

10 TRANSPORTATION

This study contains an updated transportation impact assessment completed by Bunt & Associates Engineering Ltd. The major issue addressed is the interface between the proposed development and Highway 99. The report proposes phased development of intersections at the main entrance and into Minaty Bay. The report also comments on existing problems with the highway intersection into North Britannia, provides potential solutions but notes that the problems are historic and therefore not the responsibility of Taicheng to remedy.

The development plan accommodates a highway bypass around North and South Britannia by setting aside a highway corridor between the proposed community and the BC Hydro transmission line Right of Way. This corridor defines the eastern boundary of the proposed development area and is located in lands shown as remaining undeveloped.

Bunt will be retained by Tiger Bay to continue consultations with the Ministry of Transportation and Infrastructure with the goal of securing the appropriate permits for the on-site roads and the intersections with the Highway.



South Britannia Master Plan Transportation Impact Analysis Draft Update 4

Prepared for

Tiger Bay Development Corporation

Date

June 26, 2019

Project No.

04-17-0272

June 21, 2019
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Dear Long:

**Re: South Britannia Master Plan
Draft Transportation Impact Assessment Update**

Please find attached the transportation impact assessment for the South Britannia Master Plan. This report includes updated information, per progression of site information, and is an update to the previously submitted transportation impact assessments.

I trust this report addresses Tiger Bay's, Squamish Lillooet Regional District's, and Ministry of Transportation and Infrastructure's requirements. Should you have any questions / comments, please do not hesitate to contact the undersigned.

Yours truly,
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TABLE OF CONTENTS

CORPORATE AUTHORIZATION	2
1. INTRODUCTION	1
1.1 Study Purpose	1
1.2 Site Location.....	2
1.3 Study Area.....	2
1.4 Development Description.....	5
2. PROPOSED DEVELOPMENT	7
2.1 Phasing and Timing	7
2.2 Traffic Data and Time Periods.....	8
3. AREA CONDITIONS	11
3.1 Study Area.....	11
3.1.1 Roadway System.....	11
3.2 Existing Traffic Volumes and Conditions	12
3.2.1 Capacity Analysis	12
3.2.2 Existing Conditions Analysis	14
3.3 Transit Service	15
4. PROPOSED ACCESS STRATEGY	17
4.1 Access and Egress to the Site	17
4.2 Consideration for Future Bypass.....	19
4.2.1 Interchange for a Future Highway 99 Bypass Route	19
5. PROJECTED FUTURE TRAFFIC	21
5.1 Future Traffic Volumes	21
5.1.1 Background Traffic.....	21
5.2 Trip Generation.....	21
5.2.1 General Land Use Types	22
5.2.2 Internal Capture and General Reductions.....	23
5.2.3 Future Traffic.....	25
5.2.4 Development Traffic – Trip Distribution	25
5.2.5 Development Traffic – Sensitivity Analysis	25
6. TRAFFIC ANALYSIS	37
6.1 2025 Traffic Conditions Analysis.....	37
6.1.1 Background 2025 Traffic Conditions	37
6.1.2 Total 2025 Traffic Conditions – Phase 1	38

6.2	2028 Traffic Conditions Analysis.....	40
6.2.1	Background 2028 Traffic Conditions	40
6.2.2	Total 2028 Traffic Conditions – Phase 2.....	41
6.3	2032 Traffic Conditions Analysis.....	42
6.3.1	Background 2032 Traffic Conditions	42
6.3.2	Total 2032 Traffic Conditions – Phase 3.....	43
6.4	2037 Traffic Conditions Analysis.....	44
6.4.1	Background 2037 Traffic Conditions	44
6.4.2	Total 2037 Traffic Conditions – Phase 4.....	44
6.5	2047 Traffic Conditions Analysis (Build-out +10 Year Horizon)	46
6.5.1	Background 2047 Traffic Conditions	46
6.5.2	Total 2047 Traffic Conditions – Build-out + 10 Years.....	47
6.5.3	Total 2047 Traffic Conditions – Build-out + 10 Years – Sensitivity Analyses.....	48
6.6	Summary of Road Improvements Required.....	49
7.	SITE PLAN REVIEW	54
7.1	Site Circulation and Connectivity.....	54
7.1.1	Site Circulation	54
7.1.2	Connectivity between the Different Phases	54
7.2	Parking Requirements	54
7.2.1	Off-Street Parking Bylaw	55
7.3	Bicycle and Pedestrian Facilities.....	55
7.4	Transit and Car Sharing.....	56
7.4.1	Transit	56
7.4.2	Ride Share.....	56
7.4.3	Car Share Programs	56
8.	CONCLUSION	59
APPENDIX A Detailed Development Statistics and Trip Generation		
APPENDIX B Highway 99 / Copper Road Collected Traffic Volumes		
APPENDIX C Synchro Results		

EXHIBITS

Exhibit 1.1: Site Location	3
Exhibit 1.2: Study Area	4
Exhibit 2.1: Proposed Site Plan.....	10
Exhibit 3.1: Existing Volumes.....	13
Exhibit 4.1: Proposed Access Configuration	18
Exhibit 4.2: Potential Future Highway Bypass	20
Exhibit 5.1: Background Volumes 2025	27
Exhibit 5.2: Total Volumes 2025.....	28
Exhibit 5.3: Background Volumes 2028	29
Exhibit 5.4: Background Volumes 2028	30
Exhibit 5.5: Background Volumes 2032	31
Exhibit 5.6: Total Volumes 2032.....	32
Exhibit 5.7: Background Volumes 2037	33
Exhibit 5.8: Total Volumes 2037.....	34
Exhibit 5.9: Background Volumes 2047	35
Exhibit 5.10: Total Volumes 2047	36
Exhibit 6.1: Existing Laning.....	51
Exhibit 6.2: 2025 Laning Background and Total Condition.....	52
Exhibit 6.3: 2028 Laning Background and Total Condition.....	53

TABLES

Table 2.1: Proposed Development Phasing, Timing, and Breakdown	8
Table 3.1: Existing Highway 99 Volumes at Copper Drive	12
Table 4.1: Access Scenarios	17
Table 5.1: Projected 2025 to 2047 Highway 99 Volumes	21
Table 5.2: Trip Generation Rates	22
Table 5.3: Trip Generation Volumes – Phase 1 (Includes reductions and NCHRP internal capture).....	24
Table 5.4: Trip Generation Volumes – Phase 1 + 2 (Includes reductions and NCHRP internal capture)	24
Table 5.5: Trip Generation Volumes – Phase 1 + Phase 2 + Phase 3 (Includes reductions and NCHRP internal capture)	24
Table 5.6: Trip Generation Volumes – Phase 1 + Phase 2 + Phase 3 + Phase 4 (Includes reductions and NCHRP internal capture).....	25
Table 5.7: Traffic Distribution – Highway Splits	25
Table 6.1: Phase 1 Background Vehicle Traffic Operations – Mitigated.....	38
Table 6.2: Phase 1 Total Vehicle Traffic Operations – Mitigated.....	39
Table 6.3: Phase 2 Background Vehicle Traffic Operations – Mitigated.....	40
Table 6.4: Phase 2 Total Vehicle Traffic Operations – Mitigated.....	41
Table 6.5: Phase 3 Background Vehicle Traffic Operations – Mitigated.....	42
Table 6.6: Phase 3 Total Vehicle Traffic Operations – Mitigated.....	43

Table 6.7: Phase 4 Background Vehicle Traffic Operations – Mitigated.....	44
Table 6.8: Phase 4 Total Vehicle Traffic Operations – Mitigated.....	45
Table 6.9: Full Buildout + 10 Background Vehicle Traffic Operations – Mitigated	46
Table 6.10: Full Buildout + 10 Total Vehicle Traffic Operations – Mitigated	47
Table 6.11: Total 2047 Conditions Sensitivity Analysis (30% NB / 70% SB)	48
Table 6.12: Total 2047 Conditions Sensitivity Analysis (70% NB / 30% SB)	49
Table 6.13: Summary of Suggested Improvements	50
Table 7.1: Parking Bylaw Requirements	55

1. INTRODUCTION

1.1 Study Purpose

Bunt & Associates (Bunt) has been engaged by the Tiger Bay Development Corporation (Tiger Bay), previously Taicheng, to prepare an updated Transportation Assessment Report for the proposed Britannia Beach Master Plan Development in Britannia Beach, BC. This report provides a summary of the proposed access strategy, traffic operations impact results and design recommendations to support the Britannia Beach development. The scope of the assessment includes:

- Collection & review of available relevant information along the Highway 99 corridor;
- Collection & review of traffic counts in the defined study area;
- An assessment of existing traffic demand and operational conditions as well as existing provision for alternative modes of travel;
- An assessment of future background traffic demand and operational conditions, without the site development traffic;
- Estimation of future site traffic volumes during key periods and operational conditions of adjacent intersections;
- Development of a phased access strategy to connect to Highway 99;
- Determination of improvements, if any, required to support the additional traffic generated by the proposed development; and,
- A review of the site plan including vehicle access and circulation, high level parking review, and provision for potential alternative modes of travel.

This is an update to a previously submitted proposal with Tiger Bay as a response to updates to the site land-use mix / site plan. Bunt was also involved with the previous South Britannia Beach proposal presented back in October 2012, November 2014, and April 2016.

1.2 Site Location

The South Britannia site is located approximately 12km south of the District of Squamish municipality and 50km north of the Vancouver Region along Highway 99. It is situated just south of the Historic Britannia Beach town site near the Britannia Mine Museum. The site location is highlighted in **Exhibit 1.1**.

The South Britannia development site comprises approximately 186 acres of land adjacent to Howe Sound. This unique setting and development opportunity has the potential to create a great neighbourhood that complements all other communities along this section of the Sea to Sky corridor for the Squamish-Lillooet Regional District (SLRD).

Highway 99 (Sea to Sky Highway) provides access to the site and is the only link between Vancouver, Squamish, and Whistler and all of the communities in between. Recent upgrades to the Sea to Sky Highway were completed for the 2010 Winter Olympics and have increased safety and accessibility both to the site and between the various communities along the Sea to Sky corridor.

Highway 99 has a posted speed limit of 60km/h in the vicinity of the site and up to 80km/h south of the site and north of Britannia Beach. There is a traffic signal located just north of the site at the intersection of Highway 99 / Copper Drive, which functions as the main access to North Britannia and the Britannia Mine Museum.

1.3 Study Area

The proposed study area for the operational analysis consists of approximately 2.5 km of Highway 99, extending up to the Copper Drive intersection to the north and the edge of the proposed development to the south. **Exhibit 1.2** identifies the traffic study area.

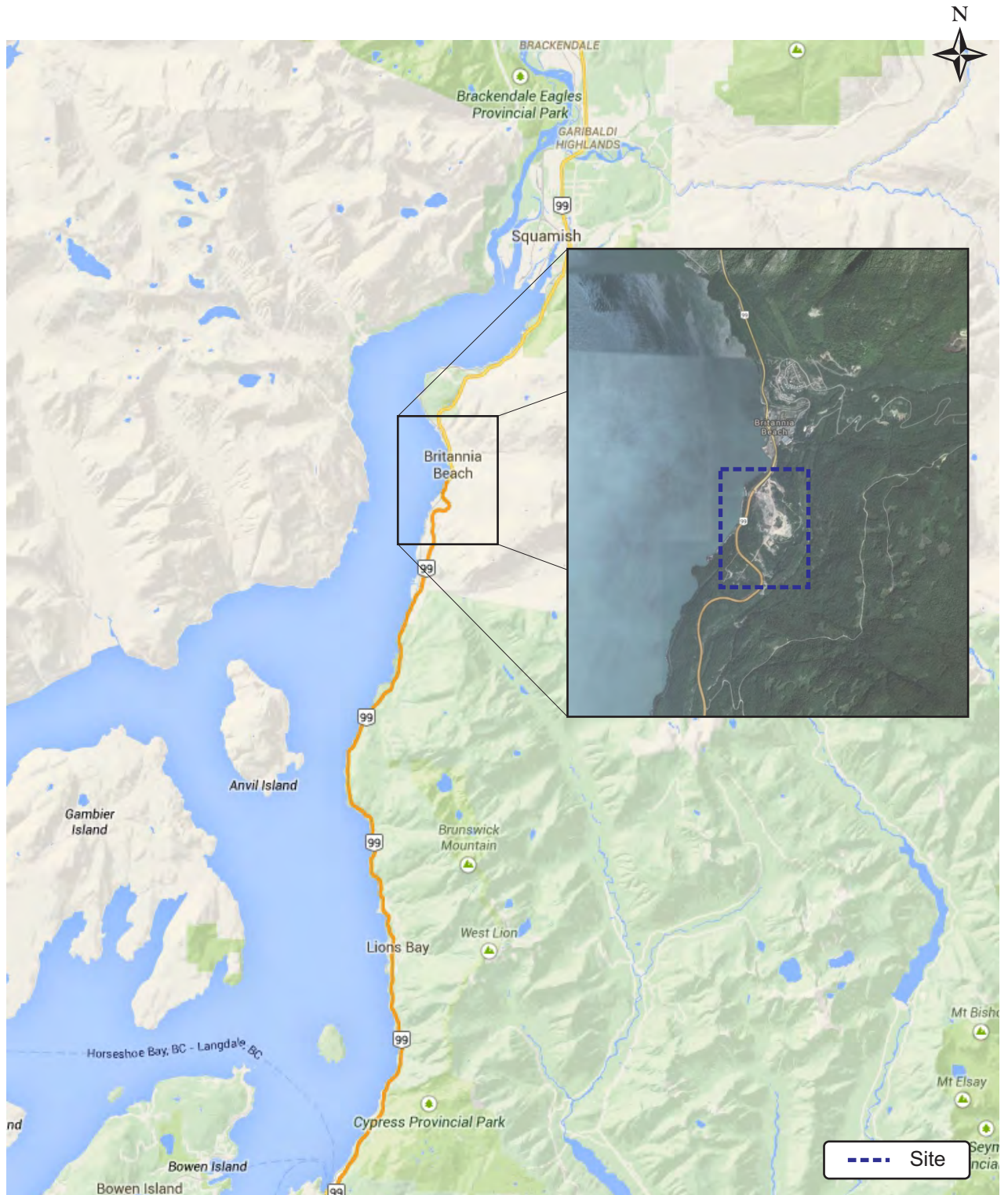


Exhibit 1.1 Site Location

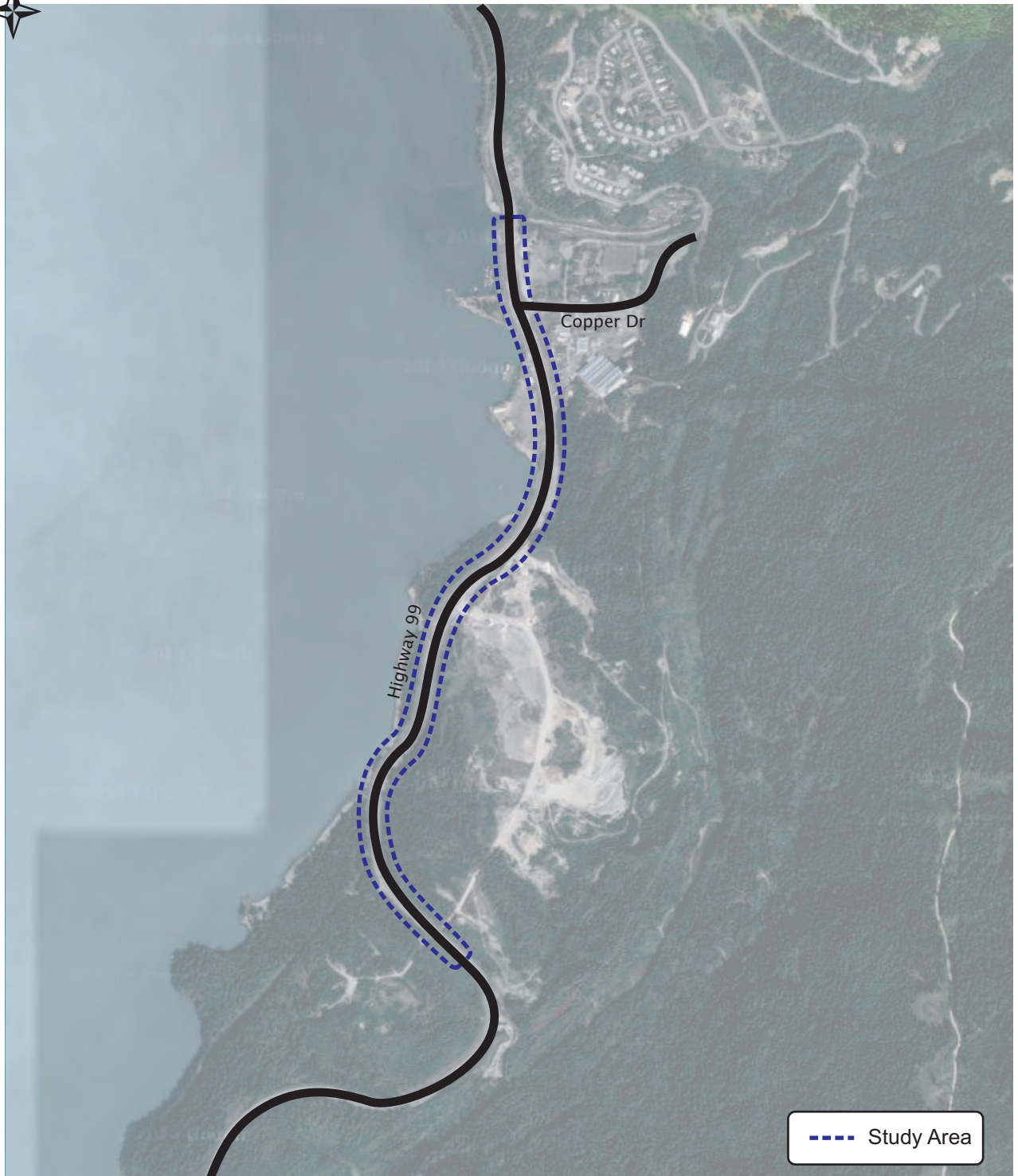


Exhibit 1.2 Study Area

1.4 Development Description

The proposal calls for the development of mixed residential/commercial uses, a wave pool, and a hotel. South Britannia Development would be completed over 4 phases that range in planning horizons between 1-5 years. For analysis purposes, Phase 1 is anticipated to be completed by 2025, Phase 2 is anticipated to be completed by 2028, Phase 3 is anticipated to be completed by 2032, and Phase 4 (build-out) is anticipated to be completed by 2037. The development statistics for each of the phases are detailed in Section 2 below while the for the full build-out, the development is anticipate to house 1,050 residential units, approximately 7,500 square feet of eatery spaces, approximately 31,000 square feet commercial and office space, 190-hotel rooms/glamping space, supporting municipal use (11,000 square feet) and recreational amenity development (including surf park/wave pool – 269,000 square feet, parks area, and etc.).

The South Britannia Development site has been identified by the SLRD Electoral D as part of the Britannia Beach “Planned Community” (i.e. Town Centre) in their Official Community Plan (OCP) referred to as Britannia South. The OCP currently allows for the development of up to 1,000 residential units (with a total of up to 2,000 residential units for the Britannia Beach community overall), up to 16,000 square feet of community-oriented commercial development, as well as other amenities including parks and open spaces, schools, and tourist accommodation (hotel) amongst other uses.

2. PROPOSED DEVELOPMENT

The proposed South Britannia Development site is envisioned as a complete Master Planned Development. It aims to be an integrated community along with the existing North Britannia site that will provide the essential services and amenities for its residents. It also proposes to be a community which will adhere to and promote environmentally sound development practices that reduce impact on natural ecosystems and fits within the context.

South Britannia Development will comprise up to 1,050 residential units and approximately 31,000 square feet of commercial and office space, 7,500 square feet of eatery, and 150 hotel rooms with 40 glamping spaces, 11,000 square feet of municipal office, and other recreational uses (wave pool / surf park / skate park / etc.) throughout the development. Community amenities will include several parks and plazas.

2.1 Phasing and Timing

The South Britannia Development is planned to be developed in a series of phases over the next 25 years. A specific year has been included for each of the phases for the purpose of analysis only. **Table 2.1** summarizes the proposed development phasing and timing, as well as the anticipated number of units / square footage for each land use for South Britannia Development throughout the course and for full build-out conditions.

Table 2.1: Proposed Development Phasing, Timing, and Breakdown

Land Use	Phase 1 2022-2025	Phase 2: 2026-2030	Phase 3: 2031-2035	Phase 4: 2036-2045	Total
Residential (units)		202	259	589	1,050
Commercial and office (sf)		27,000	4,000		31,000
Recreational	Wave garden/Surf Park (269,000 square feet) Skate park (2.4 acres)	Park Use – 0.3 acres of environmental sensitive / natural / park space	Park Use – 11 acres of environmental sensitive / natural / park space	Park Use – 0.3 acres of environmental sensitive / natural / park space	Wave garden/Surf Park (269,000 square feet) Skate park (2.4 acres) Park Use – 11.6 acres of environmental sensitive / natural / park space
Eatery (sf)	4,300		3,200		7,500
Accommodation (hotel rooms and glamping space)	20	70	70	30	190
Municipal (sf)				11,000	11,000

For the purpose of analysis, we have assumed that the Phase 1 build-out would be by 2025, the Phase 2 build-out would be by 2032, and the Phase 3 build-out would be by 2037. This is within the range of time as noted above and also with the planning horizons for the previous version of study for this site.

With respect to the above table, the phasing and timing will be subject to adjustment as the project progresses.

Also, aside from the phases above, an additional scenario will be evaluated for 2047, which represents full build out + 10 years.

The proposed development is shown in **Exhibit 2.1**. Detailed development statistics, broken down by phase and land use types, are provided in **Appendix A**.

2.2 Traffic Data and Time Periods

The Sea to Sky corridor is monitored by the MOTI permanent count stations located along the highway. The northbound and southbound traffic data are available for annual, monthly, daily and hourly conditions. Two stations were evaluated to understand the existing traffic patterns along the highway and develop projections for future traffic volumes. The permanent count stations selected were P-15-5 north of Horseshoe Bay and P-15-3 Cheekeye north of Squamish. In addition, Bunt performed traffic counts at the Copper Drive / Highway 99 intersection during the AM, PM, and Sunday peak periods. **Appendix B** includes the traffic volumes collected for the Highway 99 / Copper Road intersection.

Key observations relating to existing highway traffic conditions are as follows:

- The two highest traffic volume periods for the Sea to Sky highway tend to be Friday late afternoon into early evening period for northbound traffic, and Sunday afternoon for southbound traffic;
- Although the summer daily traffic volumes tend to be greater than winter volumes, the peak hourly volumes during the winter tend to be higher than the summer period peak hourly volumes; and

The highest peak hour traffic conditions typically fall during the New Year season (January 1st – 2nd), spring break and summer holidays (July – August). The traffic analysis was prepared based on a normal peak condition rather than extraordinary time periods in a year.

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3. AREA CONDITIONS

3.1 Study Area

The study area for this analysis includes the south edge of the proposed site (approximately 1.5km south of the existing Britannia Beach access) up to the Highway 99 / Copper Drive intersection.

3.1.1 Roadway System

Highway 99

Also known as the Sea to Sky Highway, Highway 99 is the major north-south corridor connecting the US Border to the Howe Sound Area through Greater Vancouver, Britannia, Squamish, Whistler and Pemberton. It runs north up to Cache Creek and connects to Highway 97.

The recently upgraded Highway 99, a legacy of the 2010 Olympics, is a lifeline for all communities along the Sea to Sky Corridor. At Britannia Beach, Highway 99 provides for the safe and efficient movement of longer distance highway traffic while also supporting good access to development.

The existing highway consists of a combination of one and two lanes per direction. Posted speeds range from 60km to 100km, with lower speed limits designated in urban areas such as Squamish and near signalized intersections.

In time, a bypass route for Highway 99 may be built along the hillside above the community. The new section of highway would provide for the higher speed movement of longer distance traffic along the Sea to Sky Corridor. The old highway route through the lower lands at Britannia Beach would become an urban collector route for the community with slower moving vehicle traffic mixed together with pedestrians and cyclists and a more urban streetscape treatment.

Copper Drive

Copper Drive is the main access road providing Highway connections to the existing North Britannia community and Mine Museum. It is a 2 lane road that connects to Highway 99 as a T-intersection with traffic signal control. Right turn channelized lanes are in place for the northbound and westbound approaches.

3.2 Existing Traffic Volumes and Conditions

To document the existing traffic characteristics within the study area and estimate future traffic generation for the site, a series of traffic surveys were conducted by Bunt & Associates on Friday, April 12th, 2019 (from 7:00-9:00 AM, and 3:00-6:00 PM), and Sunday, April 14th, 2019 (from 11:00AM to 4:00PM). **Table 3.1** below summarizes the peak traffic volumes for each peak period.

Table 3.1: Existing Highway 99 Volumes at Copper Drive

DIRECTION	EXISTING (VEHICLES PER HOUR)		
	Weekday AM	Weekday PM	Sunday
Northbound	500	1,200	600
Southbound	600	750	1,200

Exhibit 3.1 shows traffic volumes for the typical Friday Weekday AM and PM and Sunday PM peak traffic periods.

Note the above count is the most recent count from Bunt and forms the basis for this analysis. Further detail on assumptions regarding background traffic is provided in Section 5.1.1.

Also, Highway 99 traffic volumes are largely relevant to the amount of people traveling from Vancouver to Squamish, Whistler and beyond. As such, the time of year can have a noteworthy impact on volumes. Although the summer daily traffic volumes tend to be greater than winter volumes, the peak hourly volumes during the winter tend to be higher than the summer period peak hourly volumes. Aside from the summer and winter peaks (which are normally extraordinary peaks for the year), the typical seasonal variations were found not to be significant. As such, our April count used as basis for analysis is assumed acceptable.

3.2.1 Capacity Analysis

Traffic operations at the intersections within the study area were evaluated using the Synchro 9 traffic analysis software package, developed by Trafficware. This operational analysis includes the calculation of volume-to-capacity (v/c) ratios, and a predicted “delay based” Level of Service (LOS) indicator for each traffic movement at the key intersections.

At signalized intersections, the v/c ratio is used as a measurement of traffic congestion for individual traffic lanes and/or lane groups and for the intersection as a whole. Volume/capacity values up to 0.85 are generally considered appropriate for an intersection, and up to 0.90 for individual lanes or lane groups. A v/c ratio of 1.0 or greater indicates that the traffic operation is over-capacity. The traffic LOS indicator also ranges from LOS A condition with minimal or no delay through to the LOS F conditions with extensive delay.

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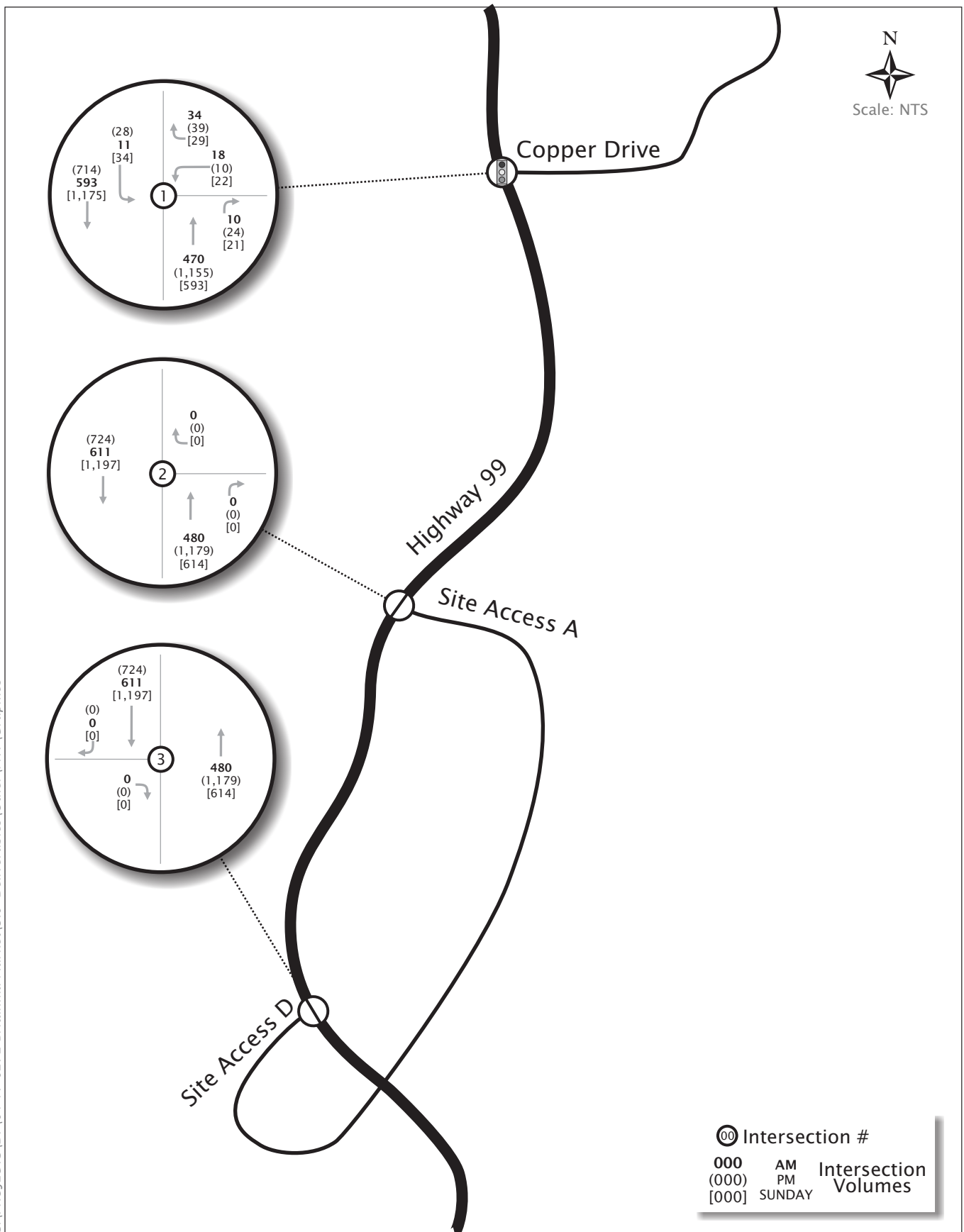


Exhibit 3.1 Existing Peak Hour Traffic Volumes

04-17-0272

Britannia Master Plan
June 2019

For unsignalized intersections, the LOS indicator is based on the estimated average control delay per vehicle for each critical movement. A control delay of less than 10 seconds indicates sufficient capacity and good traffic conditions, i.e. LOS A traffic operation. A calculated control delay value greater than 50 seconds is assigned as LOS F performance measure. SimTraffic, a microsimulation software, is used to determine the control delay and queuing of the intersection as we have found through past experience that SimTraffic is better at determining intersection operations at unsignalized and congested conditions / locations.

Of note, the 2019 traffic counts were conducted and were used for the 2019 existing conditions scenario analysis. The future conditions, to be discussed in later sections, were calculated with a standard growth rate throughout the analysis horizon to account growth in the area.

3.2.2 Existing Conditions Analysis

The 2019 data analysis is presented in **Table 3.2**. Detailed Synchro reports are provided in **Appendix C**.

Of side note, at the time of our traffic count survey, the World Ski & Snowboard Festival, hosted in Whistler, took place. As a result, we would expect our traffic count data to be conservative as it would encompass higher volumes than would be expected during typical conditions.

Table 3.2: Existing Vehicle Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	<i>Overall</i>	A	0.51		A	0.83		A	0.82	
	WBL	C	0.16	6	D	0.13	6	C	0.26	10
	WBR	C	0.02	6	D	0.03	9	C	0.02	8
	NBT	A	0.45	55	B	0.87	276	A	0.46	60
	NBR	A	0.01	2	A	0.02	2	A	0.01	2
	SBL	A	0.02	1	B	0.17	2	A	0.06	2
	SBT	A	0.49	42	A	0.50	53	A	0.79	157
Highway 99 & Site Access A (Unsignalized)	<i>Overall</i>									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.31	0		0.75	0		0.39	0
	SBT		0.20	0		0.23	0		0.38	0
Highway 99 & Site Access D (Unsignalized)	<i>Overall</i>									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.31	0		0.75	0		0.39	0
	SBT/R		0.20	0		0.23	0		0.38	0

- The signal at Copper Drive and Highway 99 was optimized to a 90-second cycle length.

- Overall intersection operations are acceptable during the Weekday AM and PM, and Sunday peak hours, each having Level of Service (LOS) 'A'. The overall volume-to-capacity (v/c) ratios do not exceed 0.83, and northbound vehicle queues do not exceed 276 m (approximately 40 vehicles). The southbound through lane also exhibits long queues of 157 m (22 m).
- For this existing conditions case, either an additional northbound or southbound lane could be worthwhile.
- For the purpose of analysis, we would suggest such improvements be added by Phase 1 (2025).

3.3 Transit Service

Currently, public transit services along the Highway 99 corridor are limited. TransLink (officially known as South Coast British Columbia Transportation Authority) is the corporation responsible for the regional transportation network in Greater Vancouver. They provide transit services that extend north up to the community of Lions Bay (Routes 259 and 262) approximately 20km south of Britannia Beach. BC Transit, the transit authority responsible for transportation services outside of the Greater Vancouver area provides public transit services in Squamish, Whistler and Pemberton. No regional transit connections are presently provided between Lions Bay and Squamish / Whistler.

Private coach bus companies offer transportation services along the corridor. Pacific Coach Lines (PCL), Squamish Shuttle (Squamish Connector), and Whistler Shuttle, provide connections from the Vancouver International Airport through Downtown Vancouver to Squamish and Whistler. Some of these services do stop on request at specific locations along the Highway 99 corridor, including the existing Britannia Beach access and North Britannia (at Copper Drive).

4. PROPOSED ACCESS STRATEGY

4.1 Access and Egress to the Site

For the four phases of development, it is anticipated there will be two access egress configurations. Specifically:

Phase 1

One access is being proposed for this phase where Access A is anticipated to be a full movement unsignalized intersection.

Phases 2-4

Two accesses are being proposed. **Exhibit 4.1** identifies the locations of the proposed site accesses to/from the highway which are described below:

- Access A - Proposed at-grade right-in, right-out access to the highway which will serve northbound (from highway) ingress traffic and northbound (from highway) egress traffic for the site; and
- Access D - Proposed at-grade right-in, right-out access to which will serve the southbound (from highway) ingress and southbound (from highway) egress traffic for the site.

These proposed intersections will work together with the existing Copper Drive signalized intersection to provide access to the Britannia Beach community.

Table 4.1 summarizes the phased site access scenarios (for Phases 2 to 4). The methodology and results of this analysis are included in a later section.

Table 4.1: Access Scenarios

ACCESS	PHASE 2	PHASE 3	PHASE 4
Access A	Right in / right out (with inbound deceleration lane and outbound yield control)		
Access D	Right in / right out (with inbound deceleration lane and outbound acceleration lane)		
Others	Pedestrian and Bike connection to North Britannia, and Transit Centre		Upgraded vehicular connection (existing culvert)

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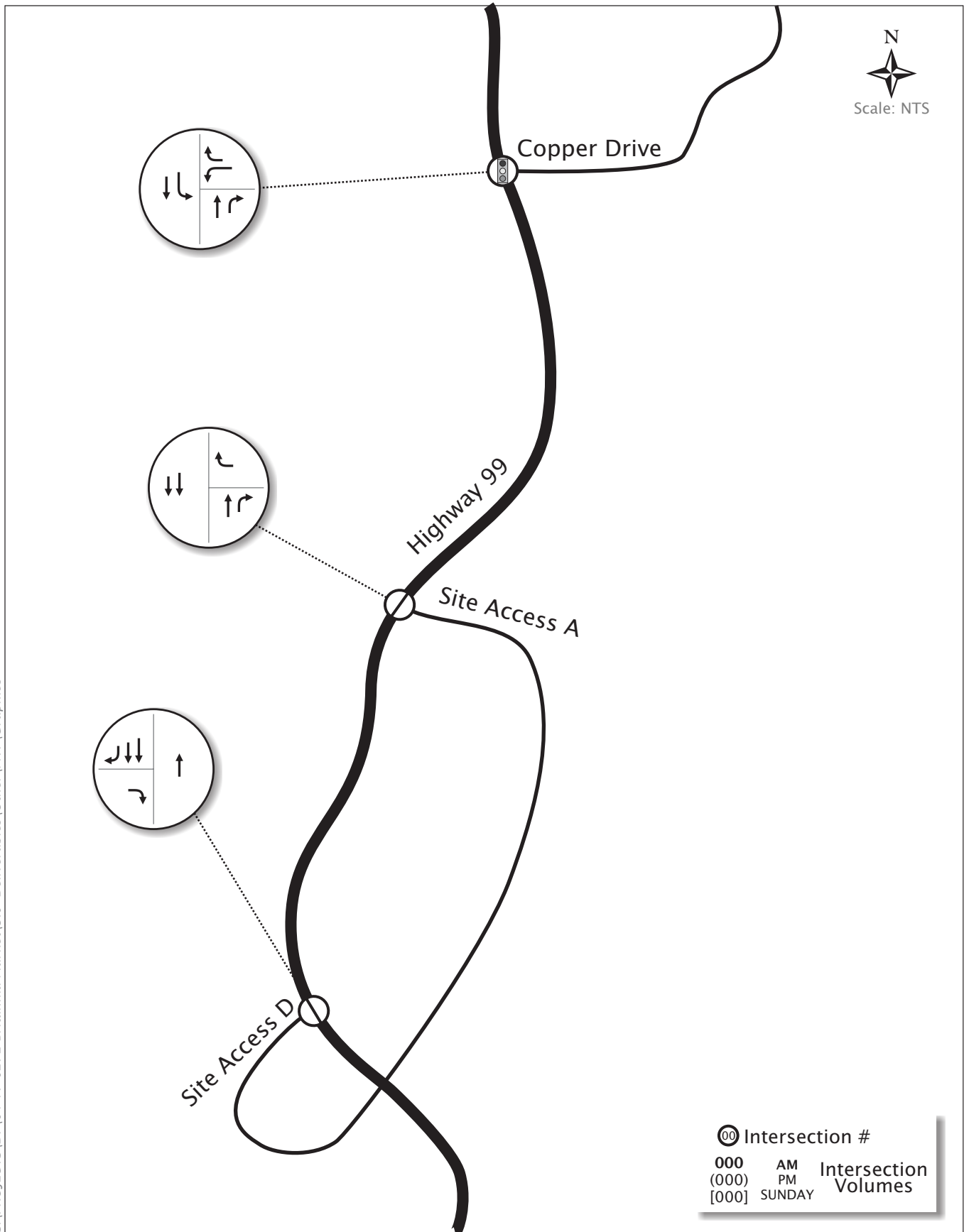


Exhibit 4.1 Access Configuration

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4.2 Consideration for Future Bypass

4.2.1 Interchange for a Future Highway 99 Bypass Route

The MOTI have advised that the Highway 99 Bypass will most likely extend from the point where Daisy Creek crosses the Highway to a point north of Britannia Creek along a schematic route illustrated on **Exhibit 4.2** below. Bypass rights of way have been established through North Britannia but none have been identified through South Britannia. New grade separated interchange will be required at both ends of the Bypass in order to connect the Bypass with the existing highway, and to provide access to the community. The replaced old highway will revert to a local road. An implementation schedule for the Bypass has not been established.

