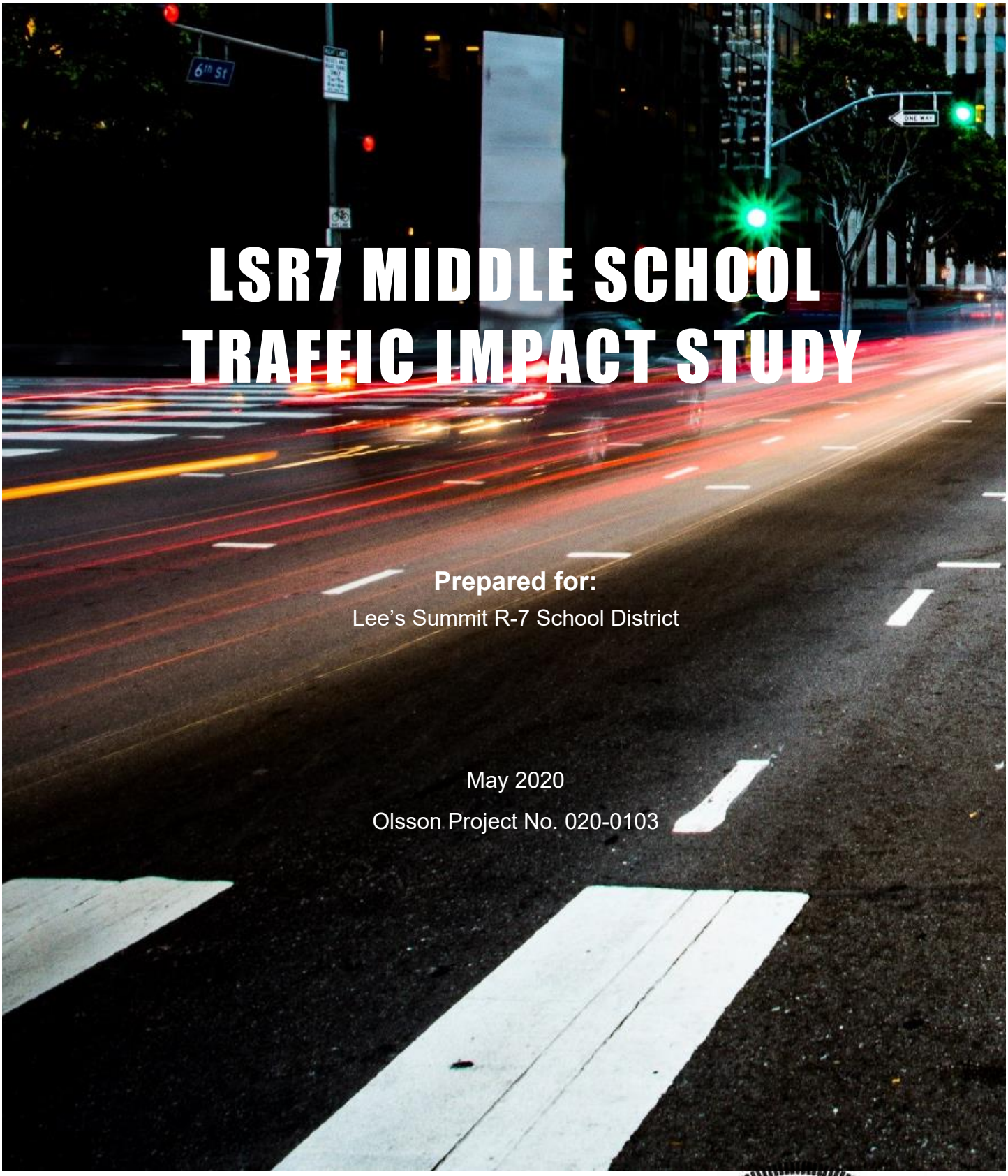


LSR7 MIDDLE SCHOOL TRAFFIC IMPACT STUDY

Prepared for:

Lee's Summit R-7 School District

May 2020

Olsson Project No. 020-0103

olsson

STATE OF MISSOURI
SHANNON L JEFFRIES
NUMBER PE-2008000069
PROFESSIONAL ENGINEER
05.08.2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Appendix A: Data Collection

Appendix B: Existing Conditions

Appendix C: Existing Plus Proposed School Conditions

Appendix D: Future Conditions

1. INTRODUCTION

This report studies traffic impacts associated with a proposed middle school complex located south of Bailey Road and west of Ranson Road in Lee's Summit, Missouri.

This report will review the impacts of the proposed site on the existing roadway network and will recommend additional turn lanes, storage bays, and intersection control methods per the City of Lee's Summit *Access Management Code* and Missouri Department of Transportation's (MoDOT's) Engineering Policy Guide (EPG), as appropriate, for the following study intersections:

- Ranson Road and US-50 Westbound Ramps
- Ranson Road and US-50 Eastbound Ramps
- Ranson Road and Oldham Parkway
- Ranson Road and Bailey Road
- Bailey Road and Century Drive / Hamblen Road East (referred to as Century Drive)
- Bailey Road and Hamblen Road West (referred to as Hamblen Road)
- Proposed Site Driveways

For this study, the following scenarios were analyzed for the AM (coincides with school arrival), Afternoon (coincides with school dismissal), and PM (includes commuters and after school functions) peak hour periods:

- Existing Conditions (Includes approved Culver's and Princeton senior living community)
- Existing Plus Proposed School Conditions
- Future Planned Development Conditions (includes future Bailey Farm residential development)

The approximate locations of the proposed school complex, approved developments, and future development are shown on **Figure 1**.

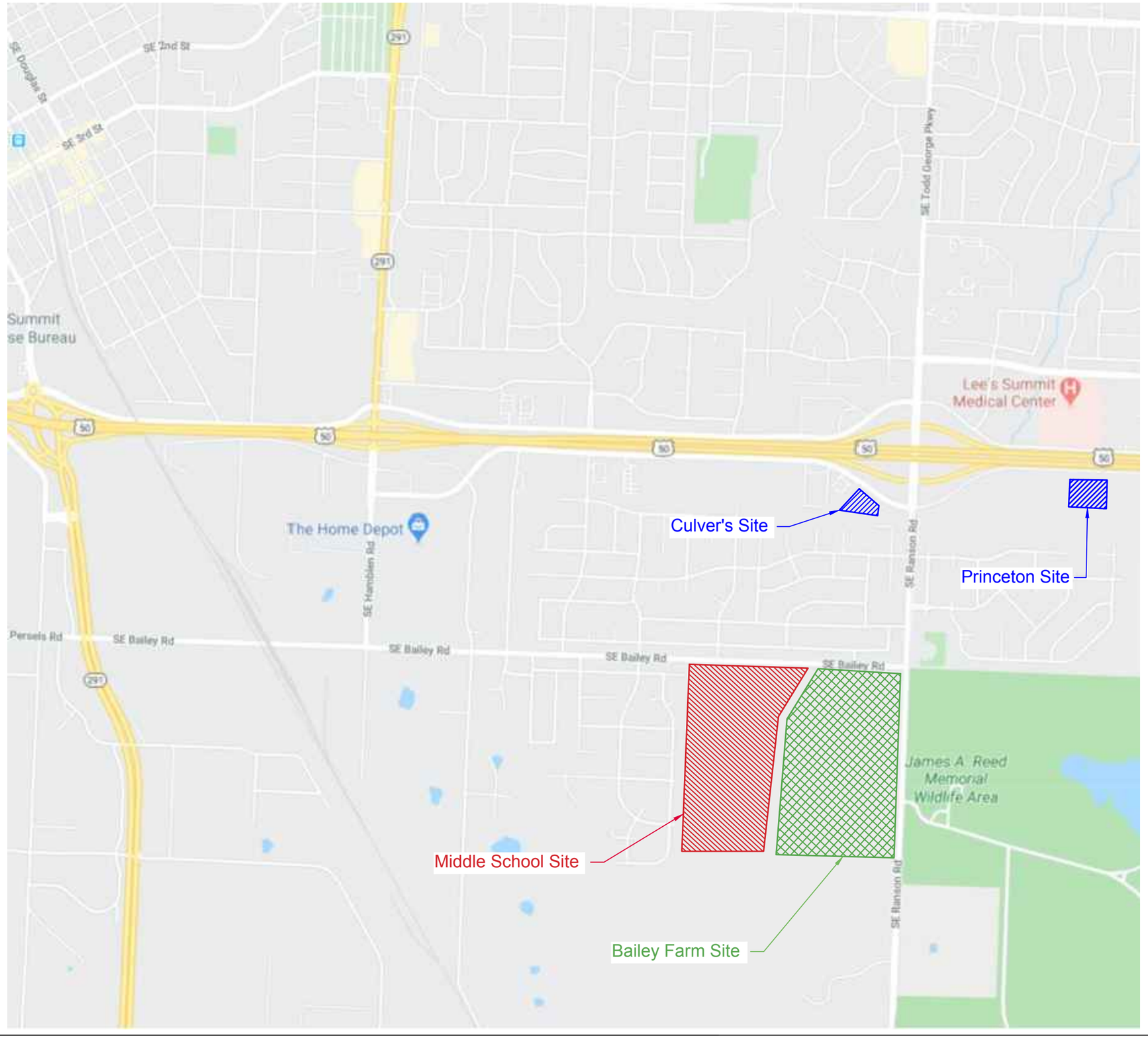
FIGURE 1

Vicinity Map

LSR7 Middle School
Lee's Summit, MO

N

olsson



LEGEND

- Middle School Site Location
- Culver's & Princeton Site Locations (Approved)
- Bailey Farm Site Location (Future)

2. DATA COLLECTION

At the time of this report, local and regional travel patterns have been affected by the Covid-19 stay-at-home order, resulting in decreased traffic volumes when compared to typical conditions. To provide for analysis of more typical conditions, recent traffic counts collected prior to the stay-at-home order were utilized where possible. **Table 1** illustrates count data provided and utilized for the purposes of this study.

Table 1. Provided Traffic Count Data.

Intersection	Source	Date of Count	Peak Period Provided
Bailey Road and Hamblen Road	City	May 14th, 2019	AM and PM
Bailey Road and Century Drive	City	May 2nd, 2019	AM and PM
Bailey Road and Ranson Road	City	April 25th, 2017	AM and PM
Ranson Road and Oldham Parkway	Approved traffic impact study	October 24-25th, 2018	AM and PM

The approved traffic impact study provided by the City included traffic volumes for the intersection of Ranson Road and Oldham Parkway which reflect the impact of a proposed Culver's development and the proposed Princeton senior living community. This count was utilized for this study, thus the impact of these two approved developments are included in existing conditions analysis.

New counts were collected at the US-50 Interchange Ramps with Ranson Road on Tuesday, April 7th, 2020. Due to variance in data collection dates, volumes were increased/balanced as appropriate across the study intersections.

The City and approved traffic study counts did not include data for the Afternoon peak hour, expected to occur from 3:00-4:00 PM. To obtain this, City average daily traffic (ADT) data in the vicinity of the project area was reviewed to compare the Afternoon and PM peak hour periods. It was determined that the Afternoon peak hour has approximately 80% of the volume observed during the PM peak hour. At study intersections where data was obtained from City or approved study counts, the existing PM peak hour counts were reduced to obtain existing Afternoon turning movement volumes.

The approach to adjust volumes to address impacts of the Covid-19 stay-at-home orders and determination of afternoon peak hour volumes were coordinated with and approved by the City of Lee's Summit and MoDOT staff.

In general, the AM peak hour was observed to be from 7:15 AM – 8:15 AM. The afternoon peak hour is expected to occur from 3:00 PM – 4:00 PM. The PM peak hour was observed to be from 4:30 PM – 5:30 PM.

The existing peak hour volumes are illustrated in **Figure 1**. Turning movement count data, ADT data, and additional information regarding volume balancing is provided in **Appendix A**.

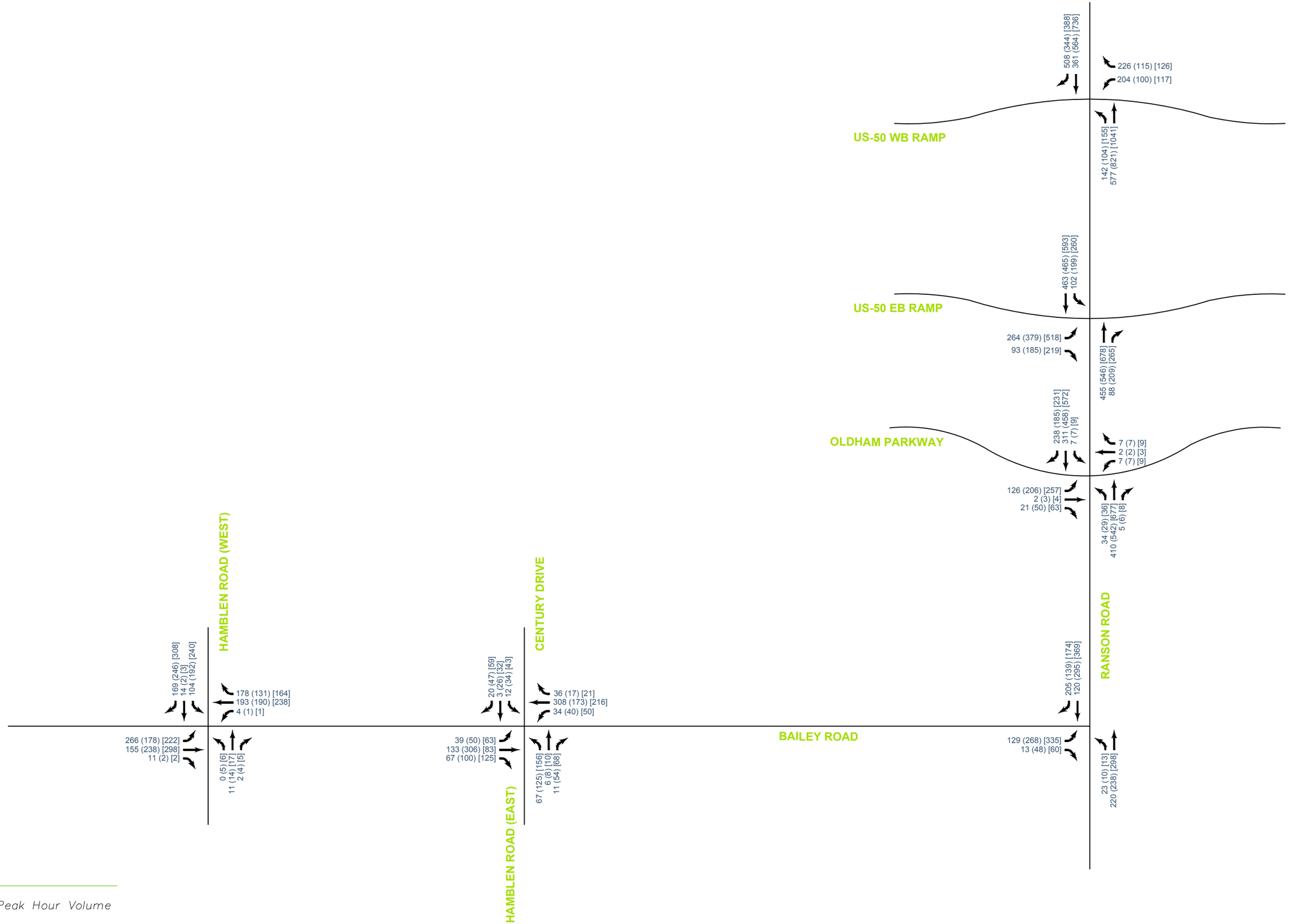
The data collection effort also included documentation of current roadway geometrics and obtaining existing and planned traffic signal timings. Existing signal timing information at the US-50 Interchange with Ranson Road was obtained from the Mid-America Regional Council's (MARC) Central Traffic Control System (TransSuite). Signal timings have not been developed at the planned signalized intersections but were approximated considering existing volumes, proximity and timings at adjacent intersections, and general guidance from City staff.

FIGURE 2

Existing
Peak Hour Volumes

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

AM (Afternoon) [PM] *Total Peak Hour Volume*

3. EXISTING CONDITIONS

Existing traffic conditions were evaluated to identify any existing deficiencies and to provide a baseline for comparative purposes. At the request of the City, two approved development projects were included within the existing conditions. The proposed Princeton senior living project is located east of Ranson Road along Oldham Parkway. The proposed Culver's project is located west of Ranson Road along Oldham Parkway. Traffic volumes associated with both approved projects were obtained from the approved traffic impact study and are reflected in the turning movement data referenced for the intersection of Ranson Road and Oldham Parkway.

Based on direction from City and MoDOT staff, the following planned improvements were considered in-place under existing conditions analysis:

- Traffic signal at Ranson Road and Oldham Pkwy with 150-foot northbound left-turn lane
- Traffic signal at Bailey Road and Hamblen Road with 90-foot westbound left-turn lane

3.1. Network Characteristics

Six roadways within the study area were considered during analysis: US-50, Oldham Parkway, Ranson Road, Bailey Road, Century Drive, and Hamblen Road. Ranson Road is also designated as Route RA; for the purposes of this report the roadway will be referred to as Ranson Road.

US-50, Ranson Road, and Oldham Parkway are maintained by MoDOT. The functional classification for these roadways was acquired from the MoDOT Functional Classification System Map. The other three roadways are maintained by the City of Lee's Summit and were referenced from the City's *Thoroughfare Master Plan.* Current network characteristics are summarized in **Table 2**.

Table 2. Existing Network Summary.

Roadway	Functional Classification	Typical Section	Median Type	Posted Speed
US-50	Other Freeway and Expressway (MoDOT)	4-Lane	Divided	65 mph on mainline / 40 mph on exit ramps
Oldham Parkway	Local (MoDOT)	2-Lane	None	40 mph
Ranson Road	Minor Arterial / Major Collector* (MoDOT)	4-Lane / 2-Lane*	Divided / None*	40 mph / 45 mph*
Bailey Road	Minor Arterial (City)	2-Lane	None	35 mph
Century Drive / Hamblen Road East	Local / Minor Arterial** (City)	2-Lane	None	25 mph north / 40 mph south
Hamblen Road West	Minor Arterial (City)	2-Lane	None	35 mph north / 25 mph south

*Minor Arterial north of Bailey Road, Major Collector south of Bailey Road. 4-lane divided with 40 mph speed limit near interchange transitioning to 2-lane undivided with 45 mph speed limit south of Oldham Parkway.
**Local north of Bailey Road, Minor Arterial south of Bailey Road

The US-50 Ramps and Ranson Road intersections are signalized. Pedestrian accommodations including marked crosswalks and pedestrian pushbuttons and signal heads are provided at each intersection for north/south crossings. No pedestrian accommodations are present for crossing Ranson Road at either intersection.

The intersection of Oldham Parkway and Ranson Road is planned for signalization. Marked crosswalks are currently provided for north/south travel, and pedestrian pushbuttons and signal heads are assumed to be provided when the signal is installed. No pedestrian accommodations are currently present for crossing Ranson Road at the intersection.

The intersection of Bailey Road and Ranson Road is unsignalized with stop-control at the minor approach (eastbound). Sidewalk is present in the northwest corner. Pedestrian crossing accommodations are not provided at the intersection. An unsignalized pedestrian crossing is provided approximately 450 feet north of Bailey Road across Ranson Road.

The intersection of Bailey Road and Century Drive is unsignalized. Sidewalk is provided along the north side of Bailey Road in the vicinity of the intersection and terminates west of Century Drive. Sidewalks are not present along the south side of Bailey Road except for an unconnected section along a developed lot in the southwest corner. Marked crosswalks are not provided.

The intersection of Bailey Road and Hamblen Road is planned for signalization by the City. Sidewalk will be provided in the northeast corner, and a shared use-path will be provided in the southwest and southeast corners for east/west travel. Pedestrian accommodations including marked crosswalks, pedestrian pushbuttons and signal heads are proposed to be provided at the south and east legs with the signalization project.

The study roadways of Bailey Road and Ranson Road are included in *Exhibit 4 – Bicycle Transportation Plan* of the City's *Thoroughfare Master Plan 2015-2040 (TMP).* Along Bailey Road, on-street bicycle lanes are provided between Century Drive and Ranson Road and is designated as planned west of Century Lane. An off-street path is also designated as planned for this section. Along Ranson Road, an off-street path is provided north of Bailey Road and is designated as planned for south of Bailey Road.

The City of Lee's Summit has adopted an Unimproved Road Policy to provide design guidelines for development activity impacting roadways that are constructed to unimproved/interim standards. Based on *Exhibit 6 – Existing Unimproved and Interim Roadways and Network Gaps* of the *TMP*, Hamblen Road East (south leg of the intersection of Century Drive and Bailey Road) is currently constructed to interim standard. All other study roadways are pending permanent or are not identified as substandard. The proposed middle school is not located along Hamblen Road East and is not expected to generate trips from this section of roadway.

3.2. Existing Warrant Analysis

Signal Warrants

A traffic signal may be justified if traffic conditions meet any of the applicable nine signal warrants described in the 2009 Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD provides criteria for conducting an engineering study to determine whether a traffic signal is appropriate at any intersection.

For this study, based on the data available, the Peak Hour Signal Warrant (Warrant 3) was reviewed under existing conditions to determine if alternative control measures are warranted for the currently unsignalized intersections of Bailey Road with Century Drive and Bailey Road with Ranson Road.

Based on available data, the intersection of Bailey Road with Century Drive is on the threshold for meeting a signal warrant during the PM peak hour.

A traffic signal is currently warranted at intersection of Bailey Road with Ranson Road during the Afternoon and PM peak hours.

Capacity and queueing analysis were also reviewed (see **Section 3.3**) to determine if signalization is recommended. Signal warrant analysis sheets are provided in **Appendix B**.

Turn Lane Warrants

City of Lee's Summit Access Management Code (AMC) guidelines were reviewed for turn lanes at study intersections along Bailey Road. MoDOT's Access Management Guidelines, located in MoDOT Engineering Policy Guide (EPG) Section 940.9, were reviewed for turn lanes at study intersections along Ranson Road.

Left-turn Lanes: Based on the Lee's Summit AMC, left-turn lanes shall be provided on all approaches to intersections controlled by a signal. Left-turn lanes are provided at the planned signal of Hamblen Road and Bailey Road except for the northbound approach, which is a private drive with minimal northbound traffic.

Based on the Lee's Summit AMC, left-turn lanes shall be provided on all arterial streets at the intersection with another arterial and on non-residential connectors intersecting with minor arterial streets where the left-turn volume is at least 20 vehicles per hour (vph). Left-turn lanes are provided at these locations except in the eastbound, westbound, and southbound directions at Century Drive and Bailey Road and in the eastbound at Bailey Road and Ranson Road.

Per the AMC, the minimum length of a left-turn lane should be 250 feet plus taper on an arterial street intersecting another arterial street and 200 feet plus taper on an arterial street at other locations. The existing southbound left-turn lane (110 feet) and planned westbound left-turn (90 feet) at Hamblen Road and Bailey Road and the existing northbound left-turn lane (110 feet) at Century Drive and Bailey Road do not meet the standard turn bay lengths. Increasing these turn bays could be achieved but would result in existing driveways being located within the turn bay and/or taper.

The MoDOT left-turn lane warrant was reviewed at study intersections along Ranson Road for which no left-turn lane is provided. Based on the MoDOT guidelines provided in the *EPG*, no additional left-turn lanes are currently warranted.

Right-turn Lanes: Based on the Lee's Summit AMC, right-turn lanes shall be provided on minor arterial streets at all connections with a turning volume of at least 60 vph. Right-turn lanes are provided at these locations except in the westbound and southbound directions at Hamblen Road and Bailey Road, northbound direction at Century Drive and Bailey Road, and eastbound direction at Ranson Road and Bailey Road.

Per the AMC, the minimum length of a right-turn lane should be 200 feet plus taper on a minor arterial street intersecting another arterial street. The existing eastbound right-turn lane (100 feet) at Century Drive and Bailey Road is below City standard.

The MoDOT right-turn lane warrant was reviewed at study intersections along Ranson Road for which no right-turn lane is provided. Based on the MoDOT guidelines provided in the *EPG*, a southbound right-turn lane is warranted for all three time periods at Ranson Road and Bailey

Road. A northbound right-turn lane is also warranted at Ranson Road and the US-50 Eastbound Ramps for the Afternoon and PM peak hour periods.

Per MoDOT guidelines, a right-turn lane along a 40-mph roadway should have a minimum deceleration/storage of 90 feet plus 100-foot taper. The westbound right-turn lane at Ranson Road and the US-50 Westbound Ramps provides 70 feet of deceleration/storage with no taper.

A summary of existing locations that do not meet left or right-turn lane standards is provided below:

- Northbound left-turn lane at Hamblen Road and Bailey Road is not planned
- Southbound left-turn lane with reduced storage at Hamblen Road and Bailey Road
- Westbound left-turn lane with reduced storage at Hamblen Road and Bailey Road
- Eastbound, westbound, and southbound left-turn lanes at Century Drive and Bailey Road are not provided
- Northbound left-turn lane with reduced storage at Century Drive and Bailey Road
- Eastbound left or right-turn lane at Ranson Road and Bailey Road
- Westbound and southbound right-turn lanes at Hamblen Road and Bailey Road are not provided
- Northbound right-turn lane is not provided at Century Drive and Bailey Road
- Eastbound right-turn lane with reduced storage at Century Drive and Bailey Road
- Southbound right-turn lane at Ranson Road and Bailey Road is not provided
- Northbound right-turn lane at Ranson Road and the US-50 Eastbound Ramps is not provided
- Westbound right-turn lane with reduced storage at Ranson Road and the US-50 Westbound ramps

Capacity and queueing analysis were reviewed (see **Section 3.3**) to determine if additional left/right-turn lanes and/or increased storage length is recommended based on existing operations. Existing conditions lane configurations and traffic control for the study intersections are illustrated in **Figure 3**. Turn lane warrant worksheets are provided in **Appendix B**.

3.3. Existing Capacity Analysis

Capacity analysis was performed for the study intersections utilizing the existing lane configurations and traffic control, including the planned signalization and geometric improvements at the intersections of Bailey Road with Hamblen Road west and Ranson Road with Oldham Parkway. Analysis was conducted using Synchro, Version 11, based on the Highway Capacity Manual (HCM) delay methodologies. For simplicity, the amount of control delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance.

The amount of delay is assigned a letter grade A through F, LOS A representing little or no delay and LOS F representing very high delay. **Table 3** shows the delays associated with each LOS grade for signalized and unsignalized intersections, respectively. Queuing analysis was also conducted using the 95th-percentile queue length. This represents the queue length that has a 5 percent probability of being exceeded during the peak hour period.

Table 3. Intersection LOS Criteria.

Level of Service	Average Control Delay (seconds)	
	Signalized	Unsignalized
A	< 10	< 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50
Highway Capacity Manual (HCM 6th Edition)		

The City of Lee's Summit references a Level of Service Policy to provide guidelines for acceptable traffic operations on its roadways. According to the policy, an overall LOS C is desirable at signalized intersections, and a LOS D may be acceptable under extraordinary circumstances. Based on discussions with City staff, individual signalized movements with a LOS D or E are typically considered acceptable. A LOS C is desirable at unsignalized intersections, and lower levels of service may be acceptable depending on the situation. MoDOT typically accepts overall peak hour LOS D (or LOS E in certain instances) on urban roadways. LOS D or E is typically considered acceptable for signalized and unsignalized individual movements.

Results of the analysis indicate that the planned signalized study intersection of Hamblen Road and Bailey Road is expected to operate at an overall LOS C or better during the three peak hour periods, which is considered acceptable based on the City's LOS Policy. Individual movements are operating at a LOS C or better with acceptable queues with one exception: the westbound shared through/right movement 95th-percentile queue is expected to extend past the adjacent left-turn lane/taper during all three peak hour periods. During the afternoon and PM peak hours, the queue is expected to block the adjacent driveway and extend toward the intersection of Fleetway Drive. As discussed previously, extension of this turn bay would result in existing driveways being located within the turn lane or taper.

Results of the analysis indicate that the existing signalized study intersections at the US-50 interchange with Ranson Road and the planned signalized intersection at Ranson Road and

Oldham Parkway are expected to operate at an overall LOS D or better during the three peak hour periods, which is typically considered acceptable for MoDOT maintained intersections. Individual signalized movements are expected to operate at a LOS D or better with acceptable queues with the following exceptions:

Ranson Road and Oldham Parkway

- Afternoon and PM Peak Hours
    - The northbound through movement 95th-percentile queue (167 feet in the Afternoon, 215 feet in the PM) is expected to extend past the adjacent left-turn lane and taper.
    - The southbound through movement 95th-percentile queue (177 feet in the Afternoon, 481 feet in the PM) is expected to extend past the adjacent left-turn bay/taper (afternoon) and into the upstream interchange ramp terminal (PM). Queueing between closely spaced outer road signalized intersections is not uncommon during peak hour periods.

Ranson Road and US-50 Eastbound Ramps

- PM Peak Hour
    - The southbound left-turn movement is expected to operate at a LOS F with a 95th-percentile queue of 228 feet, which exceeds available storage (200 feet).
    - The northbound shared through/right turn movement 95th-percentile queue (285 feet) is expected to extend past the adjacent left-turn bay/taper and toward the upstream signal at Oldham Parkway.

Ranson Road and US-50 Westbound Ramps

- AM Peak Hour
    - The southbound right-turn movement is expected to operate with a LOS E with a 95th-percentile queue of 169 feet, which extends toward the outer road signal at Blue Parkway.
    - The westbound left-turn movement is expected to operate at a LOS F with a 95th-percentile queue of 204 feet, which blocks the adjacent right-turn lane/taper.
    - An additional westbound left-turn lane was considered to address existing poor operations but would introduce a potential weaving condition unless significant roadway modifications/widening occurs along Ranson Road
- Afternoon and PM Peak Hours
    - The westbound left-turn movement 95th-percentile queue (106 feet in the Afternoon, 123 feet in the PM) is expected to block the adjacent right-turn lane/taper.

- The southbound through movement 95th-percentile queue (270 feet in the Afternoon, 347 feet in the PM) is expected to extend into the upstream outer road signal at Blue Parkway.

As stated above, poor operations and extended queueing is expected for various movements during the studied peak hour periods at the US-50 Interchange. With diamond interchange configurations, queuing between closely spaced signalized intersections, including adjacent outer road signals, is not uncommon during peak hour periods as higher ramp and crossroad volumes are serviced. An additional westbound left-turn lane was considered to address existing poor operations but would introduce a potential weaving condition without significant roadway modifications/widening along Ranson Road. Modifications to signal timings could improve poor operations but were not considered for the purposes of this study due to the impact to coordinated non-study intersections located north of US-50. A more comprehensive review of the existing interchange/outer road design or signal re-timing (considering adjacent non-study coordinated intersections) may be needed for this location.

All movements at the unsignalized study intersections are expected to operate at LOS C or better with acceptable queues during the three peak hour periods with the following exceptions:

<u>Century Drive and Bailey Road</u>

- AM Peak Hour
  - The westbound shared left/through/right movement is expected to operate at a LOS D with a 95th-percentile queue of 188 feet, which extends past the upstream driveway.
- Afternoon Peak Hour
  - The eastbound shared left/through lane is expected to operate at a LOS E with a 95th-percentile queue of 223 feet, which blocks the adjacent right-turn lane/taper.
- PM Peak Hour
  - The eastbound shared left/through lane is expected to operate at a LOS F with a 95th-percentile queue of 540 feet, which blocks the adjacent right-turn lane and extends approximately halfway to the planned signal at Hamblen Road.
  - The westbound shared left/through/right movement is expected to operate at a LOS D with a 95th-percentile queue of 158 feet, which extends past the upstream driveway.

<u>Ranson Road and Bailey Road</u>

- Afternoon and PM Peak Hour

- The eastbound shared left/right movement is expected to operate at a LOS F. The 95th-percentile queue is approximately 290 feet during the afternoon and 725 feet during the PM peak hour.

The existing conditions capacity analysis summary is illustrated in **Figure 4**. Detailed results may be found in **Appendix B**.

Several existing turn lanes were noted to not meet City or State guidance as presented in **Section 3.2**. Capacity and queuing analysis were reviewed and found that some movements are expected to operate at an acceptable level of service with the current configuration. However, the following modifications are recommended based on existing turn lane warrants and existing poor operations:

- *Provide alternate traffic control at Century Drive and Bailey Road. A traffic signal was considered for this report acknowledging the planned signal at Hamblen Road and the potential for coordination. A roundabout may be feasible at this intersection, but further investigation would be required to review available right-of-way and impact to adjacent existing development.*
- *Provide left-turn lanes at Century Drive and Bailey Road (storage length of 250 feet plus taper eastbound/westbound and 150 feet plus taper southbound).*
- *Provide a traffic signal at Ranson Road and Bailey Road.*
- *Provide right-turn lanes at Ranson Road and Bailey Road (storage length of 200 feet plus taper southbound and eastbound).*
- *Provide northbound right-turn lane at Ranson Road and the US-50 Eastbound Ramps (continuous to the upstream signal at Oldham Parkway with approximately 190 feet of storage and no taper).*

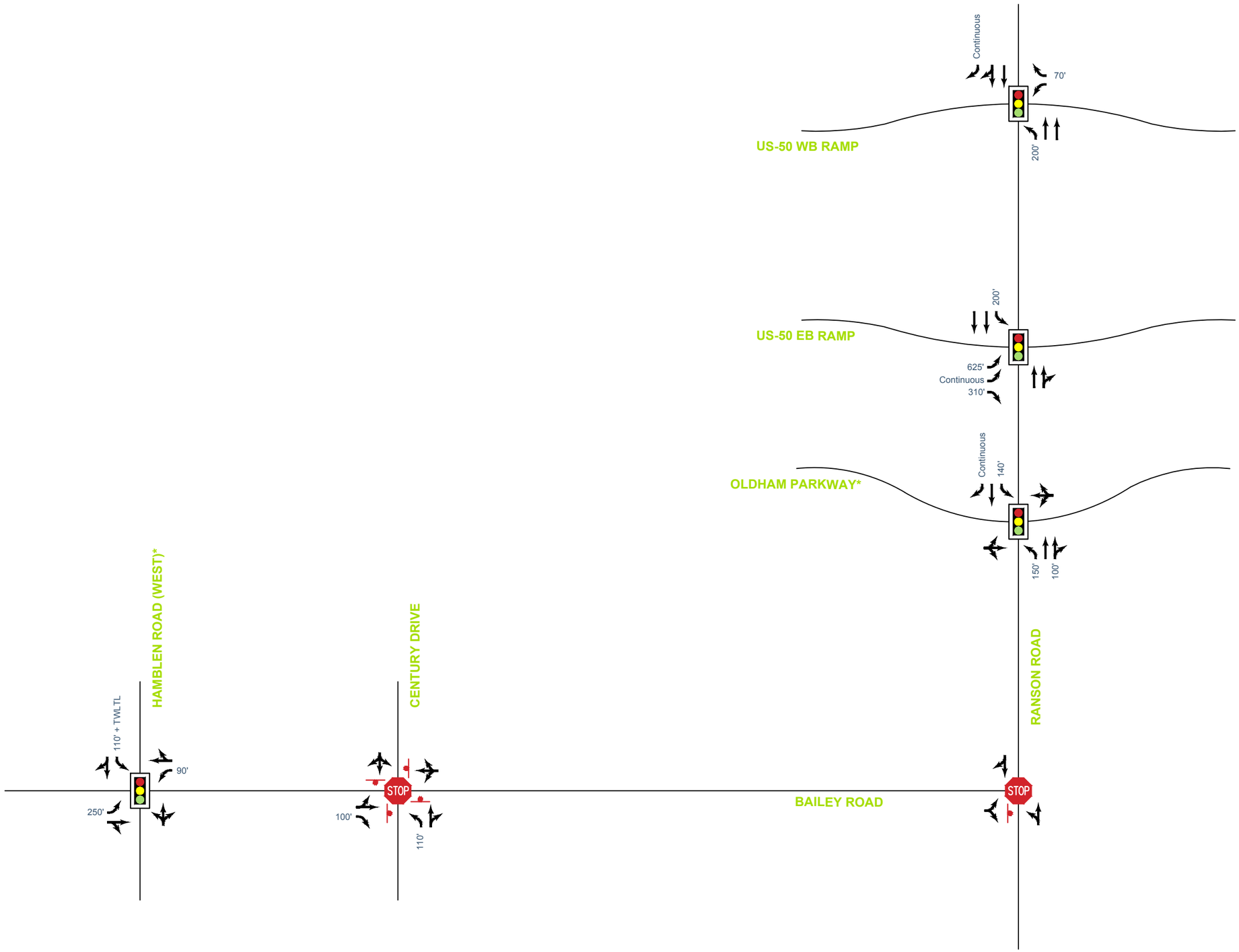
Due to the existing operational and turn lane deficiencies, capacity analysis was subsequently performed with the recommended improvements in place. This provides comparison with and without improvements under existing conditions. These lane configurations and traffic control are illustrated in **Figure 5**. The capacity analysis summary considering existing conditions with recommended improvements is illustrated in **Figure 6**. Detailed results are provided in **Appendix B**.

