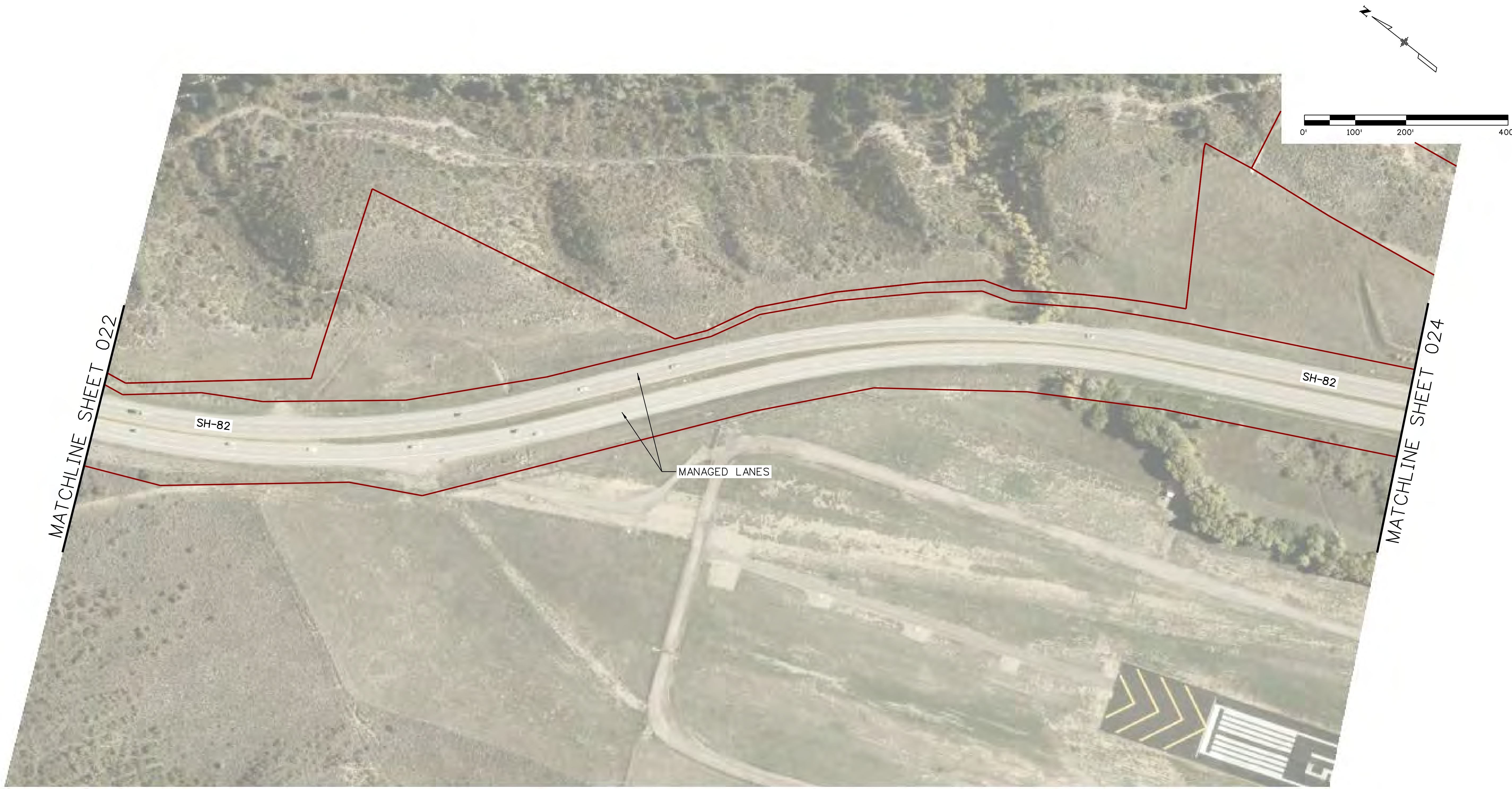

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Sheet Revisions

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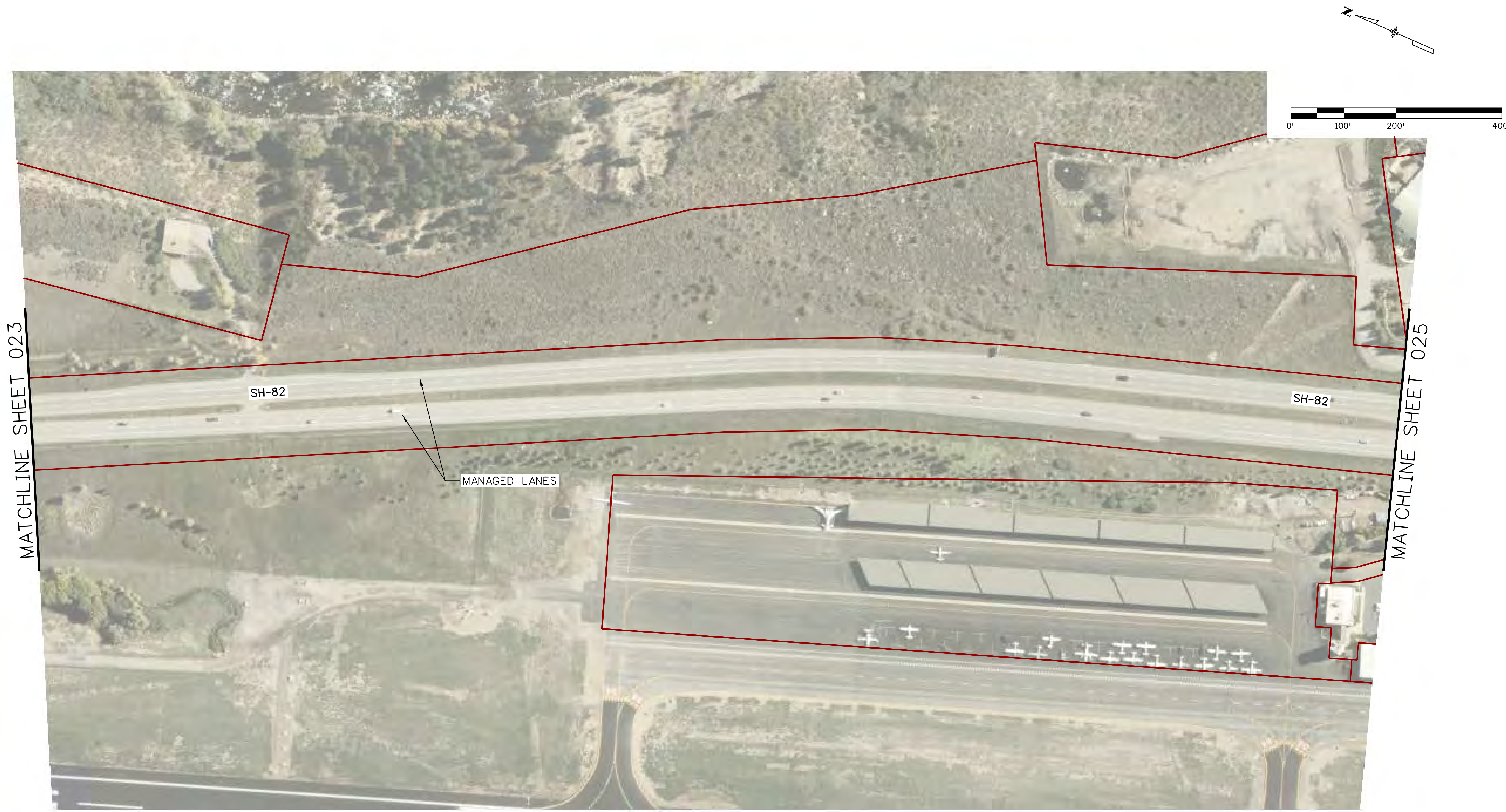
Sheet Number 023



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Sheet Revisions

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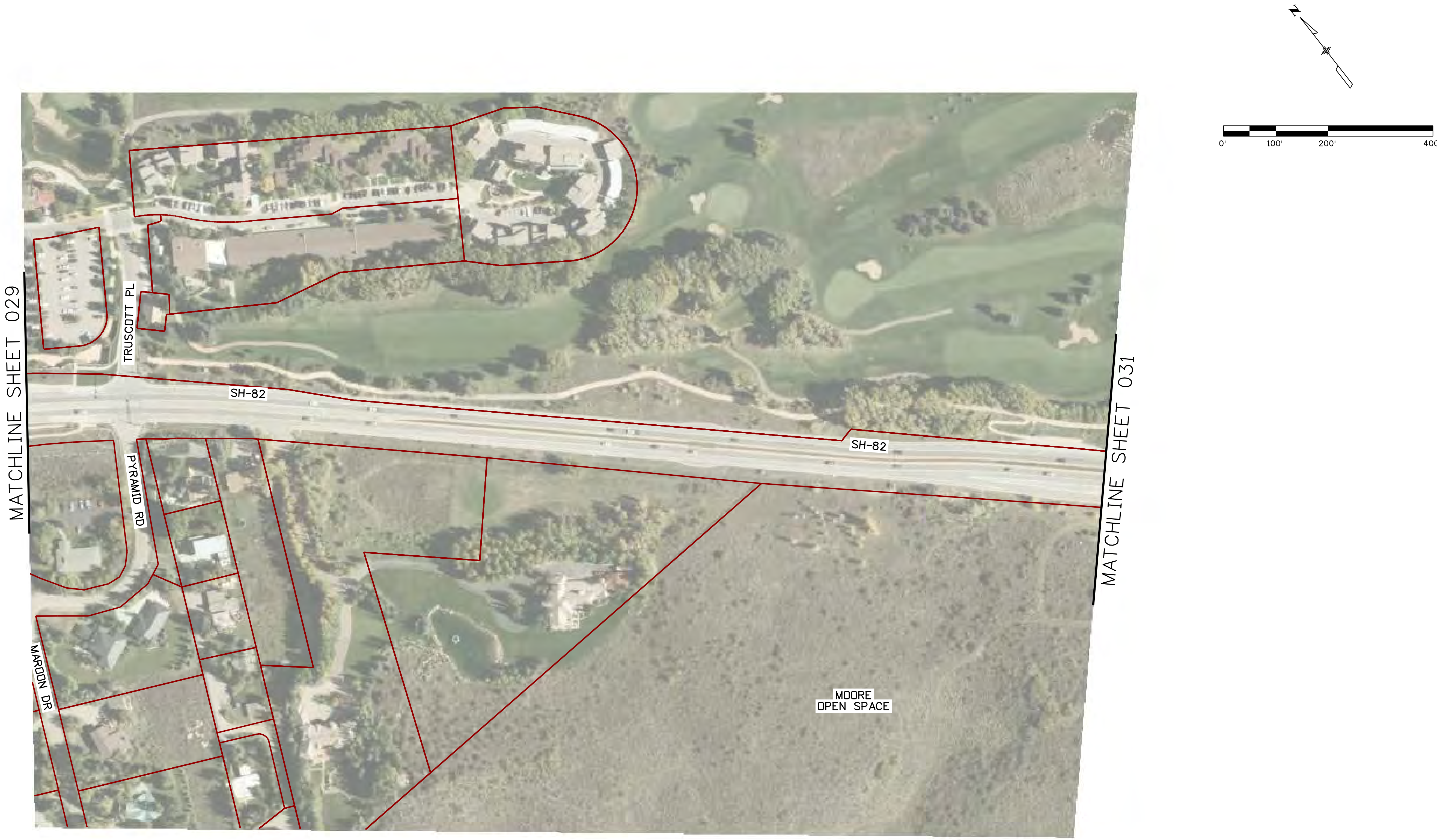

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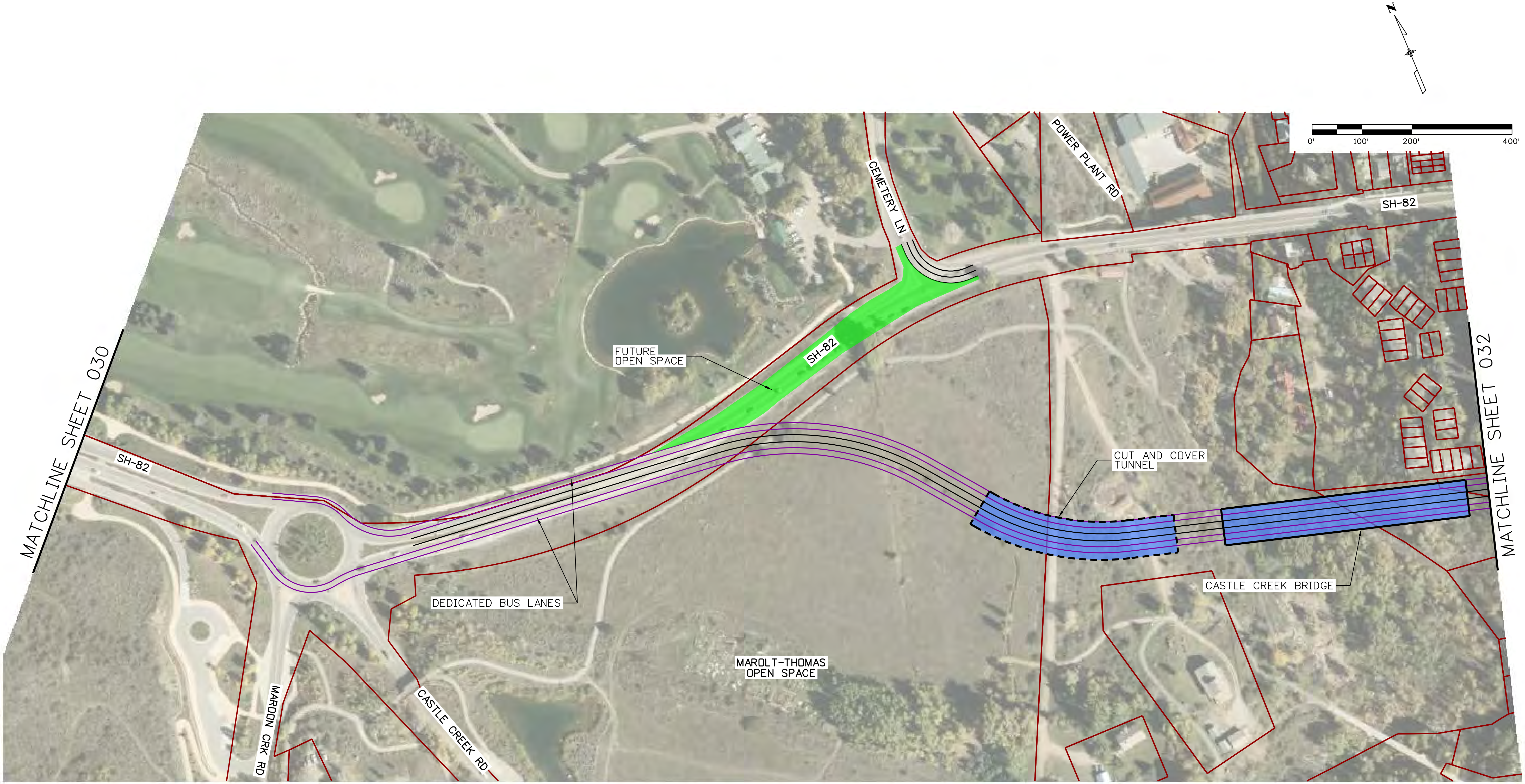

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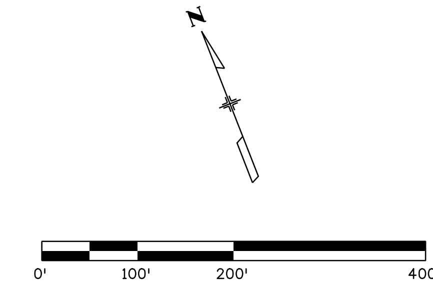

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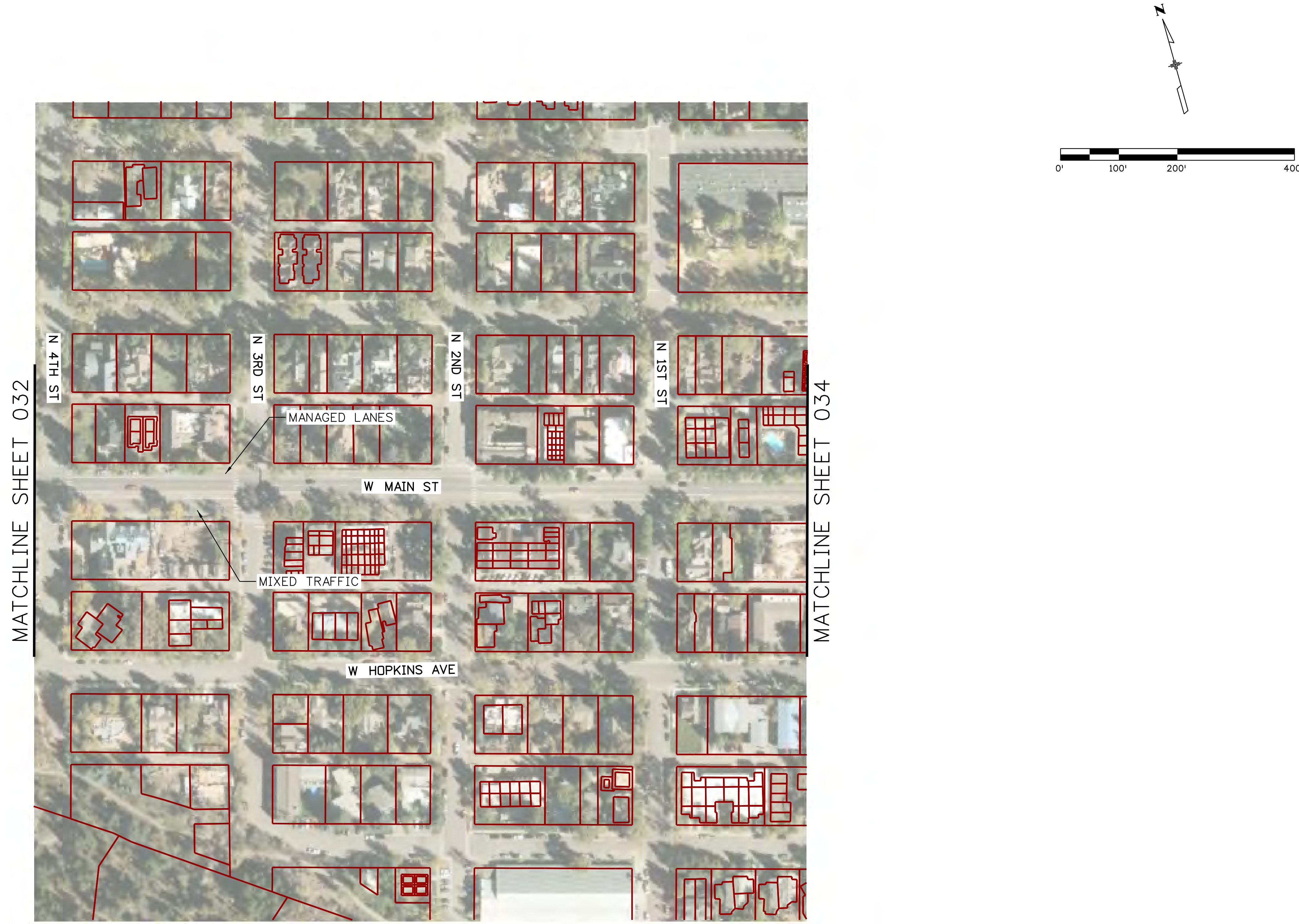

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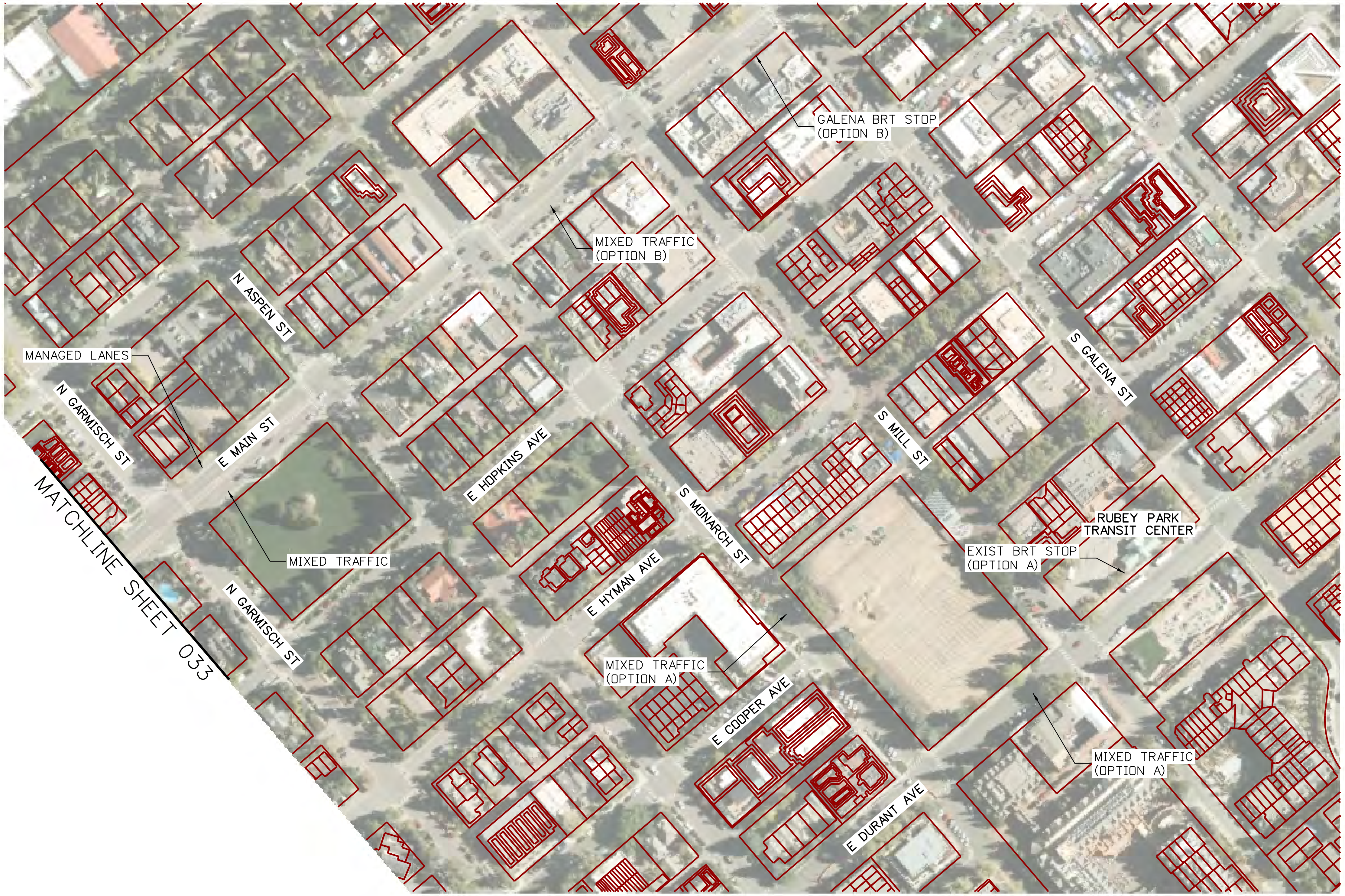

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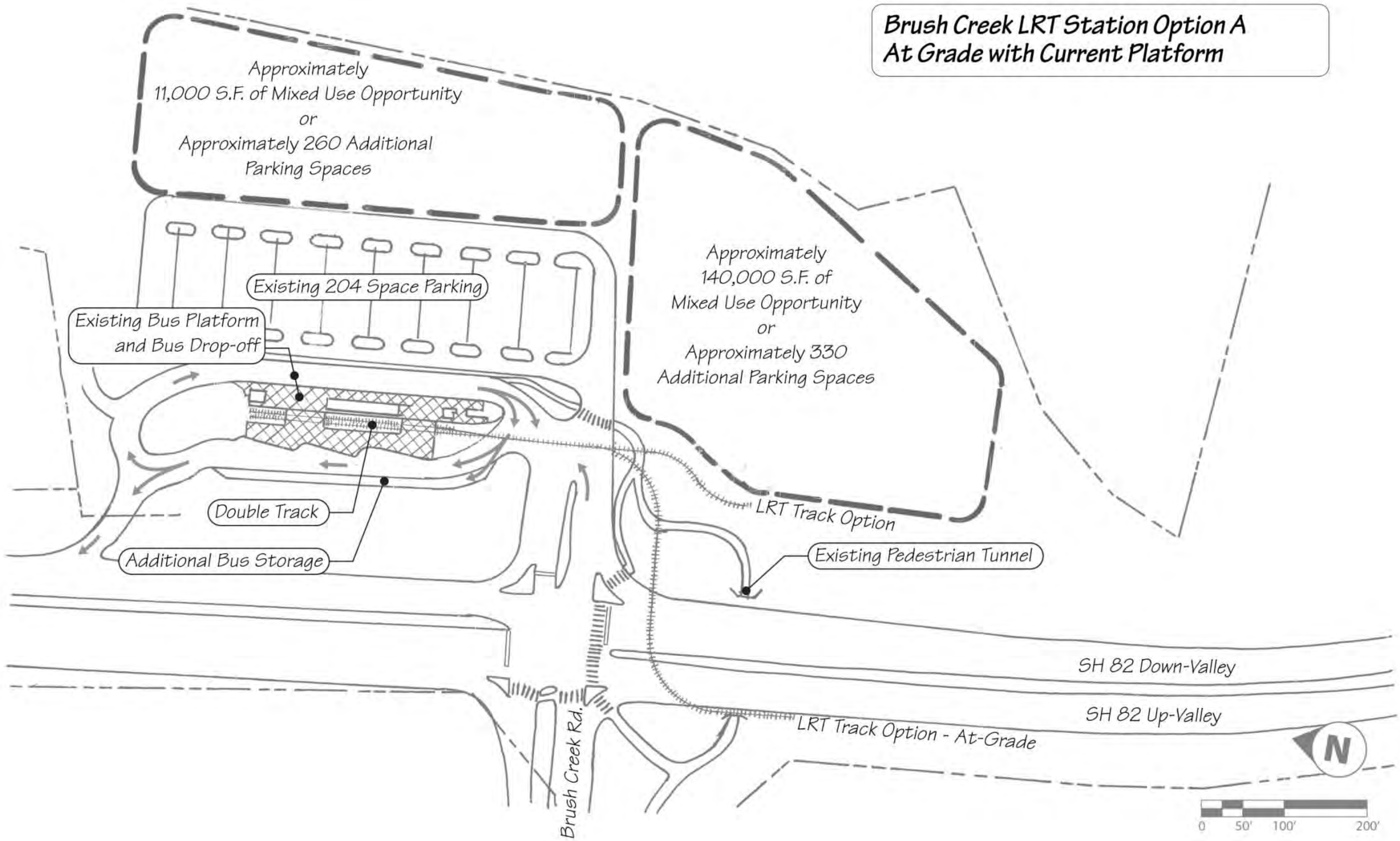
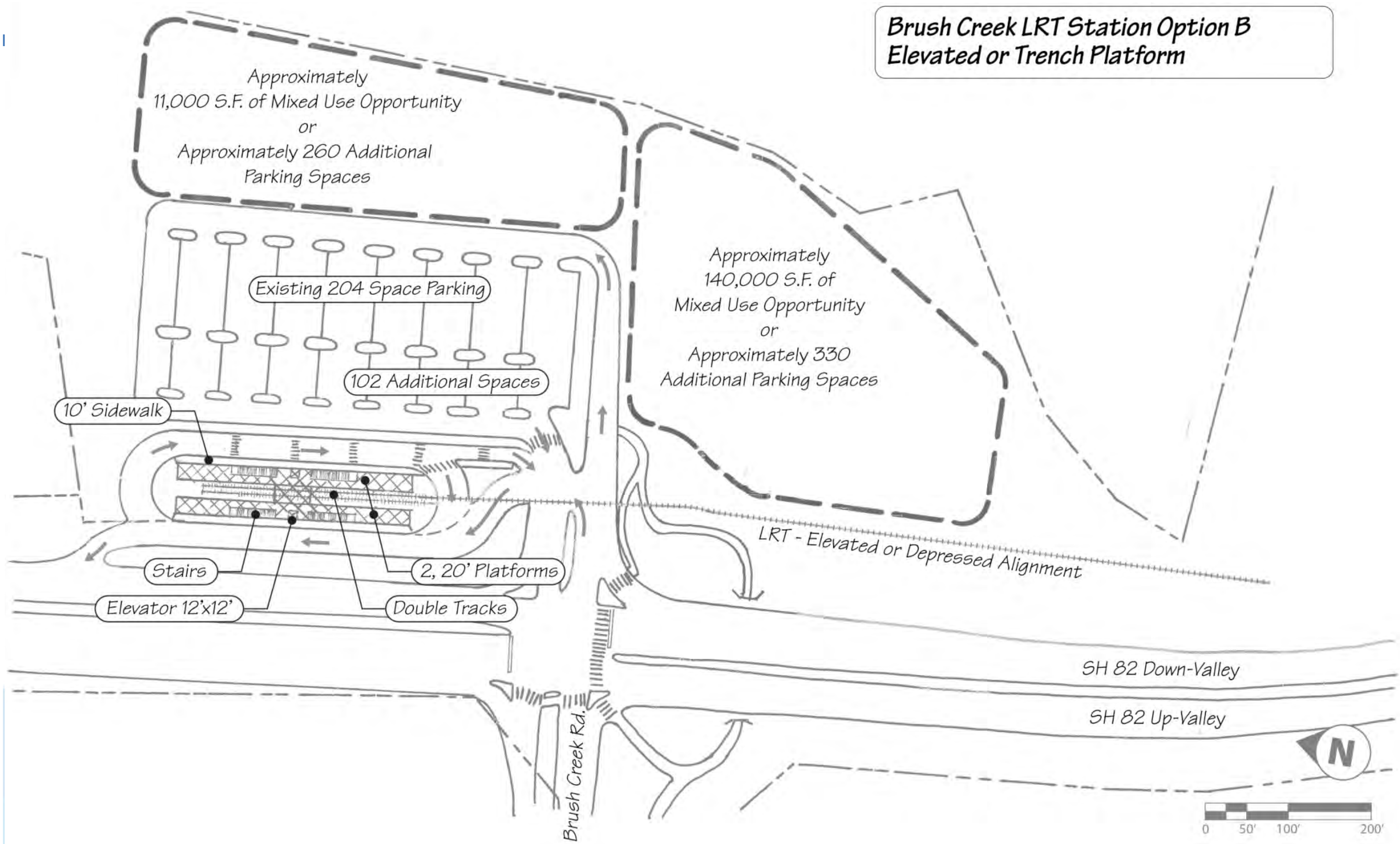
Appendix C LRT STATION RENDERINGS

BRUSH CREEK LRT STATION CONCEPTS



BRUSH CREEK LRT STATION CONCEPTS



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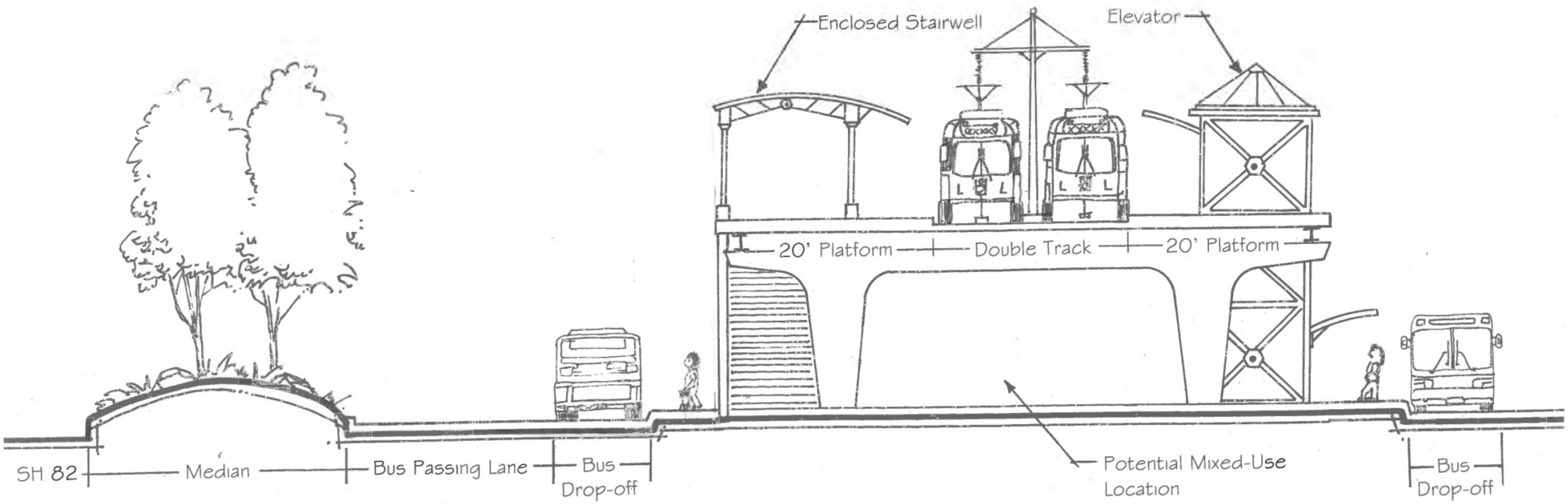
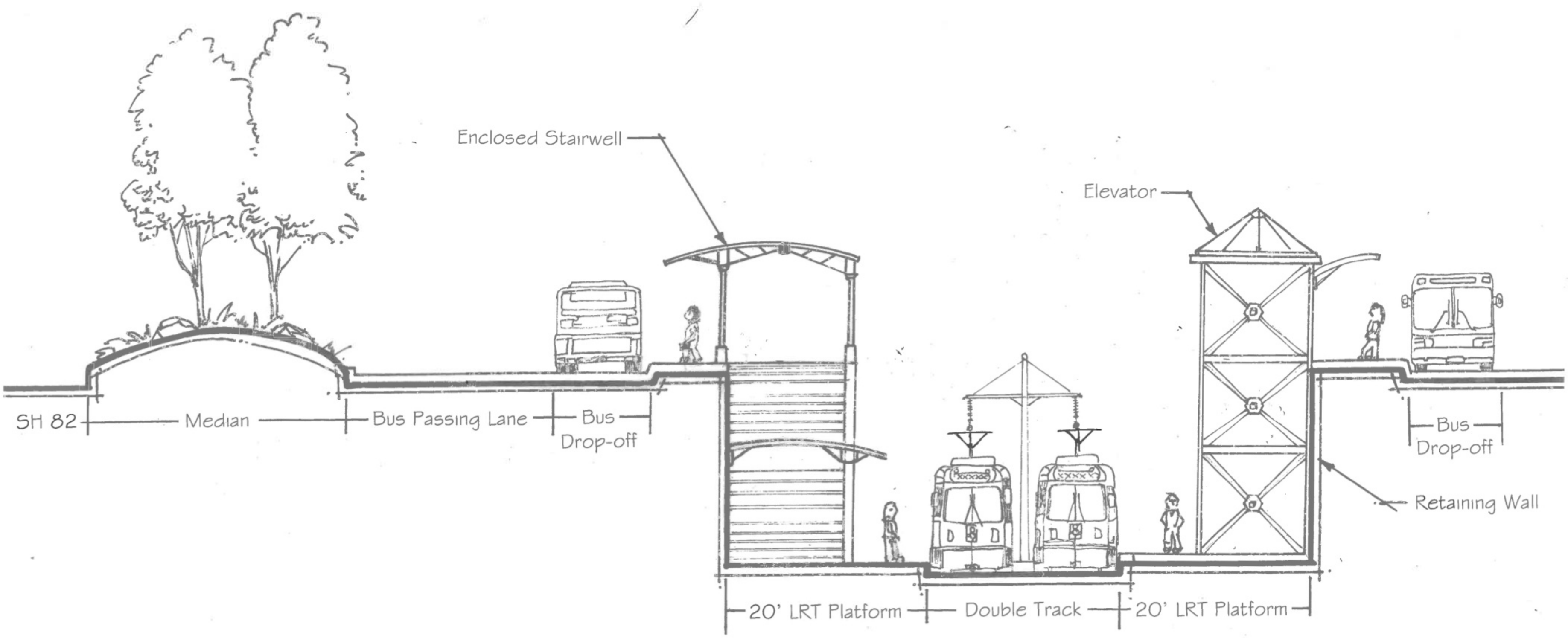
BRUSH CREEK LRT STATION CONCEPTS

Brush Creek LRT Station Option B
Elevated Platform



BRUSH CREEK LRT STATION CONCEPTS

Brush Creek LRT Station Option B
Trench Platform



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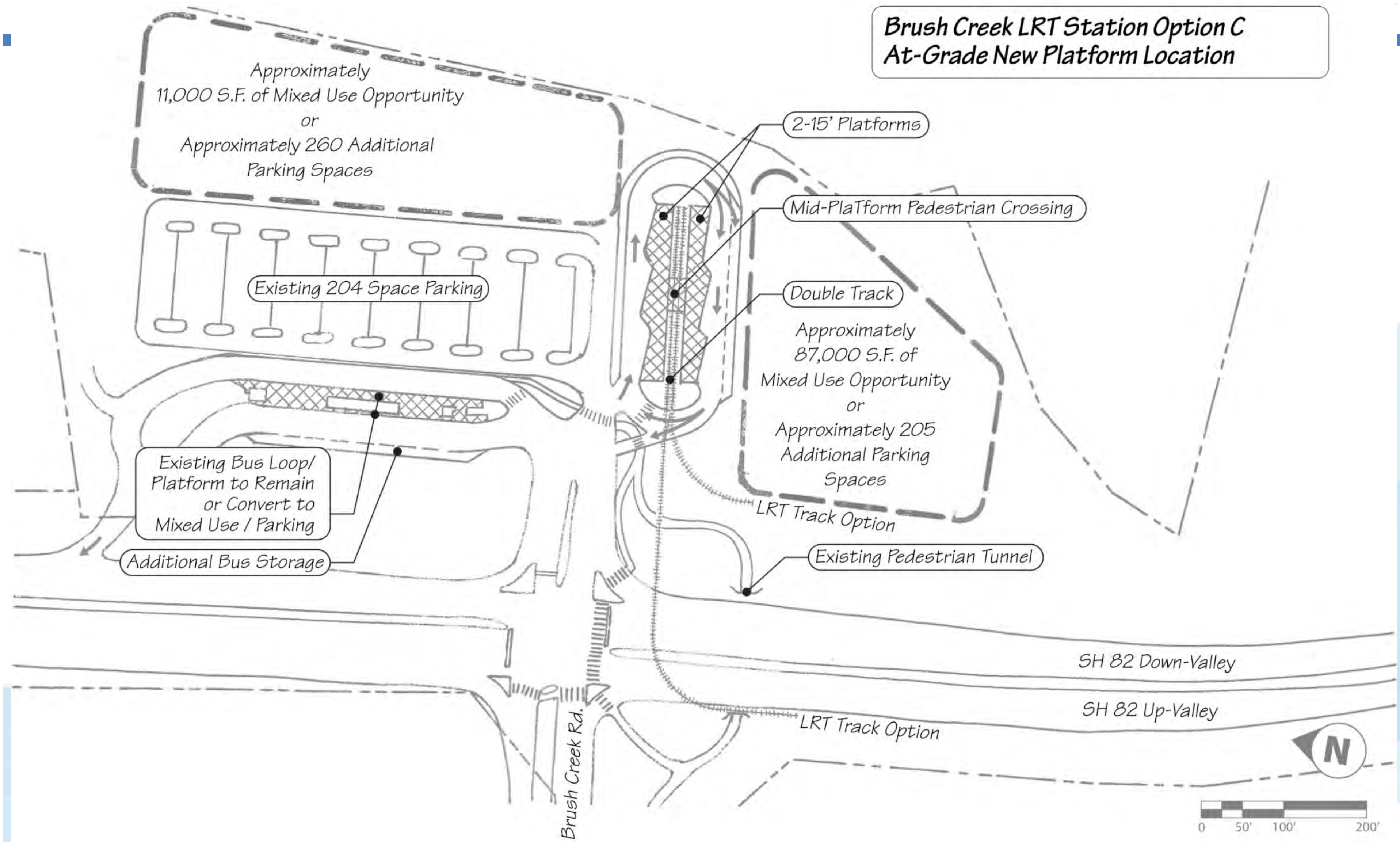
BRUSH CREEK LRT STATION CONCEPTS



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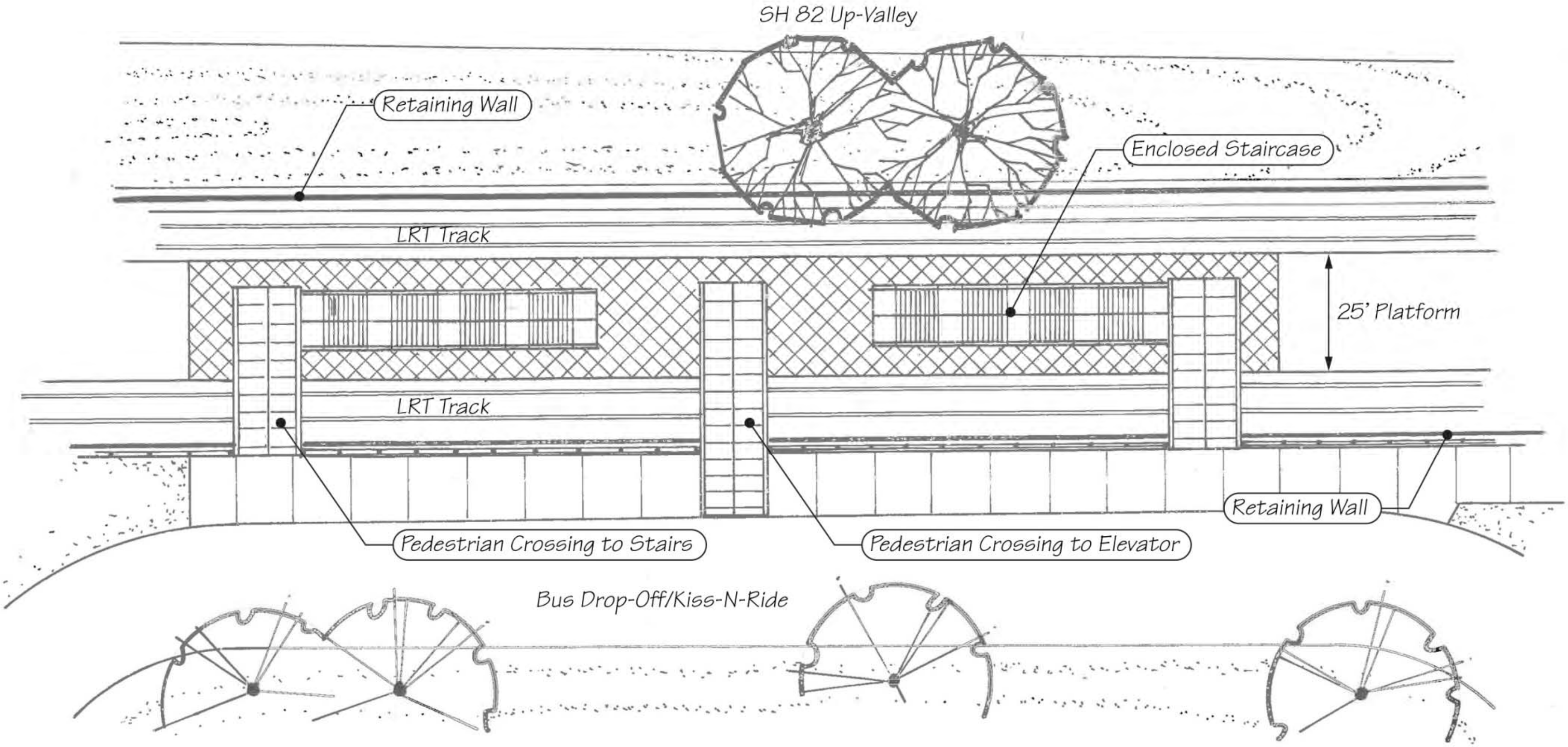
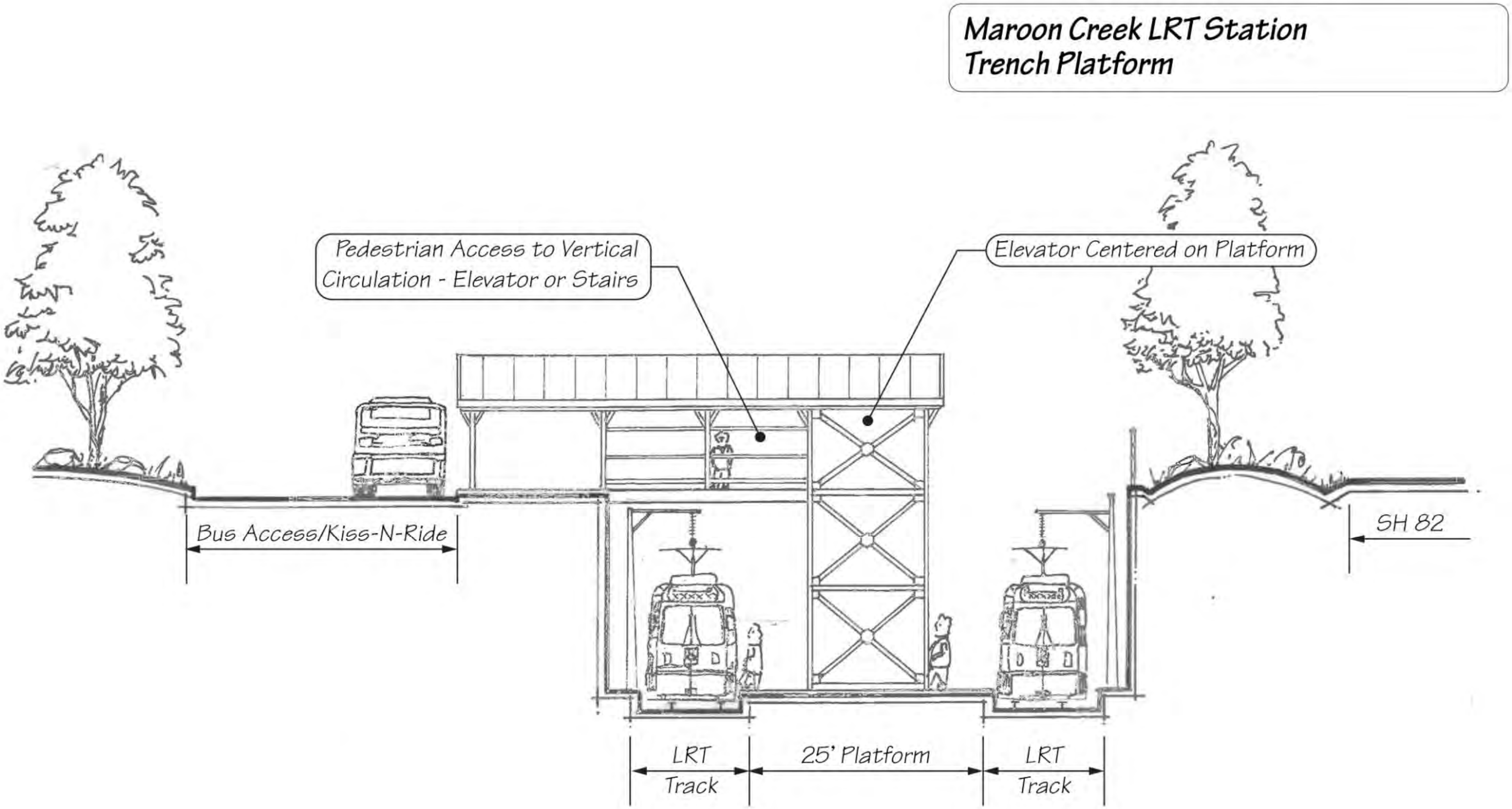
MAROON CREEK LRT STATION CONCEPTS

Maroon Creek LRT Station
Plan View



MAROON CREEK LRT STATION CONCEPTS



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Appendix D TRAFFIC IMPACTS MEMORANDUM

Upper Valley Mobility Study

State Highway 82 Traffic Assessment

May 12, 2017

Prepared for:
Roaring Fork Transportation Authority
0051 Service Center Drive
Aspen, CO 81611

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1 Introduction

The objective of this study is to evaluate the existing traffic conditions on the State Highway 82 (SH 82) corridor from Brush Creek Road to Monarch Street, and assess the potential impacts of additional rapid transit service in the Upper Roaring Fork Valley.

1.1 Study Location and Corridor Description

The SH 82 corridor is generally regarded as the most congested rural highway corridor in Colorado, and the Upper Valley, from Brush Creek Road through Downtown Aspen has historically been the most affected portion of the corridor. This segment of SH 82 is shown in Figure 1-1:

Figure 1-1: Study Area

The primary planning document for the corridor is the *State Highway 82 Entrance to Aspen Record of Decision, 1998* (*ROD*) which has several traffic related findings:

- The existing Castle Creek Bridge will be replaced with a new bridge connecting SH 82 directly to Main Street rather than utilizing the existing alignment along Hallam and 7th Streets (the Modified Direct Alternative).
- The new bridge will maintain the existing two lanes of existing general purpose traffic.
- Any additional capacity on SH 82 upvalley of Buttermilk Ski Area should come in the form of transit improvements.
- The *ROD* identifies Light Rail Transit (LRT) as the preferred method to expand transit, but allows for these improvements to be based around bus-only lanes if sufficient LRT funding and/or local support is not available.

Since the 1998 *ROD*, several improvements have been made to the system in support of these goals.

- From the Brush Creek Road intersection to the vicinity of Harmony Road a time-of day restricted Bus/HOV lane has been constructed with a queue jump at the AABC intersection.
- VelociRFTA, a Bus Rapid Transit System (BRT) has been implemented throughout the Roaring Fork Valley.
- A bus-only lane has been built from AABC up to the Maroon Creek Roundabout in the upvalley direction
- A bus-only lane has been built from the Maroon Creek Roundabout to Harmony Road in the downvalley direction.

Moving forward, stakeholders along the SH 82 seek to reexamine both LRT and/or further expansion of bus service in the area.

2 Existing Year 2016 Traffic Conditions

This Section explores the conditions currently being experienced on the SH 82 corridor between Brush Creek Road and Monarch Street.

2.1 Existing Year 2016 Traffic Volumes

Turning movement counts were collected for eight signalized intersections along the SH 82 corridor. Going in the direction of downvalley to upvalley, the intersections include:

1. Brush Creek Road
2. Aspen Airport Business Center (AABC)
3. Harmony Rd
4. Owl Creek Road
5. Truscott Place
6. Maroon Creek Roundabout
7. Aspen Street
8. Monarch Street

These counts were taken Wednesday, November 9, 2016 for the peak periods of 7:00-9:00 am and 3:00-5:00 pm. A uniform peak hour of 7:15-8:15 am and 3:45-4:45 pm was utilized when analyzing these eight intersections. Year 2016 peak hour volumes can be seen in Figure 2-1 for the seven signalized intersections and Figure 2-2 for the Maroon Creek Roundabout. The results of the counts themselves are shown in Appendix A.

2.2 Analysis Methodology

When assessing conditions at an intersection the measure of effectiveness controlling Level-of-Service (LOS) is the average control delay experienced by each vehicle. Control Delay is a measure of all time spend by a vehicle when it slowing, queued, or accelerating from an intersection. The average delay experienced by an approach or intersection is then aggregated into a letter grade ranging from LOS A to LOS F, with LOS A being very favorable conditions, and LOS F indicating conditions that are over capacity. Table 2-1 shows the delay ranges associated with each LOS condition as per the Exhibits 18-4 and 19-1 of the *Highway Capacity Manual, 201*0 (*HCM*). Note the different standards between unsignalized and signalized intersections.

Figure 2-1:Year 2016 Existing Traffic Volumes (Signalized Intersections)

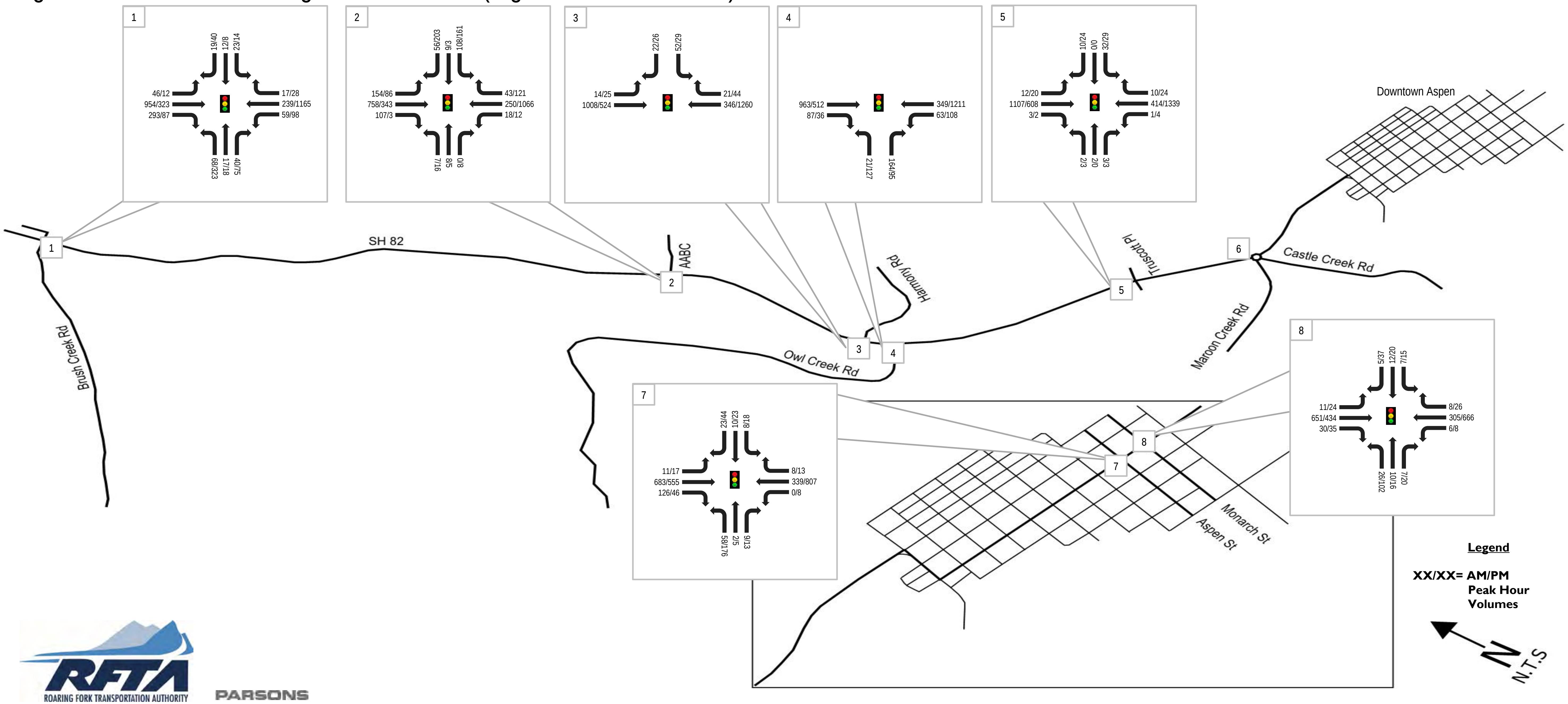
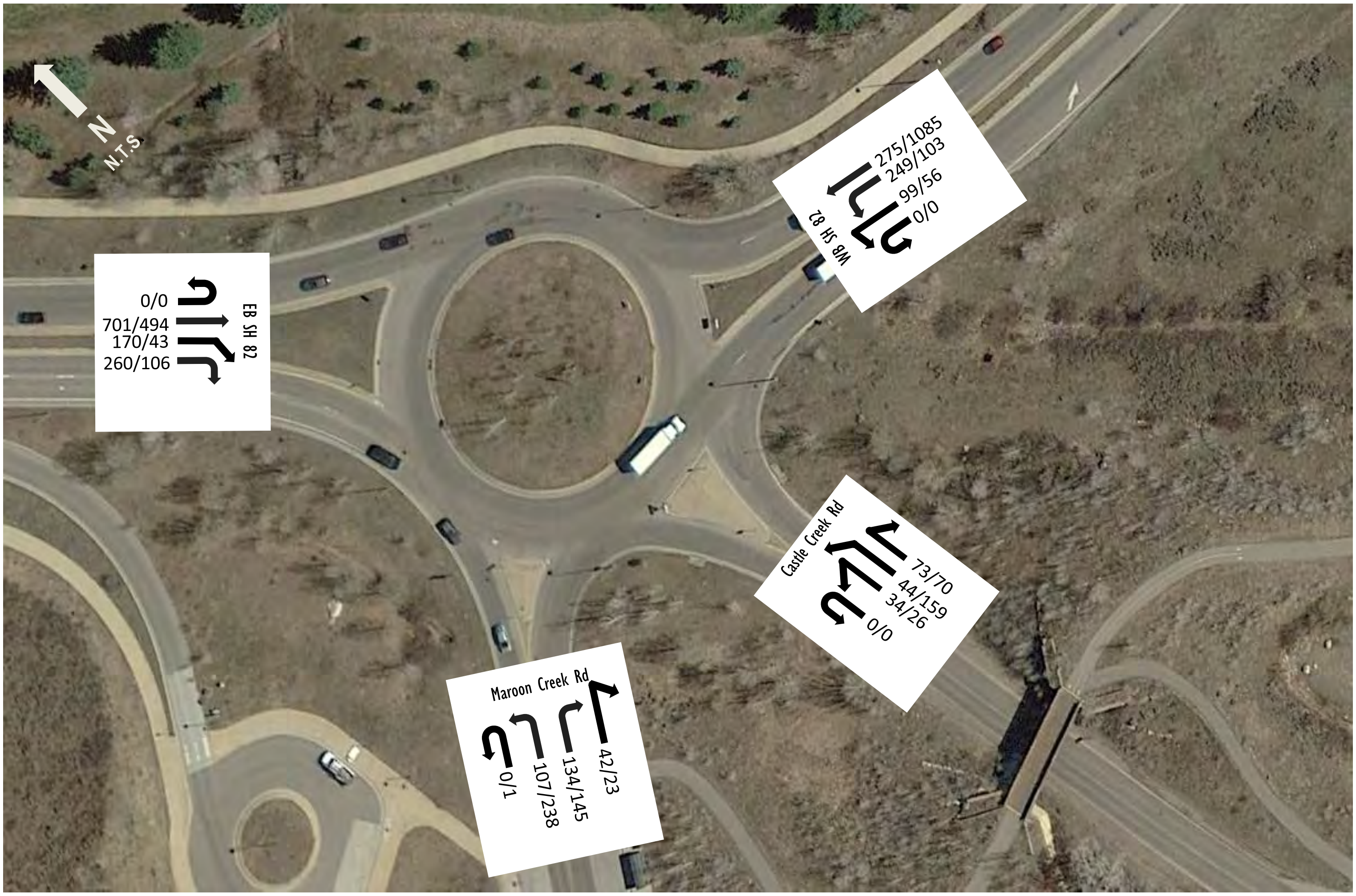


Figure 2-2: Year 2016 Existing Maroon Creek Roundabout Traffic Volumes



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Legend

XX/XX = AM/PM Hour Volumes

AM Peak 7:15-8:15

PM Peak 3:45-4:45

Table 2-1: Level-of-Service by Seconds of Average Delay

Level-of-Service (LOS)	Unsignalized Delay	Signalized Delay
	Avg. Sec/vehicle	Avg. Sec/vehicle
A	≤10	≤10
B	>10-15	>10-20
C	>15-25	>20-35
D	>25-35	>35-55
E	>35-50	>55-80
F	>50	>80

Given that this corridor has several special conditions such as High-Occupancy Vehicle (HOV) lanes and Bus-Only lanes, these effects had to be factored into the model.

Synchro Version 9.1 was used to analysis the seven signalized intersections along this segment of State Highway 82. CDOT provided the signal timing plans for each of the intersections, which were utilized within the Synchro model. The timing plans associated with each signalized intersection is shown in Appendix B.

2.2.1 Brush Creek Road

The outside lane of each direction SH 82 has a time of day dependent HOV lane. These conditions are applicable in the upvalley direction in the morning peak hour and the downvalley direction during the evening peak hour. Using the *HCM* Lane Utilization Factor, it was assumed that 80% of the vehicles approaching the intersection during the appropriate peak would use the general-purpose (GP) lane and the remaining 20% would use the HOV lane, as appropriate to the peak period.

2.2.2 Aspen Airport Business Center/Aspen Airport Access

The afternoon peak period for the Aspen Airport Business Center signal was modeled in the same way as Brush Creek, with 80% of downvalley traffic using the GP lane. However, during the morning peak period there is an additional signal phase that allows for busses and HOVs to start prior to the GP lane. The additional nine seconds per cycle granted to these vehicles appears to be able to accommodate the majority of the assumed HOVs, and as a result the GP lane would be the critical movement. To maintain compliance with HCM procedures, this leg was modelled with a single through lane with 80% of the morning peak hour through traffic applied to it. Additional clearance time was added to the intersection to account for the nine seconds of HOV exclusive green on the cycle.

This intersection, and all signals upvalley to Truscott Place, are coordinated with each other. There is a 90 second cycle length in the morning peak hour and 100 second cycle length during the evening peak hour.

2.2.3 Harmony Road

In the upvalley direction there is a single GP lane and a bus/right turn lane only lane at this intersection. Given the limited volume utilizing the bus lane, this direction was modeled as a single lane approach. To be conservative, no effort was made to remove the buses from the through upvalley traffic.

The downvalley geometry is more complicated. This approach to the Harmony Road intersection consists of two through lanes and a bus/right turn lane. The second through lane is the beginning of the HOV lane in the downvalley direction, and as a result the 80/20 lane usage split was assumed during the evening peak period.

2.2.4 Owl Creek Road and Truscott Place

Both directions of SH 82 at this location consist of a GP lane and a bus only lane. Similarly with the upvalley direction of the Harmony Road Intersection, this intersection was modeled with only a single through lane and a right turn lane in each direction.

2.2.5 Maroon Creek Roundabout

This roundabout was modelled with VISSIM Version 7.00. This microsimulation model accommodates both roundabouts as well as the complex multi-modal interactions that would be expected with the possible construction of an at-grade LRT crossing. Rather than specific input volumes yielding specific, repeatable results such as in the *HCM* methodology, VISSIM directly simulates each vehicle moving through the system. This results in the need for multiple model runs being required under each scenario. The analysis of this roundabout utilized 10 simulation runs per scenario, which are then averaged to create an overall impression of delay and queue length at the roundabout.

HCM procedures typically assume that the LOS thresholds for roundabout are the same as other unsignalized intersections. Given the high volumes experienced at the Maroon Creek Roundabout, the choice was made to utilize the same, signalized thresholds as the other seven intersections modeled as part of this study.

VISSIM does not report 95th percentile queues that are directly comparable to *HCM* methodology. Instead, the overall average of the maximum queue from each of the 10 simulation runs is reported.

