

DANCER SUBDIVISION TIS

STAR, IDAHO

June 2024



Dancer Subdivision TIS

Star, Idaho

Prepared for:

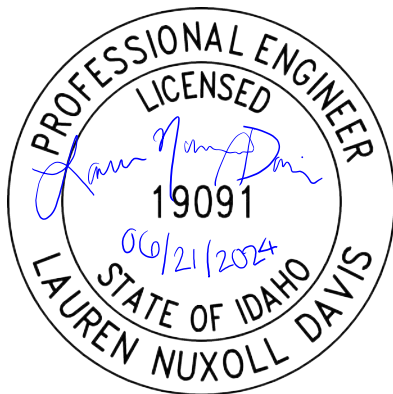
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Section 1

Executive Summary

EXECUTIVE SUMMARY

Kittelson & Associates, Inc (Kittelson) has prepared a Transportation Impact Study (TIS) for the Dancer Subdivision in Star, Idaho. The Dancer Subdivision is located in the northeast corner of the Can Ada Road and Joplin Road intersection, north of Chinden Boulevard (US 20-26). The proposed site consists of approximately 115 acres and is currently open land with some rural single-family housing and farmland. The site is currently not zoned in the City of Star but will be annexed into the city with development. The development plan proposes to build approximately 346 single-family homes on the site. Access to the site is proposed via one full-movement access to Joplin Road. The development is planned to be fully built-out by the year 2029. This TIS addresses the existing conditions (2024), background conditions (2029), and the development's impacts in the build-out year 2029 (total conditions). The TIS resulted in the following findings and recommendations.

FINDINGS

YEAR 2024 EXISTING CONDITIONS

- All study intersections were found to operate acceptably during the 2024 existing weekday AM and PM peak hours, except for:
 - **Can Ada Road / Chinden Boulevard (US 20-26)**
 - The northbound and southbound approaches operate at LOS F during both the weekday AM and PM peak hours, and overcapacity during the weekday PM peak hour.
 - ITD has planned and funded the ChindenWest corridor improvements, which include reconstructing the intersection of Can Ada Road / Chinden Boulevard (US 20-26) to be traffic signal controlled and include two eastbound and westbound through lanes, left-turn lanes on all approaches, and right-turn lanes on the eastbound, westbound, and northbound approaches. This will mitigate the intersection to within ACHD and ITD standards under existing 2024 conditions.
 - **Star Road / Chinden Boulevard (US 20-26)**
 - The overall intersection operates at LOS E, under capacity but exceeding v/c of 0.90 during the weekday PM peak hour, exceeding ACHD and ITD standards. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate under capacity but exceeding ITD's v/c threshold.
 - ITD has planned and funded the ChindenWest corridor improvements, which include widening Chinden Boulevard (US 20-26) to the west of Star Road to four lanes, which will improve westbound lane utilization through this intersection and subsequently will mitigate operations at this intersection to within ACHD and ITD standards under existing 2024 conditions.
- All study roadway segments were found to meet the ACHD volume thresholds under 2024 existing conditions, except for:
 - **Star Road (Joplin Road to Chinden Boulevard (US 20-26))**

- The southbound directional volume during the weekday AM peak hour and the northbound directional volume during the weekday PM peak hour exceed ACHD's 2-lane minor arterial standard.
- This roadway segment is forecast to meet the ACHD volume thresholds for a five-lane minor arterial volume threshold. ACHD's CIP identifies this improvement is programmed for 2031-2035.

YEAR 2029 BACKGROUND TRAFFIC CONDITIONS

- All study intersections were found to operate acceptably during the 2029 background weekday AM and PM peak hours, except for:
 - **Can Ada Road / Chinden Boulevard (US 20-26)**
 - No additional mitigation needs beyond those identified under existing 2024 conditions are required to mitigate intersection operations to within ACHD and ITD standards.
 - **Star Road / Chinden Boulevard (US 20-26)**
 - Similar to existing 2024 conditions, under 2029 background conditions the intersection of operates overcapacity and LOS F during the weekday PM peak hour. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate overcapacity, exceeding ITD's v/c threshold.
 - Adding an additional eastbound left-turn lane and the associated northbound receiving lane on Star Road, will mitigate operations at this intersection to within ACHD and ITD standards under 2029 background conditions. This is consistent with ACHD's CIP improvement programmed in 2031-2035.
 - **Star Road / Joplin Road**
 - The critical eastbound approach at the Star Road / Joplin Road intersection operates under capacity but at LOS F during the weekday AM and PM peak hours.
 - Signal warrants were evaluated using 48-hour tube count data collected in March 2024, which show that all three (peak hour, four-hour, eight-hour) volume based MUTCD signal warrants are met under background 2029 conditions.
 - However, given that all movements operate within ACHD LOS standards and under capacity a traffic signal is not needed for acceptable operations at this intersection.
- All study roadway segments were found to meet the ACHD volume thresholds under 2029 background conditions, except for:
 - **Star Road (Joplin Road to Chinden Boulevard (US 20-26))**
 - No additional mitigation needs beyond those identified under existing 2024 conditions are required to mitigate intersection operations to within ACHD standards.

TRIP GENERATION & DISTRIBUTION

- The proposed Dancer Subdivision development, consisting of 346 single-family homes, is estimated to generate approximately 3,161 daily trip ends. Of those, approximately 231 are estimated to occur during the weekday AM peak hour (58 inbound / 173 outbound), and approximately 319 are estimated to occur during the weekday PM peak hour (201 inbound / 118 outbound).

YEAR 2029 TOTAL TRAFFIC CONDITIONS

- All study intersections were found to operate acceptably during the 2029 total weekday AM and PM peak hours, except for:
 - **Can Ada Road / Chinden Boulevard (US 20-26)**
 - No additional mitigation needs beyond those identified under existing 2024 conditions are required to mitigate intersection operations to within ACHD and ITD standards.
 - **Star Road / Chinden Boulevard (US 20-26)**
 - No additional mitigation needs beyond those identified under 2029 background conditions are required to mitigate intersection operations to within ACHD and ITD standards.
 - **Star Road / Joplin Road**
 - The critical eastbound approach at the Star Road / Joplin Road intersection operates overcapacity but at LOS F during the weekday AM and PM peak hours.
 - ACHD has conditioned the in-process developments identified in this analysis with constructing a dedicated northbound left-turn, southbound left-turn, and southbound right-turn lane.
 - Constructing a dedicated northbound left-turn, southbound left-turn, and southbound right-turn lane assuming the left-turn lanes function as a two-way center left-turn lane will mitigate intersection operations to within ACHD standards under 2029 total traffic conditions.
 - Widening Star Road to five lanes will further mitigate operations at this intersection to within ACHD and ITD standards under 2029 total traffic conditions. This is consistent with ACHD's CIP improvement programmed in 2031-2035.
- All study roadway segments were found to meet the ACHD volume thresholds under 2029 background conditions, except for:
 - **Star Road (Joplin Road to Chinden Boulevard (US 20-26))**
 - No additional mitigation needs beyond those identified under existing 2024 conditions are required to mitigate intersection operations to within ACHD standards.

SITE ACCESS EVALUATION

- The proposed site access meets ACHD Policy for access spacing.
- The turn lane analysis using ACHD procedures resulted in no turn lane warrants being met at the site access location.
- Intersection sight distance is adequate at the proposed site access.

RECOMMENDATIONS

Based on the report's analyses and evaluation of findings the following recommendations were developed:

YEAR 2024 EXISTING CONDITIONS MITIGATIONS

The following mitigations are recommended to accommodate the year 2024 existing traffic volumes and meet ACHD and ITD standards:

- **Study Intersections**
 - **Can Ada Road / Chinden Boulevard (US 20-26)**
 - Construct a traffic signal as identified in ITD's ChindenWest project.
 - **Star Road / Chinden Boulevard (US 20-26)**
 - Construct Chinden Boulevard (US 20-26) widening west of Star Road as identified in ITD's ChindenWest project.
- **Study Roadway Segments**
 - **Star Road (Joplin Road to Chinden Boulevard (US 20-26))**
 - Widen to five lanes (continuous left-turn lane).

YEAR 2029 BACKGROUND CONDITIONS MITIGATIONS

The following mitigations are recommended to accommodate the year 2029 background traffic volumes and meet ACHD and ITD standards:

- **Study Intersections**
 - **Star Road / Chinden Boulevard (US 20-26)**
 - Restripe additional eastbound left-turn lane.
 - Construct associated northbound receiving lane on Star Road as identified in ACHD CIP and Master Street Map.

YEAR 2029 TOTAL CONDITIONS MITIGATIONS

The following mitigations are recommended to accommodate the year 2029 total traffic volumes and meet ACHD and ITD standards:

- **Study Intersections**
 - **Star Road / Joplin Road**
 - Construct a northbound left-turn, southbound left-turn, and southbound right-turn lane with at least 125 feet of storage.

- **Site Accesses**
 - Remove miscellaneous vegetation and shrubbery, and potential obstructions along Joplin Road as necessary to obtain and maintain adequate intersection sight distance.
 - Site access should match the existing grade of Joplin Road at the intersection and back at least one car length.
 - All access points for the development should be approved given the safety considerations, site operations, and circulation needs of the development, and consistency with the intent of the ACHD access management policy as described in the Site Access Evaluation section of this report.

MITIGATION TIMING & THRESHOLD EVALUATION

For each of the mitigations identified, the number of site development units and approximate year of need for the mitigation was evaluated. It should be noted that most mitigations are needed to address total conditions, so the site development may only trigger the need for the mitigation earlier. Table A shows the recommended mitigations and thresholds.

Table A. Mitigation Threshold Evaluation

Intersection or Roadway	2024 Existing Need?	2029 Background Need?	Percent of Site Traffic at Buildout	Operational / Mitigation Need	Proposed Mitigation	Approx. Year of Need	Estimated Units Built at Time of Need
Can Ada Road / Joplin Road	No Mitigation Required						
Can Ada Road / Chinden Boulevard (US 20-26)	Yes	Yes	AM – 4% PM – 5% Average – 4.5%	The NB and SB approaches exceed ACHD and ITD operational thresholds during the AM and PM peak hours.	ITD ChindenWest Traffic Signal (2025)	Current Need (2024)	0 units (current need under existing conditions)
Star Road / Chinden Boulevard (US 20-26)	Yes	Yes	AM – 3% PM – 4% Average – 3.5%	The overall intersection exceeds ACHD and ITD standards. During the PM peak hour the WBT, NBT, EBL operate under capacity but exceeding ITD's v/c threshold.	ITD ChindenWest Chinden Boulevard (US 20-26) widening to four lanes (2025)	Current Need (2024)	0 units (current need under existing conditions)
	No	Yes			Second dedicated EBL turn lane.	2026 (PM)	40% (138 units)
Star Road / Joplin Road	No	Yes	AM – 6% PM – 8% Average – 7%	The EB approach exceeds ACHD and ITD operational thresholds during the AM and PM peak hours.	NBL, SBL, SBR turn lane.	2028 (AM)	80% (276 units)
Star Road Joplin Road to Chinden Boulevard (US 20-26)	Yes	Yes	AM – 6% PM – 8% Average – 7%	SB volume during the AM peak hour and the NB volume during the PM peak hour exceed ACHD's 2-lane minor arterial standard.	ACHD CIP Widen to five lanes (continuous left-turn lane, 2031-2035)	Current Need (2024)	0 units (current need under existing conditions)
Joplin Road Can Ada Road to Chinden Boulevard (US 20-26)	No Mitigation Required						
Can Ada Road Joplin Road to Chinden Boulevard (US 20-26)	No Mitigation Required						



Section 2

Introduction

INTRODUCTION

Kittelston & Associates, Inc. (Kittelston) has conducted a Transportation Impact Study (TIS) for the proposed Dancer Subdivision in Star, Idaho. The study was prepared in accordance with requirements of the Ada County Highway District's (ACHD) *Policy Manual Section 7106* (Reference 1) and the Idaho Transportation Department (ITD) *Rules Governing Right-of-Way Encroachments on State Rights-of-Way* (Reference 2). The TIS examines the current transportation network and addresses the transportation impacts associated with background growth and the proposed development.

PROJECT DESCRIPTION

The Dancer Subdivision is located in the northeast corner of the Can Ada Road and Joplin Road intersection, north of Chinden Boulevard (US 20-26), as shown in Figure 1. The proposed site consists of approximately 115 acres and is currently open land with some rural single-family housing and farmland. The site is currently not zoned in the City of Star but will be annexed into the city with development. The development plan proposes to build approximately 346 single-family homes on the site.

Figure 2 illustrates the proposed development site plan.

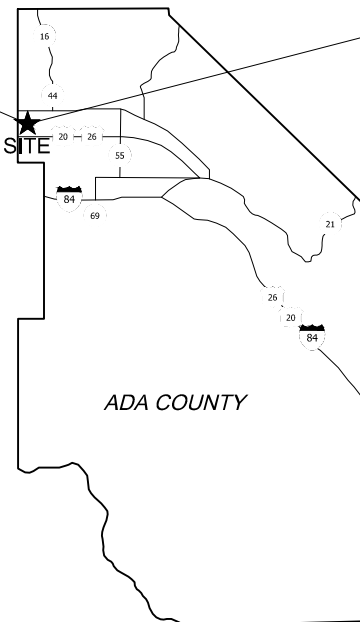
Access to the development is proposed via one full movement access on Joplin Road. The proposed access point is in the following location:

- Site Access A: a full movement access located on Joplin Road approximately 2,700 feet east of the intersection of Can Ada Road and Joplin Road.

There are several stub streets that will connect to future collectors along the western, eastern, and northern boundaries of the site.

The development is planned to be fully built-out by the year 2029. This TIS addresses the existing (2024), background (2029), and the total traffic development's impacts in the build-out year 2029 and necessary mitigation measures.

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- # - Study Intersections
- (X) - Site Access
- - Study Segment

Site Vicinity Map
Star, Idaho

Figure
1

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1

A

W JOPLIN ROAD

2,700'

N CAN-ADA ROAD

- # - Study Intersections
- X - Site Access

Proposed Site Plan
Star, Idaho

Figure
2

SCOPE OF THE REPORT

ACHD and ITD reviewed and agreed with the scope, methodology and key assumptions within this TIS in April 2024. *Appendix A includes the Proposed Scope of Work for the Transportation Impact Analysis memorandum and response emails from ITD and ACHD.*

This report evaluates these transportation issues:

- Existing land use and transportation system conditions, including intersections and roadways within the site vicinity for the typical weekday AM and PM peak periods;
- Estimated local and regional growth in the study area for future year background analyses based on an annual compounded growth rate applied to existing traffic volumes;
- Intersection and segment analysis under year 2029 background traffic conditions (existing counts plus four years of regional growth but not including the project) during the weekday AM and PM peak periods;
- Trip generation and distribution estimates for the proposed project;
- Intersection and segment analysis under year 2029 total traffic conditions (year 2029 background traffic plus site-generated trips) during the weekday AM and PM peak periods;
- Identified transportation mitigations at the study intersections under existing, year 2029 background and year 2029 total traffic conditions;
- Evaluation of site access intersections; and
- Summary of findings and recommendations.

STUDY AREA

The following study intersections and roadways were identified during the scoping process and included in the analysis:

- Existing Intersections
 1. Can Ada Road / Joplin Road
 2. Can Ada Road / Chinden Boulevard (US 20-26)
 3. Star Road / Chinden Boulevard (US 20-26)
 4. Star Road / Joplin Road
- Future Intersections:
 - A. Site Access A / Joplin Road
- Roadway Segments:
 - Star Road – Joplin Road to Chinden Boulevard (US 20-26)
 - Joplin Road – Can Ada Road to Star Road
 - Can Ada Road – Joplin Road to Chinden Boulevard (US 20-26)

INTERSECTION PERFORMANCE MEASURES

Intersection performance measures reported in this study include level of service (LOS), volume-to-capacity ratio (v/c), delay and 95th percentile queues.

The performance measures are used to gauge the performance of the transportation system and overall quality of the travel experience through an intersection or roadway segment as it is perceived by the traveler:

- *Level-of-service (LOS)* is currently the most commonly used performance measure. LOS uses an “A” to “F” ranking based on the average control delay experienced by motorists. LOS “A” conditions have very low vehicles delay times (10 seconds or less), while LOS “F” conditions have high delay times (over 80 seconds on average per vehicle at the signalized intersection) that are considered unacceptable to most drivers.
- *Volume-to-capacity (v/c)* compares the volume of traffic to the theoretical capacity of the facility to accommodate traffic. A v/c ratio of 1.0 indicates an intersection, or movement at an intersection, is operating at capacity. A v/c ratio over 1.0 indicates the intersection’s capacity is exceeded.
- *95th percentile queue* is the queue length that has only a 5 percent probability of being exceeded during the analysis time-period. It is used to help determine turn lane storage, but not what the typical driver would experience. This performance measure is helpful in assessing access spacing from adjacent unsignalized and signalized intersections.

Overall intersection performance is calculated for signalized intersections. For two-way stop-controlled intersections, performance measures are reported for the critical movement.

TRAFFIC ANALYSIS METHODOLOGY

The intersection operational analysis was performed using the *Highway Capacity Manual (HCM) 6th Edition* analysis procedures (Reference 3). To ensure that this analysis is based on a reasonable worst-case scenario, the peak 15-minute flow rate during all peak hours was used in the evaluation of all intersection LOS and v/c ratios. This analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate better than the conditions described in this report during all other time periods. The intersection operations analyses conducted for the TIS were prepared using Synchro 10.

The roadway segment analysis was performed using the ACHD Street Capacity Guidelines Table in ACHD’s *2020 Capital Improvements Plan* (Reference 4) for all ACHD roadways.

The *HCM 2000* (Reference 5) was utilized due to the ability to report overall intersection v/c ratios for a signalized intersection as required by ACHD Policy Manual, since the *HCM 6th Edition* does not report overall intersection v/c ratio.

Additionally, the guidance in the *Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition* (Reference 6) was used for signal warrant analyses when determining the appropriate mitigation for an impacted study intersection.

SIGNAL TIMING AND OTHER PARAMETERS

ACHD provided current signal timing via signal timing sheets. *Appendix B contains these signal timing sheets*. ACHD required values were used for the ideal saturation flow rate (1800 vehicles per hour per

lane), while other inputs were gathered from field data including truck percentages, peak hour factors, posted speeds, and storage lengths.

Per ACHD Policy Manual, peak hour factor adjustments were input for each intersection by approach under existing conditions. This is not consistent with HCM procedures (which outlines one peak hour factor for the overall intersection) but is outlined in the ACHD policy manual for existing conditions analysis. Inputting peak hour factors by approach models a scenario that does not actually occur in the field and, as such, the existing conditions analysis may reflect operations that are worse than occurs on the system today.

PERFORMANCE MEASURES

The operating standards of ITD and ACHD were used to assess the traffic operations of the study intersections and roadways.

ACHD INTERSECTION AND ROADWAY STANDARDS

The analysis was performed in accordance with the methodologies stated in Section 7106.6 of the *ACHD Policy Manual* (Reference 1). Intersection and segment LOS are reported per ACHD thresholds.

ACHD requires that signalized intersections operate at a minimum of LOS E for Principal Arterials and Minor Arterials and LOS D for Collectors. The acceptable v/c ratio for signalized intersection is 0.90 for the overall intersection and 1.00 for each lane group. The acceptable v/c ratio is 1.00 for the critical lane group at unsignalized intersections. All unsignalized intersections that have a projected LOS D or worse shall be evaluated to determine if a signal or roundabout is warranted. Additionally, Section 5108.6.4 identifies a maximum volume-to-capacity ratio (v/c) at a roundabout to be 0.85, which is also reviewed for mitigations involving roundabouts.

ITD INTERSECTION STANDARDS

Although not policy, ITD's desired thresholds are LOS D or better for all intersections and a V/C ratio of 0.90 or better for the overall intersections as well as each lane group.

Table 1 summarizes the LOS standards for the study area intersections (signalized and unsignalized).

Table 1. Study Intersections and Corresponding Operational Standards

ID	Study Intersection	Agency	Traffic Control	ITD Operating Standard	ACHD Operating Standard
1	Can Ada Road / Joplin Road	ACHD	TWSC	• N/A	• LOS E or better • Critical Movement v/c ≤ 1.00 • Evaluate Signal Warrants if $\leq$ LOS D
2	Can Ada Road / Chinden Blvd (US 20-26)	ITD / ACHD	TWSC	• LOS D or better • Critical Lane Group v/c Ratio ≤ 0.90	• LOS E or better • Critical Movement v/c ≤ 1.00 • Evaluate Signal Warrants if $\leq$ LOS D
3	Star Road / Chinden Blvd (US 20-26)	ITD / ACHD	Traffic Signal	• LOS D or better • Lane Group & Intersection v/c Ratio ≤ 0.90	• LOS E or better • Intersection v/c ≤ 0.90 • Lane Group v/c ≤ 1.00
4	Star Road / Joplin Road	ACHD	TWSC	• N/A	• LOS E or better • Critical Movement v/c ≤ 1.00 • Evaluate Signal Warrants if $\leq$ LOS D



Section 3

Existing Conditions

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and current operational and geometric characteristics of the roadways within the study area. These conditions will be compared with future conditions later in this report. Information regarding site conditions, adjacent land uses, existing traffic operations and transportation facilities in the study area was collected.

SITE CONDITIONS AND ADJACENT LAND USES

The proposed development is not currently zoned in the City of Star but will be annexed into the city with development. The site is located in the northeast corner of the Can Ada Road and Joplin Road intersection, north of Chinden Boulevard (US 20-26). The site is surrounded by other undeveloped parcels and single-family homes.

TRANSPORTATION FACILITIES

The transportation system inventory identifies the current characteristics of roadways within the study area. Major roadways within the study area were identified and catalogued, including transit facilities and pedestrian and bicycle infrastructure.

ROADWAY FACILITIES

Table 2 provides a summary of the existing roadway facilities included in this study within the site vicinity.

Table 2. Existing Study Transportation Facilities and Roadways

Roadway	Functional Classification ¹	Number of Lanes	Posted Speed (MPH ²)	Sidewalks	Bicycle Lanes	On-Street Parking
Star Road	Minor Arterial	2	50	No	No	No
Joplin Road	Collector	2	35	No	No	No
Can Ada Road	Principal Arterial Collector	2	35	No	No	No
Chinden Road (US 20-26)	Expressway	2	55	Yes ³	No	No

¹ Per Ada County Long Range Highway & Street Map 2040 Functional Street Classification Map. ² MPH represents miles per hour. ³ Along subdivision developments. ³ Sidewalks provided on the north side of Chinden Boulevard (US 20-26) from the Phyllis Canal to SH-16.

PEDESTRIAN AND BICYCLE FACILITIES

Within the site's vicinity, sidewalks are only present along the north side of Chinden Boulevard (US 20-26) within the area of the Star Road / Chinden Boulevard (US 20-26) intersection. Most of the other roadways are rural in nature and do not have pedestrian and bicycle facilities.

TRANSIT FACILITIES

Valley Regional Transit (VRT) is a public transportation service provider that provides fixed route buses and paratransit services with Ada Canyon County. VRT's central bus station is located in downtown Boise and provides county and intercounty connections within the Treasure Valley.

There are no bus routes servicing the immediate vicinity of the site at this time and no future routes outlined in VRT's ValleyConnect 2.0 plan (Reference 7).

EXISTING TRAFFIC OPERATIONS

Peak hour turning movement counts were collected for the Dancer Subdivision in March 2024 during AM peak (7:00 AM – 9:00 AM) and PM peak (4:00 PM – 6:00 PM) periods. *Appendix C includes the weekday AM and PM period counts utilized at each of the study intersections and roadways.*

WEEKDAY AM AND PM PEAK HOUR INTERSECTION OPERATIONS

Existing peak hour traffic operations were analyzed for a typical mid-weekday AM peak period and PM peak period. Individual peak hours for each intersection were used to provide a conservative analysis per ACHD Policy Manual.

Per the ACHD Policy Manual, peak hour factor adjustments were input for each intersection by approach for the existing conditions analysis. This is not consistent with HCM procedures (which outlines one peak hour factor for the overall intersection) but is outlined in the ACHD policy manual for existing conditions analysis. Inputting peak hour factors by approach models a scenario that does not actually occur in the field and, as such, the existing conditions analysis may reflect operations that are worse than occurs on the system today.

At the time that traffic counts were collected in March 2024, ITD was in the process of construction roadway widening improvements along Chinden Boulevard to the west of the study area. While there was no active construction present at the study intersections or along the study roadway segments at the time of data collection, minimal rerouting of traffic may have occurred. When reviewing the data and past counts, Kittelson found the collected traffic counts to be reasonable.

The existing lane configuration at the intersection of Star Road / Chinden Boulevard (US 20-26) in the westbound direction provides two westbound lanes through the intersection. Approximately 750 feet past the intersection in the westbound direction these two through lanes merge to become one westbound through lane on Chinden Boulevard (US 20-26). As a result, peak hour lane utilization patterns were reviewed for traffic in the westbound direction. During both the weekday AM and PM peak hours vehicle usage of the westbound through lanes showed a skewed usage with approximately 50 percent utilization of the tapered through lane, with vehicles favoring the maintained through lane. Therefore, an adjustment to the lane utilization for the two-lane westbound approach was made.

Table 3 presents the traffic operation results for each intersection and its corresponding lane groups during existing weekday AM and PM peak periods. Figure 3 presents lane configurations and traffic control devices. Figure 4 presents the AM and PM peak hour traffic volumes at each of the study intersections. *Appendix D includes the year 2024 existing conditions Synchro worksheets.*

Table 3. Year 2024 Existing Intersection Operations

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
1	Can Ada Road / Joplin Road	TWSC	- / -	- / -	- / -	EBLR	0.05	A	9.1	0.05	A	9.0
						NBTL	0.01	A	7.6	0.01	A	7.3
						SBTR	-	-	-	-	-	-
2	Can Ada Road / Chinden Boulevard (US 20-26)	TWSC	- / -	- / -	- / -	EBL	0.02	A	8.9	0.01	B	10.5
						EBTR	-	-	-	-	-	-
						WBL	0.26	B	13.0	0.21	B	11.4
						WBTR	-	-	-	-	-	-
						NBLTR	0.76	F	69.0	2.78	F	> 150
						SBLTR	0.22	F	89.9	1.01	F	> 150
3	Star Road / Chinden Boulevard (US 20-26)	Traffic Signal	0.80 / 0.92	D / E	39.2 / 58.5	EBL	0.89	E	61.5	0.92	F	102.6
						EBT	0.71	C	30.0	0.41	C	25.6
						EBR	0.04	C	21.5	0.04	C	20.5
						WBL	0.80	E	62.5	0.80	F	97.4
						WBT	0.85	D	40.1	0.93	E	58.9
						WBR	0.19	C	29.7	0.28	C	33.3
						NBL	0.14	D	35.5	0.36	D	49.3
						NBT	0.86	D	50.3	0.93	F	92.7
						NBR	0.39	D	40.5	0.28	E	56.6
						SBL	0.70	D	35.6	0.76	E	61.3
						SBT	0.65	D	37.9	0.42	E	55.8
4	Star Road / Joplin Road	TWSC	- / -	- / -	- / -	EBLTR	0.44	E	36.5	0.28	D	30.2
						WBLTR	0.04	C	18.6	0.02	B	14.0
						NBLTR	0.01	A	8.8	0.01	A	8.3
						SBLTR	0.01	A	8.6	0.01	A	9.2

V/C ratio is defined as vehicle-to-capacity ratio, which calculates the number of vehicles divided by the capacity of the roadway/intersection during the peak 15 minutes of the peak hour. LOS stands for Level of Service. Delay is reported in seconds per vehicle. Cells in the table above that are **bolded**, *italicized*, and **highlighted** indicate an intersection and/or lane group operating below the jurisdictional standards.

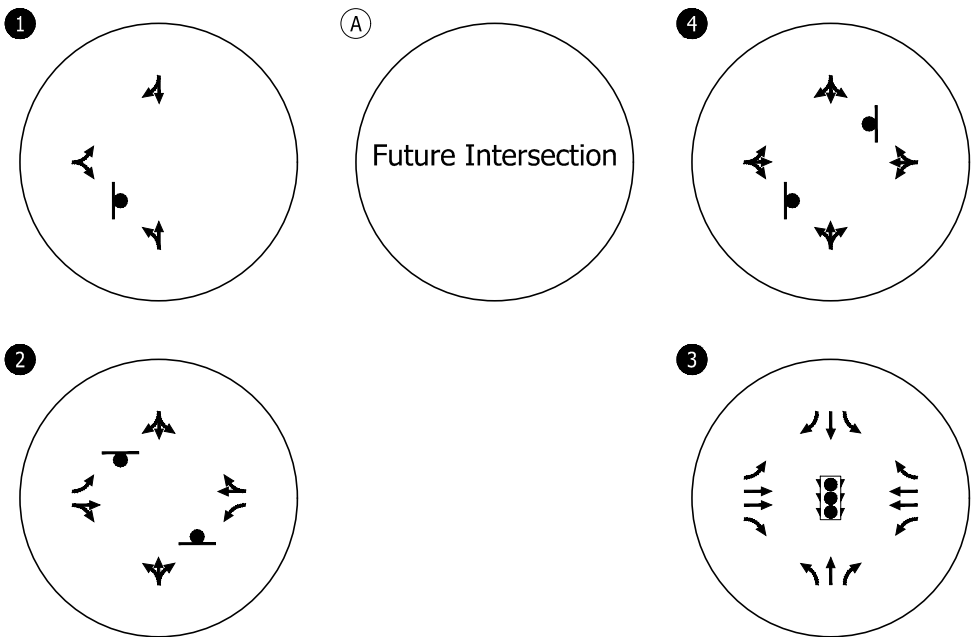
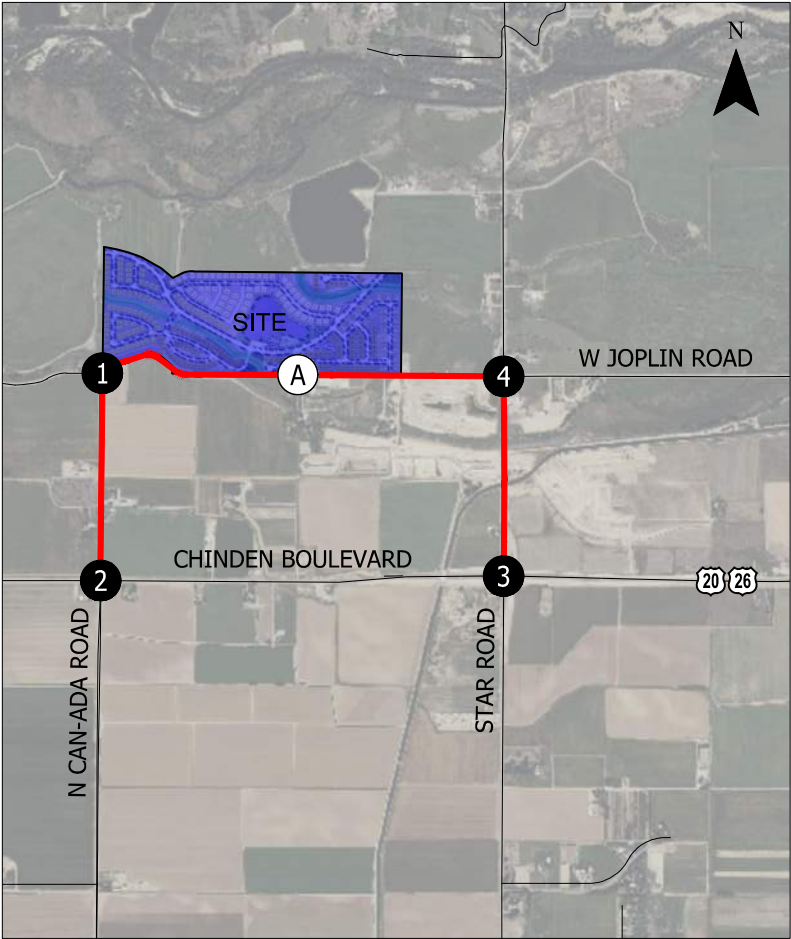
As Table 3 shows, all study intersections operate acceptably during the year 2024 existing weekday AM and PM peak hours except for:

- **Can Ada Road / Chinden Boulevard (US 20-26) (Weekday AM and PM Peak Hours):** The northbound and southbound approaches operate at LOS F during both the weekday AM and PM peak hours, and overcapacity during the weekday PM peak hour with v/c ratios of 2.78 and 1.01, respectively.
- **Star Road / Chinden Boulevard (US 20-26) (Weekday PM Peak Hour):** The overall intersection operates with a v/c of 0.92 and LOS E during the weekday PM peak hour, exceeding ACHD and ITD standards. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate under capacity but exceeding ITD's v/c threshold.

Additionally, while meeting ACHD operational standards, the critical movement at the following unsignalized intersection operates at LOS D or worse and per ACHD policy requires a signal warrant evaluation:

- **Star Road / Joplin Road (LOS E during the AM Peak Hour, LOS E during the PM Peak Hour)**

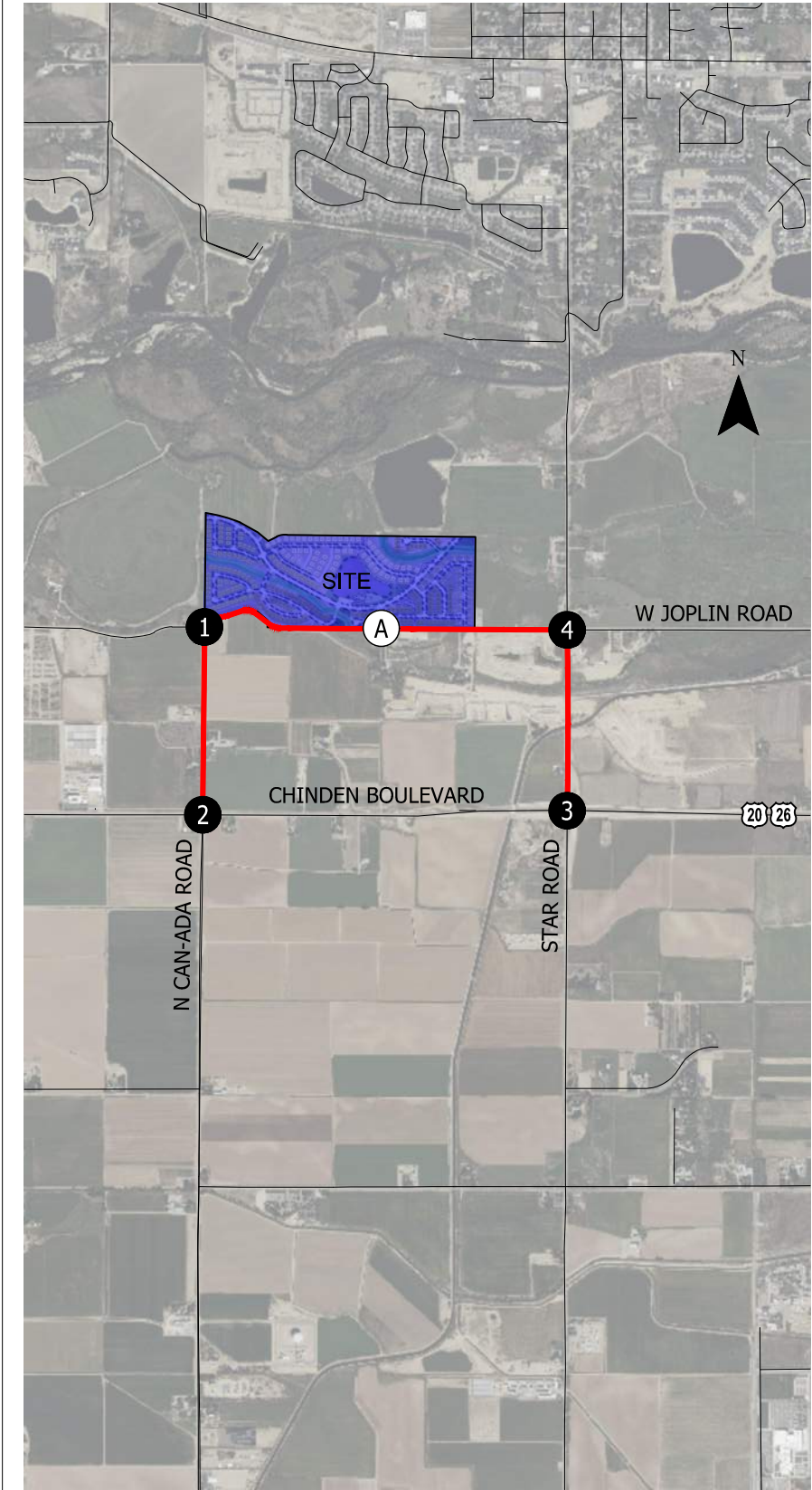
C:\Users\rhoffman\appdata\local\temp\AcPublish_23112\27927_Dancer Figs_TIS report.dwg Jun 05, 2024 - 10:31am - rhoffman Layout Tab: 3: existing LCTCD



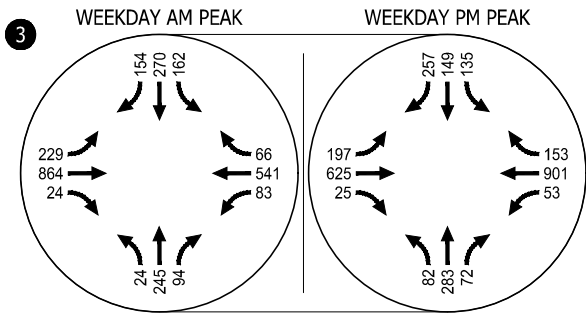
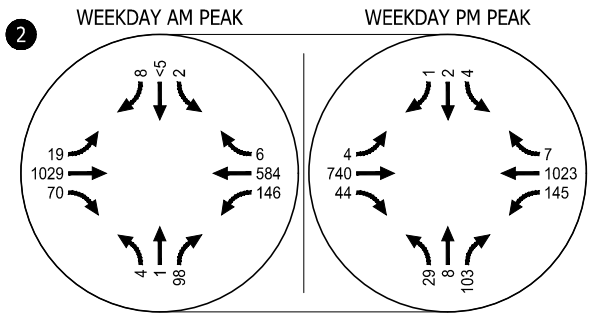
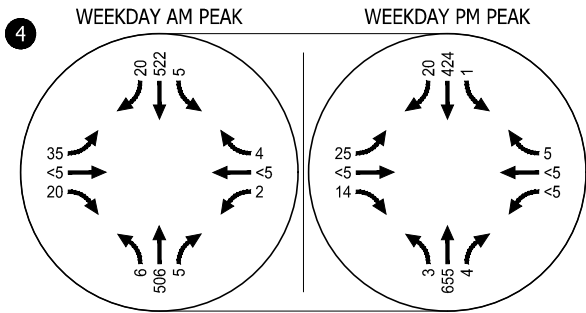
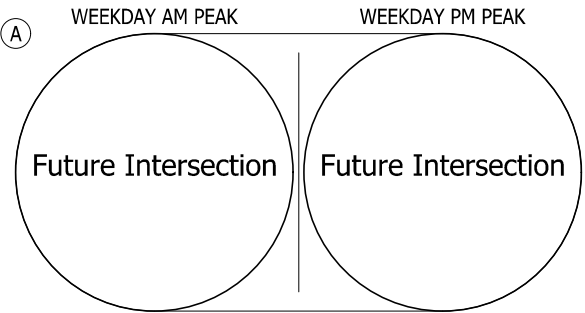
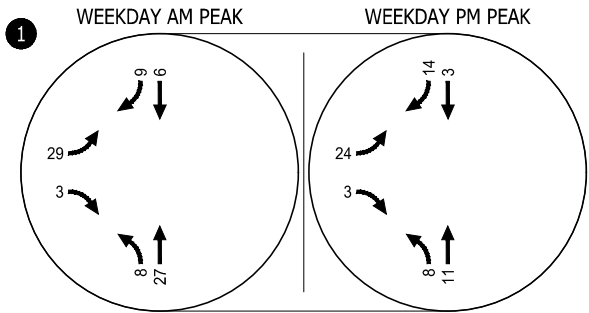
- # - Study Intersections
- (X) - Site Access
- Study Segment
- Traffic Signal
- Stop Sign

Existing Lane Configurations & Traffic Control Devices
Star, Idaho

Figure
3



- # - Study Intersections
- (X) - Site Access
- Study Segment



Year 2024 Existing Traffic Volumes
Weekday AM & PM Peak Hours
Star, Idaho

Figure
4

EXISTING CONDITIONS INTERSECTION MITIGATION

This section highlights the mitigations needed to address each of the intersections not meeting traffic operation standards under the year 2024 existing traffic conditions. *Appendix E contains the year 2024 mitigated existing traffic operational worksheets including findings from the signal warrant analysis.*

Can Ada Road / Chinden Boulevard (US 20-26)

Under existing 2024 conditions, the intersection of Can Ada Road / Chinden Boulevard (US 20-26) the northbound and southbound approaches operate at LOS F during both the weekday AM and PM peak hours, and overcapacity during the weekday PM peak hour with v/c ratios of 2.78 and 1.01, respectively.

Per ACHD policy, signal warrants were evaluated using peak hour traffic volumes collected in March 2024, which showed that all three (peak hour, four-hour, eight-hour) volume based MUTCD signal warrants are met under existing 2024 conditions.

ITD's ChindenWest project identifies a traffic signal with two through lanes in the eastbound and westbound directions along Chinden Boulevard (US 20-26), with a dedicated left-turn lane on each approach, and a dedicated right-turn lane on the eastbound, westbound, and northbound approaches. This improvement is planned to be installed with the widening of Chinden Boulevard (US 20-26) in 2025 and was explored for mitigation at this intersection. Table 4 summarizes the projected operations of the intersection with the implementation of a traffic signal with ITD's identified lane configuration for the weekday AM and PM peak hours. As shown, a traffic signal with the identified lane configuration would mitigate intersection operations to within ITD and ACHD operating standards under 2024 existing conditions.

Table 4. Year 2024 Mitigated Existing Conditions at Can Ada Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
2	Can Ada Road / Chinden Boulevard (US 20-26)	Traffic Signal (with ITD design lane config)	0.61 / 0.56	B / B	17.0 / 16.1	EBL	0.53	D	44.0	0.43	E	56.5
						EBT	0.76	B	16.6	0.69	B	16.1
						EBR	0.12	B	11.0	0.10	B	12.1
						WBL	0.79	D	36.2	0.78	C	29.7
						WBT	0.36	A	8.8	0.72	B	12.3
						WBR	0.01	A	7.1	0.01	A	7.7
						NBL	0.44	E	63.8	0.56	C	34.9
						NBT	0.01	C	27.7	0.074	C	21.8
						NBR	0.72	D	36.1	0.65	C	27.3
						SBL	0.43	F	86.3	0.43	E	56.5
						SBTR	0.06	C	28.2	0.02	C	23.2

Star Road / Chinden Boulevard (US 20-26)

Under existing 2024 conditions the intersection of Star Road / Chinden Boulevard (US 20-26) operates with a v/c of 0.92 and LOS E during the weekday PM peak hour, exceeding ACHD and ITD standards. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate under capacity but exceeding ITD's v/c threshold.

ITD's ChindenWest project identifies widening of Chinden Boulevard (US 20-26) to the west of Star Road to two through lanes in the eastbound and westbound directions. Widening from two lanes to four lanes between Can Ada Road and Star Road would improve lane utilization in the westbound direction at the Star Road / Chinden Boulevard (US 20-26) intersection. Table 5 summarizes the intersection operations assuming improvement of the westbound lane utilization as a result of the Chinden Boulevard (US 20-26) widening during the weekday AM and PM peak hours. As shown, the implementation of this widening and the associated improvement to lane utilization in the westbound direction would mitigate intersection operations to within ACHD and ITD standards during the weekday PM peak hour under existing 2024 conditions.

Table 5. Year 2024 Mitigated Existing Conditions at Star Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
3	Star Road / Chinden Boulevard (US 20-26)	Traffic Signal (with ITD Chinden Boulevard widening to the west)	0.77 / 0.83	D / D	35.2 / 43.8	EBL	0.87	D	49.7	0.90	E	73.7
						EBT	0.80	C	30.3	0.46	C	24.8
						EBR	0.05	C	21.3	0.04	B	19.8
						WBL	0.79	E	55.0	0.79	E	79.2
						WBT	0.79	D	35.9	0.85	D	41.5
						WBR	0.22	C	29.3	0.32	C	31.6
						NBL	0.13	C	30.4	0.33	D	37.7
						NBT	0.84	D	43.3	0.90	E	65.2
						NBR	0.38	C	34.9	0.27	D	43.6
						SBL	0.66	C	29.6	0.67	D	41.8
						SBT	0.64	C	32.4	0.40	D	42.9
						SBR	0.43	C	29.7	0.81	E	56.7

Star Road / Joplin Road

The Star Road / Joplin Road intersection operates with ACHD standards during the weekday AM and PM peak hours. However, the eastbound approach operates at LOS E and LOS D, respectively. ACHD policy requires an evaluation of traffic signal warrants if the critical movement at an unsignalized intersection operates at LOS D or worse.

Signal warrants were evaluated using 48-hour tube count data collected in March 2024, which show that peak hour and four-hour volume based MUTCD signal warrants are met under existing 2024 conditions. However, given that all movements operate within ACHD LOS standards and under capacity a traffic signal is not needed for acceptable operations at this intersection.

EXISTING CONDITIONS ROADWAY SEGMENT ANALYSIS

Peak hour roadway segment volumes were collected at the study intersections and roadway segments in March 2024. The peak hour, peak direction roadway segment volumes, and resultant LOS per ACHD Policy Manual 7106.4.1 for the existing study roadway segments are summarized in Table 6.