FIGURE 3

Existing
Lane Configuration and Traffic Control

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

- XX' — *Lane Configuration & Storage Length*
- *Signalized Intersection*
- STOP — *Stop Controlled Intersection*
- *Stop Sign*
- TWLTL — *Two–Way Left–Turn Lane*

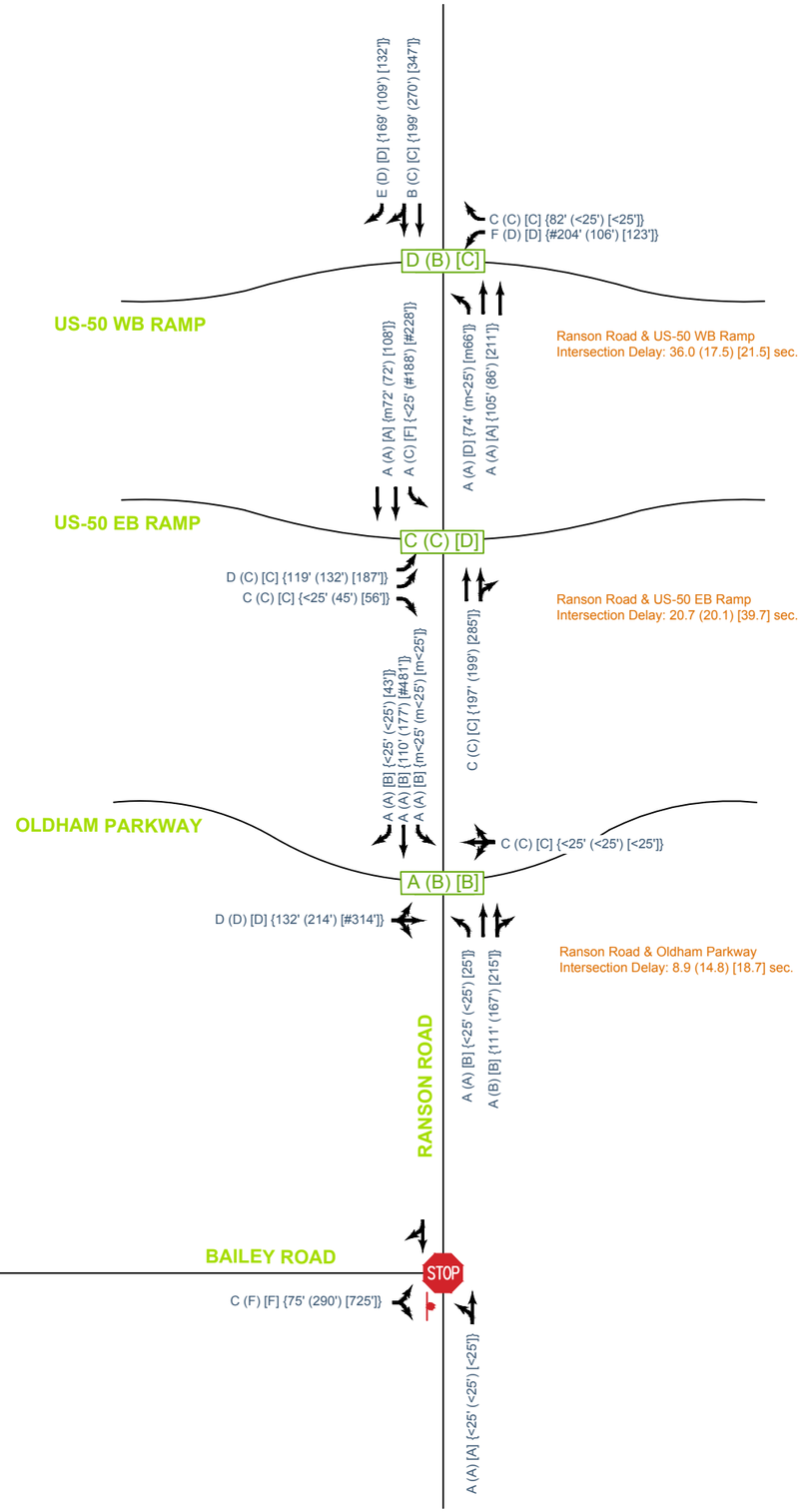
**Illustrates planned improvements including signal control and turn lane modifications.*

FIGURE 4

Existing
Capacity Analysis

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

AM (Afternoon) [PM]	Movement LOS & {95th-Percentile Queue}
AM (Afternoon) [PM]	Signalized Intersection LOS
→	Lane Geometry
STOP	Stop Controlled Intersection
	Stop Sign
#	95th-Percentile Queue Exceeds Capacity
m	Metered by Upstream Signal

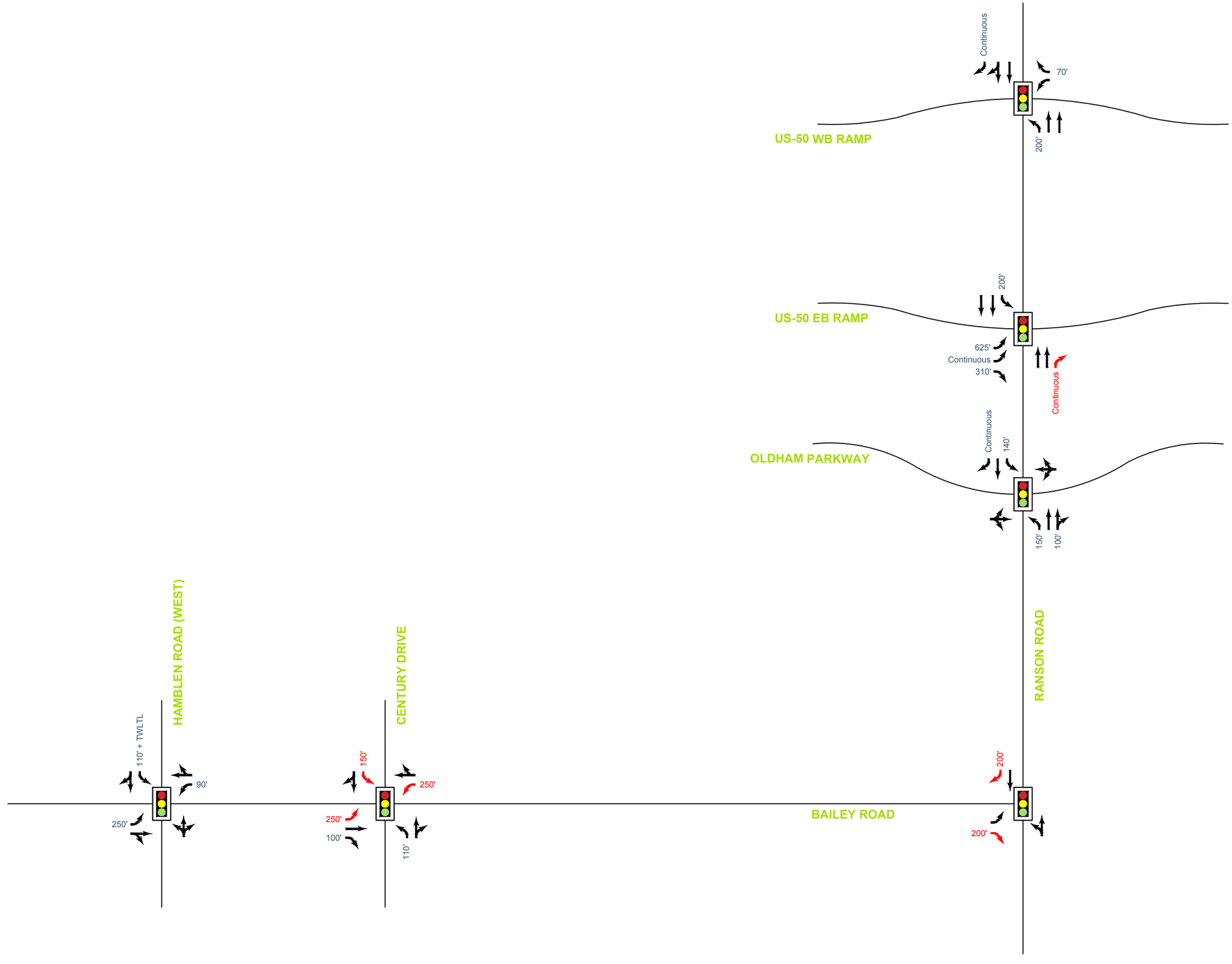
FIGURE 5

Existing
With Recommended Improvements
Lane Configuration and Traffic Control

LSR7 Middle School
Lee's Summit, MO

N

olsson



LEGEND

- XX' → *Lane Configuration*
- XX' → *Proposed Lane Configuration & Storage Length*
- *Signalized Intersection*
- STOP *Stop Controlled Intersection*
- *Stop Sign*

FIGURE 6

Existing Conditions
with Recommended Improvements
Capacity Analysis

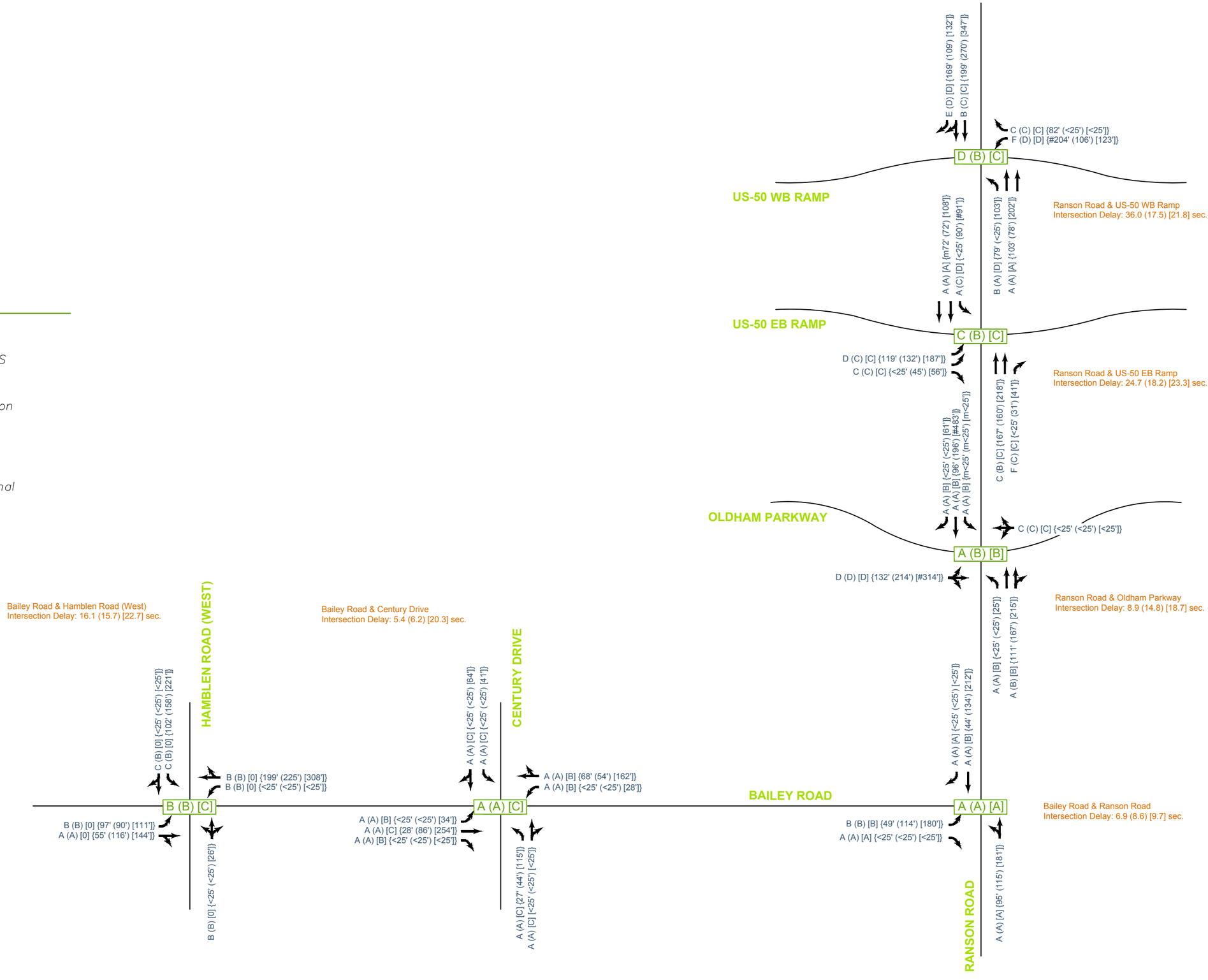
LSR7 Middle School
Lee's Summit, MO

N

olsson

LEGEND

AM (Afternoon) [PM]	Movement LOS & {95th-Percentile Queue}
AM (Afternoon) [PM]	Signalized Intersection LOS
→	Lane Geometry
STOP	Stop Controlled Intersection
	Stop Sign
#	95th-Percentile Queue Exceeds Capacity
m	Metered by Upstream Signal



4. EXISTING PLUS PROPOSED SCHOOL CONDITIONS

The middle school is proposed south of Bailey Road, approximately 2,000 feet west of Ranson Road with an ultimate enrollment of 1,290 students. The proposed site plan is illustrated in **Figure 7**.

The site plan also illustrates four baseball/softball fields, which are expected to be primarily used by the nearby high school, located on the proposed campus north of the middle school. Trips associated with the ballfields are included in this scenario.

4.1. Trip Generation and Distribution

To determine the impact of potential site traffic, expected trips associated with the proposed school complex were generated and applied to the study network. The Institute of Transportation Engineers (ITE) provides methods for estimating traffic volumes of common land uses in the Trip Generation Manual (10th Edition). The land use that most closely resembles the proposed school is Land Use Code 522 (Middle School/Junior High School).

There is not a clearly defined ITE land use for baseball/soccer fields of this type. Thus, trips were generated based on expected usage for a typical day, which considers athletes/staff arriving from the high school for practice during the afternoon peak and leaving to the high school during the PM peak hour. Information regarding field usage trips was provided by school staff.

Trip generation characteristics expected for the site are shown in **Table 4**. Detailed ITE and expected trip generation information is provided in **Appendix C.**

Table 4. Proposed School Complex Trip Generation.

Land Use	Size	Average Weekday	AM Peak Hour			Afternoon Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Middle School / Junior High School	1,290 Students	2,748	749	404	345	410	189	221	220	108	112
Baseball / Softball Fields	4 fields	60	-	-	-	30	30	-	30	-	30
Total		**2,808**	**749**	**404**	**345**	**440**	**219**	**221**	**250**	**108**	**142**

Trips were distributed through the network based on the anticipated school service area, discussions with City and MoDOT staff, and the surrounding roadway network and land uses. Directional trip distribution percentages expected for the site are illustrated in **Table 5.**

Table 5. Proposed School Trip Distribution.

Direction	To/From	
	Middle School	Ballfields
Bailey Road (West)	10%	-
Hamblen Road (North)	5%	100%
Todd George Parkway / Ranson Road (North)	15%	-
Ranson Road (South)	20%	-
US-50 (West)	5%	-
US-50 (East)	40%	-
Adjacent Homes (Internal or Walk)	5%	-
TOTAL	**100%**	**100%**

The expected trip distribution for the proposed school is shown in **Figure 8**. The resulting existing plus proposed school volumes are illustrated in **Figure 9**.

4.2. Access Characteristics

Access to the site is proposed via two full access drives located along Bailey Road. The western drive (Drive 1) aligns with Country Lane, and the eastern drive (Drive 2) is proposed approximately 615 feet east of Drive 1. During school arrival and dismissal, Drive 1 is expected to service primarily school bus traffic, with Drive 2 serving as the main access point for student pickup/drop.

South of Bailey Road along the west side of Drive 1, three existing residential streets are proposed to be extended to connect with Drive 1 – 13th Street and Cape Drive. These connections are internal to the site and are expected to be used by the adjacent homes.

Access Spacing

Access is proposed along the City maintained roadway of Bailey Road, thus Section 15 (Connection Spacing) of the City's AMC was reviewed. Per the AMC, connections shall have a minimum spacing of 400 feet along a minor arterial, such as Bailey Road, and be located outside any intersection influence area and turn lanes. Per the AMC, the upstream intersection influence area along a 35-mph road is 370 feet (270 feet if limiting conditions), and the downstream influence area is 250 feet.

Drive 1 aligns with Country Lane and will be located with approximately 960-foot spacing from the nearest access point to the west (Cape Drive) and 615-foot spacing from the nearest access

to the east (Drive 2), both of which meet AMC spacing standards. The proposed alignment with Country Lane is recommended as it is currently shown.

Drive 2 will be located with approximately 615-foot spacing from the nearest access point to the west (Drive 1) and 1,060-foot spacing from the nearest access to the east (Brownfield Drive), both of which meet AMC spacing standards.

Access Geometrics

City standards outlined in the AMC and Design & Construction Manual were reviewed for drive width and throat characteristics. Section 18.1.D (Driveway Width) of the AMC provides standards for commercial/industrial driveways and states they may be generally applied to non-commercial access points. The Design & Construction Manual provides standards for residential access, which is considered to be similar to the proposed school driveways. Considering the operations of a school drive, which is not typical of a commercial development, residential requirements were reviewed as a minimum standard with commercial requirements referenced for general guidelines.

Table 6. Access Characteristics

Proposed Access	Public Roadway Intersected	Access Type	Proposed Throat Length	Proposed Pavement Width	Median Divided
Drive 1	Bailey Road	Full Access	310 feet	24 feet	No
Drive 2	Bailey Road	Full Access	1,200 feet	22 feet	No

Referencing *Table 18-1* of the AMC, driveways servicing between 150 – 400 vph during the peak hour period should have a driveway width from back-of-curb between 42 feet (striped for 3-lanes) and 56 feet (striped for 4 lanes) for two-way access. Trip generation completed in **Section 4.1** of this report projects that Drive 1 will service 159 vehicles during the PM peak hour but less than 150 vph during other periods. Referencing Table LS-1 of the Design & Construction Manual, residential access should have lane widths between 10.5 – 12 feet, totaling a maximum of 24 feet for two-way access. Drive 1 has a proposed driveway width of 24 feet, which would satisfy residential criteria but is less than commercial requirements. The proposed width of Drive 1 is expected to be acceptable.

Referencing *Table 18-1* of the AMC, driveways servicing over 400 vph during the peak hour period should have a minimum driveway width from back-of-curb of 42 feet (striped for 3-lanes) for two-way access and a maximum width determined by a traffic study. Drive 2 is proposed with a pavement width of 22 feet and is expected to have 641 vph during the highest peak period. It is recommended to construct Drive 2 with a width of 42 feet (from back-of-curb) to

meet minimum AMC requirements. Drive 2 should be striped for one entering lane and two exiting lanes.

Throat length standards are based on projected peak hour volumes, per the City of Lee's Summit AMC. Referencing *Table 18-2* of the AMC, driveways servicing between 100 – 400 vph during the peak hour period shall have a minimum throat length of 125 feet adjacent to an arterial roadway. Drive 1 has a proposed driveway throat length of 310 feet, which meets City standards.

Referencing *Table 18-2* of the AMC, driveways servicing over 400 vph during the peak hour period shall have a minimum throat length of 150 feet adjacent to an arterial roadway. Drive 2 has a proposed driveway throat length of 1,200 feet, which meets City standards.

Additional Safety Considerations

As mentioned in **Section 3.1**, the section of Bailey Road adjacent to the proposed access points has pedestrian and bicycle facilities including sidewalk, on-street bicycle lanes, and a planned off-street path. It is recommended to coordinate potential pedestrian/bicycle needs with the City to ensure that the proposed access points accommodate the potential planned off-street path and crossing maneuvers, if necessary.

An existing crest curve is present approximately 250 feet west of Drive 1. Proposed driveways should meet minimum sight distance requirements.

Consideration should be given to imposing a reduced school zone speed limit during school arrival and drop off periods.

FIGURE 7

Site Plan

LSR7 Middle School
Lee's Summit, MO

olsson

FIGURE 8

Middle School Trip Distribution

LSR7 Middle School
Lee's Summit, MO

olsson

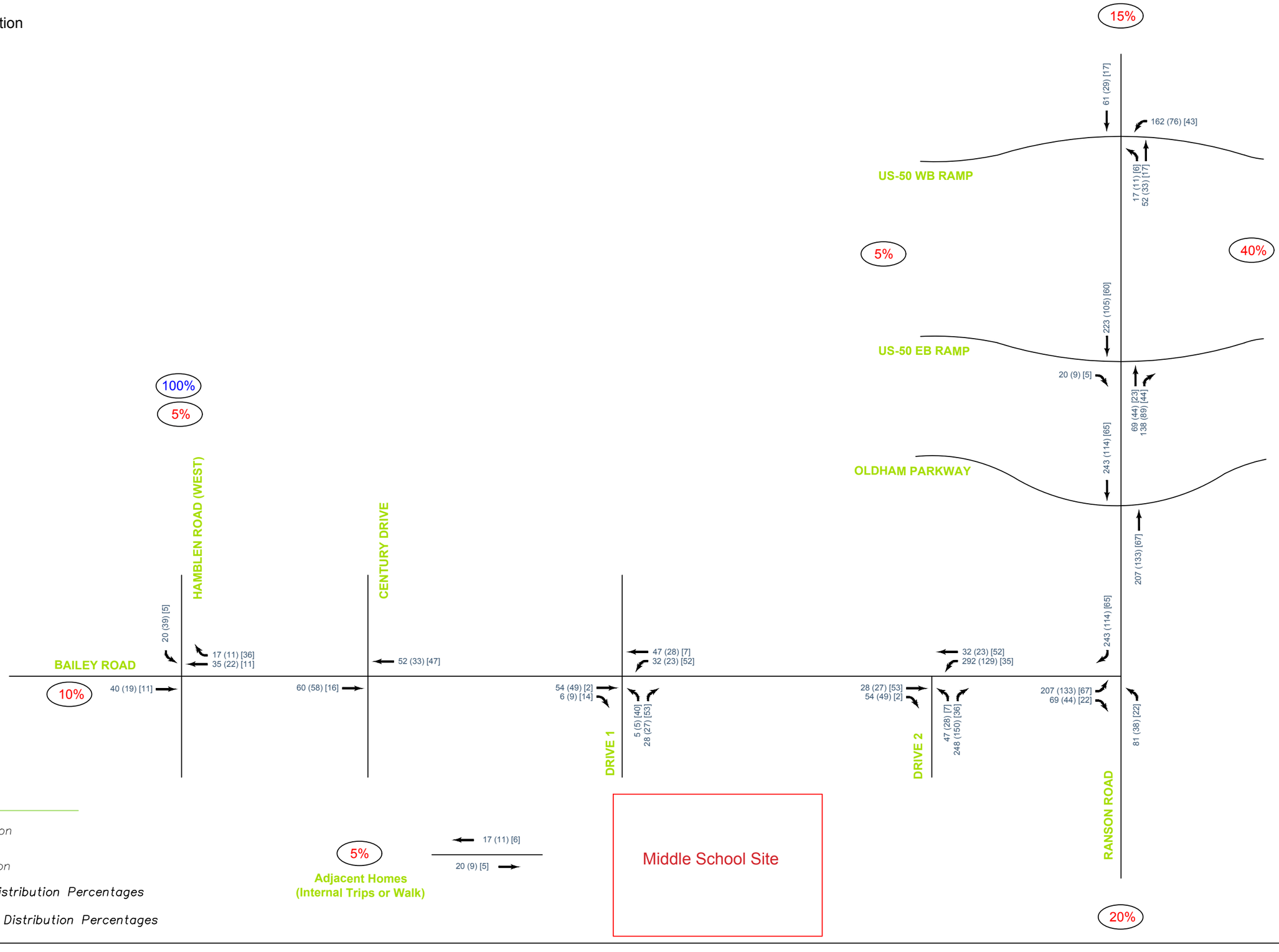
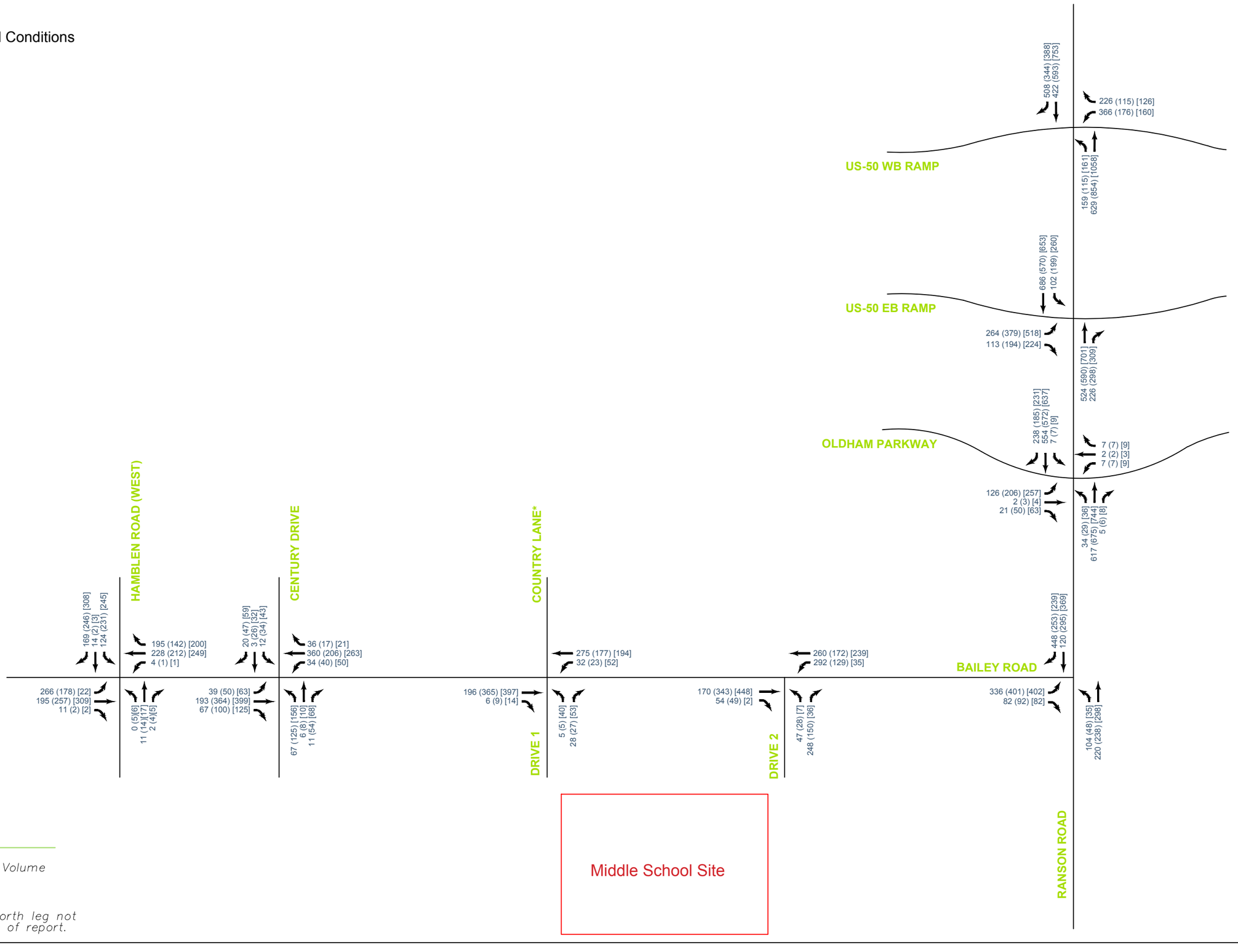


FIGURE 9

Existing Plus Proposed School Conditions
Peak Hour Volumes

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

AM (Afternoon) [PM] *Total Peak Hour Volume*

School Location

**Data to/from north leg not available at time of report.*

4.3. Existing Plus Proposed School Warrant Analysis

Warrant analysis was conducted using the same methodology described in **Section 3.2**.

Signal Warrants
Considering existing plus proposed school volumes, school traffic at the intersection of Bailey Road with Drive 1/Country Lane is not expected to meet the criteria for signalization during any peak hour period based on Warrant 3.

The intersection of Bailey Road and Drive 2 is on the threshold for warranting a signal based on expected AM peak hour volumes. However, a significant portion of the minor street volumes (approximately 85% during the AM peak hour) are expected to turn right with minimal conflict with eastbound mainline traffic. Thus, signalization is not recommended at this time.

The intersections of Ranson Road with Bailey Road and Century Drive with Bailey Road were on the threshold or met criteria for signalization under existing conditions and have poor operations with stop-control. As discussed in **Section 3.3**, traffic signals are recommended under existing conditions and were subsequently included under existing plus proposed school conditions.

Signal warrant analysis sheets are provided in **Appendix C**.

Turn Lane Warrants
As discussed in **Section 3.2**, the following turn lane deficiencies were noted in existing conditions.

- Northbound left-turn lane at Hamblen Road and Bailey Road is not planned
- Southbound left-turn lane with reduced storage at Hamblen Road and Bailey Road
- Westbound left-turn lane with reduced storage at Hamblen Road and Bailey Road
- Eastbound, westbound, and southbound left-turn lanes at Century Drive and Bailey Road are not provided (*recommended under existing conditions*)
- Northbound left-turn lane with reduced storage at Century Drive and Bailey Road
- Eastbound left or right-turn lane at Ranson Road and Bailey Road (*right-turn lane recommended under existing conditions*)
- Westbound and southbound right-turn lanes at Hamblen Road and Bailey Road are not provided
- Northbound right-turn lane is not provided at Century Drive and Bailey Road
- Eastbound right-turn lane with reduced storage at Century Drive and Bailey Road
- Southbound right-turn lane at Ranson Road and Bailey Road is not provided (*recommended under existing conditions*)

- Northbound right-turn lane at Ranson Road and the US-50 Eastbound Ramps is not provided (*recommended under existing conditions*)

Left-turn Lanes: Based on the Lee's Summit AMC, left-turn lanes shall be provided on all arterial streets at the intersection with any local street/driveway where the turning volume is at least 20 vph. A left-turn lane is also warranted when a non-residential connector intersects a minor arterial where the turning volume is at least 20 vph. Per the AMC, westbound and northbound left-turn lanes are warranted at both proposed school driveways. It should be noted that, while these driveways are technically "non-residential", they are located in and serve a largely residential population. Based on this and a review of operations (see **Section 4.4**), westbound left-turn lanes with 200 feet of storage plus taper are recommended at Drive 1/Country Lane, and at Drive 2, and a northbound left-turn lane with 150 feet of storage plus taper is recommended at Drive 2. A northbound left-turn is not expected to be required due to acceptable operations.

Based on the MoDOT guidelines provided in the *EPG*, a northbound left-turn lane is expected to be warranted at Ranson Road and Bailey Road during all three peak hours. It is recommended to provide a northbound left-turn lane with 200 feet of storage plus taper at this location.

Right-turn Lanes: Based on City and MoDOT criteria, no right-turn lanes in addition to what was previously described are expected to be warranted under existing plus proposed school conditions.

Capacity and queueing analysis were also reviewed (see **Section 4.4**) to determine if additional turn lanes and/or storage length is recommended based on expected operations. Turn lane warrant worksheets are provided in **Appendix C**. Existing plus proposed school conditions lane configurations and traffic control for the study network are illustrated in **Figure 10**.

4.4. Existing Plus Proposed School Capacity Analysis

Capacity analysis was performed under existing plus proposed school conditions using the methodologies described in **Section 3.3**. The peak hour factors observed under existing conditions were utilized for this scenario except for movements which are expected to experience a notable increase in traffic. At these locations, the peak hour factors were conservatively adjusted considering the Synchro suggested values and expected traffic conditions after development. Signal timings from the previous analysis scenario were maintained.

Results of the analysis indicate that the signalized study intersections of Hamblen Road with Bailey Road and Century Drive with Bailey Road are expected to operate at an overall LOS C or better overall during the three peak hour periods, which is considered acceptable based on the

City's LOS Policy. Movements that are expected to have a reduction in operations (to LOS D or worse) or have significantly more queueing compared to existing conditions include:

Hamblen Road and Bailey Road

- AM Peak Hour
    - The southbound shared through/right movement is expected to operate at a LOS D with minimal queueing. Similar delay would be expected if a southbound right-turn lane were installed. These operations are expected to be acceptable as they are limited to one peak hour.
- AM, Afternoon, and PM Peak Hour
    - The southbound left-turn movement is expected to operate at a LOS D with similar queueing as existing conditions. These operations are expected to be acceptable as the movement is nominally higher than the upper LOS C threshold and queues are not expected to have a significant impact to adjacent traffic lanes.

Century Drive and Bailey Road

- AM Peak Hour
    - The northbound through/right and southbound lanes are expected to operate at a LOS D with minimal queueing. These operations are expected to be acceptable as the movement is nominally higher than the upper LOS C threshold, approaching traffic is minimal, and queues are not expected to have a significant impact to adjacent traffic lanes.
- AM, Afternoon, and PM Peak Hour
    - The northbound left-turn movement is expected to operate at a LOS D with similar queueing as existing conditions. These operations are expected to be acceptable as the movement is nominally higher than the upper LOS C threshold and queues are not expected to have a significant impact to adjacent traffic lanes.

Results of the analysis indicate that the signalized study intersections along Ranson Road are expected to operate at an overall LOS C or better overall during the three peak hour periods, which is typically considered acceptable by MoDOT, with one exception. The intersection of Ranson Road with the US-50 Westbound Ramps is expected to operate with a LOS E overall (57 seconds of delay) during the AM peak hour. This is marginally higher than the LOS D threshold and limited to one peak hour period. No individual signalized movement that was considered acceptable under the previous scenario is expected to operate below a LOS D. Individual signalized movements that are expected to have significantly more queueing compared to existing conditions include:

Ranson Road and US-50 Westbound Ramps

- AM Peak Hour
    - The westbound left-turn is expected to continue operating at a LOS F with a 95th-percentile queue of 482 feet.

All movements at the unsignalized study intersections are operating at LOS C or better with acceptable queues with the one exception. The northbound left-turn movement at Drive 2 is expected to operate at a LOS E during the AM peak hour with a 95th-percentile queue of less than two vehicles. This is expected to be limited to the AM peak hour period during school arrivals and queues are not expected to have a significant impact to adjacent traffic lanes, thus is considered acceptable for proposed conditions.

Several existing turn lane deficiencies were noted in **Section 3.2**. Capacity and queuing analysis were reviewed for each movement considering school conditions. After review of the analysis, it was determined that the proposed school is not expected to have a significant impact to operations for the majority of the listed movements. Identified existing turn lane deficiencies (and expected operations) that are expected to encounter increased volumes due to the proposed school are further detailed below:

- Southbound left-turn lane with reduced storage at Hamblen Road and Bailey Road
    - Movement is expected to operate at an acceptable level of service (LOS D). The longest expected 95th-percentile queue (229 feet) would be contained within the provided TWLTL.
- Westbound right-turn lane at Hamblen Road and Bailey Road is not provided
    - Movement is expected to operate at an acceptable level of service (LOS B or better). The longest expected 95th-percentile queue (338 feet) would extend to the edge of Fleetway Drive and is minimally impacted by the proposed school.

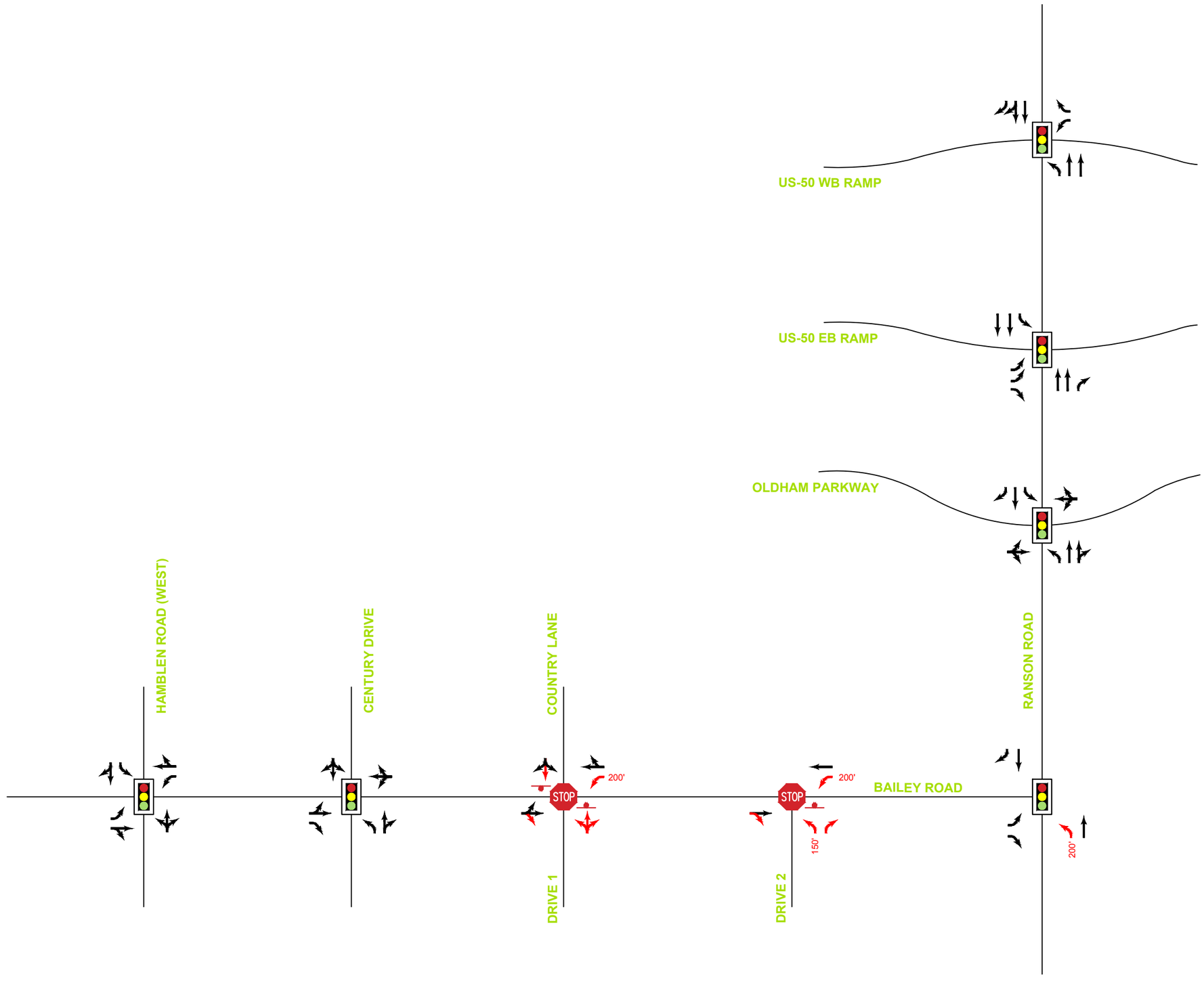
The existing plus proposed school conditions capacity analysis summary is illustrated in **Figure 11**. Detailed results may be found in **Appendix C**.

FIGURE 10

Existing Plus Proposed School
Lane Configuration and Traffic Control

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

- *Lane Configuration*
- XX' *Proposed Lane Configuration & Storage Length*
- *Signalized Intersection*
- STOP *Stop Controlled Intersection*
- *Stop Sign*

FIGURE 11

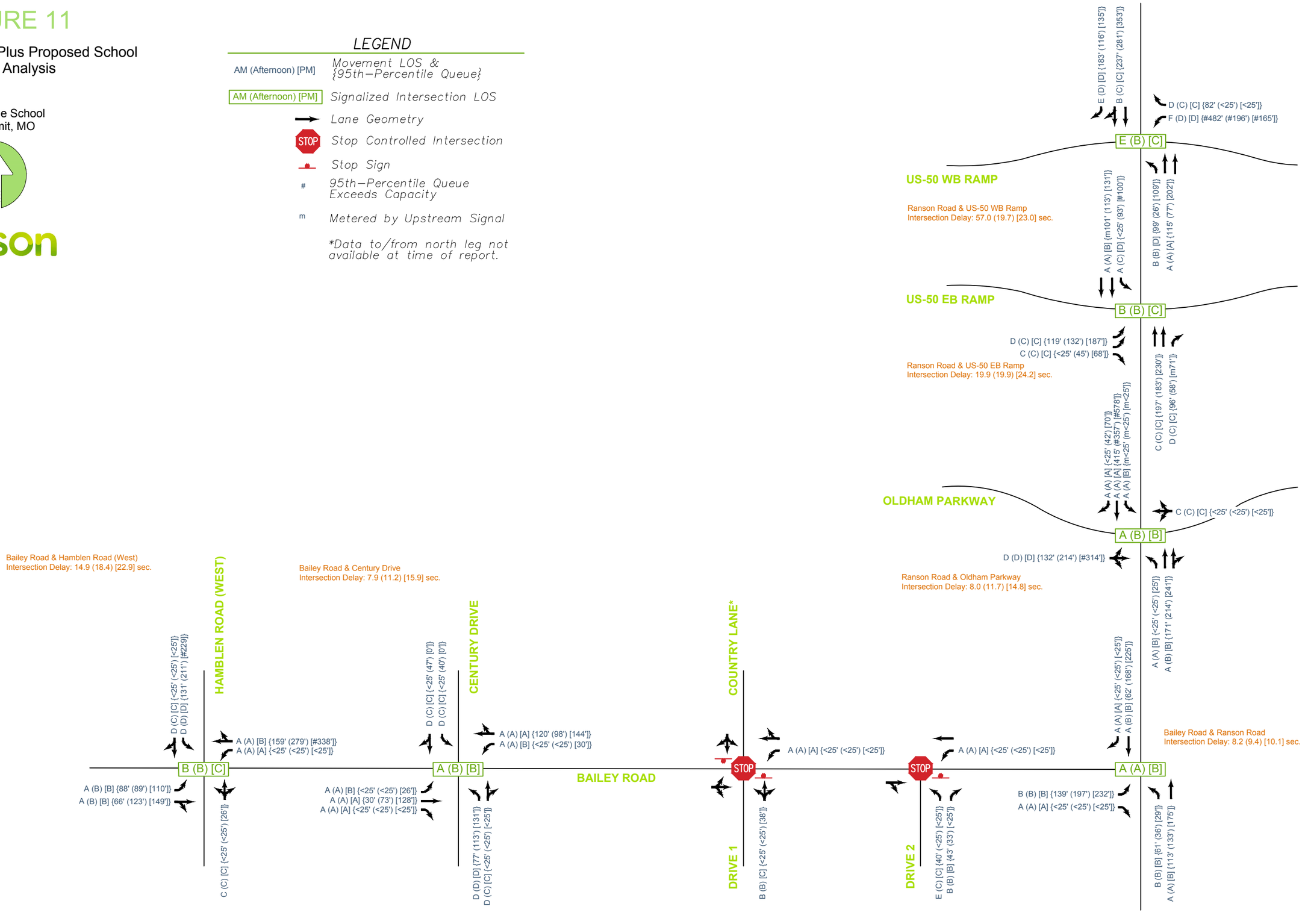
Existing Plus Proposed School Capacity Analysis

LSR7 Middle School
Lee's Summit, MO

olsson

LEGEND

AM (Afternoon) [PM]	Movement LOS & {95th-Percentile Queue}
AM (Afternoon) [PM]	Signalized Intersection LOS
	Lane Geometry
STOP	Stop Controlled Intersection
	Stop Sign
#	95th-Percentile Queue Exceeds Capacity
m	Metered by Upstream Signal
	*Data to/from north leg not available at time of report.



5. FUTURE PLANNED DEVELOPMENT CONDITIONS

A future residential housing development (referred to as “Bailey Farm”) is expected east of the proposed school. At the time of this report, the site plan for this development was not finalized but is expected to include approximately 300 single-family homes. The site is assumed to utilize two driveways – one located along Bailey Road between Drive 2 and Ranson Road and one located along Ranson Road south of Bailey Road. Additional cross access may be provided to the Cape Drive extension located south of the proposed middle school.

The timeline of the Bailey Farm development was unknown at the time of this report but is expected to occur after the school is in place. This analysis condition was reviewed to determine if the future Bailey Farm development is expected to have a significant impact on the study intersections. Specific access considerations, warrant and capacity analysis was not reviewed for the assumed Bailey Farm development driveways. Additional background growth, other than Bailey Farm trips, was not considered for this scenario.

5.1. Trip Generation and Distribution

To determine the impact of potential Bailey Farm traffic, expected trips associated with the proposed development were generated and applied to the study network using similar methodology described in **Section 4.1**. The land use that most closely resembles the proposed school is Land Use Code 210 (Single Family Detached Housing).

Trip generation characteristics expected for the site are shown in **Table 7**. Detailed ITE and expected trip generation information are provided in **Appendix D.**

Table 7. Proposed Bailey Farm Trip Generation.