With the construction of the Highway Bypass, the Highway 99 operations would improve within the study area by providing additional roadway capacity in the vicinity.

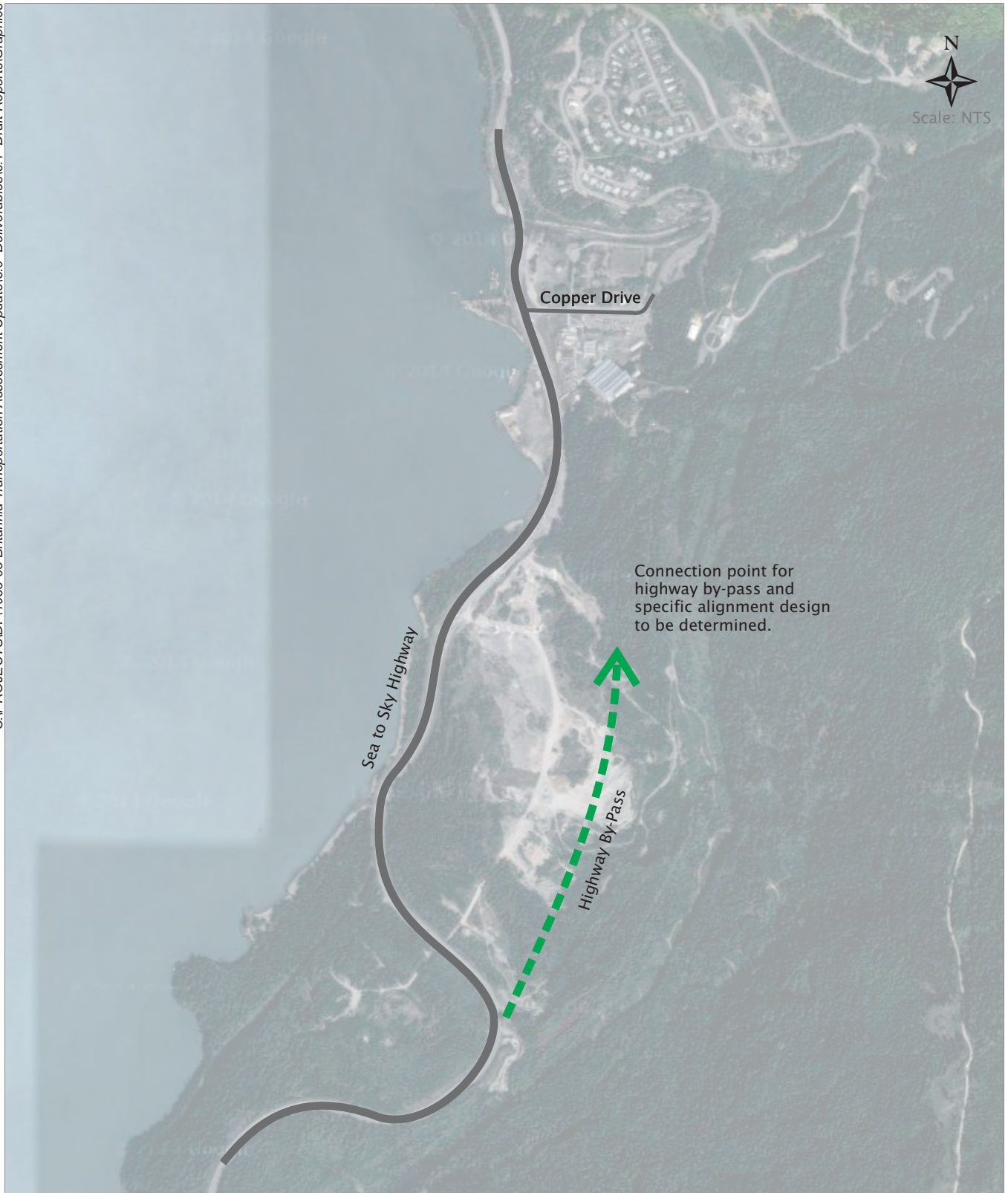


Exhibit 4.2 Potential Future Highway By-Pass

5. PROJECTED FUTURE TRAFFIC

This section discusses the background traffic volumes, projected site trip generation and trip distribution for the proposed development.

5.1 Future Traffic Volumes

5.1.1 Background Traffic

The background traffic volume is calculated using a growth rate of 2.3% per year (compounded) for Highway 99 imposed on the April 2019 traffic volumes noted above with no highway traffic capacity constraints. This is an increase from the previous reports where we had previously used 1.8% per annum and is a result of the latest information gathered.

As noted above, Phase 1 is estimated to be completed in 2025 at the latest, Phase 2 in 2028, Phase 3 in 2032, and Phase 4 in 2037. The analysis also included a scenario for full build-out plus 10 years (2047).

Table 5.1 shows the estimated background highway traffic volumes at years 2025, 2032, 2037, and 2047. Note the weekday peaks below are of the Friday AM and PM peak hours.

Table 5.1: Projected 2025 to 2047 Highway 99 Volumes

	PHASE 1 - 2025			PHASE 2 - 2028			PHASE 3 - 2032			PHASE 4 - 2037			BUILD-OUT + 10 YEARS - 2047		
	AM	PM	SUN	AM	PM	SUN	AM	PM	SUN	AM	PM	SUN	AM	PM	SUN
NB	550	1,350	700	650	1,600	850	650	1,600	850	750	1,800	950	950	2,250	1,150
SB	700	850	1,400	800	1,000	1,600	800	1,000	1,650	900	1,100	1,800	1,150	1,400	2,300

5.2 Trip Generation

The traffic generated by the new development is estimated using trip rates calculated from traffic surveys collected by Bunt for similar developments and from the ITE Trip Generation Manual (10th Edition). The estimates coincide with the scenarios illustrated in Table 5.1. **Table 5.2** below summarizes the trip rates used. Note, further trip generation breakdown is provided in Appendix A.

Table 5.2: Trip Generation Rates

LAND USE	SOURCE	AM			PM			SUNDAY		
		IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Residential	ITE-Multi-family housing low rise (220)	0.11	0.35	0.46	0.35	0.21	0.56	0.28	0.17	0.45
	ITE-Multi-family housing mid rise (221)	0.09	0.27	0.36	0.27	0.17	0.44	0.21	0.14	0.35
	AVERAGE	0.10	0.31	0.41	0.31	0.19	0.50	0.25	0.15	0.40
Commercial	ITE – Specialty Retail (826)	0.42	0.26	0.68	1.19	1.52	2.71	0.95	1.22	2.17
Recreational	ITE – Public Park (411) – environmental sensitive areas	0.01	0.01	0.02	0.06	0.05	0.11	0.12	0.19	0.31
	ITE – Public Park (411) Maximum Rate	2.66	1.85	4.50	1.93	1.58	3.50	1.95	3.05	5.00
	Surf Park, skate park, and etc.	Varies								
Office	ITE – Government Office Building (730)	2.51	0.84	3.34	0.43	1.28	1.71	0.34	1.03	1.37
Hotel	ITE - Hotel (310)	0.28	0.19	0.47	0.31	0.29	0.60	0.26	0.30	0.56
Restaurant	ITE Quality Restaurant (931)	0.46	0.27	0.73	5.23	2.57	7.80	4.91	2.89	7.80
	ITE Fast Casual Restaurant (930)	1.39	0.68	2.07	7.77	6.36	14.13	18.71	15.31	34.02
	Average	0.92	0.48	1.40	6.50	4.47	10.97	11.81	9.10	20.91

In the instance where the above rate shows an average, the average rates were used for analysis.

5.2.1 General Land Use Types

Residential Trip Rates – Multi-Family Dwellings

In general, for the single family detached homes housing in the vicinity, the ITE Trip Generation Handbook suggests a rate of 0.75 and 1.01 trips per unit for the AM and PM peak hour conditions, respectively. The observed trip generation rates for the Furry Creek and Lions Bay communities averaged in considerably lower at 0.41 and 0.43 trips per unit for the AM and PM peak hour respectively.

For communities like this located on recreational travel corridors near to but outside of major cities, we surmise that the lower trip generation rates can be attributed to several factors. A number of the homes in these communities tend to be vacation homes (mainly weekend and seasonal use) and not generate the same vehicle trip patterns as traditional residential neighbourhoods. Moreover, a higher percentage of homes in these communities are occupied by retired or semi-retired households, again having travel patterns quite different than those of traditional residential neighbourhoods.

In addition, trips generated by these more distant communities tend to be linked, i.e. residents combine trips (e.g. work and shopping) on account of the travel distances involved rather than making separate trips for these different trip purposes.

As a conservative measure for our analysis for the South Britannia development, we have assumed an average between the ITE residential trip rates and the more local values obtained from our observations at Lions Bay and Furry Creek. These averaged rates calculate to 0.58 vehicle trips per unit in the weekday morning peak and 0.72 trips per unit during the weekday afternoon peak hour.

The Sunday afternoon peak generation rates were calculated as 80% of the weekday afternoon peak, based on residential day of week trip rate information provided in the ITE Trip Generation Handbook.

For the multi-family component, the ITE Trip Generation Manual suggests a trip generation rate that calculates to approximately two thirds (2/3) of the single family use. Following this approach, Bunt calculated the trip generation rate for multi-family homes to be 0.39 trips per hour for the AM and 0.48 trips per hour during the PM peak period. Note, secondary suites are assumed to have multi-family residential trip rates.

Commercial, Institutional and Hotel Trip Rates

The South Britannia Master Plan also contemplates the development of commercial, municipal / institutional and hotel uses. Table 5.2 above summarizes the trip generation rates assumed, which are generally based on the trip rates recommended in the ITE Trip Generation Handbook. Note, to be conservative, we have assumed Glamping spaces to generate trips similarly to a hotel use.

Recreation Uses

There are numerous uses associated with recreation uses such as surf parks, park land, skate park and etc. With these uses, the breakdown of trips are detailed in Appendix A of the report as these uses have varying trip rates and some of the trip rates were determined based on a first principle basis.

5.2.2 Internal Capture and General Reductions

Due to the nature of the design of the site, it is expected there would be internal capture amongst the different uses. With this in mind, the National Cooperative Highway Research Program (NCHRP) Internal Trip Capture Estimation for Mixed Used Developments was utilized. The details of the application of the methodology are highlighted in Appendix A of this report.

In addition to internal capture of the site, our Client has indicated that approximately 15% of the multifamily units will be used as residences for on-site staff. With that in mind, we anticipate most of their peak hour trips to be internal and that we had reduced the multi-family trips by 10%.

Tables 5.3 to 5.6 present the generated vehicle volumes for Phases 1 through 3 as well as their cumulative trips. Detailed trip statistics, broken down by phase and land use type, are provided in **Appendix A**.

Table 5.3: Trip Generation Volumes – Phase 1 (Includes reductions and NCHRP internal capture)

LAND USE	AM			PM			SUNDAY		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	0	0	0	0	0	0	0	0	0
Commercial / Office	0	0	0	0	0	0	0	0	0
Hotel	6	4	10	4	4	8	3	3	6
Municipal Institutional	0	0	0	0	0	0	0	0	0
Restaurant / Eatery	4	2	6	24	15	39	44	32	76
Recreational (mixed types)	32	32	64	30	31	61	46	48	94
TOTAL	42	38	80	58	50	108	93	83	176

Table 5.4: Trip Generation Volumes – Phase 1 + 2 (Includes reductions and NCHRP internal capture)

LAND USE	AM			PM			SUNDAY		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	18	53	71	39	26	65	27	18	45
Commercial / Office	9	6	15	18	18	36	8	11	19
Hotel	23	16	39	23	23	46	18	23	41
Municipal / Institutional	0	0	0	0	0	0	0	0	0
Restaurant / Eatery	3	2	5	13	5	18	29	13	42
Recreational (mixed types)	32	32	64	28	27	55	44	45	89
TOTAL	68	139	207	139	96	236	111	77	188

Table 5.5: Trip Generation Volumes – Phase 1 + Phase 2 + Phase 3 (Includes reductions and NCHRP internal capture)

LAND USE	AM			PM			SUNDAY		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	39	118	157	103	65	168	73	43	116
Commercial / Office	9	7	16	18	17	35	9	13	22
Hotel	42	28	70	39	41	80	31	41	72
Municipal / Institutional	0	0	0	0	0	0	0	0	0
Restaurant / Eatery	4	3	7	23	8	31	55	28	83
Recreational (mixed types)	45	41	86	40	37	77	55	61	116
TOTAL	139	197	336	223	168	391	223	186	409

Table 5.6: Trip Generation Volumes – Phase 1 + Phase 2 + Phase 3 + Phase 4 (Includes reductions and NCHRP internal capture)

LAND USE	AM			PM			SUNDAY		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	88	274	362	259	156	415	197	117	314
Commercial / Office	7	6	13	16	16	32	8	13	21
Hotel	50	33	83	45	50	95	36	50	86
Municipal / Institutional	23	5	28	1	10	11	1	8	9
Restaurant / Eatery	3	2	5	23	8	31	55	28	83
Recreational (mixed types)	44	40	84	38	33	71	53	55	108
TOTAL	215	360	575	382	273	655	350	271	621

5.2.3 Future Traffic

Future traffic volumes were calculated by adding the net trip volumes to the background volumes previously calculated for 2025, 2032, 2037, and 2047. The assignment of the estimated site traffic onto the road network is generally based on the observed turning movements at the study intersections and directional highway volumes. The capacity analysis and operation results will be described in the next section. The resulting future background and total traffic volume summaries for the traffic study area are summarized in **Exhibits 5.1** and **5.2** for the Year 2025, **Exhibits 5.3** and **5.4** for the Year 2032, **Exhibits 5.5** and **5.6** for the Year 2037, and **Exhibits 5.7** and **5.8** for the 2047 Horizon Year.

5.2.4 Development Traffic – Trip Distribution

The estimated traffic generated by the proposed site was distributed based on existing highway traffic patterns and observations at other communities along the Sea to Sky corridor, as well as per discussions with SLRD staff. **Table 5.7** summarizes the northbound and southbound split distributions along the highway.

Table 5.7: Traffic Distribution – Highway Splits

TIME PERIOD	HIGHWAY TRAFFIC	
	NORTHBOUND	SOUTHBOUND
Weekday AM	50%	50%
Weekday PM	50%	50%
Sunday	55%	45%

5.2.5 Development Traffic – Sensitivity Analysis

To ensure that the traffic analysis is robust, sensitivity analyses was completed for the 2047 planning horizon. Specifically:

Directional distribution - Weekday AM and PM peak hour assumed a northbound distribution of 70% and a southbound distribution of 30% as well as a northbound distribution of 30% and a southbound distribution of 70%. The total traffic volumes for this scenario can be found in **Exhibits 5.9** and **5.10**.

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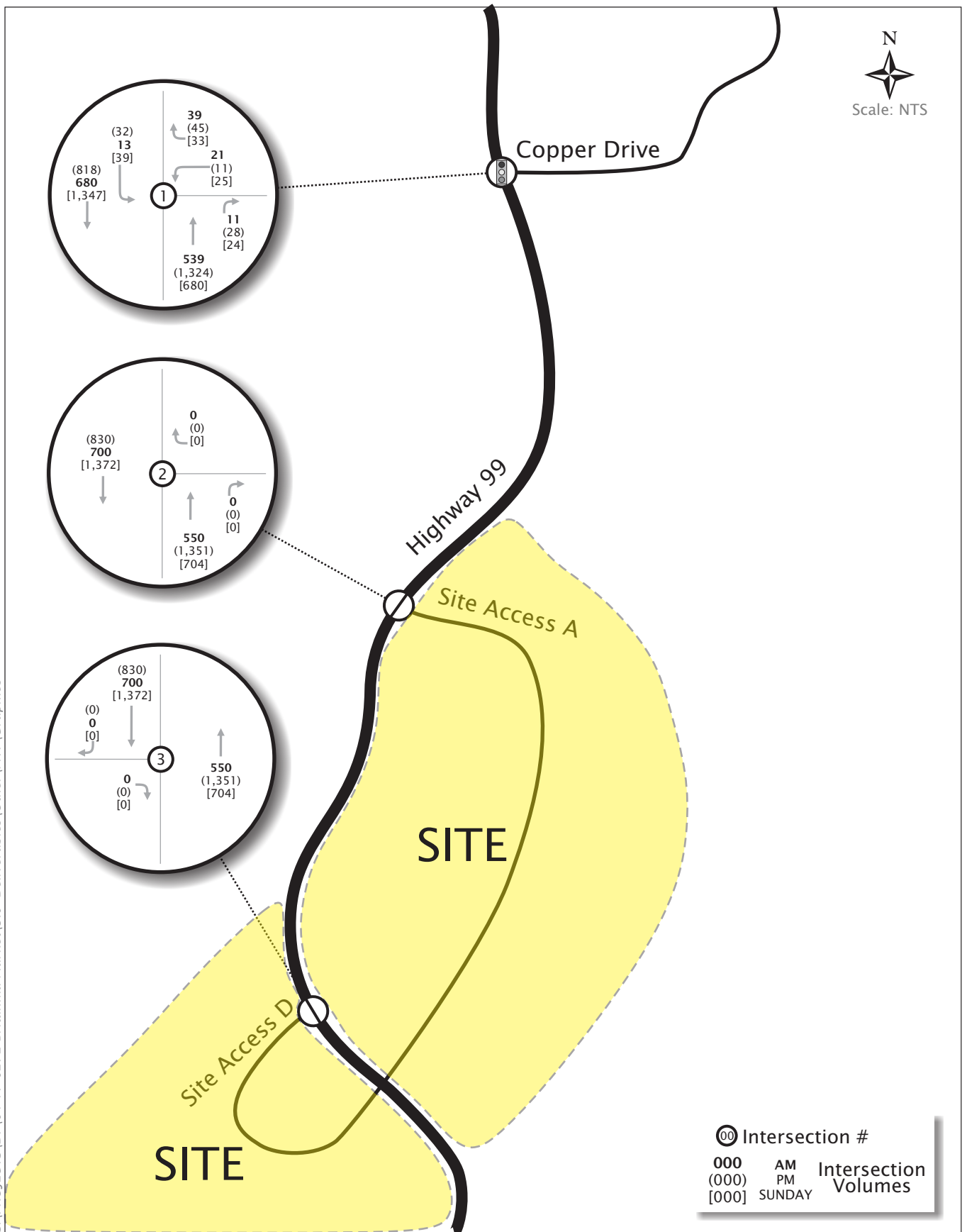


Exhibit 5.1 Phase 1 Background Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
May 2019

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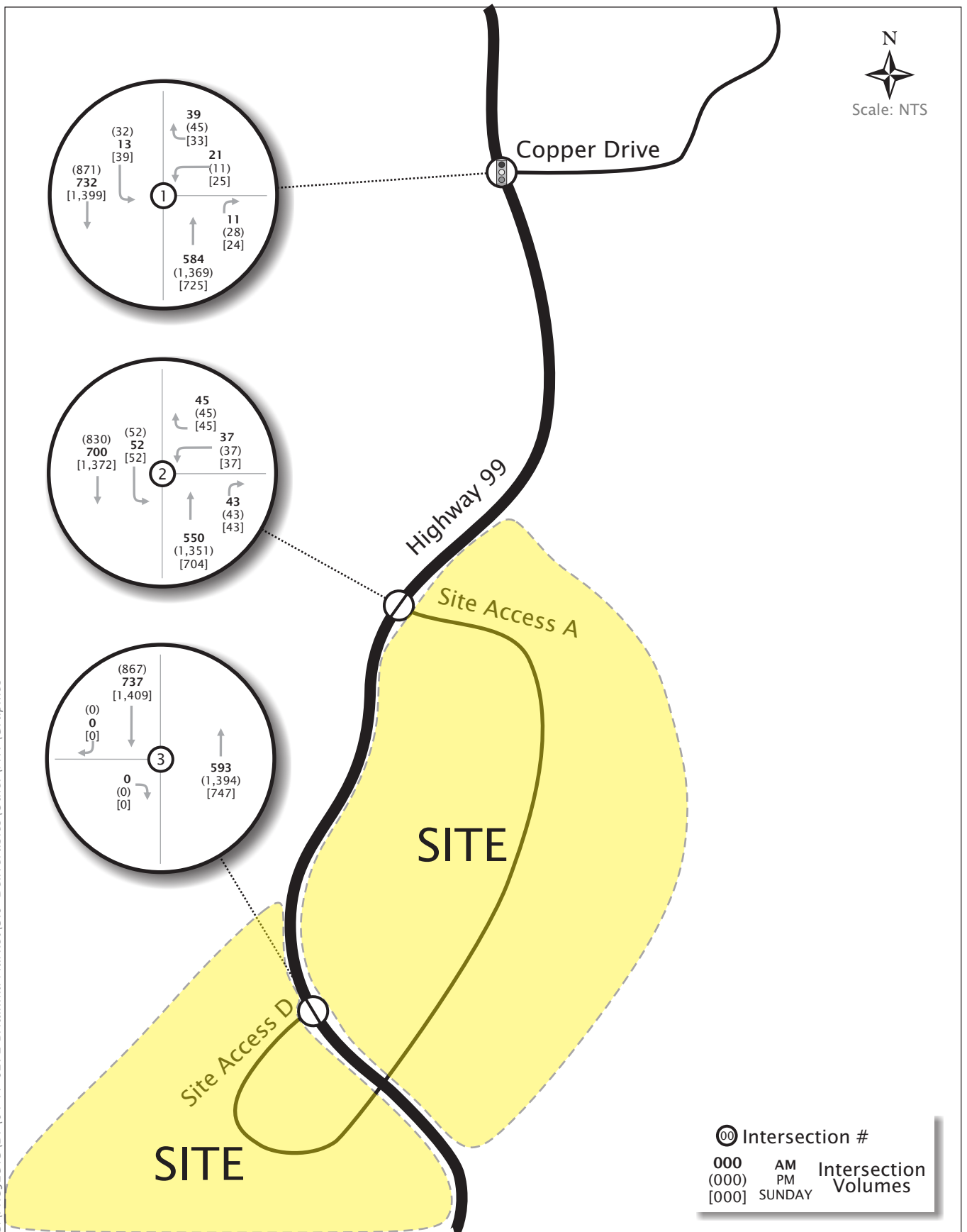


Exhibit 5.2 Phase 1 Total Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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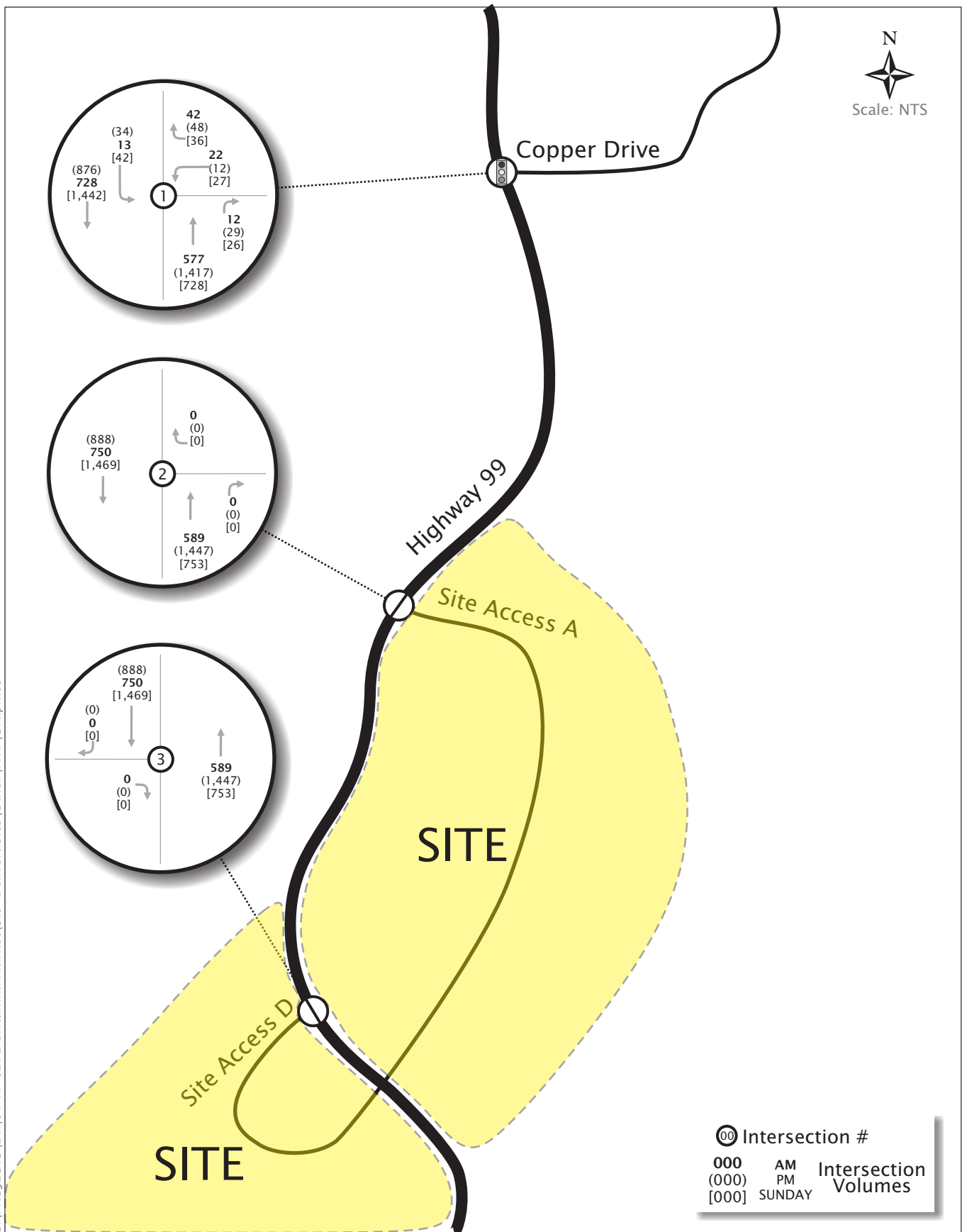


Exhibit 5.3 Phase 2 Background Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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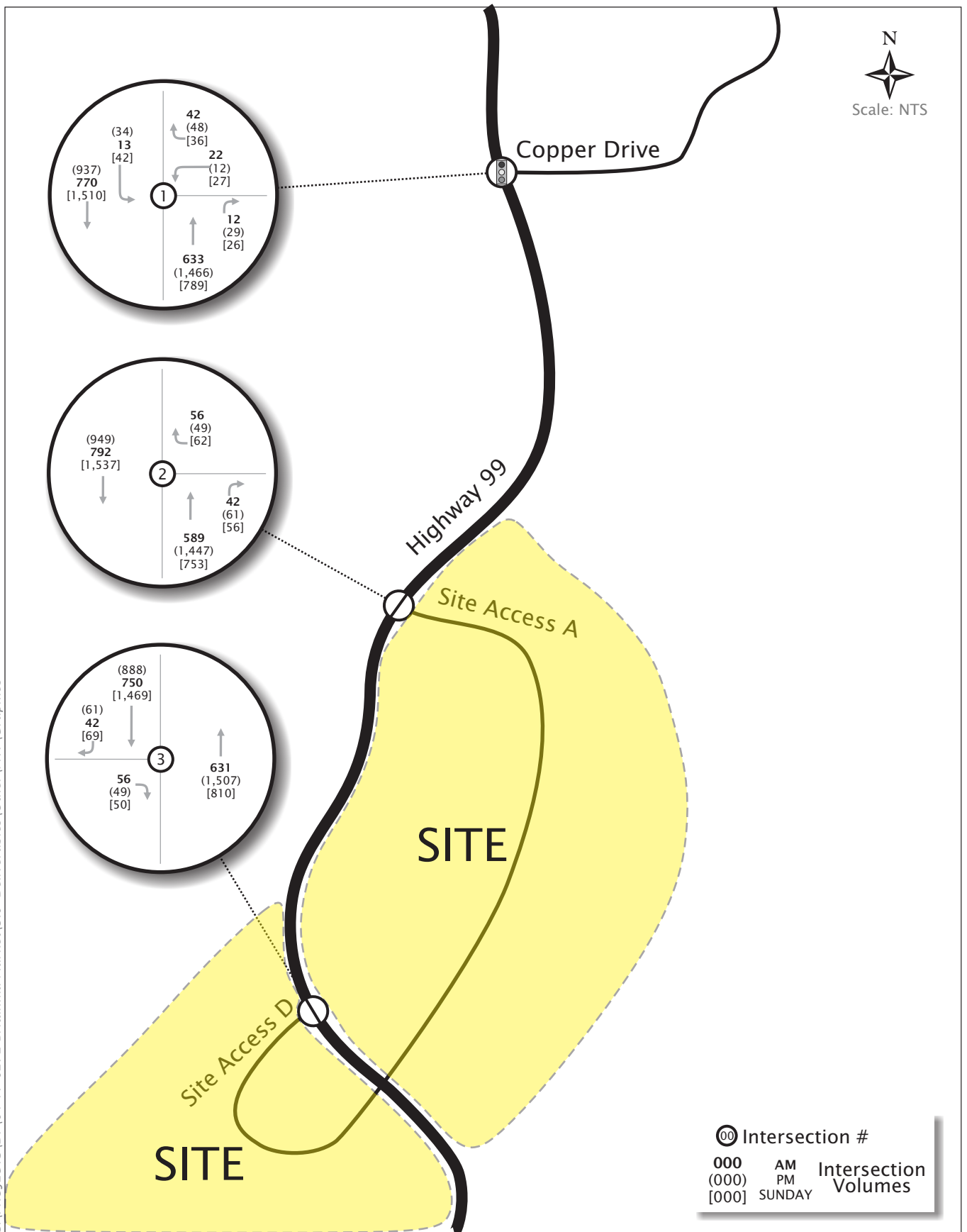


Exhibit 5.4 Phase 2 Total Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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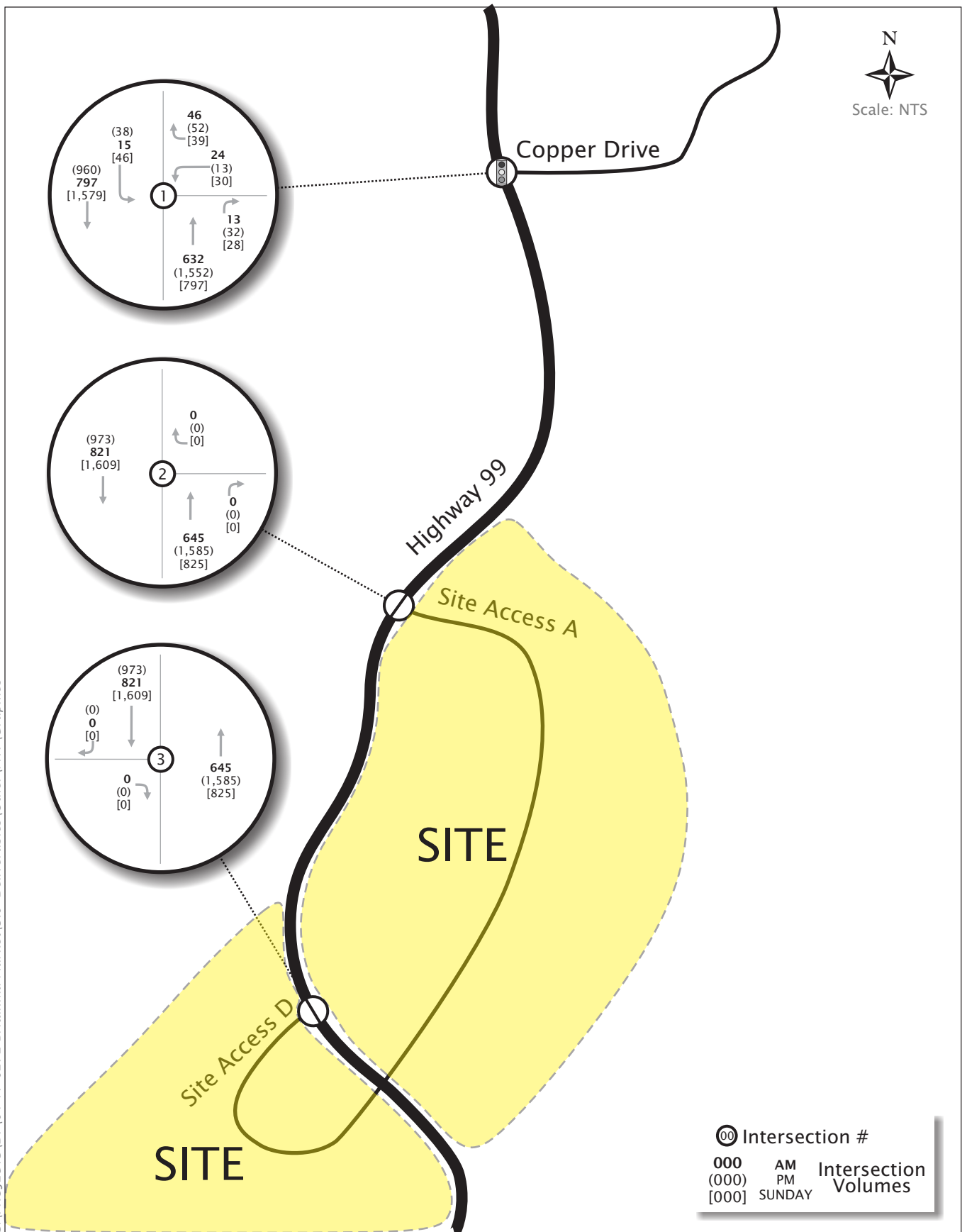


Exhibit 5.5 Phase 3 Background Peak Hour Traffic Forecasts

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Britannia Master Plan
June 2019

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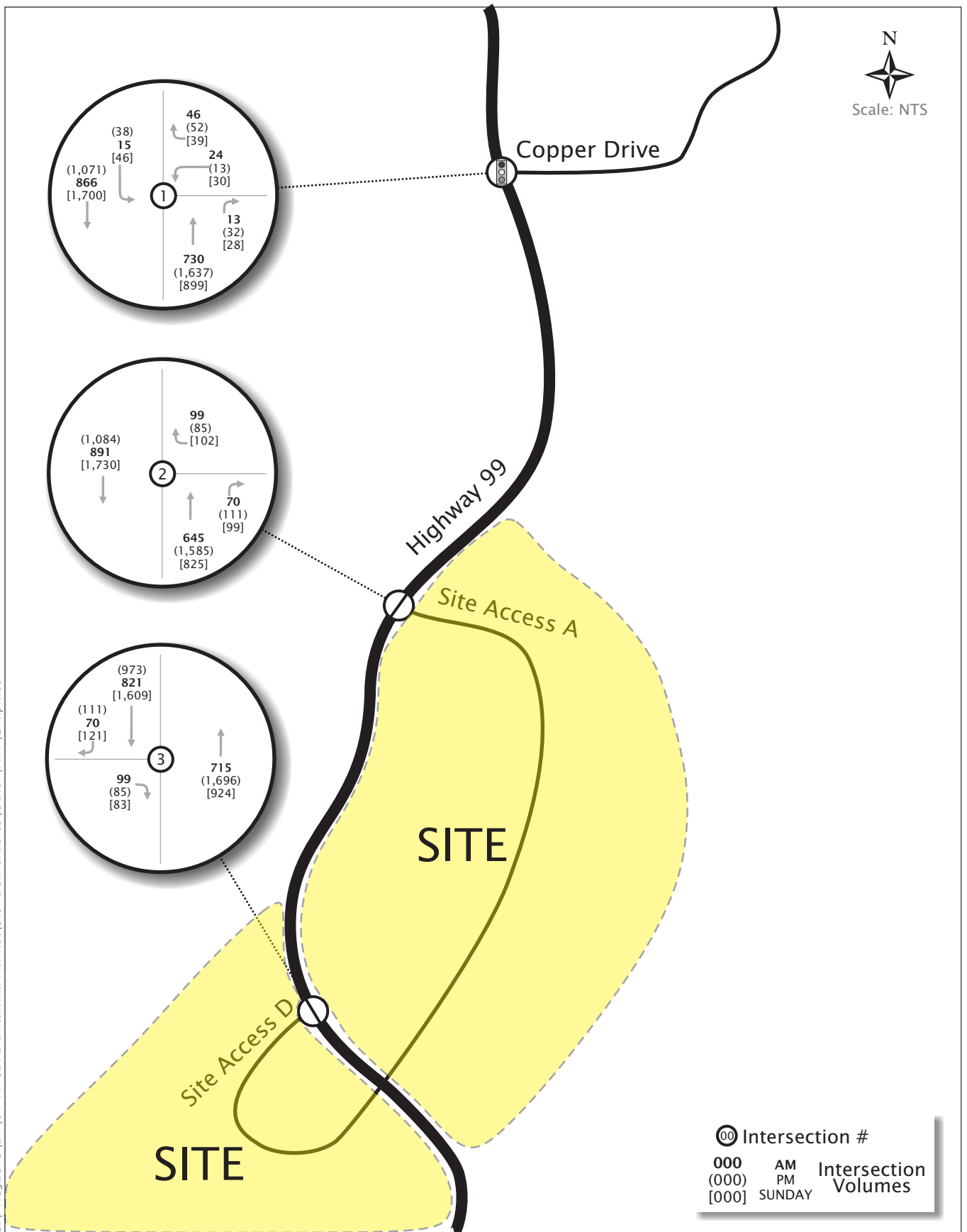