Table 6. Year 2024 Existing Roadway Segment Operations

Roadway Segment	Classification ¹	Travel Lanes ²	ADT	ACHD Peak Hour Std. Volume (One-Way)	Weekday AM Peak Hour		Weekday PM Peak Hour	
					One-Way Volume/Direction	Meets Std.	One-Way Volume/Direction	Meets Std.
Star Road – Joplin Road to Chinden Boulevard (US 20-26)	Minor Arterial	2	12,863	E / 575	586 / SB	No	662 / NB	No
Joplin Road – Can Ada Road to Star Road	Collector	2	612	D / 425	55 / EB	Yes	39 / EB	Yes
Can Ada Road – Joplin Road to Chinden Boulevard (US 20-26)	Collector	2	342	D / 425	35 / NB	Yes	19 / NB	Yes

¹Per COMPASS 2040 Functional Street Classification Map (Reference 8)

²Travel lanes include the total number of lanes across the roadway's respective cross section

As shown in Table 6, the existing roadway segments meets ACHD roadway segment LOS thresholds under 2024 existing conditions weekday AM and PM peak hours, except for:

- **Star Road from Joplin Road to Chinden Boulevard (US 20-26) (Weekday AM & PM Peak Hour):** The southbound directional volume during the weekday AM peak hour (586) and the northbound directional volume during the weekday PM peak hour (662) exceed ACHD's 2-lane minor arterial standard (575).

EXISTING CONDITIONS ROADWAY SEGMENT MITIGATIONS

As previously highlighted, there is a study roadway segment forecast to experience peak hour, peak directional volumes exceeding ACHD standards under existing conditions.

ACHD's Alternative Mitigation Measures policy 7106.7.3 states that if traditional mitigation measures such as roadway widening and intersection improvements are infeasible as determined by ACHD, the TIS may recommend alternative mitigation measures. Alternative mitigation measures shall demonstrate that impacts from the project will be offset.

- If the impacted roadway segments and/or intersections are programmed as funded in the Integrated Five-Year Work Plan (IFYWP) or the Capital Improvements Plan (CIP); no alternative mitigation is required.
- If the impacted roadway segments and/or intersections are not programmed in either the IFYWP or the CIP; the applicant may (i) analyze the shoulder hour and (ii) provide a safety analysis to determine alternative mitigation requirements.
 - If the impacted roadway segments and intersections meet the minimum acceptable level of service planning thresholds in the shoulder hour the applicant may suggest feasible alternative mitigation such as: sidewalks, bike facilities, connectivity, safety improvements, etc. within 1.5 miles of the proposed development.
 - If the shoulder hour planning thresholds are exceeded the applicant may request to enter into a Development Agreement to pay into the Priority Corridor Fund an amount determined by ACHD to offset the impacts from the project.

Further shoulder analysis is provided below by segment where relevant, followed by a summary of potential alternative mitigations.

Star Road (Joplin Road to Chinden Boulevard (US 20-26))

Under existing 2024 conditions the roadway segment weekday AM peak hour directional volume (586) and weekday PM peak hour directional volume (662) exceed ACHD's minor arterial roadway standards for a two-lane minor arterial facility (575). This segment of Star Road is identified in ACHD's Capital Improvement Plan (CIP, Reference 4) and ACHD's Master Street Map (Reference 9) for widening to 5-lanes between 2031 and 2035. If this segment were widened to 5-lanes, with one lane in the northbound and southbound directions and a continuous center left-turn lane, the existing 2024 traffic roadway segment would meet ACHD's segment standard (1,540). As the widening of this segment is preserved within ACHD's Master Street Map, widening Star Road to five lanes is a feasible solution to address the needs of existing 2024 conditions.

CRASH HISTORY

Crash data for the study intersections and roadways was provided by ITD for the previous five years on record (2018-2022). This data was used to evaluate and document any potential crash trends occurring at study intersections and along study roadways. *Appendix F contains the crash data reports provided by ITD.*

Table 7 presents the number of crashes, by crash type and severity, at each study intersection.

Table 7. Study Intersection Crash Type and Severity Summary, 2018-2022

No.	Intersection	Crash Type						Total	Severity			Crash Rate (Crashes/ MEV)
		Rear -End	Fixed Object	Turning	Side Swipe	Angle	Other		PDO	Injury	Fatality	
1	Can Ada Road / Joplin Road	No Crashes on Record										
2	Can Ada Road / Chinden Boulevard (US 20-26)	16	-	17	3	11	2	49	24	25	-	1.27
3	Star Road / Chinden Boulevard (US 20-26)	52	3	9	2	10	-	76	41	34	1	1.42
4	Star Road / Joplin Road	3	-	-	-	1	-	4	3	-	1	0.19
Total		71	3	26	5	22	2	129	68	59	2	-

As shown in Table 7 the most common crash types were rear-end, turning, and angle crashes. The intersection of Star Road / Chinden Boulevard (US 20-26) experiences the highest crash rate of 1.42 crashes per million entering vehicles. The intersection of Can Ada Road / Chinden Boulevard (US 20-26) experiences the next highest crash rate of 1.27 crashes per million entering vehicles.

The intersection of Star Road / Chinden Boulevard (US 20-26) is currently traffic signal controlled and has recently been reconstructed to provide additional intersection capacity for all approaches. The most common type of crash observed at this intersection are rear-end crashes which are common for a signal along a rural highway. This intersection experienced a fatal crash in August 2021, resulting in one fatality and two injuries. The widening of Chinden Boulevard will increase capacity at the signal and along the roadway. ACHD and ITD should monitor the intersection after construction and consider conducting a safety study if improvements are not seen.

The intersection of Can Ada Road / Chinden Boulevard (US 20-26) is currently two-way stop controlled. The most common crash types at this intersection are rear-end and turning crashes. ITD's ChindenWest project identifies a traffic signal with two through lanes in the eastbound and westbound directions along Chinden Boulevard (US 20-26), with a dedicated left-turn lane on each approach, and a dedicated right-turn lane on the eastbound, westbound, and northbound approaches. This improvement is planned to be installed with the widening of Chinden Boulevard (US 20-26) in 2025 and will likely improve turning and angle crash trends at this intersection by providing dedicated turn lanes and signal phases.

The intersection of Star Road / Joplin Road experienced a fatal angle crash that occurred in March 2019, resulting in one fatality and one suspected serious injury.

Table 8 presents the number of crashes, by crash type and severity, at each study roadway segment.

Table 8. Roadway Segment Crash Type and Severity Summary, 2018-2022

Roadway	Crash Type					Total	Severity			Crash Rate (Crashes/ MEV)
	Rear- End	Fixed Object	Overturn	Animal	Other		PDO	Injury	Fatality	
Star Road – Joplin Road to Chinden Boulevard (US 20-26)	1	3	-	1	-	5	2	3	-	0.43
Joplin Road – Can Ada Road to Star Road	-	3	4	-	-	7	2	5	-	6.27
Can Ada Road – Joplin Road to Chinden Boulevard (US 20-26)	-	1	1	-	-	2	1	1	-	6.41
Total	1	7	5	1	-	14	5	9	-	-

As shown in Table 8 the most common type of crash along study roadway segments were fixed object and overturn crashes. The segments of Joplin Road, between Can Ada Road and Star Road, and Can Ada Road, between Joplin Road and Chinden Boulevard (US 20-26) experience the highest crash rates of 6.27 and 6.41 crashes per million vehicle miles, respectively. These segments experience low traffic volumes, all lower than 1,000 vehicles per day, which results in higher crash rates with a lower number of crashes.



Section 4

Transportation Impact Analysis

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate in the year the proposed development is expected to be fully built, year 2029. An evaluation of the impact of traffic generated by the proposed project during the typical weekday AM and PM peak hours as follows:

- Transportation improvements planned in the site vicinity were identified.
- Background weekday AM and PM peak hour traffic conditions for build-out year 2029 were analyzed at each of the study intersections.
- Background conditions were developed by applying a 2.0 percent annual compounded growth rate on roadways, except for Star Road where a 3.0 percent annual compounded growth rate has been applied.
 - In addition to the identified growth rates in-process trips for the following developments were included:
 - **Inspirado Mixed-Use Development:** A mixed use development including 250 single-family homes, 257 multi-family units, 78,000 square feet of office space, and 231,500 square feet of commercial space located in the northeast corner of the Star Road / Chinden Boulevard (US 20-26) intersection.
 - **Naismith Commons (formerly Beacon Crossing Subdivision):** A residential subdivision consisting of 206 single-family homes located southeast of the Can Ada Road and Joplin Road intersection.
 - These growth rates and in-process developments account for anticipated regional growth in the site vicinity between 2024 and 2029.
- Site-generated trips were estimated for the build-out of the site.
- Site trip distribution patterns were estimated for the site-generated trips based on the existing traffic patterns, the major trip origins and destinations in the Treasure Valley area, and COMPASS modeling.
- The build-out year 2029 total traffic conditions were analyzed at each of the study intersections and site-access points during the weekday AM and PM peak hours.
- On-site circulation issues and site-access operations were evaluated.

YEAR 2029 BACKGROUND TRAFFIC CONDITIONS

The year 2029 background traffic analysis identifies how the study area's transportation system will operate in the future year without the proposed Dancer Subdivision in place. This analysis includes traffic attributed to planned developments within the study area and to general growth in the region but does not include traffic from the proposed development.

PLANNED INTERSECTION AND ROADWAY IMPROVEMENTS

Based on a review of the ACHD's Capital Improvement Plan (CIP, Reference 4), ACHD's Integrated Five Year Work Plan (IFYWP, Reference 10), ITD's Statewide Transportation Investment Program (ITIP,

Reference 11), and ITD's Statewide Transportation Improvement Program (STIP, Reference 12), the following improvements are planned in the study area:

ITD's Statewide Transportation Investment Program (ITIP)

- Chinden Boulevard: Middleton Road to SH-16 (ChindenWest Plan) – ITD is planning roadway widening on Chinden Boulevard (US 20/26) between Middleton Road and SH-16 by providing an additional eastbound and westbound lane.
 - In addition to roadway widening along Chinden Boulevard (US 20/26) the project plans to signalize major mile-spaced intersections, including the intersection of Chinden Boulevard (US 20/26) and N Can Ada Road in 2024.
- These identified improvements are currently in design or under construction. Improvements on Chinden Boulevard (US 20/26) between I-84 and Middleton Road are currently under construction, improvements between Middleton Road and Star Road are planned for construction in 2025. These improvements are planned to be completed and constructed before 2029 and may be implemented as mitigation in the following analysis as needed.

ITD's Statewide Transportation Improvement Program (STIP)

- No specific projects listed within the study area.

ACHD's Capitol Improvement Program (CIP)

- **Star Road (RD-2020-1200, 2031-2035):** McMillan Road to Chinden Boulevard (US 20/26): ACHD is planning roadway widening on Star Road between McMillan Road and Chinden Boulevard (US 20/26) to widen to five lanes.
- **Star Road (RD-2020-1210, 2031-2035):** Chinden Boulevard (US 20/26) to State Street (SH-44): ACHD is planning roadway widening on Star Road between Chinden Boulevard (US 20/26) and State Street (SH-44) to widen to five lanes.
- **Star Road / Chinden Boulevard (US 20/26) Intersection Improvements (IN-2020-0260, 2031-2035):** ACHD is planning to replace / modify the traffic signal with the reconstruction and widening of approaches to include exclusive turn lanes.

ACHD has identified a timeline for construction between 2031 and 2035 and therefore these improvements will not be included in the 2029 background conditions analysis. These improvements may be implemented as mitigation in the following analysis as needed.

ACHD's Integrated Five Year Work Plan (IFYWP)

- No specific projects listed within the study area.

BACKGROUND GROWTH

The year 2029 background traffic volumes reflect existing traffic counts plus five years of annual background growth. COMPASS maintains base year and 2030 future year regional travel demand models, which were reviewed to assess growth in the area. An evaluation of growth rates in the in the study area shows abnormally high growth rates on side street roadways in the area. Per the direction of agency staff

a 3 percent growth rate was applied to volumes on Star Road, and a 2 percent growth rate was applied to all other roadways to estimate year 2029 background traffic volumes.

IN-PROCESS DEVELOPMENTS

In addition to general roadway growth rates, in-process trips were included from the following planned developments:

- **Inspirado Mixed-Use Development:** A mixed use development including 250 single-family homes, 257 multi-family units, 78,000 square feet of office space, and 231,500 square feet of commercial space located in the northeast corner of the Star Road / Chinden Boulevard (US 20-26) intersection.
- **Naismith Commons (formerly Beacon Crossing Subdivision):** A residential subdivision consisting of 206 single-family homes located southeast of the Can Ada Road and Joplin Road intersection.

Appendix G includes figures detailing the assumed trip assignments of the identified in-process developments.

YEAR 2029 BACKGROUND TRAFFIC VOLUMES

Year 2029 background traffic volumes reflect existing traffic counts plus five years of annual background growth and trips generated from the Inspirado and Naismith in-process developments.

Per the ACHD Policy Manual, intersections with an existing peak hour factor of less than 0.90 were adjusted up to 0.90 in the future year analysis to account for the likely increase in traffic throughout the entire peak hour in the future unless significant capacity improvements were also planned where the peak hour factor was adjusted up or down to 0.90.

YEAR 2029 BACKGROUND INTERSECTION OPERATIONS

Table 9 presents the traffic operations results for each study intersection and its lane groups under year 2029 background conditions during the weekday AM and PM peak hours. Figure 5 presents the weekday AM and PM 2029 background traffic volumes at each of the study intersections. *Appendix H includes the year 2029 background conditions Synchro worksheets.*

Table 9. Year 2029 Background Intersection Operations

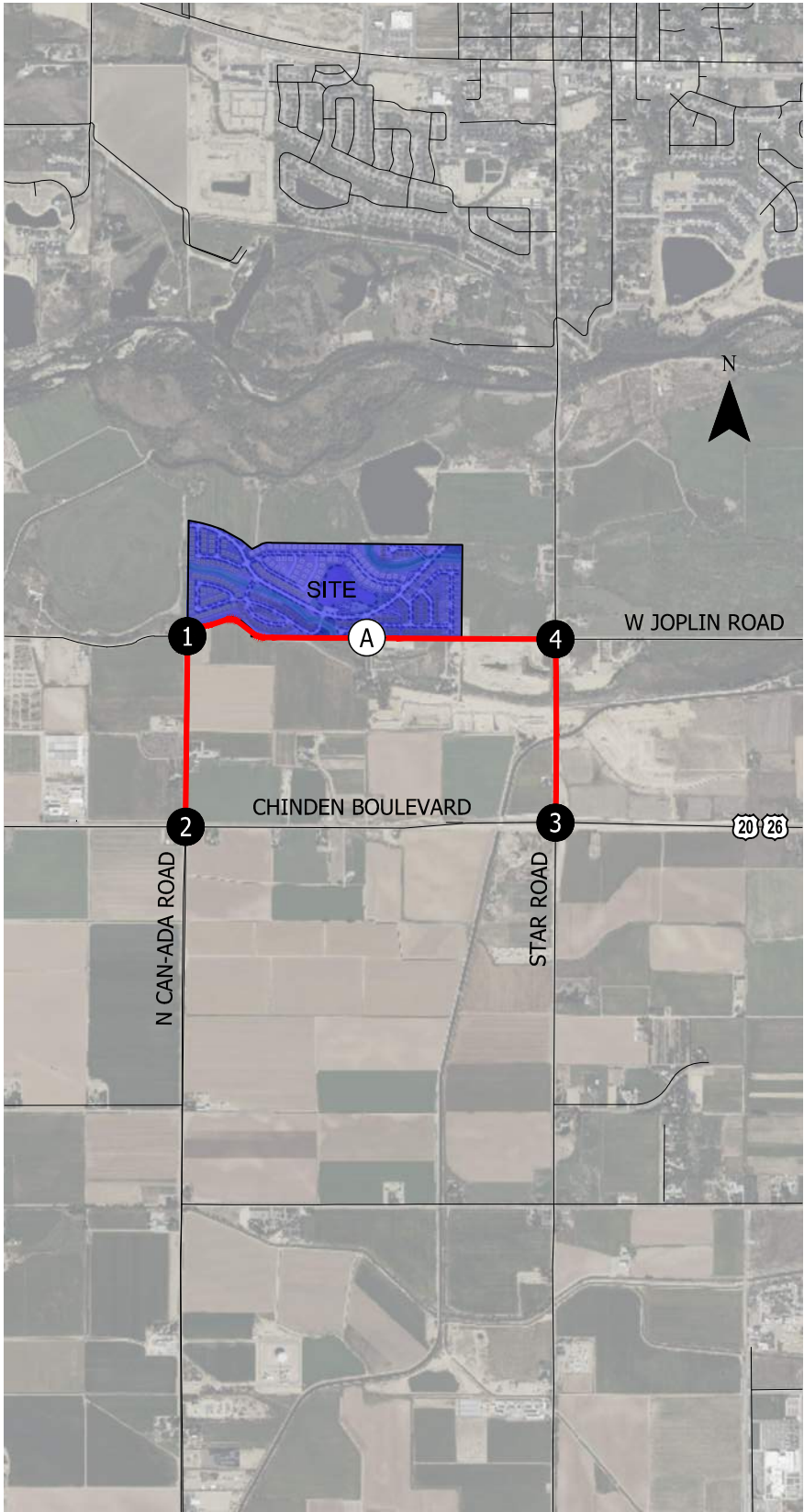
No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
1	Can Ada Road / Joplin Road	TWSC	- / -	- / -	- / -	EBLR	0.05	A	9.1	0.04	A	8.9
						NBLTR	0.01	A	7.6	0.01	A	7.3
						SBTR	-	-	-	-	-	-
2	Can Ada Road / Chinden Boulevard (US 20-26)	TWSC	- / -	- / -	- / -	EBL	0.04	A	9.5	0.08	B	12.8
						EBTR	-	-	-	-	-	-
						WBL	0.32	C	15.2	0.28	B	12.8
						WBTR	-	-	-	-	-	-
						NBLTR	1.37	F	>150	20.4	F	>150
3	Star Road / Chinden Boulevard (US 20-26)	Traffic Signal	0.88 / 1.06	D / F	49.4 / 83.5	SBLTR	4.10	F	>150	>1.00	F	>150
						EBL	0.93	F	85.0	1.08	F	159.9
						EBT	0.78	D	36.4	0.45	C	29.8
						EBR	0.04	C	24.2	0.04	C	23.3
						WBL	0.82	E	74.6	0.82	F	105.8
						WBT	0.88	D	49.1	1.05	F	97.1
						WBR	0.21	D	36.4	0.35	D	38.2
						NBL	0.16	D	42.7	0.38	E	56.3
						NBT	0.89	E	66.8	1.02	F	127.9
						NBR	0.41	D	48.7	0.30	E	64.5
						SBL	0.83	D	54.7	0.94	F	104.5
4	Star Road / Joplin Road	TWSC	- / -	- / -	- / -	SBT	0.67	D	45.2	0.47	E	62.4
						SBR	0.48	D	40.1	0.91	F	96.3
						EBLTR	0.72	F	63.0	0.55	F	50.1
						WBLTR	0.04	D	26.0	0.02	B	14.9
						NBLTR	0.04	A	8.9	0.06	A	8.9
						SBLTR	0.01	A	9.2	0.01	A	9.5

V/C ratio is defined as vehicle-to-capacity ratio, which calculates the number of vehicles divided by the capacity of the roadway/intersection during the peak 15 minutes of the peak hour. LOS stands for Level of Service. Delay is reported in seconds per vehicle. Cells in the table above that are **bolded**, *italicized*, and **highlighted** indicate an intersection and/or lane group operating below the jurisdictional standards.

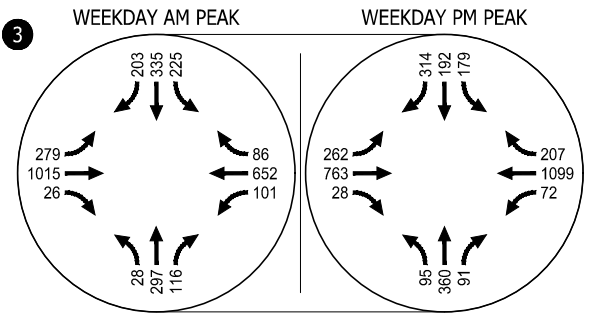
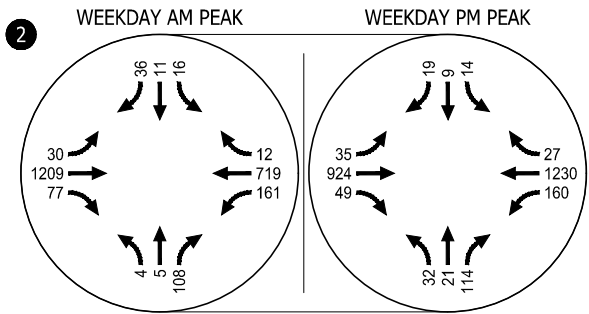
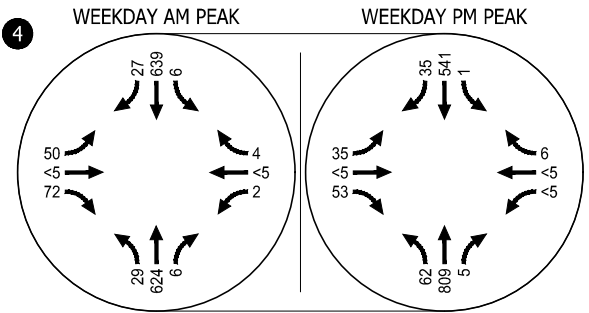
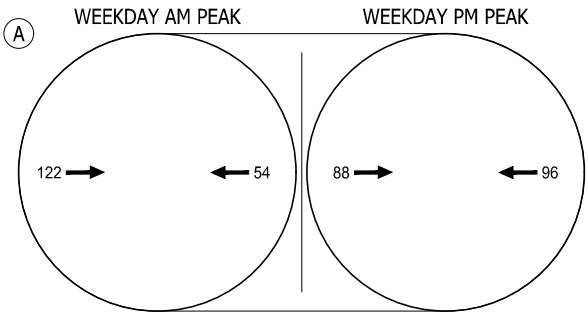
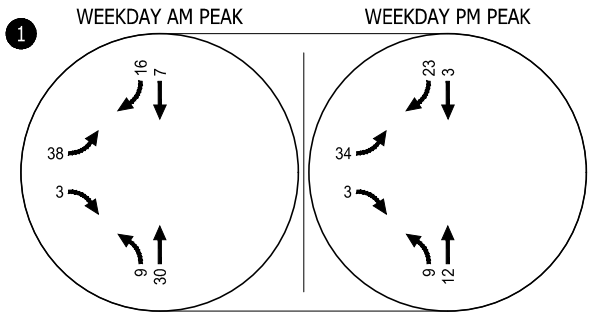
As Table 7 shows, all study intersections operate acceptably during the year 2029 background weekday AM and PM peak hours except for:

- **Can Ada Road / Chinden Boulevard (US 20-26) (Weekday AM and PM Peak Hours):** The northbound and southbound approaches operate at LOS F and overcapacity during both the weekday AM and PM peak hours.
- **Star Road / Chinden Boulevard (US 20-26) (Weekday PM Peak Hour):** The overall intersection operates with a v/c of 1.06 and LOS F during the weekday PM peak hour, exceeding ACHD and ITD standards. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate overcapacity, exceeding ITD's v/c threshold.
- **Star Road / Joplin Road (Weekday AM and PM Peak Hours):** The eastbound approach operates under capacity but at LOS F during the weekday AM and PM peak hours.

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- # - Study Intersections
- (X) - Site Access
- Study Segment



Year 2029 Background Traffic Volumes
Weekday AM & PM Peak Hours
Star, Idaho

Figure
5

YEAR 2029 BACKGROUND CONDITIONS INTERSECTION MITIGATION

This section highlights the mitigations needed to address each of the intersections not meeting traffic operation standards under the year 2029 background traffic conditions. *Appendix I contains the year 2029 mitigated background traffic operational worksheets including findings from the signal warrant analysis.*

Can Ada Road / Chinden Boulevard (US 20-26)

Similar to existing 2024 conditions, under background 2029 conditions the intersection of Can Ada Road / Chinden Boulevard (US 20-26) northbound and southbound approaches operate at LOS F and overcapacity during both the weekday AM and PM peak hours.

ITD's ChindenWest project identifies a traffic signal with two through lanes in the eastbound and westbound directions along Chinden Boulevard (US 20-26), with a dedicated left-turn lane on each approach, and a dedicated right-turn lane on the eastbound, westbound, and northbound approaches. This improvement is planned to be installed with the widening of Chinden Boulevard (US 20-26) in 2025 and was explored for mitigation at this intersection.

Table 10 summarizes the projected operations of the intersection with the implementation of a traffic signal with ITD's identified lane configuration for the weekday AM and PM peak hours. As shown, a traffic signal with the identified lane configuration would mitigate intersection operations to within ITD and ACHD operating standards under background 2029 conditions.

Table 10. Year 2029 Mitigated Background Conditions at Can Ada Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
2	Can Ada Road / Chinden Boulevard (US 20-26)	Traffic Signal (with ITD design lane config)	0.68 / 0.67	C / B	20.5 / 19.2	EBL	0.64	D	54.7	0.61	D	43.8
						EBT	0.81	B	19.8	0.70	B	17.6
						EBR	0.12	B	11.9	0.09	B	12.4
						WBL	0.83	D	45.4	0.81	D	37.7
						WBT	0.41	A	9.7	0.78	B	14.6
						WBR	0.02	A	7.4	0.04	A	8.3
						NBL	0.44	E	74.1	0.63	D	45.6
						NBT	0.03	D	35.6	0.11	C	29.4
						NBR	0.79	D	47.4	0.75	D	38.0
						SBL	0.52	D	54.5	0.49	D	46.7
						SBTR	0.27	D	36.2	0.20	C	31.0

Star Road / Chinden Boulevard (US 20-26)

Similar to existing 2024 conditions, under 2029 background conditions the intersection of Star Road / Chinden Boulevard (US 20-26) operates with a v/c of 1.06 and LOS F during the weekday PM peak hour, exceeding ACHD and ITD standards. Additionally, during the weekday PM peak hour, the westbound and northbound through movements, and the eastbound left turn movement operate overcapacity, exceeding ITD's v/c threshold.

ITD's ChindenWest project identifies widening of Chinden Boulevard (US 20-26) to the west of Star Road to two through lanes in the eastbound and westbound directions. Widening from two lanes to four lanes between Can Ada Road and Star Road would improve lane utilization in the westbound direction at the Star Road / Chinden Boulevard (US 20-26) intersection. Exclusively improving the westbound lane utilization as a result of this widening at this intersection does not mitigate intersection operations to within ACHD and ITD standards during the weekday PM peak hour under background 2029 conditions.

In addition to the improved westbound lane utilization, to mitigate intersection operations the addition of a second eastbound left-turn lane was explored. The recent widening of Chinden Boulevard at this intersection includes dedicated striped storage for a future additional eastbound left-turn lane. With an additional eastbound left-turn lane, Star Road north of Chinden Boulevard would require widening to provide dual receiving lanes to accept all left-turning vehicles. This future widening of Star Road to include two northbound lanes, as preserved in ACHD's CIP (Reference 4) and ACHD's Master Street Map (Reference 9) would be required to construct this improvement.

Table 11 summarizes the intersection operations assuming improvement of the westbound lane utilization as a result of the Chinden Boulevard (US 20-26) widening and the addition of a second dedicated eastbound left-turn lane during the weekday AM and PM peak hours. As shown, the improved westbound lane utilization and the addition of a second eastbound left-turn would mitigate intersection operations to within ACHD and ITD standards during the weekday PM peak hour under background 2029 conditions.

Table 11. Year 2029 Mitigated Background Conditions at Star Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
3	Star Road / Chinden Road (US 20-26)	Traffic Signal (with Chinden widening to W & second EBL turn lane)	0.82 / 0.86	D / D	52.9 / 51.5	EBL	0.62	E	72.9	0.67	E	73.3
						EBT	0.70	D	39.5	0.50	C	31.0
						EBR	0.04	C	25.6	0.04	C	23.5
						WBL	0.85	F	95.6	0.81	F	87.5
						WBT	0.54	D	42.2	0.89	D	53.9
						WBR	0.16	D	35.1	0.37	D	35.8
						NBL	0.17	D	53.2	0.34	D	42.6
						NBT	0.90	E	76.8	0.90	E	65.4
						NBR	0.42	E	60.0	0.27	D	49.2
						SBL	0.89	E	76.8	0.83	E	65.7
						SBT	0.68	D	54.1	0.44	D	48.0
						SBR	0.49	D	49.7	0.84	E	60.9

Star Road / Joplin Road

The critical eastbound approach at the Star Road / Joplin Road intersection operates under capacity but at LOS F during the weekday AM and PM peak hours.

Signal warrants were evaluated using 48-hour tube count data collected in March 2024, which show that all three (peak hour, four-hour, eight-hour) volume based MUTCD signal warrants are met under background 2029 conditions. However, given that all movements operate within ACHD LOS standards and under capacity a traffic signal is not needed for acceptable operations at this intersection.

YEAR 2029 BACKGROUND CONDITIONS ROADWAY SEGMENT ANALYSIS

Peak hour roadway segment volumes were based on the traffic count data collected at the study intersections. The peak hour, peak direction roadway segment volumes, and resultant LOS per ACHD Policy Manual 7106.4.1 for the existing study roadway segments are summarized in Table 12.

Table 12. Year 2029 Background Roadway Segment Operations

Roadway Segment	Classification ¹	Travel Lanes ²	ADT	ACHD Peak Hour Std. Volume (One-Way)	Weekday AM Peak Hour		Weekday PM Peak Hour	
					One-Way Volume/ Direction	Meets Std.	One-Way Volume/ Direction	Meets Std.
Star Road – Joplin Road to Chinden Boulevard (US 20-26)	Minor Arterial	2	17,174	E / 575	763 / SB	No	876 / NB	No
Joplin Road – Can Ada Road to Star Road	Collector	2	1,881	D / 425	122 / EB	Yes	97 / EB	Yes
Can Ada Road – Joplin Road to Chinden Boulevard (US 20-26)	Collector	2	1,359	D / 425	47 / NB	Yes	84 / NB	Yes

¹Per COMPASS 2040 Functional Street Classification Map (Reference 8)

²Travel lanes include the total number of lanes across the roadway's respective cross section

As shown in Table 12, the background roadway segments meet ACHD roadway segment LOS thresholds under 2029 background conditions weekday AM and PM peak hours, except for:

- **Star Road from Joplin Road to Chinden Boulevard (US 20-26) (Weekday AM & PM Peak Hour):** The southbound directional volume during the weekday AM peak hour (763) and the northbound directional volume during the weekday PM peak hour (876) exceed ACHD's 2-lane minor arterial standard (575).

YEAR 2029 BACKGROUND CONDITIONS ROADWAY MITIGATIONS

As previously highlighted, there is a study roadway segment forecast to experience peak hour, peak directional volumes exceeding ACHD standards under existing conditions.

ACHD's Alternative Mitigation Measures policy 7106.7.3 states that if traditional mitigation measures such as roadway widening and intersection improvements are infeasible as determined by ACHD, the TIS may recommend alternative mitigation measures. Alternative mitigation measures shall demonstrate that impacts from the project will be offset.

- If the impacted roadway segments and/or intersections are programmed as funded in the Integrated Five-Year Work Plan (IFYWP) or the Capital Improvements Plan (CIP); no alternative mitigation is required.
- If the impacted roadway segments and/or intersections are not programmed in either the IFYWP or the CIP; the applicant may (i) analyze the shoulder hour and (ii) provide a safety analysis to determine alternative mitigation requirements.

- If the impacted roadway segments and intersections meet the minimum acceptable level of service planning thresholds in the shoulder hour the applicant may suggest feasible alternative mitigation such as: sidewalks, bike facilities, connectivity, safety improvements, etc. within 1.5 miles of the proposed development.

If the shoulder hour planning thresholds are exceeded the applicant may request to enter into a Development Agreement to pay into the Priority Corridor Fund an amount determined by ACHD to offset the impacts from the project.

Star Road (Joplin Road to Chinden Boulevard (US 20-26))

Under background 2029 conditions the roadway segment weekday AM peak hour directional volume (763) and weekday PM peak hour directional volume (876) exceed ACHD's minor arterial roadway standards for a two-lane minor arterial facility (575). This segment of Star Road is identified in ACHD's Capitol Improvement Plan (CIP, Reference 4) and ACHD's Master Street Map (Reference 9) for widening to 5-lanes between 2031 and 2035. If this segment were widened to 5-lanes, with one lane in the northbound and southbound directions and a continuous center left-turn lane, the existing 2024 traffic roadway segment would meet ACHD's segment standard (1,540). As the widening of this segment is preserved within ACHD's Master Street Map, widening Star Road to five lanes is a feasible solution to address the needs of background 2029 conditions.

PROPOSED DEVELOPMENT PLAN

Toll Brothers is proposing to develop the Dancer Subdivision located in the northeast corner of the Can Ada Road and Joplin Road intersection, north of Chinden Boulevard (US 20-26). The project site is outside the Star city limits in Ada County but is within the City of Star's area of impact.

The development plan proposes to build approximately 346 single-family homes on the site. Access to the development is proposed via one full movement access on Joplin Road. There are several stub streets that will connect to future collectors along the western, eastern, and northern boundaries of the site.

TRIP GENERATION

The projected weekday daily, AM, and PM peak hour vehicle trips for the proposed development were estimated based on the ITE Trip Generation Manual, 11th Edition (Reference 13). Table 13 summarizes the estimated trip generation for the proposed Dancer Subdivision development.

Table 13. Dancer Subdivision Estimated Trip Generation

Land Use	ITE Code	Size	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single Family Home	210	346	3,161	231	58	173	319	201	118

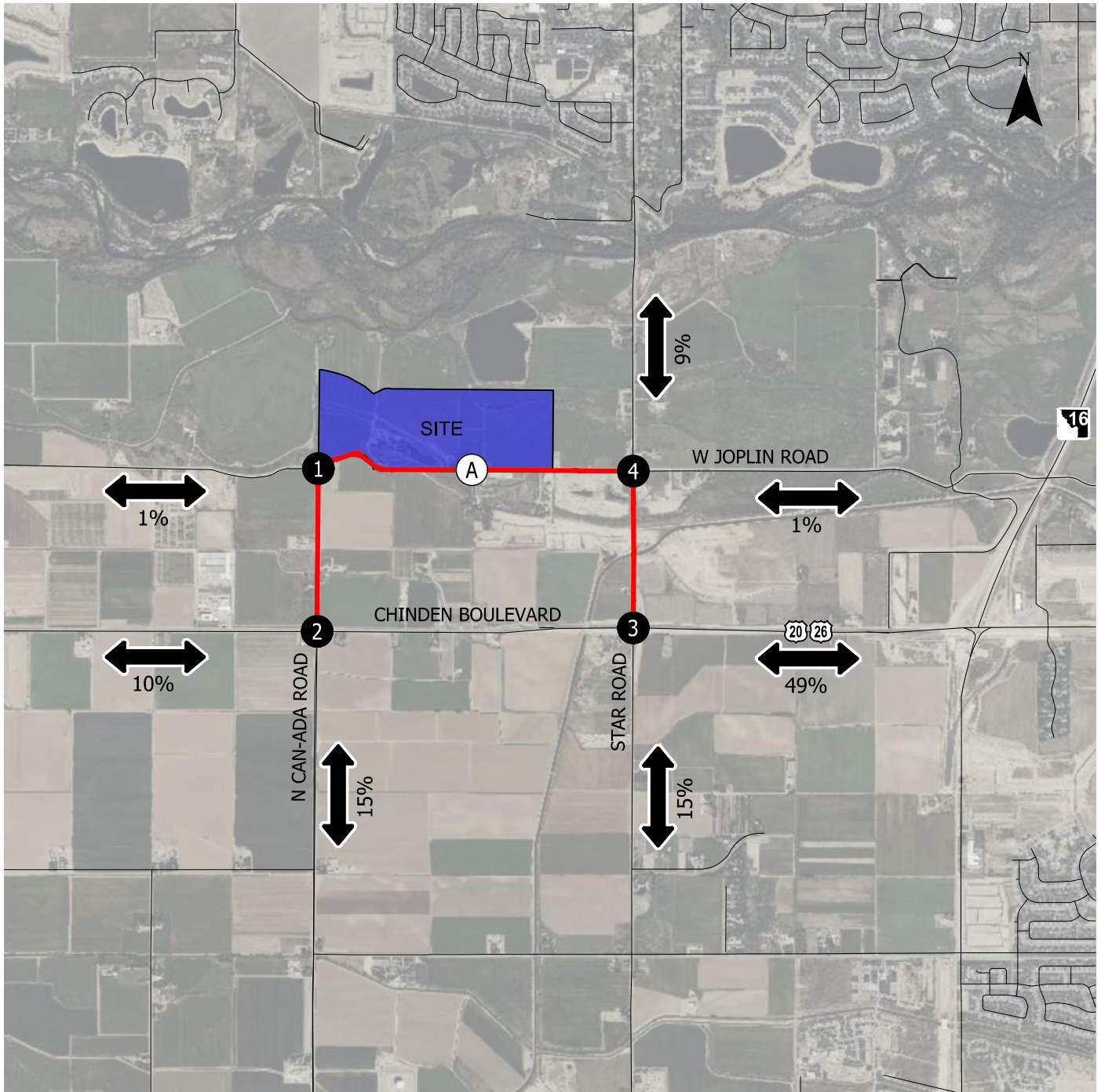
As shown in Table 13, the Dancer Subdivision is estimated to generate approximately 3,161 daily trip ends. Of those, approximately 231 are estimated to occur during the weekday AM peak hour (58 inbound / 173

outbound), and approximately 319 are estimated to occur during the weekday PM peak hour (201 inbound / 118 outbound).

TRIP DISTRIBUTION/TRIP ASSIGNMENT

The trip distribution patterns are based on the access connection to and from the proposed development and their attraction/destination characteristics. The distribution of site generated trips onto the roadway system was based on a review of the roadway system, the area of impact model run by COMPASS, and knowledge of the travel patterns in the area.

The site generated trip distribution pattern used for this analysis is shown in Figure 6. The trip assignment for the weekday AM and PM peak hours of year 2029 build-out of the project is provided in Figure 7. These trips reflect the trip generation of the proposed development during a typical weekday AM and PM peak hour.

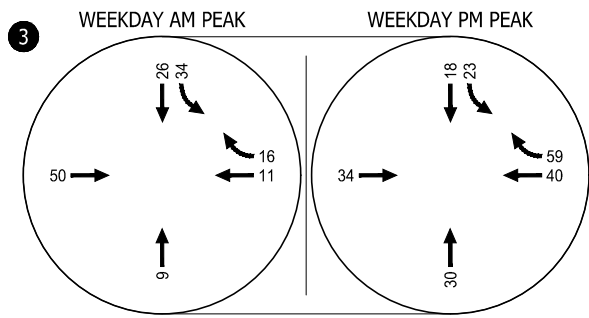
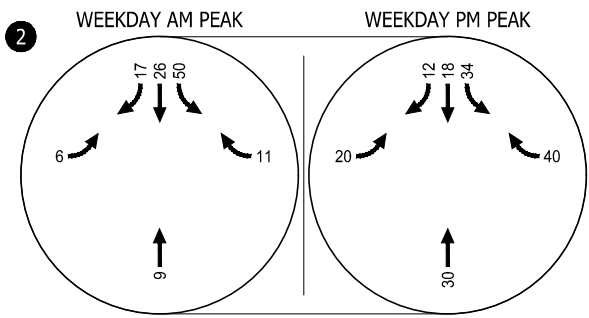
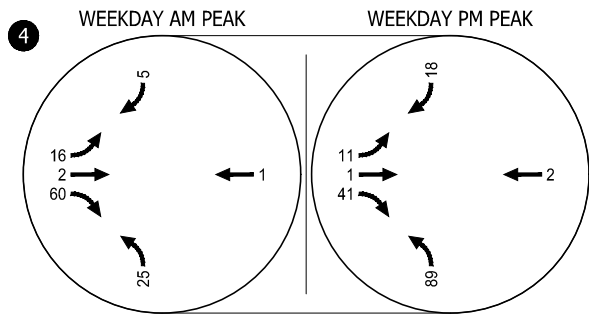
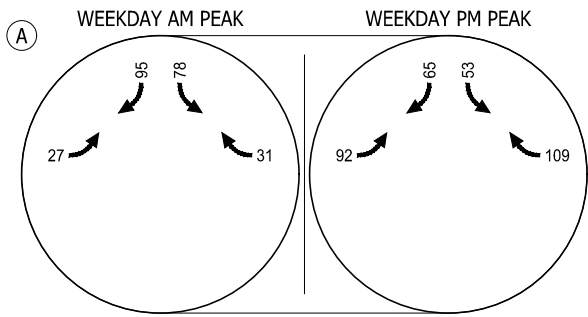
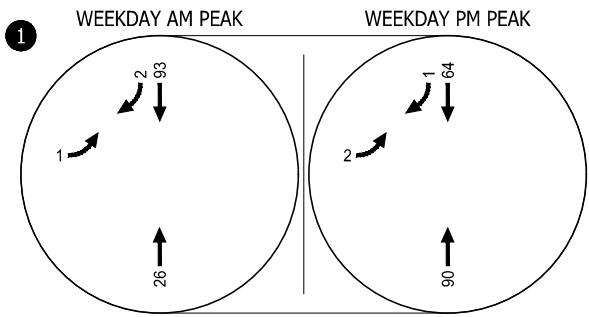
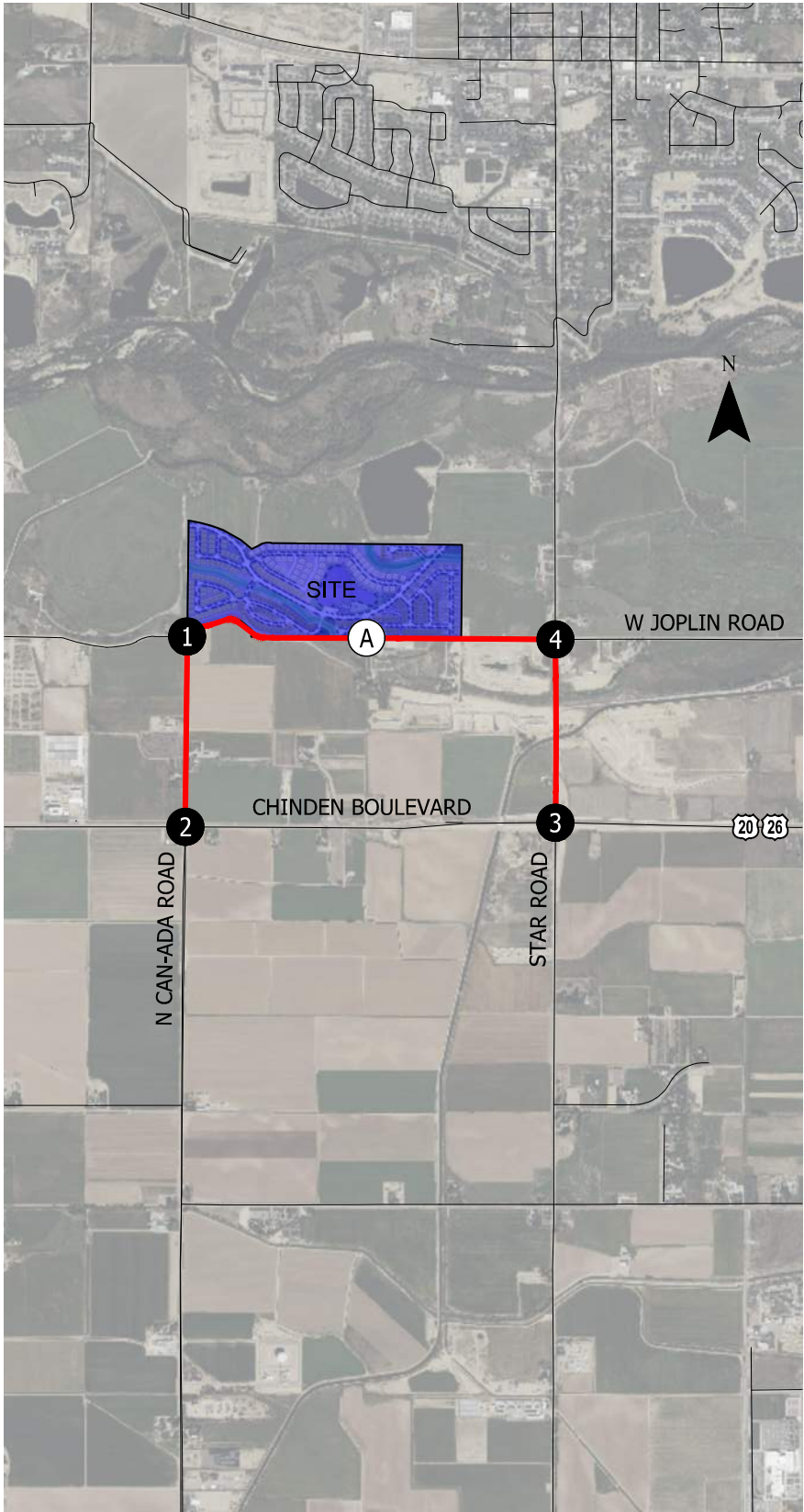


- # - Study Intersections
- (X) - Site Access
- Study Segment

Estimated Trip Distribution
Star, Idaho

Figure
6

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- # - Study Intersections
- (X) - Site Access
- Study Segment

Estimated Trip Assignment
Weekday AM & PM Peak Hours
Star, Idaho

Figure
7

YEAR 2029 TOTAL TRAFFIC CONDITIONS

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the proposed Dancer Subdivision. The 2029 background traffic volumes (Figure 5) were added to the site-generated traffic (Figure 7) to arrive at the year 2029 total traffic volumes that are shown in Figure 8.