Land Use	Size	Average Weekday	AM Peak Hour			Afternoon Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Single Family Detached Housing	300 Dwelling Units	2,748	749	404	345	410	189	221	220	108	112

Trips were distributed through the network based on the existing traffic volume gravity, discussions with City and MoDOT staff, and the surrounding roadway network and land uses**.** It is assumed that a portion of trips to the school may be generated from the Bailey Farm development if a connection to Cape Drive is provided, thereby reducing trips on Bailey Road. For the purposes of this study, those internal trips were assumed to be insignificant and/or already captured in the middle school trip distribution (which accounted for adjacent homes). Thus, adjustments to school trips were not made for this scenario.

The expected trip distribution for the future Bailey Farm development is shown in **Figure 12**. The resulting future planned development volumes at the study intersections are illustrated in **Figure 13**.

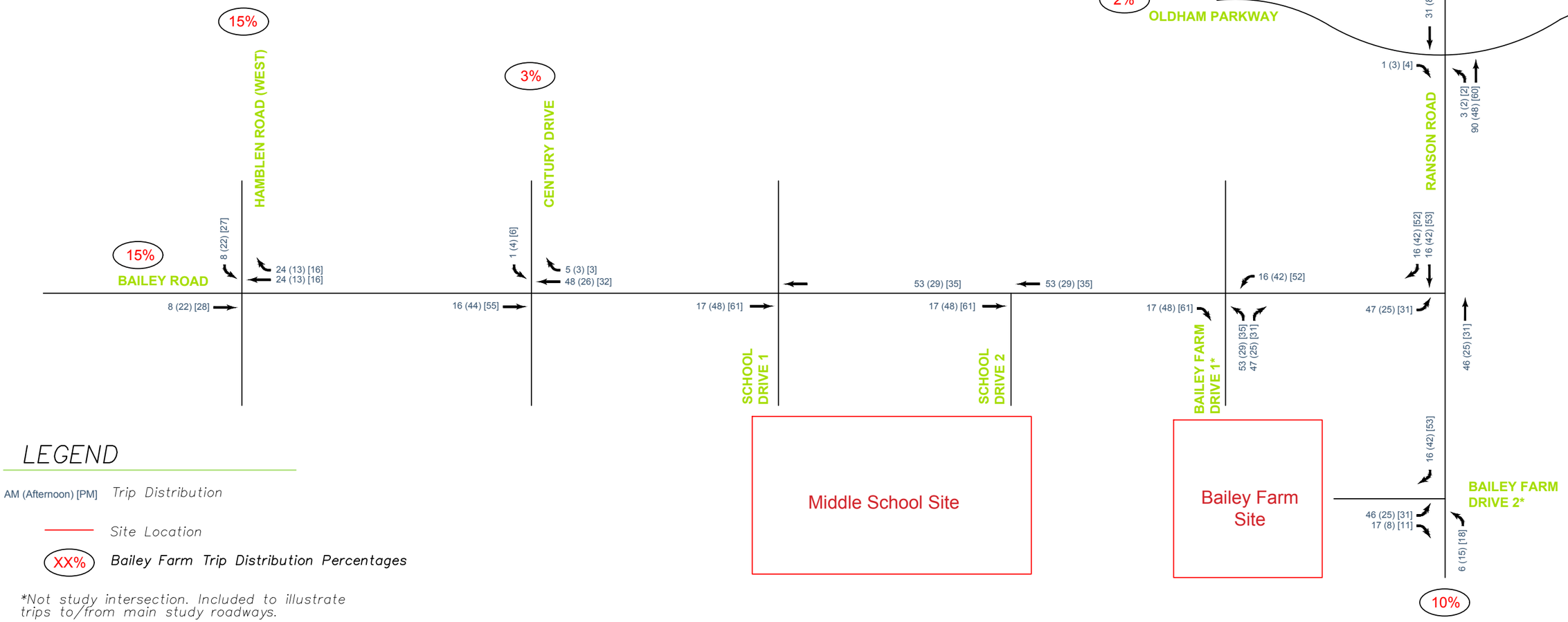
FIGURE 12

Bailey Farm Trip Distribution

LSR7 Middle School
Lee's Summit, MO

N

olsson



LEGEND

AM (Afternoon) [PM] *Trip Distribution*

Site Location

XX% *Bailey Farm Trip Distribution Percentages*

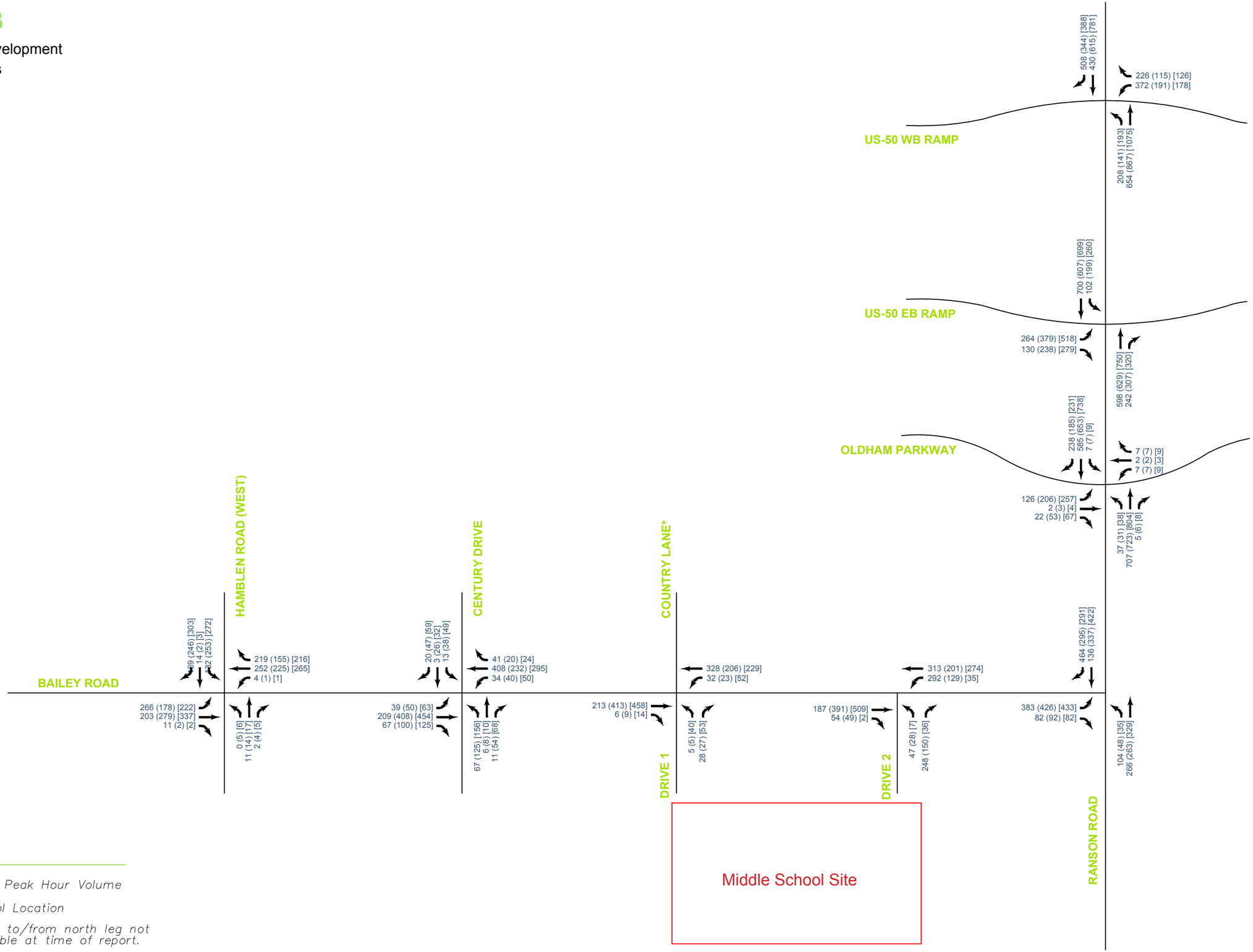
**Not study intersection. Included to illustrate trips to/from main study roadways.*

FIGURE 13

Future Planned Development
Peak Hour Volumes

LSR7 Middle School
Lee's Summit, MO

olsson



LEGEND

AM (Afternoon) [PM] *Total Peak Hour Volume*

School Location

**Data to/from north leg not available at time of report.*

5.2. Future Planned Development Warrant Analysis

Warrant analysis was conducted at existing study intersections and proposed school driveways using the same methodology described in **Section 3.2**.

Signal Warrants
Considering future planned development volumes, the intersection of Bailey Road with Drive 1/Country Lane is not expected to meet the criteria for signalization during any peak hour period based on Warrant 3.

Similar to the previous scenario, the intersection of Bailey Road and Drive 2 continues to meet the signal warrant for an intersection with one lane approaches during the AM peak hour. However, as described in **Section 4.3**, a significant portion of the minor street volumes are expected to turn right with minimal conflict with eastbound mainline traffic. Thus, signalization is not recommended at this time.

Signal warrant analysis sheets is provided in **Appendix D**.

Turn Lane Warrants
Considering future planned development volumes, no left or right-turn lanes are expected to be warranted in addition to what was discussed for the previous analysis scenarios.

Capacity and queueing analysis were also reviewed (see **Section 5.3**) to determine if additional turn lanes and/or storage length is recommended based on expected operations. Turn lane warrant worksheets are provided in **Appendix D**. Future planned development conditions lane configurations and traffic control for the study network are illustrated in **Figure 14**.

5.3. Future Planned Development Capacity Analysis

Capacity analysis was performed under future planned development conditions using the methodologies described in **Section 3.3**. The peak hour factors and signal timings utilized under the previous scenario were maintained.

Results of the capacity analysis indicate that signalized study intersections along Bailey Road are expected to operate at an overall LOS C or better, which is considered acceptable based on the City's LOS Policy. Individual movements are expected to operate at a LOS D or better during the three peak hour periods except the southbound left-turn movement at Bailey Road and Hamblen Road, which is expected to operate at a LOS E during the PM peak hour. The expected 95th-percentile queue of 283 feet would be contained within the upstream TWLTL but not extend to the nearest upstream intersection at Fleetway Drive.

Intersections along Ranson Road are expected to operate at a LOS C or better except for Ranson Road and the US-50 Westbound ramps, which is expected to continue operating at a

LOS E during the AM peak hour as described under **Section 4.4**. In general, similar operations are expected for individual movements when compared to the previous scenario with slightly increased delay and queueing.

In addition to an unknown construction timeline, analysis conducted for the purposes of this report is based on assumptions regarding access and proposed density of the Bailey Farms development. Additional improvements are not recommended at this time, but further analysis should be conducted when a final development plan is available.

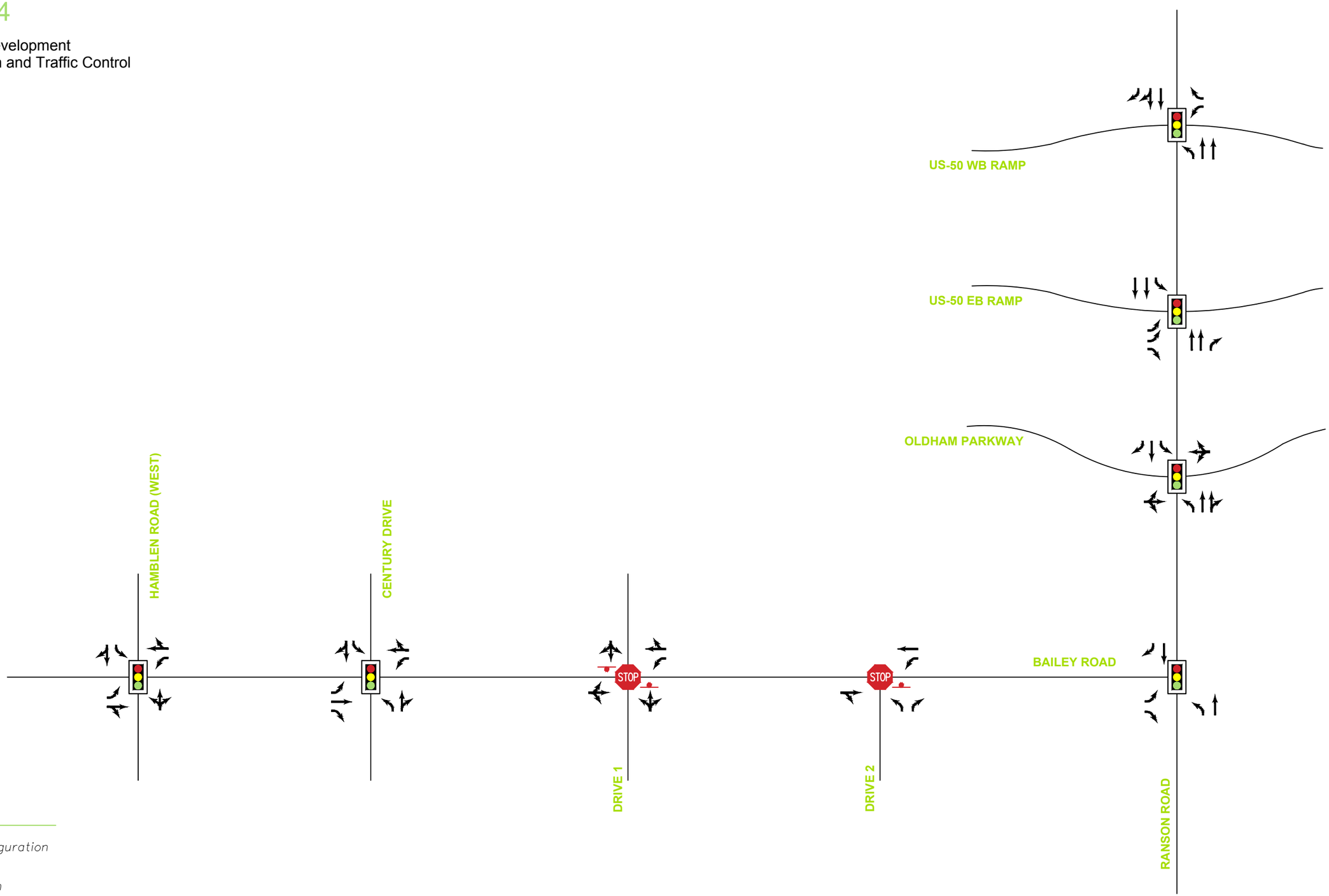
All movements at the unsignalized study intersections are expected to operate at LOS C or better with acceptable queues with one exception. The northbound left-turn movement at Drive 2 is expected to operate at a LOS F during the AM peak hour and LOS D during the afternoon peak hour. In both cases, the 95th-percentile queue is expected to be less than two vehicles. This is expected to be limited to school peak periods and not have a significant effect on mainline traffic, thus is considered acceptable for proposed conditions.

The future planned development conditions capacity analysis summary is illustrated in **Figure 15**. Detailed results may be found in **Appendix D**.

FIGURE 14

Future Planned Development
Lane Configuration and Traffic Control

LSR7 Middle School
Lee's Summit, MO



LEGEND

- *Lane Configuration*
- *Signalized Intersection*
- *Stop Controlled Intersection*
- *Stop Sign*

FIGURE 15

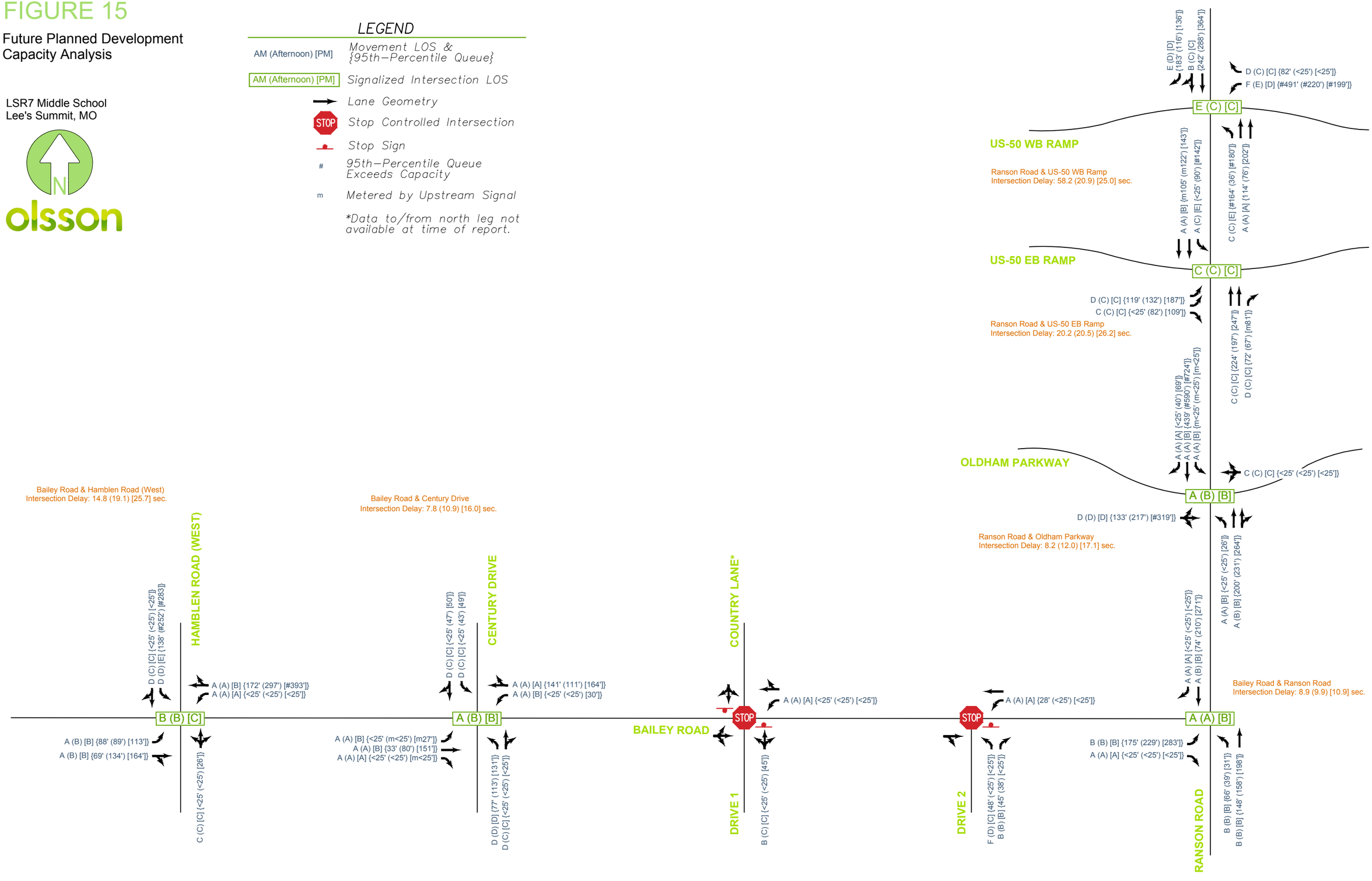
Future Planned Development
Capacity Analysis

LSR7 Middle School
Lee's Summit, MO

olsson

LEGEND

AM (Afternoon) [PM]	Movement LOS & {95th-Percentile Queue}
AM (Afternoon) [PM]	Signalized Intersection LOS
→	Lane Geometry
STOP	Stop Controlled Intersection
	Stop Sign
#	95th-Percentile Queue Exceeds Capacity
m	Metered by Upstream Signal
	*Data to/from north leg not available at time of report.



6. SUMMARY

The purpose of this study was to summarize traffic impacts regarding a proposed middle school located south of Bailey Road and west of Ranson Road in Lee's Summit, Missouri.

6.1. Conclusions

The general findings of note for the traffic impact study include:

1. In addition to the proposed school, the analysis scenarios considered approved (Culver's and Princeton senior living) and planned (Bailey Farm) developments in the surrounding area. Planned infrastructure improvements considered in this study included signal and turn lane installations at the intersections of Hamblen Road with Bailey Road and Ranson Road and Oldham Parkway.
2. Several signal and lane warrants are met under existing conditions. It was also noted that some existing turn lanes are provided with reduced storage. Existing intersection/turn lane warrant deficiencies that also have poor operations were addressed; recommendations to improve these existing conditions are listed in the next section.
3. Queueing in the north/south direction and at the westbound off-ramp was observed at the US-50 Interchange under existing conditions and is expected to continue under subsequent analysis conditions. With diamond interchange configurations, queuing between closely spaced signalized intersections, including adjacent outer road signals, is not uncommon during peak hour periods as higher ramp and crossroad volumes are serviced. An additional westbound left-turn lane was considered to address existing poor operations but would introduce a potential weaving condition without significant roadway modifications/widening along Ranson Road. A more comprehensive review of the existing interchange/outer road design or signal re-timing (considering adjacent non-study coordinated intersections) may be needed for this location.

6.2. Recommendations

Based on review and analysis of the study area, the following action items are recommended:

<u>Existing Conditions</u>

Ranson Road and Bailey Road

1. Install a traffic signal.
2. Install eastbound and southbound right-turn lanes with a storage length of 200 feet plus taper.

Ranson Road and US-50 Eastbound Ramps

3. Install a continuous northbound right-turn lane between the south ramp terminal and the intersection with Oldham Parkway (no taper)

Century Drive and Bailey Road:

4. Install a traffic signal with interconnect to allow for coordination with the planned signal approximately 0.25 mi to the west at Hamblen Road.
5. If a traffic signal is installed, install left-turn lanes with a storage length of 250 feet plus taper eastbound/westbound and 150 feet plus taper southbound resulting in left-turn lanes in all four approaches.

Existing Plus Development Conditions

Ranson Road and Bailey Road

1. Install a northbound left-turn lane with a storage of 200 feet plus taper.

Bailey Road and School Driveways

2. Coordinate potential pedestrian/bicycle needs with the City to ensure that the proposed access points accommodate the potential planned off-street path along Bailey Road and crossing maneuvers, if necessary.
3. Verify sight distance at both proposed driveways, especially considering the hill west of Drive 1.
4. Consider a school zone speed limit during school arrival/dismissal period.
5. Install a westbound left-turn lane at Drive 1 with a storage of 200 feet plus taper.
6. Install a westbound left-turn lane at Drive 2 with a storage of 200 feet plus taper.
7. Construct Drive 2 with a width of 42 feet (measured from back-of-curb) with one 14-foot entering lane and two 12-foot exiting lanes (150-foot storage plus taper) to meet City AMC requirements.

APPENDIX A

Data Collection

Count Data

Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

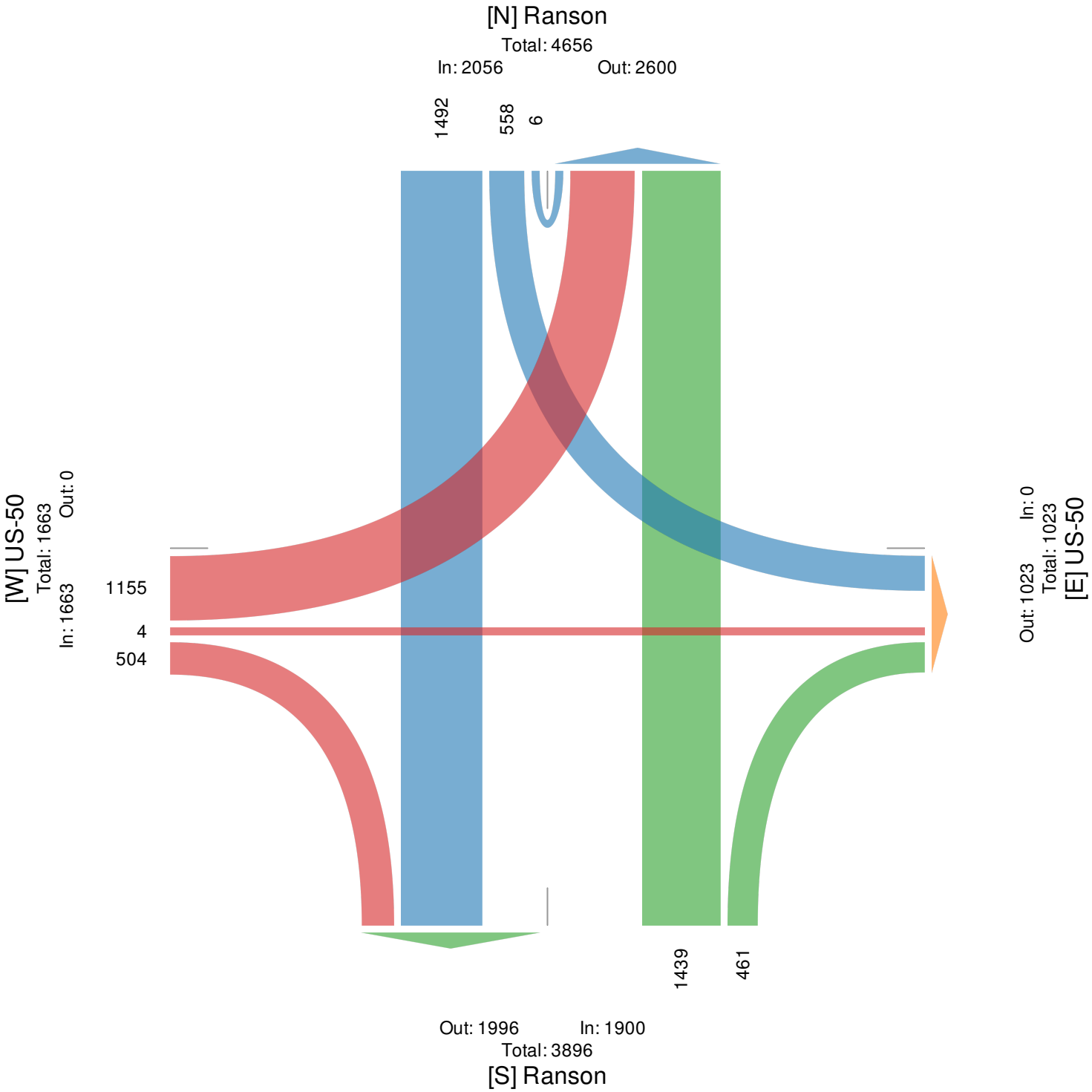
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	US-50				Ranson				Ranson				
Direction	Eastbound				Northbound				Southbound				
Time	L	T	R	**App**	T	R	U	**App**	L	T	U	**App**	**Int**
2020-04-07 7:00AM	31	0	14	**45**	46	11	0	**57**	9	40	0	**49**	**151**
7:15AM	36	0	7	**43**	55	7	0	**62**	17	41	0	**58**	**163**
7:30AM	31	1	8	**40**	36	5	0	**41**	15	55	0	**70**	**151**
7:45AM	36	0	10	**46**	61	9	0	**70**	8	84	0	**92**	**208**
Hourly Total	134	1	39	**174**	198	32	0	**230**	49	220	0	**269**	**673**
8:00AM	38	0	18	**56**	44	13	0	**57**	12	51	0	**63**	**176**
8:15AM	27	0	14	**41**	41	8	0	**49**	16	58	0	**74**	**164**
8:30AM	19	0	12	**31**	35	15	0	**50**	14	51	0	**65**	**146**
8:45AM	42	0	11	**53**	54	7	0	**61**	8	55	1	**64**	**178**
Hourly Total	126	0	55	**181**	174	43	0	**217**	50	215	1	**266**	**664**
3:00PM	50	0	25	**75**	60	22	0	**82**	27	65	1	**93**	**250**
3:15PM	59	0	36	**95**	76	27	0	**103**	38	89	1	**128**	**326**
3:30PM	68	1	36	**105**	65	32	0	**97**	37	82	1	**120**	**322**
3:45PM	81	0	29	**110**	83	28	0	**111**	34	81	0	**115**	**336**
Hourly Total	258	1	126	**385**	284	109	0	**393**	136	317	3	**456**	**1234**
4:00PM	68	0	19	**87**	89	43	0	**132**	41	103	0	**144**	**363**
4:15PM	82	0	48	**130**	99	25	0	**124**	34	77	1	**112**	**366**
4:30PM	67	0	32	**99**	94	41	0	**135**	37	109	1	**147**	**381**
4:45PM	101	0	37	**138**	94	47	0	**141**	37	110	0	**147**	**426**
Hourly Total	318	0	136	**454**	376	156	0	**532**	149	399	2	**550**	**1536**
5:00PM	100	1	40	**141**	105	50	0	**155**	49	82	0	**131**	**427**
5:15PM	82	1	39	**122**	109	19	0	**128**	53	100	0	**153**	**403**
5:30PM	72	0	37	**109**	104	29	0	**133**	39	80	0	**119**	**361**
5:45PM	65	0	32	**97**	89	23	0	**112**	33	79	0	**112**	**321**
Hourly Total	319	2	148	**469**	407	121	0	**528**	174	341	0	**515**	**1512**
Total	1155	4	504	**1663**	1439	461	0	**1900**	558	1492	6	**2056**	**5619**
% Approach	69.5%	0.2%	30.3%	-	75.7%	24.3%	0%	-	27.1%	72.6%	0.3%	-	-
% Total	20.6%	0.1%	9.0%	**29.6%**	25.6%	8.2%	0%	**33.8%**	9.9%	26.6%	0.1%	**36.6%**	-
Lights	1126	4	490	**1620**	1415	438	0	**1853**	550	1456	6	**2012**	5485
% Lights	97.5%	100%	97.2%	**97.4%**	98.3%	95.0%	0%	**97.5%**	98.6%	97.6%	100%	**97.9%**	97.6%
Articulated Trucks	6	0	3	**9**	6	2	0	**8**	1	4	0	**5**	22
% Articulated Trucks	0.5%	0%	0.6%	**0.5%**	0.4%	0.4%	0%	**0.4%**	0.2%	0.3%	0%	**0.2%**	0.4%
Buses and Single-Unit Trucks	23	0	11	**34**	18	21	0	**39**	7	32	0	**39**	112
% Buses and Single-Unit Trucks	2.0%	0%	2.2%	**2.0%**	1.3%	4.6%	0%	**2.1%**	1.3%	2.1%	0%	**1.9%**	2.0%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

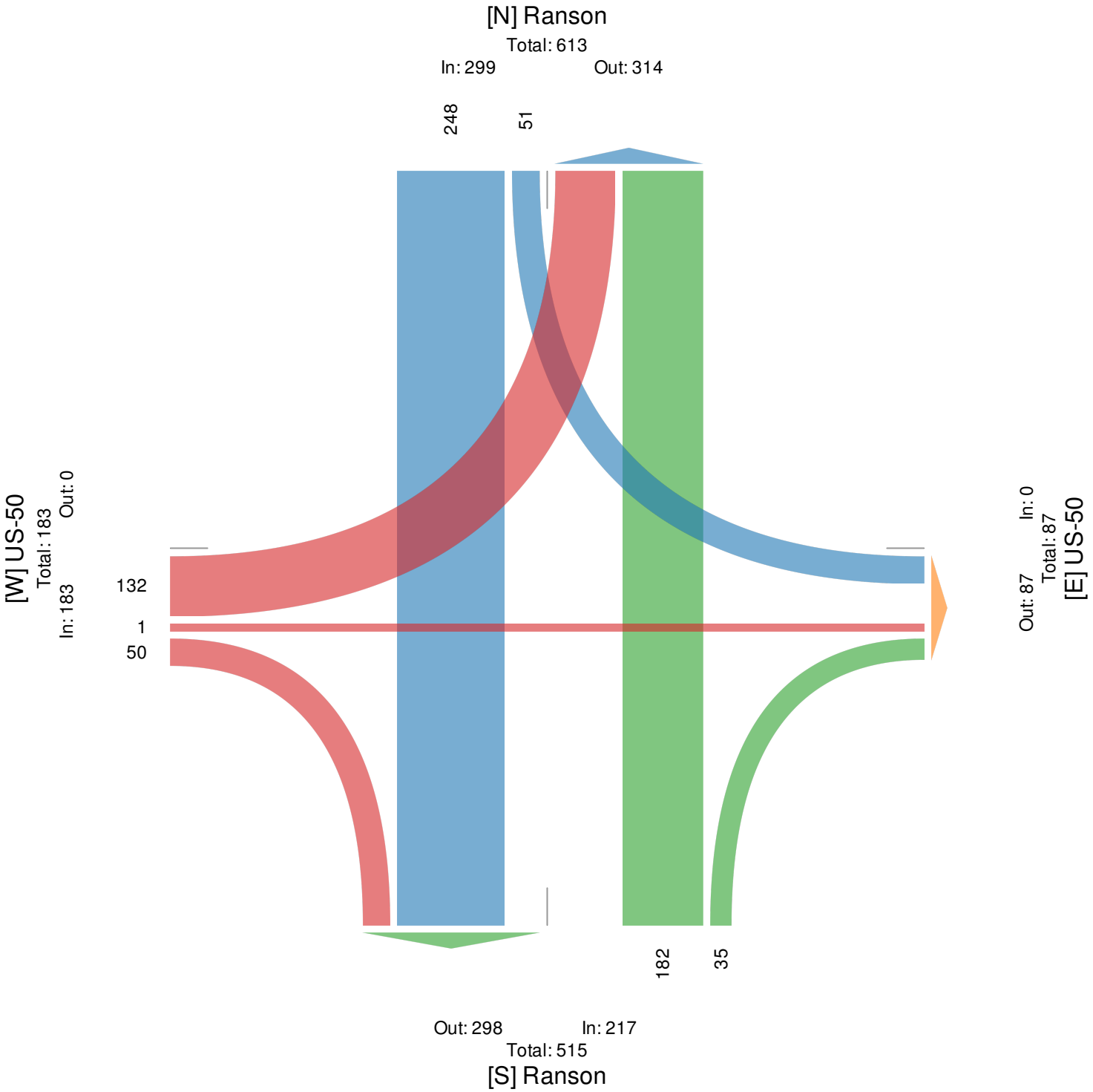
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	US-50				Ranson				Ranson				
Direction	Eastbound				Northbound				Southbound				
Time	L	T	R	**App**	T	R	U	**App**	L	T	U	**App**	**Int**
2020-04-07 7:30AM	31	1	8	**40**	36	5	0	**41**	15	55	0	**70**	**151**
7:45AM	36	0	10	**46**	61	9	0	**70**	8	84	0	**92**	**208**
8:00AM	38	0	18	**56**	44	13	0	**57**	12	51	0	**63**	**176**
8:15AM	27	0	14	**41**	41	8	0	**49**	16	58	0	**74**	**164**
Total	132	1	50	**183**	182	35	0	**217**	51	248	0	**299**	**699**
% Approach	72.1%	0.5%	27.3%	-	83.9%	16.1%	0%	-	17.1%	82.9%	0%	-	-
% Total	18.9%	0.1%	7.2%	**26.2%**	26.0%	5.0%	0%	**31.0%**	7.3%	35.5%	0%	**42.8%**	-
PHF	0.868	0.250	0.694	**0.817**	0.746	0.673	-	**0.775**	0.797	0.738	-	**0.813**	0.840
Lights	124	1	47	**172**	177	34	0	**211**	48	241	0	**289**	672
% Lights	93.9%	100%	94.0%	**94.0%**	97.3%	97.1%	0%	**97.2%**	94.1%	97.2%	0%	**96.7%**	96.1%
Articulated Trucks	2	0	0	**2**	2	0	0	**2**	0	2	0	**2**	6
% Articulated Trucks	1.5%	0%	0%	**1.1%**	1.1%	0%	0%	**0.9%**	0%	0.8%	0%	**0.7%**	0.9%
Buses and Single-Unit Trucks	6	0	3	**9**	3	1	0	**4**	3	5	0	**8**	21
% Buses and Single-Unit Trucks	4.5%	0%	6.0%	**4.9%**	1.6%	2.9%	0%	**1.8%**	5.9%	2.0%	0%	**2.7%**	3.0%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

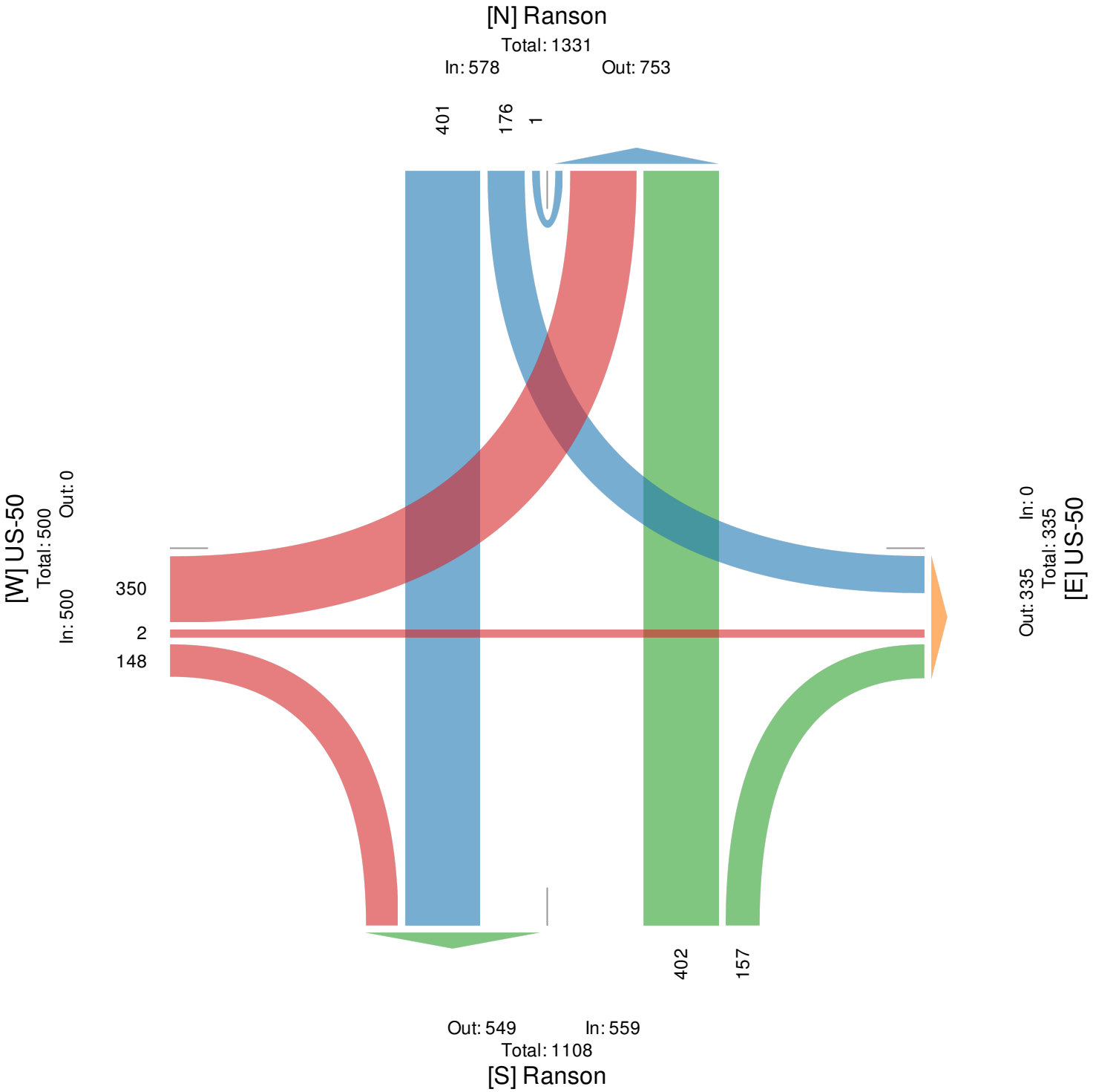
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	US-50				Ranson				Ranson				
Direction	Eastbound				Northbound				Southbound				
Time	L	T	R	**App**	T	R	U	**App**	L	T	U	**App**	**Int**
2020-04-07 4:30PM	67	0	32	**99**	94	41	0	**135**	37	109	1	**147**	**381**
4:45PM	101	0	37	**138**	94	47	0	**141**	37	110	0	**147**	**426**
5:00PM	100	1	40	**141**	105	50	0	**155**	49	82	0	**131**	**427**
5:15PM	82	1	39	**122**	109	19	0	**128**	53	100	0	**153**	**403**
Total	350	2	148	**500**	402	157	0	**559**	176	401	1	**578**	**1637**
% Approach	70.0%	0.4%	29.6%	-	71.9%	28.1%	0%	-	30.4%	69.4%	0.2%	-	-
% Total	21.4%	0.1%	9.0%	**30.5%**	24.6%	9.6%	0%	**34.1%**	10.8%	24.5%	0.1%	**35.3%**	-
PHF	0.866	0.500	0.925	**0.887**	0.922	0.785	-	**0.902**	0.830	0.911	0.250	**0.944**	0.958
Lights	347	2	146	**495**	398	151	0	**549**	176	393	1	**570**	1614
% Lights	99.1%	100%	98.6%	**99.0%**	99.0%	96.2%	0%	**98.2%**	100%	98.0%	100%	**98.6%**	98.6%
Articulated Trucks	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0
% Articulated Trucks	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0%
Buses and Single-Unit Trucks	3	0	2	**5**	4	6	0	**10**	0	8	0	**8**	23
% Buses and Single-Unit Trucks	0.9%	0%	1.4%	**1.0%**	1.0%	3.8%	0%	**1.8%**	0%	2.0%	0%	**1.4%**	1.4%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road (Route RA) @ US-50 EB ramp - TMC
Tue Apr 7, 2020
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761919, Location: 38.901279, -94.339856