Exhibit 5.6
Phase 3 Total Peak Hour Traffic Forecasts

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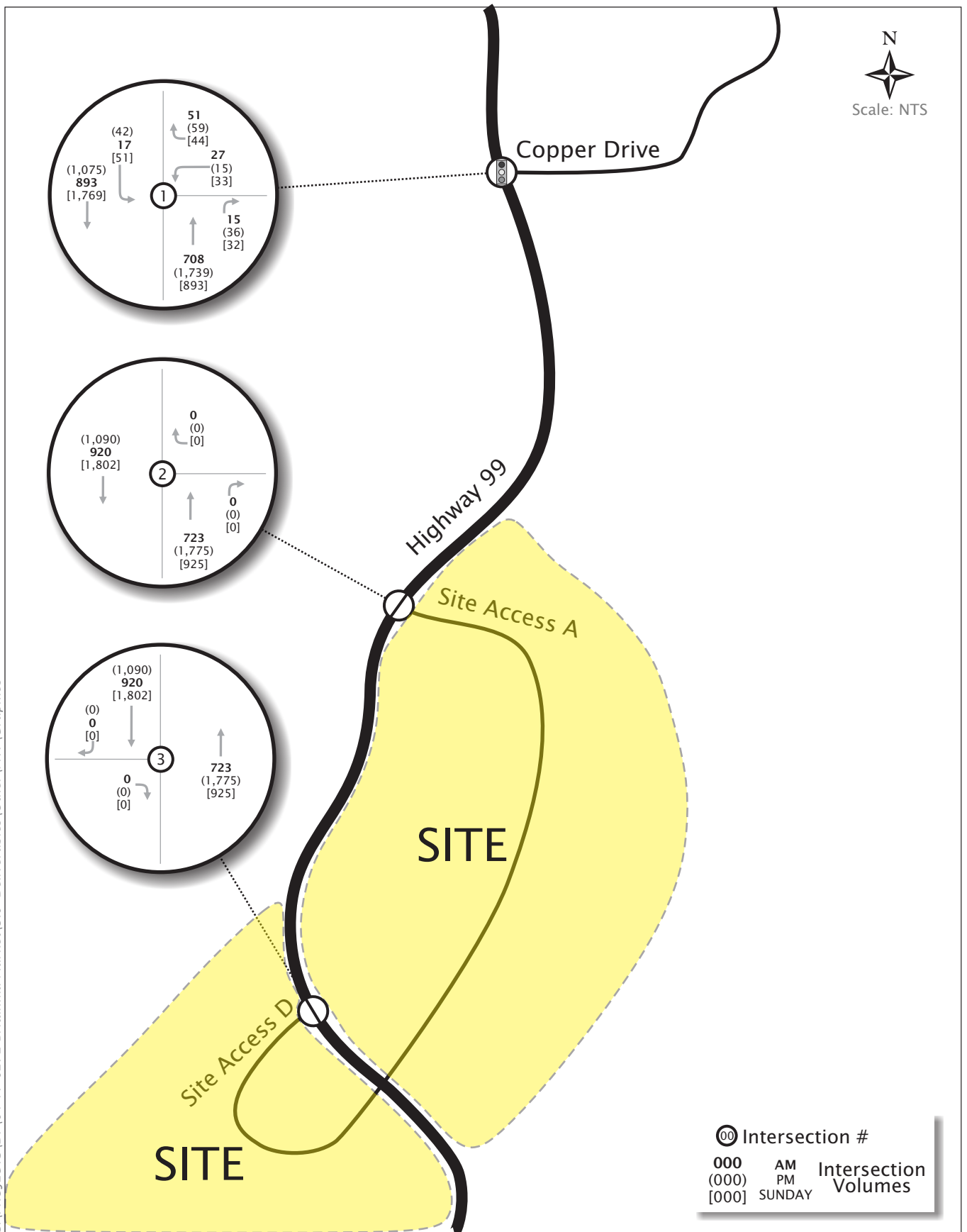


Exhibit 5.7 Phase 4 Background Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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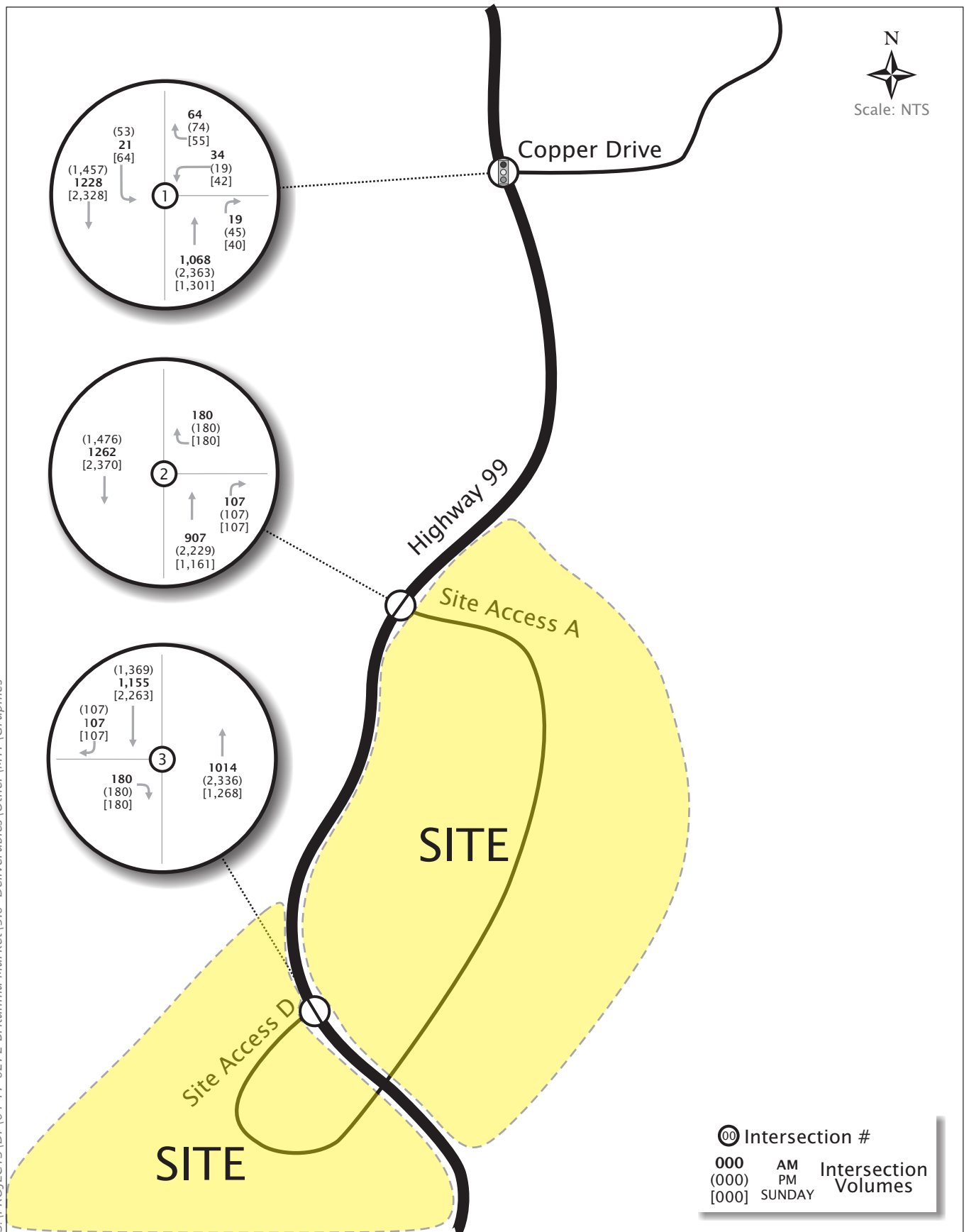


Exhibit 5.8 Phase 4 Total Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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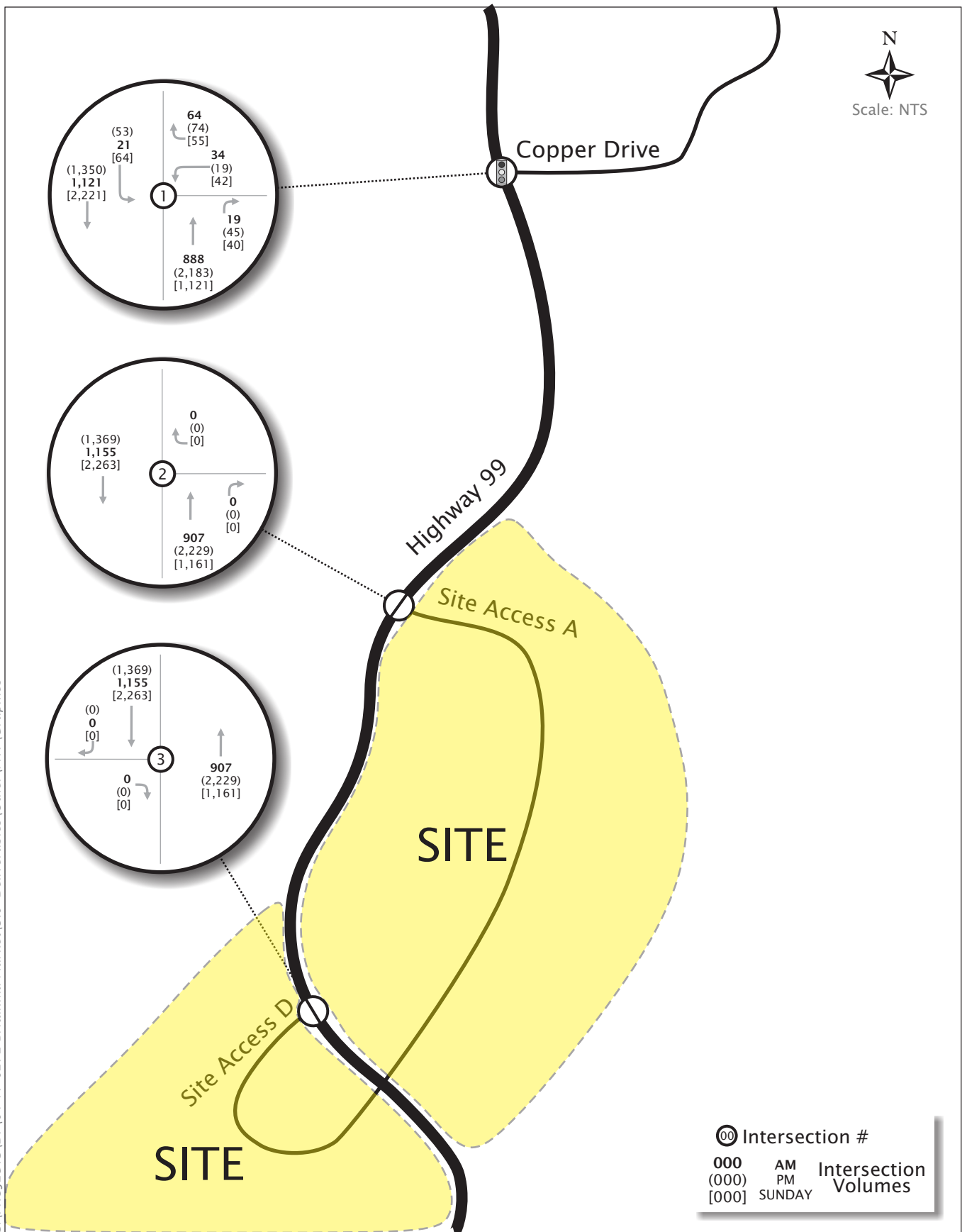


Exhibit 5.9 Full Buildout + 10 Background Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

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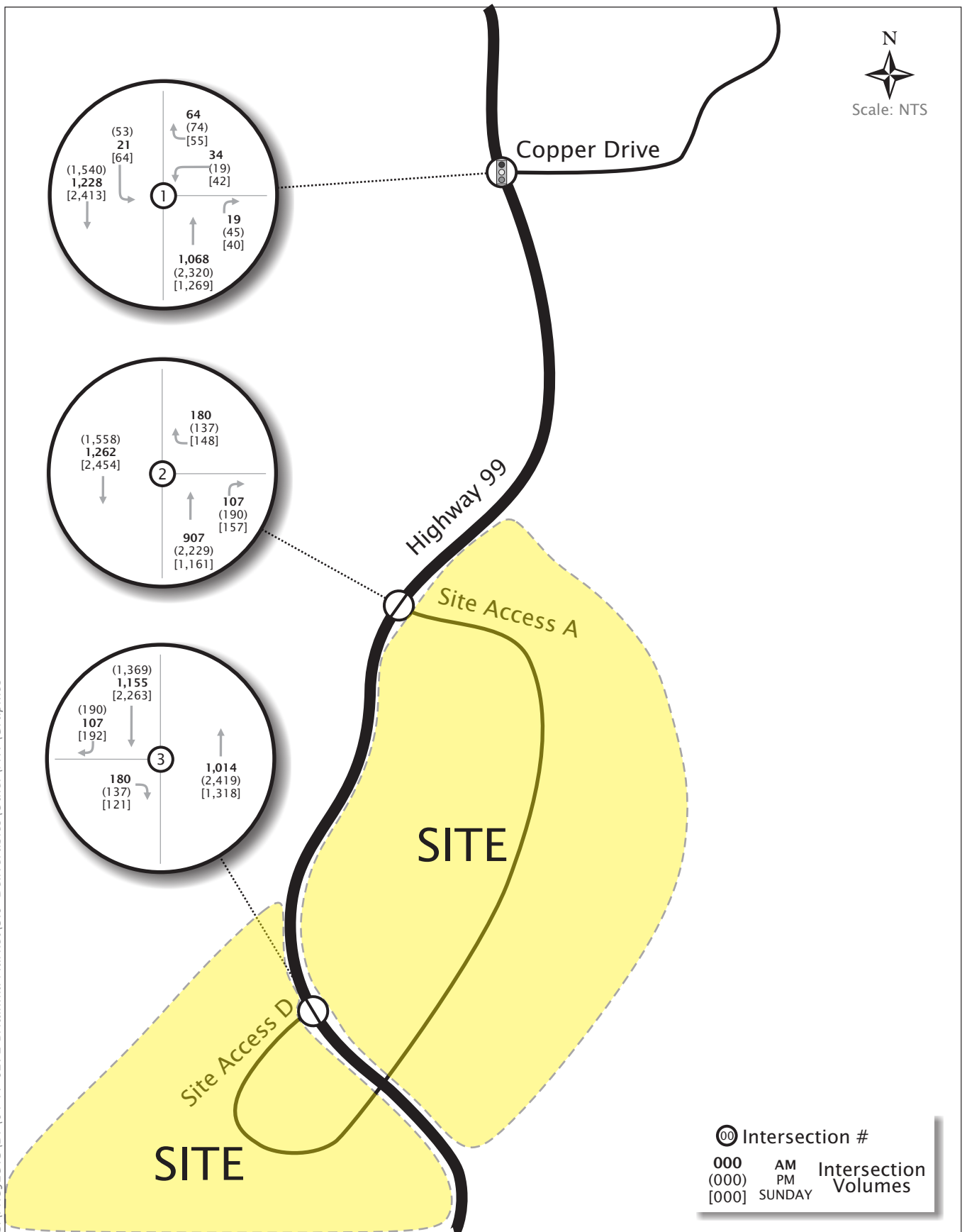


Exhibit 5.10 Full Buildout + 10 Total Peak Hour Traffic Forecasts

04-17-0272

Britannia Master Plan
June 2019

6. TRAFFIC ANALYSIS

The following sections describe the projected traffic conditions along Highway 99 and the traffic operation results for the study intersections for the future Background (without development) and Total (with development) traffic conditions.

The key objectives of this traffic analysis are to assess peak period traffic operations on the highway system, and identify potential road improvement measures, where necessary, to adequately accommodate the anticipated increase in background traffic growth and site traffic.

Future Background and Total traffic operations were tested using the Synchro/SimTraffic traffic model. Note the Synchro traffic model uses the Highway Capacity Manual (HCM) calculation methodologies in determining delays, Level of Service (LOS), and queues while the SimTraffic model determines the above measures of effectiveness based on micro-simulation modelling. Both have benefits and are further discussed within the analysis sections below. For all future year analysis, the signal timing optimization feature of Synchro was used, assuming signal cycle lengths could not exceed 90 seconds.

The following sections summarize the operational results for the background and future 2025, 2028, 2032, 2037 and 2047 evaluation scenarios. Note, the future laning configuration outlined as improvements in this report are provided following the exhibits cited below.

6.1 2025 Traffic Conditions Analysis

6.1.1 Background 2025 Traffic Conditions

- As suggested in the existing traffic operations analysis, Highway 99 and Copper Drive requires an additional northbound and southbound lane to alleviate the traffic queues during the peak periods for the Friday PM and Sunday peak hour.
- Based on current site geometry and geotechnical constraints, the second northbound / southbound lane may be limited to a length of just 55 m south of Copper Drive and extending north of Copper Drive to the Britannia Creek Bridge. This localized lane would alleviate some of the northbound traffic congestion. Note, the dual laning of the northbound/southbound direction for the bridge will eventually be required, unless the Highway 99 bypass is constructed above the community.

Table 6.1 summarizes the operation results for the Background 2025 traffic condition with an additional northbound and southbound lane as noted above.

Table 6.1: Phase 1 Background Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.34		A	0.56		A	0.56	
	WBL	B	0.16	6	C	0.12	6	C	0.21	8
	WBR	B	0.03	6	C	0.03	9	C	0.02	6
	NBT	A	0.30	27	A	0.59	72	A	0.33	32
	NBR	A	0.01	2	A	0.02	2	A	0.02	3
	SBL	A	0.03	1	A	0.15	2	A	0.08	3
	SBT	A	0.32	18	A	0.33	22	A	0.53	43
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT/R		0.35	0		0.86	0		0.45	0
	SBT		0.22	0		0.27	0		0.44	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.35	0		0.86	0		0.45	0
	SBT/R		0.22	0		0.27	0		0.44	0

Key findings and insights for the Phase 1 Background traffic analysis:

- Without improvements to the existing conditions at the Copper / Highway 99 intersection, queues were found to be in excess of 300 m in both northbound and southbound directions. As such, our analysis (and the following findings) assumed a second southbound lane and northbound lane at Copper Drive / Highway 99 was implemented as mitigation measures.
- During the AM peak hour, Highway 99 & Copper Drive is expected to operate with acceptable capacity and delay thresholds.
- During the PM peak hour, the overall V/C ratio was found to be acceptable at 0.56. The estimated queuing northbound on Highway 99 during the weekday PM peak and southbound during the weekend peak was estimated at 72m and 43m, respectively. Site (model) observations show that even though queues are expected during the weekend peak period, vehicles are able to clear the intersection within one or two signal cycles, as the northbound and southbound directions are operating with substantial green interval time for most of the signal cycle length.
- During the PM peak, the northbound through movement is expected to approach capacity with a V/C ratio of 0.86 found on Highway 99 at both Access A and Access D.

6.1.2 Total 2025 Traffic Conditions – Phase 1

The Year 2025 Total traffic condition incorporates the proposed Phase 1 future site traffic volumes. Note, for the Phase 1 scenario, it is assumed Access A will be a full movement unsignalized intersection while

Access D will not have been constructed at that point. Also, as per the Background 2025 condition, it is assumed that at the Copper Drive intersection, there will be dual northbound and southbound lanes.

Table 6.2 summarizes the operational results for the total 2025 traffic conditions. Based on our analysis, site traffic entering / exiting the proposed development would require a second northbound lane at Access A to facilitate acceptable traffic operations.

Table 6.2: Phase 1 Total Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	<i>Overall</i>	A	0.35		A	0.57		A	0.57	
	WBL	B	0.16	6	C	0.12	6	C	0.22	8
	WBR	B	0.03	6	C	0.03	9	C	0.02	6
	NBT	A	0.30	27	A	0.60	74	A	0.34	34
	NBR	A	0.01	2	A	0.02	2	A	0.02	3
	SBL	A	0.03	1	A	0.15	2	A	0.08	3
	SBT	A	0.32	19	A	0.34	23	A	0.55	45
Highway 99 & Site Access A (Unsignalized)	<i>Overall</i>									
	WBL	C	0.09	2	F	0.51	14	F	0.46	15
	WBR	B	0.03	1	C	0.07	2	B	0.08	2
	NBT/R		0.18	0		0.43	0		0.23	0
	SBT	A	0.02	1	B	0.07	2	A	0.07	2
Highway 99 & Site Access D (Unsignalized)	<i>Overall</i>									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.36	0		0.88	0		0.48	0
	SBT/R		0.23	0		0.27	0		0.45	0

Key findings and insights for Phase 1 Total traffic analysis:

- Highway 99 & Copper Drive operates acceptably during the AM, PM and Sunday peak hours, again, as a result of the additional northbound and southbound lanes being implemented as mitigation measures.
- The estimated 95th percentile queues were significantly improved as a result of the second northbound and southbound lanes. The northbound through queue was reduced from 350m to 74m, and the southbound through queue was reduced from 314m to 45m.
- According to SimTraffic results, the northbound through queue (at Copper Drive) is expected to reach 100m and a delay per vehicle of 14 seconds, which translates to an acceptable LOS 'B' during the PM peak hour. During the Sunday afternoon peak hour, the southbound through experiences a queue of 25m and delays of only 2 seconds, which translates to an LOS 'A'.
- Access A is anticipated to operate acceptably, except for the westbound left movement (exiting the site) during the Friday PM and Sunday peak hours. According to HCM results, the westbound

left is anticipated to experience long delays (LOS F) but operate within capacity (Friday PM: V/C = 0.51; Sunday: V/C = 0.46).

- To further investigate the westbound left movement, SimTraffic analysis was conducted to supplement the traffic results, as it better accounts for gaps in traffic and vehicle platooning behaviour. SimTraffic results indicated the westbound left movement would experience an average delay per vehicle of 33 seconds, which translates to an acceptable LOS D, during the Friday PM peak hour. Estimated queues were found to be acceptable at 17m. Note, the Phase 1 traffic will require an additional northbound through lane at Highway 99 & Access A.
- The Highway 99 & Access D northbound through movement was found to approach capacity (v/c = 0.88), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

6.2 2028 Traffic Conditions Analysis

6.2.1 Background 2028 Traffic Conditions

The 2028 Background traffic volumes were increased from the 2025 Background conditions based on background growth. With the noted improvements, the following are the traffic operation results.

Table 6.3: Phase 2 Background Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.35		A	0.59		A	0.59	
	WBL	B	0.17	6	C	0.14	7	C	0.22	9
	WBR	B	0.03	6	C	0.03	10	C	0.02	7
	NBT	A	0.31	29	A	0.62	80	A	0.35	31
	NBR	A	0.01	2	A	0.02	2	A	0.02	3
	SBL	A	0.03	1	A	0.17	2	A	0.09	3
	SBT	A	0.33	20	A	0.34	24	A	0.57	48
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT/R		0.38	0		0.93	0		0.48	0
	SBT		0.24	0		0.28	0		0.47	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.38	0		0.93	0		0.48	0
	SBT/R		0.24	0		0.28	0		0.47	0

Key findings and insights for Phase 2 Background traffic analysis:

- With the extra northbound/southbound lane (mitigation measure from the Phase 1 Background), Highway 99 & Copper Drive operates acceptably during the peak hours.
- The northbound through movement on Highway 99 at both Access A and Access D was found to approach capacity ($V/C = 0.93$), which is likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth. Widening for this section was not assumed a mitigation measure due to potential land cuts on either side of the highway.
- The Phase 2 conditions operations at Copper Drive would fail without the noted mitigation measures.

6.2.2 Total 2028 Traffic Conditions – Phase 2

The Year 2028 Total traffic condition incorporates the proposed Phase 2 future site traffic volumes. Note, for this phase, both Access A and Access D are constructed. They are both right-in, right-out accesses.

Table 6.4 summarizes the operational results for the Total 2028 traffic conditions.

Table 6.4: Phase 2 Total Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	<i>Overall</i>	A	0.37		A	0.60		A	0.61	
	WBL	B	0.17	6	C	0.14	7	C	0.24	9
	WBR	B	0.03	6	C	0.03	10	C	0.02	7
	NBT	A	0.34	32	A	0.64	85	A	0.37	34
	NBR	A	0.01	2	A	0.02	2	A	0.02	2
	SBL	A	0.03	1	A	0.18	2	A	0.10	3
	SBT	A	0.35	21	A	0.37	26	A	0.58	52
Highway 99 & Site Access A (Unsignalized)	<i>Overall</i>									
	WBR	B	0.09	2	C	0.16	4	B	0.11	3
	NBT/R		0.19	0		0.46	0		0.24	0
	SBT		0.25	0		0.30	0		0.49	0
Highway 99 & Site Access D (Unsignalized)	<i>Overall</i>									
	EBR	B	0.10	3	B	0.10	3	C	0.16	4
	NBT		0.40	0		0.96	0		0.52	0
	SBT/R		0.03	0		0.04	0		0.04	0

Key findings and insights for the Phase 2 Total traffic analysis:

- Highway 99 & Copper Drive was found to operate acceptably during the peak hours.
- Without previously mentioned mitigations applied, the intersection would operate beyond acceptable thresholds for capacity and delay.

- HCM calculations report Sunday peak southbound queues of 52m. Based on SimTraffic, the southbound queue was found to be 26m with an average traffic delay of only 2 seconds per vehicle, translating to very acceptable LOS 'A' traffic operation.
- The northbound through movement on Highway 99 at Access D was found to approach capacity ($V/C = 0.96$), which is likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

6.3 2032 Traffic Conditions Analysis

6.3.1 Background 2032 Traffic Conditions

The 2032 Background traffic volumes were increased from the 2028 Background conditions based on background growth. With the noted improvements, the following are the operations analysis results.

Table 6.5: Phase 3 Background Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.38		A	0.63		A	0.63	
	WBL	B	0.19	7	C	0.15	7	C	0.26	11
	WBR	B	0.03	7	C	0.04	10	C	0.03	8
	NBT	A	0.34	32	A	0.67	100	A	0.36	35
	NBR	A	0.01	2	A	0.02	3	A	0.02	3
	SBL	A	0.04	2	A	0.21	3	A	0.10	3
	SBT	A	0.36	22	A	0.37	27	A	0.60	58
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT/R		0.41	0		1.01	0		0.53	0
	SBT		0.26	0		0.31	0		0.51	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.41	0		1.01	0		0.53	0
	SBT/R		0.26	0		0.31	0		0.51	0

Key findings and insights for the Phase 3 Background traffic analysis:

- Highway 99 & Copper Drive operates acceptably during the Friday AM and PM peak hours.
- The Highway 99 & Access D northbound through movement exceeded theoretical capacity ($v/c = 1.01$), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

- The above finding would be caused by the limitation of inputting high volumes through a single lane. This, in combination with the background growth, would likely cause the northbound movement to reach capacity. Widening for this section was not assumed a mitigation measure due to potential land cuts on either side of the highway (between Access A and Access D).

6.3.2 Total 2032 Traffic Conditions – Phase 3

The Year 2032 total traffic condition incorporates the proposed Phase 3 future site traffic volumes. **Table 6.6** summarizes the operational results for the Total 2032 traffic conditions.

Table 6.6: Phase 3 Total Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	<i>Overall</i>	A	0.41		A	0.65		A	0.66	
	WBL	C	0.20	7	C	0.12	7	C	0.28	12
	WBR	B	0.03	7	C	0.04	10	C	0.03	8
	NBT	A	0.38	37	A	0.70	105	A	0.39	40
	NBR	A	0.01	2	A	0.02	2	A	0.02	2
	SBL	A	0.04	2	A	0.25	3	A	0.11	3
	SBT	A	0.38	25	A	0.42	32	A	0.63	66
Highway 99 & Site Access A (Unsignalized)	<i>Overall</i>									
	WBR	B	0.17	5	C	0.31	10	B	0.20	6
	NBT/R		0.21	0		0.51	0		0.26	0
	SBT		0.28	0		0.35	0		0.55	0
Highway 99 & Site Access D (Unsignalized)	<i>Overall</i>									
	EBR	B	0.19	5	B	0.19	5	C	0.31	10
	NBT		0.46	0		1.08	0		0.59	0
	SBT/R		0.26	0		0.31	0		0.51	0

Key findings and insights about the Phase 3 Total traffic analysis include:

- Highway 99 & Copper Drive was found to operate acceptably for all peak hours.
- Based on SimTraffic, the southbound queue on Highway 99 approach to the Copper Drive intersection is estimated to be 30 m with average traffic delay of only 2 seconds per vehicle, translating to very acceptable LOS 'A' traffic operation.
- The Highway 99 & Access D northbound through movement exceeded theoretical capacity (v/c = 1.08), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

6.4 2037 Traffic Conditions Analysis

6.4.1 Background 2037 Traffic Conditions

The traffic operations for the Year 2037 background traffic scenario are presented below.

Table 6.7: Phase 4 Background Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.42		A	0.69		A	0.67	
	WBL	C	0.21	8	C	0.13	8	C	0.24	13
	WBR	B	0.04	7	C	0.04	11	C	0.03	9
	NBT	A	0.37	36	A	0.74	121	A	0.39	39
	NBR	A	0.01	2	A	0.02	3	A	0.02	3
	SBL	A	0.04	2	A	0.30	3	A	0.13	3
	SBT	A	0.39	26	A	0.42	33	A	0.66	72
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT/R		0.46	0		1.13	0		0.59	0
	SBT		0.29	0		0.35	0		0.58	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.46	0		1.13	0		0.59	0
	SBT/R		0.29	0		0.35	0		0.58	0

Key findings and insights for the Phase 4 Background traffic analysis:

- Highway 99 & Copper Drive – this intersection was still found to operate within acceptable thresholds (LOS 'A') assuming aforementioned mitigations are implemented. The southbound through queues during the Sunday peak hour were found to be 72m (based on Synchro), while SimTraffic indicated queues to be 36m.
- The Highway 99 & Access D northbound through movement exceeded theoretical capacity ($v/c = 1.13$), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

6.4.2 Total 2037 Traffic Conditions – Phase 4

Phase 3 is anticipated to be completed by the Year 2037 and is the final phase of the South Britannia Beach development. The traffic operations for the Year 2037 Total traffic scenario are presented below.

Table 6.8: Phase 4 Total Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.46		A	0.74		A	0.72	
	WBL	C	0.23	9	C	0.14	8	C	0.27	13
	WBR	C	0.04	8	C	0.04	11	C	0.03	9
	NBT	A	0.44	47	A	0.79	146	A	0.44	49
	NBR	A	0.01	2	A	0.02	3	A	0.02	3
	SBL	A	0.05	2	B	0.31	3	A	0.15	3
	SBT	A	0.43	30	A	0.49	42	A	0.71	91
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	B	0.33	11	E	0.60	27	C	0.33	11
	NBT/R		0.23	0		0.57	0		0.30	0
	SBT		0.33	0		0.41	0		0.64	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	C	0.38	14	C	0.34	11	E	0.56	24
	NBT		0.53	0		1.26	0		0.69	0
	SBT/R		0.29	0		0.35	0		0.58	0

Key findings and insights about the Phase 4 Total traffic analysis include:

- Highway 99 & Copper Drive was found to operate acceptably for all peak hours.
- The southbound through queues during the Sunday peak hour were found to be 91m (based on Synchro), while SimTraffic indicated queues to be 40m.
- The northbound through queues during the PM peak hour were found to be 146m (based on Synchro) while SimTraffic reported a northbound queue of 40m during the Friday PM peak.
- At Highway 99 & Access A, the overall intersection is operating within capacity during the PM peak, however, the westbound right movement experiences moderately long delays (LOS E) but operates within capacity (V/C = 0.60).
- The Highway 99 & Access D northbound through movement exceeded theoretical capacity (v/c = 1.26), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.
- At Highway 99 and Access D, the overall intersection is operating within capacity during the Sunday peak, however, the eastbound right movement experiences moderately long delays (LOS E) but operates within capacity (V/C = 0.56).

6.5 2047 Traffic Conditions Analysis (Build-out +10 Year Horizon)

6.5.1 Background 2047 Traffic Conditions

This scenario represents much longer term traffic conditions 10 years after the full completion of the Britannia site development. The laning and traffic operations used for Background 2047 scenario are the same as the ones assumed for the Background 2037 scenario. The results of the traffic operational analysis are summarized in **Table 6.9**.

Table 6.9: Full Buildout + 10 Background Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.51		B	0.84		A	0.81	
	WBL	C	0.21	10	D	0.18	10	D	0.34	16
	WBR	C	0.04	9	D	0.07	12	C	0.04	10
	NBT	A	0.46	48	B	0.91	248	A	0.47	58
	NBR	A	0.01	3	A	0.03	4	A	0.03	3
	SBL	A	0.07	2	C	0.38	5	A	0.19	4
	SBT	A	0.50	37	A	0.51	49	A	0.80	135
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT/R		0.58	0		1.43	0		0.74	0
	SBT		0.37	0		0.44	0		0.72	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	A	0.00	0	A	0.00	0	A	0.00	0
	NBT		0.58	0		1.43	0		0.74	0
	SBT/R		0.37	0		0.44	0		0.72	0

Key findings and insights for the Opening Day + 10 (2047) Background traffic analysis:

- As would be expected, the results follow the operations reported for Background 2037 with longer delays and queues due to the increased background growth on the Highway 99 corridor. During the PM peak hour, the northbound through movement at Highway 99 & Copper Drive experiences queue lengths of 248m, acceptable delays (LOS 'B') and approaching capacity (V/C = 0.91).
- For the Sunday peak hour, the southbound through movement at the Highway 99 & Copper Drive intersection is estimated to experience vehicle queues of 135 m, a v/c ratio of 0.80 and LOS 'A' traffic operation. The intersection operates acceptably with the previously mentioned mitigation measures implemented.

- The Highway 99 & Access D northbound through movement exceeded theoretical capacity ($v/c = 1.43$), likely caused by the limitation of inputting high volumes through a single lane in conjunction with background growth.

6.5.2 Total 2047 Traffic Conditions – Build-out + 10 Years

For the Build-out + 10 year horizon, the traffic laning configuration and intersection operations will further deteriorate from the Year 2037 Total traffic condition reported earlier with increased queues and delays for all approaches due to the increase in background traffic on the highway. The estimated traffic operation results are presented in **Table 6.10**.

Table 6.10: Full Buildout + 10 Total Vehicle Traffic Operations – Mitigated

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.54		B	0.90		A	0.86	
	WBL	C	0.22	11	D	0.18	9	D	0.34	16
	WBR	C	0.05	9	D	0.08	13	D	0.04	10
	NBT	A	0.52	56	C	0.96	276	A	0.53	71
	NBR	A	0.01	2	A	0.03	4	A	0.03	3
	SBL	A	0.09	2	C	0.38	5	A	0.22	4
	SBT	A	0.53	43	A	0.59	63	A	0.86	180
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	C	0.38	13	F	0.88	49	C	0.40	14
	NBT/R		0.29	0		0.71	0		0.37	0
	SBT		0.40	0		0.50	0		0.79	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	C	0.46	18	C	0.43	16	F	0.82	42
	NBT		0.65	0		1.55	0		0.84	0
	SBT/R		0.37	0		0.44	0		0.72	0

Key findings and insights for the Opening Day + 10 (2047) Total traffic analysis:

- During the PM peak hour, the northbound Highway 99 through traffic movement at the intersection of Highway 99 and Copper Drive is expected to experience queues of 276 m, an overall v/c ratio of 0.90 and LOS 'B' traffic operation. SimTraffic results indicate a northbound queue of 160m during the PM peak hour.
- During the Sunday peak hour, the southbound through lane is experiencing queues of 180 m, an overall v/c ratio of 0.86 and LOS 'A'. SimTraffic results indicate a southbound queue of 270m during the PM peak hour.

- This is understandable with the amount time elapsed for the planning horizon and when traffic is grown at a 2.3% growth (compounded) rate unrestricted. Note that the deterioration of traffic is mainly a result of the background growth.
- As for the Highway 99 / Access A intersection during the PM peak hour, the intersection would experience challenges for the westbound right movement having LOS F and V/C of 0.88, which is beyond acceptable thresholds.
- At Highway 99 and Access D, the overall intersection is operating within capacity during the Sunday peak, however, the eastbound right movement experiences long delays (LOS F) but operates within capacity (V/C = 0.82).

6.5.3 Total 2047 Traffic Conditions – Build-out + 10 Years – Sensitivity Analyses

Tables 6.11 and 6.12 showcase the operations for the 2047 sensitivity analysis cases. In comparison to the 2047 Total scenario (Table 6.10), the changes in operations are minor. The change in directional distribution (northbound 70% and southbound 30% and vice versa) analyses do not materially affect the operations of the study area.

Table 6.11: Total 2047 Conditions Sensitivity Analysis (30% NB / 70% SB)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.54		B	0.90		A	0.84	
	WBL	C	0.21	11	D	0.18	9	D	0.34	16
	WBR	C	0.04	9	D	0.08	13	D	0.04	10
	NBT	A	0.50	56	C	0.96	276	A	0.50	65
	NBR	A	0.01	2	A	0.03	4	A	0.03	3
	SBL	A	0.08	2	C	0.38	5	A	0.20	4
	SBT	A	0.53	41	A	0.59	63	A	0.83	157
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	B	0.23	7	F	0.88	49	C	0.22	6
	NBT/R		0.29	0		0.71	0		0.37	0
	SBT		0.39	0		0.50	0		0.76	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	D	0.65	34	C	0.43	16	F	1.28	94
	NBT		0.68	0		1.55	0		0.90	0
	SBT/R		0.37	0		0.44	0		0.72	0

Table 6.12: Total 2047 Conditions Sensitivity Analysis (70% NB / 30% SB)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM			SUNDAY		
		LOS	V/C	Q (M)	LOS	V/C	Q (M)	LOS	V/C	Q (M)
Highway 99 & Copper Drive (Signalized)	Overall	A	0.55		B	0.92		A	0.88	
	WBL	C	0.22	11	D	0.18	9	D	0.34	16
	WBR	C	0.05	9	D	0.08	13	D	0.04	10
	NBT	A	0.52	56	C	0.99	287	A	0.54	74
	NBR	A	0.01	2	A	0.03	4	A	0.03	3
	SBL	A	0.09	2	C	0.38	5	A	0.23	4
	SBT	A	0.54	44	A	0.62	70	A	0.88	214
Highway 99 & Site Access A (Unsignalized)	Overall									
	WBR	C	0.38	13	F	1.24	91	C	0.51	21
	NBT/R		0.29	0		0.71	0		0.37	0
	SBT		0.40	0		0.53	0		0.80	0
Highway 99 & Site Access D (Unsignalized)	Overall									
	EBR	C	0.46	18	C	0.26	8	E	0.54	21
	NBT		0.65	0		1.50	0		0.81	0
	SBT/R		0.37	0		0.44	0		0.72	0

With the above operations findings, it does not materially deviate from the Total 2047 non-sensitivity analysis results. This further showcases the operations issues in the nearby area as a result of high background growth.

6.6 Summary of Road Improvements Required

Based on the operations results determined for each development phase, the **Table 6.13** on the following page provides a summary of the road improvements required to accommodate the anticipated future background and total traffic conditions to Year 2047. A diagrammatic review of the laning requirements are provided as **Exhibit 6.1 – 6.3**. Note, in the context of the development, it is assumed that the likely responsibility of only the improvements for Accesses A and D will be the developer since these are the main interfaces of the development to the Highway network.

