Arena Properties
Traffic Impact Analysis

4590 Arena Road
West Richland, Washington 99353

Prepared for:

Nirvana Cannabis, LLC
Attn: Dianna Kham
4590 Arena Road
West Richland, Washington 99353

July 17, 2018
PBS Project 66057.000

Digitally signed by John Manix
Date: 2018.07.17 10:23:17 -07'00'

PBS
314 WEST 15TH STREET
VANCOUVER, WA 98660
360.695.3488 MAIN
866.727.0140 FAX
PBSUSA.COM

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY 1
1.1 Purpose and Scope 1
1.2 Findings 1
1.3 Recommendations 2
2 INTRODUCTION 2
2.1 Purpose 2
2.2 Scope of Work 2
3 EXISTING CONDITIONS 2
3.1 Site Conditions 3
Table 1: Existing Parcels 3
3.2 Existing Infrastructure 3
3.2.1 Land Uses 3
Table 2: Land Uses around the Site 3
3.2.2 Existing Roadways 4
Table 3: Existing Roadway Information 4
3.2.3 Major Intersection and Traffic Control 4
Table 4: Major Intersection and Traffic Control 4
3.3 Traffic Volumes 5
3.3.1 Existing Traffic 5
3.3.2 Background Traffic 5
3.3.3 In-Process Traffic 5
4 PROPOSED CONDITIONS 6
4.1 Project Description 6
4.2 Access Review 6
4.3 Trip Generation and Distribution 6
4.3.1 Trip Generation 6
Table 5: Trip Generation for Cannabis Retail 6
Table 6: Trip Generation 7
4.3.2 Trip Distribution 7
4.4 Proposed Infrastructure 7
4.4.1 Roadway Frontage 7
5 INTERSECTION OPERATIONS ANALYSIS 7
5.1 Description 7
5.2 Operation Standard 8
5.3 Analysis Methodology 8
5.4 Level of Service Analyses 8
5.4.1 Weekday Peak Hour: 2017 Existing Conditions 8
5.4.2 Weekday Peak Hour: 2018 Year of Opening Conditions 10
Table 9. Estimated 2018 AM Levels of Service for Study Area Intersections 10
Table 10. Estimated 2018 PM Levels of Service for Study Area Intersections 10
5.4.3 Weekday Peak Hour: 2022 Forecast Year Conditions 11

Table 11. Estimated 2022 AM Levels of Service for Study Area Intersections *11*
Table 12. Estimated 2022 PM Levels of Service for Study Area Intersections *11*
5.4.4 Weekday Peak Hour with Mitigation 12
Table 13. Estimated 2022 PM with Traffic Signal as Mitigation *12*
Table 14. Dallas Road/Kennedy Road/Bombing Range Road intersection PM Peak Hour Traffic Signal Warrant *12*

6 SAFETY ANALYSIS 13
6.1 Collision Analysis 13
6.2 Left-Turn Storage Analysis 13
6.3 Right-Turn Storage Analysis 13
6.4 Transit, Pedestrian, and Bicycle Facilities 13
6.5 Sight Distance 13

7 STUDY FINDINGS 14

8 RECOMMENDATIONS 15

9 REFERENCES 16

SUPPORTING DATA

FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Existing Lane Configurations and Traffic Controls
Figure 4. Existing Weekday Peak Hour Volumes
Figure 5. Peak Hour In-Process Trips for 2018
Figure 6. Project Trip Distribution & Trip Assignment
Figure 7. 2018 AM Peak Hour Volumes Without & With Project
Figure 8. 2018 PM Peak Hour Volumes Without & With Project
Figure 9. Peak Hour In-Process Trips for 2022
Figure 10. 2022 AM Peak Hour Volumes Without and With Project
Figure 11. 2022 PM Peak Hour Volumes Without and With Project

APPENDICES

Appendix A: Traffic Count Data
Appendix B: In-Process Trips
Appendix C: Trip Generation Study
Appendix D: Level-of-Service Description
Appendix E: Level-of-Service Calculations
Appendix F: Safety Analysis

1 EXECUTIVE SUMMARY

1.1 Purpose and Scope

This report supports a street cut permit application for a cannabis retail establishment, Arena Properties (Client), that proposes to occupy an existing 2,162-square foot building at 4950 Arena Road in West Richland, Washington. Limited frontage and site improvements are anticipated with this project, which is expected to be fully occupied by 2018. This report includes a trip generation study that was used to analyze the traffic impacts generated by the proposal as required by the City of West Richland (City) and after consultation with City staff.

1.2 Findings

Traffic volumes in the study area are expected to increase with or without the project. A two percent annual growth rate was applied in the short-term (2018) analysis, and a two percent growth rate was applied in the long-term (2022) analysis. In addition to background growth, this TIA also assumed two approved in-process projects (Roasters Coffee Shop and a 20-home development) will be complete in the build-out year of 2018. Two additional approved in-process projects (3-lot plat and 40 percent of Badger Mountain South development) were assumed to be complete by the forecast year of 2022.

The proposed project will generate approximately 15 vehicle trips during the weekday AM peak hour and 155 vehicle trips during the weekday PM peak hour. These values are taken directly from a trip generation study performed by PBS and approved by the City. Because of the lack of information on this new land use, a conservative approach was used to estimate the trip generation rate to assure the traffic impacts are not underestimated.

The studied intersections and driveways will operate at an acceptable level of service (LOS) in the 2018 build-out year. The Dallas Road/Kennedy Road/Bombing Range Road intersection is below agency LOS standards for the 2022 forecast year with the project. All other studied intersections and driveways operate at an acceptable LOS in the 2022 forecast year.

The Dallas Road/Kennedy Road/Bombing Range Road intersection meets peak hour traffic signal warrants for 2022 PM peak hour with and without the project. The development contributes five percent new trips to the intersection.

The 2012 to 2016 collision history at the studied intersections was reviewed, and collision records were identified. The Dallas Road/Kennedy Road/Bombing Range Road intersection had a higher accident rate than the critical accident rate. Additional collision analysis was performed, and a clear pattern of right angle collisions were noted. The collision history met the warrant for a traffic signal, but the peak hour warrant was not met. It is prudent to try less expensive traffic control measure, such as advance warning devices, and continue to monitor collision history, before installing expensive traffic control measures such as a traffic signal.

Based on the analysis volumes and the existing roadway cross-sections, the existing lane configurations are deemed adequate to accommodate the 2018 and 2022 design year volumes. No left-turn or right-turn lanes are merited at the studied intersection or at the site driveways.

A preliminary evaluation of frontage conditions indicates available sight distance is adequate to meet City guidelines. It is best practice to align the easternmost driveway with the existing roadway that intersects Arena Road on the south side in close proximity.

1.3 Recommendations

This TIA supports the following recommendations:

- Construct new sidewalks and driveways in accordance with current America's with Disability Act (ADA) standard guidelines.
- Assure the sight distance triangles for the site driveways remain free of obstructions that would block exiting drivers' views to oncoming traffic. Do not install site amenities that could restrict drivers' views.
- The City should consider installing advanced warning devices (signs with flashers or rumble strips) to the approaches of the Dallas Road/Kennedy Road/Bombing Range Road intersection due to existing collision history.
- Design the easternmost driveway to align with Bretz Prairie NE.
- The applicant should contribute to traffic mitigation based on the proportionate share, 5.53 percent, to the cost of a traffic signal, at the Dallas Road/Kennedy Road/Bombing Range Road intersection.

2 INTRODUCTION

2.1 Purpose

The purpose of this study is to determine the impacts of traffic generated by the Arena Properties project. The project site is directly West of the Arena Road/Kennedy Road/E Mountain Road intersection and is shown on the vicinity map (Figure 1). This study will determine whether mitigation is required to keep the roadways operating safely and at capacity levels acceptable under the current level of service standards. This report documents the findings and conclusions of a Traffic Impact Analysis (TIA) conducted for the proposed street cut permit application for the site located in the City of West Richland, Washington (City).

2.2 Scope of Work

The scope of this TIA was refined in correspondence with City staff. The intersections of Dallas Road/Kennedy Road/Bombing Range Road, Arena Road/Kennedy Road/E Mountain Road, and Kennedy Road/Keene Road were identified for analysis.

This TIA is prepared for submission to the City following a scope coordinated with the City. The following traffic-related issues are addressed in this report:

- Existing traffic conditions, including in-process trips and background growth
- Proposed conditions, including site access configuration
- Site-generated traffic volumes and trip distribution
- Build-out year (2018) intersection operations without and with the project
- Forecast year (2022) intersection operations without and with the project
- Capacity analysis of existing and future conditions for the weekday AM and PM peak hours
- Safety analysis of existing and future conditions
- Recommendations for mitigation of traffic impacts and conclusions

Due to the lack of trip generation data for a cannabis retail outlet, a trip generation study was prepared to estimate the number of trips per 1,000 square feet of gross retail space.

3 EXISTING CONDITIONS

The existing site, infrastructure, and operational traffic conditions in the study area were documented. Roadway conditions were studied to confirm that the roadway is currently operating in a safe and efficient manner. The study area (Figure 1) and the impacted intersections were defined based on information provided by the City staff prior to starting this TIA.

3.1 Site Conditions

The project site is located directly west of the Arena Road/Kennedy Road/E Mountain Road intersection on a property measuring approximately 600 feet in the east-west dimension and between 359 feet (at the west edge) and 193 feet (at the east edge) in the north-south dimension. One parcel of record in Benton County constitutes the site, which lies within Section 17, Township 9 North, Range 28 East, of the Willamette Meridian. The parcel details are summarized in Table 1.

Table 1: Existing Parcels

Parcel APN	Parcel Size	Address
117983011240001	3.62 Acres	4950 Arena Road

Currently, the property is comprised of three sections used for different purposes. The south-east quarter of the property contains the existing structure, gravel driveway, front yard, and a couple farming structures. The existing gravel driveway apron is approximately 24 feet wide and is located at the parcel's frontage on Arena Road. No curb exists along the site's frontage on Arena Road. The north-east quarter of the property is primarily composed of a horse pasture. The west half of the property is a grass field with various trees and shrubs.

3.2 Existing Infrastructure

Characteristics of the private properties and public rights-of-way surrounding the project site were compiled to inform this analysis. These surrounding facilities may experience traffic impacts due to the project development, so it is important to inventory their existing conditions.

3.2.1 Land Uses

The land uses surrounding the project site are documented to help identify the site location and provide context for any discussion of conditions that might impact adjacent properties. The land uses surrounding the site are shown in Table 2.

Table 2: Land Uses around the Site

North of Site	
Zoning	RL-40
Description	Low Density Residential
Existing Use	Light Residential

West of Site	
Zoning	CG
Description	Commercial, General
Existing Use	Commercial

S I T E

East of Site	
Zoning	CG
Description	Commercial, General
Existing Use	Commercial, Vacant

South of Site	
Zoning	UGAR
Description	Urban Growth Area Residential District

South of Site	
Existing Use	Agriculture and Residential

The project site is currently zoned as General Commercial and is currently occupied by a single-family home.

3.2.2 Existing Roadways

The project site is located north of Arena Road directly west of the Arena Road/Kennedy Road/E Mountain Road intersection. Characteristics of Arena Road, which constitute the study area for this TIA, were compiled. The pertinent information regarding Arena Road is tabulated in Table 3.

Table 3: Existing Roadway Information

Name	Classification (Classifying Agency)	Speed Limit	Cross-Sectional Elements			
			Travel Lanes	Parking	Bike Lanes	Sidewalks
Arena Road	Local Street (City)	25 mph	2	No	No	No

3.2.3 Major Intersection and Traffic Control

Three intersections being reviewed in the study area were identified through communication with the City. They are: Dallas Road/Kennedy Road/Bombing Range Road, Arena Road/Kennedy Road/E Mountain Road, and Kennedy Road/Keene Road. Characteristics of these intersections were compiled to inform the intersection operations analysis provided in this report. The existing geometrics and traffic control at the studied intersection are presented in Table 4.

Table 4: Major Intersection and Traffic Control

Intersection	Dallas Road/Kennedy Road/Bombing Range Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Stop	Stop
Number of Lanes	1	1	1	1

Intersection	Arena Road/Kennedy Road/E Mountain Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Unc.	Unc.
Number of Lanes	1	1	1	1

Intersection	Kennedy Road/Keene Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Stop	Stop
Number of Lanes	2	2	3	3

Stop = Stop controlled leg of intersection
Unc. = Uncontrolled leg approaching intersection—does not stop or yield

The project area is defined as the vicinity of the site encompassed by the studied intersections. Intersection operations can be controlled by signing, roundabouts, or signals. Table 4 refers to the type of control and the number of approach lanes for each leg of each intersection. The existing lane configurations for all intersections are shown in Figure 3.

3.3 Traffic Volumes

Existing traffic volume data is the basis for analyzing the capacity and safety of the roadway. Background traffic growth was estimated for the build-out year of 2018 and forecast year of 2022 as percentages of the existing volumes. In-process traffic is generated by approved projects that have yet to be fully occupied. In-process trips and background growth were added to the existing traffic volumes to estimate future volumes in the absence of the proposed development.

3.3.1 Existing Traffic

On October 24, 2017, traffic data was collected at the studied intersections. PBS retained All Traffic Data Services, Inc., to gather the count data at the following intersections for the weekday evening peak hour (4:00 to 6:00 pm).

- N Dallas Road/Kennedy Road/Bombing Range Road
- Arena Road/Kennedy Road/E Mountain Road
- Kennedy Road/Keene Road

During the same period, traffic data for the weekday morning peak hour (7:00 to 9:00 am) and evening peak hour were collected at the three existing cannabis retail sites:

- The Bake Shop—19705 S Griffin Road, Prosser, Washington 99350
- Green2Go—214610 State Route 397, Kennewick, Washington 99337
- Altitude MJ—260 Merlot Drive, Prosser, Washington 99350

A fourth cannabis retail store had its traffic data collected at the store's previous location with a prior project for the PM peak hour only. This store was the Walla Walla Weedery located at 702 S 9th Avenue, Walla Walla, Washington 99362. These counts were used to estimate the trip generation of the proposed project; see the Trip Generation and Distribution section later in this TIA.

The existing peak hour volumes for the studied intersections are shown in Figure 4. Copies of the count data, including at the existing cannabis retail sites, are provided in Appendix A.

3.3.2 Background Traffic

To account for general growth in traffic volumes over time, the counts gathered were increased by the 2 percent background growth factor for one year to estimate 2018 conditions. For the 2022 forecast year, a 2 percent background growth factor was used.

3.3.3 In-Process Traffic

In-process projects are approved developments whose trips are vested but that have not yet been fully occupied. These trips are added to the studied intersections and are shown in Figures 5 and 9. The in-process projects relevant to the study area are:

- Roaster Coffee Shop (south of Kennedy Road/Keene Road intersection)
- 20-home development (west of project site)
- 3-lot plat; Bush Car Wash, RV repair shop, and restaurant (west of Kennedy Road/Keene Road intersection)
- Badger Mountain South Development (south of project site in Richland Washington)

The proposed Arena Properties project is expected to be completed in 2018. Discussions with the City determined that the Roaster Coffee Shop and the 20-home development will be fully complete by the 2018. The 3-lot plat will be completed by the 2022. Phase one of Badger Mountain South is assumed to be complete by 2018 and 40 percent of the total trips by 2022 based on review of the TIA with the City of

Richland. Only 10 percent of the Badger Mountain South trips enters the study area, 90 percent use roadways outside area. Trip generation calculations and Badger Mount South distribution from the TIA are included in Appendix B.

4 PROPOSED CONDITIONS

The proposed development will add traffic to the roadway system. Project location, size, and time of completion are all important elements that need to be considered to determine the impacts of this development on safety and capacity. It is also important to examine how the project will operate with the existing transportation system, estimate how much new traffic it will generate, and predict where traffic generated by the site will be distributed. Furthermore, this section will address any funded infrastructure changes planned by other agencies or developers. All these elements are important in assessing the traffic impacts of a project.

4.1 Project Description

This proposal will repurpose the existing building as a cannabis retail establishment of approximately 2,162 square feet gross floor area and will make limited site improvements. The existing gravel driveway will be replaced with two driveways, and a parking lot will be added. The driveways and parking lot will be located west of the existing building. This project is scheduled for completion by 2018. A preliminary site plan is presented in Figure 2.

4.2 Access Review

Properly located access points are essential to allow for the safe and orderly movement of traffic in and out of a site. A site plan provided by the client proposed two two-way driveways: both on Arena Road to the west of the existing building. It is recommended that the eastern most driveway be directly across from Bretz Prairie NE. This minimizes any conflicts between westbound left-tuning vehicles conflicting with eastbound left-turning vehicles. As noted later, sight distances at these proposed driveways are adequate at road grade.

4.3 Trip Generation and Distribution

4.3.1 Trip Generation

As noted previously, a cannabis retail establishment will occupy the existing site. Specialty Retail Center land use (Code 826) in the *Trip Generation Manual*, appeared to be the closest land use to the proposed cannabis retail center; however, through discussions with the Client and the City, it was determined that a trip generation study for cannabis retail store was needed. This trip generation study was completed by PBS. After additional consideration of the results of the trip generation study, staff directed PBS to use the Green2Go comparison site for the trip generation rate. See the email exchange in the Appendix C for more details. Using the highest comparison site of the three counted, helps assure that the traffic impacts are not under estimated. The trip generation rates calculated in this study are summarized in Table 5. The Green2Go site had 100 percent trips entering in the AM and 0 percent exiting. Green2Go opens at 9:00 AM. We modified the results to use the AM directional distribution of the three comparisons to better meet expectations. The full trip generation study can be found in Appendix C.

Table 5: Trip Generation for Cannabis Retail

Land Use	Cannabis Retail	
Independent Variable	1,000 Square Feet	
Peak Periods	AM	PM
Rate	6.67	71.56
Enter	86%	49.1%
% Exit	14%	50.9%

The total new trips generated by the 2,164 square foot Arena Properties project are shown in Table 6.

Table 6: Trip Generation

Land Use	Cannabis Retail	
Size	2.16	
Peak Period	**AM**	**PM**
In	13 trips	76 trips
Out	2 trips	79 trips
Total	15 trips	155 trips

No trip reductions were made to adjust for the existing single-family home. This is a conservative assumption that results in traffic volume estimates slightly higher than may be realized.

4.3.2 Trip Distribution

Because the study area includes only three public intersections, a simplified trip distribution pattern was estimated based on regional land development patterns, existing traffic volumes, and engineering judgment. Site-generated trips were estimated to distribute as follows:

- 25 percent to or from the north on Bombing Range Road
- 10 percent to or from the west on Keene Road
- 10 percent to or from the west on Kennedy Road
- 25 percent to or from the south on Dallas Road
- 30 percent to or from the east on Keene Road

The project trips and their distribution within the study area are shown on Figure 6.

4.4 Proposed Infrastructure

4.4.1 Roadway Frontage

The existing gravel driveway apron on Arena Road will be replaced with two 40-foot-wide driveways connecting to a new parking lot on the west side of the building. It is assumed limited frontage improvements on Arena Road will be required. Where new sidewalk is conditioned with the project, the sidewalk and driveways shall be constructed to meet current ADA standards.

5 INTERSECTION OPERATIONS ANALYSIS

5.1 Description

Traffic operations may be assessed in terms of level of service (LOS), a concept that was developed by transportation engineers to qualify traffic operations of intersections and roadways [see *Highway Capacity Manual* (HCM) and *Comprehensive Plan* in References]. LOS measures are classified in grades A through F, indicating a range of operation. LOS A signifies the best level of operation, while F represents the worst.

LOS at two-way stop-controlled intersections and commercial driveways is defined in terms of control delay; however, the methodology only presents LOS for the minor movements of the intersection since major movements are uncontrolled. For four-way stop and traffic signal-controlled intersections, the overall intersection LOS service is reported with the critical volume to capacity (v/c) ratio for each movement/approach.

LOS A represents minor delay (less than 10 seconds) for a driver, while LOS F represents long delay (over 50 seconds). The criteria are based on the theory of gap acceptance for side street stop-controlled approaches.

The City of West Richland's LOS standard is D or better. Thus, an intersection with LOS with E or F is substandard and requires mitigation. Detailed descriptions of West Richland's LOS standards are provided in Appendix D.

5.2 Operation Standard

The City considers LOS D the minimum acceptable operation standard for all roadways.

5.3 Analysis Methodology

Traffic impacts were estimated to determine the extent of change in traffic conditions caused by the proposed development. To make this determination, the following assumptions were employed:

- The project will be completed and fully occupied by 2018.
- Existing background traffic on the study area roadways will grow by 2 percent per year in the short term. For long-term (5-year forecast year) a 2 percent growth rate is more realistic.
- The in-process trips attributable to the Roasters Coffee Shop and the 20 home development projects were included in the 2018 and 2022 background traffic volumes. The in-process trips attributable to the 3-lot plat and Badger Mountain South development project were included only in the 2022 background traffic volumes.
- Background traffic volumes on the surrounding street system have been determined prior to adding the traffic volumes of the proposed project. This was done to establish a baseline for measurement of the project impacts at the time of its development. Background traffic volume estimates were prepared for the 2018 build out year and 2022 forecast year.
- Trip generation estimates for the project were prepared for the weekday AM and PM peak hours and assigned to the site driveways and studied intersections.
- The traffic impacts of the proposed project were determined by superimposing the project-generated traffic onto the background weekday AM and PM peak traffic.
- The LOS for all intersections and the 95th percentile queues for critical movements were calculated with Trafficware's Synchro, Version 9, software, which is based on HCM 2010 methodologies. The peak hour factor of 0.92 and a two percent truck traffic was used for all intersections based on the traffic count data and professional judgement.

The traffic volumes for 2018 and 2022, both without and with the project, are presented in Figures 7, 8, 10 and 11, respectively. LOS calculation reports for the study area intersections are provided in Appendix E. The key analysis findings are listed in the following tables

5.4 Level of Service Analyses

5.4.1 Weekday Peak Hour: 2017 Existing Conditions

Table 7: Estimated 2017 AM Existing Levels of Service for Study Area Intersections

Intersection	HCM Level of Service	*V/C Ratio*[1]	*HCM Intersection Delay*
Dallas Road/Kennedy Road/Bombing Range Road	A	0.24 SB approach	9.0
Arena Road/Kennedy Road/E Mountain Road	B	0.005 SB Left turn	13.2
Kennedy Road/Keene Road	B	0.62 NB right turn	10.7

[1] Critical movement or approach

Table 8: Estimated 2017 PM Existing Levels of Service for Study Area Intersections

Intersection	HCM Level of Service	*V/C Ratio*[1]	*HCM Intersection Delay (s)*
Dallas Road/Kennedy Road/Bombing Range Road	B	0.43 SB lane	12.4
Arena Road/Kennedy Road/E Mountain Road	C	0.07 SB lane	17.3
Kennedy Road/Keene Road	B	0.68 NB right turn	13.5

[1] Critical movement or approach

As shown in Tables 7 and 8, all studied intersections currently operate at an acceptable level of service during the weekday AM and PM peak hours. The LOS C for Arena Road/Kennedy Road/E Mountain Road is only for the few vehicles turning left from E Mountain Road, the critical movement.

5.4.2 Weekday Peak Hour: 2018 Year of Opening Conditions

Table 9. Estimated 2018 AM Levels of Service for Study Area Intersections

Intersection	Without Project			With Project		
	LOS	Delay (s)	V/C Ratio[1]	LOS	Delay (s)	V/C Ratio[1]
Dallas Road/Kennedy Road/Bombing Range Road	A	9.3	0.26 SB lane	A	9.4	0.27 SB lane
Arena Road/Kennedy Road/E Mountain Road	B	13.7	0.005 SB left turn	B	13.8	0.005 SB left turn
Kennedy Road/Keene Road	B	11.2	0.65 NB right turn	B	11.2	0.65 NB right turn
West Driveway/Arena Road	NA	NA	NA	A	8.7	0.001 SB lane
East Driveway/Arena Road	NA	NA	NA	A	9.6	0.001 SB lane

[1] Critical movement or approach

Table 10. Estimated 2018 PM Levels of Service for Study Area Intersections

Intersection	Without Project			With Project		
	LOS	Delay (s)	V/C Ratio[1]	LOS	Delay (s)	V/C Ratio[1]
Dallas Road/Kennedy Road/Bombing Range Road	B	13.1	0.46 SB lane	B	14.6	0.52 SB lane
Arena Road/Kennedy Road/E Mountain Road	C	18.1	0.008 SB lane	C	20.3	0.009 SB lane
Kennedy Road/Keene Road	B	14.1	0.69 NB right turn	B	14.9	0.72 NB right turn
West Driveway/Arena Road	NA	NA	NA	A	9.2	0.06 SB right turn
East Driveway/Arena Road	NA	NA	NA	B	10.1	0.04 SB left turn

[1] Critical movement or approach

As shown in Tables 9 and 10, all studied intersections will operate at an acceptable level of service in the 2018 year of opening without and with project conditions during the weekday AM and PM peak hours

5.4.3 Weekday Peak Hour: 2022 Forecast Year Conditions

Table 11. Estimated 2022 AM Levels of Service for Study Area Intersections

Intersection	Without Project			With Project		
	LOS	Delay (s)	V/C Ratio[1]	LOS	Delay (s)	V/C Ratio[1]
Dallas Road/Kennedy Road/Bombing Range Road	B	11.3	0.39 SB lane	B	11.4	0.40 SB lane
Arena Road/Kennedy Road/E Mountain Road	B	14.7	0.006 SB left turn	B	14.8	0.006 SB left turn
Kennedy Road/Keene Road	B	12.2	0.68 NB right turn	B	12.3	0.68 NB right turn
West Driveway/Arena Road	NA	NA	NA	A	8.7	0.001 SB left turn
East Driveway/Arena Road	NA	NA	NA	A	9.8	0.001 NB left turn

[1] Critical movement or approach

Table 12. Estimated 2022 PM Levels of Service for Study Area Intersections

Intersection	Without Project			With Project		
	LOS	Delay (s)	V/C Ratio[1]	LOS	Delay (s)	V/C Ratio[1]
Dallas Road/Kennedy Road/Bombing Range Road	E	41.8	0.88 SB lane	F	62.7	0.99 SB lane
Arena Road/Kennedy Road/E Mountain Road	C	20.9	0.009 NB left turn	C	23.5	0.01 SB lane
Kennedy Road/Keene Road	B	17.6	0.74 EB through	C	20.2	0.76 EB through
West Driveway/Arena Road	NA	NA	NA	A	9.3	0.07 SB left turn
East Driveway/Arena Road	NA	NA	NA	B	10.4	0.04 SB left turn

[1] Critical movement or approach

As shown in Tables 11 and 12, all but one studied intersections will operate at an acceptable level of service in the 2022 year of opening without and with project conditions during the weekday AM and PM peak hours. The Dallas Road/Kennedy Road/Bombing Range Road intersection is below agency LOS standards for the 2022 PM peak hour with the project. The LOS for worst approach is below standard with and without the project, LOS E without project trips and LOS F with project trips.

The proposed development contributes a moderate number of new trips to this intersection. The largest impact to this intersection is from the in-process trips, specifically Badger Mountain South with an estimated 251 new trips directed through the intersection in the 2022 PM peak hour. Without the in-process trips from Badger Mountain South development this intersection would fall within City LOS standards.

5.4.4 Weekday Peak Hour with Mitigation

The LOS was calculated for the Dallas Road/Kennedy Road/Bombing Range Road intersection with a simple traffic signal with no additional turn lanes.

Table 13. Estimated 2022 PM with Traffic Signal as Mitigation

Intersection	Without Project			With Project		
	LOS	Delay (s)	V/C Ratio[1]	LOS	Delay (s)	V/C Ratio[1]
Dallas Road/Kennedy Road/Bombing Range Road	A	7.9	0.52 SB left turn	A	8.1	0.53 SB left turn

The traffic signal mitigation improves the LOS well within the City standards.

Because the development contributes a low number of trips (71 in the PM peak hour entering the intersection), they should only contribute a proportionate share of the signal improvement as traffic mitigation. The proposed development will add an additional 5.53 percent of volume based on the trips that it will generate and directed through the intersection (71) and the total entering trips (1,284) in 2022 PM peak hour with the project.

The MUTCD traffic signal peak hour warrant was checked to verify it meets warrants. Table 14 documents the MUTCD volume thresholds for the PM peak hour.

Table 14. Dallas Road/Kennedy Road/Bombing Range Road intersection PM Peak Hour Traffic Signal Warrant

Scenario	PM Peak Hour Delay	Volume on Minor Street (one direction only)	Total Entering Volume	Warrant Met?
MUTCD Threshold	4 hours of Delay	100 vehicles per hour	800 vehicles per hour	
Existing Conditions	2.66 hours	185 vehicles per hour (WB approach)	828 vehicles per hour	Not met
2022 without Project	9.8 hours	225 vehicles per hour (WB approach)	1213 vehicles per hour	Met
2022 with Project	14.9 hours	225 vehicles per hour (WB approach)	1284 vehicles per hour	Met

The Dallas Road/Kennedy Road/Bombing Range Road intersection meets the peak hour warrant in 2022 PM peak hour with the project. See Appendix F for the traffic volumes plotted on MUTCD Peak Hour Figure 4C-3.

6 SAFETY ANALYSIS

6.1 Collision Analysis

Collision data from the study area were obtained from WSDOT for the most recent five-year period available. Review of the collision data set covering January 2012 through December 2016 found The Dallas Road/Kennedy Road/Bombing Range Road intersection has an existing accident rate higher than the critical accident rate and has had more than five accidents over a year's period. A collision review of this intersection included a collision diagram and by analyzing each accident, it was determined that a traffic signal is warranted based on five accidents occurring within a year's period. However, the intersection does not meet the peak hour traffic signal warrant for the existing traffic volume. See Appendix F for the collision analysis.

It is recommended the City consider installing advanced warning devices (signs with flashers or rumble strips) on the approaches to the intersection and continue to monitor the intersection.

6.2 Left-Turn Storage Analysis

No collision records were identified at the site driveways. The record includes no pattern of collisions correctable with the installation of left turn lanes. The LOS analysis did not show results that merit the need for left turn lanes. Intersection volumes were checked against Exhibit 1310-7a, Left-Turn Storage Guidelines: Two-Lane, Unsignalized in the WSDOT *Design Manual* (see References) and were found not to rise to levels meriting further analysis. Thus, no further review was performed on the need for left-turn lanes.

6.3 Right-Turn Storage Analysis

Intersection speeds were checked against the WSDOT *Design Manual* (see References) and found the speed limit of all controlled stops to be under the 45-mph threshold for right turn storage. Thus, no further review was performed on the need for right-turn lanes.

6.4 Transit, Pedestrian, and Bicycle Facilities

Ben Franklin Transit provides bus service to the greater Richland urban area. Bus Route 110 travels along Kennedy Road and Bombing Range Road. The closest transit stop to the project site is approximately 250 feet east of the site's northeast property corner on Kennedy Road.

Pedestrian activity to and from the site is anticipated to be very minimal. The bulk of walking distance activity will come from the existing residences surrounding the development and commercial activities to the west. There currently is no sidewalk to the east or north of the site to serve the pedestrian traffic between the residential areas and the proposal. To the west, however, there is a gap in the sidewalk infrastructure of approximately 500 feet. In this segment, wide roadway shoulders could accommodate pedestrians. Where new sidewalk is conditioned with the project, the sidewalk and driveways shall be constructed to meet current ADA standards.

Bicycle activity to and from the site is anticipated to be minimal. There are no bike lanes within the frontage segment of Kennedy Road to the north or on Arena Road between N Dallas Road to the west and Kennedy Road to the east. In this segment, wide roadway shoulders could accommodate bicyclists.

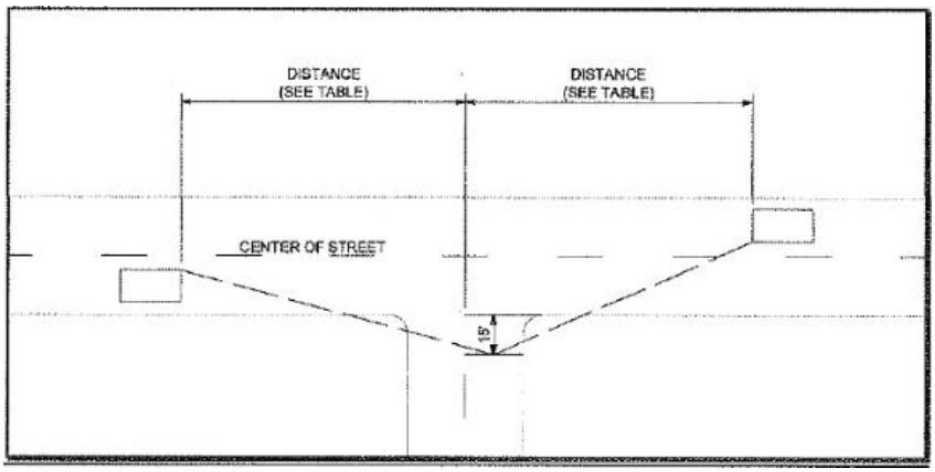
6.5 Sight Distance

The proposed site access onto Arena Road currently has several hundred feet of sight distance to the west and east. These values exceed the 250 feet of required minimum visibility standard per the City of West

Richland's Municipal Code, Section 12.08.60 for 25 MPH speed limit as measured shown in Visibility Diagram below.

Minimal sight distance concerns are anticipated with the proposed site accesses. Due to the existing site grade, it is recommended to raise the proposed driveways to road grade to ensure sight distance requirements are met. It is recommended that when the project and the driveways are finalized, they will need to meet the City visibility standards:

B. 12.08.060(B) – Visibility Diagram.



[Ord. 7-10 § 8, 2010].