YEAR 2029 TOTAL TRAFFIC CONDITIONS INTERSECTION OPERATIONS

Table 14 presents the traffic operations results for each study intersection and its corresponding lane groups under 2029 total traffic conditions during the weekday AM and PM peak hours. Figure 7 shows the lane configurations and traffic volumes for year 2029 total traffic conditions. *Appendix J contains the Year 2029 total traffic conditions Synchro worksheets.*

Table 14. Year 2029 Total Traffic Intersection Operations

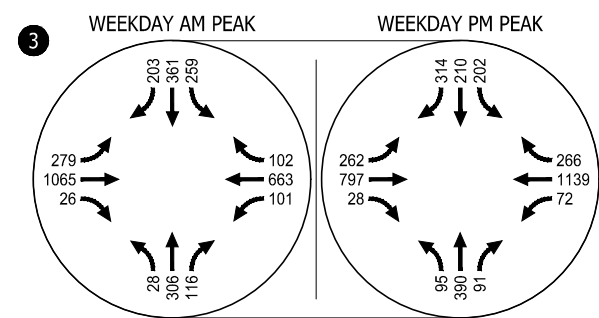
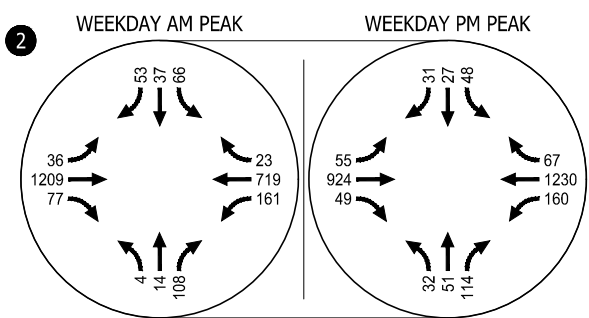
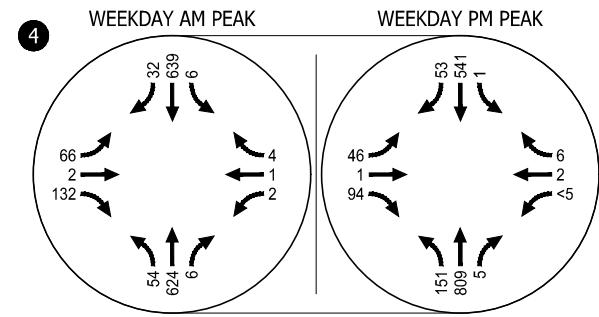
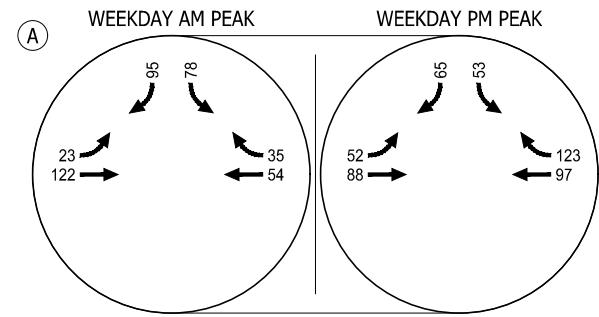
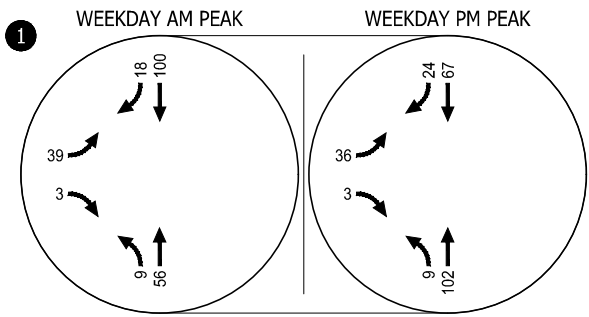
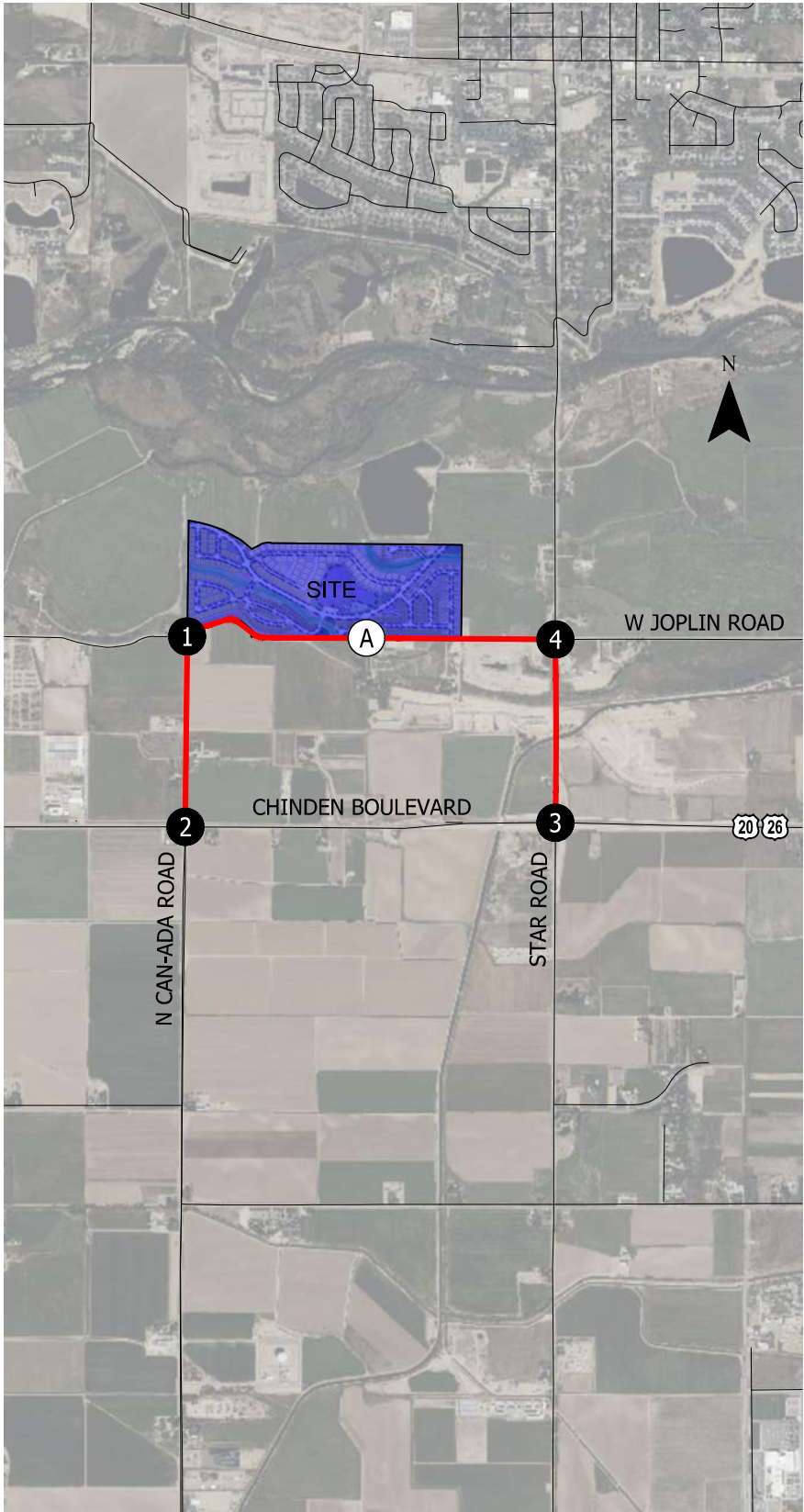
No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
1	Can Ada Road / Joplin Road	TWSC	- / -	- / -	- / -	EBLR	0.06	B	10.0	0.06	A	9.9
						NBTL	0.01	A	7.9	0.01	A	7.4
						SBTR	-	-	-	-	-	-
2	Can Ada Road / Chinden Boulevard (US 20-26)	TWSC	- / -	- / -	- / -	EBL	0.05	A	9.5	0.13	B	13.5
						EBTR	-	-	-	-	-	-
						WBL	0.32	C	15.2	0.28	B	12.8
						WBTR	-	-	-	-	-	-
						NBLTR	>1.00	F	>150	>1.00	F	>150
3	Star Road / Chinden Boulevard (US 20-26)	Traffic Signal	0.96 / 1.12	D / F	54.0 / 91.4	SBLTR	>1.00	F	>150	>1.00	F	>150
						EBL	0.94	F	90.4	>1.00	F	>150
						EBT	0.81	D	39.3	0.47	C	30.2
						EBR	0.04	C	25.2	0.04	C	23.3
						WBL	0.83	E	77.9	0.82	F	105.8
						WBT	0.88	D	51.1	>1.00	F	110.1
						WBR	0.25	D	38.3	0.45	D	40.3
						NBL	0.17	D	44.4	0.40	E	56.5
						NBT	0.90	E	71.8	>1.00	F	>150
						NBR	0.40	D	50.3	0.30	E	64.5
						SBL	0.96	F	82.3	>1.00	F	139.5
4	Star Road / Joplin Road	TWSC	- / -	- / -	- / -	SBT	0.70	D	48.0	0.52	E	63.4
						SBR	0.47	D	41.0	0.91	F	96.3
						EBLTR	>1.00	F	>150	>1.00	F	>150
						WBLTR	0.06	E	35.1	0.05	D	28.7
A	Site Access A / Joplin Road	TWSC	- / -	- / -	- / -	NBLTR	0.07	A	9.3	0.16	A	9.4
						SBLTR	0.01	A	8.9	0.001	A	9.5
						EBLTR	0.02	A	7.4	0.08	A	7.9
						WBLTR	-	-	-	-	-	-
						SBLTR	0.23	B	10.6	0.20	B	11.8

V/C ratio is defined as vehicle-to-capacity ratio, which calculates the number of vehicles divided by the capacity of the roadway/intersection during the peak 15 minutes of the peak hour. LOS stands for Level of Service. Delay is reported in seconds per vehicle. Cells in the table above that are **bolded**, *italicized*, and **highlighted** indicate an intersection and/or lane group operating below the jurisdictional standards.

As Table 15 shows, all study intersections and site accesses operate acceptably during the year 2029 total traffic weekday AM and PM peak hours except for:

- **Can Ada Road / Chinden Boulevard (US 20-26) (Weekday AM and PM Peak Hours):** The northbound and southbound approaches operate overcapacity and at LOS F during the weekday AM and PM peak hours.
- **Star Road / Chinden Boulevard (US 20-26) (Weekday AM and PM Peak Hours):** The overall intersection operates under capacity and LOS D during the weekday AM peak hour but exceeds ACHD and ITD intersection v/c standards. The overall intersection operates overcapacity and at LOS D and LOS F during the weekday AM and PM peak hours, respectively. During the weekday AM peak hour, the eastbound left turn and southbound left turn movements exceed ITD's v/c threshold and operate at LOS F. During the weekday PM peak hour, the eastbound left turn, westbound through, northbound through, southbound left, and southbound right turn movements operate overcapacity and LOS F.
- **Star Road / Joplin Road (Weekday AM and PM Peak Hours):** The eastbound movement operates overcapacity and at LOS F during the weekday AM and PM peak hours.

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- # - Study Intersections
- (X) - Site Access
- Study Segment

Year 2029 Total Traffic Volumes
Weekday AM & PM Peak Hours
Star, Idaho

Figure
8

YEAR 2029 TOTAL TRAFFIC CONDITIONS INTERSECTION MITIGATION

This section highlights the mitigations needed to address each of the intersections not meeting traffic operation standards under the year 2029 total traffic conditions. *Appendix K contains the year 2029 mitigated total traffic operational worksheets including findings from the signal warrant analysis.*

Can Ada Road / Chinden Boulevard (US 20-26)

Similar to existing 2024 and background 2029 conditions, under 2029 total traffic conditions the intersection of Can Ada Road / Chinden Boulevard (US 20-26) northbound and southbound approaches operate at LOS F and overcapacity during both the weekday AM and PM peak hours.

ITD's ChindenWest project identifies a traffic signal with two through lanes in the eastbound and westbound directions along Chinden Boulevard (US 20-26), with a dedicated left-turn lane on each approach, and a dedicated right-turn lane on the eastbound, westbound, and northbound approaches. This improvement is planned to be installed with the widening of Chinden Boulevard (US 20-26) in 2025 and was explored for mitigation at this intersection.

Table 15 summarizes the projected operations of the intersection with the implementation of a traffic signal with ITD's identified lane configuration for the weekday AM and PM peak hours. As shown, a traffic signal with the identified lane configuration would mitigate intersection operations to within ITD and ACHD operating standards under 2029 total traffic conditions.

Table 15. Year 2029 Mitigated Total Conditions at Can Ada Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
2	Can Ada Road / Chinden Boulevard (US 20-26)	Traffic Signal (with ITD design lane config)	0.69 / 0.70	C / C	22.1 / 21.5	EBL	0.67	D	53.8	0.75	D	50.5
						EBT	0.81	C	20.5	0.69	B	18.8
						EBR	0.12	B	12.9	0.09	B	13.3
						WBL	0.82	D	44.7	0.81	D	40.5
						WBT	0.41	B	11.1	0.79	B	16.4
						WBR	0.03	A	8.6	0.10	A	9.7
						NBL	0.44	E	73.0	0.64	D	49.1
						NBT	0.08	D	35.4	0.27	C	32.7
						NBR	0.76	D	45.9	0.74	D	40.2
						SBL	0.78	D	54.6	0.71	D	48.9
						SBTR	0.39	C	34.4	0.32	C	32.4

Star Road / Chinden Boulevard (US 20-26)

Similar to existing 2024 and background 2029 conditions, under 2029 total traffic conditions, the overall intersection operates under capacity and LOS D during the weekday AM peak hour but exceeds ACHD and ITD intersection v/c standards. The overall intersection operates overcapacity and at LOS D and LOS F during the weekday AM and PM peak hours, respectively. During the weekday AM peak hour, the eastbound left turn and southbound left turn movements exceed ITD's v/c threshold and operate at LOS F. During the weekday PM peak hour, the eastbound left turn, westbound through, northbound through, southbound left, and southbound right turn movements operate overcapacity and LOS F.

ITD's ChindenWest project identifies widening of Chinden Boulevard (US 20-26) to the west of Star Road to two through lanes in the eastbound and westbound directions. Widening from two lanes to four lanes between Can Ada Road and Star Road would improve lane utilization in the westbound direction at the Star Road / Chinden Boulevard (US 20-26) intersection. Exclusively improving the westbound lane utilization as a result of this widening at this intersection does not mitigate intersection operations to within ACHD and ITD standards during the weekday PM peak hour under 2029 total traffic conditions.

In addition to the Chinden Boulevard (US 20-26) widening to the west, to mitigate intersection operations the addition of a second eastbound left-turn lane was explored. The recent widening of Chinden Boulevard at this intersection includes dedicated striped storage for a future additional eastbound left-turn lane. With an additional eastbound left-turn lane, Star Road north of Chinden Boulevard would require widening to provide dual receiving lanes to accept all left-turning vehicles. This future widening of Star Road to include two northbound lanes, as preserved in ACHD's CIP (Reference 4) and ACHD's Master Street Map (Reference 9) would be required to construct this improvement.

Table 16 summarizes the intersection operations assuming improvement of the westbound lane utilization as a result of the Chinden Boulevard (US 20-26) widening and the addition of a second dedicated eastbound left-turn lane during the weekday AM and PM peak hours. As shown, the improved westbound lane utilization and the addition of a second eastbound left-turn would mitigate intersection operations to within ACHD and ITD standards during the weekday PM peak hour under 2029 total traffic conditions.

Table 16. Year 2029 Mitigated Total Conditions at Star Road / Chinden Boulevard (US 20-26)

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
3	Star Road / Chinden Road (US 20-26)	Traffic Signal (with Chinden widening to W & second EBL turn lane)	0.85 / 0.89	D / E	53.4 / 59.9	EBL	0.86	F	82.0	0.88	F	111.0
						EBT	0.90	E	55.9	0.55	D	39.7
						EBR	0.05	C	32.8	0.04	C	29.8
						WBL	0.85	F	99.3	0.82	F	102.8
						WBT	0.61	D	45.6	0.90	E	61.7
						WBR	0.22	D	38.6	0.47	D	43.5
						NBL	0.13	D	42.9	0.32	D	47.1
						NBT	0.70	E	62.5	0.85	F	80.9
						NBR	0.31	D	50.2	0.23	D	53.9
						SBL	0.77	D	42.8	0.82	E	59.4
						SBT	0.58	D	41.8	0.39	D	48.4
						SBR	0.38	D	37.9	0.68	E	56.9

Star Road / Joplin Road

The critical eastbound approach at the Star Road / Joplin Road intersection operates overcapacity and at LOS F during the weekday AM and PM peak hours.

The in-process developments identified in this analysis have been conditioned by ACHD with construction of a northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane. As such, the addition of a dedicated northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane, assuming the left-turn lanes are constructed as a two-way center left-turn lane through the

intersection, were explored to mitigate intersection operations to within ACHD standards. Table 17 summarizes intersection operations with a dedicated northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane in place during the weekday AM and PM peak hours. As shown, the addition of these turn lanes at this intersection would mitigate intersection operations to within ACHD v/c standards during the weekday AM and PM peak hours under 2029 total traffic conditions.

In addition to the addition of a dedicated northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane, the ultimate configuration of this intersection was explored, including the widening of Star Road to five lanes as identified in the CIP. Table 17 summarizes intersection operations with a five-lane cross section on Star Road. As shown, the ultimate widening of Star Road does mitigate intersection operations to within ACHD operating standards during the weekday AM and PM peak hours under 2029 total traffic conditions.

Table 17. Year 2029 Mitigated Total Conditions at Star Road / Joplin Road

No.	Intersection	Intersection Control	Intersection AM/PM			Lane Group	Weekday AM Peak Hour			Weekday PM Peak Hour		
			V/C	LOS	Delay		V/C	LOS	Delay	V/C	LOS	Delay
4	Star Road / Joplin Road	TWSC (with NBL, SBL, SBR)	- / -	- / -	- / -	EBLTR	0.67	E	36.3	0.52	D	30.8
						WBLTR	0.06	D	33.9	0.05	D	26.0
						NBL	0.07	A	9.3	0.16	A	9.4
						NBTR	-	-	-	-	-	-
						SBL	0.01	A	8.9	0.001	A	9.5
						SBT	-	-	-	-	-	-
						SBR	-	-	-	-	-	-
		TWSC (with ACHD CIP Star Road widening)	- / -	- / -	- / -	EBLTR	0.52	C	23.0	0.38	C	20.3
						WBLTR	0.04	C	22.4	0.04	C	23.0
						NBL	0.07	A	9.3	0.16	A	9.4
						NBTR	-	-	-	-	-	-
						SBL	0.01	A	8.9	0.001	A	9.5
						SBTR	-	-	-	-	-	-

The addition of a dedicated northbound left-turn lane, southbound left-turn lane, and southbound right-turn lane is the recommended mitigation for 2029 total traffic conditions as it allows for undercapacity operations during both peak hours. Trips from the Dancer Subdivision may adjust their route to utilize the traffic signal-controlled intersection of Can Ada Road and Chinden Boulevard (US 20-26) to avoid high delay.

YEAR 2029 TOTAL TRAFFIC CONDITIONS ROADWAY SEGMENT ANALYSIS

Peak hour roadway segment volumes were based on the traffic count data collected at the study intersections. The peak hour, peak direction roadway segment volumes, and resultant LOS per ACHD Policy Manual 7106.4.1 for the existing study roadway segments are summarized in Table 18.

Table 18. Year 2029 Total Traffic Roadway Segment Operations

Roadway Segment	Classification ¹	Travel Lanes ²	ADT	ACHD Peak Hour Std. Volume (One-Way)	Weekday AM Peak Hour		Weekday PM Peak Hour	
					One-Way Volume/Direction	Meets Std.	One-Way Volume/Direction	Meets Std.
Star Road – Joplin Road to Chinden Boulevard (US 20-26)	Minor Arterial	2	19,195	E / 575	873 / SB	No	1,005 / NB	No
Joplin Road – Can Ada Road to Star Road	Collector	2	4,220	D / 425	250 / EB	Yes	246 / EB	Yes
Can Ada Road – Joplin Road to Chinden Boulevard (US 20-26)	Collector	2	2,152	D / 425	106 / NB	Yes	134 / NB	Yes

¹Per COMPASS 2040 Functional Street Classification Map (Reference 8)

²Travel lanes include the total number of lanes across the roadway's respective cross section

As shown in Table 18, the background roadway segments meet ACHD roadway segment LOS thresholds under 2029 total traffic conditions weekday AM and PM peak hours, except for:

- **Star Road from Joplin Road to Chinden Boulevard (US 20-26) (Weekday AM & PM Peak Hour):**
The southbound directional volume during the weekday AM peak hour (873) and weekday PM peak hour (1,005) exceed ACHD's 2-lane minor arterial standard (575).

YEAR 2029 TOTAL TRAFFIC CONDITIONS ROADWAY MITIGATIONS

As previously highlighted, there is a study roadway segment forecast to experience peak hour, peak directional volumes exceeding ACHD standards under existing conditions.

ACHD's Alternative Mitigation Measures policy 7106.7.3 states that if traditional mitigation measures such as roadway widening and intersection improvements are infeasible as determined by ACHD, the TIS may recommend alternative mitigation measures. Alternative mitigation measures shall demonstrate that impacts from the project will be offset.

- If the impacted roadway segments and/or intersections are programmed as funded in the Integrated Five-Year Work Plan (IFYWP) or the Capital Improvements Plan (CIP); no alternative mitigation is required.
- If the impacted roadway segments and/or intersections are not programmed in either the IFYWP or the CIP; the applicant may (i) analyze the shoulder hour and (ii) provide a safety analysis to determine alternative mitigation requirements.
 - If the impacted roadway segments and intersections meet the minimum acceptable level of service planning thresholds in the shoulder hour the applicant may suggest feasible alternative mitigation such as: sidewalks, bike facilities, connectivity, safety improvements, etc. within 1.5 miles of the proposed development.

If the shoulder hour planning thresholds are exceeded the applicant may request to enter into a Development Agreement to pay into the Priority Corridor Fund an amount determined by ACHD to offset the impacts from the project.

Star Road (Joplin Road to Chinden Boulevard (US 20-26))

Under 2029 total traffic conditions the roadway segment weekday AM peak hour directional volume (873) and weekday PM peak hour directional volume (1,005) exceed ACHD's minor arterial roadway standards for a two-lane minor arterial facility (575). This segment of Star Road is identified in ACHD's Capitol Improvement Plan (CIP, Reference 4) and ACHD's Master Street Map (Reference 9) for widening to 5-lanes between 2031 and 2035. If this segment were widened to 5-lanes, with one lane in the northbound and southbound directions and a continuous center left-turn lane, the existing 2024 traffic roadway segment would meet ACHD's segment standard (1,540). As the widening of this segment is preserved within ACHD's Master Street Map, widening Star Road to five lanes is a feasible solution to address the needs of background 2029 conditions.

YEAR 2029 TOTAL TRAFFIC QUEUING

An analysis of the 95th percentile queuing at the study intersections and site accesses. Table 19 shows the projected queue under 2029 total traffic conditions. *Queuing worksheets are provided with the total traffic conditions analysis worksheets in Appendix J.*

Table 19. Year 2029 Total Traffic Conditions 95th Percentile Queuing Analysis

No.	Intersection	Lane Group	Storage Available (ft)	95 th Queue (ft) AM / PM	Fits within Storage
1	Can Ada Road / Joplin Road	EBLR	-	25 / 25	Yes
		NBTL	-	25 / 25	Yes
		SBTR	-	- / -	Yes
2	Can Ada Road / Chinden Boulevard (US 20-26)	EBL	150	25 / 25	Yes
		EBTR	-	- / -	Yes
		WBL	150	50 / 50	Yes
		WBTR	-	- / -	Yes
		NBLTR	-	- / -	Yes
		SBLTR	-	575 / -	Yes
3	Star Road / Chinden Boulevard (US 20-26)	EBL	325	625 / 600	No
		EBT	-	700 / 450	Yes
		EBR	230	25 / 25	Yes
		WBL	450	200 / 175	Yes
		WBT	-	575 / 1,300	Yes
		WBR	450	25 / 125	Yes
		NBL	200	50 / 150	Yes
		NBT	-	550 / 825	Yes
		NBR	200	50 / 25	Yes
		SBL	200	475 / 450	No
		SBT	-	600 / 375	Yes
4	Star Road / Joplin Road	EBLTR	-	300 / 225	Yes
		WBLTR	-	25 / 25	Yes
		NBLTR	-	25 / 25	Yes
		SBLTR	-	25 / 25	Yes
A	Site Access A / Joplin Road	EBLTR	-	25 / 25	Yes
		WBLTR	-	- / -	Yes
		SBLTR	-	25 / 25	Yes

Under 2029 total traffic conditions all turn lanes provide adequate storage length except for the eastbound and southbound left-turn movements at the intersection of Star Road / Chinden Boulevard (US 20-26).

At the Star Road / Chinden Boulevard (US 20-26) intersection the eastbound left-turn movement queue and the southbound left-turn movement queue are projected to spillback beyond the available left-turn storage currently provided during both the weekday AM and PM peak hours. With the implementation of an additional eastbound left-turn lane the eastbound left-turn lane queue is reduced to 250 and 275 feet during the weekday AM and PM peak hours, respectively.

The future widening of Star Road to the north of Chinden Boulevard, as outlined in the ACHD CIP (Reference 4), will provide a continuous two-way center left-turn lane beyond the existing available striped storage of the southbound left-turn and can provide additional left-turn storage.

SITE ACCESS EVALUATION

This section evaluates the need for turn lanes, intersection sight distance, and the access location, threshold, and operation with respect to ACHD Policy Manual. All analyses and evaluation in this section is based on full build-out of the site in year 2029. *Appendix L contains the worksheets for the turn lane warrants and any additional operation analyses for site access evaluation.*

SITE ACCESS SPACING

The site access was reviewed for spacing per *ACHD Policy 7207.4.6* which outlines criteria for approving local streets along minor and major arterials located away from signalized intersections. For the purposes of this analysis all internal roadways are assumed local streets. The site access roadway is assumed to be a collector roadway given that it aligns with the future mid-mile collector to the south of Joplin Road as shown on the ACHD Master Street Map. The site access location on Joplin Road has been evaluated against ACHD's Access Spacing on Collectors (away from a signalized intersection) standards.

Site Access A / Joplin Road

This proposed collector street site access to Joplin Road (a Collector roadway) is along the site's southern boundary and will be located approximately 2,700 feet east of the stop-controlled intersection of Can Ada Road and Joplin Road. Site Access A meets ACHD access spacing policy for successive local streets on a collector roadway with a speed limit of 35 mph (330 feet minimum spacing). Therefore, this access is recommended as a full-movement access. Site Access A provides access and circulation for all traffic entering and exiting the site.

TURN LANE WARRANT ANALYSIS

Turn lane warrants were analyzed for the site accesses. The warrant analysis used the ACHD guidelines as presented in Section 7106.4.4 of the *ACHD Policy Manual*. Table 20 shows the results of the turn lane analysis at the site access locations.

Table 20. Turn Lane Analysis Results

Site Access	Proposed Access Type	Turn Lane	Warranted
Site Access A / Joplin Road	Full-movement, stop-control	WB Right Turn Lane	No
		EB Left-Turn Lane	No

Based on the analysis, no turn lanes are warranted at the site accesses based on *ACHD's Policy Manual*.

INTERSECTION SIGHT DISTANCE

Sight distance was evaluated at the planned site access location.

Site Access A / Joplin Road

From Site Access A on Joplin Road, sight distance to both the east and west along Joplin Road is over 1,000 feet. Sight distance in both directions meet the requirements for intersection sight distance on a roadway for 35 mph (390 feet). Exhibit A provides a view to the east and west along Joplin Road from the approximate location of the planned Site Access A.



Exhibit A. Estimated Sight Distance at the Proposed Site Access A /Joplin Road Intersection (Google Maps)

General Recommendations for All Site Accesses

In addition to the above sight distance evaluation, the following recommendations have been identified to ensure adequate safety and operations at the site access point, internal intersections, and roadways:

- Remove miscellaneous vegetation and shrubbery, and potential obstructions along roadways as necessary to obtain and maintain adequate intersection sight distance.
- Site access is assumed to match the existing grade of the connected roadway at the intersection and back at least one car length. Significant changes to the approach grade could impact the sight distances.
- Shrubby, weeds, and landscaping near the internal intersections and site access points should be maintained to ensure adequate sight distance.
- If widening occurs along any of the site access road, care should be taken to ensure adequate grades and intersection sight distance is maintained.
- Intersection sight distance should be analyzed as part of the final access design and roadway widening.

SITE ROADWAY TRAFFIC VOLUME THRESHOLD EVALUATION

Table 21 shows the estimated average daily traffic (ADT) on the site access roadway as compared with the ACHD policy for maximum traffic on a collector street.

Table 21. Year 2029 Daily Traffic Estimates on Internal Roadways

Street	Estimated 2029 ADT	ACHD ADT Classification / Planning ADT Threshold	Meets ACHD Criteria?
Site Access A	3,161	Collector Street / No ADT Threshold	Yes

As shown in Table 22, the site access falls within the ACHD maximum criteria for collector street ADT.



Section 5 References

REFERENCES

1. Ada County Highway District. *Policy Manual Section 7106*. December 12, 2018.
2. Idaho Transportation Department. IDAPA 39.03.43. *Rules Governing Highway Right-of-Way Encroachment Right-of-Way*. 2014.
3. Transportation Research Board. *Highway Capacity Manual, 6th Edition*. April 2016.
4. Ada County Highway District. *ACHD 2020 Capital Improvements Plan*. Amended August 19, 2020.
5. Transportation Research Board. *Highway Capacity Manual 2000*. 2000.
6. Federal Highway Administration. *Manual on Uniform Traffic Control Devices*, 2009 Edition, Washington D.C., June 2012.
7. Valley Regional Transit. *Valley Connect 2.0*. April 2, 2018.
8. Community Planning Association of Southwest Idaho. *2040 Functional Classification Map for Ada County and Canyon County*. Approved January 28, 2013. Map background updated July 2019.
9. Ada County Highway District. *Ada County Master Street Map*. Amended May 16, 2018.
10. Ada County Highway District. *Integrated Five Year Work Plan*. September 25, 2019.
11. Idaho Transportation Department. *Idaho's Statewide Transportation Investment Program*. September 2021.
12. Idaho Transportation Department. *Idaho's Statewide Transportation Improvement Program*. January 2016.
13. Institute of Transportation Engineers. *Trip Generation Manual, 11th Edition*. September 2021.



Appendix A

Proposed Scope of Work Memo and Confirmation Emails

Becca Hoffman

From: Becca Hoffman
Sent: Thursday, May 2, 2024 12:27 PM
To: Niki Benyakhlef; Brandon Atchley
Cc: Lauren Nuxoll; Mindy Wallace; Liz Kaniecki
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

Hi Niki,

That sounds good, thank you!

Rebecca Hoffman, EIT
Engineering Associate
(she/her)

Kittelson & Associates, Inc.
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925.785.4553 (mobile)

From: Niki Benyakhlef <Niki.Benyakhlef@itd.idaho.gov>
Sent: Thursday, May 2, 2024 12:21 PM
To: Becca Hoffman <rhoffman@kittelson.com>; Brandon Atchley <batchley@achdidaho.org>
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Mindy Wallace <Mwallace@achdidaho.org>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

[External Sender]

Hello Becca –

Thank you for checking back in with me regarding the scope of Dancer Subdivision. The provided scope is acceptable to ITD. We also appreciate and agree with ACHD's additional comments.



Niki Benyakhlef
Development Services Coordinator

District 3 Development Services
O: 208.334.8337 | C: 208.296.9750
Email: niki.benyakhlef@itd.idaho.gov
Website: itd.idaho.gov

From: Becca Hoffman <rhoffman@kittelson.com>
Sent: Tuesday, April 30, 2024 2:53 PM
To: Brandon Atchley <batchley@achdidaho.org>; Niki Benyakhlef <Niki.Benyakhlef@itd.idaho.gov>
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Mindy Wallace <Mwallace@achdidaho.org>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

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Hi Brandon,

Thanks for confirming. We will be applying the in-process trips for the Inspirado and Naismith (Beacon Light) Developments, per the TISs supplied by ACHD.

Niki – Is there anything beyond what we have provided in the scoping memo and clarified with ACHD that you would like to provide comments on?

Thanks!

Rebecca Hoffman, EIT
Engineering Associate
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From: Brandon Atchley <batchley@achdidaho.org>
Sent: Tuesday, April 30, 2024 10:23 AM
To: Becca Hoffman <rhoffman@kittelson.com>; Niki.Benyakhlef@itd.idaho.gov
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Mindy Wallace <Mwallace@achdidaho.org>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

[External Sender]

Hello Rebecca,
Thank you for checking in with the development team regarding the build-out year. Considering the two year interval between COMPASS AOI model run and scoping, the proposed 90 SFDU/year appears aggressive at first glance, but is reportedly based on client data and can be allowed. Please provide a phasing plan when submitting the TIS for determination of timing of future improvements as necessitated in the TIS.

The growth rates proposed are acceptable. I would also recommend inclusion of Naismith Crossing's in-process traffic (FKA Beacon Crossing Development) for its impacts to Can Ada and Joplin Roads, given its proximity to the surrounding study area and its activeness.

Thanks,

Brandon Atchley
Assistant Traffic Engineer | Traffic Engineering

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From: Becca Hoffman <rhoffman@kittelson.com>
Sent: Friday, April 26, 2024 12:44
To: Brandon Atchley <batchley@achdidaho.org>; Niki.Benyakhlef@itd.idaho.gov
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Mindy Wallace <Mwallace@achdidaho.org>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

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Hi Brandon,

Thanks for following up on the scoping memo. We collected counts at all four study intersections and along all three roadway segments at the end of March. We do not have documentation of the RITA map of the area at that time.

We agree that the COMPASS growth rates on the Can Ada Road and Joplin Road segments are high and that growth adjustments are appropriate for these intersections and segments. To dig a little deeper into the growth rates and the forecasted volumes in the area we requested volumes in the area from the official COMPASS model for 2021 (time of original model run), 2023 (the closest we can get to existing), and 2030 (the closest we can get to build-out). See attached.

The volumes shown from the 2021 and 2030 models were originally used to forecast the model run for this project, which generated the heavy growth rates. The 2023 model, when compared to the 2030 model, forecasts a decrease in growth along all study segments and through all study intersections. From talking with COMPASS, the directional decreases are the result of redistribution that comes from including the SH-16 extension in the 2030 model and a redistribution associated with a new north-south connection (Mystic Creek) down to Chinden that is coded as RIRO in 2030. COMPASS also noted that another big difference between 2021 and 2023 is related to the demographic growth that was expected at the time of the original model run, assumed by 2023.

Given that the model has changed since the time of the original request, and that US 20-26 associated improvements are still ongoing in the area, we believe the most appropriate way to develop 2029 volumes at study intersections and along segments is to apply trip assignments from the Inspirado and Beacon Crossing in-process developments you included in your response with a general growth rate (2%) applied to Can Ada Road and Joplin Road. To summarize:

- Can Ada Road – 2% + in-process
- Joplin Road – 2% + in-process
- Chinden Boulevard – 2% + in-process
- Star Road – 3% + in-process

We have also been in touch with our client and confirmed that the 2029 build out year is reasonable and aligns with their plans for the site.

Please let us know your thoughts or if you have any questions. Thanks!

Rebecca Hoffman, EIT
Engineering Associate
(she/her)

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From: Brandon Atchley <batchley@achdidaho.org>
Sent: Tuesday, April 23, 2024 12:45 PM
To: Becca Hoffman <rhoffman@kittelson.com>; Niki.Benyakhlef@itd.idaho.gov
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Mindy Wallace <Mwallace@achdidaho.org>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

[External Sender]

Good afternoon Rebecca,

Thank you for the update. By chance, have counts been collected on Can Ada Road or Joplin Road yet? I'm a bit hesitant on these high growth rates without having prior knowledge of what impacts ID-16 and other closures may have, which may result in noticeable overforecasting of volumes. I did some digging through our records, and there are in-process developments in the area that may make growth rate modifications more appropriate in this instance:

Inspirado and Starpointe Subdivisions would be worthy in-process developments in the study area, have TIS's associated with the developments, and have started construction according to our records. Oaklawn Crossing Subdivision has approved plans and is under construction, but no TIS was completed. I just recently reviewed plans for Naismith Commons (fka Beacon Crossing Subdivision), which also had a TIS and collected counts in 2022 at ¾ of Dancer's study area intersections.

If counts have not been collected, it will be worthwhile to get a capture of the RITA map on or near the date of traffic count collection, to be included in the TIS Appendix, as well as for reference of potential traffic shifts due to lane restrictions or detour routes.

Additionally, 346 DU constructed and occupiable in a <5 year time span may no longer be reasonable. Coordination of a revised build-out year is recommended.

Please let me know if you have any questions or comments regarding the items above.

Thanks!

Brandon Atchley
Assistant Traffic Engineer | Traffic Engineering

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From: Becca Hoffman <rhoffman@kittelson.com>
Sent: Monday, April 22, 2024 15:01
To: Brandon Atchley <batchley@achdidaho.org>; Niki.Benyakhlef@itd.idaho.gov
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>
Subject: RE: Dancer Subdivision TIS Scoping Memorandum

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Hi Brandon and Niki,

We have had an update from the client to include an additional 14 homes in the trip generation estimate. I have included an updated trip gen estimate to reflect a new trip generation for 346 single-family homes.

Land Use	ITE Code	Size (units)	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached Housing	210	346	3161	231	58	173	319	201	118

Please let me know if you have any questions about this updated trip generation or the scoping memo.

Thanks!

Rebecca Hoffman, EIT
Engineering Associate
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From: Becca Hoffman <rhoffman@kittelson.com>
Sent: Monday, April 15, 2024 3:39 PM
To: Brandon Atchley <batchley@achdidaho.org>; Niki.Benyakhlef@itd.idaho.gov
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>; Becca Hoffman <rhoffman@kittelson.com>
Subject: Dancer Subdivision TIS Scoping Memorandum

Hi Brandon and Niki,

Attached please find the TIS scoping memorandum for the proposed Dancer Subdivision project near Star Road / Chinden Boulevard (US 20-26) in Star. This scoping memo was prepared based on ACHD's and ITD's comments to COMPASS, the COMPASS model, and our review of applicable ACHD and ITD policies and plans.

Please review the scoping memo and let us know if you have any additional comments or items that need to be addressed in the project TIS.

Thank you!

Rebecca Hoffman, EIT
Engineering Associate
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MEMORANDUM

Date: April 15, 2024

Project #: 28671

To: Brandon Atchley – Ada County Highway District
Niki Benyakhlef – Idaho Transportation Department

From: Lauren Nuxoll, PE, PTOE and Rebecca Hoffman, EIT

Project: Dancer Subdivision – Star, ID

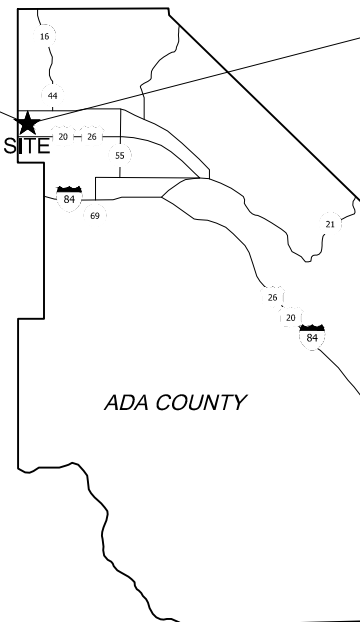
Subject: Proposed Scope of Work for the Transportation Impact Study

This memorandum documents the proposed scope and summarizes assumptions for the transportation impact study (TIS) for the proposed Dancer Subdivision development. This project is located in the northeast corner of the Can-Ada Road and Joplin Road intersection, north of Chinden Boulevard (US 20-26). The site is currently not zoned in the City of Star but will be annexed into the city with development. Figure 1 shows the site vicinity and project boundaries.

The information presented in this memorandum was developed based on information provided by the property developer, modeling prepared by COMPASS, and our familiarity with the area and with the Ada County Highway District (ACHD) and the Idaho Transportation Department (ITD) policies.

This memorandum addresses the following items:

- Project Description
- Estimated Trip Generation and Distribution
- Analysis Scenarios and Study Assumptions
- Analysis Tools



- # - Study Intersections
- (X) - Site Access
- Study Segment

Site Vicinity Map
Star, Idaho

Figure
1

PROJECT DESCRIPTION

The Dancer Subdivision is located in the northeast corner of the Can-Ada Road and Joplin Road intersection. The proposed site consists of approximately 115 acres and is currently open land with some rural single-family housing and farmland. The development plan proposes to build approximately 332 single-family homes.

Figure 2 illustrates the proposed development site plan.

Access to the development is proposed via one full movement access on N Can-Ada Road and one full movement access on W Joplin Road. The proposed access points are in the following locations:

A. Site Access A / N Can-Ada Road:

- Full access located on N Can-Ada Road approximately 1,550 north of W Joplin Road.

B. W Joplin Road / Site Access B

- Full access located on W Joplin Road approximately 2,700' east of N Can-Ada Road.

There are several stub streets that will connect to future collectors along the eastern and northern boundaries of the site.

C:\Users\hoffman\appdata\local\temp\AcPublish_27068\27927_Dancer Figs_scoping.dwg Apr 09, 2024 - 2:48pm - r.hoffman Layout Tab: 2, Proposed Site Plan



- # - Study Intersections
- X - Site Access

Proposed Site Plan
Star, Idaho

Figure
2

ESTIMATED TRIP GENERATION AND DISTRIBUTION

The projected weekday daily, AM and PM peak hour vehicle trips for the proposed development were estimated based on the *Trip Generation Manual, 11th Edition* (Reference 2). Table 1 summarizes the estimated trip generation for the proposed Verbena Ranch Subdivision.

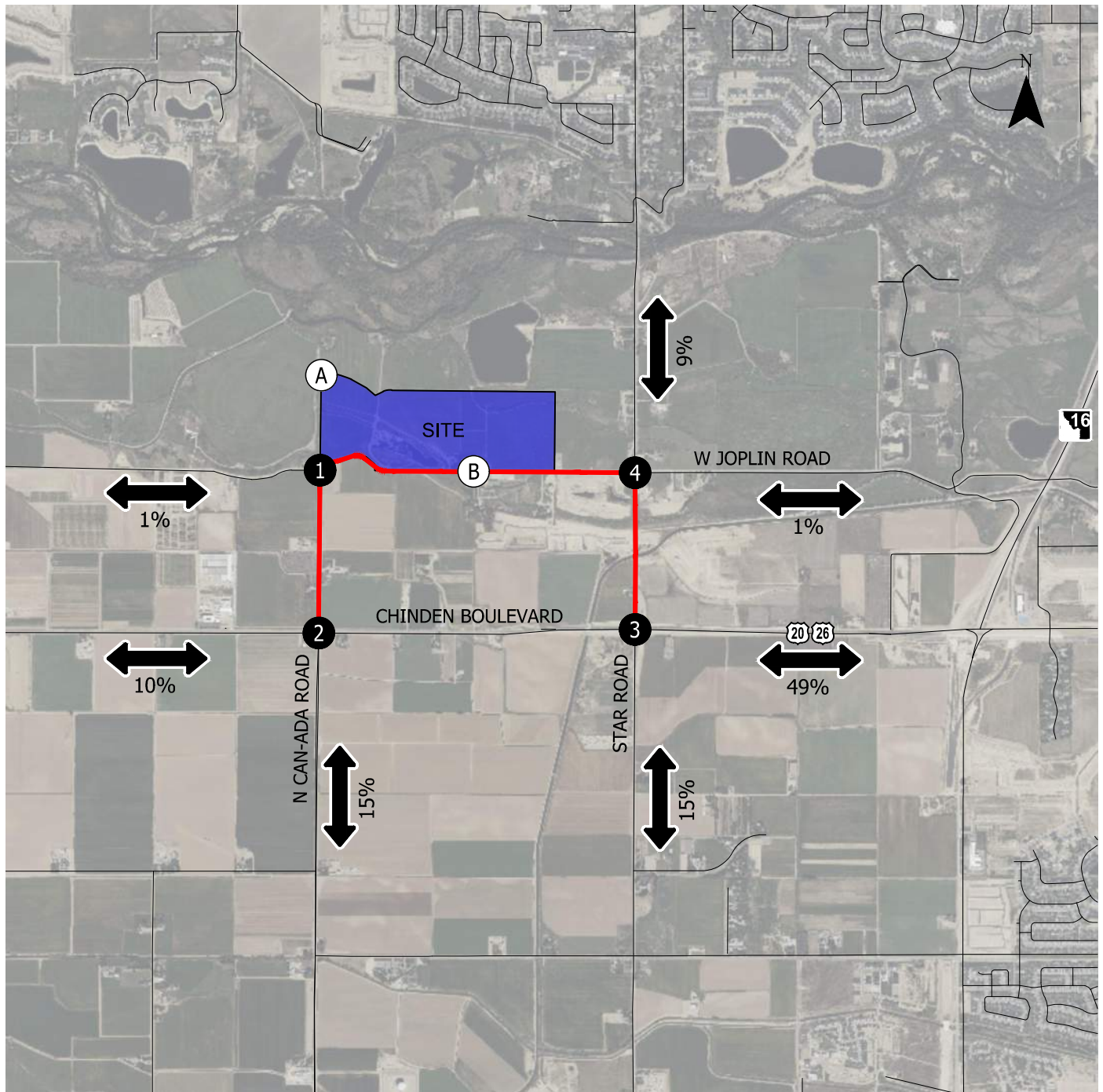
Table 1. Proposed Trip Generation

Land Use	ITE Code	Size	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single Family Home	210	332	3,043	222	56	166	307	193	114

As shown in Table 1, the proposed Dancer Subdivision is estimated to generate a total of 3,043 daily net new trip ends, of these, 222 are estimated to occur in the weekday AM peak hour (56 inbound / 166 outbound), and 307 are estimated to occur in the weekday PM peak hour (193 inbound / 114 outbound).