In general, it must be noted that the Highway corridor itself is anticipated to exceed capacity by the 2032 horizon (background conditions). This is resultant of a conservative growth rate anticipated, which may or may not be fully realized. It is suggested that the highway corridor be observed on a continuous basis to ensure there is effective operational efficiency to better determine the need for improvements along the highway.

Table 6.13: Summary of Suggested Improvements

SCENARIO	COPPER DRIVE & HWY 99	ACCESS A	ACCESS D
Existing	N/A	N/A	N/A
Background 2025	Addition of second northbound lane (55m length due to site constraints) and second southbound lane	N/A	N/A
Background 2028	-	N/A	N/A
Background 2032	-	N/A	N/A
Background 2037	-	N/A	N/A
Background 2047	-	N/A	N/A
Total 2025 (Phase 1)	-	Full Movement Access plus additional northbound lane	N/A
Total 2028 (Phase 2)	-	Right In / Out Access (maintain additional northbound lane)	Right In / Out Access
Total 2032 (Phase 3)	-	-	-
Total 2037 (Phase 4)	-	-	-
Total 2047 (Full Build out + 10 years)	-	-	-

Note, solutions for access on the Highway presented above assume acceleration and deceleration lanes for turning movements.

Should the Highway Bypass be provided within or before any of the above phases, the above suggested improvements will not be required.

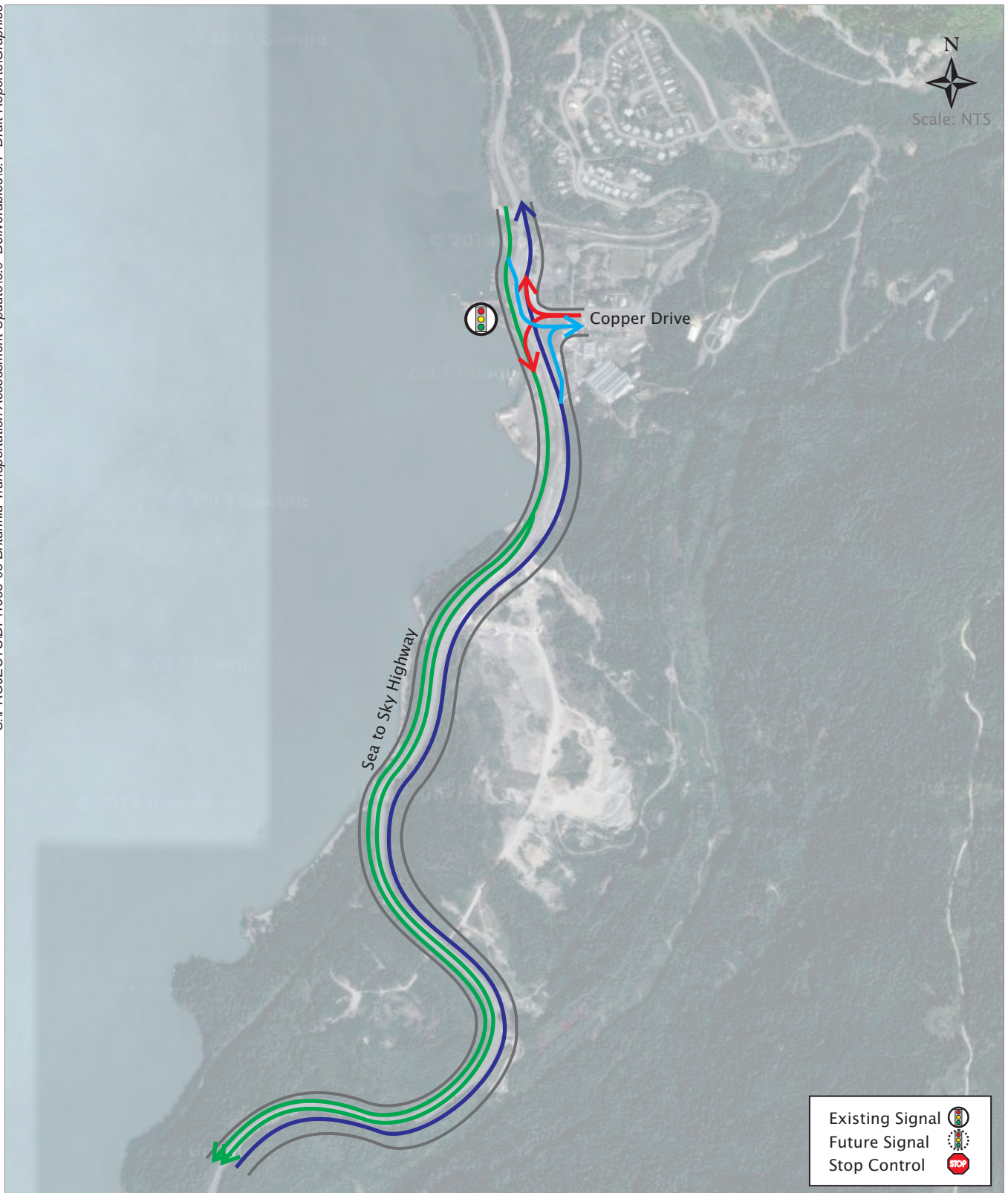


Exhibit 6.1 Existing Laning

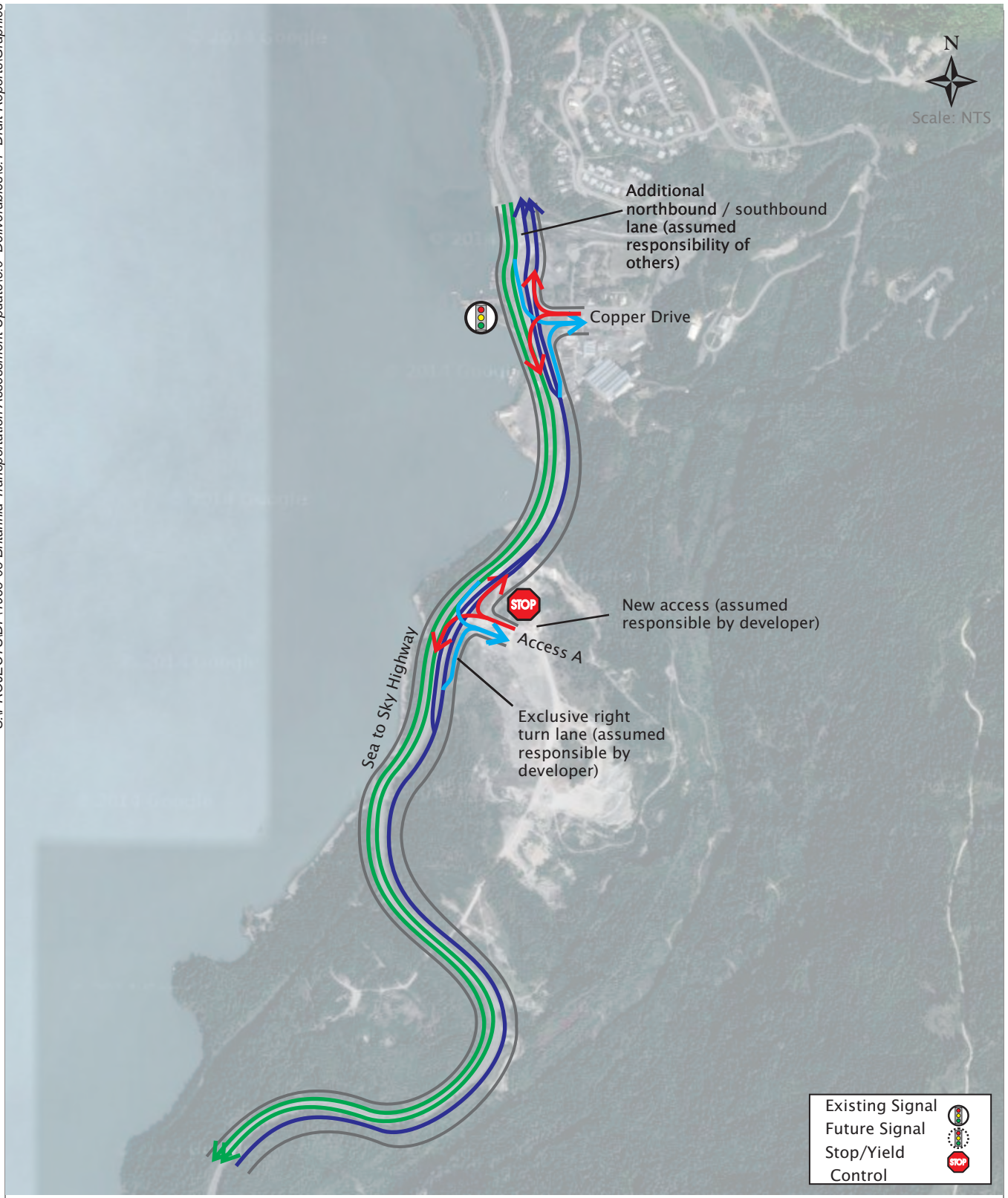


Exhibit 6.2 2025 Laning Background and Total Condition

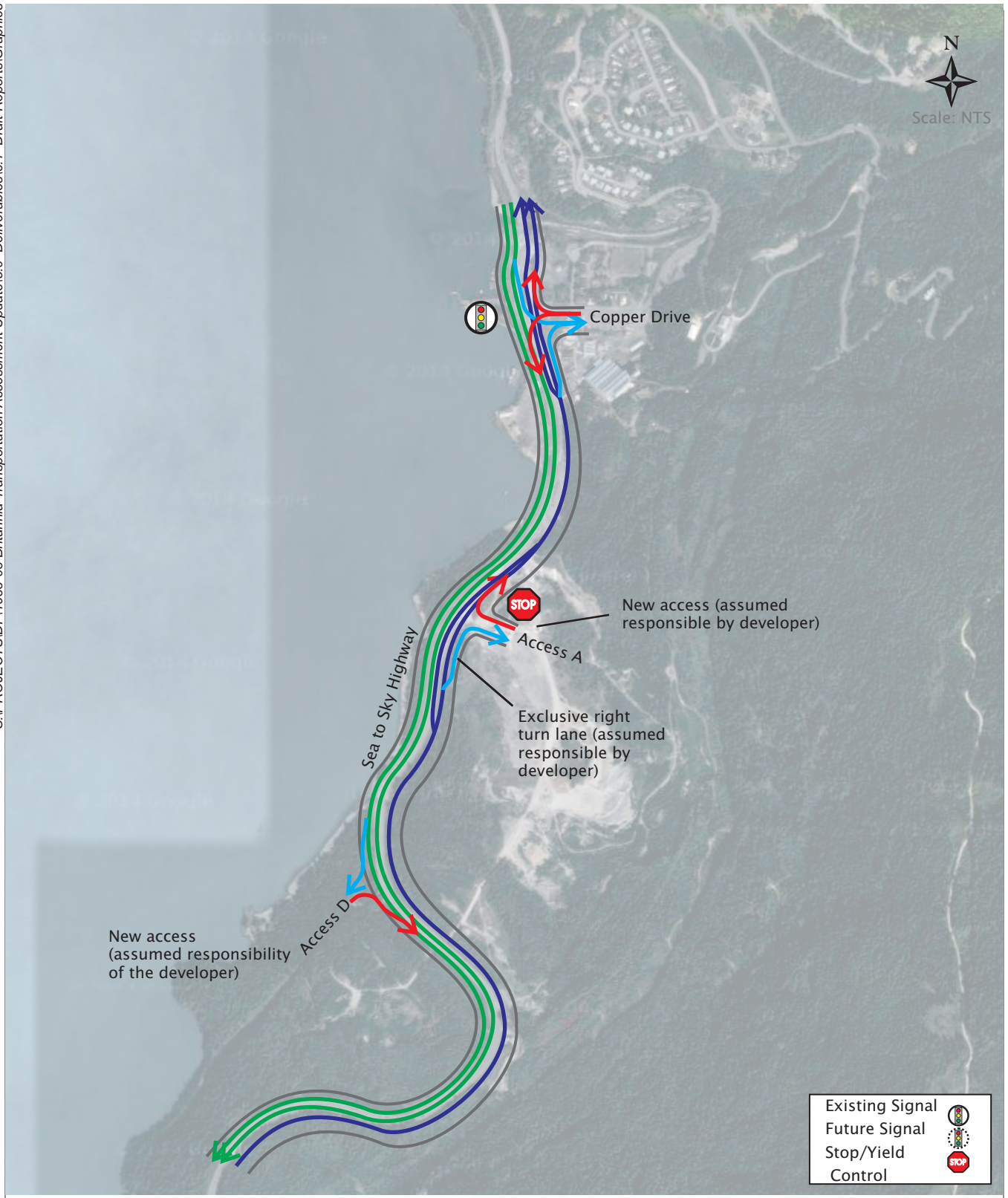


Exhibit 6.3 2028 Laning Background and Total Condition

7. SITE PLAN REVIEW

7.1 Site Circulation and Connectivity

7.1.1 Site Circulation

For Phase 1 of development, Access A connects to the spine of the development and acts as the access and egress for all directions.

For Phase 2 and beyond, the access connections are as shown in Exhibit 2.1. The Main Street is the main thoroughfare / spine between the different phases of development access. Main Street is connected to Access A on the north end and Access D on the south end. As noted earlier, both Access A and D will be right-in, right-out access where Access A services northbound traffic and D services southbound traffic.

7.1.2 Connectivity between the Different Phases

As the Highway bisects the site, a tunnel with a single lane of travel will be provided as connection between different areas of the development areas. This connection is expected to be completed at the Opening Day of Phase 2 since the unsignalized full movement Access A will no longer be adequate for the land use proposed. As the tunnel will be utilized by alternating traffic flows, signalization will need to be provided. A possible efficient way of signaling for the tunnel would be to have signal rest in green in one primary direction (usually the more busy direction for that specific period of the day) and a green light be provided for the alternate direction (while a red light is provided for the primary direction) as and when a vehicle is detected for the alternate direction.

In each direction of movement, it is expected that several hundred vehicles could utilize the signalized tunnel based on an alternating signal. From a high level perspective and reviewing the anticipated trips generated, the tunnel could see 300 to 400 trips during the peak hours in each direction of movement. It is anticipated the tunnel should operate acceptably with this level of traffic.

Aside from vehicular travel, it is also envisaged that pedestrians and bikes will be able to use this tunnel as connection between the different phases of development. As such, adequate lighting and width is necessary in ensuring a safe and efficient environment for all modes.

7.2 Parking Requirements

At this stage of the Master Plan planning process, a detailed parking allocation and analysis has not been undertaken. Bunt has however conducted a review of the existing SLRD Zoning Bylaw parking supply requirements to identify the District's existing regulatory parking supply requirements for the proposed South Britannia Development.

7.2.1 Off-Street Parking Bylaw

The Squamish-Lillooet Regional District Zoning Bylaw No.1350-2016 (August 2016) specifies off-street parking rates for different land uses. **Table 7.1** summarizes the rates and corresponding spaces required for the proposed development.

Table 7.1: Parking Bylaw Requirements

LAND USE	SIZE	ZONING BY-LAW REQUIREMENTS	
		Rate	Spaces
Multi-family Residential (apartments)	1,050 units	1.25 spaces per dwelling unit, plus 1 visitor space per 5 units	1,523
Commercial and office	31,000 sf	3 per 100 m2 gross floor area (assuming the worst case of commercial uses)	87
Restaurant (Eatery)	7,500 sf	6 per 100 m2 of grossfloor area	42
Hotel	190 Rooms (or equivalent)	1 per guest room or 1 per sleeping unit or 1 per campsite	190
Municipal	11,000 sf	1 space for every 50 m2 of Gross Floor Area (assuming similar to an office space)	20
Surf Park, pump traffic, surf park		Rough estimate based on worst case scenario of the number of trips entering / exiting the site during a two hour peak period	200
TOTAL	-	-	2,062

Based on the Bylaw, an approximate total of 2,100 off-street parking spaces will be required for the development in its entirety.

7.3 Bicycle and Pedestrian Facilities

In order to support and encourage alternative transportation modes, the development plan focuses on the provision of efficient bicycle and pedestrian facilities to ensure proper connectivity throughout the site. The plan considers the following:

- Two-way bicycle and pedestrian path connecting South and North Britannia;
- Pedestrian on-street and off-street trail network providing efficient connections throughout the site; and,

- Urban design approach to provide a functioning and inviting streetscape that creates “people places” especially in the commercial core and other high density areas.

7.4 Transit and Car Sharing

Transit, Ride-Sharing, and Car Sharing programs are fundamental to the success of this community. The following are programs being progressed.

7.4.1 Transit

At the on-set of development, it is anticipated that transit will be served mainly by private entities until ridership increases to a point where BC Transit will see provision of services as viable in this community.

We have discussed with the managers of Squamish Connector (<http://www.squamishconnector.com/>) about the South Britannia Master Plan. The Squamish Connector is a private service that currently operates between Squamish and Vancouver. They have indicated that they are interested in providing a shuttle service for the development when it is completed. The details of service will need to be discussed further.

In addition to the above, the developer is also looking into the potential for on-demand transit services. Prior to BC Transit having buses servicing the nearby area, on-demand transit would aid fill the gap in the meanwhile.

From a transit circulation planning standpoint, it is envisaged that a “transit loop” will be provided on site. With the current access to the site, northbound transit traffic would enter the site via Access A and exit via Access A while buses southbound would enter Access D and exit Access D (thereby travelling through the tunnel).

7.4.2 Ride Share

There are various ride share programs available from Squamish such as poparide.com, ridesharing.com, carpoolworld.com, and etc.

It is envisaged that ride-sharing stalls can be provided in the near vicinity to the commercial area immediately accessed from Access A on Main Street near the bus loop location. At the on-set of the project, it is envisaged 2 to 3 ride share stalls can be provided as a pilot. Based on actual on-going observations of demands for the ride share stalls every year, the number of ride share stalls can be adjusted upwards or downwards to meet community needs.

7.4.3 Car Share Programs

We have had discussions with the MODO Car Share Program staff about the South Britannia development. At this particular time, they could not commit to providing vehicles at the South Britannia site. However, they are open to providing their technologies should the owner / strata provide the vehicles and maintenance thereof. That is, MODO would make available their booking technologies (such as their

website) as well as their telephone coordinators (for booking purposes) for monthly fee. The owner / strata would have to buy and maintain vehicles as well as react to any maintenance calls for the drivers (such as flat tires and mechanical failures among others).

8. CONCLUSION

- Tiger Bay Development Corporation is proposing the development of the South Britannia Beach community located on the Highway 99 corridor, south of the existing historic mine museum in Britannia Beach, BC.
- The Master Plan comprises the development of 1,050 residential units 31,000 square ft of commercial floor area , 7,500 square feet of eatery, 150 room hotel rooms with 40 glamping spaces, 11,000 square feet of municipal office (along with other recreation uses such as a surf park, skate park, parks, and etc.).
- The site is anticipated to be developed over a series of 4 development phases. As a rough estimate, the Phase 1 opening day is anticipated to be 2025, the Phase 2 opening day is anticipated to be 2028, the Phase 3 opening day is anticipated to be 2032, and the Phase 4 opening day is anticipated to be 2037. However, these numbers are rough estimate and for the purpose of the transportation study only.
- The proposed Master Plan is expected to be developed over the next 5-25 years. All horizon years were analyzed as part of the traffic assessment to understand the potential impacts along the highway. An additional 2047 longer term horizon year was included in the analysis to account for the full build-out plus 10 years horizon.
- In order to account for growth along the Highway 99 corridor, a 2.3% per year growth rate was applied to all horizon years.
- The traffic analysis evaluation scenarios included the typical Friday AM, Friday PM and Sunday afternoon peak hours which generally represent the peak hour traffic volume conditions along the Highway 99, Sea to Sky corridor.
- Access A is assumed to be the only access for Phase 1. During that time, this access will house full movements and will be unsignalized.
- Access A and D will be unsignalized and will only house right-in, right-out movements including and beyond Phase 2 development.
- Based on traffic operations results, the improvements required to support the additional traffic expected along the corridor are as follows:
 - By 2025 it is required to consider a second northbound lane with a second southbound lane at the intersection of Copper Drive to alleviate northbound and southbound delays / queues during the Friday afternoon and Sunday peak hour conditions. Such improvement is limited by the existing sheer rock on the east and rail tracks on the west side that creates a “pinch point” along this stretch of the highway;

- Proposed Access A will require, at a minimum, a northbound right turn deceleration lane for access to the site while an additional northbound lane (making two northbound lanes total) at the access will be required by 2025 Total Scenario (Phase 1);
 - For the 2025 Total Phase 1 Scenario, a full movement unsignalized Access A is adequate to serve the site.
 - Proposed Access D requires proper acceleration and deceleration lanes for the right in/out configuration according to design standards as it is located right at a curvature and uphill roadway condition by 2028 Total Phase 2 conditions;
 - The improvements to the long term condition of the highway and the accesses indicate beyond capacity conditions, it is assumed that in the actual case peak spreading will have occurred to accommodate to the capacities of the highway;
 - The Highway corridor itself is anticipated to exceed capacity by the 2032 horizon (background conditions) and is mainly resultant of conservative growth – continuous highway corridor observations are suggested to more accurately determine the improvement needs from a timeline perspective.
 - Note, MOTI is anticipating a Highway Bypass that would alleviate and detour traffic volumes away from the existing Highway 99 in the vicinity of the study area that would likely render the above traffic improvement unnecessary;
 - Noting the above, improvements to the Highway should only be implemented based on observed demand as-and-when necessary; and
 - In the context of the development, it is assumed that the developer is likely responsible for improvements of Access A and D only.
- In order to support and encourage sustainable transportation modes, the site plan includes the provision of a pedestrian and bicycle path to North Britannia, and pedestrian trail systems and greenways throughout the community;
 - Based on the SLRD Zoning Bylaw, the proposed site will require 2,100 parking stalls for the proposed development site at full build-out; and,
 - Transit, car sharing and ride sharing programs are currently being solidified based on on-going discussion with multiple organizations.

APPENDIX A

Detailed Development Statistics and Trip Generation

Phase 4 Trip Generation Organized by Parcel Number

Parcel # (2019/02/11) NEW	Land Use	Type	Quantity	Variable	Source	AM			PM			Sunday			Notes
						In	Out	Total	In	Out	Total	In	Out	Total	
1	I	Institutional	10.8	1000 ft2 GFA	ITE #730	27	9	36	5	14	18	4	11	15	Assumed two thirds land area for building approximation
2	MF1	Townhouses	10.0	Units	ITE 220 and 221 AVG	1	3	4	3	2	5	2	2	4	
3	MF3	Apartment and commercial	75.0	Units	ITE 220 and 221 AVG	7	23	31	23	14	38	19	11	30	
			21.5	1000 ft² GFA	ITE #826	9	6	15	26	33	58	20	26	47	
5	MF1	Mixed Use Townhouses	20.0	Units	ITE 220 and 221 AVG	2	6	8	6	4	10	5	3	8	
7	C	Restaurant	3.2	1000 ft² GFA	Average of ITE #931 and ITE #930	3	2	5	21	14	35	38	29	68	Average of quality and casual restaurant to be conservative with uncertainty
9	MF3	WALK UP APARTMENTS	42.0	Units	ITE 220 and 221 AVG	4	13	17	13	8	21	10	6	17	
10	MF1	Townhouse	32.0	Units	ITE 220 and 221 AVG	3	10	13	10	6	16	8	5	13	
11	MF1	Townhouse	14.0	units	ITE 220 and 221 AVG	1	4	6	4	3	7	3	2	6	
12	MF1	Townhouse	12.0	units	ITE 220 and 221 AVG	1	4	5	4	2	6	3	2	5	
13	RC	RECREATIONAL, pump track	2.4	Acres	ITE #411	13	9	22	9	8	17	9	15	24	Assumed similar to a park use but will have a higher number of users. To be conservative assumed twice of the maximum rates per the park usage rates
14		Brewery	4.3	1000 ft² GFA	Average of ITE #931 and ITE #930	4	2	6	28	19	47	50	39	89	
		Comercial	5.4	1000 ft2 GFA	ITE #826	2	1	4	6	8	15	5	7	12	Assumed comercial for trip generation
		Retail/office building	4.3	1000 ft² GFA	ITE #826	2	1	3	5	7	12	4	5	9	Assume reduced to 2000 square feet to minimize comercial space to cut down trip gen
15	TH	Transit Hub	80.0	SM footprint area	N/A										
16	TC1	Surf Hotel	50.0	Rooms	ITE #310	14	10	24	15	15	30	13	15	28	
17	UT	SEWAGE LIFT STATION	167.0	SM footprint area	N/A										
18	RC	SURF PARK/ LAGOON	269.1	1000 ft² GFA	ASSUMPTION	33	33	67	33	33	67	51	51	103	Assumed Trip Numbers and size is 2.5 hectares as indicated in email
19	MF3	6 STORIES APARTMENT	401.0	Units	ITE 220 and 221 AVG	40	124	164	125	76	201	100	61	160	
22	MF1	TOWN HOUSE	12.0	Units	ITE 220 and 221 AVG	1	4	5	4	2	6	3	2	5	
23	MF3	WALK UP APARTMENTS	24.0	Units	ITE 220 and 221 AVG	2	7	10	7	5	12	6	4	10	
24	MF1	TOWN HOUSE	24.0	Units	ITE 220 and 221 AVG	2	7	10	7	5	12	6	4	10	
26	UT	Utilities	N/A	N/A	N/A			0			0			0	
28	MF3	APARTMENT	230.0	Units	ITE 220 and 221 AVG	23	71	94	71	44	115	57	35	92	
30	MF2	STACKED TOWNHOUSE	48.0	Units	ITE 220 and 221 AVG	5	15	20	15	9	24	12	7	19	
31	MF2	STACKED TOWNHOUSE	13.0	Units	ITE 220 and 221 AVG	1	4	5	4	2	7	3	2	5	
32	MF2	STACKED TOWNHOUSE	36.0	Units	ITE 220 and 221 AVG	4	11	15	11	7	18	9	5	14	
33	MF2	STACKED TOWNHOUSE	27.0	Units	ITE 220 and 221 AVG	3	8	11	8	5	14	7	4	11	
34	MF1	TOWNHOUSE	30.0	Units	ITE 220 and 221 AVG	3	9	12	9	6	15	7	5	12	
37	TC2	CABINS	20.0	rooms	ITE #310	6	4	9	6	6	12	5	6	11	
40	TC2	CABINS or parking	0.0	Rooms	ITE #310	0	0	0	0	0	0	0	0	0	Parking for Option B, cabins for option A
41	PK	SURFACE PARKING	140.0	stalls	N/A			0			0			0	
43	UT	Utilities	0.2	Acre	N/A			0			0			0	
45	TC2	CABINS	0.0	Rooms	ITE #310	0	0	0	0	0	0	0	0	0	
46	TC1	MINATY RESORT HOTEL	40.0	Rooms	ITE #310	11	8	19	12	12	24	10	12	22	
47	TC2	CABINS	10.0	Rooms	ITE #310	3	2	5	3	3	6	3	3	6	Assumed rooms Reduced to 10 for smaller trip gen
50	TC2	GLAMPING	20.0	Rooms	ITE #310	6	4	9	6	6	12	5	6	11	
51	TC2	GLAMPING	20.0	Rooms	ITE #310	6	4	9	6	6	12	5	6	11	
53	TC1	MINATY BEACH LODGE	30.0	Rooms	ITE #310	8	6	14	9	9	18	8	9	17	
	P	Park	11.6	Acre	ITE #411	0	0	0	1	1	1	1	2	4	
Estimated Total						251	426	677	518	391	909	494	402	896	

Base Trip Generation Rates

Land Use	AM			PM			Sunday			Source
	IN	OUT	TOTAL	IN	OUT	TOTAL	In	Out	Total	
Multi-residential	0.10	0.31	0.41	0.31	0.19	0.50	0.25	0.15	0.40	ITE 220 and 221 AVG
Commercial	0.42	0.26	0.68	1.19	1.52	2.71	0.95	1.22	2.17	ITE #826
Restaurant	0.92	0.48	1.40	6.50	4.47	10.97	11.81	9.10	20.91	Average of ITE #931 and ITE #930
Hotel	0.28	0.19	0.47	0.31	0.29	0.60	0.26	0.30	0.56	ITE #310

Land Use	AM			PM			Sunday			Source
	IN	OUT	TOTAL	IN	OUT	TOTAL	In	Out	Total	
Public park (411)	0.01	0.01	0.02	0.06	0.05	0.11	0.12	0.19	0.31	ITE #411
Public park (411) Maximum Rate	2.66	1.85	4.50	1.93	1.58	3.50	1.95	3.05	5.00	ITE #411
Government Office Building (730)	2.51	0.84	3.34	0.43	1.28	1.71	0.34	1.03	1.37	ITE #730

2019-02-11 Map Gross Trip Generation Calculation Sorted by Land Use

Land Use	Quantity	Variable	FRIDAY AM			FRIDAY PM			SUNDAY			Notes
			In	Out	Total	In	Out	Total	In	Out	Total	
Residential	1050	units	105	326	431	326	199	525	261	159	420	Similar to previous study
Commercial	31.216	1000 sqft GFA	13	8	21	37	47	85	30	38	68	
Hotel	190	rooms	53	37	89	58	56	114	49	57	106	More than previous study (new calculations included glamping, cabins, and hotels)
Tourism Restaurant/ café	7.491744	1000 sqft GFA	7	4	10	49	33	82	88	68	157	
Municipal	10.785528	1000 sqft GFA	27	9	36	5	14	18	4	11	15	
Recreational		mixed	47	43	89	44	42	85	62	69	131	Was not included in previous study
TOTAL			251	426	677	518	391	909	494	402	896	Based on Base Trip Generation Rates

Reductions to Gross Trip Generation Calculations

Land Use	Quantity	Variable	FRIDAY AM			FRIDAY PM			SUNDAY			Notes
			In	Out	Total	In	Out	Total	In	Out	Total	
Residential	1050	units	105	326	431	326	199	525	261	159	420	Assumed 10% Deduction For Local Employees that would not generate vehicle trips
	-10%		-10	-33	-43	-33	-20	-53	-26	-16	-42	
Commercial	31.216	1000 sqft GFA	13	8	21	37	47	85	30	38	68	
Hotel	190	rooms	53	37	89	58	56	114	49	57	106	
Tourism Restaurant/ café	7.491744	1000 sqft GFA	7	4	10	49	33	82	88	68	157	
Municipal	10.785528	1000 sqft GFA	27	9	36	5	14	18	4	11	15	
Recreational		mixed	47	43	89	44	42	85	62	69	131	
New Total with Deductions			240	393	634	486	371	857	468	386	854	
New Total with Internal Capture Deductions			215	360	575	382	273	655	350	271	621	Sunday values are from the Sunday-PM internal capture spreadsheet tool
April 2016 TIA Trip Gen Calculations Total			175	369	544	420	305	719	336	244	575	

Increase in trips From April 2016 TIA			40	-9	31	-38	-32	-64	14	27	46
Percent Increase			23%	-3%	6%	-9%	-11%	-9%	4%	11%	8%

Trip Generation Breakdown with Internal Capture Applied

Land Use	Quantity	Variable	FRIDAY AM			FRIDAY PM			SUNDAY		
			In	Out	Total	In	Out	Total	In	Out	Total
Residential	1050	units	88	274	362	259	156	415	197	117	314
Commercial/office	31.216	1000 sqft GFA	7	6	13	16	16	32	8	13	21
Hotel	190	rooms	50	33	83	45	50	95	36	50	86
Tourism Restaurant/ café/ brew pub	7.491744	1000 sqft GFA	3	2	5	23	8	31	55	28	83
Municipal	10.785528	1000 sqft GFA	23	5	28	1	10	11	1	8	9
Recreational		mixed	44	40	84	38	33	71	53	55	108
TOTAL			215	360	575	382	273	655	350	271	621

6/14/2019

04-17-0272

Britannia MTP - Trip Gen Summary (Internal Capture included)

ST

	land use	variable	units	Fri AM			Fri PM			Sun		
				IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Phase 1 2025	residential		0 units	0	0	0	0	0	0	0	0	0
	commercial/office		0 1000 sf GFA	0	0	0	0	0	0	0	0	0
	hotel		20 rooms	6	4	10	4	4	8	3	3	6
	restaurant/brewpub		4.306 1000 sf GFA	4	2	6	24	15	39	44	32	76
	municipal		0 1000 sf GFA	0	0	0	0	0	0	0	0	0
	recreational		varies mixed	32	32	64	30	31	61	46	48	94
				42	38	80	58	50	108	93	83	176
Phase 2 2028	residential		202 units	18	53	71	39	26	65	27	18	45
	commercial/office		26.91 1000 sf GFA	9	6	15	18	18	36	8	11	19
	hotel		90 rooms	23	16	39	23	23	46	18	23	41
	restaurant/brewpub		4.306 1000 sf GFA	3	2	5	13	5	18	29	13	42
	municipal		0 1000 sf GFA	0	0	0	0	0	0	0	0	0
	recreational		varies mixed	32	32	64	28	27	55	44	45	89
				85	109	194	121	99	220	126	110	236
Phase 3 2032	residential		461 units	39	118	157	103	65	168	73	43	116
	commercial/office		31.216 1000 sf GFA	9	7	16	18	17	35	9	13	22
	hotel		160 rooms	42	28	70	39	41	80	31	41	72
	restaurant/brewpub		7.492 1000 sf GFA	4	3	7	23	8	31	55	28	83
	municipal		0 1000 sf GFA	0	0	0	0	0	0	0	0	0
	recreational		varies mixed	45	41	86	40	37	77	55	61	116
				139	197	336	223	168	391	223	186	409
Phase 4 2037	residential		1050 units	88	274	362	259	156	415	197	117	314
	commercial/office		31.216 1000 sf GFA	7	6	13	16	16	32	8	13	21
	hotel		190 rooms	50	33	83	45	50	95	36	50	86
	restaurant/brewpub		7.492 1000 sf GFA	3	2	5	23	8	31	55	28	83
	municipal		10.785 1000 sf GFA	23	5	28	1	10	11	1	8	9
	recreational		varies mixed	44	40	84	38	33	71	53	55	108
				215	360	575	382	273	655	350	271	621

APPENDIX B

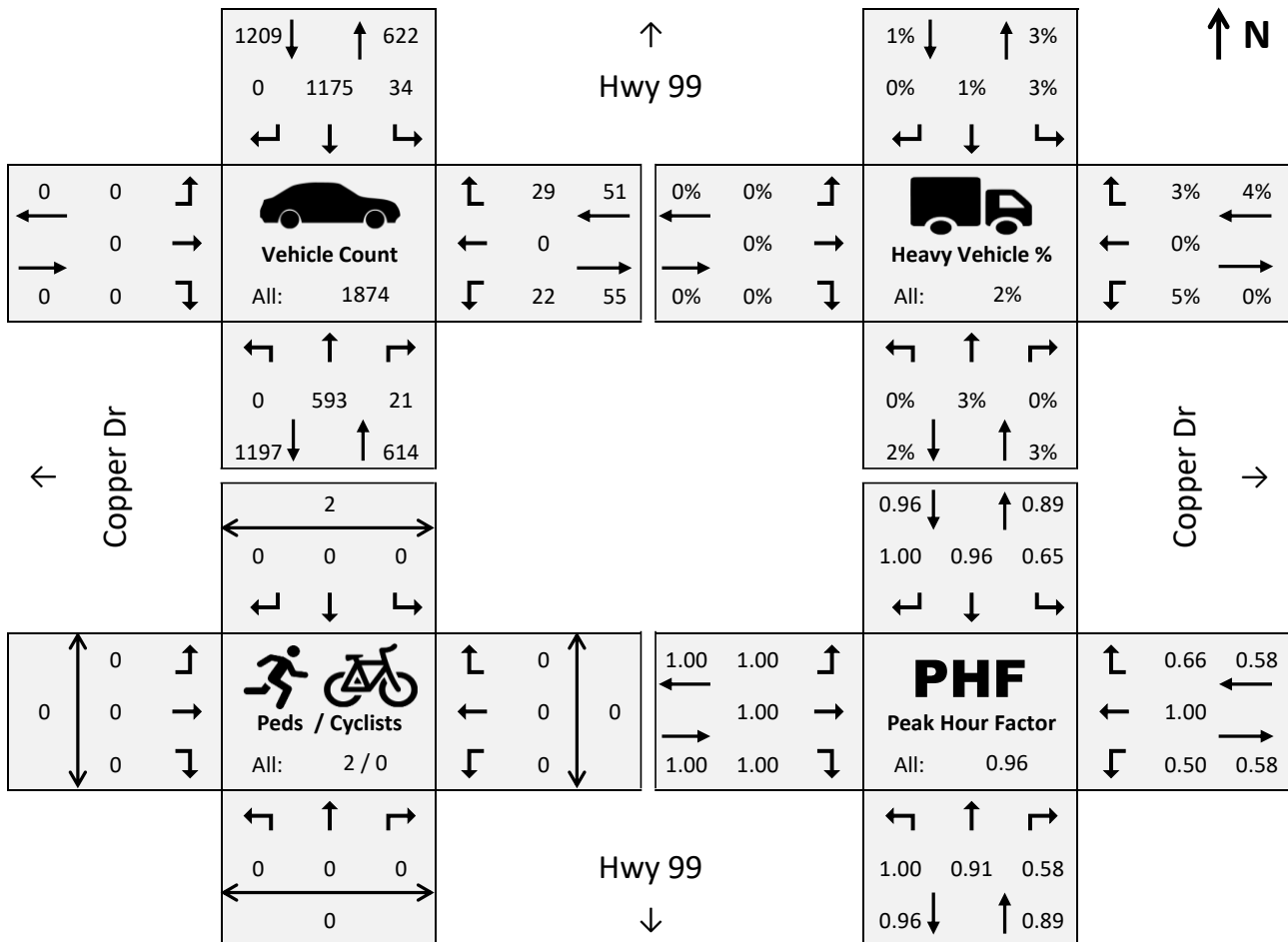
Highway 99 / Copper Road Collected Traffic Volumes

Hwy 99 @ Copper Dr – Squamish, BC

Project#: 04-17-0272 **Weather:** Sunny **Analysis Period:** 15:00 - 16:00
Date: Apr 14, 2019 (Sun) **Road Cond:** Dry **Intersection Peak:** 15:00 - 16:00
Notes:



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
12:00 - 12:15	0	134	2	9	252	0	0	0	0	3	0	10	4	0	0	0
12:15 - 12:30	0	118	4	7	222	0	0	0	0	7	0	3	0	0	0	0
12:30 - 12:45	0	125	7	6	261	0	0	0	0	6	0	5	2	0	0	0
12:45 - 13:00	0	90	7	8	258	0	0	0	0	4	0	9	4	0	0	0
13:00 - 13:15	0	82	4	5	277	0	0	0	0	3	0	12	0	0	0	0
13:15 - 13:30	0	106	6	14	259	0	0	0	0	8	0	8	0	0	0	0
13:30 - 13:45	0	122	2	7	233	0	0	0	0	6	0	12	0	0	0	0
13:45 - 14:00	0	121	4	11	228	0	0	0	0	9	0	7	0	0	0	0
14:00 - 14:15	0	143	5	9	242	0	0	0	0	3	0	2	0	0	0	0
14:15 - 14:30	0	182	3	9	262	0	0	0	0	4	0	5	0	0	0	0
14:30 - 14:45	0	154	7	10	255	0	0	0	0	5	0	6	1	0	0	0
14:45 - 15:00	0	135	8	5	253	0	0	0	0	5	0	10	2	0	0	0
15:00 - 15:15	0	147	7	13	284	0	0	0	0	2	0	5	0	0	0	0
15:15 - 15:30	0	163	9	8	284	0	0	0	0	11	0	11	0	0	0	0
15:30 - 15:45	0	124	2	4	302	0	0	0	0	2	0	7	0	0	0	0
15:45 - 16:00	0	159	3	9	305	0	0	0	0	7	0	6	2	0	0	0

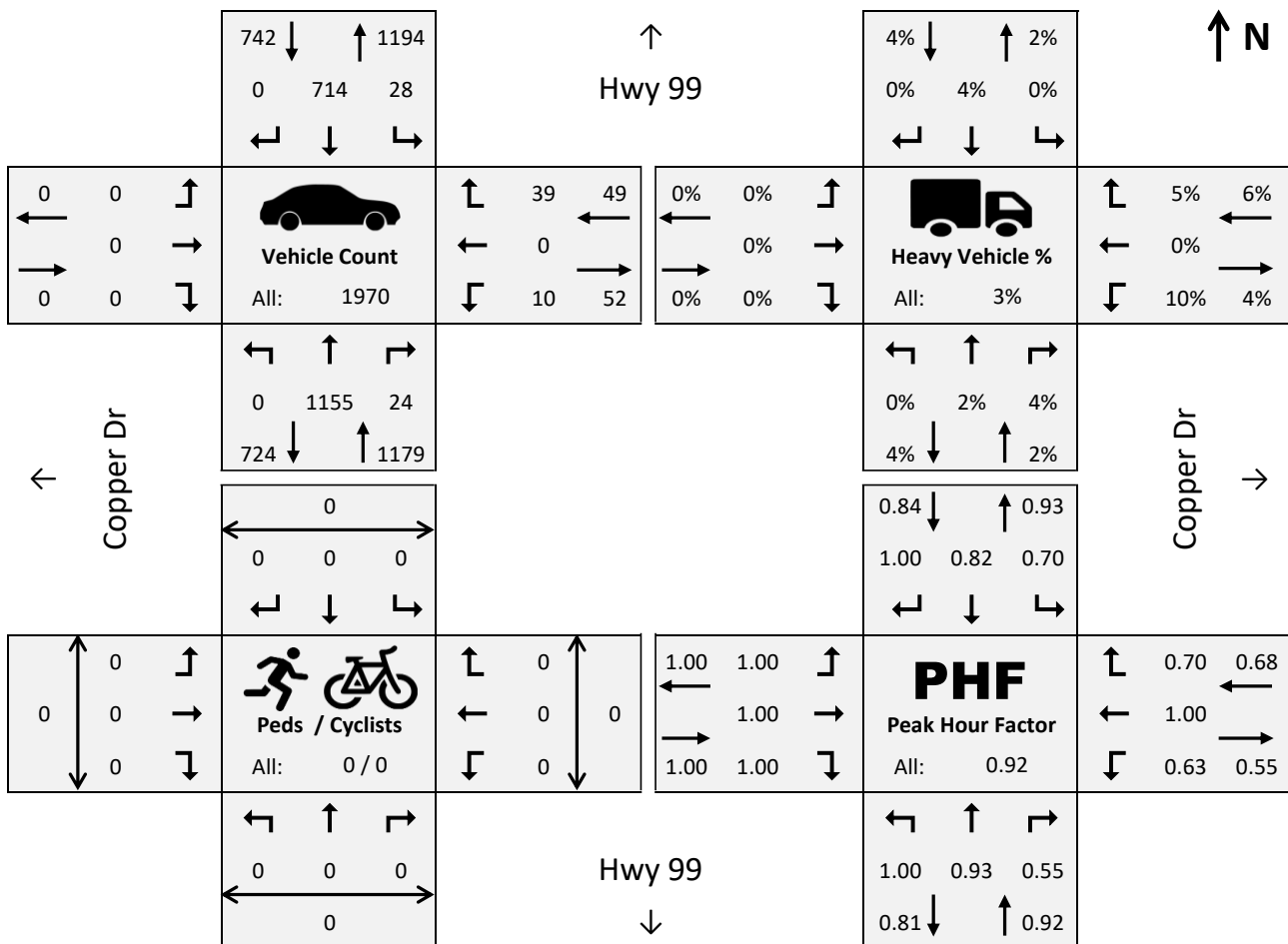


Hwy 99 @ Copper Dr – Squamish, BC

Project#: 04-17-0272 **Weather:** Sunny **Analysis Period:** 16:15 - 17:15
Date: Apr 12, 2019 (Fri) **Road Cond:** Dry **Intersection Peak:** 16:15 - 17:15
Notes:



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	162	7	4	158	0	0	0	0	2	0	6	0	0	0	0
15:15 - 15:30	0	198	11	8	175	0	0	0	0	7	0	7	1	0	1	0
15:30 - 15:45	0	211	4	8	171	0	0	0	0	1	0	6	0	0	0	0
15:45 - 16:00	0	255	8	9	160	0	0	0	0	3	0	6	0	0	0	0
16:00 - 16:15	0	263	3	12	165	0	0	0	0	6	0	10	0	0	0	0
16:15 - 16:30	0	274	11	10	173	0	0	0	0	3	0	11	0	0	0	0
16:30 - 16:45	0	289	5	2	219	0	0	0	0	4	0	14	0	0	0	0
16:45 - 17:00	0	312	7	10	155	0	0	0	0	2	0	8	0	0	0	0
17:00 - 17:15	0	280	1	6	167	0	0	0	0	1	0	6	0	0	0	0
17:15 - 17:30	0	287	5	14	165	0	0	0	0	3	0	3	0	0	1	0
17:30 - 17:45	0	281	6	10	146	0	0	0	0	2	0	7	1	0	0	0
17:45 - 18:00	0	285	9	5	149	0	0	0	0	3	0	15	1	0	1	0
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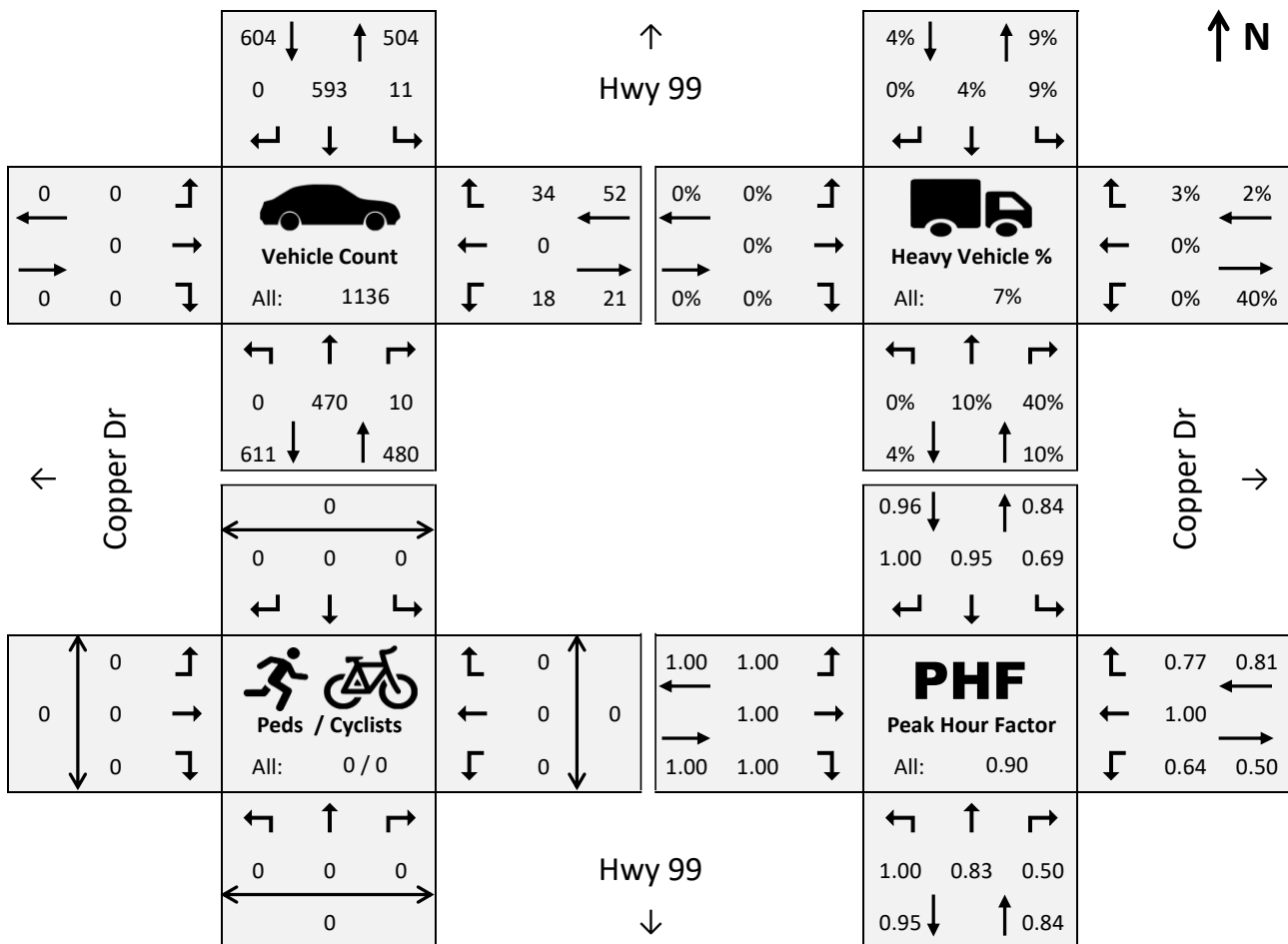


Hwy 99 @ Copper Dr – Squamish, BC

Project#: 04-17-0272 **Weather:** Sunny **Analysis Period:** 7:00 - 8:00
Date: Apr 12, 2019 (Fri) **Road Cond:** Dry **Intersection Peak:** 7:00 - 8:00
Notes:



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
7:00 - 7:15	0	94	2	1	156	0	0	0	0	4	0	6	0	0	0	0
7:15 - 7:30	0	125	1	3	135	0	0	0	0	3	0	8	0	0	0	0
7:30 - 7:45	0	141	2	4	151	0	0	0	0	7	0	9	0	0	0	0
7:45 - 8:00	0	110	5	3	151	0	0	0	0	4	0	11	0	0	0	0
8:00 - 8:15	0	101	2	3	89	0	0	0	0	2	0	4	0	0	0	0
8:15 - 8:30	0	94	1	6	118	0	0	0	0	6	0	10	0	0	0	0
8:30 - 8:45	0	97	2	3	123	0	0	0	0	3	0	16	0	0	0	0
8:45 - 9:00	0	136	2	8	142	0	0	0	0	6	0	11	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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APPENDIX C

Synchro Results

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	3.0	1.6	1.1
Total Del/Veh (s)	17.9	1.4	5.7	5.3	5.4	3.1	4.1

2: Hwy 99 & Access A Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.8	1.3	1.1

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.6	1.2	1.0

Total Network Performance

Denied Del/Veh (s)			1.2
Total Del/Veh (s)			20.8

Queuing and Blocking Report

Existing Sunday

05/14/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	SB	SB
Directions Served	L	T	L	T
Maximum Queue (m)	11.0	33.4	12.3	43.8
Average Queue (m)	4.7	11.8	4.4	15.1
95th Queue (m)	13.1	34.1	12.6	43.4
Link Distance (m)	193.6	496.4		156.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			75.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Existing Sunday
05/14/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	30	618	22	35	1224
v/c Ratio	0.13	0.16	0.41	0.02	0.05	0.74
Control Delay	36.5	15.8	5.5	2.0	1.8	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.5	15.8	5.5	2.0	1.8	8.0
Queue Length 50th (m)	3.5	0.0	36.6	0.0	0.7	77.9
Queue Length 95th (m)	10.2	7.6	60.2	1.9	2.3	157.0
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	453	436	1523	1338	638	1663
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	0.05	0.07	0.41	0.02	0.05	0.74
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Existing Sunday
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	29	593	21	34	1175
Future Volume (vph)	22	29	593	21	34	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	1865	1633	1772	1902
Flt Permitted	0.95	1.00	1.00	1.00	0.36	1.00
Satd. Flow (perm)	1738	1585	1865	1633	672	1902
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	23	30	618	22	35	1224
RTOR Reduction (vph)	0	28	0	6	0	0
Lane Group Flow (vph)	23	2	618	16	35	1224
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.6	3.6	52.2	52.2	58.1	58.1
Effective Green, g (s)	3.6	3.6	52.2	52.2	58.1	58.1
Actuated g/C Ratio	0.05	0.05	0.73	0.73	0.81	0.81
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	87	79	1357	1188	573	1541
v/s Ratio Prot	c0.01		0.33		0.00	c0.64
v/s Ratio Perm		0.00		0.01	0.05	
v/c Ratio	0.26	0.02	0.46	0.01	0.06	0.79
Uniform Delay, d1	32.8	32.4	4.0	2.7	1.9	3.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.1	0.2	0.0	0.0	2.9
Delay (s)	34.4	32.5	4.2	2.7	2.0	6.5
Level of Service	C	C	A	A	A	A
Approach Delay (s)	33.3		4.2			6.4
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			71.7		Sum of lost time (s)	14.0
Intersection Capacity Utilization			73.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Existing Sunday
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	614	0	0	1197
Future Volume (Veh/h)	0	0	614	0	0	1197
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	667	0	0	1301
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1318	667			667	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1318	667			667	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	149	401			919	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	667	0	650	650	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.39	0.00	0.38	0.38	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			36.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Existing Sunday
05/14/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	614	1197	0
Future Volume (Veh/h)	0	0	0	614	1197	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	667	1301	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1968	650	1301			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1968	650	1301			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	55	411	528			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	667	650	650	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.39	0.38	0.38	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		36.4%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	3.1	0.8	0.4
Total Del/Veh (s)	13.4	1.6	8.5	7.8	7.6	0.9	5.5

2: Hwy 99 & Access A Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.0	1.1	1.0

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.8	1.0	0.8

Total Network Performance

Denied Del/Veh (s)			1.6
Total Del/Veh (s)			25.3

Queuing and Blocking Report

Existing Fri PM

05/14/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T
Maximum Queue (m)	7.3	49.3	6.6	13.9	15.3
Average Queue (m)	2.4	21.8	0.9	4.6	3.6
95th Queue (m)	8.8	55.5	13.9	14.6	17.5
Link Distance (m)	193.6	496.4			156.9
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			65.0	75.0	
Storage Blk Time (%)		0	0		
Queuing Penalty (veh)		0	0		

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Existing Fri PM
05/14/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	42	1255	26	30	776
v/c Ratio	0.08	0.26	0.81	0.02	0.14	0.48
Control Delay	37.1	16.1	14.6	2.1	2.9	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	16.1	14.6	2.1	2.9	3.3
Queue Length 50th (m)	2.0	0.0	143.2	0.3	0.6	28.3
Queue Length 95th (m)	6.2	9.0	#275.5	2.3	2.0	52.6
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	348	345	1559	1329	215	1631
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	0.03	0.12	0.81	0.02	0.14	0.48

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Existing Fri PM
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	39	1155	24	28	714
Future Volume (vph)	10	39	1155	24	28	714
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	1883	1601	1789	1847
Flt Permitted	0.95	1.00	1.00	1.00	0.08	1.00
Satd. Flow (perm)	1789	1601	1883	1601	156	1847
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	42	1255	26	30	776
RTOR Reduction (vph)	0	40	0	5	0	0
Lane Group Flow (vph)	11	2	1255	21	30	776
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	4.0	4.0	66.4	66.4	72.7	72.7
Effective Green, g (s)	4.0	4.0	66.4	66.4	72.7	72.7
Actuated g/C Ratio	0.05	0.05	0.77	0.77	0.84	0.84
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	82	73	1442	1226	174	1548
v/s Ratio Prot	c0.01		c0.67		0.00	c0.42
v/s Ratio Perm		0.00		0.01	0.14	
v/c Ratio	0.13	0.03	0.87	0.02	0.17	0.50
Uniform Delay, d1	39.7	39.5	7.1	2.4	14.1	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	6.0	0.0	0.5	0.3
Delay (s)	40.4	39.6	13.1	2.4	14.6	2.2
Level of Service	D	D	B	A	B	A
Approach Delay (s)	39.8		12.9			2.7
Approach LOS	D		B			A
Intersection Summary						
HCM 2000 Control Delay			9.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.83			
Actuated Cycle Length (s)			86.7		Sum of lost time (s)	14.0
Intersection Capacity Utilization			72.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Existing Fri PM
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	1179	0	0	724
Future Volume (Veh/h)	0	0	1179	0	0	724
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1282	0	0	787
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1676	1282			1282	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1676	1282			1282	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	86	156			537	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1282	0	394	394	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.75	0.00	0.23	0.23	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			65.4%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Existing Fri PM
05/14/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1179	724	0
Future Volume (Veh/h)	0	0	0	1179	724	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1282	787	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2069	394	787			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2069	394	787			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	47	606	828			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1282	394	394	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.75	0.23	0.23	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		65.4%		ICU Level of Service		C
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	3.7	0.5	0.3
Total Del/Veh (s)	7.0	1.4	4.8	5.4	6.6	1.2	2.9

2: Hwy 99 & Access A Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.7	1.0	0.9

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.9	0.7

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	16.3

Queuing and Blocking Report

Existing Fri AM

05/14/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	SB	SB
Directions Served	L	T	L	T
Maximum Queue (m)	9.7	31.0	8.4	25.9
Average Queue (m)	4.2	8.5	1.9	6.4
95th Queue (m)	11.8	29.6	7.5	23.6
Link Distance (m)	193.6	496.4		156.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)			75.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Existing Fri AM
05/14/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	38	522	11	12	659
v/c Ratio	0.07	0.14	0.36	0.01	0.02	0.44
Control Delay	20.1	9.7	6.0	3.5	2.5	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.1	9.7	6.0	3.5	2.5	4.5
Queue Length 50th (m)	1.5	0.0	15.3	0.0	0.2	21.5
Queue Length 95th (m)	6.4	6.3	55.4	1.8	1.2	41.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	847	756	1877	1596	707	1883
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	0.05	0.28	0.01	0.02	0.35
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Existing Fri AM
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	18	34	470	10	11	593
Future Volume (vph)	18	34	470	10	11	593
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	1883	1601	1789	1883
Flt Permitted	0.95	1.00	1.00	1.00	0.38	1.00
Satd. Flow (perm)	1825	1585	1883	1601	713	1883
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	20	38	522	11	12	659
RTOR Reduction (vph)	0	35	0	4	0	0
Lane Group Flow (vph)	20	3	522	7	12	659
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.3	3.3	28.9	28.9	33.8	33.8
Effective Green, g (s)	3.3	3.3	28.9	28.9	33.8	33.8
Actuated g/C Ratio	0.07	0.07	0.61	0.61	0.72	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	111	1155	982	532	1351
v/s Ratio Prot	c0.01		0.28		0.00	c0.35
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.16	0.02	0.45	0.01	0.02	0.49
Uniform Delay, d1	20.6	20.4	4.9	3.5	2.3	2.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.3	0.0	0.0	0.3
Delay (s)	21.2	20.5	5.1	3.5	2.4	3.2
Level of Service	C	C	A	A	A	A
Approach Delay (s)	20.7		5.1			3.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			47.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			42.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Existing Fri AM
05/14/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	480	0	0	611
Future Volume (Veh/h)	0	0	480	0	0	611
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	522	0	0	664
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	854	522			522	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	854	522			522	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	298	499			1041	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	522	0	332	332	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.31	0.00	0.20	0.20	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			28.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Existing Fri AM
05/14/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	480	611	0
Future Volume (Veh/h)	0	0	0	480	611	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	522	664	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1186	332	664			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1186	332	664			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	181	664	921			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	522	332	332	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.31	0.20	0.20	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		28.6%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.3	1.4	5.4	1.7	4.0	1.2	2.7

2: Hwy 99 & Access A Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.0	1.9	0.5	1.7	5.3	1.6	1.6

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.6	1.3	1.1

Total Network Performance

Denied Del/Veh (s)		0.4
Total Del/Veh (s)		18.4

Queuing and Blocking Report

Phase 1 Total Sunday MIT

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	12.7	40.8	7.7	7.8	23.5	19.8
Average Queue (m)	6.0	15.8	1.5	4.2	9.9	6.2
95th Queue (m)	14.8	43.7	16.1	11.7	28.9	22.4
Link Distance (m)	189.9	496.3	496.3		77.9	77.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)			0			
Queuing Penalty (veh)			0			

Intersection: 2: Hwy 99 & Access A

Movement	WB	SB
Directions Served	L	L
Maximum Queue (m)	13.6	7.8
Average Queue (m)	7.8	4.5
95th Queue (m)	16.5	12.1
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	75.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Sunday MIT
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	34	755	25	41	1457
v/c Ratio	0.11	0.14	0.29	0.02	0.07	0.50
Control Delay	22.2	10.5	5.8	3.5	2.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	10.5	5.8	3.5	2.6	4.0
Queue Length 50th (m)	2.6	0.0	11.0	0.0	0.8	28.1
Queue Length 95th (m)	8.0	6.2	34.0	2.7	2.8	45.4
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	691	651	3397	1566	620	3614
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	0.04	0.05	0.22	0.02	0.07	0.40
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Sunday MIT
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	33	725	24	39	1399
Future Volume (vph)	25	33	725	24	39	1399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.32	1.00
Satd. Flow (perm)	1738	1585	3544	1633	595	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	34	755	25	41	1457
RTOR Reduction (vph)	0	32	0	9	0	0
Lane Group Flow (vph)	26	2	755	16	41	1457
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.6	3.6	32.3	32.3	38.4	38.4
Effective Green, g (s)	3.6	3.6	32.3	32.3	38.4	38.4
Actuated g/C Ratio	0.07	0.07	0.62	0.62	0.74	0.74
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	120	109	2201	1014	486	2668
v/s Ratio Prot	c0.01		0.21		0.00	c0.40
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.22	0.02	0.34	0.02	0.08	0.55
Uniform Delay, d1	22.9	22.6	4.7	3.8	2.0	3.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.1	0.0	0.1	0.2
Delay (s)	23.8	22.6	4.8	3.8	2.1	3.2
Level of Service	C	C	A	A	A	A
Approach Delay (s)	23.1		4.8			3.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			52.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			50.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Sunday MIT
06/20/2019

								
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Traffic Volume (veh/h)	37	45	704	43	52	1372		
Future Volume (Veh/h)	37	45	704	43	52	1372		
Sign Control	Stop		Free		Free			
Grade	0%		0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	40	49	765	47	57	1491		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None				None			
Median storage veh								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	1624	382				765		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1624	382				765		
tC, single (s)	6.8	6.9				4.1		
tC, 2 stage (s)								
tF (s)	3.5	3.3				2.2		
p0 queue free %	54	92				93		
cM capacity (veh/h)	87	616				844		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	40	49	382	382	47	57	746	746
Volume Left	40	0	0	0	0	57	0	0
Volume Right	0	49	0	0	47	0	0	0
cSH	87	616	1700	1700	1700	844	1700	1700
Volume to Capacity	0.46	0.08	0.23	0.23	0.03	0.07	0.44	0.44
Queue Length 95th (m)	14.6	2.0	0.0	0.0	0.0	1.6	0.0	0.0
Control Delay (s)	77.7	11.4	0.0	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	B				A		
Approach Delay (s)	41.2		0.0				0.4	
Approach LOS	E							
Intersection Summary								
Average Delay			1.7					
Intersection Capacity Utilization			47.9%	ICU Level of Service			A	
Analysis Period (min)			15					

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Total Sunday MIT
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	747	1409	0
Future Volume (Veh/h)	0	0	0	747	1409	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	812	1532	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2344	766	1532			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2344	766	1532			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	30	345	430			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	812	766	766	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.48	0.45	0.45	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		42.6%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	8.4	10.0	6.4
Total Del/Veh (s)	24.0	1.3	5.7	5.2	10.0	10.2	8.8

2: Hwy 99 & Access A Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.2	0.0	0.0
Total Del/Veh (s)	18.9	1.7	1.0	1.6	5.9	1.4	1.7

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.6	1.3	1.1

Total Network Performance

Denied Del/Veh (s)	6.2
Total Del/Veh (s)	26.9

Queuing and Blocking Report
Phase 1 Total Sunday adjusted

06/20/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	SB	SB
Directions Served	L	T	L	T
Maximum Queue (m)	13.6	35.7	18.4	107.1
Average Queue (m)	6.4	15.8	6.1	46.5
95th Queue (m)	15.3	39.1	22.5	134.7
Link Distance (m)	193.6	496.4		156.9
Upstream Blk Time (%)				2
Queuing Penalty (veh)				0
Storage Bay Dist (m)			75.0	
Storage Blk Time (%)				2
Queuing Penalty (veh)				1

Intersection: 2: Hwy 99 & Access A

Movement	WB	SB
Directions Served	L	L
Maximum Queue (m)	16.2	14.9
Average Queue (m)	8.4	5.8
95th Queue (m)	16.6	15.1
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	75.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Sunday adjusted
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	34	755	25	41	1457
v/c Ratio	0.22	0.24	0.47	0.02	0.07	0.85
Control Delay	46.3	19.4	4.8	1.3	1.3	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	19.4	4.8	1.3	1.3	11.2
Queue Length 50th (m)	5.0	0.0	45.7	0.0	0.7	119.5
Queue Length 95th (m)	12.4	9.0	67.8	1.6	1.8	#318.5
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	117	139	1591	1396	576	1719
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	0.22	0.24	0.47	0.02	0.07	0.85

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Sunday adjusted
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	33	725	24	39	1399
Future Volume (vph)	25	33	725	24	39	1399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	1865	1633	1772	1902
Flt Permitted	0.95	1.00	1.00	1.00	0.31	1.00
Satd. Flow (perm)	1738	1585	1865	1633	579	1902
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	34	755	25	41	1457
RTOR Reduction (vph)	0	33	0	6	0	0
Lane Group Flow (vph)	26	1	755	19	41	1457
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	2.5	2.5	64.5	64.5	70.5	70.5
Effective Green, g (s)	2.5	2.5	64.5	64.5	70.5	70.5
Actuated g/C Ratio	0.03	0.03	0.78	0.78	0.85	0.85
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	52	47	1449	1269	520	1615
v/s Ratio Prot	c0.01		0.40		0.00	c0.77
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.50	0.02	0.52	0.02	0.08	0.90
Uniform Delay, d1	39.6	39.1	3.5	2.1	1.9	4.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	0.2	0.3	0.0	0.1	7.4
Delay (s)	47.0	39.3	3.8	2.1	2.0	11.4
Level of Service	D	D	A	A	A	B
Approach Delay (s)	42.6		3.7			11.2
Approach LOS	D		A			B
Intersection Summary						
HCM 2000 Control Delay			9.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			83.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			85.3%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Sunday adjusted
06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	37	45	704	43	52	1372	
Future Volume (Veh/h)	37	45	704	43	52	1372	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	40	49	765	47	57	1491	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1624	765			765		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1624	765			765		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	54	86			93		
cM capacity (veh/h)	87	346			844		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	40	49	765	47	57	746	746
Volume Left	40	0	0	0	57	0	0
Volume Right	0	49	0	47	0	0	0
cSH	87	346	1700	1700	844	1700	1700
Volume to Capacity	0.46	0.14	0.45	0.03	0.07	0.44	0.44
Queue Length 95th (m)	14.6	3.7	0.0	0.0	1.6	0.0	0.0
Control Delay (s)	77.7	17.1	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	C			A		
Approach Delay (s)	44.3		0.0		0.4		
Approach LOS	E						
Intersection Summary							
Average Delay			1.8				
Intersection Capacity Utilization			53.2%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Total Sunday adjusted
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	747	1409	0
Future Volume (Veh/h)	0	0	0	747	1409	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	812	1532	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2344	766	1532			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2344	766	1532			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	30	345	430			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	812	766	766	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.48	0.45	0.45	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		42.6%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	20.3	1.5	14.7	4.4	9.7	0.5	8.9

Total Network Performance

Denied Del/Veh (s)	0.1
Total Del/Veh (s)	166.8

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Friday PM MIT
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	12	49	1464	30	35	922
v/c Ratio	0.06	0.21	0.52	0.02	0.11	0.31
Control Delay	29.7	12.7	6.4	2.0	2.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	12.7	6.4	2.0	2.6	2.4
Queue Length 50th (m)	1.4	0.0	49.3	0.0	0.7	13.7
Queue Length 95th (m)	6.2	9.0	74.0	2.4	2.3	23.3
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	565	539	3162	1418	318	3344
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	0.09	0.46	0.02	0.11	0.28
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Friday PM MIT

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	45	1347	28	32	848
Future Volume (vph)	11	45	1347	28	32	848
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1789	1601	3579	1601	238	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	49	1464	30	35	922
RTOR Reduction (vph)	0	46	0	10	0	0
Lane Group Flow (vph)	12	3	1464	20	35	922
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.3	3.3	41.1	41.1	47.0	47.0
Effective Green, g (s)	3.3	3.3	41.1	41.1	47.0	47.0
Actuated g/C Ratio	0.05	0.05	0.68	0.68	0.78	0.78
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	97	87	2439	1091	234	2735
v/s Ratio Prot	c0.01		c0.41		0.00	c0.26
v/s Ratio Perm		0.00		0.01	0.11	
v/c Ratio	0.12	0.03	0.60	0.02	0.15	0.34
Uniform Delay, d1	27.1	27.0	5.2	3.1	3.1	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.4	0.0	0.3	0.1
Delay (s)	27.7	27.1	5.6	3.1	3.4	2.1
Level of Service	C	C	A	A	A	A
Approach Delay (s)	27.2		5.5			2.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			60.3		Sum of lost time (s)	14.0
Intersection Capacity Utilization			48.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Friday PM MIT
06/20/2019

								
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Traffic Volume (veh/h)	23	23	1351	30	30	830		
Future Volume (Veh/h)	23	23	1351	30	30	830		
Sign Control	Stop		Free			Free		
Grade	0%		0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	25	25	1468	33	33	902		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None				None			
Median storage veh								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	1985	734			1468			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1985	734			1468			
tC, single (s)	6.8	6.9			4.1			
tC, 2 stage (s)								
tF (s)	3.5	3.3			2.2			
p0 queue free %	49	93			93			
cM capacity (veh/h)	49	363			456			
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	25	25	734	734	33	33	451	451
Volume Left	25	0	0	0	0	33	0	0
Volume Right	0	25	0	0	33	0	0	0
cSH	49	363	1700	1700	1700	456	1700	1700
Volume to Capacity	0.51	0.07	0.43	0.43	0.02	0.07	0.27	0.27
Queue Length 95th (m)	14.4	1.7	0.0	0.0	0.0	1.8	0.0	0.0
Control Delay (s)	136.5	15.7	0.0	0.0	0.0	13.5	0.0	0.0
Lane LOS	F	C			B			
Approach Delay (s)	76.1	0.0		0.5				
Approach LOS	F							
Intersection Summary								
Average Delay			1.7					
Intersection Capacity Utilization			47.3%	ICU Level of Service			A	
Analysis Period (min)			15					

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Total Friday PM MIT
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1381	853	0
Future Volume (Veh/h)	0	0	0	1381	853	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1501	927	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2428	464	927			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2428	464	927			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	27	545	733			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1501	464	464	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.88	0.27	0.27	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		76.0%		ICU Level of Service		D
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.9	0.8	0.3
Total Del/Veh (s)	28.1	1.9	13.9	12.1	21.6	1.1	9.1

2: Hwy 99 & Access A Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Total Del/Veh (s)	54.6	1.6	1.3	1.7	23.6	1.2	2.0

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.8	1.0	0.9

Total Network Performance

Denied Del/Veh (s)		2.7
Total Del/Veh (s)		31.3

Queuing and Blocking Report
Phase 1 Total Fri PM adjusted

06/20/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T
Maximum Queue (m)	9.4	89.1	6.7	12.8	17.3
Average Queue (m)	2.7	33.3	1.0	5.9	4.5
95th Queue (m)	9.9	85.2	14.2	14.7	20.0
Link Distance (m)	193.6	496.4			156.9
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			65.0	75.0	
Storage Blk Time (%)		2	0		
Queuing Penalty (veh)		1	0		

Intersection: 2: Hwy 99 & Access A

Movement	WB	SB
Directions Served	L	L
Maximum Queue (m)	13.8	17.3
Average Queue (m)	5.4	6.9
95th Queue (m)	15.4	17.4
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	75.0	75.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Fri PM adjusted

06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	12	49	1464	30	35	922
v/c Ratio	0.21	0.49	0.90	0.02	0.22	0.54
Control Delay	52.0	30.8	18.1	1.0	4.0	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	30.8	18.1	1.0	4.0	2.7
Queue Length 50th (m)	2.4	0.0	209.1	0.0	0.5	27.4
Queue Length 95th (m)	7.5	#12.8	#346.7	1.6	1.2	41.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	58	99	1631	1391	157	1694
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	0.21	0.49	0.90	0.02	0.22	0.54

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Fri PM adjusted
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	45	1347	28	32	848
Future Volume (vph)	11	45	1347	28	32	848
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	1883	1601	1789	1847
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1789	1601	1883	1601	92	1847
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	49	1464	30	35	922
RTOR Reduction (vph)	0	48	0	6	0	0
Lane Group Flow (vph)	12	1	1464	24	35	922
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	1.8	1.8	77.9	77.9	84.2	84.2
Effective Green, g (s)	1.8	1.8	77.9	77.9	84.2	84.2
Actuated g/C Ratio	0.02	0.02	0.81	0.81	0.88	0.88
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	33	30	1527	1299	121	1619
v/s Ratio Prot	c0.01		c0.78		0.01	c0.50
v/s Ratio Perm		0.00		0.02	0.25	
v/c Ratio	0.36	0.03	0.96	0.02	0.29	0.57
Uniform Delay, d1	46.5	46.2	7.7	1.7	32.9	1.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	0.4	14.3	0.0	1.3	0.5
Delay (s)	53.2	46.7	21.9	1.7	34.2	1.9
Level of Service	D	D	C	A	C	A
Approach Delay (s)	48.0		21.5			3.1
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			15.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			96.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			82.6%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Fri PM adjusted
06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	23	23	1351	30	30	830	
Future Volume (Veh/h)	23	23	1351	30	30	830	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	25	25	1468	33	33	902	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None		None		
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1985	1468			1468		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1985	1468			1468		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	49	79			93		
cM capacity (veh/h)	49	117			456		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	25	25	1468	33	33	451	451
Volume Left	25	0	0	0	33	0	0
Volume Right	0	25	0	33	0	0	0
cSH	49	117	1700	1700	456	1700	1700
Volume to Capacity	0.51	0.21	0.86	0.02	0.07	0.27	0.27
Queue Length 95th (m)	14.4	5.8	0.0	0.0	1.8	0.0	0.0
Control Delay (s)	136.5	44.0	0.0	0.0	13.5	0.0	0.0
Lane LOS	F	E			B		
Approach Delay (s)	90.3		0.0		0.5		
Approach LOS	F						
Intersection Summary							
Average Delay			2.0				
Intersection Capacity Utilization			81.1%		ICU Level of Service		D
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 1 Total Fri PM adjusted
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1381	853	0
Future Volume (Veh/h)	0	0	0	1381	853	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1501	927	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2428	464	927			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2428	464	927			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	27	545	733			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1501	464	464	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.88	0.27	0.27	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		76.0%		ICU Level of Service		D
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Friday AM MIT
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	43	619	12	14	778
v/c Ratio	0.08	0.14	0.24	0.01	0.02	0.29
Control Delay	16.6	8.1	5.1	4.2	2.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	8.1	5.1	4.2	2.9	3.4
Queue Length 50th (m)	1.6	0.0	8.3	0.0	0.3	11.1
Queue Length 95th (m)	5.9	5.8	27.4	2.0	1.4	18.8
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	1072	949	3579	1601	742	3510
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	0.05	0.17	0.01	0.02	0.22
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Friday AM MIT

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	21	39	557	11	13	700
Future Volume (vph)	21	39	557	11	13	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.36	1.00
Satd. Flow (perm)	1825	1585	3579	1601	676	3510
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	43	619	12	14	778
RTOR Reduction (vph)	0	40	0	5	0	0
Lane Group Flow (vph)	23	3	619	7	14	778
Heavy Vehicles (%)	0%	3%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.3	3.3	24.5	24.5	29.5	29.5
Effective Green, g (s)	3.3	3.3	24.5	24.5	29.5	29.5
Actuated g/C Ratio	0.08	0.08	0.57	0.57	0.69	0.69
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	140	122	2048	916	491	2419
v/s Ratio Prot	c0.01		0.17		0.00	c0.22
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.16	0.03	0.30	0.01	0.03	0.32
Uniform Delay, d1	18.5	18.3	4.7	3.9	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.0	0.0	0.1
Delay (s)	19.0	18.4	4.8	3.9	2.3	2.7
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.6		4.8			2.7
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.35			
Actuated Cycle Length (s)			42.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			31.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Friday AM MIT
06/20/2019

								
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Traffic Volume (veh/h)	19	19	550	20	20	700		
Future Volume (Veh/h)	19	19	550	20	20	700		
Sign Control	Stop		Free		Free			
Grade	0%		0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	21	21	598	22	22	761		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None				None			
Median storage veh								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	1022	299				598		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1022	299				598		
tC, single (s)	6.8	6.9				4.1		
tC, 2 stage (s)								
tF (s)	3.5	3.3				2.2		
p0 queue free %	91	97				98		
cM capacity (veh/h)	227	697				975		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	21	21	299	299	22	22	380	380
Volume Left	21	0	0	0	0	22	0	0
Volume Right	0	21	0	0	22	0	0	0
cSH	227	697	1700	1700	1700	975	1700	1700
Volume to Capacity	0.09	0.03	0.18	0.18	0.01	0.02	0.22	0.22
Queue Length 95th (m)	2.3	0.7	0.0	0.0	0.0	0.5	0.0	0.0
Control Delay (s)	22.5	10.3	0.0	0.0	0.0	8.8	0.0	0.0
Lane LOS	C	B				A		
Approach Delay (s)	16.4		0.0				0.2	
Approach LOS	C							
Intersection Summary								
Average Delay			0.6					
Intersection Capacity Utilization			29.3%	ICU Level of Service			A	
Analysis Period (min)			15					