The site proposes two driveways. The eastern driveway is proposed near the Arena Road and the private roadway Bretz Prairie NE. To minimize left turn conflicts, it is best practice to align the new driveway with Bretz Prairie NE.

7 STUDY FINDINGS

Traffic volumes in the study area are expected to increase with or without the project. A two percent annual growth rate was applied in the short-term (2018) analysis, and a two percent growth rate was applied in the long-term (2022) analysis. In addition to background growth, this TIA also assumed two approved in-process projects (Roasters Coffee Shop and a 20-home development) will be complete in the build-out year of 2018. Two additional approved in-process projects (3-lot plat and 40 percent of Badger Mountain South development) were assumed to be complete by the forecast year of 2022.

The proposed project will generate approximately 15 vehicle trips during the weekday AM peak hour and 155 vehicle trips during the weekday PM peak hour. These values are taken directly from a trip generation study performed by PBS and approved by the City. Because of the lack of information on this new land use, a conservative approach was used to estimate the trip generation rate to assure the traffic impacts are not under estimated.

The studied intersections and driveways will operate at an acceptable level of service (LOS) in the 2018 build-out year. The Dallas Road/Kennedy Road/Bombing Range Road intersection is below agency LOS standards for the 2022 forecast year with the project. All other studied intersections and driveways operate at an acceptable LOS in the 2022 forecast year.

The Dallas Road/Kennedy Road/Bombing Range Road intersection meets peak hour traffic signal warrants for 2022 PM peak hour with and without the project. The development contributes 5 percent new trips to the intersection.

The 2012 to 2016 collision history at the studied intersections was reviewed, and collision records were identified. The Dallas Road/Kennedy Road/Bombing Range Road intersection had a higher accident rate than the critical accident rate. Additional collision analysis was performed, and a clear pattern of right angle collisions were noted. The collision history met the warrant for a traffic signal, but the peak hour warrant was not met. It is prudent to try less expensive traffic control measure, such as advance warning devices, and continue to monitor collision history, before installing expensive traffic control measures such as a traffic signal.

Based on the analysis volumes and the existing roadway cross-sections, the existing lane configurations are deemed adequate to accommodate the 2018 and 2022 design year volumes. No left-turn or right-turn lanes are merited at the studied intersection or at the site driveways.

A preliminary evaluation of frontage conditions indicates available sight distance is adequate to meet AASHTO guidelines. It is best practice to align the east most driveway with the existing roadway that intersects Arena Road on the south side in close proximity.

8 RECOMMENDATIONS

This TIA supports the following recommendations:

- Construct new sidewalks and driveways in accordance with current ADA standard guidelines.
- Assure the sight distance triangles for the site driveways remain free of obstructions that would block exiting drivers' views to oncoming traffic. Do not install site amenities that could restrict drivers' views.
- The City should consider installing advanced warning devices (signs with flashers or rumble strips) to the approaches of the Dallas Road/Kennedy Road/Bombing Range Road intersection due to existing collision history.
- Design the east most driveway to align with Bretz Prairie NE.
- The applicant should contribute to traffic mitigation based on the proportionate share, 5.53 percent, to the cost of a traffic signal, at the Dallas Road/Kennedy Road/Bombing Range Road intersection.

9 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO). *A Policy on Geometric Design of Highways and Streets*, 6th Edition, 2011.

US Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways,* 2009 Edition.

City of West Richland, *Comprehensive Plan Update,* 2017.

Benton County, Washington. "Benton County Web Map" https://bentonco.maps.arcgis.com/apps/View/index.html, accessed October 27, 2017.

Institute of Transportation Engineers (ITE). *Trip Generation Manual*, 9th Edition, 2012.

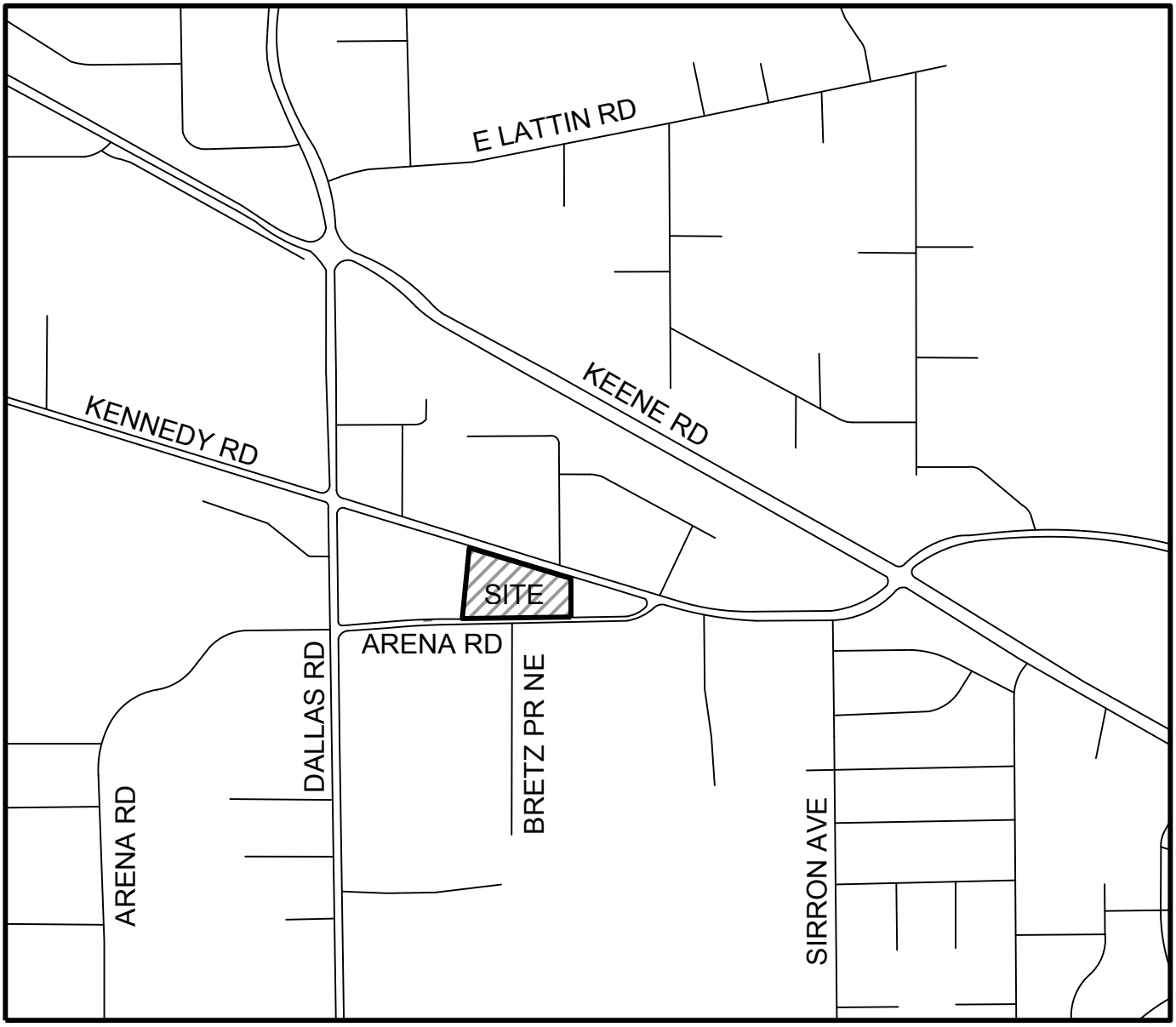
Transportation Research Boa Road (TRB), National Research Council. *Highway Capacity Manual 2010* (HCM), 5th Edition, 2010.

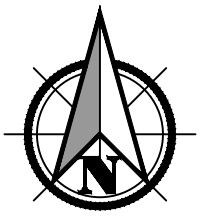
Washington State Department of Transportation (WSDOT). "GeoPortal Map Application," http://www.wsdot.wa.gov/mapsdata/tools/geoportal_ext.htm, accessed Oct 31, 2017.

Washington State Department of Transportation (WSDOT). *Design Manual (M 22-01.13)*, July 2016.

Washington State Department of Transportation (WSDOT). *Development Services Manual (M-3007.0)*, September 2005.

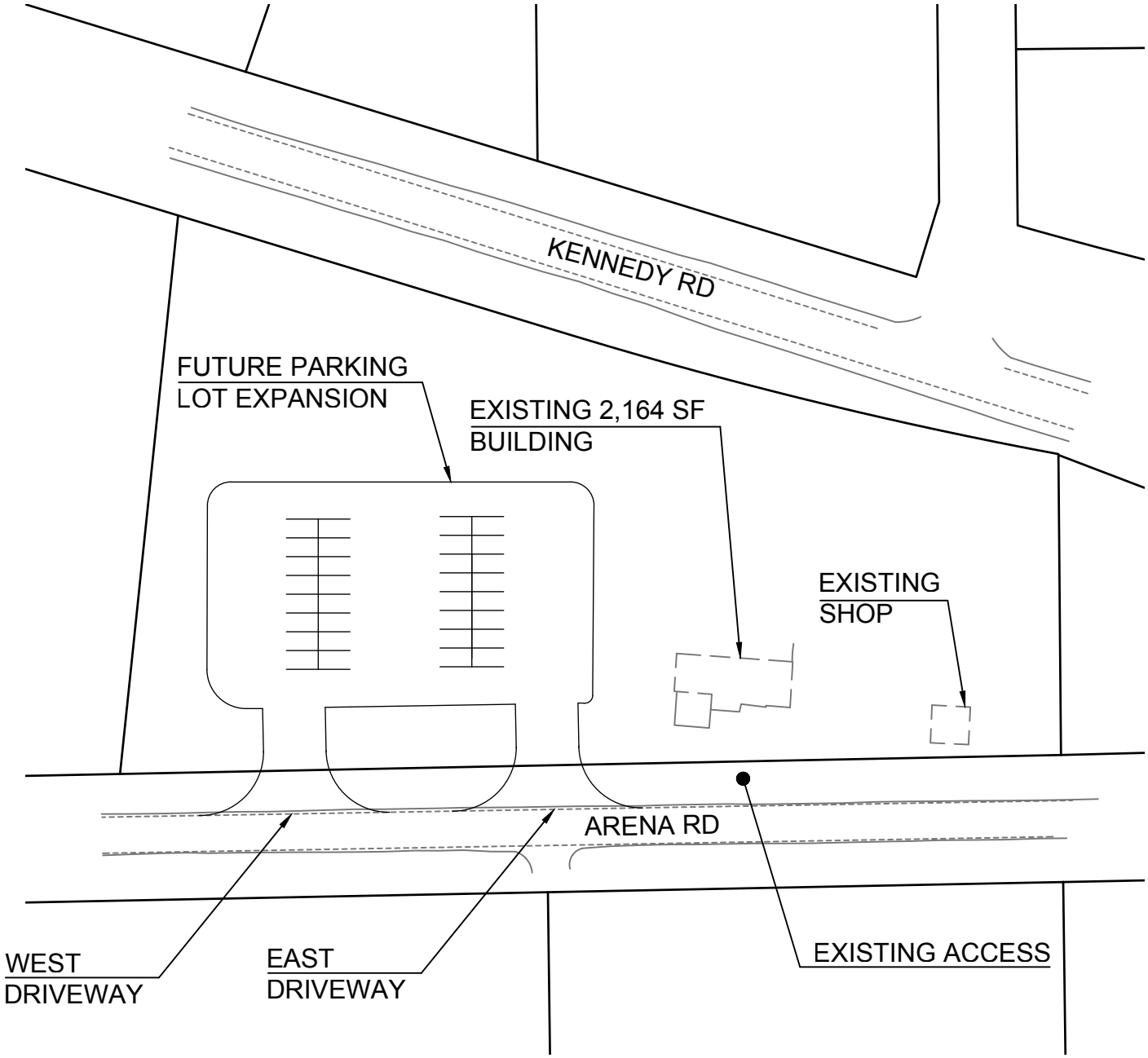
FIGURES





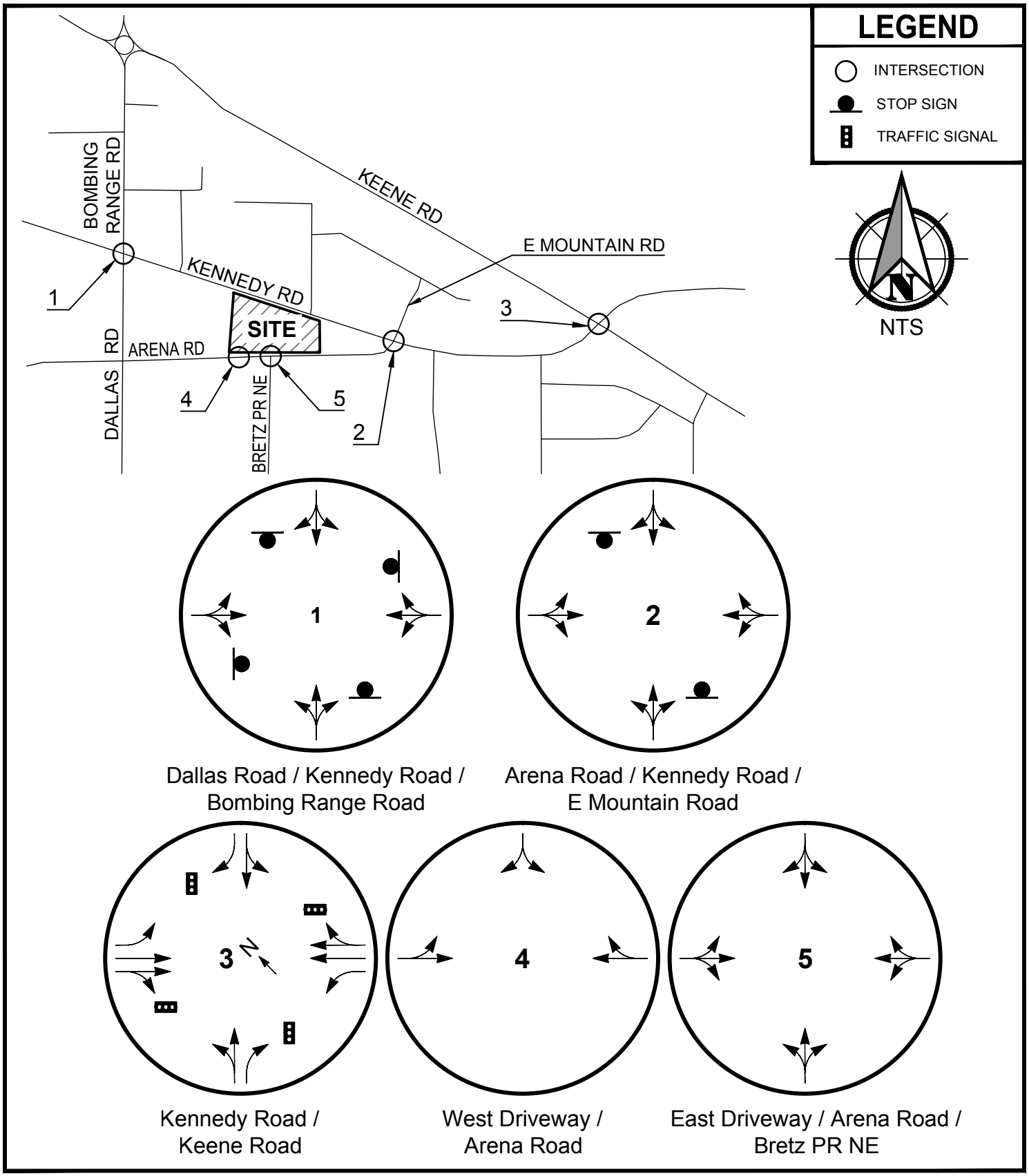
NTS

PBS	**Vicinity Map** **Arena Properties**	April 2018 66057.000 FIGURE **1**

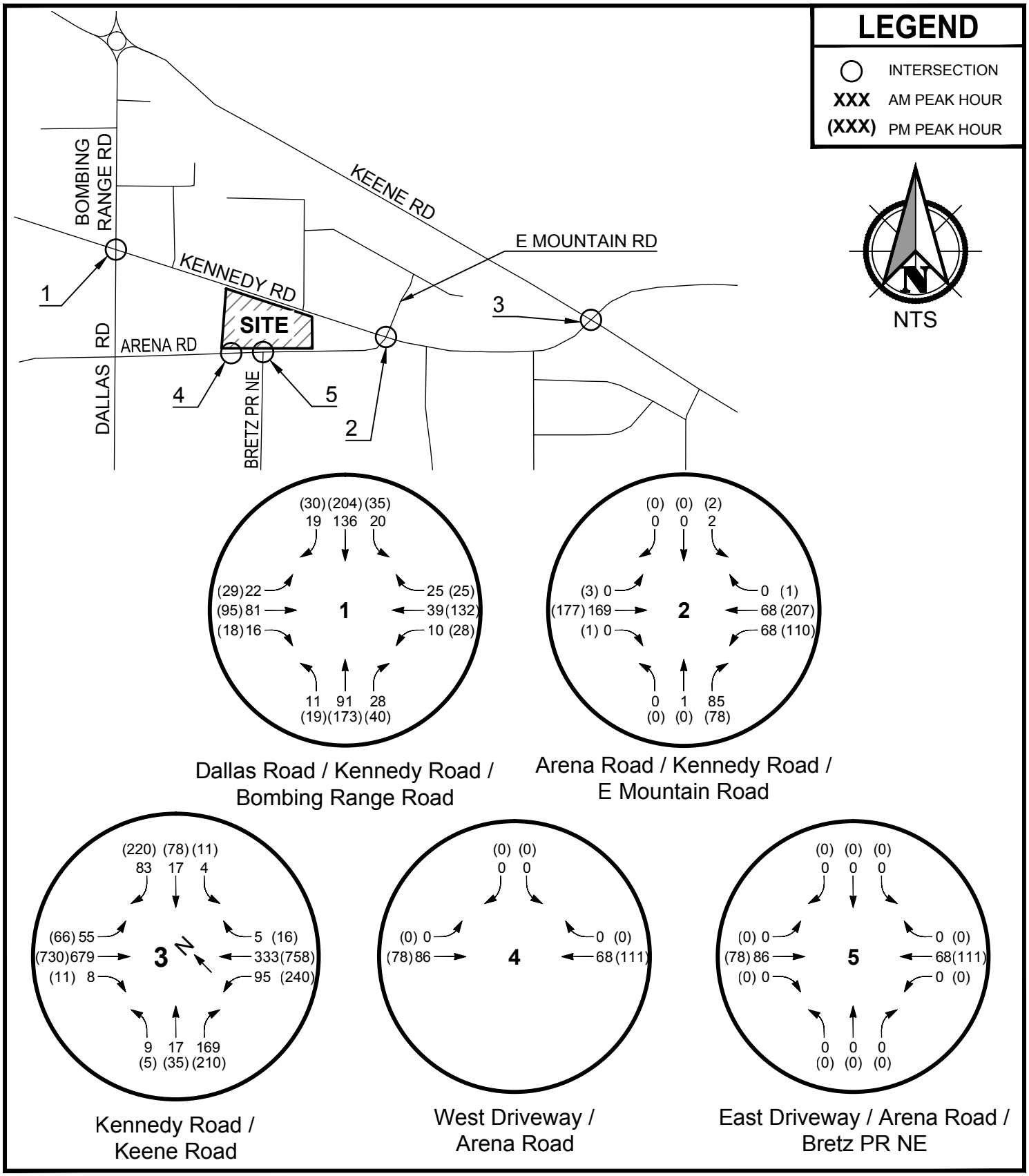


NTS

PBS	**Site Plan** **Arena Properties**	April 2018 66057.000 FIGURE **2**



PBS	**Existing Lane Configurations and Traffic Controls** **Arena Properties**	April 2018 66057.000 FIGURE **3**