2.2.6 Aspen and Monarch Streets

There are no special lane provisions at these two intersections, but as these intersections have a cycle length of 80 seconds, they can only be coordinated with other downtown intersections and not the signalized intersections further downvalley.

2.3 Existing Year 2016 Level-of-Service Analysis

For the purpose of consistency, the upvalley direction of SH 82 has been labeled as eastbound and the downvalley direction as westbound at each intersection. The results of this analysis can be seen in Table 2-2.

Table 2-2: Year 2016 Existing Conditions

	1. Brush Creek Road				2. Airport/Baltic				3. Harmony Rd				4. Owl Creek Rd			
	AM		PM		AM		PM		AM		PM		AM		PM	
Movement	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*
Eastbound Left	*B (13.7)*	*20.0*	*D (45.5)*	*15*	*B (12.9)*	*124.0*	*E (65.6)*	*119*	*E (59.8)*	*28.0*	*E (63.1)*	*44*	-	*0.0*	-	-
Eastbound Through	*C (26.6)*	*674*	*B (11.6)*	*123*	*E (63.1)*	*591*	*A (8.3)*	*96*	*B (12.8)*	*534*	*A (3.7)*	*137*	*B (18.4)*	*803*	*B (15.5)*	*417*
Eastbound Right	*B (13.4)*	*111*	*B (11.2)*	*32*	*C (21)*	-	*A (7.3)*	-	-	-	-	-	*A (6.2)*	*12*	*A (9.3)*	*26*
Eastbound Approach	C (23.1)	-	B (12.5)	-	D (49)	-	B (19.7)	-	B (13.5)	-	A (6.4)	-	B (17.4)	-	B (15.1)	-
Westbound Left	*D (36.7)*	*39*	*D (46.6)*	*69*	*C (25.8)*	*32*	*E (55.8)*	*27*		-	-	-	*D (44.5)*	*40*	*D (51.6)*	*63*
Westbound Through	*C (34.9)*	*115*	*D (43.5)*	*1126*	*D (48.1)*	*115*	*C (25.5)*	*816*	*B (15.1)*	*91*	*A (0.7)*	*401*	*A (4.2)*	*86*	*B (17.9)*	*1078*
Westbound Right	*C (31.7)*	-	*B (10.5)*	-	*D (40.3)*	-	*B (10.3)*	*30*	*B (12.4)*	*16*	*A (0)*	*4*	-	-	-	-
Westbound Approach	D (35.1)	-	D (43)	-	D (45.7)	-	C (24.3)	-	B (15)	-	A (0.7)	-	B (10.3)	-	C (20.7)	-
Northbound Left	*C (33.4)*	*63*	-	*211*	*D (48.4)*	*18*	*D (52.9)*	*32*	-	-	-	-	*D (35.4)*	*35*	*E (57.9)*	*148*
Northbound Through	*C (33.7)*	*63*	*D (44.9)*	*210*	*D (48.6)*	*19*	-	*23*	-	-	-	-	-	-	-	-
Northbound Right	-	-	-	-	-	-	*D (52.2)*	-	-	-	-	-	*F (82.2)*	*58*	*D (49.6)*	*47*
Northbound Approach	C (33.6)	-	D (44.9)	-	D (48.5)	-	D (52.6)	-	-	-	-	-	E (76.9)	-	D (54.3)	-
Southbound Left	*D (36.5)*	*39*	*D (47.1)*	*33*	*D (41.4)*	*73*	*D (38.4)*	*104*	*D (37.3)*	*66*	*D (44.1)*	*48*	-	-	-	-
Southbound Through	*D (35.7)*	*25*	*D (46.3)*	*23*	-	*74*	-	*104*	-	-	-	-	-	-	-	-
Southbound Right	-	-	-	-	*A (8.7)*	-	*D (39.4)*	*82*	*D (35.4)*	*23*	*D (44.2)*	*26*	-	-	-	-
Southbound Approach	D (36.2)	-	D (46.8)	-	C (30.6)	-	D (38.9)	-	D (36.8)	-	D (44.1)	-	-	-	-	-
Intersection	*C (26.1)*	-	*D (37.1)*	-	*D (46)*	-	*C (26.3)*	-	*B (15)*	-	*A (3.6)*	-	*C (22.3)*	-	*C (22.8)*	-

* HCM 95th Percentile in Feet

	5. Truscott Pl				7. Aspen St				8. Monarch St			
	AM		PM		AM		PM		AM		PM	
Movement	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*	LOS	Queue*
Eastbound Left	*D (53.1)*	*25.0*	*F (112)*	*67.0*	*A (2.5)*	*6.0*	*A (7.6)*	*14.0*	*A (0.1)*	*4.0*	*A (9.2)*	*19.0*
Eastbound Through	*D (53.8)*	*953*	*A (4.6)*	*227*	*A (3.9)*	*101*	*A (5.5)*	*124*	*A (0.5)*	*46*	*A (7.5)*	*123*
Eastbound Right	*A (6.4)*	*0*	*A (2.6)*	*0*	*A (3.9)*	-	*A (5.5)*	-	*A (0.4)*	-	*A (7.5)*	-
Eastbound Approach	D (53.7)	-	A (8.1)	-	A (3.9)	-	A (5.6)	-	A (0.4)	-	A (7.5)	-
Westbound Left	*C (31)*	*6*	*F (123.8)*	*21*	*A (0)*	-	*A (6.2)*	*6*	*A (2.2)*	*4*	*A (5)*	*7*
Westbound Through	*A (3.4)*	*166*	*C (27)*	*1662*	*A (0.1)*	*23*	*A (5.8)*	*124*	*A (2.6)*	*32*	*A (3.7)*	*117*
Westbound Right	*A (2.3)*	*0*	*A (3.1)*	*3*	*A (0)*	*0*	*A (4.1)*	*1*	*A (2.5)*	-	*A (3.7)*	-
Westbound Approach	A (3.4)	-	C (26.9)	-	A (0.1)	-	A (5.8)	-	A (2.5)	-	A (3.7)	-
Northbound Left	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Through	*D (41.8)*	*15*	*F (95.8)*	*0*	*C (33.6)*	*67*	*C (32.6)*	*142*	*C (33.9)*	*48*	*C (34.6)*	*110*
Northbound Right	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Approach	D (41.8)	-	F (95.8)	-	C (33.6)	-	C (32.6)	-	C (33.9)	-	C (34.6)	-
Southbound Left	*D (43.1)*	-	*F (99.4)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Through	*A (0)*	*47*	*A (0)*	*86*	*C (32.6)*	*36*	*C (28.4)*	*47*	*C (33.2)*	*32*	*C (31.8)*	*48*
Southbound Right	*D (42.9)*	-	*F (108.7)*	*0*	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Approach	D (43.1)	-	F (103.6)	-	C (32.6)	-	C (28.4)	-	C (33.2)	-	C (31.8)	-
Intersection	*D (39.9)*	-	*C (23.3)*	-	*A (5.4)*	-	*A (9.8)*	-	*A (3.1)*	-	*A (9.5)*	-

* HCM 95th Percentile in Feet

		6. Maroon Creek Roundabout					
		AM			PM		
	Movement	LOS	Delay	Queue**	LOS	Delay	Queue**
SH 82 Upvalley	*EBT*	*C*	*27.3*	*1258*	*A*	*4.4*	*12*
	EBBR	*B*	*15.4*	*1258*	*A*	*2.7*	*12*
	EBR						
	EB Approach	C	22.9		A	4.0	
SH 82 Downvalley	*WBHL*						
	WBL	*A*	*4.8*	*91*	*B*	*19.2*	*566*
	WBT	*A*	*3.5*	*91*	*B*	*17.4*	*566*
	WB Approach	A	4.2		B	17.6	
Maroon Creek Rd	*NBL*	*B*	*12.4*	*174*	*A*	*7.9*	*167*
	NBR	*B*	*11.4*	*174*	*A*	*5.4*	*167*
	NBHR						
	NB Approach	B	11.8		A	6.9	
Castle Creek Rd	*NWBHL*						
	NWBBL	*B*	*14.7*	*93*	*B*	*16.2*	*172*
	NWBHR	*A*	*9.4*	*108*	*A*	*7.7*	*173*
	NWB Approach	B	12.1		B	14.0	
	Intersection	*B*	*15.4*		*B*	*12.1*	

** Maximum Queue Averaged over 10 Simulation Runs

Figure 2-3: Evening Queuing at the Maroon Creek Roundabout

All seven signalized intersections appear to be operating satisfactorily as a whole with LOS D or better operations during both peak hours analyzed, but several intersections show signs of stress during the evening peak hour. This stress shows its self in the length of the 95th percentile queues in the downvalley through direction at Owl Creek Road and Truscott Place. The Truscott Place model (1,662 feet) may be underestimating the length of the downvalley queue, as video of the Maroon Creek Roundabout shows that at times the queue from westbound Truscott Place is interfering with the roundabout, 2,300 feet upstream. A snapshot of this video can be seen in Figure 2-1. This queuing likely results in longer delays at the Maroon Creek intersection than those assumed by the model.

It appears that CDOT has already attempted to mitigate this queue by making the Truscott Place a double cycle length (200 seconds) in the evening peak period. This double length cycle also appears to be responsible for the poor side-street conditions being experienced at this intersection.

3 Seasonal Expansion

The Roaring Fork Valley, and the Upper Valley in particular, experiences a high degree of seasonality in its traffic patterns. Both winter and summer seasons are known to have higher volumes then when traffic counts were taken in November. The City of Aspen maintains a permanent traffic counter at the intersection of Cemetery Lane with State Highway 82 and provided the project team with the hourly counts for Year 2015 and partial Year 2016. To determine the impact of seasonality on the volume of traffic, the weekdays (Tuesday-Thursday) between July 12 - August 10, 2016 and February 10-March 10, 2016 were compared to the weekdays inclusive of November 3 – November 12, 2015. This November period is the two-week period surrounding the one year prior to the collection of Turning Movement Counts, and was used as the November 2016 Cemetery Lane hourly volumes were not available at the time of analysis. A ratio of summer/winter volumes to the fall conditions was then determined, shown in Table 3-1.

Table 3-1: Seasonality Ratio

	24 Hr Volume	AM Peak Period	PM Peak Period
Winter 2016	1.04	0.93	1.04
Summer 2016	1.19	1.06	1.05

In this case a ratio greater than 1.0 indicates a 2016 summer or winter condition exceeding the fall volumes. As shown in Table 3-1, both the summer and winter conditions exceed the fall conditions in terms of twenty-four hour volumes, but only the summer conditions are consistently higher during the morning and evening peak periods. As summer peak period conditions are higher than both the fall and winter conditions, the remaining analysis in this study will use volumes expanded to assumed summer conditions, which can be seen in Figure 3-1 for the signalized intersections and Figure 3-2 for the Maroon Creek Roundabout.

While winter traffic volumes in the area appear to be lower than that in the summer, this period is the only one in which the area ski resorts are in full operation. This is likely to have an impact on the direction of traffic flow in the study area in addition to the differences in traffic volumes.

Figure 3-1: Year 2016 Summer Expansion Traffic Volumes (Signalized Intersections)

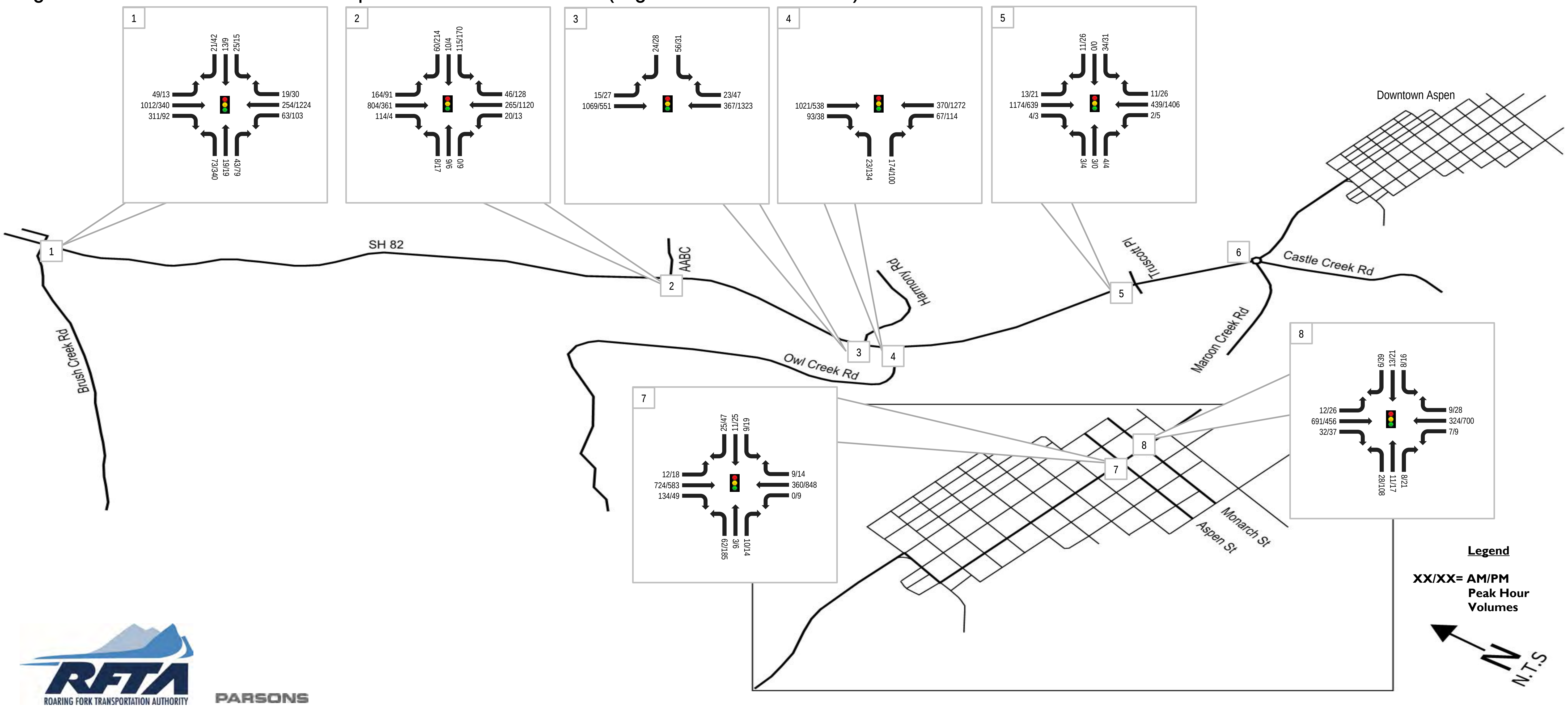
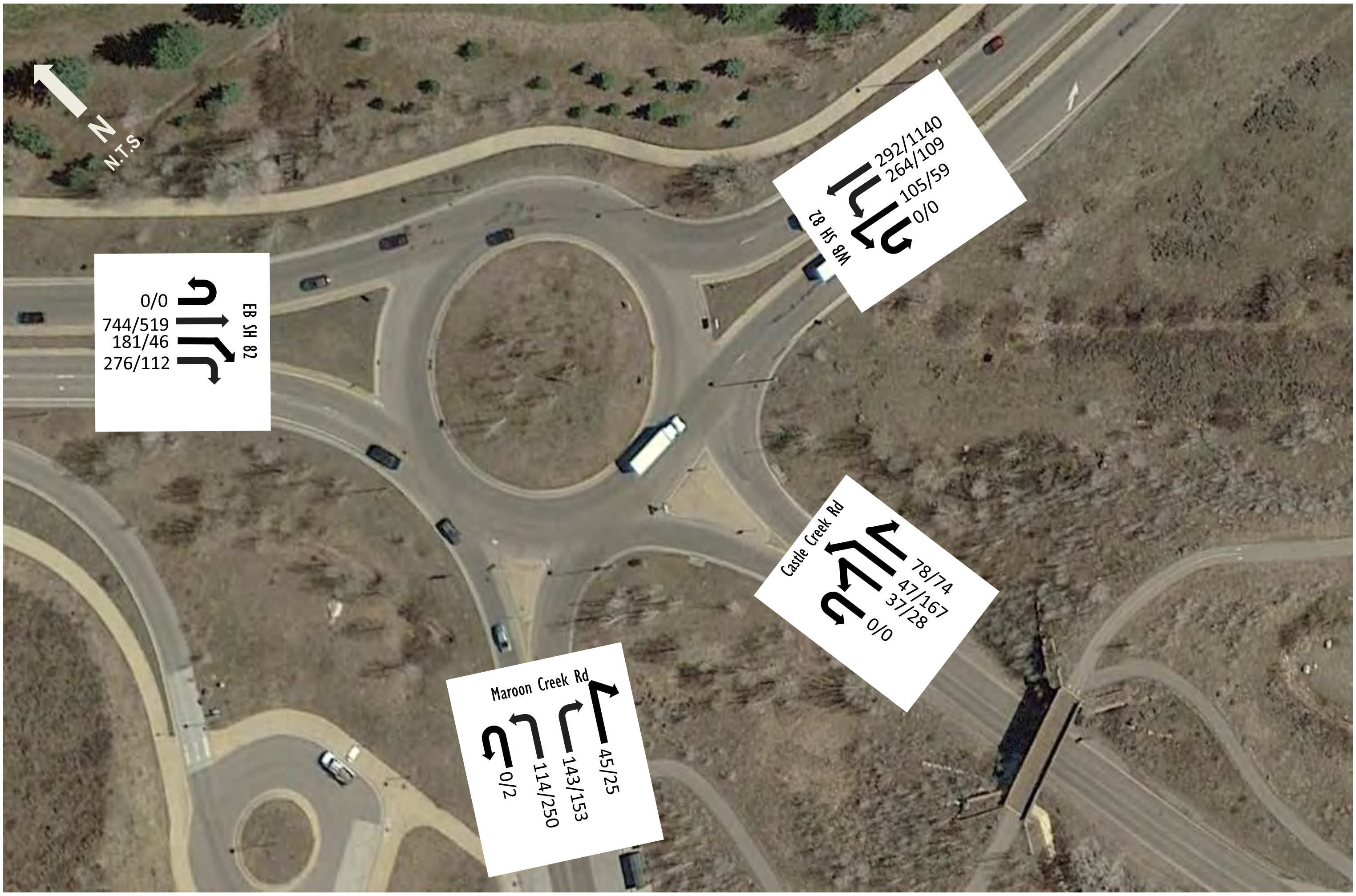


Figure 3-2: Year 2016 Maroon Creek Roundabout Summer Expansion Traffic Volumes



Legend
XX/XX = AM/PM Hour Volumes

AM Peak 7:15-8:15
PM Peak 3:45-4:45

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3.1 Expanded Summer Conditions Year 2016 Level-of-Service Analysis

Utilizing the expanded peak hour traffic volumes shown in Figures 3-1 and 3-2, an estimate of the summer season peak hour Level-of-Service can be made. The results of this analysis are shown in Table 3-2.

As under the actual volumes collected in November, in this expansion none of the seven analyzed signals experienced intersection-wide substandard conditions, but the summer expansion does exacerbate problems on an approach scale. The most notable change is the appearance of the first substandard SH 82 approach during the morning peak hour – upvalley at the AABC signal. While the evening downvalley through movement at Truscott Place remains at LOS C, the modeled 95th percentile queue for this approach is now long enough to reach the Maroon Creek Roundabout.

Table 3-2: Year 2016 Expanded Summer Conditions

Movement	1. Brush Creek Road AM LOS	AM Queue*	PM LOS	PM Queue*	2. Airport/Baltic AM LOS	AM Queue*	PM LOS	PM Queue*	3. Harmony Rd AM LOS	AM Queue*	PM LOS	PM Queue*	4. Owl Creek Rd AM LOS	AM Queue*	PM LOS	PM Queue*
Eastbound Left	*B (13.5)*	*21.0*	*D (46)*	*16*	*B (13.1)*	*133.0*	*E (66.9)*	*130*	*E (59.3)*	*29.0*	*E (63.1)*	*46*	-	*0.0*	-	-
Eastbound Through	*C (31.6)*	*748*	*B (12.2)*	*132*	*E (80)*	*651*	*A (8.8)*	*101*	*B (15.3)*	*640*	*A (3.9)*	*148*	*C (31.3)*	*822*	*B (16.3)*	*446*
Eastbound Right	*B (13.6)*	*126*	*B (11.6)*	*33*	*C (21.2)*	-	*A (7.7)*	-	-	-	-	-	*B (10.2)*	*10*	*A (9.5)*	*26*
Eastbound Approach	C (26.8)	-	B (13)	-	E (60.8)	-	C (20.4)	-	B (15.9)	-	A (6.6)	-	C (29.6)	-	B (15.8)	-
Westbound Left	*D (38.5)*	*41*	*D (47.3)*	*72*	*C (26)*	*34*	*E (55.4)*	*28*	-	-	-	-	*D (44.6)*	*41*	*D (51.4)*	*67*
Westbound Through	*D (37.5)*	*121*	*E (60.3)*	*1223*	*D (50.1)*	*122*	*C (32.2)*	*878*	*B (15.4)*	*97*	*A (1.2)*	*496*	*A (4.3)*	*92*	*C (25)*	*1169*
Westbound Right	*C (33.7)*	-	*B (10.9)*	-	*D (40.7)*	-	*B (10.9)*	*30*	*B (12.5)*	*17*	*A (0)*	*3*	-	-	-	-
Westbound Approach	D (37.5)	-	E (58.2)	-	D (47.4)	-	C (30.3)	-	B (15.2)	-	A (1.2)	-	B (10.5)	-	C (27.2)	-
Northbound Left	*D (35.3)*	*67*	*A (0)*	*223*	*D (48)*	*19*	*D (52.2)*	*33*	-	-	-	-	*D (35.5)*	*36*	*E (59.6)*	*165*
Northbound Through	*D (35.6)*	*67*	*D (45)*	*222*	*D (48.2)*	*21*	-	*26*	-	-	-	-	-	-	-	-
Northbound Right	-	-	*A (0)*	-	-	-	*D (52.4)*	-	-	-	-	-	*F (97.2)*	*60*	*D (50.4)*	*49*
Northbound Approach	D (35.5)	-	D (45)	-	D (48.1)	-	D (52.3)	-	-	-	-	-	F (90)	-	E (55.7)	-
Southbound Left	*D (38.1)*	*41*	*D (47.3)*	*35*	*D (41.7)*	*76*	*D (38)*	*108*	*D (37.6)*	*69*	*D (44)*	*50*	-	-	-	-
Southbound Through	*D (37.2)*	*27*	*D (46.5)*	*25*	-	*78*	-	*109*	-	-	-	-	-	-	-	-
Southbound Right	-	-	-	-	*A (8.8)*	-	*D (39.1)*	*94*	*D (35.6)*	*23*	*D (44.1)*	*27*	-	-	-	-
Southbound Approach	D (37.8)	-	D (47)	-	C (30.9)	-	D (38.6)	-	D (37)	-	D (44)	-	-	-	-	-
Intersection	*C (29.5)*	-	*D (47.6)*	-	*D (53.8)*	-	*C (30)*	-	*B (16.8)*	-	*A (4)*	-	*C (31.6)*	-	*C (27.3)*	-

* HCM 95th Percentile in Feet

Movement	5. Truscott Pl AM LOS	AM Queue*	PM LOS	PM Queue*	7. Aspen St AM LOS	AM Queue*	PM LOS	PM Queue*	8. Monarch St AM LOS	AM Queue*	PM LOS	PM Queue*
Eastbound Left	*D (52.7)*	*26.0*	*F (146.5)*	*67.0*	*A (2.6)*	*7.0*	*A (8.5)*	*16.0*	*A (0.1)*	*4.0*	*B (14.4)*	*18.0*
Eastbound Through	*E (75.5)*	*1048*	*A (4.5)*	*246*	*A (4.1)*	*114*	*A (6)*	*136*	*A (0.5)*	*50*	*B (12.4)*	*133*
Eastbound Right	*A (6.4)*	*0*	*A (2.4)*	*0*	*A (4.1)*	-	*A (6)*	-	*A (0.5)*	-	*B (12.4)*	-
Eastbound Approach	E (75.1)	-	A (9)	-	A (4.1)	-	A (6.1)	-	A (0.5)	-	B (12.5)	-
Westbound Left	*C (31.2)*	*8*	*F (120.5)*	*25*	*A (0)*	-	*A (6.8)*	*7*	*A (2.3)*	*4*	*A (6.3)*	*8*
Westbound Through	*A (3.6)*	*179*	*C (32.9)*	*2283*	*A (0.1)*	*25*	*A (6.4)*	*160*	*A (2.7)*	*34*	*A (3.9)*	*130*
Westbound Right	*A (2.3)*	*0*	*A (2.7)*	*4*	*A (0)*	*1*	*A (4.4)*	*2*	*A (2.7)*	-	*A (3.9)*	-
Westbound Approach	A (3.7)	-	C (32.6)	-	A (0.1)	-	A (6.3)	-	A (2.7)	-	A (4)	-
Northbound Left	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Through	*D (41.8)*	*18*	*F (95.9)*	*0*	*C (33.6)*	*70*	*C (32.1)*	*148*	*C (33.7)*	*51*	*C (34.3)*	*113*
Northbound Right	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Approach	D (41.8)	-	F (95.9)	-	C (33.6)	-	C (32.1)	-	C (33.7)	-	C (34.3)	-
Southbound Left	*D (43)*	-	*F (99.3)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Through	*A (0)*	*49*	*A (0)*	*91*	*C (32.6)*	*38*	*C (27.7)*	*48*	*C (33)*	*34*	*C (31.4)*	*48*
Southbound Right	*D (42.8)*	-	*F (108.7)*	*0*	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Approach	D (42.9)	-	F (103.6)	-	C (32.6)	-	C (27.7)	-	C (33)	-	C (31.4)	-
Intersection	*D (55)*	-	*C (27.4)*	-	*A (5.6)*	-	*B (10.2)*	-	*A (3.3)*	-	*B (11.4)*	-

* HCM 95th Percentile in Feet

	Movement	6. Maroon Creek Roundabout AM LOS	AM Delay	AM Queue**	PM LOS	PM Delay	PM Queue**
SH 82 Upvalley	*EBT*	*D*	*37.7*	*1731*	*A*	*4.7*	*10*
	EBBR	*C*	*24.1*	*1731*	*A*	*3.2*	*10*
	EBR						
	EB Approach	C	32.7		A	4.4	
SH 82 Downvalley	WBHL						
	WBL	*A*	*5.8*	*119*	*C*	*22.5*	*602*
	WBT	*A*	*3.7*	*119*	*C*	*21.1*	*602*
	WB Approach	A	4.8		C	21.3	
Maroon Creek Rd	*NBL*	*B*	*17.3*	*258*	*A*	*8.4*	*189*
	NBR	*B*	*16.0*	*258*	*A*	*6.1*	*189*
	NBHR						
	NB Approach	B	16.5		A	7.4	
Castle Creek Rd	*NWBHL*						
	NWBBL	*C*	*22.2*	*161*	*C*	*21.9*	*219*
	NWBHR	*B*	*14.3*	*170*	*B*	*11.6*	*219*
	NWB Approach	B	18.3		B	19.2	
	Intersection	*C*	*21.7*		*B*	*14.6*	

** Maximum Queue Averaged over 10 Simulation Runs

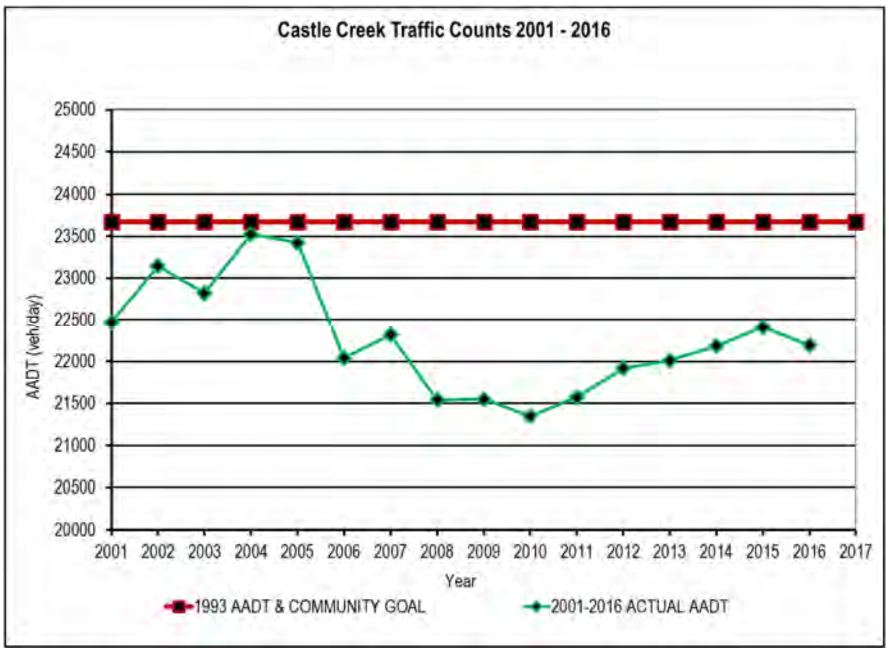
4 Future Year Projections

This section explores the historical changes in traffic patterns and projects these changes to the long-term planning horizon of Year 2036.

4.1 Historical Patterns

The Aspen area has shown a great sensitivity to traffic volumes on the SH 82 corridor and has tied the performance of the *Entrance to Aspen Record of Decision, 1998* (*ROD*) to maintaining traffic volumes at the Castle Creek Bridge at or below 1993 volumes. Figure 4-1 shows actual average annual daily traffic (AADT) volumes as compared to the Year 1993 benchmark, as provided by the City of Aspen.

Figure 4-1: Castle Creek Bridge AADT by Year



Volumes at this location have been variable, nearing the *ROD* threshold in 2004, then reducing until 2010. This trend may be due to an increased share of transit ridership in the area and the decline in the economy during much of that period. Since 2010, traffic volumes have been on the rise, and in Year 2015 average annual daily traffic volumes at Castle Creek rose to 22,411 vehicles per day.

4.2 Future Year 2036 Projected Volumes

While it is expected that the Transportation Management Program will work to maintain traffic volumes at or below 1993 values, a sensitivity analysis should be performed to gauge the impact of exceeding the *ROD* criteria. For Year 2036 conditions, the Year 2016 summer expansion volumes were given an annual growth rate of 0.25%, which equates to Year 2036 AADT volumes at Castle Creek approximately 3% higher than the *ROD* criteria. The application of the summer expansion and twenty-year growth rate to the peak hour turning movement counts can be seen in Figure 4-2 for the signalized intersections and Figure 4-3 for the Maroon Creek Roundabout.

Figure 4-2: Year 2036 Summer Expansion Traffic Volumes (Signalized Intersections)

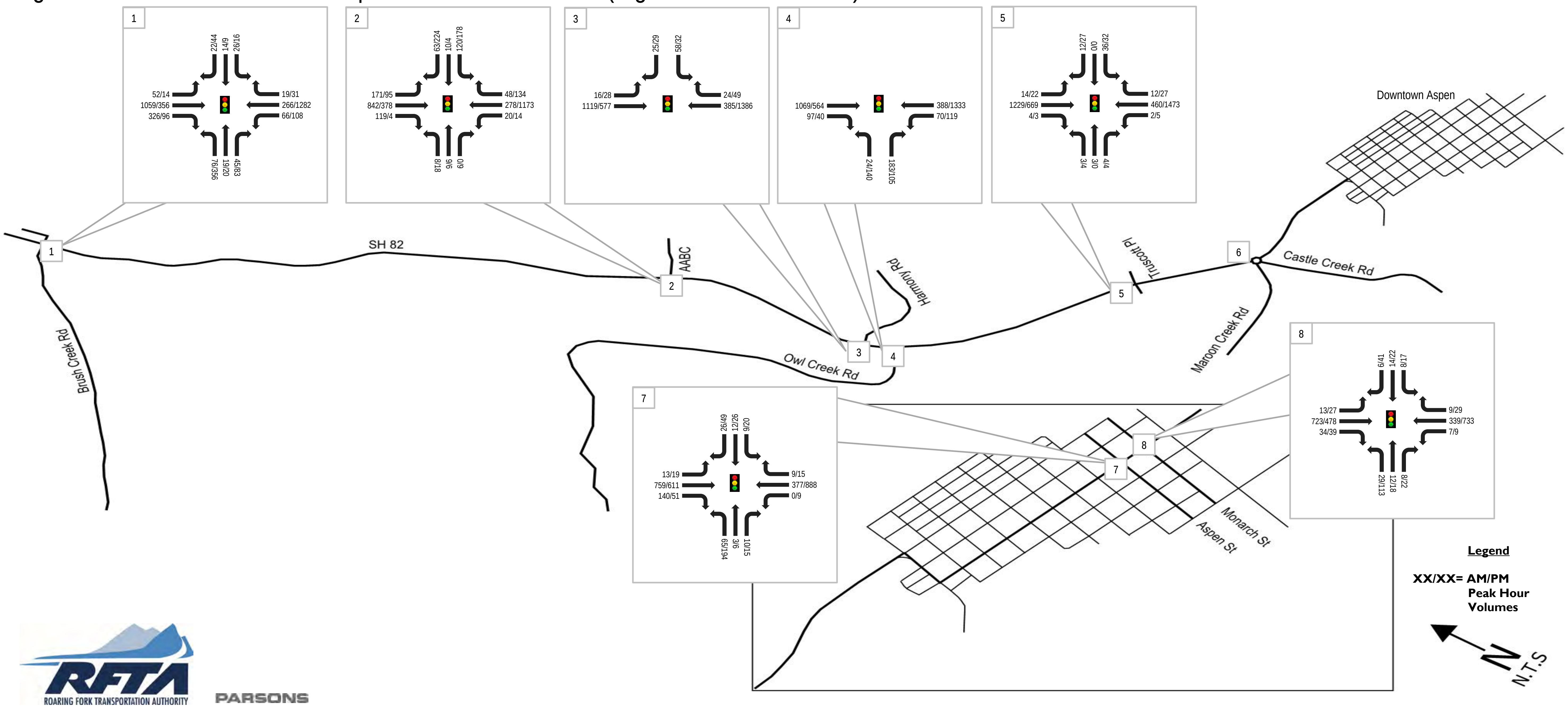
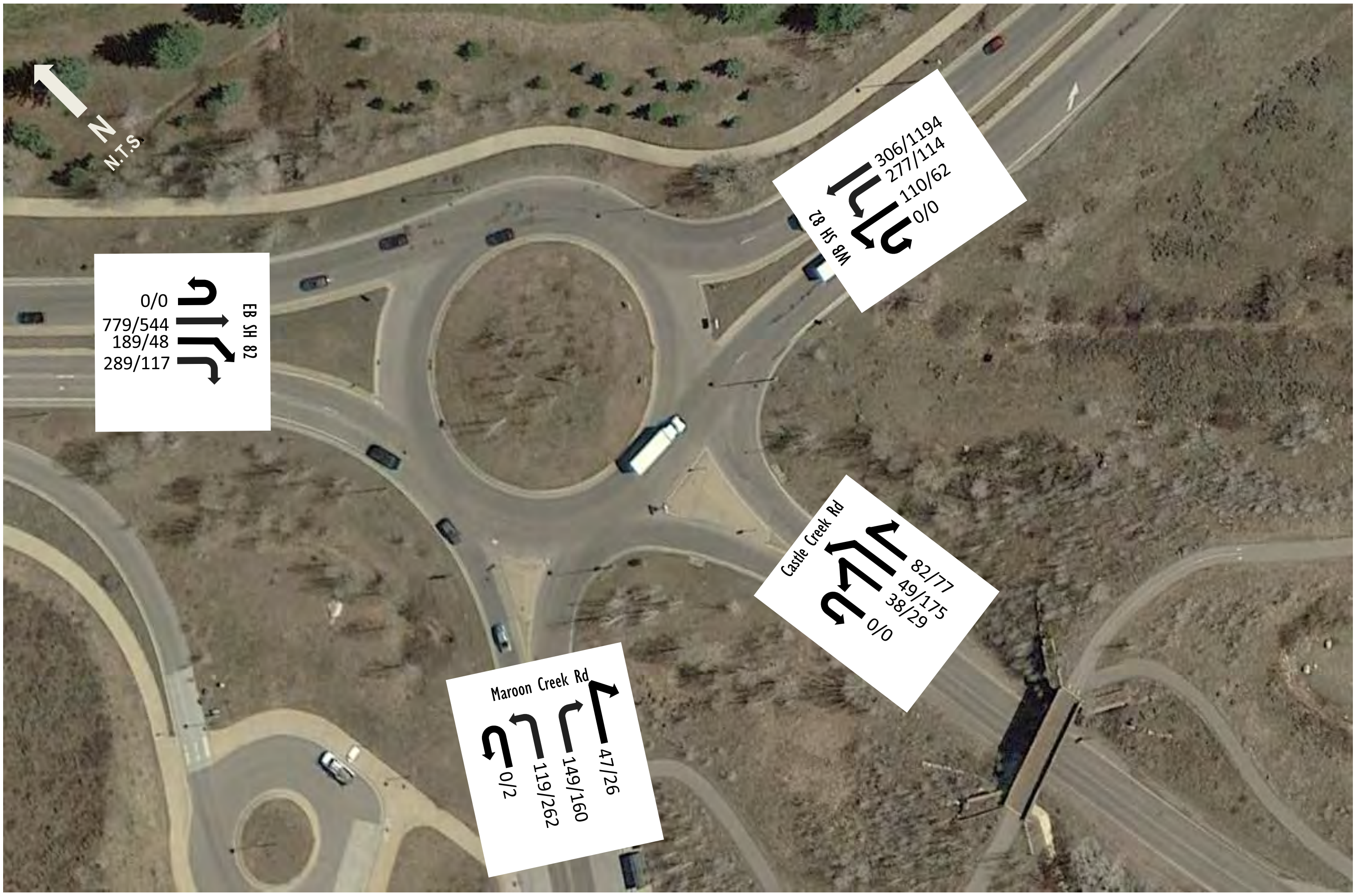


Figure 4-3: Year 2036 Maroon Creek Roundabout Summer Expansion Traffic Volumes



Legend
XX/XX = AM/PM Hour Volumes

AM Peak 7:15-8:15
PM Peak 3:45-4:45

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5 LRT Traffic Evaluation

5.1 Year 2036 Sensitivity Analysis

Table 5-1 shows the LOS results for the eight subject intersections utilizing projected Year 2036 summer expansion volumes and the existing roadway geometry.

This analysis does indicate that the Upper Valley would be sensitive to even low levels of long-term growth. While no intersections would be expected to experience failing conditions, several signalized intersections are projected to experience an overall LOS E. This includes the Brush Creek intersection in the evening, and the AABC/Truscott intersections in the morning.

Under this condition the SH 82 95th percentile queue at Truscott Place evening peak hour queue in the downvalley direction is estimated at 2,477 feet, which could functionally shut down the Maroon Creek Roundabout during this peak period.

Table 5-1: Year 2036 Summer Conditions

Movement	1. Brush Creek Road AM LOS	AM Queue*	PM LOS	PM Queue*	2. Airport/Baltic AM LOS	AM Queue*	PM LOS	PM Queue*	3. Harmony Rd AM LOS	AM Queue*	PM LOS	PM Queue*	4. Owl Creek Rd AM LOS	AM Queue*	PM LOS	PM Queue*
Eastbound Left	*B (13.7)*	*23.0*	*D (46.5)*	*17*	*B (13.2)*	*140.0*	*E (67.7)*	*138*	*E (58.8)*	*30.0*	*E (63.2)*	*48*	-	-	-	-
Eastbound Through	*D (37.6)*	*805*	*B (12.6)*	*140*	*F (96.9)*	*697*	*A (9.1)*	*106*	*B (18.2)*	*882*	*A (4)*	*159*	*D (36.5)*	*912*	*B (17)*	*475*
Eastbound Right	*B (13.8)*	*137*	*B (12)*	*34*	*C (21.3)*	*1*	*A (7.9)*	*0*	-	-	-	-	*B (10.3)*	*10*	*A (9.7)*	*27*
Eastbound Approach	C (31.4)	-	B (13.5)	-	E (72.8)	-	C (20.8)	-	B (18.8)	-	A (6.7)	-	C (34.3)	-	B (16.6)	-
Westbound Left	*D (39.6)*	*42*	*D (47.8)*	*75*	*C (26)*	*34*	*E (55.1)*	*29*	-	-	-	-	*D (44.7)*	*43*	*D (51.3)*	*69*
Westbound Through	*D (38.4)*	*126*	*F (80.7)*	*1319*	*D (52.3)*	*126*	*D (42.9)*	*941*	*B (15.6)*	*101*	*A (0.9)*	*501*	*A (4.4)*	*98*	*D (36.5)*	*1260*
Westbound Right	*C (34.3)*	*0*	*B (11.1)*	*0*	*D (41)*	*0*	*B (11.4)*	*31*	*B (12.5)*	*17*	*A (0)*	*3*	-	-	-	-
Westbound Approach	D (38.4)	-	E (76.7)	-	D (49.2)	-	D (39.8)	-	B (15.4)	-	A (0.9)	-	B (10.5)	-	D (37.7)	-
Northbound Left	*D (36.5)*	*68*	*A (0)*	*232*	*D (48)*	*19*	*D (52.5)*	*36*	-	-	-	-	*D (35.5)*	*38*	*E (60.7)*	*176*
Northbound Through	*D (36.8)*	*69*	*D (45)*	*230*	*D (48.2)*	*21*	*A (0)*	*26*	-	-	-	-	-	-	-	-
Northbound Right	*A (0)*	*0*	*A (0)*	*5*	*A (0)*	-	*D (51.9)*	-	-	-	-	-	*F (112)*	*61*	*D (51)*	*49*
Northbound Approach	D (36.6)	-	D (45)	-	D (48.1)	-	D (52.3)	-	-	-	-	-	F (103.1)	-	E (56.5)	-
Southbound Left	*D (39.1)*	*42*	*D (47.5)*	*37*	*D (41.9)*	*80*	*D (37.7)*	*111*	*D (37.8)*	*71*	*D (43.9)*	*51*	-	-	-	-
Southbound Through	*D (38.1)*	*28*	*D (46.7)*	*25*	*A (0)*	*81*	*A (0)*	*111*	-	-	-	-	-	-	-	-
Southbound Right	*A (0)*	*0*	*A (0)*	*0*	*A (8.8)*	*0*	*D (38.9)*	*105*	*D (35.6)*	*24*	*D (44.1)*	*28*	-	-	-	-
Southbound Approach	D (38.7)	-	D (47.2)	-	C (31)	-	D (38.4)	-	D (37.1)	-	D (44)	-	-	-	-	-
Intersection	*C (33.1)*	-	*E (58.3)*	-	*E (61.9)*	-	*D (35.7)*	-	*B (18.9)*	-	*A (3.8)*	-	*D (36.1)*	-	*C (34.2)*	-

* HCM 95th Percentile in Feet

Movement	5. Truscott Pl AM LOS	AM Queue*	PM LOS	PM Queue*	7. Aspen St AM LOS	AM Queue*	PM LOS	PM Queue*	8. Monarch St AM LOS	AM Queue*	PM LOS	PM Queue*
Eastbound Left	*D (52.4)*	*28.0*	*F (141.6)*	*70.0*	*A (2.6)*	*7.0*	*A (9.3)*	*17.0*	*A (0.1)*	*4.0*	*B (15.2)*	*20.0*
Eastbound Through	*F (95.9)*	*1124*	*A (4.5)*	*265*	*A (4.2)*	*124*	*A (6.5)*	*146*	*A (0.5)*	*52*	*B (12.9)*	*143*
Eastbound Right	*A (6.4)*	*0*	*A (2.3)*	*0*	*A (4.3)*	-	*A (6.4)*	-	*A (0.5)*	-	*B (12.9)*	-
Eastbound Approach	F (95.2)	-	A (8.8)	-	A (4.2)	-	A (6.5)	-	A (0.5)	-	B (13)	-
Westbound Left	*C (31.2)*	*8*	*F (120.5)*	*25*	*A (0)*	-	*A (7.4)*	*7*	*A (2.3)*	*4*	*A (6.8)*	*8*
Westbound Through	*A (3.7)*	*194*	*D (44.8)*	*2477*	*A (0.1)*	*26*	*A (6.9)*	*192*	*A (2.7)*	*37*	*A (4.2)*	*142*
Westbound Right	*A (2.4)*	*0*	*A (2.6)*	*4*	*A (0)*	*1*	*A (4.7)*	*4*	*A (2.7)*	-	*A (4.2)*	-
Westbound Approach	A (3.8)	-	D (44.3)	-	A (0.1)	-	A (6.8)	-	A (2.7)	-	A (4.2)	-
Northbound Left	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Through	*D (41.7)*	*18*	*F (95.7)*	*0*	*C (33.7)*	*73*	*C (31.7)*	*156*	*C (33.7)*	*53*	*C (34)*	*118*
Northbound Right	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Northbound Approach	D (41.7)	-	F (95.7)	-	C (33.7)	-	C (31.7)	-	C (33.7)	-	C (34)	-
Southbound Left	*D (43)*	-	*F (99.3)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Through	*A (0)*	*51*	*A (0)*	*91*	*C (32.6)*	*39*	*C (27.1)*	*49*	*C (32.9)*	*35*	*C (31)*	*49*
Southbound Right	*D (42.8)*	*0*	*F (108)*	*0*	*A (0)*	-	*A (0)*	-	*A (0)*	-	*A (0)*	-
Southbound Approach	D (42.9)	-	F (103.2)	-	C (32.6)	-	C (27.1)	-	C (32.9)	-	C (31)	-
Intersection	*E (69.1)*	-	*D (35.1)*	-	*A (5.7)*	-	*B (10.6)*	-	*A (3.3)*	-	*B (11.6)*	-

* HCM 95th Percentile in Feet

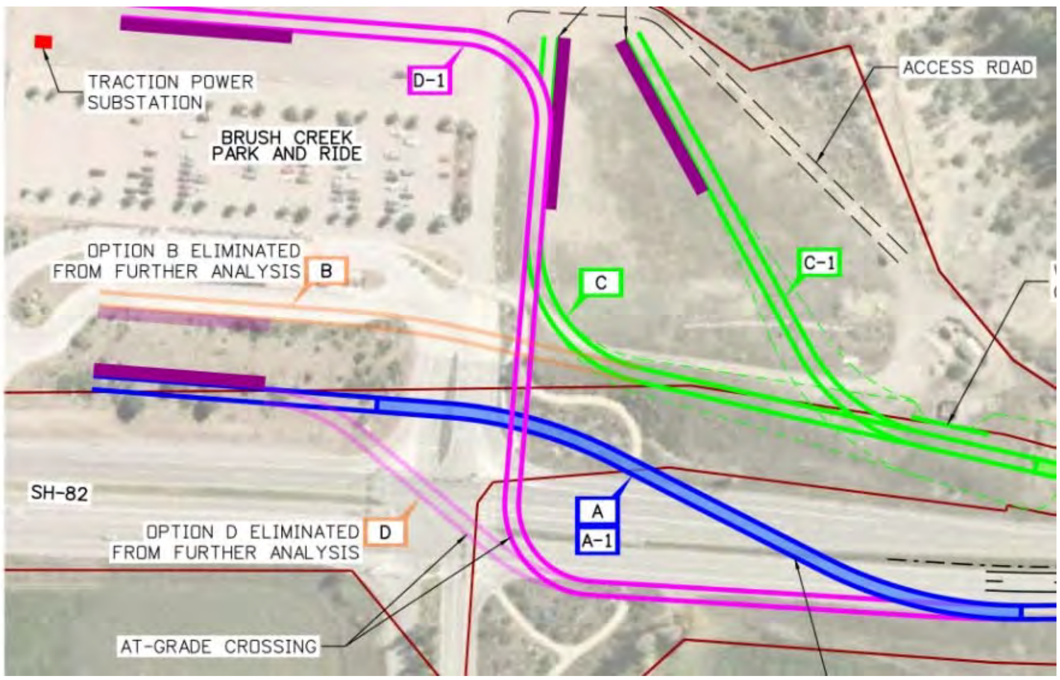
	Movement	6. Maroon Creek Roundabout AM LOS	AM Delay	AM Queue**	PM LOS	PM Delay	PM Queue**
SH 82 Upvalley	*EBT*	*D*	*50.5*	*2046*	*A*	*5.1*	*23*
	EBBR	*D*	*35.4*	*2046*	*A*	*3.0*	*23*
	EBR						
	EB Approach	D	45.0		A	4.6	
SH 82 Downvalley	*WBHL*						
	WBL	*A*	*7.3*	*155*	*C*	*26.9*	*545*
	WBT	*A*	*5.3*	*155*	*C*	*25.0*	*545*
	WB Approach	A	6.4		C	25.2	
Maroon Creek Rd	*NBL*	*C*	*20.7*	*285*	*A*	*9.5*	*171*
	NBR	*B*	*17.7*	*285*	*A*	*6.5*	*171*
	NBHR						
	NB Approach	B	18.8		A	8.2	
Castle Creek Rd	*NWBHL*						
	NWBBL	*C*	*22.2*	*134*	*C*	*26.5*	*297*
	NWBHR	*B*	*14.5*	*139*	*B*	*15.2*	*304*
	NWB Approach	B	18.4		C	23.6	
	Intersection	*C*	*28.8*		*B*	*17.0*	

** Maximum Queue Averaged over 10 Simulation Runs

5.2 Brush Creek Intercept Lot

There are several options being considered for crossing SH 82 in the vicinity of the Brush Creek Intercept Lot. Options A, A-1, C and C-1 all assume a grade separated crossing and would have no permanent impact on the operation of the Brush Creek intersection. However, there are three options currently being assessed at the Brush Creek that involve an at-grade crossing of SH 82, Options B, D, and D1. Option D assumes that the LRT tracks cross the Brush Creek Road intersection on the diagonal from the Intercept Lot to the southwest corner of the intersection. Option D1 assumes a crossing perpendicular to SH 82 on the upvalley side of Brush Creek Rd. The two options can be seen in Figure 5-1.

Figure 5-1: Brush Creek Crossing Options



5.2.1 Option D

This option assumes that the LRT track will cross the Brush Creek intersection with SH 82 and will require an almost complete shut-down of the remainder of the intersection to accommodate a rail vehicle crossing.

The model was based on the existing summer expansion evening peak hour, to show the worst commonly experienced conditions. The Brush Creek Road approaches of this intersection currently have "split" phasing in which all traffic from the Intercept Lot is allowed to go, followed by all the Brush Creek Road traffic. It is impossible to add any additional phases to this arrangement and still maintain compliance with HCM procedures. As a result, the intersection was remodeled with no left turn traffic – these vehicles were simulated as through traffic, freeing a phase to allow train crossings. The model was then calibrated to have the same total (sum of all drivers) hourly delay, both by approach and intersection. The results of modeling the summer expansion conditions as compared to the "dummy" summer expansion evening conditions can be seen in Appendix C.

The next step is to model the conditions when a train crosses the intersection. A 30-second dummy phase with no traffic was added to the model while maintaining the remaining phasing of the intersection. The key attributes associated with this timing plan can also be seen in the Appendix.

As a simulated evening peak hour would include both normal cycle lengths as well as closure cycles, all traffic assumed to arrive during a closure phase was assigned delay associated with the train cycle, all other traffic assigned the existing delay criteria.

This analysis, assuming six closures per hour, results in a total summation of 48.3 hours of delay for all vehicular traffic, 17.6 hours and a 57% increase in total delay over existing conditions. From an average delay standpoint, four closures per hour takes the Brush Creek intersection from LOS D to LOS E. Additional closures per hour would add to this delay increase.

5.2.2 Option D-1

As discussed in Section 5.2.1, the intersection of Brush Creek Road with SH 82 currently has side-street split phasing, in which each minor direction of traffic is released into the intersection separately. The primary direction coming from Snowmass Village is actuated and is currently allowed to take up to 35 seconds of green time during both the morning an evening peak periods. Of this 35 seconds of potential green time, Synchro estimates that during the higher delay PM peak, the phase utilizes an average of 17.5 seconds during the 2016 fall conditions and 18.5 seconds when the counts are expanded to summer conditions. If a train can cross SH 82 during this green time (18o feet at 7 mph average speed), the only movement to be substantially impacted under evening conditions would be the right turn movement from Brush Creek Road to upvalley SH 82. This movement, generally running free, would be required to be stopped when trains approach.

5.3 Maroon Creek Roundabout

This study examines effects of constructing LRT facilities near the Maroon Creek Roundabout. The first primary option consists of creating an at-grade crossing of the Maroon Creek Road and Castle Creek Road approaches to intersection. The second option would create a grade separation for the LRT tracks through the intersection, minimizing vehicular impacts once constructed.

Both conditions assume the construction of the Modified Direct Alternative, which redirects SH 82 off of the existing "S-Curve" alignment and directs traffic directly to Main Street via a new bridge over Maroon Creek. Figure 5-2 shows these changes under both the grade separated and at-grate options.

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Sheet Revisions

Date:	Comments	Init.

Figure 5-2: Proposed Changes at the Maroon Creek Roundabout

As Constructed
No Revisions:
Revised:
Void:

Designer:
Detailer:
Subset:
Structure Numbers
Subset Sheets: of

Project No./Code

Sheet Number 011

5.3.1 At-Grade Crossing

The LOS and queuing results of each at-grade crossing analysis of the Maroon Creek Roundabout can be compared to the no-build condition in Table 5-1. The queues associated with the proposed crossing gates can also be seen at the bottom of Table 5-1.

Crossing Gates and Queue Clearance Gates:

The first analysis assumes that crossing gates have been constructed in multiple locations, but the physical geometry of the roundabout is not effected. In addition to constructing crossing gates on both directions of Maroon Creek Road and Castle Creek Road at the LRT crossing, safety concerns regarding queuing within the roundabout would also require the outside (through-right) lane of upvalley SH 82 and inside (through-left) lane of downvalley SH 82 be gated prior to entering the roundabout.

As shown in Table 5-1, retaining the existing geometry of the roundabout results in substandard LOS F conditions in the downvalley direction, with maximum queues approaching 3,000 feet. During the evening, peak period, this results in a reduction in overall LOS from LOS B to LOS E in Year 2036.

Crossing Gates, Queue Clearance Gates and Downvalley SH 82 left turn Lane:

To mitigate the concerns of utilizing an at-grate LRT crossing, the second option takes the previous assumptions and adds an exclusive downvalley SH 82 left turn lane. It also adjusts the circulating lanes of the roundabout to accommodate this geometry, resulting in uninterrupted downvalley through traffic at this roundabout.

When Year 2036 Summer Expansion volumes are applied to this lane geometry, it results in model conditions improved over the no-build condition during both peak hours analyzed. The downvalley approach of SH 82 improves from LOS C to LOS B, and the average overall delay for the roundabout improves five seconds per vehicle during both AM and PM peak conditions.

This option would require widening of the downvalley SH 82 approach to accommodate this geometry, and would likely require additional right-of-way.

5.3.2 Grade-Separated Crossing

The primary benefit of grade-separating LRT traffic from automobile traffic at the Maroon Creek roundabout will be the elimination of any direct, permanent impact on the flow of vehicular traffic. This results in LOS conditions at the roundabout that should be the same those modelled under the no-build conditions.

6 BRT Traffic Evaluation

The second alternative permitted by the ROD is the use of bus rapid transit in exclusive lanes. While LRT is listed as the preferred alternative, if local funding or support is available these transit improvements can the form of exclusive bus lanes.

6.1 Existing Facilities

Several key improvements have been made to the SH 82 in support of exclusive bus lanes in the study area.

- From the Brush Creek Road intersection to the vicinity of Harmony Road a time-of day restricted Bus/HOV lane has been constructed with a queue jump at the AABC intersection.
- VelociRFTA, a BRT System, has been implemented throughout the Roaring Fork Valley.
- A bus-only lane has been built from AABC up to the Maroon Creek Roundabout in the upvalley direction.
- A bus-only lane has been built from the Maroon Creek Roundabout to Harmony Road in the downvalley direction.
- A time-of-day dependent downvalley bus lane from Garmisch Street to 6th Street in Downtown Aspen
- Improved bus shelters and adjacent pedestrian crossings at several locations
- Renovation and reconstruction of the Rubey Park Transit Center.

6.2 Potential Improvements

Assuming the continued development of the bus system, rather than the construction of LRT infrastructure, the largest remaining component of the exclusive bus system is to reroute SH 82 directly to downtown via a new bridge crossing Maroon Creek.

Referred to by the *ROD* as the "Modified Direct Alternative," SH 82 would leave its existing alignment upvalley of the Maroon Creek Roundabout, traverse the Marolt Open Space via a cut and cover tunnel (maintaining existing wildlife corridor connectivity) and directly connecting to Main Street via a new bridge over Maroon Creek. Much of these improvements are shown in Figure 5-2.

If LRT is not a viable option at this time, the expected cross section within the "Modified Direct Alternative" alignment would consist of one GP lane in each direction and a bus-only lane in each direction of SH 82.

7 Recommendations and Conclusions

Brush Creek at-grade Option D (diagonal through intersection) would be expected to substantially degrades intersection performance, and should not be attempted without additional intersection improvements.

Brush Creek at-grade Option D-1 (direct crossing of the downvalley approach) would have a minimal impact on intersection operations, and is preferable to Option D from an operations perspective.

Constructing an at-grade crossing at the Maroon Creek Roundabout is expected to induce additional delay for an already stressed segment of SH 82. Adding an exclusive downvalley SH 82 left turn lane at this intersection is expected to mitigate these concerns, but would likely require additional right-of-way to accomplish.

The only LRT focused solution at the Maroon Creek Roundabout that would maintain no-built levels of average delay without utilizing additional right-of-way for vehicular traffic would be to grade-separate the LRT tracks.

The primary change to the transportation network assumed if Bus Rapid Transit is continued would be the expected construction of the Modified Direct Alternative. While this would remove the capacity constraints of the Hallam Street/7th Street/Main Street “S Curve”, it would have little effect on the intersections analyzed as part of this study.