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

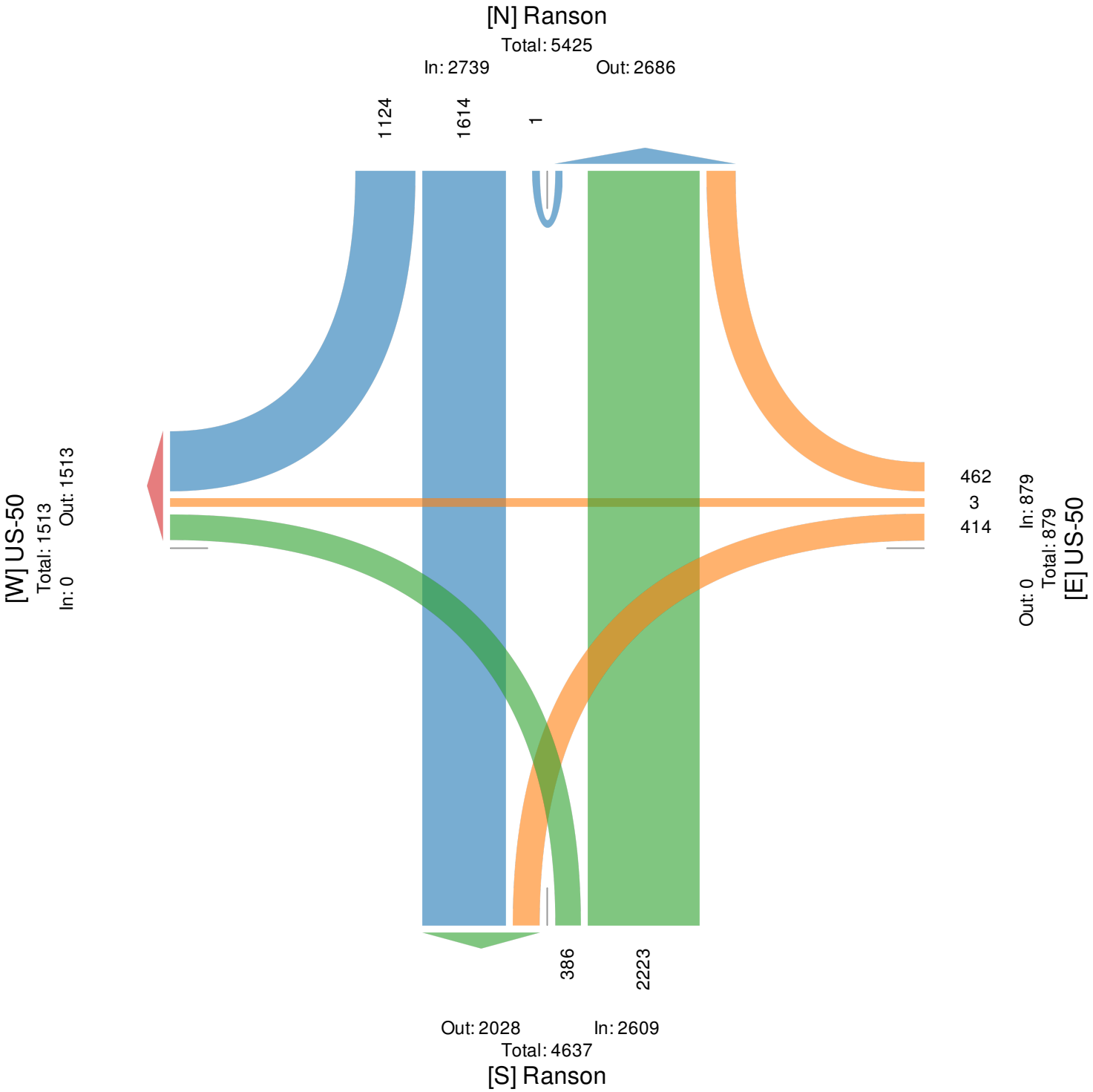
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	US-50 Westbound				Ranson Northbound				Ranson Southbound				
Time	L	T	R	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2020-04-07 7:00AM	18	0	29	**47**	14	61	0	**75**	33	50	0	**83**	**205**
7:15AM	14	0	27	**41**	18	73	0	**91**	42	67	0	**109**	**241**
7:30AM	25	0	37	**62**	13	54	0	**67**	45	76	0	**121**	**250**
7:45AM	43	0	28	**71**	17	78	0	**95**	52	51	0	**103**	**269**
Hourly Total	100	0	121	**221**	62	266	0	**328**	172	244	0	**416**	**965**
8:00AM	21	0	21	**42**	17	63	0	**80**	42	60	0	**102**	**224**
8:15AM	22	0	14	**36**	17	52	0	**69**	52	47	0	**99**	**204**
8:30AM	24	0	22	**46**	9	46	0	**55**	40	52	0	**92**	**193**
8:45AM	19	0	19	**38**	15	79	0	**94**	42	41	0	**83**	**215**
Hourly Total	86	0	76	**162**	58	240	0	**298**	176	200	0	**376**	**836**
3:00PM	16	0	14	**30**	17	98	0	**115**	76	71	1	**148**	**293**
3:15PM	20	0	18	**38**	13	123	0	**136**	99	58	0	**157**	**331**
3:30PM	16	0	17	**33**	13	108	0	**121**	102	53	0	**155**	**309**
3:45PM	15	0	28	**43**	19	158	0	**177**	99	47	0	**146**	**366**
Hourly Total	67	0	77	**144**	62	487	0	**549**	376	229	1	**606**	**1299**
4:00PM	25	0	27	**52**	20	132	0	**152**	119	51	0	**170**	**374**
4:15PM	20	1	31	**52**	30	161	0	**191**	88	50	0	**138**	**381**
4:30PM	23	0	25	**48**	29	131	0	**160**	121	82	0	**203**	**411**
4:45PM	19	1	24	**44**	21	174	0	**195**	125	67	0	**192**	**431**
Hourly Total	87	2	107	**196**	100	598	0	**698**	453	250	0	**703**	**1597**
5:00PM	13	0	13	**26**	28	181	0	**209**	117	50	0	**167**	**402**
5:15PM	23	1	22	**46**	20	171	0	**191**	130	61	0	**191**	**428**
5:30PM	16	0	21	**37**	33	144	0	**177**	103	49	0	**152**	**366**
5:45PM	22	0	25	**47**	23	136	0	**159**	87	41	0	**128**	**334**
Hourly Total	74	1	81	**156**	104	632	0	**736**	437	201	0	**638**	**1530**
Total	414	3	462	**879**	386	2223	0	**2609**	1614	1124	1	**2739**	**6227**
% Approach	47.1%	0.3%	52.6%	-	14.8%	85.2%	0%	-	58.9%	41.0%	0%	-	-
% Total	6.6%	0%	7.4%	**14.1%**	6.2%	35.7%	0%	**41.9%**	25.9%	18.1%	0%	**44.0%**	-
Lights	388	3	457	**848**	374	2180	0	**2554**	1603	1106	1	**2710**	6112
% Lights	93.7%	100%	98.9%	**96.5%**	96.9%	98.1%	0%	**97.9%**	99.3%	98.4%	100%	**98.9%**	98.2%
Articulated Trucks	3	0	1	**4**	4	6	0	**10**	2	5	0	**7**	21
% Articulated Trucks	0.7%	0%	0.2%	**0.5%**	1.0%	0.3%	0%	**0.4%**	0.1%	0.4%	0%	**0.3%**	0.3%
Buses and Single-Unit Trucks	23	0	4	**27**	8	37	0	**45**	9	13	0	**22**	94
% Buses and Single-Unit Trucks	5.6%	0%	0.9%	**3.1%**	2.1%	1.7%	0%	**1.7%**	0.6%	1.2%	0%	**0.8%**	1.5%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

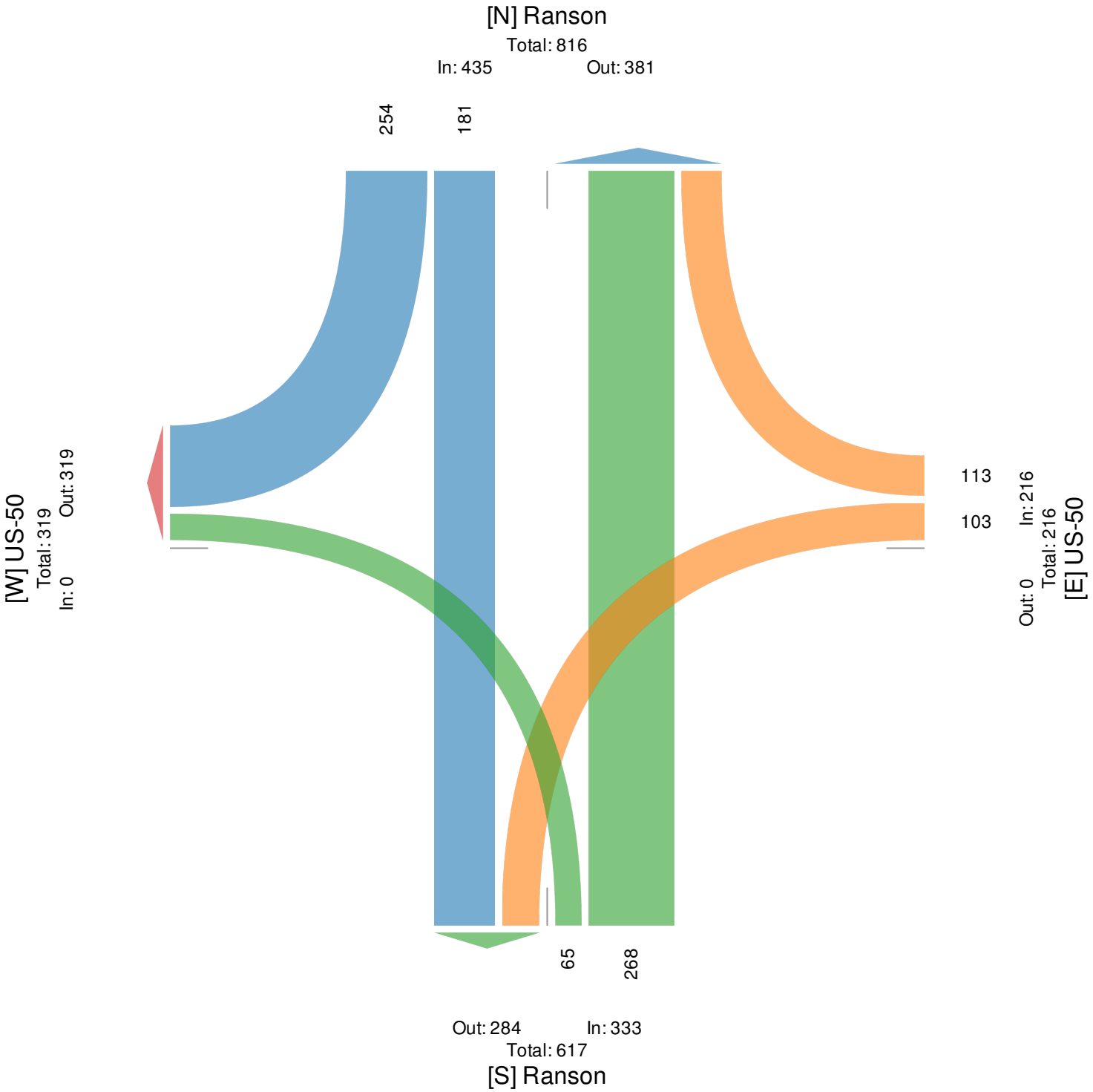
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	US-50				Ranson				Ranson				
Direction	Westbound				Northbound				Southbound				
Time	L	T	R	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2020-04-07 7:15AM	14	0	27	**41**	18	73	0	**91**	42	67	0	**109**	**241**
7:30AM	25	0	37	**62**	13	54	0	**67**	45	76	0	**121**	**250**
7:45AM	43	0	28	**71**	17	78	0	**95**	52	51	0	**103**	**269**
8:00AM	21	0	21	**42**	17	63	0	**80**	42	60	0	**102**	**224**
Total	103	0	113	**216**	65	268	0	**333**	181	254	0	**435**	**984**
% Approach	47.7%	0%	52.3%	-	19.5%	80.5%	0%	-	41.6%	58.4%	0%	-	-
% Total	10.5%	0%	11.5%	**22.0%**	6.6%	27.2%	0%	**33.8%**	18.4%	25.8%	0%	**44.2%**	-
PHF	0.599	-	0.764	**0.761**	0.903	0.859	-	**0.876**	0.870	0.836	-	**0.899**	0.914
Lights	100	0	111	**211**	62	255	0	**317**	181	250	0	**431**	959
% Lights	97.1%	0%	98.2%	**97.7%**	95.4%	95.1%	0%	**95.2%**	100%	98.4%	0%	**99.1%**	97.5%
Articulated Trucks	1	0	0	**1**	2	3	0	**5**	0	1	0	**1**	7
% Articulated Trucks	1.0%	0%	0%	**0.5%**	3.1%	1.1%	0%	**1.5%**	0%	0.4%	0%	**0.2%**	0.7%
Buses and Single-Unit Trucks	2	0	2	**4**	1	10	0	**11**	0	3	0	**3**	18
% Buses and Single-Unit Trucks	1.9%	0%	1.8%	**1.9%**	1.5%	3.7%	0%	**3.3%**	0%	1.2%	0%	**0.7%**	1.8%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

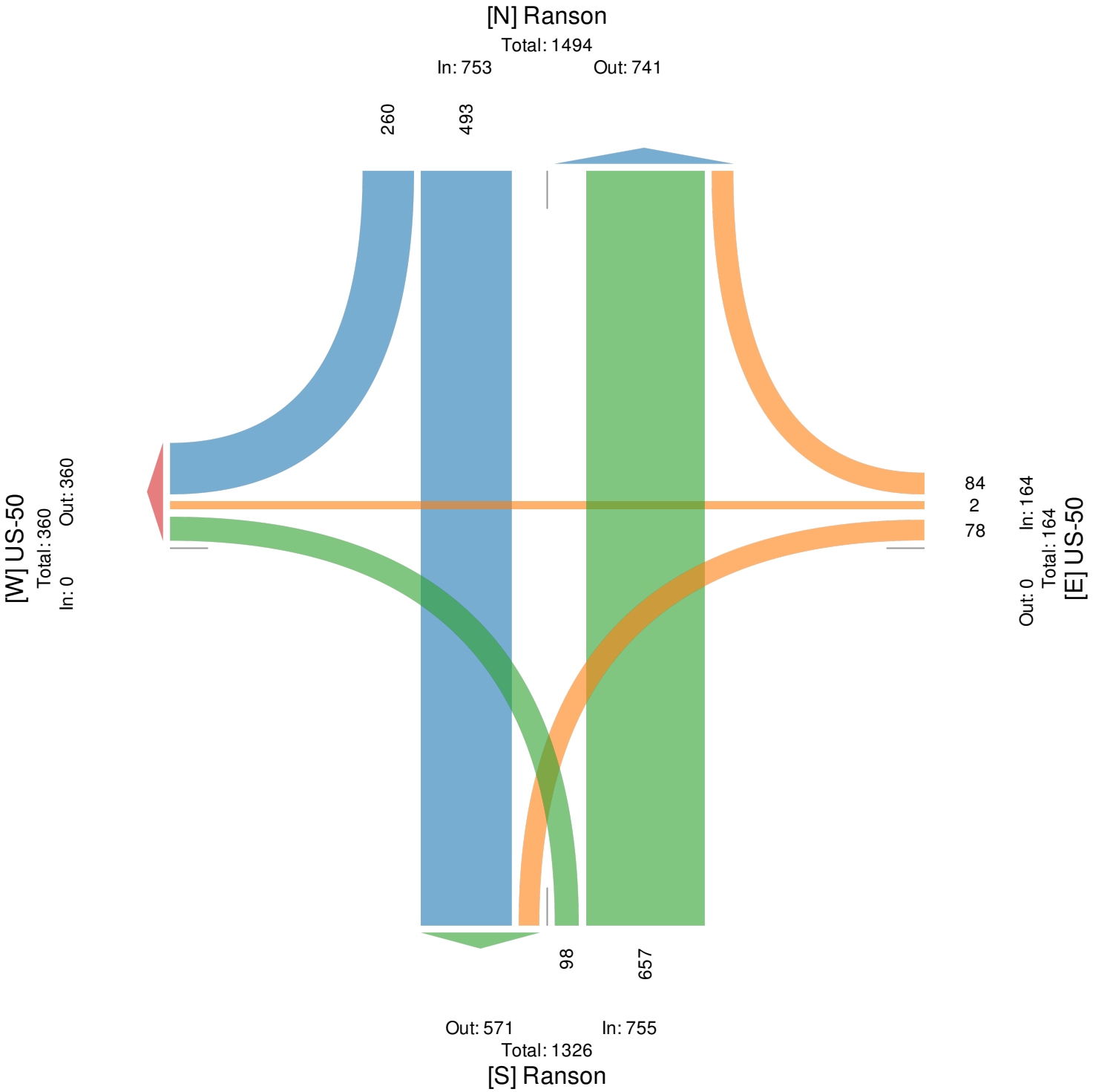
GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	US-50				Ranson				Ranson				
Direction	Westbound				Northbound				Southbound				
Time	L	T	R	**App**	L	T	U	**App**	T	R	U	**App**	**Int**
2020-04-07 4:30PM	23	0	25	**48**	29	131	0	**160**	121	82	0	**203**	**411**
4:45PM	19	1	24	**44**	21	174	0	**195**	125	67	0	**192**	**431**
5:00PM	13	0	13	**26**	28	181	0	**209**	117	50	0	**167**	**402**
5:15PM	23	1	22	**46**	20	171	0	**191**	130	61	0	**191**	**428**
Total	78	2	84	**164**	98	657	0	**755**	493	260	0	**753**	**1672**
% Approach	47.6%	1.2%	51.2%	-	13.0%	87.0%	0%	-	65.5%	34.5%	0%	-	-
% Total	4.7%	0.1%	5.0%	**9.8%**	5.9%	39.3%	0%	**45.2%**	29.5%	15.6%	0%	**45.0%**	-
PHF	0.848	0.500	0.840	**0.854**	0.845	0.907	-	**0.903**	0.948	0.793	-	**0.927**	0.970
Lights	71	2	83	**156**	96	651	0	**747**	491	256	0	**747**	1650
% Lights	91.0%	100%	98.8%	**95.1%**	98.0%	99.1%	0%	**98.9%**	99.6%	98.5%	0%	**99.2%**	98.7%
Articulated Trucks	0	0	0	**0**	0	0	0	**0**	1	2	0	**3**	3
% Articulated Trucks	0%	0%	0%	**0%**	0%	0%	0%	**0%**	0.2%	0.8%	0%	**0.4%**	0.2%
Buses and Single-Unit Trucks	7	0	1	**8**	2	6	0	**8**	1	2	0	**3**	19
% Buses and Single-Unit Trucks	9.0%	0%	1.2%	**4.9%**	2.0%	0.9%	0%	**1.1%**	0.2%	0.8%	0%	**0.4%**	1.1%

*L: Left, R: Right, T: Thru, U: U-Turn

Ranson Road/Todd George Parkway @ US-50 WB R... - TMC
Tue Apr 7, 2020
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 761917, Location: 38.903096, -94.339792

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaHa051419
Site Code : 00000000
Start Date : 5/14/2019

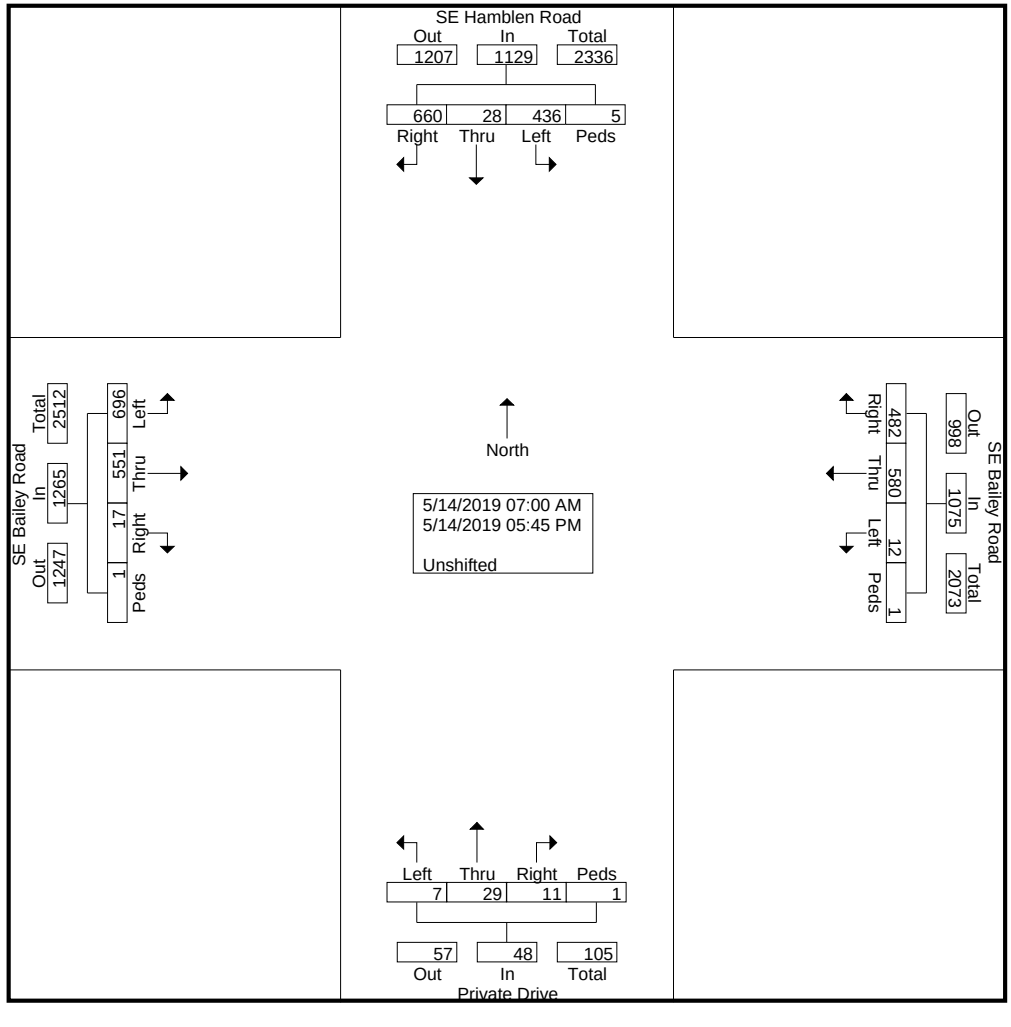
Groups Printed- Unshifted

	SE Hamblen Road From North					SE Bailey Road From East					Private Drive From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	27	10	16	0	53	37	52	5	0	94	0	0	0	0	0	1	20	29	0	50	197
07:15 AM	43	9	20	0	72	43	60	2	0	105	0	2	0	0	2	7	45	68	0	120	299
07:30 AM	38	2	31	1	72	48	49	0	0	97	0	0	0	0	0	2	46	62	0	110	279
07:45 AM	45	2	30	0	77	37	42	1	0	80	2	3	0	0	5	1	37	80	0	118	280
Total	153	23	97	1	274	165	203	8	0	376	2	5	0	0	7	11	148	239	0	398	1055
08:00 AM	43	1	23	0	67	35	27	1	0	63	0	6	0	0	6	1	27	56	0	84	220
08:15 AM	45	0	22	0	67	44	30	1	0	75	1	0	0	0	1	1	28	52	0	81	224
*** BREAK ***																					
Total	88	1	45	0	134	79	57	2	0	138	1	6	0	0	7	2	55	108	0	165	444
*** BREAK ***																					
04:30 PM	76	2	58	2	138	39	58	0	0	97	1	4	2	0	7	1	54	61	0	116	358
04:45 PM	78	1	45	0	124	32	59	1	0	92	2	7	1	0	10	0	71	50	0	121	347
Total	154	3	103	2	262	71	117	1	0	189	3	11	3	0	17	1	125	111	0	237	705
05:00 PM	65	0	48	0	113	33	42	0	0	75	1	1	0	0	2	1	67	49	0	117	307
05:15 PM	89	0	52	1	142	44	55	0	0	99	1	5	3	0	9	0	60	62	0	122	372
05:30 PM	66	0	46	1	113	43	55	0	1	99	1	0	1	1	3	0	54	69	1	124	339
05:45 PM	45	1	45	0	91	47	51	1	0	99	2	1	0	0	3	2	42	58	0	102	295
Total	265	1	191	2	459	167	203	1	1	372	5	7	4	1	17	3	223	238	1	465	1313
Grand Total	660	28	436	5	1129	482	580	12	1	1075	11	29	7	1	48	17	551	696	1	1265	3517
Apprch %	58.5	2.5	38.6	0.4		44.8	54	1.1	0.1		22.9	60.4	14.6	2.1		1.3	43.6	55	0.1		
Total %	18.8	0.8	12.4	0.1	32.1	13.7	16.5	0.3	0	30.6	0.3	0.8	0.2	0	1.4	0.5	15.7	19.8	0	36	

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

File Name : BaHa051419
Site Code : 00000000
Start Date : 5/14/2019
Page No : 2



Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

File Name : BaHa051419
Site Code : 00000000
Start Date : 5/14/2019
Page No : 3

	SE Hamblen Road From North					SE Bailey Road From East					Private Drive From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	43	**9**	20	0	72	43	**60**	**2**	0	**105**	0	2	0	0	2	**7**	45	68	0	**120**	**299**
07:30 AM	38	2	**31**	**1**	72	**48**	49	0	0	97	0	0	0	0	0	2	**46**	62	0	110	279
07:45 AM	**45**	2	30	0	**77**	37	42	1	0	80	**2**	3	0	0	5	1	37	**80**	0	118	280
08:00 AM	43	1	23	0	67	35	27	1	0	63	0	**6**	0	0	**6**	1	27	56	0	84	220
Total Volume	169	14	104	1	288	163	178	4	0	345	2	11	0	0	13	11	155	266	0	432	1078
% App. Total	58.7	4.9	36.1	0.3		47.2	51.6	1.2	0		15.4	84.6	0	0		2.5	35.9	61.6	0		
PHF	.939	.389	.839	.250	.935	.849	.742	.500	.000	.821	.250	.458	.000	.000	.542	.393	.842	.831	.000	.900	.901

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

File Name : BaHa051419
Site Code : 00000000
Start Date : 5/14/2019
Page No : 4

	SE Hamblen Road From North					SE Bailey Road From East					Private Drive From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	76	**2**	**58**	**2**	138	39	58	0	0	97	1	4	2	0	7	**1**	54	61	0	116	358
04:45 PM	78	1	45	0	124	32	**59**	**1**	0	92	**2**	**7**	1	0	**10**	0	**71**	50	0	121	347
05:00 PM	65	0	48	0	113	33	42	0	0	75	1	1	0	0	2	1	67	49	0	117	307
05:15 PM	**89**	0	52	1	**142**	**44**	55	0	0	**99**	1	5	**3**	0	9	0	60	**62**	0	**122**	**372**
Total Volume	308	3	203	3	517	148	214	1	0	363	5	17	6	0	28	2	252	222	0	476	1384
% App. Total	59.6	0.6	39.3	0.6		40.8	59	0.3	0		17.9	60.7	21.4	0		0.4	52.9	46.6	0		
PHF	.865	.375	.875	.375	.910	.841	.907	.250	.000	.917	.625	.607	.500	.000	.700	.500	.887	.895	.000	.975	.930

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaCe050219
Site Code : 00000000
Start Date : 5/2/2019
Page No : 1

Groups Printed- Unshifted - Bank 1

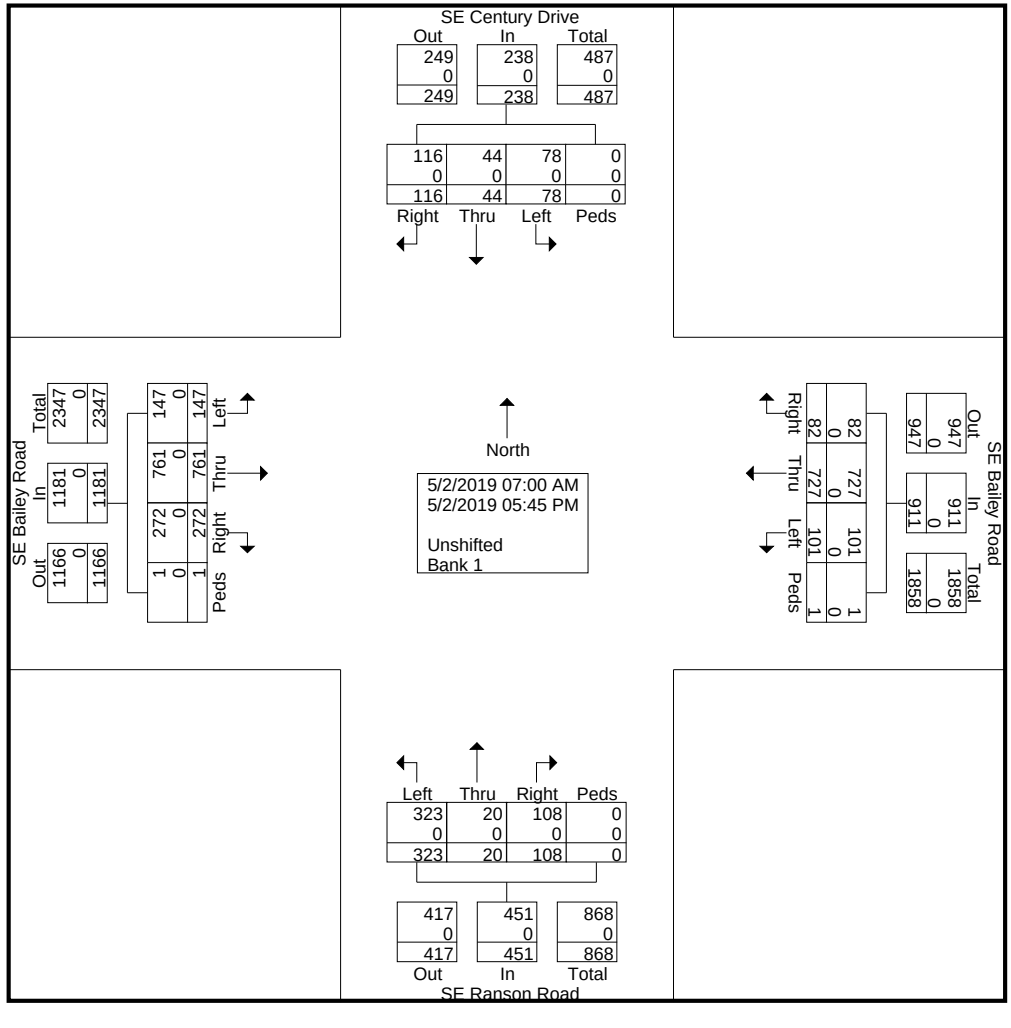
	SE Century Drive From North					SE Bailey Road From East					SE Ranson Road From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	7	1	3	0	11	11	103	4	0	118	3	1	20	0	24	12	18	9	0	39	192
07:15 AM	4	0	2	0	6	9	91	6	0	106	1	1	16	0	18	16	28	5	0	49	179
07:30 AM	6	0	5	0	11	6	57	10	0	73	3	1	18	0	22	17	36	10	0	63	169
07:45 AM	3	2	2	0	7	10	57	14	0	81	4	3	13	0	20	22	31	15	0	68	176
Total	20	3	12	0	35	36	308	34	0	378	11	6	67	0	84	67	113	39	0	219	716
08:00 AM	3	2	2	0	7	4	63	6	0	73	6	2	14	0	22	20	36	10	0	66	168
08:15 AM	7	2	2	0	11	5	45	7	0	57	4	1	19	0	24	13	27	11	0	51	143
*** BREAK ***																					
Total	10	4	4	0	18	9	108	13	0	130	10	3	33	0	46	33	63	21	0	117	311
*** BREAK ***																					
04:30 PM	16	8	13	0	37	7	55	20	0	82	15	1	24	0	40	48	76	17	0	141	300
04:45 PM	12	9	6	0	27	0	50	12	0	62	20	3	53	0	76	22	87	11	0	120	285
Total	28	17	19	0	64	7	105	32	0	144	35	4	77	0	116	70	163	28	0	261	585
05:00 PM	12	9	12	0	33	4	52	12	0	68	16	4	46	0	66	26	123	19	0	168	335
05:15 PM	19	6	12	0	37	10	59	6	1	76	17	2	33	0	52	29	97	16	1	143	308
05:30 PM	11	0	5	0	16	6	48	2	0	56	11	1	35	0	47	22	90	11	0	123	242
05:45 PM	16	5	14	0	35	10	47	2	0	59	8	0	32	0	40	25	112	13	0	150	284
Total	58	20	43	0	121	30	206	22	1	259	52	7	146	0	205	102	422	59	1	584	1169
Grand Total	116	44	78	0	238	82	727	101	1	911	108	20	323	0	451	272	761	147	1	1181	2781
Apprch %	48.7	18.5	32.8	0		9	79.8	11.1	0.1		23.9	4.4	71.6	0		23	64.4	12.4	0.1		
Total %	4.2	1.6	2.8	0	8.6	2.9	26.1	3.6	0	32.8	3.9	0.7	11.6	0	16.2	9.8	27.4	5.3	0	42.5	
Unshifted	116	44	78	0	238	82	727	101	1	911	108	20	323	0	451	272	761	147	1	1181	2781
% Unshifted	100	100	100	0	100	100	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaCe050219
Site Code : 00000000
Start Date : 5/2/2019
Page No : 2

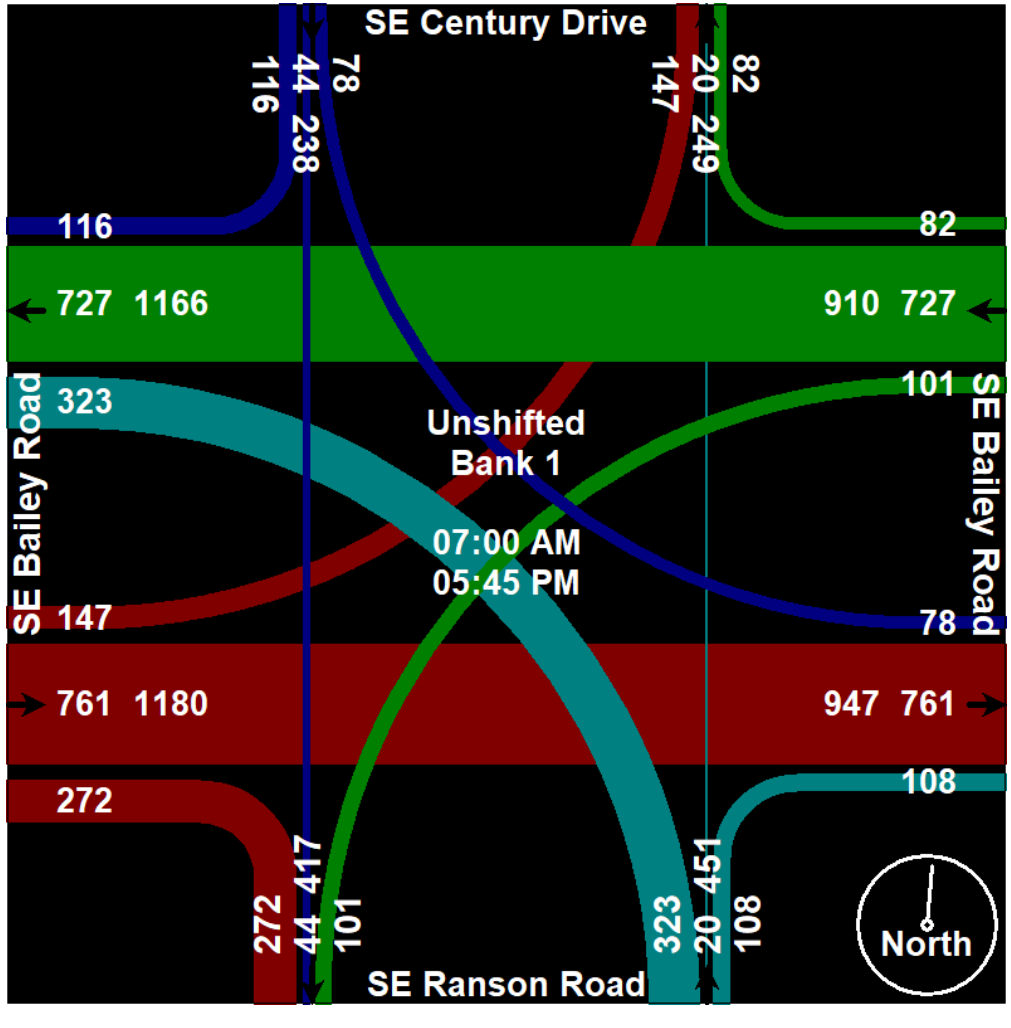


Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaCe050219
Site Code : 00000000
Start Date : 5/2/2019
Page No : 3



Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaCe050219
Site Code : 00000000
Start Date : 5/2/2019

	SE Century Drive From North					SE Bailey Road From East					SE Ranson Road From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**7**	1	3	0	**11**	**11**	**103**	4	0	**118**	3	1	**20**	0	**24**	12	18	9	0	39	**192**
07:15 AM	4	0	2	0	6	9	91	6	0	106	1	1	16	0	18	16	28	5	0	49	179
07:30 AM	6	0	**5**	0	11	6	57	10	0	73	3	1	18	0	22	17	**36**	10	0	63	169
07:45 AM	3	**2**	2	0	7	10	57	**14**	0	81	**4**	**3**	13	0	20	**22**	31	**15**	0	**68**	176
Total Volume	20	3	12	0	35	36	308	34	0	378	11	6	67	0	84	67	113	39	0	219	716
% App. Total	57.1	8.6	34.3	0		9.5	81.5	9	0		13.1	7.1	79.8	0		30.6	51.6	17.8	0		
PHF	.714	.375	.600	.000	.795	.818	.748	.607	.000	.801	.688	.500	.838	.000	.875	.761	.785	.650	.000	.805	.932

Your Company Name Here

This is your address
Your City, State, Zip Code
Your Tagline Here

Default Comments
Change These in The Preferences Window
Select File/Preference in the Main Scree
Then Click the Comments Tab

File Name : BaCe050219
Site Code : 00000000
Start Date : 5/2/2019

	SE Century Drive From North					SE Bailey Road From East					SE Ranson Road From South					SE Bailey Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	16	8	**13**	0	**37**	7	55	**20**	0	**82**	15	1	24	0	40	**48**	76	17	0	141	300
04:45 PM	12	**9**	6	0	27	0	50	12	0	62	**20**	3	**53**	0	**76**	22	87	11	0	120	285
05:00 PM	12	9	12	0	33	4	52	12	0	68	16	**4**	46	0	66	26	**123**	**19**	0	**168**	**335**
05:15 PM	**19**	6	12	0	37	**10**	**59**	6	**1**	76	17	2	33	0	52	29	97	16	**1**	143	308
Total Volume	59	32	43	0	134	21	216	50	1	288	68	10	156	0	234	125	383	63	1	572	1228
% App. Total	44	23.9	32.1	0		7.3	75	17.4	0.3		29.1	4.3	66.7	0		21.9	67	11	0.2		
PHF	.776	.889	.827	.000	.905	.525	.915	.625	.250	.878	.850	.625	.736	.000	.770	.651	.778	.829	.250	.851	.916

Start Date: 4/25/2017
Start Time: 7:00:00 AM
Site Code: 00000000
Comment 1: Default Comments
Comment 2: Change These in The Preferences Window
Comment 3: Select File/Preference in the Main Scree
Comment 4: Then Click the Comments Tab

	Ranson Road From North				From East				Ranson Road From South				Bailey Road From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
07:00 AM	41	22	0	0	0	0	0	0	0	38	7	0	4	0	16	0
07:15 AM	50	20	0	1	0	0	0	0	0	53	6	0	2	0	24	0
07:30 AM	38	40	0	0	0	0	0	0	0	57	3	0	3	0	49	0
07:45 AM	29	34	0	0	0	0	0	0	0	49	2	0	3	0	27	0
08:00 AM	18	10	0	0	0	0	0	0	0	44	4	0	4	0	19	0
08:15 AM	12	15	0	0	0	0	0	0	0	24	3	0	2	0	17	0
04:30 PM	30	49	0	0	0	0	0	0	0	51	9	0	9	0	52	0
04:45 PM	29	70	0	0	0	0	0	0	0	57	3	0	5	0	54	0
05:00 PM	36	80	0	0	0	0	0	0	0	64	2	0	13	0	79	0
05:15 PM	27	77	0	0	0	0	0	0	0	70	2	0	16	1	72	0
05:30 PM	29	69	0	0	0	0	0	0	0	55	5	0	9	0	46	0
05:45 PM	14	85	0	1	0	0	0	0	0	68	3	0	8	0	53	0

EXISTING PLUS PHASE 1 DEVELOPMENT CONDITIONS
LANE CONFIGURATIONS AND
PEAK HOUR TRAFFIC VOLUMES

Culver's
Traffic Impact Study
Lee's Summit, Missouri

December 2019

No Scale

Figure A-4

TranSystems

pw:\\hq-pwim01.ja-e.transystemscorp.com:transystemscorp-pw1\Documents\Projects_2019\KC101 - Kansas City\P101190329 - Culver's Traffic Impact Study\310.00 - Traffic\Lane Configurations and Volume.dgn

Approximation of Existing School Dismissal Peak Hour Counts

Procedure:
Use ADT data to determine approximately how much less traffic occurs during the school dismissal peak hour (approx 3-4pm) compared to the actual PM peak hour.
This factor will be applied to the existing PM TMC to approximate existing school dismissal peak hour TMC.