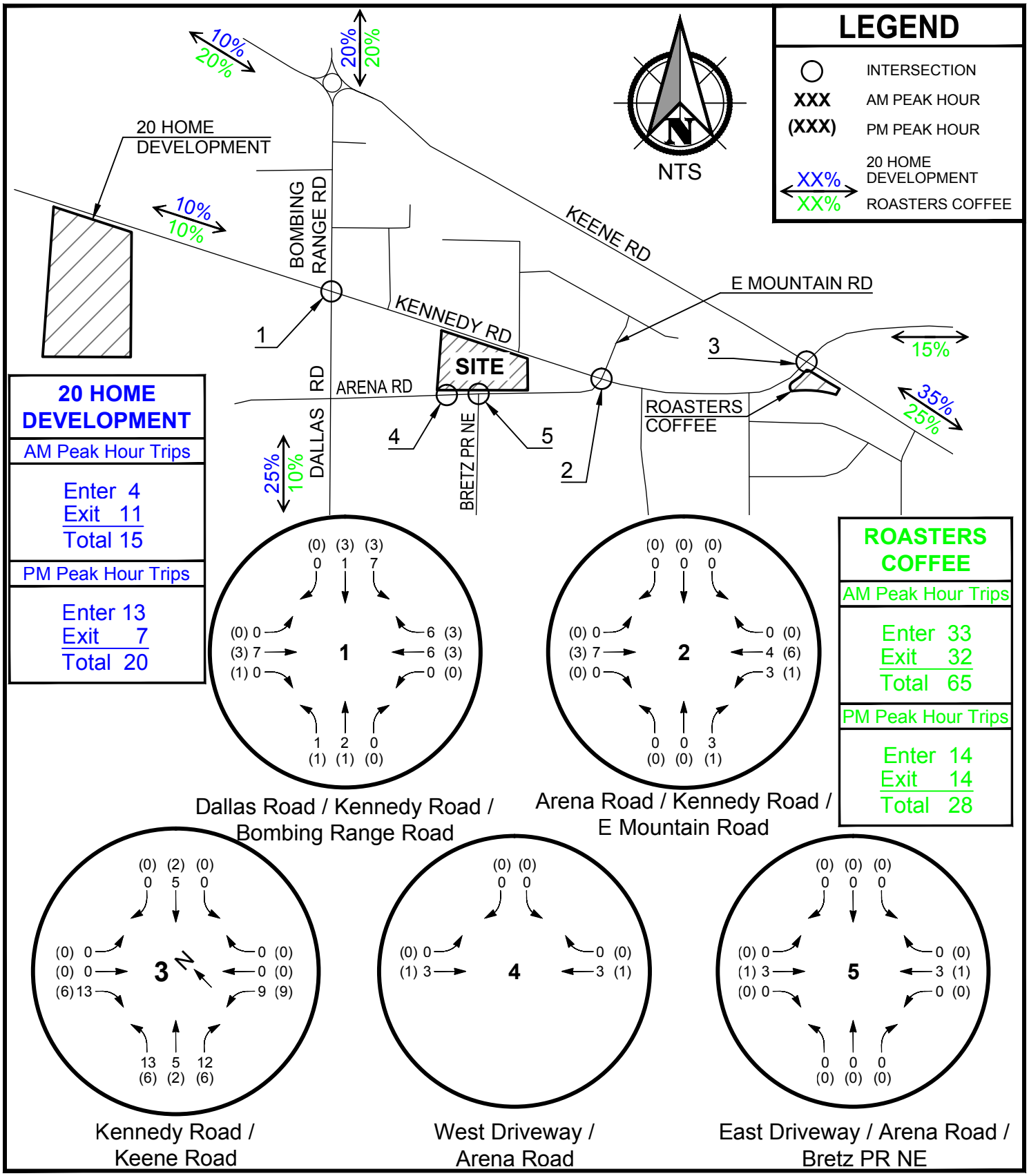
PBS

Existing Weekday Peak Hour Volumes

Arena Properties

April 2018
66057.000

FIGURE
4



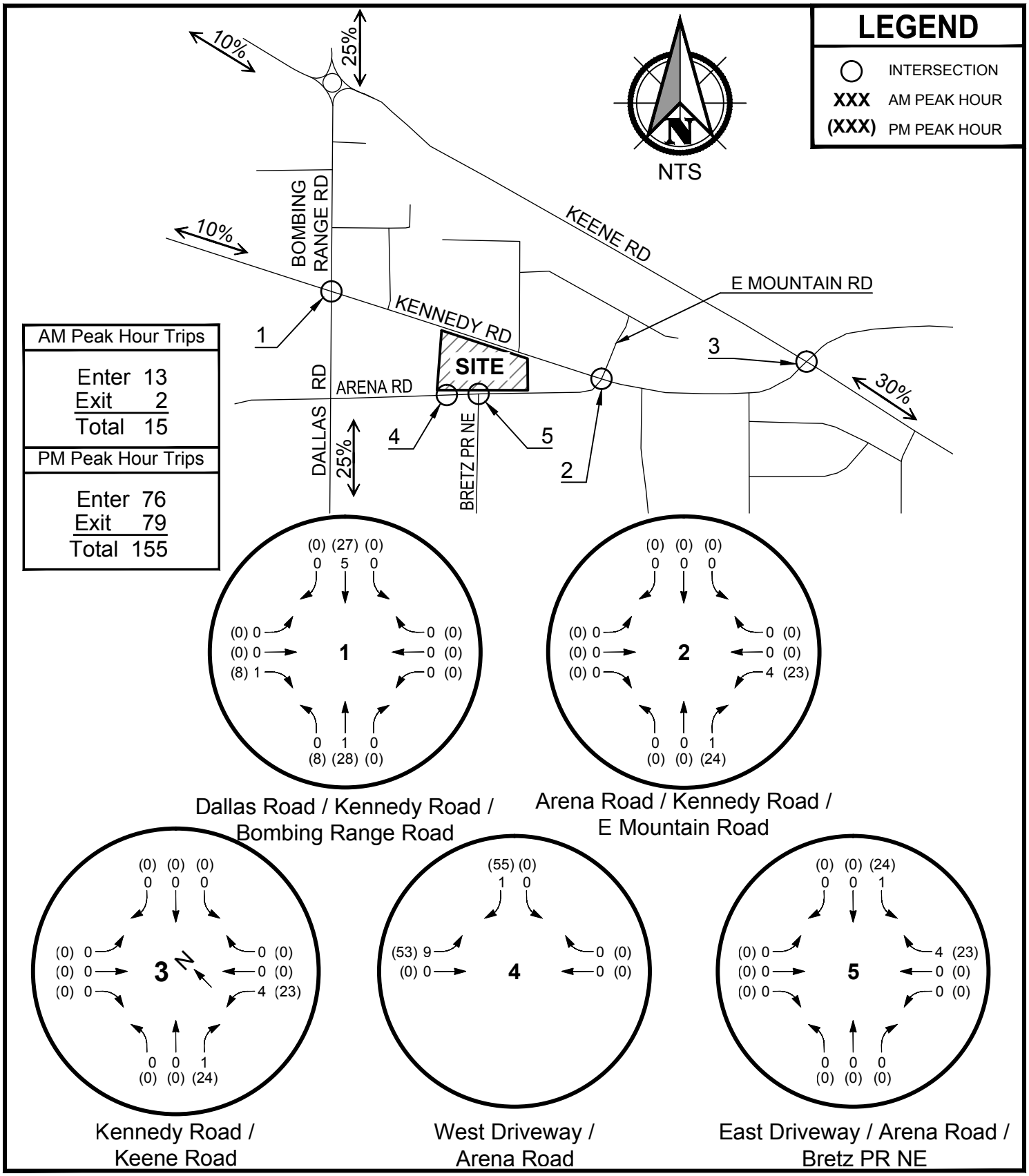
PBS

Peak Hour In-Process Trip, Distribution & Assignment for 2018

Arena Properties

April 2018
66057.000

FIGURE
5



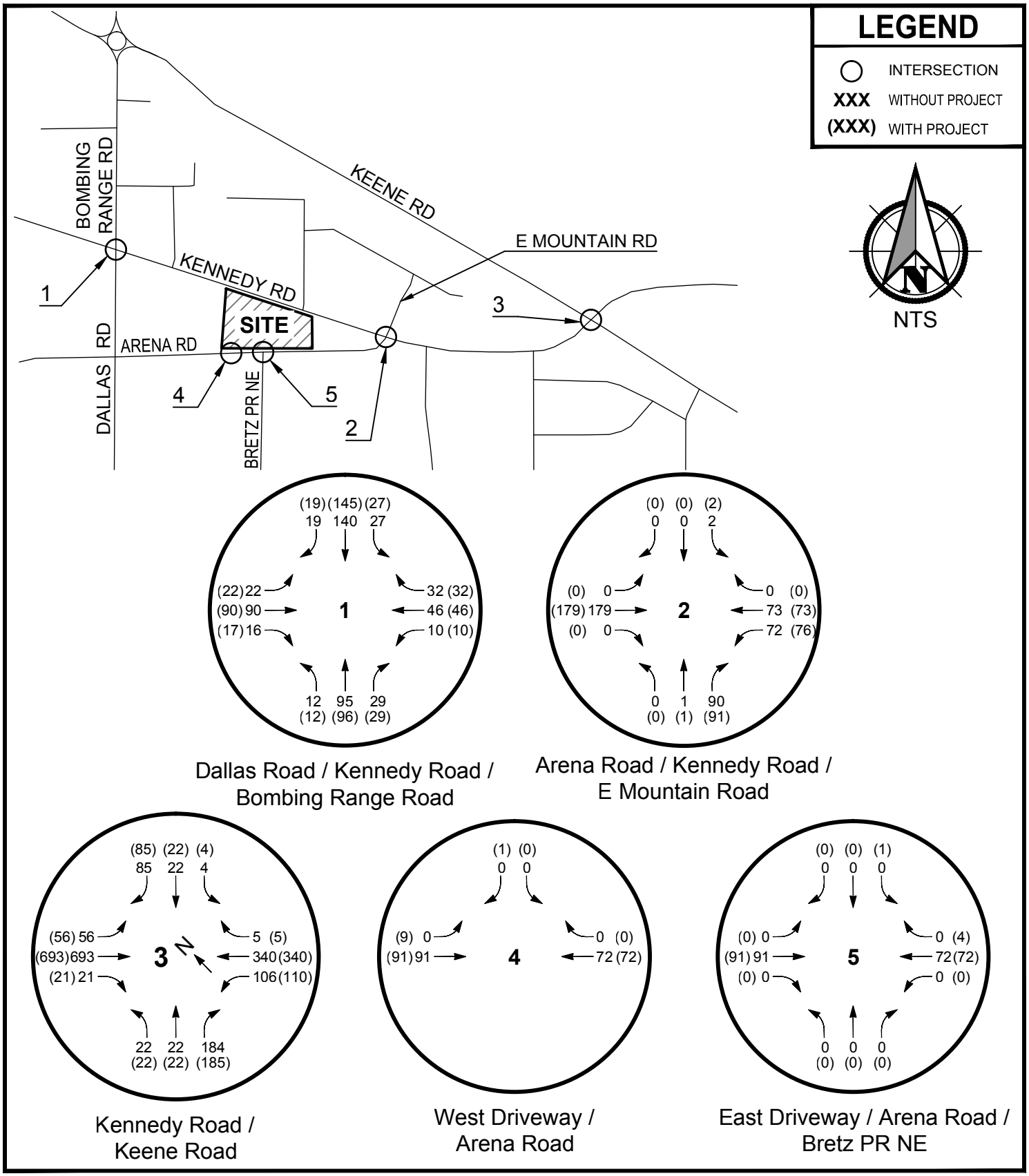
PBS

Project Trip Distribution & Trip Assignment

Arena Properties

April 2018
66057.000

FIGURE
6



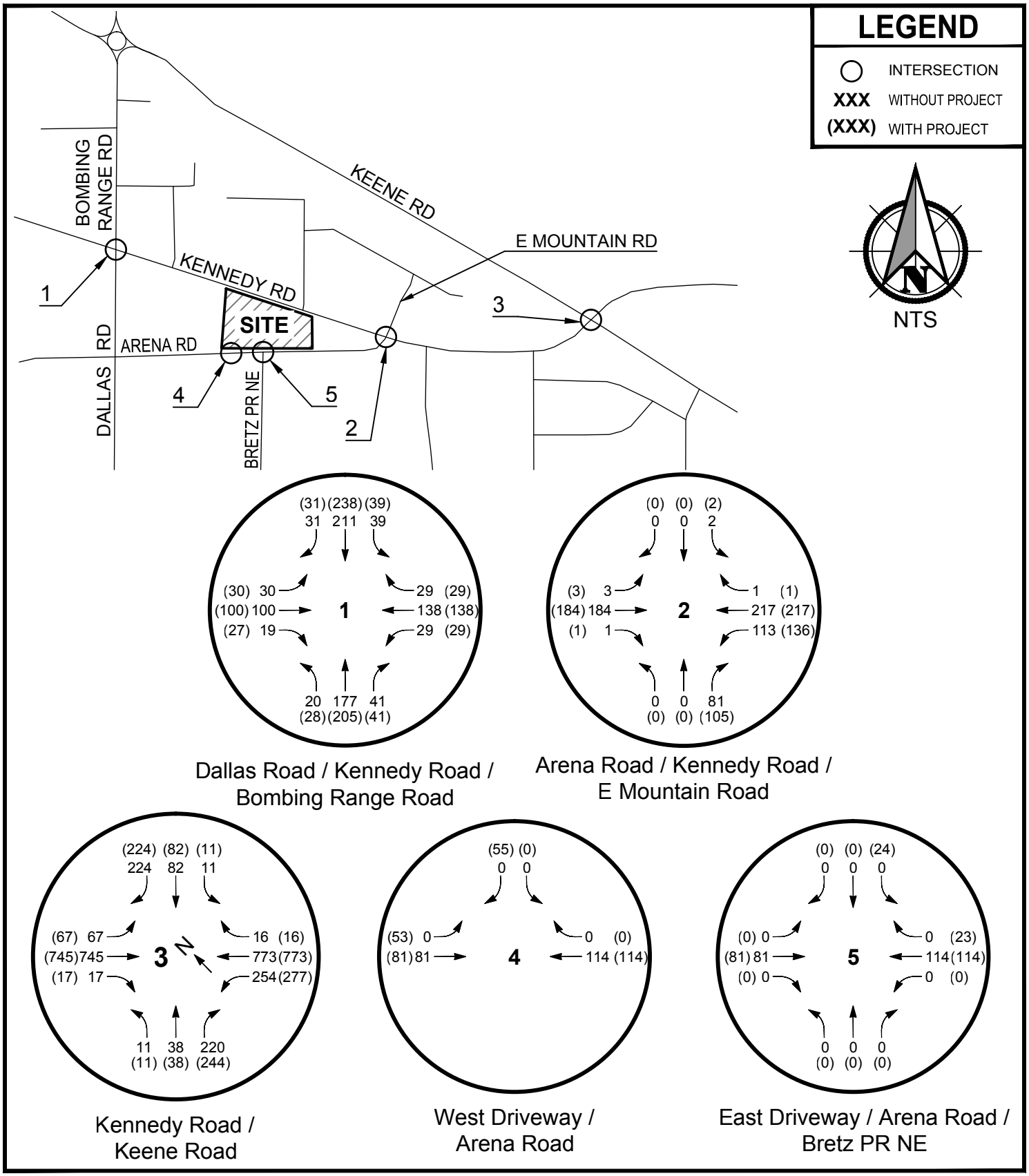
PBS

2018 AM Peak Hour Volumes Without and With Project

Arena Properties

April 2018
66057.000

FIGURE
7



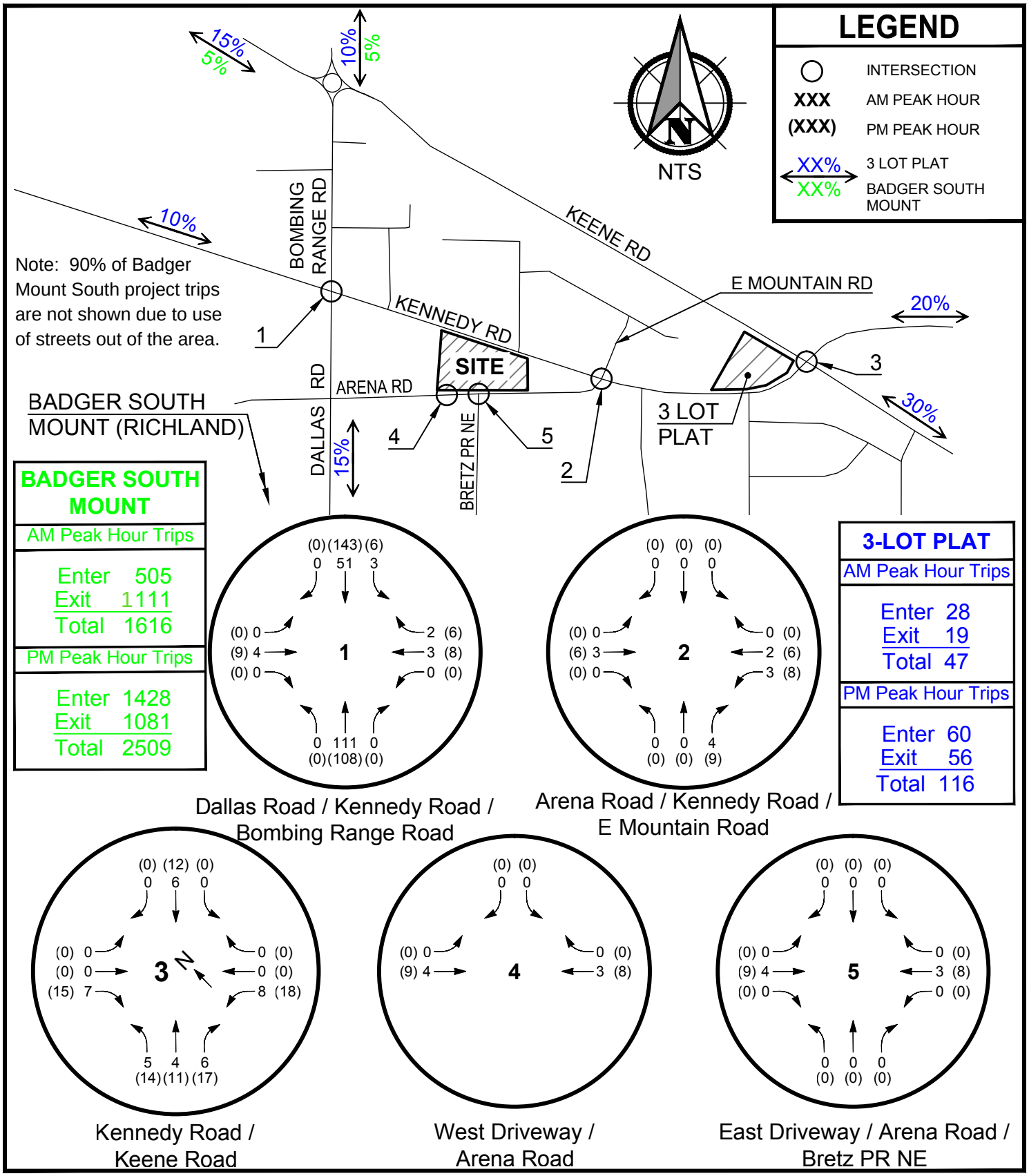
PBS

2018 PM Peak Hour Volumes Without and With Project

Arena Properties

April 2018
66057.000

FIGURE
8



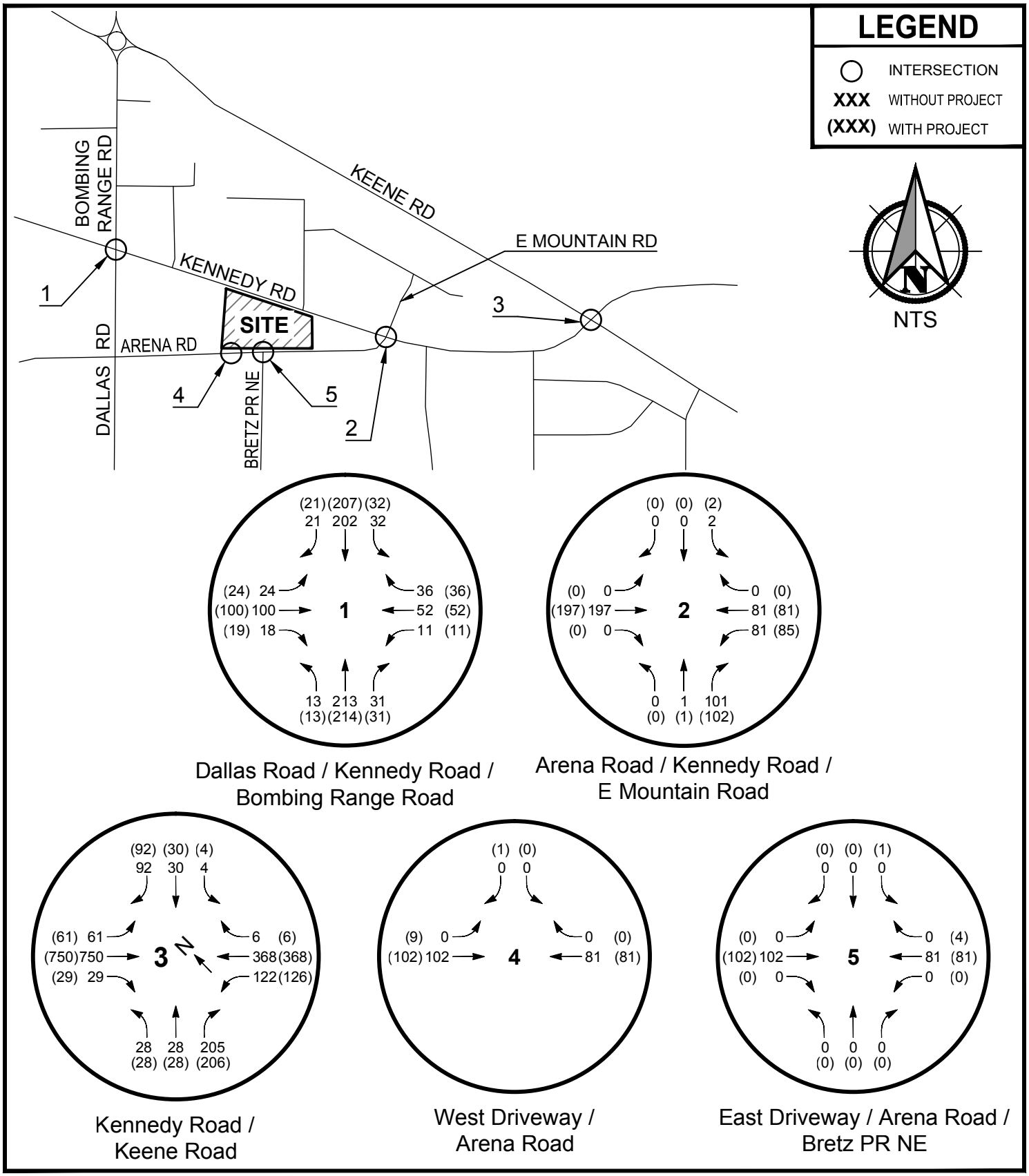
PBS

Peak Hour In-Process Trip, Distribution & Assignment for 2022

Arena Properties

April 2018
66057.000

FIGURE
9



Dallas Road / Kennedy Road / Bombing Range Road

Arena Road / Kennedy Road / E Mountain Road

Kennedy Road / Keene Road

West Driveway / Arena Road

East Driveway / Arena Road / Bretz PR NE

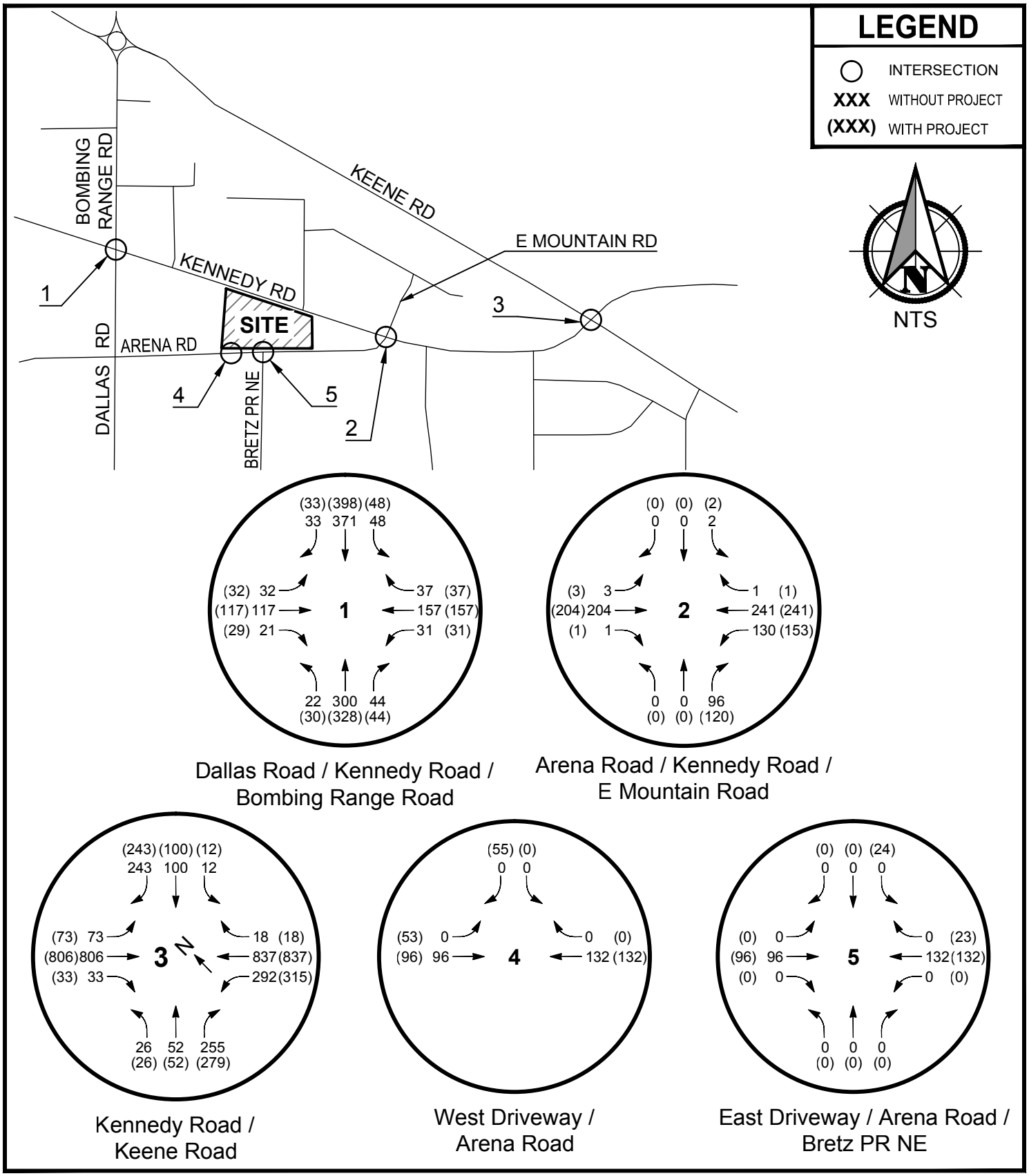
PBS

2022 AM Peak Hour Volumes Without and With Project

Arena Properties

April 2018
66057.000

FIGURE
10



PBS

2022 PM Peak Hour Volumes Without and With Project

Arena Properties

April 2018
66057.000

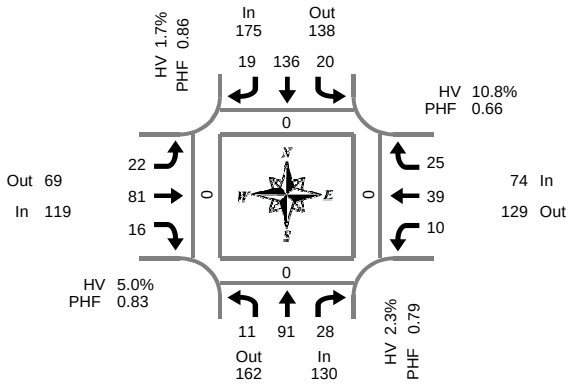
FIGURE
11

APPENDIX A

Traffic Count Data

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:15 AM to 8:15 AM

N Dallas Rd & Kennedy Rd

Tuesday, October 24, 2017
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	2	26	8	0	3	24	6	0	4	6	6	0	3	9	5	0	102	0	0	0	0
7:15 AM	2	24	7	0	0	33	4	0	5	20	3	0	0	9	9	0	116	0	0	0	0
7:30 AM	4	28	9	0	4	37	5	0	7	9	6	0	5	12	11	0	137	0	0	0	0
7:45 AM	1	27	5	0	9	37	5	0	8	26	2	0	2	10	2	0	134	0	0	0	0
8:00 AM	4	12	7	0	7	29	5	0	2	26	5	0	3	8	3	0	111	0	0	0	0
8:15 AM	0	18	5	0	10	24	3	0	4	21	2	0	1	9	4	0	101	0	0	0	0
8:30 AM	2	18	14	1	10	22	2	0	0	25	1	0	6	9	5	0	114	0	0	0	0
8:45 AM	1	18	12	0	7	22	5	0	4	14	3	0	3	15	7	0	111	0	0	0	0
Total Survey	16	171	67	1	50	228	35	0	34	147	28	0	23	81	46	0	926	0	0	0	0

Peak Hour Summary
7:15 AM to 8:15 AM

By Approach	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	130	162	292	0	175	138	313	0	119	69	188	0	74	129	203	0	498	0	0	0	0
%HV	2.3%				1.7%				5.0%				10.8%				4.0%				
PHF	0.79				0.86				0.83				0.66				0.91				

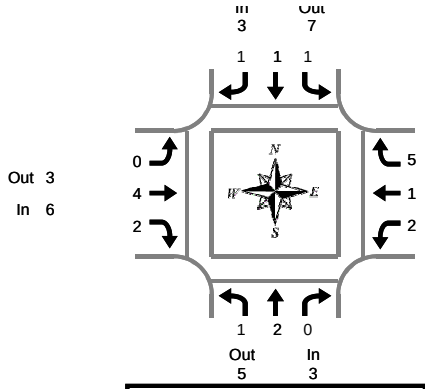
By Movement	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	11	91	28	130	20	136	19	175	22	81	16	119	10	39	25	74	498
%HV	9.1%	2.2%	0.0%	2.3%	5.0%	0.7%	5.3%	1.7%	0.0%	4.9%	12.5%	5.0%	20.0%	2.6%	20.0%	10.8%	4.0%
PHF	0.69	0.81	0.78	0.79	0.56	0.92	0.95	0.86	0.69	0.78	0.67	0.83	0.50	0.81	0.57	0.66	0.91

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	9	105	29	0	16	131	20	0	24	61	17	0	10	40	27	0	489	0	0	0	0
7:15 AM	11	91	28	0	20	136	19	0	22	81	16	0	10	39	25	0	498	0	0	0	0
7:30 AM	9	85	26	0	30	127	18	0	21	82	15	0	11	39	20	0	483	0	0	0	0
7:45 AM	7	75	31	1	36	112	15	0	14	98	10	0	12	36	14	0	460	0	0	0	0
8:00 AM	7	66	38	1	34	97	15	0	10	86	11	0	13	41	19	0	437	0	0	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:15 AM to 8:15 AM

N Dallas Rd & Kennedy Rd

Tuesday, October 24, 2017
7:00 AM to 9:00 AM

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	1	3
7:15 AM	0	0	0	0	0	1	0	1	0	1	2	3	0	0	4	4	8
7:30 AM	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	2	3
7:45 AM	0	1	0	1	0	0	0	0	0	2	0	2	1	1	0	2	5
8:00 AM	1	1	0	2	1	0	0	1	0	1	0	1	0	0	0	0	4
8:15 AM	0	0	0	0	1	0	0	1	0	1	0	1	0	0	1	1	3
8:30 AM	0	0	0	0	1	1	0	2	0	0	0	0	2	0	1	3	5
8:45 AM	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	2
Total Survey	1	3	0	4	4	2	1	7	0	5	4	9	4	1	8	13	33

Heavy Vehicle Peak Hour Summary
7:15 AM to 8:15 AM

By Approach	Northbound N Dallas Rd			Southbound N Dallas Rd			Eastbound Kennedy Rd			Westbound Kennedy Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	3	5	8	3	7	10	6	3	9	8	5	13	20
PHF	0.25			0.19			0.30			0.25			0.31

By Movement	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	1	2	0	3	1	1	1	3	0	4	2	6	2	1	5	8	20
PHF	0.25	0.25	0.00	0.25	0.08	0.25	0.25	0.19	0.00	0.25	0.17	0.30	0.25	0.25	0.21	0.25	0.31

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

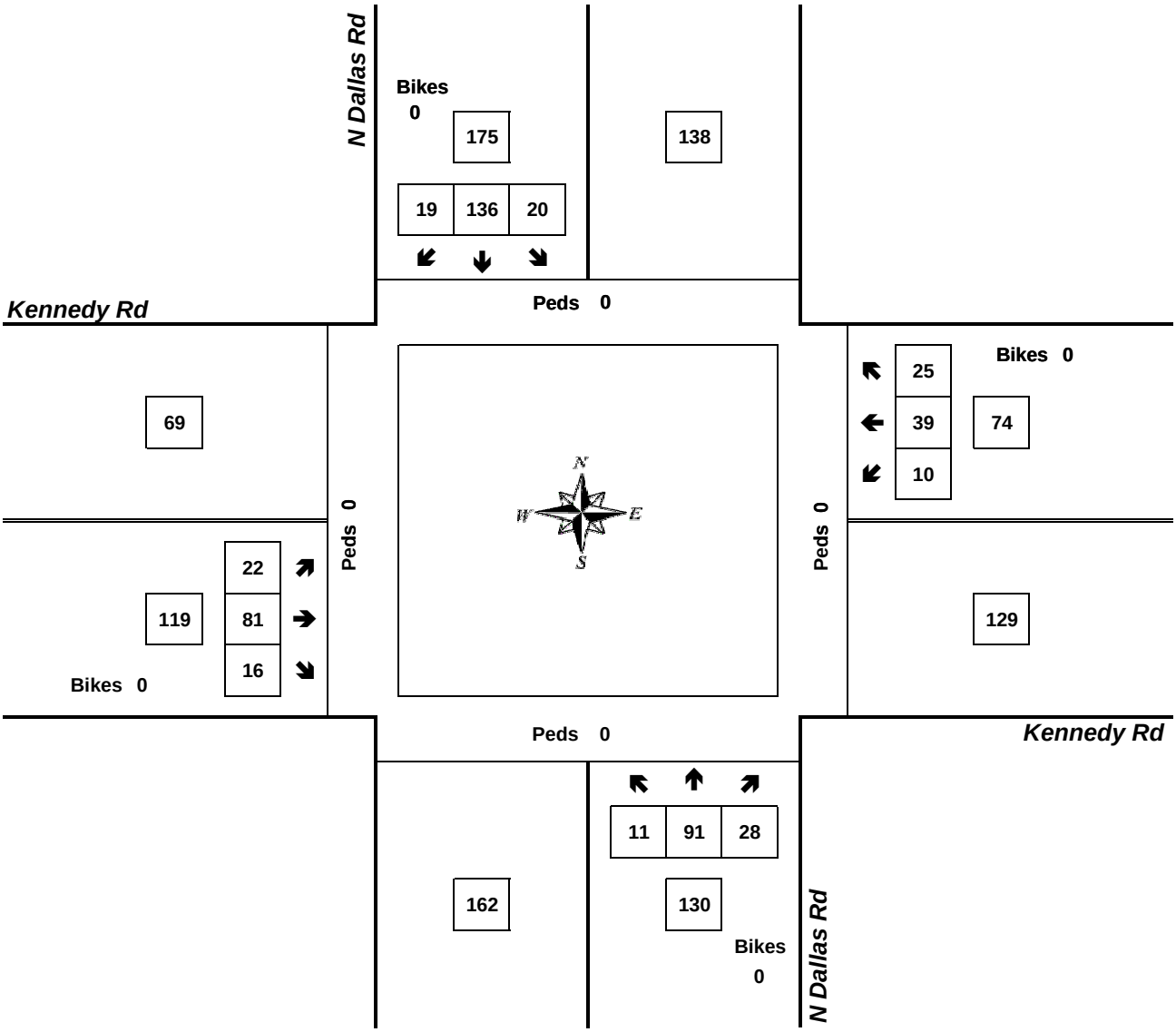
Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	1	0	1	1	1	1	3	0	3	3	6	2	1	6	9	19
7:15 AM	1	2	0	3	1	1	1	3	0	4	2	6	2	1	5	8	20
7:30 AM	1	2	0	3	2	0	1	3	0	4	0	4	2	1	2	5	15
7:45 AM	1	2	0	3	3	1	0	4	0	4	0	4	3	1	2	6	17
8:00 AM	1	2	0	3	3	1	0	4	0	2	1	3	2	0	2	4	14

Peak Hour Summary

Clay Carney
(503) 833-2740

N Dallas Rd & Kennedy Rd

7:15 AM to 8:15 AM
Tuesday, October 24, 2017

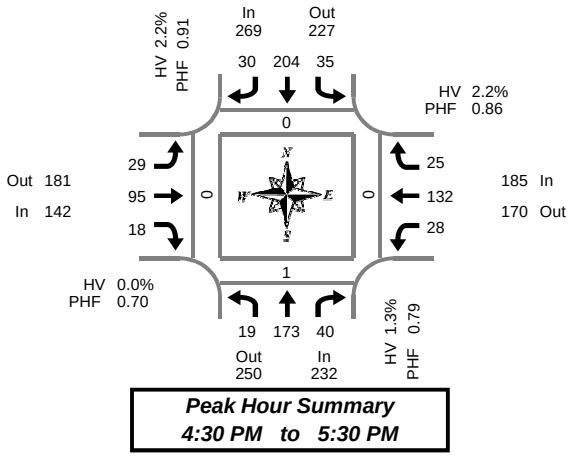


Approach	PHF	HV%	Volume
EB	0.83	5.0%	119
WB	0.66	10.8%	74
NB	0.79	2.3%	130
SB	0.86	1.7%	175
Intersection	0.91	4.0%	498

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



N Dallas Rd & Kennedy Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	1	27	9	0	7	40	6	0	6	27	2	0	6	37	3	0	171	0	0	2	0
4:15 PM	4	32	12	0	9	46	8	1	10	27	0	1	1	29	4	1	182	1	0	0	0
4:30 PM	3	34	7	0	12	54	8	0	7	22	1	0	4	25	6	0	183	0	0	0	0
4:45 PM	6	50	17	1	6	52	12	0	8	16	4	0	10	35	9	1	225	0	1	0	0
5:00 PM	6	40	10	0	12	51	1	0	10	32	9	0	8	37	1	0	217	0	0	0	0
5:15 PM	4	49	6	0	5	47	9	0	4	25	4	0	6	35	9	0	203	0	0	0	0
5:30 PM	5	31	13	0	9	35	6	0	3	18	1	0	9	33	16	0	179	0	0	0	0
5:45 PM	1	36	11	0	7	40	6	0	3	33	6	0	11	28	10	0	192	0	0	0	0
Total Survey	30	299	85	1	67	365	56	1	51	200	27	1	55	259	58	2	1,552	1	1	2	0

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	232	250	482	1	269	227	496	0	142	181	323	0	185	170	355	1	828
%HV	1.3%				2.2%				0.0%				2.2%				1.6%
PHF	0.79				0.91				0.70				0.86				0.92

Pedestrians Crosswalk			
North	South	East	West
0	1	0	0

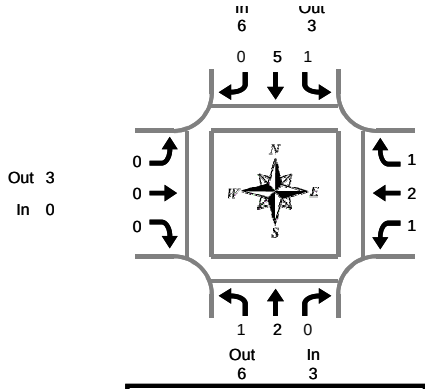
By Movement	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	19	173	40	232	35	204	30	269	29	95	18	142	28	132	25	185	828
%HV	5.3%	1.2%	0.0%	1.3%	2.9%	2.5%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	3.6%	1.5%	4.0%	2.2%	1.6%
PHF	0.79	0.87	0.59	0.79	0.73	0.94	0.63	0.91	0.73	0.74	0.50	0.70	0.70	0.89	0.69	0.86	0.92

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	14	143	45	1	34	192	34	1	31	92	7	1	21	126	22	2	761	1	1	2	0
4:15 PM	19	156	46	1	39	203	29	1	35	97	14	1	23	126	20	2	807	1	1	0	0
4:30 PM	19	173	40	1	35	204	30	0	29	95	18	0	28	132	25	1	828	0	1	0	0
4:45 PM	21	170	46	1	32	185	28	0	25	91	18	0	33	140	35	1	824	0	1	0	0
5:00 PM	16	156	40	0	33	173	22	0	20	108	20	0	34	133	36	0	791	0	0	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

N Dallas Rd & Kennedy Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	2	1	3	1	1	0	2	0	1	0	1	1	1	0	2	8
4:15 PM	0	0	1	1	1	1	0	2	1	1	0	2	0	0	0	0	5
4:30 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	1	2	4
4:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
5:00 PM	0	1	0	1	1	2	0	3	0	0	0	0	1	1	0	2	6
5:15 PM	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	2
5:45 PM	0	0	0	0	0	2	0	2	1	0	0	1	0	0	0	0	3
Total Survey	1	4	2	7	3	9	1	13	2	2	0	4	2	3	2	7	31

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound N Dallas Rd			Southbound N Dallas Rd			Eastbound Kennedy Rd			Westbound Kennedy Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	3	6	9	6	3	9	0	3	3	4	1	5	13
PHF	0.19			0.25			0.00			0.25			0.19

By Movement	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	1	2	0	3	1	5	0	6	0	0	0	0	1	2	1	4	13
PHF	0.25	0.25	0.00	0.19	0.13	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25	0.19

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

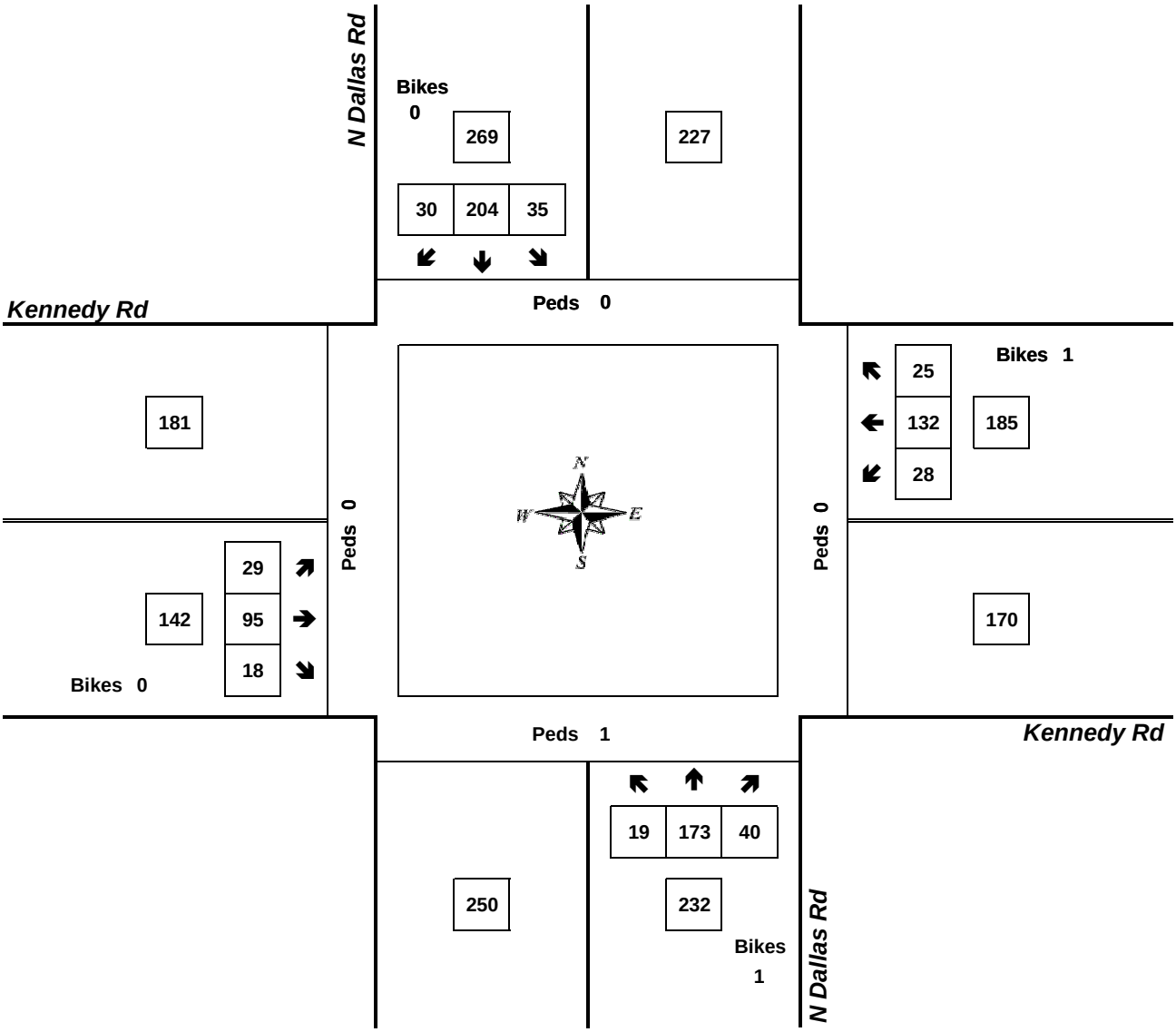
Interval Start Time	Northbound N Dallas Rd				Southbound N Dallas Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	2	2	4	2	5	0	7	1	2	0	3	1	2	1	4	18
4:15 PM	0	1	1	2	2	6	0	8	1	1	0	2	1	2	1	4	16
4:30 PM	1	2	0	3	1	5	0	6	0	0	0	0	1	2	1	4	13
4:45 PM	1	2	0	3	1	3	1	5	0	0	0	0	1	1	1	3	11
5:00 PM	1	2	0	3	1	4	1	6	1	0	0	1	1	1	1	3	13

Peak Hour Summary

Clay Carney
(503) 833-2740

N Dallas Rd & Kennedy Rd

4:30 PM to 5:30 PM
Tuesday, October 24, 2017

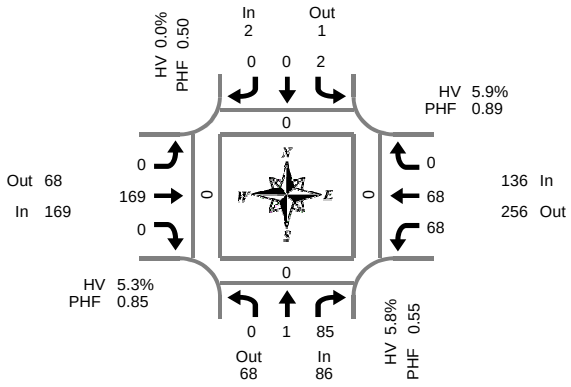


Approach	PHF	HV%	Volume
EB	0.70	0.0%	142
WB	0.86	2.2%	185
NB	0.79	1.3%	232
SB	0.91	2.2%	269
Intersection	0.92	1.6%	828