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Total Friday AM MIT
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	570	719	0
Future Volume (Veh/h)	0	0	0	570	719	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	620	782	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1402	391	782			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1402	391	782			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	131	608	832			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	620	391	391	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.36	0.23	0.23	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			33.3%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 1 Total Fri AM
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	43	619	12	14	778
v/c Ratio	0.09	0.16	0.42	0.01	0.02	0.51
Control Delay	21.8	10.0	5.8	2.9	2.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	10.0	5.8	2.9	2.5	5.0
Queue Length 50th (m)	2.0	0.0	19.9	0.0	0.3	28.7
Queue Length 95th (m)	7.2	6.9	64.1	1.7	1.3	55.4
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	708	641	1882	1600	591	1883
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	0.03	0.07	0.33	0.01	0.02	0.41
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Total Fri AM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	21	39	557	11	13	700
Future Volume (vph)	21	39	557	11	13	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	1883	1601	1789	1883
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1825	1585	1883	1601	620	1883
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	43	619	12	14	778
RTOR Reduction (vph)	0	40	0	4	0	0
Lane Group Flow (vph)	23	3	619	8	14	778
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	31.9	31.9	36.5	36.5
Effective Green, g (s)	3.4	3.4	31.9	31.9	36.5	36.5
Actuated g/C Ratio	0.07	0.07	0.64	0.64	0.73	0.73
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	107	1203	1023	467	1377
v/s Ratio Prot	c0.01		0.33		0.00	c0.41
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.19	0.03	0.51	0.01	0.03	0.56
Uniform Delay, d1	21.9	21.7	4.8	3.3	2.5	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.4	0.0	0.0	0.5
Delay (s)	22.7	21.8	5.2	3.3	2.6	3.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	22.1		5.2			3.6
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.59			
Actuated Cycle Length (s)			49.9		Sum of lost time (s)	14.0
Intersection Capacity Utilization			48.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Total Fri AM
06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	19	19	550	20	20	700	
Future Volume (Veh/h)	19	19	550	20	20	700	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	21	21	598	22	22	761	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1022	598			598		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1022	598			598		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	91	95			98		
cM capacity (veh/h)	227	445			975		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	21	21	598	22	22	380	380
Volume Left	21	0	0	0	22	0	0
Volume Right	0	21	0	22	0	0	0
cSH	227	445	1700	1700	975	1700	1700
Volume to Capacity	0.09	0.05	0.35	0.01	0.02	0.22	0.22
Queue Length 95th (m)	2.3	1.1	0.0	0.0	0.5	0.0	0.0
Control Delay (s)	22.5	13.5	0.0	0.0	8.8	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	18.0		0.0		0.2		
Approach LOS	C						
Intersection Summary							
Average Delay			0.7				
Intersection Capacity Utilization			38.9%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Total Fri AM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	570	719	0
Future Volume (Veh/h)	0	0	0	570	719	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	620	782	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1402	391	782			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1402	391	782			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	131	608	832			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	620	391	391	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.36	0.23	0.23	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			33.3%	ICU Level of Service		A
Analysis Period (min)			15			

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	34	708	25	41	1403
v/c Ratio	0.10	0.13	0.27	0.02	0.06	0.48
Control Delay	21.2	10.0	6.0	3.7	2.7	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	10.0	6.0	3.7	2.7	4.0
Queue Length 50th (m)	2.5	0.0	10.1	0.0	0.8	26.2
Queue Length 95th (m)	7.8	6.1	31.6	2.8	2.8	42.6
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	718	674	3444	1588	641	3614
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	0.04	0.05	0.21	0.02	0.06	0.39
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Sunday MIT

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	33	680	24	39	1347
Future Volume (vph)	25	33	680	24	39	1347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.34	1.00
Satd. Flow (perm)	1738	1585	3544	1633	627	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	34	708	25	41	1403
RTOR Reduction (vph)	0	32	0	10	0	0
Lane Group Flow (vph)	26	2	708	15	41	1403
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.6	3.6	30.6	30.6	36.8	36.8
Effective Green, g (s)	3.6	3.6	30.6	30.6	36.8	36.8
Actuated g/C Ratio	0.07	0.07	0.61	0.61	0.73	0.73
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	113	2151	991	507	2638
v/s Ratio Prot	c0.01		0.20		0.00	c0.39
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.21	0.02	0.33	0.02	0.08	0.53
Uniform Delay, d1	22.1	21.8	4.9	3.9	2.1	3.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.1	0.1	0.0	0.1	0.2
Delay (s)	22.9	21.8	5.0	3.9	2.1	3.2
Level of Service	C	C	A	A	A	A
Approach Delay (s)	22.3		4.9			3.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			50.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			48.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Background Sunday MIT

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	704	0	0	1372
Future Volume (Veh/h)	0	0	704	0	0	1372
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	765	0	0	1491
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1510	765			765	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1510	765			765	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	111	346			844	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	765	0	746	746	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.45	0.00	0.44	0.44	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			41.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Background Sunday MIT
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	704	1372	0
Future Volume (Veh/h)	0	0	0	704	1372	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	765	1491	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2256	746	1491			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2256	746	1491			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	35	356	446			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	765	746	746	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.45	0.44	0.44	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		41.3%		ICU Level of Service		A
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

Phase 1 Background Sunday
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	34	708	25	41	1403
v/c Ratio	0.19	0.22	0.46	0.02	0.07	0.84
Control Delay	38.8	15.9	5.9	1.8	1.8	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	15.9	5.9	1.8	1.8	12.7
Queue Length 50th (m)	4.4	0.0	45.4	0.0	0.9	122.8
Queue Length 95th (m)	10.9	7.9	74.9	2.1	2.6	#295.6
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	327	326	1530	1344	582	1667
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	0.08	0.10	0.46	0.02	0.07	0.84

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	33	680	24	39	1347
Future Volume (vph)	25	33	680	24	39	1347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	1865	1633	1772	1902
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1738	1585	1865	1633	609	1902
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	26	34	708	25	41	1403
RTOR Reduction (vph)	0	32	0	6	0	0
Lane Group Flow (vph)	26	2	708	19	41	1403
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	4.5	4.5	67.7	67.7	74.1	74.1
Effective Green, g (s)	4.5	4.5	67.7	67.7	74.1	74.1
Actuated g/C Ratio	0.05	0.05	0.76	0.76	0.84	0.84
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	88	80	1425	1247	540	1590
v/s Ratio Prot	c0.01		0.38		0.00	c0.74
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.30	0.02	0.50	0.02	0.08	0.88
Uniform Delay, d1	40.5	40.0	4.0	2.5	2.2	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.1	0.3	0.0	0.1	6.1
Delay (s)	42.4	40.1	4.2	2.5	2.2	10.7
Level of Service	D	D	A	A	A	B
Approach Delay (s)	41.1		4.2			10.4
Approach LOS	D		A			B
Intersection Summary						
HCM 2000 Control Delay			9.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			88.6		Sum of lost time (s)	14.0
Intersection Capacity Utilization			82.6%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Background Sunday
06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	0	704	0	0	1372	
Future Volume (Veh/h)	0	0	704	0	0	1372	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	0	765	0	0	1491	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None		None		
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1510	765			765		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1510	765			765		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	100			100		
cM capacity (veh/h)	111	346			844		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	0	765	0	0	746	746
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.45	0.00	0.00	0.44	0.44
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A					
Approach Delay (s)	0.0		0.0		0.0		
Approach LOS	A						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utilization			41.3%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Background Sunday
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	704	1372	0
Future Volume (Veh/h)	0	0	0	704	1372	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	765	1491	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2256	746	1491			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2256	746	1491			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	35	356	446			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	765	746	746	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.45	0.44	0.44	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			41.3%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 1 Background Friday PM MIT
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	12	49	1439	30	35	889
v/c Ratio	0.06	0.21	0.51	0.02	0.11	0.30
Control Delay	29.1	12.4	6.3	2.1	2.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	12.4	6.3	2.1	2.6	2.4
Queue Length 50th (m)	1.4	0.0	47.8	0.0	0.7	13.1
Queue Length 95th (m)	6.1	8.9	72.0	2.4	2.3	22.2
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	570	543	3186	1429	324	3371
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	0.09	0.45	0.02	0.11	0.26
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Friday PM MIT

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	45	1324	28	32	818
Future Volume (vph)	11	45	1324	28	32	818
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1789	1601	3579	1601	246	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	49	1439	30	35	889
RTOR Reduction (vph)	0	46	0	10	0	0
Lane Group Flow (vph)	12	3	1439	20	35	889
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.3	3.3	40.4	40.4	46.3	46.3
Effective Green, g (s)	3.3	3.3	40.4	40.4	46.3	46.3
Actuated g/C Ratio	0.06	0.06	0.68	0.68	0.78	0.78
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	99	88	2426	1085	240	2726
v/s Ratio Prot	c0.01		c0.40		0.00	c0.25
v/s Ratio Perm		0.00		0.01	0.11	
v/c Ratio	0.12	0.03	0.59	0.02	0.15	0.33
Uniform Delay, d1	26.8	26.6	5.2	3.1	3.1	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.4	0.0	0.3	0.1
Delay (s)	27.3	26.8	5.6	3.1	3.4	2.1
Level of Service	C	C	A	A	A	A
Approach Delay (s)	26.9		5.5			2.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			59.6		Sum of lost time (s)	14.0
Intersection Capacity Utilization			48.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 2: Hwy 99 & Access A

Phase 1 Background Friday PM MIT
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1351	0	0	830
Future Volume (Veh/h)	0	0	1351	0	0	830
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1468	0	0	902
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1919	1468			1468	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1919	1468			1468	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	59	117			456	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1468	0	451	451	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.86	0.00	0.27	0.27	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			74.4%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 1 Background Friday PM MIT
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1351	830	0
Future Volume (Veh/h)	0	0	0	1351	830	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1468	902	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2370	451	902			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2370	451	902			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	29	556	749			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1468	451	451	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.86	0.27	0.27	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		74.4%		ICU Level of Service		D
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

Phase 1 Background Fri PM

06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	12	49	1439	30	35	889
v/c Ratio	0.09	0.29	0.93	0.02	0.20	0.55
Control Delay	36.6	15.6	24.5	2.3	4.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	15.6	24.5	2.3	4.1	4.1
Queue Length 50th (m)	2.0	0.0	~275.4	0.4	0.7	36.3
Queue Length 95th (m)	6.6	9.6	#339.9	2.7	2.3	70.2
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	351	354	1551	1323	176	1626
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	0.03	0.14	0.93	0.02	0.20	0.55

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.

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	45	1324	28	32	818
Future Volume (vph)	11	45	1324	28	32	818
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	1883	1601	1789	1847
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1789	1601	1883	1601	109	1847
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	49	1439	30	35	889
RTOR Reduction (vph)	0	47	0	5	0	0
Lane Group Flow (vph)	12	2	1439	25	35	889
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	4.0	4.0	65.2	65.2	71.5	71.5
Effective Green, g (s)	4.0	4.0	65.2	65.2	71.5	71.5
Actuated g/C Ratio	0.05	0.05	0.76	0.76	0.84	0.84
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	83	74	1435	1220	136	1544
v/s Ratio Prot	c0.01		c0.76		0.01	c0.48
v/s Ratio Perm		0.00		0.02	0.21	
v/c Ratio	0.14	0.03	1.00	0.02	0.26	0.58
Uniform Delay, d1	39.1	38.9	10.1	2.4	26.5	2.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	24.4	0.0	1.0	0.5
Delay (s)	39.9	39.1	34.6	2.5	27.5	2.7
Level of Service	D	D	C	A	C	A
Approach Delay (s)	39.2		33.9			3.7
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			22.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.95			
Actuated Cycle Length (s)			85.5		Sum of lost time (s)	14.0
Intersection Capacity Utilization			81.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Background Fri PM

06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	0	1351	0	0	830	
Future Volume (Veh/h)	0	0	1351	0	0	830	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	0	1468	0	0	902	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1919	1468			1468		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1919	1468			1468		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	100			100		
cM capacity (veh/h)	59	117			456		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	0	1468	0	0	451	451
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.86	0.00	0.00	0.27	0.27
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A					
Approach Delay (s)	0.0		0.0		0.0		
Approach LOS	A						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utilization			74.4%		ICU Level of Service		D
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Background Fri PM

06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1351	830	0
Future Volume (Veh/h)	0	0	0	1351	830	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1468	902	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2370	451	902			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2370	451	902			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	29	556	749			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1468	451	451	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.86	0.27	0.27	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		74.4%		ICU Level of Service		D
Analysis Period (min)		15				

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	43	599	12	14	756
v/c Ratio	0.07	0.14	0.23	0.01	0.02	0.28
Control Delay	16.0	7.8	5.2	4.4	3.0	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	7.8	5.2	4.4	3.0	3.4
Queue Length 50th (m)	1.6	0.0	8.0	0.0	0.3	10.7
Queue Length 95th (m)	5.7	5.7	26.7	2.1	1.4	18.4
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	1137	1004	3579	1601	747	3510
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	0.04	0.17	0.01	0.02	0.22
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Friday AM MIT

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	21	39	539	11	13	680
Future Volume (vph)	21	39	539	11	13	680
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.36	1.00
Satd. Flow (perm)	1825	1585	3579	1601	687	3510
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	43	599	12	14	756
RTOR Reduction (vph)	0	40	0	5	0	0
Lane Group Flow (vph)	23	3	599	7	14	756
Heavy Vehicles (%)	0%	3%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	23.9	23.9	28.9	28.9
Effective Green, g (s)	3.4	3.4	23.9	23.9	28.9	28.9
Actuated g/C Ratio	0.08	0.08	0.57	0.57	0.68	0.68
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	146	127	2022	904	495	2398
v/s Ratio Prot	c0.01		0.17		0.00	c0.22
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.16	0.03	0.30	0.01	0.03	0.32
Uniform Delay, d1	18.1	17.9	4.8	4.0	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	0.1	0.0	0.0	0.1
Delay (s)	18.6	18.0	4.9	4.0	2.4	2.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.2		4.9			2.8
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.34			
Actuated Cycle Length (s)			42.3		Sum of lost time (s)	14.0
Intersection Capacity Utilization			30.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Background Friday AM MIT

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	550	0	0	700
Future Volume (Veh/h)	0	0	550	0	0	700
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	598	0	0	761
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	978	598			598	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	978	598			598	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	248	445			975	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	598	0	380	380	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.35	0.00	0.22	0.22	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			32.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Background Friday AM MIT

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	550	700	0
Future Volume (Veh/h)	0	0	0	550	700	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	598	761	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359	380	761			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1359	380	761			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	140	617	847			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	598	380	380	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.35	0.22	0.22	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		32.3%		ICU Level of Service		A
Analysis Period (min)		15				

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	43	599	12	14	756
v/c Ratio	0.08	0.16	0.41	0.01	0.02	0.50
Control Delay	20.9	9.7	5.8	3.0	2.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	9.7	5.8	3.0	2.5	5.0
Queue Length 50th (m)	1.9	0.0	18.8	0.0	0.3	27.1
Queue Length 95th (m)	7.0	6.7	61.6	1.7	1.3	52.9
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	766	690	1883	1601	601	1883
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	0.03	0.06	0.32	0.01	0.02	0.40
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 1 Background Fri AM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	21	39	539	11	13	680
Future Volume (vph)	21	39	539	11	13	680
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	1883	1601	1789	1883
Flt Permitted	0.95	1.00	1.00	1.00	0.34	1.00
Satd. Flow (perm)	1825	1585	1883	1601	636	1883
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	43	599	12	14	756
RTOR Reduction (vph)	0	40	0	4	0	0
Lane Group Flow (vph)	23	3	599	8	14	756
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	30.8	30.8	35.4	35.4
Effective Green, g (s)	3.4	3.4	30.8	30.8	35.4	35.4
Actuated g/C Ratio	0.07	0.07	0.63	0.63	0.73	0.73
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	110	1188	1010	475	1365
v/s Ratio Prot	c0.01		0.32		0.00	c0.40
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.18	0.03	0.50	0.01	0.03	0.55
Uniform Delay, d1	21.4	21.2	4.9	3.3	2.5	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.3	0.0	0.0	0.5
Delay (s)	22.1	21.3	5.2	3.3	2.5	3.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	21.5		5.2			3.5
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			48.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			47.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 1 Background Fri AM

06/20/2019

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	0	550	0	0	700	
Future Volume (Veh/h)	0	0	550	0	0	700	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	0	598	0	0	761	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	978	598			598		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	978	598			598		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	100			100		
cM capacity (veh/h)	248	445			975		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	0	598	0	0	380	380
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.00	0.35	0.00	0.00	0.22	0.22
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	A					
Approach Delay (s)	0.0		0.0		0.0		
Approach LOS	A						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utilization			32.3%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 1 Background Fri AM

06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	550	700	0
Future Volume (Veh/h)	0	0	0	550	700	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	598	761	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359	380	761			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1359	380	761			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	140	617	847			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	598	380	380	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.35	0.22	0.22	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		32.3%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	10.7	10.0	6.3
Total Del/Veh (s)	17.9	1.4	6.1	4.9	11.2	8.4	7.6

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.0	1.2	1.8	1.3	1.3

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.0	0.7	1.5	2.9	1.3

Total Network Performance

Denied Del/Veh (s)			6.1	
Total Del/Veh (s)			26.4	

Queuing and Blocking Report
Phase 2 Total Sunday

06/20/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	B18	SB	SB
Directions Served	L	T	T	L	T
Maximum Queue (m)	11.2	43.3	38.9	11.7	88.6
Average Queue (m)	4.7	17.1	5.6	5.3	28.1
95th Queue (m)	13.3	41.2	81.7	14.0	93.0
Link Distance (m)	193.6	496.4	384.2		156.9
Upstream Blk Time (%)			0		1
Queuing Penalty (veh)			0		0
Storage Bay Dist (m)				75.0	
Storage Blk Time (%)					1
Queuing Penalty (veh)					0

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Queuing and Blocking Report

Phase 2 Total Sunday

06/20/2019

Intersection: 12: Bend

Movement	SE
Directions Served	T
Maximum Queue (m)	1.7
Average Queue (m)	0.2
95th Queue (m)	3.5
Link Distance (m)	75.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1

Queues
1: Hwy 99 & Copper Dr

Phase 2 Total Sunday
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	38	822	27	44	1573
v/c Ratio	0.36	0.36	0.53	0.02	0.08	0.94
Control Delay	56.7	23.8	5.2	1.1	1.3	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.7	23.8	5.2	1.1	1.3	19.1
Queue Length 50th (m)	5.3	0.0	49.7	0.0	0.7	154.6
Queue Length 95th (m)	13.2	9.5	74.2	1.6	1.6	#357.5
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	77	106	1550	1361	524	1679
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	0.36	0.36	0.53	0.02	0.08	0.94

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Total Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	36	789	26	42	1510
Future Volume (vph)	27	36	789	26	42	1510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	1865	1633	1772	1902
Flt Permitted	0.95	1.00	1.00	1.00	0.29	1.00
Satd. Flow (perm)	1738	1585	1865	1633	534	1902
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	28	38	822	27	44	1573
RTOR Reduction (vph)	0	37	0	6	0	0
Lane Group Flow (vph)	28	1	822	21	44	1573
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.1	3.1	74.7	74.7	81.1	81.1
Effective Green, g (s)	3.1	3.1	74.7	74.7	81.1	81.1
Actuated g/C Ratio	0.03	0.03	0.79	0.79	0.86	0.86
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	57	52	1478	1294	491	1637
v/s Ratio Prot	c0.02		0.44		0.00	c0.83
v/s Ratio Perm		0.00		0.01	0.07	
v/c Ratio	0.49	0.02	0.56	0.02	0.09	0.96
Uniform Delay, d1	44.8	44.1	3.6	2.0	2.3	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.5	0.2	0.5	0.0	0.1	14.1
Delay (s)	51.3	44.3	4.1	2.1	2.4	19.3
Level of Service	D	D	A	A	A	B
Approach Delay (s)	47.3		4.0			18.9
Approach LOS	D		A			B
Intersection Summary						
HCM 2000 Control Delay			14.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			94.2		Sum of lost time (s)	14.0
Intersection Capacity Utilization			91.1%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Total Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	62	753	56	0	1537
Future Volume (Veh/h)	0	62	753	56	0	1537
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	67	818	61	0	1671
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1654	818			818	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1654	818			818	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	79			100	
cM capacity (veh/h)	89	319			806	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	67	818	61	836	836	
Volume Left	0	0	0	0	0	
Volume Right	67	0	61	0	0	
cSH	319	1700	1700	1700	1700	
Volume to Capacity	0.21	0.48	0.04	0.49	0.49	
Queue Length 95th (m)	5.9	0.0	0.0	0.0	0.0	
Control Delay (s)	19.3	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	19.3	0.0		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			50.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Total Sunday
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	0	810	1469	69
Future Volume (Veh/h)	0	50	0	810	1469	69
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	0	880	1597	75
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2477	798	1597			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2477	798	1597			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	100			
cM capacity (veh/h)	25	329	406			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	54	880	798	798	75	
Volume Left	0	0	0	0	0	
Volume Right	54	0	0	0	75	
cSH	329	1700	1700	1700	1700	
Volume to Capacity	0.16	0.52	0.47	0.47	0.04	
Queue Length 95th (m)	4.4	0.0	0.0	0.0	0.0	
Control Delay (s)	18.1	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	18.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		50.6%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.1	0.3	0.2
Total Del/Veh (s)	15.8	1.4	3.9	3.1	4.6	1.5	2.5

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.8	0.6	1.8	1.9	1.5

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.1	0.7	1.6	3.0	1.3

Total Network Performance

Denied Del/Veh (s)			0.5	
Total Del/Veh (s)			19.8	

Queuing and Blocking Report
Phase 2 Total Sunday

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	11.0	23.4	28.0	13.1	27.2	22.8
Average Queue (m)	4.8	9.0	11.6	5.7	10.9	7.3
95th Queue (m)	12.9	24.2	28.6	15.1	30.5	22.9
Link Distance (m)	189.9	496.3	496.3		156.9	156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 2 Total Sunday
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	38	822	27	44	1573
v/c Ratio	0.12	0.15	0.31	0.02	0.08	0.53
Control Delay	24.3	11.2	5.7	2.7	2.6	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	11.2	5.7	2.7	2.6	4.2
Queue Length 50th (m)	2.6	0.0	21.8	0.0	0.9	32.4
Queue Length 95th (m)	9.3	7.1	34.0	2.4	2.9	52.2
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	623	593	3439	1586	535	3601
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	0.04	0.06	0.24	0.02	0.08	0.44
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Total Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	36	789	26	42	1510
Future Volume (vph)	27	36	789	26	42	1510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.29	1.00
Satd. Flow (perm)	1738	1585	3544	1633	549	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	28	38	822	27	44	1573
RTOR Reduction (vph)	0	35	0	10	0	0
Lane Group Flow (vph)	28	3	822	17	44	1573
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.7	3.7	34.0	34.0	40.1	40.1
Effective Green, g (s)	3.7	3.7	34.0	34.0	40.1	40.1
Actuated g/C Ratio	0.07	0.07	0.63	0.63	0.75	0.75
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	109	2239	1032	456	2693
v/s Ratio Prot	c0.02		0.23		0.00	c0.44
v/s Ratio Perm		0.00		0.01	0.07	
v/c Ratio	0.24	0.02	0.37	0.02	0.10	0.58
Uniform Delay, d1	23.7	23.4	4.7	3.7	2.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	0.1	0.0	0.1	0.3
Delay (s)	24.7	23.5	4.8	3.7	2.2	3.4
Level of Service	C	C	A	A	A	A
Approach Delay (s)	24.0		4.8			3.4
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.61			
Actuated Cycle Length (s)			53.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			53.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Total Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	62	753	56	0	1537
Future Volume (Veh/h)	0	62	753	56	0	1537
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	67	818	61	0	1671
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1654	409			818	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1654	409			818	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	89	592			806	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	67	409	409	61	836	836
Volume Left	0	0	0	0	0	0
Volume Right	67	0	0	61	0	0
cSH	592	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.24	0.24	0.04	0.49	0.49
Queue Length 95th (m)	2.9	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	11.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.9	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			45.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Total Sunday
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	0	810	1469	69
Future Volume (Veh/h)	0	50	0	810	1469	69
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	0	880	1597	75
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2477	798	1597			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2477	798	1597			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	100			
cM capacity (veh/h)	25	329	406			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	54	880	798	798	75	
Volume Left	0	0	0	0	0	
Volume Right	54	0	0	0	75	
cSH	329	1700	1700	1700	1700	
Volume to Capacity	0.16	0.52	0.47	0.47	0.04	
Queue Length 95th (m)	4.4	0.0	0.0	0.0	0.0	
Control Delay (s)	18.1	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	18.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		50.6%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.8	1.0	0.4
Total Del/Veh (s)	34.2	2.1	25.8	23.0	22.4	1.3	16.4

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	2.0	1.9	1.1	1.7

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.1	0.8	1.0	2.4	1.0

Total Network Performance

Denied Del/Veh (s)	6.4
Total Del/Veh (s)	39.4

Queuing and Blocking Report

Phase 2 Total Fri PM

06/20/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (m)	9.4	3.2	149.2	27.0	14.2	21.4
Average Queue (m)	3.0	0.5	63.9	3.8	7.7	5.1
95th Queue (m)	10.0	6.7	167.4	29.7	16.7	20.8
Link Distance (m)	193.6	193.6	496.4			156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				65.0	75.0	
Storage Blk Time (%)			5	0		
Queuing Penalty (veh)			1	1		

Intersection: 2: Hwy 99 & Access A

Movement	WB
Directions Served	R
Maximum Queue (m)	11.5
Average Queue (m)	0.4
95th Queue (m)	6.5
Link Distance (m)	755.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 3

Queues
1: Hwy 99 & Copper Dr

Phase 2 Total Fri PM
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	13	52	1593	32	37	1018
v/c Ratio	0.34	0.62	1.00	0.02	0.24	0.61
Control Delay	68.8	44.2	34.4	0.9	4.3	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	44.2	34.4	0.9	4.3	3.4
Queue Length 50th (m)	2.6	0.0	~340.9	0.0	0.4	29.1
Queue Length 95th (m)	#9.5	#16.4	#390.5	1.5	1.0	45.0
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	38	84	1595	1361	155	1659
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	0.34	0.62	1.00	0.02	0.24	0.61

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.

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Total Fri PM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	48	1466	29	34	937
Future Volume (vph)	12	48	1466	29	34	937
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	1883	1601	1789	1847
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1789	1601	1883	1601	91	1847
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	52	1593	32	37	1018
RTOR Reduction (vph)	0	51	0	6	0	0
Lane Group Flow (vph)	13	1	1593	26	37	1018
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	1.6	1.6	78.4	78.4	84.8	84.8
Effective Green, g (s)	1.6	1.6	78.4	78.4	84.8	84.8
Actuated g/C Ratio	0.02	0.02	0.81	0.81	0.88	0.88
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	29	26	1531	1302	122	1624
v/s Ratio Prot	c0.01		c0.85		0.01	c0.55
v/s Ratio Perm		0.00		0.02	0.26	
v/c Ratio	0.45	0.03	1.04	0.02	0.30	0.63
Uniform Delay, d1	47.0	46.6	9.0	1.7	33.2	1.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	0.5	34.3	0.0	1.4	0.8
Delay (s)	57.6	47.2	43.3	1.7	34.6	2.3
Level of Service	E	D	D	A	C	A
Approach Delay (s)	49.2		42.5			3.5
Approach LOS	D		D			A
Intersection Summary						
HCM 2000 Control Delay			27.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			1.03			
Actuated Cycle Length (s)			96.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			88.8%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Total Fri PM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	49	1447	61	0	949
Future Volume (Veh/h)	0	49	1447	61	0	949
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	1573	66	0	1032
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2089	786			1573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2089	786			1573	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	84			100	
cM capacity (veh/h)	45	335			415	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	53	786	786	66	516	516
Volume Left	0	0	0	0	0	0
Volume Right	53	0	0	66	0	0
cSH	335	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.46	0.46	0.04	0.30	0.30
Queue Length 95th (m)	4.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	17.8	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			50.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Total Fri PM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	49	0	1507	888	61
Future Volume (Veh/h)	0	49	0	1507	888	61
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	0	1638	965	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2603	482	965			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2603	482	965			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	20	530	709			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	53	1638	482	482	66	
Volume Left	0	0	0	0	0	
Volume Right	53	0	0	0	66	
cSH	530	1700	1700	1700	1700	
Volume to Capacity	0.10	0.96	0.28	0.28	0.04	
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0	
Control Delay (s)	12.5	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	12.5	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			82.6%	ICU Level of Service		E
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 2 Total Fri PM
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	13	52	1593	32	37	1018
v/c Ratio	0.06	0.23	0.56	0.02	0.13	0.34
Control Delay	32.7	13.5	6.4	1.8	2.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	13.5	6.4	1.8	2.7	2.3
Queue Length 50th (m)	1.7	0.0	57.6	0.0	0.7	16.0
Queue Length 95th (m)	6.9	9.7	84.6	2.4	2.4	26.1
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	530	511	3041	1365	285	3208
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	0.10	0.52	0.02	0.13	0.32
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Total Fri PM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	48	1466	29	34	937
Future Volume (vph)	12	48	1466	29	34	937
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.11	1.00
Satd. Flow (perm)	1789	1601	3579	1601	201	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	52	1593	32	37	1018
RTOR Reduction (vph)	0	49	0	10	0	0
Lane Group Flow (vph)	13	3	1593	22	37	1018
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	45.1	45.1	51.0	51.0
Effective Green, g (s)	3.4	3.4	45.1	45.1	51.0	51.0
Actuated g/C Ratio	0.05	0.05	0.70	0.70	0.79	0.79
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	94	84	2506	1121	206	2779
v/s Ratio Prot	c0.01		c0.45		0.01	c0.29
v/s Ratio Perm		0.00		0.01	0.14	
v/c Ratio	0.14	0.03	0.64	0.02	0.18	0.37
Uniform Delay, d1	29.1	28.9	5.2	2.9	3.6	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	0.5	0.0	0.4	0.1
Delay (s)	29.8	29.1	5.7	2.9	4.1	2.0
Level of Service	C	C	A	A	A	A
Approach Delay (s)	29.2		5.7			2.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			64.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			52.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Total Fri PM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	49	1447	61	0	949
Future Volume (Veh/h)	0	49	1447	61	0	949
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	1573	66	0	1032
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2089	786			1573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2089	786			1573	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	84			100	
cM capacity (veh/h)	45	335			415	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	53	786	786	66	516	516
Volume Left	0	0	0	0	0	0
Volume Right	53	0	0	66	0	0
cSH	335	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.46	0.46	0.04	0.30	0.30
Queue Length 95th (m)	4.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	17.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	17.8	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			50.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Total Fri PM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	49	0	1507	888	61
Future Volume (Veh/h)	0	49	0	1507	888	61
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	0	1638	965	66
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2603	482	965			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2603	482	965			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	20	530	709			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	53	1638	482	482	66	
Volume Left	0	0	0	0	0	
Volume Right	53	0	0	0	66	
cSH	530	1700	1700	1700	1700	
Volume to Capacity	0.10	0.96	0.28	0.28	0.04	
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0	
Control Delay (s)	12.5	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	12.5	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			82.6%	ICU Level of Service		E
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 2 Total Fri AM
06/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	24	47	703	13	14	856
v/c Ratio	0.08	0.16	0.27	0.01	0.02	0.31
Control Delay	17.0	8.1	5.1	4.0	2.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	8.1	5.1	4.0	2.9	3.4
Queue Length 50th (m)	1.7	0.0	9.8	0.0	0.3	12.6
Queue Length 95th (m)	6.3	6.3	31.7	2.1	1.4	21.2
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	1052	933	3579	1601	713	3579
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	0.05	0.20	0.01	0.02	0.24
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Total Fri AM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	42	633	12	13	770
Future Volume (vph)	22	42	633	12	13	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1825	1585	3579	1601	625	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	24	47	703	13	14	856
RTOR Reduction (vph)	0	43	0	5	0	0
Lane Group Flow (vph)	24	4	703	8	14	856
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	25.2	25.2	30.2	30.2
Effective Green, g (s)	3.4	3.4	25.2	25.2	30.2	30.2
Actuated g/C Ratio	0.08	0.08	0.58	0.58	0.69	0.69
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	142	123	2068	925	459	2479
v/s Ratio Prot	c0.01		0.20		0.00	c0.24
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.17	0.03	0.34	0.01	0.03	0.35
Uniform Delay, d1	18.8	18.6	4.8	3.9	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.0	0.0	0.1
Delay (s)	19.3	18.7	4.9	3.9	2.3	2.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.9		4.9			2.8
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.37			
Actuated Cycle Length (s)			43.6		Sum of lost time (s)	14.0
Intersection Capacity Utilization			33.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Total Fri AM
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	56	589	42	0	792
Future Volume (Veh/h)	0	56	589	42	0	792
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	61	640	46	0	861
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1070	320			640	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1070	320			640	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			100	
cM capacity (veh/h)	216	676			940	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	61	320	320	46	430	430
Volume Left	0	0	0	0	0	0
Volume Right	61	0	0	46	0	0
cSH	676	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.19	0.19	0.03	0.25	0.25
Queue Length 95th (m)	2.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.9	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			26.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Total Fri AM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	56	0	631	750	42
Future Volume (Veh/h)	0	56	0	631	750	42
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	61	0	686	815	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1501	408	815			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1501	408	815			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	113	593	808			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	61	686	408	408	46	
Volume Left	0	0	0	0	0	
Volume Right	61	0	0	0	46	
cSH	593	1700	1700	1700	1700	
Volume to Capacity	0.10	0.40	0.24	0.24	0.03	
Queue Length 95th (m)	2.6	0.0	0.0	0.0	0.0	
Control Delay (s)	11.8	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.8	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			36.5%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 2 Background Sunday
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	38	758	27	44	1502
v/c Ratio	0.11	0.15	0.30	0.02	0.08	0.51
Control Delay	22.6	10.5	5.9	2.9	2.7	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	10.5	5.9	2.9	2.7	4.2
Queue Length 50th (m)	2.5	0.0	19.7	0.0	0.9	29.7
Queue Length 95th (m)	8.8	6.8	31.1	2.5	2.9	48.0
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	654	620	3544	1633	564	3614
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	0.04	0.06	0.21	0.02	0.08	0.42
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	36	728	26	42	1442
Future Volume (vph)	27	36	728	26	42	1442
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.32	1.00
Satd. Flow (perm)	1738	1585	3544	1633	590	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	28	38	758	27	44	1502
RTOR Reduction (vph)	0	35	0	10	0	0
Lane Group Flow (vph)	28	3	758	17	44	1502
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.7	3.7	31.5	31.5	37.6	37.6
Effective Green, g (s)	3.7	3.7	31.5	31.5	37.6	37.6
Actuated g/C Ratio	0.07	0.07	0.61	0.61	0.73	0.73
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	125	114	2176	1002	480	2648
v/s Ratio Prot	c0.02		0.21		0.00	c0.42
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.22	0.02	0.35	0.02	0.09	0.57
Uniform Delay, d1	22.4	22.1	4.9	3.9	2.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.1	0.0	0.1	0.3
Delay (s)	23.4	22.2	5.0	3.9	2.2	3.4
Level of Service	C	C	A	A	A	A
Approach Delay (s)	22.7		4.9			3.4
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.59			
Actuated Cycle Length (s)			51.3		Sum of lost time (s)	14.0
Intersection Capacity Utilization			51.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	753	0	0	1469
Future Volume (Veh/h)	0	0	753	0	0	1469
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	818	0	0	1597
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1616	818			818	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1616	818			818	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	94	319			806	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	818	0	798	798	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.48	0.00	0.47	0.47	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			43.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Background Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations					 	
Traffic Volume (veh/h)	0	0	0	753	1469	0
Future Volume (Veh/h)	0	0	0	753	1469	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	818	1597	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2415	798	1597			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2415	798	1597			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	27	329	406			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	818	798	798	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.48	0.47	0.47	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		43.9%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.9	0.9	0.4
Total Del/Veh (s)	38.5	2.0	17.1	13.4	18.9	1.6	11.3

2: Hwy 99 & Access A Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.0	1.2	1.1

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.8	1.1	0.9

Total Network Performance

Denied Del/Veh (s)		2.7
Total Del/Veh (s)		32.6

Queuing and Blocking Report

Phase 2 Background Fri PM

06/20/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T
Maximum Queue (m)	12.3	102.0	6.8	17.5	27.7
Average Queue (m)	4.7	42.6	1.0	7.3	7.1
95th Queue (m)	13.8	94.6	14.2	17.5	24.8
Link Distance (m)	193.6	496.4			156.9
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			65.0	75.0	
Storage Blk Time (%)		3	0		
Queuing Penalty (veh)		1	0		

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	13	52	1540	32	37	952
v/c Ratio	0.23	0.51	0.98	0.02	0.24	0.58
Control Delay	53.0	31.2	29.5	1.0	4.4	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	31.2	29.5	1.0	4.4	3.3
Queue Length 50th (m)	2.5	0.0	~323.2	0.0	0.5	29.2
Queue Length 95th (m)	8.1	#13.2	#374.7	1.6	1.2	44.9
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	57	101	1579	1347	154	1643
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	0.23	0.51	0.98	0.02	0.24	0.58

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.