Count Location	Count Date	Bidirectional Total		Percentage of PM Peak	**Average Percentage of PM Peak**	***Rounded Value***
		School Dismissal Peak (3-4pm)	PM Peak (either 4-5 pm or 5-6pm)			
Bailey Rd W/O Hamblen (west)	5/18/2017	747	919	81%	**79%**	***80%***
Bailey Rd E/O Hamblen (east)	7/24/2019	505	602	84%		
Bailey Rd E/O Cape Dr	8/13/2019	287	370	78%		
Ranson Rd S/O Bailey Rd	7/23/2019	288	390	74%		

Existing Volumes for Lee's Summit Middle School Traffic Study

Data Sources Utilized:

- Turning Movement Counts – AM and PM Peak Hours
    - Bailey Rd & Hamblen Rd West: May 2019 by City
    - Bailey Rd & Hamblen Rd East: May 2019 by City
    - Bailey Rd & Ranson Rd: April 2017 by City
    - Oldham Pkwy & Ranson Rd: October 2018 from approved traffic study. Includes trips associated with new Culver's and Princeton developments.
    - US-50 EB Ramp & Ranson Rd: April 2020
    - US-50 EB Ramp & Ranson Rd: April 2020
- ADT Counts
    - Along Bailey Rd, West of Hamblen Rd West: May 2017
    - Along Bailey Rd, East of Hamblen Rd East: July 2019
    - Along Bailey Rd, East of Cape Dr: August 2019
    - Along Ranson Rd, South of Baily Rd: July 2019

School Dismissal Peak Hour Determination:

- Counts at US-50 interchange contained existing turning movement counts associated with the assumed school dismissal peak hour (3-4pm).
- Obtained TMC for remaining intersections by applying an adjustment/reduction factor to the PM peak hour counts.
    - Reviewed ADTs; compared the 3-4pm hour volumes to PM peak hour volumes; obtained an adjustment/reduction factor of 0.80.
- Apply reduction factor to PM peak hour counts at necessary locations to obtain existing 3-4pm background turning movements.

Balancing Volumes Across Intersections:

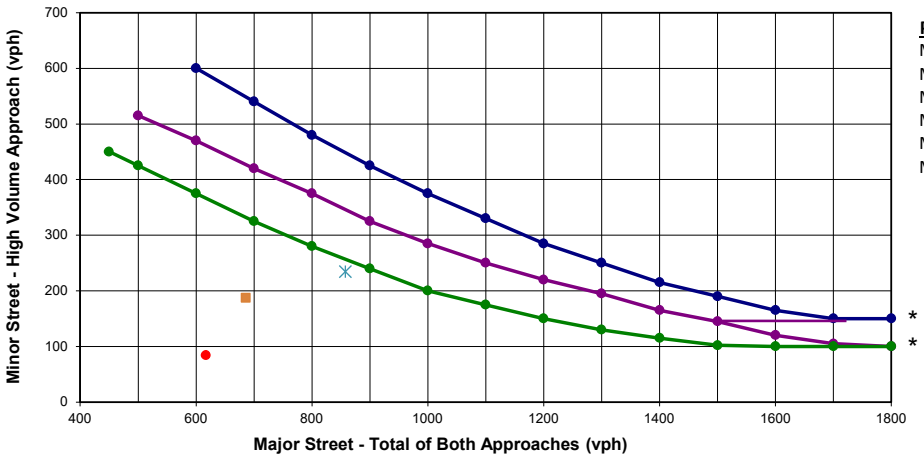
- Due to differing data collection dates, volume imbalances were present
- Volumes along Bailey Rd were conservatively adjusted (increased at adjacent intersection) to better balance the volumes across study intersections. This also accounted for some growth associated with the 2017 data captured at Ranson & Bailey.
- Volumes at the 50 Highway Interchange were collected when the local stay-at-home order was in effect. Turning movements at the interchange were balanced (increased) with the adjacent intersection of Ranson & Oldham.

APPENDIX B

Existing Conditions

Signal Warrants

Peak Hour Volume Warrant (Existing Conditions)
Bailey Rd and Hamblen Rd (East)

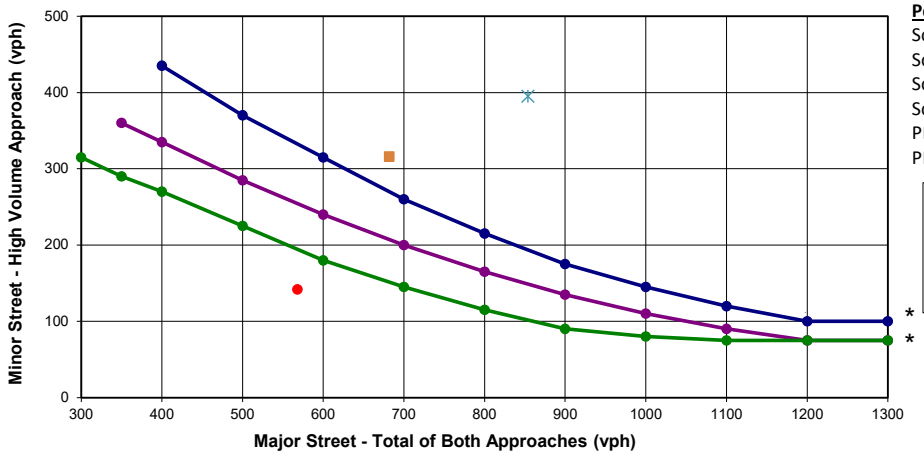


Peak Hour Volumes:
Major (AM) - 617
Minor (AM) - 84
Major (School Dis.) - 686
Minor (School Dis.) - 187
Major (PM) - 858
Minor (PM) - 234

*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.

Peak Hour Volume Warrant (Existing)
Bailey Rd & Ranson Rd

(Community less than 10,000 population or above 40mph on major street)



Peak Hour Volumes:
School Arrival Major - 568
School Arrival Minor - 142
School Dismissal Major - 682
School Dismissal Minor - 316
PM Major - 854
PM Minor - 395

*Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph

Lane Warrants

Lee's Summit AMC Lane Warrants (Applied along Bailey Rd)

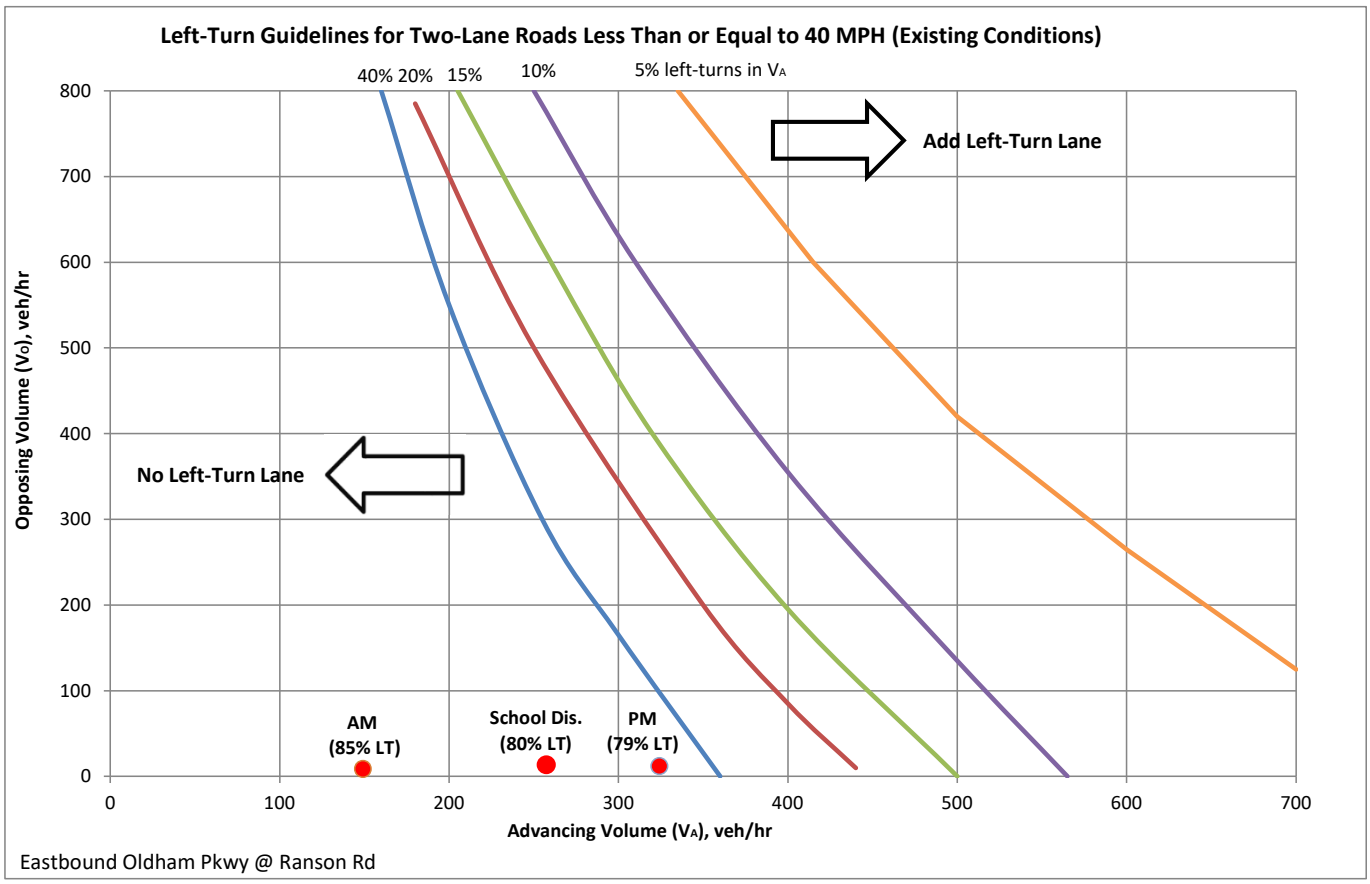
Existing Conditions

Left Turns

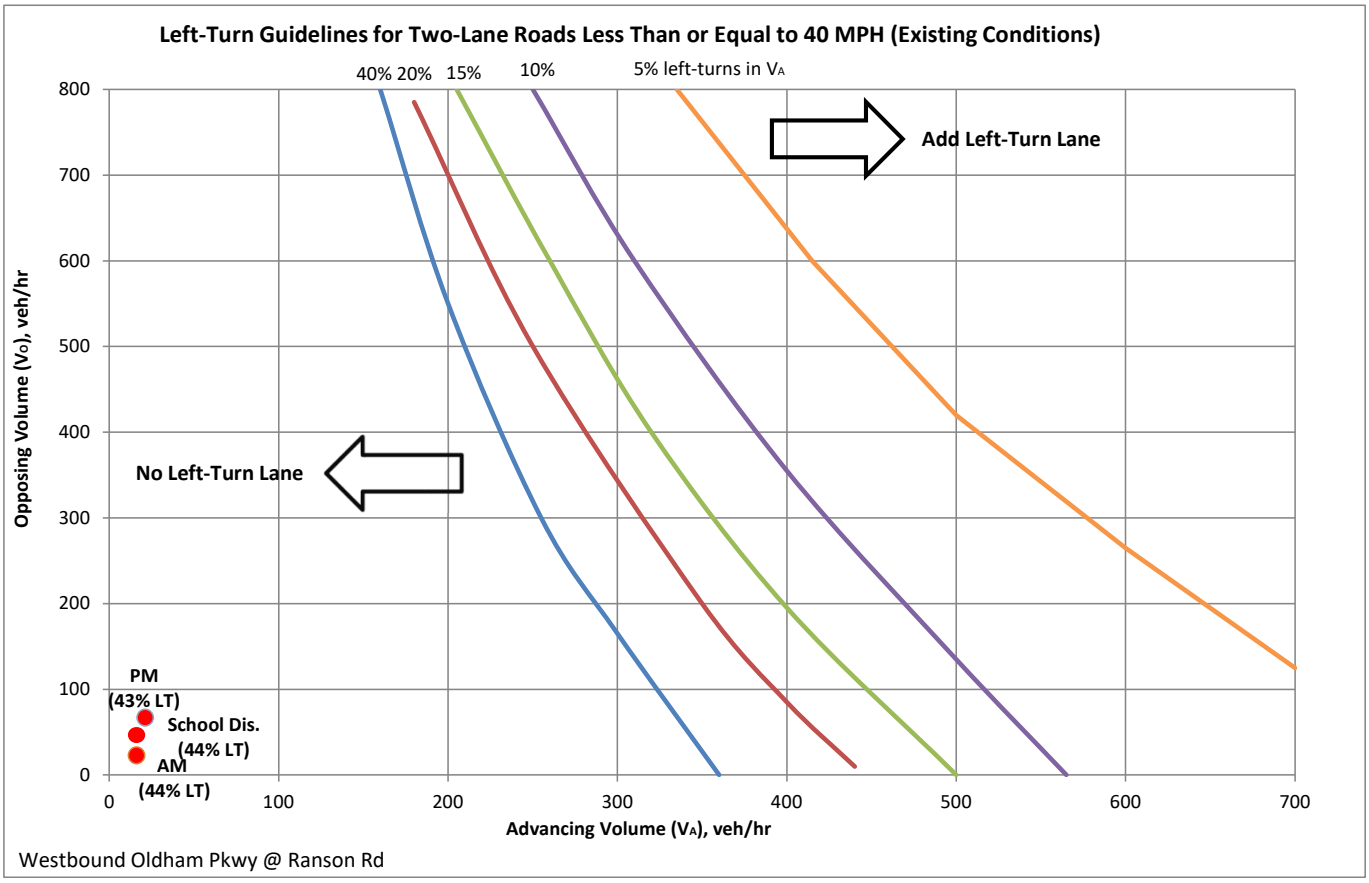
- Hamblen Rd (west) and Bailey Rd
  - EB, SB, WB existing or planned
  - NB warranted
    - AMC 16.1.A – planned traffic signal
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - NB existing
  - EB, WB warranted
    - AMC 16.1.B – arterial intersecting with arterial
  - SB warranted
    - AMC 16.1.D – non-residential connector with minor arterial and >20 LT vph (met in Afternoon and PM)
- Ranson Rd & Bailey
  - LS Criterial only applied to EB approach. N/S approach MoDOT road.
  - EB warranted
    - AMC 16.1.B – arterial intersecting with arterial

Right Turns

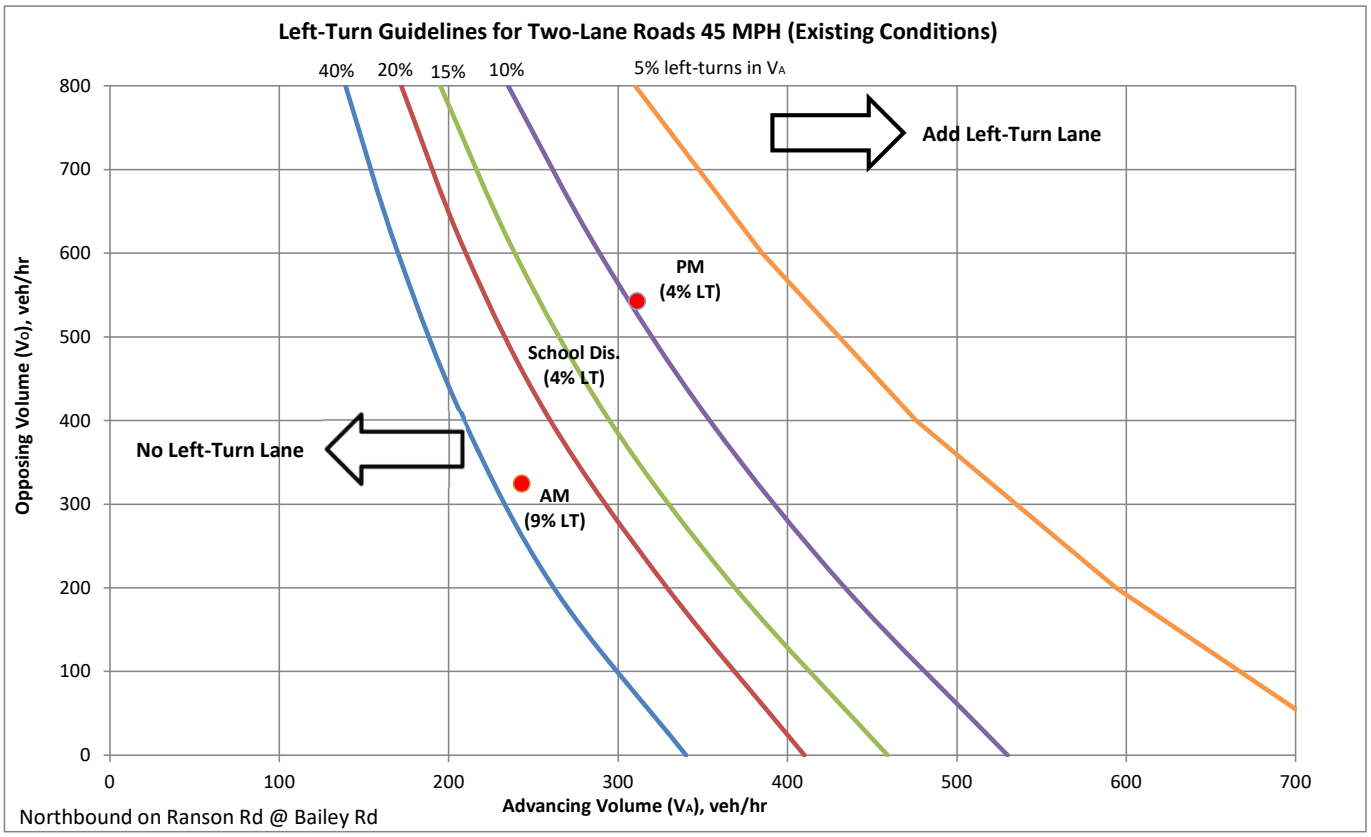
- Hamblen Rd (west) and Bailey Rd
  - WB, SB warranted
    - AMC 16.2.A – minor arterial with minor arterial and >60 RT vph (met AM, Afternoon, PM)
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - EB existing
  - NB warranted
    - AMC 16.2.A – minor arterial with minor arterial and >60 RT vph (met PM)
- Ranson Rd & Bailey
  - LS Criterial only applied to EB approach. N/S approach MoDOT road.
  - EB warranted
    - AMC 16.2.A – minor arterial with minor arterial and >60 RT vph (met PM)

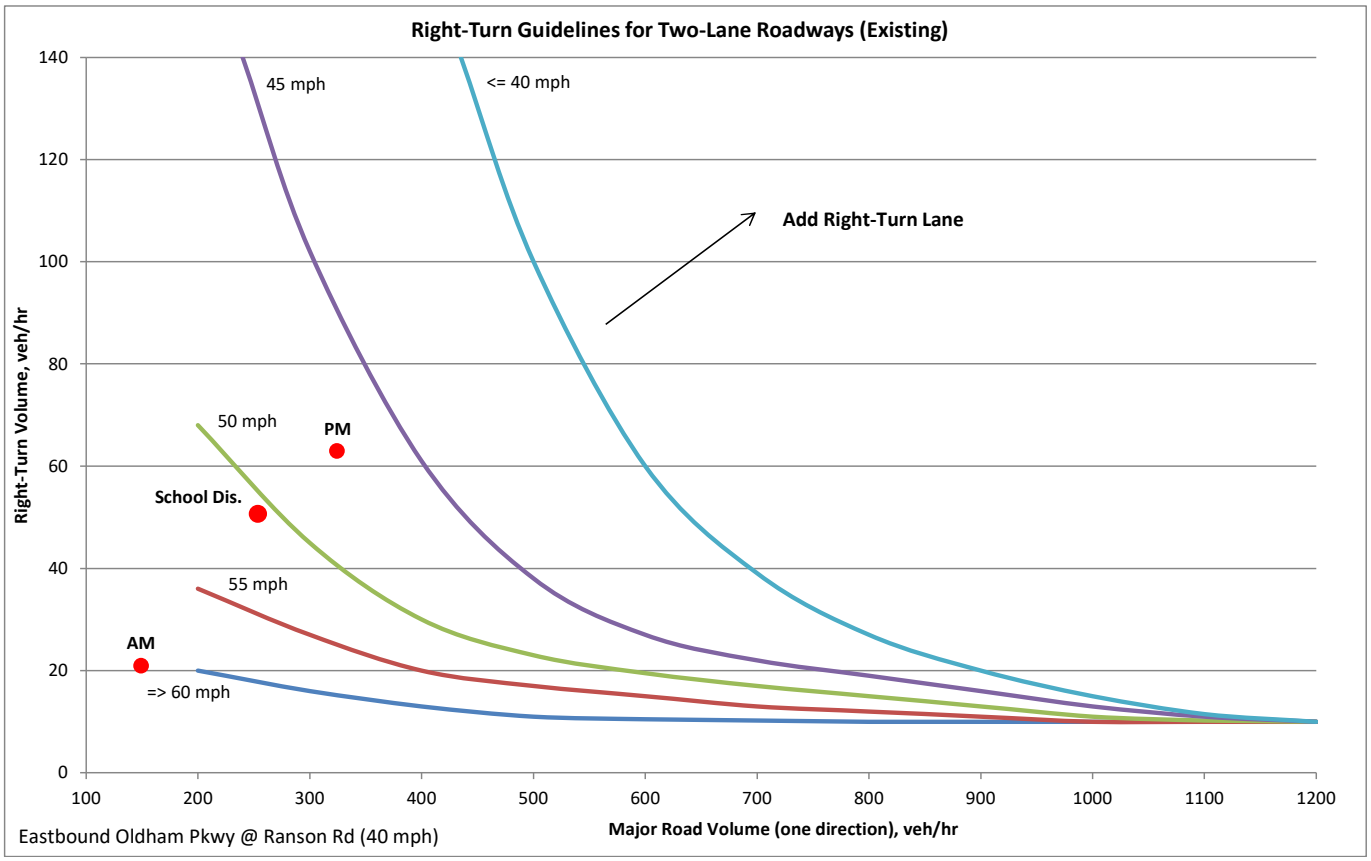


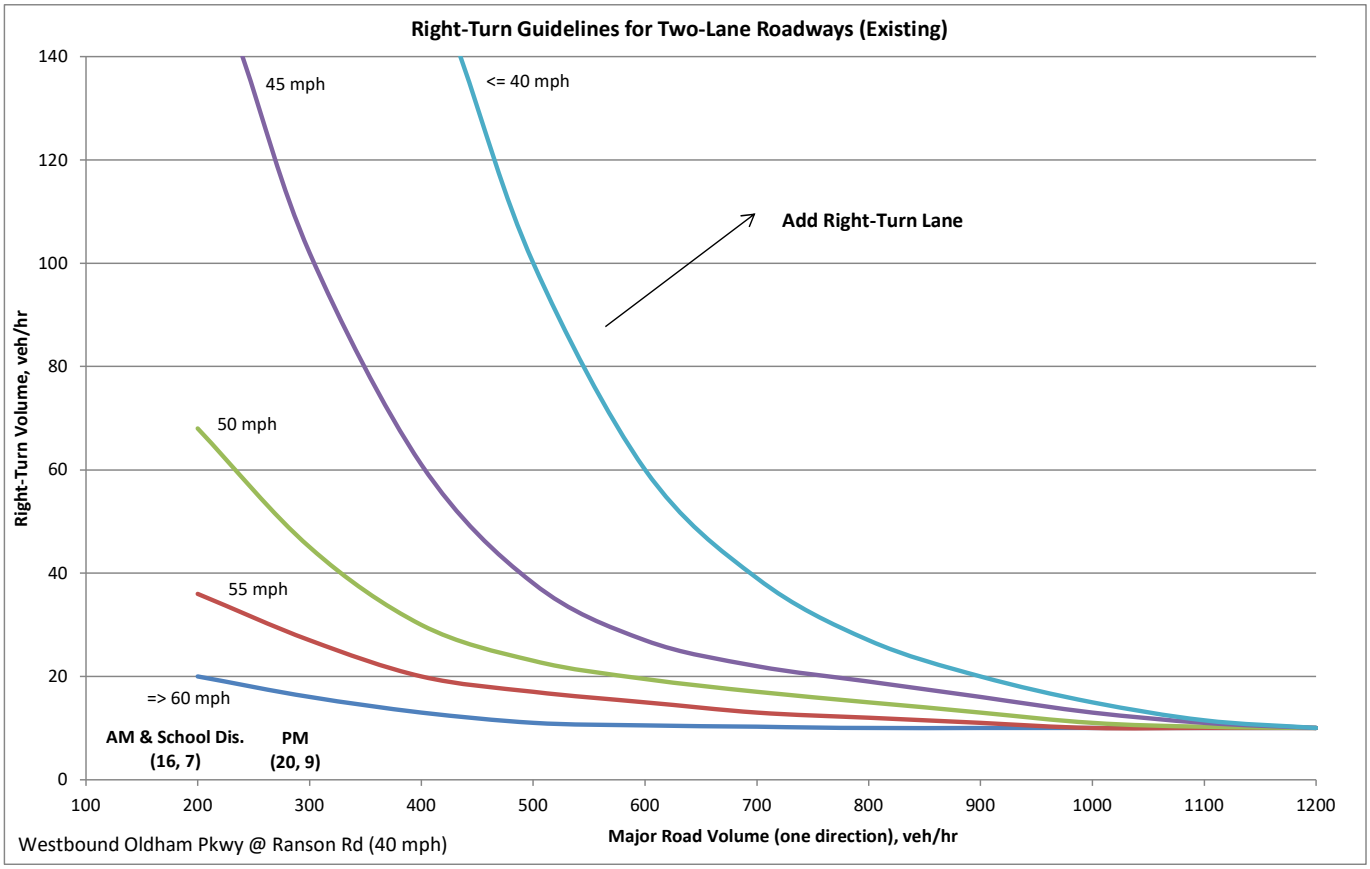
Eastbound Oldham Pkwy @ Ranson Rd

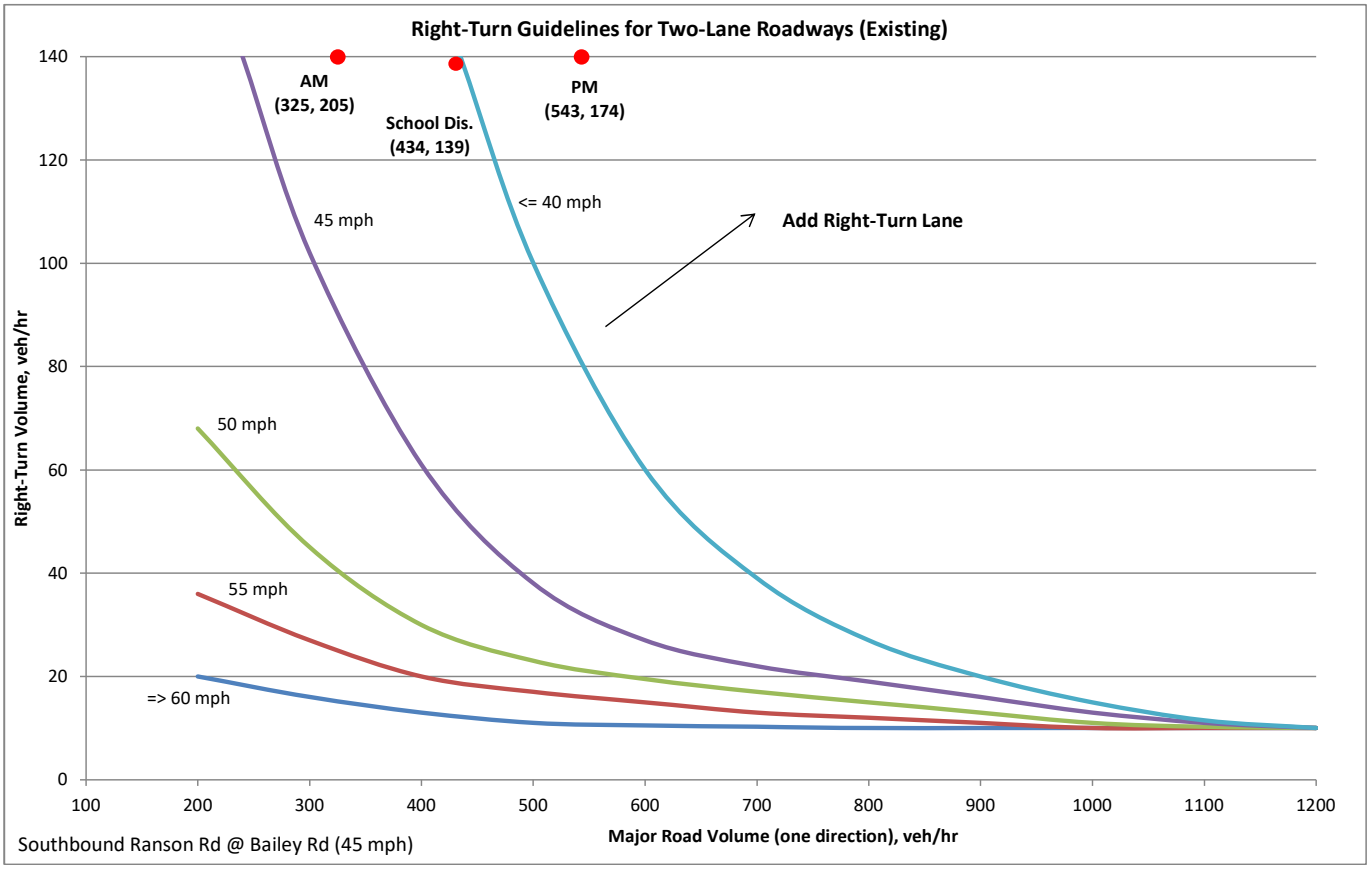


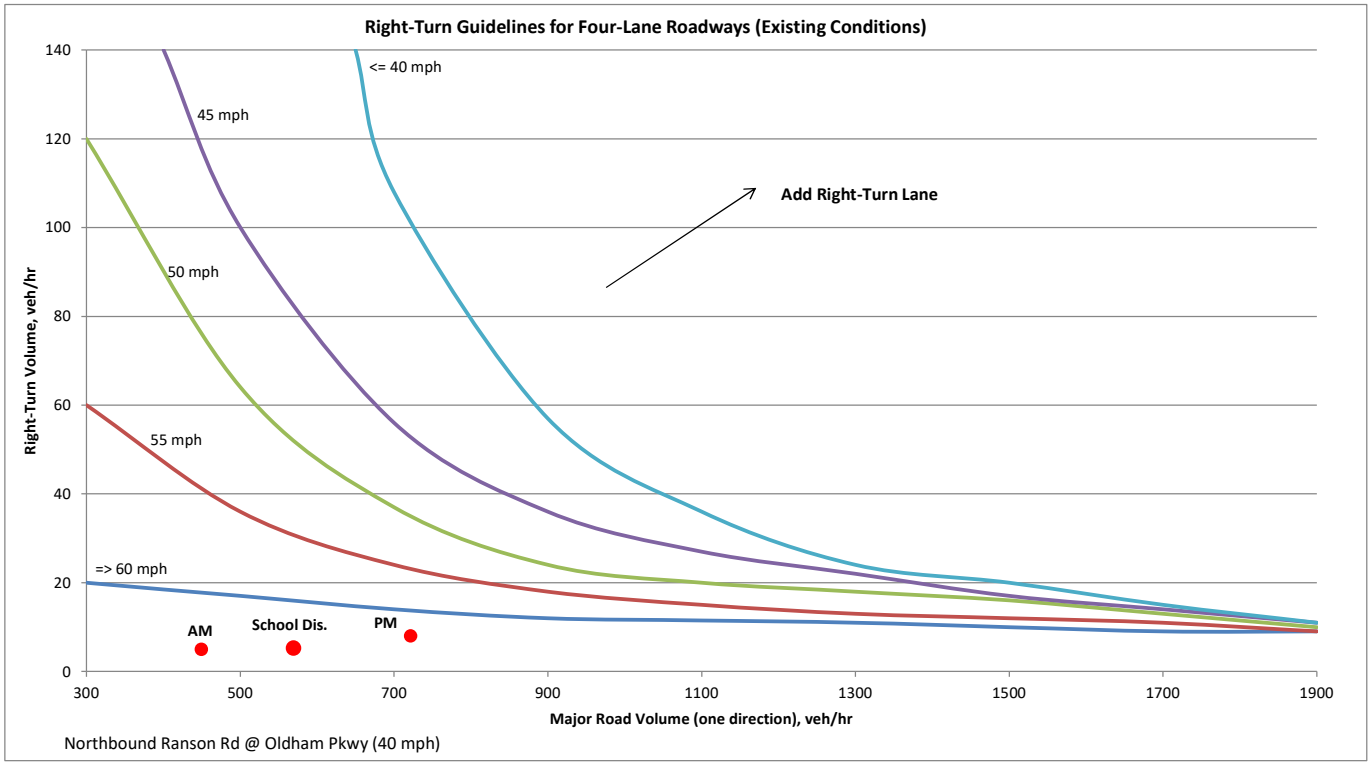
Westbound Oldham Pkwy @ Ranson Rd


Left-Turn Guidelines for Two-Lane Roads 45 MPH (Existing Conditions)
40%
20%
15%
10%
5% left-turns in VA
Add Left-Turn Lane
No Left-Turn Lane
PM
(4% LT)
School Dis.
(4% LT)
AM
(9% LT)
Opposing Volume (VO), veh/hr
Advancing Volume (VA), veh/hr
0
100
200
300
400
500
600
700
800
Northbound on Ranson Rd @ Bailey Rd

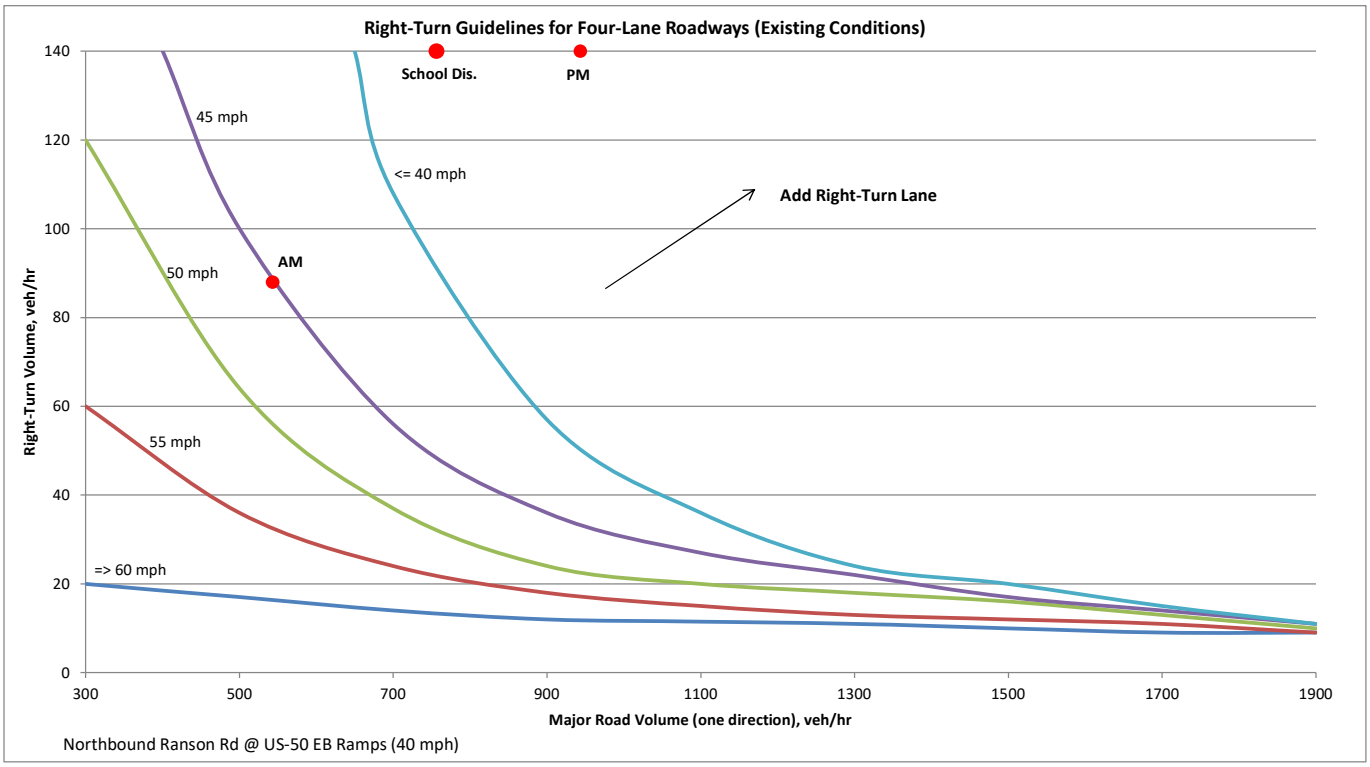

Right-Turn Guidelines for Two-Lane Roadways (Existing)
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
PM
School Dis.
55 mph
AM
=> 60 mph
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
0
20
40
60
80
100
120
140
100
200
300
400
500
600
700
800
900
1000
1100
1200
Eastbound Oldham Pkwy @ Ranson Rd (40 mph)


Right-Turn Guidelines for Two-Lane Roadways (Existing)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
55 mph
=> 60 mph
AM & School Dis.
(16, 7)
PM
(20, 9)
Westbound Oldham Pkwy @ Ranson Rd (40 mph)


Right-Turn Guidelines for Two-Lane Roadways (Existing)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
AM
(325, 205)
School Dis.
(434, 139)
PM
(543, 174)
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
55 mph
=> 60 mph
Southbound Ranson Rd @ Bailey Rd (45 mph)



Northbound Ranson Rd @ Oldham Pkwy (40 mph)



Northbound Ranson Rd @ US-50 EB Ramps (40 mph)

Capacity Analysis

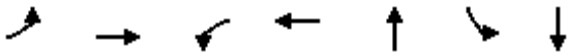
Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	13	23	220	120	205
Future Vol, veh/h	129	13	23	220	120	205
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	59	75	64	86	73	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	219	17	36	256	164	259

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	622	294	423	0	-	0
Stage 1	294	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	450	745	1136	-	-	-
Stage 1	756	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	433	745	1136	-	-	-
Mov Cap-2 Maneuver	433	-	-	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	730	-	-	-	-	-

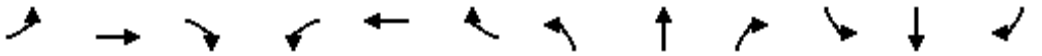
Approach	EB	NB	SB
HCM Control Delay, s	21.7	1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1136	-	447	-	-
HCM Lane V/C Ratio	0.032	-	0.528	-	-
HCM Control Delay (s)	8.3	0	21.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	3	-	-



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	320	213	8	470	32	124	216
v/c Ratio	0.65	0.17	0.02	0.74	0.09	0.49	0.46
Control Delay	13.9	5.3	15.5	25.0	20.8	32.8	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	5.3	15.5	25.0	20.8	32.8	10.7
Queue Length 50th (ft)	47	26	2	130	7	40	11
Queue Length 95th (ft)	97	55	6	199	15	102	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	651	1903	691	1159	513	361	589
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.11	0.01	0.41	0.06	0.34	0.37