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:45 AM to 8:45 AM

Arena Rd & Kennedy Rd

Tuesday, October 24, 2017
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	0	0	18	0	0	0	0	0	0	17	1	0	10	17	0	0	63	1	0	0	0
7:15 AM	1	0	17	0	2	0	0	0	0	32	0	0	8	17	1	0	78	0	0	0	0
7:30 AM	0	0	17	0	1	0	0	0	0	23	0	0	12	26	0	0	79	0	0	0	0
7:45 AM	0	0	12	0	1	0	0	0	0	44	0	0	17	20	0	0	94	0	0	0	0
8:00 AM	0	0	16	0	0	0	0	0	0	36	0	0	15	12	0	0	79	0	0	0	0
8:15 AM	0	1	38	0	1	0	0	0	0	39	0	0	22	16	0	0	117	0	0	0	0
8:30 AM	0	0	19	0	0	0	0	0	0	50	0	0	14	20	0	0	103	0	0	0	0
8:45 AM	0	0	7	0	0	0	0	0	0	28	0	0	21	33	1	0	90	0	0	0	0
Total Survey	1	1	144	0	5	0	0	0	0	269	1	0	119	161	2	0	703	1	0	0	0

Peak Hour Summary
7:45 AM to 8:45 AM

By Approach	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	86	68	154	0	2	1	3	0	169	68	237	0	136	256	392	0	393	0	0	0	0
%HV	5.8%				0.0%				5.3%				5.9%				5.6%				
PHF	0.55				0.50				0.85				0.89				0.84				

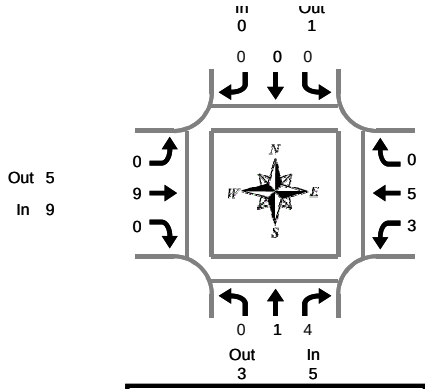
By Movement	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	85	86	2	0	0	2	0	169	0	169	68	68	0	136	393
%HV	0.0%	#####	4.7%	5.8%	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%	0.0%	5.3%	4.4%	7.4%	0.0%	5.9%	5.6%
PHF	0.00	0.25	0.56	0.55	0.50	0.00	0.00	0.50	0.00	0.85	0.00	0.85	0.77	0.85	0.00	0.89	0.84

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	1	0	64	0	4	0	0	0	0	116	1	0	47	80	1	0	314	1	0	0	0
7:15 AM	1	0	62	0	4	0	0	0	0	135	0	0	52	75	1	0	330	0	0	0	0
7:30 AM	0	1	83	0	3	0	0	0	0	142	0	0	66	74	0	0	369	0	0	0	0
7:45 AM	0	1	85	0	2	0	0	0	0	169	0	0	68	68	0	0	393	0	0	0	0
8:00 AM	0	1	80	0	1	0	0	0	0	153	0	0	72	81	1	0	389	0	0	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:45 AM to 8:45 AM

Arena Rd & Kennedy Rd

Tuesday, October 24, 2017
7:00 AM to 9:00 AM

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	2	2	0	0	0	0	0	1	0	1	2	1	0	3	6
7:15 AM	1	0	2	3	0	0	0	0	0	0	0	0	1	3	0	4	7
7:30 AM	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	2	3
7:45 AM	0	0	1	1	0	0	0	0	0	2	0	2	0	2	0	2	5
8:00 AM	0	0	1	1	0	0	0	0	0	2	0	2	2	1	0	3	6
8:15 AM	0	1	2	3	0	0	0	0	0	2	0	2	1	1	0	2	7
8:30 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
Total Survey	1	1	9	11	0	0	0	0	0	10	0	10	7	12	0	19	40

Heavy Vehicle Peak Hour Summary
7:45 AM to 8:45 AM

By Approach	Northbound Arena Rd			Southbound Arena Rd			Eastbound Kennedy Rd			Westbound Kennedy Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	5	3	8	0	1	1	9	5	14	8	13	21	22
PHF	0.21			0.00			0.32			0.22			0.31

By Movement	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	4	5	0	0	0	0	0	9	0	9	3	5	0	8	22
PHF	0.00	0.25	0.20	0.21	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.32	0.25	0.18	0.00	0.22	0.31

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

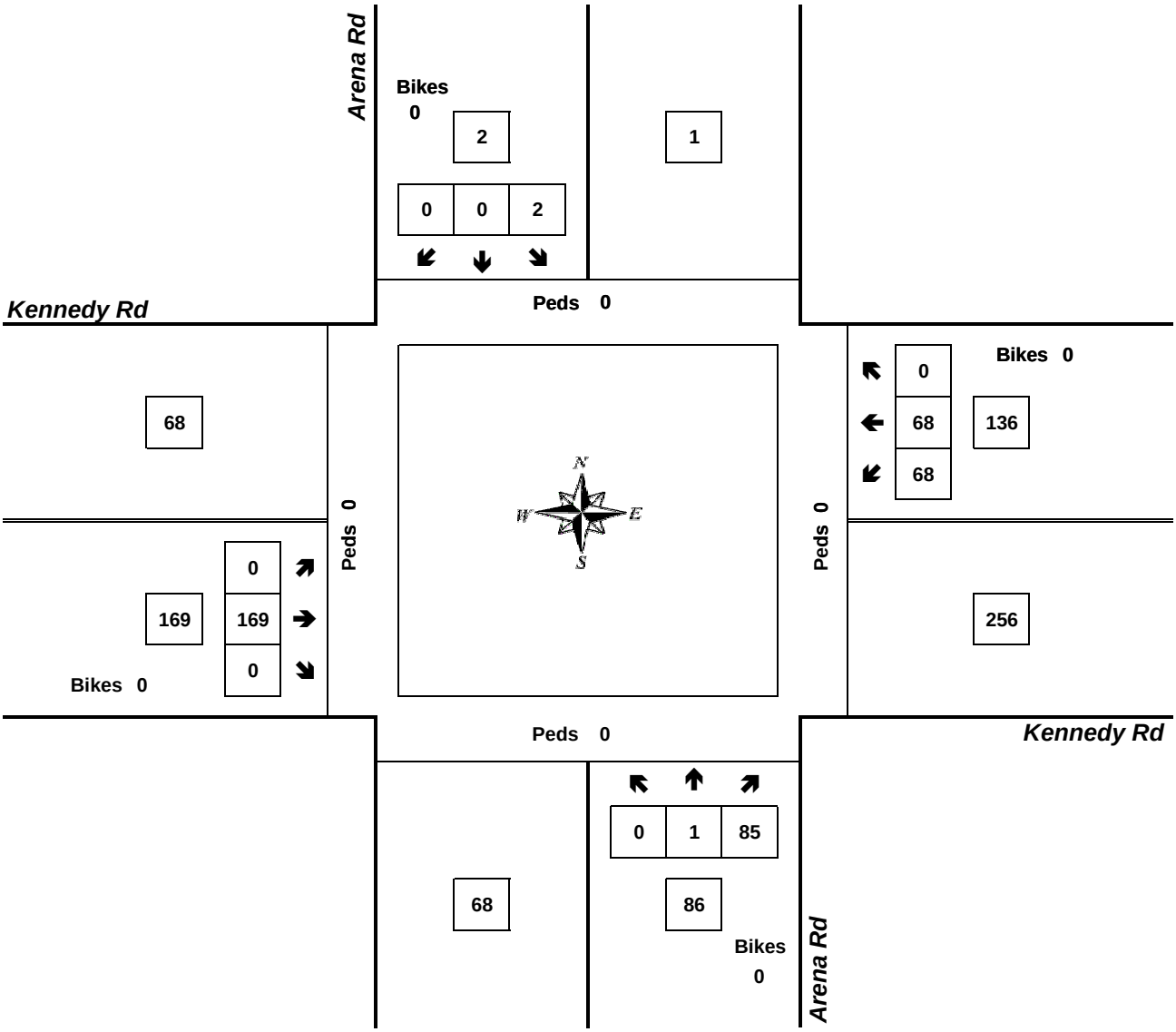
Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	1	0	6	7	0	0	0	0	0	3	0	3	3	8	0	11	21
7:15 AM	1	0	5	6	0	0	0	0	0	4	0	4	3	8	0	11	21
7:30 AM	0	1	5	6	0	0	0	0	0	6	0	6	3	6	0	9	21
7:45 AM	0	1	4	5	0	0	0	0	0	9	0	9	3	5	0	8	22
8:00 AM	0	1	3	4	0	0	0	0	0	7	0	7	4	4	0	8	19

Peak Hour Summary

Clay Carney
(503) 833-2740

Arena Rd & Kennedy Rd

7:45 AM to 8:45 AM
Tuesday, October 24, 2017

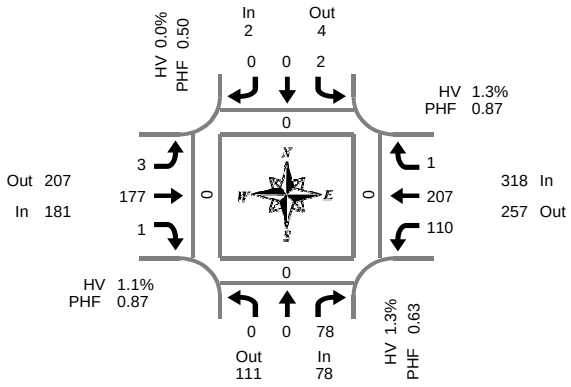


Approach	PHF	HV%	Volume
EB	0.85	5.3%	169
WB	0.89	5.9%	136
NB	0.55	5.8%	86
SB	0.50	0.0%	2
Intersection	0.84	5.6%	393

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Arena Rd & Kennedy Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	20	0	1	0	0	0	0	40	0	0	27	48	0	0	136	0	0	0	0
4:15 PM	0	0	20	0	0	0	0	0	0	52	0	0	24	41	0	0	137	0	0	0	0
4:30 PM	0	0	15	0	1	0	0	0	0	39	0	0	24	39	4	0	122	0	0	0	0
4:45 PM	0	0	21	0	1	0	0	0	0	42	0	0	23	52	0	0	139	0	0	0	0
5:00 PM	0	0	14	0	0	0	0	0	2	50	0	0	24	41	0	0	131	0	0	0	0
5:15 PM	0	0	31	0	1	0	0	0	1	38	0	0	35	56	0	0	162	0	0	0	0
5:30 PM	0	0	12	0	0	0	0	0	0	47	1	0	28	58	1	0	147	0	0	0	0
5:45 PM	0	0	16	0	0	0	1	0	0	45	1	0	28	43	2	0	136	0	0	0	0
Total Survey	0	0	149	0	4	0	1	0	3	353	2	0	213	378	7	0	1,110	0	0	0	0

Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	78	111	189	0	2	4	6	0	181	207	388	0	318	257	575	0	579	0	0	0	0
%HV	1.3%				0.0%				1.1%				1.3%				1.2%				
PHF	0.63				0.50				0.87				0.87				0.89				

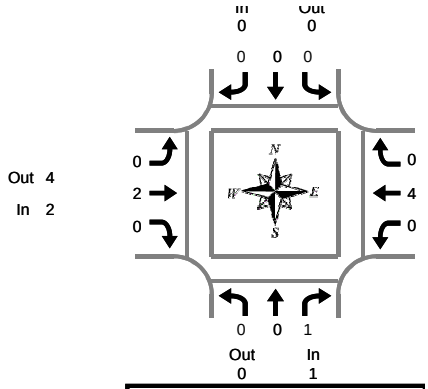
By Movement	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	78	78	2	0	0	2	3	177	1	181	110	207	1	318	579
%HV	0.0%	0.0%	1.3%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	1.1%	0.0%	1.9%	0.0%	1.3%	1.2%
PHF	0.00	0.00	0.63	0.63	0.50	0.00	0.00	0.50	0.38	0.89	0.25	0.87	0.79	0.89	0.25	0.87	0.89

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	76	0	3	0	0	0	0	173	0	0	98	180	4	0	534	0	0	0	0
4:15 PM	0	0	70	0	2	0	0	0	2	183	0	0	95	173	4	0	529	0	0	0	0
4:30 PM	0	0	81	0	3	0	0	0	3	169	0	0	106	188	4	0	554	0	0	0	0
4:45 PM	0	0	78	0	2	0	0	0	3	177	1	0	110	207	1	0	579	0	0	0	0
5:00 PM	0	0	73	0	1	0	1	0	3	180	2	0	115	198	3	0	576	0	0	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Arena Rd & Kennedy Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	1	1	0	0	0	0	0	3	0	3	0	2	0	2	6
4:15 PM	0	0	1	1	0	0	0	0	0	3	0	3	0	2	0	2	6
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3	3
4:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
5:00 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0	1	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:45 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Survey	0	0	4	4	0	0	0	0	0	8	0	8	1	10	0	11	23

Heavy Vehicle Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Arena Rd			Southbound Arena Rd			Eastbound Kennedy Rd			Westbound Kennedy Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	1	0	1	0	0	0	2	4	6	4	3	7	7
PHF	0.13			0.00			0.08			0.14			0.12

By Movement	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	1	1	0	0	0	0	0	2	0	2	0	4	0	4	7
PHF	0.00	0.00	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.17	0.00	0.14	0.12

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

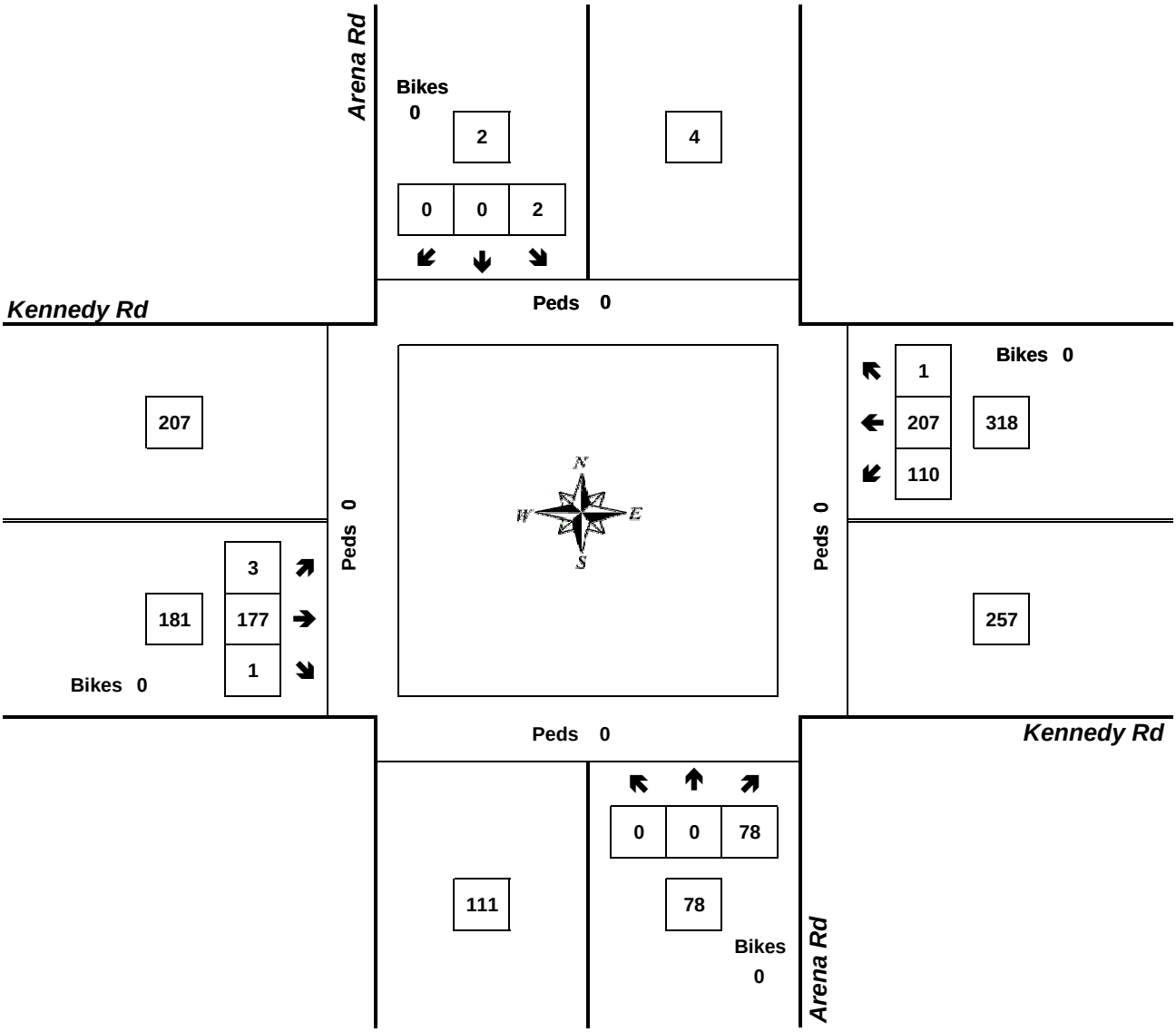
Interval Start Time	Northbound Arena Rd				Southbound Arena Rd				Eastbound Kennedy Rd				Westbound Kennedy Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	2	2	0	0	0	0	0	7	0	7	1	7	0	8	17
4:15 PM	0	0	2	2	0	0	0	0	0	5	0	5	1	6	0	7	14
4:30 PM	0	0	1	1	0	0	0	0	0	2	0	2	1	5	0	6	9
4:45 PM	0	0	1	1	0	0	0	0	0	2	0	2	0	4	0	4	7
5:00 PM	0	0	2	2	0	0	0	0	0	1	0	1	0	3	0	3	6

Peak Hour Summary

Clay Carney
(503) 833-2740

Arena Rd & Kennedy Rd

4:45 PM to 5:45 PM
Tuesday, October 24, 2017

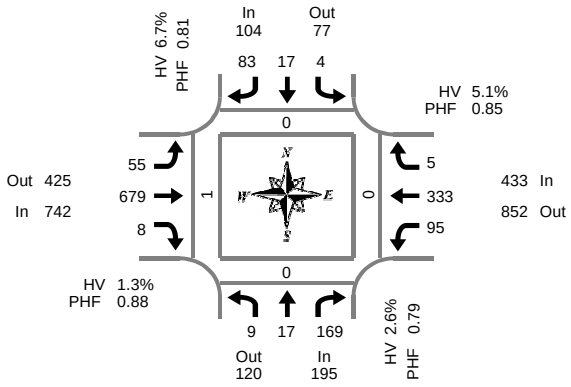


Approach	PHF	HV%	Volume
EB	0.87	1.1%	181
WB	0.87	1.3%	318
NB	0.63	1.3%	78
SB	0.50	0.0%	2
Intersection	0.89	1.2%	579

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:00 AM to 8:00 AM

Kennedy Rd & Keene Rd

Wednesday, October 25, 2017
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	2	2	41	0	0	4	20	0	9	148	2	0	28	67	3	0	326	0	0	0	0
7:15 AM	2	3	45	0	1	6	19	0	15	165	1	0	17	80	0	0	354	0	0	0	0
7:30 AM	1	5	32	0	2	0	20	0	15	194	3	0	21	106	1	0	400	0	0	0	1
7:45 AM	4	7	51	0	1	7	24	0	16	172	2	0	29	80	1	0	394	0	0	0	0
8:00 AM	1	4	43	0	3	9	14	0	9	147	2	0	25	67	2	0	326	0	0	0	0
8:15 AM	1	5	44	0	5	9	18	0	3	151	1	0	26	59	1	0	323	0	0	0	0
8:30 AM	0	4	39	0	2	6	17	0	15	187	8	0	31	83	3	0	395	0	0	0	0
8:45 AM	2	8	41	0	3	11	13	0	9	177	0	0	46	74	0	0	384	0	0	0	0
Total Survey	13	38	336	0	17	52	145	0	91	1,341	19	0	223	616	11	0	2,902	0	0	0	1

Peak Hour Summary
7:00 AM to 8:00 AM

By Approach	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	195	120	315	0	104	77	181	0	742	425	1,167	0	433	852	1,285	0	1,474
%HV	2.6%				6.7%				1.3%				5.1%				3.0%
PHF	0.79				0.81				0.88				0.85				0.92

Pedestrians Crosswalk			
North	South	East	West
0	0	0	1

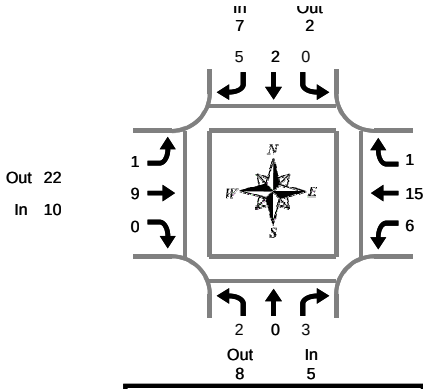
By Movement	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	9	17	169	195	4	17	83	104	55	679	8	742	95	333	5	433	1,474
%HV	22.2%	0.0%	1.8%	2.6%	0.0%	11.8%	6.0%	6.7%	1.8%	1.3%	0.0%	1.3%	6.3%	4.5%	20.0%	5.1%	3.0%
PHF	0.56	0.61	0.83	0.79	0.50	0.61	0.86	0.81	0.86	0.88	0.67	0.88	0.82	0.79	0.42	0.85	0.92

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	9	17	169	0	4	17	83	0	55	679	8	0	95	333	5	0	1,474	0	0	0	1
7:15 AM	8	19	171	0	7	22	77	0	55	678	8	0	92	333	4	0	1,474	0	0	0	1
7:30 AM	7	21	170	0	11	25	76	0	43	664	8	0	101	312	5	0	1,443	0	0	0	1
7:45 AM	6	20	177	0	11	31	73	0	43	657	13	0	111	289	7	0	1,438	0	0	0	0
8:00 AM	4	21	167	0	13	35	62	0	36	662	11	0	128	283	6	0	1,428	0	0	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:00 AM to 8:00 AM

Kennedy Rd & Keene Rd

Wednesday, October 25, 2017
7:00 AM to 9:00 AM

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	3	3	0	0	0	0	0	2	0	2	1	4	0	5	10
7:15 AM	1	0	0	1	0	1	4	5	1	2	0	3	3	6	0	9	18
7:30 AM	0	0	0	0	0	0	0	0	0	3	0	3	1	2	1	4	7
7:45 AM	1	0	0	1	0	1	1	2	0	2	0	2	1	3	0	4	9
8:00 AM	0	0	3	3	0	1	1	2	1	6	0	7	4	2	1	7	19
8:15 AM	0	0	3	3	1	2	1	4	0	3	0	3	0	3	0	3	13
8:30 AM	0	0	0	0	0	0	1	1	0	1	0	1	3	4	0	7	9
8:45 AM	0	0	3	3	0	2	0	2	0	3	0	3	3	6	0	9	17
Total Survey	2	0	12	14	1	7	8	16	2	22	0	24	16	30	2	48	102

Heavy Vehicle Peak Hour Summary
7:00 AM to 8:00 AM

By Approach	Northbound Kennedy Rd			Southbound Kennedy Rd			Eastbound Keene Rd			Westbound Keene Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	5	8	13	7	2	9	10	22	32	22	12	34	44
PHF	0.18			0.22			0.21			0.29			0.27

By Movement	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	2	0	3	5	0	2	5	7	1	9	0	10	6	15	1	22	44
PHF	0.25	0.00	0.13	0.18	0.00	0.13	0.25	0.22	0.25	0.20	0.00	0.21	0.21	0.29	0.13	0.29	0.27

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

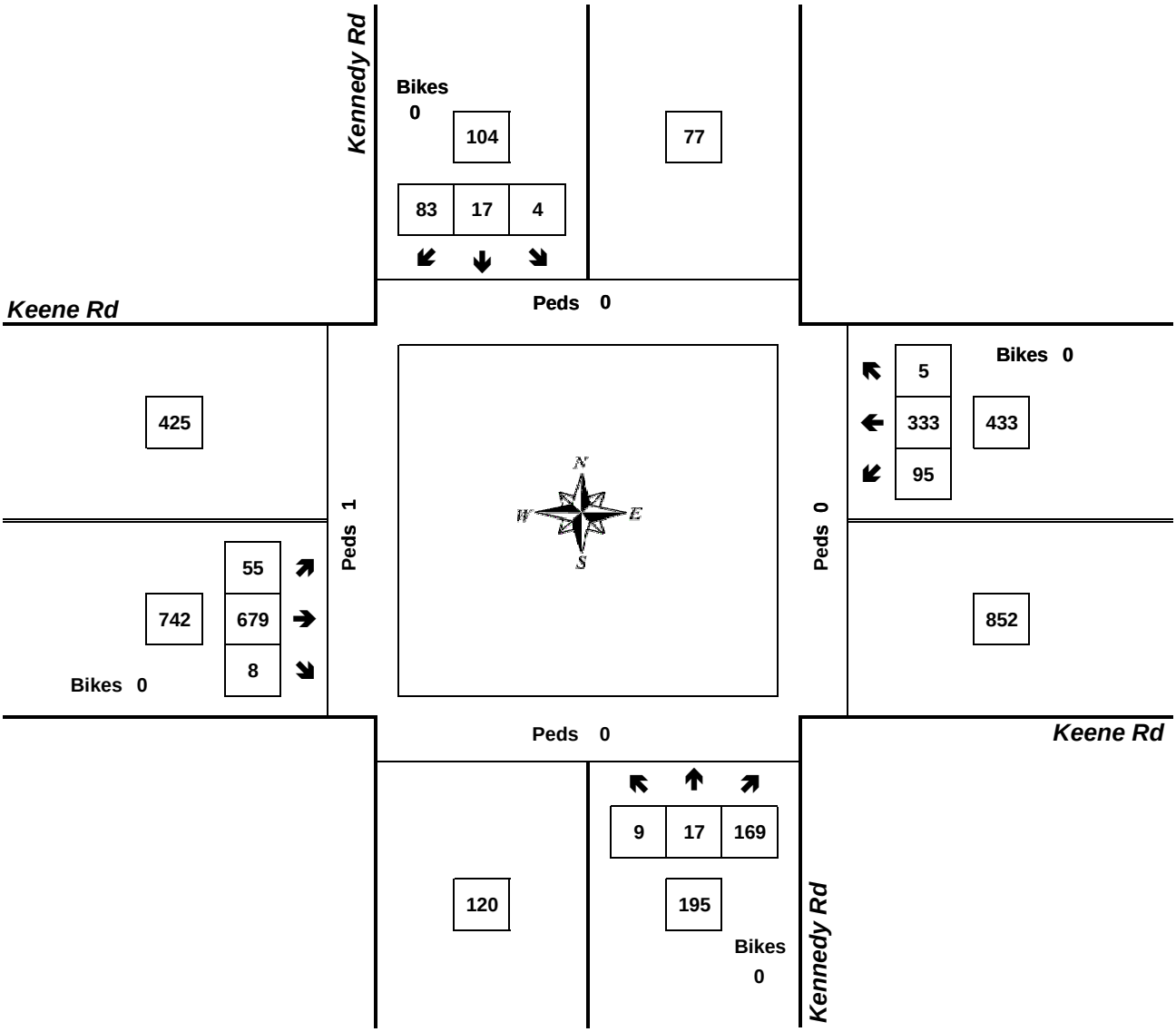
Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	2	0	3	5	0	2	5	7	1	9	0	10	6	15	1	22	44
7:15 AM	2	0	3	5	0	3	6	9	2	13	0	15	9	13	2	24	53
7:30 AM	1	0	6	7	1	4	3	8	1	14	0	15	6	10	2	18	48
7:45 AM	1	0	6	7	1	4	4	9	1	12	0	13	8	12	1	21	50
8:00 AM	0	0	9	9	1	5	3	9	1	13	0	14	10	15	1	26	58

Peak Hour Summary

Clay Carney
(503) 833-2740

Kennedy Rd & Keene Rd

7:00 AM to 8:00 AM
Wednesday, October 25, 2017

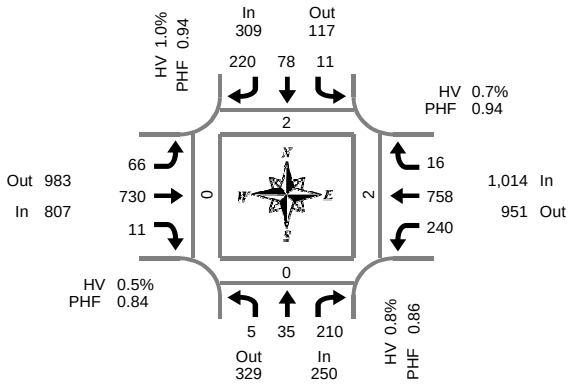


Approach	PHF	HV%	Volume
EB	0.88	1.3%	742
WB	0.85	5.1%	433
NB	0.79	2.6%	195
SB	0.81	6.7%	104
Intersection	0.92	3.0%	1,474

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Kennedy Rd & Keene Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	15	45	0	3	12	43	1	15	118	1	0	56	166	2	0	476	0	0	0	0
4:15 PM	2	11	59	0	4	19	45	0	16	172	1	1	51	145	3	0	528	0	0	0	0
4:30 PM	1	10	41	0	2	19	60	0	21	158	2	1	49	149	5	0	517	0	0	0	0
4:45 PM	1	4	59	0	5	21	56	0	18	176	1	0	55	203	3	0	602	0	0	0	0
5:00 PM	1	14	44	0	1	11	60	0	22	215	4	0	54	157	3	2	586	0	0	0	0
5:15 PM	2	9	62	0	3	23	55	0	17	178	3	0	70	198	3	0	623	0	0	0	0
5:30 PM	1	8	45	0	2	23	49	0	9	161	3	1	61	200	7	0	569	2	0	2	0
5:45 PM	1	8	57	0	9	21	42	0	15	166	0	0	51	173	4	1	547	2	0	0	0
Total Survey	9	79	412	0	29	149	410	1	133	1,344	15	3	447	1,391	30	3	4,448	4	0	2	0

Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	250	329	579	0	309	117	426	0	807	983	1,790	1	1,014	951	1,965	2	2,380	2	0	2	0
%HV	0.8%				1.0%				0.5%				0.7%				0.7%				
PHF	0.86				0.94				0.84				0.94				0.96				

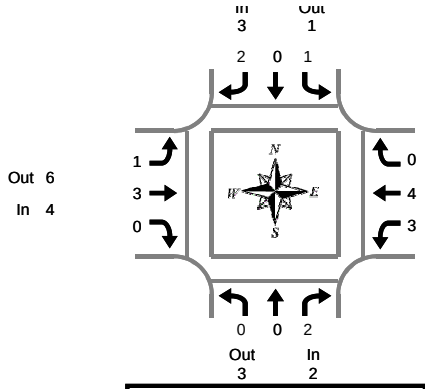
By Movement	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	5	35	210	250	11	78	220	309	66	730	11	807	240	758	16	1,014	2,380
%HV	0.0%	0.0%	1.0%	0.8%	9.1%	0.0%	0.9%	1.0%	1.5%	0.4%	0.0%	0.5%	1.3%	0.5%	0.0%	0.7%	0.7%
PHF	0.63	0.63	0.85	0.86	0.55	0.85	0.92	0.94	0.75	0.85	0.69	0.84	0.86	0.93	0.57	0.94	0.96

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	4	40	204	0	14	71	204	1	70	624	5	2	211	663	13	0	2,123	0	0	0	0
4:15 PM	5	39	203	0	12	70	221	0	77	721	8	2	209	654	14	2	2,233	0	0	0	0
4:30 PM	5	37	206	0	11	74	231	0	78	727	10	1	228	707	14	2	2,328	0	0	0	0
4:45 PM	5	35	210	0	11	78	220	0	66	730	11	1	240	758	16	2	2,380	2	0	2	0
5:00 PM	5	39	208	0	15	78	206	0	63	720	10	1	236	728	17	3	2,325	4	0	2	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Kennedy Rd & Keene Rd

Tuesday, October 24, 2017
4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	4	4	0	0	0	0	0	5	1	6	2	0	0	2	12
4:15 PM	0	1	3	4	1	1	0	2	1	1	0	2	0	1	0	1	9
4:30 PM	0	0	0	0	0	0	1	1	0	1	0	1	2	2	0	4	6
4:45 PM	0	0	0	0	1	0	1	2	0	0	0	0	1	2	0	3	5
5:00 PM	0	0	2	2	0	0	0	0	1	1	0	2	1	0	0	1	5
5:15 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
5:30 PM	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	2	3
5:45 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	4	0	4	5
Total Survey	0	1	10	11	2	1	3	6	2	10	1	13	7	11	0	18	48

Heavy Vehicle Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Kennedy Rd			Southbound Kennedy Rd			Eastbound Keene Rd			Westbound Keene Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	2	3	5	3	1	4	4	6	10	7	6	13	16
PHF	0.06			0.15			0.11			0.22			0.15

By Movement	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	2	2	1	0	2	3	1	3	0	4	3	4	0	7	16
PHF	0.00	0.00	0.07	0.06	0.13	0.00	0.25	0.15	0.25	0.11	0.00	0.11	0.19	0.17	0.00	0.22	0.15