Trip Distribution

The distribution of site generated trips onto the roadway system was based on the area of impact model run by COMPASS that included in process developments, a review of the roadway system, and knowledge of travel patterns the area. The proposed trip distribution is shown in Figure 3. *Attachment A contains the COMPASS Model Run Results and emails from ITD.*



- # - Study Intersections
- (X) - Site Access
- Study Segment

Estimated Trip Distribution
Star, Idaho

Figure
3

ANALYSIS SCENARIOS & STUDY ASSUMPTIONS

The proposed TIS assumptions for the analysis include:

- **Study Years:**
 - Existing traffic conditions (Year 2024)
 - Buildout year (Year 2029) background traffic conditions (includes regional growth and in-process developments, but no site development traffic)
 - Buildout year (Year 2029) total traffic conditions (includes background traffic conditions plus site-generated trips from the proposed development)
- **Time Periods:**
 - Weekday AM Peak Hour (7-9 AM)
 - Weekday PM Peak Hour (4-6 PM)
- **Study Intersections:**
 1. N Can-Ada Road / W Joplin Road
 2. N Can-Ada Road / Chinden Blvd (US 20-26)
 3. Star Road / Chinden Blvd (US 20-26)
 4. Star Road / W Joplin Road
 - A. Site Access A / Can-Ada Road
 - B. W Joplin Road / Site Access B
- **Roadway Segments:**
 - Star Road – W Joplin Road to Chinden Boulevard (US 20/26)
 - W Joplin Road – N Can Ada Road to Star Road
 - N Can Ada Road – W Joplin Road to Chinden Boulevard (US 20/26)
- **Data Collection:**
 - Turning movement counts will be collected during a typical midweek (Tuesday through Thursday) AM peak period (7:00 AM – 9:00 AM) and PM peak period (4:00 PM – 6:00 PM).
 - For crash data, Kittelson will obtain historical crash data from ITD for the last 5 years on record.
- **Background Growth Rate and In-Process Developments:**
 - Based on the COMPASS model, the following annual growth rates have been identified by segment:
 - A 13% compound growth rate is proposed for N Can Ada Road
 - A 3% compound growth rate is proposed for Star Road
 - A 31% compound growth rate is proposed for W Joplin Road

- A 2% compound growth rate is proposed for Chinden Boulevard (US 20/26)
- Kittelson requests that ACHD provide information in the response to this scope for any other background developments that should be included in this TIS (in addition to normal background development growth included in the identified growth rates) as well as the approved traffic studies for the developments.
- **Access Spacing & Needs**
 - All proposed site access points will be evaluated with respect to ACHD policy, spacing requirements, and sight distance.
 - The need for traffic control and turn lanes will also be evaluated at each site access.
- **Planned Transportation Improvements:**
 - Based on our review of ITD's Idaho Transportation Investment Program (ITIP, Reference 2) and ITD's Transportation Expansion & Congestion Mitigation Program (TECM), the following projects have been identified in the study area:
 - Chinden Boulevard: Middleton Road to SH-16 (ChindenWest Plan): ITD is planning roadway widening on Chinden Boulevard (US 20/26) between Middleton Road and SH-16 by providing an additional eastbound and westbound lane.
 - In addition to roadway widening along Chinden Boulevard (US 20/26) the project plans to signalize major mile-spaced intersections, including the intersection of Chinden Boulevard (US 20/26) and N Can Ada Road in 2024.
 - These identified improvements are currently in design or under construction. Improvements on Chinden Boulevard (US 20/26) between I-84 and Middleton Road are currently under construction, improvements between Middleton Road and Star Road are planned for construction in 2025. Given that these improvements are planned to be completed and constructed before 2029 they will be included as background improvements.
 - Based on our review of ITD's Statewide Transportation Improvements Plan (STIP, Reference 3), there are no projects in the study area.
 - Based on our review of ACHD's Capital Improvement Plan (Reference 4), the following projects have been identified in the study area:
 - Star Road (RD-2020-1200, 2031-2035): McMillan Road to Chinden Boulevard (US 20/26): ACHD is planning roadway widening on Star Road between McMillan Road and Chinden Boulevard (US 20/26) to widen to five lanes.
 - Star Road (RD-2020-1210, 2031-2035): Chinden Boulevard (US 20/26) to State Street (SH-44): ACHD is planning roadway widening on Star Road between Chinden Boulevard (US 20/26) and State Street (SH-44) to widen to five lanes.
 - Star Road / Chinden Boulevard (US 20/26) Intersection Improvements (IN-2020-0260, 2031-2035): ACHD is planning to replace / modify the traffic signal with the reconstruction and widening of approaches to include exclusive turn lanes.

- ACHD has identified a timeline for construction between 2031 and 2035 and therefore these improvements will not be included in the 2029 background conditions analysis. These improvements may be implemented as mitigation as needed.

ANALYSIS TOOLS AND OPERATING STANDARDS

The intersection operational analysis will be performed using the *Highway Capacity Manual (HCM)*, 6th Edition analysis procedures (Reference 5). To ensure that this analysis is based on a reasonable worst-case scenario, the peak 15-minute flow rate during the weekday AM and PM peak hours will be used in the evaluation of all intersection level-of-service (LOS) and volume-to-capacity (V/C) ratios. The signalized and stop-controlled intersection operations analyses will be completed using Synchro 11 software, and if needed for supplemental analysis, HCS 7 software (version 7.40). For signalized intersection overall V/C ratios, the HCM 2000 procedure (Reference 6) will be used because the HCM 6th Edition procedure does not produce an intersection overall V/C ratio. Roundabout intersection operations analyses will be completed using Sidra 9.

Per the *District 3 Operational Procedures Memorandum: Development Proportionate Share Contribution* (Reference 7), ITD's desired thresholds are LOS E and v/c ratio of 0.90 or better for all intersections. Mitigations will only be required for intersections/individual movements at LOS F or with a v/c greater than 0.90.

ACHD requires that signalized intersections operate at a minimum of LOS E for Principal Arterials and Minor Arterials and LOS D for Collectors. All unsignalized intersections that have a projected LOS D or worse shall be evaluated to determine if a traffic signal or roundabout is warranted. The acceptable v/c ratio for signalized intersections is 0.90 for the overall intersection and 1.00 for each lane group. The acceptable v/c ratio is 1.00 for the critical lane group at unsignalized intersections.

NEXT STEPS

We request the ACHD and ITD to review this scoping memo and provide a response on the assumptions so that we can move forward with the study. Please contact Rebecca Hoffman at rhoffman@kittelson.com if you have any questions or comments on the information presented in this memorandum.

REFERENCES

1. Institute of Transportation Engineers. *Trip Generation Manual, 11th Edition*. September 2021.
2. Idaho Transportation Department. *Idaho Transportation Investment Program (ITIP) – FY24 to FY30*. September 21, 2023.
3. Idaho Transportation Department. *Idaho Statewide Transportation Investment Program (STIP) – FY22 to FY28*. September 22, 2021.
4. Ada County Highway District. *Capital Improvements Plan*. Published August 2020, Amended July 2022.
5. Transportation Research Board. *Highway Capacity Manual 6th Edition*. Washington D.C. 2015.
6. Transportation Research Board. *Highway Capacity Manual 2000*. 2000.
7. Idaho Transportation Department. *District 3 Operational Procedures Memorandum: Development Proportionate Share Contribution*. November 2020.

ATTACHMENTS

- A. COMPASS Model Run Results

Attachment A COMPASS Model Run Results

Becca Hoffman

From: Mitch Skiles <mskiles@compassidaho.org>
Sent: Tuesday, April 9, 2024 8:39 AM
To: Becca Hoffman
Cc: Lauren Nuxoll; Mary Ann Waldinger
Subject: RE: COMPASS Model Run Request - Dancer TIS
Attachments: JoplinCanAda_TAZ921.docx; RE: [EXTERNAL] RE: Model Run Request - Star

[External Sender]

Hi Becca,

We did a special model run for Kittelson at this same location back in 2022. We checked with ACHD and they are good with using the past report along with their previous scoping comments. Please see the email string attached for scoping comments. At the time, ITD did not have any additional comments. Our previous report is attached also.

Thanks,



Mitch Skiles, P.E. | Principal Planner - Modeler

Community Planning Association (COMPASS)

700 NE 2nd Street, Suite 200

Meridian, ID 83642

Direct: 208-475-2234 | Main: 208-855-2558

mskiles@compassidaho.org

Typical Availability: Monday - Thursday

<https://compassidaho.org/>



From: Becca Hoffman <rhoffman@kittelson.com>
Sent: Monday, April 1, 2024 4:29 PM
To: Mitch Skiles <mskiles@compassidaho.org>; Mary Ann Waldinger <MWaldinger@compassidaho.org>
Cc: Lauren Nuxoll <lnuxoll@kittelson.com>
Subject: COMPASS Model Run Request - Dancer TIS

Hi Mitch and Mary Ann,

We are getting started on a formal scoping process for the Dancer Subdivision residential development in Star, located in the NE corner of the N Can-Ada Road / W Joplin Road intersection. A preliminary site plan is attached.

The development plans to include 332 single-family detached homes. See the reference table below for our trip generation estimate.

Land Use	ITE Code	Size (units)	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached Housing	210	332	3043	222	56	166	307	193	114

The anticipated year of completion is 2029. As shown on the site plan, access is proposed via two full movement accesses on W Joplin Road and one full movement access on N Can-Ada Road.

Could you please also advise a time estimate for the completion of this request?

Thanks!

Rebecca Hoffman, EIT
Engineering Associate
(*she/her*)

[Kittelson & Associates, Inc.](#)

Transportation Engineering / Planning
101 South Capitol Boulevard, Suite 600
Boise, ID 83702
208.338.2683
208.472.9825 (direct)
925.785.4553 (mobile)

Becca Hoffman

From: Regan Hansen <Regan.Hansen@itd.idaho.gov>
Sent: Friday, June 3, 2022 4:01 PM
To: Mitch Skiles
Cc: Mary Ann Waldinger; Paige Bankhead; Mindy Wallace; Sarah Arjona
Subject: RE: [EXTERNAL] RE: Model Run Request - Star

Hi Mitch,

ITD does not need any analysis in addition to ACHD's requests.

Thank you,

Regan Hansen, P.E.

Traffic Signal Engineer

District 3 Traffic Section

Idaho Transportation Department

P: 208-332-7170 | E: Regan.Hansen@itd.idaho.gov



YOUR Safety •••▶ **YOUR Mobility** •••▶ **YOUR Economic Opportunity**

From: Paige Bankhead <pbankhead@achdidaho.org>
Sent: Friday, June 3, 2022 11:52 AM
To: Mitch Skiles <mskiles@compassidaho.org>; Mindy Wallace <Mwallace@achdidaho.org>; Regan Hansen <Regan.Hansen@itd.idaho.gov>; Sarah Arjona <Sarah.Arjona@itd.idaho.gov>
Cc: Mary Ann Waldinger <MWaldinger@compassidaho.org>
Subject: [EXTERNAL] RE: Model Run Request - Star

--- This email is from an external sender. Be cautious and DO NOT open links or attachments if the sender is unknown. ---

Hi Mitch,

ACHD requests the following:

- Joplin Road/Star Road
- Joplin Road/Can Ada Road
- Can Ada Road/Chinden Boulevard
- Star Road/Chinden Boulevard

- Star Road – Joplin Road to Chinden Boulevard
- Joplin Road – Can Ada Road to Star Road
- Can Ada Road – Joplin Road to Chinden Boulevard

Thanks!

Paige Bankhead, PE

Traffic Engineer

Ada County Highway District
Development Services
1301 N. Orchard St. Ste. 200
Phone: (208) 387-6293



We currently have a high volume of development applications and traffic impact studies that are under review and review times are longer than usual. Thank you in advance for your patience.

From: Mitch Skiles <mskiles@compassidaho.org>

Sent: Monday, May 23, 2022 12:08 PM

To: Mindy Wallace <Mwallace@achdidaho.org>; Paige Bankhead <pbankhead@achdidaho.org>; Regan Hansen <Regan.Hansen@itd.idaho.gov> <Regan.Hansen@itd.idaho.gov>; Sarah.Arjona@itd.idaho.gov

Cc: Mary Ann Waldinger <MWaldinger@compassidaho.org>

Subject: FW: Model Run Request - Star

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hello All,

We received the request below for an area of influence analysis. Our report is attached for your review.

Thanks,



Mitch Skiles, P.E. | Principal Planner - Modeler

Community Planning Association (COMPASS)

700 NE 2nd Street, Suite 200

Meridian, ID 83642

Direct: 208-475-2234 | Main: 208-855-2558

Typical Availability: Monday - Thursday

<http://www.compassidaho.org>



From: Lauren Nuxoll <lnuxoll@kittelerson.com>

Sent: Thursday, May 19, 2022 10:03 AM

To: Mitch Skiles <mskiles@compassidaho.org>

Subject: Model Run Request - Star

Hi Mitch,

Hope you are surviving this busy season! I have another request for you.

This is a 400 single family house development in Star, Idaho. It's along Joplin Road between Can Ada Road and Star Road. Hopefully this map below helps with the location. The site plan is attached.



Buildout will be 2028. Access will be along Joplin Road so traffic will be able to come in from either Can Ada Road or Star Road.

Can you do a model run for us?

Thank you!

Lauren

Lauren Nuxoll, PE, PTOE
Senior Engineer

[Kittelson & Associates, Inc.](#)

Transportation Engineering / Planning
101 South Capitol Boulevard, Suite 600
Boise, ID 83702
208.338.2683
208.472.9817 (direct)

[Kittelson Bio](#)

[LinkedIn Bio](#)

Joplin and Can Ada Proposed Development

The following summarizes the results of an area of influence model run for a proposed development located northeast of Joplin Rd and Can Ada Rd. The proposed development shown in Figure 1 will consist of 400 single family residential units with an anticipated build out by 2028. Year 2030 was used for this analysis.

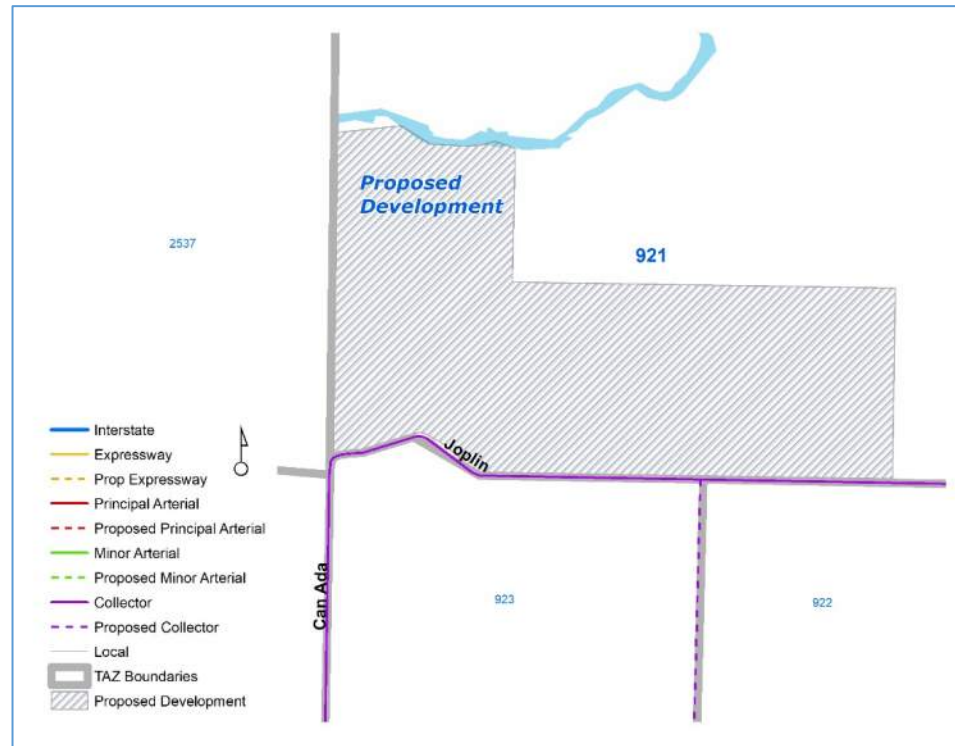


Figure 1

Table 1 provides the existing demographics for TAZ 921 and the proposed development’s demographics used for the area of influence model run. A

Cumulative Analysis was conducted to account for nearby developments with pending entitlements or recent area of influence analyses (Starpointe, Oaklawn Crossing, Inspirado, and Beacon Crossing).

Table 1

	2021		2030 (Proposed)		2030 (Cumulative)		2050	
	HH	Jobs	HH	Jobs	HH	Jobs	HH	Jobs
TAZ 921	9	10	17	5	17	5	72	0
Temp TAZ 1552	n/a	n/a	400	0	400	0	n/a	n/a
<i>Surrounding TAZs</i>	20	120	72	595	934	595	193	795
<u>Total</u>	<u>29</u>	<u>130</u>	<u>489</u>	<u>600</u>	<u>1,351</u>	<u>600</u>	<u>265</u>	<u>795</u>

Figure 2, Figure 3, **Error! Reference source not found.**: Peak Hour Results
Error! Reference source not found. and Figure 4: Cumulative Analysis

Figure 7: Surrounding Area TAZs

Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, and Figure 13: Compounded Annual Growth Rates

Note to Reviewers: *The primary purpose of this report is to help agencies determine the scope of a Traffic Impact Study (TIS) and to assist TIS preparers in establishing trip distributions. New demand forecasted by the regional model for a proposed development may not match ITE Trip Generation estimates and they are not intended to replace the trip generation process of the TIS.*

Disclaimer Regarding Updated Model: *The results documented in this report are based on the latest regional model, maintained by COMPASS, released in October of 2021, and based on the COMPASS 2050 Vision adopted in August 2021. Due to changes in demographics, TAZs, model network and model parameters, results should not be compared to those provided prior to October of 2021.*

Cumulative Analysis

The following figures show the results of including additional households for three developments with pending entitlements (Inspirado, Oaklawn Crossing, and Starpointe) and one development with a recent area of influence analysis (Beacon Crossing, November 2021). Official job growth in TAZ 925 is sufficient for Inspirado.

TAZ	2021		2030 Cumulative	
	HH	Jobs	HH	Jobs
TAZs 921 and 1552	9	10	417	5
TAZs 922, 923, and 925	27	20	910	485

Figure 5: Area of Influence (cumulative; percent contribution to the total peak hour demand)

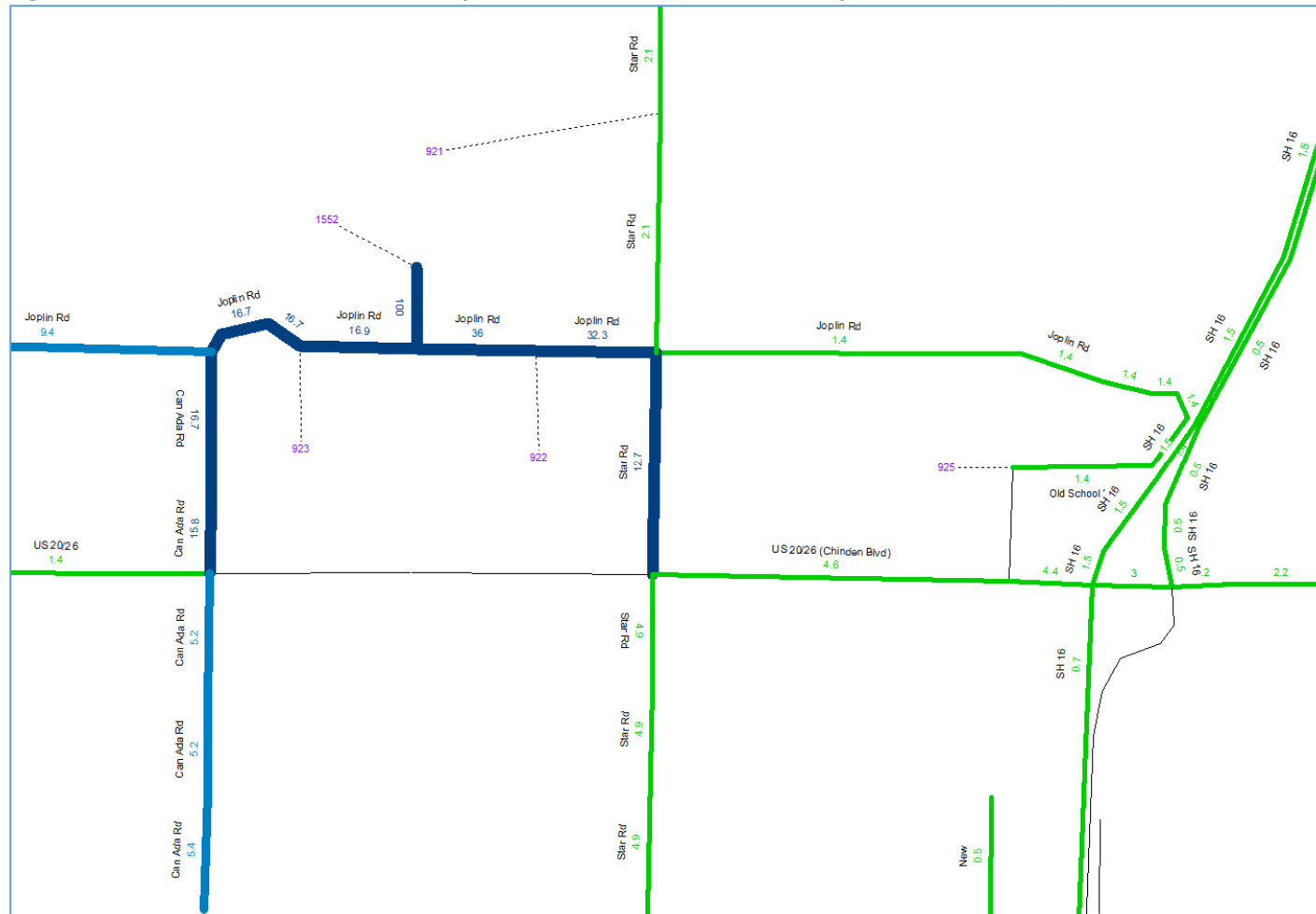


Figure 7: Surrounding Area TAZs

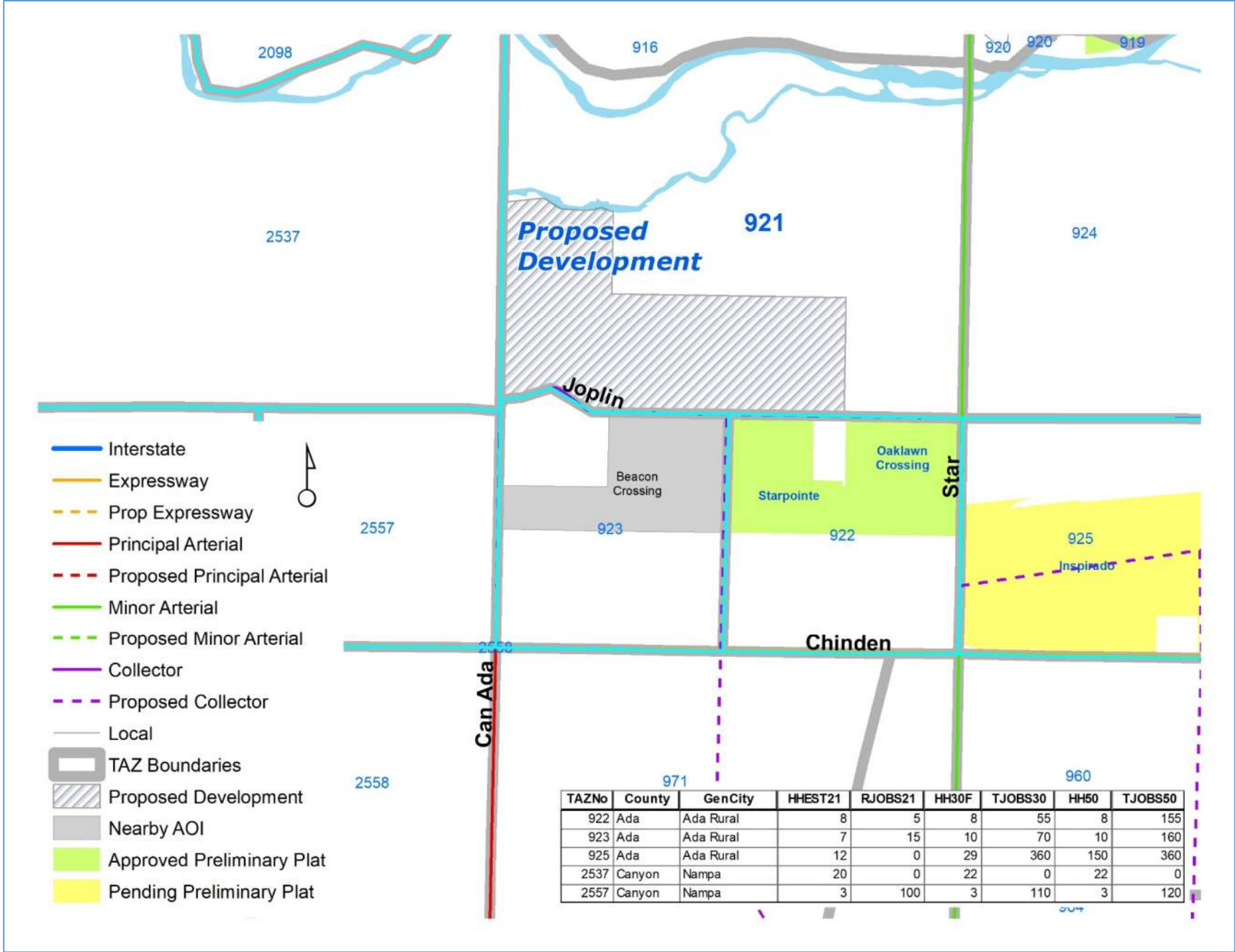


Figure 8: 2021 to 2025 Compounded Annual Growth Rates

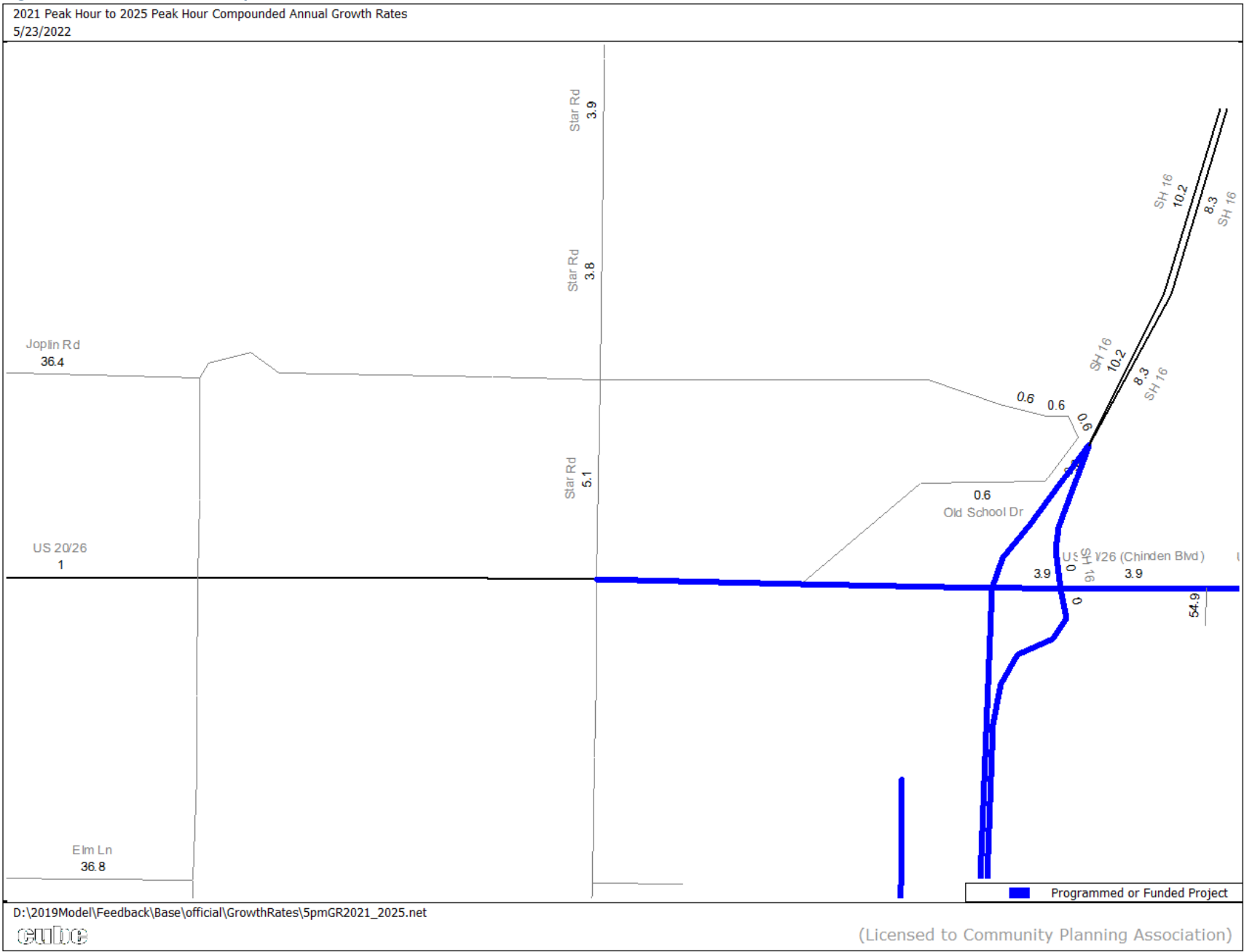
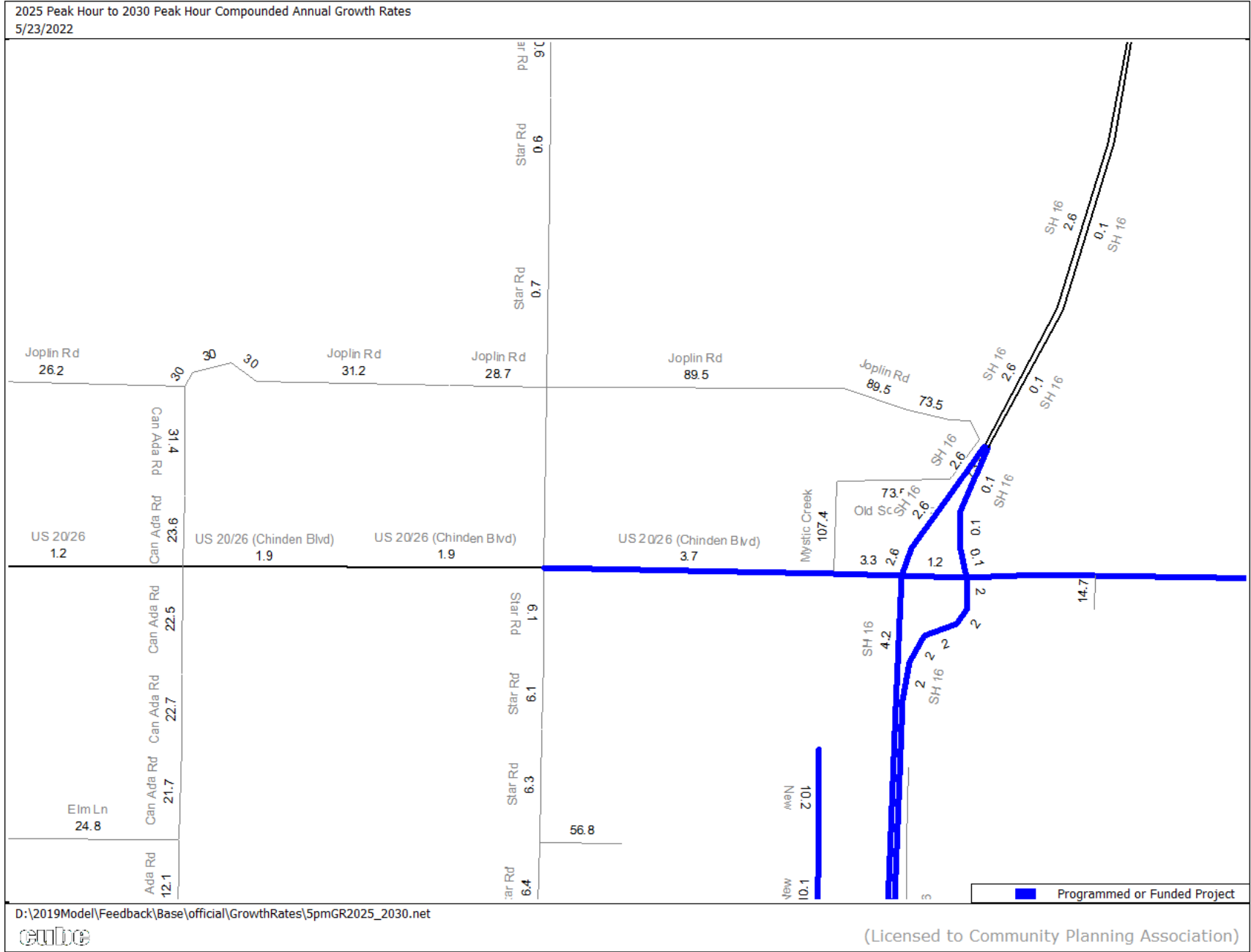


Figure 9: 2025 to 2030 Compounded Annual Growth Rates



2030 Peak Hour to 2035 Peak Hour Compounded Annual Growth Rates
5/23/2022



[illegible]



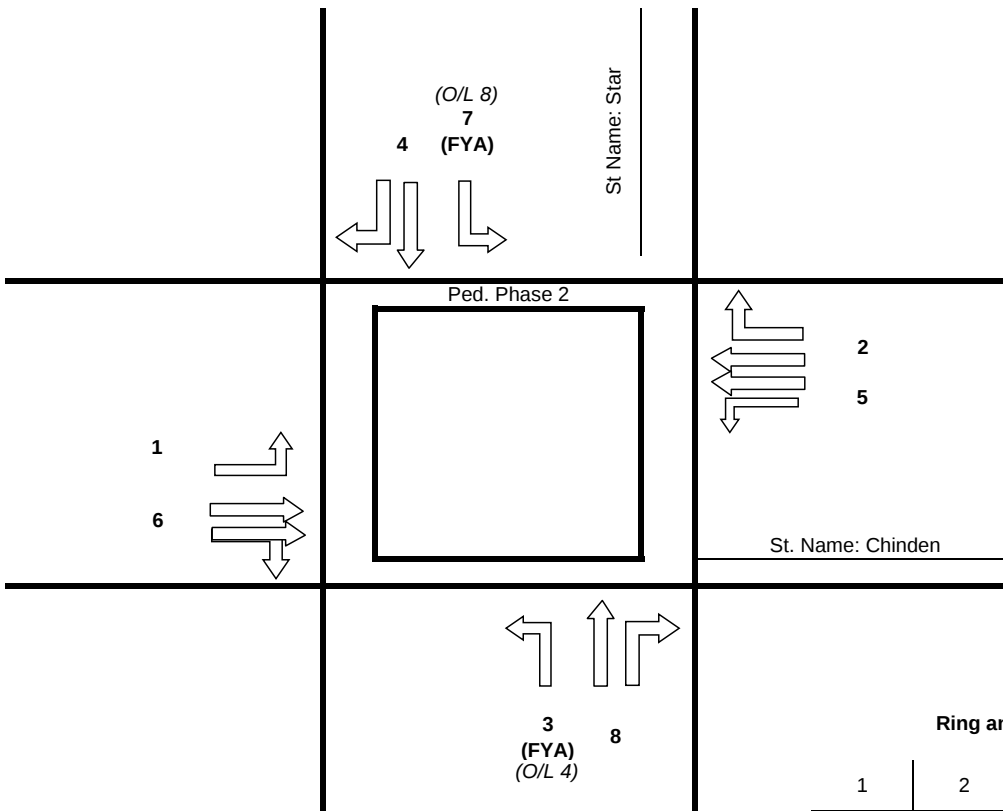
Appendix B

Signal Timing Sheets

ACHD Standard Phasing

Diagram

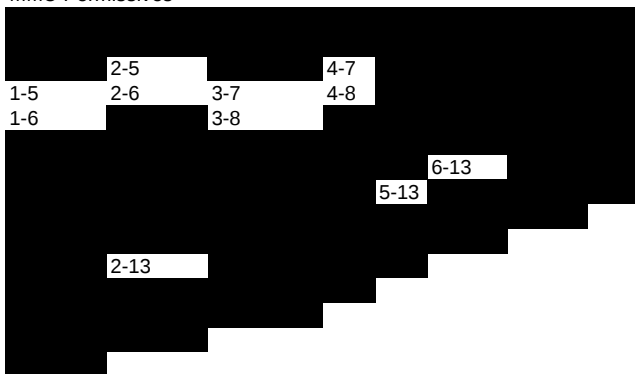
Location: #189 Chinden & Star



Ring and Barrier

1	2	3 FYA	4	Ring 1
5	6	7 FYA	8	Ring 2

MMU Permissives



Controller Database Timing Sheet



Station: 189 - Chinden & Star (Standard-3/28/2024 4:34:44 PM)

Type: Scout Ethernet v85.3/v85.4

Firmware: 85.4.2

Created By: NTdomain\wloyd

Modified By:

Reviewed By:

Phase Times and Options(1.1.1/1.1.2/1.1.4)								
	1	2	3	4	5	6	7	8
Table - 1								
MIN GRN	5	5	5	10	5	5	5	10
Gap Ext	3.5	3.5	3	3	3.5	3.5	3	3
MAX 1	35	85	25	45	25	85	25	45
Max 2	35	60	35	45	35	60	35	45
Yel Clr	5	5	5	5	5	5	5	5
Red Clr	2	1	2	1	2	1	2	1
Walk	0	5	0	0	0	0	0	0
Ped Clr	0	25	0	0	0	0	0	0
Red Revt	0	0	0	0	0	0	0	0
Add Init	0	0	0	0	0	0	0	0
Max Init	0	0	0	0	0	0	0	0
Gap Reduce Time B4	0	0	0	0	0	0	0	0
Gap Reduce Cars B4 Reduce	0	0	0	0	0	0	0	0
Gap Reduce Time To	0	0	0	0	0	0	0	0
Gap Reduce ReduceBy	0	0	0	0	0	0	0	0
Gap Reduce Min Gap	0	0	0	0	0	0	0	0
DyMaxLim	45	0	0	60	0	0	0	60
Max Step	5	0	0	5	0	0	0	5
Enable P	X	X	X	X	X	X	X	X
Min Recall	.	X	.	.	.	X	.	.
Max Recall	.	.	.	.	.	.	.	.
Ped Recall	.	.	.	.	.	.	.	.
Soft Recall	.	.	.	.	.	.	.	.
Lock Calls	.	.	.	.	.	.	.	.

Phase Times and Options(1.1.1/1.1.2/1.1.4)								
	1	2	3	4	5	6	7	8
Auto Flash Entry	.	X	.	.	.	X	.	.
Auto Flash Exit	.	X	.	.	.	X	.	.
Dual Entry	.	X	.	X	.	X	.	X
Enable Simul Gap	X	X	X	X	X	X	X	X
Guarantd Passage	.	.	.	.	.	.	.	.
Rest In Walk	.	.	.	.	.	.	.	.
Condit'l Service	.	.	.	.	.	.	.	.
Non-Actuated 1	.	.	.	.	.	.	.	.
Non-Actuated 2	.	.	.	.	.	.	.	.
Added Init Calc	S	S	S	S	S	S	S	S
Hold to Max	.	.	.	.	.	.	.	.
Ring	1	1	1	1	2	2	2	2
Startup	RED	GREEN	RED	RED	RED	GREEN	RED	RED
C 1	5	5	7	7	1	1	3	3
C 2	6	6	8	8	2	2	4	4
C 3	0	0	0	0	0	0	0	0
C 4	0	0	0	0	0	0	0	0
C 5	0	0	0	0	0	0	0	0
C 6	0	0	0	0	0	0	0	0
C 7	0	0	0	0	0	0	0	0
C 8	0	0	0	0	0	0	0	0
C 9	0	0	0	0	0	0	0	0
C 10	0	0	0	0	0	0	0	0
C 11	0	0	0	0	0	0	0	0
C 12	0	0	0	0	0	0	0	0
C 13	0	0	0	0	0	0	0	0
C 14	0	0	0	0	0	0	0	0
C 15	0	0	0	0	0	0	0	0
C 16	0	0	0	0	0	0	0	0
C 17	0	0	0	0	0	0	0	0
C 18	0	0	0	0	0	0	0	0
C 19	0	0	0	0	0	0	0	0
C 20	0	0	0	0	0	0	0	0
C 21	0	0	0	0	0	0	0	0
C 22	0	0	0	0	0	0	0	0
C 23	0	0	0	0	0	0	0	0

Phase Times and Options(1.1.1/1.1.2/1.1.4)								
	1	2	3	4	5	6	7	8
C 24	0	0	0	0	0	0	0	0
C 25	0	0	0	0	0	0	0	0
C 26	0	0	0	0	0	0	0	0
C 27	0	0	0	0	0	0	0	0
C 28	0	0	0	0	0	0	0	0
C 29	0	0	0	0	0	0	0	0
C 30	0	0	0	0	0	0	0	0
C 31	0	0	0	0	0	0	0	0
C 32	0	0	0	0	0	0	0	0

Ring Sequences(1.2.4)		
	1	2
Table - 1		
1	1	5
2	2	6
3	3	7
4	4	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 2		
1	1	6
2	2	5

Ring Sequences(1.2.4)		
	1	2
3	3	7
4	4	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 3		
1	2	5
2	1	6
3	3	7
4	4	8
5	0	0

Ring Sequences(1.2.4)		
	1	2
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 4		
1	2	6
2	1	5
3	3	7
4	4	8
5	0	0
6	0	0
7	0	0
8	0	0

Ring Sequences(1.2.4)		
	1	2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 5		
1	1	5
2	2	6
3	3	8
4	4	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0

Ring Sequences(1.2.4)		
	1	2
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 6		
1	1	6
2	2	5
3	3	8
4	4	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0

Ring Sequences(1.2.4)		
	1	2
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 7		
1	2	5
2	1	6
3	3	8
4	4	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0

Ring Sequences(1.2.4)		
	1	2
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 8		
1	2	6
2	1	5
3	3	8
4	4	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0

Ring Sequences(1.2.4)		
	1	2
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 9		
1	1	5
2	2	6
3	4	7
4	3	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0

Ring Sequences(1.2.4)		
	1	2
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 10		
1	1	6
2	2	5
3	4	7
4	3	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0

Ring Sequences(1.2.4)		
	1	2
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 11		
1	2	5
2	1	6
3	4	7
4	3	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0

Ring Sequences(1.2.4)		
	1	2
30	0	0
31	0	0
32	0	0
Table - 12		
1	2	6
2	1	5
3	4	7
4	3	8
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0

Ring Sequences(1.2.4)		
	1	2
Table - 13		
1	1	5
2	2	6
3	4	8
4	3	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 14		
1	1	6
2	2	5

Ring Sequences(1.2.4)		
	1	2
3	4	8
4	3	7
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 15		
1	2	5
2	1	6
3	4	8
4	3	7
5	0	0

Ring Sequences(1.2.4)		
	1	2
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
32	0	0
Table - 16		
1	2	6
2	1	5
3	4	8
4	3	7
5	0	0
6	0	0
7	0	0
8	0	0

Ring Sequences(1.2.4)																																
	1																2															
9	0																0															
10	0																0															
11	0																0															
12	0																0															
13	0																0															
14	0																0															
15	0																0															
16	0																0															
17	0																0															
18	0																0															
19	0																0															
20	0																0															
21	0																0															
22	0																0															
23	0																0															
24	0																0															
25	0																0															
26	0																0															
27	0																0															
28	0																0															
29	0																0															
30	0																0															
31	0																0															
32	0																0															
Patterns(2.4)																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Table - 1																																
Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Split	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
seqnc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Splits Expanded(2.7.X.1)								
	1	2	3	4	5	6	7	8
Table - 1								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 2								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 3								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 4								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 5								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 6								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 7								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 8								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 9								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 10								

Splits Expanded(2.7.X.1)								
	1	2	3	4	5	6	7	8
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 11								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 12								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 13								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 14								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 15								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 16								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 17								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 18								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 19								
Time	0	0	0	0	0	0	0	0

Splits Expanded(2.7.X.1)								
	1	2	3	4	5	6	7	8
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 20								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 21								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 22								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 23								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 24								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NON	NON	NON	NON	NON	NON	NON	NON
Table - 25								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NVD	NVD	NVD	NVD	NVD	NVD	NVD	NVD
Table - 26								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NVD	NVD	NVD	NVD	NVD	NVD	NVD	NVD
Table - 27								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.
Mode	NVD	NVD	NVD	NVD	NVD	NVD	NVD	NVD
Table - 28								
Time	0	0	0	0	0	0	0	0
Coord Phase	.	.	.	.	.	.	.	.