Appendix A

- Existing AM/PM Peak Hour Traffic Counts
  (Wednesday, November 9, 2016)

1. Brush Creek Road
2. Aspen Airport Business Center (AABC)
3. Harmony Rd
4. Owl Creek Road
5. Truscott Place
6. Maroon Creek Roundabout
7. Aspen Street
8. Monarch Street

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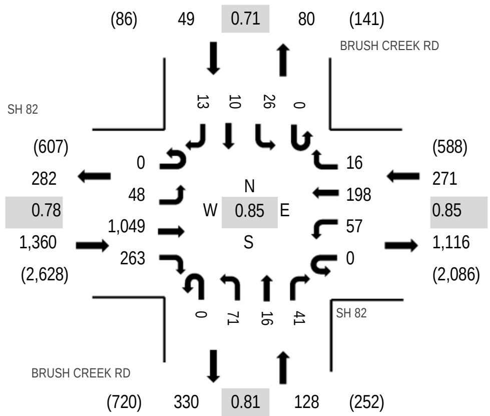
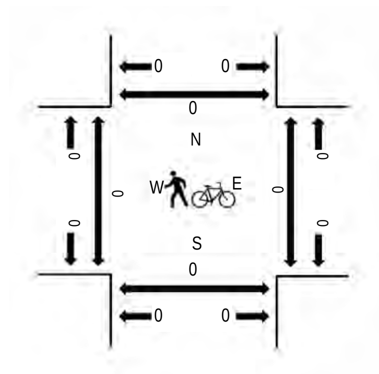
Location: 8 BRUSH CREEK RD & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	BRUSH CREEK RD Northbound U-Turn	Left	Thru	Right	BRUSH CREEK RD Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	10	269	39	0	11	36	2	0	13	1	14	0	5	1	0	401	1,808	0	0	0	0
7:15 AM	0	17	343	78	0	12	44	8	0	8	6	5	0	4	2	7	534	1,787	0	0	0	0
7:30 AM	0	7	241	68	0	17	61	3	0	21	6	10	0	9	5	5	453	1,617	0	0	0	0
7:45 AM	0	14	196	78	0	17	57	3	0	29	3	12	0	8	2	1	420	1,661	0	0	0	0
8:00 AM	0	8	174	69	0	13	77	3	0	10	2	13	0	2	3	6	380	1,746	0	0	0	0
8:15 AM	0	10	193	63	0	10	49	3	0	14	3	14	0	4	1	0	364		0	0	0	0
8:30 AM	0	15	249	91	0	14	70	2	0	21	0	22	0	9	2	2	497		0	0	0	0
8:45 AM	0	11	278	107	0	13	60	3	0	15	1	9	0	3	4	1	505		0	0	0	0
Count Total	0	92	1,943	593	0	107	454	27	0	131	22	99	0	44	20	22	3,554		0	0	0	0
Peak Hour	0	48	1,049	263	0	57	198	16	0	71	16	41	0	26	10	13	1,808		0	0	0	0

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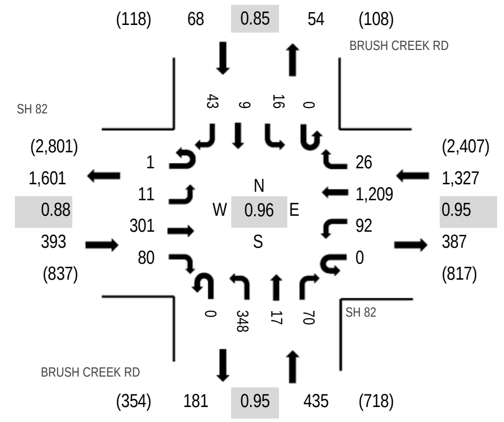
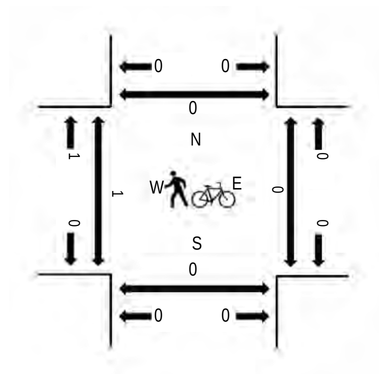
Location: 8 BRUSH CREEK RD & SH 82 PM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	BRUSH CREEK RD Northbound U-Turn	Left	Thru	Right	BRUSH CREEK RD Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	0	3	83	18	0	21	207	8	0	59	2	10	0	8	3	4	426	1,857	0	0	0	0
3:15 PM	0	5	73	17	1	18	218	6	0	45	5	15	0	2	2	4	411	1,961	0	0	0	0
3:30 PM	0	3	109	16	0	18	265	7	0	49	2	13	0	11	2	6	501	2,113	0	0	0	0
3:45 PM	0	4	84	29	0	29	276	6	0	61	3	19	0	2	0	6	519	2,191	0	0	0	0
4:00 PM	1	3	82	19	0	30	263	4	0	80	9	22	0	5	3	9	530	2,223	1	0	0	0
4:15 PM	0	2	76	22	0	20	306	6	0	89	4	21	0	3	0	14	563		0	0	0	0
4:30 PM	0	2	81	17	0	19	320	12	0	93	2	13	0	4	5	11	579		0	0	0	0
4:45 PM	0	4	62	22	0	23	320	4	0	86	2	14	0	4	1	9	551		0	0	0	0
Count Total	1	26	650	160	1	178	2,175	53	0	562	29	127	0	39	16	63	4,080		1	0	0	0
Peak Hour	1	11	301	80	0	92	1,209	26	0	348	17	70	0	16	9	43	2,223		1	0	0	0

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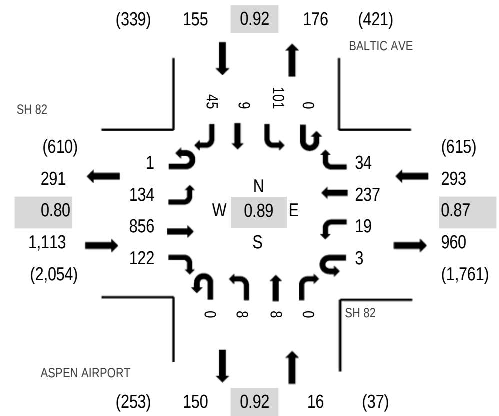
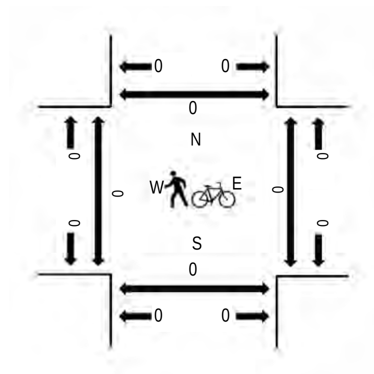
Location: 7 ASPEN AIRPORT & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	ASPEN AIRPORT Northbound U-Turn	Left	Thru	Right	BALTIC AVE Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	24	221	35	0	8	49	5	0	3	4	0	0	23	2	7	381	1,577	0	0	0	0
7:15 AM	1	31	279	35	1	4	43	6	0	3	1	0	0	26	0	13	443	1,518	0	0	0	0
7:30 AM	0	28	215	35	0	5	83	5	0	0	0	0	0	32	2	13	418	1,397	0	0	0	0
7:45 AM	0	51	141	17	2	2	62	18	0	2	3	0	0	20	5	12	335	1,376	0	0	0	0
8:00 AM	0	43	123	20	0	4	62	14	0	2	4	0	0	30	2	18	322	1,468	0	0	0	0
8:15 AM	0	45	141	14	0	6	53	8	0	3	3	0	0	25	6	18	322		0	0	0	0
8:30 AM	1	35	200	21	1	7	67	9	0	2	3	0	0	40	2	9	397		0	0	0	0
8:45 AM	0	64	216	18	0	3	74	14	0	1	3	0	0	25	0	9	427		0	0	0	0
Count Total	2	321	1,536	195	4	39	493	79	0	16	21	0	0	221	19	99	3,045		0	0	0	0
Peak Hour	1	134	856	122	3	19	237	34	0	8	8	0	0	101	9	45	1,577		0	0	0	0

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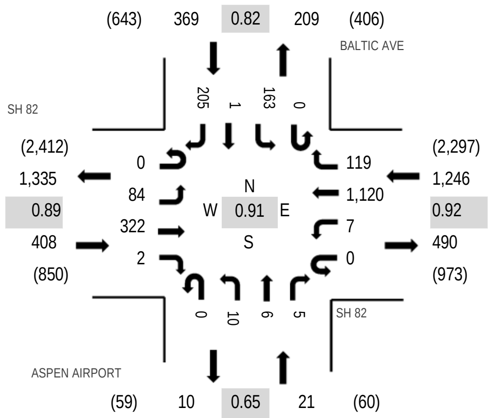
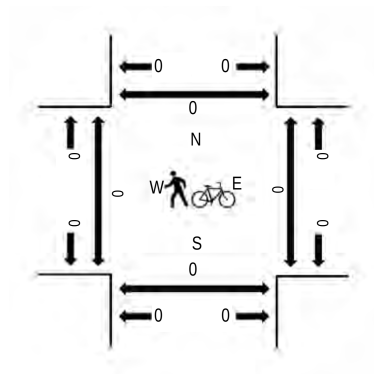
Location: 7 ASPEN AIRPORT & SH 82 PM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	ASPEN AIRPORT Northbound U-Turn	Left	Thru	Right	BALTIC AVE Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	0	15	82	1	1	13	207	21	0	3	1	1	0	28	0	26	399	1,806	0	0	1	0
3:15 PM	0	18	79	2	0	5	222	26	0	4	4	0	0	28	0	28	416	1,895	0	0	0	0
3:30 PM	1	28	94	5	1	5	264	28	0	7	3	1	0	37	7	32	513	1,980	0	0	0	0
3:45 PM	0	25	90	2	2	7	223	26	0	9	2	4	0	35	2	51	478	2,027	0	0	0	0
4:00 PM	0	18	86	1	0	2	268	22	0	2	0	2	0	47	0	40	488	2,044	0	0	0	0
4:15 PM	0	29	77	0	0	1	268	42	0	3	2	0	0	31	1	47	501		0	0	0	0
4:30 PM	0	14	90	0	0	0	307	31	0	2	1	2	0	48	0	65	560		0	0	0	0
4:45 PM	0	23	69	1	0	4	277	24	0	3	3	1	0	37	0	53	495		0	0	0	0
Count Total	1	170	667	12	4	37	2,036	220	0	33	16	11	0	291	10	342	3,850		0	0	1	0
Peak Hour	0	84	322	2	0	7	1,120	119	0	10	6	5	0	163	1	205	2,044		0	0	0	0

All Traffic Data Services Inc.

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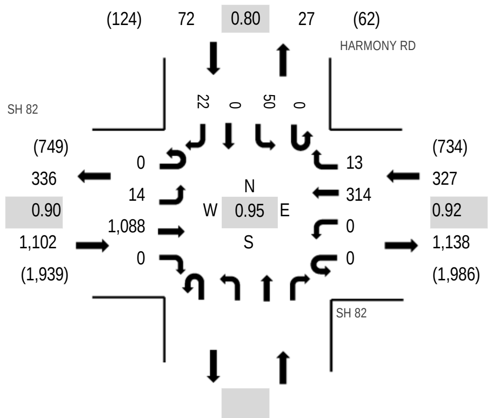
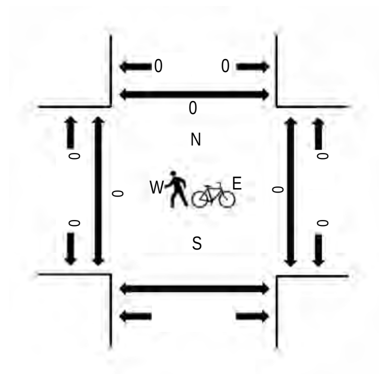
Location: 6 HARMONY RD & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	HARMONY RD Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	5	268	0	0	0	64	0					0	5	0	6	348	1,501	0	0		0
7:15 AM	0	5	300	0	0	0	56	5					0	11	0	4	381	1,463	0	0		0
7:30 AM	0	1	276	0	0	0	91	4					0	17	0	6	395	1,333	0	0		0
7:45 AM	0	3	244	0	0	0	103	4					0	17	0	6	377	1,320	0	0		0
8:00 AM	1	4	188	0	0	0	96	8					0	7	0	6	310	1,296	0	0		0
8:15 AM	0	1	149	0	0	0	83	3					0	7	0	8	251		0	0		0
8:30 AM	0	5	257	0	0	0	99	7					0	8	0	6	382		0	0		0
8:45 AM	2	6	224	0	0	0	110	1					0	8	0	2	353		0	0		0
Count Total	3	30	1,906	0	0	0	702	32					0	80	0	44	2,797		0	0		0
Peak Hour	0	14	1,088	0	0	0	314	13					0	50	0	22	1,501		0	0		0

All Traffic Data Services Inc.

(303) 216-2439
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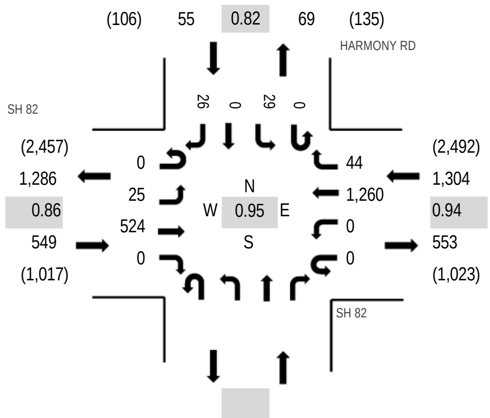
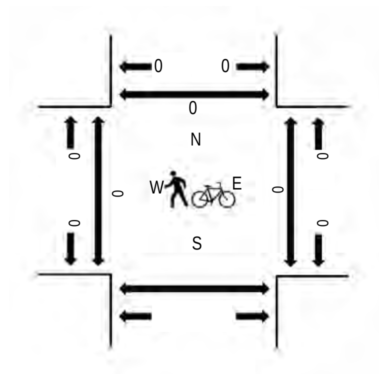
Location: 6 HARMONY RD & SH 82 PM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 03:45 PM - 04:45 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	HARMONY RD Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	1	4	106	0	0	0	240	11					0	10	0	8	380	1,713	0	0		0
3:15 PM	0	4	109	0	0	0	274	9					0	6	0	7	409	1,793	0	0		0
3:30 PM	2	3	125	0	0	0	313	6					0	7	0	5	461	1,886	0	0		2
3:45 PM	0	7	152	0	0	0	281	7					0	9	0	7	463	1,908	0	0		0
4:00 PM	0	8	126	0	0	0	304	12					0	4	0	6	460	1,902	0	0		0
4:15 PM	0	4	123	0	0	0	347	11					0	9	0	8	502		0	0		0
4:30 PM	0	6	123	0	0	0	328	14					0	7	0	5	483		0	0		0
4:45 PM	0	11	103	0	1	0	316	18					0	3	0	5	457		0	0		0
Count Total	3	47	967	0	1	0	2,403	88					0	55	0	51	3,615		0	0		2
Peak Hour	0	25	524	0	0	0	1,260	44					0	29	0	26	1,908		0	0		0

All Traffic Data Services Inc.

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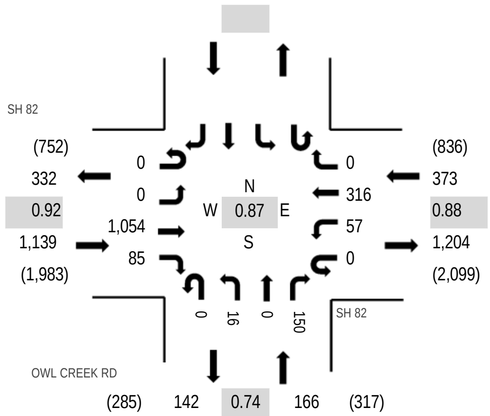
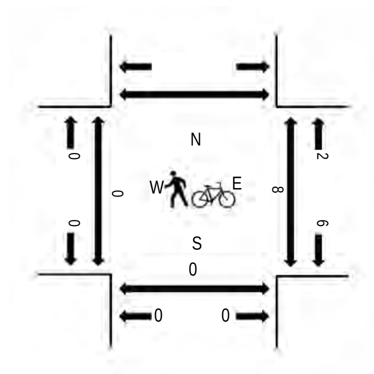
Location: 5 OWL CREEK RD & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	OWL CREEK RD Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	0	263	12	0	12	62	0	0	2	0	14					365	1,678	0	1	0	
7:15 AM	0	0	293	17	0	6	57	0	0	3	0	26					402	1,647	0	2	0	
7:30 AM	0	0	273	26	0	17	98	0	0	5	0	64					483	1,557	0	0	0	
7:45 AM	0	0	225	30	0	22	99	0	0	6	0	46					428	1,489	0	5	0	
8:00 AM	0	0	172	14	0	18	95	0	0	7	0	28					334	1,458	0	3	0	
8:15 AM	0	0	149	15	0	15	84	0	0	8	0	41					312		0	3	0	
8:30 AM	0	0	235	25	0	14	106	0	0	1	0	34					415		0	4	0	
8:45 AM	0	0	211	23	1	19	111	0	0	8	0	24					397		0	7	0	
Count Total	0	0	1,821	162	1	123	712	0	0	40	0	277					3,136		0	25	0	
Peak Hour	0	0	1,054	85	0	57	316	0	0	16	0	150					1,678		0	8	0	

(303) 216-2439
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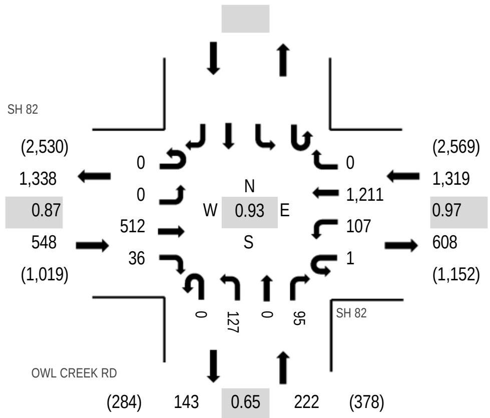
Location: 5 OWL CREEK RD & SH 82 PM

Date and Start Time: Wednesday, November 9, 2016

Peak Hour: 03:45 PM - 04:45 PM

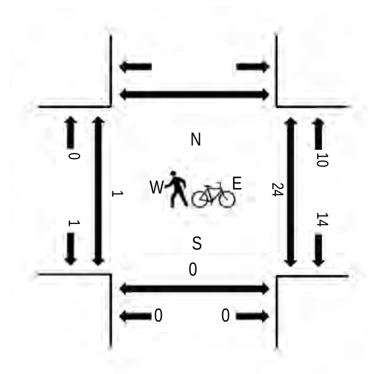
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



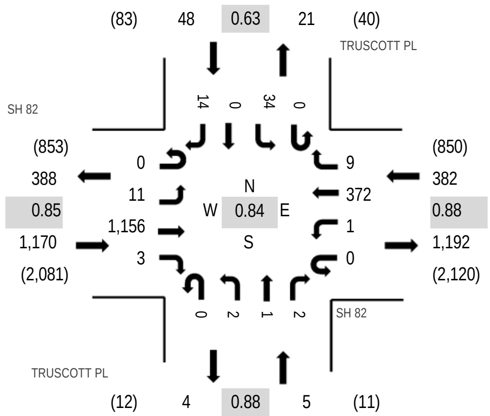
Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	OWL CREEK RD Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	0	0	106	11	0	28	245	0	0	17	0	22					429	1,884	0	1	0	
3:15 PM	0	0	109	6	0	35	267	0	0	11	0	19					447	1,951	0	5	1	
3:30 PM	0	0	131	6	0	23	307	0	0	15	0	33					515	2,066	0	2	0	
3:45 PM	0	0	149	9	1	20	269	0	0	19	0	26					493	2,089	0	3	0	
4:00 PM	0	0	125	8	0	22	300	0	0	23	0	18					496	2,082	0	6	0	
4:15 PM	0	0	115	9	0	26	326	0	0	59	0	27					562		0	9	0	
4:30 PM	0	0	123	10	0	39	316	0	0	26	0	24					538		0	6	0	
4:45 PM	0	0	97	5	0	27	318	0	0	12	0	27					486		0	3	0	
Count Total	0	0	955	64	1	220	2,348	0	0	182	0	196					3,966		0	35	1	
Peak Hour	0	0	512	36	1	107	1,211	0	0	127	0	95					2,089		0	24	0	

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

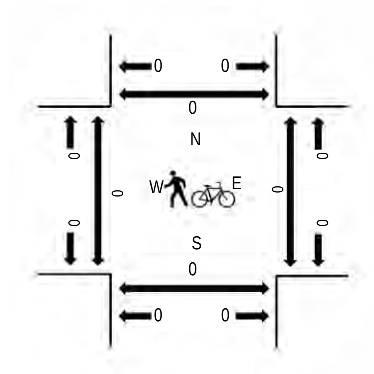
Location: 4 TRUSCOTT PL & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	TRUSCOTT PL Northbound U-Turn	Left	Thru	Right	TRUSCOTT PL Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	0	267	1	0	0	66	0	0	0	0	0	0	4	0	5	343	1,605	0	0	0	0
7:15 AM	0	4	284	1	0	0	68	0	0	1	0	0	0	4	0	3	365	1,596	0	0	0	0
7:30 AM	0	5	341	0	0	0	113	1	0	0	1	1	0	8	0	5	475	1,541	0	0	0	0
7:45 AM	0	2	264	1	0	1	125	8	0	1	0	1	0	18	0	1	422	1,465	0	0	0	0
8:00 AM	0	1	218	1	0	0	108	1	0	0	1	1	0	2	0	1	334	1,420	0	0	0	0
8:15 AM	0	2	193	1	0	0	101	4	0	0	0	0	0	6	0	3	310		0	0	0	0
8:30 AM	0	0	260	1	0	0	120	2	0	0	0	1	0	12	0	3	399		0	0	0	0
8:45 AM	0	5	227	2	0	3	126	3	0	1	0	2	0	6	0	2	377		0	0	0	0
Count Total	0	19	2,054	8	0	4	827	19	0	3	2	6	0	60	0	23	3,025		0	0	0	0
Peak Hour	0	11	1,156	3	0	1	372	9	0	2	1	2	0	34	0	14	1,605		0	0	0	0

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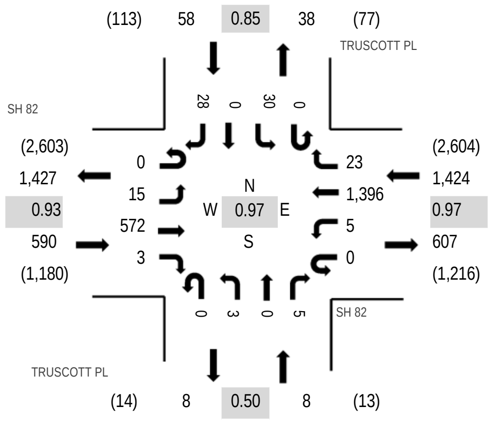
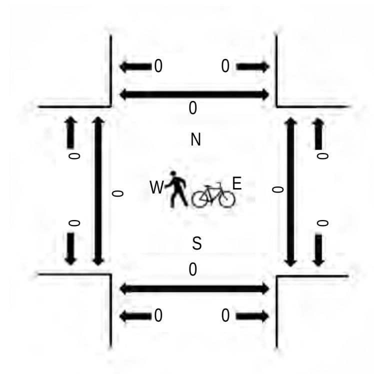
Location: 4 TRUSCOTT PL & SH 82 PM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	TRUSCOTT PL Northbound U-Turn	Left	Thru	Right	TRUSCOTT PL Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	0	3	121	1	1	2	269	2	0	0	0	2	0	8	0	6	415	1,830	0	0	1	0
3:15 PM	0	1	128	1	0	1	283	13	0	1	0	1	0	7	0	4	440	1,923	0	0	0	0
3:30 PM	0	4	159	0	0	1	307	4	0	0	0	1	0	11	0	7	494	2,019	0	0	1	0
3:45 PM	0	8	164	0	0	0	293	4	0	0	0	0	0	6	0	6	481	2,056	0	0	2	0
4:00 PM	0	4	146	2	0	3	325	8	0	2	0	2	0	10	0	6	508	2,080	0	0	0	0
4:15 PM	0	4	151	0	0	1	362	5	0	1	0	1	0	6	0	5	536		0	0	0	0
4:30 PM	0	4	147	0	0	0	359	7	0	0	0	0	0	7	0	7	531		0	0	0	0
4:45 PM	0	3	128	1	0	1	350	3	0	0	0	2	0	7	0	10	505		0	0	0	0
Count Total	0	31	1,144	5	1	9	2,548	46	0	4	0	9	0	62	0	51	3,910		0	0	4	0
Peak Hour	0	15	572	3	0	5	1,396	23	0	3	0	5	0	30	0	28	2,080		0	0	0	0

All Traffic Data Services Inc.

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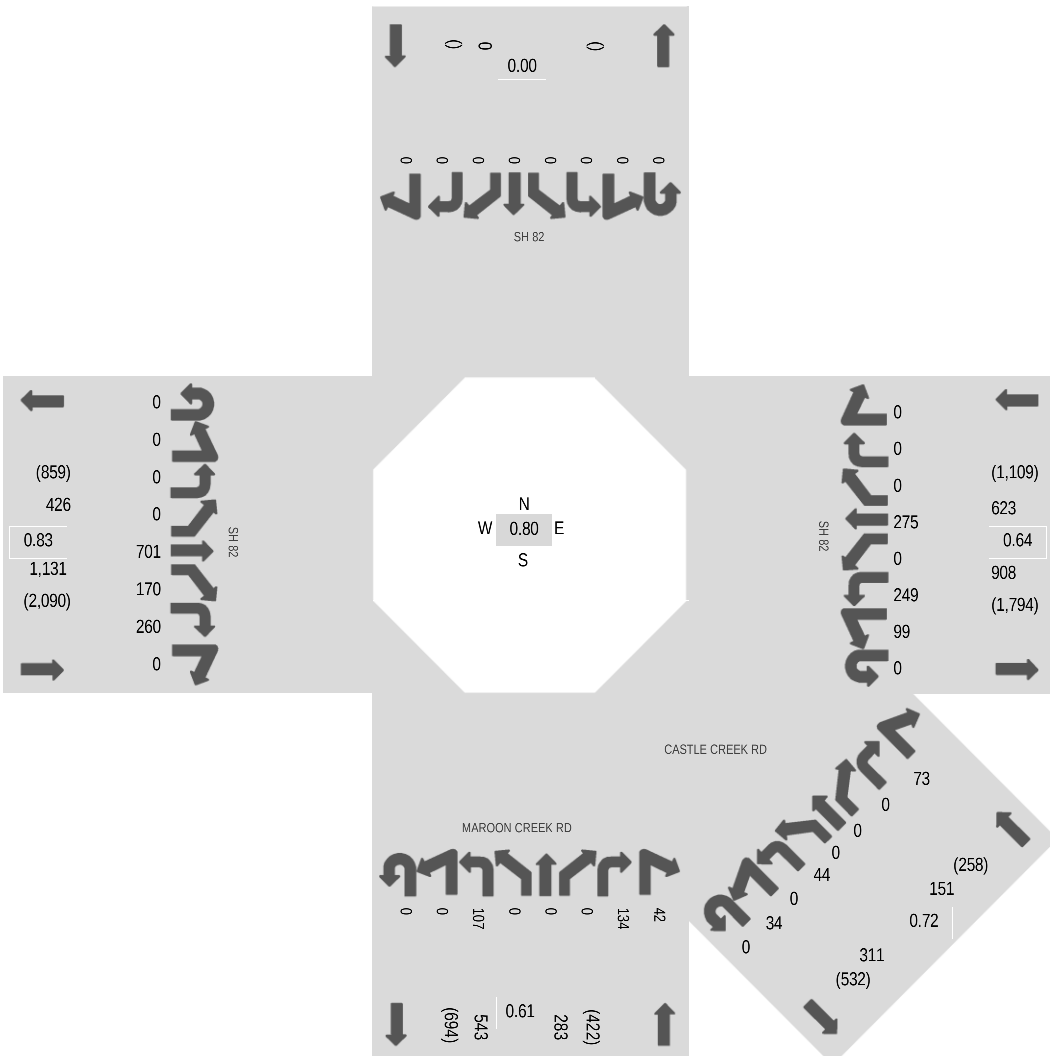
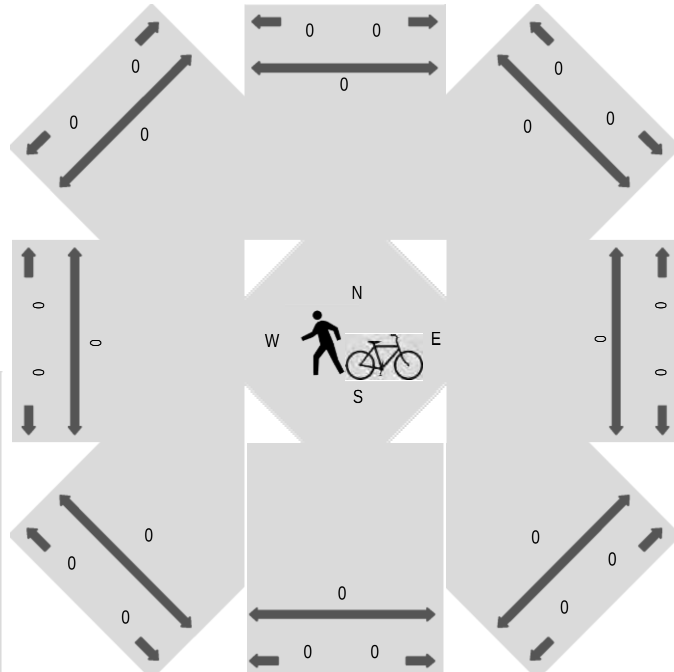
Location: 3 MAROON CREEK RD & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

Interval Start Time	Westbound								Northwestbound								Northbound								Northereastbound							
	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR
7:00 AM	0	13	10	0	52	0	0	0	0	3	0	3	0	0	0	13	0	0	13	0	0	0	6	2								
7:15 AM	0	11	18	0	45	0	0	0	0	5	0	10	0	0	0	12	0	0	9	0	0	0	12	4								
7:30 AM	0	19	63	0	92	0	0	0	0	7	0	9	0	0	0	12	0	0	20	0	0	0	23	7								
7:45 AM	0	52	139	0	75	0	0	0	0	19	0	12	0	0	0	24	0	0	41	0	0	0	63	20								
8:00 AM	0	17	29	0	63	0	0	0	0	3	0	13	0	0	0	25	0	0	37	0	0	0	36	11								
8:15 AM	0	25	20	0	82	0	0	0	0	3	0	9	0	0	0	16	0	0	20	0	0	0	15	9								
8:30 AM	0	19	11	0	95	0	0	0	0	0	0	9	0	0	0	25	0	0	17	0	0	0	13	5								
8:45 AM	0	25	22	0	112	0	0	0	0	1	0	8	0	0	0	17	0	0	13	0	0	0	21	5								
Count Total	0	181	312	0	616	0	0	0	0	41	0	73	0	0	0	144	0	0	170	0	0	0	189	63								
Peak Hour	0	99	249	0	275	0	0	0	0	34	0	44	0	0	0	73	0	0	107	0	0	0	134	42								

Interval Start Time	Eastbound								Southeastbound								Southbound								Southwestbound								Total	Rolling Hour
	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR		
7:00 AM	0	0	0	0	200	33	27	0									0	0	0	0	0	0	0	0									375	2,075
7:15 AM	0	0	0	0	189	51	57	0									0	0	0	0	0	0	0	0									423	2,188
7:30 AM	0	0	0	0	179	55	108	0									0	0	0	0	0	0	0	0									594	2,161
7:45 AM	0	0	0	0	140	28	70	0									0	0	0	0	0	0	0	0									683	2,029
8:00 AM	0	0	0	0	193	36	25	0									0	0	0	0	0	0	0	0									488	1,804
8:15 AM	0	0	0	0	156	28	13	0									0	0	0	0	0	0	0	0									396	
8:30 AM	0	0	0	0	209	34	25	0									0	0	0	0	0	0	0	0									462	
8:45 AM	0	0	0	0	195	23	16	0									0	0	0	0	0	0	0	0									458	
Count Total	0	0	0	0	1,461	288	341	0									0	0	0	0	0	0	0	0									3,879	
Peak Hour	0	0	0	0	701	170	260	0									0	0	0	0	0	0	0	0									2,188	

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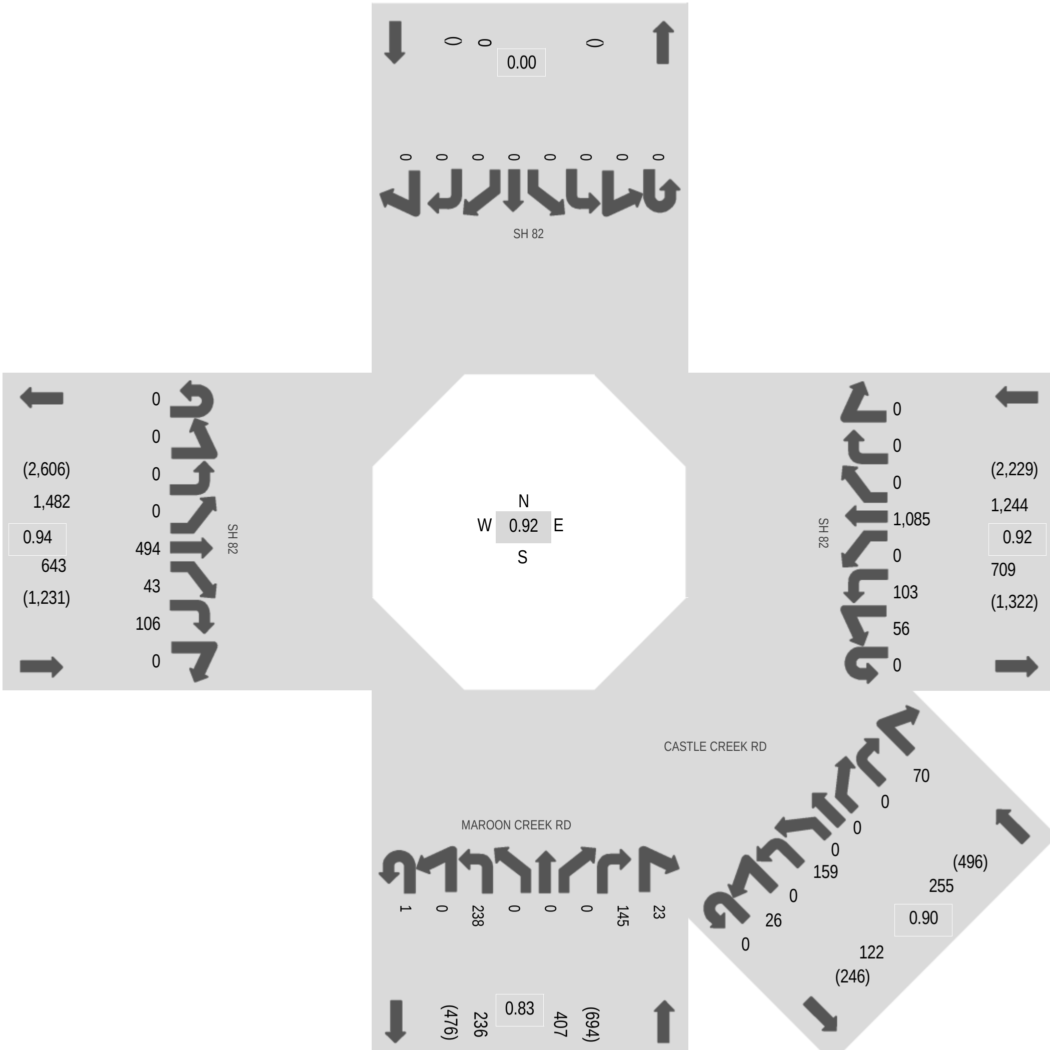
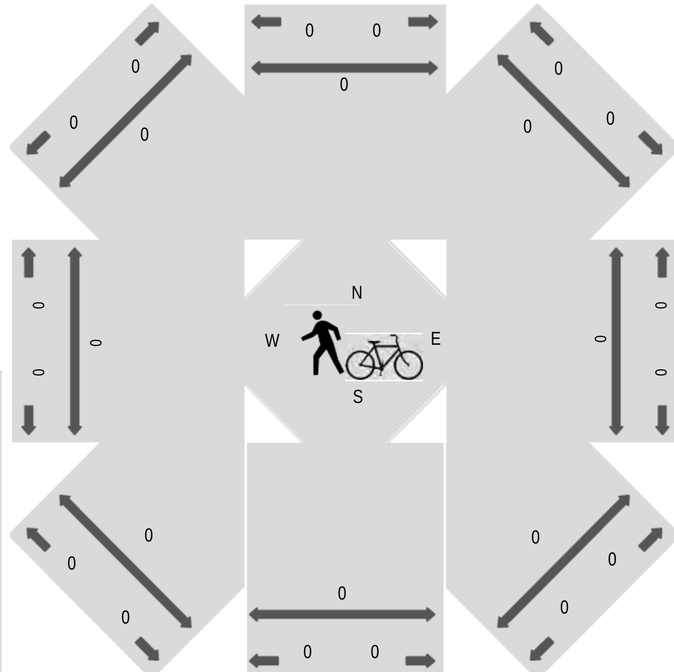
Location: 3 MAROON CREEK RD & SH 82 PM
Date and Start Time: Wednesday, November 09, 2016
Peak Hour: 03:45 PM - 04:45 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	Westbound								Northwestbound								Northbound								Northereastbound							
	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR
3:00 PM	0	16	23	0	191	0	0	0	0	10	0	28	0	0	0	24	0	0	34	0	0	0	27	3								
3:15 PM	0	16	34	0	214	0	0	0	0	4	0	39	0	0	0	13	0	0	36	0	0	0	21	5								
3:30 PM	0	10	25	0	219	0	0	0	0	7	0	42	0	0	0	16	0	0	35	0	0	0	46	3								
3:45 PM	0	15	36	0	204	0	0	0	0	8	0	27	0	0	0	20	1	0	51	0	0	0	37	6								
4:00 PM	0	11	22	0	286	0	0	0	0	6	0	48	0	0	0	18	0	0	61	0	0	0	38	4								
4:15 PM	0	14	25	0	299	0	0	0	0	4	0	42	0	0	0	21	0	0	79	0	0	0	36	7								
4:30 PM	0	16	20	0	296	0	0	0	0	8	0	42	0	0	0	11	0	0	47	0	0	0	34	6								
4:45 PM	0	9	26	0	202	0	0	0	0	6	0	35	0	0	0	17	0	0	49	0	0	0	26	2								
Count Total	0	107	211	0	1,911	0	0	0	0	53	0	303	0	0	0	140	1	0	392	0	0	0	265	36								
Peak Hour	0	56	103	0	1,085	0	0	0	0	26	0	159	0	0	0	70	1	0	238	0	0	0	145	23								

Interval Start Time	Eastbound								Southeastbound								Southbound								Southwestbound								Total	Rolling Hour
	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR	U	HL	L	BL	T	BR	R	HR		
3:00 PM	0	0	0	0	92	9	30	0									0	0	0	0	0	0	0	0									487	2,161
3:15 PM	0	0	0	0	90	21	26	0									0	0	0	0	0	0	0	0									519	2,324
3:30 PM	0	0	0	0	124	19	27	0									0	0	0	0	0	0	0	0									573	2,495
3:45 PM	0	0	0	0	127	10	40	0									0	0	0	0	0	0	0	0									582	2,549
4:00 PM	0	0	0	0	125	12	19	0									0	0	0	0	0	0	0	0									650	2,489
4:15 PM	0	0	0	0	125	14	24	0									0	0	0	0	0	0	0	0									690	
4:30 PM	0	0	0	0	117	7	23	0									0	0	0	0	0	0	0	0									627	
4:45 PM	0	0	0	0	117	11	22	0									0	0	0	0	0	0	0	0									522	
Count Total	0	0	0	0	917	103	211	0									0	0	0	0	0	0	0	0									4,650	
Peak Hour	0	0	0	0	494	43	106	0									0	0	0	0	0	0	0	0									2,549	

Location: 2 ASPEN ST & SH 82 AM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

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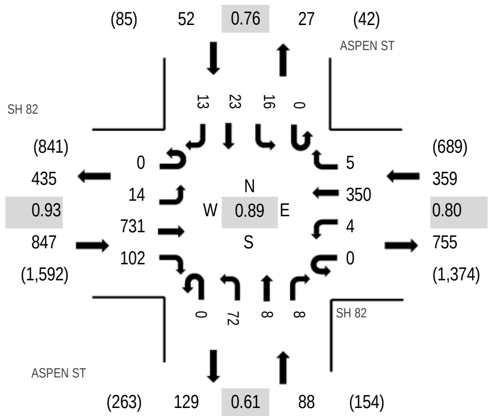
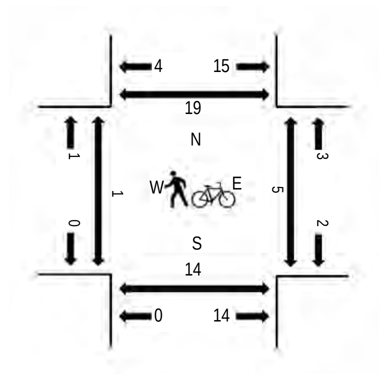
Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	ASPEN ST Northbound U-Turn	Left	Thru	Right	ASPEN ST Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	3	116	34	0	0	49	0	0	12	0	0	0	0	2	2	218	1,174	0	0	1	1
7:15 AM	0	3	164	32	0	0	56	1	0	11	0	3	0	1	1	4	276	1,277	0	1	4	5
7:30 AM	0	1	164	36	0	0	103	3	0	23	0	1	0	2	1	10	344	1,293	1	2	0	1
7:45 AM	0	2	164	26	0	0	116	2	0	14	0	2	0	2	2	6	336	1,306	0	0	7	1
8:00 AM	0	5	191	32	0	0	64	2	0	10	2	3	0	3	6	3	321	1,346	0	2	4	6
8:15 AM	0	5	162	18	0	3	85	1	0	10	0	0	0	2	4	2	292		1	1	3	7
8:30 AM	0	1	186	28	0	0	100	0	0	23	4	0	0	4	9	2	357		0	0	1	1
8:45 AM	0	3	192	24	0	1	101	2	0	29	2	5	0	7	4	6	376		0	2	6	5
Count Total	0	23	1,339	230	0	4	674	11	0	132	8	14	0	21	29	35	2,520		2	8	26	27
Peak Hour	0	14	731	102	0	4	350	5	0	72	8	8	0	16	23	13	1,346		1	5	14	19

Location: 2 ASPEN ST & SH 82 PM

Date and Start Time: Wednesday, November 9, 2016

Peak Hour: 03:45 PM - 04:45 PM

Peak 15-Minutes: 03:45 PM - 04:00 PM

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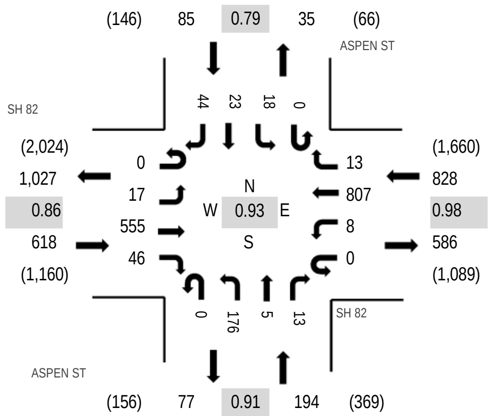
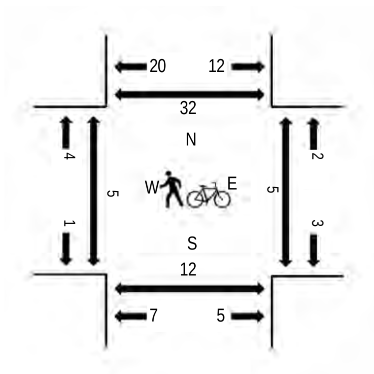
Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	ASPEN ST Northbound U-Turn	Left	Thru	Right	ASPEN ST Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	0	2	117	12	0	2	207	5	0	49	1	2	0	7	4	8	416	1,663	2	2	2	7
3:15 PM	0	3	108	13	0	3	205	2	0	31	0	5	0	1	3	10	384	1,680	3	1	9	5
3:30 PM	0	2	126	13	0	4	199	4	0	36	0	0	0	4	4	9	401	1,710	0	0	3	3
3:45 PM	0	4	164	12	0	3	210	2	0	40	1	4	0	4	4	14	462	1,725	1	1	5	8
4:00 PM	0	5	126	11	0	1	202	6	0	48	1	6	0	5	10	12	433	1,672	0	1	3	7
4:15 PM	0	5	141	12	0	3	192	2	0	42	1	0	0	4	1	11	414		1	2	1	10
4:30 PM	0	3	124	11	0	1	203	3	0	46	2	3	0	5	8	7	416		3	0	3	6
4:45 PM	0	5	124	17	0	1	195	5	0	45	2	4	0	5	3	3	409		3	1	8	10
Count Total	0	29	1,030	101	0	18	1,613	29	0	337	8	24	0	35	37	74	3,335		13	8	34	56
Peak Hour	0	17	555	46	0	8	807	13	0	176	5	13	0	18	23	44	1,725		5	4	12	31

All Traffic Data Services Inc.
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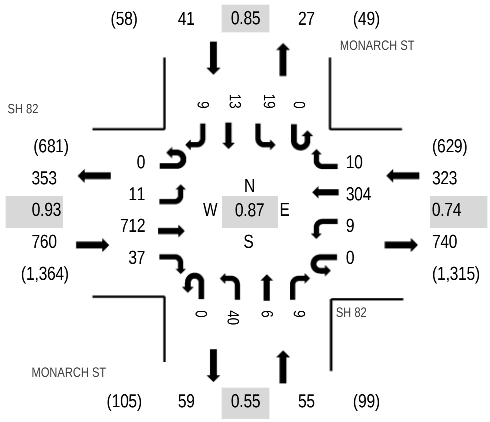
Location: 1 MONARCH ST & SH 82 AM

Date and Start Time: Wednesday, November 9, 2016

Peak Hour: 08:00 AM - 09:00 AM

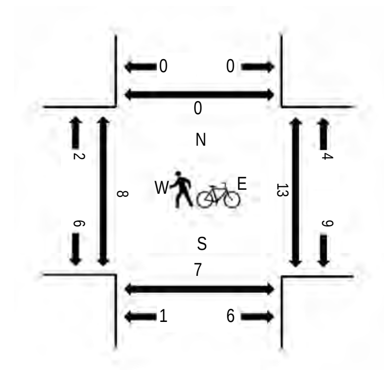
Peak 15-Minutes: 08:45 AM - 09:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	MONARCH ST Northbound U-Turn	Left	Thru	Right	MONARCH ST Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	0	98	11	0	0	45	0	0	4	0	4	0	0	1	2	165	971	1	0	1	0
7:15 AM	0	2	161	7	0	1	51	2	0	3	4	1	0	1	2	1	236	1,078	1	2	2	0
7:30 AM	0	2	152	7	0	2	87	1	0	12	1	0	0	1	2	3	270	1,114	0	0	1	0
7:45 AM	0	3	153	8	0	2	111	4	0	8	3	4	0	0	3	1	300	1,142	5	5	3	0
8:00 AM	0	4	185	8	0	1	56	1	0	3	2	2	0	5	5	0	272	1,179	1	4	2	0
8:15 AM	0	2	154	11	0	4	75	3	0	10	0	1	0	5	2	5	272		3	2	2	0
8:30 AM	0	0	183	9	0	0	81	4	0	11	0	1	0	4	2	3	298		1	4	0	0
8:45 AM	0	5	190	9	0	4	92	2	0	16	4	5	0	5	4	1	337		1	2	3	0
Count Total	0	18	1,276	70	0	14	598	17	0	67	14	18	0	21	21	16	2,150		13	19	14	0
Peak Hour	0	11	712	37	0	9	304	10	0	40	6	9	0	19	13	9	1,179		6	12	7	0

All Traffic Data Services Inc.
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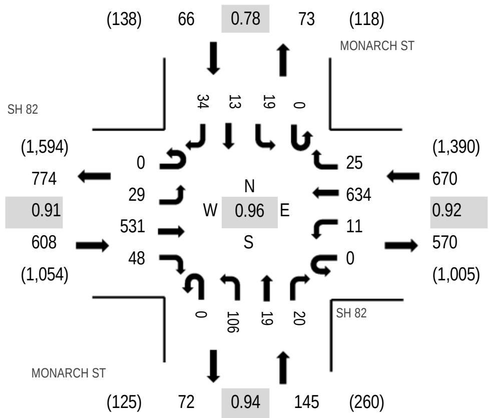
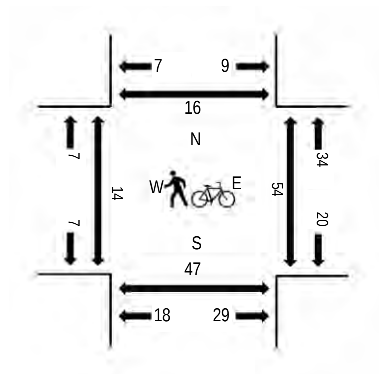
Location: 1 MONARCH ST & SH 82 PM
Date and Start Time: Wednesday, November 9, 2016
Peak Hour: 03:15 PM - 04:15 PM
Peak 15-Minutes: 03:30 PM - 03:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	SH 82 Eastbound U-Turn	Left	Thru	Right	SH 82 Westbound U-Turn	Left	Thru	Right	MONARCH ST Northbound U-Turn	Left	Thru	Right	MONARCH ST Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
3:00 PM	1	5	102	9	0	1	156	5	0	15	0	8	0	3	3	8	316	1,450	7	12	6	2
3:15 PM	0	7	129	12	0	4	168	3	0	22	3	4	0	8	5	6	371	1,489	0	9	6	1
3:30 PM	0	7	147	13	0	2	152	9	0	28	4	7	0	4	2	13	388	1,444	6	22	18	1
3:45 PM	0	9	127	16	0	1	163	7	0	27	7	3	0	4	5	6	375	1,403	2	15	12	4
4:00 PM	0	6	128	7	0	4	151	6	0	29	5	6	0	3	1	9	355	1,392	6	8	11	10
4:15 PM	0	4	90	4	0	2	162	8	0	28	4	3	0	5	5	11	326		0	17	8	1
4:30 PM	0	5	89	8	0	1	190	5	0	18	0	8	0	3	9	11	347		3	9	9	4
4:45 PM	0	3	117	9	0	0	184	6	0	26	0	5	0	2	2	10	364		0	8	2	3
Count Total	1	46	929	78	0	15	1,326	49	0	193	23	44	0	32	32	74	2,842		24	100	72	26
Peak Hour	0	29	531	48	0	11	634	25	0	106	19	20	0	19	13	34	1,489		14	54	47	16

Appendix B

- Existing AM/PM Traffic Signal Timing Plans (As provided by CDOT)

1. Brush Creek Road
2. Aspen Airport Business Center (AABC)
3. Harmony Rd
4. Owl Creek Road
5. Truscott Place
6. Aspen Street
7. Monarch Street

8040027 - SH 82 @ Brush Ck
Table 1 - Timing and Functions Page 0,1,2
11/22/2016 7:44 AM

0 + Key			Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	2 6	Max I	0	15	30	0	12	15	30	0	25
Ped Recall	1		Max II/HFDW	1	25	45	0	12	15	45	0	35
Red Lock	2	1 45 8	Walk	2	0	6	0	0	0	6	0	6
Yellow Lock	3	1	Flashing DW	3	0	20	0	0	0	20	0	18
Permits	4	12 456 8	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5	2 6 8	Min Green	5	7	10	0	10	7	10	0	10
Lead Phases	6	1 3 67	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	4.0	0.0	0.0	4.0	4.0	0.0	0.0	4.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	4.0	4.0	0.0	4.0	4.0	4.0	0.0	4.0
Overlap D	D		Red Clear	D	1.0	2.0	0.0	1.0	1.0	2.0	0.0	1.0
Exclusive	E	4 8	Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + C + 0 + Key			D + C + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + D + 0 + Key			D + D + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

8040027 - SH 82 @ Brush Ck
Table 5 - TOD/DOW Events
11/22/2016 7:44 AM

A + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3	1234567	7	0	129	88-8B	19		0	0	0	C8-CB
4	1234567	9	30	128	8C-8F	20		0	0	0	CC-CF
5	1234567	15	0	129	90-93	21		0	0	0	D0-D3
6	1234567	18	30	128	94-97	22		0	0	0	D4-D7
7	1234567	6	0	132	98-9B	23		0	0	0	D8-DB
8	1234567	22	0	130	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

D + 8 + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3		0	0	0	88-8B	19		0	0	0	C8-CB
4		0	0	0	8C-8F	20		0	0	0	CC-CF
5		0	0	0	90-93	21		0	0	0	D0-D3
6		0	0	0	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

8040029 - SH 82 @ ABC
Table 1 - Timing and Functions Page 0,1,2
11/19/2015 1:51 PM

0 + Key			Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	12 6	Max I	0	15	65	0	30	20	60	0	30
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4	12 456 8	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	7	10	0	7	5	10	0	5
Lead Phases	6	1 3 5 7	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	4.0	0.0	0.0	4.0	4.0	0.0	0.0	4.0
Overlap A	A	45	Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B	2	Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	3.0	5.0	0.0	3.0	3.0	5.0	0.0	3.0
Overlap D	D		Red Clear	D	1.0	1.0	0.0	1.0	1.0	1.0	0.0	1.0
Exclusive	E	4 8	Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + C + 0 + Key			D + C + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	2 6	Max I	0	15	65	0	30	20	60	15	30
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4	12 45678	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	7	10	0	7	5	10	5	5
Lead Phases	6	2 4 6 8	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	4.0	0.0	0.0	4.0	4.0	0.0	4.0	4.0
Overlap A	A	45	Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B	2 7	Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	3.0	5.0	0.0	3.0	3.0	5.0	3.0	3.0
Overlap D	D		Red Clear	D	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
Exclusive	E	4 78	Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + D + 0 + Key			D + D + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

8040029 - SH 82 @ ABC
Table 5 - TOD/DOW Events
11/19/2015 1:52 PM

A + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1	23456	6	0	1	80-83	17		0	0	0	C0-C3
2	23456	9	30	2	84-87	18		0	0	0	C4-C7
3	23456	11	30	3	88-8B	19		0	0	0	C8-CB
4	23456	18	0	2	8C-8F	20		0	0	0	CC-CF
5	23456	19	30	20	90-93	21		0	0	0	D0-D3
6	1 7	6	0	2	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8	23456	9	1	100	9C-9F	24		0	0	0	DC-DF
9	23456	5	59	101	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

D + 8 + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3		0	0	0	88-8B	19		0	0	0	C8-CB
4		0	0	0	8C-8F	20		0	0	0	CC-CF
5		0	0	0	90-93	21		0	0	0	D0-D3
6		0	0	0	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

B + 0 + Key			D + Key		
FUNCTION	KEY	VALUE	FUNCTION	KEY	VALUE
Present Plan	0	0	Floating Ped	2E	0
TOD/DOW Plan	1	0	ID Number	2F	29
Hardwire Plan	2	0	No Coord Ped Recall	3E	1
Modem Plan	3	0	Rest In Walk	3F	0
Mode (0-4)	4	1	Adv Warning EOG	4E	0
Master (0 = Off)	5	0	Adv Warning SOG	4F	0
Master Clock	6	0	RR Red Clear	5E	0
Local Clock	7	0	RR Clear Color	5F	0
Dwell Clock	8	6	Bus Delay	6D	0.0
Reserved	9	0	Bus Free T1	6E	0
Reserved	A	0	Bus Free T3	6F	0
Reserved	B	0	EV Min After Clear	7E	0
		12345678	EV Indicators	7F	0
Reserved	C		NEMA Inputs	66	0
NEMA CNA Phase	D		Reserved		0
Adv Warning Phase	E		Reserved		0
MRI Phase	F	1 45 8			

B + Plan + Key		Plan								
FUNCTION	KEY	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9
Cycle Length	0	90	90	100	0	0	0	0	0	0
Forceoff Phase 1	1	18	13	45	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	37	27	21	0	0	0	0	0	0
Forceoff Phase 5	5	23	13	45	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	57	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	48	38	32	0	0	0	0	0	0
Offset	9	0	47	54	0	0	0	0	0	0
Permissive Length	A	2	2	2	0	0	0	0	0	0
Max Dwell	B	31	31	33	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C	2 4 6 8	2 4 6 8	1 3 5 7						
Coord Phases	D	2 6	2 6	2 6						
Perm 2 Phases	E									
Min Recall	F	2 6	2 6	2 6						

B + D + Key1 + Key2		Plan 10	Plan 11	Plan 12	Plan 13	Plan 14	Plan 15	Plan 16	Plan 17	Plan 18
		Key1								
FUNCTION	Key2	7	8	9	A	B	C	D	E	F
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff Phase 1	1	0	0	0	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	0	0	0	0	0	0	0	0	0
Forceoff Phase 5	5	0	0	0	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Permissive Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C									
Coord Phases	D									
Reserved	E									

1650002 - SH 82 @ Harmony
Table 1 - Timing and Functions Page 0,1,2
11/22/2016 7:45 AM

0 + Key			Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	2 6	Max I	0	0	85	0	20	15	75	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4	2 456	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	10	0	10	5	10	0	0
Lead Phases	6	1 3 5 7	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	6.0	0.0	4.0	4.0	6.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	4.0	0.0	4.0	3.0	4.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	2.0	0.0	2.0	2.0	2.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + C + 0 + Key			D + C + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + D + 0 + Key			D + D + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

1650002 - SH 82 @ Harmony
Table 5 - TOD/DOW Events
11/22/2016 7:46 AM

A + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1	1234567	6	0	1	80-83	17		0	0	0	C0-C3
2	1234567	9	30	2	84-87	18		0	0	0	C4-C7
3	1234567	11	30	3	88-8B	19		0	0	0	C8-CB
4	1234567	18	0	2	8C-8F	20		0	0	0	CC-CF
5	1234567	19	30	20	90-93	21		0	0	0	D0-D3
6	1 7	8	0	0	94-97	22		0	0	0	D4-D7
7	1 7	20	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

D + 8 + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3		0	0	0	88-8B	19		0	0	0	C8-CB
4		0	0	0	8C-8F	20		0	0	0	CC-CF
5		0	0	0	90-93	21		0	0	0	D0-D3
6		0	0	0	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

1650002 - SH 82 @ Harmony
Table 6 Coordination Fuctions and Plans
11/22/2016 7:46 AM

B + 0 + Key			D + Key		
FUNCTION	KEY	VALUE	FUNCTION	KEY	VALUE
Present Plan	0	0	Floating Ped	2E	0
TOD/DOW Plan	1	0	ID Number	2F	2
Hardwire Plan	2	0	No Coord Ped Recall	3E	1
Modem Plan	3	0	Rest In Walk	3F	0
Mode (0-4)	4	1	Adv Warning EOG	4E	0
Master (0 = Off)	5	0	Adv Warning SOG	4F	0
Master Clock	6	0	RR Red Clear	5E	0
Local Clock	7	0	RR Clear Color	5F	0
Dwell Clock	8	3	Bus Delay	6D	0.0
Reserved	9	0	Bus Free T1	6E	0
Reserved	A	0	Bus Free T3	6F	0
Reserved	B	0	EV Min After Clear	7E	0
		12345678	EV Indicators	7F	0
Reserved	C		NEMA Inputs	66	0
NEMA CNA Phase	D		Reserved		0
Adv Warning Phase	E		Reserved		0
MRI Phase	F	45			

B + Plan + Key		Plan								
FUNCTION	KEY	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9
Cycle Length	0	90	90	100	0	0	0	0	0	0
Forceoff Phase 1	1	0	0	0	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	18	18	29	0	0	0	0	0	0
Forceoff Phase 5	5	30	32	12	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	71	82	81	0	0	0	0	0	0
Permissive Length	A	2	2	2	0	0	0	0	0	0
Max Dwell	B	31	31	33	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C	1 3 5 7	1 3 5 7	2 4 6 8						
Coord Phases	D	2 6	2 6	2 6						
Perm 2 Phases	E									
Min Recall	F	2 6	2 6	2 6						

B + D + Key1 + Key2		Plan 10	Plan 11	Plan 12	Plan 13	Plan 14	Plan 15	Plan 16	Plan 17	Plan 18
		Key1								
FUNCTION	Key2	7	8	9	A	B	C	D	E	F
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff Phase 1	1	0	0	0	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	0	0	0	0	0	0	0	0	0
Forceoff Phase 5	5	0	0	0	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Permissive Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C									
Coord Phases	D									
Reserved	E									

1650003 - SH 82 @ Owl creek
Table 1 - Timing and Functions Page 0,1,2
11/23/2016 6:54 AM

0 + Key			Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	2 6	Max I	0	15	70	0	20	0	85	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2	1	Walk	2	0	0	0	4	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	22	0	0	0	0
Permits	4	12 4 6	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5	4	Min Green	5	5	10	0	10	0	10	0	0
Lead Phases	6	1 3 5 7	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	4.0	6.0	0.0	4.0	0.0	6.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	3.0	4.0	0.0	4.0	0.0	4.0	0.0	0.0
Overlap D	D		Red Clear	D	2.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + C + 0 + Key			D + C + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + D + 0 + Key			D + D + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

1650003 - SH 82 @ Owl creek
Table 5 - TOD/DOW Events
11/23/2016 6:49 AM

A + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1	1234567	6	0	1	80-83	17		0	0	0	C0-C3
2	1234567	9	30	2	84-87	18		0	0	0	C4-C7
3	1234567	11	30	3	88-8B	19		0	0	0	C8-CB
4	1234567	18	0	2	8C-8F	20		0	0	0	CC-CF
5	1234567	19	30	20	90-93	21		0	0	0	D0-D3
6	1 7	8	0	0	94-97	22		0	0	0	D4-D7
7	1 7	20	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

D + 8 + Code

EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3		0	0	0	88-8B	19		0	0	0	C8-CB
4		0	0	0	8C-8F	20		0	0	0	CC-CF
5		0	0	0	90-93	21		0	0	0	D0-D3
6		0	0	0	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

1650003 - SH 82 @ Owl creek
Table 6 Coordination Fuctions and Plans
11/23/2016 6:49 AM

B + 0 + Key			D + Key		
FUNCTION	KEY	VALUE	FUNCTION	KEY	VALUE
Present Plan	0	0	Floating Ped	2E	0
TOD/DOW Plan	1	0	ID Number	2F	3
Hardwire Plan	2	0	No Coord Ped Recall	3E	1
Modem Plan	3	0	Rest In Walk	3F	0
Mode (0-4)	4	1	Adv Warning EOG	4E	0
Master (0 = Off)	5	0	Adv Warning SOG	4F	0
Master Clock	6	0	RR Red Clear	5E	0
Local Clock	7	0	RR Clear Color	5F	0
Dwell Clock	8	19	Bus Delay	6D	0.0
Reserved	9	0	Bus Free T1	6E	0
Reserved	A	0	Bus Free T3	6F	0
Reserved	B	0	EV Min After Clear	7E	0
		12345678	EV Indicators	7F	0
Reserved	C		NEMA Inputs	66	0
NEMA CNA Phase	D		Reserved		0
Adv Warning Phase	E		Reserved		0
MRI Phase	F	1 4 8			

B + Plan + Key		Plan								
FUNCTION	KEY	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9
Cycle Length	0	90	90	100	0	0	0	0	0	0
Forceoff Phase 1	1	12	20	16	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	29	37	35	0	0	0	0	0	0
Forceoff Phase 5	5	0	0	0	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	65	69	11	0	0	0	0	0	0
Permissive Length	A	2	2	2	0	0	0	0	0	0
Max Dwell	B	31	31	33	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C	2 4 6 8	2 4 6 8	2 4 6 8						
Coord Phases	D	2 6	2 6	2 6						
Perm 2 Phases	E									
Min Recall	F	2 6	2 6	2 6						

B + D + Key1 + Key2		Plan 10	Plan 11	Plan 12	Plan 13	Plan 14	Plan 15	Plan 16	Plan 17	Plan 18
		Key1								
FUNCTION	Key2	7	8	9	A	B	C	D	E	F
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff Phase 1	1	0	0	0	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	0	0	0	0	0	0	0	0	0
Forceoff Phase 5	5	0	0	0	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Permissive Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C									
Coord Phases	D									
Reserved	E									

0 + Key			Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0	2 6	Max I	0	15	170	0	15	15	170	0	15
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4	12 456 8	Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	5	10	0	5	5	10	0	5
Lead Phases	6	1 3 5 7	TBR	6	0	0	0	0	0	0	0	0
Double Entry	7	4 8	TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	2.5	6.0	0.0	3.0	2.5	6.0	0.0	3.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0
Overlap D	D		Red Clear	D	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + C + 0 + Key			D + C + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

D + D + 0 + Key			D + D + Phase + Key		Phase							
FUNCTION	KEY	12345678	FUNCTION	KEY	Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	Ph 7	Ph 8
Vehicle Recall	0		Max I	0	0	0	0	0	0	0	0	0
Ped Recall	1		Max II/HFDW	1	0	0	0	0	0	0	0	0
Red Lock	2		Walk	2	0	0	0	0	0	0	0	0
Yellow Lock	3		Flashing DW	3	0	0	0	0	0	0	0	0
Permits	4		Max Initial	4	0	0	0	0	0	0	0	0
Ped Phases	5		Min Green	5	0	0	0	0	0	0	0	0
Lead Phases	6		TBR	6	0	0	0	0	0	0	0	0
Double Entry	7		TTR	7	0	0	0	0	0	0	0	0
Sequential Timing	8		Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Startup Green	9		Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap A	A		Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap B	B		Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap C	C		Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Overlap D	D		Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exclusive	E		Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Simultaneous Gap	F		Walk II	F	0	0	0	0	0	0	0	0

1650004 - SH 82 @ truscott
Table 5 - TOD/DOW Events
11/23/2016 6:47 AM

A + Code											
EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1	1234567	6	0	1	80-83	17		0	0	0	C0-C3
2	1234567	9	30	2	84-87	18		0	0	0	C4-C7
3	1234567	11	30	3	88-8B	19		0	0	0	C8-CB
4	1234567	18	0	2	8C-8F	20		0	0	0	CC-CF
5	1234567	19	30	20	90-93	21		0	0	0	D0-D3
6	1 7	8	0	0	94-97	22		0	0	0	D4-D7
7	1 7	20	0	0	98-9B	23		0	0	0	D8-DB
8	23456	15	0	4	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

D + 8 + Code											
EVENT	1234567	HOUR	MIN	FUNC	CODE	EVENT	1234567	HOUR	MIN	FUNC	CODE
1		0	0	0	80-83	17		0	0	0	C0-C3
2		0	0	0	84-87	18		0	0	0	C4-C7
3		0	0	0	88-8B	19		0	0	0	C8-CB
4		0	0	0	8C-8F	20		0	0	0	CC-CF
5		0	0	0	90-93	21		0	0	0	D0-D3
6		0	0	0	94-97	22		0	0	0	D4-D7
7		0	0	0	98-9B	23		0	0	0	D8-DB
8		0	0	0	9C-9F	24		0	0	0	DC-DF
9		0	0	0	A0-A3	25		0	0	0	E0-E3
10		0	0	0	A4-A7	26		0	0	0	E4-E7
11		0	0	0	A8-AB	27		0	0	0	E8-EB
12		0	0	0	AC-AF	28		0	0	0	EC-EF
13		0	0	0	B0-B3	29		0	0	0	F0-F3
14		0	0	0	B4-B7	30		0	0	0	F4-F7
15		0	0	0	B8-BB	31		0	0	0	F8-FB
16		0	0	0	BC-BF	32		0	0	0	FC-FF