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

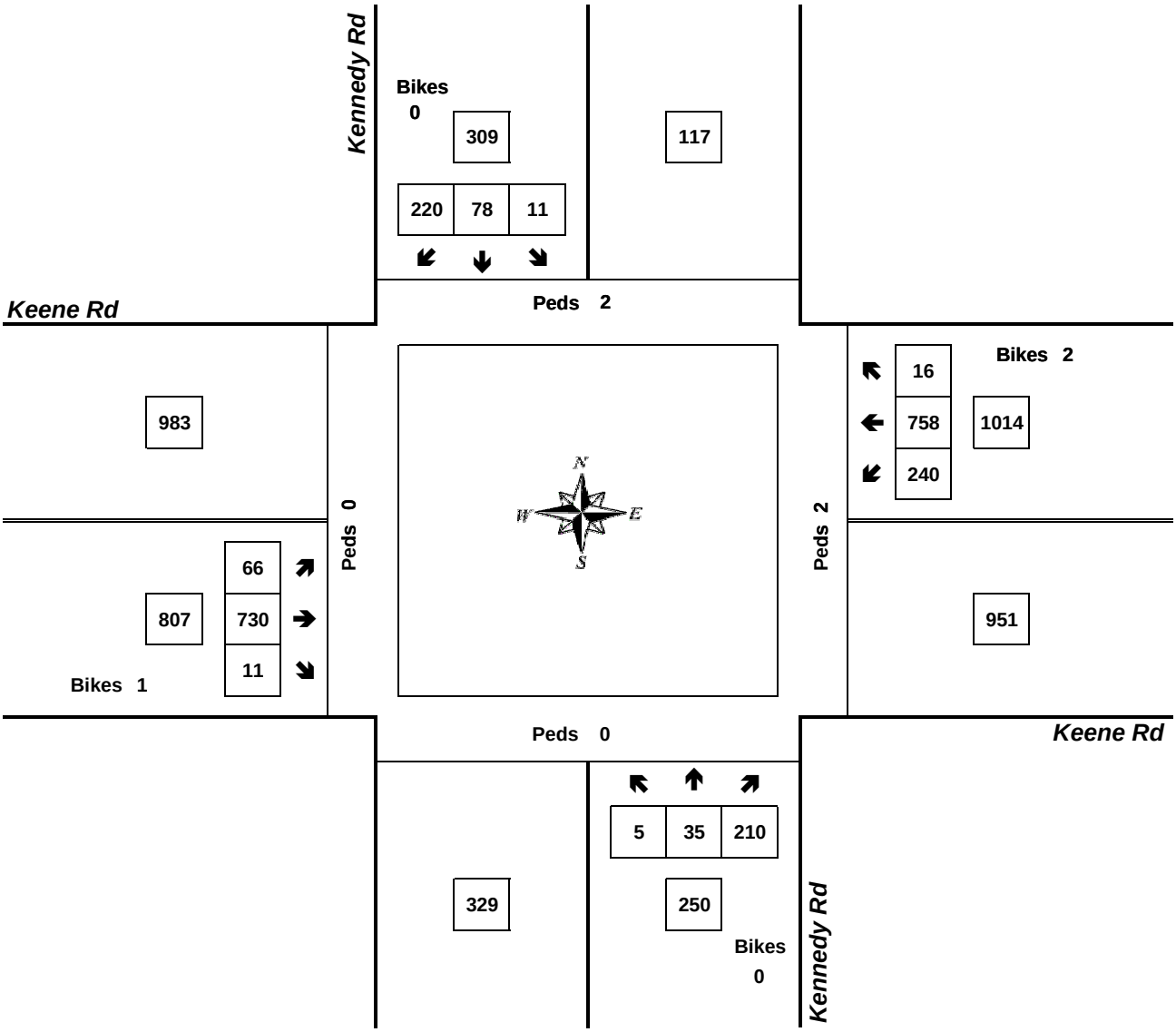
Interval Start Time	Northbound Kennedy Rd				Southbound Kennedy Rd				Eastbound Keene Rd				Westbound Keene Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	1	7	8	2	1	2	5	1	7	1	9	5	5	0	10	32
4:15 PM	0	1	5	6	2	1	2	5	2	3	0	5	4	5	0	9	25
4:30 PM	0	0	2	2	1	0	2	3	1	4	0	5	4	5	0	9	19
4:45 PM	0	0	2	2	1	0	2	3	1	3	0	4	3	4	0	7	16
5:00 PM	0	0	3	3	0	0	1	1	1	3	0	4	2	6	0	8	16

Peak Hour Summary

Clay Carney
(503) 833-2740

Kennedy Rd & Keene Rd

4:45 PM to 5:45 PM
Tuesday, October 24, 2017



Approach	PHF	HV%	Volume
EB	0.84	0.5%	807
WB	0.94	0.7%	1,014
NB	0.86	0.8%	250
SB	0.94	1.0%	309
Intersection	0.96	0.7%	2,380

Count Period: 4:00 PM to 6:00 PM

10/24/2017
Altitude MJ

	Enter	Exit
7:00	1	0
7:15	0	0
7:30	0	0
7:45	1	0
8:00	2	2
8:15	0	1
8:30	0	0
8:45	2	0
4:00	3	1
4:15	4	3
4:30	5	4
4:45	1	4
5:00	5	4
5:15	3	6
5:30	9	4
5:45	0	8

	Enter	Exit	Total
AM Peak	4	3	7
PM Peak	17	22	39

10/24/2017
Green 2 Go

	Enter	Exit
7:00	0	0
7:15	0	0
7:30	0	0
7:45	2	0
8:00	4	0
8:15	1	0
8:30	2	0
8:45	8	0
4:00	19	21
4:15	24	17
4:30	15	26
4:45	21	18
5:00	16	17
5:15	22	14
5:30	17	14
5:45	29	14

	Enter	Exit	Total
AM Peak	15	0	15
PM Peak	79	82	161

10/24/2017
The Bake Shop

	Enter	Exit
7:00	0	0
7:15	0	0
7:30	0	0
7:45	0	0
8:00	0	0
8:15	0	0
8:30	0	0
8:45	0	0
4:00	7	5
4:15	7	10
4:30	0	4
4:45	6	5
5:00	8	9
5:15	8	7
5:30	8	10
5:45	11	5

	Enter	Exit	Total
AM Peak	0	0	0
PM Peak	35	31	66

Walla Walla Weedery

May-17

Interval Start Time	Driveway Volumes						Poplar Street Volumes	
	NB L	NB R	Entering	EB R	WB L	Exiting	EB T	WB T
4:00 PM	1	7	8	7	4	11	102	118
4:15 PM	3	8	11	4	6	10	91	101
4:30 PM	2	14	16	8	6	14	104	138
4:45 PM	1	10	11	8	3	11	97	103
5:00 PM	1	10	11	5	6	11	88	144
5:15 PM	1	9	10	7	2	9	101	118
5:30 PM	3	13	16	7	7	14	79	92
5:45 PM	3	10	13	5	4	9	64	66

Peak Hour (4:30-5:30 PM)	5	43	48	28	17	45	390	503

APPENDIX B

In-Process Trips

Another portion of retail traffic volumes is in the form of pass-by trips and diverted linked trips with only a portion of the project volume defined as primary trips. A pass-by trip is defined as a trip made as an intermediate stop on the way to a primary destination; such a trip is attracted from traffic "passing by" a site on an adjacent street, which contains direct access to the generator and include a significant amount of "spur-of-the-moment" trips. A second traffic volume element associated with this use but to a lesser degree is the diverted trip which is a vehicle already on the traffic network which decides to divert to the project site from a neighboring roadway. In both cases the trip is convenience based, however, diverted trips typically are planned trips going slightly out of the way for an intermediate trip on the way to a different final destination.

Typically, to give a conservative estimate of project impact, pass-by trips should be examined exclusively as they become transparent or not detectable at outlying intersections. The ITE document, *Trip Generation Handbook*, has studied LUC 820 in terms of pass-by trips and estimates this traffic to 34 percent on average during the P.M. peak hour. In the case of the retail portion of Badger Mountain South, the adjacent roadway of Dallas Road would not have many trips to draw pass-by traffic from. However, the site will have good visibility from I-82 and an adjacent ramp interchange to allow for freeway traffic to easily divert into the site. Therefore the 34 percent in this case is assumed to apply to freeway spur-of-the-moment trips for the retail portion of the site. In effect such trips would be hybrid pass-by/diverted trips, passing by adjacent to the site on I-82; however, these trips would not be transparent at the I-82 ramp intersections. The 34 percent was applied to the external retail trips after the 17 percent internal trip reduction. Calculations are shown in ***Appendix E – Trip Generation*** showing approximately 723 inbound and 752 outbound diverted linked trips during the P.M. peak hour.

Table 4.2 – Trip Generation Volumes-Primary & Diverted Linked Trips provides the total Badger Mountain Subarea external trips separated by primary trips and diverted linked trips.

Table 4.2 – Trip Generation Volumes-Primary & Diverted Linked Trips (Full Build out)

	Total External Trips	Diverted Linked Trips	Primary Trips
AWDT	80090	14781	65309
A.M. Peak Enter	1263	0	1263
A.M. Peak Exit	2777	0	2777
A.M. Total	4040	0	4040
P.M. Peak Enter	4292	723	3569
P.M. Peak Exit	3454	752	2702
P.M. Total	7746	1475	6271

Based on the above, the full build out of the Badger Mountain Subarea would be expected to add 6271 P.M. peak hour trips to the roadway network outside of the Dallas Road/I-82 interchange.

The first mitigation phase of development of the Badger Mountain Subarea is for 1,000 P.M. peak hour trips. Based on the expected 7746 external trips for full build out, the 1000 trip threshold would be 12.91% of the full build out volumes. The trip breakdown for this phase is compiled in ***Table 4.3 – Trip Generation Volumes-Primary & Diverted Linked Trips (Phase 1)***.

Table 4.3 – Trip Generation Volumes-Primary & Diverted Linked Trips (Phase 1)

	Total External Trips	*Diverted Linked Trips*	*Primary Trips*
AWDT	10340	1908	8432
A.M. Peak Enter	163	0	163
A.M. Peak Exit	359	0	359
A.M. Total	522	0	522
P.M. Peak Enter	554	93	461
P.M. Peak Exit	446	97	349
P.M. Total	1000	190	810

TRIP DISTRIBUTION & ASSIGNMENT

Trip distribution describes the process by which project generated trips are dispersed onto the street network surrounding the site. P.M. peak hour site generated trips for Phase 1 are expected to follow the trip pattern shown in ***Figure 4.2 - Phase 1 Trip Distribution & Assignment***. The percentages in ***Figure 4.2 - Phase 1 Trip Distribution & Assignment*** are generally based on the proximity to major corridors as well as the concentrations of other residential and commercial areas in the nearby Tri-Cities region.

4.3 FUTURE TRAFFIC

FUTURE P.M. PEAK HOUR VOLUMES

The horizon year of 2015 was chosen for Phase 1 build out. Baseline 2015 peak hour volumes without the project were derived by applying a 2 percent growth rate per year to the existing volumes of ***Figure 2.3 - Existing PM Peak Hour Volumes***. This growth rate should cover background growth along with new developments in the area. 2015 intersection volumes without the project are given in ***Figure 4.3 – 2015 PM Peak Hour Volumes Without Project***. ***Figure 4.4 – 2015 PM Peak Hour Volumes with Project Phase 1*** provides estimated 2015 P.M. peak hour volumes with Phase 1 project volumes included.

John A. Manix

From: John A. Manix
Sent: Tuesday, October 24, 2017 5:49 PM
To: Deskins, John; Doug Ehlebracht
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study
Attachments: Badger South Trip Gen Info.pdf

John: This is very useful. They are calling it phase 1 mitigation plan, which assumes 1000 PM peak hour primary trips (total minus internal capture, pass-by and diverted link trips) , to work on a mitigation plan to address these trips.

I am going to assume 40% primary trips for full build out will be in the system in 2022 (our horizon year). Let me know if you think this is significantly off. If you know of a full build out year, that would be of help.

Doug: See the trips bubbled on pdf page 3 and 7 of the following link for our pass-by trip through both the Arena/Dalles intersection and the Bombing Run/Kennedy intersection. Give me your estimate the trips assigned to these intersections using the percent of trips shown on the trip distribution map on pdf page 3.
\\pbsenv.lan\L\Projects\66000\66057\66057-000\Traffic\Correspondence\Incoming\In-process_trips\BadgerSouthTripGenInfo(003).pdf

Give me a call for more instructions.

John Manix, PE | Senior Traffic Engineer | PBS Vancouver | 360.567.2117 (direct) | 360.607.1854 (cell)

From: Deskins, John [mailto:jdeskins@CI.RICHLAND.WA.US]
Sent: Tuesday, October 24, 2017 11:41 AM
To: John A. Manix <John.Manix@pbsusa.com>
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study

John,

Here is some information. I didn't have time to review as thoroughly as I'd like. It looks like Phase 1 is about 12.9% of the Full Build Out, but I never found a figure that truly identifies what area is included in Phase 1 which was assumed to be complete in 2015 from the 2010 report. My sense is they are about 4-5 years behind though right now. Hopefully, this is helpful.

Sincerely,

John Deskins, PE, PTOE
Traffic Engineer
City of Richland
509.942.7514
www.ci.richland.wa.us

From: John A. Manix [mailto:John.Manix@pbsusa.com]
Sent: Tuesday, October 24, 2017 10:45 AM
To: Deskins, John <jdeskins@CI.RICHLAND.WA.US>
Subject: FW: West Richland Cannabis Sales- Comparison sites for trip generation study

John: Nice catching up. If I get out your way, I will try and look you up. Please send TIA or trip generation and distribution to us for the Badger Mt South development. We are doing the TIA for Arena Properties or Nirvana Cannabis at 4950 Area Road. We have been directed to include Badger Mt South trips as in-process background traffic.

John Manix, PE | Senior Traffic Engineer | PBS Vancouver | 360.567.2117 (direct) | 360.607.1854 (cell)

From: Drew Woodruff [mailto:drew@westrichland.org]
Sent: Monday, October 16, 2017 11:30 AM
To: John A. Manix <John.Manix@pbsusa.com>
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study

This is a City of Richland Development, not City of West Richland. We do not have anything on it.

DREW WOODRUFF, P.E.
CITY ENGINEER
3601 W. VAN GIESEN ST.
WEST RICHLAND, WA 99353
509-967-5434
www.westrichland.org

From: John A. Manix [mailto:John.Manix@pbsusa.com]
Sent: Monday, October 16, 2017 11:28 AM
To: Drew Woodruff
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study

Please forward the Badger South development data. We will need the TIA or an excerpt that shows the trips and the distribution.

John Manix, PE | Senior Traffic Engineer | PBS Vancouver | 360.567.2117 (direct) | 360.607.1854 (cell)

From: Drew Woodruff [mailto:drew@westrichland.org]
Sent: Monday, October 16, 2017 11:11 AM
To: John A. Manix <John.Manix@pbsusa.com>
Cc: Doug Ehlebracht <Doug.Ehlebracht@pbsusa.com>; Roscoe Slade <roscoe@westrichland.org>
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study

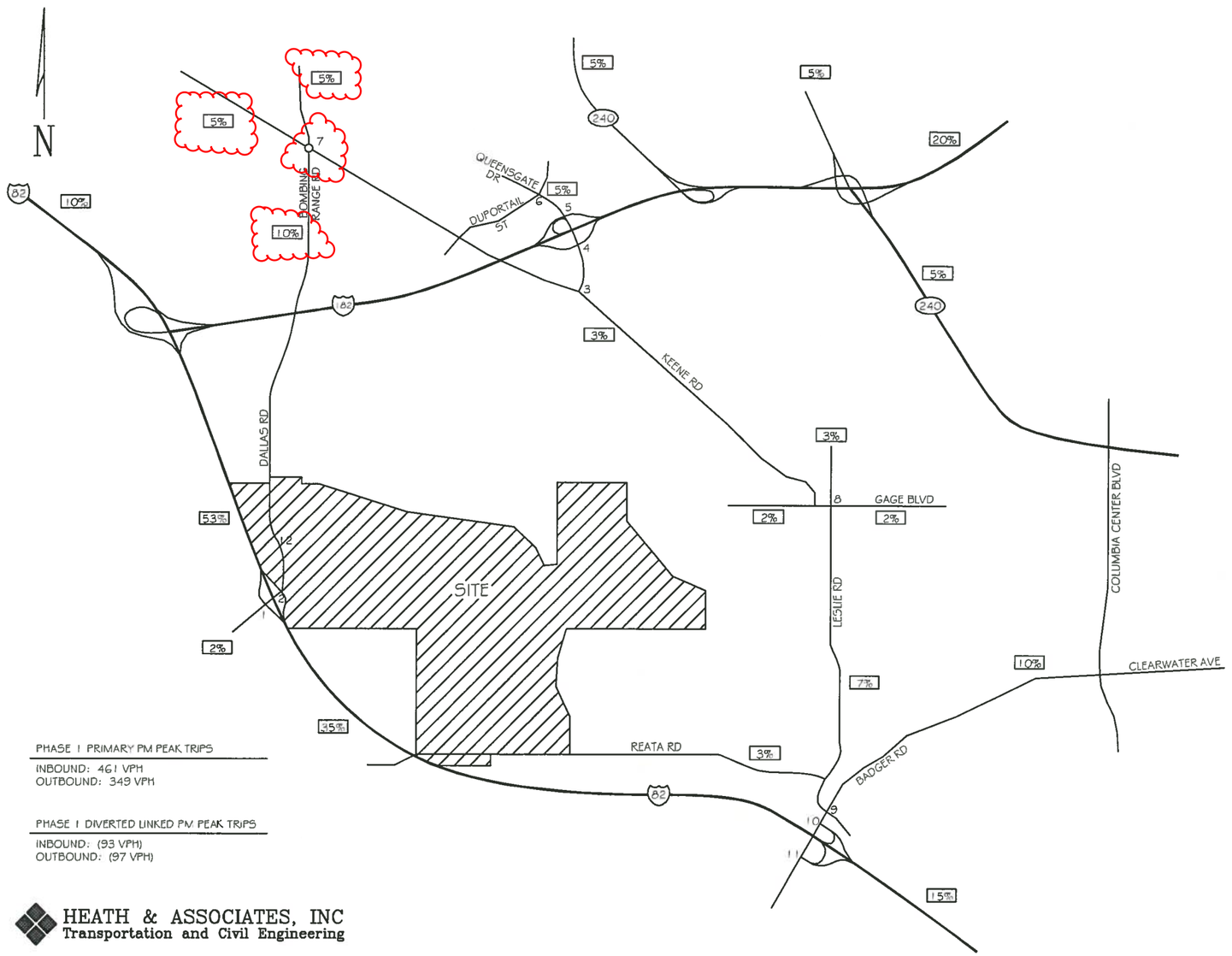
John

The 3 lot short plat is the Tim Bush property. Badger South is in City of Richland. It is a very large proposed development that has done a few of the phases. I am sure that COR has some data on it.

Thanks.

DREW WOODRUFF, P.E.
CITY ENGINEER
3601 W. VAN GIESEN ST.
WEST RICHLAND, WA 99353
509-967-5434
www.westrichland.org

From: John A. Manix [mailto:John.Manix@pbsusa.com]
Sent: Monday, October 16, 2017 10:45 AM
To: Drew Woodruff
Cc: Doug Ehlebracht; Roscoe Slade
Subject: RE: West Richland Cannabis Sales- Comparison sites for trip generation study



PHASE 1 PRIMARY PM PEAK TRIPS

INBOUND: 461 VPH
OUTBOUND: 349 VPH

PHASE 1 DIVERTED LINKED PM PEAK TRIPS

INBOUND: (93 VPH)
OUTBOUND: (97 VPH)

HEATH & ASSOCIATES, INC
Transportation and Civil Engineering

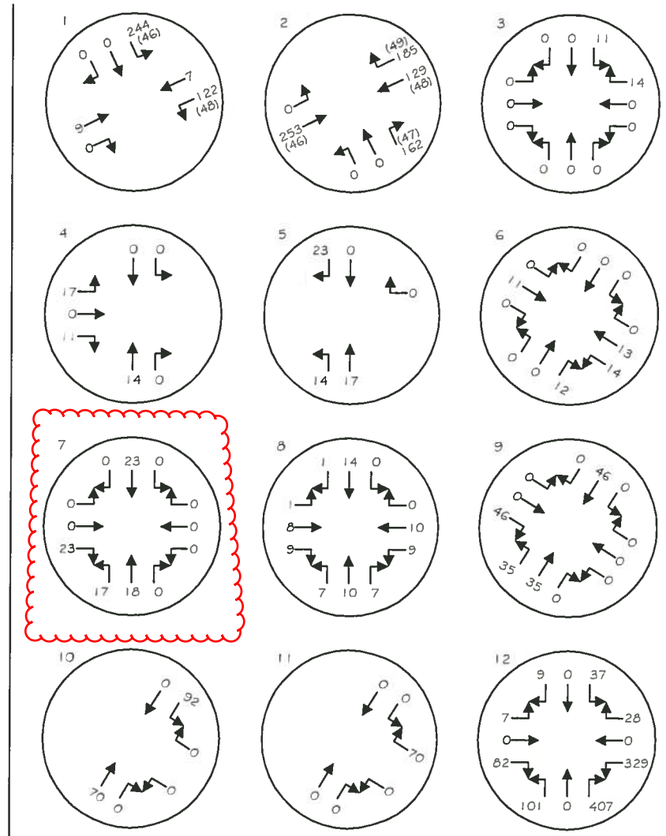


FIG 4.2 - PHASE 1 TRIP DISTRIBUTION & ASSIGNMENT
BADGER MOUNTAIN SUBAREA PLAN - TRANSPORTATION

BADGER MOUNTAIN SOUTH: A WALKABLE AND SUSTAINABLE COMMUNITY

NOT TO SCALE

APRIL, 2010

CITY OF RICHLAND

THESE DRAWINGS WERE PREPARED FOR BADGER MOUNTAIN SOUTH IN RICHLAND WA © PACWEST ENGINEERING LLC

Johnson Braund
PacWest Engineering
VSI DEVELOPMENT LLC

Appendix E – Trip Generation

BADGER MOUNTAIN SOUTH MASTER PLAN TRIP GENERATION

This letter serves to provide trip generation information for the Badger Mountain South master plan development. This site is estimated to have the following square footage and lot counts: 2,317,000 square feet of commercial area (including destination retail, specialty retail, and commercial), 3564 low to medium density single family units, and 2000 medium high density multifamily units. A total of 5 schools in addition to parks, trails, and public open space are also to be provided.

Given the type of uses, the chosen land uses are Shopping Center (LUC 820) for the retail/commercial areas, Single Family Detached Housing (LUC 210) for the low and medium density housing, and Apartments (LUC 220) for the medium high multifamily housing based on ITE Land Use Codes found in *Trip Generation, 8th Edition*. The schools and parks/open space are typically expected to have trips internal to the master plan and not generate trips to the external intersections. A site plan is attached showing the proposed layout.

Trip Generation

The trip generation data presented in this letter was taken from the Institute of Transportation Engineer's publication *Trip Generation*, 8th Edition. ITE equations were used rather than rates due to the generally high correlation factors.

A significant amount of the traffic volumes are expected to remain internal to the master plan. Trips between the retail/commercial sites and the residential areas would not add trips to the external intersections. The size of this master plan, coupled with the types of land uses provided, would lend to high internal capture rates. For this analysis, an internal capture rate of 17% was chosen.

Badger Mountain South
Trip Generation Volumes – Full Buildout

	2,317,000 ft² *Shopping Ctr*	*4,128 units* *Single Family*	*2,000 units* *Apartments*	*Total*	*External Trips (17% Int Cap)*
AWDT	52377	31873	12244	96494	80090 vpd
AM Peak Enter	600	725	197	1522	1263 vph
AM Peak Exit	384	2174	787	3345	2777 vph
AM Total	984	2899	984	4867	4040 vph
PM Peak Enter	2560	1884	727	5171	4292 vph
PM Peak Exit	2665	1106	391	4162	3454 vph
PM Total	5225	2990	1118	9333	7746 vph

Another portion of retail traffic volumes is in the form of pass-by trips and diverted linked trips with only a portion of the project volume defined as primary trips. A pass-by trip is defined as a trip made as an intermediate stop on the way to a primary destination. Such a trip is attracted from traffic "passing by" a site on an adjacent street which contains direct access to the generator. A second traffic volume element associated with this use but to a lesser degree is the diverted trip which is a vehicle already on the traffic network which decides to divert to the project site from a neighboring roadway. In both cases the trip to and from the project is in some sense "spur of the moment" and convenience based.

Typically, to give a conservative estimate of project impact, pass-by trips should be examined exclusively as they become transparent or not detectable at outlying intersections. The ITE document, Trip Generation Handbook, has studied LUC 820 in terms of pass-by trips and estimates this traffic to 34 percent on average during the PM peak hour. In the case of the retail portion of Badger Mountain South, the adjacent roadway of Dallas Road would not have many trips to draw pass-by traffic from. However, the site will have good visibility from I-82 and an adjacent ramp interchange to allow for freeway traffic to easily divert into the site. Therefore the 34 percent in this case is assumed to apply to freeway spur of the moment trips for the retail portion of the site. The 34 percent was applied to the external retail trips after the 17 percent internal trip reduction. The breakdown of retail primary and diverted linked trips are given below.

LUC 820 Shopping Center
Trip Generation Volumes
Adjusted for Diverted Linked Trips

	External Retail Trips (after 17% Internal Cap)	*Diverted Linked Trips (34% of External)*
AWDT	43473	14781
AM Peak Enter	498	0
AM Peak Exit	319	0
AM Total	817	0
PM Peak Enter	2125	723
PM Peak Exit	2212	752
PM Total	4337	1475

The above two tables were then coalesced into the following table, which provides the total Badger Mountain South external trips separated by primary trips and diverted linked trips.

Badger Mountain South
Trip Generation Volumes
Primary and Diverted Linked Trips

	Total External Trips	*Diverted Linked Trips*	*Primary Trips*
AWDT	80090	14781	65309
AM Peak Enter	1263	0	1263
AM Peak Exit	2777	0	2777
AM Total	4040	0	4040
PM Peak Enter	4292	723	3569
PM Peak Exit	3454	752	2702
PM Total	7746	1475	6271

Based on the above, the full buildout of the Badger Mountain South Master Plan would be expected to add 6271 PM peak hour trips to the roadway network outside of the Dallas Rd/I-82 interchange.

The first mitigation phase of the Badger Mountain South Master Plan is for 1000 PM peak hour trips. Based on the expected 7746 external trips for full buildout, the 1000 trip threshold would be 12.91% of the full buildout volumes. The breakdown for this phase is given below:

Badger Mountain South Phase I
Trip Generation Volumes
Primary and Diverted Linked Trips

	Total External Trips	*Diverted Linked Trips*	*Primary Trips*
AWDT	10340	1908	8432
AM Peak Enter	163	0	163
AM Peak Exit	359	0	359
AM Total	522	0	522
PM Peak Enter	554	93	461
PM Peak Exit	446	97	349
PM Total	1000	190	810

Summary of Trip Generation Calculation
For 2317 Th.Sq.Ft. GLA of Shopping Center
April 07, 2010

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	22.61	0.00	1.00	52377
7-9 AM Peak Hour Enter	0.26	0.00	1.00	600
7-9 AM Peak Hour Exit	0.17	0.00	1.00	384
7-9 AM Peak Hour Total	0.42	0.00	1.00	984
4-6 PM Peak Hour Enter	1.10	0.00	1.00	2560
4-6 PM Peak Hour Exit	1.15	0.00	1.00	2665
4-6 PM Peak Hour Total	2.26	0.00	1.00	5225
AM Pk Hr, Generator, Enter	0.00	0.00	1.00	0
AM Pk Hr, Generator, Exit	0.00	0.00	1.00	0
AM Pk Hr, Generator, Total	0.00	0.00	1.00	0
PM Pk Hr, Generator, Enter	0.00	0.00	1.00	0
PM Pk Hr, Generator, Exit	0.00	0.00	1.00	0
PM Pk Hr, Generator, Total	0.00	0.00	1.00	0
Saturday 2-Way Volume	28.88	0.00	1.00	66920
Saturday Peak Hour Enter	1.48	0.00	1.00	3437
Saturday Peak Hour Exit	1.37	0.00	1.00	3172
Saturday Peak Hour Total	2.85	0.00	1.00	6609
Sunday 2-Way Volume	17.45	0.00	1.00	40429
Sunday Peak Hour Enter	0.00	0.00	1.00	0
Sunday Peak Hour Exit	0.00	0.00	1.00	0
Sunday Peak Hour Total	0.00	0.00	1.00	0

Note: A zero indicates no data available.
The above rates were calculated from these equations:

24-Hr. 2-Way Volume:	LN(T) = .65LN(X) + 5.83, R^2 = 0.78
7-9 AM Peak Hr. Total:	LN(T) = .59LN(X) + 2.32
	R^2 = 0.52 , 0.61 Enter, 0.39 Exit
4-6 PM Peak Hr. Total:	LN(T) = .67LN(X) + 3.37
	R^2 = 0.81 , 0.49 Enter, 0.51 Exit
AM Gen Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit
PM Gen Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit
Sat. 2-Way Volume:	LN(T) = .63LN(X) + 6.23, R^2 = 0.82
Sat. Pk Hr. Total:	LN(T) = .65LN(X) + 3.76
	R^2 = 0.83 , 0.52 Enter, 0.48 Exit
Sun. 2-Way Volume:	T = 15.63(X) + 4214.46, R^2 = 0.52
Sun. Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Table 5.6 (Cont'd)
Pass-By Trips and Diverted Linked Trips
Weekday, p.m. Peak Period

Land Use 820—Shopping Center

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
237	W. Windsor Twp, NJ	Winter 1988/89	n/a	4:00–6:00 p.m.	—	52	—	48	n/a	46,000	Booz Allen & Hamilton
242	Willow Grove, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	63	—	37	n/a	26,000	McMahon Associates
297	Whitehall, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	67	—	33	n/a	26,000	Orth-Rodgers & Assoc. Inc.
360	Broward Cnty., FL	Winter 1988/89	n/a	4:00–6:00 p.m.	—	56	—	44	n/a	73,000	McMahon Associates
370	Pittsburgh, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	81	—	19	n/a	33,000	Wilbur Smith
150	Portland, OR	n/a	519	4:00–6:00 p.m.	6	—	26	68	n/a	25,000	Kittleson and Associates
150	Portland, OR	n/a	655	4:00–6:00 p.m.	7	—	28	65	n/a	30,000	Kittleson and Associates
760	Calgary, Alberta	Oct-Dec 1987	15,436	4:00–6:00 p.m.	39	—	41	20	n/a	n/a	City of Calgary DOT
178	Bordentown, NJ	Apr. 1989	154	2:00–6:00 p.m.	—	65	—	35	n/a	37,980	Raymond Keyes Assoc.
144	Manalapan, NJ	Jul. 1990	176	3:30–6:15 p.m.	44	—	24	32	n/a	69,347	Raymond Keyes Assoc.
549	Natick, MA	Feb. 1989	n/a	4:45–5:45 p.m.	26	—	41	33	n/a	48,782	Raymond Keyes Assoc.