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	48	1417	29	34	876
Future Volume (vph)	12	48	1417	29	34	876
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	1883	1601	1789	1847
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1789	1601	1883	1601	93	1847
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	52	1540	32	37	952
RTOR Reduction (vph)	0	51	0	6	0	0
Lane Group Flow (vph)	13	1	1540	26	37	952
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	2.4	2.4	77.4	77.4	83.8	83.8
Effective Green, g (s)	2.4	2.4	77.4	77.4	83.8	83.8
Actuated g/C Ratio	0.02	0.02	0.80	0.80	0.87	0.87
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	44	39	1515	1288	123	1608
v/s Ratio Prot	c0.01		c0.82		0.01	c0.52
v/s Ratio Perm		0.00		0.02	0.26	
v/c Ratio	0.30	0.03	1.02	0.02	0.30	0.59
Uniform Delay, d1	46.1	45.8	9.4	1.9	32.6	1.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	0.3	27.3	0.0	1.4	0.6
Delay (s)	49.8	46.1	36.7	1.9	34.0	2.2
Level of Service	D	D	D	A	C	A
Approach Delay (s)	46.9		36.0			3.4
Approach LOS	D		D			A
Intersection Summary						
HCM 2000 Control Delay			24.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			96.2		Sum of lost time (s)	14.0
Intersection Capacity Utilization			86.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	1447	0	0	888
Future Volume (Veh/h)	0	0	1447	0	0	888
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1573	0	0	965
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2056	1573			1573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2056	1573			1573	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	48	99			415	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1573	0	482	482	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.93	0.00	0.28	0.28	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			79.5%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 2 Background Fri PM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1447	888	0
Future Volume (Veh/h)	0	0	0	1447	888	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1573	965	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2538	482	965			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2538	482	965			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	22	530	709			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1573	482	482	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.93	0.28	0.28	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		79.5%		ICU Level of Service		D
Analysis Period (min)		15				

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	13	52	1540	32	37	952
v/c Ratio	0.06	0.23	0.54	0.03	0.12	0.32
Control Delay	31.7	13.2	6.4	1.9	2.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	13.2	6.4	1.9	2.6	2.3
Queue Length 50th (m)	1.6	0.0	54.1	0.0	0.7	14.5
Queue Length 95th (m)	7.0	9.7	79.6	2.4	2.4	23.9
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	542	522	3088	1386	298	3261
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	0.10	0.50	0.02	0.12	0.29
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	48	1417	29	34	876
Future Volume (vph)	12	48	1417	29	34	876
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.11	1.00
Satd. Flow (perm)	1789	1601	3579	1601	216	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	52	1540	32	37	952
RTOR Reduction (vph)	0	49	0	10	0	0
Lane Group Flow (vph)	13	3	1540	22	37	952
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	43.5	43.5	49.4	49.4
Effective Green, g (s)	3.4	3.4	43.5	43.5	49.4	49.4
Actuated g/C Ratio	0.05	0.05	0.69	0.69	0.79	0.79
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	96	86	2479	1108	217	2761
v/s Ratio Prot	c0.01		c0.43		0.01	c0.27
v/s Ratio Perm		0.00		0.01	0.13	
v/c Ratio	0.14	0.03	0.62	0.02	0.17	0.34
Uniform Delay, d1	28.3	28.1	5.2	3.0	3.4	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	0.5	0.0	0.4	0.1
Delay (s)	28.9	28.3	5.7	3.0	3.8	2.0
Level of Service	C	C	A	A	A	A
Approach Delay (s)	28.4		5.6			2.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.59			
Actuated Cycle Length (s)			62.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			50.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	1447	0	0	888
Future Volume (Veh/h)	0	0	1447	0	0	888
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1573	0	0	965
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2056	1573			1573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2056	1573			1573	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	48	99			415	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1573	0	482	482	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.93	0.00	0.28	0.28	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			79.5%	ICU Level of Service		D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 2 Background Fri PM
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1447	888	0
Future Volume (Veh/h)	0	0	0	1447	888	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1573	965	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2538	482	965			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2538	482	965			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	22	530	709			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1573	482	482	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.93	0.28	0.28	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		79.5%		ICU Level of Service		D
Analysis Period (min)		15				

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	24	47	641	13	14	809
v/c Ratio	0.08	0.15	0.25	0.01	0.02	0.29
Control Delay	16.6	8.0	5.1	4.1	3.0	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	8.0	5.1	4.1	3.0	3.4
Queue Length 50th (m)	1.7	0.0	8.6	0.0	0.3	11.6
Queue Length 95th (m)	6.1	6.1	28.7	2.1	1.4	19.9
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	1061	942	3579	1601	732	3579
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	0.05	0.18	0.01	0.02	0.23
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 2 Background Fri AM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	22	42	577	12	13	728
Future Volume (vph)	22	42	577	12	13	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.35	1.00
Satd. Flow (perm)	1825	1585	3579	1601	662	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	24	47	641	13	14	809
RTOR Reduction (vph)	0	43	0	6	0	0
Lane Group Flow (vph)	24	4	641	7	14	809
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.4	3.4	24.7	24.7	29.7	29.7
Effective Green, g (s)	3.4	3.4	24.7	24.7	29.7	29.7
Actuated g/C Ratio	0.08	0.08	0.57	0.57	0.69	0.69
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	143	125	2051	917	482	2466
v/s Ratio Prot	c0.01		0.18		0.00	c0.23
v/s Ratio Perm		0.00		0.00	0.02	
v/c Ratio	0.17	0.03	0.31	0.01	0.03	0.33
Uniform Delay, d1	18.5	18.3	4.8	3.9	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.0	0.0	0.1
Delay (s)	19.1	18.4	4.9	3.9	2.3	2.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.6		4.9			2.8
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.35			
Actuated Cycle Length (s)			43.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			31.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 2 Background Fri AM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	589	0	0	750
Future Volume (Veh/h)	0	0	589	0	0	750
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	640	0	0	815
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1048	640			640	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1048	640			640	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	223	418			940	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	640	0	408	408	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.38	0.00	0.24	0.24	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			34.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 2 Background Fri AM

06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	589	750	0
Future Volume (Veh/h)	0	0	0	589	750	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	640	815	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1455	408	815			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1455	408	815			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	121	593	808			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	640	408	408	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.38	0.24	0.24	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		34.3%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.1	0.4	0.3
Total Del/Veh (s)	18.3	1.6	4.4	4.0	5.1	2.2	3.2

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.0	0.7	2.0	2.3	1.8

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.3	0.7	1.9	3.4	1.5

Total Network Performance

Denied Del/Veh (s)			0.6	
Total Del/Veh (s)			21.6	

Queuing and Blocking Report

Phase 3 Total Sunday

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	10.5	31.4	29.4	11.0	27.1	26.3
Average Queue (m)	6.3	11.6	13.3	5.8	14.9	9.9
95th Queue (m)	13.1	30.8	30.6	13.4	33.9	27.1
Link Distance (m)	189.9	496.3	496.3		156.9	156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 3 Total Sunday
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	31	41	936	29	48	1771
v/c Ratio	0.14	0.18	0.34	0.02	0.10	0.58
Control Delay	29.4	12.8	5.3	2.1	2.5	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	12.8	5.3	2.1	2.5	4.3
Queue Length 50th (m)	3.3	0.0	26.4	0.0	1.0	41.4
Queue Length 95th (m)	11.7	8.4	39.6	2.3	3.1	65.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	522	504	3211	1482	491	3489
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	0.08	0.29	0.02	0.10	0.51
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	39	899	28	46	1700
Future Volume (vph)	30	39	899	28	46	1700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.26	1.00
Satd. Flow (perm)	1738	1585	3544	1633	487	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	31	41	936	29	48	1771
RTOR Reduction (vph)	0	38	0	10	0	0
Lane Group Flow (vph)	31	3	936	19	48	1771
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.9	3.9	40.9	40.9	47.0	47.0
Effective Green, g (s)	3.9	3.9	40.9	40.9	47.0	47.0
Actuated g/C Ratio	0.06	0.06	0.67	0.67	0.77	0.77
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	101	2380	1096	420	2789
v/s Ratio Prot	c0.02		0.26		0.00	c0.49
v/s Ratio Perm		0.00		0.01	0.08	
v/c Ratio	0.28	0.03	0.39	0.02	0.11	0.63
Uniform Delay, d1	27.2	26.7	4.5	3.3	2.0	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.1	0.1	0.0	0.1	0.5
Delay (s)	28.5	26.8	4.6	3.3	2.1	3.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	27.6		4.5			3.6
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			60.9		Sum of lost time (s)	14.0
Intersection Capacity Utilization			58.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	102	825	99	0	1730
Future Volume (Veh/h)	0	102	825	99	0	1730
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	111	897	108	0	1880
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1837	448			897	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1837	448			897	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	67	558			753	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	111	448	448	108	940	940
Volume Left	0	0	0	0	0	0
Volume Right	111	0	0	108	0	0
cSH	558	1700	1700	1700	1700	1700
Volume to Capacity	0.20	0.26	0.26	0.06	0.55	0.55
Queue Length 95th (m)	5.6	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	13.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.1	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			51.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 3 Total Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	83	0	924	1609	121
Future Volume (Veh/h)	0	83	0	924	1609	121
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	90	0	1004	1749	132
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2753	874	1749			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2753	874	1749			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	69	100			
cM capacity (veh/h)	16	293	355			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	90	1004	874	874	132	
Volume Left	0	0	0	0	0	
Volume Right	90	0	0	0	132	
cSH	293	1700	1700	1700	1700	
Volume to Capacity	0.31	0.59	0.51	0.51	0.08	
Queue Length 95th (m)	9.6	0.0	0.0	0.0	0.0	
Control Delay (s)	22.7	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	22.7	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		56.3%		ICU Level of Service		B
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

Phase 3 Total Fri PM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	57	1779	35	41	1164
v/c Ratio	0.08	0.27	0.65	0.03	0.18	0.40
Control Delay	35.0	14.0	7.8	1.7	3.5	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	14.0	7.8	1.7	3.5	2.9
Queue Length 50th (m)	2.0	0.0	71.2	0.0	0.8	19.5
Queue Length 95th (m)	7.4	10.2	105.4	2.4	2.6	31.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	449	444	2841	1278	224	3075
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	0.03	0.13	0.63	0.03	0.18	0.38
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Total Fri PM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	13	52	1637	32	38	1071
Future Volume (vph)	13	52	1637	32	38	1071
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.08	1.00
Satd. Flow (perm)	1789	1601	3579	1601	149	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	57	1779	35	41	1164
RTOR Reduction (vph)	0	53	0	10	0	0
Lane Group Flow (vph)	14	4	1779	25	41	1164
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	4.8	4.8	51.0	51.0	57.0	57.0
Effective Green, g (s)	4.8	4.8	51.0	51.0	57.0	57.0
Actuated g/C Ratio	0.07	0.07	0.71	0.71	0.79	0.79
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	107	2542	1137	163	2786
v/s Ratio Prot	c0.01		c0.50		0.01	c0.33
v/s Ratio Perm		0.00		0.02	0.19	
v/c Ratio	0.12	0.04	0.70	0.02	0.25	0.42
Uniform Delay, d1	31.5	31.3	6.0	3.1	5.4	2.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.9	0.0	0.8	0.1
Delay (s)	32.0	31.5	6.9	3.1	6.3	2.4
Level of Service	C	C	A	A	A	A
Approach Delay (s)	31.6		6.8			2.5
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.65			
Actuated Cycle Length (s)			71.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			56.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Total Fri PM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	85	1585	111	0	1084
Future Volume (Veh/h)	0	85	1585	111	0	1084
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	1723	121	0	1178
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2312	862			1723	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2312	862			1723	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	69			100	
cM capacity (veh/h)	32	299			363	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	92	862	862	121	589	589
Volume Left	0	0	0	0	0	0
Volume Right	92	0	0	121	0	0
cSH	299	1700	1700	1700	1700	1700
Volume to Capacity	0.31	0.51	0.51	0.07	0.35	0.35
Queue Length 95th (m)	9.7	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	22.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	22.3	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			55.7%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 3 Total Fri PM
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	85	0	1696	973	111
Future Volume (Veh/h)	0	85	0	1696	973	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	0	1843	1058	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2901	529	1058			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2901	529	1058			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	12	494	654			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	92	1843	529	529	121	
Volume Left	0	0	0	0	0	
Volume Right	92	0	0	0	121	
cSH	494	1700	1700	1700	1700	
Volume to Capacity	0.19	1.08	0.31	0.31	0.07	
Queue Length 95th (m)	5.1	0.0	0.0	0.0	0.0	
Control Delay (s)	13.9	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	13.9	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			92.6%	ICU Level of Service		F
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 3 Total Fri AM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	27	51	811	14	17	962
v/c Ratio	0.09	0.17	0.30	0.01	0.03	0.34
Control Delay	18.3	8.5	5.1	3.8	2.9	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	8.5	5.1	3.8	2.9	3.5
Queue Length 50th (m)	2.0	0.0	11.9	0.0	0.3	14.9
Queue Length 95th (m)	7.2	6.8	37.1	2.1	1.6	24.6
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	939	840	3572	1598	634	3579
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	0.03	0.06	0.23	0.01	0.03	0.27
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Total Fri AM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	46	730	13	15	866
Future Volume (vph)	24	46	730	13	15	866
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.29	1.00
Satd. Flow (perm)	1825	1585	3579	1601	553	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	51	811	14	17	962
RTOR Reduction (vph)	0	47	0	6	0	0
Lane Group Flow (vph)	27	4	811	8	17	962
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.5	3.5	27.5	27.5	32.5	32.5
Effective Green, g (s)	3.5	3.5	27.5	27.5	32.5	32.5
Actuated g/C Ratio	0.08	0.08	0.60	0.60	0.71	0.71
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	138	120	2139	957	417	2528
v/s Ratio Prot	c0.01		0.23		0.00	c0.27
v/s Ratio Perm		0.00		0.01	0.03	
v/c Ratio	0.20	0.03	0.38	0.01	0.04	0.38
Uniform Delay, d1	19.9	19.7	4.8	3.7	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.1	0.0	0.0	0.1
Delay (s)	20.6	19.8	4.9	3.7	2.3	2.8
Level of Service	C	B	A	A	A	A
Approach Delay (s)	20.1		4.9			2.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			46.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			35.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Total Fri AM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	99	645	70	0	891
Future Volume (Veh/h)	0	99	645	70	0	891
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	108	701	76	0	968
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1185	350			701	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1185	350			701	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	83			100	
cM capacity (veh/h)	182	646			892	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	108	350	350	76	484	484
Volume Left	0	0	0	0	0	0
Volume Right	108	0	0	76	0	0
cSH	646	1700	1700	1700	1700	1700
Volume to Capacity	0.17	0.21	0.21	0.04	0.28	0.28
Queue Length 95th (m)	4.5	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	11.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.7	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			30.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 3 Total Fri AM
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	99	0	715	821	70
Future Volume (Veh/h)	0	99	0	715	821	70
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	108	0	777	892	76
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1669	446	892			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1669	446	892			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	87	560	756			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	108	777	446	446	76	
Volume Left	0	0	0	0	0	
Volume Right	108	0	0	0	76	
cSH	560	1700	1700	1700	1700	
Volume to Capacity	0.19	0.46	0.26	0.26	0.04	
Queue Length 95th (m)	5.4	0.0	0.0	0.0	0.0	
Control Delay (s)	13.0	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	13.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			41.0%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 3 Background Sunday
06/20/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	31	41	830	29	48	1645
v/c Ratio	0.14	0.17	0.31	0.02	0.09	0.55
Control Delay	26.0	11.6	5.6	2.5	2.6	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	11.6	5.6	2.5	2.6	4.3
Queue Length 50th (m)	3.0	0.0	22.4	0.0	1.0	35.5
Queue Length 95th (m)	10.5	7.7	34.6	2.5	3.1	57.5
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	562	541	3395	1565	534	3562
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	0.08	0.24	0.02	0.09	0.46
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Background Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	39	797	28	46	1579
Future Volume (vph)	30	39	797	28	46	1579
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.29	1.00
Satd. Flow (perm)	1738	1585	3544	1633	548	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	31	41	830	29	48	1645
RTOR Reduction (vph)	0	38	0	10	0	0
Lane Group Flow (vph)	31	3	830	19	48	1645
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.8	3.8	36.2	36.2	42.3	42.3
Effective Green, g (s)	3.8	3.8	36.2	36.2	42.3	42.3
Actuated g/C Ratio	0.07	0.07	0.65	0.65	0.75	0.75
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	107	2286	1053	459	2724
v/s Ratio Prot	c0.02		0.23		0.00	c0.46
v/s Ratio Perm		0.00		0.01	0.07	
v/c Ratio	0.26	0.03	0.36	0.02	0.10	0.60
Uniform Delay, d1	24.8	24.4	4.6	3.6	2.0	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	0.1	0.0	0.1	0.4
Delay (s)	26.0	24.5	4.7	3.6	2.1	3.5
Level of Service	C	C	A	A	A	A
Approach Delay (s)	25.2		4.7			3.5
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			56.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			55.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Background Sunday
06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	825	0	0	1609
Future Volume (Veh/h)	0	0	825	0	0	1609
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	897	0	0	1749
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1772	897			897	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1772	897			897	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	74	283			753	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	897	0	874	874	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.53	0.00	0.51	0.51	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			47.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 3 Background Sunday
06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	825	1609	0
Future Volume (Veh/h)	0	0	0	825	1609	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	897	1749	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2646	874	1749			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2646	874	1749			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	19	293	355			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	897	874	874	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.53	0.51	0.51	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			47.8%	ICU Level of Service		A
Analysis Period (min)			15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	57	1687	35	41	1043
v/c Ratio	0.07	0.26	0.59	0.03	0.14	0.34
Control Delay	34.1	13.7	7.1	1.8	2.8	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	13.7	7.1	1.8	2.8	2.3
Queue Length 50th (m)	1.9	0.0	67.7	0.0	0.8	16.7
Queue Length 95th (m)	7.4	10.2	99.5	2.6	2.6	27.4
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	487	478	2938	1320	284	3123
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	0.03	0.12	0.57	0.03	0.14	0.33
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	13	52	1552	32	38	960
Future Volume (vph)	13	52	1552	32	38	960
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1789	1601	3579	1601	175	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	57	1687	35	41	1043
RTOR Reduction (vph)	0	54	0	10	0	0
Lane Group Flow (vph)	14	3	1687	25	41	1043
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.5	3.5	48.6	48.6	55.1	55.1
Effective Green, g (s)	3.5	3.5	48.6	48.6	55.1	55.1
Actuated g/C Ratio	0.05	0.05	0.71	0.71	0.80	0.80
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	91	81	2535	1134	199	2819
v/s Ratio Prot	c0.01		c0.47		0.01	c0.30
v/s Ratio Perm		0.00		0.02	0.16	
v/c Ratio	0.15	0.04	0.67	0.02	0.21	0.37
Uniform Delay, d1	31.1	30.9	5.5	3.0	4.3	1.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	0.7	0.0	0.5	0.1
Delay (s)	31.9	31.1	6.2	3.0	4.8	2.0
Level of Service	C	C	A	A	A	A
Approach Delay (s)	31.3		6.1			2.1
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			68.6		Sum of lost time (s)	14.0
Intersection Capacity Utilization			54.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Background Fri PM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1585	0	0	973
Future Volume (Veh/h)	0	0	1585	0	0	973
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1723	0	0	1058
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2252	1723			1723	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2252	1723			1723	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	35	78			363	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1723	0	529	529	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.01	0.00	0.31	0.31	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			86.8%	ICU Level of Service		E
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 3 Background Fri PM

06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1585	973	0
Future Volume (Veh/h)	0	0	0	1585	973	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1723	1058	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2781	529	1058			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2781	529	1058			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	15	494	654			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1723	529	529	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.01	0.31	0.31	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		86.8%		ICU Level of Service	E	
Analysis Period (min)		15				

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	27	51	702	14	17	886
v/c Ratio	0.09	0.17	0.27	0.01	0.03	0.32
Control Delay	17.0	7.9	5.2	4.0	3.0	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	7.9	5.2	4.0	3.0	3.5
Queue Length 50th (m)	2.0	0.0	9.9	0.0	0.3	13.4
Queue Length 95th (m)	6.8	6.5	31.7	2.2	1.6	22.3
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	1027	914	3579	1601	709	3579
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	0.03	0.06	0.20	0.01	0.02	0.25
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 3 Background Fri AM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	24	46	632	13	15	797
Future Volume (vph)	24	46	632	13	15	797
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1825	1585	3579	1601	627	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	51	702	14	17	886
RTOR Reduction (vph)	0	47	0	6	0	0
Lane Group Flow (vph)	27	4	702	8	17	886
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.5	3.5	25.7	25.7	30.7	30.7
Effective Green, g (s)	3.5	3.5	25.7	25.7	30.7	30.7
Actuated g/C Ratio	0.08	0.08	0.58	0.58	0.69	0.69
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	144	125	2081	930	461	2485
v/s Ratio Prot	c0.01		0.20		0.00	c0.25
v/s Ratio Perm		0.00		0.01	0.02	
v/c Ratio	0.19	0.03	0.34	0.01	0.04	0.36
Uniform Delay, d1	19.0	18.8	4.8	3.9	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.0	0.0	0.1
Delay (s)	19.7	18.9	4.9	3.9	2.3	2.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	19.2		4.9			2.8
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			44.2		Sum of lost time (s)	14.0
Intersection Capacity Utilization			33.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 3 Background Fri AM

06/20/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	645	0	0	821
Future Volume (Veh/h)	0	0	645	0	0	821
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	701	0	0	892
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1147	701			701	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1147	701			701	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	192	381			892	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	701	0	446	446	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.41	0.00	0.26	0.26	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			37.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 3 Background Fri AM

06/20/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	645	821	0
Future Volume (Veh/h)	0	0	0	645	821	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	701	892	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1593	446	892			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1593	446	892			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	98	560	756			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	701	446	446	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.41	0.26	0.26	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		37.3%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	2.0	0.5	0.4
Total Del/Veh (s)	23.6	1.5	4.4	5.0	7.3	2.9	3.7

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.7	0.8	2.2	2.8	2.2

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.4	0.7	2.1	3.9	1.8

Total Network Performance

Denied Del/Veh (s)			0.9	
Total Del/Veh (s)			23.2	

Queuing and Blocking Report
Phase 4 Total Sunday

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	15.3	25.7	30.2	13.6	40.4	33.1
Average Queue (m)	6.6	10.6	14.8	7.3	18.1	13.1
95th Queue (m)	15.0	26.2	30.9	16.4	44.2	36.5
Link Distance (m)	189.9	496.3	496.3		156.9	156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Queuing and Blocking Report
Phase 4 Total Sunday

06/21/2019

Intersection: 12: Bend

Movement	SE
Directions Served	T
Maximum Queue (m)	1.7
Average Queue (m)	0.2
95th Queue (m)	3.5
Link Distance (m)	75.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 4 Total Sunday
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	46	1093	33	53	2046
v/c Ratio	0.19	0.23	0.41	0.03	0.13	0.69
Control Delay	36.0	14.1	5.4	1.7	2.6	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	14.1	5.4	1.7	2.6	5.7
Queue Length 50th (m)	4.5	0.0	33.5	0.0	1.2	58.5
Queue Length 95th (m)	13.1	9.1	48.8	2.5	3.3	90.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	409	408	2762	1280	411	3094
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	0.08	0.11	0.40	0.03	0.13	0.66
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	33	44	1049	32	51	1964
Future Volume (vph)	33	44	1049	32	51	1964
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.22	1.00
Satd. Flow (perm)	1738	1585	3544	1633	408	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	34	46	1093	33	53	2046
RTOR Reduction (vph)	0	43	0	10	0	0
Lane Group Flow (vph)	34	3	1093	23	53	2046
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.5	5.5	52.8	52.8	59.0	59.0
Effective Green, g (s)	5.5	5.5	52.8	52.8	59.0	59.0
Actuated g/C Ratio	0.07	0.07	0.71	0.71	0.79	0.79
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	128	117	2511	1157	363	2862
v/s Ratio Prot	c0.02		0.31		0.00	c0.57
v/s Ratio Perm		0.00		0.01	0.11	
v/c Ratio	0.27	0.03	0.44	0.02	0.15	0.71
Uniform Delay, d1	32.6	32.0	4.6	3.2	2.3	3.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.1	0.1	0.0	0.2	0.9
Delay (s)	33.7	32.1	4.7	3.2	2.5	4.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	32.8		4.6			4.5
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.3	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			74.5	Sum of lost time (s)		14.0
Intersection Capacity Utilization			66.0%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 4 Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	156	925	159	0	1997
Future Volume (Veh/h)	0	156	925	159	0	1997
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	170	1005	173	0	2171
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2090	502			1005	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2090	502			1005	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	67			100	
cM capacity (veh/h)	45	514			685	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	170	502	502	173	1086	1086
Volume Left	0	0	0	0	0	0
Volume Right	170	0	0	173	0	0
cSH	514	1700	1700	1700	1700	1700
Volume to Capacity	0.33	0.30	0.30	0.10	0.64	0.64
Queue Length 95th (m)	10.9	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	15.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	15.4	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			58.5%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 4 Total Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	128	0	1084	1802	195
Future Volume (Veh/h)	0	128	0	1084	1802	195
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	139	0	1178	1959	212
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3137	980	1959			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3137	980	1959			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	44	100			
cM capacity (veh/h)	8	249	294			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	139	1178	980	980	212	
Volume Left	0	0	0	0	0	
Volume Right	139	0	0	0	212	
cSH	249	1700	1700	1700	1700	
Volume to Capacity	0.56	0.69	0.58	0.58	0.12	
Queue Length 95th (m)	23.5	0.0	0.0	0.0	0.0	
Control Delay (s)	36.2	0.0	0.0	0.0	0.0	
Lane LOS	E					
Approach Delay (s)	36.2	0.0	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		64.4%		ICU Level of Service		C
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	2.4	0.3	0.1
Total Del/Veh (s)	16.4	1.6	5.4	5.0	7.8	1.4	3.7

2: Hwy 99 & Access A Performance by movement

Movement	WBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.4	1.0	2.0	1.6	1.4

3: Hwy 99 & Access D Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.6	0.8	1.2	2.9	1.2

Total Network Performance

Denied Del/Veh (s)	73.0
Total Del/Veh (s)	24.5

Queuing and Blocking Report

Phase 4 Total Fri PM

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	10.3	35.5	39.5	10.3	31.7	21.0
Average Queue (m)	4.6	16.6	22.0	6.3	10.2	5.4
95th Queue (m)	12.1	37.8	42.7	13.1	30.7	19.7
Link Distance (m)	189.9	496.3	496.3		156.9	156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 4 Total Fri PM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	16	64	2045	39	46	1382
v/c Ratio	0.10	0.32	0.74	0.03	0.23	0.47
Control Delay	35.9	14.3	9.4	1.7	4.5	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	14.3	9.4	1.7	4.5	3.2
Queue Length 50th (m)	2.5	0.0	96.6	0.1	0.9	25.8
Queue Length 95th (m)	7.8	10.8	145.9	2.7	2.9	42.2
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	401	409	2780	1252	196	2952
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	0.04	0.16	0.74	0.03	0.23	0.47
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Total Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	59	1881	36	42	1271
Future Volume (vph)	15	59	1881	36	42	1271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1789	1601	3579	1601	125	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	64	2045	39	46	1382
RTOR Reduction (vph)	0	60	0	10	0	0
Lane Group Flow (vph)	16	4	2045	29	46	1382
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.0	5.0	56.5	56.5	62.7	62.7
Effective Green, g (s)	5.0	5.0	56.5	56.5	62.7	62.7
Actuated g/C Ratio	0.06	0.06	0.73	0.73	0.81	0.81
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	115	103	2602	1164	147	2832
v/s Ratio Prot	c0.01		c0.57		0.01	c0.39
v/s Ratio Perm		0.00		0.02	0.24	
v/c Ratio	0.14	0.04	0.79	0.02	0.31	0.49
Uniform Delay, d1	34.3	34.1	6.7	2.9	8.8	2.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	1.6	0.0	1.2	0.1
Delay (s)	34.9	34.3	8.4	3.0	10.0	2.5
Level of Service	C	C	A	A	B	A
Approach Delay (s)	34.4		8.3			2.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			77.7		Sum of lost time (s)	14.0
Intersection Capacity Utilization			64.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 4 Total Fri PM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	142	1775	196	0	1286
Future Volume (Veh/h)	0	142	1775	196	0	1286
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	154	1929	213	0	1398
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2628	964			1929	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2628	964			1929	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	40			100	
cM capacity (veh/h)	19	255			302	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	154	964	964	213	699	699
Volume Left	0	0	0	0	0	0
Volume Right	154	0	0	213	0	0
cSH	255	1700	1700	1700	1700	1700
Volume to Capacity	0.60	0.57	0.57	0.13	0.41	0.41
Queue Length 95th (m)	27.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	38.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	E					
Approach Delay (s)	38.5	0.0			0.0	
Approach LOS	E					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			64.5%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 4 Total Fri PM
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations					 	
Traffic Volume (veh/h)	0	142	0	1971	1090	196
Future Volume (Veh/h)	0	142	0	1971	1090	196
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	154	0	2142	1185	213
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3327	592	1185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3327	592	1185			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	66	100			
cM capacity (veh/h)	6	449	585			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	154	2142	592	592	213	
Volume Left	0	0	0	0	0	
Volume Right	154	0	0	0	213	
cSH	449	1700	1700	1700	1700	
Volume to Capacity	0.34	1.26	0.35	0.35	0.13	
Queue Length 95th (m)	11.4	0.0	0.0	0.0	0.0	
Control Delay (s)	17.1	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	17.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			107.1%	ICU Level of Service		G
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Phase 4 Total Fri AM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	57	989	17	19	1116
v/c Ratio	0.11	0.20	0.36	0.01	0.04	0.39
Control Delay	20.7	9.2	5.1	3.2	2.8	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	9.2	5.1	3.2	2.8	3.5
Queue Length 50th (m)	2.4	0.0	15.6	0.0	0.4	18.5
Queue Length 95th (m)	8.6	7.9	47.4	2.2	1.6	30.2
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	829	751	3517	1574	531	3579
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	0.04	0.08	0.28	0.01	0.04	0.31
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Total Fri AM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	51	890	15	17	1004
Future Volume (vph)	27	51	890	15	17	1004
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.24	1.00
Satd. Flow (perm)	1825	1585	3579	1601	444	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	30	57	989	17	19	1116
RTOR Reduction (vph)	0	53	0	6	0	0
Lane Group Flow (vph)	30	4	989	11	19	1116
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.6	3.6	30.9	30.9	35.8	35.8
Effective Green, g (s)	3.6	3.6	30.9	30.9	35.8	35.8
Actuated g/C Ratio	0.07	0.07	0.63	0.63	0.72	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	132	115	2238	1001	346	2593
v/s Ratio Prot	c0.02		0.28		0.00	c0.31
v/s Ratio Perm		0.00		0.01	0.04	
v/c Ratio	0.23	0.04	0.44	0.01	0.05	0.43
Uniform Delay, d1	21.6	21.3	4.8	3.5	2.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.1	0.0	0.1	0.1
Delay (s)	22.5	21.4	4.9	3.5	2.4	2.8
Level of Service	C	C	A	A	A	A
Approach Delay (s)	21.8		4.9			2.8
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			4.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.46			
Actuated Cycle Length (s)			49.4		Sum of lost time (s)	14.0
Intersection Capacity Utilization			39.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 4 Total Fri AM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	182	723	111	0	1031
Future Volume (Veh/h)	0	182	723	111	0	1031
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	198	786	121	0	1121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1346	393			786	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1346	393			786	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	67			100	
cM capacity (veh/h)	142	606			829	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	198	393	393	121	560	560
Volume Left	0	0	0	0	0	0
Volume Right	198	0	0	121	0	0
cSH	606	1700	1700	1700	1700	1700
Volume to Capacity	0.33	0.23	0.23	0.07	0.33	0.33
Queue Length 95th (m)	10.8	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.8	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			37.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

Phase 4 Total Fri AM
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations					 	
Traffic Volume (veh/h)	0	182	0	834	920	111
Future Volume (Veh/h)	0	182	0	834	920	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	198	0	907	1000	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1907	500	1000			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1907	500	1000			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	62	100			
cM capacity (veh/h)	60	516	688			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	198	907	500	500	121	
Volume Left	0	0	0	0	0	
Volume Right	198	0	0	0	121	
cSH	516	1700	1700	1700	1700	
Volume to Capacity	0.38	0.53	0.29	0.29	0.07	
Queue Length 95th (m)	13.6	0.0	0.0	0.0	0.0	
Control Delay (s)	16.2	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	16.2	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		47.2%		ICU Level of Service		A
Analysis Period (min)		15				

1: Hwy 99 & Copper Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	2.2	0.4	0.3
Total Del/Veh (s)	21.4	1.6	4.2	3.3	6.2	2.9	3.6

2: Hwy 99 & Access A Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.9	2.5	2.0

3: Hwy 99 & Access D Performance by movement

Movement	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.7	1.6	1.3

Total Network Performance

Denied Del/Veh (s)			0.6
Total Del/Veh (s)			24.2

Queuing and Blocking Report

Phase 4 Background Sunday

06/21/2019

Intersection: 1: Hwy 99 & Copper Dr

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T
Maximum Queue (m)	17.6	28.1	28.2	13.5	39.9	30.6
Average Queue (m)	9.0	13.7	13.5	5.9	18.5	13.1
95th Queue (m)	18.5	30.7	30.7	15.0	41.7	31.2
Link Distance (m)	189.9	496.3	496.3		156.9	156.9
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				75.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Hwy 99 & Access A

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3: Hwy 99 & Access D

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Queues
1: Hwy 99 & Copper Dr

Phase 4 Background Sunday
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	46	930	33	53	1843
v/c Ratio	0.18	0.21	0.36	0.03	0.11	0.64
Control Delay	32.3	13.2	5.5	1.9	2.5	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	13.2	5.5	1.9	2.5	5.2
Queue Length 50th (m)	3.7	0.0	26.4	0.0	1.1	45.3
Queue Length 95th (m)	13.1	9.1	39.2	2.5	3.3	71.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	458	451	2997	1386	473	3382
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	0.10	0.31	0.02	0.11	0.54
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	33	44	893	32	51	1769
Future Volume (vph)	33	44	893	32	51	1769
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.26	1.00
Satd. Flow (perm)	1738	1585	3544	1633	491	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	34	46	930	33	53	1843
RTOR Reduction (vph)	0	42	0	11	0	0
Lane Group Flow (vph)	34	4	930	22	53	1843
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.4	5.4	45.4	45.4	51.6	51.6
Effective Green, g (s)	5.4	5.4	45.4	45.4	51.6	51.6
Actuated g/C Ratio	0.08	0.08	0.68	0.68	0.77	0.77
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	140	127	2401	1106	420	2783
v/s Ratio Prot	c0.02		0.26		0.00	c0.51
v/s Ratio Perm		0.00		0.01	0.09	
v/c Ratio	0.24	0.03	0.39	0.02	0.13	0.66
Uniform Delay, d1	28.9	28.4	4.7	3.5	2.2	3.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.1	0.0	0.1	0.6
Delay (s)	29.8	28.5	4.8	3.5	2.4	4.2
Level of Service	C	C	A	A	A	A
Approach Delay (s)	29.0		4.8			4.2
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			67.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			60.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 4 Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	925	0	0	1802
Future Volume (Veh/h)	0	0	925	0	0	1802
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1005	0	0	1959
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1984	1005			1005	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1984	1005			1005	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	53	240			685	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1005	0	980	980	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.59	0.00	0.58	0.58	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			53.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 4 Background Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	925	1802	0
Future Volume (Veh/h)	0	0	0	925	1802	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1005	1959	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2964	980	1959			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2964	980	1959			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	11	249	294			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1005	980	980	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.59	0.58	0.58	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			53.1%	ICU Level of Service		A
Analysis Period (min)			15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	16	64	1890	39	46	1168
v/c Ratio	0.09	0.30	0.69	0.03	0.22	0.40
Control Delay	35.5	14.0	8.4	1.6	4.2	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	14.0	8.4	1.6	4.2	2.9
Queue Length 50th (m)	2.4	0.0	81.1	0.0	0.9	19.9
Queue Length 95th (m)	7.8	10.8	121.3	2.6	2.9	32.5
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	430	433	2797	1259	207	3031
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	0.04	0.15	0.68	0.03	0.22	0.39
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Background Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	15	59	1739	36	42	1075
Future Volume (vph)	15	59	1739	36	42	1075
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1789	1601	3579	1601	132	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	64	1890	39	46	1168
RTOR Reduction (vph)	0	60	0	11	0	0
Lane Group Flow (vph)	16	4	1890	28	46	1168
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.0	5.0	53.1	53.1	59.2	59.2
Effective Green, g (s)	5.0	5.0	53.1	53.1	59.2	59.2
Actuated g/C Ratio	0.07	0.07	0.72	0.72	0.80	0.80
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	120	107	2561	1145	152	2800
v/s Ratio Prot	c0.01		c0.53		0.01	c0.33
v/s Ratio Perm		0.00		0.02	0.23	
v/c Ratio	0.13	0.04	0.74	0.02	0.30	0.42
Uniform Delay, d1	32.6	32.4	6.4	3.1	6.8	2.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	1.1	0.0	1.1	0.1
Delay (s)	33.1	32.5	7.5	3.1	7.9	2.4
Level of Service	C	C	A	A	A	A
Approach Delay (s)	32.6		7.4			2.6
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			6.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			74.2		Sum of lost time (s)	14.0
Intersection Capacity Utilization			60.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

Phase 4 Background Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	1775	0	0	1090
Future Volume (Veh/h)	0	0	1775	0	0	1090
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1929	0	0	1185
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2522	1929			1929	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2522	1929			1929	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	23	56			302	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1929	0	592	592	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.13	0.00	0.35	0.35	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			96.8%	ICU Level of Service		F
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 4 Background Fri PM

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1775	1090	0
Future Volume (Veh/h)	0	0	0	1775	1090	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1929	1185	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3114	592	1185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3114	592	1185			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	9	449	585			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1929	592	592	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.13	0.35	0.35	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		96.8%		ICU Level of Service		F
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

Phase 4 Background Fri AM
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	57	787	17	19	992
v/c Ratio	0.10	0.19	0.30	0.01	0.03	0.36
Control Delay	18.0	8.2	5.2	3.7	2.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	8.2	5.2	3.7	2.9	3.6
Queue Length 50th (m)	2.2	0.0	11.5	0.0	0.4	15.6
Queue Length 95th (m)	7.7	7.2	36.2	2.4	1.7	25.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	936	840	3573	1598	641	3579
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	0.03	0.07	0.22	0.01	0.03	0.28
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

Phase 4 Background Fri AM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	51	708	15	17	893
Future Volume (vph)	27	51	708	15	17	893
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.30	1.00
Satd. Flow (perm)	1825	1585	3579	1601	569	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	30	57	787	17	19	992
RTOR Reduction (vph)	0	53	0	7	0	0
Lane Group Flow (vph)	30	4	787	10	19	992
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	3.6	3.6	27.3	27.3	32.3	32.3
Effective Green, g (s)	3.6	3.6	27.3	27.3	32.3	32.3
Actuated g/C Ratio	0.08	0.08	0.59	0.59	0.70	0.70
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	143	124	2128	952	426	2518
v/s Ratio Prot	c0.02		0.22		0.00	c0.28
v/s Ratio Perm		0.00		0.01	0.03	
v/c Ratio	0.21	0.04	0.37	0.01	0.04	0.39
Uniform Delay, d1	19.8	19.5	4.8	3.8	2.3	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.1	0.0	0.0	0.1
Delay (s)	20.6	19.7	4.9	3.8	2.3	2.9
Level of Service	C	B	A	A	A	A
Approach Delay (s)	20.0		4.9			2.9
Approach LOS	B		A			A
Intersection Summary						
HCM 2000 Control Delay			4.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.42			
Actuated Cycle Length (s)			45.9		Sum of lost time (s)	14.0
Intersection Capacity Utilization			36.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 2: Hwy 99 & Access A

Phase 4 Background Fri AM
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	723	0	0	920
Future Volume (Veh/h)	0	0	723	0	0	920
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	786	0	0	1000
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1286	786			786	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1286	786			786	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	156	335			829	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	786	0	500	500	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.46	0.23	0.29	0.29	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			41.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

Phase 4 Background Fri AM

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	723	920	0
Future Volume (Veh/h)	0	0	0	723	920	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	786	1000	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1786	500	1000			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1786	500	1000			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	73	516	688			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	786	500	500	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.46	0.29	0.29	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		41.4%		ICU Level of Service		A
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

(2047) Total Sunday
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	44	57	1330	42	67	2517
v/c Ratio	0.28	0.29	0.50	0.03	0.20	0.84
Control Delay	39.4	14.0	7.0	1.8	3.3	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.4	14.0	7.0	1.8	3.3	9.9
Queue Length 50th (m)	6.5	0.0	48.4	0.0	1.5	105.3
Queue Length 95th (m)	15.9	10.0	70.5	3.0	4.2	179.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	338	354	2638	1226	336	2996
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	0.13	0.16	0.50	0.03	0.20	0.84
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	42	55	1277	40	64	2416
Future Volume (vph)	42	55	1277	40	64	2416
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.16	1.00
Satd. Flow (perm)	1738	1585	3544	1633	298	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	44	57	1330	42	67	2517
RTOR Reduction (vph)	0	53	0	12	0	0
Lane Group Flow (vph)	44	4	1330	30	67	2517
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	6.4	6.4	60.5	60.5	68.4	68.4
Effective Green, g (s)	6.4	6.4	60.5	60.5	68.4	68.4
Actuated g/C Ratio	0.08	0.08	0.71	0.71	0.81	0.81
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	131	119	2528	1165	308	2915
v/s Ratio Prot	c0.03		0.38		0.01	c0.70
v/s Ratio Perm		0.00		0.02	0.17	
v/c Ratio	0.34	0.04	0.53	0.03	0.22	0.86
Uniform Delay, d1	37.2	36.3	5.6	3.5	3.1	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1	0.2	0.0	0.4	2.9
Delay (s)	38.7	36.5	5.8	3.6	3.5	8.1
Level of Service	D	D	A	A	A	A
Approach Delay (s)	37.4		5.7			8.0
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.86			
Actuated Cycle Length (s)			84.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			78.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Total Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	156	1161	159	0	2457
Future Volume (Veh/h)	0	156	1161	159	0	2457
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	170	1262	173	0	2671
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2598	631			1262	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2598	631			1262	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	60			100	
cM capacity (veh/h)	20	424			547	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	170	631	631	173	1336	1336
Volume Left	0	0	0	0	0	0
Volume Right	170	0	0	173	0	0
cSH	424	1700	1700	1700	1700	1700
Volume to Capacity	0.40	0.37	0.37	0.10	0.79	0.79
Queue Length 95th (m)	14.4	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	19.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	19.1	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			71.3%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

(2047) Total Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	128	0	1320	2263	195
Future Volume (Veh/h)	0	128	0	1320	2263	195
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	139	0	1435	2460	212
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3895	1230	2460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3895	1230	2460			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	18	100			
cM capacity (veh/h)	2	169	186			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	139	1435	1230	1230	212	
Volume Left	0	0	0	0	0	
Volume Right	139	0	0	0	212	
cSH	169	1700	1700	1700	1700	
Volume to Capacity	0.82	0.84	0.72	0.72	0.12	
Queue Length 95th (m)	42.3	0.0	0.0	0.0	0.0	
Control Delay (s)	83.3	0.0	0.0	0.0	0.0	
Lane LOS	F					
Approach Delay (s)	83.3	0.0	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		2.7				
Intersection Capacity Utilization		77.1%		ICU Level of Service		D
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

(2047) Total Fri PM
06/19/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	80	2527	49	58	1680
v/c Ratio	0.14	0.40	0.93	0.04	0.33	0.57
Control Delay	36.6	15.9	19.9	2.1	7.9	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	15.9	19.9	2.1	7.9	4.0
Queue Length 50th (m)	3.1	0.6	~180.1	0.5	1.2	37.2
Queue Length 95th (m)	9.4	12.6	#276.2	3.6	5.4	63.1
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	345	370	2725	1227	175	2938
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	0.22	0.93	0.04	0.33	0.57

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.