B + 0 + Key			D + Key		
FUNCTION	KEY	VALUE	FUNCTION	KEY	VALUE
Present Plan	0	0	Floating Ped	2E	0
TOD/DOW Plan	1	0	ID Number	2F	4
Hardwire Plan	2	0	No Coord Ped Recall	3E	1
Modem Plan	3	0	Rest In Walk	3F	0
Mode (0-4)	4	1	Adv Warning EOG	4E	0
Master (0 = Off)	5	0	Adv Warning SOG	4F	0
Master Clock	6	0	RR Red Clear	5E	0
Local Clock	7	0	RR Clear Color	5F	0
Dwell Clock	8	54	Bus Delay	6D	0.0
Reserved	9	0	Bus Free T1	6E	0
Reserved	A	0	Bus Free T3	6F	0
Reserved	B	0	EV Min After Clear	7E	0
		12345678	EV Indicators	7F	0
Reserved	C		NEMA Inputs	66	0
NEMA CNA Phase	D		Reserved		0
Adv Warning Phase	E		Reserved		0
MRI Phase	F	1 45 8			

B + Plan + Key		Plan								
FUNCTION	KEY	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9
Cycle Length	0	90	90	100	200	0	0	0	0	0
Forceoff Phase 1	1	11	11	37	39	0	0	0	0	0
Forceoff Phase 2	2	0	0	11	12	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	29	29	26	27	0	0	0	0	0
Forceoff Phase 5	5	40	40	11	12	0	0	0	0	0
Forceoff Phase 6	6	11	11	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	29	29	26	27	0	0	0	0	0
Offset	9	58	48	6	4	0	0	0	0	0
Permissive Length	A	2	2	2	2	0	0	0	0	0
Max Dwell	B	31	31	33	68	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C	23 5 7	23 5 7	1 3 67	1 3 67					
Coord Phases	D	2	2	6	6					
Perm 2 Phases	E									
Min Recall	F	2 6	2 6	2 6	2 6					

B + D + Key1 + Key2		Plan 10	Plan 11	Plan 12	Plan 13	Plan 14	Plan 15	Plan 16	Plan 17	Plan 18
		Key1								
FUNCTION	Key2	7	8	9	A	B	C	D	E	F
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff Phase 1	1	0	0	0	0	0	0	0	0	0
Forceoff Phase 2	2	0	0	0	0	0	0	0	0	0
Forceoff Phase 3	3	0	0	0	0	0	0	0	0	0
Forceoff Phase 4	4	0	0	0	0	0	0	0	0	0
Forceoff Phase 5	5	0	0	0	0	0	0	0	0	0
Forceoff Phase 6	6	0	0	0	0	0	0	0	0	0
Forceoff Phase 7	7	0	0	0	0	0	0	0	0	0
Forceoff Phase 8	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Permissive Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
		12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
Lead Phases	C									
Coord Phases	D									
Reserved	E									

Node #2 ASPEN

W4IKS Table 1 Page 0
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	_2___6___
Ped Recall	1	
Red Lock	2	
Yellow Lock	3	
Permit	4	_2_4_6_8
Ped Phases	5	_2_4_6_8
Lead Phases	6	1_3_5_7_
Double Entry	7	
Sequential Timing	8	
Startup Green	9	
Overlap A	A	
Overlap B	B	
Overlap C	C	
Overlap D	D	
Exclusive	E	
Simultaneous Gap	F	

(PHASE+KEY)

			E/W		N/S				
FUNCTIONS	**KEY**	**PH1**	**PH2**	**PH3**	**PH4**	**PH5**	**PH6**	**PH7**	**PH8**
Max I	0	0	52	0	23	0	52	0	23
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	7	0	7	0	7	0	7
Flash DW	3	0	7	0	13	0	7	0	13
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	10	0	10	0	10	0	10
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0
Red Clear	D	0.0	2.0	0.0	2.5	0.0	2.0	0.0	2.5
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

W4IKS Table 1 Page 1
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(D+C+0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	
Ped Recall	1	
Red Lock	2	
Yellow Lock	3	
Permit	4	
Ped Phases	5	
Lead Phases	6	
Double Entry	7	
Sequential Timing	8	
Startup Green	9	
Overlap A	A	
Overlap B	B	
Overlap C	C	
Overlap D	D	
Exclusive	E	
Simultaneous Gap	F	

(D+C+PHASE+KEY)

FUNCTIONS	KEY	PH1	PH2	PH3	PH4	PH5	PH6	PH7	PH8
Max I	0	0	0	0	0	0	0	0	0
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	0	0	0	0	0	0	0
Flash DW	3	0	0	0	0	0	0	0	0
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	0	0	0	0	0	0	0
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

W4IKS Table 1 Page 2
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(D+D+0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	
Ped Recall	1	
Red Lock	2	
Yellow Lock	3	
Permit	4	
Ped Phases	5	
Lead Phases	6	
Double Entry	7	
Sequential Timing	8	
Startup Green	9	
Overlap A	A	
Overlap B	B	
Overlap C	C	
Overlap D	D	
Exclusive	E	
Simultaneous Gap	F	

(D+D+PHASE+KEY)

FUNCTIONS	KEY	PH1	PH2	PH3	PH4	PH5	PH6	PH7	PH8
Max I	0	0	0	0	0	0	0	0	0
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	0	0	0	0	0	0	0
Flash DW	3	0	0	0	0	0	0	0	0
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	0	0	0	0	0	0	0
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

Page 4

W4IKS Table 5 Sheet 1
Date: Monday, September 29, 2014   Time: 07:39 AM
Intersection #003   SH 82 @ Aspen 2012

(A+CODE)   Plan#

EVENT	1234567	HR	MIN	FUNC	CODE	EVENT	1234567	HR	MIN	FUNC	CODE
1	_23456_	6	0	1	80-83	17	_______	0	0	0	C0-C3
2	_23456_	10	0	2	84-87	18	_______	0	0	0	C4-C7
3	_23456_	15	0	3	88-8B	19	_______	0	0	0	C8-CB
4	_23456_	20	0	2	8C-8F	20	_______	0	0	0	CC-CF
5	_23456_	0	0	20	90-93	21	_______	0	0	0	D0-D3
6	1_____7	7	0	4	94-97	22	_______	0	0	0	D4-D7
7	1_____7	23	30	20	98-9B	23	_______	0	0	0	D8-DB
8	_______	0	0	0	9C-9F	24	_______	0	0	0	DC-DF
9	_______	0	0	0	A0-A3	25	_______	0	0	0	E0-E3
10	_______	0	0	0	A4-A7	26	_______	0	0	0	E4-E7
11	_______	0	0	0	A8-AB	27	_______	0	0	0	E8-EB
12	_______	0	0	0	AC-AF	28	_______	0	0	0	EC-EF
13	_______	0	0	0	B0-B3	29	_______	0	0	0	F0-F3
14	_______	0	0	0	B4-B7	30	_______	0	0	0	F4-F7
15	_______	0	0	0	B8-BB	31	_______	0	0	0	F8-FB
16	_______	0	0	0	BC-BF	32	_______	0	0	0	FC-FF

W4IKS Table 5 Sheet 2
Date: Monday, September 29, 2014   Time: 07:39 AM
Intersection #003   SH 82 @ Aspen 2012

(D+8+CODE)

EVENT	1234567	HR	MIN	FUNC	CODE	EVENT	1234567	HR	MIN	FUNC	CODE
33	_______	0	0	0	80-83	49	_______	0	0	0	C0-C3
34	_______	0	0	0	84-87	50	_______	0	0	0	C4-C7
35	_______	0	0	0	88-8B	51	_______	0	0	0	C8-CB
36	_______	0	0	0	8C-8F	52	_______	0	0	0	CC-CF
37	_______	0	0	0	90-93	53	_______	0	0	0	D0-D3
38	_______	0	0	0	94-97	54	_______	0	0	0	D4-D7
39	_______	0	0	0	98-9B	55	_______	0	0	0	D8-DB
40	_______	0	0	0	9C-9F	56	_______	0	0	0	DC-DF
41	_______	0	0	0	A0-A3	57	_______	0	0	0	E0-E3
42	_______	0	0	0	A4-A7	58	_______	0	0	0	E4-E7
43	_______	0	0	0	A8-AB	59	_______	0	0	0	E8-EB
44	_______	0	0	0	AC-AF	60	_______	0	0	0	EC-EF
45	_______	0	0	0	B0-B3	61	_______	0	0	0	F0-F3
46	_______	0	0	0	B4-B7	62	_______	0	0	0	F4-F7
47	_______	0	0	0	B8-BB	63	_______	0	0	0	F8-FB
48	_______	0	0	0	BC-BF	64	_______	0	0	0	FC-FF

W4IKS Table 6
Date: Monday, September 29, 2014   Time: 07:39 AM
Intersection #003   SH 82 @ Aspen 2012

(B+0+KEY)

FUNCTIONS	KEY	VALUE
Present Plan	0	0
TOD/DOW Plan	1	0
Hardwire Plan	2	0
Modem Plan	3	0
Mode (0-4)	4	1
Master (0-OFF)	5	0
Master Clock	6	0
Local Clock	7	0
Dwell Clock	8	0
Future	9	0
Future	A	0
Future	B	0
Future	C	________
NEMA CNA Phases	D	________
Adv Warning Phases	E	________
MRI Phases	F	___4___8

(D+KEY1+KEY2)

FUNCTIONS	KEY	VALUE
Floating Ped	2E	0
ID Number	2F	3
No Coord Ped Recall	3E	0
Rest In Walk	3F	1
Adv Warning EOG	4E	0
Adv Warning SOG	4F	0
RR Red Clear	5E	0
RR Clear Color	5F	0
Bus Delay	6D	0.0
Bus Free T1	6E	0
Bus Free T3	6F	0
EV Min Aft Clear	7E	1
EV Indicators	7F	0
NEMA Inputs	66	0.0

W4IKS Table 7 Sheet 1
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(B+PLAN+KEY)

6-10 AM (Plan 1) 10-3:00 pm (Plan 2) 3pm-8pm (Plan 3) weekends (Plan 4)

FUNCTION	KEY	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8	Plan 9
Cycle Length	0	80	80	80	80	0	0	0	0	0
Forceoff 01	1	0	0	0	0	0	0	0	0	0
Forceoff 02	2	0	0	0	0	0	0	0	0	0
Forceoff 03	3	0	0	0	0	0	0	0	0	0
Forceoff 04	4	33	33	36	33	0	0	0	0	0
Forceoff 05	5	0	0	0	0	0	0	0	0	0
Forceoff 06	6	0	0	0	0	0	0	0	0	0
Forceoff 07	7	0	0	0	0	0	0	0	0	0
Forceoff 08	8	33	33	36	33	0	0	0	0	0
Offset	9	5	72	2	1	0	0	0	0	0
Perm Length	A	14	14	14	14	0	0	0	0	0
Max Dwell	B	28	28	28	28	0	0	0	0	0
Lead Phases	C	1_3_5_7_	1_3_5_7_	1_3_5_7_	1_3_5_7_					
Coord Phases	D	_2___6__	_2___6__	_2___6__	_2___6__					
Perm 2 Phases	E									
Min Recall	F									

W4IKS Table 7 Sheet 2
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(B+D+KEY1+KEY2)

	KEY1	7	8	9	A	B	C	D	E	F
FUNCTION	**KEY2**	**Plan 10**	**Plan 11**	**Plan 12**	**Plan 13**	**Plan 14**	**Plan 15**	**Plan 16**	**Plan 17**	**Plan 18**
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff 01	1	0	0	0	0	0	0	0	0	0
Forceoff 02	2	0	0	0	0	0	0	0	0	0
Forceoff 03	3	0	0	0	0	0	0	0	0	0
Forceoff 04	4	0	0	0	0	0	0	0	0	0
Forceoff 05	5	0	0	0	0	0	0	0	0	0
Forceoff 06	6	0	0	0	0	0	0	0	0	0
Forceoff 07	7	0	0	0	0	0	0	0	0	0
Forceoff 08	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Perm Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
Lead Phases	C									
Coord Phases	D									
Perm 2 Phases	E									
Min Recall	F									

W4IKS Table 8
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #003 SH 82 @ Aspen 2012

(B+A+KEY)

FUNCTIONS	KEY	VALUE
Bus P1 T1	0	0
Bus P1 T2	1	0
Bus P1 T3	2	0
Bus P2 T1	3	0
Bus P2 T2	4	0
Bus P2 T3	5	0
Bus P3 T1	6	0
Bus P3 T2	7	0
Bus P3 T3	8	0
Perm 2 P1	9	0
Perm 2 P2	A	0
Perm 2 P3	B	0
Flash Yellow	C	_2___6__
Flash Circuit	D	_2___6__
TOD/DOW Max	E	
OLB Switchpack	F	

(B+B+KEY)

FUNCTIONS	KEY	VALUE
Bus P4 T1	0	0
Bus P4 T2	1	0
Bus P4 T3	2	0
Bus P5 T1	3	0
Bus P5 T2	4	0
Bus P5 T3	5	0
Bus P6 T1	6	0
Bus P6 T2	7	0
Bus P6 T3	8	0
Perm 2 P4	9	0
Perm 2 P5	A	0
Perm 2 P6	B	0
OL Flash Yellow	C	
OL Flash Clear	D	
TOD/DOW Ped	E	
OLC Switchpack	F	

(B+C+KEY)

FUNCTIONS	KEY	VALUE
Bus P7 T1	0	0
Bus P7 T2	1	0
Bus P7 T3	2	0
Bus P8 T1	3	0
Bus P8 T2	4	0
Bus P8 T3	5	0
Bus P9 T1	6	0
Bus P9 T2	7	0
Bus P9 T3	8	0
Perm 2 P7	9	0
Perm 2 P8	A	0
Perm 2 P9	B	0
Coord Max	C	
TOD Red Rest	D	
OLA Switchpack	E	
OLD Switchpack	F	

Node #1 MONARCH

W4IKS Table 1 Page 0
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	_2___6___
Ped Recall	1	_________
Red Lock	2	_________
Yellow Lock	3	_________
Permit	4	_2_4_6_8
Ped Phases	5	_2_4_6_8
Lead Phases	6	1_3_5_7_
Double Entry	7	_________
Sequential Timing	8	_________
Startup Green	9	_________
Overlap A	A	_________
Overlap B	B	_________
Overlap C	C	_________
Overlap D	D	_________
Exclusive	E	_________
Simultaneous Gap	F	_________

(PHASE+KEY)

FUNCTIONS	KEY	PH1	E/W PH2	PH3	N/S PH4	PH5	PH6	PH7	PH8
Max I	0	0	46	0	26	0	46	0	26
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	7	0	7	0	7	0	7
Flash DW	3	0	9	0	13	0	9	0	13
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	10	0	10	0	10	0	10
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0
Red Clear	D	0.0	2.0	0.0	2.5	0.0	2.0	0.0	2.5
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

W4IKS Table 1 Page 1
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(D+C+0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	_________
Ped Recall	1	_________
Red Lock	2	_________
Yellow Lock	3	_________
Permit	4	_________
Ped Phases	5	_________
Lead Phases	6	_________
Double Entry	7	_________
Sequential Timing	8	_________
Startup Green	9	_________
Overlap A	A	_________
Overlap B	B	_________
Overlap C	C	_________
Overlap D	D	_________
Exclusive	E	_________
Simultaneous Gap	F	_________

(D+C+PHASE+KEY)

FUNCTIONS	KEY	PH1	PH2	PH3	PH4	PH5	PH6	PH7	PH8
Max I	0	0	0	0	0	0	0	0	0
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	0	0	0	0	0	0	0
Flash DW	3	0	0	0	0	0	0	0	0
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	0	0	0	0	0	0	0
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

W4IKS Table 1 Page 2
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(D+D+0+KEY)

FUNCTIONS	KEY	12345678
Veh Recall	0	_________
Ped Recall	1	_________
Red Lock	2	_________
Yellow Lock	3	_________
Permit	4	_________
Ped Phases	5	_________
Lead Phases	6	_________
Double Entry	7	_________
Sequential Timing	8	_________
Startup Green	9	_________
Overlap A	A	_________
Overlap B	B	_________
Overlap C	C	_________
Overlap D	D	_________
Exclusive	E	_________
Simultaneous Gap	F	_________

(D+D+PHASE+KEY)

FUNCTIONS	KEY	PH1	PH2	PH3	PH4	PH5	PH6	PH7	PH8
Max I	0	0	0	0	0	0	0	0	0
Max II	1	0	0	0	0	0	0	0	0
Walk	2	0	0	0	0	0	0	0	0
Flash DW	3	0	0	0	0	0	0	0	0
Max Initial	4	0	0	0	0	0	0	0	0
Min Green	5	0	0	0	0	0	0	0	0
TBR	6	0	0	0	0	0	0	0	0
TTR	7	0	0	0	0	0	0	0	0
Observe Gap	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passage	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min Gap	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Actuation	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Clear	D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk II	F	0	0	0	0	0	0	0	0

W4IKS Table 5 Sheet 1
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(A+CODE)

EVENT	1234567	HR	MIN	FUNC	CODE	EVENT	1234567	HR	MIN	FUNC	CODE
1	_23456_	6	0	1	80-83	17	_______	0	0	0	C0-C3
2	_23456_	10	0	2	84-87	18	_______	0	0	0	C4-C7
3	_23456_	15	0	3	88-8B	19	_______	0	0	0	C8-CB
4	_23456_	20	0	2	8C-8F	20	_______	0	0	0	CC-CF
5	_23456_	0	0	20	90-93	21	_______	0	0	0	D0-D3
6	1_____7	7	0	4	94-97	22	_______	0	0	0	D4-D7
7	1_____7	23	30	20	98-9B	23	_______	0	0	0	D8-DB
8	_______	0	0	0	9C-9F	24	_______	0	0	0	DC-DF
9	_______	0	0	0	A0-A3	25	_______	0	0	0	E0-E3
10	_______	0	0	0	A4-A7	26	_______	0	0	0	E4-E7
11	_______	0	0	0	A8-AB	27	_______	0	0	0	E8-EB
12	_______	0	0	0	AC-AF	28	_______	0	0	0	EC-EF
13	_______	0	0	0	B0-B3	29	_______	0	0	0	F0-F3
14	_______	0	0	0	B4-B7	30	_______	0	0	0	F4-F7
15	_______	0	0	0	B8-BB	31	_______	0	0	0	F8-FB
16	_______	0	0	0	BC-BF	32	_______	0	0	0	FC-FF

function 20 free operation

W4IKS Table 5 Sheet 2
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(D+8+CODE)

EVENT	1234567	HR	MIN	FUNC	CODE	EVENT	1234567	HR	MIN	FUNC	CODE
33	_______	0	0	0	80-83	49	_______	0	0	0	C0-C3
34	_______	0	0	0	84-87	50	_______	0	0	0	C4-C7
35	_______	0	0	0	88-8B	51	_______	0	0	0	C8-CB
36	_______	0	0	0	8C-8F	52	_______	0	0	0	CC-CF
37	_______	0	0	0	90-93	53	_______	0	0	0	D0-D3
38	_______	0	0	0	94-97	54	_______	0	0	0	D4-D7
39	_______	0	0	0	98-9B	55	_______	0	0	0	D8-DB
40	_______	0	0	0	9C-9F	56	_______	0	0	0	DC-DF
41	_______	0	0	0	A0-A3	57	_______	0	0	0	E0-E3
42	_______	0	0	0	A4-A7	58	_______	0	0	0	E4-E7
43	_______	0	0	0	A8-AB	59	_______	0	0	0	E8-EB
44	_______	0	0	0	AC-AF	60	_______	0	0	0	EC-EF
45	_______	0	0	0	B0-B3	61	_______	0	0	0	F0-F3
46	_______	0	0	0	B4-B7	62	_______	0	0	0	F4-F7
47	_______	0	0	0	B8-BB	63	_______	0	0	0	F8-FB
48	_______	0	0	0	BC-BF	64	_______	0	0	0	FC-FF

W4IKS Table 6
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(B+0+KEY)

FUNCTIONS	KEY	VALUE
Present Plan	0	0
TOD/DOW Plan	1	0
Hardwire Plan	2	0
Modem Plan	3	0
Mode (0-4)	4	1
Master (0-OFF)	5	0
Master Clock	6	0
Local Clock	7	0
Dwell Clock	8	0
Future	9	0
Future	A	0
Future	B	0
Future	C	_______
NEMA CNA Phases	D	_______
Adv Warning Phases	E	_______
MRI Phases	F	___4___8

(D+KEY1+KEY2)

FUNCTIONS	KEY	VALUE
Floating Ped	2E	0
ID Number	2F	4
No Coord Ped Recall	3E	0
Rest In Walk	3F	1
Adv Warning EOG	4E	0
Adv Warning SOG	4F	0
RR Red Clear	5E	0
RR Clear Color	5F	0
Bus Delay	6D	0.0
Bus Free T1	6E	0
Bus Free T3	6F	0
EV Min Aft Clear	7E	1
EV Indicators	7F	0
NEMA Inputs	66	0.0

W4IKS Table 7 Sheet 1
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(B+PLAN+KEY)

FUNCTION	**KEY**	**Plan 1**	**Plan 2**	**Plan 3**	**Plan 4**	**Plan 5**	**Plan 6**	**Plan 7**	**Plan 8**	**Plan 9**
Cycle Length	0	80	80	80	80	0	0	0	0	0
Forceoff 01	1	0	0	0	0	0	0	0	0	0
Forceoff 02	2	0	0	0	0	0	0	0	0	0
Forceoff 03	3	0	0	0	0	0	0	0	0	0
Forceoff 04	4	39	39	39	39	0	0	0	0	0
Forceoff 05	5	0	0	0	0	0	0	0	0	0
Forceoff 06	6	0	0	0	0	0	0	0	0	0
Forceoff 07	7	0	0	0	0	0	0	0	0	0
Forceoff 08	8	39	39	39	39	0	0	0	0	0
Offset	9	79	62	76	77	0	0	0	0	0
Perm Length	A	14	14	14	14	0	0	0	0	0
Max Dwell	B	28	28	28	28	0	0	0	0	0
Lead Phases	C	1_3_5_7_	1_3_5_7_	1_3_5_7_	1_3_5_7_					
Coord Phases	D	_2___6__	_2___6__	_2___6__	_2___6__					
Perm 2 Phases	E									
Min Recall	F									

W4IKS Table 7 Sheet 2
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(B+D+KEY1+KEY2)

	KEY1	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
FUNCTION	**KEY2**	**Plan 10**	**Plan 11**	**Plan 12**	**Plan 13**	**Plan 14**	**Plan 15**	**Plan 16**	**Plan 17**	**Plan 18**
Cycle Length	0	0	0	0	0	0	0	0	0	0
Forceoff 01	1	0	0	0	0	0	0	0	0	0
Forceoff 02	2	0	0	0	0	0	0	0	0	0
Forceoff 03	3	0	0	0	0	0	0	0	0	0
Forceoff 04	4	0	0	0	0	0	0	0	0	0
Forceoff 05	5	0	0	0	0	0	0	0	0	0
Forceoff 06	6	0	0	0	0	0	0	0	0	0
Forceoff 07	7	0	0	0	0	0	0	0	0	0
Forceoff 08	8	0	0	0	0	0	0	0	0	0
Offset	9	0	0	0	0	0	0	0	0	0
Perm Length	A	0	0	0	0	0	0	0	0	0
Max Dwell	B	0	0	0	0	0	0	0	0	0
Lead Phases	C									
Coord Phases	D									
Perm 2 Phases	E									
Min Recall	F									

W4IKS Table 8
Date: Monday, September 29, 2014 Time: 07:39 AM
Intersection #004 HWY 82 (MAIN) @ S. MONARCH 2012

(B+A+KEY)

FUNCTIONS	**KEY**	**VALUE**
Bus P1 T1	0	0
Bus P1 T2	1	0
Bus P1 T3	2	0
Bus P2 T1	3	0
Bus P2 T2	4	0
Bus P2 T3	5	0
Bus P3 T1	6	0
Bus P3 T2	7	0
Bus P3 T3	8	0
Perm 2 P1	9	0
Perm 2 P2	A	0
Perm 2 P3	B	0
Flash Yellow	C	_2___6__
Flash Circuit	D	_2___6__
TOD/DOW Max	E	
OLB Switchpack	F	

(B+B+KEY)

FUNCTIONS	**KEY**	**VALUE**
Bus P4 T1	0	0
Bus P4 T2	1	0
Bus P4 T3	2	0
Bus P5 T1	3	0
Bus P5 T2	4	0
Bus P5 T3	5	0
Bus P6 T1	6	0
Bus P6 T2	7	0
Bus P6 T3	8	0
Perm 2 P4	9	0
Perm 2 P5	A	0
Perm 2 P6	B	0
OL Flash Yellow	C	
OL Flash Clear	D	
TOD/DOW Ped	E	
OLC Switchpack	F	

(B+C+KEY)

FUNCTIONS	**KEY**	**VALUE**
Bus P7 T1	0	0
Bus P7 T2	1	0
Bus P7 T3	2	0
Bus P8 T1	3	0
Bus P8 T2	4	0
Bus P8 T3	5	0
Bus P9 T1	6	0
Bus P9 T2	7	0
Bus P9 T3	8	0
Perm 2 P7	9	0
Perm 2 P8	A	0
Perm 2 P9	B	0
Coord Max	C	
TOD Red Rest	D	
OLA Switchpack	E	
OLD Switchpack	F	

Appendix C

- *Highway Capacity Manual, 2010* Reports

1. Brush Creek Road
2. Aspen Airport Business Center (AABC)
3. Harmony Rd
4. Owl Creek Road
5. Truscott Place
6. Aspen Street
7. Monarch Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	954	293	59	239	17	68	17	40	23	12	19
Future Volume (veh/h)	46	954	293	59	239	17	68	17	40	23	12	19
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	50	1037	318	64	260	18	46	57	0	25	13	0
Adj No. of Lanes	2	2	1	2	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	1455	1156	780	227	437	195	197	207	176	126	132	112
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.42	0.49	0.49	0.07	0.12	0.12	0.11	0.11	0.00	0.07	0.07	0.00
Ln Grp Delay, s/veh	13.7	26.6	13.4	36.7	34.9	31.7	33.4	33.7	0.0	36.5	35.7	0.0
Ln Grp LOS	B	C	B	D	C	C	C	C		D	D	
Approach Vol, veh/h		1405			342			103			38	
Approach Delay, s/veh		23.1			35.1			33.6			36.2	
Approach LOS		C			D			C			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	10.3	45.9	14.0	10.7	16.0	40.2		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	4.6	5.3	4.8	4.6		
Max Q Clear (g_c+I1), s	3.4	34.5	4.3	3.1	7.6	2.7		
Green Ext Time (g_e), s	0.1	5.4	0.4	0.1	1.6	6.2		
Prob of Phs Call (p_c)	0.76	1.00	0.90	0.57	1.00	0.68		
Prob of Max Out (p_x)	0.00	0.56	0.00	0.03	0.00	0.47		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		1774	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		2347	1863	1863	3539			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	1	1	0	2	0	0

Grp Vol (v), veh/h	64	0	46	25	0	50	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	1.4	0.0	1.9	1.1	0.0	0.7	0.0	0.0
Cycle Q Clear Time (g_c), s	1.4	0.0	1.9	1.1	0.0	0.7	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	227	0	197	126	0	1455	0	0
V/C Ratio (X)	0.28	0.00	0.23	0.20	0.00	0.03	0.00	0.00
Avail Cap (c_a), veh/h	1062	0	767	263	0	1455	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	36.0	0.0	32.8	35.5	0.0	13.7	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.6	1.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	36.7	0.0	33.4	36.5	0.0	13.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.7	0.0	0.9	0.5	0.0	0.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.7	0.0	1.0	0.6	0.0	0.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.09	0.00	0.08	0.14	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T	T	T	T			
Lanes in Grp	0	2	1	1	2	0	0	0
Grp Vol (v), veh/h	0	1037	57	13	260	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1174	1863	1863	1770	0	0	0
Q Serve Time (g_s), s	0.0	32.5	2.3	0.5	5.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	32.5	2.3	0.5	5.6	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1156	207	132	437	0	0	0
V/C Ratio (X)	0.00	0.90	0.27	0.10	0.60	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1304	805	276	2403	0	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	18.7	33.0	35.2	33.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	7.9	0.7	0.5	1.3	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	26.6	33.7	35.7	34.9	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	10.5	1.2	0.3	2.7	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	1.3	0.0	0.0	0.1	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	11.8	1.2	0.3	2.8	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.20	0.10	0.04	0.12	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	318	0	0	18	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	10.3	0.0	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.3	0.0	0.0	0.8	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	780	176	112	195	0	0	0
V/C Ratio (X)	0.00	0.41	0.00	0.00	0.09	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	880	684	235	1075	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	13.0	0.0	0.0	31.5	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	13.4	0.0	0.0	31.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.5	0.0	0.0	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.6	0.0	0.0	0.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		26.1						
HCM 2010 LOS		C						

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	50	1037	318	64	260	18	46	46	43	25	13	21
v/c Ratio	0.05	0.73	0.31	0.21	0.17	0.02	0.23	0.22	0.13	0.12	0.06	0.07
Control Delay	18.2	23.0	7.8	41.3	29.3	0.1	41.0	40.8	0.8	39.4	38.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	23.0	7.8	41.3	29.3	0.1	41.0	40.8	0.8	39.4	38.8	0.4
Queue Length 50th (ft)	8	430	50	18	76	0	26	26	0	14	7	0
Queue Length 95th (ft)	20	#674	111	39	115	0	63	63	0	39	25	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	1149	1414	1019	1028	2468	1135	704	719	750	254	267	355
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.73	0.31	0.06	0.11	0.02	0.07	0.06	0.06	0.10	0.05	0.06

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	323	87	98	1165	28	323	18	75	14	8	40
Future Volume (veh/h)	12	323	87	98	1165	28	323	18	75	14	8	40
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	13	351	95	107	1266	30	365	0	0	15	9	0
Adj No. of Lanes	2	2	1	2	2	1	2	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	178	1924	861	228	1287	868	469	0	209	86	91	77
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.05	0.54	0.54	0.07	0.55	0.55	0.13	0.00	0.00	0.05	0.05	0.00
Ln Grp Delay, s/veh	45.5	11.6	11.2	46.6	43.5	10.5	44.9	0.0	0.0	47.1	46.3	0.0
Ln Grp LOS	D	B	B	D	D	B	D			D	D	
Approach Vol, veh/h		459			1403			365			24	
Approach Delay, s/veh		12.5			43.0			44.9			46.8	
Approach LOS		B			D			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	11.6	60.5	18.3	9.9	61.0	11.2		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	3.8	5.3	4.8	4.6		
Max Q Clear (g_c+I1), s	5.0	7.0	12.0	2.8	55.1	2.4		
Green Ext Time (g_e), s	0.3	2.5	1.3	0.0	0.0	0.1		
Prob of Phs Call (p_c)	0.95	1.00	1.00	0.49	1.00	1.00		
Prob of Max Out (p_x)	0.00	0.00	0.00	0.01	1.00	0.05		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		3548	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		3539	0	1863	2347			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	2	1	0	2	0	0

Grp Vol (v), veh/h	107	0	365	15	0	13	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	3.0	0.0	10.0	0.8	0.0	0.4	0.0	0.0
Cycle Q Clear Time (g_c), s	3.0	0.0	10.0	0.8	0.0	0.4	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	228	0	469	86	0	178	0	0
V/C Ratio (X)	0.47	0.00	0.78	0.17	0.00	0.07	0.00	0.00
Avail Cap (c_a), veh/h	858	0	1238	212	0	515	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	45.1	0.0	42.1	45.8	0.0	45.3	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	2.8	1.3	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	46.6	0.0	44.9	47.1	0.0	45.5	0.0	0.0
1st-Term Q (Q1), veh/ln	1.4	0.0	4.9	0.4	0.0	0.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.5	0.0	5.1	0.4	0.0	0.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.19	0.00	0.41	0.11	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T		T	T			
Lanes in Grp	0	2	0	1	2	0	0	0
Grp Vol (v), veh/h	0	351	0	9	1266	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	1863	1174	0	0	0
Q Serve Time (g_s), s	0.0	5.0	0.0	0.5	53.1	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.0	0.0	0.5	53.1	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1924	0	91	1287	0	0	0
V/C Ratio (X)	0.00	0.18	0.00	0.10	0.98	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1924	0	223	1287	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	11.6	0.0	45.6	22.2	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.7	21.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	11.6	0.0	46.3	43.5	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.4	0.0	0.2	17.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.4	0.0	0.3	20.8	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.03	0.91	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	95	0	0	30	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	2.9	0.0	0.0	0.9	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.9	0.0	0.0	0.9	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	861	209	77	868	0	0	0
V/C Ratio (X)	0.00	0.11	0.00	0.00	0.03	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	861	552	189	868	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	11.1	0.0	0.0	10.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	11.2	0.0	0.0	10.5	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.3	0.0	0.0	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.3	0.0	0.0	0.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	13	351	95	107	1266	30	186	185	82	15	9	43
v/c Ratio	0.06	0.20	0.11	0.38	1.05	0.03	0.68	0.67	0.21	0.09	0.05	0.15
Control Delay	52.0	17.6	4.4	52.8	67.6	0.1	56.0	55.4	1.3	50.2	49.6	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	17.6	4.4	52.8	67.6	0.1	56.0	55.4	1.3	50.2	49.6	1.1
Queue Length 50th (ft)	4	72	0	37	~798	0	132	132	0	10	6	0
Queue Length 95th (ft)	15	123	32	69	#1126	0	211	210	0	33	23	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	482	1760	835	803	1208	865	550	555	619	199	209	310
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.20	0.11	0.13	1.05	0.03	0.34	0.33	0.13	0.08	0.04	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	1012	311	63	254	19	73	19	43	25	13	21
Future Volume (veh/h)	49	1012	311	63	254	19	73	19	43	25	13	21
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	53	1100	338	68	276	21	50	62	0	27	14	0
Adj No. of Lanes	2	2	1	2	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	1514	1183	798	227	419	187	194	204	173	130	136	116
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.44	0.50	0.50	0.07	0.12	0.12	0.11	0.11	0.00	0.07	0.07	0.00
Ln Grp Delay, s/veh	13.5	31.6	13.6	38.5	37.5	33.7	35.3	35.6	0.0	38.1	37.2	0.0
Ln Grp LOS	B	C	B	D	D	C	D	D		D	D	
Approach Vol, veh/h		1491			365			112			41	
Approach Delay, s/veh		26.8			37.5			35.5			37.8	
Approach LOS		C			D			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	10.6	48.8	14.3	11.2	16.0	43.3		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	4.6	5.3	4.7	4.6		
Max Q Clear (g_c+I1), s	3.6	39.1	4.6	3.2	8.3	2.7		
Green Ext Time (g_e), s	0.2	3.7	0.4	0.1	1.7	6.5		
Prob of Phs Call (p_c)	0.80	1.00	0.93	0.62	1.00	0.71		
Prob of Max Out (p_x)	0.00	0.89	0.00	0.03	0.00	0.51		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		1774	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		2347	1863	1863	3539			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	1	1	0	2	0	0

Grp Vol (v), veh/h	68	0	50	27	0	53	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	1.6	0.0	2.2	1.2	0.0	0.7	0.0	0.0
Cycle Q Clear Time (g_c), s	1.6	0.0	2.2	1.2	0.0	0.7	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	227	0	194	130	0	1514	0	0
V/C Ratio (X)	0.30	0.00	0.26	0.21	0.00	0.03	0.00	0.00
Avail Cap (c_a), veh/h	1014	0	732	251	0	1514	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	37.8	0.0	34.6	37.0	0.0	13.5	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.7	1.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	38.5	0.0	35.3	38.1	0.0	13.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.8	0.0	1.1	0.6	0.0	0.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.8	0.0	1.1	0.6	0.0	0.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.10	0.00	0.09	0.16	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T	T	T	T			
Lanes in Grp	0	2	1	1	2	0	0	0
Grp Vol (v), veh/h	0	1100	62	14	276	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1174	1863	1863	1770	0	0	0
Q Serve Time (g_s), s	0.0	37.1	2.6	0.6	6.3	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	37.1	2.6	0.6	6.3	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1183	204	136	419	0	0	0
V/C Ratio (X)	0.00	0.93	0.30	0.10	0.66	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1245	768	263	2294	0	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	19.6	34.8	36.7	35.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	11.9	0.8	0.5	1.8	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	31.6	35.6	37.2	37.5	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	11.9	1.3	0.3	3.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.0	0.0	0.0	0.1	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	13.9	1.4	0.3	3.2	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.24	0.11	0.04	0.14	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	338	0	0	21	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	11.4	0.0	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	11.4	0.0	0.0	1.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	798	173	116	187	0	0	0
V/C Ratio (X)	0.00	0.42	0.00	0.00	0.11	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	840	653	224	1026	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	13.3	0.0	0.0	33.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	13.6	0.0	0.0	33.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	5.0	0.0	0.0	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	5.1	0.0	0.0	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.09	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		29.5
HCM 2010 LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	53	1100	338	68	276	21	50	50	47	27	14	23
v/c Ratio	0.05	0.78	0.33	0.22	0.18	0.03	0.25	0.24	0.15	0.13	0.06	0.07
Control Delay	18.6	25.2	8.3	41.5	29.1	0.1	41.3	41.1	1.0	39.7	39.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	25.2	8.3	41.5	29.1	0.1	41.3	41.1	1.0	39.7	39.0	0.4
Queue Length 50th (ft)	9	482	57	20	81	0	29	29	0	15	8	0
Queue Length 95th (ft)	21	#748	126	41	121	0	67	67	0	41	27	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	1139	1412	1018	1026	2464	1133	703	720	750	253	267	355
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.78	0.33	0.07	0.11	0.02	0.07	0.07	0.06	0.11	0.05	0.06

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	340	92	103	1224	30	340	19	79	15	9	42
Future Volume (veh/h)	13	340	92	103	1224	30	340	19	79	15	9	42
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	14	370	100	112	1330	33	385	0	0	16	10	0
Adj No. of Lanes	2	2	1	2	2	1	2	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	173	1901	851	228	1275	860	490	0	218	91	95	81
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.05	0.54	0.54	0.07	0.54	0.54	0.14	0.00	0.00	0.05	0.05	0.00
Ln Grp Delay, s/veh	46.0	12.2	11.6	47.3	60.3	10.9	45.0	0.0	0.0	47.3	46.5	0.0
Ln Grp LOS	D	B	B	D	F	B	D			D	D	
Approach Vol, veh/h		484			1475			385			26	
Approach Delay, s/veh		13.0			58.2			45.0			47.0	
Approach LOS		B			E			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	11.7	60.4	19.0	10.2	61.0	11.1		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	3.8	5.4	4.8	4.6		
Max Q Clear (g_c+l1), s	5.2	7.5	12.6	2.9	57.0	2.4		
Green Ext Time (g_e), s	0.3	2.6	1.3	0.0	0.0	0.1		
Prob of Phs Call (p_c)	0.96	1.00	1.00	0.52	1.00	1.00		
Prob of Max Out (p_x)	0.00	0.00	0.00	0.02	0.00	0.06		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		3548	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		3539	0	1863	2347			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	2	1	0	2	0	0

Grp Vol (v), veh/h	112	0	385	16	0	14	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	3.2	0.0	10.6	0.9	0.0	0.4	0.0	0.0
Cycle Q Clear Time (g_c), s	3.2	0.0	10.6	0.9	0.0	0.4	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	228	0	490	91	0	173	0	0
V/C Ratio (X)	0.49	0.00	0.79	0.18	0.00	0.08	0.00	0.00
Avail Cap (c_a), veh/h	850	0	1227	210	0	510	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	45.6	0.0	42.2	46.0	0.0	45.9	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	2.8	1.3	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	47.3	0.0	45.0	47.3	0.0	46.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.5	0.0	5.2	0.4	0.0	0.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.6	0.0	5.4	0.5	0.0	0.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.20	0.00	0.43	0.12	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T		T	T			
Lanes in Grp	0	2	0	1	2	0	0	0
Grp Vol (v), veh/h	0	370	0	10	1330	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	1863	1174	0	0	0
Q Serve Time (g_s), s	0.0	5.5	0.0	0.5	55.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.5	0.0	0.5	55.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1901	0	95	1275	0	0	0
V/C Ratio (X)	0.00	0.19	0.00	0.10	1.04	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1901	0	221	1275	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.1	0.0	45.8	23.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.7	37.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.2	0.0	46.5	60.3	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.7	0.0	0.3	17.7	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.7	0.0	0.3	24.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.05	0.00	0.04	1.06	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	13.7	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	100	0	0	33	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	3.2	0.0	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.2	0.0	0.0	1.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	851	218	81	860	0	0	0
V/C Ratio (X)	0.00	0.12	0.00	0.00	0.04	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	851	547	188	860	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	11.6	0.0	0.0	10.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	11.6	0.0	0.0	10.9	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.4	0.0	0.0	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.4	0.0	0.0	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary

HCM 2010 Ctrl Delay	46.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	14	370	100	112	1330	33	196	195	86	16	10	46
v/c Ratio	0.06	0.21	0.12	0.39	1.11	0.04	0.69	0.68	0.22	0.10	0.06	0.16
Control Delay	52.5	18.3	4.4	53.4	90.0	0.1	55.7	55.1	1.4	50.9	50.3	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	18.3	4.4	53.4	90.0	0.1	55.7	55.1	1.4	50.9	50.3	1.2
Queue Length 50th (ft)	5	80	0	40	~899	0	141	140	0	11	7	0
Queue Length 95th (ft)	16	132	33	72	#1223	0	223	222	1	35	25	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	478	1741	829	796	1198	858	546	550	615	197	207	309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.21	0.12	0.14	1.11	0.04	0.36	0.35	0.14	0.08	0.05	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	1059	326	66	266	19	76	19	45	26	14	22
Future Volume (veh/h)	52	1059	326	66	266	19	76	19	45	26	14	22
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	57	1151	354	72	289	21	52	64	0	28	15	0
Adj No. of Lanes	2	2	1	2	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	1527	1198	808	228	431	193	191	201	171	132	138	118
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.44	0.51	0.51	0.07	0.12	0.12	0.11	0.11	0.00	0.07	0.07	0.00
Ln Grp Delay, s/veh	13.7	37.6	13.8	39.6	38.4	34.3	36.5	36.8	0.0	39.1	38.1	0.0
Ln Grp LOS	B	D	B	D	D	C	D	D		D	D	
Approach Vol, veh/h		1562			382			116			43	
Approach Delay, s/veh		31.4			38.4			36.6			38.7	
Approach LOS		C			D			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	10.8	50.5	14.4	11.5	16.6	44.6		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	4.6	5.3	4.8	4.6		
Max Q Clear (g_c+l1), s	3.7	43.0	4.8	3.3	8.8	2.8		
Green Ext Time (g_e), s	0.2	1.4	0.5	0.1	1.8	6.8		
Prob of Phs Call (p_c)	0.82	1.00	0.94	0.65	1.00	0.75		
Prob of Max Out (p_x)	0.00	1.00	0.00	0.04	0.00	0.55		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		1774	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		2347	1863	1863	3539			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	1	1	0	2	0	0

Grp Vol (v), veh/h	72	0	52	28	0	57	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	1.7	0.0	2.3	1.3	0.0	0.8	0.0	0.0
Cycle Q Clear Time (g_c), s	1.7	0.0	2.3	1.3	0.0	0.8	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	228	0	191	132	0	1527	0	0
V/C Ratio (X)	0.32	0.00	0.27	0.21	0.00	0.04	0.00	0.00
Avail Cap (c_a), veh/h	988	0	713	244	0	1527	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	38.8	0.0	35.7	37.9	0.0	13.7	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.8	1.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	39.6	0.0	36.5	39.1	0.0	13.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.8	0.0	1.2	0.6	0.0	0.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.9	0.0	1.2	0.7	0.0	0.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.11	0.00	0.10	0.17	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T	T	T	T			
Lanes in Grp	0	2	1	1	2	0	0	0
Grp Vol (v), veh/h	0	1151	64	15	289	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1174	1863	1863	1770	0	0	0
Q Serve Time (g_s), s	0.0	41.0	2.8	0.7	6.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	41.0	2.8	0.7	6.8	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1198	201	138	431	0	0	0
V/C Ratio (X)	0.00	0.96	0.32	0.11	0.67	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1213	749	257	2235	0	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	20.5	35.9	37.6	36.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	17.1	0.9	0.5	1.8	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	37.6	36.8	38.1	38.4	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	13.1	1.4	0.3	3.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.9	0.1	0.0	0.1	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	16.0	1.5	0.4	3.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.27	0.12	0.05	0.15	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	354	0	0	21	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	12.3	0.0	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	12.3	0.0	0.0	1.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	808	171	118	193	0	0	0
V/C Ratio (X)	0.00	0.44	0.00	0.00	0.11	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	818	636	218	1000	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	13.4	0.0	0.0	34.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	13.8	0.0	0.0	34.3	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	5.3	0.0	0.0	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	5.4	0.0	0.0	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.09	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	33.1
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	57	1151	354	72	289	21	51	53	49	28	15	24
v/c Ratio	0.06	0.84	0.36	0.24	0.20	0.03	0.26	0.26	0.15	0.14	0.07	0.08
Control Delay	19.8	30.0	9.2	42.5	29.5	0.1	42.4	42.5	1.0	40.4	39.3	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	30.0	9.2	42.5	29.5	0.1	42.4	42.5	1.0	40.4	39.3	0.5
Queue Length 50th (ft)	9	~544	63	21	85	0	29	30	0	15	8	0
Queue Length 95th (ft)	23	#805	137	42	126	0	68	69	0	42	28	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	1110	1367	991	990	2378	1097	678	693	728	244	257	348
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.84	0.36	0.07	0.12	0.02	0.08	0.08	0.07	0.11	0.06	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	356	96	108	1282	31	356	20	83	16	9	44
Future Volume (veh/h)	14	356	96	108	1282	31	356	20	83	16	9	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	15	387	104	117	1393	34	403	0	0	17	10	0
Adj No. of Lanes	2	2	1	2	2	1	2	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	168	1883	843	228	1266	854	508	0	227	93	98	83
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.05	0.53	0.53	0.07	0.54	0.54	0.14	0.00	0.00	0.05	0.05	0.00
Ln Grp Delay, s/veh	46.5	12.6	12.0	47.8	80.7	11.1	45.0	0.0	0.0	47.5	46.7	0.0
Ln Grp LOS	D	B	B	D	F	B	D			D	D	
Approach Vol, veh/h		506			1544			403			27	
Approach Delay, s/veh		13.5			76.7			45.0			47.2	
Approach LOS		B			E			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	6	5		
Case No	2.0	3.0	9.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	11.7	60.2	19.6	10.3	61.0	11.0		
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	* 6	6.0		
Max Green (Gmax), s	25.0	45.0	35.0	12.0	* 55	15.0		
Max Allow Headway (MAH), s	3.7	4.6	3.8	5.3	4.8	4.6		
Max Q Clear (g_c+I1), s	5.3	7.9	13.2	2.9	57.0	2.4		
Green Ext Time (g_e), s	0.3	2.7	1.4	0.0	0.0	0.1		
Prob of Phs Call (p_c)	0.96	1.00	1.00	0.53	1.00	1.00		
Prob of Max Out (p_x)	0.00	0.00	0.00	0.02	0.00	0.06		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7		5		
Mvmt Sat Flow, veh/h	3442		3548	1774		3442		
Through Movement Data								
Assigned Mvmt		2	8	4	6			
Mvmt Sat Flow, veh/h		3539	0	1863	2347			
Right-Turn Movement Data								
Assigned Mvmt		12	18	14	16			
Mvmt Sat Flow, veh/h		1583	1583	1583	1583			
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	0	5	0	0
Lane Assignment	(Prot)					(Prot)		
Lanes in Grp	2	0	2	1	0	2	0	0

Grp Vol (v), veh/h	117	0	403	17	0	15	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	1774	1774	0	1721	0	0
Q Serve Time (g_s), s	3.3	0.0	11.2	0.9	0.0	0.4	0.0	0.0
Cycle Q Clear Time (g_c), s	3.3	0.0	11.2	0.9	0.0	0.4	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	228	0	508	93	0	168	0	0
V/C Ratio (X)	0.51	0.00	0.79	0.18	0.00	0.09	0.00	0.00
Avail Cap (c_a), veh/h	844	0	1218	209	0	506	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	46.0	0.0	42.2	46.2	0.0	46.3	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	2.8	1.3	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	47.8	0.0	45.0	47.5	0.0	46.5	0.0	0.0
1st-Term Q (Q1), veh/ln	1.6	0.0	5.5	0.5	0.0	0.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.6	0.0	5.7	0.5	0.0	0.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.21	0.00	0.46	0.13	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	6	0	0	0
Lane Assignment		T		T	T			
Lanes in Grp	0	2	0	1	2	0	0	0
Grp Vol (v), veh/h	0	387	0	10	1393	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	1863	1174	0	0	0
Q Serve Time (g_s), s	0.0	5.9	0.0	0.5	55.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.9	0.0	0.5	55.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1883	0	98	1266	0	0	0
V/C Ratio (X)	0.00	0.21	0.00	0.10	1.10	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1883	0	219	1266	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.5	0.0	46.0	23.5	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.6	57.3	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.6	0.0	46.7	80.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.8	0.0	0.3	17.6	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.9	0.0	0.3	27.7	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.05	0.00	0.04	1.20	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	31.6	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	14	16	0	0	0
Lane Assignment		R	R	R	R			
Lanes in Grp	0	1	1	1	1	0	0	0
Grp Vol (v), veh/h	0	104	0	0	34	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1583	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	3.4	0.0	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.4	0.0	0.0	1.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	843	227	83	854	0	0	0
V/C Ratio (X)	0.00	0.12	0.00	0.00	0.04	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	843	544	186	854	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	11.9	0.0	0.0	11.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.0	0.0	0.0	11.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.4	0.0	0.0	0.5	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.5	0.0	0.0	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		58.3
HCM 2010 LOS		E

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	15	387	104	117	1393	34	205	204	90	17	10	48
v/c Ratio	0.07	0.22	0.13	0.40	1.17	0.04	0.70	0.69	0.23	0.10	0.06	0.17
Control Delay	53.0	18.8	4.4	53.7	113.3	0.1	56.1	55.4	1.8	51.3	50.7	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	18.8	4.4	53.7	113.3	0.1	56.1	55.4	1.8	51.3	50.7	1.3
Queue Length 50th (ft)	5	85	0	42	~983	0	148	147	0	12	7	0
Queue Length 95th (ft)	17	140	34	75	#1319	0	232	230	5	37	25	0
Internal Link Dist (ft)		1446			576			301			170	
Turn Bay Length (ft)	825		475	200		500				100		100
Base Capacity (vph)	475	1726	825	792	1192	854	543	547	613	196	206	308
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.22	0.13	0.15	1.17	0.04	0.38	0.37	0.15	0.09	0.05	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	154	607	107	18	250	43	7	8	0	108	9	56
Future Volume (veh/h)	154	607	107	18	250	43	7	8	0	108	9	56
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	167	660	116	20	272	47	8	9	0	124	0	61
Adj No. of Lanes	1	1	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	874	662	563	440	393	176	34	36	0	273	0	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.49	0.36	0.36	0.25	0.11	0.11	0.02	0.02	0.00	0.08	0.00	0.08
Ln Grp Delay, s/veh	12.9	63.1	21.0	25.8	48.1	40.3	48.4	48.6	0.0	41.4	0.0	8.7
Ln Grp LOS	B	E	C	C	D	D	D	D		D		A
Approach Vol, veh/h		943			339			17			185	
Approach Delay, s/veh		49.0			45.7			48.5			30.6	
Approach LOS		D			D			D			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1	8	4	6	5		
Case No	3.0	2.0	10.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	38.0	26.3	10.7	14.9	16.0	48.3		
Change Period (Y+Rc), s	6.0	4.0	9.0	8.0	6.0	4.0		
Max Green (Gmax), s	32.0	14.0	7.0	10.0	27.0	19.0		
Max Allow Headway (MAH), s	1.8	4.6	5.6	4.9	1.8	4.6		
Max Q Clear (g_c+I1), s	33.8	2.8	2.4	5.0	8.7	6.7		
Green Ext Time (g_e), s	0.0	0.1	0.0	0.4	0.2	0.6		
Prob of Phs Call (p_c)	1.00	0.39	0.35	0.99	1.00	0.98		
Prob of Max Out (p_x)	1.00	0.02	1.00	0.94	0.00	0.01		
Left-Turn Movement Data								
Assigned Mvmt		1	3	7		5		
Mvmt Sat Flow, veh/h		1774	1774	3548		1774		
Through Movement Data								
Assigned Mvmt	2		8	4	6			
Mvmt Sat Flow, veh/h	1863		1863	0	3539			
Right-Turn Movement Data								
Assigned Mvmt	12		18	14	16			
Mvmt Sat Flow, veh/h	1583		0	1583	1583			
Left Lane Group Data								
Assigned Mvmt	0	1	3	7	0	5	0	0
Lane Assignment		(Prot)				(Prot)		
Lanes in Grp	0	1	1	2	0	1	0	0

Grp Vol (v), veh/h	0	20	8	124	0	167	0	0
Grp Sat Flow (s), veh/h/ln	0	1774	1774	1774	0	1774	0	0
Q Serve Time (g_s), s	0.0	0.8	0.4	3.0	0.0	4.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.8	0.4	3.0	0.0	4.7	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	440	34	273	0	874	0	0
V/C Ratio (X)	0.00	0.05	0.23	0.45	0.00	0.19	0.00	0.00
Avail Cap (c_a), veh/h	0	440	138	394	0	874	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	25.7	43.5	39.7	0.0	12.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	4.9	1.7	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	25.8	48.4	41.4	0.0	12.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.4	0.2	1.5	0.0	2.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.2	1.5	0.0	2.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.07	0.36	0.00	0.14	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	2	0	8	4	6	0	0	0
Lane Assignment	T		T		T			
Lanes in Grp	1	0	1	0	2	0	0	0
Grp Vol (v), veh/h	660	0	9	0	272	0	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	1863	0	1770	0	0	0
Q Serve Time (g_s), s	31.8	0.0	0.4	0.0	6.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	31.8	0.0	0.4	0.0	6.7	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	662	0	36	0	393	0	0	0
V/C Ratio (X)	1.00	0.00	0.25	0.00	0.69	0.00	0.00	0.00
Avail Cap (c_a), veh/h	662	0	145	0	1062	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	28.9	0.0	43.5	0.0	38.5	0.0	0.0	0.0
Incr Delay (d2), s/veh	34.1	0.0	5.1	0.0	9.6	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	63.1	0.0	48.6	0.0	48.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	16.3	0.0	0.2	0.0	3.2	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	6.3	0.0	0.1	0.0	0.5	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	22.6	0.0	0.3	0.0	3.8	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.38	0.00	0.08	0.00	0.07	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	18	14	16	0	0	0
Lane Assignment	R			R	R			
Lanes in Grp	1	0	0	1	1	0	0	0
Grp Vol (v), veh/h	116	0	0	61	47	0	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	1583	0	0	0
Q Serve Time (g_s), s	4.6	0.0	0.0	0.0	2.4	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	4.6	0.0	0.0	0.0	2.4	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	44.3	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	563	0	0	902	176	0	0	0
V/C Ratio (X)	0.21	0.00	0.00	0.07	0.27	0.00	0.00	0.00
Avail Cap (c_a), veh/h	563	0	0	956	475	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	20.2	0.0	0.0	8.7	36.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.0	3.7	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	21.0	0.0	0.0	8.7	40.3	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	2.0	0.0	0.0	0.7	1.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	2.1	0.0	0.0	0.7	1.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.17	0.00	0.00	0.16	0.09	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		46.0
HCM 2010 LOS		D

Notes
User approved volume balancing among the lanes for turning movement.
User approved changes to right turn type.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	167	660	116	20	272	47	8	9	63	64	61
v/c Ratio	0.46	0.54	0.10	0.13	0.17	0.06	0.06	0.06	0.34	0.35	0.09
Control Delay	33.2	18.7	0.2	39.6	23.1	0.1	39.0	39.0	41.5	41.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	18.7	0.2	39.6	23.1	0.1	39.0	39.0	41.5	41.5	0.3
Queue Length 50th (ft)	89	126	0	11	38	0	4	5	35	35	0
Queue Length 95th (ft)	124	#591	0	32	115	0	18	19	73	74	0
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	451	1213	1107	275	1765	898	142	150	201	204	710
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.54	0.10	0.07	0.15	0.05	0.06	0.06	0.31	0.31	0.09

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	343	3	12	1066	121	16	5	8	161	3	203
Future Volume (veh/h)	86	343	3	12	1066	121	16	5	8	161	3	203
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	93	373	3	13	1159	132	17	5	9	177	0	221
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	118	2188	979	38	1344	907	51	17	31	539	0	346
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.07	0.62	0.62	0.02	0.57	0.57	0.03	0.03	0.03	0.15	0.00	0.15
Ln Grp Delay, s/veh	65.6	8.3	7.3	55.8	25.5	10.3	52.9	0.0	52.2	38.4	0.0	39.4
Ln Grp LOS	E	A	A	E	C	B	D		D	D		D
Approach Vol, veh/h		469			1304			31			398	
Approach Delay, s/veh		19.7			24.3			52.6			38.9	
Approach LOS		B			C			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	5	6		
Case No	2.0	3.0	10.0	9.0	2.0	3.0		
Phs Duration (G+Y+Rc), s	6.1	67.8	6.9	19.2	10.7	63.3		
Change Period (Y+Rc), s	4.0	6.0	4.0	4.0	4.0	6.0		
Max Green (Gmax), s	9.0	49.0	7.0	17.0	9.0	49.0		
Max Allow Headway (MAH), s	4.6	1.9	5.6	4.9	4.6	1.9		
Max Q Clear (g_c+I1), s	2.7	6.5	2.9	14.7	7.2	43.7		
Green Ext Time (g_e), s	0.0	1.4	0.0	0.5	0.0	1.1		
Prob of Phs Call (p_c)	0.30	1.00	0.58	1.00	0.92	1.00		
Prob of Max Out (p_x)	0.08	0.00	1.00	1.00	1.00	0.12		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7	5			
Mvmt Sat Flow, veh/h	1774		1774	3548	1774			
Through Movement Data								
Assigned Mvmt		2	8	4		6		
Mvmt Sat Flow, veh/h		3539	597	0		2347		
Right-Turn Movement Data								
Assigned Mvmt		12	18	14		16		
Mvmt Sat Flow, veh/h		1583	1075	1583		1583		
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	5	0	0	0
Lane Assignment	(Prot)				(Prot)			
Lanes in Grp	1	0	1	2	1	0	0	0

Grp Vol (v), veh/h	13	0	17	177	93	0	0	0
Grp Sat Flow (s), veh/h/ln	1774	0	1774	1774	1774	0	0	0
Q Serve Time (g_s), s	0.7	0.0	0.9	4.5	5.2	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.7	0.0	0.9	4.5	5.2	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	38	0	51	539	118	0	0	0
V/C Ratio (X)	0.35	0.00	0.33	0.33	0.79	0.00	0.00	0.00
Avail Cap (c_a), veh/h	160	0	124	603	160	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	48.3	0.0	47.6	37.9	46.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	7.6	0.0	5.3	0.5	19.7	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	55.8	0.0	52.9	38.4	65.6	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.4	0.0	0.5	2.2	2.5	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.1	0.0	0.6	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.4	0.0	0.5	2.2	3.2	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.03	0.00	0.18	0.52	0.19	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	373	0	0	0	1159	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1174	0	0
Q Serve Time (g_s), s	0.0	4.5	0.0	0.0	0.0	41.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	4.5	0.0	0.0	0.0	41.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	2188	0	0	0	1344	0	0
V/C Ratio (X)	0.00	0.17	0.00	0.00	0.00	0.86	0.00	0.00
Avail Cap (c_a), veh/h	0	2188	0	0	0	1344	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.2	0.0	0.0	0.0	18.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	7.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	8.3	0.0	0.0	0.0	25.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.2	0.0	0.0	0.0	13.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	1.4	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.2	0.0	0.0	0.0	14.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.27	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	14	0	16	0	0
Lane Assignment		R	T+R	R		R		
Lanes in Grp	0	1	1	1	0	1	0	0
Grp Vol (v), veh/h	0	3	14	221	0	132	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1673	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.1	0.8	12.7	0.0	3.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	0.8	12.7	0.0	3.9	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.64	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	979	48	346	0	907	0	0
V/C Ratio (X)	0.00	0.00	0.29	0.64	0.00	0.15	0.00	0.00
Avail Cap (c_a), veh/h	0	979	117	375	0	907	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.3	47.6	35.5	0.0	10.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	4.6	3.9	0.0	0.3	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.3	52.2	39.4	0.0	10.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.4	5.5	0.0	1.7	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.1	0.4	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.4	5.9	0.0	1.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.15	1.39	0.00	0.13	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

User approved changes to right turn type.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	93	373	3	13	1159	132	17	14	89	89	221
v/c Ratio	0.53	0.15	0.00	0.10	0.86	0.14	0.13	0.11	0.46	0.46	0.47
Control Delay	54.3	7.8	0.0	44.3	29.2	2.9	45.2	29.8	48.2	48.0	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	7.8	0.0	44.3	29.2	2.9	45.2	29.8	48.2	48.0	12.0
Queue Length 50th (ft)	56	41	0	8	538	0	10	3	56	56	33
Queue Length 95th (ft)	#119	96	0	27	#816	30	32	23	104	104	82
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	181	2432	1118	159	1345	963	133	135	285	286	477
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.15	0.00	0.08	0.86	0.14	0.13	0.10	0.31	0.31	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	644	114	20	265	46	8	9	0	115	10	60
Future Volume (veh/h)	164	644	114	20	265	46	8	9	0	115	10	60
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	178	700	124	22	288	50	9	10	0	133	0	65
Adj No. of Lanes	1	1	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	870	662	563	437	393	176	37	39	0	274	0	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.49	0.36	0.36	0.25	0.11	0.11	0.02	0.02	0.00	0.08	0.00	0.08
Ln Grp Delay, s/veh	13.1	80.0	21.2	26.0	50.1	40.7	48.0	48.2	0.0	41.7	0.0	8.8
Ln Grp LOS	B	F	C	C	D	D	D	D		D		A
Approach Vol, veh/h		1002			360			19			198	
Approach Delay, s/veh		60.8			47.4			48.1			30.9	
Approach LOS		E			D			D			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1	8	4	6	5		
Case No	3.0	2.0	10.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	38.0	26.2	10.9	15.0	16.0	48.2		
Change Period (Y+Rc), s	6.0	4.0	9.0	8.0	6.0	4.0		
Max Green (Gmax), s	32.0	14.0	6.0	11.0	27.0	19.0		
Max Allow Headway (MAH), s	1.8	4.6	5.6	4.9	1.8	4.6		
Max Q Clear (g_c+I1), s	34.0	2.9	2.5	5.2	9.1	7.1		
Green Ext Time (g_e), s	0.0	0.1	0.0	0.4	0.2	0.6		
Prob of Phs Call (p_c)	1.00	0.42	0.38	0.99	1.00	0.99		
Prob of Max Out (p_x)	1.00	0.02	1.00	0.60	0.00	0.01		