Average Pass-By Trip Percentage: 34

Summary of Trip Generation Calculation
For 4128 Dwelling Units of Single Family Detached Housing
April 05, 2010

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	7.72	0.00	1.00	31873
7-9 AM Peak Hour Enter	0.18	0.00	1.00	725
7-9 AM Peak Hour Exit	0.53	0.00	1.00	~~2175~~ 2174
7-9 AM Peak Hour Total	0.70	0.00	1.00	2899
4-6 PM Peak Hour Enter	0.46	0.00	1.00	1884
4-6 PM Peak Hour Exit	0.27	0.00	1.00	1106
4-6 PM Peak Hour Total	0.72	0.00	1.00	2990
AM Pk Hr, Generator, Enter	0.18	0.00	1.00	755
AM Pk Hr, Generator, Exit	0.52	0.00	1.00	2147
AM Pk Hr, Generator, Total	0.70	0.00	1.00	2902
PM Pk Hr, Generator, Enter	0.44	0.00	1.00	1808
PM Pk Hr, Generator, Exit	0.25	0.00	1.00	1017
PM Pk Hr, Generator, Total	0.68	0.00	1.00	2826
Saturday 2-Way Volume	8.79	0.00	1.00	36289
Saturday Peak Hour Enter	0.47	0.00	1.00	1952
Saturday Peak Hour Exit	0.42	0.00	1.00	1731
Saturday Peak Hour Total	0.89	0.00	1.00	3683
Sunday 2-Way Volume	8.84	0.00	1.00	36478
Sunday Peak Hour Enter	0.36	0.00	1.00	1468
Sunday Peak Hour Exit	0.32	0.00	1.00	1301
Sunday Peak Hour Total	0.67	0.00	1.00	2769

Note: A zero indicates no data available.
The above rates were calculated from these equations:

24-Hr. 2-Way Volume:	LN(T) = .92LN(X) + 2.71, R^2 = 0.96
7-9 AM Peak Hr. Total:	T = .7(X) + 9.74
	R^2 = 0.89 , 0.25 Enter, 0.75 Exit
4-6 PM Peak Hr. Total:	LN(T) = .9LN(X) + .51
	R^2 = 0.91 , 0.63 Enter, 0.37 Exit
AM Gen Pk Hr. Total:	T = .7(X) + 12.37
	R^2 = 0.89 , 0.26 Enter, 0.74 Exit
PM Gen Pk Hr. Total:	LN(T) = .88LN(X) + .62
	R^2 = 0.91 , 0.64 Enter, 0.36 Exit
Sat. 2-Way Volume:	LN(T) = .95LN(X) + 2.59, R^2 = 0.92
Sat. Pk Hr. Total:	T = .89(X) + 9.56
	R^2 = 0.91 , 0.53 Enter, 0.47 Exit
Sun. 2-Way Volume:	T = 8.84(X) + -13.31, R^2 = 0.94
Sun. Pk Hr. Total:	LN(T) = .91LN(X) + .35
	R^2 = 0.87 , 0.53 Enter, 0.47 Exit

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 2000 Dwelling Units of Apartments
April 05, 2010

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	6.12	0.00	1.00	12244
7-9 AM Peak Hour Enter	0.10	0.00	1.00	197
7-9 AM Peak Hour Exit	0.39	0.00	1.00	787
7-9 AM Peak Hour Total	0.49	0.00	1.00	984
4-6 PM Peak Hour Enter	0.36	0.00	1.00	~~726~~ 727
4-6 PM Peak Hour Exit	0.20	0.00	1.00	391
4-6 PM Peak Hour Total	0.56	0.00	1.00	1118
AM Pk Hr, Generator, Enter	0.16	0.00	1.00	314
AM Pk Hr, Generator, Exit	0.38	0.00	1.00	769
AM Pk Hr, Generator, Total	0.54	0.00	1.00	1082
PM Pk Hr, Generator, Enter	0.37	0.00	1.00	741
PM Pk Hr, Generator, Exit	0.24	0.00	1.00	474
PM Pk Hr, Generator, Total	0.61	0.00	1.00	1215
Saturday 2-Way Volume	7.72	0.00	1.00	15444
Saturday Peak Hour Enter	0.00	0.00	1.00	0
Saturday Peak Hour Exit	0.00	0.00	1.00	0
Saturday Peak Hour Total	0.42	0.00	1.00	839
Sunday 2-Way Volume	6.37	0.00	1.00	12739
Sunday Peak Hour Enter	0.00	0.00	1.00	0
Sunday Peak Hour Exit	0.00	0.00	1.00	0
Sunday Peak Hour Total	0.00	0.00	1.00	0

Note: A zero indicates no data available.
The above rates were calculated from these equations:

24-Hr. 2-Way Volume:	T = 6.06(X) + 123.56, R^2 = 0.87
7-9 AM Peak Hr. Total:	T = .49(X) + 3.73
	R^2 = 0.83 , 0.2 Enter, 0.8 Exit
4-6 PM Peak Hr. Total:	T = .55(X) + 17.65
	R^2 = 0.77 , 0.65 Enter, 0.35 Exit
AM Gen Pk Hr. Total:	T = .54(X) + 2.45
	R^2 = 0.82 , 0.29 Enter, 0.71 Exit
PM Gen Pk Hr. Total:	T = .6(X) + 14.91
	R^2 = 0.8 , 0.61 Enter, 0.39 Exit
Sat. 2-Way Volume:	T = 7.85(X) + -256.19, R^2 = 0.85
Sat. Pk Hr. Total:	T = .41(X) + 19.23
	R^2 = 0.56 , 0 Enter, 0 Exit
Sun. 2-Way Volume:	T = 6.42(X) + -101.12, R^2 = 0.82
Sun. Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

ITE Trip Generation

Trip Generation Based on Weighted Average Rates

PBS Engineering and Environmental

General			
Land Use Code	Single-Family Detached (dw)		
Independent Variable	Dwellings		
Size (X)		20.00	
ITE Land Use Code		210	

Date:	Analyst:	Project:
10/25/2017	DKE	Arena Properties

	In	Out	Total
Average Weekday	95	95	190
New Trips	95	95	190
AM Peak Hour	4	11	15
New Trips	4	11	15
PM Peak of generati	13	7	20
New Trips	13	7	20

Housing Subdivision, 20 Dwellings, Single Family Homes. Trip gen based on average rate.

Analysis Period	Weekday		
Average Rate	**Rate**		**Trips**
	9.52		190
Entering / Exiting			
% Entering	50%		95
% Exiting	50%		95
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		95	95
Internal Trips		0	0
Passby Trips		0	0
New Trips		95	95

	AM Peak Hour		
Average Rate	**Rate**		**Trips**
	0.75		15
Entering / Exiting			
% Entering	25%		4
% Exiting	75%		11
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		4	11
Internal Trips		0	0
Passby Trips		0	0
New Trips		4	11

Analysis Period	PM Peak of generation, approx. 3		
Average Rate	**Rate**		**Trips**
	1.00		20
Entering / Exiting			
% Entering	63%		13
% Exiting	37%		7
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		13	7
Internal Trips		0	0
Passby Trips		0	0
New Trips		13	7

ITE Trip Generation

Trip Generation Based on Weighted Average Rates

PBS Engineering and Environmental

General			
Land Use Code	Coffee/Donut with drive-through window		
Independent Variable	1,000 Sq Ft		
Size (X)		0.65	
ITE Land Use Code		937	

Date:	Analyst:	Project:
10/25/2017	DKE	Arena Properties

	In	Out	Total
Average Weekday	266	266	532
New Trips	266	266	532
AM Peak Hour	33	32	65
New Trips	33	32	65
PM Peak of generati	14	14	28
New Trips	14	14	28

Coffee Shop, 650 SF. Trip gen based on average rate.

Analysis Period	Weekday		
Average Rate	**Rate**		**Trips**
	818.58		532
Entering / Exiting			
% Entering	50%		266
% Exiting	50%		266
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		266	266
Internal Trips		0	0
Passby Trips		0	0
New Trips		266	266

	AM Peak Hour		
Average Rate	**Rate**		**Trips**
	100.58		65
Entering / Exiting			
% Entering	51%		33
% Exiting	49%		32
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		33	32
Internal Trips		0	0
Passby Trips		0	0
New Trips		33	32

Analysis Period	PM Peak of generation, approx. 3		
Average Rate	**Rate**		**Trips**
	42.80		28
Entering / Exiting			
% Entering	50%		14
% Exiting	50%		14
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		14	14
Internal Trips		0	0
Passby Trips		0	0
New Trips		14	14

ITE Trip Generation

Trip Generation Based on Weighted Average Rates

PBS Engineering and Environmental

General			
Land Use Code	Automobile Care Center		
Independent Variable	1,000 Sq Ft		
Size (X)		8.44	
ITE Land Use Code		942	

Date:	Analyst:	Project:
10/25/2017	DKE	Arena Properties

	In	Out	Total
Average Weekday	0	0	0
New Trips	0	0	0
AM Peak Hour	13	6	19
New Trips	13	6	19
PM Peak of generati	12	14	26
New Trips	12	14	26

RV Repair Center, 8,439 SF. Trip gen based on average rate.

Analysis Period	Weekday		
Average Rate	**Rate**		**Trips**
	0		0
Entering / Exiting			
% Entering	0%		0
% Exiting	0%		0
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		0	0
Internal Trips		0	0
Passby Trips		0	0
New Trips		0	0

	AM Peak Hour		
Average Rate	**Rate**		**Trips**
	2.25		19
Entering / Exiting			
% Entering	66%		13
% Exiting	34%		6
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		13	6
Internal Trips		0	0
Passby Trips		0	0
New Trips		13	6

Analysis Period	PM Peak of generation, approx. 3		
Average Rate	**Rate**		**Trips**
	3.11		26
Entering / Exiting			
% Entering	48%		12
% Exiting	52%		14
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		12	14
Internal Trips		0	0
Passby Trips		0	0
New Trips		12	14

ITE Trip Generation

Trip Generation Based on Weighted Average Rates

PBS Engineering and Environmental

General			
Land Use Code	Automated Car Wash		
Independent Variable	1,000 Sq Ft		
Size (X)		4.53	
ITE Land Use Code		948	

Date:	Analyst:	Project:
10/25/2017	DKE	Arena Properties

	In	Out	Total
Average Weekday	0	0	0
New Trips	0	0	0
AM Peak Hour	0	0	0
New Trips	0	0	0
PM Peak of generati	32	32	64
New Trips	32	32	64

Automated Carwash, 4,532 SF,1 Stall. Trip gen based on higest alternative of the indendent variables.

Analysis Period	Weekday		
Average Rate	**Rate**		**Trips**
	0		0
Entering / Exiting			
% Entering	0%		0
% Exiting	0%		0
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		0	0
Internal Trips		0	0
Passby Trips		0	0
New Trips		0	0

	AM Peak Hour		
Average Rate	**Rate**		**Trips**
	0		0
Entering / Exiting			
% Entering	0%		0
% Exiting	0%		0
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		0	0
Internal Trips		0	0
Passby Trips		0	0
New Trips		0	0

Analysis Period	PM Peak of generation, approx. 3		
Average Rate	**Rate**		**Trips**
	14.12		64
Entering / Exiting			
% Entering	50%		32
% Exiting	50%		32
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		32	32
Internal Trips		0	0
Passby Trips		0	0
New Trips		32	32

ITE Trip Generation

Trip Generation Based on Weighted Average Rates

PBS Engineering and Environmental

General			
Land Use Code	High-Turnover(Sit-down) Restaurant		
Independent Variable	1000 Sq Ft		
Size (X)		2.60	
ITE Land Use Code		932	

Date:	Analyst:	Project:
10/25/2017	DKE	Arena Properties

	In	Out	Total
Average Weekday	166	166	331
New Trips	166	166	332
AM Peak Hour	15	13	28
New Trips	15	13	28
PM Peak of generati	16	10	26
New Trips	16	10	26

Sit-Down Restaurant, 2,600 SF. Trip gen based on average rate.

Analysis Period	Weekday		
Average Rate	**Rate**		**Trips**
	127.15		331
Entering / Exiting			
% Entering	50%		166
% Exiting	50%		166
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		166	166
Internal Trips		0	0
Passby Trips		0	0
New Trips		166	166

	AM Peak Hour		
Average Rate	**Rate**		**Trips**
	10.81		28
Entering / Exiting			
% Entering	55%		15
% Exiting	45%		13
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		15	13
Internal Trips		0	0
Passby Trips		0	0
New Trips		15	13

Analysis Period	PM Peak of generation, approx. 3		
Average Rate	**Rate**		**Trips**
	9.85		26
Entering / Exiting			
% Entering	60%		16
% Exiting	40%		10
New Trips			
% internal	0%		
% pass by	0%		
		In	Out
Total Trips		16	10
Internal Trips		0	0
Passby Trips		0	0
New Trips		16	10

APPENDIX C

Trip Generation Study

November 2, 2017

Drew Woodruff
City of West Richland
3801 W. Van Giesen St
West Richland, Washington 99353

Via email: drew@westrichland.org

Regarding: Trip Generation Study for Cannabis Retail
Arena Properties
4590 Arena Road
West Richland, Washington 99353
PBS Project 66057.000

Dear Mr. Woodruff:

PBS Engineering and Environmental (PBS) has performed a trip generation study to establish the number of trips that will be generated by the proposed Arena Properties cannabis retail store located at 4590 Arena Road in West Richland, Washington. The intent of this study was to use the number of trips in the traffic impact analysis (TIA) report.

PROJECT DESCRIPTION AND BACKGROUND

Arena Properties (Client) is proposing to occupy an existing 2,162-square-foot building at 4950 Arena Road. The building will be converted from a single-family home to a recreational cannabis retail store.

Specialty Retail Center land use (Code 826) in the *Trip Generation Manual*[1], appeared to be the closest land use to the proposed cannabis retail center; however, through discussions with the Client and The City of West Richland (City), it was determined that a cannabis retail store does not satisfy the description of "Specialty Retail Center," and a trip generation study was needed.

PBS proposes trip generation study to provide a rate based on the gross square feet of the proposed land use to calculate TIF as an alternative to the *Trip Generation Manual*. The study would be based on methodology from the *Trip Generation Handbook*[2].

TRIP GENERATION STUDY FOR CANNABIS RETAIL

A trip generation study typically uses three to five study sites to calculate a rate based on the average of all trips entering and exiting the sites. Four cannabis retail stores with similar driveway entrances, surrounding population density, and proximity to the proposed site were chosen as comparison sites for the study. Visits to the sites and discussions with the Client and the City verified the similarity of each with the proposed West Richland cannabis retail center.

---

[1] Institute of Transportation Engineers, *Trip Generation Manual*, 9th Edition, 2012
2Institute of Transportation Engineers, *Trip Generation Handbook*, Second *Edition,* June 2004

The four comparison sites identified as representative of the proposed cannabis retail center include the following:

The Bake Shop
19705 S Griffin Road
Prosser, Washington 99350
1,300 square feet

Altitude MJ
260 Merlot Drive
Prosser, Washington 99350
1,750 square feet

Green2Go
214610 E State Route 397
Kennewick, Washington 99337
2,250 square feet

Walla Walla Weedery (Previous Location)
702 S 9th Avenue
Walla Walla, Washington 99362
4,163 square feet

Traffic count data was ordered and collected by a traffic counting firm in the AM and PM peak hours. The counts were conducted at the entrance of each facility to collect traffic entering and exiting, on a typical weekday, with no special events in process. The data was collected for 15-minute periods from 7:00 am to 9:00 am and 4:00 pm to 6:00 pm. The Walla Walla Weedery data had been collected at the store's previous location with a prior project for the PM peak hour only. AM and PM peak hours were determined by summing the four highest, consecutive, 15-minute periods. Tables 1 and 2 summarize the AM and PM peak hour data for each location and calculates the rate for each site.

Table 1. AM Trip Generation Data for Cannabis Retail

Location	Size of Building (1,000 SF)	AM Peak Hour Volume		AM Rate
		Entering	Exiting	
The Bake Shop	1.3	0	0	0.00
Altitude MJ	1.75	4	3	4.00
Green2Go	2.25	15	0	6.67
Sum and Average Rate	5.30	19	3	4.15
Directional Distribution		86.3%	13.7%	

Table 2. PM Trip Generation Data for Cannabis Retail

Location	Size of Building (1,000 SF)	PM Peak Hour Volume		PM Rate
		Entering	Exiting	
The Bake Shop	1.3	35	31	50.77
Altitude MJ	1.75	17	22	22.29
Green2Go	2.25	79	82	71.56
Walla Walla Weedery	4.16	48	45	22.36
Sum and Average Rate	9.46	179	180	37.95
Directional Distribution		49.9%	50.1%	

With the average rate established for the proposed cannabis retail store in West Richland, the number of trips was estimated for the proposed 2,162 square foot store, the results of which are summarized in Table 3.

Table 3. Trip Generation for Proposed Cannabis Retail

Land Use	**Cannabis Retail**	
Independent Variable	1,000 Square Feet	
Size	2.16	
Peak Periods	AM	PM
In	8	41
Out	1	41
Total	**9**	**82**

Please feel free to contact me at 360.567.2117 or John.Manix@pbsusa.com with any questions or comments.

Sincerely,

John Manix, PE PTOE
Senior Traffic Engineer

Attachment: Traffic Count for the study sites

JM::bmp

JOHN ANDREW MANIX
STATE OF WASHINGTON
37225
REGISTERED
PROFESSIONAL ENGINEER

11/2/17

10/24/2017
Altitude MJ

	Enter	Exit
7:00	1	0
7:15	0	0
7:30	0	0
7:45	1	0
8:00	2	2
8:15	0	1
8:30	0	0
8:45	2	0
4:00	3	1
4:15	4	3
4:30	5	4
4:45	1	4
5:00	5	4
5:15	3	6
5:30	9	4
5:45	0	8

	Enter	Exit	Total
AM Peak	4	3	7
PM Peak	17	22	39

10/24/2017
Green 2 Go

	Enter	Exit
7:00	0	0
7:15	0	0
7:30	0	0
7:45	2	0
8:00	4	0
8:15	1	0
8:30	2	0
8:45	8	0
4:00	19	21
4:15	24	17
4:30	15	26
4:45	21	18
5:00	16	17
5:15	22	14
5:30	17	14
5:45	29	14

	Enter	Exit	Total
AM Peak	15	0	15
PM Peak	79	82	161

10/24/2017
The Bake Shop

	Enter	Exit
7:00	0	0
7:15	0	0
7:30	0	0
7:45	0	0
8:00	0	0
8:15	0	0
8:30	0	0
8:45	0	0
4:00	7	5
4:15	7	10
4:30	0	4
4:45	6	5
5:00	8	9
5:15	8	7
5:30	8	10
5:45	11	5

	Enter	Exit	Total
AM Peak	0	0	0
PM Peak	35	31	66

Walla Walla Weedery

May-17

Interval Start Time	Driveway Volumes						Poplar Street Volumes	
	NB L	NB R	Entering	EB R	WB L	Exiting	EB T	WB T
4:00 PM	1	7	8	7	4	11	102	118
4:15 PM	3	8	11	4	6	10	91	101
4:30 PM	2	14	16	8	6	14	104	138
4:45 PM	1	10	11	8	3	11	97	103
5:00 PM	1	10	11	5	6	11	88	144
5:15 PM	1	9	10	7	2	9	101	118
5:30 PM	3	13	16	7	7	14	79	92
5:45 PM	3	10	13	5	4	9	64	66

Peak Hour (4:30-5:30 PM)	5	43	48	28	17	45	390	503

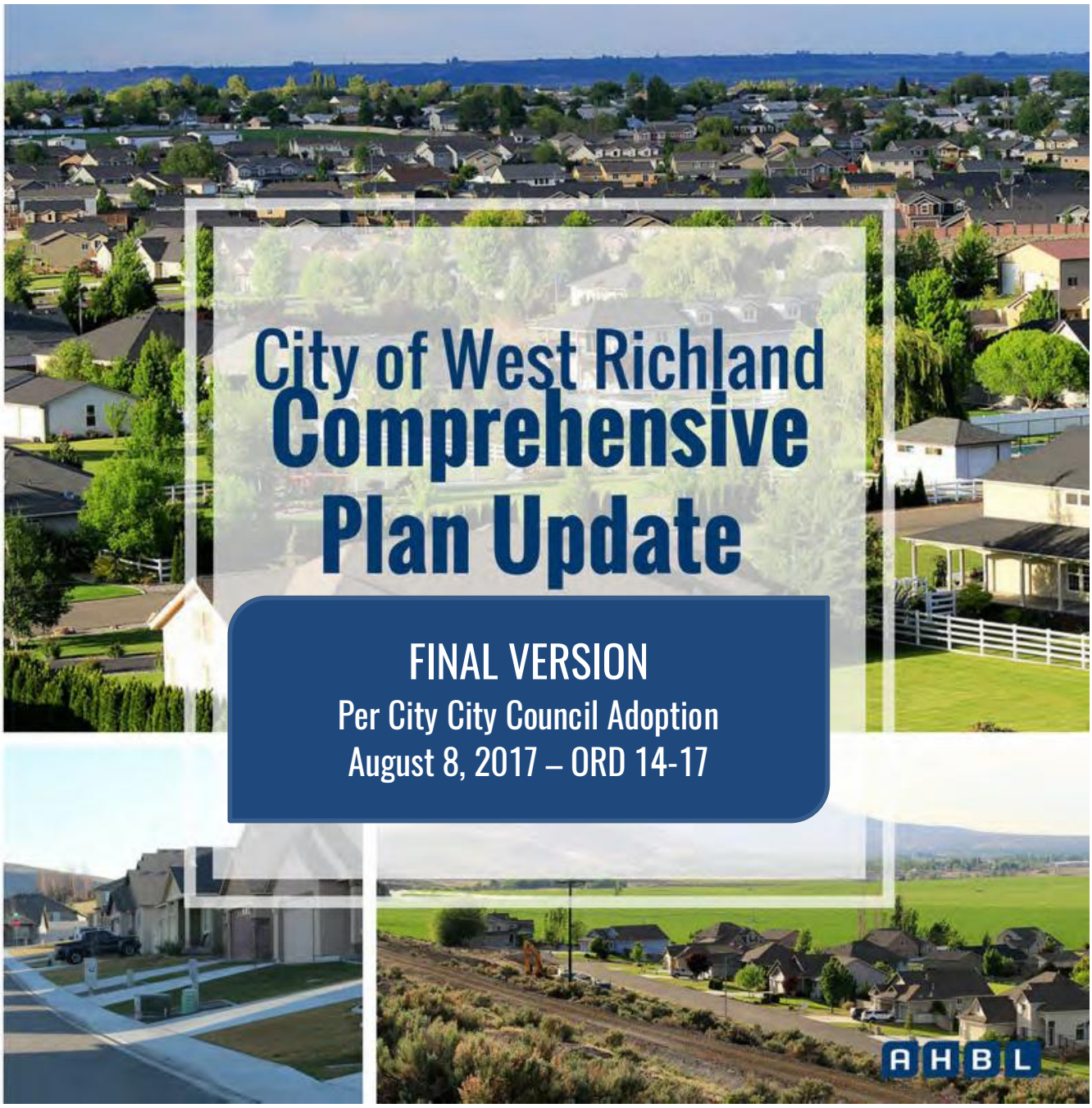
APPENDIX D

Level-of-Service Description

CITY OF WEST RICHLAND

COMPREHENSIVE PLAN UPDATE

2017



Prepared by AHBL, Inc.
With ECONorthwest and Fehr & Peers
For the City of West Richland

- City of West Richland Ordinance No. 18-08 (2008 Bicycle Plan)
- City of West Richland Ordinance No. 2-10 (Mitigation of Development Impacts on the City's Transportation System)
- City of West Richland Ordinances No. 13-16 and 25-16 (Transportation Impact Fees)
- City of West Richland Ordinance No. 15-16 (Complete Streets Policy)
- Ben Franklin Transit 2016 – 2021 Transit Development Plan

Level of Service Standards and Guidelines

To determine the existing and projected capacity of transportation facilities, two different schemes have been established: Level of Service Standards and Level of Service Guidelines.

Level of Service Standards

The GMA requires the city to establish Level of Service Standards for all arterial streets. Level of Service Standards are binding requirements subject to the concept of concurrency under the GMA. Briefly summarized, the GMA prohibits jurisdictions from approving a development if the development causes the Level of Service to decline below the minimum standard adopted for a specific transportation facility, unless improvements or strategies to accommodate the impacts of development are made concurrent with development. Further, the GMA defines "concurrent with development" as the required improvements or strategies in place at the time of development, or a financial commitment to complete the improvements or strategy within six years.

A six-year Capital Improvement Plan that details the city's commitment and ability to achieve the established Level of Service Standards is discussed in the Capital Facilities Element of the city's Comprehensive Plan.

Level of Service categories for arterial streets are described in Table T-1.

Table T-1 – Level of Service Category Descriptions

Level of Service	Description
Level of Service A	Describes a condition of free flow with low volumes and high speeds. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. Stopped delay at intersections is minimal.
Level of Service B	Represents reasonably unimpeded traffic flow operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tensions.
Level of Service C	In the range of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. The selection of speed is now significantly affected by interactions with others in the traffic stream, and maneuvering within the traffic stream requires

	substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.
Level of Service D	Represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.
Level of Service E	Represents operating conditions at or near the maximum capacity level. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor disturbances within the traffic stream will cause breakdowns.
Level of Service F	Describes forced or breakdown flow at very low speeds and long delays. Volumes exceed theoretical capacity. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Operations within the queue are characterized by stop-and-go waves which are extremely unstable.

Source: Benton Franklin Council of Governments

Level of Service Guidelines

Although not required by the GMA, Level of Service Guidelines are established for other transportation facilities provided by the city. These include sidewalks, trails, bicycle lanes, and transit service and amenities. Level of Service Guidelines, in contrast to Level of Service Standards, are not subject to concurrency and are used as general recommendations for guiding the design and development of the remaining transportation facilities. Several transportation facilities subject to the Level of Service Guidelines are funded within the six-year Capital Improvement Plan.

Land Use Assumptions

Land use assumptions for the Transportation Element include information contained in other elements of the Comprehensive Plan, including the Land Use Element. Key assumptions include:

- Because the city anticipates an average of six residential units per acre of land by 2037, over 500 acres of land will need to be developed within the city in order to house, employ, and provide shopping and other needed services.

- At this time and given present circumstances, the city does not anticipate making any requests for an expansion to its UGA during this 20-year planning period.

Street System Facilities - Capacity

The existing capacity of the city's street system can be measured by comparing the current Level of Service to the established minimum Level of Service Standard. All roadways exceeding the Level of Service Standard of "D" (i.e. Level of Service Standard "E" or "F") will be considered deficient and in need of capacity and/or operational improvements.

Street System Facilities – LOS Determination

The city's roadway system currently meets or exceeds the adopted Level of Service Standard D. As future development impacts the Level of Service of the City's roadway system, transportation system improvements and/or strategies to maintain the Level of Service will be necessary over the 20-year planning period. The GMA requires that LOS standards be regionally coordinated. This coordination will continue to occur through the BFCOG; the Regional Transportation Planning Organization (RTPO) for the area.

Sidewalk System

Sidewalk System - Inventory
As of July 2010, the City's pedestrian sidewalk system consists of approximately 75 miles of public sidewalks.

Level of Service Guidelines for Sidewalk Facilities
The adequacy of the sidewalk system is measured by comparing the inventory of facilities with the adopted Level of Service Guidelines. The following Level of Service Guidelines is established to assess the adequacy of the City's sidewalk facilities:

- Local, collector, minor arterial and principal arterial streets, and state highways should have sidewalks along both sides, where practical and appropriate. Sidewalks on local streets within a low-density residential zone or sidewalks on local streets with less than 50 feet of road right-of-way are considered impractical. Installing a separated pathway or sidewalk on only one side of a principal and minor arterials designated limited access is considered appropriate.
- All sidewalks shall comply with the Federal American with Disabilities Act (ADA) design requirements.
- Sidewalks shall be "transit oriented" (i.e., located to connect neighborhoods to transit stops and include pedestrian boarding shelters where appropriate).

Sidewalk System – LOS Determination
The City's sidewalk system was evaluated in relationship to the established Level of Service Guidelines and has been found to be generally in compliance with the guidelines; however, the

APPENDIX E

Level-of-Service Calculations

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	81	16	10	39	25	11	91	28	20	136	19
Future Vol, veh/h	22	81	16	10	39	25	11	91	28	20	136	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	88	17	11	42	27	12	99	30	22	148	21
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	8.3	8.6	9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	18%	14%	11%
Vol Thru, %	70%	68%	53%	78%
Vol Right, %	22%	13%	34%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	119	74	175
LT Vol	11	22	10	20
Through Vol	91	81	39	136
RT Vol	28	16	25	19
Lane Flow Rate	141	129	80	190
Geometry Grp	1	1	1	1
Degree of Util (X)	0.178	0.171	0.105	0.241
Departure Headway (Hd)	4.546	4.753	4.686	4.558
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	787	753	763	788
Service Time	2.584	2.793	2.729	2.593
HCM Lane V/C Ratio	0.179	0.171	0.105	0.241
HCM Control Delay	8.6	8.8	8.3	9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.6	0.4	0.9

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	169	0	68	68	0	0	1	85	2	0	0
Future Vol, veh/h	0	169	0	68	68	0	0	1	85	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	184	0	74	74	0	0	1	92	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	74	0	0	184	0	0	406	406	184	452	406	74
Stage 1	-	-	-	-	-	-	184	184	-	222	222	-
Stage 2	-	-	-	-	-	-	222	222	-	230	184	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1526	-	-	1391	-	-	555	534	858	518	534	988
Stage 1	-	-	-	-	-	-	818	747	-	780	720	-
Stage 2	-	-	-	-	-	-	780	720	-	773	747	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1526	-	-	1391	-	-	532	505	858	442	505	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	532	505	-	442	505	-
Stage 1	-	-	-	-	-	-	818	747	-	780	680	-
Stage 2	-	-	-	-	-	-	737	680	-	689	747	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.9	9.8	13.2
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	851	1526	-	-	1391	-	-	442
HCM Lane V/C Ratio	0.11	-	-	-	0.053	-	-	0.005
HCM Control Delay (s)	9.8	0	-	-	7.7	0	-	13.2
HCM Lane LOS	A	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.2	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	60	747	103	367	10	202	22	90
v/c Ratio	0.10	0.54	0.23	0.23	0.04	0.43	0.06	0.22
Control Delay	4.4	10.9	5.3	7.6	15.0	7.4	15.2	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	10.9	5.3	7.6	15.0	7.4	15.2	4.1
Queue Length 50th (ft)	4	63	7	13	2	3	4	0
Queue Length 95th (ft)	16	122	24	58	11	43	18	19
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	578	2069	456	2179	810	1018	1000	976
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.36	0.23	0.17	0.01	0.20	0.02	0.09

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	679	8	95	333	5	9	17	169	4	17	83
Future Volume (veh/h)	55	679	8	95	333	5	9	17	169	4	17	83
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	60	738	9	103	362	5	10	18	184	4	18	90
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	609	1246	15	476	1336	18	440	29	297	137	342	322
Arrive On Green	0.06	0.35	0.35	0.09	0.37	0.37	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3581	44	1774	3574	49	1280	143	1462	113	1684	1583
Grp Volume(v), veh/h	60	365	382	103	179	188	10	0	202	22	0	90
Grp Sat Flow(s),veh/h/ln	1774	1770	1855	1774	1770	1854	1280	0	1605	1797	0	1583
Q Serve(g_s), s	0.8	6.3	6.3	1.3	2.6	2.6	0.2	0.0	4.3	0.0	0.0	1.8
Cycle Q Clear(g_c), s	0.8	6.3	6.3	1.3	2.6	2.6	0.6	0.0	4.3	0.4	0.0	1.8
Prop In Lane	1.00		0.02	1.00		0.03	1.00		0.91	0.18		1.00
Lane Grp Cap(c), veh/h	609	616	645	476	661	693	440	0	326	479	0	322
V/C Ratio(X)	0.10	0.59	0.59	0.22	0.27	0.27	0.02	0.00	0.62	0.05	0.00	0.28
Avail Cap(c_a), veh/h	736	852	893	557	852	893	797	0	773	947	0	762
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.8	10.0	10.0	6.9	8.2	8.2	12.3	0.0	13.6	12.0	0.0	12.6
Incr Delay (d2), s/veh	0.1	0.9	0.9	0.2	0.2	0.2	0.0	0.0	1.9	0.0	0.0	0.5
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	3.2	3.3	0.6	1.3	1.4	0.1	0.0	2.0	0.2	0.0	0.8
LnGrp Delay(d),s/veh	6.8	10.9	10.9	7.2	8.4	8.4	12.3	0.0	15.5	12.1	0.0	13.1
LnGrp LOS	A	B	B	A	A	A	B		B	B		B
Approach Vol, veh/h		807			470			212			112	
Approach Delay, s/veh		10.6			8.1			15.4			12.9	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.1	7.8	17.5		12.1	6.8	18.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		6.3	3.3	8.3		3.8	2.8	4.6
Green Ext Time (p_c), s		1.3	0.0	4.7		1.4	0.0	5.7

Intersection Summary	
HCM 2010 Ctrl Delay	10.7
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	95	18	28	132	25	19	173	40	35	204	30
Future Vol, veh/h	29	95	18	28	132	25	19	173	40	35	204	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	103	20	30	143	27	21	188	43	38	222	33
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.7	11.3	11.6	12.4
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	20%	15%	13%
Vol Thru, %	75%	67%	71%	76%
Vol Right, %	17%	13%	14%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	232	142	185	269
LT Vol	19	29	28	35
Through Vol	173	95	132	204
RT Vol	40	18	25	30
Lane Flow Rate	252	154	201	292
Geometry Grp	1	1	1	1
Degree of Util (X)	0.374	0.246	0.314	0.432
Departure Headway (Hd)	5.34	5.735	5.63	5.322
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	671	624	637	675
Service Time	3.388	3.788	3.681	3.368
HCM Lane V/C Ratio	0.376	0.247	0.316	0.433
HCM Control Delay	11.6	10.7	11.3	12.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.7	1	1.3	2.2

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	171	1	110	207	1	0	0	78	2	0	0
Future Vol, veh/h	3	171	1	110	207	1	0	0	78	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	186	1	120	225	1	0	0	85	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	187	0	0	658	658	186	700	658	226
Stage 1	-	-	-	-	-	-	193	193	-	465	465	-
Stage 2	-	-	-	-	-	-	465	465	-	235	193	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1342	-	-	1387	-	-	378	384	856	354	384	813
Stage 1	-	-	-	-	-	-	809	741	-	578	563	-
Stage 2	-	-	-	-	-	-	578	563	-	768	741	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1342	-	-	1387	-	-	349	345	856	294	345	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	345	-	294	345	-
Stage 1	-	-	-	-	-	-	807	740	-	577	507	-
Stage 2	-	-	-	-	-	-	521	507	-	691	740	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2.7	9.7	17.3
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	1342	-	-	1387	-	-	294
HCM Lane V/C Ratio	0.099	0.002	-	-	0.086	-	-	0.007
HCM Control Delay (s)	9.7	7.7	0	-	7.8	0	-	17.3
HCM Lane LOS	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.3	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	72	805	261	841	5	266	97	239
v/c Ratio	0.17	0.62	0.65	0.51	0.02	0.54	0.30	0.48
Control Delay	5.3	13.6	17.2	10.9	14.4	8.7	17.8	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	13.6	17.2	10.9	14.4	8.7	17.8	6.6
Queue Length 50th (ft)	6	76	23	81	1	8	21	0
Queue Length 95th (ft)	20	142	#105	148	7	53	51	41
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	425	1522	399	1670	556	828	742	817
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.53	0.65	0.50	0.01	0.32	0.13	0.29