Splits Expanded(2.7.X.1)																							
	1			2			3			4			5			6			7			8	
Mode	NVD			NVD			NVD			NVD			NVD			NVD			NVD			NVD	
Table - 29																							
Time	0			0			0			0			0			0			0			0	
Coord Phase	.			.			.			.			.			.			.			.	
Mode	NVD			NVD			NVD			NVD			NVD			NVD			NVD			NVD	
Table - 30																							
Time	30			85			30			55			35			85			30			55	
Coord Phase	.			.			.			.			.			.			.			.	
Mode	NON			MIN			NON			NON			NON			MIN			NON			NON	
Table - 31																							
Time	0			0			0			0			0			0			0			0	
Coord Phase	.			.			.			.			.			.			.			.	
Mode	NVD			NVD			NVD			NVD			NVD			NVD			NVD			NVD	
Table - 32																							
Time	30			125			30			55			35			125			30			55	
Coord Phase	.			.			.			.			.			.			.			.	
Mode	NON			MIN			NON			NON			NON			MIN			NON			NON	
Adv Schedule(4.3)																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
Table - 1																							
Sun	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Mon	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Tue	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Wed	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Thu	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Fri	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Sat	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Jan	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Feb	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Mar	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Apr	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
May	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Jun	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Jul	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Aug	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Sep	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			

Adv Schedule(4.3)																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Oct	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nov	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dec	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
01	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
02	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
03	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
04	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
05	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
06	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
07	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
08	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
09	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plan	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Day Plan(4.4)																				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20													
Table - 1																																	
Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Minute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Action	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Table - 2																																	
Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Minute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Action	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Table - 3																																	
Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Minute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Action	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
Actions(4.5)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Table - 1																																	
Pattern	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	254
Aux 1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aux 2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aux 3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Special 8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pre1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pre2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



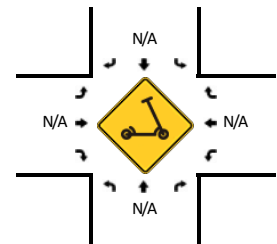
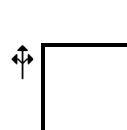
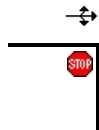
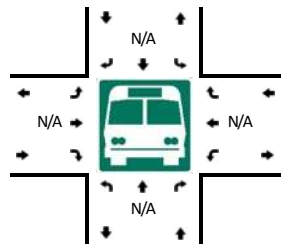
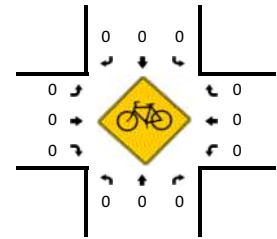
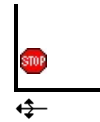
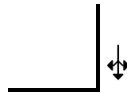
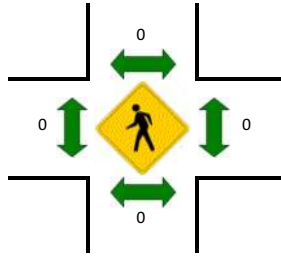
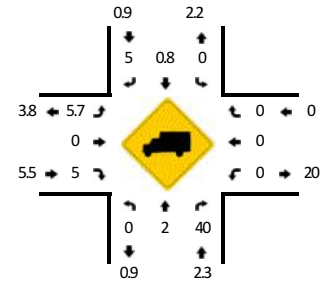
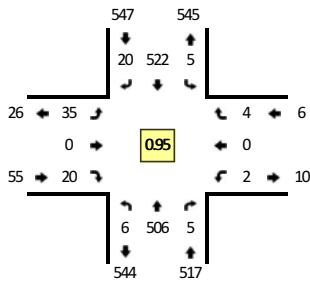
Appendix C

Existing 2024 Traffic Count Data

LOCATION: Star Rd -- Joplin Rd
CITY/STATE: Nampa, ID

QC JOB #: 16510101
DATE: Tue, Mar 26 2024

Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM



15-Min Count Period Beginning At	Star Rd (Northbound)				Star Rd (Southbound)				Joplin Rd (Eastbound)				Joplin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	65	1	0	0	186	3	0	3	0	0	0	2	0	0	0	260	
7:15 AM	1	98	1	0	2	146	11	0	3	0	3	0	1	0	2	0	268	
7:30 AM	1	135	2	0	0	139	2	0	8	0	7	0	0	0	2	0	296	
7:45 AM	2	143	1	0	1	115	1	0	15	0	7	0	0	0	0	0	285	1109
8:00 AM	2	130	1	0	2	122	6	0	9	0	3	0	1	0	0	0	276	1125
8:15 AM	0	95	1	0	1	123	1	0	11	0	0	0	0	0	0	0	232	1089
8:30 AM	4	84	0	0	1	145	4	0	6	0	5	0	2	0	3	0	254	1047
8:45 AM	1	144	1	0	0	149	3	0	1	0	2	0	0	0	3	0	304	1066
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	4	540	8	0	0	556	8	0	32	0	28	0	0	0	8	0	1184	
Heavy Trucks	0	4	4		0	8	0		0	0	0		0	0	0		16	
Buses																	0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																	0	

Comments:

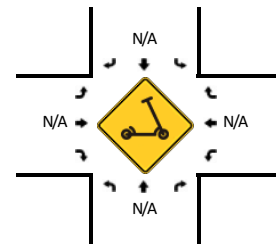
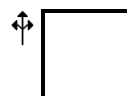
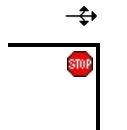
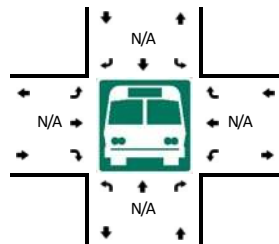
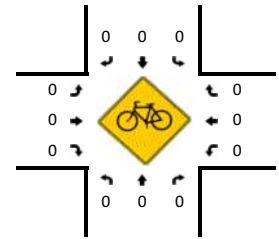
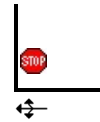
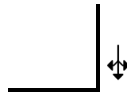
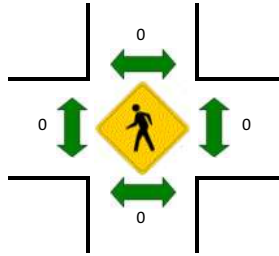
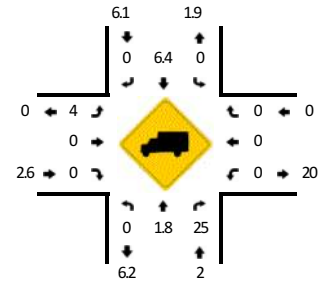
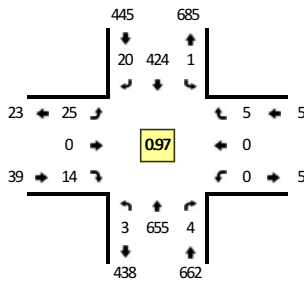
Report generated on 3/28/2024 9:56 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Star Rd -- Joplin Rd
CITY/STATE: Nampa, ID

QC JOB #: 16510102
DATE: Tue, Mar 12 2024

Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

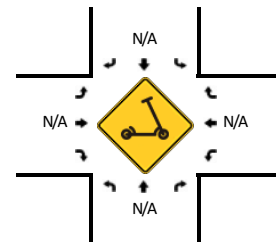
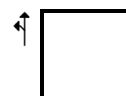
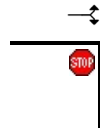
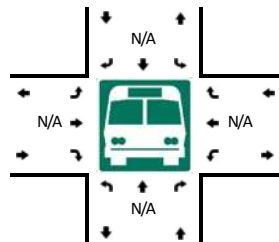
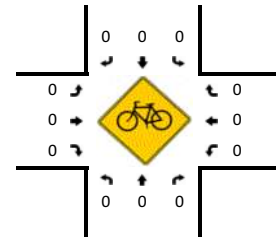
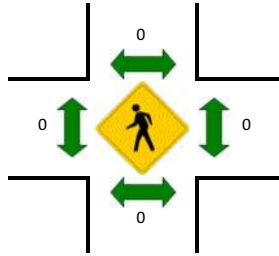
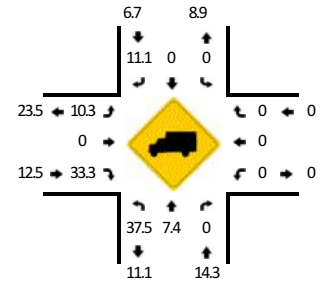
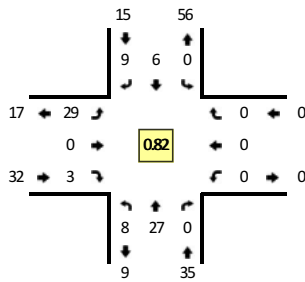


15-Min Count Period Beginning At	Star Rd (Northbound)				Star Rd (Southbound)				Joplin Rd (Eastbound)				Joplin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	124	0	0	2	95	4	0	4	0	0	0	0	0	0	0	231	
4:15 PM	3	137	1	0	0	120	6	0	14	0	8	0	0	0	0	0	289	
4:30 PM	1	162	0	0	0	112	4	0	7	0	4	0	0	0	1	0	291	
4:45 PM	0	146	1	0	0	102	8	0	9	0	5	0	0	0	2	0	273	1084
5:00 PM	2	156	2	0	1	116	4	0	6	0	2	0	0	0	1	0	290	1143
5:15 PM	0	191	1	0	0	94	4	0	3	0	3	0	0	0	1	0	297	1151
5:30 PM	1	135	1	0	2	100	3	0	4	0	1	0	0	0	1	0	248	1108
5:45 PM	2	141	0	0	0	116	5	0	5	0	0	0	0	0	0	0	269	1104
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	764	4	0	0	376	16	0	12	0	12	0	0	0	4	0	1188	
Heavy Trucks	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	24	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

Comments:

LOCATION: Can Ada Rd -- Joplin Rd**QC JOB #:** 16510103**CITY/STATE:** Nampa, ID**DATE:** Wed, Mar 13 2024

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



15-Min Count Period Beginning At	Can Ada Rd (Northbound)				Can Ada Rd (Southbound)				Joplin Rd (Eastbound)				Joplin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	0	1	2	0	2	0	0	0	0	0	0	0	5	
7:15 AM	2	5	0	0	0	2	5	0	5	0	0	0	0	0	0	0	19	
7:30 AM	1	3	0	0	0	1	4	0	7	0	2	0	0	0	0	0	18	
7:45 AM	3	7	0	0	0	1	3	0	10	0	1	0	0	0	0	0	25	67
8:00 AM	3	7	0	0	0	2	1	0	3	0	0	0	0	0	0	0	16	78
8:15 AM	1	10	0	0	0	2	1	0	9	0	0	0	0	0	0	0	23	82
8:30 AM	1	2	0	0	0	0	3	0	7	0	0	0	0	0	0	0	13	77
8:45 AM	3	7	0	0	0	2	2	0	3	0	1	0	0	0	0	0	18	70
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	28	0	0	0	4	12	0	40	0	4	0	0	0	0	0	100	
Heavy Trucks	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	8	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

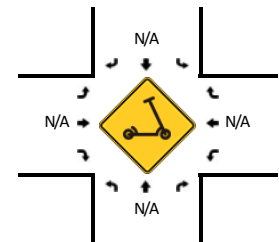
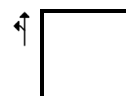
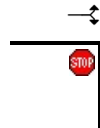
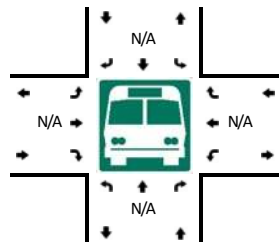
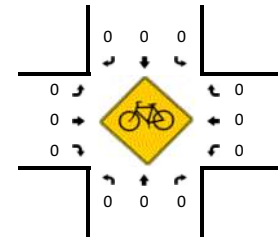
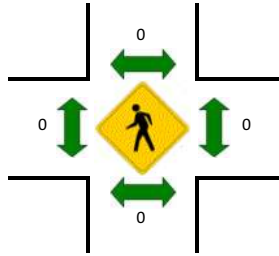
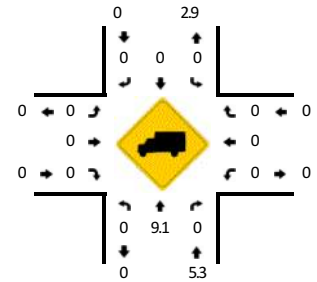
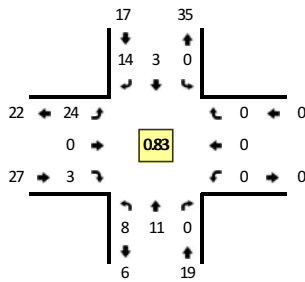
Comments:

Report generated on 3/20/2024 12:52 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Can Ada Rd -- Joplin Rd**QC JOB #:** 16510104**CITY/STATE:** Nampa, ID**DATE:** Wed, Mar 13 2024

Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

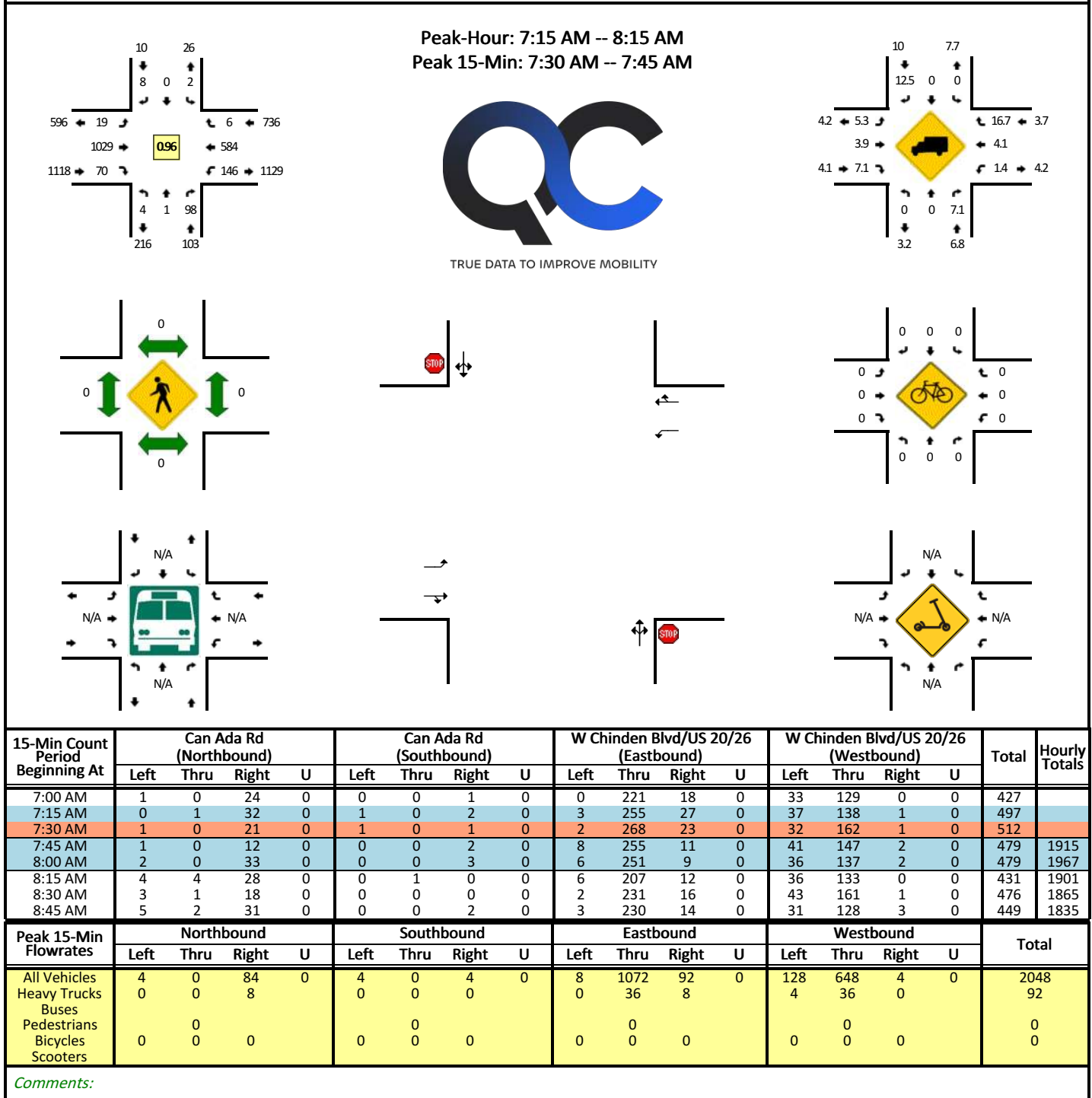


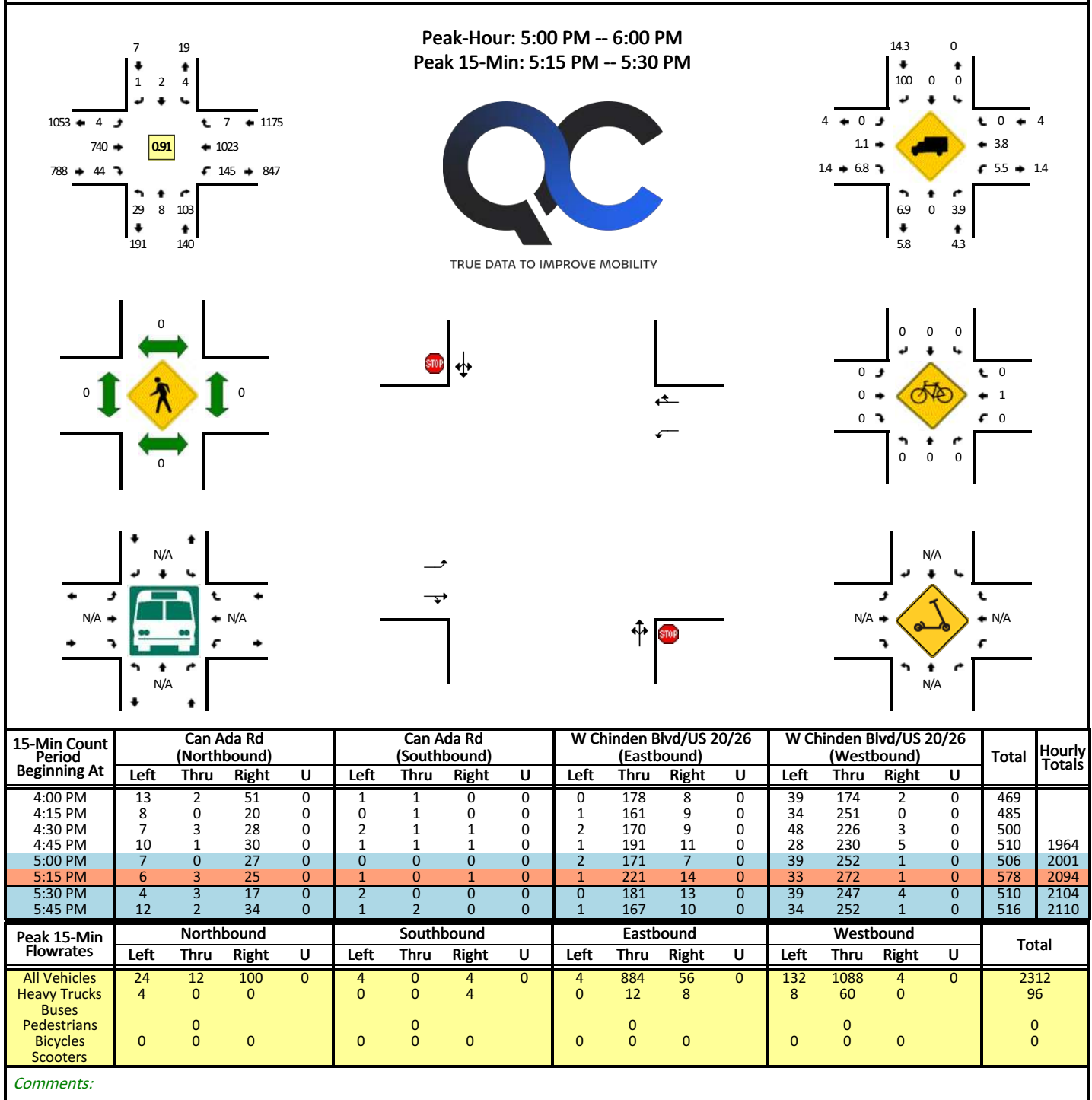
15-Min Count Period Beginning At	Can Ada Rd (Northbound)				Can Ada Rd (Southbound)				Joplin Rd (Eastbound)				Joplin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	1	0	0	0	0	4	0	10	0	2	0	0	0	0	0	19	
4:15 PM	0	3	0	0	0	1	5	0	7	0	0	0	0	0	0	0	16	
4:30 PM	4	5	0	0	0	2	2	0	4	0	0	0	0	0	0	0	17	
4:45 PM	2	2	0	0	0	0	3	0	3	0	1	0	0	0	0	0	11	63
5:00 PM	2	2	0	0	0	0	4	0	3	0	0	0	0	0	0	0	11	55
5:15 PM	6	1	0	0	0	1	4	0	2	0	0	0	0	0	0	0	14	53
5:30 PM	5	2	0	0	0	0	6	0	1	0	1	0	0	0	0	0	15	51
5:45 PM	0	4	0	0	0	1	4	0	2	0	0	0	0	0	0	0	11	51
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	4	0	0	0	0	16	0	40	0	8	0	0	0	0	0	76	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

Report generated on 3/20/2024 12:52 PM

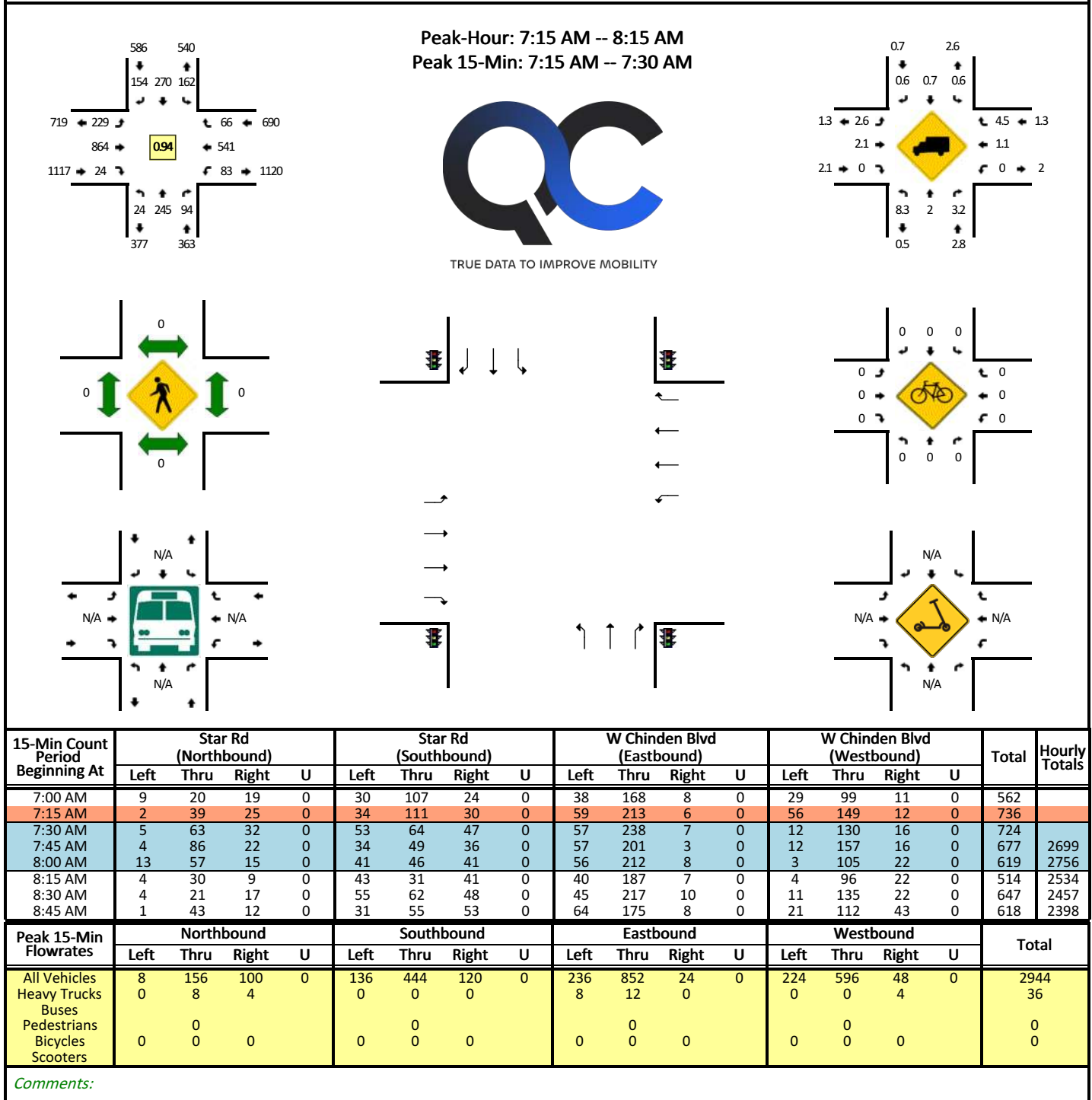
SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Can Ada Rd -- W Chinden Blvd/US 20/26**QC JOB #:** 16510105**CITY/STATE:** Nampa, ID**DATE:** Wed, Mar 13 2024

LOCATION: Can Ada Rd -- W Chinden Blvd/US 20/26**QC JOB #:** 16510106**CITY/STATE:** Nampa, ID**DATE:** Wed, Mar 13 2024

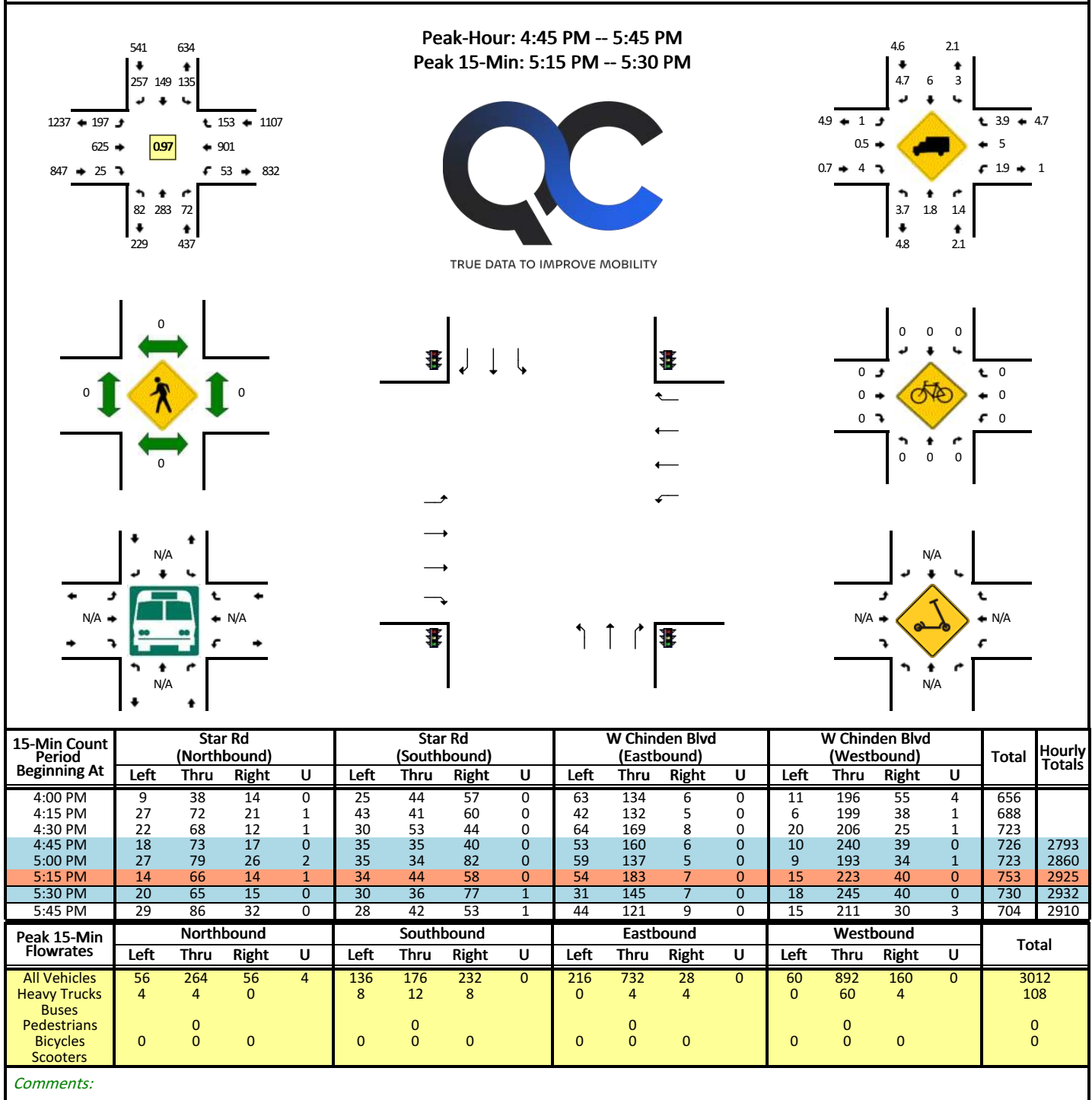
LOCATION: Star Rd -- W Chinden Blvd
CITY/STATE: Meridian, ID

QC JOB #: 16510107
DATE: Tue, Mar 26 2024



LOCATION: Star Rd -- W Chinden Blvd
CITY/STATE: Meridian, ID

QC JOB #: 16510108
DATE: Thu, Mar 14 2024





Appendix D

Year 2024 Existing Traffic Operations Worksheets

HCM 6th TWSC
1: Can Ada Rd & Joplin Rd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

Intersection						
Int Delay, s/veh	4.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	3	8	27	6	9
Future Vol, veh/h	29	3	8	27	6	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	80	80	75	75
Heavy Vehicles, %	10	33	38	7	0	11
Mvmt Flow	40	4	10	34	8	12
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	68	14	20	0	-	0
Stage 1	14	-	-	-	-	-
Stage 2	54	-	-	-	-	-
Critical Hdwy	6.5	6.53	4.48	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.597	2.542	-	-	-
Pot Cap-1 Maneuver	917	983	1391	-	-	-
Stage 1	988	-	-	-	-	-
Stage 2	948	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	983	1391	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	948	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.1	1.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1391	-	917	-	-	
HCM Lane V/C Ratio	0.007	-	0.048	-	-	
HCM Control Delay (s)	7.6	0	9.1	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

HCM 6th TWSC
2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	6.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	1029	70	146	584	6	4	1	98	2	0	8
Future Vol, veh/h	19	1029	70	146	584	6	4	1	98	2	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	94	94	94	74	74	74	83	83	83
Heavy Vehicles, %	5	4	7	1	4	17	0	0	7	0	0	12
Mvmt Flow	20	1083	74	155	621	6	5	1	132	2	0	10
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	627	0	0	1157	0	0	2099	2097	1120	2161	2131	624
Stage 1	-	-	-	-	-	-	1160	1160	-	934	934	-
Stage 2	-	-	-	-	-	-	939	937	-	1227	1197	-
Critical Hdwy	4.15	-	-	4.11	-	-	7.1	6.5	6.27	7.1	6.5	6.32
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.209	-	-	3.5	4	3.363	3.5	4	3.408
Pot Cap-1 Maneuver	940	-	-	607	-	-	38	53	245	35	50	468
Stage 1	-	-	-	-	-	-	240	272	-	322	347	-
Stage 2	-	-	-	-	-	-	320	346	-	220	261	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	940	-	-	607	-	-	29	39	245	12	36	468
Mov Cap-2 Maneuver	-	-	-	-	-	-	29	39	-	12	36	-
Stage 1	-	-	-	-	-	-	235	266	-	315	259	-
Stage 2	-	-	-	-	-	-	233	258	-	98	256	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.6			69			89.9		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	183	940	-	-	607	-	-	54				
HCM Lane V/C Ratio	0.761	0.021	-	-	0.256	-	-	0.223				
HCM Control Delay (s)	69	8.9	-	-	13	-	-	89.9				
HCM Lane LOS	F	A	-	-	B	-	-	F				
HCM 95th %tile Q(veh)	5	0.1	-	-	1	-	-	0.8				

Queues
3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	249	939	26	105	685	84	30	302	116	193	321	183
v/c Ratio	0.78	0.70	0.04	0.65	0.85	0.16	0.12	0.83	0.28	0.64	0.57	0.32
Control Delay	75.6	41.2	0.1	85.7	59.7	0.6	34.2	76.4	5.9	44.8	49.9	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.6	41.2	0.1	85.7	59.7	0.6	34.2	76.4	5.9	44.8	49.9	14.2
Queue Length 50th (ft)	233	401	0	99	415	0	19	282	0	132	274	32
Queue Length 95th (ft)	#449	534	0	160	459	0	42	381	19	205	396	90
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	321	2066	980	213	1462	859	365	476	501	310	563	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.45	0.03	0.49	0.47	0.10	0.08	0.63	0.23	0.62	0.57	0.32

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	229	864	24	83	541	66	24	245	94	162	270	154
Future Volume (vph)	229	864	24	83	541	66	24	245	94	162	270	154
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1660	3353	1530	1710	2673	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.51	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	1660	3353	1530	1710	2673	1457	842	1765	1485	410	1782	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.79	0.79	0.79	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	249	939	26	105	685	84	30	302	116	193	321	183
RTOR Reduction (vph)	0	0	16	0	0	59	0	0	90	0	0	95
Lane Group Flow (vph)	249	939	10	105	685	25	30	302	26	193	321	88
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.5	58.6	58.6	14.0	44.1	44.1	38.2	33.6	33.6	58.0	46.4	46.4
Effective Green, g (s)	28.5	58.6	58.6	14.0	44.1	44.1	38.2	33.6	33.6	58.0	46.4	46.4
Actuated g/C Ratio	0.19	0.39	0.39	0.09	0.29	0.29	0.26	0.22	0.22	0.39	0.31	0.31
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	316	1313	599	160	787	429	237	396	333	308	552	469
v/s Ratio Prot	c0.15	c0.28		0.06	c0.26		0.00	c0.17		c0.07	c0.18	
v/s Ratio Perm			0.01			0.02	0.03		0.02	0.17		0.06
v/c Ratio	0.79	0.72	0.02	0.66	0.87	0.06	0.13	0.76	0.08	0.63	0.58	0.19
Uniform Delay, d1	57.7	38.4	27.9	65.5	50.0	37.8	42.3	54.3	45.8	34.1	43.4	37.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.2	1.9	0.0	9.3	10.3	0.1	0.2	8.4	0.1	3.9	1.6	0.2
Delay (s)	69.9	40.3	27.9	74.8	60.4	37.9	42.6	62.7	45.9	38.0	45.0	38.0
Level of Service	E	D	C	E	E	D	D	E	D	D	D	D
Approach Delay (s)		46.1			59.9			57.0			41.2	
Approach LOS		D			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			50.3		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			149.6		Sum of lost time (s)					26.0		
Intersection Capacity Utilization			74.8%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	229	864	24	83	541	66	24	245	94	162	270	154
Future Volume (veh/h)	229	864	24	83	541	66	24	245	94	162	270	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	249	939	26	105	685	84	30	302	116	193	321	183
Peak Hour Factor	0.92	0.92	0.92	0.79	0.79	0.79	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	280	1316	596	131	804	440	208	351	295	276	495	420
Arrive On Green	0.17	0.39	0.39	0.08	0.30	0.30	0.03	0.20	0.20	0.11	0.28	0.28
Sat Flow, veh/h	1674	3367	1525	1714	2679	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	249	939	26	105	685	84	30	302	116	193	321	183
Grp Sat Flow(s),veh/h/ln	1674	1683	1525	1714	1339	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	16.5	26.8	1.2	6.9	27.3	4.8	1.7	18.7	7.7	9.9	18.0	11.3
Cycle Q Clear(g_c), s	16.5	26.8	1.2	6.9	27.3	4.8	1.7	18.7	7.7	9.9	18.0	11.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	280	1316	596	131	804	440	208	351	295	276	495	420
V/C Ratio(X)	0.89	0.71	0.04	0.80	0.85	0.19	0.14	0.86	0.39	0.70	0.65	0.44
Avail Cap(c_a), veh/h	412	2340	1060	271	1862	1019	419	608	511	365	613	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	29.2	21.5	51.7	37.4	29.5	35.2	44.1	39.7	31.8	36.2	33.8
Incr Delay (d2), s/veh	15.1	0.7	0.0	10.9	2.7	0.2	0.3	6.3	0.9	3.8	1.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	10.0	0.4	3.2	8.6	1.7	0.7	8.4	2.8	4.1	7.7	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.5	30.0	21.5	62.5	40.1	29.7	35.5	50.3	40.5	35.6	37.9	34.5
LnGrp LOS	E	C	C	E	D	C	D	D	D	D	D	C
Approach Vol, veh/h	1214			874			448			697		
Approach Delay, s/veh	36.2			41.8			46.8			36.4		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.0	40.1	10.1	37.5	15.7	50.4	19.1	28.5				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	18.5	29.3	3.7	20.0	8.9	28.8	11.9	20.7				
Green Ext Time (p_c), s	0.5	4.8	0.0	2.1	0.1	6.9	0.2	1.8				
Intersection Summary												
HCM 6th Ctrl Delay	39.2											
HCM 6th LOS	D											

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	0	20	2	0	4	6	506	5	5	522	20
Future Vol, veh/h	35	0	20	2	0	4	6	506	5	5	522	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	63	63	63	50	50	50	89	89	89	86	86	86
Heavy Vehicles, %	6	0	5	0	0	0	0	2	40	0	1	5
Mvmt Flow	56	0	32	4	0	8	7	569	6	6	607	23
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1221	1220	619	1233	1228	572	630	0	0	575	0	0
Stage 1	631	631	-	586	586	-	-	-	-	-	-	-
Stage 2	590	589	-	647	642	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.25	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.345	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	154	182	483	155	180	523	962	-	-	1008	-	-
Stage 1	462	477	-	500	500	-	-	-	-	-	-	-
Stage 2	487	499	-	463	472	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	149	178	483	143	176	523	962	-	-	1008	-	-
Mov Cap-2 Maneuver	149	178	-	143	176	-	-	-	-	-	-	-
Stage 1	457	473	-	495	495	-	-	-	-	-	-	-
Stage 2	474	494	-	429	468	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	36.5		18.6			0.1			0.1			
HCM LOS	E		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	962	-	-	199	277	1008	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.439	0.043	0.006	-	-				
HCM Control Delay (s)	8.8	0	-	36.5	18.6	8.6	0	-				
HCM Lane LOS	A	A	-	E	C	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	2	0.1	0	-	-				

HCM 6th TWSC
1: Can Ada Rd & Joplin Rd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

Intersection						
Int Delay, s/veh	5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	3	8	11	3	14
Future Vol, veh/h	24	3	8	11	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	56	56	53	53	71	71
Heavy Vehicles, %	0	0	0	9	0	0
Mvmt Flow	43	5	15	21	4	20
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	65	14	24	0	-	0
Stage 1	14	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	946	1072	1604	-	-	-
Stage 1	1014	-	-	-	-	-
Stage 2	977	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	937	1072	1604	-	-	-
Mov Cap-2 Maneuver	937	-	-	-	-	-
Stage 1	1005	-	-	-	-	-
Stage 2	977	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9	3.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1604	-	950	-	-	
HCM Lane V/C Ratio	0.009	-	0.051	-	-	
HCM Control Delay (s)	7.3	0	9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM 6th TWSC
2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	79.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	740	44	145	1023	7	29	8	103	4	2	1
Future Vol, veh/h	4	740	44	145	1023	7	29	8	103	4	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	96	96	96	73	73	73	58	58	58
Heavy Vehicles, %	0	1	7	6	4	0	7	0	4	0	0	100
Mvmt Flow	5	892	53	151	1066	7	40	11	141	7	3	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1073	0	0	945	0	0	2303	2304	919	2377	2327	1070
Stage 1	-	-	-	-	-	-	929	929	-	1372	1372	-
Stage 2	-	-	-	-	-	-	1374	1375	-	1005	955	-
Critical Hdwy	4.1	-	-	4.16	-	-	7.17	6.5	6.24	7.1	6.5	7.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.254	-	-	3.563	4	3.336	3.5	4	4.2
Pot Cap-1 Maneuver	657	-	-	710	-	-	~ 26	39	326	24	38	177
Stage 1	-	-	-	-	-	-	314	349	-	182	216	-
Stage 2	-	-	-	-	-	-	175	215	-	294	339	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	657	-	-	710	-	-	~ 20	30	326	8	30	177
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 20	30	-	8	30	-
Stage 1	-	-	-	-	-	-	311	346	-	181	170	-
Stage 2	-	-	-	-	-	-	134	169	-	160	336	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			1.4			\$ 932.5			\$ 674.8		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	69	657	-	-	710	-	-	12
HCM Lane V/C Ratio	2.779	0.007	-	-	0.213	-	-	1.006
HCM Control Delay (s)	\$ 932.5	10.5	-	-	11.4	-	-	\$ 674.8
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	19.1	0	-	-	0.8	-	-	2.1

Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon						

Queues
3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	718	29	58	990	168	100	345	88	150	166	286
v/c Ratio	0.91	0.41	0.04	0.54	0.95	0.24	0.31	0.94	0.21	0.74	0.43	0.52
Control Delay	112.9	30.0	0.1	102.5	69.9	6.4	47.4	104.4	1.4	68.0	66.1	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	112.9	30.0	0.1	102.5	69.9	6.4	47.4	104.4	1.4	68.0	66.1	9.4
Queue Length 50th (ft)	283	295	0	72	783	8	90	432	0	139	180	0
Queue Length 95th (ft)	#430	352	0	126	#964	60	130	#545	0	#235	271	92
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	265	1754	802	168	1135	737	365	385	438	215	393	557
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.41	0.04	0.35	0.87	0.23	0.27	0.90	0.20	0.70	0.42	0.51

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	625	25	53	901	153	82	283	72	135	149	257
Future Volume (vph)	197	625	25	53	901	153	82	283	72	135	149	257
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	3420	1471	1676	2571	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.57	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1693	3420	1471	1676	2571	1471	987	1765	1515	220	1698	1457
Peak-hour factor, PHF	0.87	0.87	0.87	0.91	0.91	0.91	0.82	0.82	0.82	0.90	0.90	0.90
Adj. Flow (vph)	226	718	29	58	990	168	100	345	88	150	166	286
RTOR Reduction (vph)	0	0	14	0	0	92	0	0	70	0	0	221
Lane Group Flow (vph)	226	718	15	58	990	76	100	345	18	150	166	65
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	26.6	91.6	91.6	10.0	75.0	75.0	50.8	37.6	37.6	58.0	41.2	41.2
Effective Green, g (s)	26.6	91.6	91.6	10.0	75.0	75.0	50.8	37.6	37.6	58.0	41.2	41.2
Actuated g/C Ratio	0.15	0.50	0.50	0.05	0.41	0.41	0.28	0.21	0.21	0.32	0.23	0.23
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	1721	740	92	1059	606	323	364	312	203	384	329
v/s Ratio Prot	c0.13	0.21		0.03	c0.38		0.02	c0.20		c0.07	0.10	
v/s Ratio Perm			0.01			0.05	0.06		0.01	c0.17		0.04
v/c Ratio	0.91	0.42	0.02	0.63	0.93	0.12	0.31	0.95	0.06	0.74	0.43	0.20
Uniform Delay, d1	76.6	28.4	22.7	84.2	51.2	33.2	50.4	71.2	58.0	49.7	60.4	57.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.0	0.2	0.0	13.2	14.5	0.1	0.5	33.5	0.1	13.1	0.8	0.3
Delay (s)	111.6	28.6	22.7	97.4	65.7	33.3	51.0	104.7	58.1	62.9	61.2	57.3
Level of Service	F	C	C	F	E	C	D	F	E	E	E	E
Approach Delay (s)		47.7			62.7			86.9			59.7	
Approach LOS		D			E			F			E	
Intersection Summary												
HCM 2000 Control Delay			61.7			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			182.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			82.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	625	25	53	901	153	82	283	72	135	149	257
Future Volume (veh/h)	197	625	25	53	901	153	82	283	72	135	149	257
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	226	718	29	58	990	168	100	345	88	150	166	286
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.82	0.82	0.82	0.90	0.90	0.90
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	245	1751	756	73	1066	607	279	369	316	197	398	340
Arrive On Green	0.14	0.51	0.51	0.04	0.41	0.41	0.06	0.21	0.21	0.08	0.23	0.23
Sat Flow, veh/h	1701	3420	1478	1688	2595	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	226	718	29	58	990	168	100	345	88	150	166	286
Grp Sat Flow(s),veh/h/ln	1701	1710	1478	1688	1297	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	22.1	21.9	1.6	5.7	61.3	12.8	7.9	32.3	8.2	11.8	13.9	31.4
Cycle Q Clear(g_c), s	22.1	21.9	1.6	5.7	61.3	12.8	7.9	32.3	8.2	11.8	13.9	31.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	245	1751	756	73	1066	607	279	369	316	197	398	340
V/C Ratio(X)	0.92	0.41	0.04	0.80	0.93	0.28	0.36	0.93	0.28	0.76	0.42	0.84
Avail Cap(c_a), veh/h	282	1751	756	180	1215	692	358	410	350	238	398	340
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.2	25.4	20.5	80.0	47.4	33.0	48.5	65.6	56.1	50.1	55.1	61.8
Incr Delay (d2), s/veh	31.3	0.2	0.0	17.4	11.5	0.2	0.8	27.1	0.5	11.2	0.7	17.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	8.6	0.6	2.8	20.6	4.6	3.3	17.0	3.2	5.5	6.0	13.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	102.6	25.6	20.5	97.4	58.9	33.3	49.3	92.7	56.6	61.3	55.8	78.9
LnGrp LOS	F	C	C	F	E	C	D	F	E	E	E	E
Approach Vol, veh/h	973			1216			533			602		
Approach Delay, s/veh	43.3			57.2			78.6			68.1		
Approach LOS	D			E			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	31.3	75.3	16.9	45.1	14.3	92.4	20.9	41.2				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	24.1	63.3	9.9	33.4	7.7	23.9	13.8	34.3				
Green Ext Time (p_c), s	0.2	6.0	0.1	0.9	0.1	4.8	0.1	0.9				
Intersection Summary												
HCM 6th Ctrl Delay	58.5											
HCM 6th LOS	E											

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	25	0	14	0	0	5	3	655	4	1	424	20
Future Vol, veh/h	25	0	14	0	0	5	3	655	4	1	424	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	70	70	70	63	63	63	86	86	86	92	92	92
Heavy Vehicles, %	4	0	0	0	0	0	0	2	25	0	6	0
Mvmt Flow	36	0	20	0	0	8	3	762	5	1	461	22
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1249	1247	472	1255	1256	765	483	0	0	767	0	0
Stage 1	474	474	-	771	771	-	-	-	-	-	-	-
Stage 2	775	773	-	484	485	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	148	175	596	150	173	406	1090	-	-	856	-	-
Stage 1	567	561	-	396	413	-	-	-	-	-	-	-
Stage 2	388	412	-	568	555	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	144	174	596	144	172	406	1090	-	-	856	-	-
Mov Cap-2 Maneuver	144	174	-	144	172	-	-	-	-	-	-	-
Stage 1	564	560	-	394	411	-	-	-	-	-	-	-
Stage 2	379	410	-	548	554	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	30.2		14			0			0			
HCM LOS	D		B									
Minor Lane/Major Mvmt	NBL		NBT	NBR		EBLn1WBLn1		SBL	SBT	SBR		
Capacity (veh/h)	1090		-	-	198	406	856	-	-			
HCM Lane V/C Ratio	0.003		-	-	0.281	0.02	0.001	-	-			
HCM Control Delay (s)	8.3		0	-	30.2	14	9.2	0	-			
HCM Lane LOS	A		A	-	D	B	A	A	-			
HCM 95th %tile Q(veh)	0		-	-	1.1	0.1	0	-	-			