Left-Turn Movement Data								
Assigned Mvmt		1	3	7		5		
Mvmt Sat Flow, veh/h		1774	1774	3548		1774		
Through Movement Data								
Assigned Mvmt	2		8	4	6			
Mvmt Sat Flow, veh/h	1863		1863	0	3539			
Right-Turn Movement Data								
Assigned Mvmt	12		18	14	16			
Mvmt Sat Flow, veh/h	1583		0	1583	1583			
Left Lane Group Data								
Assigned Mvmt	0	1	3	7	0	5	0	0
Lane Assignment		(Prot)				(Prot)		
Lanes in Grp	0	1	1	2	0	1	0	0

Grp Vol (v), veh/h	0	22	9	133	0	178	0	0
Grp Sat Flow (s), veh/h/ln	0	1774	1774	1774	0	1774	0	0
Q Serve Time (g_s), s	0.0	0.9	0.4	3.2	0.0	5.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.9	0.4	3.2	0.0	5.1	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	437	37	274	0	870	0	0
V/C Ratio (X)	0.00	0.05	0.24	0.49	0.00	0.20	0.00	0.00
Avail Cap (c_a), veh/h	0	437	118	434	0	870	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	25.9	43.3	39.8	0.0	13.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	4.7	1.9	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	26.0	48.0	41.7	0.0	13.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.4	0.2	1.6	0.0	2.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.3	1.7	0.0	2.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.08	0.39	0.00	0.15	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	2	0	8	4	6	0	0	0
Lane Assignment	T		T		T			
Lanes in Grp	1	0	1	0	2	0	0	0
Grp Vol (v), veh/h	700	0	10	0	288	0	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	1863	0	1770	0	0	0
Q Serve Time (g_s), s	32.0	0.0	0.5	0.0	7.1	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	32.0	0.0	0.5	0.0	7.1	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	662	0	39	0	393	0	0	0
V/C Ratio (X)	1.06	0.00	0.26	0.00	0.73	0.00	0.00	0.00
Avail Cap (c_a), veh/h	662	0	124	0	1062	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	29.0	0.0	43.4	0.0	38.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	51.0	0.0	4.8	0.0	11.4	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	80.0	0.0	48.2	0.0	50.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	16.4	0.0	0.2	0.0	3.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	9.4	0.0	0.1	0.0	0.6	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	25.8	0.0	0.3	0.0	4.1	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.43	0.00	0.08	0.00	0.08	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	18	14	16	0	0	0
Lane Assignment	R			R	R			
Lanes in Grp	1	0	0	1	1	0	0	0
Grp Vol (v), veh/h	124	0	0	65	50	0	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	1583	0	0	0
Q Serve Time (g_s), s	4.9	0.0	0.0	0.0	2.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	4.9	0.0	0.0	0.0	2.6	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	44.2	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	563	0	0	899	176	0	0	0
V/C Ratio (X)	0.22	0.00	0.00	0.07	0.28	0.00	0.00	0.00
Avail Cap (c_a), veh/h	563	0	0	970	475	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	20.3	0.0	0.0	8.8	36.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.0	4.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	21.2	0.0	0.0	8.8	40.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	2.1	0.0	0.0	0.7	1.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	2.3	0.0	0.0	0.7	1.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.18	0.00	0.00	0.17	0.10	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		53.8
HCM 2010 LOS		D

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	178	700	124	22	288	50	9	10	67	69	65
v/c Ratio	0.44	0.58	0.11	0.14	0.20	0.06	0.06	0.07	0.36	0.37	0.09
Control Delay	32.0	20.1	0.2	39.6	23.7	0.2	39.0	39.1	41.6	41.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	20.1	0.2	39.6	23.7	0.2	39.0	39.1	41.6	41.7	0.2
Queue Length 50th (ft)	95	139	0	12	42	0	5	5	37	38	0
Queue Length 95th (ft)	133	#651	0	34	122	0	19	21	76	78	0
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	447	1207	1102	275	1674	863	139	146	215	217	722
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.58	0.11	0.08	0.17	0.06	0.06	0.07	0.31	0.32	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	361	4	13	1120	128	17	6	9	170	4	214
Future Volume (veh/h)	91	361	4	13	1120	128	17	6	9	170	4	214
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	99	392	4	14	1217	139	18	7	10	188	0	233
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	125	2156	964	40	1317	888	55	22	31	558	0	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.07	0.61	0.61	0.02	0.56	0.56	0.03	0.03	0.03	0.16	0.00	0.16
Ln Grp Delay, s/veh	66.9	8.8	7.7	55.4	32.2	10.9	52.2	0.0	52.4	38.0	0.0	39.1
Ln Grp LOS	E	A	A	E	C	B	D		D	D		D
Approach Vol, veh/h		495			1370			35			421	
Approach Delay, s/veh		20.4			30.3			52.3			38.6	
Approach LOS		C			C			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	5	6		
Case No	2.0	3.0	10.0	9.0	2.0	3.0		
Phs Duration (G+Y+Rc), s	6.3	66.9	7.1	19.7	11.1	62.1		
Change Period (Y+Rc), s	4.0	6.0	4.0	4.0	4.0	6.0		
Max Green (Gmax), s	9.0	49.0	7.0	17.0	9.0	49.0		
Max Allow Headway (MAH), s	4.6	1.9	5.6	4.9	4.6	1.9		
Max Q Clear (g_c+I1), s	2.8	6.9	3.0	15.3	7.5	49.3		
Green Ext Time (g_e), s	0.0	1.5	0.0	0.4	0.0	0.0		
Prob of Phs Call (p_c)	0.32	1.00	0.62	1.00	0.94	1.00		
Prob of Max Out (p_x)	0.09	0.00	1.00	1.00	1.00	1.00		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7	5			
Mvmt Sat Flow, veh/h	1774		1774	3548	1774			
Through Movement Data								
Assigned Mvmt		2	8	4		6		
Mvmt Sat Flow, veh/h		3539	695	0		2347		
Right-Turn Movement Data								
Assigned Mvmt		12	18	14		16		
Mvmt Sat Flow, veh/h		1583	993	1583		1583		
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	5	0	0	0
Lane Assignment	(Prot)				(Prot)			
Lanes in Grp	1	0	1	2	1	0	0	0

Grp Vol (v), veh/h	14	0	18	188	99	0	0	0
Grp Sat Flow (s), veh/h/ln	1774	0	1774	1774	1774	0	0	0
Q Serve Time (g_s), s	0.8	0.0	1.0	4.7	5.5	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.8	0.0	1.0	4.7	5.5	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	40	0	55	558	125	0	0	0
V/C Ratio (X)	0.35	0.00	0.33	0.34	0.79	0.00	0.00	0.00
Avail Cap (c_a), veh/h	160	0	124	603	160	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	48.2	0.0	47.4	37.5	45.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	7.3	0.0	4.8	0.5	21.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	55.4	0.0	52.2	38.0	66.9	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.4	0.0	0.5	2.3	2.7	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.1	0.0	0.7	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.5	0.0	0.6	2.3	3.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.03	0.00	0.18	0.55	0.20	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	392	0	0	0	1217	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1174	0	0
Q Serve Time (g_s), s	0.0	4.9	0.0	0.0	0.0	47.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	4.9	0.0	0.0	0.0	47.3	0.0	0.0
Lane Grp Cap (c), veh/h	0	2156	0	0	0	1317	0	0
V/C Ratio (X)	0.00	0.18	0.00	0.00	0.00	0.92	0.00	0.00
Avail Cap (c_a), veh/h	0	2156	0	0	0	1317	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.6	0.0	0.0	0.0	20.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	12.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	8.8	0.0	0.0	0.0	32.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.3	0.0	0.0	0.0	15.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	2.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.4	0.0	0.0	0.0	17.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.32	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	14	0	16	0	0
Lane Assignment		R	T+R	R		R		
Lanes in Grp	0	1	1	1	0	1	0	0
Grp Vol (v), veh/h	0	4	17	233	0	139	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1688	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.1	1.0	13.3	0.0	4.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	1.0	13.3	0.0	4.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.59	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	964	52	361	0	888	0	0
V/C Ratio (X)	0.00	0.00	0.32	0.65	0.00	0.16	0.00	0.00
Avail Cap (c_a), veh/h	0	964	118	381	0	888	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.7	47.4	35.0	0.0	10.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	5.0	4.1	0.0	0.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.7	52.4	39.1	0.0	10.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.5	5.8	0.0	1.9	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.1	0.4	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.5	6.3	0.0	1.9	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.18	1.47	0.00	0.14	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		30.0
HCM 2010 LOS		C

Notes
User approved volume balancing among the lanes for turning movement.
User approved changes to right turn type.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	99	392	4	14	1217	139	18	17	94	95	233
v/c Ratio	0.55	0.16	0.00	0.11	0.91	0.14	0.14	0.13	0.47	0.47	0.49
Control Delay	55.3	7.9	0.0	44.5	33.8	2.8	45.6	30.4	48.2	48.3	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	7.9	0.0	44.5	33.8	2.8	45.6	30.4	48.2	48.3	13.6
Queue Length 50th (ft)	60	44	0	9	~659	0	11	4	60	60	41
Queue Length 95th (ft)	#130	101	0	28	#878	30	33	26	108	109	94
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	183	2424	1115	159	1336	960	132	136	285	286	477
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.16	0.00	0.09	0.91	0.14	0.14	0.13	0.33	0.33	0.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	674	119	20	278	48	8	9	0	120	10	63
Future Volume (veh/h)	171	674	119	20	278	48	8	9	0	120	10	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	186	733	129	22	302	52	9	10	0	138	0	68
Adj No. of Lanes	1	1	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	870	662	563	437	393	176	37	39	0	274	0	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.49	0.36	0.36	0.25	0.11	0.11	0.02	0.02	0.00	0.08	0.00	0.08
Ln Grp Delay, s/veh	13.2	96.9	21.3	26.0	52.3	41.0	48.0	48.2	0.0	41.9	0.0	8.8
Ln Grp LOS	B	F	C	C	D	D	D	D		D		A
Approach Vol, veh/h		1048			376			19			206	
Approach Delay, s/veh		72.8			49.2			48.1			31.0	
Approach LOS		E			D			D			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1	8	4	6	5		
Case No	3.0	2.0	10.0	9.0	3.0	2.0		
Phs Duration (G+Y+Rc), s	38.0	26.2	10.9	15.0	16.0	48.2		
Change Period (Y+Rc), s	6.0	4.0	9.0	8.0	6.0	4.0		
Max Green (Gmax), s	32.0	14.0	7.0	10.0	27.0	19.0		
Max Allow Headway (MAH), s	1.8	4.6	5.6	4.9	1.8	4.6		
Max Q Clear (g_c+I1), s	34.0	2.9	2.5	5.4	9.5	7.4		
Green Ext Time (g_e), s	0.0	0.1	0.0	0.4	0.2	0.6		
Prob of Phs Call (p_c)	1.00	0.42	0.38	0.99	1.00	0.99		
Prob of Max Out (p_x)	1.00	0.02	1.00	1.00	0.00	0.02		
Left-Turn Movement Data								
Assigned Mvmt		1	3	7		5		
Mvmt Sat Flow, veh/h		1774	1774	3548		1774		
Through Movement Data								
Assigned Mvmt	2		8	4	6			
Mvmt Sat Flow, veh/h	1863		1863	0	3539			
Right-Turn Movement Data								
Assigned Mvmt	12		18	14	16			
Mvmt Sat Flow, veh/h	1583		0	1583	1583			
Left Lane Group Data								
Assigned Mvmt	0	1	3	7	0	5	0	0
Lane Assignment		(Prot)				(Prot)		
Lanes in Grp	0	1	1	2	0	1	0	0

Grp Vol (v), veh/h	0	22	9	138	0	186	0	0
Grp Sat Flow (s), veh/h/ln	0	1774	1774	1774	0	1774	0	0
Q Serve Time (g_s), s	0.0	0.9	0.4	3.4	0.0	5.4	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.9	0.4	3.4	0.0	5.4	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	437	37	274	0	870	0	0
V/C Ratio (X)	0.00	0.05	0.24	0.50	0.00	0.21	0.00	0.00
Avail Cap (c_a), veh/h	0	437	138	394	0	870	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	25.9	43.3	39.9	0.0	13.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	4.7	2.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	26.0	48.0	41.9	0.0	13.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.4	0.2	1.6	0.0	2.6	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.3	1.7	0.0	2.7	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.08	0.41	0.00	0.16	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	2	0	8	4	6	0	0	0
Lane Assignment	T		T		T			
Lanes in Grp	1	0	1	0	2	0	0	0
Grp Vol (v), veh/h	733	0	10	0	302	0	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	1863	0	1770	0	0	0
Q Serve Time (g_s), s	32.0	0.0	0.5	0.0	7.5	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	32.0	0.0	0.5	0.0	7.5	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	662	0	39	0	393	0	0	0
V/C Ratio (X)	1.11	0.00	0.26	0.00	0.77	0.00	0.00	0.00
Avail Cap (c_a), veh/h	662	0	145	0	1062	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	29.0	0.0	43.4	0.0	38.9	0.0	0.0	0.0
Incr Delay (d2), s/veh	67.9	0.0	4.8	0.0	13.4	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	96.9	0.0	48.2	0.0	52.3	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	16.4	0.0	0.2	0.0	3.6	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	12.5	0.0	0.1	0.0	0.7	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	28.9	0.0	0.3	0.0	4.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.48	0.00	0.08	0.00	0.08	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	17.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	18	14	16	0	0	0
Lane Assignment	R			R	R			
Lanes in Grp	1	0	0	1	1	0	0	0
Grp Vol (v), veh/h	129	0	0	68	52	0	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	1583	0	0	0
Q Serve Time (g_s), s	5.1	0.0	0.0	0.0	2.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	5.1	0.0	0.0	0.0	2.7	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	44.2	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	563	0	0	899	176	0	0	0
V/C Ratio (X)	0.23	0.00	0.00	0.08	0.30	0.00	0.00	0.00
Avail Cap (c_a), veh/h	563	0	0	953	475	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	20.3	0.0	0.0	8.8	36.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.1	4.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	21.3	0.0	0.0	8.8	41.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	2.3	0.0	0.0	0.8	1.2	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	2.4	0.0	0.0	0.8	1.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.19	0.00	0.00	0.18	0.10	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		61.9						
HCM 2010 LOS		E						

Notes

User approved volume balancing among the lanes for turning movement.
User approved changes to right turn type.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	186	733	129	22	302	52	9	10	70	71	68
v/c Ratio	0.43	0.61	0.12	0.14	0.21	0.07	0.06	0.07	0.37	0.37	0.09
Control Delay	31.1	20.9	0.3	39.6	24.2	0.2	39.0	39.1	41.8	41.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	20.9	0.3	39.6	24.2	0.2	39.0	39.1	41.8	41.8	0.3
Queue Length 50th (ft)	95	151	0	12	48	0	5	5	40	40	0
Queue Length 95th (ft)	140	#697	1	34	126	0	19	21	80	81	0
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	443	1205	1101	275	1616	841	143	150	205	207	721
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.61	0.12	0.08	0.19	0.06	0.06	0.07	0.34	0.34	0.09

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↱		↰	↰	↱
Traffic Volume (veh/h)	95	378	4	14	1173	134	18	6	9	178	4	224
Future Volume (veh/h)	95	378	4	14	1173	134	18	6	9	178	4	224
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	103	411	4	15	1275	146	20	7	10	196	0	243
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	130	2132	954	42	1298	876	57	22	32	574	0	372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.07	0.60	0.60	0.02	0.55	0.55	0.03	0.03	0.03	0.16	0.00	0.16
Ln Grp Delay, s/veh	67.7	9.1	7.9	55.1	42.9	11.4	52.5	0.0	51.9	37.7	0.0	38.9
Ln Grp LOS	E	A	A	E	D	B	D		D	D		D
Approach Vol, veh/h		518			1436			37			439	
Approach Delay, s/veh		20.8			39.8			52.3			38.4	
Approach LOS		C			D			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	8	4	5	6		
Case No	2.0	3.0	10.0	9.0	2.0	3.0		
Phs Duration (G+Y+Rc), s	6.4	66.2	7.2	20.2	11.3	61.3		
Change Period (Y+Rc), s	4.0	6.0	4.0	4.0	4.0	6.0		
Max Green (Gmax), s	9.0	49.0	7.0	17.0	9.0	49.0		
Max Allow Headway (MAH), s	4.6	1.9	5.6	4.9	4.6	1.9		
Max Q Clear (g_c+I1), s	2.8	7.2	3.1	15.9	7.7	55.1		
Green Ext Time (g_e), s	0.0	1.6	0.0	0.3	0.0	0.0		
Prob of Phs Call (p_c)	0.34	1.00	0.64	1.00	0.94	1.00		
Prob of Max Out (p_x)	0.10	0.00	1.00	1.00	1.00	1.00		
Left-Turn Movement Data								
Assigned Mvmt	1		3	7	5			
Mvmt Sat Flow, veh/h	1774		1774	3548	1774			
Through Movement Data								
Assigned Mvmt		2	8	4		6		
Mvmt Sat Flow, veh/h		3539	695	0		2347		
Right-Turn Movement Data								
Assigned Mvmt		12	18	14		16		
Mvmt Sat Flow, veh/h		1583	993	1583		1583		
Left Lane Group Data								
Assigned Mvmt	1	0	3	7	5	0	0	0
Lane Assignment	(Prot)				(Prot)			
Lanes in Grp	1	0	1	2	1	0	0	0

Grp Vol (v), veh/h	15	0	20	196	103	0	0	0
Grp Sat Flow (s), veh/h/ln	1774	0	1774	1774	1774	0	0	0
Q Serve Time (g_s), s	0.8	0.0	1.1	4.9	5.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.8	0.0	1.1	4.9	5.7	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1774	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	42	0	57	574	130	0	0	0
V/C Ratio (X)	0.35	0.00	0.35	0.34	0.79	0.00	0.00	0.00
Avail Cap (c_a), veh/h	160	0	124	603	160	0	0	0
Upstream Filter (I)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	48.0	0.0	47.4	37.2	45.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	7.0	0.0	5.2	0.5	22.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	55.1	0.0	52.5	37.7	67.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.4	0.0	0.5	2.4	2.8	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.1	0.0	0.8	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.5	0.0	0.6	2.4	3.6	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.03	0.00	0.20	0.57	0.22	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	8	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	411	0	0	0	1275	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1174	0	0
Q Serve Time (g_s), s	0.0	5.2	0.0	0.0	0.0	53.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.2	0.0	0.0	0.0	53.1	0.0	0.0
Lane Grp Cap (c), veh/h	0	2132	0	0	0	1298	0	0
V/C Ratio (X)	0.00	0.19	0.00	0.00	0.00	0.98	0.00	0.00
Avail Cap (c_a), veh/h	0	2132	0	0	0	1298	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.9	0.0	0.0	0.0	21.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	21.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.1	0.0	0.0	0.0	42.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.5	0.0	0.0	0.0	17.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	3.8	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.6	0.0	0.0	0.0	20.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.38	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	18	14	0	16	0	0
Lane Assignment		R	T+R	R		R		
Lanes in Grp	0	1	1	1	0	1	0	0
Grp Vol (v), veh/h	0	4	17	243	0	146	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	1688	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.1	1.0	13.9	0.0	4.5	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	1.0	13.9	0.0	4.5	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1583.3	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.59	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	954	54	372	0	876	0	0
V/C Ratio (X)	0.00	0.00	0.31	0.65	0.00	0.17	0.00	0.00
Avail Cap (c_a), veh/h	0	954	118	385	0	876	0	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.9	47.3	34.6	0.0	11.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	4.6	4.4	0.0	0.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.9	51.9	38.9	0.0	11.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.5	6.0	0.0	2.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.1	0.4	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.5	6.5	0.0	2.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.17	1.53	0.00	0.15	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		35.7						
HCM 2010 LOS		D						

Notes

User approved volume balancing among the lanes for turning movement.
User approved changes to right turn type.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	103	411	4	15	1275	146	20	17	98	99	243
v/c Ratio	0.58	0.18	0.00	0.11	0.96	0.15	0.16	0.13	0.48	0.49	0.52
Control Delay	56.5	9.4	0.0	44.5	40.7	2.8	46.1	30.6	48.2	48.3	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	9.4	0.0	44.5	40.7	2.8	46.1	30.6	48.2	48.3	15.1
Queue Length 50th (ft)	62	46	0	9	~727	0	12	4	62	63	49
Queue Length 95th (ft)	#138	106	0	29	#941	31	36	26	111	111	105
Internal Link Dist (ft)		1516			1354			55		87	
Turn Bay Length (ft)	425		325	375		350					
Base Capacity (vph)	183	2331	1076	159	1330	960	131	136	285	286	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.18	0.00	0.09	0.96	0.15	0.15	0.13	0.34	0.35	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	1008	346	21	52	22
Future Volume (veh/h)	14	1008	346	21	52	22
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	15	1096	376	23	57	24
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	31	1366	2337	1046	237	211
HCM Platoon Ratio	1.00	1.00	0.33	0.33	1.00	1.00
Prop Arrive On Green	0.02	0.73	0.22	0.22	0.13	0.13
Ln Grp Delay, s/veh	59.8	12.8	15.1	12.4	37.3	35.4
Ln Grp LOS	E	B	B	B	D	D
Approach Vol, veh/h		1111	399		81	
Approach Delay, s/veh		13.5	15.0		36.8	
Approach LOS		B	B		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		72.0		18.0	6.6	65.4		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		66.0		12.0	7.0	54.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+I1), s		36.3		4.6	2.8	9.7		
Green Ext Time (g_e), s		25.3		0.1	0.0	35.5		
Prob of Phs Call (p_c)		1.00		1.00	0.31	1.00		
Prob of Max Out (p_x)		0.00		0.12	1.00	0.00		
Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3632		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		
Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	57	15	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	2.6	0.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	2.6	0.8	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	59.4	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	237	31	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.24	0.49	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	237	138	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	34.9	43.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.4	15.9	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	37.3	59.8	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.3	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.4	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.60	0.03	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	1096	0	0	0	376	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	34.3	0.0	0.0	0.0	7.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	34.3	0.0	0.0	0.0	7.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	1366	0	0	0	2337	0	0
V/C Ratio (X)	0.00	0.80	0.00	0.00	0.00	0.16	0.00	0.00
Avail Cap (c_a), veh/h	0	1366	0	0	0	2337	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.98	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.8	0.0	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	5.1	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.8	0.0	0.0	0.0	15.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	17.0	0.0	0.0	0.0	3.8	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	19.0	0.0	0.0	0.0	3.9	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.47	0.00	0.00	0.00	0.22	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	24	0	23	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.2	0.0	1.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.2	0.0	1.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	211	0	1046	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.11	0.00	0.02	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	211	0	1046	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.98	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	34.3	0.0	12.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	35.4	0.0	12.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.1	0.0	0.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.2	0.0	0.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		15.0
HCM 2010 LOS		B

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	15	1096	376	23	57	24
v/c Ratio	0.11	0.78	0.15	0.02	0.28	0.12
Control Delay	40.4	12.3	6.5	5.1	39.8	15.5
Queue Delay	0.0	0.5	0.0	0.0	0.0	0.0
Total Delay	40.4	12.8	6.5	5.1	39.8	15.5
Queue Length 50th (ft)	8	296	43	0	30	0
Queue Length 95th (ft)	28	534	91	16	66	23
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	141	1397	2560	1151	236	231
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	75	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.83	0.15	0.02	0.24	0.10

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	524	1260	44	29	26
Future Volume (veh/h)	25	524	1260	44	29	26
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	570	1370	48	32	28
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	47	1488	1911	1144	144	128
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Prop Arrive On Green	0.03	0.80	1.00	1.00	0.08	0.08
Ln Grp Delay, s/veh	63.1	3.7	0.7	0.0	44.1	44.2
Ln Grp LOS	E	A	A	A	D	D
Approach Vol, veh/h		597	1418		60	
Approach Delay, s/veh		6.4	0.7		44.1	
Approach LOS		A	A		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		85.9		14.1	7.6	78.3		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		77.0		11.0	7.0	65.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+I1), s		10.9		3.7	3.5	2.0		
Green Ext Time (g_e), s		54.9		0.1	0.0	52.7		
Prob of Phs Call (p_c)		1.00		0.81	0.53	1.00		
Prob of Max Out (p_x)		0.75		0.11	1.00	0.76		
Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3185		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		
Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	32	27	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.7	1.5	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.7	1.5	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	72.3	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	144	47	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.22	0.58	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	195	124	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	43.0	48.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.1	15.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	44.1	63.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.8	0.7	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.9	0.9	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.37	0.06	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	570	0	0	0	1370	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1323	0	0
Q Serve Time (g_s), s	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1488	0	0	0	1911	0	0
V/C Ratio (X)	0.00	0.38	0.00	0.00	0.00	0.72	0.00	0.00
Avail Cap (c_a), veh/h	0	1488	0	0	0	1911	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.30	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.7	0.0	0.0	0.0	0.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.7	0.0	0.0	0.0	0.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.12	0.00	0.00	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	28	0	48	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	128	0	1144	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.22	0.00	0.04	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	174	0	1144	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.30	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	43.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	44.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		3.6						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	27	570	1370	48	32	28
v/c Ratio	0.21	0.35	0.66	0.04	0.18	0.15
Control Delay	47.4	3.3	10.6	3.2	43.7	17.3
Queue Delay	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	47.4	3.3	10.8	3.2	43.7	17.3
Queue Length 50th (ft)	16	91	352	2	19	0
Queue Length 95th (ft)	44	137	m401	m4	48	26
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	131	1615	2090	1261	194	199
Starvation Cap Reductn	0	0	143	0	0	0
Spillback Cap Reductn	0	31	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.36	0.70	0.04	0.16	0.14

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	1069	367	23	56	24
Future Volume (veh/h)	15	1069	367	23	56	24
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	1162	399	25	61	26
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	32	1366	2334	1044	237	211
HCM Platoon Ratio	1.00	1.00	0.33	0.33	1.00	1.00
Prop Arrive On Green	0.02	0.73	0.22	0.22	0.13	0.13
Ln Grp Delay, s/veh	59.3	15.3	15.4	12.5	37.6	35.6
Ln Grp LOS	E	B	B	B	D	D
Approach Vol, veh/h		1178	424		87	
Approach Delay, s/veh		15.9	15.2		37.0	
Approach LOS		B	B		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		72.0		18.0	6.6	65.4		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		66.0		12.0	7.0	54.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+I1), s		41.8		4.8	2.8	10.2		
Green Ext Time (g_e), s		21.9		0.1	0.0	37.1		
Prob of Phs Call (p_c)		1.00		1.00	0.33	1.00		
Prob of Max Out (p_x)		0.00		0.14	1.00	0.00		
Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3632		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		
Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	61	16	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	2.8	0.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	2.8	0.8	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	59.4	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	237	32	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.26	0.49	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	237	138	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	35.0	43.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.6	15.5	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	37.6	59.3	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.4	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.5	0.5	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.65	0.04	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	1162	0	0	0	399	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	39.8	0.0	0.0	0.0	8.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	39.8	0.0	0.0	0.0	8.2	0.0	0.0
Lane Grp Cap (c), veh/h	0	1366	0	0	0	2334	0	0
V/C Ratio (X)	0.00	0.85	0.00	0.00	0.00	0.17	0.00	0.00
Avail Cap (c_a), veh/h	0	1366	0	0	0	2334	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.97	0.00	0.00
Uniform Delay (d1), s/veh	0.0	8.5	0.0	0.0	0.0	15.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	6.8	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	15.3	0.0	0.0	0.0	15.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	20.0	0.0	0.0	0.0	4.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.6	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	22.6	0.0	0.0	0.0	4.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.55	0.00	0.00	0.00	0.23	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	26	0	25	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.3	0.0	1.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.3	0.0	1.1	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	211	0	1044	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.12	0.00	0.02	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	211	0	1044	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.97	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	34.4	0.0	12.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	35.6	0.0	12.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.2	0.0	0.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.3	0.0	0.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.8
HCM 2010 LOS	B

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	16	1162	399	25	61	26
v/c Ratio	0.12	0.83	0.16	0.02	0.29	0.12
Control Delay	40.5	14.8	6.5	5.1	40.1	15.2
Queue Delay	0.0	1.6	0.0	0.0	0.0	0.0
Total Delay	40.5	16.4	6.5	5.1	40.1	15.2
Queue Length 50th (ft)	9	343	45	0	32	0
Queue Length 95th (ft)	29	640	97	17	69	23
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	141	1396	2558	1151	236	233
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	105	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.90	0.16	0.02	0.26	0.11

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	551	1323	47	31	28
Future Volume (veh/h)	27	551	1323	47	31	28
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	29	599	1438	51	34	30
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	49	1484	1688	1139	147	132
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Prop Arrive On Green	0.03	0.80	1.00	1.00	0.08	0.08
Ln Grp Delay, s/veh	63.1	3.9	1.2	0.0	44.0	44.1
Ln Grp LOS	E	A	A	A	D	D
Approach Vol, veh/h		628	1489		64	
Approach Delay, s/veh		6.6	1.2		44.0	
Approach LOS		A	A		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		85.7		14.3	7.8	77.9		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		77.0		11.0	7.0	65.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+l1), s		11.6		3.8	3.6	2.0		
Green Ext Time (g_e), s		56.3		0.1	0.0	54.6		
Prob of Phs Call (p_c)		1.00		0.83	0.55	1.00		
Prob of Max Out (p_x)		0.80		0.12	1.00	0.81		

Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		

Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3036		

Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		

Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	34	29	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.8	1.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.8	1.6	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	71.9	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	147	49	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.23	0.59	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	195	124	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	42.9	48.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.1	15.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	44.0	63.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.9	0.8	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.9	1.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.39	0.07	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	599	0	0	0	1438	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1174	0	0
Q Serve Time (g_s), s	0.0	9.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	9.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1484	0	0	0	1688	0	0
V/C Ratio (X)	0.00	0.40	0.00	0.00	0.00	0.85	0.00	0.00
Avail Cap (c_a), veh/h	0	1484	0	0	0	1688	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.20	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.0	0.0	1.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.9	0.0	0.0	0.0	1.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	5.2	0.0	0.0	0.0	0.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.13	0.00	0.00	0.00	0.02	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	30	0	51	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	132	0	1139	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.23	0.00	0.04	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	174	0	1139	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.20	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	42.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	44.1	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	4.0
HCM 2010 LOS	A

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	29	599	1438	51	34	30
v/c Ratio	0.22	0.39	0.82	0.04	0.19	0.16
Control Delay	47.9	4.1	15.5	3.1	43.9	16.8
Queue Delay	0.0	0.0	0.4	0.0	0.0	0.0
Total Delay	47.9	4.1	15.8	3.1	43.9	16.8
Queue Length 50th (ft)	18	98	436	2	20	0
Queue Length 95th (ft)	46	148	m496	m3	50	27
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	132	1532	1750	1193	194	200
Starvation Cap Reductn	0	0	59	0	0	0
Spillback Cap Reductn	0	55	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.41	0.85	0.04	0.18	0.15

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	1119	385	24	58	25
Future Volume (veh/h)	16	1119	385	24	58	25
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	17	1216	418	26	63	27
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	34	1366	2331	1043	237	211
HCM Platoon Ratio	1.00	1.00	0.33	0.33	1.00	1.00
Prop Arrive On Green	0.02	0.73	0.22	0.22	0.13	0.13
Ln Grp Delay, s/veh	58.8	18.2	15.6	12.5	37.8	35.6
Ln Grp LOS	E	B	B	B	D	D
Approach Vol, veh/h		1233	444		90	
Approach Delay, s/veh		18.8	15.4		37.1	
Approach LOS		B	B		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		72.0		18.0	6.7	65.3		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		66.0		12.0	7.0	54.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+I1), s		47.1		4.9	2.9	10.7		
Green Ext Time (g_e), s		17.7		0.2	0.0	38.2		
Prob of Phs Call (p_c)		1.00		1.00	0.35	1.00		
Prob of Max Out (p_x)		0.00		0.16	1.00	0.00		
Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3632		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		
Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	63	17	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	2.9	0.9	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	2.9	0.9	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	59.3	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	237	34	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.27	0.50	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	237	138	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	35.0	43.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.7	15.1	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	37.8	58.8	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.4	0.4	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.6	0.6	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.67	0.04	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	1216	0	0	0	418	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	45.1	0.0	0.0	0.0	8.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	45.1	0.0	0.0	0.0	8.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	1366	0	0	0	2331	0	0
V/C Ratio (X)	0.00	0.89	0.00	0.00	0.00	0.18	0.00	0.00
Avail Cap (c_a), veh/h	0	1366	0	0	0	2331	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.97	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.2	0.0	0.0	0.0	15.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	9.0	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	18.2	0.0	0.0	0.0	15.6	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	22.6	0.0	0.0	0.0	4.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	3.4	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	26.1	0.0	0.0	0.0	4.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.64	0.00	0.00	0.00	0.24	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	27	0	26	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.4	0.0	1.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.4	0.0	1.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	211	0	1043	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.13	0.00	0.02	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	211	0	1043	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.97	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	34.4	0.0	12.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	35.6	0.0	12.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.3	0.0	0.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.3	0.0	0.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	18.9
HCM 2010 LOS	B

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	17	1216	418	26	63	27
v/c Ratio	0.12	0.87	0.17	0.02	0.30	0.13
Control Delay	40.6	17.5	8.1	6.2	40.3	15.0
Queue Delay	0.0	6.3	0.0	0.0	0.0	0.0
Total Delay	40.6	23.8	8.1	6.2	40.3	15.0
Queue Length 50th (ft)	9	390	48	0	34	0
Queue Length 95th (ft)	30	#882	101	17	71	24
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	142	1396	2455	1106	236	234
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	145	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.97	0.17	0.02	0.27	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	577	1386	49	32	29
Future Volume (veh/h)	28	577	1386	49	32	29
Number	5	2	6	16	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	30	627	1507	53	35	32
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				Yes	
Cap, veh/h	50	1482	1683	1136	150	134
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Prop Arrive On Green	0.03	0.80	1.00	1.00	0.08	0.08
Ln Grp Delay, s/veh	63.2	4.0	0.9	0.0	43.9	44.1
Ln Grp LOS	E	A	A	A	D	D
Approach Vol, veh/h		657	1560		67	
Approach Delay, s/veh		6.7	0.9		44.0	
Approach LOS		A	A		D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Case No		4.0		9.0	2.0	7.0		
Phs Duration (G+Y+Rc), s		85.6		14.4	7.8	77.7		
Change Period (Y+Rc), s		6.0		6.0	5.0	6.0		
Max Green (Gmax), s		77.0		11.0	7.0	65.0		
Max Allow Headway (MAH), s		7.9		4.9	4.7	7.9		
Max Q Clear (g_c+I1), s		12.4		3.9	3.7	2.0		
Green Ext Time (g_e), s		57.4		0.1	0.0	56.2		
Prob of Phs Call (p_c)		1.00		0.84	0.57	1.00		
Prob of Max Out (p_x)		0.84		0.14	1.00	0.85		
Left-Turn Movement Data								
Assigned Mvmt				7	5	1		
Mvmt Sat Flow, veh/h				1774	1774	0		
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		3036		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		0		1583		1583		
Left Lane Group Data								
Assigned Mvmt	0	0	0	7	5	1	0	0
Lane Assignment					(Prot)			
Lanes in Grp	0	0	0	1	1	0	0	0

Grp Vol (v), veh/h	0	0	0	35	30	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1774	1774	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.8	1.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.8	1.7	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	71.7	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	150	50	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.23	0.60	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	195	124	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	42.8	48.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.1	15.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	43.9	63.2	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.9	0.8	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.40	0.07	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	627	0	0	0	1507	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1174	0	0
Q Serve Time (g_s), s	0.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1482	0	0	0	1683	0	0
V/C Ratio (X)	0.00	0.42	0.00	0.00	0.00	0.90	0.00	0.00
Avail Cap (c_a), veh/h	0	1482	0	0	0	1683	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.10	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.0	0.0	0.0	0.0	0.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	5.6	0.0	0.0	0.0	0.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.14	0.00	0.00	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment				R		R		
Lanes in Grp	0	0	0	1	0	1	0	0
Grp Vol (v), veh/h	0	0	0	32	0	53	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	134	0	1136	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.24	0.00	0.05	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	174	0	1136	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.10	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	42.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	44.1	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		3.8						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	30	627	1507	53	35	32
v/c Ratio	0.23	0.41	0.86	0.04	0.19	0.17
Control Delay	48.1	4.2	16.6	3.3	44.0	16.7
Queue Delay	0.0	0.0	0.6	0.0	0.0	0.0
Total Delay	48.1	4.3	17.3	3.3	44.0	16.7
Queue Length 50th (ft)	18	105	534	3	21	0
Queue Length 95th (ft)	48	159	m501	m3	51	28
Internal Link Dist (ft)		1020	453		635	
Turn Bay Length (ft)	370				60	
Base Capacity (vph)	132	1532	1750	1193	194	202
Starvation Cap Reductn	0	0	59	0	0	0
Spillback Cap Reductn	0	77	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.43	0.89	0.04	0.18	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	963	87	63	349	21	164
Future Volume (veh/h)	963	87	63	349	21	164
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1047	95	68	379	23	178
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1199	1019	156	1387	217	194
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.64	0.64	0.05	0.74	0.12	0.12
Ln Grp Delay, s/veh	18.4	6.2	44.5	4.2	35.4	82.2
Ln Grp LOS	B	A	D	A	D	F
Approach Vol, veh/h	1142			447	201	
Approach Delay, s/veh	17.4			10.3	76.9	
Approach LOS	B			B	E	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	9.1	63.9		17.0		73.0		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	7.0	55.0		11.0		67.0		
Max Allow Headway (MAH), s	4.7	7.9		5.0		7.9		
Max Q Clear (g_c+I1), s	3.7	43.2		12.0		7.9		
Green Ext Time (g_e), s	0.1	10.8		0.0		43.6		
Prob of Phs Call (p_c)	0.82	1.00		1.00		1.00		
Prob of Max Out (p_x)	1.00	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	68	0	0	23	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	1.7	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	1.7	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	57.9	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	156	0	0	217	0	0	0	0
V/C Ratio (X)	0.44	0.00	0.00	0.11	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	268	0	0	217	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	41.8	0.0	0.0	35.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	44.5	0.0	0.0	35.4	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.8	0.0	0.0	0.5	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.9	0.0	0.0	0.5	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.12	0.00	0.00	0.11	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	1047	0	0	0	379	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	41.2	0.0	0.0	0.0	5.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	41.2	0.0	0.0	0.0	5.9	0.0	0.0
Lane Grp Cap (c), veh/h	0	1199	0	0	0	1387	0	0
V/C Ratio (X)	0.00	0.87	0.00	0.00	0.00	0.27	0.00	0.00
Avail Cap (c_a), veh/h	0	1199	0	0	0	1387	0	0
Upstream Filter (I)	0.00	0.56	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	13.1	0.0	0.0	0.0	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	5.4	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	18.4	0.0	0.0	0.0	4.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	20.9	0.0	0.0	0.0	2.9	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	1.8	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	22.7	0.0	0.0	0.0	3.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.27	0.00	0.00	0.00	0.29	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	95	0	178	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	2.0	0.0	10.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	2.0	0.0	10.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1019	0	194	0	0	0	0
V/C Ratio (X)	0.00	0.09	0.00	0.92	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1019	0	194	0	0	0	0
Upstream Filter (I)	0.00	0.56	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.1	0.0	39.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	43.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.2	0.0	82.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.9	0.0	4.4	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.9	0.0	6.7	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.08	0.00	0.14	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1047	95	68	379	23	178
v/c Ratio	0.88	0.09	0.24	0.27	0.12	0.53
Control Delay	18.8	2.5	40.9	4.0	37.2	12.2
Queue Delay	1.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	2.5	40.9	4.0	37.2	12.2
Queue Length 50th (ft)	241	0	19	53	12	0
Queue Length 95th (ft)	#803	m12	40	86	35	58
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1194	1049	286	1403	216	349
Starvation Cap Reductn	38	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.09	0.24	0.27	0.11	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	512	36	108	1211	127	95
Future Volume (veh/h)	512	36	108	1211	127	95
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	557	39	117	1316	138	103
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1261	1072	183	1453	177	158
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.45	0.45	0.05	0.78	0.10	0.10
Ln Grp Delay, s/veh	15.5	9.3	51.6	17.9	57.9	49.6
Ln Grp LOS	B	A	D	B	E	D
Approach Vol, veh/h	596			1433	241	
Approach Delay, s/veh	15.1			20.7	54.3	
Approach LOS	B			C	D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	10.3	73.7		16.0		84.0		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	11.0	59.0		13.0		75.0		
Max Allow Headway (MAH), s	4.7	7.9		4.9		7.9		
Max Q Clear (g_c+I1), s	5.3	22.4		9.6		54.9		
Green Ext Time (g_e), s	0.2	34.7		0.3		19.5		
Prob of Phs Call (p_c)	0.96	1.00		1.00		1.00		
Prob of Max Out (p_x)	0.45	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	117	0	0	138	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	3.3	0.0	0.0	7.6	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	3.3	0.0	0.0	7.6	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	67.7	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	183	0	0	177	0	0	0	0
V/C Ratio (X)	0.64	0.00	0.00	0.78	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	379	0	0	231	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	46.4	0.0	0.0	43.9	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	5.2	0.0	0.0	13.9	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	51.6	0.0	0.0	57.9	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.6	0.0	0.0	3.7	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.7	0.0	0.0	4.4	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.24	0.00	0.00	0.89	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	557	0	0	0	1316	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	20.4	0.0	0.0	0.0	52.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	20.4	0.0	0.0	0.0	52.9	0.0	0.0
Lane Grp Cap (c), veh/h	0	1261	0	0	0	1453	0	0
V/C Ratio (X)	0.00	0.44	0.00	0.00	0.00	0.91	0.00	0.00
Avail Cap (c_a), veh/h	0	1261	0	0	0	1453	0	0
Upstream Filter (I)	0.00	0.95	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	14.4	0.0	0.0	0.0	8.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.1	0.0	0.0	0.0	9.7	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	15.5	0.0	0.0	0.0	17.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	10.5	0.0	0.0	0.0	26.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	3.9	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	10.9	0.0	0.0	0.0	30.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.61	0.00	0.00	0.00	2.76	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	39	0	103	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	1.4	0.0	6.3	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	1.4	0.0	6.3	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1072	0	158	0	0	0	0
V/C Ratio (X)	0.00	0.04	0.00	0.65	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1072	0	206	0	0	0	0
Upstream Filter (I)	0.00	0.95	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.2	0.0	43.3	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	6.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.3	0.0	49.6	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.6	0.0	2.7	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.6	0.0	3.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.05	0.00	0.06	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		22.8						
HCM 2010 LOS		C						

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	557	39	117	1316	138	103
v/c Ratio	0.49	0.04	0.36	0.93	0.64	0.36
Control Delay	20.6	9.2	45.2	24.3	55.8	12.0
Queue Delay	1.4	0.0	0.0	0.3	0.0	0.0
Total Delay	22.0	9.2	45.2	24.6	55.8	12.0
Queue Length 50th (ft)	284	2	36	593	84	0
Queue Length 95th (ft)	417	26	63	#1078	148	47
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1142	985	377	1412	230	295
Starvation Cap Reductn	373	0	0	0	0	0
Spillback Cap Reductn	0	0	0	8	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.04	0.31	0.94	0.60	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1021	93	67	370	23	174
Future Volume (veh/h)	1021	93	67	370	23	174
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1110	101	73	402	25	189
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1196	1017	160	1387	217	194
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.43	0.43	0.05	0.74	0.12	0.12
Ln Grp Delay, s/veh	31.3	10.2	44.6	4.3	35.5	97.2
Ln Grp LOS	C	B	D	A	D	F
Approach Vol, veh/h	1211			475	214	
Approach Delay, s/veh	29.6			10.5	90.0	
Approach LOS	C			B	F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	9.2	63.8		17.0		73.0		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	7.0	55.0		11.0		67.0		
Max Allow Headway (MAH), s	4.7	7.9		5.0		7.9		
Max Q Clear (g_c+I1), s	3.9	52.9		12.7		8.3		
Green Ext Time (g_e), s	0.1	2.1		0.0		46.5		
Prob of Phs Call (p_c)	0.84	1.00		1.00		1.00		
Prob of Max Out (p_x)	1.00	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	73	0	0	25	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	1.9	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	1.9	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	57.8	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	160	0	0	217	0	0	0	0
V/C Ratio (X)	0.46	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	268	0	0	217	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	41.8	0.0	0.0	35.2	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	2.9	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	44.6	0.0	0.0	35.5	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.13	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	1110	0	0	0	402	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	50.9	0.0	0.0	0.0	6.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	50.9	0.0	0.0	0.0	6.3	0.0	0.0
Lane Grp Cap (c), veh/h	0	1196	0	0	0	1387	0	0
V/C Ratio (X)	0.00	0.93	0.00	0.00	0.00	0.29	0.00	0.00
Avail Cap (c_a), veh/h	0	1196	0	0	0	1387	0	0
Upstream Filter (I)	0.00	0.49	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	23.7	0.0	0.0	0.0	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	7.7	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	31.3	0.0	0.0	0.0	4.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	26.1	0.0	0.0	0.0	3.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.5	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	28.6	0.0	0.0	0.0	3.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.61	0.00	0.00	0.00	0.31	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	101	0	189	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	3.4	0.0	10.7	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.4	0.0	10.7	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1017	0	194	0	0	0	0
V/C Ratio (X)	0.00	0.10	0.00	0.98	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1017	0	194	0	0	0	0
Upstream Filter (I)	0.00	0.49	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	10.1	0.0	39.4	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	57.9	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	10.2	0.0	97.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.5	0.0	4.7	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.5	0.0	7.8	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.13	0.00	0.16	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		31.6						
HCM 2010 LOS		C						

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1110	101	73	402	25	189
v/c Ratio	0.93	0.10	0.26	0.29	0.12	0.55
Control Delay	23.3	2.7	41.1	4.1	37.4	12.3
Queue Delay	2.7	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	2.7	41.1	4.1	37.4	12.3
Queue Length 50th (ft)	256	0	20	57	13	0
Queue Length 95th (ft)	#882	m10	41	92	36	60
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1193	1050	287	1403	216	359
Starvation Cap Reductn	38	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.10	0.25	0.29	0.12	0.53

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	538	38	114	1272	134	100
Future Volume (veh/h)	538	38	114	1272	134	100
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	585	41	124	1383	146	109
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1249	1062	191	1446	184	164
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.45	0.45	0.06	0.78	0.10	0.10
Ln Grp Delay, s/veh	16.3	9.5	51.4	25.0	59.6	50.4
Ln Grp LOS	B	A	D	C	E	D
Approach Vol, veh/h	626			1507	255	
Approach Delay, s/veh	15.8			27.2	55.7	
Approach LOS	B			C	E	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	10.6	73.1		16.4		83.6		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	11.0	59.0		13.0		75.0		
Max Allow Headway (MAH), s	4.7	7.9		4.9		7.9		
Max Q Clear (g_c+I1), s	5.5	23.9		10.0		66.5		
Green Ext Time (g_e), s	0.2	34.0		0.3		8.4		
Prob of Phs Call (p_c)	0.97	1.00		1.00		1.00		
Prob of Max Out (p_x)	0.54	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	124	0	0	146	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	3.5	0.0	0.0	8.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	3.5	0.0	0.0	8.0	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	67.1	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	191	0	0	184	0	0	0	0
V/C Ratio (X)	0.65	0.00	0.00	0.79	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	379	0	0	231	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	46.3	0.0	0.0	43.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	5.2	0.0	0.0	15.9	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	51.4	0.0	0.0	59.6	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.7	0.0	0.0	3.9	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.8	0.0	0.0	4.7	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.26	0.00	0.00	0.96	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	585	0	0	0	1383	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	21.9	0.0	0.0	0.0	64.5	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	21.9	0.0	0.0	0.0	64.5	0.0	0.0
Lane Grp Cap (c), veh/h	0	1249	0	0	0	1446	0	0
V/C Ratio (X)	0.00	0.47	0.00	0.00	0.00	0.96	0.00	0.00
Avail Cap (c_a), veh/h	0	1249	0	0	0	1446	0	0
Upstream Filter (I)	0.00	0.93	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	15.1	0.0	0.0	0.0	9.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.2	0.0	0.0	0.0	15.3	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	16.3	0.0	0.0	0.0	25.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	11.3	0.0	0.0	0.0	32.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	6.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	11.7	0.0	0.0	0.0	38.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.65	0.00	0.00	0.00	3.51	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	41	0	109	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	1.5	0.0	6.6	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	1.5	0.0	6.6	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1062	0	164	0	0	0	0
V/C Ratio (X)	0.00	0.04	0.00	0.66	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1062	0	206	0	0	0	0
Upstream Filter (I)	0.00	0.93	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.5	0.0	43.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	7.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.5	0.0	50.4	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.6	0.0	2.9	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.7	0.0	3.2	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.06	0.00	0.07	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.3
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	585	41	124	1383	146	109
v/c Ratio	0.51	0.04	0.38	0.98	0.67	0.38
Control Delay	23.1	9.1	45.4	33.1	57.8	11.9
Queue Delay	1.7	0.0	0.0	7.3	0.0	0.0
Total Delay	24.7	9.1	45.4	40.4	57.8	11.9
Queue Length 50th (ft)	306	3	38	709	90	0
Queue Length 95th (ft)	446	26	67	#1169	#165	49
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1138	982	377	1410	230	300
Starvation Cap Reductn	367	0	0	0	0	0
Spillback Cap Reductn	0	0	0	45	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.04	0.33	1.01	0.63	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1069	97	70	388	24	183
Future Volume (veh/h)	1069	97	70	388	24	183
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1162	105	76	422	26	199
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1195	1016	163	1387	217	194
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.43	0.43	0.05	0.74	0.12	0.12
Ln Grp Delay, s/veh	36.5	10.3	44.7	4.4	35.5	112.0
Ln Grp LOS	D	B	D	A	D	F
Approach Vol, veh/h	1267			498	225	
Approach Delay, s/veh	34.3			10.5	103.1	
Approach LOS	C			B	F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	9.3	63.7		17.0		73.0		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	7.0	55.0		11.0		67.0		
Max Allow Headway (MAH), s	4.7	7.9		5.0		7.9		
Max Q Clear (g_c+I1), s	3.9	57.0		13.0		8.7		
Green Ext Time (g_e), s	0.1	0.0		0.0		48.5		
Prob of Phs Call (p_c)	0.85	1.00		1.00		1.00		
Prob of Max Out (p_x)	1.00	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	76	0	0	26	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	1.9	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	1.9	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	57.7	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	163	0	0	217	0	0	0	0
V/C Ratio (X)	0.47	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	268	0	0	217	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	41.8	0.0	0.0	35.2	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	44.7	0.0	0.0	35.5	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.14	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	1162	0	0	0	422	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	55.0	0.0	0.0	0.0	6.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	55.0	0.0	0.0	0.0	6.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	1195	0	0	0	1387	0	0
V/C Ratio (X)	0.00	0.97	0.00	0.00	0.00	0.30	0.00	0.00
Avail Cap (c_a), veh/h	0	1195	0	0	0	1387	0	0
Upstream Filter (I)	0.00	0.42	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	24.9	0.0	0.0	0.0	3.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	11.6	0.0	0.0	0.0	0.6	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	36.5	0.0	0.0	0.0	4.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	28.2	0.0	0.0	0.0	3.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	3.8	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	32.0	0.0	0.0	0.0	3.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	1.80	0.00	0.00	0.00	0.33	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	105	0	199	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	3.6	0.0	11.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	3.6	0.0	11.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1016	0	194	0	0	0	0
V/C Ratio (X)	0.00	0.10	0.00	1.03	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1016	0	194	0	0	0	0
Upstream Filter (I)	0.00	0.42	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	10.2	0.0	39.5	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	72.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	10.3	0.0	112.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.6	0.0	4.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	1.6	0.0	8.7	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.14	0.00	0.18	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.1
HCM 2010 LOS	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1162	105	76	422	26	199
v/c Ratio	0.97	0.10	0.27	0.30	0.13	0.56
Control Delay	29.4	2.9	41.3	4.2	37.5	12.3
Queue Delay	6.6	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	2.9	41.3	4.2	37.5	12.3
Queue Length 50th (ft)	~296	0	21	61	14	0
Queue Length 95th (ft)	m#912	m10	43	98	38	61
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1193	1052	287	1403	216	368
Starvation Cap Reductn	38	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.10	0.26	0.30	0.12	0.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	564	40	119	1333	140	105
Future Volume (veh/h)	564	40	119	1333	140	105
Number	2	12	1	6	7	14
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	613	43	129	1449	152	114
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence			Yes		Yes	
Cap, veh/h	1240	1054	197	1440	189	169
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.45	0.45	0.06	0.77	0.11	0.11
Ln Grp Delay, s/veh	17.0	9.7	51.3	36.5	60.7	51.0
Ln Grp LOS	B	A	D	F	E	D
Approach Vol, veh/h	656			1578	266	
Approach Delay, s/veh	16.6			37.7	56.5	
Approach LOS	B			D	E	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Case No	2.0	7.0		9.0		4.0		
Phs Duration (G+Y+Rc), s	10.7	72.6		16.7		83.3		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green (Gmax), s	11.0	59.0		13.0		75.0		
Max Allow Headway (MAH), s	4.7	7.9		4.9		7.9		
Max Q Clear (g_c+I1), s	5.7	25.4		10.4		79.3		
Green Ext Time (g_e), s	0.2	33.0		0.3		0.0		
Prob of Phs Call (p_c)	0.97	1.00		1.00		1.00		
Prob of Max Out (p_x)	0.61	0.00		1.00		0.00		
Left-Turn Movement Data								
Assigned Mvmt	1	5		7				
Mvmt Sat Flow, veh/h	3442	0		1774				
Through Movement Data								
Assigned Mvmt		2		4		6		
Mvmt Sat Flow, veh/h		1863		0		1863		
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		
Mvmt Sat Flow, veh/h		1583		1583		0		
Left Lane Group Data								
Assigned Mvmt	1	5	0	7	0	0	0	0
Lane Assignment	(Prot)							
Lanes in Grp	2	0	0	1	0	0	0	0

Grp Vol (v), veh/h	129	0	0	152	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1721	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	3.7	0.0	0.0	8.4	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	3.7	0.0	0.0	8.4	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	66.6	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	197	0	0	189	0	0	0	0
V/C Ratio (X)	0.65	0.00	0.00	0.80	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	379	0	0	231	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	46.2	0.0	0.0	43.6	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	5.2	0.0	0.0	17.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	51.3	0.0	0.0	60.7	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.7	0.0	0.0	4.1	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.9	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.9	0.0	0.0	5.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.27	0.00	0.00	1.01	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	0
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	613	0	0	0	1449	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	0	1863	0	0
Q Serve Time (g_s), s	0.0	23.4	0.0	0.0	0.0	77.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	23.4	0.0	0.0	0.0	77.3	0.0	0.0
Lane Grp Cap (c), veh/h	0	1240	0	0	0	1440	0	0
V/C Ratio (X)	0.00	0.49	0.00	0.00	0.00	1.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1240	0	0	0	1440	0	0
Upstream Filter (I)	0.00	0.92	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	15.7	0.0	0.0	0.0	11.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.3	0.0	0.0	0.0	25.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	17.0	0.0	0.0	0.0	36.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	12.0	0.0	0.0	0.0	38.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	10.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	12.5	0.0	0.0	0.0	48.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.70	0.00	0.00	0.00	4.43	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	0
Lane Assignment		R		R				
Lanes in Grp	0	1	0	1	0	0	0	0
Grp Vol (v), veh/h	0	43	0	114	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0
Q Serve Time (g_s), s	0.0	1.5	0.0	6.9	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	1.5	0.0	6.9	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1054	0	169	0	0	0	0
V/C Ratio (X)	0.00	0.04	0.00	0.67	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1054	0	206	0	0	0	0
Upstream Filter (I)	0.00	0.92	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.7	0.0	43.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	8.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.7	0.0	51.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.7	0.0	3.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.7	0.0	3.4	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.06	0.00	0.07	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.2
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	613	43	129	1449	152	114
v/c Ratio	0.54	0.04	0.39	1.03	0.69	0.39
Control Delay	23.8	9.0	45.4	46.1	59.3	11.9
Queue Delay	2.1	0.0	0.0	20.9	0.0	0.0
Total Delay	25.9	9.0	45.4	66.9	59.3	11.9
Queue Length 50th (ft)	328	3	40	~1001	94	0
Queue Length 95th (ft)	475	27	69	#1260	#176	49
Internal Link Dist (ft)	453			259	1202	
Turn Bay Length (ft)		290	180		125	
Base Capacity (vph)	1134	980	377	1409	230	304
Starvation Cap Reductn	363	0	0	0	0	0
Spillback Cap Reductn	0	0	0	71	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.04	0.34	1.08	0.66	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	1107	3	1	414	10	2	2	3	32	0	10
Future Volume (veh/h)	12	1107	3	1	414	10	2	2	3	32	0	10
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	13	1203	3	1	450	11	2	2	3	35	0	11
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	27	1159	985	302	1448	1230	61	23	25	144	0	65
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.62	0.62	0.17	0.78	0.78	0.04	0.04	0.04	0.04	0.00	0.04
Ln Grp Delay, s/veh	53.1	53.8	6.4	31.0	3.4	2.3	41.8	0.0	0.0	43.1	0.0	42.9
Ln Grp LOS	D	F	A	C	A	A	D			D		D
Approach Vol, veh/h		1219			462			7			46	
Approach Delay, s/veh		53.7			3.4			41.8			43.1	
Approach LOS		D			A			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1		4	5	6		8
Case No	3.0	2.0		7.0	2.0	3.0		8.0
Phs Duration (G+Y+Rc), s	61.0	20.3		8.7	6.4	74.9		8.7
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	56.0	6.0		13.0	6.0	56.0		13.0
Max Allow Headway (MAH), s	7.9	7.9		5.1	3.2	7.9		5.1
Max Q Clear (g_c+I1), s	58.0	2.0		3.7	2.7	8.4		3.7
Green Ext Time (g_e), s	0.0	1.8		0.1	0.0	8.1		0.1
Prob of Phs Call (p_c)	1.00	0.02		0.73	0.28	1.00		0.73
Prob of Max Out (p_x)	0.00	1.00		0.02	0.72	0.01		0.02
Left-Turn Movement Data								
Assigned Mvmt		1		7	5			3
Mvmt Sat Flow, veh/h		1774		1580	1774			239
Through Movement Data								
Assigned Mvmt	2			4		6		8
Mvmt Sat Flow, veh/h	1863			0		1863		569
Right-Turn Movement Data								
Assigned Mvmt	12			14		16		18
Mvmt Sat Flow, veh/h	1583			1583		1583		606
Left Lane Group Data								
Assigned Mvmt	0	1	0	7	5	0	0	3
Lane Assignment		(Prot)		L+T	(Prot)			L+T+R
Lanes in Grp	0	1	0	1	1	0	0	1

Grp Vol (v), veh/h	0	1	0	35	13	0	0	7
Grp Sat Flow (s), veh/h/ln	0	1774	0	1580	1774	0	0	1414
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.7	0.7	0.0	0.0	1.7
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1434	0	0	0	1426
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1774	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	3.7	0.0	0.0	0.0	3.7
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.29
Lane Grp Cap (c), veh/h	0	302	0	144	27	0	0	109
V/C Ratio (X)	0.00	0.00	0.00	0.24	0.48	0.00	0.00	0.06
Avail Cap (c_a), veh/h	0	302	0	290	118	0	0	274
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	31.0	0.0	42.2	43.9	0.0	0.0	41.6
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.9	9.2	0.0	0.0	0.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	31.0	0.0	43.1	53.1	0.0	0.0	41.8
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.9	0.3	0.0	0.0	0.2
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.9	0.4	0.0	0.0	0.2
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.07	0.04	0.00	0.00	0.02
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	0	6	0	8
Lane Assignment	T					T		
Lanes in Grp	1	0	0	0	0	1	0	0
Grp Vol (v), veh/h	1203	0	0	0	0	450	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	0	0	0	1863	0	0
Q Serve Time (g_s), s	56.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear Time (g_c), s	56.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0
Lane Grp Cap (c), veh/h	1159	0	0	0	0	1448	0	0
V/C Ratio (X)	1.04	0.00	0.00	0.00	0.00	0.31	0.00	0.00
Avail Cap (c_a), veh/h	1159	0	0	0	0	1448	0	0
Upstream Filter (I)	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	17.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Incr Delay (d2), s/veh	36.8	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	53.8	0.0	0.0	0.0	0.0	3.4	0.0	0.0
1st-Term Q (Q1), veh/ln	28.3	0.0	0.0	0.0	0.0	3.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	11.8	0.0	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	40.2	0.0	0.0	0.0	0.0	3.4	0.0	0.0
%ile Storage Ratio (RQ%)	2.36	0.00	0.00	0.00	0.00	0.13	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	0	14	0	16	0	18
Lane Assignment	R			R		R		
Lanes in Grp	1	0	0	1	0	1	0	0
Grp Vol (v), veh/h	3	0	0	11	0	11	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.1	0.0	0.0	0.6	0.0	0.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.1	0.0	0.0	0.6	0.0	0.1	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.43
Lane Grp Cap (c), veh/h	985	0	0	65	0	1230	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.17	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	985	0	0	229	0	1230	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	6.4	0.0	0.0	41.7	0.0	2.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	6.4	0.0	0.0	42.9	0.0	2.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		39.9						
HCM 2010 LOS		D						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	13	1203	3	1	450	11	7	35	11
v/c Ratio	0.12	0.76	0.00	0.01	0.29	0.01	0.05	0.29	0.04
Control Delay	41.5	11.7	0.0	40.0	4.0	0.0	30.5	43.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	11.7	0.0	40.0	4.0	0.0	30.5	43.8	0.3
Queue Length 50th (ft)	7	274	0	1	48	0	2	19	0
Queue Length 95th (ft)	25	#953	0	6	166	0	15	47	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	122	1583	1358	118	1577	1353	228	202	352
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.76	0.00	0.01	0.29	0.01	0.03	0.17	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	608	2	4	1339	24	3	0	3	29	0	24
Future Volume (veh/h)	20	608	2	4	1339	24	3	0	3	29	0	24
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	22	661	2	4	1455	26	3	0	3	32	0	26
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	34	1565	1330	9	1539	1308	34	7	14	81	0	43
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.84	0.84	0.00	0.83	0.83	0.03	0.00	0.03	0.03	0.00	0.03
Ln Grp Delay, s/veh	112.0	4.6	2.6	123.8	27.0	3.1	95.8	0.0	0.0	99.4	0.0	108.7
Ln Grp LOS	F	A	A	F	C	A	F			F		F
Approach Vol, veh/h		685			1485			6			58	
Approach Delay, s/veh		8.1			26.9			95.8			103.6	
Approach LOS		A			C			F			F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	6	5		8
Case No	2.0	3.0		7.0	3.0	2.0		8.0
Phs Duration (G+Y+Rc), s	6.0	173.0		10.5	170.2	8.8		10.5
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	7.0	168.0		10.0	168.0	7.0		10.0
Max Allow Headway (MAH), s	3.2	7.8		4.9	7.9	7.8		4.9
Max Q Clear (g_c+I1), s	2.4	19.6		5.6	126.2	4.5		5.6
Green Ext Time (g_e), s	0.0	15.6		0.1	39.0	1.2		0.1
Prob of Phs Call (p_c)	0.20	1.00		0.97	1.00	0.71		0.97
Prob of Max Out (p_x)	0.02	0.00		1.00	0.91	1.00		1.00
Left-Turn Movement Data								
Assigned Mvmt	1			7		5		3
Mvmt Sat Flow, veh/h	1774			1647		1774		256
Through Movement Data								
Assigned Mvmt		2		4	6			8
Mvmt Sat Flow, veh/h		1863		0	1863			266
Right-Turn Movement Data								
Assigned Mvmt		12		14	16			18
Mvmt Sat Flow, veh/h		1583		1583	1583			522
Left Lane Group Data								
Assigned Mvmt	1	0	0	7	0	5	0	3
Lane Assignment	(Prot)			L+T		(Prot)		L+T+R
Lanes in Grp	1	0	0	1	0	1	0	1