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	730	11	240	758	16	5	35	210	11	78	220
Future Volume (veh/h)	66	730	11	240	758	16	5	35	210	11	78	220
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	72	793	12	261	824	17	5	38	228	12	85	239
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	412	1244	19	464	1394	29	343	56	337	109	419	385
Arrive On Green	0.07	0.35	0.35	0.11	0.39	0.39	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1774	3569	54	1774	3546	73	1052	231	1387	82	1725	1583
Grp Volume(v), veh/h	72	393	412	261	411	430	5	0	266	97	0	239
Grp Sat Flow(s),veh/h/ln	1774	1770	1853	1774	1770	1850	1052	0	1618	1807	0	1583
Q Serve(g_s), s	1.1	8.4	8.4	4.2	8.3	8.3	0.2	0.0	6.7	0.0	0.0	6.1
Cycle Q Clear(g_c), s	1.1	8.4	8.4	4.2	8.3	8.3	3.3	0.0	6.7	1.9	0.0	6.1
Prop In Lane	1.00		0.03	1.00		0.04	1.00		0.86	0.12		1.00
Lane Grp Cap(c), veh/h	412	617	646	464	696	727	343	0	393	529	0	385
V/C Ratio(X)	0.17	0.64	0.64	0.56	0.59	0.59	0.01	0.00	0.68	0.18	0.00	0.62
Avail Cap(c_a), veh/h	491	703	736	464	703	735	505	0	643	793	0	629
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.6	12.4	12.4	9.1	10.9	10.9	15.5	0.0	15.5	13.7	0.0	15.3
Incr Delay (d2), s/veh	0.2	1.6	1.5	1.6	1.3	1.2	0.0	0.0	2.0	0.2	0.0	1.6
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	0.6	4.3	4.5	2.2	4.2	4.4	0.1	0.0	3.2	1.0	0.0	2.8
LnGrp Delay(d),s/veh	8.8	13.9	13.9	10.6	12.2	12.1	15.5	0.0	17.6	13.9	0.0	16.9
LnGrp LOS	A	B	B	B	B	B	B		B	B		B
Approach Vol, veh/h		877			1102			271			336	
Approach Delay, s/veh		13.5			11.8			17.5			16.0	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		15.5	9.5	20.3		15.5	7.5	22.3
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		8.7	6.2	10.4		8.1	3.1	10.3
Green Ext Time (p_c), s		2.2	0.0	5.4		2.3	0.0	5.4

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	90	16	10	46	32	12	95	29	27	140	19
Future Vol, veh/h	22	90	16	10	46	32	12	95	29	27	140	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	98	17	11	50	35	13	103	32	29	152	21
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9	8.5	8.8	9.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	17%	11%	15%
Vol Thru, %	70%	70%	52%	75%
Vol Right, %	21%	12%	36%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	136	128	88	186
LT Vol	12	22	10	27
Through Vol	95	90	46	140
RT Vol	29	16	32	19
Lane Flow Rate	148	139	96	202
Geometry Grp	1	1	1	1
Degree of Util (X)	0.19	0.187	0.126	0.261
Departure Headway (Hd)	4.631	4.829	4.735	4.642
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	772	740	754	770
Service Time	2.679	2.879	2.788	2.687
HCM Lane V/C Ratio	0.192	0.188	0.127	0.262
HCM Control Delay	8.8	9	8.5	9.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.7	0.4	1

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	179	0	72	73	0	0	1	90	2	0	0
Future Vol, veh/h	0	179	0	72	73	0	0	1	90	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	195	0	78	79	0	0	1	98	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	79	0	0	195	0	0	431	431	195	480	431	79
Stage 1	-	-	-	-	-	-	195	195	-	236	236	-
Stage 2	-	-	-	-	-	-	236	236	-	244	195	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1519	-	-	1378	-	-	535	517	846	496	517	981
Stage 1	-	-	-	-	-	-	807	739	-	767	710	-
Stage 2	-	-	-	-	-	-	767	710	-	760	739	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1378	-	-	511	486	846	418	486	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	511	486	-	418	486	-
Stage 1	-	-	-	-	-	-	807	739	-	767	668	-
Stage 2	-	-	-	-	-	-	722	668	-	671	739	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.9	9.9	13.7
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	839	1519	-	-	1378	-	-	418
HCM Lane V/C Ratio	0.118	-	-	-	0.057	-	-	0.005
HCM Control Delay (s)	9.9	0	-	-	7.8	0	-	13.7
HCM Lane LOS	A	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.2	-	-	0

Queues
3: Kennedy Road & Keen Road

06/07/2018

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	61	776	115	375	24	224	28	92
v/c Ratio	0.10	0.54	0.26	0.23	0.09	0.47	0.08	0.22
Control Delay	4.5	10.9	5.7	7.7	15.7	7.7	15.3	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	10.9	5.7	7.7	15.7	7.7	15.3	4.3
Queue Length 50th (ft)	4	66	8	13	5	5	6	0
Queue Length 95th (ft)	17	129	27	60	19	47	21	19
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	584	1856	448	1989	724	943	910	889
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.42	0.26	0.19	0.03	0.24	0.03	0.10

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	693	21	106	340	5	22	22	184	4	22	85
Future Volume (veh/h)	56	693	21	106	340	5	22	22	184	4	22	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	753	23	115	370	5	24	24	200	4	24	92
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	600	1219	37	463	1348	18	443	37	310	123	374	341
Arrive On Green	0.06	0.35	0.35	0.09	0.38	0.38	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1774	3506	107	1774	3576	48	1271	172	1437	80	1734	1583
Grp Volume(v), veh/h	61	380	396	115	183	192	24	0	224	28	0	92
Grp Sat Flow(s),veh/h/ln	1774	1770	1844	1774	1770	1854	1271	0	1609	1813	0	1583
Q Serve(g_s), s	0.8	7.0	7.0	1.5	2.8	2.8	0.6	0.0	5.0	0.0	0.0	1.9
Cycle Q Clear(g_c), s	0.8	7.0	7.0	1.5	2.8	2.8	1.1	0.0	5.0	0.5	0.0	1.9
Prop In Lane	1.00		0.06	1.00		0.03	1.00		0.89	0.14		1.00
Lane Grp Cap(c), veh/h	600	615	641	463	667	699	443	0	347	496	0	341
V/C Ratio(X)	0.10	0.62	0.62	0.25	0.27	0.27	0.05	0.00	0.65	0.06	0.00	0.27
Avail Cap(c_a), veh/h	717	816	850	529	816	855	755	0	742	916	0	730
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.1	10.6	10.6	7.3	8.5	8.5	12.6	0.0	14.0	12.2	0.0	12.8
Incr Delay (d2), s/veh	0.1	1.0	1.0	0.3	0.2	0.2	0.1	0.0	2.0	0.0	0.0	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	0.4	3.6	3.7	0.7	1.4	1.5	0.2	0.0	2.4	0.2	0.0	0.8
LnGrp Delay(d),s/veh	7.2	11.6	11.6	7.6	8.7	8.7	12.7	0.0	16.0	12.3	0.0	13.2
LnGrp LOS	A	B	B	A	A	A	B		B	B		B
Approach Vol, veh/h		837			490			248			120	
Approach Delay, s/veh		11.3			8.4			15.7			13.0	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.9	8.1	18.1		12.9	6.9	19.2
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		7.0	3.5	9.0		3.9	2.8	4.8
Green Ext Time (p_c), s		1.5	0.0	4.6		1.6	0.0	5.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	91	72	0	0	0
Future Vol, veh/h	0	91	72	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	99	78	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	78	0	-	0	177	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	99	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1520	-	-	-	813	983
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	925	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1520	-	-	-	813	983
Mov Cap-2 Maneuver	-	-	-	-	813	-
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	925	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1520	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	0	72	0	0	0	0	0	0	0
Future Vol, veh/h	0	91	0	0	72	0	0	0	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	0	78	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	78	0	0	99	0	0	177	177	99	177	177	78
Stage 1	-	-	-	-	-	-	99	99	-	78	78	-
Stage 2	-	-	-	-	-	-	78	78	-	99	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1520	-	-	1494	-	-	785	717	957	785	717	983
Stage 1	-	-	-	-	-	-	907	813	-	931	830	-
Stage 2	-	-	-	-	-	-	931	830	-	907	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1520	-	-	1494	-	-	785	717	957	785	717	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	785	717	-	785	717	-
Stage 1	-	-	-	-	-	-	907	813	-	931	830	-
Stage 2	-	-	-	-	-	-	931	830	-	907	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1520	-	-	1494	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	90	17	10	46	32	12	96	29	27	145	19
Future Vol, veh/h	22	90	17	10	46	32	12	96	29	27	145	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	98	18	11	50	35	13	104	32	29	158	21
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9	8.5	8.8	9.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	17%	11%	14%
Vol Thru, %	70%	70%	52%	76%
Vol Right, %	21%	13%	36%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	137	129	88	191
LT Vol	12	22	10	27
Through Vol	96	90	46	145
RT Vol	29	17	32	19
Lane Flow Rate	149	140	96	208
Geometry Grp	1	1	1	1
Degree of Util (X)	0.192	0.189	0.126	0.268
Departure Headway (Hd)	4.642	4.84	4.752	4.649
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	770	738	750	770
Service Time	2.691	2.891	2.808	2.694
HCM Lane V/C Ratio	0.194	0.19	0.128	0.27
HCM Control Delay	8.8	9	8.5	9.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.7	0.4	1.1

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	179	0	76	73	0	0	1	91	2	0	0
Future Vol, veh/h	0	179	0	76	73	0	0	1	91	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	195	0	83	79	0	0	1	99	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	79	0	0	195	0	0	440	440	195	490	440	79
Stage 1	-	-	-	-	-	-	195	195	-	245	245	-
Stage 2	-	-	-	-	-	-	245	245	-	245	195	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1519	-	-	1378	-	-	527	511	846	489	511	981
Stage 1	-	-	-	-	-	-	807	739	-	759	703	-
Stage 2	-	-	-	-	-	-	759	703	-	759	739	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1519	-	-	1378	-	-	502	479	846	410	479	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	502	479	-	410	479	-
Stage 1	-	-	-	-	-	-	807	739	-	759	659	-
Stage 2	-	-	-	-	-	-	711	659	-	669	739	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4	9.9	13.8
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	839	1519	-	-	1378	-	-	410
HCM Lane V/C Ratio	0.119	-	-	-	0.06	-	-	0.005
HCM Control Delay (s)	9.9	0	-	-	7.8	0	-	13.8
HCM Lane LOS	A	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.2	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	61	776	120	375	24	225	28	92
v/c Ratio	0.11	0.57	0.28	0.22	0.09	0.48	0.09	0.23
Control Delay	4.4	12.0	5.8	7.5	15.8	8.0	15.5	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	12.0	5.8	7.5	15.8	8.0	15.5	4.4
Queue Length 50th (ft)	4	66	8	13	5	5	6	0
Queue Length 95th (ft)	17	129	28	60	19	47	21	19
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	579	1742	436	1968	679	897	854	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.45	0.28	0.19	0.04	0.25	0.03	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	693	21	110	340	5	22	22	185	4	22	85
Future Volume (veh/h)	56	693	21	110	340	5	22	22	185	4	22	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	61	753	23	120	370	5	24	24	201	4	24	92
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	601	1216	37	465	1352	18	443	37	310	122	374	342
Arrive On Green	0.06	0.35	0.35	0.09	0.38	0.38	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1774	3506	107	1774	3576	48	1271	172	1437	80	1734	1583
Grp Volume(v), veh/h	61	380	396	120	183	192	24	0	225	28	0	92
Grp Sat Flow(s),veh/h/ln	1774	1770	1844	1774	1770	1854	1271	0	1609	1814	0	1583
Q Serve(g_s), s	0.8	7.0	7.0	1.6	2.8	2.8	0.6	0.0	5.0	0.0	0.0	1.9
Cycle Q Clear(g_c), s	0.8	7.0	7.0	1.6	2.8	2.8	1.1	0.0	5.0	0.5	0.0	1.9
Prop In Lane	1.00		0.06	1.00		0.03	1.00		0.89	0.14		1.00
Lane Grp Cap(c), veh/h	601	614	640	465	669	701	443	0	347	496	0	342
V/C Ratio(X)	0.10	0.62	0.62	0.26	0.27	0.27	0.05	0.00	0.65	0.06	0.00	0.27
Avail Cap(c_a), veh/h	717	812	846	526	812	851	752	0	739	913	0	727
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.1	10.6	10.6	7.4	8.5	8.5	12.7	0.0	14.0	12.2	0.0	12.8
Incr Delay (d2), s/veh	0.1	1.0	1.0	0.3	0.2	0.2	0.1	0.0	2.0	0.0	0.0	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	0.4	3.6	3.7	0.8	1.4	1.5	0.2	0.0	2.4	0.2	0.0	0.9
LnGrp Delay(d),s/veh	7.2	11.7	11.6	7.6	8.7	8.7	12.7	0.0	16.1	12.3	0.0	13.2
LnGrp LOS	A	B	B	A	A	A	B		B	B		B
Approach Vol, veh/h		837			495			249			120	
Approach Delay, s/veh		11.3			8.4			15.7			13.0	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		13.0	8.1	18.1		13.0	6.9	19.3
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		7.0	3.6	9.0		3.9	2.8	4.8
Green Ext Time (p_c), s		1.5	0.0	4.6		1.7	0.0	5.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	91	72	0	0	1
Future Vol, veh/h	9	91	72	0	0	1
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	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	99	78	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	78	0	-	0	196	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	118	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1520	-	-	-	793	983
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	907	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1520	-	-	-	787	983
Mov Cap-2 Maneuver	-	-	-	-	787	-
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	901	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1520	-	-	-	-	983
HCM Lane V/C Ratio	0.006	-	-	-	-	0.001
HCM Control Delay (s)	7.4	0	-	-	0	8.7
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	-	0

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	91	0	0	72	4	0	0	0	1	0	0
Future Vol, veh/h	0	91	0	0	72	4	0	0	0	1	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	99	0	0	78	4	0	0	0	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	83	0	0	99	0	0	179	182	99	179	179	80
Stage 1	-	-	-	-	-	-	99	99	-	80	80	-
Stage 2	-	-	-	-	-	-	80	83	-	99	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1514	-	-	1494	-	-	783	712	957	783	715	980
Stage 1	-	-	-	-	-	-	907	813	-	929	828	-
Stage 2	-	-	-	-	-	-	929	826	-	907	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1514	-	-	1494	-	-	783	712	957	783	715	980
Mov Cap-2 Maneuver	-	-	-	-	-	-	783	712	-	783	715	-
Stage 1	-	-	-	-	-	-	907	813	-	929	828	-
Stage 2	-	-	-	-	-	-	929	826	-	907	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1514	-	-	1494	-	-	783
HCM Lane V/C Ratio	-	-	-	-	-	-	-	0.001
HCM Control Delay (s)	0	0	-	-	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	100	19	29	138	29	20	177	41	39	211	31
Future Vol, veh/h	30	100	19	29	138	29	20	177	41	39	211	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	109	21	32	150	32	22	192	45	42	229	34
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11	11.7	12	13.1
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	20%	15%	14%
Vol Thru, %	74%	67%	70%	75%
Vol Right, %	17%	13%	15%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	238	149	196	281
LT Vol	20	30	29	39
Through Vol	177	100	138	211
RT Vol	41	19	29	31
Lane Flow Rate	259	162	213	305
Geometry Grp	1	1	1	1
Degree of Util (X)	0.391	0.263	0.338	0.46
Departure Headway (Hd)	5.448	5.841	5.719	5.419
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	657	612	626	663
Service Time	3.506	3.907	3.78	3.474
HCM Lane V/C Ratio	0.394	0.265	0.34	0.46
HCM Control Delay	12	11	11.7	13.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	1.1	1.5	2.4

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	184	1	113	217	1	0	0	81	2	0	0
Future Vol, veh/h	3	184	1	113	217	1	0	0	81	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	200	1	123	236	1	0	0	88	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	237	0	0	201	0	0	689	690	201	733	690	236
Stage 1	-	-	-	-	-	-	207	207	-	482	482	-
Stage 2	-	-	-	-	-	-	482	483	-	251	208	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1330	-	-	1371	-	-	360	368	840	336	368	803
Stage 1	-	-	-	-	-	-	795	731	-	565	553	-
Stage 2	-	-	-	-	-	-	565	553	-	753	730	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1330	-	-	1371	-	-	331	329	840	276	329	803
Mov Cap-2 Maneuver	-	-	-	-	-	-	331	329	-	276	329	-
Stage 1	-	-	-	-	-	-	793	729	-	563	496	-
Stage 2	-	-	-	-	-	-	507	496	-	672	728	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2.7	9.8	18.1
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	840	1330	-	-	1371	-	-	276
HCM Lane V/C Ratio	0.105	0.002	-	-	0.09	-	-	0.008
HCM Control Delay (s)	9.8	7.7	0	-	7.9	0	-	18.1
HCM Lane LOS	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.3	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	73	828	276	857	12	280	101	243
v/c Ratio	0.18	0.64	0.71	0.52	0.05	0.55	0.31	0.48
Control Delay	5.6	14.1	21.0	11.2	14.7	8.7	18.0	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	14.1	21.0	11.2	14.7	8.7	18.0	6.4
Queue Length 50th (ft)	6	80	25	83	3	9	22	0
Queue Length 95th (ft)	22	153	#136	160	12	55	53	41
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	417	1507	389	1665	550	829	712	814
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.55	0.71	0.51	0.02	0.34	0.14	0.30

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	745	17	254	773	16	11	38	220	11	82	224
Future Volume (veh/h)	67	745	17	254	773	16	11	38	220	11	82	224
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	73	810	18	276	840	17	12	41	239	12	89	243
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	403	1234	27	451	1388	28	268	59	345	106	429	395
Arrive On Green	0.07	0.35	0.35	0.11	0.39	0.39	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1774	3540	79	1774	3548	72	1044	237	1382	76	1720	1583
Grp Volume(v), veh/h	73	405	423	276	419	438	12	0	280	101	0	243
Grp Sat Flow(s),veh/h/ln	1774	1770	1849	1774	1770	1850	1044	0	1619	1797	0	1583
Q Serve(g_s), s	1.2	8.9	8.9	4.6	8.7	8.7	0.5	0.0	7.2	0.0	0.0	6.3
Cycle Q Clear(g_c), s	1.2	8.9	8.9	4.6	8.7	8.7	7.0	0.0	7.2	7.2	0.0	6.3
Prop In Lane	1.00		0.04	1.00		0.04	1.00		0.85	0.12		1.00
Lane Grp Cap(c), veh/h	403	617	645	451	692	724	268	0	404	536	0	395
V/C Ratio(X)	0.18	0.66	0.66	0.61	0.61	0.61	0.04	0.00	0.69	0.19	0.00	0.61
Avail Cap(c_a), veh/h	479	692	723	451	692	724	416	0	633	779	0	619
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.8	12.7	12.7	9.5	11.2	11.2	18.6	0.0	15.7	13.7	0.0	15.3
Incr Delay (d2), s/veh	0.2	1.9	1.8	2.4	1.5	1.4	0.1	0.0	2.1	0.2	0.0	1.6
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	0.6	4.6	4.8	2.5	4.5	4.7	0.1	0.0	3.4	1.0	0.0	2.9
LnGrp Delay(d),s/veh	9.0	14.6	14.5	11.9	12.7	12.6	18.6	0.0	17.8	13.9	0.0	16.9
LnGrp LOS	A	B	B	B	B	B	B		B	B		B
Approach Vol, veh/h		901			1133			292			344	
Approach Delay, s/veh		14.1			12.5			17.8			16.0	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		16.0	9.5	20.6		16.0	7.5	22.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		9.2	6.6	10.9		9.2	3.2	10.7
Green Ext Time (p_c), s		2.3	0.0	5.2		2.3	0.0	5.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	81	114	0	0	0
Future Vol, veh/h	0	81	114	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	88	124	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	124	0	-	0	212	124
Stage 1	-	-	-	-	124	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1463	-	-	-	776	927
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	935	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	776	927
Mov Cap-2 Maneuver	-	-	-	-	776	-
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	935	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1463	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	81	0	0	114	0	0	0	0	0	0	0
Future Vol, veh/h	0	81	0	0	114	0	0	0	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	88	0	0	124	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	88	0	0	212	212	88	212	212	124
Stage 1	-	-	-	-	-	-	88	88	-	124	124	-
Stage 2	-	-	-	-	-	-	124	124	-	88	88	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1463	-	-	1508	-	-	745	685	970	745	685	927
Stage 1	-	-	-	-	-	-	920	822	-	880	793	-
Stage 2	-	-	-	-	-	-	880	793	-	920	822	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1463	-	-	1508	-	-	745	685	970	745	685	927
Mov Cap-2 Maneuver	-	-	-	-	-	-	745	685	-	745	685	-
Stage 1	-	-	-	-	-	-	920	822	-	880	793	-
Stage 2	-	-	-	-	-	-	880	793	-	920	822	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1463	-	-	1508	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Intersection Delay, s/veh	13.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	100	27	29	138	29	28	205	41	39	238	31
Future Vol, veh/h	30	100	27	29	138	29	28	205	41	39	238	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	109	29	32	150	32	30	223	45	42	259	34
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.6	12.3	13.5	14.6
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	19%	15%	13%
Vol Thru, %	75%	64%	70%	77%
Vol Right, %	15%	17%	15%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	274	157	196	308
LT Vol	28	30	29	39
Through Vol	205	100	138	238
RT Vol	41	27	29	31
Lane Flow Rate	298	171	213	335
Geometry Grp	1	1	1	1
Degree of Util (X)	0.463	0.287	0.354	0.518
Departure Headway (Hd)	5.601	6.063	5.975	5.573
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	637	587	597	643
Service Time	3.677	4.153	4.059	3.645
HCM Lane V/C Ratio	0.468	0.291	0.357	0.521
HCM Control Delay	13.5	11.6	12.3	14.6
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2.4	1.2	1.6	3

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	3	184	1	136	217	1	0	0	105	2	0	0
Future Vol, veh/h	3	184	1	136	217	1	0	0	105	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	200	1	148	236	1	0	0	114	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	237	0	0	201	0	0	739	740	201	796	740	236
Stage 1	-	-	-	-	-	-	207	207	-	532	532	-
Stage 2	-	-	-	-	-	-	532	533	-	264	208	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1330	-	-	1371	-	-	333	345	840	305	345	803
Stage 1	-	-	-	-	-	-	795	731	-	531	526	-
Stage 2	-	-	-	-	-	-	531	525	-	741	730	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1330	-	-	1371	-	-	301	301	840	238	301	803
Mov Cap-2 Maneuver	-	-	-	-	-	-	301	301	-	238	301	-
Stage 1	-	-	-	-	-	-	793	729	-	529	461	-
Stage 2	-	-	-	-	-	-	465	460	-	638	728	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.1	10	20.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	840	1330	-	-	1371	-	-	238
HCM Lane V/C Ratio	0.136	0.002	-	-	0.108	-	-	0.009
HCM Control Delay (s)	10	7.7	0	-	7.9	0	-	20.3
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.4	-	-	0

Queues
3: Kennedy Road & Keen Road

06/07/2018

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	73	828	301	857	12	306	101	243
v/c Ratio	0.18	0.64	0.78	0.52	0.05	0.58	0.34	0.48
Control Delay	5.7	14.2	26.6	11.3	14.6	8.7	18.5	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	14.2	26.6	11.3	14.6	8.7	18.5	6.3
Queue Length 50th (ft)	6	80	27	83	3	9	23	0
Queue Length 95th (ft)	23	155	#161	162	12	57	53	40
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	415	1504	387	1661	548	842	650	813
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.55	0.78	0.52	0.02	0.36	0.16	0.30

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	745	17	277	773	16	11	38	244	11	82	224
Future Volume (veh/h)	67	745	17	277	773	16	11	38	244	11	82	224
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	73	810	18	301	840	17	12	41	265	12	89	243
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	391	1213	27	438	1360	28	304	57	370	105	454	419
Arrive On Green	0.07	0.34	0.34	0.11	0.38	0.38	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1774	3540	79	1774	3548	72	1044	216	1399	73	1718	1583
Grp Volume(v), veh/h	73	405	423	301	419	438	12	0	306	101	0	243
Grp Sat Flow(s),veh/h/ln	1774	1770	1849	1774	1770	1850	1044	0	1616	1791	0	1583
Q Serve(g_s), s	1.2	9.2	9.2	5.0	9.0	9.0	0.5	0.0	8.1	0.0	0.0	6.3
Cycle Q Clear(g_c), s	1.2	9.2	9.2	5.0	9.0	9.0	6.1	0.0	8.1	8.0	0.0	6.3
Prop In Lane	1.00		0.04	1.00		0.04	1.00		0.87	0.12		1.00
Lane Grp Cap(c), veh/h	391	607	634	438	678	709	304	0	427	559	0	419
V/C Ratio(X)	0.19	0.67	0.67	0.69	0.62	0.62	0.04	0.00	0.72	0.18	0.00	0.58
Avail Cap(c_a), veh/h	463	676	707	438	678	709	427	0	617	761	0	605
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	13.2	13.2	10.8	11.7	11.7	17.4	0.0	15.7	13.5	0.0	15.1
Incr Delay (d2), s/veh	0.2	2.2	2.1	4.5	1.7	1.6	0.1	0.0	2.3	0.2	0.0	1.3
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	0.6	4.8	5.0	3.0	4.6	4.8	0.1	0.0	3.8	1.0	0.0	2.9
LnGrp Delay(d),s/veh	9.4	15.4	15.3	15.3	13.4	13.4	17.5	0.0	18.0	13.6	0.0	16.3
LnGrp LOS	A	B	B	B	B	B	B		B	B		B
Approach Vol, veh/h		901			1158			318			344	
Approach Delay, s/veh		14.8			13.9			18.0			15.5	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		16.9	9.5	20.6		16.9	7.6	22.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		10.1	7.0	11.2		10.0	3.2	11.0
Green Ext Time (p_c), s		2.2	0.0	4.9		2.3	0.0	5.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	53	81	114	0	0	55
Future Vol, veh/h	53	81	114	0	0	55
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	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	88	124	0	0	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	124	0	-	0	327	124
Stage 1	-	-	-	-	124	-
Stage 2	-	-	-	-	203	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1463	-	-	-	667	927
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	831	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	639	927
Mov Cap-2 Maneuver	-	-	-	-	639	-
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	796	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1463	-	-	-	-	927
HCM Lane V/C Ratio	0.039	-	-	-	-	0.064
HCM Control Delay (s)	7.6	0	-	-	0	9.2
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.2

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	0	81	0	0	114	23	0	0	0	24	0	0
Future Vol, veh/h	0	81	0	0	114	23	0	0	0	24	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	88	0	0	124	25	0	0	0	26	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	149	0	0	88	0	0	224	237	88	224	224	136
Stage 1	-	-	-	-	-	-	88	88	-	136	136	-
Stage 2	-	-	-	-	-	-	136	149	-	88	88	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1432	-	-	1508	-	-	732	664	970	732	675	913
Stage 1	-	-	-	-	-	-	920	822	-	867	784	-
Stage 2	-	-	-	-	-	-	867	774	-	920	822	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1432	-	-	1508	-	-	732	664	970	732	675	913
Mov Cap-2 Maneuver	-	-	-	-	-	-	732	664	-	732	675	-
Stage 1	-	-	-	-	-	-	920	822	-	867	784	-
Stage 2	-	-	-	-	-	-	867	774	-	920	822	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	10.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1432	-	-	1508	-	-	732
HCM Lane V/C Ratio	-	-	-	-	-	-	-	0.036
HCM Control Delay (s)	0	0	-	-	0	-	-	10.1
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	100	18	11	52	36	13	213	31	32	202	21
Future Vol, veh/h	24	100	18	11	52	36	13	213	31	32	202	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	109	20	12	57	39	14	232	34	35	220	23
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	9.5	11.2	11.3
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	17%	11%	13%
Vol Thru, %	83%	70%	53%	79%
Vol Right, %	12%	13%	36%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	257	142	99	255
LT Vol	13	24	11	32
Through Vol	213	100	52	202
RT Vol	31	18	36	21
Lane Flow Rate	279	154	108	277
Geometry Grp	1	1	1	1
Degree of Util (X)	0.39	0.235	0.162	0.39
Departure Headway (Hd)	5.02	5.491	5.429	5.059
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	721	653	660	715
Service Time	3.03	3.529	3.469	3.068
HCM Lane V/C Ratio	0.387	0.236	0.164	0.387
HCM Control Delay	11.2	10.2	9.5	11.3
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.9	0.9	0.6	1.9

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	197	0	81	81	0	0	1	101	2	0	0
Future Vol, veh/h	0	197	0	81	81	0	0	1	101	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	214	0	88	88	0	0	1	110	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	214	0	0	478	478	214	534	478	88
Stage 1	-	-	-	-	-	-	214	214	-	264	264	-
Stage 2	-	-	-	-	-	-	264	264	-	270	214	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1356	-	-	498	486	826	457	486	970
Stage 1	-	-	-	-	-	-	788	725	-	741	690	-
Stage 2	-	-	-	-	-	-	741	690	-	736	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1508	-	-	1356	-	-	472	453	826	375	453	970
Mov Cap-2 Maneuver	-	-	-	-	-	-	472	453	-	375	453	-
Stage 1	-	-	-	-	-	-	788	725	-	741	643	-
Stage 2	-	-	-	-	-	-	691	643	-	637	725	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.9	10.1	14.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	819	1508	-	-	1356	-	-	375
HCM Lane V/C Ratio	0.135	-	-	-	0.065	-	-	0.006
HCM Control Delay (s)	10.1	0	-	-	7.8	0	-	14.7
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0.2	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	66	847	133	407	30	253	37	100
v/c Ratio	0.12	0.62	0.33	0.26	0.11	0.51	0.11	0.25
Control Delay	4.8	12.9	6.8	9.0	15.8	8.1	15.5	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	12.9	6.8	9.0	15.8	8.1	15.5	4.8
Queue Length 50th (ft)	4	75	9	31	6	6	8	0
Queue Length 95th (ft)	20	153	34	69	22	50	25	22
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	568	1702	404	1811	659	895	849	826
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.50	0.33	0.22	0.05	0.28	0.04	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	750	29	122	368	6	28	28	205	4	30	92
Future Volume (veh/h)	61	750	29	122	368	6	28	28	205	4	30	92
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	66	815	32	133	400	7	30	30	223	4	33	100
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	583	1225	48	439	1362	24	441	44	327	109	407	364
Arrive On Green	0.06	0.35	0.35	0.09	0.38	0.38	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	3472	136	1774	3559	62	1252	191	1421	57	1769	1583
Grp Volume(v), veh/h	66	415	432	133	199	208	30	0	253	37	0	100
Grp Sat Flow(s),veh/h/ln	1774	1770	1839	1774	1770	1852	1252	0	1612	1825	0	1583
Q Serve(g_s), s	0.9	8.3	8.3	1.9	3.3	3.3	0.8	0.0	6.0	0.0	0.0	2.2
Cycle Q Clear(g_c), s	0.9	8.3	8.3	1.9	3.3	3.3	1.5	0.0	6.0	0.7	0.0	2.2
Prop In Lane	1.00		0.07	1.00		0.03	1.00		0.88	0.11		1.00
Lane Grp Cap(c), veh/h	583	624	648	439	677	709	441	0	371	515	0	364
V/C Ratio(X)	0.11	0.67	0.67	0.30	0.29	0.29	0.07	0.00	0.68	0.07	0.00	0.27
Avail Cap(c_a), veh/h	681	763	792	485	763	798	692	0	695	865	0	682
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.4	11.4	11.4	7.9	9.0	9.0	13.2	0.0	14.7	12.6	0.0	13.2
Incr Delay (d2), s/veh	0.1	1.6	1.6	0.4	0.2	0.2	0.1	0.0	2.2	0.1	0.0	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	0.5	4.3	4.5	0.9	1.6	1.7	0.3	0.0	2.9	0.3	0.0	1.0
LnGrp Delay(d),s/veh	7.5	13.1	13.0	8.3	9.2	9.2	13.3	0.0	16.9	12.7	0.0	13.6
LnGrp LOS	A	B	B	A	A	A	B		B	B		B
Approach Vol, veh/h		913			540			283			137	
Approach Delay, s/veh		12.6			9.0			16.5			13.4	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.1	8.4	19.2		14.1	7.2	20.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		8.0	3.9	10.3		4.2	2.9	5.3
Green Ext Time (p_c), s		1.6	0.0	4.4		1.9	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	102	81	0	0	0
Future Vol, veh/h	0	102	81	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	111	88	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	88	0	-	0	199	88
Stage 1	-	-	-	-	88	-
Stage 2	-	-	-	-	111	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1508	-	-	-	790	970
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	914	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1508	-	-	-	790	970
Mov Cap-2 Maneuver	-	-	-	-	790	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	914	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1508	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	102	0	0	81	0	0	0	0	0	0	0
Future Vol, veh/h	0	102	0	0	81	0	0	0	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	111	0	0	88	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	111	0	0	199	199	111	199	199	88
Stage 1	-	-	-	-	-	-	111	111	-	88	88	-
Stage 2	-	-	-	-	-	-	88	88	-	111	111	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1479	-	-	760	697	942	760	697	970
Stage 1	-	-	-	-	-	-	894	804	-	920	822	-
Stage 2	-	-	-	-	-	-	920	822	-	894	804	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1508	-	-	1479	-	-	760	697	942	760	697	970
Mov Cap-2 Maneuver	-	-	-	-	-	-	760	697	-	760	697	-
Stage 1	-	-	-	-	-	-	894	804	-	920	822	-
Stage 2	-	-	-	-	-	-	920	822	-	894	804	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1508	-	-	1479	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	100	19	11	52	36	13	214	31	32	207	21
Future Vol, veh/h	24	100	19	11	52	36	13	214	31	32	207	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	109	21	12	57	39	14	233	34	35	225	23
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.3	9.6	11.2	11.4
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	17%	11%	12%
Vol Thru, %	83%	70%	53%	80%
Vol Right, %	12%	13%	36%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	258	143	99	260
LT Vol	13	24	11	32
Through Vol	214	100	52	207
RT Vol	31	19	36	21
Lane Flow Rate	280	155	108	283
Geometry Grp	1	1	1	1
Degree of Util (X)	0.391	0.238	0.163	0.397
Departure Headway (Hd)	5.019	5.507	5.452	5.051
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	718	651	657	712
Service Time	3.046	3.541	3.488	3.078
HCM Lane V/C Ratio	0.39	0.238	0.164	0.397
HCM Control Delay	11.2	10.3	9.6	11.4
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.9	0.9	0.6	1.9