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	155	11	4	193	178	0	11	2	104	14	169
Future Volume (veh/h)	266	155	11	4	193	178	0	11	2	104	14	169
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	320	185	28	8	261	209	0	24	8	124	36	180
Peak Hour Factor	0.83	0.84	0.39	0.50	0.74	0.85	0.25	0.46	0.25	0.84	0.39	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	493	981	149	519	330	264	0	247	82	366	50	249
Arrive On Green	0.15	0.59	0.59	0.33	0.33	0.33	0.00	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1781	1650	250	1168	1000	801	0	1342	447	1377	271	1355
Grp Volume(v), veh/h	320	0	213	8	0	470	0	0	32	124	0	216
Grp Sat Flow(s),veh/h/ln	1781	0	1900	1168	0	1801	0	0	1790	1377	0	1626
Q Serve(g_s), s	5.7	0.0	2.8	0.3	0.0	12.8	0.0	0.0	0.8	4.5	0.0	6.8
Cycle Q Clear(g_c), s	5.7	0.0	2.8	0.3	0.0	12.8	0.0	0.0	0.8	5.3	0.0	6.8
Prop In Lane	1.00		0.13	1.00		0.44	0.00		0.25	1.00		0.83
Lane Grp Cap(c), veh/h	493	0	1130	519	0	595	0	0	329	366	0	299
V/C Ratio(X)	0.65	0.00	0.19	0.02	0.00	0.79	0.00	0.00	0.10	0.34	0.00	0.72
Avail Cap(c_a), veh/h	811	0	2140	931	0	1230	0	0	562	545	0	510
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	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.5	0.0	5.0	12.2	0.0	16.4	0.0	0.0	18.4	20.6	0.0	20.8
Incr Delay (d2), s/veh	1.4	0.0	0.1	0.0	0.0	2.4	0.0	0.0	0.1	0.5	0.0	3.3
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	1.8	0.0	0.7	0.1	0.0	4.8	0.0	0.0	0.3	1.3	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	5.1	12.2	0.0	18.8	0.0	0.0	18.5	21.1	0.0	24.1
LnGrp LOS	B	A	A	B	A	B	A	A	B	C	A	C
Approach Vol, veh/h		533			478			32			340	
Approach Delay, s/veh		9.2			18.7			18.5			23.0	
Approach LOS		A			B			B			C	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	14.3	23.9		16.0		38.2		16.0				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	18.0	37.0		17.0		61.0		17.0				
Max Q Clear Time (g_c+I1), s	7.7	14.8		8.8		4.8		2.8				
Green Ext Time (p_c), s	0.7	3.1		1.0		1.3		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									

Intersection	
Intersection Delay, s/veh	18.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	133	67	34	308	36	67	6	11	12	3	20
Future Vol, veh/h	39	133	67	34	308	36	67	6	11	12	3	20
Peak Hour Factor	0.65	0.79	0.76	0.61	0.75	0.82	0.84	0.50	0.69	0.60	0.38	0.71
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	168	88	56	411	44	80	12	16	20	8	28
Number of Lanes	0	1	1	0	1	0	1	1	0	0	1	0

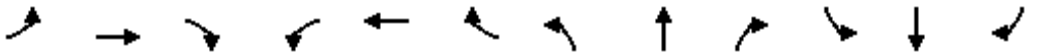
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	10.9	25.3	11	10.6
HCM LOS	B	D	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	23%	0%	9%	34%
Vol Thru, %	0%	35%	77%	0%	81%	9%
Vol Right, %	0%	65%	0%	100%	10%	57%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	67	17	172	67	378	35
LT Vol	67	0	39	0	34	12
Through Vol	0	6	133	0	308	3
RT Vol	0	11	0	67	36	20
Lane Flow Rate	80	28	228	88	510	56
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.162	0.049	0.369	0.122	0.78	0.105
Departure Headway (Hd)	7.331	6.359	5.814	4.99	5.501	6.726
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	489	562	619	718	658	532
Service Time	5.076	4.104	3.542	2.718	3.524	4.775
HCM Lane V/C Ratio	0.164	0.05	0.368	0.123	0.775	0.105
HCM Control Delay	11.5	9.4	11.9	8.4	25.3	10.6
HCM Lane LOS	B	A	B	A	D	B
HCM 95th-tile Q	0.6	0.2	1.7	0.4	7.5	0.3

Lane Group	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	179	21	37	451	8	338	259
v/c Ratio	0.69	0.07	0.05	0.19	0.01	0.30	0.25
Control Delay	45.8	19.9	6.4	8.0	7.6	10.5	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Total Delay	45.8	19.9	6.4	8.0	7.6	10.8	2.6
Queue Length 50th (ft)	91	6	6	42	1	63	0
Queue Length 95th (ft)	132	19	20	111	m6	110	24
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	428	483	694	2313	656	1113	1050
Starvation Cap Reductn	0	0	0	0	0	298	255
Spillback Cap Reductn	0	0	0	79	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.04	0.05	0.20	0.01	0.41	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	2	21	7	2	7	34	410	5	7	311	238
Future Volume (veh/h)	126	2	21	7	2	7	34	410	5	7	311	238
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	2	25	9	3	9	37	446	5	8	338	259
Peak Hour Factor	0.83	0.83	0.83	0.78	0.78	0.78	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	257	2	30	144	58	108	647	2310	26	653	1156	980
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.03	0.64	0.64	0.02	1.00	1.00
Sat Flow, veh/h	1235	16	203	584	388	729	1781	3600	40	1781	1870	1585
Grp Volume(v), veh/h	179	0	0	21	0	0	37	220	231	8	338	259
Grp Sat Flow(s),veh/h/ln	1455	0	0	1702	0	0	1781	1777	1863	1781	1870	1585
Q Serve(g_s), s	9.8	0.0	0.0	0.0	0.0	0.0	0.7	4.6	4.6	0.1	0.0	0.0
Cycle Q Clear(g_c), s	10.7	0.0	0.0	0.9	0.0	0.0	0.7	4.6	4.6	0.1	0.0	0.0
Prop In Lane	0.85		0.14	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	0	310	0	0	647	1140	1195	653	1156	980
V/C Ratio(X)	0.62	0.00	0.00	0.07	0.00	0.00	0.06	0.19	0.19	0.01	0.29	0.26
Avail Cap(c_a), veh/h	522	0	0	558	0	0	726	1140	1195	774	1156	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	37.1	0.0	0.0	33.0	0.0	0.0	5.6	6.6	6.6	5.5	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	0.4	0.0	0.0	0.2	1.5	1.6	0.0	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	0.0	0.0	33.1	0.0	0.0	5.6	7.0	7.0	5.6	0.6	0.6
LnGrp LOS	D	A	A	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		179			21			488			605	
Approach Delay, s/veh		39.2			33.1			6.9			0.7	
Approach LOS		D			C			A			A	

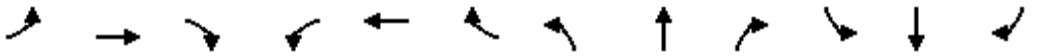
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	63.7		19.3	9.0	61.6		19.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	37.0		28.0	7.0	37.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	6.6		12.7	2.7	2.0		2.9				
Green Ext Time (p_c), s	0.0	2.6		0.7	0.0	2.9		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		8.9	
HCM 6th LOS		A	

Lane Group	EBL	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	303	135	738	128	626
v/c Ratio	0.60	0.33	0.57	0.39	0.25
Control Delay	41.0	3.0	27.1	7.6	4.0
Queue Delay	0.0	0.0	0.9	0.0	0.0
Total Delay	41.0	3.0	28.1	7.6	4.0
Queue Length 50th (ft)	83	0	187	5	66
Queue Length 95th (ft)	119	0	197	19	m72
Internal Link Dist (ft)			257		581
Turn Bay Length (ft)	625	310		200	
Base Capacity (vph)	556	433	1290	337	2516
Starvation Cap Reductn	0	0	290	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.31	0.74	0.38	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	0	93	0	0	0	0	455	88	102	463	0
Future Volume (vph)	264	0	93	0	0	0	0	455	88	102	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8		6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95		1.00	0.95	
Frt	1.00		0.85					0.97		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	3433		1583					3445		1711	3539	
Flt Permitted	0.95		1.00					1.00		0.27	1.00	
Satd. Flow (perm)	3433		1583					3445		491	3539	
Peak-hour factor, PHF	0.87	0.25	0.69	1.00	1.00	1.00	1.00	0.75	0.67	0.80	0.74	1.00
Adj. Flow (vph)	303	0	135	0	0	0	0	607	131	128	626	0
RTOR Reduction (vph)	0	0	115	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	303	0	20	0	0	0	0	718	0	128	626	0
Turn Type	Prot		Prot					NA		D.P+P	NA	
Protected Phases	3		3					2		1	1 2 4	
Permitted Phases										2		
Actuated Green, G (s)	13.3		13.3					33.2		40.9	63.5	
Effective Green, g (s)	13.3		13.3					33.2		40.9	63.5	
Actuated g/C Ratio	0.15		0.15					0.37		0.45	0.71	
Clearance Time (s)	6.4		6.4					6.8		6.8		
Vehicle Extension (s)	4.0		4.0					4.0		3.0		
Lane Grp Cap (vph)	507		233					1270		327	2496	
v/s Ratio Prot	c0.09		0.01					c0.21		c0.03	c0.18	
v/s Ratio Perm										0.14		
v/c Ratio	0.60		0.09					0.57		0.39	0.25	
Uniform Delay, d1	35.8		33.1					22.6		23.1	4.7	
Progression Factor	1.00		1.00					1.15		0.31	0.79	
Incremental Delay, d2	2.2		0.2					1.8		0.7	0.0	
Delay (s)	38.1		33.3					27.9		7.7	3.8	
Level of Service	D		C					C		A	A	
Approach Delay (s)		36.6			0.0			27.9			4.5	
Approach LOS		D			A			C			A	

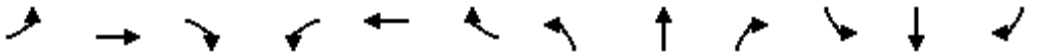
Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	340	297	158	671	699	321
v/c Ratio	1.11	0.66	0.46	0.27	0.54	0.44
Control Delay	122.9	19.1	9.8	4.1	13.6	9.7
Queue Delay	0.0	0.0	0.0	0.0	1.5	1.1
Total Delay	122.9	19.1	9.8	4.1	15.1	10.8
Queue Length 50th (ft)	~229	44	19	86	152	101
Queue Length 95th (ft)	#204	82	74	105	199	169
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	305	448	353	2469	1295	736
Starvation Cap Reductn	0	0	0	0	386	220
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.66	0.45	0.27	0.77	0.62

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 (vph)	0	0	0	204	0	226	142	577	0	0	361	508
Future Volume (vph)	0	0	0	204	0	226	142	577	0	0	361	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.94	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3184	1441
Flt Permitted				0.95		1.00	0.28	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	497	3539			3184	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.60	1.00	0.76	0.90	0.86	1.00	1.00	0.87	0.84
Adj. Flow (vph)	0	0	0	340	0	297	158	671	0	0	415	605
RTOR Reduction (vph)	0	0	0	0	0	174	0	0	0	0	114	202
Lane Group Flow (vph)	0	0	0	340	0	123	158	671	0	0	585	119
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				15.6		15.6	41.7	62.3			33.4	33.4
Effective Green, g (s)				15.6		15.6	41.7	55.7			33.4	33.4
Actuated g/C Ratio				0.17		0.17	0.46	0.62			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				306		274	342	2190			1181	534
v/s Ratio Prot				c0.19		0.08	c0.04	c0.19			c0.18	
v/s Ratio Perm							0.17					0.08
v/c Ratio				1.11		0.45	0.46	0.31			0.50	0.22
Uniform Delay, d1				37.2		33.3	23.6	8.1			21.8	19.4
Progression Factor				1.00		1.00	0.38	0.74			0.74	3.11
Incremental Delay, d2				84.7		1.6	0.8	0.1			1.4	0.9
Delay (s)				121.9		34.9	9.8	6.0			17.6	61.2
Level of Service				F		C	A	A			B	E
Approach Delay (s)		0.0			81.4			6.8			31.3	
Approach LOS		A			F			A			C	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

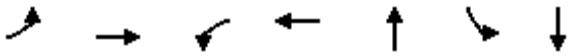
Intersection	
Int Delay, s/veh	23.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	268	48	10	238	295	139
Future Vol, veh/h	268	48	10	238	295	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	72	60	92	91	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	339	67	17	259	324	188

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	711	418	512	0	-	0
Stage 1	418	-	-	-	-	-
Stage 2	293	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	400	635	1053	-	-	-
Stage 1	664	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	392	635	1053	-	-	-
Mov Cap-2 Maneuver	392	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	757	-	-	-	-	-

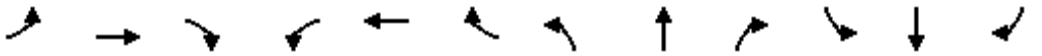
Approach	EB	NB	SB
HCM Control Delay, s	68.8	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1053	-	418	-	-
HCM Lane V/C Ratio	0.016	-	0.971	-	-
HCM Control Delay (s)	8.5	0	68.8	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	11.6	-	-



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	198	271	4	365	39	218	288
v/c Ratio	0.43	0.25	0.01	0.68	0.09	0.63	0.45
Control Delay	11.8	9.4	19.0	25.2	16.7	30.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.4	19.0	25.2	16.7	30.1	5.6
Queue Length 50th (ft)	34	46	1	99	9	68	1
Queue Length 95th (ft)	90	116	2	225	22	158	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	507	1743	600	1066	778	607	905
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.16	0.01	0.34	0.05	0.36	0.32

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	238	2	1	190	131	5	14	4	192	2	246
Future Volume (veh/h)	178	238	2	1	190	131	5	14	4	192	2	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	198	267	4	4	209	156	10	23	6	218	5	283
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	417	941	14	435	276	206	133	257	55	452	8	430
Arrive On Green	0.11	0.49	0.49	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	1911	29	1108	1034	772	166	932	199	1381	28	1562
Grp Volume(v), veh/h	198	0	271	4	0	365	39	0	0	218	0	288
Grp Sat Flow(s),veh/h/ln	1781	0	1940	1108	0	1806	1297	0	0	1381	0	1589
Q Serve(g_s), s	3.8	0.0	4.3	0.1	0.0	9.6	0.1	0.0	0.0	1.7	0.0	8.3
Cycle Q Clear(g_c), s	3.8	0.0	4.3	0.1	0.0	9.6	8.4	0.0	0.0	10.0	0.0	8.3
Prop In Lane	1.00		0.01	1.00		0.43	0.26		0.15	1.00		0.98
Lane Grp Cap(c), veh/h	417	0	956	435	0	482	445	0	0	452	0	438
V/C Ratio(X)	0.47	0.00	0.28	0.01	0.00	0.76	0.09	0.00	0.00	0.48	0.00	0.66
Avail Cap(c_a), veh/h	600	0	1874	846	0	1152	855	0	0	818	0	860
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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	7.7	14.0	0.0	17.4	14.0	0.0	0.0	17.5	0.0	16.6
Incr Delay (d2), s/veh	0.8	0.0	0.2	0.0	0.0	2.5	0.1	0.0	0.0	0.8	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.4	0.0	0.0	3.7	0.3	0.0	0.0	2.2	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	7.9	14.0	0.0	19.9	14.1	0.0	0.0	18.3	0.0	18.3
LnGrp LOS	B	A	A	B	A	B	B	A	A	B	A	B
Approach Vol, veh/h		469			369			39			506	
Approach Delay, s/veh		9.8			19.8			14.1			18.3	
Approach LOS		A			B			B			B	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	11.7	19.8		20.3		31.5		20.3				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	11.0	33.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	5.8	11.6		12.0		6.3		10.4				
Green Ext Time (p_c), s	0.2	2.2		2.2		1.7		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			15.7									
HCM 6th LOS			B									

Intersection	
Intersection Delay, s/veh	22.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	306	100	40	173	17	125	8	54	34	26	47
Future Vol, veh/h	50	306	100	40	173	17	125	8	54	34	26	47
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	77	387	132	63	188	32	169	13	64	41	29	60
Number of Lanes	0	1	1	0	1	0	1	1	0	0	1	0

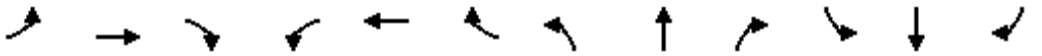
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	30	18.3	14	13.7
HCM LOS	D	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	14%	0%	17%	32%
Vol Thru, %	0%	13%	86%	0%	75%	24%
Vol Right, %	0%	87%	0%	100%	7%	44%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	125	62	356	100	230	107
LT Vol	125	0	50	0	40	34
Through Vol	0	8	306	0	173	26
RT Vol	0	54	0	100	17	47
Lane Flow Rate	169	76	464	132	284	130
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.376	0.145	0.847	0.211	0.551	0.278
Departure Headway (Hd)	8.005	6.866	6.57	5.785	6.993	7.666
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	449	522	552	620	516	468
Service Time	5.752	4.612	4.308	3.523	5.037	5.72
HCM Lane V/C Ratio	0.376	0.146	0.841	0.213	0.55	0.278
HCM Control Delay	15.5	10.8	35.7	10.1	18.3	13.7
HCM Lane LOS	C	B	E	B	C	B
HCM 95th-tile Q	1.7	0.5	8.9	0.8	3.3	1.1

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	297	21	32	596	8	498	201
v/c Ratio	0.81	0.05	0.07	0.29	0.02	0.51	0.22
Control Delay	46.6	15.9	9.5	11.6	4.1	8.7	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	46.6	15.9	9.5	11.6	4.1	8.9	1.6
Queue Length 50th (ft)	150	5	7	78	0	99	0
Queue Length 95th (ft)	214	17	22	167	m3	177	0
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	466	504	452	2058	487	982	930
Starvation Cap Reductn	0	0	0	0	0	104	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.04	0.07	0.29	0.02	0.57	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	3	50	7	2	7	29	542	6	7	458	185
Future Volume (veh/h)	206	3	50	7	2	7	29	542	6	7	458	185
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	237	3	57	9	3	9	32	589	7	8	498	201
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	341	3	65	201	77	166	448	2007	24	485	1005	852
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.56	0.56	0.01	0.71	0.71
Sat Flow, veh/h	1159	15	279	619	333	714	1781	3597	43	1781	1870	1585
Grp Volume(v), veh/h	297	0	0	21	0	0	32	291	305	8	498	201
Grp Sat Flow(s),veh/h/ln	1452	0	0	1666	0	0	1781	1777	1863	1781	1870	1585
Q Serve(g_s), s	16.9	0.0	0.0	0.0	0.0	0.0	0.7	7.8	7.8	0.2	10.6	3.9
Cycle Q Clear(g_c), s	17.7	0.0	0.0	0.8	0.0	0.0	0.7	7.8	7.8	0.2	10.6	3.9
Prop In Lane	0.80		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	409	0	0	443	0	0	448	992	1040	485	1005	852
V/C Ratio(X)	0.73	0.00	0.00	0.05	0.00	0.00	0.07	0.29	0.29	0.02	0.50	0.24
Avail Cap(c_a), veh/h	555	0	0	596	0	0	493	992	1040	566	1005	852
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	33.3	0.0	0.0	26.9	0.0	0.0	9.2	10.5	10.5	8.7	7.4	6.5
Incr Delay (d2), s/veh	3.1	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.0	1.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	0.0	0.3	0.0	0.0	0.3	2.9	3.0	0.1	3.5	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	0.0	0.0	26.9	0.0	0.0	9.3	11.3	11.2	8.8	9.1	7.1
LnGrp LOS	D	A	A	C	A	A	A	B	B	A	A	A
Approach Vol, veh/h		297			21			628			707	
Approach Delay, s/veh		36.4			26.9			11.1			8.6	
Approach LOS		D			C			B			A	

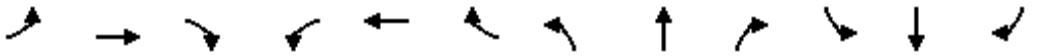
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	56.2		26.9	8.8	54.4		26.9				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	9.8		19.7	2.7	12.6		2.8				
Green Ext Time (p_c), s	0.0	3.5		1.1	0.0	3.7		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		14.8	
HCM 6th LOS		B	

Lane Group	EBL	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	474	210	881	224	522
v/c Ratio	0.44	0.33	0.67	0.78	0.27
Control Delay	26.0	4.9	20.9	34.4	7.8
Queue Delay	0.0	0.0	0.7	0.0	0.0
Total Delay	26.0	4.9	21.6	34.4	7.8
Queue Length 50th (ft)	109	0	132	85	47
Queue Length 95th (ft)	132	45	199	#188	72
Internal Link Dist (ft)			257		581
Turn Bay Length (ft)	625	310		200	
Base Capacity (vph)	1090	646	1308	288	1908
Starvation Cap Reductn	0	0	163	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.43	0.33	0.77	0.78	0.27

Intersection Summary

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



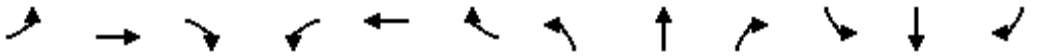
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	379	0	185	0	0	0	0	546	209	199	465	0
Future Volume (vph)	379	0	185	0	0	0	0	546	209	199	465	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8		6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95		1.00	0.95	
Frt	1.00		0.85					0.96		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	3433		1583					3391		1711	3539	
Flt Permitted	0.95		1.00					1.00		0.20	1.00	
Satd. Flow (perm)	3433		1583					3391		359	3539	
Peak-hour factor, PHF	0.80	0.25	0.88	1.00	1.00	1.00	1.00	0.86	0.85	0.89	0.89	1.00
Adj. Flow (vph)	474	0	210	0	0	0	0	635	246	224	522	0
RTOR Reduction (vph)	0	0	144	0	0	0	0	45	0	0	0	0
Lane Group Flow (vph)	474	0	66	0	0	0	0	836	0	224	522	0
Turn Type	Prot		Prot					NA		D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases										2		
Actuated Green, G (s)	28.3		28.3					33.5		41.7	48.5	
Effective Green, g (s)	28.3		28.3					33.5		41.7	48.5	
Actuated g/C Ratio	0.31		0.31					0.37		0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8		6.8		
Vehicle Extension (s)	4.0		4.0					4.0		3.0		
Lane Grp Cap (vph)	1079		497					1262		289	1907	
v/s Ratio Prot	c0.14		0.04					0.25		c0.07	0.15	
v/s Ratio Perm										c0.29		
v/c Ratio	0.44		0.13					0.66		0.78	0.27	
Uniform Delay, d1	24.5		22.1					23.5		28.5	11.2	
Progression Factor	1.00		1.00					0.83		0.68	0.66	
Incremental Delay, d2	0.4		0.2					2.6		10.4	0.1	
Delay (s)	24.9		22.2					22.1		29.9	7.4	
Level of Service	C		C					C		C	A	
Approach Delay (s)		24.1			0.0			22.1			14.2	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	119	167	127	1066	724	314
v/c Ratio	0.52	0.37	0.36	0.41	0.58	0.43
Control Delay	44.1	2.3	6.9	3.5	22.8	7.0
Queue Delay	0.0	0.0	0.0	0.0	2.5	0.9
Total Delay	44.1	2.3	6.9	3.5	25.3	8.0
Queue Length 50th (ft)	64	0	6	128	202	67
Queue Length 95th (ft)	106	0	m7	86	270	109
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	348	2600	1252	735
Starvation Cap Reductn	0	0	0	0	388	207
Spillback Cap Reductn	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.35	0.36	0.41	0.84	0.59

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	0	115	104	821	0	0	564	344
Future Volume (vph)	0	0	0	100	0	115	104	821	0	0	564	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3312	1441
Flt Permitted				0.95		1.00	0.26	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	473	3539			3312	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.84	1.00	0.69	0.82	0.77	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	119	0	167	127	1066	0	0	613	425
RTOR Reduction (vph)	0	0	0	0	0	145	0	0	0	0	16	197
Lane Group Flow (vph)	0	0	0	119	0	22	127	1066	0	0	708	117
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				11.8		11.8	42.5	65.7			33.6	33.6
Effective Green, g (s)				11.8		11.8	42.5	65.7			33.6	33.6
Actuated g/C Ratio				0.13		0.13	0.47	0.73			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				232		207	345	2583			1236	537
v/s Ratio Prot				c0.07		0.01	0.04	c0.30			c0.21	
v/s Ratio Perm							0.14					0.08
v/c Ratio				0.51		0.11	0.37	0.41			0.57	0.22
Uniform Delay, d1				36.4		34.5	14.1	4.7			22.5	19.2
Progression Factor				1.00		1.00	0.41	0.63			0.95	2.05
Incremental Delay, d2				2.5		0.3	0.6	0.1			1.9	0.9
Delay (s)				39.0		34.8	6.4	3.0			23.2	40.4
Level of Service				D		C	A	A			C	D
Approach Delay (s)		0.0			36.5			3.4			28.4	
Approach LOS		A			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	98.7

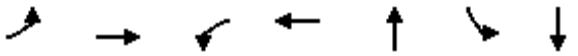
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	335	60	13	298	369	174
Future Vol, veh/h	335	60	13	298	369	174
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	72	60	92	91	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	424	83	22	324	405	235

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	891	523	640	0	-	0
Stage 1	523	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 313	554	944	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 304	554	944	-	-	-
Mov Cap-2 Maneuver	~ 304	-	-	-	-	-
Stage 1	578	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	290	0.6	0
HCM LOS	F		

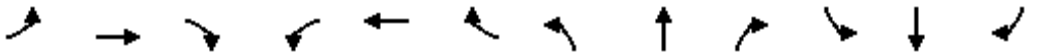
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	944	-	328	-	-
HCM Lane V/C Ratio	0.023	-	1.547	-	-
HCM Control Delay (s)	8.9	0	290	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	29	-	-

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



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	247	339	4	457	48	273	362
v/c Ratio	0.61	0.30	0.01	0.78	0.10	0.75	0.51
Control Delay	16.6	10.6	20.0	31.6	18.8	39.2	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	10.6	20.0	31.6	18.8	39.2	5.9
Queue Length 50th (ft)	56	79	1	171	13	110	3
Queue Length 95th (ft)	111	144	2	308	26	221	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	462	1521	453	864	660	514	857
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.22	0.01	0.53	0.07	0.53	0.42

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	298	2	1	238	164	6	17	5	240	3	308
Future Volume (veh/h)	222	298	2	1	238	164	6	17	5	240	3	308
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	247	335	4	4	262	195	12	28	8	273	8	354
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	367	956	11	407	307	228	115	246	60	423	12	524
Arrive On Green	0.12	0.50	0.50	0.30	0.30	0.30	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1918	23	1041	1036	771	159	729	177	1372	35	1555
Grp Volume(v), veh/h	247	0	339	4	0	457	48	0	0	273	0	362
Grp Sat Flow(s),veh/h/ln	1781	0	1941	1041	0	1806	1065	0	0	1372	0	1590
Q Serve(g_s), s	6.5	0.0	7.8	0.2	0.0	17.4	0.3	0.0	0.0	6.6	0.0	14.3
Cycle Q Clear(g_c), s	6.5	0.0	7.8	0.2	0.0	17.4	14.5	0.0	0.0	21.2	0.0	14.3
Prop In Lane	1.00		0.01	1.00		0.43	0.25		0.17	1.00		0.98
Lane Grp Cap(c), veh/h	367	0	968	407	0	535	421	0	0	423	0	536
V/C Ratio(X)	0.67	0.00	0.35	0.01	0.00	0.85	0.11	0.00	0.00	0.64	0.00	0.68
Avail Cap(c_a), veh/h	470	0	1329	540	0	767	490	0	0	487	0	610
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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.5	0.0	11.1	18.2	0.0	24.2	17.0	0.0	0.0	24.7	0.0	20.8
Incr Delay (d2), s/veh	2.6	0.0	0.2	0.0	0.0	6.5	0.1	0.0	0.0	2.4	0.0	2.5
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	2.6	0.0	3.0	0.0	0.0	7.8	0.5	0.0	0.0	4.5	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	0.0	11.3	18.2	0.0	30.7	17.1	0.0	0.0	27.1	0.0	23.3
LnGrp LOS	B	A	B	B	A	C	B	A	A	C	A	C
Approach Vol, veh/h		586			461			48			635	
Approach Delay, s/veh		14.6			30.6			17.1			24.9	
Approach LOS		B			C			B			C	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	14.8	27.7		30.6		42.4		30.6				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	13.0	31.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	8.5	19.4		23.2		9.8		16.5				
Green Ext Time (p_c), s	0.3	2.2		1.4		2.1		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			22.7									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	61.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	63	383	125	50	216	21	156	10	68	43	32	59
Future Vol, veh/h	63	383	125	50	216	21	156	10	68	43	32	59
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	97	485	164	79	235	40	211	16	80	52	36	76
Number of Lanes	0	1	1	0	1	0	1	1	0	0	1	0

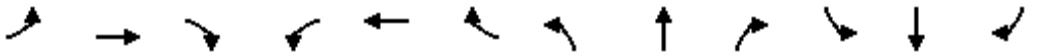
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	102.8	31.6	17.9	17.4
HCM LOS	F	D	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	14%	0%	17%	32%
Vol Thru, %	0%	13%	86%	0%	75%	24%
Vol Right, %	0%	87%	0%	100%	7%	44%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	156	78	446	125	287	134
LT Vol	156	0	63	0	50	43
Through Vol	0	10	383	0	216	32
RT Vol	0	68	0	125	21	59
Lane Flow Rate	211	96	582	164	354	163
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.499	0.197	1.189	0.3	0.753	0.384
Departure Headway (Hd)	9.054	7.903	7.357	6.566	7.997	8.958
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	401	457	494	549	456	404
Service Time	6.754	5.603	5.082	4.291	5.997	6.958
HCM Lane V/C Ratio	0.526	0.21	1.178	0.299	0.776	0.403
HCM Control Delay	20.4	12.5	128.5	12.1	31.6	17.4
HCM Lane LOS	C	B	F	B	D	C
HCM 95th-tile Q	2.7	0.7	21.6	1.3	6.3	1.8

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	372	28	39	745	10	622	251
v/c Ratio	0.89	0.06	0.13	0.39	0.03	0.68	0.28
Control Delay	52.5	14.8	11.1	14.1	4.7	13.6	2.3
Queue Delay	3.2	0.0	0.0	0.0	0.0	0.2	0.1
Total Delay	55.6	14.8	11.1	14.1	4.7	13.7	2.4
Queue Length 50th (ft)	185	6	10	123	1	136	1
Queue Length 95th (ft)	#314	21	25	215	m3	#481	43
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	463	500	303	1912	376	915	905
Starvation Cap Reductn	0	0	0	0	0	29	166
Spillback Cap Reductn	37	40	0	28	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.06	0.13	0.40	0.03	0.70	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	4	63	9	3	9	36	677	8	9	572	231
Future Volume (veh/h)	257	4	63	9	3	9	36	677	8	9	572	231
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	295	5	72	12	4	12	39	736	9	10	622	251
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	395	5	79	236	89	201	314	1821	22	373	906	768
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.03	0.51	0.51	0.02	0.64	0.64
Sat Flow, veh/h	1150	19	281	635	316	714	1781	3595	44	1781	1870	1585
Grp Volume(v), veh/h	372	0	0	28	0	0	39	364	381	10	622	251
Grp Sat Flow(s),veh/h/ln	1450	0	0	1665	0	0	1781	1777	1862	1781	1870	1585
Q Serve(g_s), s	21.2	0.0	0.0	0.0	0.0	0.0	1.0	11.4	11.4	0.2	19.1	6.4
Cycle Q Clear(g_c), s	22.3	0.0	0.0	1.1	0.0	0.0	1.0	11.4	11.4	0.2	19.1	6.4
Prop In Lane	0.79		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	479	0	0	525	0	0	314	900	943	373	906	768
V/C Ratio(X)	0.78	0.00	0.00	0.05	0.00	0.00	0.12	0.40	0.40	0.03	0.69	0.33
Avail Cap(c_a), veh/h	554	0	0	603	0	0	352	900	943	450	906	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	31.1	0.0	0.0	23.6	0.0	0.0	12.8	13.8	13.8	11.2	11.7	9.4
Incr Delay (d2), s/veh	5.9	0.0	0.0	0.0	0.0	0.0	0.2	1.3	1.3	0.0	4.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	0.0	0.4	0.0	0.0	0.4	4.4	4.7	0.1	6.3	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	0.0	0.0	23.7	0.0	0.0	13.0	15.1	15.1	11.2	15.7	10.5
LnGrp LOS	D	A	A	C	A	A	B	B	B	B	B	B
Approach Vol, veh/h		372			28			784			883	
Approach Delay, s/veh		37.1			23.7			15.0			14.2	
Approach LOS		D			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	51.6		31.3	9.1	49.6		31.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	13.4		24.3	3.0	21.1		3.1				
Green Ext Time (p_c), s	0.0	4.4		1.0	0.0	4.3		0.1				

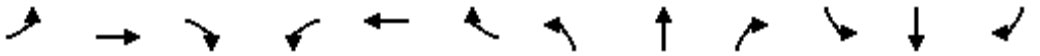
Intersection Summary			
HCM 6th Ctrl Delay		18.7	
HCM 6th LOS		B	

Lane Group	EBL	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	595	235	1072	313	652
v/c Ratio	0.55	0.36	0.82	1.33	0.34
Control Delay	27.6	5.7	24.5	190.7	10.0
Queue Delay	0.0	0.0	1.2	0.0	0.0
Total Delay	27.6	5.7	25.7	190.7	10.0
Queue Length 50th (ft)	142	5	161	~141	58
Queue Length 95th (ft)	187	56	285	#228	108
Internal Link Dist (ft)			257		581
Turn Bay Length (ft)	625	310		200	
Base Capacity (vph)	1090	654	1304	235	1897
Starvation Cap Reductn	0	0	84	0	0
Spillback Cap Reductn	0	9	0	0	152
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.55	0.36	0.88	1.33	0.37

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.



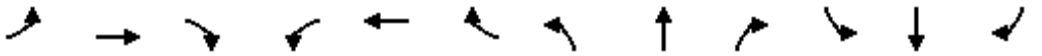
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	518	0	219	0	0	0	0	678	265	260	593	0
Future Volume (vph)	518	0	219	0	0	0	0	678	265	260	593	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8		6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95		1.00	0.95	
Frt	1.00		0.85					0.95		1.00	1.00	
Flt Protected	0.95		1.00					1.00		0.95	1.00	
Satd. Flow (prot)	3433		1583					3373		1711	3539	
Flt Permitted	0.95		1.00					1.00		0.12	1.00	
Satd. Flow (perm)	3433		1583					3373		217	3539	
Peak-hour factor, PHF	0.87	0.50	0.93	1.00	1.00	1.00	1.00	0.92	0.79	0.83	0.91	1.00
Adj. Flow (vph)	595	0	235	0	0	0	0	737	335	313	652	0
RTOR Reduction (vph)	0	0	151	0	0	0	0	59	0	0	0	0
Lane Group Flow (vph)	595	0	84	0	0	0	0	1013	0	313	652	0
Turn Type	Prot		Prot					NA		D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases										2		
Actuated Green, G (s)	28.6		28.6					33.2		41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2		41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37		0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8		6.8		
Vehicle Extension (s)	4.0		4.0					4.0		3.0		
Lane Grp Cap (vph)	1090		503					1244		235	1895	
v/s Ratio Prot	c0.17		0.05					0.30		c0.12	0.18	
v/s Ratio Perm										c0.49		
v/c Ratio	0.55		0.17					0.81		1.33	0.34	
Uniform Delay, d1	25.3		22.1					25.6		33.2	11.9	
Progression Factor	1.00		1.00					0.80		0.54	0.80	
Incremental Delay, d2	0.7		0.2					5.3		170.5	0.1	
Delay (s)	26.0		22.3					25.8		188.6	9.6	
Level of Service	C		C					C		F	A	
Approach Delay (s)		25.0			0.0			25.8			67.6	
Approach LOS		C			A			C			E	

Intersection Summary			
HCM 2000 Control Delay	39.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	138	150	185	1144	883	383
v/c Ratio	0.57	0.33	0.64	0.44	0.71	0.49
Control Delay	45.9	1.9	33.9	3.9	25.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	16.4	1.5
Total Delay	45.9	1.9	33.9	3.9	41.6	9.0
Queue Length 50th (ft)	74	0	50	171	264	92
Queue Length 95th (ft)	123	0	m66	211	347	132
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	288	2581	1246	775
Starvation Cap Reductn	0	0	0	0	366	221
Spillback Cap Reductn	0	7	0	93	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.31	0.64	0.46	1.00	0.69

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	117	0	126	155	1041	0	0	736	388
Future Volume (vph)	0	0	0	117	0	126	155	1041	0	0	736	388
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3328	1441
Flt Permitted				0.95		1.00	0.18	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	319	3539			3328	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.85	0.50	0.84	0.84	0.91	1.00	1.00	0.95	0.79
Adj. Flow (vph)	0	0	0	138	0	150	185	1144	0	0	775	491
RTOR Reduction (vph)	0	0	0	0	0	130	0	0	0	0	11	241
Lane Group Flow (vph)	0	0	0	138	0	20	185	1144	0	0	872	142
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				12.2		12.2	42.2	65.3			33.4	33.4
Effective Green, g (s)				12.2		12.2	42.2	65.3			33.4	33.4
Actuated g/C Ratio				0.14		0.14	0.47	0.73			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				239		214	285	2567			1235	534
v/s Ratio Prot				c0.08		0.01	0.06	c0.32			c0.26	
v/s Ratio Perm							0.24					0.10
v/c Ratio				0.58		0.10	0.65	0.45			0.71	0.27
Uniform Delay, d1				36.5		34.1	15.9	5.0			24.1	19.7
Progression Factor				1.00		1.00	2.28	0.67			0.92	2.29
Incremental Delay, d2				4.0		0.3	2.8	0.1			3.1	1.1
Delay (s)				40.5		34.3	39.2	3.5			25.3	46.3
Level of Service				D		C	D	A			C	D
Approach Delay (s)		0.0			37.3			8.4			31.6	
Approach LOS		A			D			A			C	

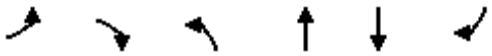
Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: Ranson Rd (Rt RA) & Bailey Rd

04/29/2020

Lane Group	EBL	EBR	NBT	SBT	SBR
Lane Group Flow (vph)	219	17	292	164	259
v/c Ratio	0.43	0.04	0.49	0.26	0.16
Control Delay	13.2	5.6	12.5	9.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	5.6	12.5	9.7	0.2
Queue Length 50th (ft)	30	0	38	19	0
Queue Length 95th (ft)	49	7	95	44	0
Internal Link Dist (ft)	5220		795	1562	
Turn Bay Length (ft)		200			200
Base Capacity (vph)	1525	1366	1650	1759	1535
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.14	0.01	0.18	0.09	0.17

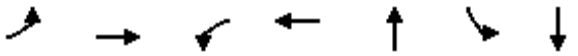
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	129	13	23	220	120	205
Future Volume (veh/h)	129	13	23	220	120	205
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	219	17	36	256	164	259
Peak Hour Factor	0.59	0.75	0.64	0.86	0.73	0.79
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	375	334	184	596	671	903
Arrive On Green	0.21	0.21	0.36	0.36	0.36	0.36
Sat Flow, veh/h	1781	1585	107	1662	1870	1585
Grp Volume(v), veh/h	219	17	292	0	164	259
Grp Sat Flow(s),veh/h/ln	1781	1585	1769	0	1870	1585
Q Serve(g_s), s	3.1	0.2	0.0	0.0	1.7	2.3
Cycle Q Clear(g_c), s	3.1	0.2	3.3	0.0	1.7	2.3
Prop In Lane	1.00	1.00	0.12			1.00
Lane Grp Cap(c), veh/h	375	334	780	0	671	903
V/C Ratio(X)	0.58	0.05	0.37	0.00	0.24	0.29
Avail Cap(c_a), veh/h	1853	1649	2524	0	2617	2552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	9.9	8.8	6.8	0.0	6.3	3.1
Incr Delay (d2), s/veh	1.4	0.1	0.3	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.1	0.5	0.0	0.3	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.3	8.8	7.1	0.0	6.5	3.3
LnGrp LOS	B	A	A	A	A	A
Approach Vol, veh/h	236			292	423	
Approach Delay, s/veh	11.2			7.1	4.5	
Approach LOS	B			A	A	

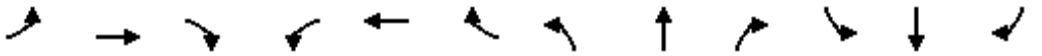
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		16.0		11.9		16.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		39.0		29.0		39.0
Max Q Clear Time (g_c+I1), s		5.3		5.1		4.3
Green Ext Time (p_c), s		1.7		0.7		1.7

Intersection Summary	
HCM 6th Ctrl Delay	6.9
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	320	213	8	470	32	124	216
v/c Ratio	0.65	0.17	0.02	0.74	0.09	0.49	0.46
Control Delay	13.9	5.3	15.5	25.0	20.8	32.8	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	5.3	15.5	25.0	20.8	32.8	10.7
Queue Length 50th (ft)	47	26	2	130	7	40	11
Queue Length 95th (ft)	97	55	6	199	15	102	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	651	1903	691	1159	513	361	589
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.11	0.01	0.41	0.06	0.34	0.37