Grp Vol (v), veh/h	4	0	0	32	0	22	0	6
Grp Sat Flow (s), veh/h/ln	1774	0	0	1647	0	1774	0	1044
Q Serve Time (g_s), s	0.4	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Cycle Q Clear Time (g_c), s	0.4	0.0	0.0	3.6	0.0	2.5	0.0	3.6
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1436	0	0	0	1407
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1774	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	5.5	0.0	0.0	0.0	5.5
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.50
Lane Grp Cap (c), veh/h	9	0	0	81	0	34	0	56
V/C Ratio (X)	0.45	0.00	0.00	0.39	0.00	0.65	0.00	0.11
Avail Cap (c_a), veh/h	62	0	0	113	0	62	0	89
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	99.2	0.0	0.0	96.3	0.0	97.4	0.0	94.9
Incr Delay (d2), s/veh	24.6	0.0	0.0	3.1	0.0	14.6	0.0	0.8
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	123.8	0.0	0.0	99.4	0.0	112.0	0.0	95.8
1st-Term Q (Q1), veh/ln	0.2	0.0	0.0	1.8	0.0	1.2	0.0	0.3
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.3	0.0	0.0	1.8	0.0	1.3	0.0	0.3
%ile Storage Ratio (RQ%)	0.02	0.00	0.00	0.14	0.00	0.12	0.00	0.04
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	6	0	0	8
Lane Assignment		T			T			
Lanes in Grp	0	1	0	0	1	0	0	0
Grp Vol (v), veh/h	0	661	0	0	1455	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	1863	0	0	0
Q Serve Time (g_s), s	0.0	17.6	0.0	0.0	124.2	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	17.6	0.0	0.0	124.2	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1565	0	0	1539	0	0	0
V/C Ratio (X)	0.00	0.42	0.00	0.00	0.95	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1565	0	0	1565	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	4.0	0.0	0.0	13.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	13.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.6	0.0	0.0	27.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	9.0	0.0	0.0	62.6	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	5.6	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.3	0.0	0.0	68.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.55	0.00	0.00	2.49	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	16	0	0	18
Lane Assignment		R		R	R			
Lanes in Grp	0	1	0	1	1	0	0	0
Grp Vol (v), veh/h	0	2	0	26	26	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	3.2	0.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	3.2	0.6	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.50
Lane Grp Cap (c), veh/h	0	1330	0	43	1308	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.60	0.02	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1330	0	79	1330	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.6	0.0	96.2	3.1	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.6	0.0	108.7	3.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.4	0.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.6	0.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.12	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		23.3						
HCM 2010 LOS		C						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	22	661	2	4	1455	26	6	32	26
v/c Ratio	0.39	0.39	0.00	0.08	0.88	0.02	0.05	0.52	0.20
Control Delay	114.1	2.6	0.0	97.8	17.4	0.3	0.7	122.6	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	114.1	2.6	0.0	97.8	17.4	0.3	0.7	122.6	3.4
Queue Length 50th (ft)	29	99	0	5	1198	0	0	42	0
Queue Length 95th (ft)	67	227	0	21	1662	3	0	86	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	61	1696	1444	61	1650	1406	134	70	140
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.39	0.00	0.07	0.88	0.02	0.04	0.46	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1174	4	2	439	11	3	3	4	34	0	11
Future Volume (veh/h)	13	1174	4	2	439	11	3	3	4	34	0	11
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	14	1276	4	2	477	12	3	3	4	37	0	12
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	29	1159	985	299	1442	1226	63	25	24	148	0	68
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.62	0.62	0.17	0.77	0.77	0.04	0.04	0.04	0.04	0.00	0.04
Ln Grp Delay, s/veh	52.7	75.5	6.4	31.2	3.6	2.3	41.8	0.0	0.0	43.0	0.0	42.8
Ln Grp LOS	D	F	A	C	A	A	D			D		D
Approach Vol, veh/h		1294			491			10			49	
Approach Delay, s/veh		75.1			3.7			41.8			42.9	
Approach LOS		E			A			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1		4	5	6		8
Case No	3.0	2.0		7.0	2.0	3.0		8.0
Phs Duration (G+Y+Rc), s	61.0	20.1		8.9	6.5	74.7		8.9
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	56.0	6.0		13.0	6.0	56.0		13.0
Max Allow Headway (MAH), s	7.9	7.9		5.1	3.2	7.9		5.1
Max Q Clear (g_c+I1), s	58.0	2.1		3.8	2.7	9.0		3.8
Green Ext Time (g_e), s	0.0	1.9		0.1	0.0	8.8		0.1
Prob of Phs Call (p_c)	1.00	0.05		0.77	0.30	1.00		0.77
Prob of Max Out (p_x)	0.00	1.00		0.03	0.81	0.01		0.03
Left-Turn Movement Data								
Assigned Mvmt		1		7	5			3
Mvmt Sat Flow, veh/h		1774		1580	1774			250
Through Movement Data								
Assigned Mvmt	2			4		6		8
Mvmt Sat Flow, veh/h	1863			0		1863		591
Right-Turn Movement Data								
Assigned Mvmt	12			14		16		18
Mvmt Sat Flow, veh/h	1583			1583		1583		561
Left Lane Group Data								
Assigned Mvmt	0	1	0	7	5	0	0	3
Lane Assignment		(Prot)		L+T	(Prot)			L+T+R
Lanes in Grp	0	1	0	1	1	0	0	1

Grp Vol (v), veh/h	0	2	0	37	14	0	0	10
Grp Sat Flow (s), veh/h/ln	0	1774	0	1580	1774	0	0	1401
Q Serve Time (g_s), s	0.0	0.1	0.0	0.0	0.7	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	0.0	1.8	0.7	0.0	0.0	1.8
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1431	0	0	0	1424
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1774	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.9
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.30
Lane Grp Cap (c), veh/h	0	299	0	148	29	0	0	112
V/C Ratio (X)	0.00	0.01	0.00	0.25	0.48	0.00	0.00	0.09
Avail Cap (c_a), veh/h	0	299	0	290	118	0	0	274
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	31.2	0.0	42.1	43.9	0.0	0.0	41.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.9	8.9	0.0	0.0	0.3
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	31.2	0.0	43.0	52.7	0.0	0.0	41.8
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.9	0.3	0.0	0.0	0.2
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.9	0.4	0.0	0.0	0.2
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.07	0.04	0.00	0.00	0.03
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	0	6	0	8
Lane Assignment	T					T		
Lanes in Grp	1	0	0	0	0	1	0	0
Grp Vol (v), veh/h	1276	0	0	0	0	477	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	0	0	0	1863	0	0
Q Serve Time (g_s), s	56.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0
Cycle Q Clear Time (g_c), s	56.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0
Lane Grp Cap (c), veh/h	1159	0	0	0	0	1442	0	0
V/C Ratio (X)	1.10	0.00	0.00	0.00	0.00	0.33	0.00	0.00
Avail Cap (c_a), veh/h	1159	0	0	0	0	1442	0	0
Upstream Filter (I)	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	17.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0
Incr Delay (d2), s/veh	58.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	75.5	0.0	0.0	0.0	0.0	3.6	0.0	0.0
1st-Term Q (Q1), veh/ln	28.3	0.0	0.0	0.0	0.0	3.6	0.0	0.0
2nd-Term Q (Q2), veh/ln	18.9	0.0	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	47.2	0.0	0.0	0.0	0.0	3.8	0.0	0.0
%ile Storage Ratio (RQ%)	2.77	0.00	0.00	0.00	0.00	0.14	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	29.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	0	14	0	16	0	18
Lane Assignment	R			R		R		
Lanes in Grp	1	0	0	1	0	1	0	0
Grp Vol (v), veh/h	4	0	0	12	0	12	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.1	0.0	0.0	0.7	0.0	0.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.1	0.0	0.0	0.7	0.0	0.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.40
Lane Grp Cap (c), veh/h	985	0	0	68	0	1226	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.18	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	985	0	0	229	0	1226	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	6.4	0.0	0.0	41.5	0.0	2.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	6.4	0.0	0.0	42.8	0.0	2.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		55.0
HCM 2010 LOS		E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	14	1276	4	2	477	12	10	37	12
v/c Ratio	0.12	0.81	0.00	0.02	0.30	0.01	0.07	0.30	0.04
Control Delay	41.6	13.7	0.0	40.5	4.2	0.0	30.7	44.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	13.7	0.0	40.5	4.2	0.0	30.7	44.0	0.3
Queue Length 50th (ft)	8	333	0	1	53	0	3	20	0
Queue Length 95th (ft)	26	#1048	0	8	179	0	18	49	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	123	1580	1356	118	1574	1351	228	202	352
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.81	0.00	0.02	0.30	0.01	0.04	0.18	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	639	3	5	1406	26	4	0	4	31	0	26
Future Volume (veh/h)	21	639	3	5	1406	26	4	0	4	31	0	26
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	23	695	3	5	1528	28	4	0	4	34	0	28
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	26	1577	1340	11	1561	1327	34	7	15	83	0	46
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.01	0.85	0.85	0.01	0.84	0.84	0.03	0.00	0.03	0.03	0.00	0.03
Ln Grp Delay, s/veh	146.5	4.5	2.4	120.5	32.9	2.7	95.9	0.0	0.0	99.3	0.0	108.7
Ln Grp LOS	F	A	A	F	C	A	F			F		F
Approach Vol, veh/h		721			1561			8			62	
Approach Delay, s/veh		9.0			32.6			95.9			103.6	
Approach LOS		A			C			F			F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	6	5		8
Case No	2.0	3.0		7.0	3.0	2.0		8.0
Phs Duration (G+Y+Rc), s	6.2	174.3		10.8	172.6	7.9		10.8
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	7.0	168.0		10.0	168.0	7.0		10.0
Max Allow Headway (MAH), s	3.2	7.8		4.9	7.9	7.8		4.9
Max Q Clear (g_c+I1), s	2.6	20.3		5.8	149.8	4.6		5.8
Green Ext Time (g_e), s	0.0	17.1		0.1	17.8	0.0		0.1
Prob of Phs Call (p_c)	0.24	1.00		0.98	1.00	0.72		0.98
Prob of Max Out (p_x)	0.03	0.00		1.00	0.98	1.00		1.00
Left-Turn Movement Data								
Assigned Mvmt	1			7		5		3
Mvmt Sat Flow, veh/h	1774			1650		1774		251
Through Movement Data								
Assigned Mvmt		2		4	6			8
Mvmt Sat Flow, veh/h		1863		0	1863			257
Right-Turn Movement Data								
Assigned Mvmt		12		14	16			18
Mvmt Sat Flow, veh/h		1583		1583	1583			508
Left Lane Group Data								
Assigned Mvmt	1	0	0	7	0	5	0	3
Lane Assignment	(Prot)			L+T		(Prot)		L+T+R
Lanes in Grp	1	0	0	1	0	1	0	1

Grp Vol (v), veh/h	5	0	0	34	0	23	0	8
Grp Sat Flow (s), veh/h/ln	1774	0	0	1650	0	1774	0	1015
Q Serve Time (g_s), s	0.6	0.0	0.0	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.6	0.0	0.0	3.8	0.0	2.6	0.0	3.8
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1435	0	0	0	1404
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1774	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	5.8	0.0	0.0	0.0	5.8
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	2.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.50
Lane Grp Cap (c), veh/h	11	0	0	83	0	26	0	56
V/C Ratio (X)	0.46	0.00	0.00	0.41	0.00	0.90	0.00	0.14
Avail Cap (c_a), veh/h	62	0	0	113	0	62	0	87
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	99.1	0.0	0.0	96.2	0.0	98.4	0.0	94.8
Incr Delay (d2), s/veh	21.4	0.0	0.0	3.2	0.0	48.1	0.0	1.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	120.5	0.0	0.0	99.3	0.0	146.5	0.0	95.9
1st-Term Q (Q1), veh/ln	0.3	0.0	0.0	1.9	0.0	1.3	0.0	0.4
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.1	0.0	0.3	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.3	0.0	0.0	1.9	0.0	1.6	0.0	0.5
%ile Storage Ratio (RQ%)	0.02	0.00	0.00	0.15	0.00	0.15	0.00	0.05
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	6	0	0	8
Lane Assignment		T			T			
Lanes in Grp	0	1	0	0	1	0	0	0
Grp Vol (v), veh/h	0	695	0	0	1528	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	1863	0	0	0
Q Serve Time (g_s), s	0.0	18.3	0.0	0.0	147.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	18.3	0.0	0.0	147.8	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1577	0	0	1561	0	0	0
V/C Ratio (X)	0.00	0.44	0.00	0.00	0.98	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1577	0	0	1565	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.8	0.0	0.0	14.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	18.3	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.5	0.0	0.0	32.9	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	9.3	0.0	0.0	74.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	7.9	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	9.6	0.0	0.0	82.2	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.56	0.00	0.00	3.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	16	0	0	18
Lane Assignment		R		R	R			
Lanes in Grp	0	1	0	1	1	0	0	0
Grp Vol (v), veh/h	0	3	0	28	28	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	0.1	0.0	3.5	0.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	0.0	3.5	0.6	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.50
Lane Grp Cap (c), veh/h	0	1340	0	46	1327	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.61	0.02	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1340	0	79	1330	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.4	0.0	96.0	2.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	12.7	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.4	0.0	108.7	2.7	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.5	0.2	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.7	0.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.13	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		27.4						
HCM 2010 LOS		C						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	23	695	3	5	1528	28	8	34	28
v/c Ratio	0.41	0.41	0.00	0.10	0.93	0.02	0.06	0.56	0.21
Control Delay	115.5	2.8	0.0	98.4	22.3	0.4	1.0	125.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.5	2.8	0.0	98.4	22.3	0.4	1.0	125.1	3.7
Queue Length 50th (ft)	30	108	0	7	1539	0	0	45	0
Queue Length 95th (ft)	67	246	0	25	#2283	4	0	91	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	61	1694	1443	61	1649	1406	134	70	140
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.41	0.00	0.08	0.93	0.02	0.06	0.49	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1229	4	2	460	12	3	3	4	36	0	12
Future Volume (veh/h)	14	1229	4	2	460	12	3	3	4	36	0	12
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	15	1336	4	2	500	13	3	3	4	39	0	13
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	31	1159	985	297	1438	1223	63	26	24	149	0	69
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.62	0.62	0.17	0.77	0.77	0.04	0.04	0.04	0.04	0.00	0.04
Ln Grp Delay, s/veh	52.4	95.9	6.4	31.2	3.7	2.4	41.7	0.0	0.0	43.0	0.0	42.8
Ln Grp LOS	D	F	A	C	A	A	D			D		D
Approach Vol, veh/h		1355			515			10			52	
Approach Delay, s/veh		95.2			3.8			41.7			42.9	
Approach LOS		F			A			D			D	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	2	1		4	5	6		8
Case No	3.0	2.0		7.0	2.0	3.0		8.0
Phs Duration (G+Y+Rc), s	61.0	20.1		8.9	6.6	74.5		8.9
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	56.0	6.0		13.0	6.0	56.0		13.0
Max Allow Headway (MAH), s	7.9	7.9		5.1	3.2	7.9		5.1
Max Q Clear (g_c+I1), s	58.0	2.1		3.9	2.8	9.5		3.9
Green Ext Time (g_e), s	0.0	2.0		0.1	0.0	9.3		0.1
Prob of Phs Call (p_c)	1.00	0.05		0.79	0.31	1.00		0.79
Prob of Max Out (p_x)	0.00	1.00		0.03	0.91	0.02		0.03
Left-Turn Movement Data								
Assigned Mvmt		1		7	5			3
Mvmt Sat Flow, veh/h		1774		1586	1774			243
Through Movement Data								
Assigned Mvmt	2			4		6		8
Mvmt Sat Flow, veh/h	1863			0		1863		595
Right-Turn Movement Data								
Assigned Mvmt	12			14		16		18
Mvmt Sat Flow, veh/h	1583			1583		1583		558
Left Lane Group Data								
Assigned Mvmt	0	1	0	7	5	0	0	3
Lane Assignment		(Prot)		L+T	(Prot)			L+T+R
Lanes in Grp	0	1	0	1	1	0	0	1

Grp Vol (v), veh/h	0	2	0	39	15	0	0	10
Grp Sat Flow (s), veh/h/ln	0	1774	0	1586	1774	0	0	1396
Q Serve Time (g_s), s	0.0	0.1	0.0	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	0.0	1.9	0.8	0.0	0.0	1.9
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1431	0	0	0	1423
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1774	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	3.9	0.0	0.0	0.0	3.9
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.30
Lane Grp Cap (c), veh/h	0	297	0	149	31	0	0	113
V/C Ratio (X)	0.00	0.01	0.00	0.26	0.49	0.00	0.00	0.09
Avail Cap (c_a), veh/h	0	297	0	291	118	0	0	273
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	31.2	0.0	42.1	43.8	0.0	0.0	41.4
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.9	8.6	0.0	0.0	0.3
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	31.2	0.0	43.0	52.4	0.0	0.0	41.7
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.0	0.4	0.0	0.0	0.2
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.0	0.4	0.0	0.0	0.2
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.08	0.04	0.00	0.00	0.03
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	0	6	0	8
Lane Assignment	T					T		
Lanes in Grp	1	0	0	0	0	1	0	0
Grp Vol (v), veh/h	1336	0	0	0	0	500	0	0
Grp Sat Flow (s), veh/h/ln	1863	0	0	0	0	1863	0	0
Q Serve Time (g_s), s	56.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0
Cycle Q Clear Time (g_c), s	56.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0
Lane Grp Cap (c), veh/h	1159	0	0	0	0	1438	0	0
V/C Ratio (X)	1.15	0.00	0.00	0.00	0.00	0.35	0.00	0.00
Avail Cap (c_a), veh/h	1159	0	0	0	0	1438	0	0
Upstream Filter (I)	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	17.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0
Incr Delay (d2), s/veh	78.9	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	95.9	0.0	0.0	0.0	0.0	3.7	0.0	0.0
1st-Term Q (Q1), veh/ln	28.3	0.0	0.0	0.0	0.0	3.7	0.0	0.0
2nd-Term Q (Q2), veh/ln	25.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	53.7	0.0	0.0	0.0	0.0	4.0	0.0	0.0
%ile Storage Ratio (RQ%)	3.16	0.00	0.00	0.00	0.00	0.14	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	44.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	12	0	0	14	0	16	0	18
Lane Assignment	R			R		R		
Lanes in Grp	1	0	0	1	0	1	0	0
Grp Vol (v), veh/h	4	0	0	13	0	13	0	0
Grp Sat Flow (s), veh/h/ln	1583	0	0	1583	0	1583	0	0
Q Serve Time (g_s), s	0.1	0.0	0.0	0.7	0.0	0.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.1	0.0	0.0	0.7	0.0	0.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.40
Lane Grp Cap (c), veh/h	985	0	0	69	0	1223	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.19	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	985	0	0	229	0	1223	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	6.4	0.0	0.0	41.5	0.0	2.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	6.4	0.0	0.0	42.8	0.0	2.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		69.1						
HCM 2010 LOS		E						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	15	1336	4	2	500	13	10	39	13
v/c Ratio	0.13	0.85	0.00	0.02	0.32	0.01	0.07	0.31	0.05
Control Delay	41.7	15.8	0.0	40.5	4.3	0.0	30.4	44.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	15.8	0.0	40.5	4.3	0.0	30.4	44.1	0.3
Queue Length 50th (ft)	8	392	0	1	56	0	3	21	0
Queue Length 95th (ft)	28	#1124	0	8	194	0	18	51	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	124	1578	1354	118	1571	1348	228	202	352
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.85	0.00	0.02	0.32	0.01	0.04	0.19	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	669	3	5	1473	27	4	0	4	32	0	27
Future Volume (veh/h)	22	669	3	5	1473	27	4	0	4	32	0	27
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	24	727	3	5	1601	29	4	0	4	35	0	29
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	27	1582	1345	11	1565	1330	34	7	15	85	0	47
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.85	0.85	0.01	0.84	0.84	0.03	0.00	0.03	0.03	0.00	0.03
Ln Grp Delay, s/veh	141.6	4.5	2.3	120.5	44.8	2.6	95.7	0.0	0.0	99.3	0.0	108.0
Ln Grp LOS	F	A	A	F	F	A	F			F		F
Approach Vol, veh/h		754			1635			8			64	
Approach Delay, s/veh		8.8			44.3			95.7			103.2	
Approach LOS		A			D			F			F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	6	5		8
Case No	2.0	3.0		7.0	3.0	2.0		8.0
Phs Duration (G+Y+Rc), s	6.2	174.9		11.0	173.0	8.1		11.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green (Gmax), s	7.0	168.0		10.0	168.0	7.0		10.0
Max Allow Headway (MAH), s	3.2	7.8		4.9	7.9	7.8		4.9
Max Q Clear (g_c+I1), s	2.6	21.3		6.0	170.0	4.7		6.0
Green Ext Time (g_e), s	0.0	18.7		0.1	0.0	0.0		0.1
Prob of Phs Call (p_c)	0.24	1.00		0.98	1.00	0.74		0.98
Prob of Max Out (p_x)	0.03	0.00		1.00	1.00	1.00		1.00
Left-Turn Movement Data								
Assigned Mvmt	1			7		5		3
Mvmt Sat Flow, veh/h	1774			1622		1774		242
Through Movement Data								
Assigned Mvmt		2		4	6			8
Mvmt Sat Flow, veh/h		1863		0	1863			250
Right-Turn Movement Data								
Assigned Mvmt		12		14	16			18
Mvmt Sat Flow, veh/h		1583		1583	1583			492
Left Lane Group Data								
Assigned Mvmt	1	0	0	7	0	5	0	3
Lane Assignment	(Prot)			L+T		(Prot)		L+T+R
Lanes in Grp	1	0	0	1	0	1	0	1

Grp Vol (v), veh/h	5	0	0	35	0	24	0	8
Grp Sat Flow (s), veh/h/ln	1774	0	0	1622	0	1774	0	984
Q Serve Time (g_s), s	0.6	0.0	0.0	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.6	0.0	0.0	4.0	0.0	2.7	0.0	4.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1435	0	0	0	1403
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1726	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.50
Lane Grp Cap (c), veh/h	11	0	0	85	0	27	0	56
V/C Ratio (X)	0.46	0.00	0.00	0.41	0.00	0.88	0.00	0.14
Avail Cap (c_a), veh/h	62	0	0	113	0	62	0	86
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	99.1	0.0	0.0	96.1	0.0	98.3	0.0	94.6
Incr Delay (d2), s/veh	21.4	0.0	0.0	3.2	0.0	43.3	0.0	1.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	120.5	0.0	0.0	99.3	0.0	141.6	0.0	95.7
1st-Term Q (Q1), veh/ln	0.3	0.0	0.0	1.9	0.0	1.3	0.0	0.4
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.1	0.0	0.3	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.3	0.0	0.0	2.0	0.0	1.7	0.0	0.5
%ile Storage Ratio (RQ%)	0.02	0.00	0.00	0.15	0.00	0.15	0.00	0.05
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	6	0	0	8
Lane Assignment		T			T			
Lanes in Grp	0	1	0	0	1	0	0	0
Grp Vol (v), veh/h	0	727	0	0	1601	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1863	0	0	1863	0	0	0
Q Serve Time (g_s), s	0.0	19.3	0.0	0.0	168.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	19.3	0.0	0.0	168.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1582	0	0	1565	0	0	0
V/C Ratio (X)	0.00	0.46	0.00	0.00	1.02	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1582	0	0	1565	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.7	0.0	0.0	16.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.0	28.8	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.5	0.0	0.0	44.8	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	9.7	0.0	0.0	84.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	12.5	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	10.0	0.0	0.0	96.8	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.59	0.00	0.00	3.53	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	9.1	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	16	0	0	18
Lane Assignment		R		R	R			
Lanes in Grp	0	1	0	1	1	0	0	0
Grp Vol (v), veh/h	0	3	0	29	29	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	1583	0	0	0
Q Serve Time (g_s), s	0.0	0.1	0.0	3.6	0.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.1	0.0	3.6	0.6	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.50
Lane Grp Cap (c), veh/h	0	1345	0	47	1330	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.61	0.02	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1345	0	79	1330	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	2.3	0.0	95.9	2.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	12.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.3	0.0	108.0	2.6	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.6	0.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.7	0.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.13	0.02	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		35.1						
HCM 2010 LOS		D						

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	24	727	3	5	1601	29	8	35	29
v/c Ratio	0.42	0.43	0.00	0.10	0.98	0.02	0.06	0.56	0.22
Control Delay	116.8	2.9	0.0	98.4	33.4	0.4	1.0	126.1	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	116.8	2.9	0.0	98.4	33.4	0.4	1.0	126.1	3.8
Queue Length 50th (ft)	32	116	0	7	~2229	0	0	46	0
Queue Length 95th (ft)	70	265	0	25	#2477	4	0	91	0
Internal Link Dist (ft)		420			676		199	299	
Turn Bay Length (ft)	275		275	360		360			
Base Capacity (vph)	61	1694	1443	61	1628	1388	134	70	140
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.43	0.00	0.08	0.98	0.02	0.06	0.50	0.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	683	126	0	339	8	58	2	9	8	10	23
Future Volume (veh/h)	11	683	126	0	339	8	58	2	9	8	10	23
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	12	742	137	0	368	9	63	2	10	9	11	25
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	844	2245	414	90	2663	1191	220	12	23	72	67	107
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.75	0.75	0.75	0.00	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Ln Grp Delay, s/veh	2.5	3.9	3.9	0.0	0.1	0.0	33.6	0.0	0.0	32.6	0.0	0.0
Ln Grp LOS	A	A	A		A	A	C			C		
Approach Vol, veh/h		891			377			75			45	
Approach Delay, s/veh		3.9			0.1			33.6			32.6	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		65.2		14.8		65.2		14.8
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		42.0		27.5		42.0		27.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		8.6		3.9		2.0		5.4
Green Ext Time (g_e), s		1.8		0.9		1.8		0.9
Prob of Phs Call (p_c)		1.00		0.93		1.00		0.93
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		1002		155		629		1183
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		2984		579		3539		102
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		551		916		1583		198
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	12	0	45	0	0	0	75
Grp Sat Flow (s), veh/h/ln	0	1002	0	1649	0	629	0	1483
Q Serve Time (g_s), s	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.5
Cycle Q Clear Time (g_c), s	0.0	0.2	0.0	1.9	0.0	0.0	0.0	3.4
Perm LT Sat Flow (s_l), veh/h/ln	0	1002	0	1424	0	629	0	1394
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1844	0	0	0	1788
Perm LT Eff Green (g_p), s	0.0	60.2	0.0	9.3	0.0	0.0	0.0	9.3
Perm LT Serve Time (g_u), s	0.0	60.2	0.0	5.9	0.0	0.0	0.0	7.4
Perm LT Q Serve Time (g_ps), s	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.5
Time to First Blk (g_f), s	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.20	0.00	1.00	0.00	0.84
Lane Grp Cap (c), veh/h	0	844	0	246	0	90	0	255
V/C Ratio (X)	0.00	0.01	0.00	0.18	0.00	0.00	0.00	0.29
Avail Cap (c_a), veh/h	0	844	0	610	0	90	0	574
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	2.5	0.0	32.1	0.0	0.0	0.0	32.7
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.9
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.5	0.0	32.6	0.0	0.0	0.0	33.6
1st-Term Q (Q1), veh/ln	0.0	0.1	0.0	0.9	0.0	0.0	0.0	1.5
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.1	0.0	0.9	0.0	0.0	0.0	1.6
%ile Storage Ratio (RQ%)	0.00	0.01	0.00	0.10	0.00	0.00	0.00	0.15
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	440	0	0	0	368	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1332	0	0	0	2663	0	0
V/C Ratio (X)	0.00	0.33	0.00	0.00	0.00	0.14	0.00	0.00
Avail Cap (c_a), veh/h	0	1332	0	0	0	2663	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.9	0.0	0.0	0.0	0.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	439	0	0	0	9	0	0
Grp Sat Flow (s), veh/h/ln	0	1766	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.31	0.00	0.56	0.00	1.00	0.00	0.13
Lane Grp Cap (c), veh/h	0	1328	0	0	0	1191	0	0
V/C Ratio (X)	0.00	0.33	0.00	0.00	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1328	0	0	0	1191	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		5.4						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	12	879	368	9	75	45
v/c Ratio	0.02	0.32	0.13	0.01	0.39	0.19
Control Delay	3.5	3.8	2.3	0.0	33.5	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.5	3.8	2.3	0.0	33.5	19.2
Queue Length 50th (ft)	1	58	15	0	30	9
Queue Length 95th (ft)	6	101	23	0	67	36
Internal Link Dist (ft)		276	276		240	217
Turn Bay Length (ft)	140					
Base Capacity (vph)	775	2709	2764	1244	464	562
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.32	0.13	0.01	0.16	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	555	46	8	807	13	176	5	13	18	23	44
Future Volume (veh/h)	17	555	46	8	807	13	176	5	13	18	23	44
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	18	603	50	9	877	14	191	5	14	20	25	48
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	448	2256	187	564	2412	1079	334	6	18	96	114	166
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.68	0.68	0.68	0.68	0.68	0.68	0.19	0.19	0.19	0.19	0.19	0.19
Ln Grp Delay, s/veh	7.6	5.5	5.5	6.2	5.8	4.1	32.6	0.0	0.0	28.4	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		671			900			210			93	
Approach Delay, s/veh		5.6			5.8			32.6			28.4	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		59.5		20.5		59.5		20.5
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		39.0		30.5		39.0		30.5
Max Allow Headway (MAH), s		2.6		6.6		2.6		6.6
Max Q Clear (g_c+I1), s		11.4		5.7		10.4		12.6
Green Ext Time (g_e), s		2.5		2.7		2.5		2.4
Prob of Phs Call (p_c)		1.00		1.00		1.00		1.00
Prob of Max Out (p_x)		0.00		0.01		0.00		0.05
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		622		219		776		1323
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3310		611		3539		35
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		274		886		1583		97
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	18	0	93	0	9	0	210
Grp Sat Flow (s), veh/h/ln	0	622	0	1716	0	776	0	1455
Q Serve Time (g_s), s	0.0	1.0	0.0	0.0	0.0	0.4	0.0	6.8
Cycle Q Clear Time (g_c), s	0.0	9.4	0.0	3.7	0.0	6.1	0.0	10.6
Perm LT Sat Flow (s_l), veh/h/ln	0	622	0	1416	0	776	0	1348
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1843	0	0	0	1782
Perm LT Eff Green (g_p), s	0.0	54.5	0.0	15.0	0.0	54.5	0.0	15.0
Perm LT Serve Time (g_u), s	0.0	46.1	0.0	4.4	0.0	48.8	0.0	11.2
Perm LT Q Serve Time (g_ps), s	0.0	1.0	0.0	0.0	0.0	0.4	0.0	6.8
Time to First Blk (g_f), s	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.22	0.00	1.00	0.00	0.91
Lane Grp Cap (c), veh/h	0	448	0	376	0	564	0	358
V/C Ratio (X)	0.00	0.04	0.00	0.25	0.00	0.02	0.00	0.59
Avail Cap (c_a), veh/h	0	448	0	686	0	564	0	619
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.96	0.00	1.00
Uniform Delay (d1), s/veh	0.0	7.4	0.0	27.9	0.0	6.1	0.0	30.4
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.5	0.0	0.0	0.0	2.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.6	0.0	28.4	0.0	6.2	0.0	32.6
1st-Term Q (Q1), veh/ln	0.0	0.2	0.0	1.8	0.0	0.1	0.0	4.4
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	1.8	0.0	0.1	0.0	4.6
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	0.19	0.00	0.03	0.00	0.43
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	322	0	0	0	877	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	5.7	0.0	0.0	0.0	8.4	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.7	0.0	0.0	0.0	8.4	0.0	0.0
Lane Grp Cap (c), veh/h	0	1206	0	0	0	2412	0	0
V/C Ratio (X)	0.00	0.27	0.00	0.00	0.00	0.36	0.00	0.00
Avail Cap (c_a), veh/h	0	1206	0	0	0	2412	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.96	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.0	0.0	0.0	0.0	5.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	5.5	0.0	0.0	0.0	5.8	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.7	0.0	0.0	0.0	4.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	2.9	0.0	0.0	0.0	4.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.24	0.00	0.00	0.00	0.35	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	331	0	0	0	14	0	0
Grp Sat Flow (s), veh/h/ln	0	1814	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	5.7	0.0	0.0	0.0	0.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	5.7	0.0	0.0	0.0	0.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.52	0.00	1.00	0.00	0.07
Lane Grp Cap (c), veh/h	0	1237	0	0	0	1079	0	0
V/C Ratio (X)	0.00	0.27	0.00	0.00	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1237	0	0	0	1079	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.96	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.0	0.0	0.0	0.0	4.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	5.5	0.0	0.0	0.0	4.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.8	0.0	0.0	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	2.9	0.0	0.0	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.25	0.00	0.00	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		9.8						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	18	653	9	877	14	210	93
v/c Ratio	0.05	0.30	0.02	0.40	0.01	0.63	0.22
Control Delay	8.5	8.0	7.0	7.3	0.5	34.3	13.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	8.5	8.0	7.0	7.5	0.5	34.3	13.1
Queue Length 50th (ft)	3	68	1	84	0	92	18
Queue Length 95th (ft)	14	124	m6	124	m1	142	47
Internal Link Dist (ft)		276		276		240	217
Turn Bay Length (ft)	140		80				
Base Capacity (vph)	338	2201	452	2220	1005	521	633
Starvation Cap Reductn	0	0	0	619	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.30	0.02	0.55	0.01	0.40	0.15

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	724	134	0	360	9	62	3	10	9	11	25
Future Volume (veh/h)	12	724	134	0	360	9	62	3	10	9	11	25
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	13	787	146	0	391	10	67	3	11	10	12	27
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	826	2238	415	90	2657	1189	220	14	24	73	68	107
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.75	0.75	0.75	0.00	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Ln Grp Delay, s/veh	2.6	4.1	4.1	0.0	0.1	0.0	33.6	0.0	0.0	32.6	0.0	0.0
Ln Grp LOS	A	A	A		A	A	C			C		
Approach Vol, veh/h		946			401			81			49	
Approach Delay, s/veh		4.1			0.1			33.6			32.6	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		65.1		14.9		65.1		14.9
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		42.0		27.5		42.0		27.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		9.2		4.1		2.0		5.7
Green Ext Time (g_e), s		1.9		1.0		1.9		0.9
Prob of Phs Call (p_c)		1.00		0.94		1.00		0.94
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		980		162		598		1166
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		2982		578		3539		122
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		553		908		1583		202
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	13	0	49	0	0	0	81
Grp Sat Flow (s), veh/h/ln	0	980	0	1648	0	598	0	1490
Q Serve Time (g_s), s	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.6
Cycle Q Clear Time (g_c), s	0.0	0.3	0.0	2.1	0.0	0.0	0.0	3.7
Perm LT Sat Flow (s_l), veh/h/ln	0	980	0	1422	0	598	0	1390
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1844	0	0	0	1789
Perm LT Eff Green (g_p), s	0.0	60.1	0.0	9.4	0.0	0.0	0.0	9.4
Perm LT Serve Time (g_u), s	0.0	60.1	0.0	5.7	0.0	0.0	0.0	7.3
Perm LT Q Serve Time (g_ps), s	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.6
Time to First Blk (g_f), s	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.20	0.00	1.00	0.00	0.83
Lane Grp Cap (c), veh/h	0	826	0	249	0	90	0	258
V/C Ratio (X)	0.00	0.02	0.00	0.20	0.00	0.00	0.00	0.31
Avail Cap (c_a), veh/h	0	826	0	609	0	90	0	575
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	2.5	0.0	32.0	0.0	0.0	0.0	32.6
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.6	0.0	32.6	0.0	0.0	0.0	33.6
1st-Term Q (Q1), veh/ln	0.0	0.1	0.0	1.0	0.0	0.0	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.1	0.0	1.0	0.0	0.0	0.0	1.7
%ile Storage Ratio (RQ%)	0.00	0.01	0.00	0.11	0.00	0.00	0.00	0.16
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	467	0	0	0	391	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1328	0	0	0	2657	0	0
V/C Ratio (X)	0.00	0.35	0.00	0.00	0.00	0.15	0.00	0.00
Avail Cap (c_a), veh/h	0	1328	0	0	0	2657	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.1	0.0	0.0	0.0	0.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	466	0	0	0	10	0	0
Grp Sat Flow (s), veh/h/ln	0	1765	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.31	0.00	0.55	0.00	1.00	0.00	0.14
Lane Grp Cap (c), veh/h	0	1325	0	0	0	1189	0	0
V/C Ratio (X)	0.00	0.35	0.00	0.00	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1325	0	0	0	1189	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		5.6						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	13	933	391	10	81	49
v/c Ratio	0.02	0.35	0.14	0.01	0.41	0.20
Control Delay	3.7	4.1	2.4	0.1	33.3	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	4.1	2.4	0.1	33.3	18.8
Queue Length 50th (ft)	1	65	16	0	33	10
Queue Length 95th (ft)	7	114	25	1	70	38
Internal Link Dist (ft)		276	276		240	217
Turn Bay Length (ft)	140					
Base Capacity (vph)	753	2696	2750	1238	465	563
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.35	0.14	0.01	0.17	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	583	49	9	848	14	185	6	14	19	25	47
Future Volume (veh/h)	18	583	49	9	848	14	185	6	14	19	25	47
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	20	634	53	10	922	15	201	7	15	21	27	51
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	420	2216	185	535	2371	1061	344	9	19	98	122	176
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.67	0.67	0.67	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Ln Grp Delay, s/veh	8.5	6.0	6.0	6.8	6.4	4.4	32.1	0.0	0.0	27.7	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		707			947			223			99	
Approach Delay, s/veh		6.1			6.3			32.1			27.7	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		58.6		21.4		58.6		21.4
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		39.0		30.5		39.0		30.5
Max Allow Headway (MAH), s		2.6		6.6		2.6		6.6
Max Q Clear (g_c+I1), s		12.5		5.9		11.3		13.4
Green Ext Time (g_e), s		2.7		2.9		2.7		2.5
Prob of Phs Call (p_c)		1.00		1.00		1.00		1.00
Prob of Max Out (p_x)		0.00		0.01		0.00		0.07
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		595		221		752		1298
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3307		612		3539		45
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		276		885		1583		97
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	20	0	99	0	10	0	223
Grp Sat Flow (s), veh/h/ln	0	595	0	1718	0	752	0	1440
Q Serve Time (g_s), s	0.0	1.2	0.0	0.0	0.0	0.4	0.0	7.4
Cycle Q Clear Time (g_c), s	0.0	10.5	0.0	3.9	0.0	6.7	0.0	11.4
Perm LT Sat Flow (s_l), veh/h/ln	0	595	0	1412	0	752	0	1342
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1837	0	0	0	1732
Perm LT Eff Green (g_p), s	0.0	53.6	0.0	15.9	0.0	53.6	0.0	15.9
Perm LT Serve Time (g_u), s	0.0	44.3	0.0	4.5	0.0	47.3	0.0	12.0
Perm LT Q Serve Time (g_ps), s	0.0	1.2	0.0	0.0	0.0	0.4	0.0	7.4
Time to First Blk (g_f), s	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.21	0.00	1.00	0.00	0.90
Lane Grp Cap (c), veh/h	0	420	0	396	0	535	0	372
V/C Ratio (X)	0.00	0.05	0.00	0.25	0.00	0.02	0.00	0.60
Avail Cap (c_a), veh/h	0	420	0	688	0	535	0	617
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.95	0.00	1.00
Uniform Delay (d1), s/veh	0.0	8.2	0.0	27.3	0.0	6.8	0.0	29.9
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.5	0.0	0.1	0.0	2.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	8.5	0.0	27.7	0.0	6.8	0.0	32.1
1st-Term Q (Q1), veh/ln	0.0	0.2	0.0	1.8	0.0	0.1	0.0	4.6
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	1.9	0.0	0.1	0.0	4.9
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.20	0.00	0.03	0.00	0.45
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	339	0	0	0	922	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	6.3	0.0	0.0	0.0	9.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.3	0.0	0.0	0.0	9.3	0.0	0.0
Lane Grp Cap (c), veh/h	0	1185	0	0	0	2371	0	0
V/C Ratio (X)	0.00	0.29	0.00	0.00	0.00	0.39	0.00	0.00
Avail Cap (c_a), veh/h	0	1185	0	0	0	2371	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.95	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.4	0.0	0.0	0.0	5.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.0	0.0	0.0	0.0	6.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.0	0.0	0.0	0.0	4.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.2	0.0	0.0	0.0	4.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.27	0.00	0.00	0.00	0.39	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	348	0	0	0	15	0	0
Grp Sat Flow (s), veh/h/ln	0	1814	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	6.3	0.0	0.0	0.0	0.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.3	0.0	0.0	0.0	0.3	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.52	0.00	1.00	0.00	0.07
Lane Grp Cap (c), veh/h	0	1215	0	0	0	1061	0	0
V/C Ratio (X)	0.00	0.29	0.00	0.00	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1215	0	0	0	1061	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.95	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.4	0.0	0.0	0.0	4.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.0	0.0	0.0	0.0	4.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.1	0.0	0.0	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.3	0.0	0.0	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.28	0.00	0.00	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	20	687	10	922	15	223	99
v/c Ratio	0.06	0.32	0.02	0.42	0.02	0.65	0.23
Control Delay	9.1	8.6	8.3	8.4	1.6	34.3	12.6
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Total Delay	9.1	8.6	8.3	8.7	1.6	34.3	12.6
Queue Length 50th (ft)	4	75	1	93	0	97	19
Queue Length 95th (ft)	16	136	m7	160	m2	148	48
Internal Link Dist (ft)		276		276		240	217
Turn Bay Length (ft)	140		80				
Base Capacity (vph)	309	2162	423	2182	989	515	634
Starvation Cap Reductn	0	0	0	574	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.32	0.02	0.57	0.02	0.43	0.16

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	759	140	0	377	9	65	3	10	9	12	26
Future Volume (veh/h)	13	759	140	0	377	9	65	3	10	9	12	26
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	825	152	0	410	10	71	3	11	10	13	28
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	812	2238	412	90	2654	1187	223	14	23	72	70	108
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.75	0.75	0.75	0.00	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Ln Grp Delay, s/veh	2.6	4.2	4.3	0.0	0.1	0.0	33.7	0.0	0.0	32.6	0.0	0.0
Ln Grp LOS	A	A	A		A	A	C			C		
Approach Vol, veh/h		991			420			85			51	
Approach Delay, s/veh		4.2			0.1			33.7			32.6	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		65.0		15.0		65.0		15.0
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		42.0		27.5		42.0		27.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		9.6		4.2		2.0		5.9
Green Ext Time (g_e), s		2.0		1.0		2.0		1.0
Prob of Phs Call (p_c)		1.00		0.95		1.00		0.95
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		963		155		573		1181
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		2985		589		3539		116
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		550		906		1583		193
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	14	0	51	0	0	0	85
Grp Sat Flow (s), veh/h/ln	0	963	0	1651	0	573	0	1490
Q Serve Time (g_s), s	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.7
Cycle Q Clear Time (g_c), s	0.0	0.3	0.0	2.2	0.0	0.0	0.0	3.9
Perm LT Sat Flow (s_l), veh/h/ln	0	963	0	1422	0	573	0	1388
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1845	0	0	0	1788
Perm LT Eff Green (g_p), s	0.0	60.0	0.0	9.5	0.0	0.0	0.0	9.5
Perm LT Serve Time (g_u), s	0.0	60.0	0.0	5.6	0.0	0.0	0.0	7.3
Perm LT Q Serve Time (g_ps), s	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.7
Time to First Blk (g_f), s	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.20	0.00	1.00	0.00	0.84
Lane Grp Cap (c), veh/h	0	812	0	250	0	90	0	260
V/C Ratio (X)	0.00	0.02	0.00	0.20	0.00	0.00	0.00	0.33
Avail Cap (c_a), veh/h	0	812	0	610	0	90	0	574
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	2.5	0.0	32.0	0.0	0.0	0.0	32.7
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.6	0.0	32.6	0.0	0.0	0.0	33.7
1st-Term Q (Q1), veh/ln	0.0	0.1	0.0	1.0	0.0	0.0	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.1	0.0	1.1	0.0	0.0	0.0	1.8
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.11	0.00	0.00	0.00	0.17
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	489	0	0	0	410	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1327	0	0	0	2654	0	0
V/C Ratio (X)	0.00	0.37	0.00	0.00	0.00	0.15	0.00	0.00
Avail Cap (c_a), veh/h	0	1327	0	0	0	2654	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.2	0.0	0.0	0.0	0.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	488	0	0	0	10	0	0
Grp Sat Flow (s), veh/h/ln	0	1766	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.31	0.00	0.55	0.00	1.00	0.00	0.13
Lane Grp Cap (c), veh/h	0	1324	0	0	0	1187	0	0
V/C Ratio (X)	0.00	0.37	0.00	0.00	0.00	0.01	0.00	0.00
Avail Cap (c_a), veh/h	0	1324	0	0	0	1187	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		5.7						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	14	977	410	10	85	51
v/c Ratio	0.02	0.36	0.15	0.01	0.42	0.20
Control Delay	3.8	4.3	2.4	0.1	33.9	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	4.3	2.4	0.1	33.9	18.5
Queue Length 50th (ft)	2	71	17	0	35	10
Queue Length 95th (ft)	7	124	26	1	73	39
Internal Link Dist (ft)		276	276		240	217
Turn Bay Length (ft)	140					
Base Capacity (vph)	737	2688	2741	1234	463	568
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.36	0.15	0.01	0.18	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱		✣			✣	
Traffic Volume (veh/h)	19	611	51	9	888	15	194	6	15	20	26	49
Future Volume (veh/h)	19	611	51	9	888	15	194	6	15	20	26	49
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	21	664	55	10	965	16	211	7	16	22	28	53
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	394	2184	181	509	2335	1045	354	9	20	102	127	185
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.66	0.66	0.66	0.66	0.66	0.66	0.21	0.21	0.21	0.21	0.21	0.21
Ln Grp Delay, s/veh	9.3	6.5	6.4	7.4	6.9	4.7	31.7	0.0	0.0	27.1	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		740			991			234			103	
Approach Delay, s/veh		6.5			6.8			31.7			27.1	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		5.0		8.0
Phs Duration (G+Y+Rc), s		57.8		22.2		57.8		22.2
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		39.0		30.5		39.0		30.5
Max Allow Headway (MAH), s		2.6		6.6		2.6		6.6
Max Q Clear (g_c+l1), s		13.6		6.1		12.2		14.1
Green Ext Time (g_e), s		2.9		3.1		2.9		2.6
Prob of Phs Call (p_c)		1.00		1.00		1.00		1.00
Prob of Max Out (p_x)		0.00		0.01		0.00		0.09
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		571		228		730		1285
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3310		607		3539		43
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		274		885		1583		97
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	21	0	103	0	10	0	234
Grp Sat Flow (s), veh/h/ln	0	571	0	1720	0	730	0	1425
Q Serve Time (g_s), s	0.0	1.4	0.0	0.0	0.0	0.5	0.0	8.0
Cycle Q Clear Time (g_c), s	0.0	11.6	0.0	4.1	0.0	7.3	0.0	12.1
Perm LT Sat Flow (s_l), veh/h/ln	0	571	0	1410	0	730	0	1338
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1831	0	0	0	1692
Perm LT Eff Green (g_p), s	0.0	52.8	0.0	16.7	0.0	52.8	0.0	16.7
Perm LT Serve Time (g_u), s	0.0	42.6	0.0	4.6	0.0	46.0	0.0	12.7
Perm LT Q Serve Time (g_ps), s	0.0	1.4	0.0	0.0	0.0	0.5	0.0	8.0
Time to First Blk (g_f), s	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.21	0.00	1.00	0.00	0.90
Lane Grp Cap (c), veh/h	0	394	0	414	0	509	0	383
V/C Ratio (X)	0.00	0.05	0.00	0.25	0.00	0.02	0.00	0.61
Avail Cap (c_a), veh/h	0	394	0	689	0	509	0	614
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.95	0.00	1.00
Uniform Delay (d1), s/veh	0.0	9.1	0.0	26.6	0.0	7.3	0.0	29.5
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.4	0.0	0.1	0.0	2.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.3	0.0	27.1	0.0	7.4	0.0	31.7
1st-Term Q (Q1), veh/ln	0.0	0.2	0.0	1.9	0.0	0.1	0.0	4.9
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	2.0	0.0	0.1	0.0	5.1
%ile Storage Ratio (RQ%)	0.00	0.05	0.00	0.21	0.00	0.03	0.00	0.48
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	2	0	0
Grp Vol (v), veh/h	0	355	0	0	0	965	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	6.8	0.0	0.0	0.0	10.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.8	0.0	0.0	0.0	10.2	0.0	0.0
Lane Grp Cap (c), veh/h	0	1168	0	0	0	2335	0	0
V/C Ratio (X)	0.00	0.30	0.00	0.00	0.00	0.41	0.00	0.00
Avail Cap (c_a), veh/h	0	1168	0	0	0	2335	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.95	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.8	0.0	0.0	0.0	6.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.5	0.0	0.0	0.0	6.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.3	0.0	0.0	0.0	5.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.5	0.0	0.0	0.0	5.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.30	0.00	0.00	0.00	0.44	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	364	0	0	0	16	0	0
Grp Sat Flow (s), veh/h/ln	0	1814	0	0	0	1583	0	0
Q Serve Time (g_s), s	0.0	6.8	0.0	0.0	0.0	0.3	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.8	0.0	0.0	0.0	0.3	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.51	0.00	1.00	0.00	0.07
Lane Grp Cap (c), veh/h	0	1197	0	0	0	1045	0	0
V/C Ratio (X)	0.00	0.30	0.00	0.00	0.00	0.02	0.00	0.00
Avail Cap (c_a), veh/h	0	1197	0	0	0	1045	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.95	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.8	0.0	0.0	0.0	4.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.4	0.0	0.0	0.0	4.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.3	0.0	0.0	0.0	0.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.6	0.0	0.0	0.0	0.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.30	0.00	0.00	0.00	0.01	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		10.6						
HCM 2010 LOS		B						

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	21	719	10	965	16	234	103
v/c Ratio	0.07	0.33	0.02	0.45	0.02	0.68	0.23
Control Delay	9.5	8.9	9.4	9.3	2.5	35.3	12.4
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Total Delay	9.5	8.9	9.4	9.6	2.5	35.3	12.4
Queue Length 50th (ft)	4	81	1	100	0	103	19
Queue Length 95th (ft)	17	146	m7	192	m4	156	49
Internal Link Dist (ft)		276		276		240	217
Turn Bay Length (ft)	140		80				
Base Capacity (vph)	288	2147	402	2165	981	511	635
Starvation Cap Reductn	0	0	0	546	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.33	0.02	0.60	0.02	0.46	0.16

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	651	30	6	305	8	26	10	7	7	12	5
Future Volume (veh/h)	11	651	30	6	305	8	26	10	7	7	12	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	12	708	33	7	332	9	28	11	8	8	13	5
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	861	2646	123	640	2705	73	147	54	27	87	110	33
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	1.00	1.00	1.00	0.77	0.77	0.77	0.10	0.10	0.10	0.10	0.10	0.10
Ln Grp Delay, s/veh	0.1	0.5	0.4	2.2	2.6	2.5	33.9	0.0	0.0	33.2	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		753			348			47			26	
Approach Delay, s/veh		0.4			2.5			33.9			33.2	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		66.5		13.5		66.5		13.5
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		4.0		3.1		3.9		4.0
Green Ext Time (g_e), s		1.3		0.5		1.3		0.5
Prob of Phs Call (p_c)		1.00		0.80		1.00		0.80
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		1035		285		715		752
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3444		1093		3520		542
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		160		328		95		265
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	12	0	26	0	7	0	47
Grp Sat Flow (s), veh/h/ln	0	1035	0	1707	0	715	0	1560
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.7
Cycle Q Clear Time (g_c), s	0.0	2.0	0.0	1.1	0.0	0.2	0.0	2.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1035	0	1416	0	715	0	1417
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1835	0	0	0	1809
Perm LT Eff Green (g_p), s	0.0	61.5	0.0	8.0	0.0	61.5	0.0	8.0
Perm LT Serve Time (g_u), s	0.0	59.5	0.0	6.0	0.0	61.5	0.0	7.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.7
Time to First Blk (g_f), s	0.0	0.0	0.0	3.5	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.3
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.31	0.00	1.00	0.00	0.60
Lane Grp Cap (c), veh/h	0	861	0	230	0	640	0	228
V/C Ratio (X)	0.00	0.01	0.00	0.11	0.00	0.01	0.00	0.21
Avail Cap (c_a), veh/h	0	861	0	751	0	640	0	709
Upstream Filter (I)	0.00	0.96	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	32.9	0.0	2.2	0.0	33.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.1	0.0	33.2	0.0	2.2	0.0	33.9
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.06	0.00	0.01	0.00	0.10
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	364	0	0	0	167	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0
Lane Grp Cap (c), veh/h	0	1360	0	0	0	1360	0	0
V/C Ratio (X)	0.00	0.27	0.00	0.00	0.00	0.12	0.00	0.00
Avail Cap (c_a), veh/h	0	1360	0	0	0	1360	0	0
Upstream Filter (I)	0.00	0.96	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.5	0.0	0.0	0.0	2.6	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	377	0	0	0	174	0	0
Grp Sat Flow (s), veh/h/ln	0	1834	0	0	0	1846	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.09	0.00	0.19	0.00	0.05	0.00	0.17
Lane Grp Cap (c), veh/h	0	1410	0	0	0	1418	0	0
V/C Ratio (X)	0.00	0.27	0.00	0.00	0.00	0.12	0.00	0.00
Avail Cap (c_a), veh/h	0	1410	0	0	0	1418	0	0
Upstream Filter (I)	0.00	0.96	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.4	0.0	0.0	0.0	2.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		3.1						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	12	741	7	341	47	26
v/c Ratio	0.01	0.25	0.01	0.11	0.24	0.12
Control Delay	2.5	2.1	3.0	2.3	30.5	28.0
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.5	2.1	3.0	2.3	30.5	28.0
Queue Length 50th (ft)	1	36	1	20	18	9
Queue Length 95th (ft)	m4	46	4	32	48	32
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	859	2964	581	2973	616	670
Starvation Cap Reductn	0	694	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.33	0.01	0.11	0.08	0.04

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	434	35	8	666	26	102	16	20	15	20	37
Future Volume (veh/h)	24	434	35	8	666	26	102	16	20	15	20	37
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	26	472	38	9	724	28	111	17	22	16	22	40
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	557	2424	195	666	2538	98	227	31	31	80	88	120
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.49	0.49	0.49	0.73	0.73	0.73	0.14	0.14	0.14	0.14	0.14	0.14
Ln Grp Delay, s/veh	9.2	7.5	7.5	5.0	3.7	3.7	34.6	0.0	0.0	31.8	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		536			761			150			78	
Approach Delay, s/veh		7.5			3.7			34.6			31.8	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		63.4		16.6		63.4		16.6
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+l1), s		9.4		5.3		8.7		9.2
Green Ext Time (g_e), s		1.6		2.1		1.6		2.0
Prob of Phs Call (p_c)		1.00		0.99		1.00		0.99
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		708		187		886		1079
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3319		639		3474		225
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		266		869		134		224
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	26	0	78	0	9	0	150
Grp Sat Flow (s), veh/h/ln	0	708	0	1695	0	886	0	1528
Q Serve Time (g_s), s	0.0	1.7	0.0	0.0	0.0	0.3	0.0	3.9
Cycle Q Clear Time (g_c), s	0.0	7.4	0.0	3.3	0.0	6.7	0.0	7.2
Perm LT Sat Flow (s_l), veh/h/ln	0	708	0	1390	0	886	0	1362
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1844	0	0	0	1796
Perm LT Eff Green (g_p), s	0.0	58.4	0.0	11.1	0.0	58.4	0.0	11.1
Perm LT Serve Time (g_u), s	0.0	52.8	0.0	3.9	0.0	52.0	0.0	7.8
Perm LT Q Serve Time (g_ps), s	0.0	1.7	0.0	0.0	0.0	0.3	0.0	3.9
Time to First Blk (g_f), s	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.21	0.00	1.00	0.00	0.74
Lane Grp Cap (c), veh/h	0	557	0	289	0	666	0	290
V/C Ratio (X)	0.00	0.05	0.00	0.27	0.00	0.01	0.00	0.52
Avail Cap (c_a), veh/h	0	557	0	737	0	666	0	686
Upstream Filter (I)	0.00	0.97	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	9.0	0.0	31.1	0.0	5.0	0.0	32.6
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.7	0.0	0.0	0.0	2.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	9.2	0.0	31.8	0.0	5.0	0.0	34.6
1st-Term Q (Q1), veh/ln	0.0	0.3	0.0	1.6	0.0	0.1	0.0	3.2
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.0	1.6	0.0	0.1	0.0	3.3
%ile Storage Ratio (RQ%)	0.00	0.09	0.00	0.18	0.00	0.02	0.00	0.34
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	251	0	0	0	369	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	6.4	0.0	0.0	0.0	5.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.4	0.0	0.0	0.0	5.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	1293	0	0	0	1293	0	0
V/C Ratio (X)	0.00	0.19	0.00	0.00	0.00	0.29	0.00	0.00
Avail Cap (c_a), veh/h	0	1293	0	0	0	1293	0	0
Upstream Filter (I)	0.00	0.97	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.1	0.0	0.0	0.0	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.5	0.0	0.0	0.0	3.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.1	0.0	0.0	0.0	2.8	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.2	0.0	0.0	0.0	2.8	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.27	0.00	0.00	0.00	0.22	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	259	0	0	0	383	0	0
Grp Sat Flow (s), veh/h/ln	0	1816	0	0	0	1839	0	0
Q Serve Time (g_s), s	0.0	6.4	0.0	0.0	0.0	5.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	6.4	0.0	0.0	0.0	5.7	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.51	0.00	0.07	0.00	0.15
Lane Grp Cap (c), veh/h	0	1326	0	0	0	1343	0	0
V/C Ratio (X)	0.00	0.20	0.00	0.00	0.00	0.29	0.00	0.00
Avail Cap (c_a), veh/h	0	1326	0	0	0	1343	0	0
Upstream Filter (I)	0.00	0.97	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.1	0.0	0.0	0.0	3.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.5	0.0	0.0	0.0	3.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.2	0.0	0.0	0.0	2.9	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.3	0.0	0.0	0.0	2.9	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.28	0.00	0.00	0.00	0.23	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		9.5						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	26	510	9	752	150	78
v/c Ratio	0.06	0.21	0.02	0.31	0.55	0.24
Control Delay	5.2	6.3	5.5	5.9	34.2	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	6.3	5.5	5.9	34.2	16.6
Queue Length 50th (ft)	6	72	1	64	63	16
Queue Length 95th (ft)	m19	123	7	117	110	48
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	450	2406	593	2416	605	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.21	0.02	0.31	0.25	0.11