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	197	0	85	81	0	0	1	102	2	0	0
Future Vol, veh/h	0	197	0	85	81	0	0	1	102	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	214	0	92	88	0	0	1	111	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	214	0	0	487	487	214	543	487	88
Stage 1	-	-	-	-	-	-	214	214	-	273	273	-
Stage 2	-	-	-	-	-	-	273	273	-	270	214	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1356	-	-	491	481	826	451	481	970
Stage 1	-	-	-	-	-	-	788	725	-	733	684	-
Stage 2	-	-	-	-	-	-	733	684	-	736	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1508	-	-	1356	-	-	464	447	826	369	447	970
Mov Cap-2 Maneuver	-	-	-	-	-	-	464	447	-	369	447	-
Stage 1	-	-	-	-	-	-	788	725	-	733	635	-
Stage 2	-	-	-	-	-	-	681	635	-	636	725	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4	10.1	14.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	819	1508	-	-	1356	-	-	369
HCM Lane V/C Ratio	0.137	-	-	-	0.068	-	-	0.006
HCM Control Delay (s)	10.1	0	-	-	7.8	0	-	14.8
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0.2	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	66	847	137	407	30	254	37	100
v/c Ratio	0.12	0.62	0.34	0.26	0.11	0.51	0.11	0.25
Control Delay	4.8	12.9	6.9	9.0	15.8	8.1	15.5	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	12.9	6.9	9.0	15.8	8.1	15.5	4.8
Queue Length 50th (ft)	4	75	10	31	6	6	8	0
Queue Length 95th (ft)	20	153	35	69	22	50	25	22
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	568	1702	404	1811	659	896	849	826
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.50	0.34	0.22	0.05	0.28	0.04	0.12

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	750	29	126	368	6	28	28	206	4	30	92
Future Volume (veh/h)	61	750	29	126	368	6	28	28	206	4	30	92
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	66	815	32	137	400	7	30	30	224	4	33	100
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	583	1223	48	440	1364	24	441	44	327	108	408	365
Arrive On Green	0.06	0.35	0.35	0.10	0.38	0.38	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	3472	136	1774	3559	62	1252	190	1422	56	1769	1583
Grp Volume(v), veh/h	66	415	432	137	199	208	30	0	254	37	0	100
Grp Sat Flow(s),veh/h/ln	1774	1770	1839	1774	1770	1852	1252	0	1612	1825	0	1583
Q Serve(g_s), s	0.9	8.3	8.3	1.9	3.3	3.3	0.8	0.0	6.0	0.0	0.0	2.2
Cycle Q Clear(g_c), s	0.9	8.3	8.3	1.9	3.3	3.3	1.5	0.0	6.0	0.7	0.0	2.2
Prop In Lane	1.00		0.07	1.00		0.03	1.00		0.88	0.11		1.00
Lane Grp Cap(c), veh/h	583	623	647	440	678	710	441	0	371	516	0	365
V/C Ratio(X)	0.11	0.67	0.67	0.31	0.29	0.29	0.07	0.00	0.68	0.07	0.00	0.27
Avail Cap(c_a), veh/h	681	761	790	483	761	796	690	0	693	862	0	681
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	11.5	11.5	8.0	9.0	9.0	13.2	0.0	14.7	12.7	0.0	13.2
Incr Delay (d2), s/veh	0.1	1.6	1.6	0.4	0.2	0.2	0.1	0.0	2.2	0.1	0.0	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	0.5	4.3	4.5	1.0	1.6	1.7	0.3	0.0	2.9	0.3	0.0	1.0
LnGrp Delay(d),s/veh	7.5	13.1	13.1	8.4	9.2	9.2	13.3	0.0	17.0	12.7	0.0	13.6
LnGrp LOS	A	B	B	A	A	A	B		B	B		B
Approach Vol, veh/h		913			544			284			137	
Approach Delay, s/veh		12.7			9.0			16.6			13.4	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.1	8.5	19.2		14.1	7.2	20.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		8.0	3.9	10.3		4.2	2.9	5.3
Green Ext Time (p_c), s		1.6	0.0	4.4		1.9	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	102	81	0	0	1
Future Vol, veh/h	9	102	81	0	0	1
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	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	111	88	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	88	0	-	0	218	88
Stage 1	-	-	-	-	88	-
Stage 2	-	-	-	-	130	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1508	-	-	-	770	970
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	896	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1508	-	-	-	765	970
Mov Cap-2 Maneuver	-	-	-	-	765	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	890	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1508	-	-	-	-	970
HCM Lane V/C Ratio	0.006	-	-	-	-	0.001
HCM Control Delay (s)	7.4	0	-	-	0	8.7
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	-	0

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	102	0	0	81	4	0	0	0	1	0	0
Future Vol, veh/h	0	102	0	0	81	4	0	0	0	1	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	111	0	0	88	4	0	0	0	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	92	0	0	111	0	0	201	203	111	201	201	90
Stage 1	-	-	-	-	-	-	111	111	-	90	90	-
Stage 2	-	-	-	-	-	-	90	92	-	111	111	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1503	-	-	1479	-	-	757	693	942	757	695	968
Stage 1	-	-	-	-	-	-	894	804	-	917	820	-
Stage 2	-	-	-	-	-	-	917	819	-	894	804	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1503	-	-	1479	-	-	757	693	942	757	695	968
Mov Cap-2 Maneuver	-	-	-	-	-	-	757	693	-	757	695	-
Stage 1	-	-	-	-	-	-	894	804	-	917	820	-
Stage 2	-	-	-	-	-	-	917	819	-	894	804	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1503	-	-	1479	-	-	757
HCM Lane V/C Ratio	-	-	-	-	-	-	-	0.001
HCM Control Delay (s)	0	0	-	-	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Intersection Delay, s/veh	29
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	117	21	31	157	37	22	300	44	48	371	33
Future Vol, veh/h	32	117	21	31	157	37	22	300	44	48	371	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	127	23	34	171	40	24	326	48	52	403	36
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	15.6	17.7	26.5	41.8
HCM LOS	C	C	D	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	6%	19%	14%	11%
Vol Thru, %	82%	69%	70%	82%
Vol Right, %	12%	12%	16%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	366	170	225	452
LT Vol	22	32	31	48
Through Vol	300	117	157	371
RT Vol	44	21	37	33
Lane Flow Rate	398	185	245	491
Geometry Grp	1	1	1	1
Degree of Util (X)	0.74	0.393	0.502	0.89
Departure Headway (Hd)	6.692	7.658	7.391	6.522
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	541	469	487	555
Service Time	4.748	5.729	5.456	4.575
HCM Lane V/C Ratio	0.736	0.394	0.503	0.885
HCM Control Delay	26.5	15.6	17.7	41.8
HCM Lane LOS	D	C	C	E
HCM 95th-tile Q	6.3	1.8	2.8	10.3

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	204	1	130	241	1	0	0	96	2	0	0
Future Vol, veh/h	3	204	1	130	241	1	0	0	96	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	222	1	141	262	1	0	0	104	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	263	0	0	223	0	0	774	775	222	826	774	263
Stage 1	-	-	-	-	-	-	229	229	-	545	545	-
Stage 2	-	-	-	-	-	-	545	546	-	281	229	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1301	-	-	1346	-	-	316	329	818	291	329	776
Stage 1	-	-	-	-	-	-	774	715	-	523	519	-
Stage 2	-	-	-	-	-	-	523	518	-	726	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1301	-	-	1346	-	-	286	288	818	229	288	776
Mov Cap-2 Maneuver	-	-	-	-	-	-	286	288	-	229	288	-
Stage 1	-	-	-	-	-	-	772	713	-	521	455	-
Stage 2	-	-	-	-	-	-	459	454	-	631	713	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2.8	10	20.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	818	1301	-	-	1346	-	-	229
HCM Lane V/C Ratio	0.128	0.003	-	-	0.105	-	-	0.009
HCM Control Delay (s)	10	7.8	0	-	8	0	-	20.9
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.4	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	912	317	930	28	334	122	264
v/c Ratio	0.21	0.70	0.90	0.56	0.11	0.61	0.40	0.50
Control Delay	6.5	15.8	44.7	12.6	15.1	9.9	19.7	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	15.8	44.7	12.6	15.1	9.9	19.7	6.4
Queue Length 50th (ft)	7	92	34	95	6	16	28	2
Queue Length 95th (ft)	26	184	#200	190	21	67	63	43
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	382	1447	352	1656	519	823	598	800
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.63	0.90	0.56	0.05	0.41	0.20	0.33

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	806	33	292	837	18	26	52	255	12	100	243
Future Volume (veh/h)	73	806	33	292	837	18	26	52	255	12	100	243
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	79	876	36	317	910	20	28	57	277	13	109	264
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	362	1178	48	400	1328	29	246	78	380	99	476	446
Arrive On Green	0.07	0.34	0.34	0.10	0.37	0.37	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1774	3465	142	1774	3541	78	1005	277	1348	61	1687	1583
Grp Volume(v), veh/h	79	447	465	317	455	475	28	0	334	122	0	264
Grp Sat Flow(s),veh/h/ln	1774	1770	1838	1774	1770	1849	1005	0	1625	1748	0	1583
Q Serve(g_s), s	1.4	10.9	10.9	5.0	10.6	10.6	1.3	0.0	9.1	0.0	0.0	7.0
Cycle Q Clear(g_c), s	1.4	10.9	10.9	5.0	10.6	10.6	10.2	0.0	9.1	9.2	0.0	7.0
Prop In Lane	1.00		0.08	1.00		0.04	1.00		0.83	0.11		1.00
Lane Grp Cap(c), veh/h	362	601	625	400	664	693	246	0	458	574	0	446
V/C Ratio(X)	0.22	0.74	0.74	0.79	0.69	0.69	0.11	0.00	0.73	0.21	0.00	0.59
Avail Cap(c_a), veh/h	424	651	676	400	664	693	333	0	598	722	0	583
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.9	14.3	14.3	12.9	12.9	12.9	20.4	0.0	15.9	13.5	0.0	15.1
Incr Delay (d2), s/veh	0.3	4.3	4.1	10.4	2.9	2.8	0.2	0.0	3.2	0.2	0.0	1.3
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	0.7	5.9	6.1	3.9	5.6	5.8	0.4	0.0	4.5	1.3	0.0	3.2
LnGrp Delay(d),s/veh	10.2	18.5	18.4	23.2	15.8	15.7	20.6	0.0	19.0	13.7	0.0	16.4
LnGrp LOS	B	B	B	C	B	B	C		B	B		B
Approach Vol, veh/h		991			1247			362			386	
Approach Delay, s/veh		17.8			17.6			19.2			15.5	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.5	9.5	21.1		18.5	7.8	22.8
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		12.2	7.0	12.9		11.2	3.4	12.6
Green Ext Time (p_c), s		2.0	0.0	3.7		2.3	0.0	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	17.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	96	132	0	0	0
Future Vol, veh/h	0	96	132	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	104	143	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	143	0	-	0	247	143
Stage 1	-	-	-	-	143	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1440	-	-	-	741	905
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	920	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1440	-	-	-	741	905
Mov Cap-2 Maneuver	-	-	-	-	741	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	920	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1440	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	96	0	0	132	0	0	0	0	0	0	0
Future Vol, veh/h	0	96	0	0	132	0	0	0	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	104	0	0	143	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	143	0	0	104	0	0	247	247	104	247	247	143
Stage 1	-	-	-	-	-	-	104	104	-	143	143	-
Stage 2	-	-	-	-	-	-	143	143	-	104	104	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1440	-	-	1488	-	-	707	655	951	707	655	905
Stage 1	-	-	-	-	-	-	902	809	-	860	779	-
Stage 2	-	-	-	-	-	-	860	779	-	902	809	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1488	-	-	707	655	951	707	655	905
Mov Cap-2 Maneuver	-	-	-	-	-	-	707	655	-	707	655	-
Stage 1	-	-	-	-	-	-	902	809	-	860	779	-
Stage 2	-	-	-	-	-	-	860	779	-	902	809	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1440	-	-	1488	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Intersection Delay, s/veh	41.8
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	117	29	31	157	37	30	328	44	48	398	33
Future Vol, veh/h	32	117	29	31	157	37	30	328	44	48	398	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	127	32	34	171	40	33	357	48	52	433	36
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	17.5	20	39.9	62.7
HCM LOS	C	C	E	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	18%	14%	10%
Vol Thru, %	82%	66%	70%	83%
Vol Right, %	11%	16%	16%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	402	178	225	479
LT Vol	30	32	31	48
Through Vol	328	117	157	398
RT Vol	44	29	37	33
Lane Flow Rate	437	193	245	521
Geometry Grp	1	1	1	1
Degree of Util (X)	0.861	0.44	0.54	0.987
Departure Headway (Hd)	7.091	8.187	7.951	6.951
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	511	441	455	526
Service Time	5.108	6.231	5.976	4.951
HCM Lane V/C Ratio	0.855	0.438	0.538	0.99
HCM Control Delay	39.9	17.5	20	62.7
HCM Lane LOS	E	C	C	F
HCM 95th-tile Q	9.1	2.2	3.1	13.4

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	3	204	1	153	241	1	0	0	120	2	0	0
Future Vol, veh/h	3	204	1	153	241	1	0	0	120	2	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	222	1	166	262	1	0	0	130	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	263	0	0	223	0	0	824	825	222	889	824	263
Stage 1	-	-	-	-	-	-	229	229	-	595	595	-
Stage 2	-	-	-	-	-	-	595	596	-	294	229	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1301	-	-	1346	-	-	292	308	818	264	308	776
Stage 1	-	-	-	-	-	-	774	715	-	491	492	-
Stage 2	-	-	-	-	-	-	491	492	-	714	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1301	-	-	1346	-	-	259	263	818	197	263	776
Mov Cap-2 Maneuver	-	-	-	-	-	-	259	263	-	197	263	-
Stage 1	-	-	-	-	-	-	772	713	-	490	421	-
Stage 2	-	-	-	-	-	-	420	421	-	598	713	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.1	10.2	23.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	818	1301	-	-	1346	-	-	197
HCM Lane V/C Ratio	0.159	0.003	-	-	0.124	-	-	0.011
HCM Control Delay (s)	10.2	7.8	0	-	8.1	0	-	23.5
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.4	-	-	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	912	342	930	28	360	122	264
v/c Ratio	0.21	0.71	0.99	0.57	0.10	0.64	0.39	0.48
Control Delay	7.1	17.0	65.3	13.7	14.5	10.8	18.8	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	17.0	65.3	13.7	14.5	10.8	18.8	5.9
Queue Length 50th (ft)	7	93	~42	96	6	22	28	2
Queue Length 95th (ft)	29	#202	#236	#214	20	77	62	42
Internal Link Dist (ft)		1214		510		1379	531	
Turn Bay Length (ft)	200		200					330
Base Capacity (vph)	374	1426	345	1634	511	813	580	792
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.64	0.99	0.57	0.05	0.44	0.21	0.33

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	806	33	315	837	18	26	52	279	12	100	243
Future Volume (veh/h)	73	806	33	315	837	18	26	52	279	12	100	243
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	79	876	36	342	910	20	28	57	303	13	109	264
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	347	1150	47	383	1291	28	245	77	411	98	512	477
Arrive On Green	0.07	0.33	0.33	0.10	0.36	0.36	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	3465	142	1774	3541	78	1005	257	1365	62	1700	1583
Grp Volume(v), veh/h	79	447	465	342	455	475	28	0	360	122	0	264
Grp Sat Flow(s),veh/h/ln	1774	1770	1838	1774	1770	1849	1005	0	1622	1761	0	1583
Q Serve(g_s), s	1.4	11.4	11.4	5.0	11.1	11.1	1.3	0.0	10.1	0.0	0.0	7.1
Cycle Q Clear(g_c), s	1.4	11.4	11.4	5.0	11.1	11.1	11.4	0.0	10.1	10.1	0.0	7.1
Prop In Lane	1.00		0.08	1.00		0.04	1.00		0.84	0.11		1.00
Lane Grp Cap(c), veh/h	347	587	610	383	645	674	245	0	489	610	0	477
V/C Ratio(X)	0.23	0.76	0.76	0.89	0.70	0.70	0.11	0.00	0.74	0.20	0.00	0.55
Avail Cap(c_a), veh/h	406	632	656	383	645	674	301	0	579	705	0	565
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.6	15.1	15.1	14.8	13.7	13.7	20.9	0.0	15.8	13.2	0.0	14.8
Incr Delay (d2), s/veh	0.3	5.1	4.9	22.2	3.5	3.3	0.2	0.0	4.1	0.2	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	0.7	6.3	6.5	5.4	5.9	6.2	0.4	0.0	5.1	1.3	0.0	3.2
LnGrp Delay(d),s/veh	10.9	20.1	20.0	37.1	17.2	17.0	21.2	0.0	19.9	13.3	0.0	15.8
LnGrp LOS	B	C	B	D	B	B	C		B	B		B
Approach Vol, veh/h		991			1272			388			386	
Approach Delay, s/veh		19.3			22.5			20.0			15.0	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.7	9.5	21.2		19.7	7.8	22.9
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.0	5.0	18.0		18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s		13.4	7.0	13.4		12.1	3.4	13.1
Green Ext Time (p_c), s		1.8	0.0	3.3		2.2	0.0	4.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	53	96	132	0	0	55
Future Vol, veh/h	53	96	132	0	0	55
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	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	104	143	0	0	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	143	0	-	0	363	143
Stage 1	-	-	-	-	143	-
Stage 2	-	-	-	-	220	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1440	-	-	-	636	905
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	817	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1440	-	-	-	609	905
Mov Cap-2 Maneuver	-	-	-	-	609	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	782	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1440	-	-	-	-	905
HCM Lane V/C Ratio	0.04	-	-	-	-	0.066
HCM Control Delay (s)	7.6	0	-	-	0	9.3
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	96	0	0	132	23	0	0	0	24	0	0
Future Vol, veh/h	0	96	0	0	132	23	0	0	0	24	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	104	0	0	143	25	0	0	0	26	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	168	0	0	104	0	0	260	272	104	260	260	156
Stage 1	-	-	-	-	-	-	104	104	-	156	156	-
Stage 2	-	-	-	-	-	-	156	168	-	104	104	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1410	-	-	1488	-	-	693	635	951	693	645	890
Stage 1	-	-	-	-	-	-	902	809	-	846	769	-
Stage 2	-	-	-	-	-	-	846	759	-	902	809	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1410	-	-	1488	-	-	693	635	951	693	645	890
Mov Cap-2 Maneuver	-	-	-	-	-	-	693	635	-	693	645	-
Stage 1	-	-	-	-	-	-	902	809	-	846	769	-
Stage 2	-	-	-	-	-	-	846	759	-	902	809	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	10.4
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1410	-	-	1488	-	-	693
HCM Lane V/C Ratio	-	-	-	-	-	-	-	0.038
HCM Control Delay (s)	0	0	-	-	0	-	-	10.4
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Queues
1: Dallas Road/Bombing Range Road & Kennedy Road

04/27/2018

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	185	245	398	491
v/c Ratio	0.38	0.49	0.49	0.62
Control Delay	14.5	15.8	9.5	11.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.5	15.8	9.5	11.9
Queue Length 50th (ft)	28	38	47	65
Queue Length 95th (ft)	90	116	124	168
Internal Link Dist (ft)	401	1837	284	79
Turn Bay Length (ft)				
Base Capacity (vph)	1275	1316	1740	1693
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.15	0.19	0.23	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	117	21	31	157	37	22	300	44	48	371	33
Future Volume (veh/h)	32	117	21	31	157	37	22	300	44	48	371	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	35	127	23	34	171	40	24	326	48	52	403	36
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	176	337	54	159	335	72	136	722	102	167	724	61
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	183	1329	215	136	1323	285	43	1526	215	97	1531	129
Grp Volume(v), veh/h	185	0	0	245	0	0	398	0	0	491	0	0
Grp Sat Flow(s),veh/h/ln	1726	0	0	1743	0	0	1783	0	0	1757	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	0.0	3.9	0.0	0.0	4.8	0.0	0.0	6.3	0.0	0.0
Prop In Lane	0.19		0.12	0.14		0.16	0.06		0.12	0.11		0.07
Lane Grp Cap(c), veh/h	568	0	0	566	0	0	960	0	0	952	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.43	0.00	0.00	0.41	0.00	0.00	0.52	0.00	0.00
Avail Cap(c_a), veh/h	1571	0	0	1602	0	0	2892	0	0	2843	0	0
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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.2	0.0	0.0	10.6	0.0	0.0	5.8	0.0	0.0	6.2	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	2.0	0.0	0.0	2.4	0.0	0.0	3.3	0.0	0.0
LnGrp Delay(d),s/veh	10.5	0.0	0.0	11.1	0.0	0.0	6.1	0.0	0.0	6.7	0.0	0.0
LnGrp LOS	B			B			A			A		
Approach Vol, veh/h		185			245			398			491	
Approach Delay, s/veh		10.5			11.1			6.1			6.7	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.1		12.9		20.1		12.9
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		52.5		28.5		52.5		28.5
Max Q Clear Time (g_c+I1), s		6.8		4.8		8.3		5.9
Green Ext Time (p_c), s		7.3		2.7		7.3		2.6

Intersection Summary	
HCM 2010 Ctrl Delay	7.9
HCM 2010 LOS	A

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	194	245	438	521
v/c Ratio	0.40	0.49	0.53	0.64
Control Delay	15.3	16.7	10.1	12.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.3	16.7	10.1	12.3
Queue Length 50th (ft)	30	40	55	72
Queue Length 95th (ft)	98	122	143	185
Internal Link Dist (ft)	401	1837	284	79
Turn Bay Length (ft)				
Base Capacity (vph)	1212	1249	1703	1684
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.20	0.26	0.31

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	117	29	31	157	37	30	328	44	48	398	33
Future Volume (veh/h)	32	117	29	31	157	37	30	328	44	48	398	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	35	127	32	34	171	40	33	357	48	52	433	36
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	166	315	71	152	329	71	140	746	95	159	761	60
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	175	1263	284	136	1321	284	59	1516	194	92	1545	121
Grp Volume(v), veh/h	194	0	0	245	0	0	438	0	0	521	0	0
Grp Sat Flow(s),veh/h/ln	1722	0	0	1741	0	0	1768	0	0	1758	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.1	0.0	0.0	4.1	0.0	0.0	5.6	0.0	0.0	7.0	0.0	0.0
Prop In Lane	0.18		0.16	0.14		0.16	0.08		0.11	0.10		0.07
Lane Grp Cap(c), veh/h	551	0	0	552	0	0	982	0	0	979	0	0
V/C Ratio(X)	0.35	0.00	0.00	0.44	0.00	0.00	0.45	0.00	0.00	0.53	0.00	0.00
Avail Cap(c_a), veh/h	1437	0	0	1466	0	0	2756	0	0	2744	0	0
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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	0.0	0.0	11.4	0.0	0.0	5.9	0.0	0.0	6.3	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	2.1	0.0	0.0	2.8	0.0	0.0	3.6	0.0	0.0
LnGrp Delay(d),s/veh	11.4	0.0	0.0	11.9	0.0	0.0	6.2	0.0	0.0	6.7	0.0	0.0
LnGrp LOS	B			B			A			A		
Approach Vol, veh/h		194			245			438			521	
Approach Delay, s/veh		11.4			11.9			6.2			6.7	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.6		13.2		21.6		13.2
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		53.5		27.5		53.5		27.5
Max Q Clear Time (g_c+I1), s		7.6		5.1		9.0		6.1
Green Ext Time (p_c), s		8.2		2.7		8.2		2.7

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

APPENDIX F

Safety Analysis

Intersection: Dallas Rd/Kennedy Rd/Bombing Range Rd 17-Nov-17

Ra =	System Wide Average accident rate =	0.6
K =	Statistical Constant =	1.645
Average Daily cars passing Through intersection		
	ADT	1,850
		1320
		1420
		2690
M=	Millions of Vehicles for a five year period =	**13.286**

Rc= Critical Accident Rate = **0.9119447**

Accident Rate

Number of accidents =	14
Number of years =	5
Accident Rate =	**1.0537**

Rc= Ra+(K*Ra/M)^.5)-1/(2*M)

ADT = 2006 PM Count X 10
PM Peak Hour= Approx. 10% ADT

Intersection: Arena Rd/ Kennedy Rd 17-Nov-17

Ra =	System Wide Average accident rate =	0.6
K =	Statistical Constant =	1.645
Average Daily cars passing Through intersection		
	ADT	20
		1810
		780
		3180
M=	Millions of Vehicles for a five year period =	**10.56675**

Rc= Critical Accident Rate = **0.944668**

Accident Rate

Number of accidents =	1
Number of years =	5
Accident Rate =	**0.0946365**

Rc= Ra+(K*Ra/M)^.5)-1/(2*M)

ADT = 2006 PM Count X 10
PM Peak Hour= Approx. 10% ADT

Intersection: Kennedy / Keene 15-Nov-17

Ra =	System Wide Average accident rate =	0.6
K =	Statistical Constant =	1.645
Average Daily cars passing Through intersection		
	ADT	3090
		10140
		2500
		8070
M=	Millions of Vehicles for a five year period =	43.435

Rc= Critical Accident Rate = 0.7818285

Accident Rate

Number of accidents =	16
Number of years =	5
Accident Rate =	0.3683665

Rc= Ra+(K*Ra / M)^.5)-1 / (2*M)

ADT = 2006 PM Count X 10
PM Peak Hour= Approx. 10% ADT

COLLISION DIAGRAM

NOV 15, 2017

DALLAS RD / KENNEDY RD / BOMBING RANGE RD
- 14 TOTAL COLLISIONS

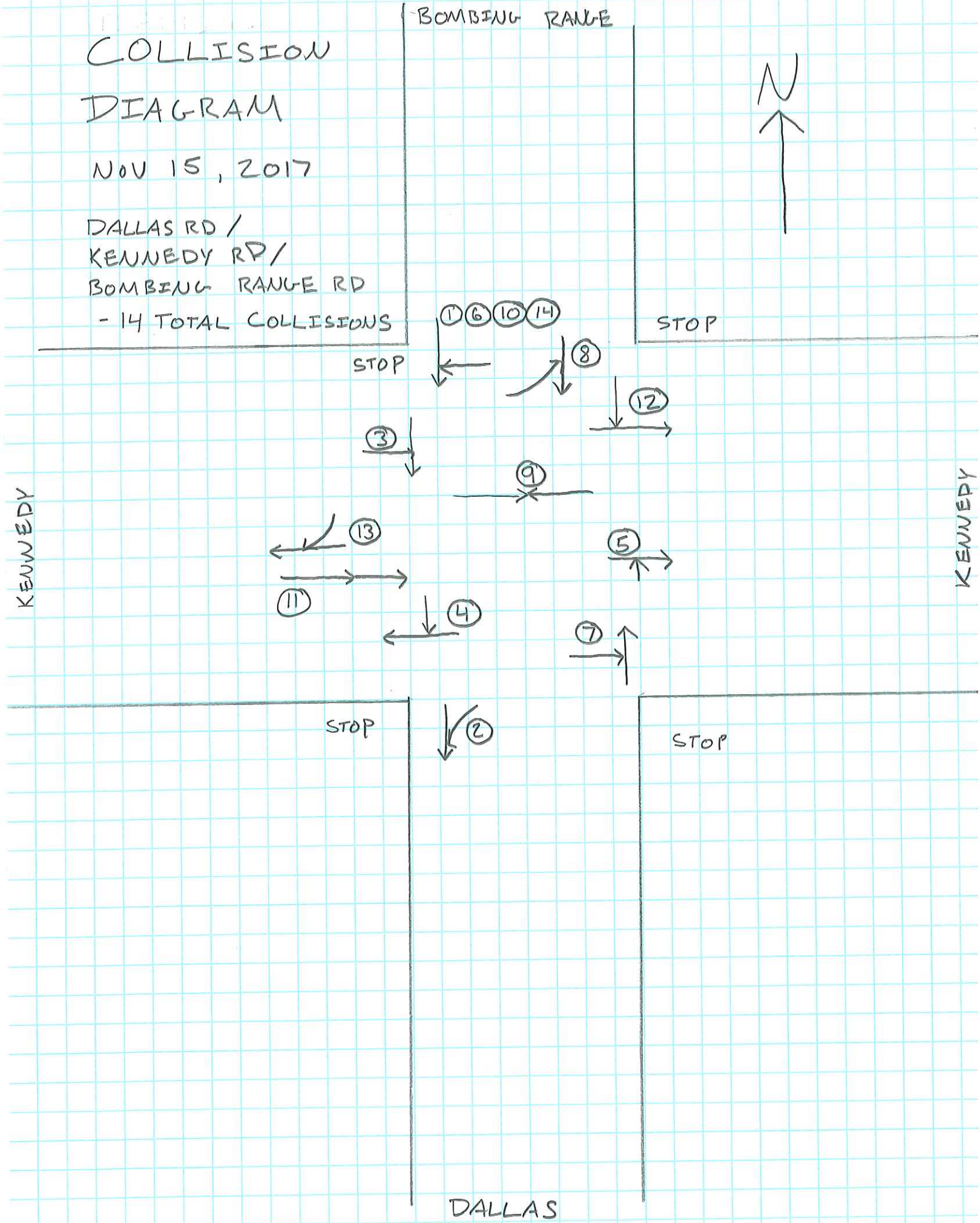
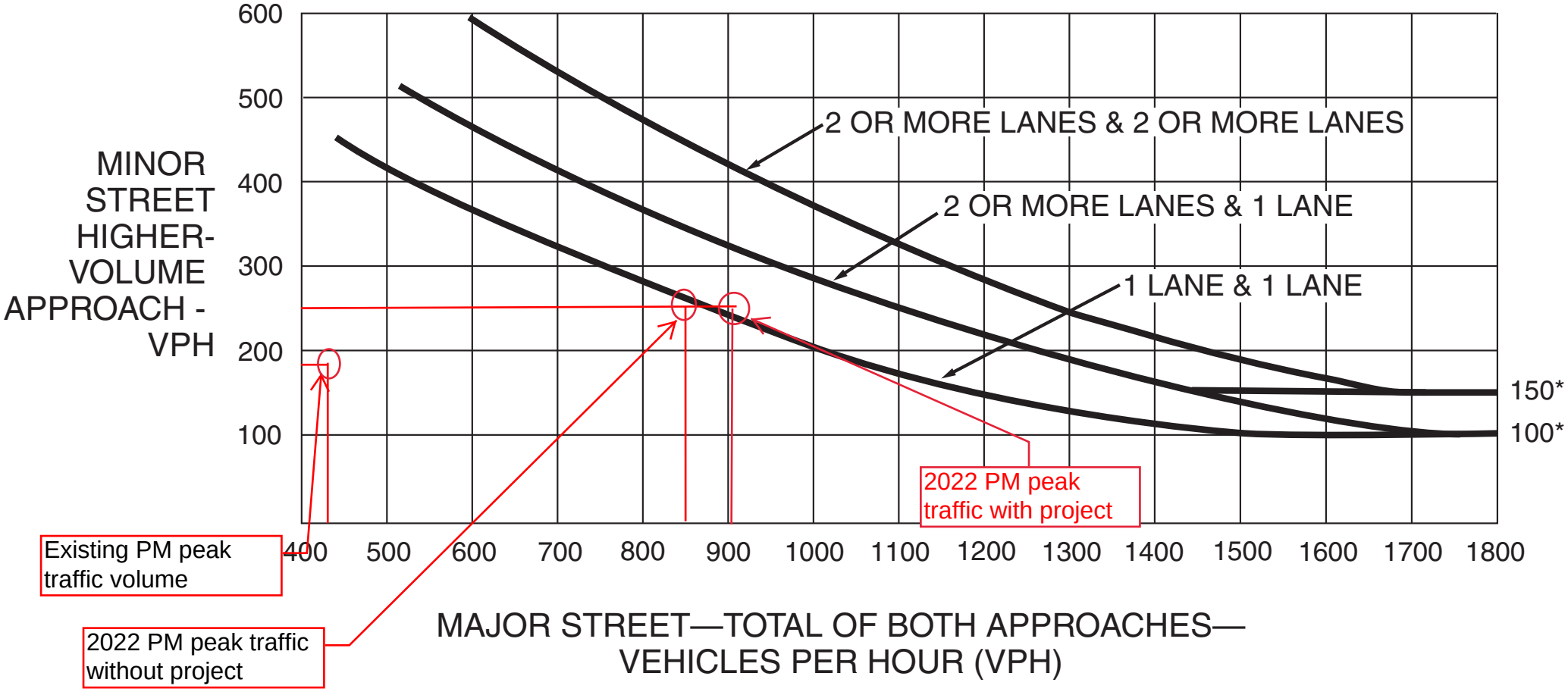


Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.