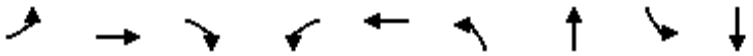
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	155	11	4	193	178	0	11	2	104	14	169
Future Volume (veh/h)	266	155	11	4	193	178	0	11	2	104	14	169
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	320	185	28	8	261	209	0	24	8	124	36	180
Peak Hour Factor	0.83	0.84	0.39	0.50	0.74	0.85	0.25	0.46	0.25	0.84	0.39	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	493	981	149	519	330	264	0	247	82	366	50	249
Arrive On Green	0.15	0.59	0.59	0.33	0.33	0.33	0.00	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1781	1650	250	1168	1000	801	0	1342	447	1377	271	1355
Grp Volume(v), veh/h	320	0	213	8	0	470	0	0	32	124	0	216
Grp Sat Flow(s),veh/h/ln	1781	0	1900	1168	0	1801	0	0	1790	1377	0	1626
Q Serve(g_s), s	5.7	0.0	2.8	0.3	0.0	12.8	0.0	0.0	0.8	4.5	0.0	6.8
Cycle Q Clear(g_c), s	5.7	0.0	2.8	0.3	0.0	12.8	0.0	0.0	0.8	5.3	0.0	6.8
Prop In Lane	1.00		0.13	1.00		0.44	0.00		0.25	1.00		0.83
Lane Grp Cap(c), veh/h	493	0	1130	519	0	595	0	0	329	366	0	299
V/C Ratio(X)	0.65	0.00	0.19	0.02	0.00	0.79	0.00	0.00	0.10	0.34	0.00	0.72
Avail Cap(c_a), veh/h	811	0	2140	931	0	1230	0	0	562	545	0	510
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	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.5	0.0	5.0	12.2	0.0	16.4	0.0	0.0	18.4	20.6	0.0	20.8
Incr Delay (d2), s/veh	1.4	0.0	0.1	0.0	0.0	2.4	0.0	0.0	0.1	0.5	0.0	3.3
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	1.8	0.0	0.7	0.1	0.0	4.8	0.0	0.0	0.3	1.3	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	5.1	12.2	0.0	18.8	0.0	0.0	18.5	21.1	0.0	24.1
LnGrp LOS	B	A	A	B	A	B	A	A	B	C	A	C
Approach Vol, veh/h		533			478			32			340	
Approach Delay, s/veh		9.2			18.7			18.5			23.0	
Approach LOS		A			B			B			C	

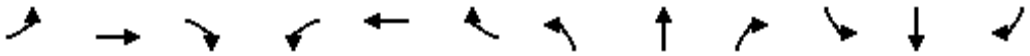
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	14.3	23.9		16.0		38.2		16.0				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	18.0	37.0		17.0		61.0		17.0				
Max Q Clear Time (g_c+I1), s	7.7	14.8		8.8		4.8		2.8				
Green Ext Time (p_c), s	0.7	3.1		1.0		1.3		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	168	88	56	455	80	28	20	36
v/c Ratio	0.17	0.20	0.11	0.11	0.58	0.21	0.06	0.05	0.07
Control Delay	6.2	5.5	1.9	5.3	9.2	10.2	6.4	8.9	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	5.5	1.9	5.3	9.2	10.2	6.4	8.9	5.3
Queue Length 50th (ft)	4	12	0	4	36	8	1	2	1
Queue Length 95th (ft)	11	28	8	9	68	27	5	7	3
Internal Link Dist (ft)		1216			5220		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	492	1183	1103	722	1099	814	1020	819	1121
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.14	0.08	0.08	0.41	0.10	0.03	0.02	0.03

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	133	67	34	308	36	67	6	11	12	3	20
Future Volume (veh/h)	39	133	67	34	308	36	67	6	11	12	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	60	168	88	56	411	44	80	12	16	20	8	28
Peak Hour Factor	0.65	0.79	0.76	0.61	0.75	0.82	0.84	0.50	0.69	0.60	0.38	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	550	779	660	746	665	71	610	145	194	617	76	265
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	936	1945	1648	1124	1661	178	1372	727	969	1382	379	1327
Grp Volume(v), veh/h	60	168	88	56	0	455	80	0	28	20	0	36
Grp Sat Flow(s),veh/h/ln	936	1945	1648	1124	0	1838	1372	0	1696	1382	0	1706
Q Serve(g_s), s	1.1	1.1	0.7	0.7	0.0	3.9	1.0	0.0	0.3	0.2	0.0	0.3
Cycle Q Clear(g_c), s	5.0	1.1	0.7	1.8	0.0	3.9	1.4	0.0	0.3	0.5	0.0	0.3
Prop In Lane	1.00		1.00	1.00		0.10	1.00		0.57	1.00		0.78
Lane Grp Cap(c), veh/h	550	779	660	746	0	736	610	0	339	617	0	341
V/C Ratio(X)	0.11	0.22	0.13	0.08	0.00	0.62	0.13	0.00	0.08	0.03	0.00	0.11
Avail Cap(c_a), veh/h	923	1555	1318	1194	0	1469	1433	0	1355	1446	0	1364
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.8	3.9	3.8	4.5	0.0	4.8	7.1	0.0	6.5	6.7	0.0	6.5
Incr Delay (d2), s/veh	0.1	0.1	0.1	0.0	0.0	0.8	0.1	0.0	0.1	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.9	4.1	3.9	4.6	0.0	5.6	7.2	0.0	6.6	6.7	0.0	6.7
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		316			511			108			56	
Approach Delay, s/veh		4.6			5.5			7.0			6.7	
Approach LOS		A			A			A			A	

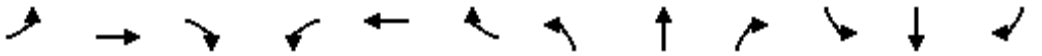
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		8.0		12.0		8.0		12.0				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		16.0		16.0		16.0		16.0				
Max Q Clear Time (g_c+I1), s		3.4		7.0		2.5		5.9				
Green Ext Time (p_c), s		0.2		1.0		0.1		2.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.4									
HCM 6th LOS			A									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	179	21	37	451	8	338	259
v/c Ratio	0.69	0.07	0.05	0.19	0.01	0.30	0.25
Control Delay	45.8	19.9	6.4	8.0	6.7	9.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.2
Total Delay	45.8	19.9	6.4	8.0	6.7	9.2	1.8
Queue Length 50th (ft)	91	6	6	42	1	55	0
Queue Length 95th (ft)	132	19	20	111	m5	96	16
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	428	483	694	2313	656	1113	1050
Starvation Cap Reductn	0	0	0	0	0	298	255
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.04	0.05	0.19	0.01	0.41	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	2	21	7	2	7	34	410	5	7	311	238
Future Volume (veh/h)	126	2	21	7	2	7	34	410	5	7	311	238
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	2	25	9	3	9	37	446	5	8	338	259
Peak Hour Factor	0.83	0.83	0.83	0.78	0.78	0.78	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	257	2	30	144	58	108	647	2310	26	653	1156	980
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.03	0.64	0.64	0.02	1.00	1.00
Sat Flow, veh/h	1235	16	203	584	388	729	1781	3600	40	1781	1870	1585
Grp Volume(v), veh/h	179	0	0	21	0	0	37	220	231	8	338	259
Grp Sat Flow(s),veh/h/ln	1455	0	0	1702	0	0	1781	1777	1863	1781	1870	1585
Q Serve(g_s), s	9.8	0.0	0.0	0.0	0.0	0.0	0.7	4.6	4.6	0.1	0.0	0.0
Cycle Q Clear(g_c), s	10.7	0.0	0.0	0.9	0.0	0.0	0.7	4.6	4.6	0.1	0.0	0.0
Prop In Lane	0.85		0.14	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	0	310	0	0	647	1140	1195	653	1156	980
V/C Ratio(X)	0.62	0.00	0.00	0.07	0.00	0.00	0.06	0.19	0.19	0.01	0.29	0.26
Avail Cap(c_a), veh/h	522	0	0	558	0	0	726	1140	1195	774	1156	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	37.1	0.0	0.0	33.0	0.0	0.0	5.6	6.6	6.6	5.5	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	0.4	0.0	0.0	0.2	1.5	1.6	0.0	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	0.0	0.0	33.1	0.0	0.0	5.6	7.0	7.0	5.6	0.6	0.6
LnGrp LOS	D	A	A	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		179			21			488			605	
Approach Delay, s/veh		39.2			33.1			6.9			0.7	
Approach LOS		D			C			A			A	

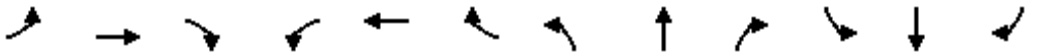
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	63.7		19.3	9.0	61.6		19.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	37.0		28.0	7.0	37.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	6.6		12.7	2.7	2.0		2.9				
Green Ext Time (p_c), s	0.0	2.6		0.7	0.0	2.9		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		8.9
HCM 6th LOS		A

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	303	135	607	131	128	626
v/c Ratio	0.60	0.33	0.47	0.18	0.34	0.25
Control Delay	41.0	3.0	26.2	3.2	4.8	4.0
Queue Delay	0.0	0.0	0.6	0.0	0.0	0.0
Total Delay	41.0	3.0	26.8	3.2	4.8	4.0
Queue Length 50th (ft)	83	0	155	1	5	66
Queue Length 95th (ft)	119	0	167	16	9	m72
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	556	433	1305	713	390	2516
Starvation Cap Reductn	0	0	348	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.31	0.63	0.18	0.33	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	0	93	0	0	0	0	455	88	102	463	0
Future Volume (vph)	264	0	93	0	0	0	0	455	88	102	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.35	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	635	3539	
Peak-hour factor, PHF	0.87	0.25	0.69	1.00	1.00	1.00	1.00	0.75	0.67	0.80	0.74	1.00
Adj. Flow (vph)	303	0	135	0	0	0	0	607	131	128	626	0
RTOR Reduction (vph)	0	0	115	0	0	0	0	0	83	0	0	0
Lane Group Flow (vph)	303	0	20	0	0	0	0	607	48	128	626	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2 4	
Permitted Phases									2	2		
Actuated Green, G (s)	13.3		13.3					33.2	33.2	40.9	63.5	
Effective Green, g (s)	13.3		13.3					33.2	33.2	40.9	63.5	
Actuated g/C Ratio	0.15		0.15					0.37	0.37	0.45	0.71	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	507		233					1305	583	380	2496	
v/s Ratio Prot	c0.09		0.01					c0.17		c0.03	c0.18	
v/s Ratio Perm									0.03	0.12		
v/c Ratio	0.60		0.09					0.47	0.08	0.34	0.25	
Uniform Delay, d1	35.8		33.1					21.6	18.5	19.9	4.7	
Progression Factor	1.00		1.00					1.14	5.33	0.20	0.79	
Incremental Delay, d2	2.2		0.2					1.2	0.3	0.5	0.0	
Delay (s)	38.1		33.3					25.9	98.8	4.5	3.8	
Level of Service	D		C					C	F	A	A	
Approach Delay (s)		36.6			0.0			38.9			3.9	
Approach LOS		D			A			D			A	

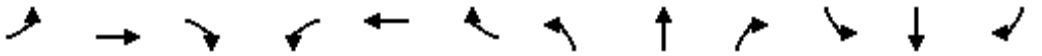
Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	340	297	158	671	699	321
v/c Ratio	1.11	0.66	0.46	0.27	0.54	0.44
Control Delay	122.9	19.1	11.5	4.0	13.6	9.7
Queue Delay	0.0	0.0	0.0	0.0	1.5	1.1
Total Delay	122.9	19.1	11.5	4.0	15.1	10.8
Queue Length 50th (ft)	~229	44	26	85	152	101
Queue Length 95th (ft)	#204	82	79	103	199	169
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	305	448	353	2469	1295	736
Starvation Cap Reductn	0	0	0	0	386	220
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.66	0.45	0.27	0.77	0.62

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.

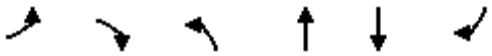


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	204	0	226	142	577	0	0	361	508
Future Volume (vph)	0	0	0	204	0	226	142	577	0	0	361	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.94	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3184	1441
Flt Permitted				0.95		1.00	0.28	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	497	3539			3184	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.60	1.00	0.76	0.90	0.86	1.00	1.00	0.87	0.84
Adj. Flow (vph)	0	0	0	340	0	297	158	671	0	0	415	605
RTOR Reduction (vph)	0	0	0	0	0	174	0	0	0	0	114	202
Lane Group Flow (vph)	0	0	0	340	0	123	158	671	0	0	585	119
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				15.6		15.6	41.7	62.3			33.4	33.4
Effective Green, g (s)				15.6		15.6	41.7	55.7			33.4	33.4
Actuated g/C Ratio				0.17		0.17	0.46	0.62			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				306		274	342	2190			1181	534
v/s Ratio Prot				c0.19		0.08	c0.04	c0.19			c0.18	
v/s Ratio Perm							0.17					0.08
v/c Ratio				1.11		0.45	0.46	0.31			0.50	0.22
Uniform Delay, d1				37.2		33.3	23.6	8.1			21.8	19.4
Progression Factor				1.00		1.00	0.46	0.71			0.74	3.11
Incremental Delay, d2				84.7		1.6	0.9	0.1			1.4	0.9
Delay (s)				121.9		34.9	11.8	5.8			17.6	61.2
Level of Service				F		C	B	A			B	E
Approach Delay (s)		0.0			81.4			6.9			31.3	
Approach LOS		A			F			A			C	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBT	SBT	SBR
Lane Group Flow (vph)	339	67	276	324	188
v/c Ratio	0.56	0.11	0.47	0.53	0.12
Control Delay	14.9	3.9	14.0	14.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	3.9	14.0	14.9	0.2
Queue Length 50th (ft)	53	0	43	51	0
Queue Length 95th (ft)	114	11	115	134	0
Internal Link Dist (ft)	5220		795	1562	
Turn Bay Length (ft)		200			200
Base Capacity (vph)	1537	1384	1504	1564	1557
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.05	0.18	0.21	0.12

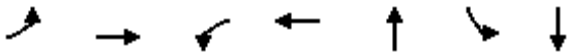
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	268	48	10	238	295	139
Future Volume (veh/h)	268	48	10	238	295	139
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	339	67	17	259	324	188
Peak Hour Factor	0.79	0.72	0.60	0.92	0.91	0.74
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	481	428	142	589	621	954
Arrive On Green	0.27	0.27	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1781	1585	46	1774	1870	1585
Grp Volume(v), veh/h	339	67	276	0	324	188
Grp Sat Flow(s),veh/h/ln	1781	1585	1820	0	1870	1585
Q Serve(g_s), s	5.2	1.0	0.0	0.0	4.2	1.6
Cycle Q Clear(g_c), s	5.2	1.0	3.5	0.0	4.2	1.6
Prop In Lane	1.00	1.00	0.06			1.00
Lane Grp Cap(c), veh/h	481	428	731	0	621	954
V/C Ratio(X)	0.71	0.16	0.38	0.00	0.52	0.20
Avail Cap(c_a), veh/h	2010	1789	2126	0	2111	2216
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	9.9	8.4	7.9	0.0	8.1	2.7
Incr Delay (d2), s/veh	1.9	0.2	0.3	0.0	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.2	0.7	0.0	0.9	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.8	8.6	8.2	0.0	8.8	2.8
LnGrp LOS	B	A	A	A	A	A
Approach Vol, veh/h	406			276	512	
Approach Delay, s/veh	11.3			8.2	6.6	
Approach LOS	B			A	A	

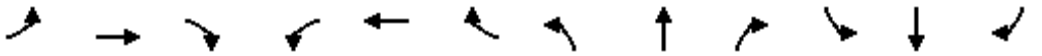
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		16.0		14.1		16.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		5.5		7.2		6.2
Green Ext Time (p_c), s		1.5		1.2		2.4

Intersection Summary	
HCM 6th Ctrl Delay	8.6
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	198	271	4	365	39	218	288
v/c Ratio	0.43	0.25	0.01	0.68	0.09	0.63	0.45
Control Delay	11.8	9.4	19.0	25.2	16.7	30.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	9.4	19.0	25.2	16.7	30.1	5.6
Queue Length 50th (ft)	34	46	1	99	9	68	1
Queue Length 95th (ft)	90	116	2	225	22	158	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	507	1743	600	1066	778	607	905
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.16	0.01	0.34	0.05	0.36	0.32

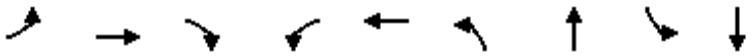
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	238	2	1	190	131	5	14	4	192	2	246
Future Volume (veh/h)	178	238	2	1	190	131	5	14	4	192	2	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	198	267	4	4	209	156	10	23	6	218	5	283
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	417	941	14	435	276	206	133	257	55	452	8	430
Arrive On Green	0.11	0.49	0.49	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1781	1911	29	1108	1034	772	166	932	199	1381	28	1562
Grp Volume(v), veh/h	198	0	271	4	0	365	39	0	0	218	0	288
Grp Sat Flow(s),veh/h/ln	1781	0	1940	1108	0	1806	1297	0	0	1381	0	1589
Q Serve(g_s), s	3.8	0.0	4.3	0.1	0.0	9.6	0.1	0.0	0.0	1.7	0.0	8.3
Cycle Q Clear(g_c), s	3.8	0.0	4.3	0.1	0.0	9.6	8.4	0.0	0.0	10.0	0.0	8.3
Prop In Lane	1.00		0.01	1.00		0.43	0.26		0.15	1.00		0.98
Lane Grp Cap(c), veh/h	417	0	956	435	0	482	445	0	0	452	0	438
V/C Ratio(X)	0.47	0.00	0.28	0.01	0.00	0.76	0.09	0.00	0.00	0.48	0.00	0.66
Avail Cap(c_a), veh/h	600	0	1874	846	0	1152	855	0	0	818	0	860
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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	7.7	14.0	0.0	17.4	14.0	0.0	0.0	17.5	0.0	16.6
Incr Delay (d2), s/veh	0.8	0.0	0.2	0.0	0.0	2.5	0.1	0.0	0.0	0.8	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.4	0.0	0.0	3.7	0.3	0.0	0.0	2.2	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	7.9	14.0	0.0	19.9	14.1	0.0	0.0	18.3	0.0	18.3
LnGrp LOS	B	A	A	B	A	B	B	A	A	B	A	B
Approach Vol, veh/h		469			369			39			506	
Approach Delay, s/veh		9.8			19.8			14.1			18.3	
Approach LOS		A			B			B			B	

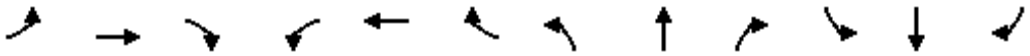
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	11.7	19.8		20.3		31.5		20.3				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	11.0	33.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	5.8	11.6		12.0		6.3		10.4				
Green Ext Time (p_c), s	0.2	2.2		2.2		1.7		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			15.7									
HCM 6th LOS			B									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	387	132	63	220	169	77	41	89
v/c Ratio	0.17	0.51	0.17	0.18	0.31	0.38	0.13	0.09	0.13
Control Delay	7.5	10.0	2.5	7.9	7.1	11.3	4.1	8.2	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	10.0	2.5	7.9	7.1	11.3	4.1	8.2	4.5
Queue Length 50th (ft)	6	36	0	5	17	18	1	4	3
Queue Length 95th (ft)	18	86	13	15	54	44	9	16	20
Internal Link Dist (ft)		1216			5220		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	647	1112	1062	509	1032	729	941	737	1089
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.35	0.12	0.12	0.21	0.23	0.08	0.06	0.08

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	306	100	40	173	17	125	8	54	34	26	47
Future Volume (veh/h)	50	306	100	40	173	17	125	8	54	34	26	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	77	387	132	63	188	32	169	13	64	41	29	60
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	644	696	590	506	557	95	639	75	371	646	155	321
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	1161	1945	1648	882	1558	265	1308	275	1352	1322	565	1169
Grp Volume(v), veh/h	77	387	132	63	0	220	169	0	77	41	0	89
Grp Sat Flow(s),veh/h/ln	1161	1945	1648	882	0	1823	1308	0	1627	1322	0	1735
Q Serve(g_s), s	1.1	3.5	1.2	1.3	0.0	1.9	2.5	0.0	0.8	0.5	0.0	0.9
Cycle Q Clear(g_c), s	3.0	3.5	1.2	4.8	0.0	1.9	3.3	0.0	0.8	1.3	0.0	0.9
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.83	1.00		0.67
Lane Grp Cap(c), veh/h	644	696	590	506	0	652	639	0	447	646	0	476
V/C Ratio(X)	0.12	0.56	0.22	0.12	0.00	0.34	0.26	0.00	0.17	0.06	0.00	0.19
Avail Cap(c_a), veh/h	1082	1430	1212	839	0	1340	1241	0	1196	1256	0	1276
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.2	5.6	4.9	7.5	0.0	5.1	7.3	0.0	6.0	6.5	0.0	6.0
Incr Delay (d2), s/veh	0.1	0.7	0.2	0.1	0.0	0.3	0.2	0.0	0.2	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.5	0.1	0.1	0.0	0.2	0.3	0.0	0.1	0.1	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.3	6.3	5.1	7.6	0.0	5.4	7.5	0.0	6.2	6.5	0.0	6.2
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		596			283			246			130	
Approach Delay, s/veh		6.0			5.9			7.1			6.3	
Approach LOS		A			A			A			A	

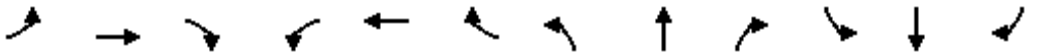
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		10.0		11.8		10.0		11.8				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		16.0		16.0		16.0		16.0				
Max Q Clear Time (g_c+I1), s		5.3		5.5		3.3		6.8				
Green Ext Time (p_c), s		0.7		2.3		0.4		1.0				

Intersection Summary												
HCM 6th Ctrl Delay			6.2									
HCM 6th LOS			A									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	297	21	32	596	8	498	201
v/c Ratio	0.81	0.05	0.07	0.29	0.02	0.51	0.22
Control Delay	46.6	15.9	9.5	11.6	4.3	9.2	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	46.6	15.9	9.5	11.6	4.3	9.5	1.8
Queue Length 50th (ft)	150	5	7	78	0	113	0
Queue Length 95th (ft)	214	17	22	167	m3	196	0
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	466	504	452	2058	487	982	930
Starvation Cap Reductn	0	0	0	0	0	104	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.04	0.07	0.29	0.02	0.57	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



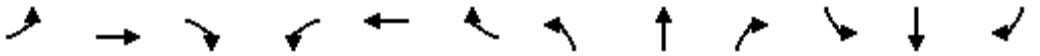
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	3	50	7	2	7	29	542	6	7	458	185
Future Volume (veh/h)	206	3	50	7	2	7	29	542	6	7	458	185
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	237	3	57	9	3	9	32	589	7	8	498	201
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	341	3	65	201	77	166	448	2007	24	485	1005	852
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.56	0.56	0.01	0.71	0.71
Sat Flow, veh/h	1159	15	279	619	333	714	1781	3597	43	1781	1870	1585
Grp Volume(v), veh/h	297	0	0	21	0	0	32	291	305	8	498	201
Grp Sat Flow(s),veh/h/ln	1452	0	0	1666	0	0	1781	1777	1863	1781	1870	1585
Q Serve(g_s), s	16.9	0.0	0.0	0.0	0.0	0.0	0.7	7.8	7.8	0.2	10.6	3.9
Cycle Q Clear(g_c), s	17.7	0.0	0.0	0.8	0.0	0.0	0.7	7.8	7.8	0.2	10.6	3.9
Prop In Lane	0.80		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	409	0	0	443	0	0	448	992	1040	485	1005	852
V/C Ratio(X)	0.73	0.00	0.00	0.05	0.00	0.00	0.07	0.29	0.29	0.02	0.50	0.24
Avail Cap(c_a), veh/h	555	0	0	596	0	0	493	992	1040	566	1005	852
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.97	0.97	0.97
Uniform Delay (d), s/veh	33.3	0.0	0.0	26.9	0.0	0.0	9.2	10.5	10.5	8.7	7.4	6.5
Incr Delay (d2), s/veh	3.1	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.7	0.0	1.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	0.0	0.3	0.0	0.0	0.3	2.9	3.0	0.1	3.5	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	0.0	0.0	26.9	0.0	0.0	9.3	11.3	11.2	8.8	9.1	7.1
LnGrp LOS	D	A	A	C	A	A	A	B	B	A	A	A
Approach Vol, veh/h		297			21			628			707	
Approach Delay, s/veh		36.4			26.9			11.1			8.6	
Approach LOS		D			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	56.2		26.9	8.8	54.4		26.9				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	9.8		19.7	2.7	12.6		2.8				
Green Ext Time (p_c), s	0.0	3.5		1.1	0.0	3.7		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		14.8	
HCM 6th LOS		B	

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	474	210	635	246	224	522
v/c Ratio	0.44	0.33	0.48	0.33	0.59	0.27
Control Delay	26.0	4.9	19.5	4.1	19.4	7.8
Queue Delay	0.0	0.0	0.5	0.2	0.0	0.0
Total Delay	26.0	4.9	20.0	4.3	19.4	7.8
Queue Length 50th (ft)	109	0	105	7	56	47
Queue Length 95th (ft)	132	45	160	31	90	72
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	646	1318	744	381	1908
Starvation Cap Reductn	0	0	285	119	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.33	0.61	0.39	0.59	0.27

Intersection Summary

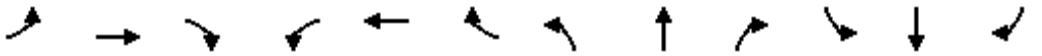


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	379	0	185	0	0	0	0	546	209	199	465	0
Future Volume (vph)	379	0	185	0	0	0	0	546	209	199	465	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.34	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	605	3539	
Peak-hour factor, PHF	0.80	0.25	0.88	1.00	1.00	1.00	1.00	0.86	0.85	0.89	0.89	1.00
Adj. Flow (vph)	474	0	210	0	0	0	0	635	246	224	522	0
RTOR Reduction (vph)	0	0	144	0	0	0	0	0	154	0	0	0
Lane Group Flow (vph)	474	0	66	0	0	0	0	635	92	224	522	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.3		28.3					33.5	33.5	41.7	48.5	
Effective Green, g (s)	28.3		28.3					33.5	33.5	41.7	48.5	
Actuated g/C Ratio	0.31		0.31					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1079		497					1317	589	381	1907	
v/s Ratio Prot	c0.14		0.04					0.18		c0.05	0.15	
v/s Ratio Perm									0.06	c0.22		
v/c Ratio	0.44		0.13					0.48	0.16	0.59	0.27	
Uniform Delay, d1	24.5		22.1					21.6	18.8	23.6	11.2	
Progression Factor	1.00		1.00					0.84	1.04	0.78	0.66	
Incremental Delay, d2	0.4		0.2					1.2	0.5	2.0	0.1	
Delay (s)	24.9		22.2					19.3	20.0	20.3	7.4	
Level of Service	C		C					B	C	C	A	
Approach Delay (s)		24.1			0.0			19.5			11.3	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	119	167	127	1066	724	314
v/c Ratio	0.52	0.37	0.36	0.41	0.58	0.43
Control Delay	44.1	2.3	8.7	3.2	22.8	7.0
Queue Delay	0.0	0.0	0.0	0.0	2.5	0.9
Total Delay	44.1	2.3	8.7	3.2	25.3	8.0
Queue Length 50th (ft)	64	0	18	123	202	67
Queue Length 95th (ft)	106	0	21	78	270	109
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	348	2600	1252	735
Starvation Cap Reductn	0	0	0	0	388	207
Spillback Cap Reductn	0	1	0	16	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.35	0.36	0.41	0.84	0.59

Intersection Summary

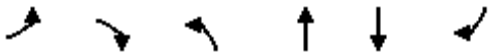


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	0	115	104	821	0	0	564	344
Future Volume (vph)	0	0	0	100	0	115	104	821	0	0	564	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3312	1441
Flt Permitted				0.95		1.00	0.26	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	473	3539			3312	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.84	1.00	0.69	0.82	0.77	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	119	0	167	127	1066	0	0	613	425
RTOR Reduction (vph)	0	0	0	0	0	145	0	0	0	0	16	197
Lane Group Flow (vph)	0	0	0	119	0	22	127	1066	0	0	708	117
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				11.8		11.8	42.5	65.7			33.6	33.6
Effective Green, g (s)				11.8		11.8	42.5	65.7			33.6	33.6
Actuated g/C Ratio				0.13		0.13	0.47	0.73			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				232		207	345	2583			1236	537
v/s Ratio Prot				c0.07		0.01	0.04	c0.30			c0.21	
v/s Ratio Perm							0.14					0.08
v/c Ratio				0.51		0.11	0.37	0.41			0.57	0.22
Uniform Delay, d1				36.4		34.5	14.1	4.7			22.5	19.2
Progression Factor				1.00		1.00	0.56	0.57			0.95	2.05
Incremental Delay, d2				2.5		0.3	0.6	0.1			1.9	0.9
Delay (s)				39.0		34.8	8.5	2.8			23.2	40.4
Level of Service				D		C	A	A			C	D
Approach Delay (s)		0.0			36.5			3.4			28.4	
Approach LOS		A			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBT	SBT	SBR
Lane Group Flow (vph)	424	83	346	405	235
v/c Ratio	0.64	0.13	0.56	0.63	0.15
Control Delay	18.2	3.9	17.3	18.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	3.9	17.3	18.6	0.2
Queue Length 50th (ft)	85	0	70	84	0
Queue Length 95th (ft)	180	13	181	212	0
Internal Link Dist (ft)	5220		795	1562	
Turn Bay Length (ft)		200			200
Base Capacity (vph)	1336	1216	1299	1360	1542
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.07	0.27	0.30	0.15

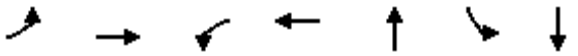
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	335	60	13	298	369	174
Future Volume (veh/h)	335	60	13	298	369	174
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	424	83	22	324	405	235
Peak Hour Factor	0.79	0.72	0.60	0.92	0.91	0.74
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	563	501	128	582	623	1029
Arrive On Green	0.32	0.32	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1781	1585	49	1747	1870	1585
Grp Volume(v), veh/h	424	83	346	0	405	235
Grp Sat Flow(s),veh/h/ln	1781	1585	1796	0	1870	1585
Q Serve(g_s), s	7.3	1.3	0.0	0.0	6.3	2.1
Cycle Q Clear(g_c), s	7.3	1.3	6.3	0.0	6.3	2.1
Prop In Lane	1.00	1.00	0.06			1.00
Lane Grp Cap(c), veh/h	563	501	710	0	623	1029
V/C Ratio(X)	0.75	0.17	0.49	0.00	0.65	0.23
Avail Cap(c_a), veh/h	1771	1576	1848	0	1860	2077
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	10.5	8.4	9.3	0.0	9.7	2.5
Incr Delay (d2), s/veh	2.1	0.2	0.5	0.0	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.3	1.3	0.0	1.6	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.6	8.6	9.9	0.0	10.9	2.6
LnGrp LOS	B	A	A	A	B	A
Approach Vol, veh/h	507			346	640	
Approach Delay, s/veh	11.9			9.9	7.8	
Approach LOS	B			A	A	

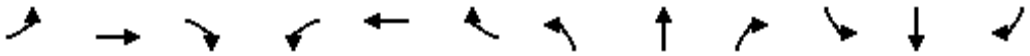
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		17.4		16.8		17.4
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		8.3		9.3		8.3
Green Ext Time (p_c), s		2.0		1.6		3.1

Intersection Summary	
HCM 6th Ctrl Delay	9.7
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	247	339	4	457	48	273	362
v/c Ratio	0.61	0.30	0.01	0.78	0.10	0.75	0.51
Control Delay	16.6	10.6	20.0	31.6	18.8	39.2	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	10.6	20.0	31.6	18.8	39.2	5.9
Queue Length 50th (ft)	56	79	1	171	13	110	3
Queue Length 95th (ft)	111	144	2	308	26	221	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	462	1521	453	864	660	514	857
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.22	0.01	0.53	0.07	0.53	0.42

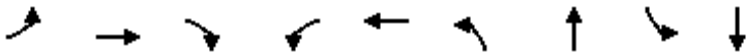
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	298	2	1	238	164	6	17	5	240	3	308
Future Volume (veh/h)	222	298	2	1	238	164	6	17	5	240	3	308
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	247	335	4	4	262	195	12	28	8	273	8	354
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	367	956	11	407	307	228	115	246	60	423	12	524
Arrive On Green	0.12	0.50	0.50	0.30	0.30	0.30	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1918	23	1041	1036	771	159	729	177	1372	35	1555
Grp Volume(v), veh/h	247	0	339	4	0	457	48	0	0	273	0	362
Grp Sat Flow(s),veh/h/ln	1781	0	1941	1041	0	1806	1065	0	0	1372	0	1590
Q Serve(g_s), s	6.5	0.0	7.8	0.2	0.0	17.4	0.3	0.0	0.0	6.6	0.0	14.3
Cycle Q Clear(g_c), s	6.5	0.0	7.8	0.2	0.0	17.4	14.5	0.0	0.0	21.2	0.0	14.3
Prop In Lane	1.00		0.01	1.00		0.43	0.25		0.17	1.00		0.98
Lane Grp Cap(c), veh/h	367	0	968	407	0	535	421	0	0	423	0	536
V/C Ratio(X)	0.67	0.00	0.35	0.01	0.00	0.85	0.11	0.00	0.00	0.64	0.00	0.68
Avail Cap(c_a), veh/h	470	0	1329	540	0	767	490	0	0	487	0	610
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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.5	0.0	11.1	18.2	0.0	24.2	17.0	0.0	0.0	24.7	0.0	20.8
Incr Delay (d2), s/veh	2.6	0.0	0.2	0.0	0.0	6.5	0.1	0.0	0.0	2.4	0.0	2.5
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	2.6	0.0	3.0	0.0	0.0	7.8	0.5	0.0	0.0	4.5	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	0.0	11.3	18.2	0.0	30.7	17.1	0.0	0.0	27.1	0.0	23.3
LnGrp LOS	B	A	B	B	A	C	B	A	A	C	A	C
Approach Vol, veh/h		586			461			48			635	
Approach Delay, s/veh		14.6			30.6			17.1			24.9	
Approach LOS		B			C			B			C	

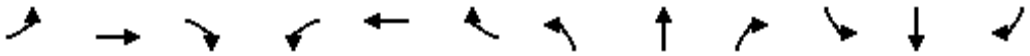
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	14.8	27.7		30.6		42.4		30.6				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	13.0	31.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	8.5	19.4		23.2		9.8		16.5				
Green Ext Time (p_c), s	0.3	2.2		1.4		2.1		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		22.7	
HCM 6th LOS		C	



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	485	164	79	275	211	96	52	112
v/c Ratio	0.21	0.71	0.21	0.26	0.43	0.51	0.21	0.19	0.35
Control Delay	11.8	26.8	0.9	12.8	20.1	23.7	10.8	20.7	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	26.8	0.9	12.8	20.1	23.7	10.8	20.7	17.6
Queue Length 50th (ft)	22	187	0	18	90	66	6	15	15
Queue Length 95th (ft)	34	254	0	28	162	115	21	41	64
Internal Link Dist (ft)		1216			5220		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	462	1141	1138	300	1051	474	663	268	520
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.43	0.14	0.26	0.26	0.45	0.14	0.19	0.22

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	383	125	50	216	21	156	10	68	43	32	59
Future Volume (veh/h)	63	383	125	50	216	21	156	10	68	43	32	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	97	485	164	79	235	40	211	16	80	52	36	76
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	437	611	518	289	481	82	412	53	263	344	62	130
Arrive On Green	0.07	0.31	0.31	0.06	0.31	0.31	0.13	0.19	0.19	0.05	0.11	0.11
Sat Flow, veh/h	1781	1945	1648	1781	1558	265	1781	271	1355	1781	557	1176
Grp Volume(v), veh/h	97	485	164	79	0	275	211	0	96	52	0	112
Grp Sat Flow(s),veh/h/ln	1781	1945	1648	1781	0	1823	1781	0	1626	1781	0	1733
Q Serve(g_s), s	2.3	14.2	4.7	1.8	0.0	7.7	6.2	0.0	3.2	1.6	0.0	3.8
Cycle Q Clear(g_c), s	2.3	14.2	4.7	1.8	0.0	7.7	6.2	0.0	3.2	1.6	0.0	3.8
Prop In Lane	1.00		1.00	1.00		0.15	1.00		0.83	1.00		0.68
Lane Grp Cap(c), veh/h	437	611	518	289	0	563	412	0	316	344	0	192
V/C Ratio(X)	0.22	0.79	0.32	0.27	0.00	0.49	0.51	0.00	0.30	0.15	0.00	0.58
Avail Cap(c_a), veh/h	463	1090	924	325	0	1021	521	0	547	402	0	389
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.5	19.6	16.3	14.8	0.0	17.6	19.6	0.0	21.5	22.8	0.0	26.4
Incr Delay (d2), s/veh	0.3	2.4	0.3	0.5	0.0	0.7	1.0	0.0	0.5	0.2	0.0	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	6.1	1.6	0.7	0.0	3.0	2.4	0.0	1.1	0.7	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	22.0	16.7	15.3	0.0	18.2	20.6	0.0	22.1	23.0	0.0	29.2
LnGrp LOS	B	C	B	B	A	B	C	A	C	C	A	C
Approach Vol, veh/h		746			354			307			164	
Approach Delay, s/veh		19.7			17.6			21.0			27.2	
Approach LOS		B			B			C			C	

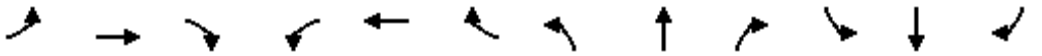
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	18.1	9.7	25.6	14.2	12.9	10.1	25.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	5.0	21.0	5.0	35.0	12.0	14.0	5.0	35.0
Max Q Clear Time (g_c+I1), s	3.6	5.2	3.8	16.2	8.2	5.8	4.3	9.7
Green Ext Time (p_c), s	0.0	0.4	0.0	3.4	0.2	0.3	0.0	1.6

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	372	28	39	745	10	622	251
v/c Ratio	0.89	0.06	0.13	0.39	0.03	0.68	0.28
Control Delay	52.5	14.8	11.1	14.1	4.7	14.3	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Total Delay	52.5	14.8	11.1	14.1	4.7	14.5	2.7
Queue Length 50th (ft)	185	6	10	123	1	155	1
Queue Length 95th (ft)	#314	21	25	215	m3	#483	61
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	463	500	303	1912	376	915	905
Starvation Cap Reductn	0	0	0	0	0	29	166
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.06	0.13	0.39	0.03	0.70	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	4	63	9	3	9	36	677	8	9	572	231
Future Volume (veh/h)	257	4	63	9	3	9	36	677	8	9	572	231
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	295	5	72	12	4	12	39	736	9	10	622	251
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	395	5	79	236	89	201	314	1821	22	373	906	768
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.03	0.51	0.51	0.02	0.64	0.64
Sat Flow, veh/h	1150	19	281	635	316	714	1781	3595	44	1781	1870	1585
Grp Volume(v), veh/h	372	0	0	28	0	0	39	364	381	10	622	251
Grp Sat Flow(s),veh/h/ln	1450	0	0	1665	0	0	1781	1777	1862	1781	1870	1585
Q Serve(g_s), s	21.2	0.0	0.0	0.0	0.0	0.0	1.0	11.4	11.4	0.2	19.1	6.4
Cycle Q Clear(g_c), s	22.3	0.0	0.0	1.1	0.0	0.0	1.0	11.4	11.4	0.2	19.1	6.4
Prop In Lane	0.79		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	479	0	0	525	0	0	314	900	943	373	906	768
V/C Ratio(X)	0.78	0.00	0.00	0.05	0.00	0.00	0.12	0.40	0.40	0.03	0.69	0.33
Avail Cap(c_a), veh/h	554	0	0	603	0	0	352	900	943	450	906	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	31.1	0.0	0.0	23.6	0.0	0.0	12.8	13.8	13.8	11.2	11.7	9.4
Incr Delay (d2), s/veh	5.9	0.0	0.0	0.0	0.0	0.0	0.2	1.3	1.3	0.0	4.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	0.0	0.4	0.0	0.0	0.4	4.4	4.7	0.1	6.3	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	0.0	0.0	23.7	0.0	0.0	13.0	15.1	15.1	11.2	15.7	10.5
LnGrp LOS	D	A	A	C	A	A	B	B	B	B	B	B
Approach Vol, veh/h		372			28			784			883	
Approach Delay, s/veh		37.1			23.7			15.0			14.2	
Approach LOS		D			C			B			B	

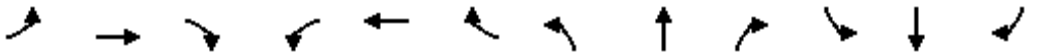
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	51.6		31.3	9.1	49.6		31.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	13.4		24.3	3.0	21.1		3.1				
Green Ext Time (p_c), s	0.0	4.4		1.0	0.0	4.3		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		18.7	
HCM 6th LOS		B	

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	595	235	737	335	313	652
v/c Ratio	0.55	0.36	0.56	0.42	0.93	0.34
Control Delay	27.6	5.7	20.7	5.0	50.8	10.0
Queue Delay	0.0	0.0	0.6	0.2	0.0	0.0
Total Delay	27.6	5.7	21.3	5.2	50.8	10.0
Queue Length 50th (ft)	142	5	121	3	87	58
Queue Length 95th (ft)	187	56	218	41	#91	108
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	654	1307	796	337	1897
Starvation Cap Reductn	0	0	238	95	0	0
Spillback Cap Reductn	0	9	0	0	0	152
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.36	0.69	0.48	0.93	0.37

Intersection Summary

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

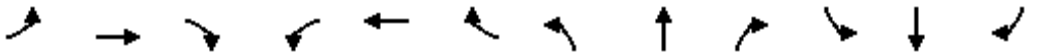


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	518	0	219	0	0	0	0	678	265	260	593	0
Future Volume (vph)	518	0	219	0	0	0	0	678	265	260	593	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.27	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	492	3539	
Peak-hour factor, PHF	0.87	0.50	0.93	1.00	1.00	1.00	1.00	0.92	0.79	0.83	0.91	1.00
Adj. Flow (vph)	595	0	235	0	0	0	0	737	335	313	652	0
RTOR Reduction (vph)	0	0	151	0	0	0	0	0	211	0	0	0
Lane Group Flow (vph)	595	0	84	0	0	0	0	737	124	313	652	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1090		503					1305	583	337	1895	
v/s Ratio Prot	c0.17		0.05					0.21		c0.08	0.18	
v/s Ratio Perm									0.08	c0.34		
v/c Ratio	0.55		0.17					0.56	0.21	0.93	0.34	
Uniform Delay, d1	25.3		22.1					22.6	19.4	27.3	11.9	
Progression Factor	1.00		1.00					0.84	1.41	0.82	0.80	
Incremental Delay, d2	0.7		0.2					1.6	0.7	26.2	0.1	
Delay (s)	26.0		22.3					20.5	28.2	48.7	9.6	
Level of Service	C		C					C	C	D	A	
Approach Delay (s)		25.0			0.0			22.9			22.3	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	138	150	185	1144	883	383
v/c Ratio	0.57	0.33	0.64	0.44	0.71	0.49
Control Delay	45.9	1.9	41.1	3.6	25.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	16.4	1.5
Total Delay	45.9	1.9	41.1	3.6	41.6	9.0
Queue Length 50th (ft)	74	0	54	164	264	92
Queue Length 95th (ft)	123	0	103	202	347	132
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	288	2581	1246	775
Starvation Cap Reductn	0	0	0	0	366	221
Spillback Cap Reductn	0	6	0	77	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.31	0.64	0.46	1.00	0.69

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	117	0	126	155	1041	0	0	736	388
Future Volume (vph)	0	0	0	117	0	126	155	1041	0	0	736	388
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3328	1441
Flt Permitted				0.95		1.00	0.18	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	319	3539			3328	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.85	0.50	0.84	0.84	0.91	1.00	1.00	0.95	0.79
Adj. Flow (vph)	0	0	0	138	0	150	185	1144	0	0	775	491
RTOR Reduction (vph)	0	0	0	0	0	130	0	0	0	0	11	241
Lane Group Flow (vph)	0	0	0	138	0	20	185	1144	0	0	872	142
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				12.2		12.2	42.2	65.3			33.4	33.4
Effective Green, g (s)				12.2		12.2	42.2	65.3			33.4	33.4
Actuated g/C Ratio				0.14		0.14	0.47	0.73			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				239		214	285	2567			1235	534
v/s Ratio Prot				c0.08		0.01	0.06	c0.32			c0.26	
v/s Ratio Perm							0.24					0.10
v/c Ratio				0.58		0.10	0.65	0.45			0.71	0.27
Uniform Delay, d1				36.5		34.1	15.9	5.0			24.1	19.7
Progression Factor				1.00		1.00	2.64	0.61			0.92	2.29
Incremental Delay, d2				4.0		0.3	4.2	0.1			3.1	1.1
Delay (s)				40.5		34.3	46.3	3.1			25.3	46.3
Level of Service				D		C	D	A			C	D
Approach Delay (s)		0.0			37.3			9.2			31.6	
Approach LOS		A			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX C

Existing Plus Proposed School Conditions

ITE Sheets

Land Use 522
Middle School/Junior High School

Description

A middle or junior high school serves students who have completed elementary school and have not yet entered high school. Both public and private middle schools/junior high schools are included in this land use. Elementary school (Land Use 520), high school (Land Use 530), private school (K-8) (Land Use 534), private school (K-12) (Land Use 536), and charter elementary school (Land Use 537) are related uses.