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	691	32	7	324	9	28	11	8	8	13	6
Future Volume (veh/h)	12	691	32	7	324	9	28	11	8	8	13	6
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	13	751	35	8	352	10	30	12	9	9	14	7
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	840	2632	123	614	2687	76	149	56	29	87	107	41
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	1.00	1.00	1.00	0.76	0.76	0.76	0.10	0.10	0.10	0.10	0.10	0.10
Ln Grp Delay, s/veh	0.1	0.5	0.5	2.3	2.7	2.7	33.7	0.0	0.0	33.0	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		799			370			51			30	
Approach Delay, s/veh		0.5			2.7			33.7			33.0	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		66.2		13.8		66.2		13.8
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		4.1		3.2		4.1		4.2
Green Ext Time (g_e), s		1.4		0.6		1.4		0.6
Prob of Phs Call (p_c)		1.00		0.83		1.00		0.83
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		1016		277		686		743
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3444		1024		3515		540
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		160		396		100		275
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	13	0	30	0	8	0	51
Grp Sat Flow (s), veh/h/ln	0	1016	0	1697	0	686	0	1558
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.9
Cycle Q Clear Time (g_c), s	0.0	2.1	0.0	1.2	0.0	0.2	0.0	2.2
Perm LT Sat Flow (s_l), veh/h/ln	0	1016	0	1413	0	686	0	1413
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1835	0	0	0	1810
Perm LT Eff Green (g_p), s	0.0	61.2	0.0	8.3	0.0	61.2	0.0	8.3
Perm LT Serve Time (g_u), s	0.0	59.1	0.0	6.1	0.0	61.2	0.0	7.1
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.9
Time to First Blk (g_f), s	0.0	0.0	0.0	3.6	0.0	0.0	0.0	1.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.30	0.00	1.00	0.00	0.59
Lane Grp Cap (c), veh/h	0	840	0	236	0	614	0	234
V/C Ratio (X)	0.00	0.02	0.00	0.13	0.00	0.01	0.00	0.22
Avail Cap (c_a), veh/h	0	840	0	747	0	614	0	709
Upstream Filter (I)	0.00	0.95	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	32.6	0.0	2.2	0.0	33.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.1	0.0	33.0	0.0	2.3	0.0	33.7
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.1
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.07	0.00	0.02	0.00	0.11
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	386	0	0	0	177	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Lane Grp Cap (c), veh/h	0	1353	0	0	0	1353	0	0
V/C Ratio (X)	0.00	0.29	0.00	0.00	0.00	0.13	0.00	0.00
Avail Cap (c_a), veh/h	0	1353	0	0	0	1353	0	0
Upstream Filter (I)	0.00	0.95	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.5	0.0	0.0	0.0	2.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.00	0.08	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	400	0	0	0	185	0	0
Grp Sat Flow (s), veh/h/ln	0	1834	0	0	0	1845	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.09	0.00	0.23	0.00	0.05	0.00	0.18
Lane Grp Cap (c), veh/h	0	1402	0	0	0	1410	0	0
V/C Ratio (X)	0.00	0.29	0.00	0.00	0.00	0.13	0.00	0.00
Avail Cap (c_a), veh/h	0	1402	0	0	0	1410	0	0
Upstream Filter (I)	0.00	0.95	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.5	0.0	0.0	0.0	2.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.1	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.00	0.09	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		3.3						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	13	786	8	362	51	30
v/c Ratio	0.02	0.27	0.01	0.12	0.26	0.14
Control Delay	2.6	2.1	3.0	2.4	30.6	27.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.6	2.2	3.0	2.4	30.6	27.2
Queue Length 50th (ft)	1	38	1	21	19	10
Queue Length 95th (ft)	m4	50	4	34	51	34
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	841	2961	555	2971	615	669
Starvation Cap Reductn	0	631	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.34	0.01	0.12	0.08	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	456	37	9	700	28	108	17	21	16	21	39
Future Volume (veh/h)	26	456	37	9	700	28	108	17	21	16	21	39
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	28	496	40	10	761	30	117	18	23	17	23	42
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	531	2403	193	613	2514	99	235	32	32	82	92	126
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.24	0.24	0.24	0.72	0.72	0.72	0.14	0.14	0.14	0.14	0.14	0.14
Ln Grp Delay, s/veh	14.4	12.4	12.4	6.3	3.9	3.9	34.3	0.0	0.0	31.4	0.0	0.0
Ln Grp LOS	B	B	B	A	A	A	C			C		
Approach Vol, veh/h		564			801			158			82	
Approach Delay, s/veh		12.5			4.0			34.3			31.4	
Approach LOS		B			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		62.9		17.1		62.9		17.1
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.6		2.6		6.6
Max Q Clear (g_c+I1), s		11.6		5.5		12.0		9.6
Green Ext Time (g_e), s		1.8		2.2		1.8		2.1
Prob of Phs Call (p_c)		1.00		1.00		1.00		1.00
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		683		191		865		1082
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3318		637		3471		222
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		267		869		137		222
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	28	0	82	0	10	0	158
Grp Sat Flow (s), veh/h/ln	0	683	0	1697	0	865	0	1526
Q Serve Time (g_s), s	0.0	2.6	0.0	0.0	0.0	0.4	0.0	4.1
Cycle Q Clear Time (g_c), s	0.0	8.8	0.0	3.5	0.0	10.0	0.0	7.6
Perm LT Sat Flow (s_l), veh/h/ln	0	683	0	1388	0	865	0	1358
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1844	0	0	0	1796
Perm LT Eff Green (g_p), s	0.0	57.9	0.0	11.6	0.0	57.9	0.0	11.6
Perm LT Serve Time (g_u), s	0.0	51.7	0.0	4.0	0.0	48.3	0.0	8.1
Perm LT Q Serve Time (g_ps), s	0.0	2.6	0.0	0.0	0.0	0.4	0.0	4.1
Time to First Blk (g_f), s	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.21	0.00	1.00	0.00	0.74
Lane Grp Cap (c), veh/h	0	531	0	300	0	613	0	299
V/C Ratio (X)	0.00	0.05	0.00	0.27	0.00	0.02	0.00	0.53
Avail Cap (c_a), veh/h	0	531	0	737	0	613	0	685
Upstream Filter (I)	0.00	0.96	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	14.2	0.0	30.7	0.0	6.3	0.0	32.3
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.7	0.0	0.0	0.0	2.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	14.4	0.0	31.4	0.0	6.3	0.0	34.3
1st-Term Q (Q1), veh/ln	0.0	0.5	0.0	1.6	0.0	0.1	0.0	3.3
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.5	0.0	1.7	0.0	0.1	0.0	3.5
%ile Storage Ratio (RQ%)	0.00	0.14	0.00	0.19	0.00	0.03	0.00	0.35
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	264	0	0	0	388	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	9.5	0.0	0.0	0.0	6.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	9.5	0.0	0.0	0.0	6.2	0.0	0.0
Lane Grp Cap (c), veh/h	0	1281	0	0	0	1281	0	0
V/C Ratio (X)	0.00	0.21	0.00	0.00	0.00	0.30	0.00	0.00
Avail Cap (c_a), veh/h	0	1281	0	0	0	1281	0	0
Upstream Filter (I)	0.00	0.96	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.0	0.0	0.0	0.0	3.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.4	0.0	0.0	0.0	3.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.7	0.0	0.0	0.0	3.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	4.8	0.0	0.0	0.0	3.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.41	0.00	0.00	0.00	0.24	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	272	0	0	0	403	0	0
Grp Sat Flow (s), veh/h/ln	0	1816	0	0	0	1839	0	0
Q Serve Time (g_s), s	0.0	9.6	0.0	0.0	0.0	6.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	9.6	0.0	0.0	0.0	6.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.51	0.00	0.07	0.00	0.15
Lane Grp Cap (c), veh/h	0	1315	0	0	0	1331	0	0
V/C Ratio (X)	0.00	0.21	0.00	0.00	0.00	0.30	0.00	0.00
Avail Cap (c_a), veh/h	0	1315	0	0	0	1331	0	0
Upstream Filter (I)	0.00	0.96	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.1	0.0	0.0	0.0	3.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.4	0.0	0.0	0.0	3.9	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.8	0.0	0.0	0.0	3.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.0	0.0	0.0	0.0	3.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.42	0.00	0.00	0.00	0.25	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		11.4						
HCM 2010 LOS		B						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	28	536	10	791	158	82
v/c Ratio	0.07	0.23	0.02	0.33	0.56	0.24
Control Delay	5.1	6.2	5.9	6.4	33.7	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	6.2	5.9	6.4	33.7	16.0
Queue Length 50th (ft)	7	78	1	72	66	17
Queue Length 95th (ft)	m18	133	8	130	113	48
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	423	2376	571	2386	604	696
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.23	0.02	0.33	0.26	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	723	34	7	339	9	29	12	8	8	14	6
Future Volume (veh/h)	13	723	34	7	339	9	29	12	8	8	14	6
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	786	37	8	368	10	32	13	9	9	15	7
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	825	2625	124	595	2685	73	152	58	28	86	112	41
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	1.00	1.00	1.00	0.76	0.76	0.76	0.11	0.11	0.11	0.11	0.11	0.11
Ln Grp Delay, s/veh	0.1	0.5	0.5	2.3	2.7	2.7	33.7	0.0	0.0	32.9	0.0	0.0
Ln Grp LOS	A	A	A	A	A	A	C			C		
Approach Vol, veh/h		837			386			54			31	
Approach Delay, s/veh		0.5			2.7			33.7			32.9	
Approach LOS		A			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		66.0		14.0		66.0		14.0
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.5		2.6		6.5
Max Q Clear (g_c+I1), s		4.3		3.3		4.2		4.4
Green Ext Time (g_e), s		1.5		0.6		1.5		0.6
Prob of Phs Call (p_c)		1.00		0.85		1.00		0.85
Prob of Max Out (p_x)		0.00		0.00		0.00		0.00
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		1001		265		663		753
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3442		1054		3520		545
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		162		385		95		259
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	14	0	31	0	8	0	54
Grp Sat Flow (s), veh/h/ln	0	1001	0	1703	0	663	0	1557
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.0
Cycle Q Clear Time (g_c), s	0.0	2.3	0.0	1.3	0.0	0.2	0.0	2.4
Perm LT Sat Flow (s_l), veh/h/ln	0	1001	0	1412	0	663	0	1412
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1836	0	0	0	1809
Perm LT Eff Green (g_p), s	0.0	61.0	0.0	8.5	0.0	61.0	0.0	8.5
Perm LT Serve Time (g_u), s	0.0	58.8	0.0	6.1	0.0	61.0	0.0	7.2
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.0
Time to First Blk (g_f), s	0.0	0.0	0.0	3.7	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.29	0.00	1.00	0.00	0.59
Lane Grp Cap (c), veh/h	0	825	0	239	0	595	0	237
V/C Ratio (X)	0.00	0.02	0.00	0.13	0.00	0.01	0.00	0.23
Avail Cap (c_a), veh/h	0	825	0	750	0	595	0	709
Upstream Filter (I)	0.00	0.94	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	32.5	0.0	2.3	0.0	33.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.1	0.0	32.9	0.0	2.3	0.0	33.7
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.1
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.1
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.07	0.00	0.02	0.00	0.12
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	404	0	0	0	185	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Lane Grp Cap (c), veh/h	0	1350	0	0	0	1350	0	0
V/C Ratio (X)	0.00	0.30	0.00	0.00	0.00	0.14	0.00	0.00
Avail Cap (c_a), veh/h	0	1350	0	0	0	1350	0	0
Upstream Filter (I)	0.00	0.94	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.5	0.0	0.0	0.0	2.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.00	0.09	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	419	0	0	0	193	0	0
Grp Sat Flow (s), veh/h/ln	0	1834	0	0	0	1846	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.09	0.00	0.23	0.00	0.05	0.00	0.17
Lane Grp Cap (c), veh/h	0	1399	0	0	0	1408	0	0
V/C Ratio (X)	0.00	0.30	0.00	0.00	0.00	0.14	0.00	0.00
Avail Cap (c_a), veh/h	0	1399	0	0	0	1408	0	0
Upstream Filter (I)	0.00	0.94	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.5	0.0	0.0	0.0	2.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.2	0.0	0.0	0.0	1.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.00	0.09	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		3.3						
HCM 2010 LOS		A						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	14	823	8	378	54	31
v/c Ratio	0.02	0.28	0.02	0.13	0.28	0.15
Control Delay	2.6	2.1	3.0	2.4	31.0	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	2.2	3.0	2.4	31.0	27.3
Queue Length 50th (ft)	1	40	1	22	21	11
Queue Length 95th (ft)	m4	52	4	37	53	35
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	828	2959	532	2967	614	671
Starvation Cap Reductn	0	577	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.35	0.02	0.13	0.09	0.05

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	478	39	9	733	29	113	18	22	17	22	41
Future Volume (veh/h)	27	478	39	9	733	29	113	18	22	17	22	41
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	29	520	42	10	797	32	123	20	24	18	24	45
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	507	2379	192	589	2487	100	242	34	33	83	95	133
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.24	0.24	0.24	0.72	0.72	0.72	0.15	0.15	0.15	0.15	0.15	0.15
Ln Grp Delay, s/veh	15.2	12.9	12.9	6.8	4.2	4.2	34.0	0.0	0.0	31.0	0.0	0.0
Ln Grp LOS	B	B	B	A	A	A	C			C		
Approach Vol, veh/h		591			839			167			87	
Approach Delay, s/veh		13.0			4.2			34.0			31.0	
Approach LOS		B			A			C			C	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Case No		6.0		8.0		6.0		8.0
Phs Duration (G+Y+Rc), s		62.4		17.6		62.4		17.6
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5
Max Green (Gmax), s		36.0		33.5		36.0		33.5
Max Allow Headway (MAH), s		2.6		6.6		2.6		6.6
Max Q Clear (g_c+I1), s		12.1		5.6		12.5		10.0
Green Ext Time (g_e), s		1.9		2.3		1.9		2.2
Prob of Phs Call (p_c)		1.00		1.00		1.00		1.00
Prob of Max Out (p_x)		0.00		0.00		0.00		0.01
Left-Turn Movement Data								
Assigned Mvmt		5		7		1		3
Mvmt Sat Flow, veh/h		659		191		845		1079
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3318		628		3469		227
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		267		878		139		219
Left Lane Group Data								
Assigned Mvmt	0	5	0	7	0	1	0	3
Lane Assignment				L+T+R				L+T+R
Lanes in Grp	0	1	0	1	0	1	0	1

Grp Vol (v), veh/h	0	29	0	87	0	10	0	167
Grp Sat Flow (s), veh/h/ln	0	659	0	1697	0	845	0	1525
Q Serve Time (g_s), s	0.0	2.8	0.0	0.0	0.0	0.4	0.0	4.3
Cycle Q Clear Time (g_c), s	0.0	9.6	0.0	3.6	0.0	10.5	0.0	8.0
Perm LT Sat Flow (s_l), veh/h/ln	0	659	0	1384	0	845	0	1353
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1844	0	0	0	1797
Perm LT Eff Green (g_p), s	0.0	57.4	0.0	12.1	0.0	57.4	0.0	12.1
Perm LT Serve Time (g_u), s	0.0	50.6	0.0	4.1	0.0	47.2	0.0	8.5
Perm LT Q Serve Time (g_ps), s	0.0	2.8	0.0	0.0	0.0	0.4	0.0	4.3
Time to First Blk (g_f), s	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.4
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.4
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.21	0.00	1.00	0.00	0.74
Lane Grp Cap (c), veh/h	0	507	0	312	0	589	0	309
V/C Ratio (X)	0.00	0.06	0.00	0.28	0.00	0.02	0.00	0.54
Avail Cap (c_a), veh/h	0	507	0	737	0	589	0	685
Upstream Filter (I)	0.00	0.95	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	15.0	0.0	30.3	0.0	6.8	0.0	31.9
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.7	0.0	0.0	0.0	2.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	15.2	0.0	31.0	0.0	6.8	0.0	34.0
1st-Term Q (Q1), veh/ln	0.0	0.5	0.0	1.7	0.0	0.1	0.0	3.5
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.5	0.0	1.8	0.0	0.1	0.0	3.7
%ile Storage Ratio (RQ%)	0.00	0.15	0.00	0.20	0.00	0.03	0.00	0.37
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	277	0	0	0	407	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (g_s), s	0.0	10.1	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.1	0.0	0.0	0.0	6.8	0.0	0.0
Lane Grp Cap (c), veh/h	0	1269	0	0	0	1269	0	0
V/C Ratio (X)	0.00	0.22	0.00	0.00	0.00	0.32	0.00	0.00
Avail Cap (c_a), veh/h	0	1269	0	0	0	1269	0	0
Upstream Filter (I)	0.00	0.95	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.5	0.0	0.0	0.0	4.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.9	0.0	0.0	0.0	4.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.9	0.0	0.0	0.0	3.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.1	0.0	0.0	0.0	3.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.43	0.00	0.00	0.00	0.26	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	285	0	0	0	422	0	0
Grp Sat Flow (s), veh/h/ln	0	1816	0	0	0	1838	0	0
Q Serve Time (g_s), s	0.0	10.1	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.1	0.0	0.0	0.0	6.8	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.15	0.00	0.52	0.00	0.08	0.00	0.14
Lane Grp Cap (c), veh/h	0	1302	0	0	0	1318	0	0
V/C Ratio (X)	0.00	0.22	0.00	0.00	0.00	0.32	0.00	0.00
Avail Cap (c_a), veh/h	0	1302	0	0	0	1318	0	0
Upstream Filter (I)	0.00	0.95	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	12.5	0.0	0.0	0.0	4.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.9	0.0	0.0	0.0	4.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	5.1	0.0	0.0	0.0	3.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.2	0.0	0.0	0.0	3.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.44	0.00	0.00	0.00	0.27	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay		11.6						
HCM 2010 LOS		B						

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	29	562	10	829	167	87
v/c Ratio	0.07	0.24	0.02	0.35	0.58	0.25
Control Delay	5.3	6.4	6.1	6.7	33.8	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	6.4	6.1	6.7	33.8	15.5
Queue Length 50th (ft)	8	84	1	78	70	18
Queue Length 95th (ft)	m20	143	8	142	118	49
Internal Link Dist (ft)		276		271	216	209
Turn Bay Length (ft)	95		80			
Base Capacity (vph)	397	2354	550	2364	603	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.24	0.02	0.35	0.28	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

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Appendix E LRT Alternative Cost Worksheets

LRT BASE SYSTEM: LRT along SH-82, SH-82 Airport Station, Marolt Easement, Terminal @ Rubey Park

At-Grade Crossing of SH-82 at Brush Creek; At-Grade along Shale Bluffs, Underground at Maroon Creek Roundabout

Technology
Diesel-Electric
$ 428,000,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Brush Creek Intercept Lot (2000 Parking Spaces, Lighting, etc.)	LS	1	$ 20,000,000	$ 20,000,000
SH-82 Crossing at Brush Creek Road (Opt D1 At-Grade Crossing)	LS	1	$ 2,140,592	$ 2,140,592
Brush Creek - Airport Earthwork & Walls	LS	1	$ 600,000	$ 600,000
Structures - Brush Creek (Opt A Above Grade)	LS	0		$ -
Structures - Brush Creek (Opt A1 Below Grade)	LS	0		$ -
Structures - Brush Creek (Opt C Above Grade)	LS	0		$ -
Structures - Shale Bluffs Viaduct	SF	0		$ -
Structures - Airport Station at Terminal - Trench Earthwork & Walls	LS	0		$ -
Structures - Historic Maroon Creek Bridge Reconstruction	LS	1	$ 5,000,000	$ 5,000,000
Structures - Castle Creek Bridge (4 lanes + LRT)	SF	41,160	$ 500	$ 20,580,000
Structures - Existing Castle Creek Bridge Rehabiliation	LS	1	$ 1,400,000	$ 1,400,000
Structures - Trench Maroon Creek Roundabout	LS	1	$ 10,906,726	$ 10,906,726
Structures - Cut & Cover Marolt Tunnel, Open Space Expansion	LS	1	$ 24,160,000	$ 24,160,000
Subgrade for Ballasted Track	TF	25,350	$ 150	$ 3,802,500
Track - Ballasted	TF	24,150	$ 650	$ 15,697,500
Track - Embedded (Street)	TF	4,769	$ 850	$ 4,053,650
Track - Direct Fixation (Bridges)	TF	1,700	$ 750	$ 1,275,000
Track - Double Track (Ballasted)	TF	600	$ 1,600	$ 960,000
Track - Double Track (Embedded)	TF	2,300	$ 2,000	$ 4,600,000
Track - Vibration & Noise Dampening	TF	5,969	$ 100	$ 596,900
Stations - At-Grade (Buttermilk, Airport, Truscott)	EA	3	$ 1,250,000	$ 3,750,000
Stations - At-Grade (7th & Main)	LS	1	$ 1,750,000	$ 1,750,000
Stations - At Grade (Rubey Park)	LS	1	$ 1,750,000	$ 1,750,000
Stations - At-Grade (Main & Galena)	LS	0		$ -
Stations - At-Grade Brush Creek	LS	1	$ 2,000,000	$ 2,000,000
Stations - Aerial / Elevated Platform (Brush Creek Option A)	LS	0		$ -
Stations - Underground / Trench Platform (Airport Terminal)	LS	0		$ -
Moving Walkway - SH 82 / AABC to Airport Terminal	LS	1	$ 4,000,000	$ 4,000,000
Stations - Underground / Trench Platform (Maroon Creek)	LS	1	$ 2,000,000	$ 2,000,000
Galena Streetscape	LS	0		$ -
Support Facilities @ Brush Creek (O&M Facilities, Yards, Shops, Admin.)	LS	1	$ 30,000,000	$ 30,000,000
Systems (TSP, Communications, Fare Collection, Gates, Signals)	TM	6.1	$ 3,000,000	$ 18,300,000
Systems (TPSS & Station Charging - OESS Vehicles Only)	LS	0		$ -
Infrastructure Subtotal				$ 179,322,868

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 5,379,686
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 896,614
Drainage	3.0% - 5.0%	3.0%	$ 5,379,686
Signing & Striping	0.5% - 1.0%	0.5%	$ 896,614
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 12,552,601
Mobilization	5.0% - 15%	7.0%	$ 12,552,601
Total of Infrastructure Allowances			$ 37,657,802

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
LRT Vehicles - Diesel Electric	EA	10	$ 4,500,000	$ 45,000,000
LRT Vehicles - Wireless / On-Board Storage	EA			$ -
Galena Main St to Rubey Park Shuttle	LS			$ -
Rolling Stock Additional Allowances	LS	1	$ 5,000,000	$ 5,000,000
Rolling Stock Total				$ 50,000,000

Summary of Capital Costs		Cost
Infrastructure		$ 179,322,868
Infrastructure Allowances		$ 37,657,802
Rolling Stock		$ 50,000,000
Infrastructure & Rolling Stock Construction Total		$ 266,980,670

LRT BASE SYSTEM: LRT along SH-82, SH-82 Airport Station, Marolt Easement, Terminal @ Rubey Park

At-Grade Crossing of SH-82 at Brush Creek; At-Grade along Shale Bluffs, Underground at Maroon Creek Roundabout

Technology
Diesel-Electric
$ 428,000,000

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 21,698,067
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 32,547,101
Design & Construction Engineering Total			$ 54,245,168

Right-of-Way	Units	Quantity	Cost	
			Unit Cost	Cost
Right-of-Way - Brush Creek Intercept Lot	LS	1		$ -
Right-of-Way - Station (Main & Galena St)	LS			$ -
Right-of-Way - (East of Marolt Easement to 7th & Main St. w/ Station)	LS	1	$ 8,000,000	$ 8,000,000
Right-of-Way Total				$ 8,000,000

Capital Costs		Cost
Infrastructure		$ 179,322,868
Infrastructure Allowances		$ 37,657,802
Rolling Stock		$ 50,000,000
Design & Construction Engineering		$ 54,245,168
Right-of-Way		$ 8,000,000
Total Project Costs		$ 329,225,838
Total Project Contingency	30%	$ 98,767,751
Total Project with Contingency		$ 427,993,589

LRT PRIME SYSTEM: LRT on SH-82, U/G Airport Station at Terminal, Marolt Easement, Terminal @ Main & Galena
Bridge over SH-82 at Brush Creek; Viaduct along Shale Bluffs, Underground at Maroon Creek Roundabout

Technology
Electric - OESS

$ 527,800,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Brush Creek Intercept Lot (2000 Parking Spaces, Lighting, Mixed Use Development, etc.)	LS	1	$ 20,000,000	$ 20,000,000
Brush Creek SH-82 Crossing Earthwork & Walls	LS	1	$ 2,916,391	$ 2,916,391
Brush Creek - Airport Earthwork & Walls	LS	1	$ 658,325	$ 658,325
Structures - Brush Creek (Opt A Above Grade)	SF	13,547	$ 400	$ 5,418,800
Structures - Brush Creek (Opt A1 Below Grade)	LS	0		$ -
Structures - Brush Creek (Opt C Above Grade)	LS	0		$ -
Structures - Shale Bluffs Viaduct	SF	25,678	$ 400	$ 10,271,200
Structures - Airport Station at Terminal - Trench Earthwork & Walls	LS	1	$ 13,727,785	$ 13,727,785
Structures - Historic Maroon Creek Bridge Reconstruction	LS	1	$ 5,000,000	$ 5,000,000
Structures - Castle Creek Bridge (4 lanes + LRT)	SF	41,160	$ 500	$ 20,580,000
Structures - Existing Castle Creek Bridge Rehabiliation	LS	1	$ 1,400,000	$ 1,400,000
Structures - Trench Maroon Creek Roundabout	LS	1	$ 10,906,726	$ 10,906,726
Structures - Cut & Cover Marolt Tunnel, Open Space Expansion	LS	1	$ 24,160,000	$ 24,160,000
Subgrade for Ballasted Track	TF	22,421	$ 150	$ 3,363,150
Track - Ballasted	TF	21,821	$ 650	$ 14,183,650
Track - Embedded (Street)	TF	3,484	$ 850	$ 2,961,400
Track - Direct Fixation (Bridges)	TF	4,007	$ 750	$ 3,005,250
Track - Double Track (Ballasted)	TF	600	$ 1,600	$ 960,000
Track - Double Track (Embedded)	TF	2,300	$ 2,000	$ 4,600,000
Track - Vibration & Noise Dampening	TF	4,684	$ 100	$ 468,400
Stations - At-Grade (Buttermilk, Truscott)	EA	2	$ 1,250,000	$ 2,500,000
Stations - At-Grade (7th & Main)	LS	1	$ 1,750,000	$ 1,750,000
Stations - At Grade (Rubey Park)	LS	0		$ -
Stations - At-Grade (Main & Galena)	LS	1	$ 2,000,000	$ 2,000,000
Stations - At-Grade Brush Creek	LS	0		$ -
Stations - Aerial / Elevated Platform (Brush Creek Option A)	LS	1	$ 3,000,000	$ 3,000,000
Stations - Underground / Trench Platform (Airport Terminal)	LS	1	$ 2,500,000	$ 2,500,000
Moving Walkway - SH 82 / AABC to Airport Terminal	LS	0		$ -
Stations - Underground / Trench Platform (Maroon Creek)	LS	1	$ 2,000,000	$ 2,000,000
Galena Streetscape	LS	1	$ 2,000,000	$ 2,000,000
Support Facilities @ Brush Creek (O&M Facilities, Yards, Shops, Admin.)	LS	1	$ 30,000,000	$ 32,000,000
Systems (TSP, Communications, Fare Collection, Gates, Signals)	TM	6.1	$ 3,000,000	$ 18,300,000
Systems (TPSS & Station Charging - OESS Vehicles Only)	TM	6.1	$ 2,000,000	$ 12,200,000
Infrastructure Subtotal				$ 222,831,077

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 6,684,932
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 1,114,155
Drainage	3.0% - 5.0%	3.0%	$ 6,684,932
Signing & Striping	0.5% - 1.0%	0.5%	$ 1,114,155
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 15,598,175
Mobilization	5.0% - 15%	7.0%	$ 15,598,175
Total of Infrastructure Allowances			$ 46,794,526

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
LRT Vehicles - Diesel Electric	EA			$ -
LRT Vehicles - Wireless / On-Board Storage	EA	10	$ 5,000,000	$ 50,000,000
Galena Main St to Rubey Park Shuttle	LS	1	$ 3,000,000	$ 3,000,000
Rolling Stock Additional Allowances	LS	1	$ 5,000,000	$ 5,000,000
Rolling Stock Total				$ 58,000,000

Summary of Capital Costs		Cost
Infrastructure		$ 222,831,077
Infrastructure Allowances		$ 46,794,526
Rolling Stock		$ 58,000,000
Infrastructure & Rolling Stock Construction Total		$ 327,625,603

LRT PRIME SYSTEM: LRT on SH-82, U/G Airport Station at Terminal, Marolt Easement, Terminal @ Main & Galena
Bridge over SH-82 at Brush Creek; Viaduct along Shale Bluffs, Underground at Maroon Creek Roundabout

Technology
Electric - OESS

$ 527,800,000

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 26,962,560
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 40,443,840
Design & Construction Engineering Total			$ 67,406,401

Right-of-Way	Units	Quantity	Cost	
			Unit Cost	Cost
Right-of-Way - Brush Creek Intercept Lot	LS	1		$ -
Right-of-Way - Station (Main & Galena St)	LS	1	$ 3,000,000	$ 3,000,000
Right-of-Way - (East of Marolt Easement to 7th & Main St. w/ Station)	LS	1	$ 8,000,000	$ 8,000,000
Right-of-Way Total				$ 11,000,000

Capital Costs		Cost
Infrastructure		$ 222,831,077
Infrastructure Allowances		$ 46,794,526
Rolling Stock		$ 58,000,000
Design & Construction Engineering		$ 67,406,401
Right-of-Way		$ 11,000,000
Total Project Costs		$ 406,032,004
Total Project Contingency	30%	$ 121,809,601
Total Project with Contingency		$ 527,841,605

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Appendix F BRT ALTERNATIVE COST WORKSHEETS

BRT BASE SYSTEM: BRT on SH-82, SH-82 Airport Station, Marolt Easement, Terminal @ Rubey Park
Operator Controlled; At-Grade & Along SH-82 Lanes

Technology
CNG
$ 159,100,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Brush Creek Intercept Lot (2000 Parking Spaces, Lighting, Mixed Use Development, etc.)	LS	1	$ 20,000,000	$ 20,000,000
Stations - Brush Creek	LS	1	$ 1,000,000	$ 1,000,000
Stations - Intermediate (Buttermilk, Truscott, Maroon Creek)	EA	3	$ 150,000	$ 450,000
Stations - 7th & Main St	LS	1	$ 500,000	$ 500,000
Stations - Rubey Park	LS	1	$ 150,000	$ 150,000
Stations - Main & Galena	LS			$ -
Roadway Improvements (Signing, Striping)	LS	1	$ 250,000	$ 250,000
Dedicated Bus Lanes 1 EB, 1 WB	LM			$ -
Autonomous - Precision Mapping, Education	LS			
Structures - Cut & Cover Marolt Easement Open Space Expansion	LS	1	$ 24,160,000	$ 24,160,000
Structures - Castle Creek Bridge	SF	41,160	$ 500	$ 20,580,000
Structures - Existing Castle Creek Bridge Rehabiliation	LS	1	$ 1,400,000	$ 1,400,000
Intersection Signals & Controls	LS	1	$ 1,500,000	$ 1,500,000
Galena Streetscape	LS			$ -
Infrastructure Subtotal				$ 69,990,000

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 2,099,700
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 349,950
Drainage	3.0% - 5.0%	3.0%	$ 2,099,700
Signing & Striping	0.5% - 1.0%	0.5%	$ 349,950
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 4,899,300
Mobilization	5.0% - 15%	7.0%	$ 4,899,300
Total of Infrastructure Allowances			$ 14,697,900

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
BRT Vehicles, CNG	EA	10	$ 750,000	$ 7,500,000
BRT Vehicles, Electric	EA			$ -
BRT Vehicles, Electric Charging System	LS			$ -
BRT Vehicles, Autonomous Retrofit	EA			
Galena Main St to Rubey Park Shuttle	LS			$ -
Rolling Stock Additional Allowances	LS	1	$ 1,000,000	$ 1,000,000
Rolling Stock Total				$ 8,500,000

Summary of Capital Costs		Cost
Infrastructure		$ 69,990,000
Infrastructure Allowances		$ 14,697,900
Rolling Stock		$ 8,500,000
Infrastructure & Rolling Stock Construction Total		$ 93,187,900

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 8,468,790
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 12,703,185
Design & Construction Engineering Total			$ 21,171,975

Right-of-Way	Units	Quantity	Cost	
			Unit Cost	Cost
Right-of-Way - Brush Creek Intercept Lot	LS	1		$ -
Right-of-Way - Station (Main & Galena St)	LS			$ -
Right-of-Way - (East of Marolt Easement to 7th & Main St. w/ Station)	LS	1	$ 8,000,000	$ 8,000,000
Right-of-Way Total				$ 8,000,000

Capital Costs		Cost
Infrastructure		$ 69,990,000
Infrastructure Allowances		$ 14,697,900
Rolling Stock		$ 8,500,000
Design & Construction Engineering		$ 21,171,975
Right-of-Way		$ 8,000,000
Total Project Costs		$ 122,359,875
Total Project Contingency	30%	$ 36,707,963
Total Project with Contingency		$ 159,067,838

BRT PHASING: BRT Autonomous Infrastructure

$ 4,900,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Autonomous - Precision Mapping, Education	LS	1	$ 2,500,000	$ 2,500,000
Infrastructure Subtotal				$ 2,500,000

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 75,000
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 12,500
Drainage	3.0% - 5.0%	3.0%	$ 75,000
Signing & Striping	0.5% - 1.0%	0.5%	$ 12,500
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 175,000
Mobilization	5.0% - 15%	7.0%	$ 175,000
Total of Infrastructure Allowances			$ 525,000

Summary of Capital Costs		Cost
Infrastructure		$ 2,500,000
Infrastructure Allowances		$ 525,000
Infrastructure & Rolling Stock Construction Total		$ 3,025,000

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 302,500
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 453,750
Design & Construction Engineering Total			$ 756,250

Capital Costs		Cost
Infrastructure		$ 2,500,000
Infrastructure Allowances		$ 525,000
Design & Construction Engineering		$ 756,250
Total Project Costs		$ 3,781,250
Total Project Contingency	30%	$ 1,134,375
Total Project with Contingency		$ 4,915,625

BRT PHASING: BRT Autonomous Retrofits per Bus

$ 330,000

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
BRT Vehicles, Autonomous Retrofit	EA	1	$ 250,000	$ 250,000
Rolling Stock Total				$ 250,000

Summary of Capital Costs		Cost
Rolling Stock		$ 250,000
Infrastructure & Rolling Stock Construction Total		$ 250,000

Capital Costs		Cost
Rolling Stock		$ 250,000
Design & Construction Engineering		$ -
Total Project Costs		$ 250,000
Total Project Contingency	30%	$ 75,000
Total Project with Contingency		$ 325,000

BRT PHASING: BRT Dedicated Lanes

$ 3,400,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Roadway Improvements (Signing, Striping)	LS	1	$ 250,000	$ 250,000
Dedicated Bus Lanes 1 EB, 1 WB	LM	6	$ 250,000	$ 1,500,000
Infrastructure Subtotal				$ 1,750,000

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 52,500
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 8,750
Drainage	3.0% - 5.0%	3.0%	$ 52,500
Signing & Striping	0.5% - 1.0%	0.5%	$ 8,750
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 122,500
Mobilization	5.0% - 15%	7.0%	$ 122,500
Total of Infrastructure Allowances			$ 367,500

Summary of Capital Costs		Cost
Infrastructure		$ 1,750,000
Infrastructure Allowances		$ 367,500
Infrastructure & Rolling Stock Construction Total		$ 2,117,500

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 211,750
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 317,625
Design & Construction Engineering Total			$ 529,375

Capital Costs		Cost
Infrastructure		$ 1,750,000
Infrastructure Allowances		$ 367,500
Design & Construction Engineering		$ 529,375
Total Project Costs		$ 2,646,875
Total Project Contingency	30%	$ 794,063
Total Project with Contingency		$ 3,440,938

BRT PHASING: BRT Electric Bus Charging System

Technology
Electric
$ 13,000,000

Rolling Stock	Units	Quantity	Minimum Cost Unit Cost	Minimum Cost Cost
BRT Vehicles, Electric Charging System	LS	1	$ 10,000,000	$ 10,000,000
Rolling Stock Total				$ 10,000,000

Capital Costs		Cost
Rolling Stock		$ 10,000,000
Total Project Costs		$ 10,000,000
Total Project Contingency	30%	$ 3,000,000
Total Project with Contingency		$ 13,000,000

BRT PHASING: BRT Electric Rolling Stock per Bus

Technology
Electric
$ 1,300,000

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
BRT Vehicles, Electric	EA	1	$ 1,000,000	$ 1,000,000
Rolling Stock Total				$ 1,000,000

Capital Costs		Cost
Rolling Stock		$ 1,000,000
Total Project Costs		$ 1,000,000
Total Project Contingency	30%	$ 300,000
Total Project with Contingency		$ 1,300,000

BRT PHASING: Marolt Easement & Castle Creek Bridge

$ 102,600,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Stations - 7th & Main St	LS	1	$ 500,000	$ 500,000
Structures - Cut & Cover Marolt Easement Open Space Expansion	LS	1	$ 24,160,000	$ 24,160,000
Structures - Castle Creek Bridge	SF	41,160	$ 500	$ 20,580,000
Structures - Existing Castle Creek Bridge Rehabiliation	LS	1	$ 1,400,000	$ 1,400,000
Intersection Signals & Controls	LS	1	$ 250,000	$ 250,000
Infrastructure Subtotal				$ 46,890,000

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 1,406,700
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 234,450
Drainage	3.0% - 5.0%	3.0%	$ 1,406,700
Signing & Striping	0.5% - 1.0%	0.5%	$ 234,450
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 3,282,300
Mobilization	5.0% - 15%	7.0%	$ 3,282,300
Total of Infrastructure Allowances			$ 9,846,900

Summary of Capital Costs		Cost
Infrastructure		$ 46,890,000
Infrastructure Allowances		$ 9,846,900
Infrastructure & Rolling Stock Construction Total		$ 56,736,900

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 5,673,690
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 8,510,535
Design & Construction Engineering Total			$ 14,184,225

Right-of-Way	Units	Quantity	Cost	
			Unit Cost	Cost
Right-of-Way - (East of Marolt Easement to 7th & Main St. w/ Station)	LS	1	$ 8,000,000	$ 8,000,000
Right-of-Way Total				$ 8,000,000

Capital Costs		Cost
Infrastructure		$ 46,890,000
Infrastructure Allowances		$ 9,846,900
Design & Construction Engineering		$ 14,184,225
Right-of-Way		$ 8,000,000
Total Project Costs		$ 78,921,125
Total Project Contingency	30%	$ 23,676,338
Total Project with Contingency		$ 102,597,463

BRT PRIME SYSTEM: BRT on SH-82, SH-82 Airport Station, Marolt Easement, Terminal @ Main & Galena
Autonomous Controlled; At-Grade & Along Dedicated Bus Lanes

Technology
Electric
$ 200,500,000

Infrastructure Capital Costs	Units	Quantity	Cost	
			Unit Cost	Cost
Brush Creek Intercept Lot (2000 Parking Spaces, Lighting, Mixed Use Development, etc.)	LS	1	$ 20,000,000	$ 20,000,000
Stations - Brush Creek	LS	1	$ 1,000,000	$ 1,000,000
Stations - Intermediate (Buttermilk, Truscott, Maroon Creek)	EA	3	$ 150,000	$ 450,000
Stations - 7th & Main St	LS	1	$ 500,000	$ 500,000
Stations - Rubey Park	LS	0		$ -
Stations - Main & Galena	LS	1	$ 500,000	$ 500,000
Roadway Improvements (Signing, Striping)	LS	1	$ 500,000	$ 500,000
Dedicated Bus Lanes 1 EB, 1 WB	LM	6	$ 250,000	$ 1,500,000
Autonomous - Precision Mapping, Education	LS	1	$ 2,500,000	$ 2,500,000
Structures - Cut & Cover Marolt Easement Open Space Expansion	LS	1	$ 24,160,000	$ 24,160,000
Structures - Castle Creek Bridge	SF	41,160	$ 500	$ 20,580,000
Structures - Existing Castle Creek Bridge Rehabiliation	LS	1	$ 1,400,000	$ 1,400,000
Intersection Signals & Controls	LS	1	$ 1,750,000	$ 1,750,000
Galena Streetscape	LS	1	$ 2,000,000	$ 2,000,000
Infrastructure Subtotal				$ 76,840,000

Infrastructure Allowances	% Range	Cost	
		% Cost	Cost
Environmental Mitigation & NEPA	1.5% - 3.0%	3.0%	$ 2,305,200
Utilities (Relocations)	0.5% - 1.0%	0.5%	$ 384,200
Drainage	3.0% - 5.0%	3.0%	$ 2,305,200
Signing & Striping	0.5% - 1.0%	0.5%	$ 384,200
Construction Staging & Traffic Control	5.0% - 10%	7.0%	$ 5,378,800
Mobilization	5.0% - 15%	7.0%	$ 5,378,800
Total of Infrastructure Allowances			$ 16,136,400

Rolling Stock	Units	Quantity	Minimum Cost	
			Unit Cost	Cost
BRT Vehicles, CNG	EA			$ -
BRT Vehicles, Electric	EA	10	$ 1,000,000	$ 10,000,000
BRT Vehicles, Electric Charging System	LS	1	$ 10,000,000	$ 10,000,000
BRT Vehicles, Autonomous Retrofit	EA	10	$ 250,000	$ 2,500,000
Galena Main St to Rubey Park Shuttle	LS	1	$ 3,000,000	$ 3,000,000
Rolling Stock Additional Allowances	LS	1	$ 2,500,000	$ 2,500,000
Rolling Stock Total				$ 28,000,000

Summary of Capital Costs		Cost
Infrastructure		$ 76,840,000
Infrastructure Allowances		$ 16,136,400
Rolling Stock		$ 28,000,000
Infrastructure & Rolling Stock Construction Total		$ 120,976,400

Design & Construction Engineering	% Range	Cost	
		% Cost	Cost
Preliminary & Final Design	7.0% - 12.0%	10%	$ 9,297,640
Construction Engineering / Construction Management	7.0% - 22.0%	15%	$ 13,946,460
Design & Construction Engineering Total			$ 23,244,100

Right-of-Way	Units	Quantity	Cost	
			Unit Cost	Cost
Right-of-Way - Brush Creek Intercept Lot	LS	1		$ -
Right-of-Way - Station (Main & Galena St)	LS	1	$ 2,000,000	$ 2,000,000
Right-of-Way - (East of Marolt Easement to 7th & Main St. w/ Station)	LS	1	$ 8,000,000	$ 8,000,000
Right-of-Way Total				$ 10,000,000

Capital Costs		Cost
Infrastructure		$ 76,840,000
Infrastructure Allowances		$ 16,136,400
Rolling Stock		$ 28,000,000
Design & Construction Engineering		$ 23,244,100
Right-of-Way		$ 10,000,000
Total Project Costs		$ 154,220,500
Total Project Contingency	30%	$ 46,266,150
Total Project with Contingency		$ 200,486,650

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Appendix G TAC/EOTC/PUBLIC WORKSHOP MEETING MINUTES AND MATERIALS

TAC MEETING 1

September 15, 2016

Integrated Transportation System Plan
UVMS Kick Off/TAC 01 Meeting Minutes

Date: 9/15/16 **Time**: 10:00-1:00pm
Location: RFTA Bunker

Attendees:

Ralph Trapani, Parsons
Jen Leifheit, Parsons
Phil Hoffmann, Parsons
Greg Gaides, Parsons

David Johnson, RFTA
Dan Blakenship, RFTA
Brain Pettet, Pitkin County
John Krueger, City of Aspen

Randy Ready, City of Aspen
~~David Peckler, Snowmass Village~~
Michael Miracle, Aspen Ski Co
Lynn Rumbaugh, City of Aspen

Agenda:

+ **Introductions**

- Brian Pettet, Pitkin County, is the project manager for this task order
- TAC members to let Jen Leifheit know if you would like to add anyone else to represent your agency

+ **Schedule for UVMS**

- Reviewed schedule for TO3 - UVMS
- Aspen city council/mayor election in May/June - might need to bump up last public meeting and individual meetings with entities; Jen to revise and send with minutes
- Stakeholder Outreach
  - Next EOTC meeting is October 20. Ralph Trapani can't make it; will work to get Phil Hoffmann and Joe Kracum to attend instead to represent project. Want to remind them of our UVMS scope of work; focusing on the preferred alternative (not a travel patterns study). If time, could discuss some of the initial scoping thoughts (assumptions) and technology scan preview.
  - Aspen Ski Company would like to meet now to discuss how gondola connections fit into the ITSP
  - Politcal buy-in/consensus building effort will continue through outreach

+ **Air Sage Data**

- Still working on Pitkin Co change to Willits/El Jebel.
- Submitted information to Air Sage 9/20/16. Will be receiving data in 2-4 weeks.
- Licensure agreements should be signed and returned ASAP; Dan will distribute their changes to language for information
- New contact at Air Sage is Bill King; Ralph will distribute contact info
- Once get data, TAC members to assist with "smell test"/reasonable test
- Will be looking at total person flow and marry with transit flow (identify baseline travel patterns and transit shares)
- Stage III will be able to test alternatives with this tool
- Verizon data will be used, and expanded up using census data as a multiplier to account for 100% of trips
- Greg and Michael to discuss with Air Sage on tourist multiplier, and report back to team

- Data will be gathered as follows:

  AirSage zone shapefile, consisting of 43 internal and 4 external zones (47 total) for the study area. Below are the specifications for the three months and day parts.

  <u>Data collection months (3):</u>

  - Fall: September 30 (Wednesday) – October 29 (Thursday), 2015
  - Winter: February 10 (Wednesday) – March 10 (Wednesday), 2016
  - Summer: July 12 (Tuesday) – August 10 (Wednesday), 2016

  <u>Day Parts (3 for weekday and 3 for weekend):</u>

  Weekday:
  - AM Peak Period: 5:00am – 10:00am
  - Mid-Day Period: 10:30am –2:00pm
  - PM Peak Period: 2:00pm – 7:00pm

  Weekend:
  - AM Peak Period: 8:00am – Noon
  - Mid-Day Period: 12:30pm –2:00pm
  - PM Peak Period: 2:30pm – 7:00pm

  Note the above day part information applies to all three months.

- PM data and weekend data is included in the cost
- Will be important to tell the story of where the public is part of the problem/what their travel patterns are so that they can see the need for the solution and take ownership

+ **Next Steps**

- Technology scan - will be looking at "families" of technology and then breaking it down from there; will report to TAC in October
- Initial design fixed guideway alternative
- Initial design bus alternative
- Next UVMS TAC meeting Oct 27 10-12; ITSP TAC meeting will be Oct 27 1-4; trying to get the Third Street Center in Carbondale; Jen to send invite
- EOTC meeting on October 20; remind them of scope of work and early discussion on technology scan; Joe Kracum and Phil Hoffmann to attend; packets go out 10/12 - include scope and schedule

+ **Other/Questions?**

- Park City, Utah, is buying bus "shells" and then leasing technology so can be switched out as technology advances
- Discussed "Study Assumpitons" sheet and made revisions as a team; Jen to send updated version with minutes
- Pitkin Co airport plan will be part of their November Board discussion
- Brian Pettet to help set up small group meeting with Pitkin Co airport planners as part of TO2 ITSP outreach effort

TAC MEETING 2

October 27, 2016

UVMS TAC Meeting #1
10-27-2016

Date: 10-27-2016 **Time**: 10:00 a.m.
Location: Third Street Center, Carbondale

Attendees:
Phillip Hoffman, PTG
Jen Leifheit, PTG
Greg Gaides, PTG
Joseph Kracum, PTG
Leslie Lamont, Lamont Planning
Dan Blankenship, RFTA
David Johnson, RFTA
John Krueger, City of Aspen
Randy Ready, City of Aspen
Brian Pettet, Pitkin County
David Peckler, Snowmass Village
Michael Miracle, Aspen Skiing Company

Minutes:

Phil Hoff man: Technology Overview

LRT and streetcar are somewhat synonymous: 65 passengers per train, so two-car consist would be 130 or so passengers. Two-car consists will probably be maximum (2 90-ft vehicles); otherwise intersections will be impacted, thinks City of Aspen has 250-ft city blocks.

When PH visited many cities with OCS, the catenary (catenary refer specifically to the overhead wire; while system is OCS) did not seem intrusive. Trams have 40-60 seats. IF capacity is an issue, we can spec' the vehicles for extra or maximum capacity.

Capital cost for vehicles is $5 million/vehicle for LRVs with OCS.

On-board storage is a possibility, but vehicles still require charging en route (such as at-stations during dwell times, charging can be sort at 30-45 seconds). Now developing ultra-capacitors, which can be charged in shorter interval

RT: Any concerns at Owl Creek with OCS interfering with the flight zones?

PH: OCS will be less than 20 feet

RT, DB: Should still verify

RT: We can make the argument that here are plenty of options now, but OCS will still be viewed unfavorably. Diesel/Electric units are quieter than you think, even quitter than CNG buses.

RT: We want to be visionary, but we don't want to discuss a DV rail, keep scope/minimal operating segment limited; we would have a train now if Mayor Bennett had not gone there.

DB: Clean and quiet will be selling points, and capacity that will limit number of buses into Aspen

PH: Stadler Tramway claims 9.9 miles on one charge; general rules though is about 1 mile on a charge; super capacity/battery adds 15% or so to cost of vehicle + replacement

PH: Bordeaux, France and Augsburg, Germany use third rail; full on third rail not an option for Aspen

Wireless Pros/Cons: Basically, there are several, viable wireless options. Power requirements are really not that significant.

RT: You have to run the trains enough to keep the snow off. Probably cannot put skis on side. LRT is only thing operating in Denver on big snow days

PH: The alignment is on the south side on Main Street and on West side on Durant, with stations at 7th and 3rd and Rubey Park. Other than blocking right turns, the issue is the last two blocks between Wagner Park and RP. We have not developed a service plan. If we stopped at 7th, we could have longer trains

DB: We may need to look at minimally operable segments; running straight down main possibly to Galena should be considered for simplicity.

RR: If the Rio Grande Parking Garage area becomes a potential terminus (instead of RP), you would need to relocate library and jail.

DB: Costs may kill it, but having a station that is a straight shot might reduce travel times and be simpler.

RT: Everyone has great visions, but how clean a sheet of paper do we want to start with?

PH: Goal should be to get the vehicle to the center; we do not want it outside center and a million vehicles running around for transfers

RR: Galena and Main is not a deal breaker

DB: The primary option is getting to RB; we need options. We don't want to create a "this or nothing" option, or it will be nothing.

JK: If this were regional, then outskirts of Aspen would be fine, but not this segment.

All: Transfers are not all alike. Platform to platform transfers are different than a 20-minute transfer in middle of nowhere.

Alignment Presentation – RT

Brush Creek

3 Options at BC; all include a viaduct. Grade limitation of 2% with trains; impacts grade separated crossing options

RR: We would like to see a trail incorporated at Brush Creek to connect Brush Creek area with Aspen area.

Between BC and North/West Airport side

Viaduct over shale bluffs to allow shale to slide underneath alignment. The alignment will need to span the shale bluffs. Conceptual cost estimate of $20 million for roughly .5 mile viaduct.

Airport Area

Dog pound area could be maintenance facility. There will be an estimated 100,000 additional enplanements by 2035.

Airport and Buttermilk and Truscott

Double tracking, follow along edge of open space

Roundabout

Grade separation of the alignment is possible, but the runs will have to start way out on each end to meet 2% grade. PTG wants to get a microsyn model and traffic counts. A bypass will require more open space.

S Curves

LRT and lanes go through Open space. LRT only is not an option. Structural costs of cut and cover tunnel will not be much less by narrowing width. The ROD calls for bus lanes to go away and grassy median to replace.

Downtown

Go down Main, turn on Monarch, then on to Durant; single track at Rubey Park, but might need two tracks. Buses in mixed traffic in bound; outbound might need bus priority measures, like bus only lane (plus extended hours)

RR: Politically, especially with rail, open space advocates will tolerate rail only. GP lanes plus rail unlikely.

RT: As soon as you do rail only, all assumptions regarding open space acquisition need to be revisited, including ROD.

DB: Does community have flexibility to not go with ROD?

RT: No. This corridor has been federalized; even if this project is locally funded. If S-curves are not eliminated, you start over.

RR: There is a process for changing ROD.

RT: IF you build the tunnel narrow, you will be cussed out in 20 years. We will look at widths described in ROD, but do it only for train.

Headway Variations

Round trip travel time = 32:43 minimum, with a bit of layover at RP. At 10 min headways you need 4 trainsets, down to 2 train sets at 30 min headways. At 18 minutes, no slack time needs for pressing, but only 3 min layover at RB

DB: There is about 13 minutes travel time from BC to RB, but we include layover time (20 minutes overall between GWS and RP). IF you have 8-10 hour shift, you need breaks. Otherwise, the operators get stressed.

PH: The train pressing will be dynamic

RT: Train will likely be getting charged while it is waiting.

JK: If these travel times do not look as good as BRT, then we have a problem.

RT: When you add in the transfer to LRT, you are looking at pretty much similar travel times.

PH: But the train will be more reliable.

JK: Dwell times at stations might be a problem too.

GG: We estimate 40 seconds per station; that s 2 minutes in dwell time alone

PH: Every silver bullet seems to have a little bit of tarnish. However, people worried about transfer time at I-25 and Broadway in Denver, but they have forgotten. Everything else is so much better, particularly the reliability.

GG: Do we have on-time performance data to compare to proposed FG? By season?

DB: For us, the train is attractive because we do not need a lot of FTEs and housing and bus facility expansions. IF 150 people on a train can replace 2 57-passenger MCIs or even more 40-ft buses, then we see some efficiency.

RT: We have to make the LRT headways the same or better as connecting buses at BC, or we'll get thrown out

DB: Can we haul 90 people on a trainset?

PH: Yes, minimum. Worst case, the 2-car or more LRV will hang over the edge of an intersection for a few minutes

DB: The local bus will also stop at BC. Is the assumption that all buses will stop of BC? Is that a line in the sand? What about Burlingame buses, etc.?

RT: Assumptions to date is no BRT or express past BC. Other services up in the air.

DB: The BC center is the hub as I see it.

DP: What bout ski co service?

BP: How can we present this to EOTC? All those other services and how they connect or don't with LRT?

RT: Either of these systems will not solve the problems. Ski CO wants to start talking about Buttermilk to Highlands aerial connections to move skiers differently. It's going to be a complete deal killer to suggest headways any worse.

JK: Peak period has to be same; off peak is flexible. Good frequency coves up a lot of sins.

DP: We are trying to capture choice rider. You need to meet those expectations. 10 minutes is a user expectation and a selling point.

Next TAC Meeting

JL: Supposed to be monthly, but we can combine

BP: Combine, have one in December.

RT: I can't go to EOTC until there is a TAC meeting first. This is complex information, need regular check in. Still some perception that there is some magic bullet solution. And its low class bus or high class LRT. I am looking at ways to reduce demand. The only way is moving skiers mountain to mountain. (DP: that works in winter only). Ski CO is looking carefully at this and wants to work in alignment with this process.

RR: Getting into headways discussion without discussing demand will derail this thing. It's enough to say that this works for 10 min to 30 minute headways, and leave it at that for now.

DB: Also, can we accommodate this future growth better with LRT than with buses.

TAC MEETING 3

December 15, 2016

Meeting Summary: UVMS TAC Meeting

12/15/2016
Carbondale Town Hall
10:00 am

Attendees

Phil Hoffman
Jen Leifheit
Ralph Trapani
Joe Kracum
Dan Blankenship
David Peckler
Emily K
John Krueger
Randy Ready
Brian Pettet
Greg Gaides
Michael Miracle
Lynn Rumbaugh
Tim Malloy
David Johnson

Snowmass Village Agenda Item – David Peckler

If LRT is the preferred alternative for the future, significant planning and design of the Intercept Lot is critical. If all the bus passengers are transferred to LRT, then we could have up to 3,000,000 passengers. Planning a station that will handle that many transfers needs to be well thought out and placed appropriately to minimize conflicts.

Pitkin COunty is trying to secure a land transfer to gain acquisition of the intercept lot, and we have a FLAP grant to implement $4m in investments. We need to consider those investments carefully.

Referring to the various alignment options at Brush Creek: The signalized intersection at BC drops out if we do option D, which is preferable, maybe move all the activity to the triangular section and streamline passenger movements.

RT: Option D requires relocating compressor station, which not a good idea

DB: You will still have pedestrian conflicts under all options, because people will still need to park and walk to a station.

Existing and Future Demand - Greg Gaides

Gaides showed a graph illustrating the mode split for Aspen to Snowmass trips and Downvalley to Aspen trips. There are approximately 30,000 person trips/day in the aspen area (graph focuses on regional trips, not intra-city trips); transit trips make up about 18% to 23% of the regional trips.

Buses vs Alternative LRT Options – Gaides/Hoffman

PH discussed the number of bus trips that could potentially be replaced by LRT trips if LRT operated on the roughly 6.1-mile corridor between BC and downtown Aspen. Hoffman first showed all average weekday winter bus trips, by route: A total of 1,591 daily trips throughout the system (with a fleet of 93 buses). Of those, 1,231 service Brush Creek and Rubey Park. And of those, 73%, or 907 trips (Valley, Snowmass-Aspen, and local routes crossing the bridge) could be replaced, in part, by fixed guideway.

Hoffman pointed out that the majority of the bus trips in and out of Aspen are local (City of Aspen) routes.

LRT vehicles have at least double the capacity of Standard 40-ft coaches and the 57-passenger vehicles. When they are linked in consists of two vehicles (or more), they provide even more capacity than buses. LRT with 15-20 minute headways would provide sufficient capacity for the long term, but 10-min headways, similar to peak-hour bus service, could also happen. The transfer penalty from changing modes at BC could be an issue, and longer headways could be too. Headways of 10-minutes or better is where people stop looking at schedules.

Hoffman also noted that the shorter trips (such as the local trips) will be more sensitive to transfer penalties.

TM: The plan at the airport was originally to build an underground parking structure with a weather protected connection to the BRT station, and that can still happen; but financially, the parking structure is a serious challenge.

JK: We need more explanation about how the LRT will intercept the shorter services, if at all.

PH: Maybe we pick and choose.

RT/JK: Buttermilk should maybe be intersected, the other shorter trips, no. (Buttermilk has a very high frequency of daily routes)

MM: How will this reduce vehicle and transit trips into Aspen? That will be a critical question to Aspen decision makers

PH: If we only take out the trips in the red box (those with long distances and Buttermilk), we reduce 35 trips/hour in peak hours to 17 trips/hour

RT: We assume that we intercept the Buttermilk route, that there is a grade separated pedestrian crossing at Buttermilk, and that all other shorter routes remain bus routes without a transfer to LRT (All-YES)

DB: IF the transfer at Maroon Creek is convenient, it might not be a big deal, but it would challenging to make it convenient because LRT is going I both directions and unless the trains in each direction arrive at the station at the same time, the transfers might not be very convenient to/from the feeder bus.

JK: IF LRT is implemented we are looking at additional transfers for people going to Highlands, etc. This could be a degradation of service

DB: Maybe, but people are making multiple transfers all the time in urban areas, such as Boston.

DB: Are we still looking at Electric buses? (PH-yes). Seems like articulated buses have been ruled out. (PH-it's either fixed guideway or LRT)

TM: We could have over 350,000 enplanements by next year according to airlines. This might be overly optimistic, but that one-year forecast alone by the airlines exceeds the entire 20-year forecast. Hotels cannot handle all these passengers, but VRBO can. The trip distribution then, could be much different.

DP: We should alert the EOTC that the goal to get all buses out of Aspen is not feasible.

JK: That's fine, we just want to reduce, not get to zero.

DB: $300 million or more to get only half the buses out of town is not compelling, unless that % reduction grows in the long term, if increased ridership demand increases the number of buses over those needed today.

RT: There are discussions about aerial connections too.

MM: The main gondola portal will be at Buttermilk; you can connect all four mountains or just connect the shorter distances.

RT: Remember, with gondola, that may change travel habits, you may take gondola at BM to go to Highlands.

Refined Alignment and Stations

RT: Based on previous meetings, the D alignments is now called D1, we needed to avoid the compressor station. Still work? (DP –yes)
D impacts traffic, D1 does not
A is grade separated, does not impact SH82 traffic (A is over, A1 is under – both grade separated)
Option B uses existing platforms,

BP: Given the project cost, the existing BRT platforms should be sacrificial if necessary

RT: D1 will be the least traffic impacted and least costly

TM: Seems like D1 would accommodate future down valley rail the best

DP: Option D1 at BC is confusing, **PTG will move it up and make it clearer**

DB: Another reason for alt D1 is to continue bus service during construction. Take caution because the CIS got bogged down by way bigger, more speculative questions, such as whether the regional train needed to be able to go to DIA. So we do not want to entertain these kinds of discussions. Keep scope of improvements manageable.

RT: We looked at potential for the LRT to get closer to the airport terminal; we also looked at a moving, covered walkway from SH82 station to airport

TM: the lodging community was adamant that they wanted to capture the Aspen-bound passengers, not LRT.

MM: Is it possible to bring this to the airport, given where we are and they (the Airport Team) are?

TM: Yes…One of the big economic problems is the parking structure; the alignment you are proposing (to airport) looks like it might work better under our surface parking scenario.

BP: The proposed parking at airport is inadequate, which increases the need for LRT.

RT: At roundabout, there is a cut and cover option. We could eliminate the LRT stop at C/M, because we do not want to intercept C/M buses anyway, based on the previous discussion. 7th and main station will then be a major development.

GG: There will be a 4 sec additional delay per vehicle caused by these trains by the C/M stop

RT: The people going up Castle or Maroon will be stopped at a light. I suggest that we ask the EOTC about the C/M alignments and the station.

RT: Will cross streets in downtown Aspen require gates? (PH – guidelines are loose, professional discretion comes into play—but they don't have gates in downtown Denver)

RT: We are looking at options to go directly to Galena Street (red line) instead of going to RP (right turn, then left turn to get 4 blocks closer). There are real benefits to this Galena option. A train making all these turns will have an impact. You could make Galena a pedestrian mall and implement autonomous transit to RP from there, and you will also lose parking on the streets leading to RP.

DB: When we started raising the project cost of RP, we started to get into questions about where the terminus should be and whether it was worth it to make RP improvements.

JK: RP renovation was necessary and it will last 10 years

Traffic Impacts – Gaides/Hoffman

Option A – At grade at MC/CC

Adds 4 seconds per vehicle of delay during peak hours, LRT induced queues dissipate prior to next LRT
Option B – LRT underpass – more costly, but no traffic impacts, but bus station at MC is "relocated" to 7th/main

Comments on simulation:
RT: Simulation seems to be very early peak hour

TM/JK: The simulation is incorrect; the whole intersection is gridlocked all the way to airport or Brush Creek

RT: We want to show the issue of clearing the roundabout.

TM: People will see this and say this is not how traffic works here.

JK: If you show this, say it is not totally represented; it's showing how the LRT works, shows the mechanics. Say it is just representative.

BP: Patty may also ask about movement of emergency vehicles.

TM: Patty sits in that traffic too.

BP: If we are doing that alignment underneath the roundabout, you go underneath the roundabout and right into cut and cover tunnel

RT: It's not a true tunnel; we optimized the length to reduce costs for HVAC, etc.

JK: Castle/ Maroon is not an actual, functioning KNR

Next Steps – Jen Leifheit

- We will refine the design, the traffic impacts, the models
- We will prepare for the January 5th UVMS TAC, which will also be preparation for the January 19 EOTC meeting
    - we will have a draft EOTC PowerPoint to discuss, covering two alternatives, including alignment, structure delineation, station locations, traffic impacts, ridership forecasts, travel times, and triggers for implementation.
- February UVMS TAC - Discuss capital and O&M costs
- February Open House in Aspen (after EOTC meeting)
- March UVMS TAC —funding

TAC MEETING 4

January 5, 2017

Meeting Summary: UVMS TAC

1/5/2017 – Airport Operations Center

Attendees

John Krueger
David Peckler
Brian Pettet
Joe Kracum
Ralph Trapani
Phil Hoffman
Michael Miracle
Dan Blankenship
Jen Leifheit
David Johnson

Purpose: To prepare the UVMS Presentation for the EOTC Meeting

Ridership Forecasting

RT: Tim Malloy felt that our previous presentation was too complex, so we are trying to pare it down and make it easier for the EOTC
JK: EOTC may request a travel patterns study type piece, though the meeting is focused on the UVMS
RT: Jen Leifheit and I still working out scope and budget for TPS; if you want to include it, we can include a scope and budget (JL – it's a 2-pager). It's $100k-$200k (BP-that's fine for budget)
BP: You will have one new Commissioner, Greg Poshner. To clearly define the scope, you should say that transit was part of scope specifically, not overall traffic. The request for the study should come from us (EOTC staff). If I were an elected, I would want to know if we can get to where we need to go with current SOW, or do we need additional.
JK: I think we should send a draft SOW and budget to staff initially and see if we need to put it in there or have it ready.
BP: If we don't make the ask this time, next opportunity is March
RT: Our modeler could get way ahead of us if we don't do it now. There are efficiencies to be gained by doing now. Gaides can convert the air sage data from transit modeling to overall transportation modeling
BP: It does not go into packet then; but we have it, in case they ask. If they are open to listening to the idea, then we go there.
DP: Will we have to re-visit the EIS?
RT: Maybe, but if our LPA is similar to ROD, it will be simple.
JK: Rubey Park is cleared as part of ROD
RT: As part of our work, we discovered that there is a huge benefit for a double track near the airport, which is not consistent with the ROD, but not a huge deal from a NEPA standpoint. If we start introducing something that is not a part of ROD, we are back into a full NEPA process. Without PM nonattainment, the 4-lane unrestricted roadway would be more OK.