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Total Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	74	2325	45	53	1546
Future Volume (vph)	19	74	2325	45	53	1546
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1789	1601	3579	1601	114	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	80	2527	49	58	1680
RTOR Reduction (vph)	0	71	0	10	0	0
Lane Group Flow (vph)	21	9	2527	39	58	1680
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.7	5.7	62.3	62.3	69.4	69.4
Effective Green, g (s)	5.7	5.7	62.3	62.3	69.4	69.4
Actuated g/C Ratio	0.07	0.07	0.73	0.73	0.82	0.82
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	107	2620	1172	153	2862
v/s Ratio Prot	c0.01		c0.71		0.01	c0.48
v/s Ratio Perm		0.01		0.02	0.29	
v/c Ratio	0.18	0.08	0.96	0.03	0.38	0.59
Uniform Delay, d1	37.5	37.3	10.4	3.1	25.0	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	10.5	0.0	1.6	0.3
Delay (s)	38.2	37.6	20.9	3.1	26.6	3.1
Level of Service	D	D	C	A	C	A
Approach Delay (s)	37.7		20.6			3.9
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			14.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			77.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Total Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	142	2229	196	0	1565
Future Volume (Veh/h)	0	142	2229	196	0	1565
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	154	2423	213	0	1701
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3274	1212			2423	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3274	1212			2423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	12			100	
cM capacity (veh/h)	7	174			193	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	154	1212	1212	213	850	850
Volume Left	0	0	0	0	0	0
Volume Right	154	0	0	213	0	0
cSH	174	1700	1700	1700	1700	1700
Volume to Capacity	0.88	0.71	0.71	0.13	0.50	0.50
Queue Length 95th (m)	48.9	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	93.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	93.9	0.0			0.0	
Approach LOS	F					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			77.1%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

(2047) Total Fri PM

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	142	0	2425	1369	196
Future Volume (Veh/h)	0	142	0	2425	1369	196
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	154	0	2636	1488	213
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4124	744	1488			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4124	744	1488			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	57	100			
cM capacity (veh/h)	2	357	448			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	154	2636	744	744	213	
Volume Left	0	0	0	0	0	
Volume Right	154	0	0	0	213	
cSH	357	1700	1700	1700	1700	
Volume to Capacity	0.43	1.55	0.44	0.44	0.13	
Queue Length 95th (m)	16.0	0.0	0.0	0.0	0.0	
Control Delay (s)	22.5	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	22.5	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		131.0%		ICU Level of Service		H
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

(2047) Total Fri AM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	71	1187	21	23	1364
v/c Ratio	0.15	0.25	0.46	0.02	0.06	0.51
Control Delay	23.1	9.6	5.6	2.5	2.9	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.1	9.6	5.6	2.5	2.9	4.8
Queue Length 50th (m)	3.2	0.0	20.8	0.0	0.5	26.1
Queue Length 95th (m)	11.2	9.4	56.1	2.2	1.9	42.6
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	686	641	3480	1557	369	3571
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	0.11	0.34	0.01	0.06	0.38
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Total Fri AM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	1068	19	21	1228
Future Volume (vph)	34	64	1068	19	21	1228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.18	1.00
Satd. Flow (perm)	1825	1585	3579	1601	337	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	71	1187	21	23	1364
RTOR Reduction (vph)	0	64	0	8	0	0
Lane Group Flow (vph)	38	7	1187	13	23	1364
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.2	5.2	34.5	34.5	39.1	39.1
Effective Green, g (s)	5.2	5.2	34.5	34.5	39.1	39.1
Actuated g/C Ratio	0.10	0.10	0.64	0.64	0.72	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	174	151	2273	1017	258	2577
v/s Ratio Prot	c0.02		0.33		0.00	c0.38
v/s Ratio Perm		0.00		0.01	0.06	
v/c Ratio	0.22	0.05	0.52	0.01	0.09	0.53
Uniform Delay, d1	22.7	22.3	5.4	3.6	3.0	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.2	0.0	0.2	0.2
Delay (s)	23.3	22.4	5.6	3.6	3.2	3.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	22.7		5.6			3.6
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			54.3		Sum of lost time (s)	14.0
Intersection Capacity Utilization			45.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Total Fri AM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	180	907	107	0	1262
Future Volume (Veh/h)	0	180	907	107	0	1262
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	196	986	116	0	1372
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1672	493			986	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1672	493			986	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	62			100	
cM capacity (veh/h)	87	522			696	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	196	493	493	116	686	686
Volume Left	0	0	0	0	0	0
Volume Right	196	0	0	116	0	0
cSH	522	1700	1700	1700	1700	1700
Volume to Capacity	0.38	0.29	0.29	0.07	0.40	0.40
Queue Length 95th (m)	13.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	16.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	16.0	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		42.9%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

(2047) Total Fri AM
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	180	0	1014	1155	107
Future Volume (Veh/h)	0	180	0	1014	1155	107
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	196	0	1102	1255	116
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2357	628	1255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2357	628	1255			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	54	100			
cM capacity (veh/h)	30	426	550			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	196	1102	628	628	116	
Volume Left	0	0	0	0	0	
Volume Right	196	0	0	0	116	
cSH	426	1700	1700	1700	1700	
Volume to Capacity	0.46	0.65	0.37	0.37	0.07	
Queue Length 95th (m)	18.0	0.0	0.0	0.0	0.0	
Control Delay (s)	20.4	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	20.4	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		1.5				
Intersection Capacity Utilization		56.7%		ICU Level of Service		B
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

(2047) Background Sunday
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	44	57	1168	42	67	2314
v/c Ratio	0.26	0.28	0.44	0.03	0.17	0.77
Control Delay	38.7	13.7	6.5	1.8	2.9	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	13.7	6.5	1.8	2.9	7.5
Queue Length 50th (m)	6.5	0.0	39.5	0.0	1.5	81.6
Queue Length 95th (m)	15.9	10.0	57.9	3.0	4.2	134.9
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	365	378	2630	1222	394	2991
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	0.12	0.15	0.44	0.03	0.17	0.77
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	42	55	1121	40	64	2221
Future Volume (vph)	42	55	1121	40	64	2221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.20	1.00
Satd. Flow (perm)	1738	1585	3544	1633	368	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	44	57	1168	42	67	2314
RTOR Reduction (vph)	0	53	0	12	0	0
Lane Group Flow (vph)	44	4	1168	30	67	2314
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	6.1	6.1	56.8	56.8	64.5	64.5
Effective Green, g (s)	6.1	6.1	56.8	56.8	64.5	64.5
Actuated g/C Ratio	0.08	0.08	0.70	0.70	0.80	0.80
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	131	119	2497	1150	358	2892
v/s Ratio Prot	c0.03		0.33		0.01	c0.64
v/s Ratio Perm		0.00		0.02	0.14	
v/c Ratio	0.34	0.04	0.47	0.03	0.19	0.80
Uniform Delay, d1	35.3	34.5	5.2	3.6	2.6	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1	0.1	0.0	0.3	1.7
Delay (s)	36.8	34.7	5.4	3.6	2.9	6.1
Level of Service	D	C	A	A	A	A
Approach Delay (s)	35.6		5.3			6.0
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			6.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.81			
Actuated Cycle Length (s)			80.6		Sum of lost time (s)	14.0
Intersection Capacity Utilization			73.1%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Background Sunday
06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1161	0	0	2263
Future Volume (Veh/h)	0	0	1161	0	0	2263
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1262	0	0	2460
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2492	1262			1262	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2492	1262			1262	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	24	161			547	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	1262	0	1230	1230	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.74	0.00	0.72	0.72	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			65.9%	ICU Level of Service		C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

(2047) Background Sunday
06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1161	2263	0
Future Volume (Veh/h)	0	0	0	1161	2263	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1262	2460	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3722	1230	2460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3722	1230	2460			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	3	169	186			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	1262	1230	1230	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.74	0.72	0.72	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		65.9%		ICU Level of Service		C
Analysis Period (min)		15				

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	80	2373	49	58	1467
v/c Ratio	0.14	0.39	0.87	0.04	0.33	0.50
Control Delay	36.7	15.3	15.5	2.0	7.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	15.3	15.5	2.0	7.9	3.4
Queue Length 50th (m)	3.1	0.3	144.3	0.4	1.2	29.1
Queue Length 95th (m)	9.5	12.3	#248.4	3.5	5.4	48.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	345	372	2726	1229	175	2939
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	0.22	0.87	0.04	0.33	0.50

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Background Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	74	2183	45	53	1350
Future Volume (vph)	19	74	2183	45	53	1350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1789	1601	3579	1601	114	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	80	2373	49	58	1467
RTOR Reduction (vph)	0	73	0	11	0	0
Lane Group Flow (vph)	21	7	2373	38	58	1467
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.7	5.7	62.3	62.3	69.4	69.4
Effective Green, g (s)	5.7	5.7	62.3	62.3	69.4	69.4
Actuated g/C Ratio	0.07	0.07	0.73	0.73	0.82	0.82
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	107	2620	1172	153	2862
v/s Ratio Prot	c0.01		c0.66		0.01	c0.42
v/s Ratio Perm		0.00		0.02	0.29	
v/c Ratio	0.18	0.07	0.91	0.03	0.38	0.51
Uniform Delay, d1	37.5	37.2	9.1	3.1	18.6	2.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	5.0	0.0	1.6	0.2
Delay (s)	38.2	37.5	14.0	3.1	20.2	2.6
Level of Service	D	D	B	A	C	A
Approach Delay (s)	37.6		13.8			3.3
Approach LOS	D		B			A
Intersection Summary						
HCM 2000 Control Delay			10.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			73.3%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Background Fri PM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	2229	0	0	1369
Future Volume (Veh/h)	0	0	2229	0	0	1369
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2423	0	0	1488
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3167	2423			2423	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3167	2423			2423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	8	25			193	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	2423	0	744	744	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.43	0.00	0.44	0.44	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			120.6%		ICU Level of Service	H
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Hwy 99 & Access D

(2047) Background Fri PM

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	2229	1369	0
Future Volume (Veh/h)	0	0	0	2229	1369	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	2423	1488	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3911	744	1488			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3911	744	1488			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	2	357	448			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	2423	744	744	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	1.43	0.44	0.44	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		120.6%		ICU Level of Service		H
Analysis Period (min)		15				

Queues
1: Hwy 99 & Copper Dr

(2047) Background Fri AM
06/19/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	71	987	21	23	1246
v/c Ratio	0.14	0.24	0.40	0.02	0.05	0.48
Control Delay	20.8	8.8	5.9	3.1	2.9	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	8.8	5.9	3.1	2.9	4.7
Queue Length 50th (m)	3.0	0.0	15.9	0.0	0.5	22.3
Queue Length 95th (m)	10.2	8.8	48.2	2.5	1.9	36.8
Internal Link Dist (m)	177.0		485.0			136.4
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	773	712	3508	1570	493	3579
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	0.05	0.10	0.28	0.01	0.05	0.35
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

1: Hwy 99 & Copper Dr

(2047) Background Fri AM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	888	19	21	1121
Future Volume (vph)	34	64	888	19	21	1121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.23	1.00
Satd. Flow (perm)	1825	1585	3579	1601	434	3579
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	71	987	21	23	1246
RTOR Reduction (vph)	0	64	0	8	0	0
Lane Group Flow (vph)	38	7	987	13	23	1246
Heavy Vehicles (%)	0%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.2	5.2	30.9	30.9	35.9	35.9
Effective Green, g (s)	5.2	5.2	30.9	30.9	35.9	35.9
Actuated g/C Ratio	0.10	0.10	0.60	0.60	0.70	0.70
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	161	2164	968	331	2514
v/s Ratio Prot	c0.02		0.28		0.00	c0.35
v/s Ratio Perm		0.00		0.01	0.05	
v/c Ratio	0.21	0.04	0.46	0.01	0.07	0.50
Uniform Delay, d1	21.1	20.7	5.5	4.0	2.8	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.2	0.0	0.1	0.2
Delay (s)	21.6	20.8	5.7	4.0	2.9	3.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	21.1		5.6			3.6
Approach LOS	C		A			A
Intersection Summary						
HCM 2000 Control Delay			5.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			51.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			42.7%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

2: Hwy 99 & Access A

(2047) Background Fri AM

06/19/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (veh/h)	0	0	907	0	0	1155
Future Volume (Veh/h)	0	0	907	0	0	1155
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	986	0	0	1255
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1614	986			986	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1614	986			986	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	95	247			696	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	986	0	628	628	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.58	0.29	0.37	0.37	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			51.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 3: Hwy 99 & Access D

(2047) Background Fri AM

06/19/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	907	1155	0
Future Volume (Veh/h)	0	0	0	907	1155	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	986	1255	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2241	628	1255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2241	628	1255			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	36	426	550			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	0	986	628	628	0	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.58	0.37	0.37	0.00	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			51.1%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Sunday - Mitigated - 70/30

05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	44	57	1375	42	67	2572
v/c Ratio	0.28	0.29	0.52	0.03	0.21	0.86
Control Delay	39.6	14.2	7.2	1.8	3.5	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	14.2	7.2	1.8	3.5	10.7
Queue Length 50th (m)	6.5	0.0	50.9	0.0	1.5	113.8
Queue Length 95th (m)	15.9	10.0	74.4	3.0	4.2	#213.8
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	328	345	2638	1226	321	2996
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	0.13	0.17	0.52	0.03	0.21	0.86

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis Day + 10 (2047) Total Sunday - Mitigated - 70/30

1: Hwy 99 & Copper Dr

05/22/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	42	55	1320	40	64	2469
Future Volume (vph)	42	55	1320	40	64	2469
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.15	1.00
Satd. Flow (perm)	1738	1585	3544	1633	281	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	44	57	1375	42	67	2572
RTOR Reduction (vph)	0	53	0	12	0	0
Lane Group Flow (vph)	44	4	1375	30	67	2572
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	6.5	6.5	62.3	62.3	70.3	70.3
Effective Green, g (s)	6.5	6.5	62.3	62.3	70.3	70.3
Actuated g/C Ratio	0.07	0.07	0.72	0.72	0.81	0.81
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	130	118	2543	1172	296	2927
v/s Ratio Prot	c0.03		0.39		0.01	c0.71
v/s Ratio Perm		0.00		0.02	0.17	
v/c Ratio	0.34	0.04	0.54	0.03	0.23	0.88
Uniform Delay, d1	38.1	37.2	5.7	3.5	3.3	5.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.1	0.2	0.0	0.4	3.3
Delay (s)	39.7	37.4	5.9	3.5	3.7	8.8
Level of Service	D	D	A	A	A	A
Approach Delay (s)	38.4		5.8			8.6
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.4	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			86.8	Sum of lost time (s)		14.0
Intersection Capacity Utilization			79.9%	ICU Level of Service		D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis + 10 (2047) Total Sunday - Mitigated - 70/30 2: Hwy 99 & Access A

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↗		↕
Traffic Volume (veh/h)	0	199	1161	106	0	2510
Future Volume (Veh/h)	0	199	1161	106	0	2510
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	1262	115	0	2728
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2626	631			1262	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2626	631			1262	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	49			100	
cM capacity (veh/h)	19	424			547	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	216	631	631	115	1364	1364
Volume Left	0	0	0	0	0	0
Volume Right	216	0	0	115	0	0
cSH	424	1700	1700	1700	1700	1700
Volume to Capacity	0.51	0.37	0.37	0.07	0.80	0.80
Queue Length 95th (m)	21.4	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	22.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	22.0	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			72.7%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis + 10 (2047) Total Sunday - Mitigated - 70/30 3: Hwy 99 & Access D

05/22/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	85	0	1267	2263	248
Future Volume (Veh/h)	0	85	0	1267	2263	248
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	0	1377	2460	270
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3837	1230	2460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3837	1230	2460			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	46	100			
cM capacity (veh/h)	3	169	186			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	92	1377	1230	1230	270	
Volume Left	0	0	0	0	0	
Volume Right	92	0	0	0	270	
cSH	169	1700	1700	1700	1700	
Volume to Capacity	0.54	0.81	0.72	0.72	0.16	
Queue Length 95th (m)	21.1	0.0	0.0	0.0	0.0	
Control Delay (s)	49.0	0.0	0.0	0.0	0.0	
Lane LOS	E					
Approach Delay (s)	49.0	0.0	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			74.5%	ICU Level of Service		D
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Sunday - Mitigated - 30/70

05/22/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	44	57	1256	42	67	2424
v/c Ratio	0.27	0.28	0.48	0.03	0.19	0.81
Control Delay	39.1	13.9	6.8	1.8	3.1	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.1	13.9	6.8	1.8	3.1	8.6
Queue Length 50th (m)	6.5	0.0	44.0	0.0	1.5	93.5
Queue Length 95th (m)	15.9	10.0	64.6	3.0	4.2	157.0
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	350	365	2638	1226	361	2996
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	0.13	0.16	0.48	0.03	0.19	0.81
Intersection Summary						

HCM Signalized Intersection Capacity Analysis 1: Hwy 99 & Copper Dr

05/22/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	42	55	1206	40	64	2327
Future Volume (vph)	42	55	1206	40	64	2327
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	1585	3544	1633	1772	3614
Flt Permitted	0.95	1.00	1.00	1.00	0.18	1.00
Satd. Flow (perm)	1738	1585	3544	1633	329	3614
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	44	57	1256	42	67	2424
RTOR Reduction (vph)	0	53	0	12	0	0
Lane Group Flow (vph)	44	4	1256	30	67	2424
Heavy Vehicles (%)	5%	3%	3%	0%	3%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	6.2	6.2	58.8	58.8	66.6	66.6
Effective Green, g (s)	6.2	6.2	58.8	58.8	66.6	66.6
Actuated g/C Ratio	0.07	0.07	0.71	0.71	0.80	0.80
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	130	118	2516	1159	330	2906
v/s Ratio Prot	c0.03		0.35		0.01	c0.67
v/s Ratio Perm		0.00		0.02	0.15	
v/c Ratio	0.34	0.04	0.50	0.03	0.20	0.83
Uniform Delay, d1	36.4	35.5	5.4	3.5	2.9	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.1	0.2	0.0	0.3	2.2
Delay (s)	37.9	35.7	5.5	3.6	3.2	7.0
Level of Service	D	D	A	A	A	A
Approach Delay (s)	36.6		5.5			6.9
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			7.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			82.8		Sum of lost time (s)	14.0
Intersection Capacity Utilization			76.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis + 10 (2047) Total Sunday - Mitigated - 30/70 2: Hwy 99 & Access A

05/22/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	85	1161	248	0	2369
Future Volume (Veh/h)	0	85	1161	248	0	2369
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	1262	270	0	2575
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2550	631			1262	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2550	631			1262	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	78			100	
cM capacity (veh/h)	22	424			547	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	92	631	631	270	1288	1288
Volume Left	0	0	0	0	0	0
Volume Right	92	0	0	270	0	0
cSH	424	1700	1700	1700	1700	1700
Volume to Capacity	0.22	0.37	0.37	0.16	0.76	0.76
Queue Length 95th (m)	6.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	15.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	15.8	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			68.8%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis + 10 (2047) Total Sunday - Mitigated - 30/70 3: Hwy 99 & Access D

05/22/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖↗	↗
Traffic Volume (veh/h)	0	199	0	1408	2263	106
Future Volume (Veh/h)	0	199	0	1408	2263	106
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	0	1530	2460	115
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3990	1230	2460			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3990	1230	2460			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	2	169	186			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	216	1530	1230	1230	115	
Volume Left	0	0	0	0	0	
Volume Right	216	0	0	0	115	
cSH	169	1700	1700	1700	1700	
Volume to Capacity	1.28	0.90	0.72	0.72	0.07	
Queue Length 95th (m)	94.1	0.0	0.0	0.0	0.0	
Control Delay (s)	215.1	0.0	0.0	0.0	0.0	
Lane LOS	F					
Approach Delay (s)	215.1	0.0	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			10.8			
Intersection Capacity Utilization			81.5%		ICU Level of Service	
Analysis Period (min)			15			
			D			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Friday PM - Mitigated - 70/30

05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	80	2589	49	58	1765
v/c Ratio	0.14	0.40	0.95	0.04	0.33	0.60
Control Delay	36.6	15.9	22.7	2.2	7.9	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	15.9	22.7	2.2	7.9	4.3
Queue Length 50th (m)	3.1	0.6	~230.6	0.5	1.2	41.1
Queue Length 95th (m)	9.4	12.6	#287.2	3.7	5.4	69.5
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	345	370	2725	1227	175	2938
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	0.22	0.95	0.04	0.33	0.60

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.

HCM Signalized Intersection Capacity Analysis - 10 (2047) Total Friday PM - Mitigated - 70/30
 1: Hwy 99 & Copper Dr

05/22/2019

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	74	2382	45	53	1624
Future Volume (vph)	19	74	2382	45	53	1624
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1789	1601	3579	1601	114	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	80	2589	49	58	1765
RTOR Reduction (vph)	0	71	0	10	0	0
Lane Group Flow (vph)	21	9	2589	39	58	1765
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.7	5.7	62.3	62.3	69.4	69.4
Effective Green, g (s)	5.7	5.7	62.3	62.3	69.4	69.4
Actuated g/C Ratio	0.07	0.07	0.73	0.73	0.82	0.82
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	107	2620	1172	153	2862
v/s Ratio Prot	c0.01		c0.72		0.01	c0.50
v/s Ratio Perm		0.01		0.02	0.29	
v/c Ratio	0.18	0.08	0.99	0.03	0.38	0.62
Uniform Delay, d1	37.5	37.3	11.0	3.1	25.0	2.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	14.7	0.0	1.6	0.4
Delay (s)	38.2	37.6	25.8	3.1	26.6	3.3
Level of Service	D	D	C	A	C	A
Approach Delay (s)	37.7		25.4			4.1
Approach LOS	D		C			A
Intersection Summary						
HCM 2000 Control Delay			17.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			78.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday PM - Mitigated - 70/30 2: Hwy 99 & Access A

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↗		↕
Traffic Volume (veh/h)	0	199	2229	118	0	1643
Future Volume (Veh/h)	0	199	2229	118	0	1643
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	2423	128	0	1786
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3316	1212			2423	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3316	1212			2423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	0			100	
cM capacity (veh/h)	6	174			193	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	216	1212	1212	128	893	893
Volume Left	0	0	0	0	0	0
Volume Right	216	0	0	128	0	0
cSH	174	1700	1700	1700	1700	1700
Volume to Capacity	1.24	0.71	0.71	0.08	0.53	0.53
Queue Length 95th (m)	91.1	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	199.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	199.8	0.0			0.0	
Approach LOS	F					
Intersection Summary						
Average Delay		9.5				
Intersection Capacity Utilization		80.6%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday PM - Mitigated - 70/30 3: Hwy 99 & Access D

05/22/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑↑	↗
Traffic Volume (veh/h)	0	85	0	2346	1369	274
Future Volume (Veh/h)	0	85	0	2346	1369	274
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	0	2550	1488	298
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4038	744	1488			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4038	744	1488			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	74	100			
cM capacity (veh/h)	2	357	448			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	92	2550	744	744	298	
Volume Left	0	0	0	0	0	
Volume Right	92	0	0	0	298	
cSH	357	1700	1700	1700	1700	
Volume to Capacity	0.26	1.50	0.44	0.44	0.18	
Queue Length 95th (m)	7.7	0.0	0.0	0.0	0.0	
Control Delay (s)	18.5	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	18.5	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			126.8%	ICU Level of Service		H
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Friday PM - Mitigated - 30/70

05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	80	2465	49	58	1595
v/c Ratio	0.14	0.39	0.90	0.04	0.33	0.54
Control Delay	36.6	15.6	17.8	2.0	7.9	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	15.6	17.8	2.0	7.9	3.7
Queue Length 50th (m)	3.1	0.5	162.2	0.4	1.2	33.9
Queue Length 95th (m)	9.4	12.4	#265.3	3.6	5.4	57.0
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	345	371	2726	1228	175	2938
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	0.22	0.90	0.04	0.33	0.54

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis - 10 (2047) Total Friday PM - Mitigated - 30/70 1: Hwy 99 & Copper Dr

05/22/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	19	74	2268	45	53	1467
Future Volume (vph)	19	74	2268	45	53	1467
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.06	1.00
Satd. Flow (perm)	1789	1601	3579	1601	114	3510
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	80	2465	49	58	1595
RTOR Reduction (vph)	0	72	0	10	0	0
Lane Group Flow (vph)	21	8	2465	39	58	1595
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.7	5.7	62.3	62.3	69.4	69.4
Effective Green, g (s)	5.7	5.7	62.3	62.3	69.4	69.4
Actuated g/C Ratio	0.07	0.07	0.73	0.73	0.82	0.82
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	107	2620	1172	153	2862
v/s Ratio Prot	c0.01		c0.69		0.01	c0.45
v/s Ratio Perm		0.01		0.02	0.29	
v/c Ratio	0.18	0.08	0.94	0.03	0.38	0.56
Uniform Delay, d1	37.5	37.2	9.8	3.1	22.5	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	7.7	0.0	1.6	0.2
Delay (s)	38.2	37.5	17.5	3.1	24.1	2.9
Level of Service	D	D	B	A	C	A
Approach Delay (s)	37.7		17.2			3.6
Approach LOS	D		B			A
Intersection Summary						
HCM 2000 Control Delay			12.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.87			
Actuated Cycle Length (s)			85.1		Sum of lost time (s)	14.0
Intersection Capacity Utilization			75.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday PM - Mitigated - 30/70 2: Hwy 99 & Access A

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕↕	↗		↕↕
Traffic Volume (veh/h)	0	85	2229	274	0	1486
Future Volume (Veh/h)	0	85	2229	274	0	1486
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	2423	298	0	1615
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3230	1212			2423	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3230	1212			2423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	47			100	
cM capacity (veh/h)	7	174			193	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	92	1212	1212	298	808	808
Volume Left	0	0	0	0	0	0
Volume Right	92	0	0	298	0	0
cSH	174	1700	1700	1700	1700	1700
Volume to Capacity	0.53	0.71	0.71	0.18	0.47	0.47
Queue Length 95th (m)	20.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	46.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	E					
Approach Delay (s)	46.7	0.0			0.0	
Approach LOS	E					
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		73.5%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday PM - Mitigated - 30/70 3: Hwy 99 & Access D

05/22/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑↑	↗
Traffic Volume (veh/h)	0	199	0	2503	1369	118
Future Volume (Veh/h)	0	199	0	2503	1369	118
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	216	0	2721	1488	128
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4209	744	1488			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4209	744	1488			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	40	100			
cM capacity (veh/h)	1	357	448			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	216	2721	744	744	128	
Volume Left	0	0	0	0	0	
Volume Right	216	0	0	0	128	
cSH	357	1700	1700	1700	1700	
Volume to Capacity	0.60	1.60	0.44	0.44	0.08	
Queue Length 95th (m)	28.7	0.0	0.0	0.0	0.0	
Control Delay (s)	29.4	0.0	0.0	0.0	0.0	
Lane LOS	D					
Approach Delay (s)	29.4	0.0	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			135.1%	ICU Level of Service		H
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Friday AM - Mitigated - 70/30

05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	71	1271	21	23	1419
v/c Ratio	0.16	0.26	0.49	0.02	0.07	0.53
Control Delay	24.6	10.1	5.7	2.4	2.9	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	10.1	5.7	2.4	2.9	4.8
Queue Length 50th (m)	3.4	0.0	23.3	0.0	0.5	28.1
Queue Length 95th (m)	11.8	9.8	61.9	2.2	1.9	46.4
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	622	588	3457	1547	345	3475
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	0.12	0.37	0.01	0.07	0.41
Intersection Summary						

HCM Signalized Intersection Capacity Analysis + 10 (2047) Total Friday AM - Mitigated - 70/30 1: Hwy 99 & Copper Dr

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	1144	19	21	1277
Future Volume (vph)	34	64	1144	19	21	1277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.16	1.00
Satd. Flow (perm)	1825	1585	3579	1601	302	3510
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	71	1271	21	23	1419
RTOR Reduction (vph)	0	64	0	7	0	0
Lane Group Flow (vph)	38	7	1271	14	23	1419
Heavy Vehicles (%)	0%	3%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.3	5.3	36.6	36.6	41.2	41.2
Effective Green, g (s)	5.3	5.3	36.6	36.6	41.2	41.2
Actuated g/C Ratio	0.09	0.09	0.65	0.65	0.73	0.73
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	148	2318	1037	236	2559
v/s Ratio Prot	c0.02		0.36		0.00	c0.40
v/s Ratio Perm		0.00		0.01	0.07	
v/c Ratio	0.22	0.05	0.55	0.01	0.10	0.55
Uniform Delay, d1	23.7	23.3	5.4	3.5	3.2	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.3	0.0	0.2	0.3
Delay (s)	24.4	23.4	5.7	3.5	3.4	3.7
Level of Service	C	C	A	A	A	A
Approach Delay (s)	23.7		5.7			3.7
Approach LOS	C		A			A

Intersection Summary

HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday AM - Mitigated - 70/30

2: Hwy 99 & Access A

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕↕	↗		↕↕
Traffic Volume (veh/h)	0	255	907	67	0	1311
Future Volume (Veh/h)	0	255	907	67	0	1311
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	277	986	73	0	1425
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1698	493			986	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1698	493			986	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	47			100	
cM capacity (veh/h)	83	522			696	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	277	493	493	73	712	712
Volume Left	0	0	0	0	0	0
Volume Right	277	0	0	73	0	0
cSH	522	1700	1700	1700	1700	1700
Volume to Capacity	0.53	0.29	0.29	0.04	0.42	0.42
Queue Length 95th (m)	23.4	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	19.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	19.4	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay		2.0				
Intersection Capacity Utilization		47.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday AM - Mitigated - 70/30 3: Hwy 99 & Access D

05/22/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑↑	↗
Traffic Volume (veh/h)	0	109	0	974	1155	156
Future Volume (Veh/h)	0	109	0	974	1155	156
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	118	0	1059	1255	170
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2314	628	1255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2314	628	1255			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	72	100			
cM capacity (veh/h)	32	426	550			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	118	1059	628	628	170	
Volume Left	0	0	0	0	0	
Volume Right	118	0	0	0	170	
cSH	426	1700	1700	1700	1700	
Volume to Capacity	0.28	0.62	0.37	0.37	0.10	
Queue Length 95th (m)	8.5	0.0	0.0	0.0	0.0	
Control Delay (s)	16.7	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	16.7	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			54.6%	ICU Level of Service		A
Analysis Period (min)			15			

Queues
1: Hwy 99 & Copper Dr

Opening Day + 10 (2047) Total Friday AM - Mitigated - 30/70

05/22/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	71	1109	21	23	1320
v/c Ratio	0.15	0.25	0.44	0.02	0.05	0.51
Control Delay	22.6	9.4	5.9	2.9	2.9	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	9.4	5.9	2.9	2.9	4.8
Queue Length 50th (m)	3.2	0.0	19.0	0.0	0.5	25.0
Queue Length 95th (m)	11.0	9.3	56.1	2.4	1.9	41.3
Internal Link Dist (m)	177.0		485.0			62.6
Turn Bay Length (m)				65.0	75.0	
Base Capacity (vph)	696	648	3464	1550	452	3510
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	0.05	0.11	0.32	0.01	0.05	0.38
Intersection Summary						

HCM Signalized Intersection Capacity Analysis - 10 (2047) Total Friday AM - Mitigated - 30/70 1: Hwy 99 & Copper Dr

05/22/2019



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	998	19	21	1188
Future Volume (vph)	34	64	998	19	21	1188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1585	3579	1601	1789	3510
Flt Permitted	0.95	1.00	1.00	1.00	0.20	1.00
Satd. Flow (perm)	1825	1585	3579	1601	371	3510
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	71	1109	21	23	1320
RTOR Reduction (vph)	0	64	0	8	0	0
Lane Group Flow (vph)	38	7	1109	13	23	1320
Heavy Vehicles (%)	0%	3%	2%	2%	2%	4%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.3	5.3	33.4	33.4	38.4	38.4
Effective Green, g (s)	5.3	5.3	33.4	33.4	38.4	38.4
Actuated g/C Ratio	0.10	0.10	0.62	0.62	0.72	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	180	156	2226	995	291	2509
v/s Ratio Prot	c0.02		0.31		0.00	c0.38
v/s Ratio Perm		0.00		0.01	0.05	
v/c Ratio	0.21	0.04	0.50	0.01	0.08	0.53
Uniform Delay, d1	22.3	21.9	5.6	3.9	3.0	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.2	0.0	0.1	0.2
Delay (s)	22.9	22.0	5.7	3.9	3.1	3.7
Level of Service	C	C	A	A	A	A
Approach Delay (s)	22.3		5.7			3.7
Approach LOS	C		A			A

Intersection Summary

HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	53.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis Opening Day 10 (2047) Total Friday AM - Mitigated - 30/70 2: Hwy 99 & Access A

05/22/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	109	907	156	0	1222
Future Volume (Veh/h)	0	109	907	156	0	1222
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	118	986	170	0	1328
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1650	493			986	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1650	493			986	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	77			100	
cM capacity (veh/h)	90	522			696	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	118	493	493	170	664	664
Volume Left	0	0	0	0	0	0
Volume Right	118	0	0	170	0	0
cSH	522	1700	1700	1700	1700	1700
Volume to Capacity	0.23	0.29	0.29	0.10	0.39	0.39
Queue Length 95th (m)	6.6	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	13.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.9	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			38.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 10 (2047) Total Friday AM - Mitigated - 30/70 3: Hwy 99 & Access D

05/22/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑↑	↗
Traffic Volume (veh/h)	0	255	0	1063	1155	67
Future Volume (Veh/h)	0	255	0	1063	1155	67
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	277	0	1155	1255	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2410	628	1255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2410	628	1255			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	35	100			
cM capacity (veh/h)	27	426	550			
Direction, Lane #	EB 1	NB 1	SB 1	SB 2	SB 3	
Volume Total	277	1155	628	628	73	
Volume Left	0	0	0	0	0	
Volume Right	277	0	0	0	73	
cSH	426	1700	1700	1700	1700	
Volume to Capacity	0.65	0.68	0.37	0.37	0.04	
Queue Length 95th (m)	34.1	0.0	0.0	0.0	0.0	
Control Delay (s)	27.8	0.0	0.0	0.0	0.0	
Lane LOS	D					
Approach Delay (s)	27.8	0.0	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			59.3%	ICU Level of Service		B
Analysis Period (min)			15			