Appendix E

Year 2024 Mitigated Existing Traffic Operations Worksheets

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Existing 2024 Weekday AM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	21	1143	78	162	649	7	4	1	109	2	9
v/c Ratio	0.14	0.75	0.11	0.50	0.29	0.01	0.03	0.01	0.43	0.01	0.02
Control Delay	42.4	20.8	0.4	36.5	6.6	0.0	43.5	43.0	9.3	44.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	20.8	0.4	36.5	6.6	0.0	43.5	43.0	9.3	44.0	0.1
Queue Length 50th (ft)	8	193	0	61	31	0	2	0	0	1	0
Queue Length 95th (ft)	42	430	2	178	152	0	15	6	29	10	0
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	207	2957	1300	599	3114	1244	242	586	563	242	716
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.39	0.06	0.27	0.21	0.01	0.02	0.00	0.19	0.01	0.01
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1029	70	146	584	6	4	1	98	2	0	8
Future Volume (vph)	19	1029	70	146	584	6	4	1	98	2	0	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1366	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1366	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	1143	78	162	649	7	4	1	109	2	0	9
RTOR Reduction (vph)	0	0	41	0	0	3	0	0	101	0	8	0
Lane Group Flow (vph)	21	1143	37	162	649	4	4	1	8	2	1	0
Heavy Vehicles (%)	5%	4%	7%	1%	4%	17%	0%	0%	7%	0%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	2.6	39.6	39.6	14.6	51.6	51.6	0.9	6.4	6.4	0.8	6.3	
Effective Green, g (s)	2.6	39.6	39.6	14.6	51.6	51.6	0.9	6.4	6.4	0.8	6.3	
Actuated g/C Ratio	0.03	0.47	0.47	0.18	0.62	0.62	0.01	0.08	0.08	0.01	0.08	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	50	1561	678	296	2034	809	18	138	109	16	103	
v/s Ratio Prot	0.01	c0.35		c0.10	0.20		c0.00	0.00		0.00	0.00	
v/s Ratio Perm			0.03			0.00			c0.01			
v/c Ratio	0.42	0.73	0.05	0.55	0.32	0.01	0.22	0.01	0.08	0.12	0.01	
Uniform Delay, d1	39.7	17.6	11.8	31.4	7.6	6.1	40.9	35.6	35.8	41.0	35.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.6	1.8	0.0	2.1	0.1	0.0	6.2	0.0	0.3	3.5	0.0	
Delay (s)	45.3	19.4	11.8	33.5	7.6	6.1	47.1	35.6	36.1	44.5	35.7	
Level of Service	D	B	B	C	A	A	D	D	D	D	D	
Approach Delay (s)		19.4			12.7			36.4			37.3	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			17.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			83.4				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			56.9%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	1029	70	146	584	6	4	1	98	2	0	8
Future Volume (veh/h)	19	1029	70	146	584	6	4	1	98	2	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1730	1744	1702	1786	1744	1561	1800	1800	1702	1800	1800	1632
Adj Flow Rate, veh/h	21	1143	78	162	649	7	4	1	109	2	0	9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	4	7	1	4	17	0	0	7	0	0	12
Cap, veh/h	40	1501	653	205	1822	728	9	190	152	5	0	157
Arrive On Green	0.02	0.45	0.45	0.12	0.55	0.55	0.01	0.11	0.11	0.00	0.00	0.10
Sat Flow, veh/h	1647	3313	1442	1701	3313	1323	1714	1800	1442	1714	0	1525
Grp Volume(v), veh/h	21	1143	78	162	649	7	4	1	109	2	0	9
Grp Sat Flow(s),veh/h/ln	1647	1657	1442	1701	1657	1323	1714	1800	1442	1714	0	1525
Q Serve(g_s), s	0.9	19.9	2.2	6.4	7.6	0.2	0.2	0.0	5.1	0.1	0.0	0.4
Cycle Q Clear(g_c), s	0.9	19.9	2.2	6.4	7.6	0.2	0.2	0.0	5.1	0.1	0.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	40	1501	653	205	1822	728	9	190	152	5	0	157
V/C Ratio(X)	0.53	0.76	0.12	0.79	0.36	0.01	0.44	0.01	0.72	0.43	0.00	0.06
Avail Cap(c_a), veh/h	214	3350	1458	614	4115	1643	248	598	479	248	0	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.4	15.8	10.9	29.6	8.7	7.1	34.3	27.7	30.0	34.5	0.0	28.0
Incr Delay (d2), s/veh	10.6	0.8	0.1	6.6	0.1	0.0	29.4	0.0	6.1	51.9	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.8	0.5	2.7	1.9	0.0	0.1	0.0	1.8	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	16.6	11.0	36.2	8.8	7.1	63.8	27.7	36.1	86.3	0.0	28.2
LnGrp LOS	D	B	B	D	A	A	E	C	D	F	A	C
Approach Vol, veh/h	1242			818			114			11		
Approach Delay, s/veh	16.7			14.2			37.0			38.7		
Approach LOS	B			B			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.2	12.3	14.4	37.4	5.4	12.1	7.7	44.1				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	23.0	25.0	70.0	10.0	23.0	9.0	86.0				
Max Q Clear Time (g_c+I1), s	2.1	7.1	8.4	21.9	2.2	2.4	2.9	9.6				
Green Ext Time (p_c), s	0.0	0.3	0.3	9.4	0.0	0.0	0.0	4.2				
Intersection Summary												
HCM 6th Ctrl Delay	17.0											
HCM 6th LOS	B											

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Existing 2024 Weekday PM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	4	822	49	161	1137	8	32	9	114	4	3
v/c Ratio	0.03	0.68	0.08	0.51	0.56	0.01	0.18	0.03	0.32	0.03	0.03
Control Delay	39.5	23.7	0.3	34.9	10.7	0.0	38.3	32.2	6.6	39.5	36.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	23.7	0.3	34.9	10.7	0.0	38.3	32.2	6.6	39.5	36.0
Queue Length 50th (ft)	2	168	0	68	144	0	14	3	0	2	1
Queue Length 95th (ft)	13	277	0	150	318	0	47	20	31	13	10
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	238	2839	1221	824	3210	1465	247	668	637	264	477
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.29	0.04	0.20	0.35	0.01	0.13	0.01	0.18	0.02	0.01
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	740	44	145	1023	7	29	8	103	4	2	1
Future Volume (vph)	4	740	44	145	1023	7	29	8	103	4	2	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1282	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1282	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	4	822	49	161	1137	8	32	9	114	4	2	1
RTOR Reduction (vph)	0	0	30	0	0	4	0	0	98	0	1	0
Lane Group Flow (vph)	4	822	19	161	1137	4	32	9	16	4	2	0
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	7%	6%	4%	0%	7%	0%	4%	0%	0%	100%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	0.9	30.4	30.4	13.8	43.3	43.3	4.2	11.3	11.3	0.9	8.0	
Effective Green, g (s)	0.9	30.4	30.4	13.8	43.3	43.3	4.2	11.3	11.3	0.9	8.0	
Actuated g/C Ratio	0.01	0.39	0.39	0.18	0.55	0.55	0.05	0.14	0.14	0.01	0.10	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	19	1312	554	283	1815	827	85	259	212	19	130	
v/s Ratio Prot	0.00	0.24		c0.10	c0.35		c0.02	0.01		0.00	0.00	
v/s Ratio Perm			0.01			0.00			c0.01			
v/c Ratio	0.21	0.63	0.03	0.57	0.63	0.01	0.38	0.03	0.08	0.21	0.02	
Uniform Delay, d1	38.4	19.4	14.9	29.6	12.0	7.9	35.8	28.9	29.0	38.4	31.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.5	0.9	0.0	2.6	0.7	0.0	2.8	0.1	0.2	5.5	0.1	
Delay (s)	43.9	20.4	14.9	32.2	12.7	7.9	38.6	28.9	29.2	43.9	31.7	
Level of Service	D	C	B	C	B	A	D	C	C	D	C	
Approach Delay (s)		20.2			15.1			31.1			38.7	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			18.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			78.4			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			56.5%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (veh/h)	4	740	44	145	1023	7	29	8	103	4	2	1
Future Volume (veh/h)	4	740	44	145	1023	7	29	8	103	4	2	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1702	1716	1744	1800	1702	1800	1744	1800	1800	396
Adj Flow Rate, veh/h	4	822	49	161	1137	8	32	9	114	4	2	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	7	6	4	0	7	0	4	0	0	100
Cap, veh/h	9	1200	510	207	1574	710	57	215	176	9	102	51
Arrive On Green	0.01	0.35	0.35	0.13	0.48	0.48	0.04	0.12	0.12	0.01	0.09	0.09
Sat Flow, veh/h	1714	3393	1442	1634	3313	1494	1621	1800	1478	1714	1132	566
Grp Volume(v), veh/h	4	822	49	161	1137	8	32	9	114	4	0	3
Grp Sat Flow(s),veh/h/ln	1714	1697	1442	1634	1657	1494	1621	1800	1478	1714	0	1698
Q Serve(g_s), s	0.1	11.5	1.3	5.3	15.3	0.2	1.1	0.2	4.1	0.1	0.0	0.1
Cycle Q Clear(g_c), s	0.1	11.5	1.3	5.3	15.3	0.2	1.1	0.2	4.1	0.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	9	1200	510	207	1574	710	57	215	176	9	0	152
V/C Ratio(X)	0.43	0.69	0.10	0.78	0.72	0.01	0.56	0.04	0.65	0.43	0.00	0.02
Avail Cap(c_a), veh/h	277	3714	1578	968	5053	2278	291	775	636	308	0	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	15.4	12.1	23.6	11.7	7.7	26.5	21.7	23.4	27.6	0.0	23.1
Incr Delay (d2), s/veh	28.9	0.7	0.1	6.1	0.6	0.0	8.5	0.1	3.9	28.9	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	3.4	0.3	2.0	3.7	0.0	0.5	0.1	1.4	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.5	16.1	12.1	29.7	12.3	7.7	34.9	21.8	27.3	56.5	0.0	23.2
LnGrp LOS	E	B	B	C	B	A	C	C	C	E	A	C
Approach Vol, veh/h		875			1306			155			7	
Approach Delay, s/veh		16.0			14.4			28.6			42.2	
Approach LOS		B			B			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.3	11.7	13.1	25.7	7.0	10.0	6.3	32.5				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	24.0	33.0	61.0	10.0	24.0	9.0	85.0				
Max Q Clear Time (g_c+I1), s	2.1	6.1	7.3	13.5	3.1	2.1	2.1	17.3				
Green Ext Time (p_c), s	0.0	0.3	0.4	5.8	0.0	0.0	0.0	9.2				
Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Existing 2024 Weekday AM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	249	939	26	105	685	84	30	302	116	193	321	183
v/c Ratio	0.72	0.76	0.04	0.61	0.78	0.17	0.11	0.80	0.27	0.59	0.54	0.31
Control Delay	66.8	44.2	0.1	78.3	54.1	0.9	30.3	68.7	5.7	38.3	44.7	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.8	44.2	0.1	78.3	54.1	0.9	30.3	68.7	5.7	38.3	44.7	13.0
Queue Length 50th (ft)	211	394	0	91	302	0	16	256	0	117	245	29
Queue Length 95th (ft)	#417	537	0	153	340	0	39	359	20	192	370	86
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	344	2209	1041	227	1980	909	395	509	526	336	590	594
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.43	0.02	0.46	0.35	0.09	0.08	0.59	0.22	0.57	0.54	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	229	864	24	83	541	66	24	245	94	162	270	154
Future Volume (vph)	229	864	24	83	541	66	24	245	94	162	270	154
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1660	3353	1530	1710	3386	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	1660	3353	1530	1710	3386	1457	893	1765	1485	440	1782	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.79	0.79	0.79	0.81	0.81	0.81	0.84	0.84	0.84
Adj. Flow (vph)	249	939	26	105	685	84	30	302	116	193	321	183
RTOR Reduction (vph)	0	0	17	0	0	63	0	0	89	0	0	93
Lane Group Flow (vph)	249	939	9	105	685	21	30	302	27	193	321	90
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.5	50.5	50.5	13.7	35.7	35.7	37.2	32.7	32.7	57.0	45.5	45.5
Effective Green, g (s)	28.5	50.5	50.5	13.7	35.7	35.7	37.2	32.7	32.7	57.0	45.5	45.5
Actuated g/C Ratio	0.20	0.36	0.36	0.10	0.25	0.25	0.27	0.23	0.23	0.41	0.32	0.32
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	337	1207	551	167	862	371	259	411	346	333	578	491
v/s Ratio Prot	c0.15	c0.28		0.06	0.20		0.00	c0.17		c0.07	c0.18	
v/s Ratio Perm			0.01			0.01	0.03		0.02	0.16		0.06
v/c Ratio	0.74	0.78	0.02	0.63	0.79	0.06	0.12	0.73	0.08	0.58	0.56	0.18
Uniform Delay, d1	52.4	39.9	28.9	60.8	48.8	39.5	38.6	49.7	42.0	30.1	39.0	34.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2	3.2	0.0	7.2	5.1	0.1	0.2	6.7	0.1	2.4	1.2	0.2
Delay (s)	60.6	43.1	28.9	68.0	53.9	39.6	38.8	56.4	42.1	32.6	40.2	34.2
Level of Service	E	D	C	E	D	D	D	E	D	C	D	C
Approach Delay (s)		46.4			54.2			51.5			36.5	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			47.1									
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			140.2							26.0		
Intersection Capacity Utilization			74.8%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	229	864	24	83	541	66	24	245	94	162	270	154
Future Volume (veh/h)	229	864	24	83	541	66	24	245	94	162	270	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	249	939	26	105	685	84	30	302	116	193	321	183
Peak Hour Factor	0.92	0.92	0.92	0.79	0.79	0.79	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	285	1176	533	132	871	376	225	359	302	294	504	427
Arrive On Green	0.17	0.35	0.35	0.08	0.26	0.26	0.03	0.20	0.20	0.11	0.28	0.28
Sat Flow, veh/h	1674	3367	1525	1714	3393	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	249	939	26	105	685	84	30	302	116	193	321	183
Grp Sat Flow(s),veh/h/ln	1674	1683	1525	1714	1697	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	14.4	24.9	1.1	6.0	18.6	4.5	1.4	16.2	6.7	8.5	15.6	9.8
Cycle Q Clear(g_c), s	14.4	24.9	1.1	6.0	18.6	4.5	1.4	16.2	6.7	8.5	15.6	9.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	285	1176	533	132	871	376	225	359	302	294	504	427
V/C Ratio(X)	0.87	0.80	0.05	0.79	0.79	0.22	0.13	0.84	0.38	0.66	0.64	0.43
Avail Cap(c_a), veh/h	474	2687	1217	312	2708	1170	472	698	587	420	704	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.0	29.1	21.3	44.9	34.3	29.0	30.1	37.9	34.1	27.1	31.1	29.0
Incr Delay (d2), s/veh	9.6	1.3	0.0	10.1	1.6	0.3	0.3	5.4	0.8	2.5	1.3	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	9.2	0.4	2.8	7.2	1.5	0.5	7.1	2.3	3.4	6.4	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.7	30.3	21.3	55.0	35.9	29.3	30.4	43.3	34.9	29.6	32.4	29.7
LnGrp LOS	D	C	C	E	D	C	C	D	C	C	C	C
Approach Vol, veh/h	1214			874			448			697		
Approach Delay, s/veh	34.1			37.6			40.3			30.9		
Approach LOS	C			D			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.8	31.4	9.8	33.9	14.7	40.6	17.7	26.0				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	16.4	20.6	3.4	17.6	8.0	26.9	10.5	18.2				
Green Ext Time (p_c), s	0.5	4.8	0.0	2.2	0.1	6.9	0.3	1.8				
Intersection Summary												
HCM 6th Ctrl Delay	35.2											
HCM 6th LOS	D											

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Existing 2024 Weekday PM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	226	718	29	58	990	168	100	345	88	150	166	286
v/c Ratio	0.84	0.45	0.04	0.51	0.86	0.27	0.28	0.87	0.20	0.63	0.39	0.49
Control Delay	94.2	32.0	0.1	93.2	57.9	5.5	40.5	84.1	1.4	51.4	57.5	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.2	32.0	0.1	93.2	57.9	5.5	40.5	84.1	1.4	51.4	57.5	8.8
Queue Length 50th (ft)	246	293	0	64	545	0	75	372	0	115	152	0
Queue Length 95th (ft)	#412	352	0	123	634	52	125	#527	0	200	264	90
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	296	1906	863	188	1611	812	416	431	474	256	441	590
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.38	0.03	0.31	0.61	0.21	0.24	0.80	0.19	0.59	0.38	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

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	625	25	53	901	153	82	283	72	135	149	257
Future Volume (vph)	197	625	25	53	901	153	82	283	72	135	149	257
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	3420	1471	1676	3257	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.61	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1693	3420	1471	1676	3257	1471	1053	1765	1515	294	1698	1457
Peak-hour factor, PHF	0.87	0.87	0.87	0.91	0.91	0.91	0.82	0.82	0.82	0.90	0.90	0.90
Adj. Flow (vph)	226	718	29	58	990	168	100	345	88	150	166	286
RTOR Reduction (vph)	0	0	16	0	0	107	0	0	68	0	0	215
Lane Group Flow (vph)	226	718	13	58	990	61	100	345	20	150	166	71
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	25.8	75.7	75.7	9.4	59.3	59.3	48.9	36.6	36.6	57.1	40.7	40.7
Effective Green, g (s)	25.8	75.7	75.7	9.4	59.3	59.3	48.9	36.6	36.6	57.1	40.7	40.7
Actuated g/C Ratio	0.16	0.46	0.46	0.06	0.36	0.36	0.30	0.22	0.22	0.35	0.25	0.25
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	266	1577	678	96	1176	531	358	393	337	238	421	361
v/s Ratio Prot	c0.13	0.21		0.03	c0.30		0.02	c0.20		c0.06	0.10	
v/s Ratio Perm			0.01			0.04	0.06		0.01	c0.16		0.05
v/c Ratio	0.85	0.46	0.02	0.60	0.84	0.11	0.28	0.88	0.06	0.63	0.39	0.20
Uniform Delay, d1	67.3	30.1	24.0	75.5	48.1	34.9	43.1	61.6	50.2	41.2	51.4	48.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.6	0.2	0.0	10.3	5.6	0.1	0.4	19.3	0.1	5.3	0.6	0.3
Delay (s)	88.8	30.4	24.0	85.8	53.7	35.0	43.5	80.9	50.3	46.6	52.0	49.0
Level of Service	F	C	C	F	D	D	D	F	D	D	D	D
Approach Delay (s)		43.7			52.7			68.8			49.3	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			52.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			164.1			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			82.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Existing 2024 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	625	25	53	901	153	82	283	72	135	149	257
Future Volume (veh/h)	197	625	25	53	901	153	82	283	72	135	149	257
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	226	718	29	58	990	168	100	345	88	150	166	286
Peak Hour Factor	0.87	0.87	0.87	0.91	0.91	0.91	0.82	0.82	0.82	0.90	0.90	0.90
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	252	1568	677	74	1163	523	303	384	328	222	413	353
Arrive On Green	0.15	0.46	0.46	0.04	0.35	0.35	0.06	0.22	0.22	0.08	0.24	0.24
Sat Flow, veh/h	1701	3420	1478	1688	3287	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	226	718	29	58	990	168	100	345	88	150	166	286
Grp Sat Flow(s),veh/h/ln	1701	1710	1478	1688	1643	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	17.3	19.1	1.4	4.5	36.9	11.0	6.1	25.1	6.4	9.1	10.8	24.4
Cycle Q Clear(g_c), s	17.3	19.1	1.4	4.5	36.9	11.0	6.1	25.1	6.4	9.1	10.8	24.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	252	1568	677	74	1163	523	303	384	328	222	413	353
V/C Ratio(X)	0.90	0.46	0.04	0.79	0.85	0.32	0.33	0.90	0.27	0.67	0.40	0.81
Avail Cap(c_a), veh/h	360	2040	881	229	1960	881	427	522	446	308	505	432
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	24.6	19.8	62.7	39.6	31.2	37.0	50.5	43.2	38.3	42.3	47.4
Incr Delay (d2), s/veh	18.3	0.2	0.0	16.5	1.9	0.4	0.6	14.7	0.4	3.5	0.6	9.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	7.3	0.5	2.2	14.3	3.8	2.5	12.3	2.4	3.8	4.5	9.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.7	24.8	19.8	79.2	41.5	31.6	37.7	65.2	43.6	41.8	42.9	56.7
LnGrp LOS	E	C	B	E	D	C	D	E	D	D	D	E
Approach Vol, veh/h	973			1216			533			602		
Approach Delay, s/veh	36.0			41.9			56.5			49.2		
Approach LOS	D			D			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.7	52.9	15.1	37.9	12.8	66.7	18.2	34.7				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	19.3	38.9	8.1	26.4	6.5	21.1	11.1	27.1				
Green Ext Time (p_c), s	0.4	8.0	0.1	1.4	0.1	4.8	0.2	1.6				
Intersection Summary												
HCM 6th Ctrl Delay	43.8											
HCM 6th LOS	D											



Appendix F

Crash Data

[illegible]

Star & Chinden - Intersection Crashes 2018-2022

Star & Chinden - Intersection Crashes 2018-2022

Report Criteria:

Star & Joplin - Intersection Crashes 2018-2022

Intersection Analysis Report

[illegible]

Total Crashes: 2 Total Fatalities: 0
Total Vehicles: 2 Total Injuries: 1
Total People: 2

Report Criteria:

Can Ada (Chinden to Joplin) - Segment Crashes 2018-2022

Route ID Measure Listing Report

Route ID: 003354QH000 Measure Range: 4.016 to 4.52 Counties:ALL, Cities:ALL - In City And Rural,

Data From: 2022,2021,2020,2019,2018,

Sub-Query Filters: IsReportable = 'Y', IntersectionRelated = 'N(N)'.
Reportable Accidents Only

Accident #	Route ID	Measure	Vehicle Type	Driver Action	Lane Direction	Left Travel Direction	Most Harmful Event	Event Relation to Junction	Event Relation To Road	Vehicle Hit At	Contributing Circumstance 1	Contributing Circumstance 2	Contributing Circumstance 3	Lane	Road Condition	Weather	Surface	Light	Fatalities	Injuries	Day	Hour	Serial Number	Accident Date	Refusible	Severity	Work Zone Related	Shoilder	State Highway	Latitude	Longitude	Sort Order	View Accident Image
1	003354QH000	4.0605	Pickup	Going Straight	N		Other Post, Pole or Support	Nonjunction	Outside Right-Of-Way	Point 11 Power Unit	Alcohol Impaired	None	None	0	None	Clear	Dry	Dark, No Street Lights	0	0	Sunday	2	1C578078	7/11/2023	1	Property Dmg Report	N	N	Off highway	43.66384088	-116.5128605	1	Select
2	003354QH000	4.0714	SuV/Crossover	Going Straight	N		Overturn	Nonjunction	Right Shoulder	Top And Windows Power Unit	Alcohol Impaired	None	None	0	None	Clear	Dry	Day	0	0	Monday	10	2C0612134	8/12/2023	1	C Injury Accident	N	N	Off highway	43.66400422	-116.5128576	2	Select

Total Crews: 7 Total Fatalities: 8
Total Vehicles: 7 Total Injuries: 18
Total People: 12

Report Criteria:

Route ID: 00005ADH000 Measure Range: 3.054 to 4.06 Counties:ALL, Cities:ALL - In City And Rural,

Data From: 2022,2021,2020,2019,2018,

Sub-Query Filters: IsReportable = 'Y', IntersectionRelated = !N(N),

Reportable Accidents Only

Joplin (Can Ada to Star) - Segment Crashes 2018-2022

Route ID Measure Listing Report

Accident #	Route ID	Measure	Vehicle Type	Driver Action	Lane Direction	Unit Travel Direction	Most Harmful Event	Event Relation to Junction	Event Relation to Road	Vehicle Hit At	Contributing Circumstance 1	Contributing Circumstance 2	Contributing Circumstance 3	Lane	Road Condition	Weather	Surface	Light	Fatalities	Injuries	Day	Hour	Serial Number	AccidentDate	RelUnitNbr	Severity	Work Zone Related	Divided	State Highway	Latitude	Longitude	SortOrder	View Accident Image
1	00005ADH000	3.0732	Pickup	Negotiating Curve	N		Overturn	Nonjunction	Outside Right-Of-Way	Point 1 Power Unit	Alcohol Impaired	Failed to Maintain Lane	None	QNone	Clear	Dry	Dark, No Street Lights	D	0	1	Sunday	21	22C810581	8/14/2022	1	C-Injury Accident	N	N	Off Highway	43.67073131	-116.5126522	1	Select
2	00005ADH000	3.0757	Car	Going Straight	NE		Overturn	Nonjunction	Left Shoulder	Point 10 Power Unit	Exhaustion	None	None	QNone	Clear	Dry	Dark, No Street Lights	D	0	1	Saturday	19	21C578675	7/24/2021	1	B-Injury Accident	N	N	Off Highway	43.67073641	-116.5126158	2	Select
3	00005ADH000	3.0793	Car	Negotiating Curve	N		Overturn	Nonjunction	Private Property	Point 12 Power Unit	Alcohol Impaired	Failed to Maintain Lane	None	QNone	Clear	Dry	Dark, Street Lights On	D	0	1	Saturday	22	21C567635	5/6/2021	1	A-Injury Accident	N	N	Off Highway	43.67073881	-116.5125722	3	Select
4	00005ADH000	3.0802547	Car	Passing Pickup	Ascending	NW	Imbairment	Nonjunction	Off Roadway-Location Unknown	Point 12 Power Unit	Speed Too Fast For Conditions	Drove Left of Center	Failed to Maintain Lane	QNone	Clear	Dry	Dark, No Street Lights	D	0	5	Thursday	0	18C488391	8/26/2018	1	A-Injury Accident	N	N	Not in State Highway System	43.67079715	-116.5126412	4	Select
5	00005ADH000	3.1117	Car	Negotiating Curve	E		Overturn	Nonjunction	Left Shoulder	Point 10 Power Unit	Speed Too Fast For Conditions	Drove Left of Center	None	QNone	Clear	Dry	Dark, No Street Lights	D	0	0	Friday	19	22C939660	3/31/2022	1	Property Dmg Report	N	N	Off Highway	43.67064307	-116.5113913	5	Select
6	00005ADH000	3.2022	Car	Going Straight	E		Overturn	Nonjunction	Left Shoulder	Top And Windown Power Unit	Speed Too Fast For Conditions	Failed to Maintain Lane	Alcohol Impaired	QNone	Clear	Dry	Dark, No Street Lights	D	0	2	Thursday	4	18C520803	4/18/2019	1	C-Injury Accident	N	N	Off Highway	43.67105746	-116.5131188	6	Select
7	00005ADH000	3.4537	Pickup		E		Fence	Nonjunction	Off Roadway-Location Unknown	Point 11 Power Unit	Failed to Maintain Lane	None	Drove Left of Center	QNone	Clear	Dry	Dark, No Street Lights	D	0	0	Friday	22	19C535993	12/27/2019	1	Property Dmg Report	N	N	Off Highway	43.67039686	-116.5054446	7	Select

Total Crashes: 5
Total Fatalities: 0
Total Injuries: 4
Total People: 10

Report Criteria:

Route ID: 0256040H000 Measure Range: 8.544 to 9.044 Counties:ALL, Cities:ALL - In City And Rural,
Data From: 2022,2021,2020,2019,2018,
Sub-Query Filters: IsReportable = 'Y', IntersectionRelated = 'N/[N]',
Reportable Accidents Only

Star (Chinden to Joplin) - Segment Crashes 2018-2022

Route ID Measure Listing Report

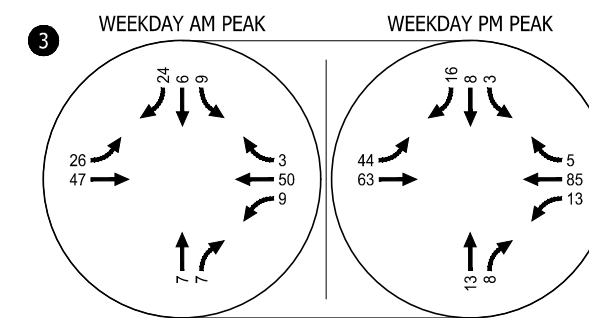
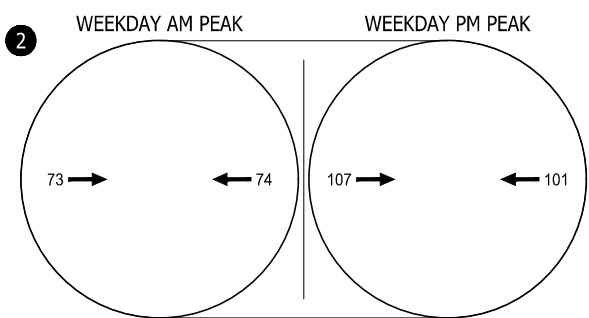
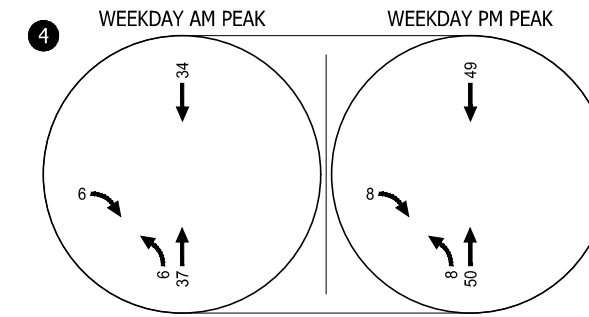
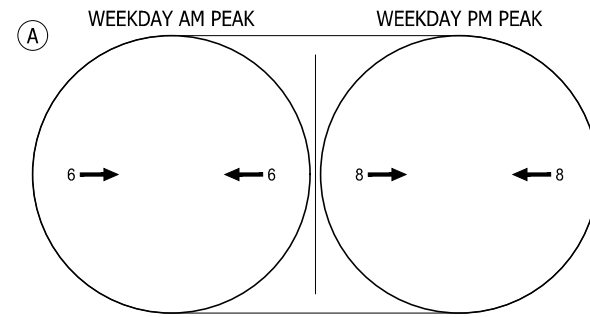
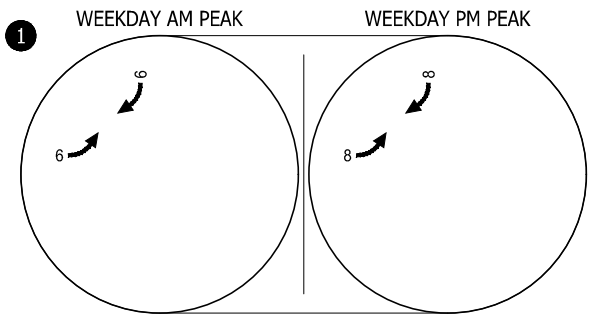
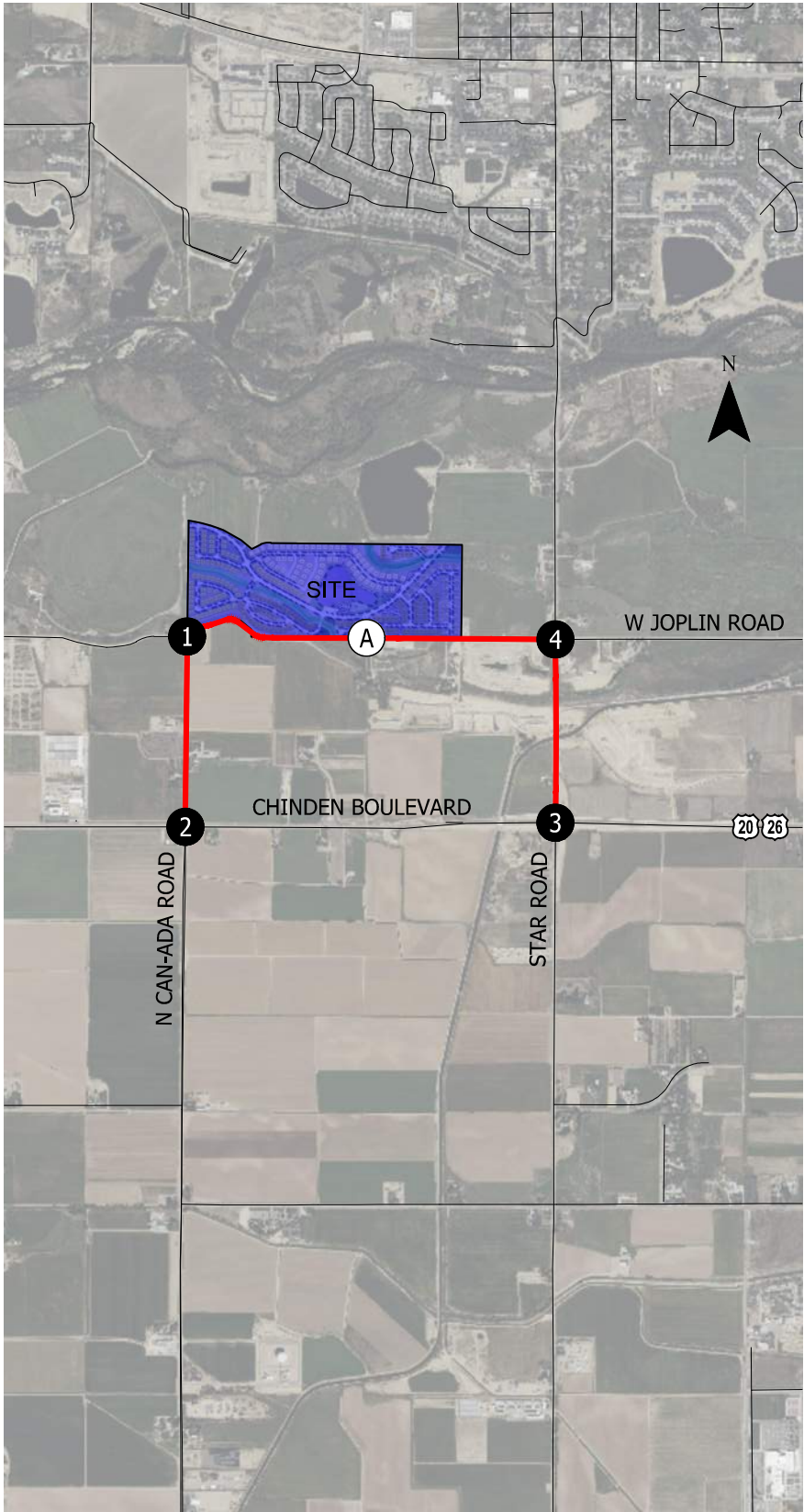
Accident #	Route ID	Measure	Vehicle Type	Driver Action	Lane Direction	Travel Direction	Most Harmful Event	Event Relation to Junction	Event Relation To Road	Vehicle Hit At	Contributing Circumstance 1	Contributing Circumstance 2	Contributing Circumstance 3	Lane	Road Condition	Weather	Surface	Light	Fatalities	Injuries	Day	Hour	Serial Number	Accident Date	RelayID#	Severity	Work Zone Related	Divided	State Highway	Latitude	Longitude	SortOrder	View Accident Image	
1	0256040H000	8.7202	Car			N	Drift	Nonjunction	Right Shoulder	Point 2 Power Unit	ick	None	None	0	None	Clear	Dry	Day	0	0	0	1	18CS56028	12/20/2019	18	Injury Accident	N	N	Off Highway	43.66566652	-116.4893564	1	Select	
2	0256040H000	8.7227	Car	Going Straight		N	Concrete Traffic Barrier	Nonjunction	2in Roadway	Point 12 Power Unit	Alcohol Impaired	Failed to Maintain Lane	None	0	None	Clear	Dry	Day	0	1	1	Thursday	20	20CS51179	8/6/2020	18	Injury Accident	N	N	Off Highway	43.66642735	-116.4893936	2	Select
3	0256040H000	8.9766	Pickup	Going Straight		S	Rear End	Nonjunction	2in Roadway	Point 12 Power Unit	Following Too Close	None	None	50	None	Clear	Dry	Day	0	2	2	Wednesday	11	22CS01740	3/25/2022	18	Injury Accident	N	N	Off Highway	43.66938946	-116.4893417	3	Select
	0256040H000	8.9766	Srv/Crossover	Stopped in Traffic		S	Rear End	Nonjunction		Point 6 Power Unit	None	None	None	50	None				0	0	0		22	22CS00140	5/25/2022	2	In Injury Accident	N	N	Off Highway	43.66938946	-116.4893417	4	Select
4	0256040H000	9.0109	Pickup	Going Straight		N	Guardrail Face	Nonjunction	Right Shoulder	Point 1 Power Unit	Speed Too Fast For Conditions	None	None	0	None	Blowing Snow	ice	Dark, No Street Lights	0	0	0	Friday	20	21CS66125	2/12/2021	1	Property Dmg Report	N	N	Off Highway	43.66999386	-116.4893417	5	Select
5	0256040H000	9.0244	Pickup	Going Straight	Ascending	N	Animal - Domestic	Nonjunction	2in Roadway	Point 11 Power Unit	Animal(s) in Roadway	None	None	50	None	Clear	Dry	Dark, No Street Lights	0	0	0	Sunday	1	19CS09444	1/20/2019	1	Property Dmg Report	N	N	Off Highway	43.67007301	-116.4893416	6	Select



Appendix G

In-Process Development Trip Assignments

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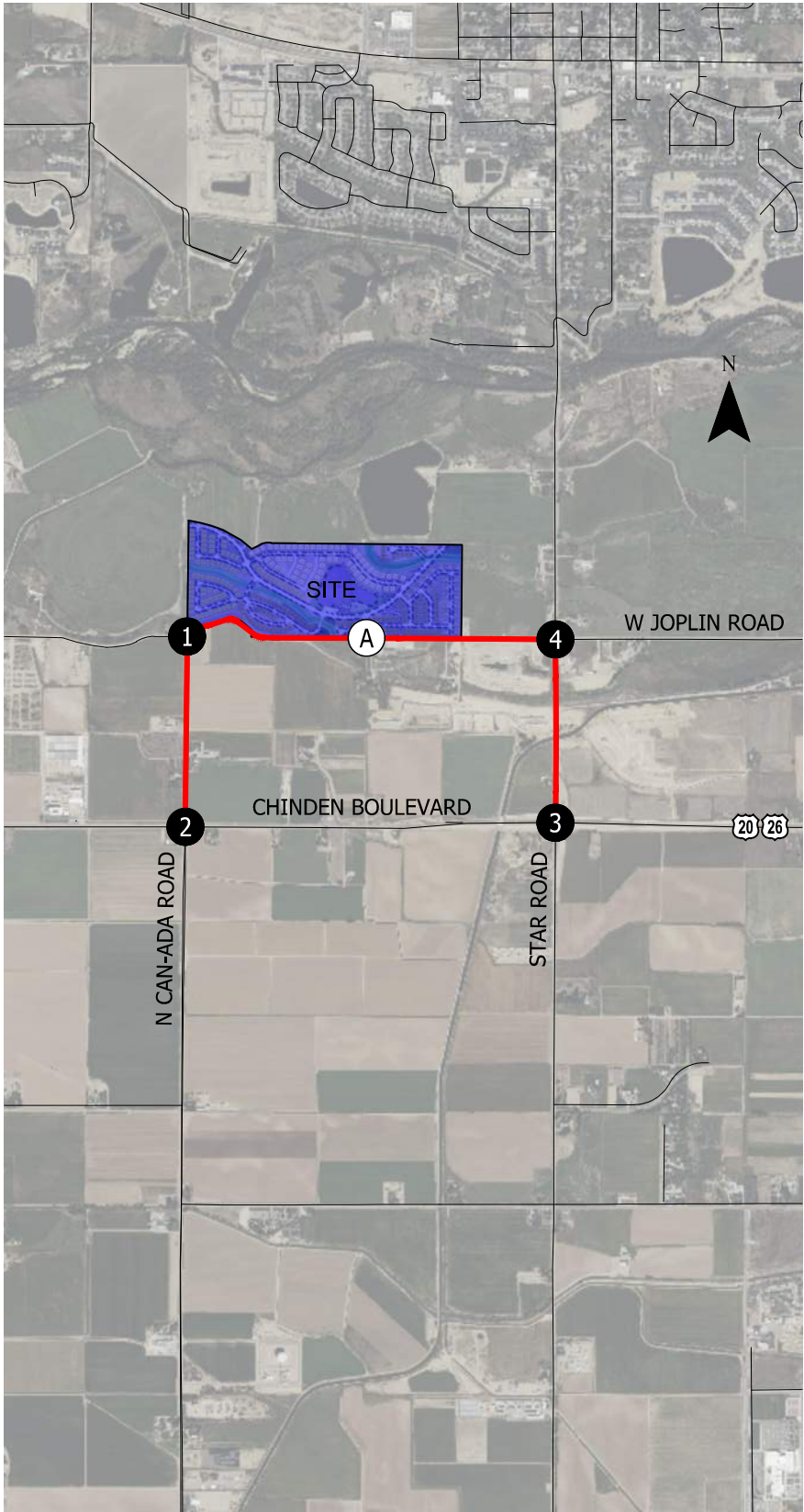


- # - Study Intersections
- (X) - Site Access
- Study Segment

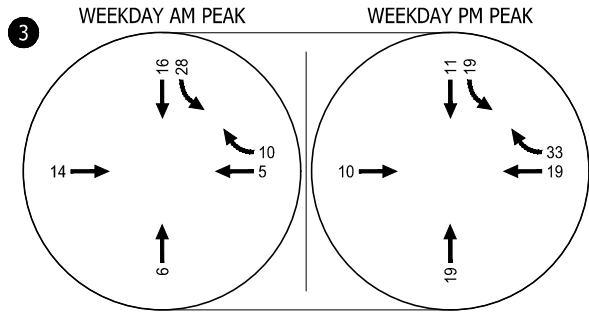
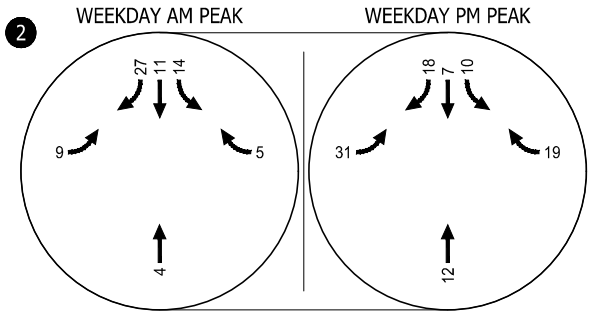
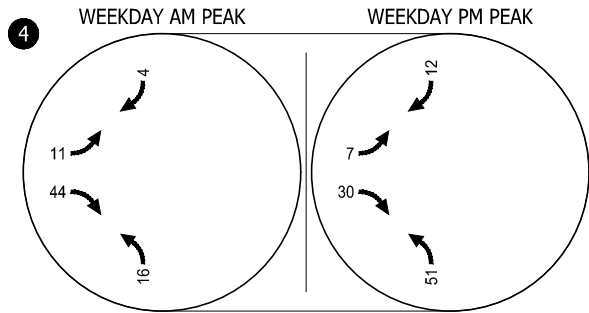
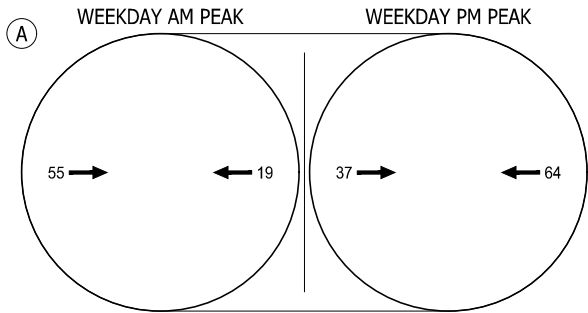
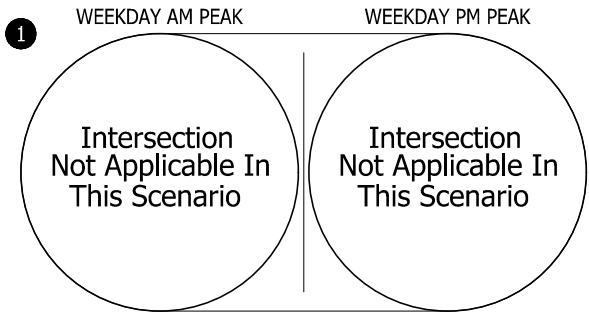
In-Process Trip Assignment: Inspirado Mixed-Use Development
Weekday AM & PM Peak Hours
Star, Idaho

Figure
G1

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- # - Study Intersections
- (X) - Site Access
- Study Segment



In-Process Trip Assignment: Naismith Commons (formerly Beacon Crossing Subdivision)
Weekday AM & PM Peak Hours
Star, Idaho

Figure
G2



Appendix H

Year 2029 Background Traffic Operations Worksheets

HCM 6th TWSC
1: Can Ada Rd & Joplin Rd

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	3	9	30	7	16
Future Vol, veh/h	38	3	9	30	7	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	33	38	7	0	11
Mvmt Flow	42	3	10	33	8	18
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	70	17	26	0	-	0
Stage 1	17	-	-	-	-	-
Stage 2	53	-	-	-	-	-
Critical Hdwy	6.5	6.53	4.48	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.597	2.542	-	-	-
Pot Cap-1 Maneuver	915	979	1384	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	949	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	909	979	1384	-	-	-
Mov Cap-2 Maneuver	909	-	-	-	-	-
Stage 1	978	-	-	-	-	-
Stage 2	949	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.1	1.8		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1384	-	914	-	-	
HCM Lane V/C Ratio	0.007	-	0.05	-	-	
HCM Control Delay (s)	7.6	0	9.1	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM 6th TWSC
2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	65.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1209	77	161	719	12	4	5	108	16	11	36
Future Vol, veh/h	30	1209	77	161	719	12	4	5	108	16	11	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	4	7	1	4	17	0	0	7	0	0	12
Mvmt Flow	31	1259	80	168	749	13	4	5	113	17	11	38
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	762	0	0	1339	0	0	2477	2459	1299	2512	2493	756
Stage 1	-	-	-	-	-	-	1361	1361	-	1092	1092	-
Stage 2	-	-	-	-	-	-	1116	1098	-	1420	1401	-
Critical Hdwy	4.15	-	-	4.11	-	-	7.1	6.5	6.27	7.1	6.5	6.32
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.209	-	-	3.5	4	3.363	3.5	4	3.408
Pot Cap-1 Maneuver	837	-	-	518	-	-	21	31	192	19	30	392
Stage 1	-	-	-	-	-	-	185	218	-	262	293	-
Stage 2	-	-	-	-	-	-	254	291	-	171	209	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	837	-	-	518	-	-	8	20	192	~ 5	20	392
Mov Cap-2 Maneuver	-	-	-	-	-	-	8	20	-	~ 5	20	-
Stage 1	-	-	-	-	-	-	178	210	-	252	198	-
Stage 2	-	-	-	-	-	-	146	197	-	66	201	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.8			\$ 307			\$ 1877.7		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	89	837	-	-	518	-	-	16				
HCM Lane V/C Ratio	1.369	0.037	-	-	0.324	-	-	4.102				
HCM Control Delay (s)	\$ 307	9.5	-	-	15.2	-	-	\$ 1877.7				
HCM Lane LOS	F	A	-	-	C	-	-	F				
HCM 95th %tile Q(veh)	9.1	0.1	-	-	1.4	-	-	9				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined				*: All major volume in platoon		