DP: DO you have an example of the Travel Patterns Study that we can show to electeds (at least to TOSV elected) that shows what it looks like, what they get? I am worried about sticker shock and "fool me once…"
JK: The $200k range could be met with resistance, which gets us to $700k total now, which gets people uptight
JL: The draft SOW and budget might help

Approach to Forecasting Tool

JK: Use different terms than subscriber
JL: Subscriber class = person types; inbound commuter = external to internal zone; outbound commuter = internal to external zone

Existing Ridership Slide (RT)

RFTA Ridership data goes to transit trip table; Air sage data (all modes) goes into person trip table (all modes); then both sets translated to transit shares (% of all trips made by transit)

Using Future No-Build transit ridership (no transit service or capacity improvements) can be modified based on various alternatives, such as LRT, BRT, etc.

Mode split to Aspen, Snowmass slide – people will start to draw conclusions immediately; we need to make sure we are confident with this data--so we don't show this slide

All: This is an update on progress of the UVMS, not findings or recommendations. We need to define what this ridership forecasting tool is and is not
Kracum: We have three points to make for each level of discussion, stop at end of each of these, and ask for questions
BP: Bring back summary of last meeting, bring them up to speed (as JL suggested)

UVMS Corridor – Phil Hoffman

Total bus trips = 1436 (from roughly 93 buses); 1056 serving RP and BC; then based on transfer analysis, 752 maximum bus trips operating between BC and RP can be replaced by FG

MM: Should show the number of buses that do this (93 buses)
DB: Just go straight from 1436 to 752; too much information right now
PH: the shorter the bus trip to be intercepted, the less feasible the transfer to LRT; so we should not intercept all potential bus routes with LRT. This reduces potential trips from 752 to 458
DB: The goal should be to have a seat for everyone for the last 6.1 miles, especially since we are now making them transfer from a one-seat ride. Otherwise, people will see this an a burden, not an improvement
JK: We need to show EOTC the number of buses we eliminate

Bus Reductions at Rubey Park - PH

Current buses that could be intercepted = 452 (graph shows interceptions by hour)
RT: The cost difference between EV BRT buses and LRT is tremendous, but LRT can displace a lot of buses. EV BRT can be an interim solution, a phased approach to LRT
DB: Another interim step could be natural gas (from a noise and emissions standpoint). If EV technology improves to do long-haul service, that's even better
JK: I don't see the buses going away, regardless. Are articulated EV buses an option?
DB: Pushes (RWD) are not good in snow (unless there is a heated guideway). Pullers (FWD) are better
RT: We are talking about a precision guideway; I am not sure there is a cost difference between guided bus and non-guided bus, and it is still against the law to operate autonomous vehicles
PH: Next steps are to refine the operating plans of various alternatives and come up with Capital and O&M costs, which will be very telling and will help us determine the feasibility of various solutions
DB: This is not all about reducing bus trips, but enticing more people to use transit, we have to keep this in mind
DP: Keep it at 4th grade level; reduce the data to the minimum
RT: We have a smart group of electeds, but I agree; we removed the VISSIM analysis

Fixed Guideway Sections

RT: At Brush Creek, we dropped alt B and any alts that cut through the BC intersection, C and C1 are designed to eliminate any crossing of Brush Creek intersection
DP, JL: Make those alts a lighter color, to show we looked at them but are removing them
RT: At Maroon Creek, there should be a station; we need to put back in
RT: One option is to terminate at Galena and provide some sort of service along Galena to Rubey Park, crossing gates are out
RT: The s-curves are even tighter than the two turns in downtown Aspen to Rubey Park; you will lose all parking on the south side with LRT
DP: If I built LRT and took buses off road, then why do I need the bus lane?
DB: For CL, C/M and BG routes, possibly others
RT: We will lose trees on the south side (but arborists says those trees will be dead in 20 years anyway)
RT: Transit mall on Galena is appealing (maybe electric shuttle)
PH: Do you want to show a rendering of Galena? We are working on that.
BP: Yes
PH: We will show to staff
RT: We will do concept of transit mall idea, we need to do more than numbers, and we need to start talking visions; my view is the line haul stays on Main Street
DB: You will get a lot of support from people on Garmisch and Monarch. Some type of station at Galena and Main
MM: This could lead to a car free core, which is appealing to some council members
DB: Maybe a couple of slides showing technologies would be helpful. For me, the best part of these discussions comes from looking at the vehicles and the other things, not the numbers.
BP: The Bridge between the reality and the data, to allow people to see it, would be helpful. The alignment, how it works at BC and in town, and the vehicles
DB: Maybe show pictures from Holland, etc.
PH, Kracum: Will do.

TAC MEETING 5

February 23, 2017

UVMS Meeting Summary

February 23, 2017

Attendees

Ralph Trapani
Phil Hoffman
Dan Blankenship
Lynn Rumbaugh
Michal Miracle
Joseph Kracum
John Krueger
David Johnson
Brian Pettet

Purpose

RT: The purpose of this meeting is to review and refine the information we intend to present to the EOTC on March 23. We need to determine what slides to include, not include at the upcoming meetings.

Ralph and Joe's Presentation

RT: We think we can get a third continuous bus-only lane UV and DV between BC and Aspen; also considering dedicated bus lanes in Aspen, so all the way from BC to Galena. We think there is an opportunity for a fully autonomous bus in that 3rd lane (AGT will require 3rd lane regardless). Again, if we want autonomous bus, it should have a dedicated lane (maybe in 20 years, semi-autonomous would be OK).

JKra: There are very rational phasing options with BRT. For bus control options, even base level fully driver operational control will have driver assist options.

RT: Base case is simplest, most functional; prime case is everything we could think of. Castle Creek Bridge rehab is part of ROD, and is included in all scenarios. Similarly, crossing Marolt is $60 million of $159m base case, because everything goes across Marolt.

T: Will include a basement slide of 2100 spaces at BC. Not pretty, but it can be done.

JKru: Cost estimate for buses should be $1.1m/bus (not $1.0m)

RT/PH: Turntable may be option at Galena to 180 the buses.

JKru: ROW acquisition at local's corner is $2m; should increase to $5 million

RT: No annual cost escalation on this. People think you would be writing a check for $159 for base, but it will be higher.

JKru: Trail option?

RT: Alts do not include a trail – you should look at tying into Rio Grande, because an adjacent trail along LRT will be expensive and unpleasant

BP: Maybe show the percentage of the BRT infrastructure that can be incorporated into LRT, show that BRT doesn't preclude LRT, moves your forward to LRT…

DB: We have up to 5 mils property tax available, and some sales tax, and some savings that would accrue to RFTA if buses were not operating in that corridor

RT: If the State gains a half cent for transportation, the local tax will be reduced, and State tax trumps local
DB: The transit tax is exempt from the 10% or so limit; it can go above because it is a special district. The 10% cap is for regular sales tax only.

DB: We might be able to get some level of funding, like SGR or TIGER, but it will be a fraction.

PH: average TIGER grant size is $25m.

BP: To present this more efficiently, do base and then show options. Like buying a car. People understand that.

Phil's Presentation

JK: For TOSV, after Base Village, the next big thing is interconnecting the mountains and the airport expansion. At one point, they really got behind the airport expansion, but they really got beat up for it.

PH: O&M cost estimate for BRT of $124/hour is very reasonable, compared to other systems.

DB and others: Do not show all those background numbers just show the $124/hour cost estimate.

PH: IF LRT is chosen, we will value engineer; same with the O&M for BRT, we would fine tune.

RT: We can give a capital cost financing scenario, but we don't know if and when the money is coming, and we don't want to give people a false sense of precision. For P3's people want a 10% return. That gets very costly.

DB: We need to look at the do nothing option and what that looks like in terms of impacts and costs.

RT: I'm going to tell people that we cannot finance this unless Aspen wants to allocate property taxes.

BP: Make sure that we show that this is part of the larger plan, not another standalone study of LRT.

JKru: Need to show how BRT can evolve into LRT

DB: If we don't want more buses in town, we need to do something different.

RT: Benefits of LRT are not nearly worth the cost differential, compared to fully autonomous BRT. Maybe at front end, we should have asked "what are your problems with buses?"

JKru: It is the number, noise and emissions.

PH: Can we have some dialogue with RFTA staff about the service plan refinements?

DB: IF we assume we eliminate locals, expresses, buttermilk (the 6 routes)—if we did not operate those, how much would we save?

PH: How could it work, physically, on the ground, from your service planners' standpoint? What does it look like to intercept these 6 services? Maybe they will find out it is not feasible, for instance, to intercept all six.

DB: If we are going to intercept Buttermilk, we would need to factor in a grade separated crossing, so that we are making people cross SH82 at grade. In the mornings, you have a lot of BRT capacity coming out of town, and opposite in the PM.

PH: We need to refine these numbers enough to create a plausible practical plan.

RT: Buttermilk is the only grade separated crossing that needs to be built

JKru: Need to be more qualitative on our discussion of benefits

RT: People are still looking for the magic bullet.

BP: For Pitkin County, it's about alleviating congestion (same with Aspen)

RT: I think Mayor had a vision of no buses at all, but based on Phil's research, that is not possible

RT: Phil and Dan will work on service plan. Final Air Sage data is coming in tomorrow (Friday 2/24). Greg says he needs a few days to drop the data into the spreadsheets.

TAC MEETING 6

March 9, 2017

UVMS TAC Meeting

March 9, 2017
Carbondale Bank Building

Attendees

Emily Kushto
Ralph Trapani
Joseph Kracum
Brian Pettit
David Peckler
Dan Blankenship
David Johnson
John Krueger
Greg Gaides
Michael Miracle
Tim Malloy

Meeting Summary/Comments on Meeting Materials

Kracum: We have LRT and BRT costs, but we also have some phasing information for BRT; can't phase LRT.

DB: Any refinement of those costs?

Kracum: No, not significantly.

Krueger: There's enough to present without costs.

RT: The EOTC needs to select an alternative to put into ITSP-- Not at this meeting, but next meeting.

Krueger: Just provide two-pager in EOTC packet, and bring PowerPoint later.

BP: Do UVMS update, and then Snowmass request.

Ridership Forecasts – Gaides

Please be aware that these are "planning level" forecasts. And with the revision of the data, Snowmass, Aspen, SkiCO and RFTA need new CSV files.

RT: There is an additional glitch in the AirSage data: If you stop less than 5 minutes, there is no trip. So instead of being one trip there and one back (to schools, for instance) there is one long trip, so we can miss a number of trips. Another issue was that some towers were not triangulating. We have made adjustments to vehicle occupancy as a result. You always have to make these calibrations.

GG: Ridership estimate includes base + growth in pop and employment + alternative-related specific changes + other considerations (airport expansion and stuff pushing ADT over 1993 levels). The ridership tool develops origins and destinations (synthesized trip table grounded in observed data). For Background growth, basis is trip table.

RT: There seems to be a level of comfort now with population growth forecasts. Of these 60 slides, there might be 3 slides to show EOTC.

GG: Assumption is no-build transit share in 2016 will be same transit share in 2036. Transit in vehicle time and additional wait time and change in fares will influence ridership. We are relying on elasticity factors to determine how these things impact ridership. % change in TT x elasticity = change in ridership. These changes can be applied to 2016 and to 2036 ridership

MM: Is a gain of 54 passengers due to implementation of alternative worth it? (Referring to LRT at the airport, I believe).
RT: Remember this assumes same initial mode split (no increase in rider share, due to other issue such as congestion, cost of parking and gas, etc. Our next step is to look at those impacts.

DB: There will also be impacts to fleet and maintenance facilities and such, regardless of alternative.

GG: What we are gaining is 2 minutes with LRT, with a net gain in travel time of 1 min (due to transfer at BC), so it is not much of a difference in tt.

TM: Mode change will be an issue

RT: Yes, but we can mitigate that.

DB: No-build is delivering same type of service, but we will still need to address impacts of growth to facilities, housing, fleet, etc. No-build is as misnomer. There will still be significant impacts to fleet, and to costs and to impacts on the community.

TM: We always thought we could capture more transit passengers with improvements, such as better connections to airport, baggage changes sending bags directly to hotel or destination

TM: If you are going to achieve 20% mode split at airport, you need to bring the service to them (RT: or an automated guideway); you can’t make them walk to/from the stop across a parking lot. At one point, we were looking at a garage, with a walkway incorporated to the station. That’s what we are thinking.

MM: Getting that number to 20% is important. 3% is depressing.

RT: You are at capacity for s-curves; more people will likely want to switch modes as the peak hour strings out.

TM: the airport team will be very interested in the 10% and 20% mode spit goals, and how they drive changes at the airport. If we want to create something that really drives a change in airport design and construction, that's controversial. Trying to wedge this into the EA process would be awkward.

RT: Electeds will want to capture more of the airport traffic. This is going to be an issue.

TM: Alignment going right next to airport is not in EA, but not precluded. It may be precluded by other issues or processes.

RT: The two alternatives are similar (BRT or LRT). Except for "cool factor" of LRT.

DB: whatever options you choose, there will be impacts to fleet and facilities

Tm: Travel time isn't the reason that people are not using transit; there are other reasons, according to our studies and charrettes, etc.

GG: We incorporate the cool factor in the model by showing it as a travel time reduction. It's a time savings perception elasticity adjustment, because that's how model work.

RT: We are not going to sell something based on sexy.

DP: It's about offering more attractive options.

DB: This is not just about getting current riders into different mode? What you want is to significantly change the mode share?

RT: Ridership is same, travel time is same for LRT, and it is long and it will disrupt traffic. We are looking at automated buses, so that may change the delta on operating costs.

Capital Cost Estimation – Kracum

Kracum: Based on Krueger's suggestion, we changed the cost estimation presentation

RT: We can do phasing, but shortest LRT system in country is 6-7 miles.

Kracum: Average hourly cost of BRT is $275/hour, more than BRT. However it includes maintenance of FG. Basically capital cost and annual O&M are each 2x higher than BRT.

JK: Phil came up with optimized service plan, reduces 458 trips by 102 per day to 358 trips.

DB: If we can do that. I am not sure we can, for instance, drop BRT trips from 149/day to 112/day.

GG: Phil sent to you and operations staff to review.

DB: Seems like a pretty big reduction.

Phasing Considerations

RT: Sequence for the presentation is… (All agreed OK.)

RT: Costs of original solution are killing us know. In 1998 it was less than $40m. Castle Creek Bridge needs to be reconstructed. The Efficiency Rating is .61.

JK: If you don't build LPA, you don't have too many options.

EK: If you build the dedicated lanes, you have the platform for LRT.

RT: There ain't no magic bullet; there are things that will make travel and other impacts better

MM: Some elected officials will think the modified direct will never happen, and what can we do with that in mind.

JK: No one on council appears to favor MD.

MM: To some Aspen folks, the bottleneck is appealing

RT: We know that the "sticks" work, such as when you increase paid parking. But if you do that too much, employees will not want to pay, nor will they want to sit in a bus in mixed traffic

JK: Council does appear to be open to being swayed.

MM: If Burt says that the 'MD is a potential option, you have to help me block this', then Ann and Art will be in a tough position. This could be a wedge issue.

TAC MEETING 7

April 27, 2017

EOTC Meeting

October 20, 2016

Snowmass	5-0	yes

Buttermilk Underpass
The EOTC approved a potential future funding request for 2018 in the amount of $800,000 in the multi-year plan for the design of the Buttermilk Underpass.

VOTE: Approved

Aspen	2-0	yes
Pitkin County	5-0	yes
Snowmass	5-0	yes

VII. UPPER VALLEY MOBILITY STUDY

Joe Kracum and Phil Hoffman-Parsons
No decision Needed: Information only

Parsons provided a presentation from the Upper Valley Mobility Study (UVMS). The meeting packet included a copy of the scope of work and schedule previously approved by the EOTC. The presentation included the "Project Purpose and Need" which is to:

- Improve mobility between Brush Creek and Rubey Park
- Reduce the number of buses and congestion in Aspen
- Enhance transit service to make it faster, more reliable and attractive for users
- Support City of Aspen and Pitkin County transportation plans and policies

The technology section of the presentation included a discussion of BRT and LRT options for vehicles/manufacturers and propulsion and technology comparison of BRT and LRT.

BRT propulsion options included:

- Diesel
- CNG
- Hybrid
- Electric

LRT/Modern Streetcar propulsion options included:

- Diesel-Electric LRT
- Overhead Catenary Systems (OCS)
- Wireless On-board Storage
- Wireless On-board Generation
- Wireless Ground Level

More information from the ITSP will be presented to the EOTC at its next meeting.

VIII. UPDATES

Verbal updates were provided on the following topics at the meeting:

- Basalt Underpass Project – G.R. Fielding-Pitkin County
- RFTA Update-David Johnson-RFTA

EOTC Meeting

January 19, 2017

- June 15, 2017 Snowmass
- October 19, 2017 Aspen

IV. UPPER VALLEY MOBILITY STUDY (UVMS)

Ralph Trapani, Joe Kracum and Phil Hoffman-Parsons

No decision Needed: Information only

The meeting objective was to provide a review of the project purpose and need, scope an update and inspire a visioning process. The project purpose and need is to improve mobility between Brush Creek and Rubey Park, reduce the number of buses and congestion in Aspen, enhance transit and support current policies on transportation. The project scope provides transit ridership forecasting, an analysis of LRT and BRT from Brush Creek to Rubey Park on the preferred alternative alignment and cost estimating of the LRT and BRT alternatives.

The October meeting provided an update on potential technology solutions as they may apply to the project.

The January meeting included a review of the ridership forecast, current bus operations, a discussion of the BRT and LRT alignment alternatives and traffic impacts.

At the March meeting, there will be an update on the UVMS schedule, ridership forecasts for both LRT and BRT alternatives and capital, operations and maintenance costs of both LRT and BRT alternatives

V. UPDATES

None

VI. FUTURE AGENDA ITEMS

UVMS Study-Costs

EOTC Meeting

March 23, 2017

III. UPPER VALLEY MOBILITY STUDY (UVMS)

Ralph Trapani, Joe Kracum and Phil Hoffman-Parsons

No decision Needed: Information only

The meeting objective was to provide a review of the UVMS schedule, ridership forecasts for both LRT and BRT alternatives and capital, operations and maintenance costs of both LRT and BRT alternatives.

Ridership forecast for 2016 and 2036 are listed below.

2016 | 2036 FORECAST

Base Average Weekday Transit Trips | Winter Season

Ridership Condition	Existing Base 2016	Future Base 2036	Change	Percent Change
Ridership | System-wide	17,600	21,200	3,600	20%
Ridership | Crossing Castle Creek	8,300	9,600	1,300	16%

THE RIDERSHIP TOOL : FORECASTS FUTURE BASE YEAR TRANSIT TRIPS, BASED ON THE PROJECTED POPULATION AND EMPLOYMENT GROWTH THROUGHOUT THE REGION. DETERMINES HOW MANY NEW TRIPS MAY BE ANTICIPATED BASED ON EACH ALTERNATIVE'S LEVEL-OF-SERVICE CHANGES AFFORDED THE POTENTIAL TRANSIT USER.

A cost comparison of the two alternatives is shown below.

Brush Creek to Aspen	LRT	BRT
Capital Cost : Base Case	$ 428 M	$ 159.1 M
Capital Cost : Prime Case	$ 527.8 M	$ 200.5 M
Annual O&M Cost	$ 6 - $ 9 M	$ 3.2 M

Public Open House

May 31, 2017

Why are We Doing an Upper Valley Mobility Study?

To supplement RFTA's Integrated Transportation System Plan (ITSP), considering a premium level transit service and analyzing for potential implementation along Highway 82 between the Brush Creek Intercept Lot and the Rubey Park Transit Center.

THIS UVMS STUDY DOES NOT INCLUDE ANALYZING ANY OTHER MODE OF TRANSPORTATION BESIDES LIGHT RAIL TRANSIT AND BUS RAPID TRANSIT AS DESCRIBED IN THE PREFERRED ALTERNATIVE. IT DOES NOT INCLUDE IDENTIFICATION AND SCREENING OF ANY OTHER ALTERNATIVES.

1

The purpose of the UVMS study is to :

- Improve mobility between Brush Creek and Rubey Park.
- Reduce number of buses and congestion both in and going into Aspen.
- Enhance transit service to make it faster, more reliable and attractive for users.
- Support City of Aspen, Town of Snowmass Village and Pitkin County transportation plans and policies.

2

The Upper Valley Mobility Study (UVMS) analyzes

the viability of a fixed guideway system (light rail transit – LRT and bus rapid transit – BRT) in terms of ridership, capital expenditures, and operations and maintenance costs.

3

The objective of this UVMS study is to analyze and summarize the following components:

- LRT and BRT descriptions including design guidelines, alignments, airport expansion interfaces, station locations, and maintenance facility needs.
- LRT and BRT ridership and service plans.
- Impacts to traffic on SH82, including at the intersection of SH82 and Brush Creek Road, at the Maroon Creek roundabout, and at local city street intersections in Aspen.
- LRT and BRT technology scans.
- Cost and funding opportunities and constraints.
- Sustainability for the LRT and BRT alternatives.

What are the Design Team Recommendations ?

To Move Forward with the Phased BRT Alternative.

1) More Cost Effective.
2) Does not Preclude LRT in the Future.
3) Improves Sustainability with a Reduction in the # of buses and improved air / noise quality.

FUNDING

Analyze funding solutions to identify a specific funding package and determine financing strategies as appropriate.

Next Steps ?

1

PHASE 1

- Optimize service plan for six "interceptible" corridor routes : BRT Bus Rapid Transit, VALL_EX Valley Express, VAL Valley/SH82 Corridor, SMS Snowmass Ski, SMA Snowmass/Aspen and BM Buttermilk Ski.

2

PHASE 2

- Replace one Buttermilk and two Snowmass Village route buses with 40-foot electric buses, $ 1.1 million each.
- Replace BRT and Valley/SH 82 buses with 60-foot electric buses, $ 1.3 million each.
- Replace remaining route buses with electric buses, $ 1.1 million each.

3

PHASE 3

- Build preferred alignment across Marolt easement with New Castle Creek bridge, $102.6 million.
- Build continuous dedicated bus lanes from Brush Creek to Buttermilk, $ 3.4 million.
- This totals $16.3 M in purchasing electric buses, which will improve air and noise quality.

4

PHASE 4

- Retrofit buses to autonomous control, $ 4.9 million plus $0.33 million per bus retrofit.

LIGHT RAIL TRANSIT ALIGNMENT

BUS RAPID TRANSIT ALIGNMENT

Alignment Alternatives

LEGEND

- LRT ALIGNMENT OPTION
- LRT CORRIDOR (SINGLE TRACK)
- STRUCTURE
- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)

LIGHT RAIL TRANSIT ALIGNMENT

BUS RAPID TRANSIT ALIGNMENT

LEGEND

- LRT ALIGNMENT OPTION
- LRT CORRIDOR (SINGLE TRACK)
- STRUCTURE
- STATION PLATFORM
- TRACTION POWER SUBSTATION
- PARCEL BOUNDARY (PITKIN CO GIS)

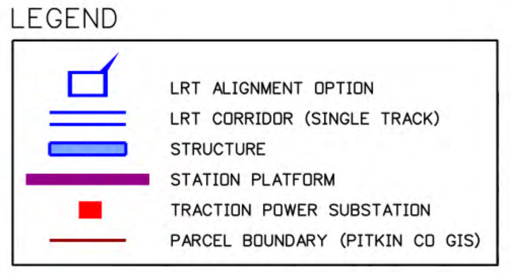
Alignment Alternatives

RFTA · The City of Aspen · The Town of Snowmass Village · Pitkin County

LIGHT RAIL TRANSIT ALIGNMENT

BUS RAPID TRANSIT ALIGNMENT

LEGEND



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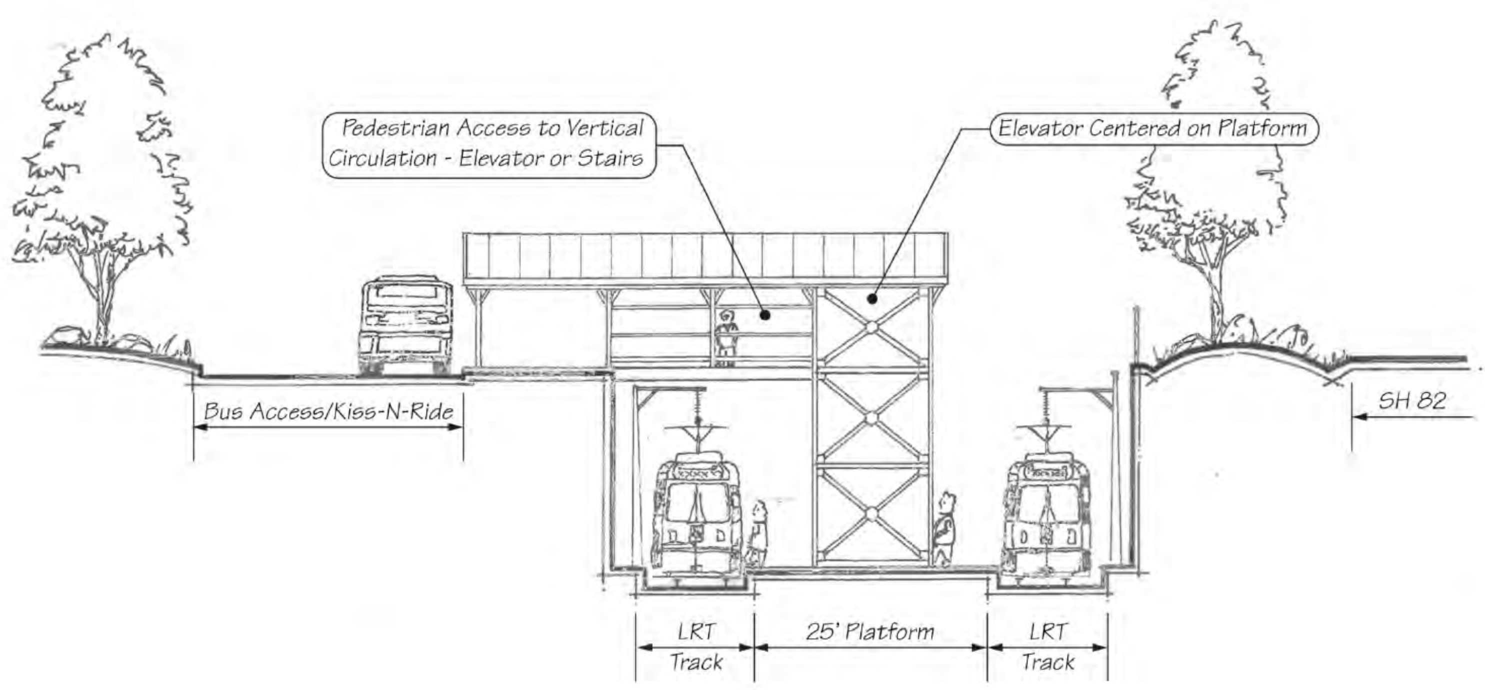
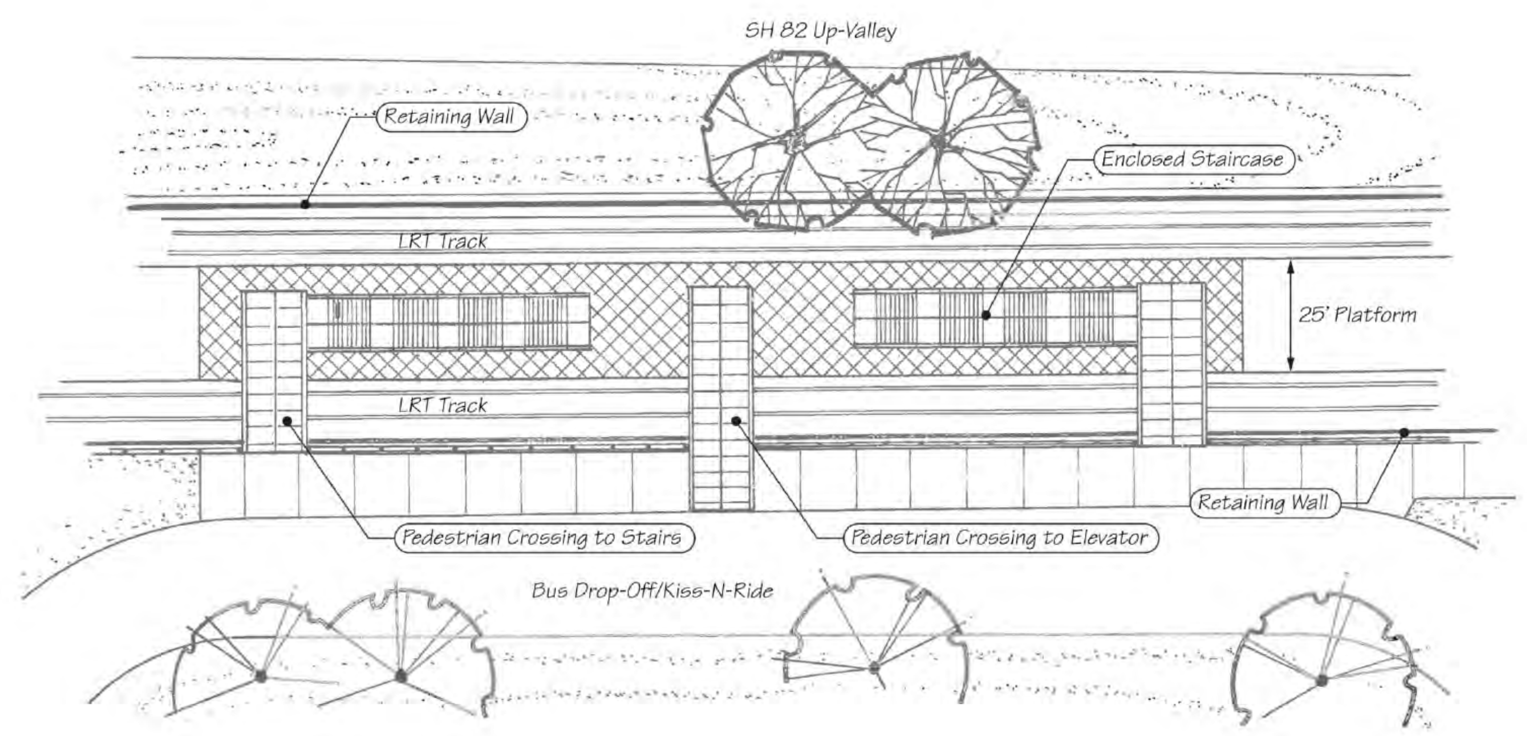
Alignment Alternatives

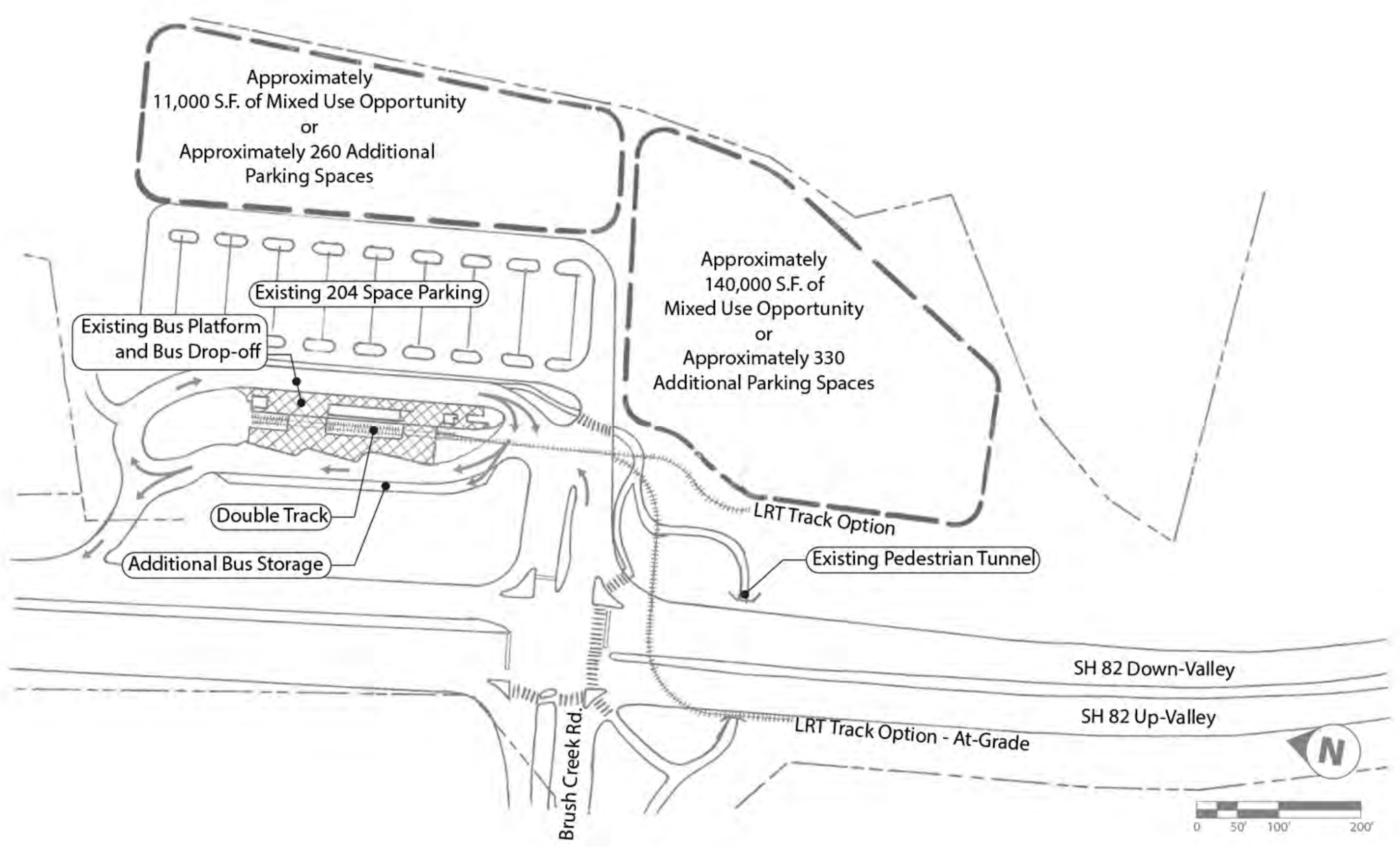
Light Rail Transit Stations



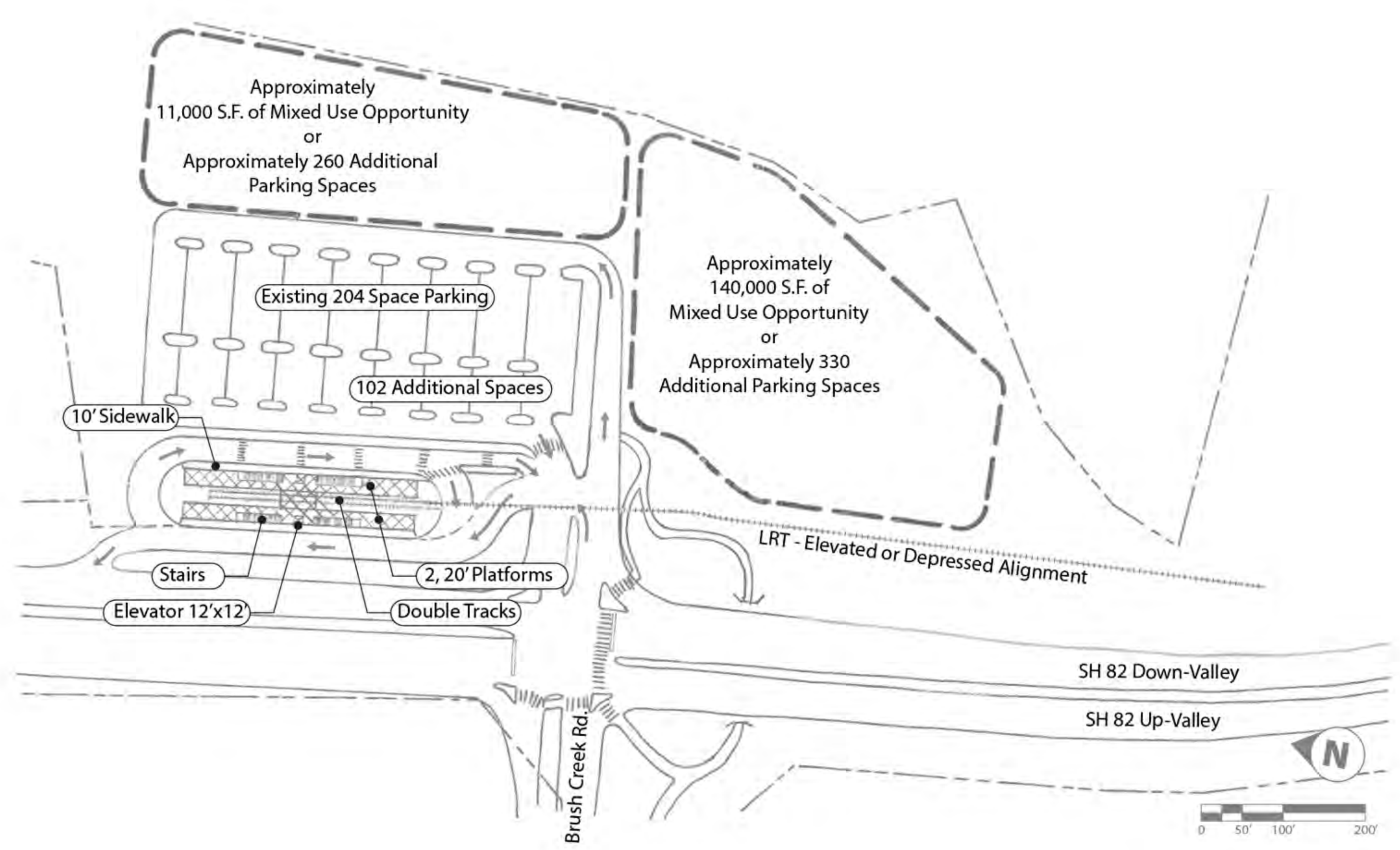
MAROON CREEK LRT - TRENCH PLATFORM



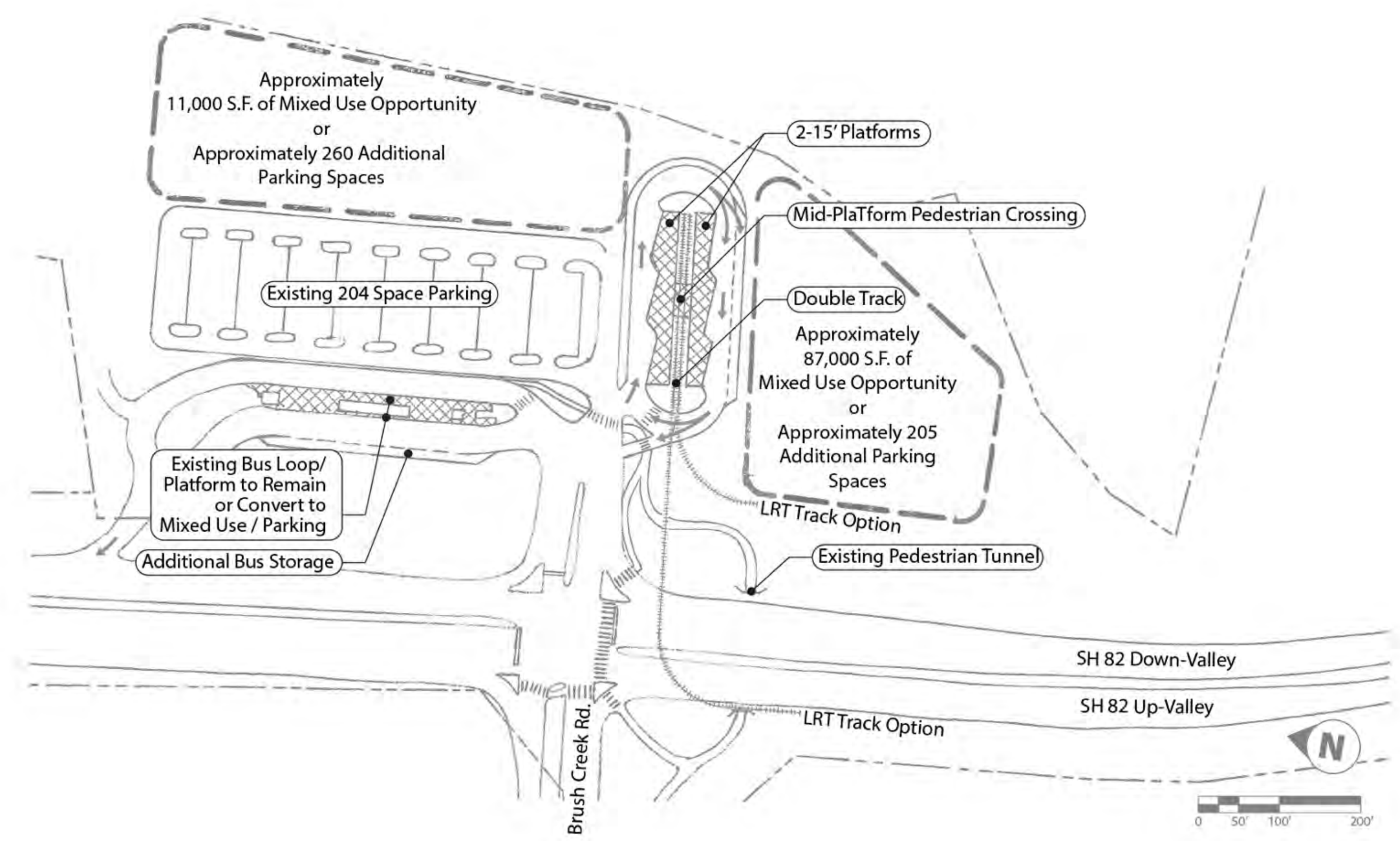
MAROON CREEK LRT - TRENCH PLATFORM PLAN VIEW



BRUSH CREEK OPTION A - AT GRADE W/ CURRENT PLATFORM

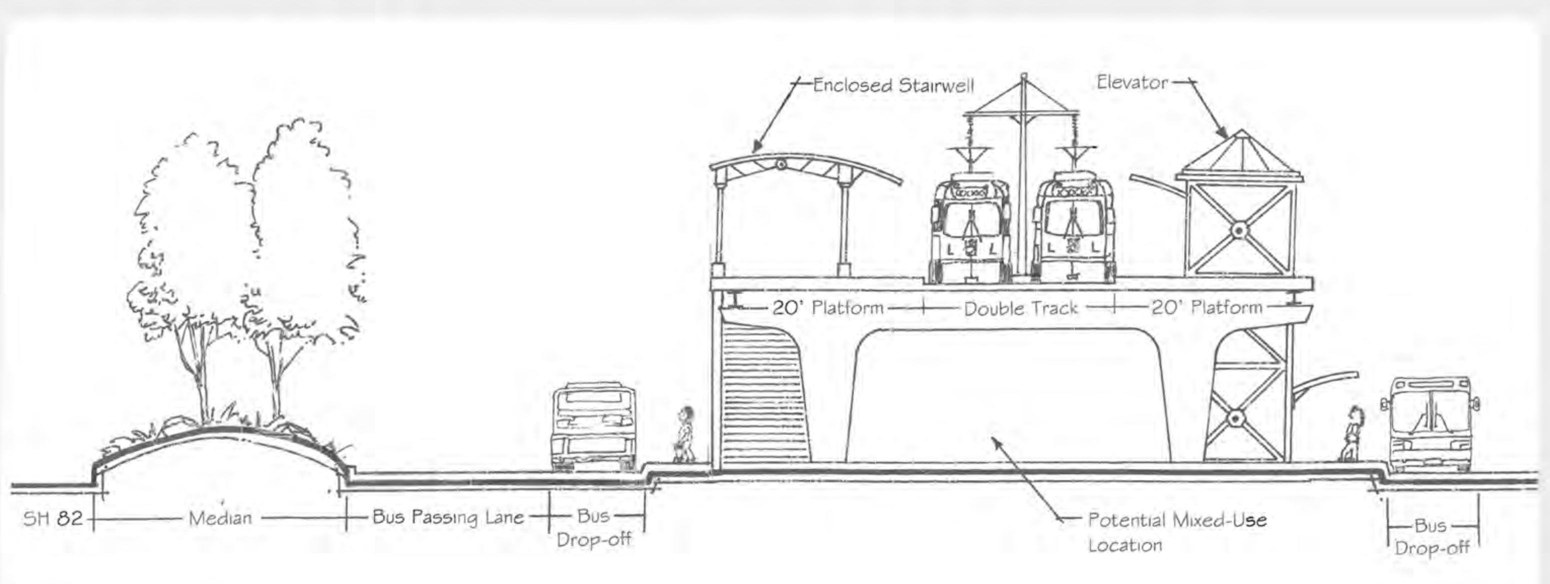


BRUSH CREEK OPTION B - ELEVATED OR TRENCH PLATFORM

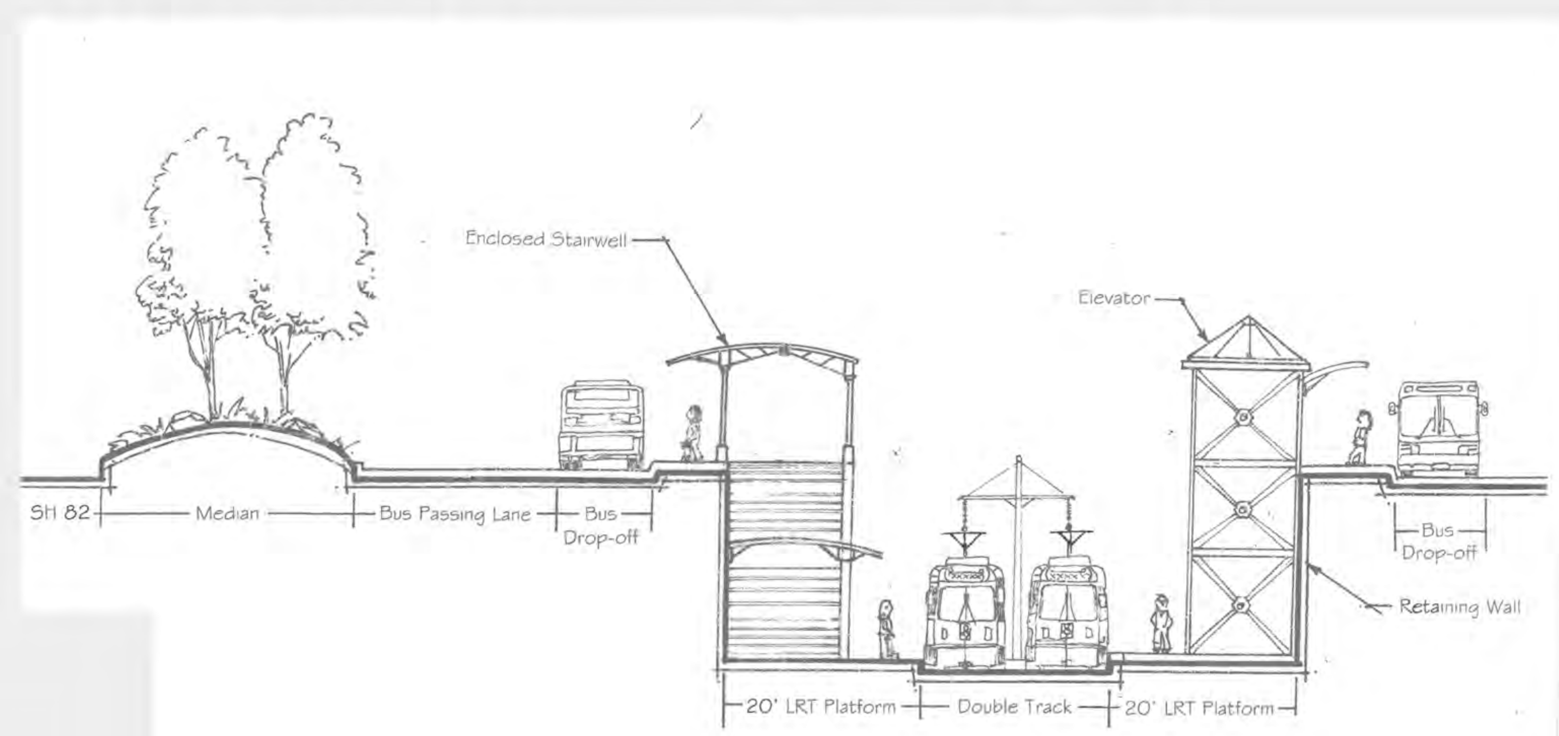


BRUSH CREEK OPTION C - AT GRADE NEW PLATFORM LOCATION

ELEVATED PLATFORM | BRUSH CREEK OPTION B



TRENCH PLATFORM | BRUSH CREEK OPTION B



Ridership Expectations

2016 | 2036 FORECAST

Base Average Weekday Transit Trips | Winter Season

Ridership Condition	Existing Base 2016	Future Base 2036	Change	Percent Change
Ridership | System-wide	17,600	21,200	3,600	20%
Ridership | Crossing Castle Creek	8,300	9,600	1,300	16%

- The Ridership Tool : forecasts future base year transit trips, based on the projected population and employment growth throughout the region. Determines how many new trips may be anticipated based on each alternative's level-of-service changes afforded the potential transit user.

EVALUATION

The Evaluation Ridership is virtually the same for the LRT and BRT. The LRT option would reduce the number of buses at Rubey Park and would improve air and noise quality more than the BRT option. However, LRT's capital cost is more than twice the BRT capital cost. Similarly, the LRT O&M cost is also twice the BRT O&M cost. For the BRT option, bus service refinement would help reduce the number of buses and improve efficiency (i.e., higher passenger loads). In addition, using electric buses would improve the air and noise quality at Rubey Park.

The BRT improvements, when phased in over time, can also set the stage for, and not preclude, future LRT if desired. All the proposed options would improve sustainability (including energy usage/saving, and noise/air quality improvements) and the greatest benefit to sustainability would come from the LRT and Phased BRT options. Because the Phased BRT with refined service plan option would maintain one-seat rides for the six routes in the UVMS corridor and does not require transfers, that option provides the best overall transit user experience.

Service Plans

BRT	LRT	
●	●	Connect Brush Creek intercept lot with Rubey Park or Galena/Main as the end-of-line station.
●	●	Serve Galena/Main station with a transit/pedestrian connection to Rubey Park which would serve all local routes.
●	●	Transit signal priority (TSP) at key intersections.
●	●	Station Dwell Time : 30 seconds.
●	●	Serve five stations along the 6.1-mile route : Aspen Airport/ABC, Buttermilk, Truscott, Maroon/Castle Creek, & 7th/Main.
●	●	Average station spacing : 0.87 mile.
●	●	Convenient transfer connections with six routes : Valley BRT, Valley Express, Valley/82 Corridor, Snowmass Ski, Snowmass/Aspen Shuttle, Buttermilk Ski
●		Requires wheelchair ramp deployment for mobility-impaired passengers and driver assistance in securing wheelchair-bound passengers.
●		Operates through most of the corridor in bi-directional, curbside dedicated lanes that would allow other vehicles to make right turns.
●		Accelerate/decelerate to/from stations at 2.25 mphps.
●		Capacity of 45-60 seated passengers, depending on the selected vehicle.
	●	Operates along a single track along the west/south sides of the SH 82 alignment ROW, with double track at all stations and a short double track segment just north of the airport to facilitate passing trains and minimize operating delays.
	●	Single track is embedded in a dedicated curbside lane (2-way operation) along the south side of Main Street that would allow other vehicles to make right turns.
	●	Level boarding at station platforms.
	●	Station Dwell Time : 2 mins at one end-of-line station and 5 mins at the other end-of-line station.
	●	Accelerate/decelerate to/from stations at 1.50 mphps.
	●	Capacity of 120 seated passengers.

MINIMUM BRT/LRT SERVICE PLAN

	Existing	BRT	LRT
Headway - peak hours and midday	2-3 min.	10 min.	15 min.
Trips per day	458	224	144
Seated Passenger capacity	40-57 (Gilligs/MCI's)	62 (60' artic. bus)	120 (2-car train)
Daily capacity	20,610 pass.	13,888 pass.	17,280 pass.
Current / Potential Future ridership	6,800 pass.*	13,600 pass.	13,600 pass.

* Average weekday during winter season on 6 corridor routes. It is unlikely that the minimum service plan headways will be acceptable to RFTA's clients. A refined service plan would maintain one-seat rides and would modify the bus headways somewhat to meet the contractual requirements but more closely align capacity with demand as described below.

REFINED SERVICE PLAN

Route	Existing Bus Trips / Day	Refined Service Plan Bus Trips / Day
BRT	149	112
Valley Express	12	8
Valley/82 corridor	83	72
Snowmass / Aspen	73	54
Snowmass Ski	70	56
Buttermilk	71	54
Total bus trips/day	458	356

The two-minute minimum allows the operator to transfer direction of the train at each end, while the five-minute minimum layover provides for additional operator break and schedule recovery. The longer layover period would switch between end-of-line stations depending upon time of day and directional demand (i.e. the five-minute layover would occur at Brush Creek in the morning and Rubey Park (or Galena St) in the afternoon. This maximizes opportunity for passengers to wait on-board the train as opposed to on the platform.

Cost of Alternatives

All costs are in 2016 dollars
20% for escalation was added to Marolt Easement Crossing and Cut & Cover pricing in the 2008 Study
30% contingency added to bottom line

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LRT CAPITAL COST RANGE

LRT operations and maintenance costs for UVMS service = $6.0 million, but there would be some cost savings from bus service reductions

Feature	Base Case | $428 M	Prime Case | $527.8 M
Power	Diesel - Electric	Electric OBS | $30.5 M
SH - 82 Crossing	At - Grade	Grade separated | $17 M
Shale Bluffs	At - Grade on SH - 82	On Viaduct | $20.6 M
Stations	All at Existing Bus Stops : New Station at 7th & Main	All at Existing Bus Stops except airport station New Station at 7th & Main
Airport Station	At Existing Bus Stop : Moving walkway connects Airport / AABC & Station	Underground station at Airport Terminal | $21.6 M
End - of - Line	Rubey Park	Main & Galena with Shuttle to Rubey Park | $10.1 M
Roundabout to 7th & Main	Under Roundabout onto Preferred Alternative on Marolt Easement	Under Roundabout onto Preferred Alternative on Marolt Easement
Existing Maroon Creek Bridge & Castle Creek Bridge	Rehabilitation	Rehabilitation

BRT CAPITAL COST RANGE

BRT operations and maintenance costs for UVMS service = $3.2 million, but there would be some cost savings from bus service reductions

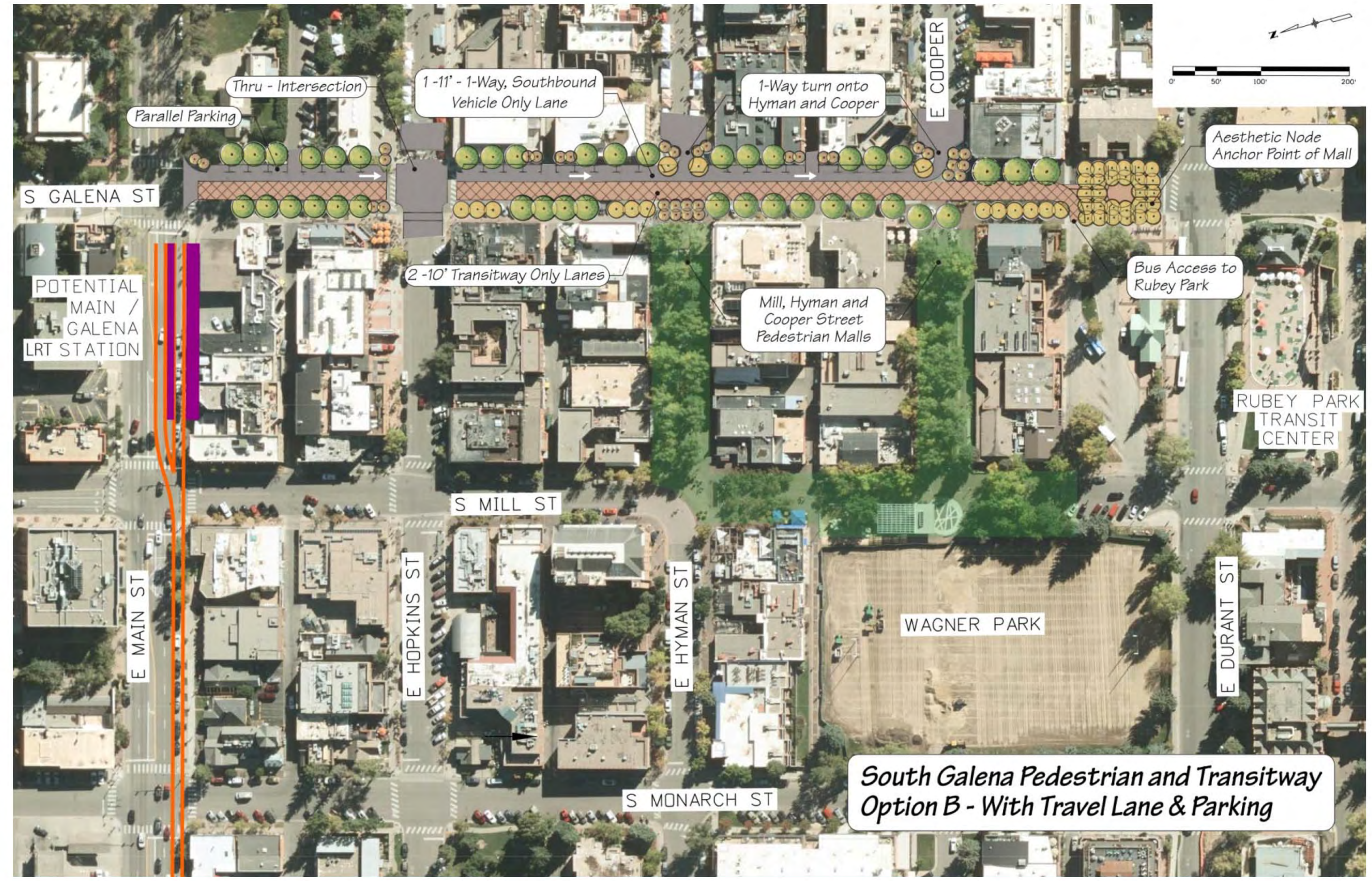
Feature	Base Case $159.1 M	Prime Case $200.5 M
Power	CNG	Electric | $16.3 M
Control	Operator	Autonomous | $11.1 M
Alignment	At - Grade on SH - 82 To Roundabout	Dedicated Bus Lanes | $3.4 M + cost of widening
Roundabout to 7th & Main	Preferred Alternative on Marolt Easement	Preferred Alternative on Marolt Easement
Stations	All at existing bus stops (upgraded) : New Stop at 7th & Main	All at existing bus stops (upgraded) : New Stop at 7th& Main : End-of-line Station at Main & Galena
End - of - Line	Rubey Park	Main & Galena with Shuttle to Rubey Park | $11.1 M
Existing Castle Creek Bridge	Rehabilitation	Rehabilitation

LRT | BRT COST COMPARISON

Brush Creek to Aspen	LRT	BRT
Capital Cost : Base Case	$ 428 M	$ 159.1 M
Capital Cost : Prime Case	$ 527.8 M	$ 200.5 M
Annual O&M Cost	$ 6 - $ 9 M	$ 3.2 M

South Galena Pedestrian & Transitway

OPTION A – WITHOUT TRAVEL LANE



OPTION B – WITH TRAVEL LANE & PARKING

05.31.2017 RFTA UVMS Open House Summary

On Wednesday, May 31, 2017, the Parsons Consulting Team held an open house to review findings of the Upper Valley Mobility Study. The study considered a comparison of BRT to light rail in terms of improving mobility, reducing bus congestion in Aspen, and making travel along the 6.1 mile entrance to Aspen between Brush Creek and Rubey Park more reliable and attractive. Findings of the study also included the costs associated with improved BRT versus a light rail system crossing the Marolt Property.

The open house included presentation of ten boards that summarized findings in the UVMS report. A PDF version of the boards have been provided to RFTA as well as other EOTC members and can be uploaded to websites and other social media platforms as a source of information for the public.

The open house was held at the CMC campus in Aspen and attracted approximately 30 members of the public. A summary of the comments heard during the public meeting are provided below:

Comments on Marolt Property:

- General concern about the community will to move this forward.
- Implementation of the realignment would allow more traffic to flow through the system reducing congestion.

Comments In Favor of Light Rail:

- Light rail seems more scalable, long term solution.
- LRT is preferred regardless of cost. It will then motivate down valley to look at implementing. LRT too. It will also increase the property values.

General Concerns with Either Option:

- Transfers are a significant time penalty.
- Tunnel through the Rockies is a mega project.
- How many minutes are saved relative to the cost of the projects?
- CDOT directives and strategies – how does that process work? Behind closed doors, no communication between various government agencies – need to work together publicly.

Comments on the Ridership Data and Service Plans:

- System wide ridership 2016-2036: ridership only shows an increase of 4,000? Should be a goal of <u>doubling</u> this.
- Current potential future ridership – 13,600
  - o How did we get to that number – is it the same for LRT and BRT – or a general finding?
- Is the valley BRT system included in the single seat rides @ 6 stops; or would a transfer at Brush Creek be required
  - o Including valley BRT (down valley?)

Potential Solutions:

- Is every option being considered, or are there new technologies out there (or emerging) to take advantage of?
- Are we considering a solution that doesn't require continued building?

    - Simplify, downsize, more sustainable.
- Congestion pricing @ peak hours to reduce peak flow
- Consider ride sharing, metering
- Our first recommendation (optimizing the 6 routes) is great and should be completed by RFTA regardless of the UVMS process
- Perhaps the current and planned BRT system could be changed to have local stops in particular zones and then express (no stops) between those zones and Aspen.
- Most of the growth is maxed out up valley
    - Why not prioritize down valley where growth will double?

Improvements to the Overall System:

- Connector to the Maroon Bells traffic?
    - Greater connectivity to lateral demands
- A new proposed LRT stop at Maroon Creek is ideal
- Charging stations @ nodes – encourage the ability for laterals and transit to/from, utilizing infrastructure for dual purposes, beyond just the electric bus.
- Woody creek + 82 intersection – high accident rate, need to improve that intersection

Other General Comments:

- RFTA amenities for elderly and disabled.
- Lower steps for mobility impaired riders
    - Helen Palmer –
        - 920.3965
        - Helenpalmer333@gmail.com

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