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Background 2029 Weekday AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	297	1080	28	107	694	91	30	316	123	239	356	216
v/c Ratio	0.96	0.81	0.04	0.66	0.85	0.17	0.13	0.83	0.29	0.79	0.62	0.37
Control Delay	103.6	47.2	0.1	88.8	60.3	1.4	35.2	77.4	7.2	56.3	52.5	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	103.6	47.2	0.1	88.8	60.3	1.4	35.2	77.4	7.2	56.3	52.5	18.6
Queue Length 50th (ft)	300	514	0	105	438	0	19	300	0	171	314	58
Queue Length 95th (ft)	#589	643	0	192	557	6	49	#487	43	#308	501	154
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	309	1985	946	204	1405	831	345	457	487	302	578	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.54	0.03	0.52	0.49	0.11	0.09	0.69	0.25	0.79	0.62	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1015	26	101	652	86	28	297	116	225	335	203
Future Volume (vph)	279	1015	26	101	652	86	28	297	116	225	335	203
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1660	3353	1530	1710	2673	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.45	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1660	3353	1530	1710	2673	1457	747	1765	1485	390	1782	1515
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	297	1080	28	107	694	91	30	316	123	239	356	216
RTOR Reduction (vph)	0	0	17	0	0	64	0	0	95	0	0	94
Lane Group Flow (vph)	297	1080	11	107	694	27	30	316	28	239	356	122
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.4	60.5	60.5	14.5	46.6	46.6	40.6	35.9	35.9	61.1	49.4	49.4
Effective Green, g (s)	28.4	60.5	60.5	14.5	46.6	46.6	40.6	35.9	35.9	61.1	49.4	49.4
Actuated g/C Ratio	0.18	0.39	0.39	0.09	0.30	0.30	0.26	0.23	0.23	0.39	0.32	0.32
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	1307	596	159	803	437	220	408	343	306	567	482
v/s Ratio Prot	c0.18	c0.32		0.06	0.26		0.00	0.18		c0.09	0.20	
v/s Ratio Perm			0.01			0.02	0.03		0.02	c0.22		0.08
v/c Ratio	0.98	0.83	0.02	0.67	0.86	0.06	0.14	0.77	0.08	0.78	0.63	0.25
Uniform Delay, d1	63.1	42.6	29.1	68.0	51.3	38.7	43.2	55.8	46.7	36.1	45.0	39.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	46.1	4.4	0.0	10.7	9.6	0.1	0.3	8.9	0.1	12.2	2.2	0.3
Delay (s)	109.2	47.0	29.1	78.7	60.8	38.7	43.5	64.7	46.8	48.3	47.2	39.5
Level of Service	F	D	C	E	E	D	D	E	D	D	D	D
Approach Delay (s)		59.8			60.7			58.7			45.5	
Approach LOS		E			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			56.6			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			155.1			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			86.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	279	1015	26	101	652	86	28	297	116	225	335	203
Future Volume (veh/h)	279	1015	26	101	652	86	28	297	116	225	335	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	297	1080	28	107	694	91	30	316	123	239	356	216
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	319	1383	627	130	793	434	192	355	298	288	534	452
Arrive On Green	0.19	0.41	0.41	0.08	0.30	0.30	0.02	0.20	0.20	0.12	0.30	0.30
Sat Flow, veh/h	1674	3367	1525	1714	2679	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	297	1080	28	107	694	91	30	316	123	239	356	216
Grp Sat Flow(s),veh/h/ln	1674	1683	1525	1714	1339	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	23.9	38.1	1.5	8.4	33.7	6.4	2.0	23.8	9.9	14.8	23.9	16.0
Cycle Q Clear(g_c), s	23.9	38.1	1.5	8.4	33.7	6.4	2.0	23.8	9.9	14.8	23.9	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	319	1383	627	130	793	434	192	355	298	288	534	452
V/C Ratio(X)	0.93	0.78	0.04	0.82	0.88	0.21	0.16	0.89	0.41	0.83	0.67	0.48
Avail Cap(c_a), veh/h	342	1941	880	225	1545	845	363	504	424	302	534	452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.6	35.0	24.2	62.4	45.8	36.2	42.3	53.3	47.8	37.9	42.1	39.3
Incr Delay (d2), s/veh	30.5	1.4	0.0	12.2	3.2	0.2	0.4	13.4	0.9	16.9	3.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.4	14.9	0.5	4.0	11.0	2.3	0.8	11.6	3.6	7.3	10.7	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	85.0	36.4	24.2	74.6	49.1	36.4	42.7	66.8	48.7	54.7	45.2	40.1
LnGrp LOS	F	D	C	E	D	D	D	E	D	D	D	D
Approach Vol, veh/h		1405			892			469			811	
Approach Delay, s/veh		46.4			50.8			60.5			46.7	
Approach LOS		D			D			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	33.1	46.6	10.4	46.9	17.4	62.3	23.9	33.4				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	25.9	35.7	4.0	25.9	10.4	40.1	16.8	25.8				
Green Ext Time (p_c), s	0.2	4.8	0.0	2.1	0.1	8.2	0.1	1.7				
Intersection Summary												
HCM 6th Ctrl Delay			49.4									
HCM 6th LOS			D									

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	0	72	2	0	4	29	624	6	6	639	27
Future Vol, veh/h	50	0	72	2	0	4	29	624	6	6	639	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	5	0	0	0	0	2	40	0	1	5
Mvmt Flow	54	0	77	2	0	4	31	671	6	6	687	29
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1452	1453	702	1488	1464	674	716	0	0	677	0	0
Stage 1	714	714	-	736	736	-	-	-	-	-	-	-
Stage 2	738	739	-	752	728	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.25	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.345	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	106	132	433	103	130	458	894	-	-	924	-	-
Stage 1	416	438	-	414	428	-	-	-	-	-	-	-
Stage 2	403	427	-	405	432	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	100	123	433	80	121	458	894	-	-	924	-	-
Mov Cap-2 Maneuver	100	123	-	80	121	-	-	-	-	-	-	-
Stage 1	393	433	-	391	404	-	-	-	-	-	-	-
Stage 2	377	403	-	329	427	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	63		26		0.4		0.1					
HCM LOS	F		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	894	-	-	183	178	924	-	-				
HCM Lane V/C Ratio	0.035	-	-	0.717	0.036	0.007	-	-				
HCM Control Delay (s)	9.2	0	-	63	26	8.9	0	-				
HCM Lane LOS	A	A	-	F	D	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	4.5	0.1	0	-	-				

HCM 6th TWSC
1: Can Ada Rd & Joplin Rd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

Intersection						
Int Delay, s/veh	4.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	3	9	12	3	23
Future Vol, veh/h	34	3	9	12	3	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	9	0	0
Mvmt Flow	38	3	10	13	3	26
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	49	16	29	0	-	0
Stage 1	16	-	-	-	-	-
Stage 2	33	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	965	1069	1597	-	-	-
Stage 1	1012	-	-	-	-	-
Stage 2	995	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	959	1069	1597	-	-	-
Mov Cap-2 Maneuver	959	-	-	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	995	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.9	3.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1597	-	967	-	-	
HCM Lane V/C Ratio	0.006	-	0.043	-	-	
HCM Control Delay (s)	7.3	0	8.9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

HCM 6th TWSC
2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	605.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	924	49	160	1230	27	32	21	114	14	9	19
Future Vol, veh/h	35	924	49	160	1230	27	32	21	114	14	9	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	1	7	6	4	0	7	0	4	0	0	5
Mvmt Flow	38	1015	54	176	1352	30	35	23	125	15	10	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1382	0	0	1069	0	0	2853	2852	1042	2911	2864	1367
Stage 1	-	-	-	-	-	-	1118	1118	-	1719	1719	-
Stage 2	-	-	-	-	-	-	1735	1734	-	1192	1145	-
Critical Hdwy	4.1	-	-	4.16	-	-	7.17	6.5	6.24	7.1	6.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.254	-	-	3.563	4	3.336	3.5	4	3.345
Pot Cap-1 Maneuver	502	-	-	637	-	-	~ 10	~ 17	276	~ 10	17	177
Stage 1	-	-	-	-	-	-	246	285	-	115	146	-
Stage 2	-	-	-	-	-	-	108	144	-	230	277	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	502	-	-	637	-	-	~ 2	~ 11	276	-	11	177
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 2	~ 11	-	-	11	-
Stage 1	-	-	-	-	-	-	227	263	-	106	106	-
Stage 2	-	-	-	-	-	-	63	104	-	106	256	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	1.4	\$ 9532.9	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	9	502	-	-	637	-	-	-
HCM Lane V/C Ratio	20.391	0.077	-	-	0.276	-	-	-
HCM Control Delay (s)	\$ 9532.9	12.8	-	-	12.8	-	-	-
HCM Lane LOS	F	B	-	-	B	-	-	-
HCM 95th %tile Q(veh)	24.6	0.2	-	-	1.1	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Queues
3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	270	787	29	74	1133	213	98	371	94	185	198	324
v/c Ratio	1.08	0.47	0.04	0.62	1.06	0.30	0.33	1.02	0.22	0.96	0.51	0.57
Control Delay	152.6	33.4	0.1	107.3	97.1	8.8	49.0	125.0	2.5	110.1	70.2	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	152.6	33.4	0.1	107.3	97.1	8.8	49.0	125.0	2.5	110.1	70.2	12.4
Queue Length 50th (ft)	~375	338	0	92	~1031	29	88	~491	0	187	219	22
Queue Length 95th (ft)	#579	416	0	152	#1210	92	141	#715	9	#371	322	131
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	249	1683	773	158	1068	713	332	362	420	192	388	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.47	0.04	0.47	1.06	0.30	0.30	1.02	0.22	0.96	0.51	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

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	262	763	28	72	1099	207	95	360	91	179	192	314
Future Volume (vph)	262	763	28	72	1099	207	95	360	91	179	192	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	3420	1471	1676	2571	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.51	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)	1693	3420	1471	1676	2571	1471	882	1765	1515	161	1698	1457
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	787	29	74	1133	213	98	371	94	185	198	324
RTOR Reduction (vph)	0	0	15	0	0	102	0	0	75	0	0	233
Lane Group Flow (vph)	270	787	14	74	1133	111	98	371	19	185	198	91
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.0	93.5	93.5	13.5	79.0	79.0	52.5	39.0	39.0	61.5	43.5	43.5
Effective Green, g (s)	28.0	93.5	93.5	13.5	79.0	79.0	52.5	39.0	39.0	61.5	43.5	43.5
Actuated g/C Ratio	0.15	0.49	0.49	0.07	0.42	0.42	0.28	0.21	0.21	0.32	0.23	0.23
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	249	1683	723	119	1068	611	297	362	310	194	388	333
v/s Ratio Prot	c0.16	0.23		0.04	c0.44		0.02	c0.21		c0.09	0.12	
v/s Ratio Perm			0.01			0.08	0.07		0.01	c0.22		0.06
v/c Ratio	1.08	0.47	0.02	0.62	1.06	0.18	0.33	1.02	0.06	0.95	0.51	0.27
Uniform Delay, d1	81.0	31.8	24.7	85.8	55.5	35.1	53.1	75.5	60.8	57.7	64.0	60.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	81.3	0.2	0.0	9.7	45.2	0.1	0.7	53.8	0.1	51.0	1.1	0.4
Delay (s)	162.3	32.0	24.8	95.5	100.7	35.2	53.7	129.3	60.9	108.6	65.1	60.7
Level of Service	F	C	C	F	F	D	D	F	E	F	E	E
Approach Delay (s)		64.2			90.6			104.7			74.5	
Approach LOS		E			F			F			E	
Intersection Summary												
HCM 2000 Control Delay			82.1			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			98.9%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	763	28	72	1099	207	95	360	91	179	192	314
Future Volume (veh/h)	262	763	28	72	1099	207	95	360	91	179	192	314
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	270	787	29	74	1133	213	98	371	94	185	198	324
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	251	1744	754	90	1079	614	257	364	311	197	417	356
Arrive On Green	0.15	0.51	0.51	0.05	0.42	0.42	0.06	0.21	0.21	0.09	0.24	0.24
Sat Flow, veh/h	1701	3420	1478	1688	2595	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	270	787	29	74	1133	213	98	371	94	185	198	324
Grp Sat Flow(s),veh/h/ln	1701	1710	1478	1688	1297	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	28.0	27.8	1.9	8.2	79.0	18.7	8.8	39.0	10.0	16.5	18.8	40.8
Cycle Q Clear(g_c), s	28.0	27.8	1.9	8.2	79.0	18.7	8.8	39.0	10.0	16.5	18.8	40.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	251	1744	754	90	1079	614	257	364	311	197	417	356
V/C Ratio(X)	1.08	0.45	0.04	0.82	1.05	0.35	0.38	1.02	0.30	0.94	0.47	0.91
Avail Cap(c_a), veh/h	251	1744	754	160	1079	614	320	364	311	197	417	356
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	81.0	29.6	23.3	89.1	55.5	37.9	55.3	75.5	64.0	56.8	61.5	69.9
Incr Delay (d2), s/veh	78.9	0.2	0.0	16.7	41.6	0.3	0.9	52.4	0.5	47.6	0.8	26.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.5	11.2	0.7	4.0	31.0	6.8	3.7	22.8	3.9	9.4	8.2	17.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	159.9	29.8	23.3	105.8	97.1	38.2	56.3	127.9	64.5	104.5	62.4	96.3
LnGrp LOS	F	C	C	F	F	D	E	F	E	F	E	F
Approach Vol, veh/h		1086			1420			563			707	
Approach Delay, s/veh		62.0			88.7			104.8			88.9	
Approach LOS		E			F			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	35.0	85.0	17.8	52.2	17.1	102.9	25.0	45.0				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	30.0	81.0	10.8	42.8	10.2	29.8	18.5	41.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	5.4	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			83.5									
HCM 6th LOS			F									

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	0	53	0	0	6	62	809	5	1	541	35
Future Vol, veh/h	35	0	53	0	0	6	62	809	5	1	541	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	0	0	0	0	0	0	2	25	0	6	0
Mvmt Flow	36	0	55	0	0	6	64	834	5	1	558	36
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1546	1545	576	1571	1561	837	594	0	0	839	0	0
Stage 1	578	578	-	965	965	-	-	-	-	-	-	-
Stage 2	968	967	-	606	596	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	92	116	521	91	113	370	992	-	-	804	-	-
Stage 1	498	504	-	309	336	-	-	-	-	-	-	-
Stage 2	303	335	-	487	495	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	82	102	521	74	99	370	992	-	-	804	-	-
Mov Cap-2 Maneuver	82	102	-	74	99	-	-	-	-	-	-	-
Stage 1	438	503	-	272	295	-	-	-	-	-	-	-
Stage 2	262	294	-	435	494	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	50.1		14.9		0.6		0					
HCM LOS	F		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	992	-	-	166	370	804	-	-				
HCM Lane V/C Ratio	0.064	-	-	0.547	0.017	0.001	-	-				
HCM Control Delay (s)	8.9	0	-	50.1	14.9	9.5	0	-				
HCM Lane LOS	A	A	-	F	B	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	2.8	0.1	0	-	-				



Appendix I

Year 2029 Mitigated Background Traffic Operations Worksheets

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Background 2029 Weekday AM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	1343	86	179	799	13	4	6	120	18	52
v/c Ratio	0.25	0.80	0.11	0.59	0.36	0.01	0.04	0.05	0.50	0.14	0.29
Control Delay	57.2	24.2	0.6	50.3	8.6	0.0	57.8	55.6	13.4	56.7	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	24.2	0.6	50.3	8.6	0.0	57.8	55.6	13.4	56.7	25.9
Queue Length 50th (ft)	18	291	0	96	97	0	2	3	0	10	7
Queue Length 95th (ft)	65	585	4	233	210	0	17	21	40	43	54
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	166	2586	1154	462	2847	1145	194	429	452	194	378
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.52	0.07	0.39	0.28	0.01	0.02	0.01	0.27	0.09	0.14
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1209	77	161	719	12	4	5	108	16	11	36
Future Volume (vph)	30	1209	77	161	719	12	4	5	108	16	11	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1458	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1458	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	33	1343	86	179	799	13	4	6	120	18	12	40
RTOR Reduction (vph)	0	0	42	0	0	5	0	0	111	0	36	0
Lane Group Flow (vph)	33	1343	44	179	799	8	4	6	9	18	16	0
Heavy Vehicles (%)	5%	4%	7%	1%	4%	17%	0%	0%	7%	0%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	4.3	53.0	53.0	17.2	65.9	65.9	0.9	7.8	7.8	2.5	9.4	
Effective Green, g (s)	4.3	53.0	53.0	17.2	65.9	65.9	0.9	7.8	7.8	2.5	9.4	
Actuated g/C Ratio	0.04	0.52	0.52	0.17	0.64	0.64	0.01	0.08	0.08	0.02	0.09	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	68	1700	739	284	2113	840	15	136	108	41	133	
v/s Ratio Prot	0.02	c0.41		c0.11	0.24		0.00	0.00		c0.01	c0.01	
v/s Ratio Perm			0.03			0.01			0.01			
v/c Ratio	0.49	0.79	0.06	0.63	0.38	0.01	0.27	0.04	0.08	0.44	0.12	
Uniform Delay, d1	48.0	20.2	12.3	39.7	8.6	6.6	50.5	43.9	44.0	49.3	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.4	2.6	0.0	4.5	0.1	0.0	9.3	0.1	0.3	7.3	0.4	
Delay (s)	53.4	22.8	12.4	44.2	8.7	6.6	59.8	44.0	44.4	56.7	43.1	
Level of Service	D	C	B	D	A	A	E	D	D	E	D	
Approach Delay (s)		22.9			15.1			44.8			46.6	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			21.7			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			102.5			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			66.5%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1209	77	161	719	12	4	5	108	16	11	36
Future Volume (veh/h)	30	1209	77	161	719	12	4	5	108	16	11	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1730	1744	1702	1786	1744	1561	1800	1800	1702	1800	1800	1632
Adj Flow Rate, veh/h	33	1343	86	179	799	13	4	6	120	18	12	40
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	5	4	7	1	4	17	0	0	7	0	0	12
Cap, veh/h	52	1651	719	217	1970	787	9	190	152	35	44	146
Arrive On Green	0.03	0.50	0.50	0.13	0.59	0.59	0.01	0.11	0.11	0.02	0.12	0.12
Sat Flow, veh/h	1647	3313	1442	1701	3313	1323	1714	1800	1442	1714	365	1216
Grp Volume(v), veh/h	33	1343	86	179	799	13	4	6	120	18	0	52
Grp Sat Flow(s),veh/h/ln	1647	1657	1442	1701	1657	1323	1714	1800	1442	1714	0	1581
Q Serve(g_s), s	1.8	30.3	2.8	9.1	11.4	0.4	0.2	0.3	7.2	0.9	0.0	2.6
Cycle Q Clear(g_c), s	1.8	30.3	2.8	9.1	11.4	0.4	0.2	0.3	7.2	0.9	0.0	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.77
Lane Grp Cap(c), veh/h	52	1651	719	217	1970	787	9	190	152	35	0	190
V/C Ratio(X)	0.64	0.81	0.12	0.83	0.41	0.02	0.44	0.03	0.79	0.52	0.00	0.27
Avail Cap(c_a), veh/h	167	2732	1189	461	3293	1315	194	427	342	194	0	375
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.4	18.7	11.8	37.7	9.6	7.4	43.9	35.5	38.6	43.0	0.0	35.4
Incr Delay (d2), s/veh	12.3	1.0	0.1	7.7	0.1	0.0	30.2	0.1	8.7	11.5	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	9.7	0.8	4.0	3.2	0.1	0.2	0.1	2.7	0.5	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	19.8	11.9	45.4	9.7	7.4	74.1	35.6	47.4	54.5	0.0	36.2
LnGrp LOS	D	B	B	D	A	A	E	D	D	D	A	D
Approach Vol, veh/h	1462			991			130			70		
Approach Delay, s/veh	20.1			16.1			47.7			40.9		
Approach LOS	C			B			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.8	14.3	17.3	50.1	5.5	15.7	8.8	58.6				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	21.0	24.0	73.0	10.0	21.0	9.0	88.0				
Max Q Clear Time (g_c+I1), s	2.9	9.2	11.1	32.3	2.2	4.6	3.8	13.4				
Green Ext Time (p_c), s	0.0	0.3	0.3	11.8	0.0	0.2	0.0	5.5				
Intersection Summary												
HCM 6th Ctrl Delay	20.5											
HCM 6th LOS	C											

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Background 2029 Weekday PM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	39	1027	54	178	1367	30	36	23	127	16	31
v/c Ratio	0.24	0.73	0.08	0.56	0.69	0.03	0.24	0.11	0.42	0.11	0.21
Control Delay	48.1	25.3	0.2	42.4	16.9	0.1	48.4	44.2	10.9	48.9	29.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.1	25.3	0.2	42.4	16.9	0.1	48.4	44.2	10.9	48.9	29.5
Queue Length 50th (ft)	21	247	0	92	321	0	19	10	0	9	5
Queue Length 95th (ft)	65	406	0	196	473	0	61	43	45	35	39
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	225	2660	1153	616	2954	1355	210	568	564	225	508
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.39	0.05	0.29	0.46	0.02	0.17	0.04	0.23	0.07	0.06
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Background 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	924	49	160	1230	27	32	21	114	14	9	19
Future Volume (vph)	35	924	49	160	1230	27	32	21	114	14	9	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1564	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1564	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	1027	54	178	1367	30	36	23	127	16	10	21
RTOR Reduction (vph)	0	0	31	0	0	13	0	0	113	0	19	0
Lane Group Flow (vph)	39	1027	23	178	1367	17	36	23	14	16	12	0
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	7%	6%	4%	0%	7%	0%	4%	0%	0%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	4.4	38.3	38.3	16.4	50.3	50.3	4.4	10.0	10.0	2.4	8.0	
Effective Green, g (s)	4.4	38.3	38.3	16.4	50.3	50.3	4.4	10.0	10.0	2.4	8.0	
Actuated g/C Ratio	0.05	0.43	0.43	0.18	0.56	0.56	0.05	0.11	0.11	0.03	0.09	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	84	1455	614	296	1856	845	78	202	165	46	140	
v/s Ratio Prot	0.02	0.30		c0.11	c0.42		c0.02	c0.01		0.01	0.01	
v/s Ratio Perm			0.02			0.01			0.01			
v/c Ratio	0.46	0.71	0.04	0.60	0.74	0.02	0.46	0.11	0.09	0.35	0.08	
Uniform Delay, d1	41.2	20.8	14.7	33.4	14.5	8.5	41.2	35.6	35.5	42.6	37.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.0	1.6	0.0	3.4	1.6	0.0	4.3	0.3	0.2	4.5	0.3	
Delay (s)	45.2	22.4	14.7	36.8	16.0	8.6	45.5	35.8	35.7	47.1	37.5	
Level of Service	D	C	B	D	B	A	D	D	D	D	D	
Approach Delay (s)		22.8			18.2			37.6			40.7	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			21.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			89.1			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			62.8%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (veh/h)	35	924	49	160	1230	27	32	21	114	14	9	19
Future Volume (veh/h)	35	924	49	160	1230	27	32	21	114	14	9	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1702	1716	1744	1800	1702	1800	1744	1800	1800	1730
Adj Flow Rate, veh/h	39	1027	54	178	1367	30	36	23	127	16	10	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	1	7	6	4	0	7	0	4	0	0	5
Cap, veh/h	64	1465	622	220	1753	790	57	206	169	33	51	107
Arrive On Green	0.04	0.43	0.43	0.13	0.53	0.53	0.04	0.11	0.11	0.02	0.10	0.10
Sat Flow, veh/h	1714	3393	1442	1634	3313	1494	1621	1800	1478	1714	518	1087
Grp Volume(v), veh/h	39	1027	54	178	1367	30	36	23	127	16	0	31
Grp Sat Flow(s),veh/h/ln	1714	1697	1442	1634	1657	1494	1621	1800	1478	1714	0	1604
Q Serve(g_s), s	1.6	18.1	1.6	7.8	24.3	0.7	1.6	0.8	6.1	0.7	0.0	1.3
Cycle Q Clear(g_c), s	1.6	18.1	1.6	7.8	24.3	0.7	1.6	0.8	6.1	0.7	0.0	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.68
Lane Grp Cap(c), veh/h	64	1465	622	220	1753	790	57	206	169	33	0	157
V/C Ratio(X)	0.61	0.70	0.09	0.81	0.78	0.04	0.63	0.11	0.75	0.49	0.00	0.20
Avail Cap(c_a), veh/h	234	3007	1278	646	3794	1710	221	589	483	234	0	525
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.8	17.0	12.3	30.8	13.8	8.3	34.9	29.1	31.5	35.6	0.0	30.4
Incr Delay (d2), s/veh	9.0	0.6	0.1	6.9	0.8	0.0	10.7	0.2	6.5	11.1	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	5.7	0.4	3.1	6.7	0.2	0.8	0.4	2.2	0.4	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.8	17.6	12.4	37.7	14.6	8.3	45.6	29.4	38.0	46.7	0.0	31.0
LnGrp LOS	D	B	B	D	B	A	D	C	D	D	A	C
Approach Vol, veh/h		1120			1575			186			47	
Approach Delay, s/veh		18.3			17.1			38.4			36.4	
Approach LOS		B			B			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	13.4	15.9	37.7	7.6	12.2	8.7	44.8				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	24.0	29.0	65.0	10.0	24.0	10.0	84.0				
Max Q Clear Time (g_c+I1), s	2.7	8.1	9.8	20.1	3.6	3.3	3.6	26.3				
Green Ext Time (p_c), s	0.0	0.4	0.4	7.9	0.0	0.1	0.0	12.6				
Intersection Summary												
HCM 6th Ctrl Delay			19.2									
HCM 6th LOS			B									

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Background 2029 Weekday AM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	297	1080	28	107	694	91	30	316	123	239	356	216
v/c Ratio	0.63	0.74	0.04	0.70	0.55	0.14	0.15	0.86	0.29	0.87	0.68	0.39
Control Delay	76.2	46.1	0.1	100.7	44.8	1.1	37.2	87.3	6.8	70.0	60.8	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.2	46.1	0.1	100.7	44.8	1.1	37.2	87.3	6.8	70.0	60.8	15.9
Queue Length 50th (ft)	163	532	0	118	320	0	22	345	0	199	360	50
Queue Length 95th (ft)	235	723	0	200	433	5	47	465	43	#313	488	129
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	473	1454	742	190	1273	634	225	570	573	278	680	675
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.74	0.04	0.56	0.55	0.14	0.13	0.55	0.21	0.86	0.52	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Background 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1015	26	101	652	86	28	297	116	225	335	203
Future Volume (vph)	279	1015	26	101	652	86	28	297	116	225	335	203
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3221	3353	1530	1710	3386	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.39	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	3221	3353	1530	1710	3386	1457	653	1765	1485	329	1782	1515
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	297	1080	28	107	694	91	30	316	123	239	356	216
RTOR Reduction (vph)	0	0	16	0	0	57	0	0	97	0	0	111
Lane Group Flow (vph)	297	1080	12	107	694	34	30	316	27	239	356	105
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	25.1	74.1	74.1	15.2	64.2	64.2	43.5	37.1	37.1	63.9	50.5	50.5
Effective Green, g (s)	25.1	74.1	74.1	15.2	64.2	64.2	43.5	37.1	37.1	63.9	50.5	50.5
Actuated g/C Ratio	0.15	0.43	0.43	0.09	0.37	0.37	0.25	0.22	0.22	0.37	0.29	0.29
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	469	1442	658	150	1262	543	199	380	319	278	522	444
v/s Ratio Prot	c0.09	c0.32		0.06	0.20		0.01	0.18		c0.10	0.20	
v/s Ratio Perm			0.01			0.02	0.03		0.02	c0.22		0.07
v/c Ratio	0.63	0.75	0.02	0.71	0.55	0.06	0.15	0.83	0.08	0.86	0.68	0.24
Uniform Delay, d1	69.2	41.2	28.2	76.4	42.6	34.7	49.4	64.6	54.0	43.0	53.8	46.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	3.6	0.1	14.8	1.7	0.2	0.4	14.3	0.1	22.3	3.7	0.3
Delay (s)	75.6	44.8	28.2	91.2	44.3	34.9	49.7	78.9	54.1	65.3	57.4	46.5
Level of Service	E	D	C	F	D	C	D	E	D	E	E	D
Approach Delay (s)		51.0			49.0			70.5			56.8	
Approach LOS		D			D			E			E	
Intersection Summary												
HCM 2000 Control Delay			54.4			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			172.2			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			86.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			 						 	
Traffic Volume (veh/h)	279	1015	26	101	652	86	28	297	116	225	335	203
Future Volume (veh/h)	279	1015	26	101	652	86	28	297	116	225	335	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	297	1080	28	107	694	91	30	316	123	239	356	216
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	483	1532	694	126	1291	558	174	350	295	268	525	445
Arrive On Green	0.15	0.46	0.46	0.07	0.38	0.38	0.02	0.20	0.20	0.12	0.29	0.29
Sat Flow, veh/h	3248	3367	1525	1714	3393	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	297	1080	28	107	694	91	30	316	123	239	356	216
Grp Sat Flow(s),veh/h/ln	1624	1683	1525	1714	1697	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	14.4	43.3	1.7	10.4	26.8	6.9	2.5	29.3	12.1	18.5	29.6	19.8
Cycle Q Clear(g_c), s	14.4	43.3	1.7	10.4	26.8	6.9	2.5	29.3	12.1	18.5	29.6	19.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	483	1532	694	126	1291	558	174	350	295	268	525	445
V/C Ratio(X)	0.62	0.70	0.04	0.85	0.54	0.16	0.17	0.90	0.42	0.89	0.68	0.49
Avail Cap(c_a), veh/h	483	1532	694	194	1291	558	233	579	487	268	690	585
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.1	36.8	25.4	77.0	40.6	34.5	52.7	65.9	59.0	47.7	52.3	48.9
Incr Delay (d2), s/veh	5.8	2.7	0.1	18.6	1.6	0.6	0.5	10.9	0.9	29.1	1.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	17.6	0.6	5.1	11.2	2.5	1.0	14.0	4.6	9.8	13.2	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.9	39.5	25.6	95.6	42.2	35.1	53.2	76.8	60.0	76.8	54.1	49.7
LnGrp LOS	E	D	C	F	D	D	D	E	E	E	D	D
Approach Vol, veh/h	1405			892			469			811		
Approach Delay, s/veh	46.3			47.9			70.9			59.6		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	32.0	70.0	10.8	55.5	19.4	82.6	27.0	39.3				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	25.0	64.0	10.0	65.0	19.0	70.0	20.0	55.0				
Max Q Clear Time (g_c+I1), s	16.4	28.8	4.5	31.6	12.4	45.3	20.5	31.3				
Green Ext Time (p_c), s	0.6	4.8	0.0	2.7	0.1	7.4	0.0	2.0				
Intersection Summary												
HCM 6th Ctrl Delay	52.9											
HCM 6th LOS	D											

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Background 2029 Weekday PM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	270	787	29	74	1133	213	98	371	94	185	198	324
v/c Ratio	0.68	0.54	0.04	0.58	0.91	0.31	0.29	0.87	0.21	0.83	0.46	0.53
Control Delay	76.9	36.9	0.1	89.9	58.0	8.0	35.2	78.0	7.9	65.5	53.0	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.9	36.9	0.1	89.9	58.0	8.0	35.2	78.0	7.9	65.5	53.0	7.6
Queue Length 50th (ft)	138	314	0	74	576	16	67	369	0	135	172	0
Queue Length 95th (ft)	207	453	0	139	#822	84	111	496	42	#236	260	81
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	398	1463	708	171	1246	678	454	799	739	224	649	757
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.54	0.04	0.43	0.91	0.31	0.22	0.46	0.13	0.83	0.31	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Background 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	262	763	28	72	1099	207	95	360	91	179	192	314
Future Volume (vph)	262	763	28	72	1099	207	95	360	91	179	192	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3285	3420	1471	1676	3257	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	3285	3420	1471	1676	3257	1471	918	1765	1515	305	1698	1457
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	787	29	74	1133	213	98	371	94	185	198	324
RTOR Reduction (vph)	0	0	17	0	0	116	0	0	71	0	0	241
Lane Group Flow (vph)	270	787	12	74	1133	97	98	371	23	185	198	83
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	19.1	67.4	67.4	11.9	60.2	60.2	49.7	38.0	38.0	54.3	40.3	40.3
Effective Green, g (s)	19.1	67.4	67.4	11.9	60.2	60.2	49.7	38.0	38.0	54.3	40.3	40.3
Actuated g/C Ratio	0.12	0.43	0.43	0.08	0.38	0.38	0.32	0.24	0.24	0.35	0.26	0.26
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	398	1465	630	126	1246	562	344	426	365	225	435	373
v/s Ratio Prot	c0.08	c0.23		0.04	c0.35		0.02	c0.21		c0.07	0.12	
v/s Ratio Perm			0.01			0.07	0.07		0.01	0.21		0.06
v/c Ratio	0.68	0.54	0.02	0.59	0.91	0.17	0.28	0.87	0.06	0.82	0.46	0.22
Uniform Delay, d1	66.2	33.4	25.9	70.3	46.0	32.1	39.3	57.3	45.9	40.9	49.3	46.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	1.4	0.1	6.8	11.3	0.7	0.5	17.4	0.1	20.9	0.8	0.3
Delay (s)	75.1	34.8	26.0	77.1	57.3	32.8	39.7	74.7	46.0	61.8	50.0	46.4
Level of Service	E	C	C	E	E	C	D	E	D	E	D	D
Approach Delay (s)		44.6			54.7			63.8			51.5	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM 2000 Control Delay			52.5			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			157.3			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			91.5%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Background 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	763	28	72	1099	207	95	360	91	179	192	314
Future Volume (veh/h)	262	763	28	72	1099	207	95	360	91	179	192	314
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	270	787	29	74	1133	213	98	371	94	185	198	324
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	405	1559	674	92	1273	573	288	410	351	224	453	387
Arrive On Green	0.12	0.46	0.46	0.05	0.39	0.39	0.06	0.23	0.23	0.09	0.26	0.26
Sat Flow, veh/h	3300	3420	1478	1688	3287	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	270	787	29	74	1133	213	98	371	94	185	198	324
Grp Sat Flow(s),veh/h/ln	1650	1710	1478	1688	1643	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	12.1	25.2	1.7	6.7	49.9	16.0	6.9	31.5	7.9	13.0	14.9	32.3
Cycle Q Clear(g_c), s	12.1	25.2	1.7	6.7	49.9	16.0	6.9	31.5	7.9	13.0	14.9	32.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	405	1559	674	92	1273	573	288	410	351	224	453	387
V/C Ratio(X)	0.67	0.50	0.04	0.81	0.89	0.37	0.34	0.90	0.27	0.83	0.44	0.84
Avail Cap(c_a), veh/h	405	1559	674	174	1273	573	460	812	694	224	665	568
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.9	29.8	23.4	72.4	44.3	34.0	41.9	57.8	48.7	43.8	47.4	53.8
Incr Delay (d2), s/veh	8.4	1.2	0.1	15.1	9.6	1.9	0.7	7.6	0.4	21.9	0.7	7.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	10.2	0.6	3.2	21.0	5.9	2.8	14.6	3.0	6.6	6.3	12.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.3	31.0	23.5	87.5	53.9	35.8	42.6	65.4	49.2	65.7	48.0	60.9
LnGrp LOS	E	C	C	F	D	D	D	E	D	E	D	E
Approach Vol, veh/h	1086			1420			563			707		
Approach Delay, s/veh	41.3			52.9			58.7			58.6		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.0	66.0	15.9	46.9	15.4	76.6	21.0	41.9				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	19.0	60.0	25.0	60.0	16.0	63.0	14.0	71.0				
Max Q Clear Time (g_c+I1), s	14.1	51.9	8.9	34.3	8.7	27.2	15.0	33.5				
Green Ext Time (p_c), s	0.4	4.6	0.2	2.1	0.1	5.3	0.0	2.4				
Intersection Summary												
HCM 6th Ctrl Delay	51.5											
HCM 6th LOS	D											



Appendix J

Year 2029 Total Traffic Operations Worksheets

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	39	3	9	56	100	18
Future Vol, veh/h	39	3	9	56	100	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	10	33	38	7	0	11
Mvmt Flow	43	3	10	62	111	20
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	203	121	131	0	-	0
Stage 1	121	-	-	-	-	-
Stage 2	82	-	-	-	-	-
Critical Hdwy	6.5	6.53	4.48	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.597	2.542	-	-	-
Pot Cap-1 Maneuver	768	853	1260	-	-	-
Stage 1	885	-	-	-	-	-
Stage 2	921	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	762	853	1260	-	-	-
Mov Cap-2 Maneuver	762	-	-	-	-	-
Stage 1	878	-	-	-	-	-
Stage 2	921	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10	1.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1260	-	768	-	-	
HCM Lane V/C Ratio	0.008	-	0.061	-	-	
HCM Control Delay (s)	7.9	0	10	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

Intersection												
Int Delay, s/veh	1221.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	1209	77	161	719	23	4	14	108	66	37	53
Future Vol, veh/h	36	1209	77	161	719	23	4	14	108	66	37	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	4	7	1	4	17	0	0	7	0	0	12
Mvmt Flow	38	1259	80	168	749	24	4	15	113	69	39	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	773	0	0	1339	0	0	2519	2484	1299	2536	2512	761
Stage 1	-	-	-	-	-	-	1375	1375	-	1097	1097	-
Stage 2	-	-	-	-	-	-	1144	1109	-	1439	1415	-
Critical Hdwy	4.15	-	-	4.11	-	-	7.1	6.5	6.27	7.1	6.5	6.32
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.209	-	-	3.5	4	3.363	3.5	4	3.408
Pot Cap-1 Maneuver	829	-	-	518	-	-	19	30	192	~ 19	~ 29	390
Stage 1	-	-	-	-	-	-	181	215	-	261	291	-
Stage 2	-	-	-	-	-	-	245	288	-	167	206	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	829	-	-	518	-	-	-	19	192	~ 2	~ 19	390
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	19	-	~ 2	~ 19	-
Stage 1	-	-	-	-	-	-	173	205	-	249	197	-
Stage 2	-	-	-	-	-	-	114	195	-	~ 61	197	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	2.7		\$ 19615.6
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	829	-	-	518	-	-	4
HCM Lane V/C Ratio	-	0.045	-	-	0.324	-	-	40.625
HCM Control Delay (s)	-	9.5	-	-	15.2	-	-	\$ 19615.6
HCM Lane LOS	-	A	-	-	C	-	-	F
HCM 95th %tile Q(veh)	-	0.1	-	-	1.4	-	-	22.5

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Total 2029 Weekday AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	297	1133	28	107	705	109	30	326	123	276	384	216
v/c Ratio	0.99	0.84	0.04	0.67	0.83	0.20	0.15	0.85	0.28	0.97	0.70	0.39
Control Delay	113.2	49.1	0.1	92.4	59.1	2.8	37.1	79.7	7.3	85.0	59.0	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	113.2	49.1	0.1	92.4	59.1	2.8	37.1	79.7	7.3	85.0	59.0	19.8
Queue Length 50th (ft)	~328	574	0	110	462	0	19	321	0	210	357	60
Queue Length 95th (ft)	#612	686	0	196	566	22	50	#535	45	#451	#588	161
Internal Link Dist (ft)		5088			2616			923			2481	
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	300	1926	920	198	1363	810	311	444	476	286	545	560
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.59	0.03	0.54	0.52	0.13	0.10	0.73	0.26	0.97	0.70	0.39

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

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	279	1065	26	101	663	102	28	306	116	259	361	203
Future Volume (vph)	279	1065	26	101	663	102	28	306	116	259	361	203
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1660	3353	1530	1710	2673	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.36	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1660	3353	1530	1710	2673	1457	600	1765	1485	350	1782	1515
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	297	1133	28	107	705	109	30	326	123	276	384	216
RTOR Reduction (vph)	0	0	17	0	0	75	0	0	95	0	0	96
Lane Group Flow (vph)	297	1133	11	107	705	34	30	326	28	276	384	120
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.3	63.4	63.4	14.6	49.7	49.7	42.1	36.0	36.0	61.2	48.1	48.1
Effective Green, g (s)	28.3	63.4	63.4	14.6	49.7	49.7	42.1	36.0	36.0	61.2	48.1	48.1
Actuated g/C Ratio	0.18	0.40	0.40	0.09	0.31	0.31	0.27	0.23	0.23	0.39	0.30	0.30
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	296	1343	613	157	839	457	197	401	337	289	541	460
v/s Ratio Prot	c0.18	c0.34		0.06	0.26		0.01	0.18		c0.11	0.22	
v/s Ratio Perm			0.01			0.02	0.03		0.02	c0.26		0.08
v/c Ratio	1.00	0.84	0.02	0.68	0.84	0.07	0.15	0.81	0.08	0.96	0.71	0.26
Uniform Delay, d1	64.9	42.9	28.6	69.5	50.6	38.1	43.9	57.9	48.1	39.8	48.9	41.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	53.2	5.0	0.0	11.5	7.6	0.1	0.4	11.9	0.1	40.5	4.3	0.3
Delay (s)	118.1	47.9	28.6	81.1	58.1	38.2	44.2	69.8	48.2	80.4	53.1	41.9
Level of Service	F	D	C	F	E	D	D	E	D	F	D	D
Approach Delay (s)		61.9			58.4			62.7			58.9	
Approach LOS		E			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			60.4			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			158.2			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			90.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	279	1065	26	101	663	102	28	306	116	259	361	203
Future Volume (veh/h)	279	1065	26	101	663	102	28	306	116	259	361	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	297	1133	28	107	705	109	30	326	123	276	384	216
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	317	1391	630	129	801	438	179	362	304	288	546	463
Arrive On Green	0.19	0.41	0.41	0.08	0.30	0.30	0.02	0.20	0.20	0.13	0.31	0.31
Sat Flow, veh/h	1674	3367	1525	1714	2679	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	297	1133	28	107	705	109	30	326	123	276	384	216
Grp Sat Flow(s),veh/h/ln	1674	1683	1525	1714	1339	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	25.0	42.6	1.6	8.8	35.9	8.1	2.1	25.7	10.3	18.0	27.2	16.6
Cycle Q Clear(g_c), s	25.0	42.6	1.6	8.8	35.9	8.1	2.1	25.7	10.3	18.0	27.2	16.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	317	1391	630	129	801	438	179	362	304	288	546	463
V/C Ratio(X)	0.94	0.81	0.04	0.83	0.88	0.25	0.17	0.90	0.40	0.96	0.70	0.47
Avail Cap(c_a), veh/h	327	1856	841	215	1477	808	342	482	406	288	546	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.2	37.2	25.1	65.3	47.8	38.0	44.0	55.6	49.4	40.3	44.0	40.3
Incr Delay (d2), s/veh	33.2	2.2	0.0	12.6	3.4	0.3	0.4	16.2	0.9	42.0	4.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	16.9	0.6	4.2	11.8	2.9	0.8	12.8	3.8	10.7	12.3	6.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	90.4	39.3	25.2	77.9	51.1	38.3	44.4	71.8	50.3	82.3	48.0	41.0
LnGrp LOS	F	D	C	E	D	D	D	E	D	F	D	D
Approach Vol, veh/h	1458			921			479			876		
Approach Delay, s/veh	49.5			52.7			64.5			57.1		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	34.1	48.8	10.5	49.8	17.8	65.2	25.0	35.3				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	27.0	37.9	4.1	29.2	10.8	44.6	20.0	27.7				
Green Ext Time (p_c), s	0.1	5.0	0.0	2.0	0.1	8.6	0.0	1.6				
Intersection Summary												
HCM 6th Ctrl Delay	54.0											
HCM 6th LOS	D											

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	22											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Future Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	5	0	0	0	0	2	40	0	1	5
Mvmt Flow	71	2	142	2	1	4	58	671	6	6	687	34
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1509	1509	704	1578	1523	674	721	0	0	677	0	0
Stage 1	716	716	-	790	790	-	-	-	-	-	-	-
Stage 2	793	793	-	788	733	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.25	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.345	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	97	122	432	90	119	458	890	-	-	924	-	-
Stage 1	415	437	-	386	404	-	-	-	-	-	-	-
Stage 2	376	403	-	387	429	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	87	108	432	54	105	458	890	-	-	924	-	-
Mov Cap-2 Maneuver	87	108	-	54	105	-	-	-	-	-	-	-
Stage 1	371	432	-	345	362	-	-	-	-	-	-	-
Stage 2	332	361	-	256	424	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	168.3		35.1		0.7		0.1					
HCM LOS	F		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	890	-	-	185	127	924	-	-				
HCM Lane V/C Ratio	0.065	-	-	1.162	0.059	0.007	-	-				
HCM Control Delay (s)	9.3	0	-	168.3	35.1	8.9	0	-				
HCM Lane LOS	A	A	-	F	E	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	11.1	0.2	0	-	-				

Intersection						
Int Delay, s/veh	5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	122	54	31	78	95
Future Vol, veh/h	27	122	54	31	78	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	30	136	60	34	87	106
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	94	0	-	0	273	77
Stage 1	-	-	-	-	77	-
Stage 2	-	-	-	-	196	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1513	-	-	-	721	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	842	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1513	-	-	-	706	990
Mov Cap-2 Maneuver	-	-	-	-	706	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	842	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.3	0		10.6		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1513	-	-	-	838	
HCM Lane V/C Ratio	0.02	-	-	-	0.229	
HCM Control Delay (s)	7.4	0	-	-	10.6	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9	

Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	3	9	102	67	24
Future Vol, veh/h	36	3	9	102	67	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	9	0	0
Mvmt Flow	40	3	10	113	74	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	221	88	101	0	-	0
Stage 1	88	-	-	-	-	-
Stage 2	133	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	772	976	1504	-	-	-
Stage 1	940	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	767	976	1504	-	-	-
Mov Cap-2 Maneuver	767	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.9	0.6		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1504	-	780	-	-	
HCM Lane V/C Ratio	0.007	-	0.056	-	-	
HCM Control Delay (s)	7.4	0	9.9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

HCM 6th TWSC
2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	924	49	160	1230	67	32	51	114	48	27	31
Future Vol, veh/h	55	924	49	160	1230	67	32	51	114	48	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	1	7	6	4	0	7	0	4	0	0	5
Mvmt Flow	60	1015	54	176	1352	74	35	56	125	53	30	34
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1426	0	0	1069	0	0	2935	2940	1042	2994	2930	1389
Stage 1	-	-	-	-	-	-	1162	1162	-	1741	1741	-
Stage 2	-	-	-	-	-	-	1773	1778	-	1253	1189	-
Critical Hdwy	4.1	-	-	4.16	-	-	7.17	6.5	6.24	7.1	6.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.17	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.254	-	-	3.563	4	3.336	3.5	4	3.345
Pot Cap-1 Maneuver	483	-	-	637	-	-	~ 9	~ 15	276	~ 9	~ 15	172
Stage 1	-	-	-	-	-	-	232	272	-	112	142	-
Stage 2	-	-	-	-	-	-	103	136	-	213	264	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	483	-	-	637	-	-	-	~ 10	276	-	~ 10	172
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 10	-	-	~ 10	-
Stage 1	-	-	-	-	-	-	203	238	-	98	103	-
Stage 2	-	-	-	-	-	-	43	98	-	78	231	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.4								
HCM LOS							-			-		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	-	483	-	-	637	-	-	-				
HCM Lane V/C Ratio	-	0.125	-	-	0.276	-	-	-				
HCM Control Delay (s)	-	13.5	-	-	12.8	-	-	-				
HCM Lane LOS	-	B	-	-	B	-	-	-				
HCM 95th %tile Q(veh)	-	0.4	-	-	1.1	-	-	-				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

Queues
3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	270	822	29	74	1174	274	98	402	94	208	216	324
v/c Ratio	1.08	0.49	0.04	0.62	1.10	0.37	0.35	1.11	0.22	1.08	0.56	0.58
Control Delay	152.6	33.9	0.1	107.3	109.3	9.8	49.3	146.1	2.5	139.6	71.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	152.6	33.9	0.1	107.3	109.3	9.8	49.3	146.1	2.5	139.6	71.9	13.1
Queue Length 50th (ft)	~375	358	0	92	~1102	44	88	~571	0	~241	241	27
Queue Length 95th (ft)	#579	439	0	152	#1279	121	141	#801	9	#439	351	138
Internal Link Dist (ft)	5088			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	249	1683	773	158	1068	737	319	362	420	192	388	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.49	0.04	0.47	1.10	0.37	0.31	1.11	0.22	1.08	0.56	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

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	262	797	28	72	1139	266	95	390	91	202	210	314
Future Volume (vph)	262	797	28	72	1139	266	95	390	91	202	210	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	3420	1471	1676	2571	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.47	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)	1693	3420	1471	1676	2571	1471	816	1765	1515	161	1698	1457
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	822	29	74	1174	274	98	402	94	208	216	324
RTOR Reduction (vph)	0	0	15	0	0	126	0	0	75	0	0	229
Lane Group Flow (vph)	270	822	14	74	1174	148	98	402	19	208	216	95
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	28.0	93.5	93.5	13.5	79.0	79.0	52.5	39.0	39.0	61.5	43.5	43.5
Effective Green, g (s)	28.0	93.5	93.5	13.5	79.0	79.0	52.5	39.0	39.0	61.5	43.5	43.5
Actuated g/C Ratio	0.15	0.49	0.49	0.07	0.42	0.42	0.28	0.21	0.21	0.32	0.23	0.23
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	249	1683	723	119	1068	611	284	362	310	194	388	333
v/s Ratio Prot	c0.16	0.24		0.04	c0.46		0.02	0.23		c0.10	0.13	
v/s Ratio Perm			0.01			0.10	0.07		0.01	c0.25		0.07
v/c Ratio	1.08	0.49	0.02	0.62	1.10	0.24	0.35	1.11	0.06	1.07	0.56	0.29
Uniform Delay, d1	81.0	32.3	24.7	85.8	55.5	36.0	53.2	75.5	60.8	59.5	64.7	60.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	81.3	0.2	0.0	9.7	58.8	0.2	0.7	80.6	0.1	85.1	1.7	0.5
Delay (s)	162.3	32.5	24.8	95.5	114.3	36.3	53.9	156.1	60.9	144.6	66.5	60.9
Level of Service	F	C	C	F	F	D	D	F	E	F	E	E
Approach Delay (s)		63.6			99.4			124.1			85.8	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			90.4			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			190.0			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			102.9%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	797	28	72	1139	266	95	390	91	202	210	314
Future Volume (veh/h)	262	797	28	72	1139	266	95	390	91	202	210	314
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	270	822	29	74	1174	274	98	402	94	208	216	324
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	251	1744	754	90	1079	614	247	364	311	197	417	356
Arrive On Green	0.15	0.51	0.51	0.05	0.42	0.42	0.06	0.21	0.21	0.09	0.24	0.24
Sat Flow, veh/h	1701	3420	1478	1688	2595	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	270	822	29	74	1174	274	98	402	94	208	216	324
Grp Sat Flow(s),veh/h/ln	1701	1710	1478	1688	1297	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	28.0	29.5	1.9	8.2	79.0	25.3	8.8	39.0	10.0	18.0	20.7	40.8
Cycle Q Clear(g_c), s	28.0	29.5	1.9	8.2	79.0	25.3	8.8	39.0	10.0	18.0	20.7	40.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	251	1744	754	90	1079	614	247	364	311	197	417	356
V/C Ratio(X)	1.08	0.47	0.04	0.82	1.09	0.45	0.40	1.11	0.30	1.06	0.52	0.91
Avail Cap(c_a), veh/h	251	1744	754	160	1079	614	309	364	311	197	417	356
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	81.0	30.0	23.3	89.1	55.5	39.8	55.5	75.5	64.0	59.0	62.3	69.9
Incr Delay (d2), s/veh	78.9	0.2	0.0	16.7	54.6	0.5	1.0	78.7	0.5	80.5	1.1	26.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.5	11.9	0.7	4.0	33.0	9.2	3.7	25.4	3.9	11.6	9.1	17.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	159.9	30.2	23.3	105.8	110.1	40.3	56.5	154.2	64.5	139.5	63.4	96.3
LnGrp LOS	F	C	C	F	F	D	E	F	E	F	E	F
Approach Vol, veh/h	1121		1522				594		748			
Approach Delay, s/veh	61.3		97.4				123.9		98.8			
Approach LOS	E		F				F		F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	35.0	85.0	17.8	52.2	17.1	102.9	25.0	45.0				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	28.0	79.0	18.0	39.0	18.0	79.0	18.0	39.0				
Max Q Clear Time (g_c+I1), s	30.0	81.0	10.8	42.8	10.2	31.5	20.0	41.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	5.7	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	91.4											
HCM 6th LOS	F											

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	17.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Future Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	0	0	0	0	0	0	2	25	0	6	0
Mvmt Flow	47	1	97	0	2	6	156	834	5	1	558	55
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1741	1739	586	1786	1764	837	613	0	0	839	0	0
Stage 1	588	588	-	1149	1149	-	-	-	-	-	-	-
Stage 2	1153	1151	-	637	615	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	67	88	514	64	85	370	976	-	-	804	-	-
Stage 1	492	499	-	244	275	-	-	-	-	-	-	-
Stage 2	238	275	-	469	485	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	49	62	514	39	59	370	976	-	-	804	-	-
Mov Cap-2 Maneuver	49	62	-	39	59	-	-	-	-	-	-	-
Stage 1	344	498	-	171	193	-	-	-	-	-	-	-
Stage 2	162	193	-	379	484	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	202.5		28.7		1.5		0					
HCM LOS	F		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	976	-	-	124	160	804	-	-				
HCM Lane V/C Ratio	0.159	-	-	1.172	0.052	0.001	-	-				
HCM Control Delay (s)	9.4	0	-	202.5	28.7	9.5	0	-				
HCM Lane LOS	A	A	-	F	D	A	A	-				
HCM 95th %tile Q(veh)	0.6	-	-	8.8	0.2	0	-	-				

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	88	97	109	53	65
Future Vol, veh/h	92	88	97	109	53	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	102	98	108	121	59	72
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	229	0	-	0	471	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	302	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1351	-	-	-	555	880
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	755	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1351	-	-	-	511	880
Mov Cap-2 Maneuver	-	-	-	-	511	-
Stage 1	-	-	-	-	797	-
Stage 2	-	-	-	-	755	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		11.8		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1351	-	-	-	664	
HCM Lane V/C Ratio	0.076	-	-	-	0.197	
HCM Control Delay (s)	7.9	0	-	-	11.8	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.2	-	-	-	0.7	



Appendix K

Year 2029 Mitigated Total Traffic Operations Worksheets

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Total 2029 Weekday AM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	38	1259	80	168	749	24	4	15	113	69	94
v/c Ratio	0.31	0.80	0.11	0.62	0.36	0.03	0.04	0.11	0.47	0.45	0.33
Control Delay	60.7	27.8	0.3	55.1	11.4	0.0	59.0	55.9	10.8	62.7	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.7	27.8	0.3	55.1	11.4	0.0	59.0	55.9	10.8	62.7	32.9
Queue Length 50th (ft)	24	365	0	104	143	0	3	10	0	43	30
Queue Length 95th (ft)	74	561	0	225	210	0	17	37	31	#122	107
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	153	2408	1084	423	2768	1116	178	394	426	178	370
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.52	0.07	0.40	0.27	0.02	0.02	0.04	0.27	0.39	0.25

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1209	77	161	719	23	4	14	108	66	37	53
Future Volume (vph)	36	1209	77	161	719	23	4	14	108	66	37	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91	0.91
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1534	1534
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1629	3288	1430	1693	3288	1308	1710	1800	1430	1710	1534	1534
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	38	1259	80	168	749	24	4	15	112	69	39	55
RTOR Reduction (vph)	0	0	41	0	0	10	0	0	102	0	33	0
Lane Group Flow (vph)	38	1259	39	168	749	14	4	15	11	69	61	0
Heavy Vehicles (%)	5%	4%	7%	1%	4%	17%	0%	0%	7%	0%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	4.5	52.8	52.8	16.7	65.0	65.0	1.0	10.5	10.5	7.2	16.7	
Effective Green, g (s)	4.5	52.8	52.8	16.7	65.0	65.0	1.0	10.5	10.5	7.2	16.7	
Actuated g/C Ratio	0.04	0.48	0.48	0.15	0.60	0.60	0.01	0.10	0.10	0.07	0.15	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	67	1589	691	258	1957	778	15	173	137	112	234	
v/s Ratio Prot	0.02	c0.38		c0.10	0.23		0.00	0.01		c0.04	c0.04	
v/s Ratio Perm			0.03			0.01			0.01			
v/c Ratio	0.57	0.79	0.06	0.65	0.38	0.02	0.27	0.09	0.08	0.62	0.26	
Uniform Delay, d1	51.4	23.6	15.0	43.5	11.6	9.0	53.7	45.0	44.9	49.7	40.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.6	2.8	0.0	5.8	0.1	0.0	9.3	0.2	0.2	9.7	0.6	
Delay (s)	61.9	26.4	15.0	49.3	11.7	9.1	63.1	45.2	45.2	59.3	41.4	
Level of Service	E	C	B	D	B	A	E	D	D	E	D	
Approach Delay (s)		26.7			18.4			45.7			49.0	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			26.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			109.2			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			69.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (veh/h)	36	1209	77	161	719	23	4	14	108	66	37	53
Future Volume (veh/h)	36	1209	77	161	719	23	4	14	108	66	37	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1730	1744	1702	1786	1744	1561	1800	1800	1702	1800	1800	1632
Adj Flow Rate, veh/h	38	1259	80	168	749	24	4	15	112	69	39	55
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	4	7	1	4	17	0	0	7	0	0	12
Cap, veh/h	57	1563	680	206	1849	738	9	183	146	88	100	141
Arrive On Green	0.03	0.47	0.47	0.12	0.56	0.56	0.01	0.10	0.10	0.05	0.15	0.15
Sat Flow, veh/h	1647	3313	1442	1701	3313	1323	1714	1800	1442	1714	676	953
Grp Volume(v), veh/h	38	1259	80	168	749	24	4	15	112	69	0	94
Grp Sat Flow(s),veh/h/ln	1647	1657	1442	1701	1657	1323	1714	1800	1442	1714	0	1628
Q Serve(g_s), s	2.0	28.0	2.7	8.3	11.2	0.7	0.2	0.7	6.5	3.4	0.0	4.5
Cycle Q Clear(g_c), s	2.0	28.0	2.7	8.3	11.2	0.7	0.2	0.7	6.5	3.4	0.0	4.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.59
Lane Grp Cap(c), veh/h	57	1563	680	206	1849	738	9	183	146	88	0	240
V/C Ratio(X)	0.67	0.81	0.12	0.82	0.41	0.03	0.44	0.08	0.76	0.78	0.00	0.39
Avail Cap(c_a), veh/h	171	2797	1217	472	3371	1346	198	437	350	198	0	395
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	19.5	12.8	37.1	10.9	8.6	42.9	35.2	37.8	40.5	0.0	33.3
Incr Delay (d2), s/veh	12.6	1.0	0.1	7.7	0.1	0.0	30.1	0.2	8.0	14.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.0	0.7	3.6	3.2	0.2	0.2	0.3	2.5	1.8	0.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.8	20.5	12.9	44.7	11.1	8.6	73.0	35.4	45.9	54.6	0.0	34.4
LnGrp LOS	D	C	B	D	B	A	E	D	D	D	A	C
Approach Vol, veh/h		1377			941			131			163	
Approach Delay, s/veh		21.0			17.0			45.5			42.9	
Approach LOS		C			B			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.4	13.8	16.5	46.8	5.5	17.8	9.0	54.3				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	21.0	24.0	73.0	10.0	21.0	9.0	88.0				
Max Q Clear Time (g_c+I1), s	5.4	8.5	10.3	30.0	2.2	6.5	4.0	13.2				
Green Ext Time (p_c), s	0.0	0.3	0.3	10.8	0.0	0.3	0.0	5.1				
Intersection Summary												
HCM 6th Ctrl Delay				22.1								
HCM 6th LOS				C								

Queues

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS

Total 2029 Weekday PM Peak Hour - MIT

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	60	1015	54	176	1352	74	35	56	125	53	64
v/c Ratio	0.36	0.72	0.08	0.60	0.75	0.09	0.26	0.32	0.46	0.34	0.27
Control Delay	54.1	27.2	0.2	49.7	22.4	1.8	54.3	52.7	11.7	55.2	31.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	27.2	0.2	49.7	22.4	1.8	54.3	52.7	11.7	55.2	31.2
Queue Length 50th (ft)	36	268	0	103	359	0	21	34	0	32	19
Queue Length 95th (ft)	93	426	0	206	520	14	63	88	44	86	71
Internal Link Dist (ft)	1463			5088			742			2579	
Turn Bay Length (ft)	260		390	380		390	100		100	100	
Base Capacity (vph)	238	2432	1066	524	2769	1276	185	480	499	198	454
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.42	0.05	0.34	0.49	0.06	0.19	0.12	0.25	0.27	0.14
Intersection Summary											

HCM Signalized Intersection Capacity Analysis

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	924	49	160	1230	67	32	51	114	48	27	31
Future Volume (vph)	55	924	49	160	1230	67	32	51	114	48	27	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1614	1614
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1710	3386	1430	1613	3288	1498	1598	1800	1471	1710	1614	1614
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	60	1015	54	176	1352	74	35	56	125	53	30	34
RTOR Reduction (vph)	0	0	31	0	0	35	0	0	112	0	28	0
Lane Group Flow (vph)	60	1015	23	176	1352	39	35	56	13	53	36	0
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	7%	6%	4%	0%	7%	0%	4%	0%	0%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	7.1	41.8	41.8	17.1	51.8	51.8	4.6	10.4	10.4	6.5	12.3	
Effective Green, g (s)	7.1	41.8	41.8	17.1	51.8	51.8	4.6	10.4	10.4	6.5	12.3	
Actuated g/C Ratio	0.07	0.43	0.43	0.17	0.53	0.53	0.05	0.11	0.11	0.07	0.13	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	124	1447	611	282	1741	793	75	191	156	113	202	
v/s Ratio Prot	0.04	0.30		c0.11	c0.41		0.02	c0.03		c0.03	0.02	
v/s Ratio Perm			0.02			0.03			0.01			
v/c Ratio	0.48	0.70	0.04	0.62	0.78	0.05	0.47	0.29	0.09	0.47	0.18	
Uniform Delay, d1	43.6	22.9	16.3	37.4	18.4	11.1	45.4	40.3	39.4	44.0	38.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	1.6	0.0	4.3	2.2	0.0	4.5	0.9	0.2	3.1	0.4	
Delay (s)	46.5	24.5	16.3	41.6	20.6	11.1	49.9	41.2	39.6	47.0	38.7	
Level of Service	D	C	B	D	C	B	D	D	D	D	D	
Approach Delay (s)		25.2			22.5			41.7			42.5	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			25.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			97.8			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			63.7%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Signalized Intersection Summary

2: Can Ada Rd & W Chinden Blvd/US 20/26

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (veh/h)	55	924	49	160	1230	67	32	51	114	48	27	31
Future Volume (veh/h)	55	924	49	160	1230	67	32	51	114	48	27	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1702	1716	1744	1800	1702	1800	1744	1800	1800	1730
Adj Flow Rate, veh/h	60	1015	54	176	1352	74	35	56	125	53	30	34
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	1	7	6	4	0	7	0	4	0	0	5
Cap, veh/h	80	1464	622	216	1714	773	55	205	168	75	95	108
Arrive On Green	0.05	0.43	0.43	0.13	0.52	0.52	0.03	0.11	0.11	0.04	0.12	0.12
Sat Flow, veh/h	1714	3393	1442	1634	3313	1494	1621	1800	1478	1714	770	873
Grp Volume(v), veh/h	60	1015	54	176	1352	74	35	56	125	53	0	64
Grp Sat Flow(s),veh/h/ln	1714	1697	1442	1634	1657	1494	1621	1800	1478	1714	0	1643
Q Serve(g_s), s	2.7	19.1	1.7	8.3	26.2	2.0	1.7	2.2	6.5	2.4	0.0	2.8
Cycle Q Clear(g_c), s	2.7	19.1	1.7	8.3	26.2	2.0	1.7	2.2	6.5	2.4	0.0	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	80	1464	622	216	1714	773	55	205	168	75	0	203
V/C Ratio(X)	0.75	0.69	0.09	0.81	0.79	0.10	0.64	0.27	0.74	0.71	0.00	0.32
Avail Cap(c_a), veh/h	261	2885	1226	581	3489	1573	206	525	431	218	0	479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.1	18.2	13.2	33.3	15.5	9.7	37.6	31.9	33.8	37.2	0.0	31.5
Incr Delay (d2), s/veh	13.4	0.6	0.1	7.3	0.8	0.1	11.5	0.7	6.4	11.7	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	6.2	0.5	3.4	7.7	0.5	0.8	1.0	2.4	1.2	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.5	18.8	13.3	40.5	16.4	9.7	49.1	32.7	40.2	48.9	0.0	32.4
LnGrp LOS	D	B	B	D	B	A	D	C	D	D	A	C
Approach Vol, veh/h		1129			1602			216			117	
Approach Delay, s/veh		20.2			18.7			39.7			39.9	
Approach LOS		C			B			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	14.0	16.4	40.0	7.7	14.7	9.7	46.8				
Change Period (Y+Rc), s	5.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	23.0	28.0	67.0	10.0	23.0	12.0	83.0				
Max Q Clear Time (g_c+I1), s	4.4	8.5	10.3	21.1	3.7	4.8	4.7	28.2				
Green Ext Time (p_c), s	0.0	0.5	0.4	7.7	0.0	0.2	0.0	12.5				
Intersection Summary												
HCM 6th Ctrl Delay			21.5									
HCM 6th LOS			C									

Queues

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS

Total 2029 Weekday AM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	297	1133	28	107	705	109	30	326	123	276	384	216
v/c Ratio	0.78	0.94	0.04	0.77	0.65	0.18	0.12	0.75	0.25	0.70	0.54	0.31
Control Delay	91.9	70.3	0.1	113.9	54.8	0.7	34.8	75.9	1.8	43.8	46.6	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.9	70.3	0.1	113.9	54.8	0.7	34.8	75.9	1.8	43.8	46.6	13.3
Queue Length 50th (ft)	184	688	0	129	377	0	21	378	0	227	374	49
Queue Length 95th (ft)	243	809	0	#235	471	0	45	#543	4	316	500	122
Internal Link Dist (ft)	1063			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	460	1360	702	156	1205	633	258	433	498	434	733	713
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.83	0.04	0.69	0.59	0.17	0.12	0.75	0.25	0.64	0.52	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1065	26	101	663	102	28	306	116	259	361	203
Future Volume (vph)	279	1065	26	101	663	102	28	306	116	259	361	203
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3221	3353	1530	1710	3386	1457	1583	1765	1485	1693	1782	1515
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	3221	3353	1530	1710	3386	1457	890	1765	1485	418	1782	1515
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	297	1133	28	107	705	109	30	326	123	276	384	216
RTOR Reduction (vph)	0	0	18	0	0	74	0	0	92	0	0	93
Lane Group Flow (vph)	297	1133	10	107	705	35	30	326	31	276	384	123
Heavy Vehicles (%)	3%	2%	0%	0%	1%	5%	8%	2%	3%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	20.8	63.4	63.4	14.4	57.0	57.0	49.0	45.1	45.1	81.3	70.4	70.4
Effective Green, g (s)	20.8	63.4	63.4	14.4	57.0	57.0	49.0	45.1	45.1	81.3	70.4	70.4
Actuated g/C Ratio	0.12	0.36	0.36	0.08	0.32	0.32	0.28	0.25	0.25	0.46	0.40	0.40
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	376	1193	544	138	1083	466	260	446	376	399	704	598
v/s Ratio Prot	c0.09	c0.34		0.06	0.21		0.00	c0.18		c0.11	0.22	
v/s Ratio Perm			0.01			0.02	0.03		0.02	0.20		0.08
v/c Ratio	0.79	0.95	0.02	0.78	0.65	0.07	0.12	0.73	0.08	0.69	0.55	0.21
Uniform Delay, d1	76.5	55.8	37.2	80.3	52.0	42.2	47.7	60.9	50.7	35.0	41.5	35.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	15.3	0.0	23.3	1.4	0.1	0.2	10.1	0.4	5.1	0.9	0.2
Delay (s)	87.1	71.1	37.2	103.6	53.4	42.3	47.9	71.1	51.2	40.1	42.4	35.6
Level of Service	F	E	D	F	D	D	D	E	D	D	D	D
Approach Delay (s)		73.7			57.9			64.5			40.0	
Approach LOS		E			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			60.7			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			178.1			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			90.8%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			 							
Traffic Volume (veh/h)	279	1065	26	101	663	102	28	306	116	259	361	203
Future Volume (veh/h)	279	1065	26	101	663	102	28	306	116	259	361	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1758	1772	1800	1800	1786	1730	1688	1772	1758	1786	1786	1786
Adj Flow Rate, veh/h	297	1133	28	107	705	109	30	326	123	276	384	216
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	2	0	0	1	5	8	2	3	1	1	1
Cap, veh/h	344	1253	568	126	1153	498	237	467	393	360	664	563
Arrive On Green	0.11	0.37	0.37	0.07	0.34	0.34	0.02	0.26	0.26	0.13	0.37	0.37
Sat Flow, veh/h	3248	3367	1525	1714	3393	1466	1607	1772	1490	1701	1786	1514
Grp Volume(v), veh/h	297	1133	28	107	705	109	30	326	123	276	384	216
Grp Sat Flow(s),veh/h/ln	1624	1683	1525	1714	1697	1466	1607	1772	1490	1701	1786	1514
Q Serve(g_s), s	14.7	51.9	1.9	10.1	28.2	8.6	2.2	27.1	10.8	18.7	28.0	17.0
Cycle Q Clear(g_c), s	14.7	51.9	1.9	10.1	28.2	8.6	2.2	27.1	10.8	18.7	28.0	17.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	344	1253	568	126	1153	498	237	467	393	360	664	563
V/C Ratio(X)	0.86	0.90	0.05	0.85	0.61	0.22	0.13	0.70	0.31	0.77	0.58	0.38
Avail Cap(c_a), veh/h	498	1466	664	168	1291	558	249	467	393	492	789	668
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.7	48.4	32.7	74.6	44.8	38.4	42.6	54.1	48.2	37.9	41.0	37.5
Incr Delay (d2), s/veh	10.3	7.5	0.0	24.7	0.7	0.2	0.2	8.4	2.1	4.9	0.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	22.1	0.7	5.2	11.6	3.1	0.9	12.9	4.2	8.1	12.2	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.0	55.9	32.8	99.3	45.6	38.6	42.9	62.5	50.2	42.8	41.8	37.9
LnGrp LOS	F	E	C	F	D	D	D	E	D	D	D	D
Approach Vol, veh/h	1458			921			479			876		
Approach Delay, s/veh	60.8			51.0			58.1			41.1		
Approach LOS	E			D			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.3	61.4	10.7	66.6	19.0	66.7	28.3	49.0				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	25.0	62.0	5.0	72.0	16.0	71.0	34.0	43.0				
Max Q Clear Time (g_c+I1), s	16.7	30.2	4.2	30.0	12.1	53.9	20.7	29.1				
Green Ext Time (p_c), s	0.6	4.9	0.0	2.9	0.1	6.7	0.6	1.7				
Intersection Summary												
HCM 6th Ctrl Delay	53.4											
HCM 6th LOS	D											

Queues
3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour - MIT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	270	822	29	74	1174	274	98	402	94	208	216	324
v/c Ratio	0.91	0.59	0.04	0.64	0.93	0.38	0.28	0.88	0.19	0.75	0.37	0.49
Control Delay	117.1	46.0	0.1	109.9	68.4	6.4	39.9	86.9	2.0	56.2	49.0	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	117.1	46.0	0.1	109.9	68.4	6.4	39.9	86.9	2.0	56.2	49.0	14.7
Queue Length 50th (ft)	175	425	0	92	745	12	75	488	0	172	203	73
Queue Length 95th (ft)	#269	508	0	154	#885	82	121	#681	9	259	286	175
Internal Link Dist (ft)	1063			2616			923			2481		
Turn Bay Length (ft)	325		230	450		450	200		200	200		200
Base Capacity (vph)	296	1400	683	142	1263	729	344	459	496	290	595	668
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.59	0.04	0.52	0.93	0.38	0.28	0.88	0.19	0.72	0.36	0.49

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	262	797	28	72	1139	266	95	390	91	202	210	314
Future Volume (vph)	262	797	28	72	1139	266	95	390	91	202	210	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3285	3420	1471	1676	3257	1471	1644	1765	1515	1660	1698	1457
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.62	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)	3285	3420	1471	1676	3257	1471	1078	1765	1515	246	1698	1457
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	822	29	74	1174	274	98	402	94	208	216	324
RTOR Reduction (vph)	0	0	17	0	0	159	0	0	70	0	0	159
Lane Group Flow (vph)	270	822	12	74	1174	115	98	402	24	208	216	165
Heavy Vehicles (%)	1%	0%	4%	2%	5%	4%	4%	2%	1%	3%	6%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases			6			2	8		8	4		4
Actuated Green, G (s)	17.0	77.1	77.1	12.9	73.0	73.0	57.0	49.0	49.0	79.2	64.2	64.2
Effective Green, g (s)	17.0	77.1	77.1	12.9	73.0	73.0	57.0	49.0	49.0	79.2	64.2	64.2
Actuated g/C Ratio	0.09	0.41	0.41	0.07	0.39	0.39	0.30	0.26	0.26	0.42	0.34	0.34
Clearance Time (s)	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	296	1401	602	114	1263	570	350	459	394	277	579	497
v/s Ratio Prot	c0.08	c0.24		0.04	c0.36		0.01	c0.23		c0.09	0.13	
v/s Ratio Perm			0.01			0.08	0.07		0.02	0.22		0.11
v/c Ratio	0.91	0.59	0.02	0.65	0.93	0.20	0.28	0.88	0.06	0.75	0.37	0.33
Uniform Delay, d1	84.9	43.2	33.1	85.4	55.1	38.3	48.6	66.7	52.3	41.9	46.8	46.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.0	1.8	0.1	12.0	13.3	0.8	0.4	20.3	0.3	10.9	0.4	0.4
Delay (s)	118.8	45.0	33.1	97.5	68.4	39.1	49.1	87.0	52.6	52.8	47.2	46.4
Level of Service	F	D	C	F	E	D	D	F	D	D	D	D
Approach Delay (s)		62.5			64.5			75.3			48.4	
Approach LOS		E			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			62.5			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			188.2			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			95.4%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

3: Star Rd & W Chinden Blvd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour - MIT

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	797	28	72	1139	266	95	390	91	202	210	314
Future Volume (veh/h)	262	797	28	72	1139	266	95	390	91	202	210	314
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1786	1800	1744	1772	1730	1744	1744	1772	1786	1758	1716	1730
Adj Flow Rate, veh/h	270	822	29	74	1174	274	98	402	94	208	216	324
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	4	2	5	4	4	2	1	3	6	5
Cap, veh/h	306	1495	646	90	1308	588	305	473	404	254	556	475
Arrive On Green	0.09	0.44	0.44	0.05	0.40	0.40	0.04	0.27	0.27	0.10	0.32	0.32
Sat Flow, veh/h	3300	3420	1478	1688	3287	1478	1661	1772	1514	1674	1716	1466
Grp Volume(v), veh/h	270	822	29	74	1174	274	98	402	94	208	216	324
Grp Sat Flow(s),veh/h/ln	1650	1710	1478	1688	1643	1478	1661	1772	1514	1674	1716	1466
Q Serve(g_s), s	14.8	32.7	2.1	8.0	61.4	25.1	7.9	39.5	8.9	16.2	17.9	35.2
Cycle Q Clear(g_c), s	14.8	32.7	2.1	8.0	61.4	25.1	7.9	39.5	8.9	16.2	17.9	35.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	306	1495	646	90	1308	588	305	473	404	254	556	475
V/C Ratio(X)	0.88	0.55	0.04	0.82	0.90	0.47	0.32	0.85	0.23	0.82	0.39	0.68
Avail Cap(c_a), veh/h	306	1495	646	147	1308	588	305	473	404	314	617	527
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	82.3	38.3	29.6	86.0	51.7	40.8	46.5	63.7	52.5	46.5	47.9	53.8
Incr Delay (d2), s/veh	28.7	1.5	0.1	16.8	9.9	2.6	0.6	17.1	1.3	12.9	0.4	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	13.6	0.8	3.8	26.2	9.5	3.3	19.7	3.5	7.5	7.6	13.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	111.0	39.7	29.8	102.8	61.7	43.5	47.1	80.9	53.9	59.4	48.4	56.9
LnGrp LOS	F	D	C	F	E	D	D	F	D	E	D	E
Approach Vol, veh/h	1121		1522				594		748			
Approach Delay, s/veh	56.6		60.4				71.0		55.2			
Approach LOS	E		E				E		E			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.0	79.0	15.0	65.5	16.8	86.2	25.5	55.0				
Change Period (Y+Rc), s	7.0	6.0	7.0	6.0	7.0	6.0	7.0	6.0				
Max Green Setting (Gmax), s	17.0	73.0	8.0	66.0	16.0	74.0	25.0	49.0				
Max Q Clear Time (g_c+I1), s	16.8	63.4	9.9	37.2	10.0	34.7	18.2	41.5				
Green Ext Time (p_c), s	0.0	5.5	0.0	2.2	0.1	5.7	0.3	1.5				
Intersection Summary												
HCM 6th Ctrl Delay	59.9											
HCM 6th LOS	E											

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↵	↵		↵	↕	↵
Traffic Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Future Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	150
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	5	0	0	0	0	2	40	0	1	5
Mvmt Flow	71	2	142	2	1	4	58	671	6	6	687	34
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1492	1492	687	1578	1523	674	721	0	0	677	0	0
Stage 1	699	699	-	790	790	-	-	-	-	-	-	-
Stage 2	793	793	-	788	733	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.5	6.25	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4	3.345	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	100	125	442	90	119	458	890	-	-	924	-	-
Stage 1	424	445	-	386	404	-	-	-	-	-	-	-
Stage 2	376	403	-	387	429	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	116	442	57	111	458	890	-	-	924	-	-
Mov Cap-2 Maneuver	209	236	-	57	111	-	-	-	-	-	-	-
Stage 1	396	442	-	361	378	-	-	-	-	-	-	-
Stage 2	347	377	-	260	426	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	36.3		33.9		0.7		0.1					
HCM LOS	E		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	890	-	-	321	132	924	-	-				
HCM Lane V/C Ratio	0.065	-	-	0.67	0.057	0.007	-	-				
HCM Control Delay (s)	9.3	-	-	36.3	33.9	8.9	-	-				
HCM Lane LOS	A	-	-	E	D	A	-	-				
HCM 95th %tile Q(veh)	0.2	-	-	4.5	0.2	0	-	-				

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Future Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	150
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	0	0	0	0	0	0	2	25	0	6	0
Mvmt Flow	47	1	97	0	2	6	156	834	5	1	558	55
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1713	1711	558	1786	1764	837	613	0	0	839	0	0
Stage 1	560	560	-	1149	1149	-	-	-	-	-	-	-
Stage 2	1153	1151	-	637	615	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	70	92	533	64	85	370	976	-	-	804	-	-
Stage 1	509	514	-	244	275	-	-	-	-	-	-	-
Stage 2	238	275	-	469	485	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	59	77	533	46	71	370	976	-	-	804	-	-
Mov Cap-2 Maneuver	144	174	-	46	71	-	-	-	-	-	-	-
Stage 1	428	513	-	205	231	-	-	-	-	-	-	-
Stage 2	195	231	-	382	485	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	30.8		26		1.5		0					
HCM LOS	D		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	976	-	-	281	180	804	-	-				
HCM Lane V/C Ratio	0.159	-	-	0.517	0.046	0.001	-	-				
HCM Control Delay (s)	9.4	-	-	30.8	26	9.5	-	-				
HCM Lane LOS	A	-	-	D	D	A	-	-				
HCM 95th %tile Q(veh)	0.6	-	-	2.8	0.1	0	-	-				

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday AM Peak Hour

Intersection												
Int Delay, s/veh	3.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Future Vol, veh/h	66	2	132	2	1	4	54	624	6	6	639	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	6	0	5	0	0	0	0	2	40	0	1	5
Mvmt Flow	71	2	142	2	1	4	58	671	6	6	687	34
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1168	1509	361	1147	1523	339	721	0	0	677	0	0
Stage 1	716	716	-	790	790	-	-	-	-	-	-	-
Stage 2	452	793	-	357	733	-	-	-	-	-	-	-
Critical Hdwy	7.62	6.5	7	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.62	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.62	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.56	4	3.35	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	144	122	627	156	119	663	890	-	-	924	-	-
Stage 1	378	437	-	354	404	-	-	-	-	-	-	-
Stage 2	546	403	-	639	429	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	134	113	627	113	111	663	890	-	-	924	-	-
Mov Cap-2 Maneuver	247	234	-	113	111	-	-	-	-	-	-	-
Stage 1	353	434	-	331	378	-	-	-	-	-	-	-
Stage 2	506	377	-	489	426	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23		22.4		0.7		0.1					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	890	-	-	411	214	924	-	-				
HCM Lane V/C Ratio	0.065	-	-	0.523	0.035	0.007	-	-				
HCM Control Delay (s)	9.3	-	-	23	22.4	8.9	-	-				
HCM Lane LOS	A	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0.2	-	-	2.9	0.1	0	-	-				

HCM 6th TWSC
4: Star Rd & Joplin Rd

Dancer Subdivision TIS
Total 2029 Weekday PM Peak Hour

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↵	↕↵		↵	↕↵	
Traffic Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Future Vol, veh/h	46	1	94	0	2	6	151	809	5	1	541	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	0	0	0	0	0	0	2	25	0	6	0
Mvmt Flow	47	1	97	0	2	6	156	834	5	1	558	55
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1318	1739	307	1431	1764	420	613	0	0	839	0	0
Stage 1	588	588	-	1149	1149	-	-	-	-	-	-	-
Stage 2	730	1151	-	282	615	-	-	-	-	-	-	-
Critical Hdwy	7.58	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.58	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.58	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	113	88	695	97	85	588	976	-	-	804	-	-
Stage 1	457	499	-	215	275	-	-	-	-	-	-	-
Stage 2	375	275	-	707	485	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	96	74	695	73	71	588	976	-	-	804	-	-
Mov Cap-2 Maneuver	199	172	-	73	71	-	-	-	-	-	-	-
Stage 1	384	499	-	181	231	-	-	-	-	-	-	-
Stage 2	309	231	-	606	485	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	20.3		23		1.5		0					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	976	-	-	379	208	804	-	-				
HCM Lane V/C Ratio	0.159	-	-	0.384	0.04	0.001	-	-				
HCM Control Delay (s)	9.4	-	-	20.3	23	9.5	-	-				
HCM Lane LOS	A	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0.6	-	-	1.8	0.1	0	-	-				



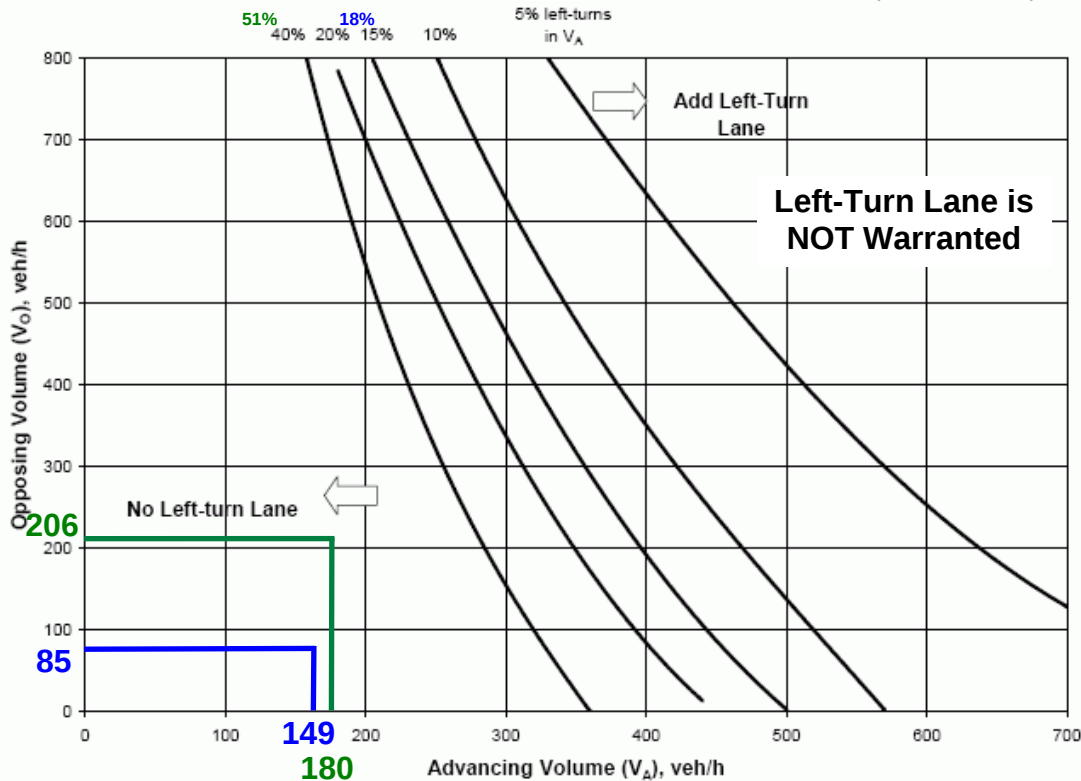
Appendix L

Site Access Evaluation

Site Access A / Joplin Road - Eastbound Left-Turn Lane Evaluation

AM / PM

Figure 1 – Left-Turn Lane Guidelines for Two-Lane Roads less than or equal to 40 mph



The following data are required:

1. Opposing Volume (veh/hr) - V_O - The opposing volume is to include only the right-turn and through movements in the opposite direction of the left turning vehicle.
2. Advancing Volume (veh/hr) - V_A - The advancing volume is to include the right-turn, left-turn and through movements in the same direction as the left turning vehicle.
3. Operating Speed (mph) - The greatest of anticipated operating speed, measured 85th percentile speed or posted speed.
4. Percentage of left turns in V_A

Left- turn lane is not needed for left turn volume less than 10 vph. However, criteria other than volume, such as crash experience, may be used to justify a left-turn lane.

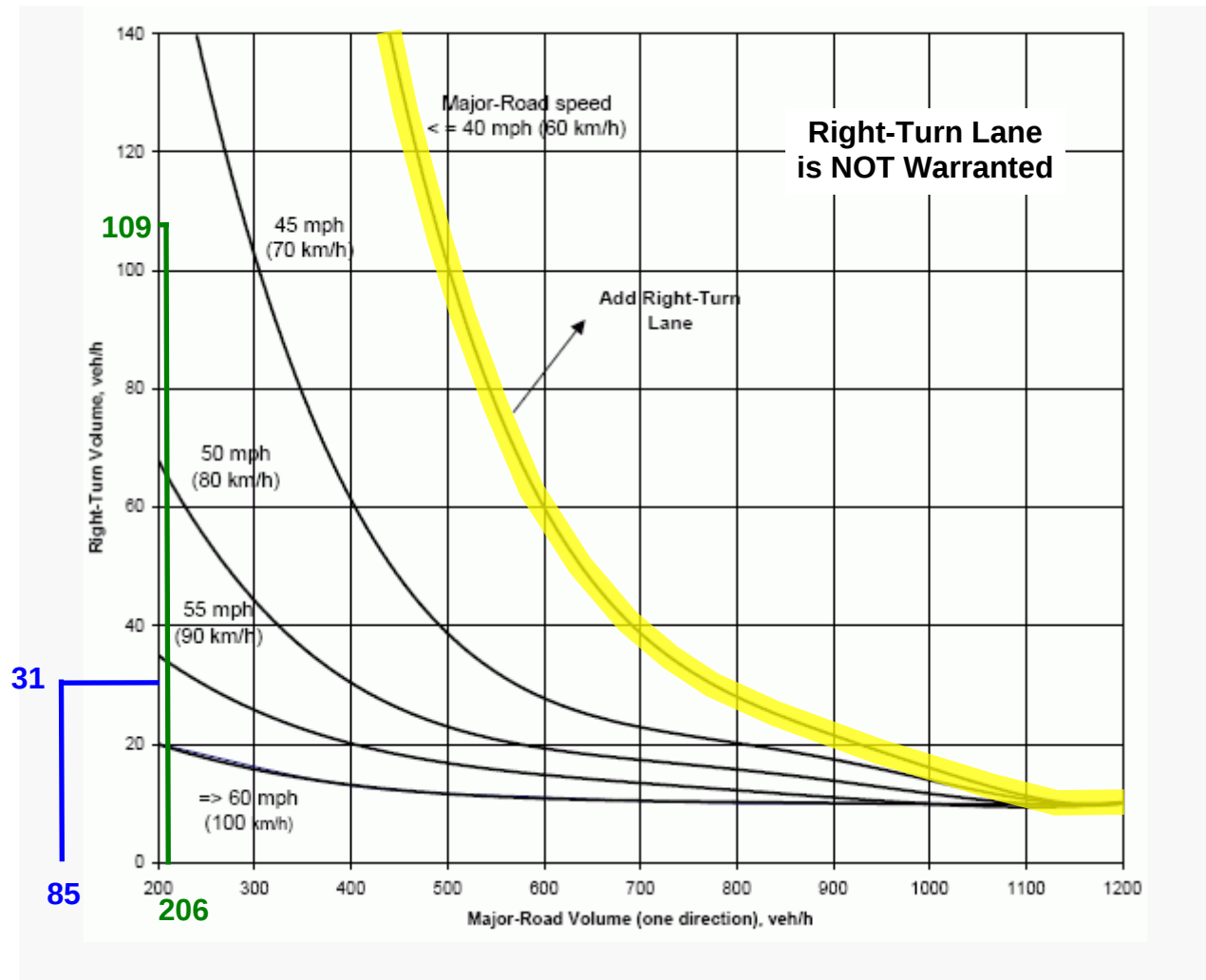
The appropriate trend line is identified on the basis of the percentage of left-turns in the advancing volume, rounded up to the nearest percentage trend line. If the advancing and opposing volume combination intersects above or to the right of this trend line, a left-turn lane is appropriate.

Source: NCHRP Report 279 and 457

Site Access A / Joplin Road - Westbound Right-Turn Lane Evaluation

AM / PM

Figure 6 – Right-Turn Lane Guidelines for Two-Lane Roadways



The following data are required:

1. Advancing Volume (veh/hr) - The advancing volume is to include the right-turn, left-turn and through movements in the same direction as the right-turning vehicle.
2. Right-Turning Volume (veh/hr) - The right-turning volume is the number of advancing vehicles turning right.
3. Operating Speed (mph) - The greatest of anticipated operating speed, measured 85th percentile speed or posted speed.

Note: Right-turn lane is not needed for right-turn volume less than 10 vph. However, criteria other than volume, e.g. crash experience, may be used to justify a right-turn lane.

If the combination of major road approach volume and right-turn volume intersects above or to the right of the speed trend line corresponding to the major road operating speed, then a right-turn lane is appropriate.

Source: NCHRP Report 279 and 457