Additional Data

The percentage of students at the sites who were transported to school via bus varied considerably. Due to the varied transit and school bus usage at these sites, it is desirable that future studies include additional detail on the percentage of students who were bused to school and the percentage that were dropped off and picked up.

Because the ratio of floor space to student population varies widely among the schools surveyed, the number of students may be a more reliable independent variable on which to establish trip generation rates.

Time-of-day distribution data for this land use are presented in Appendix A. For the two general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:00 and 8:00 a.m. and 5:00 and 6:00 p.m., respectively.

The sites were surveyed in the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Florida, Minnesota, Nebraska, Oregon, Pennsylvania, and Tennessee.

Source Numbers

431, 444, 534, 536, 564, 579, 592, 611, 719, 867, 936, 940

Middle School/Junior High School
(522)

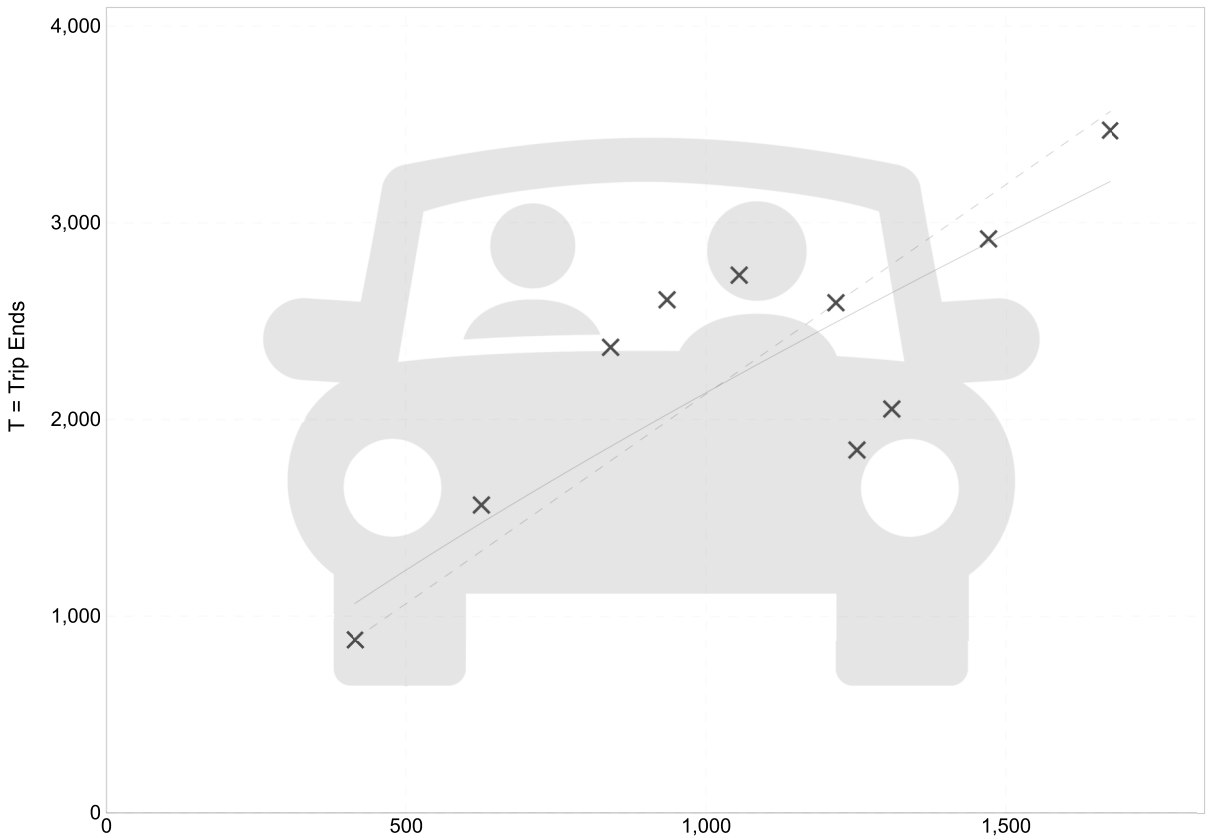
Vehicle Trip Ends vs: **Students**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 10
Avg. Num. of Students: 1079
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
2.13	1.48 - 2.81	0.46

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.79 Ln(X) + 2.21

R^2= 0.73

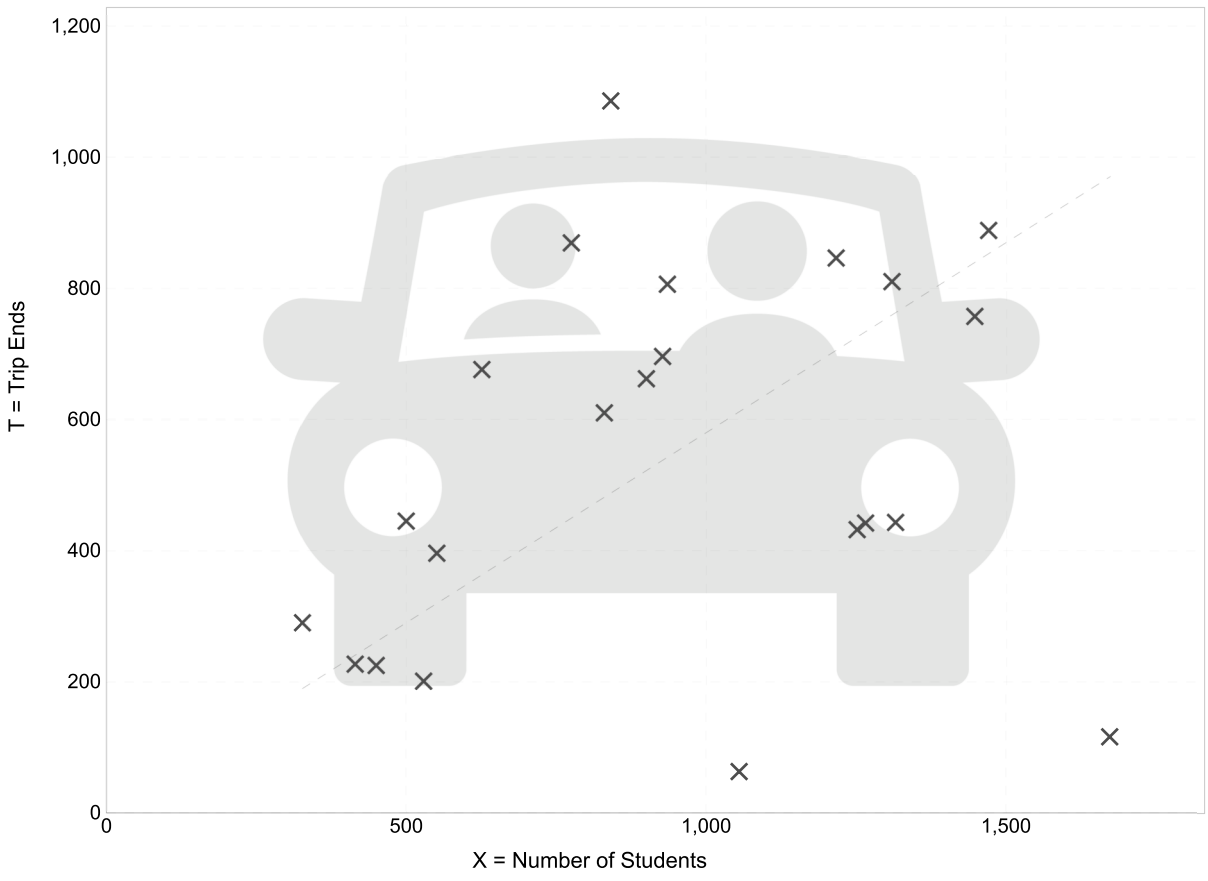
Middle School/Junior High School
(522)

Vehicle Trip Ends vs:	**Students**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	22
Avg. Num. of Students:	937
Directional Distribution:	54% entering, 46% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.58	0.06 - 1.29	0.32

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

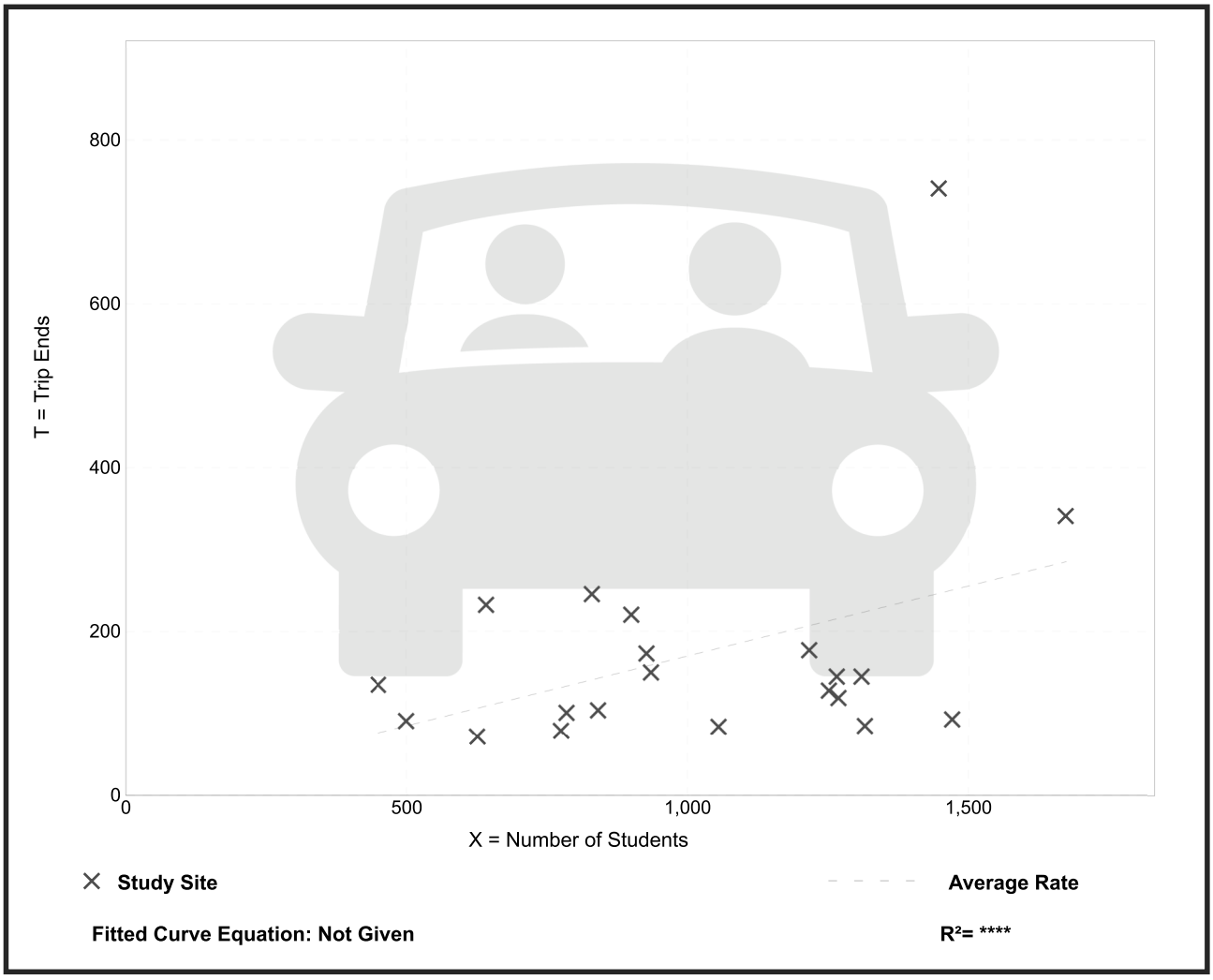
Middle School/Junior High School
(522)

Vehicle Trip Ends vs: **Students**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. Num. of Students: 1023
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.17	0.06 - 0.51	0.12

Data Plot and Equation



Middle School/Junior High School
(522)

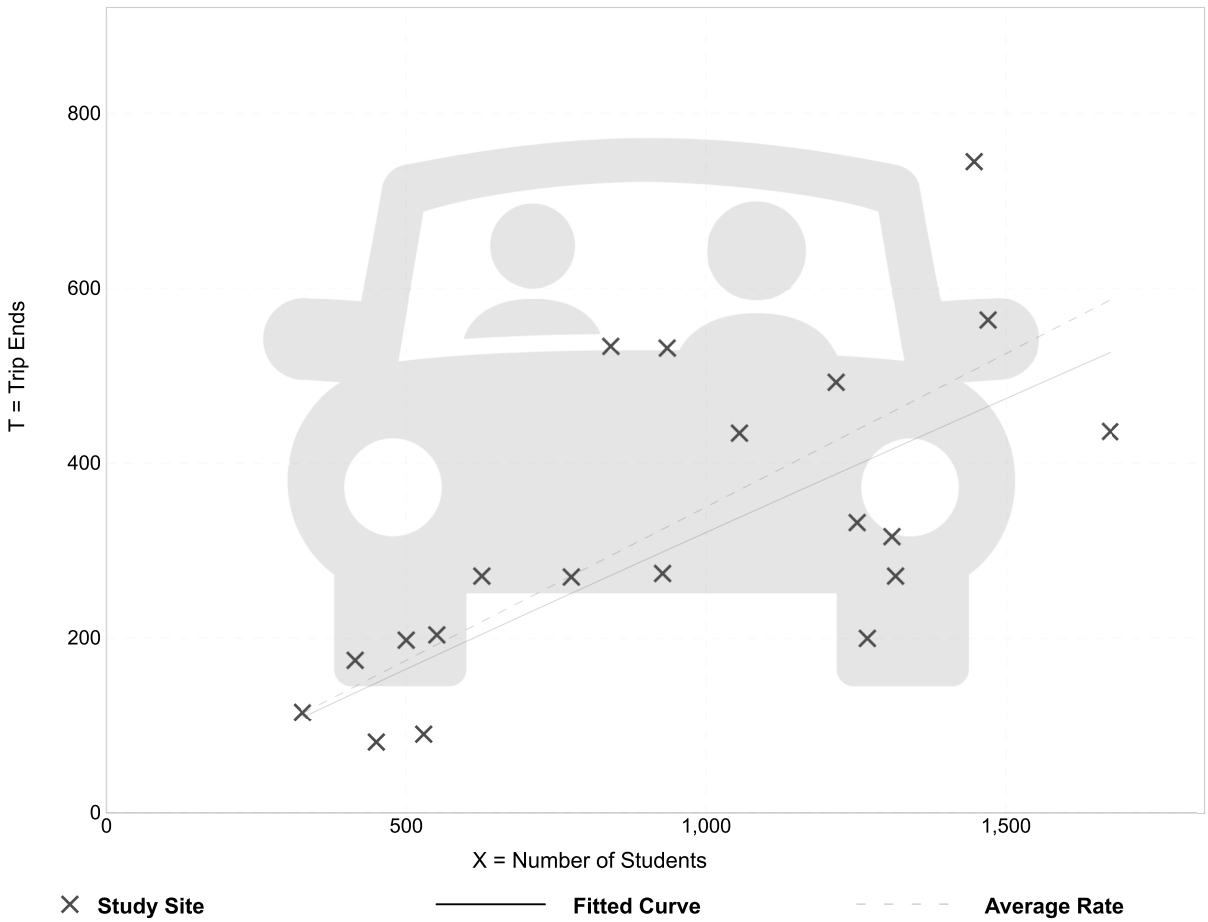
Vehicle Trip Ends vs: **Students**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 20
Avg. Num. of Students: 944
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.35	0.16 - 0.63	0.13

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.96 Ln(X) - 0.86

R^2= 0.58

Trip Generation & Distribution

LS Middle School Trip Generation

Daily Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	Daily Trips	Trip Distribution Enter	Trip Distribution Exit	Daily Trips Enter	Daily Trips Exit
522	Middle School/Junior High School	1,290	Students	Average	2,748	50%	50%	1,374	1,374
Total					**2,748**			**1,374**	**1,374**

AM Peak Hour Trip Generation (Peak Hour of Adjacent Street Traffic, 7-9 AM)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	AM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	AM Peak Hour Trips Enter	AM Peak Hour Trips Exit
522	Middle School/Junior High School	1,290	Students	Average	749	54%	46%	404	345
Total					**749**			**404**	**345**

School Dismisal Peak Hour Trip Generation (PM Peak Hour of Generator)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
522	Middle School/Junior High School	1,290	Students	Equation	410	46%	54%	189	221
Total					**410**			**189**	**221**

Note: PM Peak Hour of Generator is assumed to occur during the school dismissal time period.

PM Peak Hour Trip Generation (Peak Hour of Adjacent Street Traffic, 4-6 PM)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
522	Middle School/Junior High School	1,290	Students	Average	220	49%	51%	108	112
Total					**220**			**108**	**112**

Baseball Field Trip Generation			
	Typical AM Peak	Typical School Dismissal	Typical PM Peak
Enter	0	30	0
Exit	0	0	30
Based on usage information provided by client			

Middle School	
Direction	Primary Trips (To/From)
Bailey Rd (West)	10%
Hamblen Rd (North)	5%
Todd George Pkwy (North)	15%
Ranson Rd (South)	20%
US-50 (West)	5%
US-50 (East)	40%
Adjacent Homes (Internal or Walk)	5%
Total	100%
Baseball Fields	
Direction	Primary Trips (To/From)
Hamblen Rd (North)	100%

- Community building - A 6th-8th setting can offer a greater sense of community and relationship building with staff, students and parents. The relationships are stronger the longer they are a part of the learning community
- Academics - A 6th-8th setting would necessitate a content specific certified teacher in each core subject area
- Academic/Behavioral Interventions - A 6th-8th setting provides a longer opportunity to address academic and behavioral gaps in a systemic way

A fourth 6th-8th grade middle school may mitigate the need for elementary schools in the northeast and southwest. A map illustrating a *potential* fourth middle school boundary (designated by the green section) is provided below:

Map 1.1 Sample Middle School Four Boundary

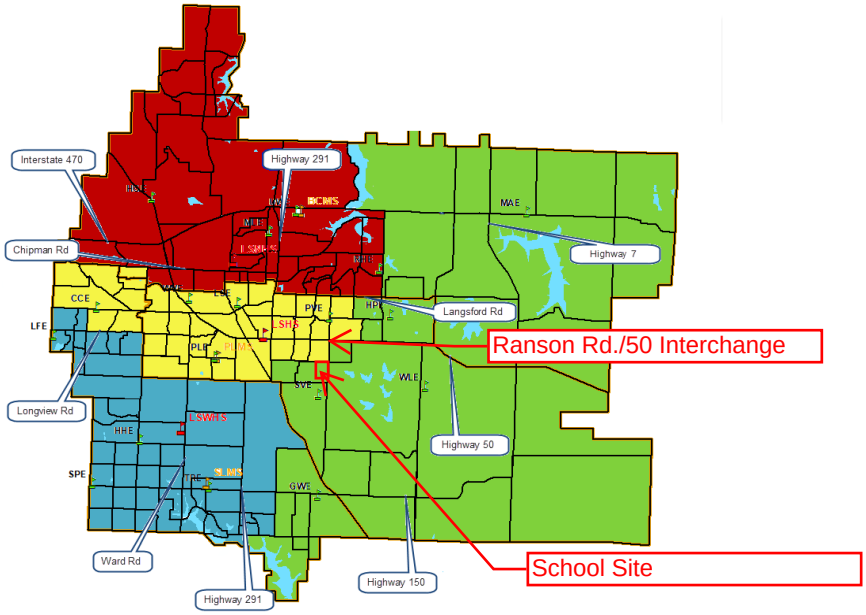


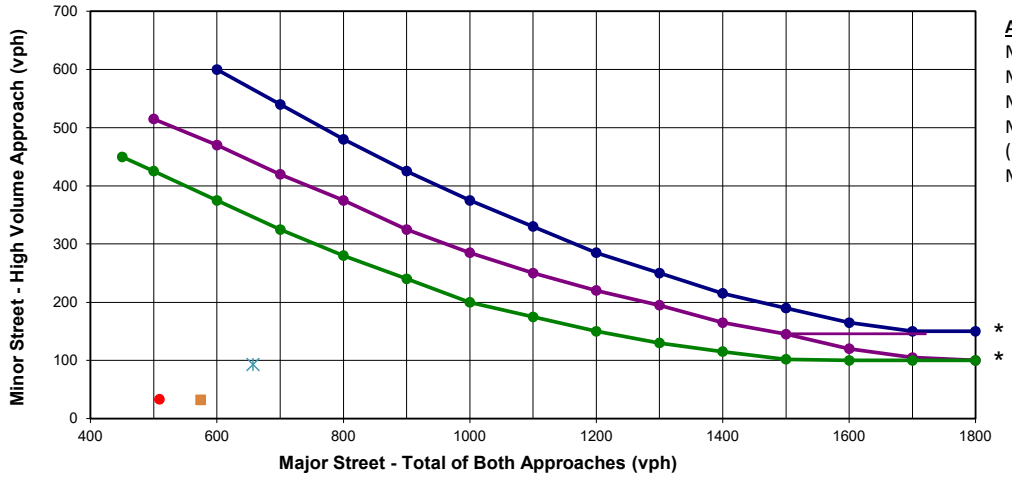
Table 1.1 Sample Middle School Four Capacity

School	85% Program Capacity	School of Residency Enrollment 9/26/18 **	2021-22	2022-23	2023-24	2028-29
PLMS	962	818	1167	1143	1094	1108
BCMS	1043	958	1118	1120	1143	1106
SLMS	1071	1090	1142	1126	1161	1211
NEW MS			1080	1033	1042	1290

Table 1.1 was not color coded because some of the existing middle schools will likely need additions if a fourth middle school is added. This approach would also create a split feeder system. In the example

Signal Warrants

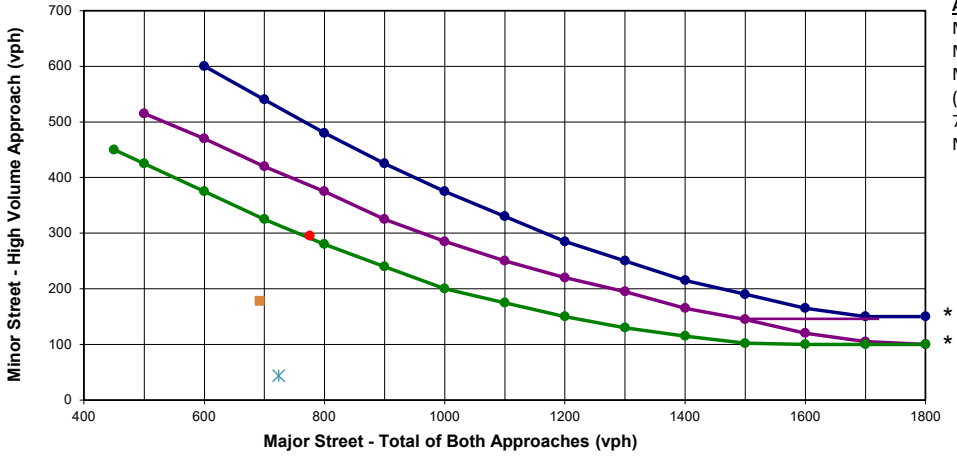
Peak Hour Volume Warrant (Existing + Development)
Bailey Rd and Drive 1



AM & PM Volumes:
Major (AM) - 509
Minor (AM) - 33
Major (School Dis.) - 574
Minor (School Dis.) -32 Major (PM) - 657
Minor (PM) - 93

*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.

Peak Hour Volume Warrant (Existing + Development)
Bailey Road & Drive 2



AM & PM Volumes:
Major (AM) - 776
Minor (AM) - 295
Major (School Dis.) - 693 Minor (School Dis.) - 178 Major (PM) - 724
Minor (PM) - 43

*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.

Lane Warrants

Lee's Summit AMC Lane Warrants (Applied along Bailey Rd)

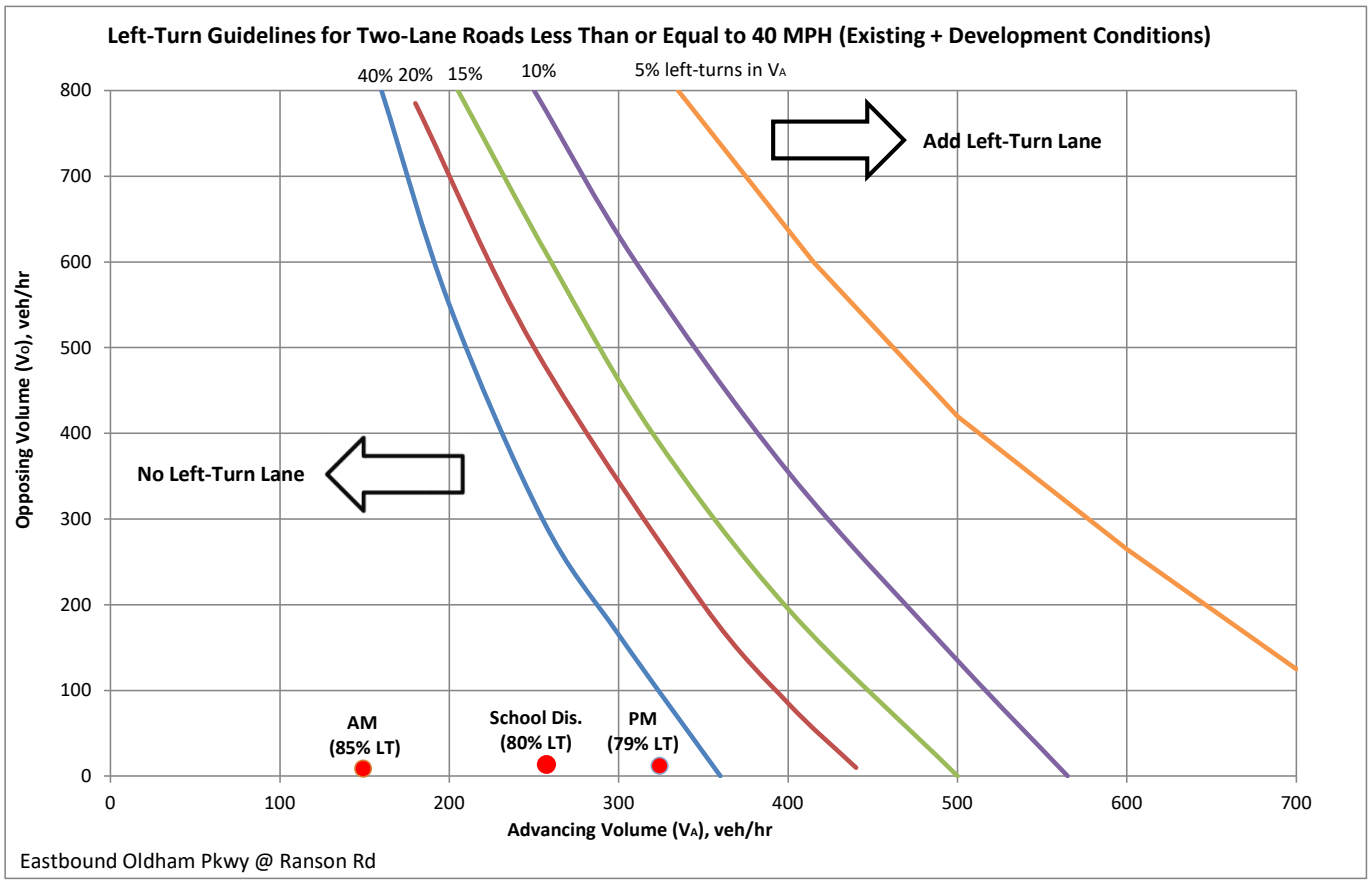
Existing + Development Conditions

Left Turns

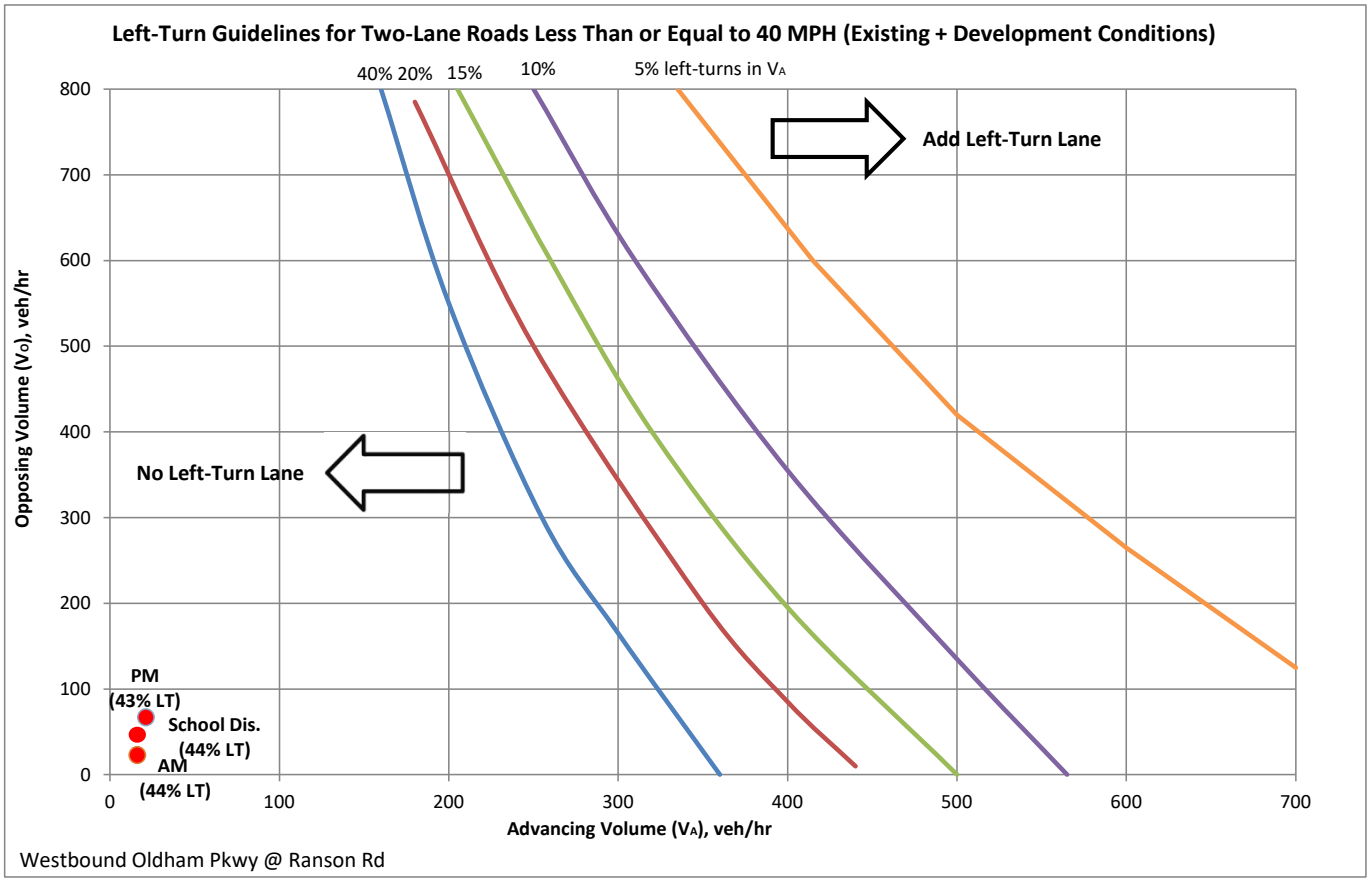
- Hamblen Rd (west) and Bailey Rd
  - EB, SB, WB existing or planned
  - NB warranted under existing
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - NB existing
  - EB, WB, SB warranted under existing
- Ranson Rd & Bailey
  - LS Criterial only applied to EB approach. N/S approach MoDOT road.
  - EB warranted under existing
- School Drive 1 & Bailey
  - WB warranted
    - AMC 16.1.B – minor arterial intersection with driveway and >20 LT vph (met in all three time periods)
  - NB warranted
    - AMC 16.1.D – non-residential connector with minor arterial and >20 LT vph (met in PM)
- School Drive 2 & Bailey
  - WB warranted
    - AMC 16.1.B – minor arterial intersection with driveway and >20 LT vph (met in all three time periods)
  - NB warranted
    - AMC 16.1.D – non-residential connector with minor arterial and >20 LT vph (met in School Arrival and Dismissal)

Right Turns

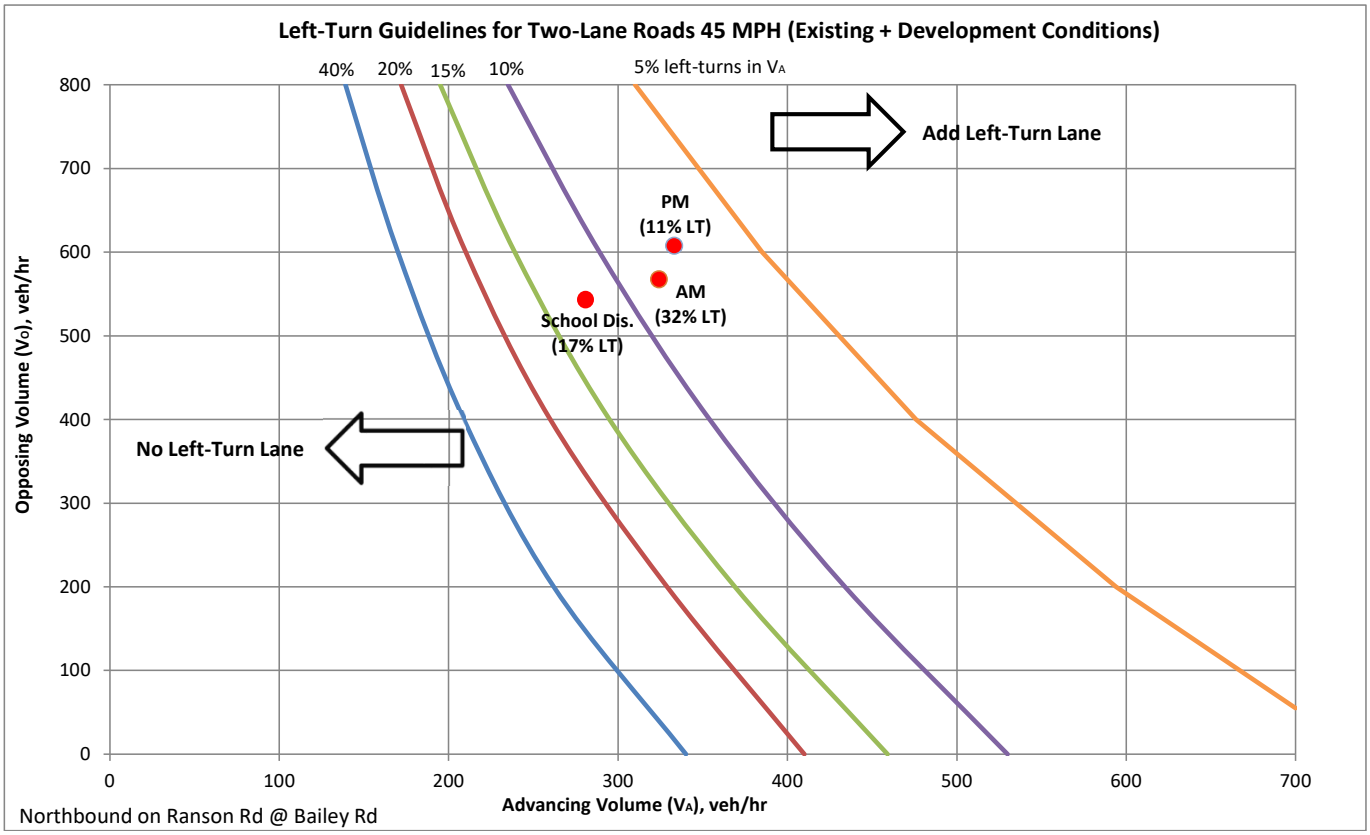
- Hamblen Rd (west) and Bailey Rd
  - WB, SB warranted under existing
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - EB existing
  - NB warranted under existing
- Ranson Rd & Bailey
  - LS Criteria only applied to EB approach. N/S approach MoDOT road.
  - EB warranted under existing



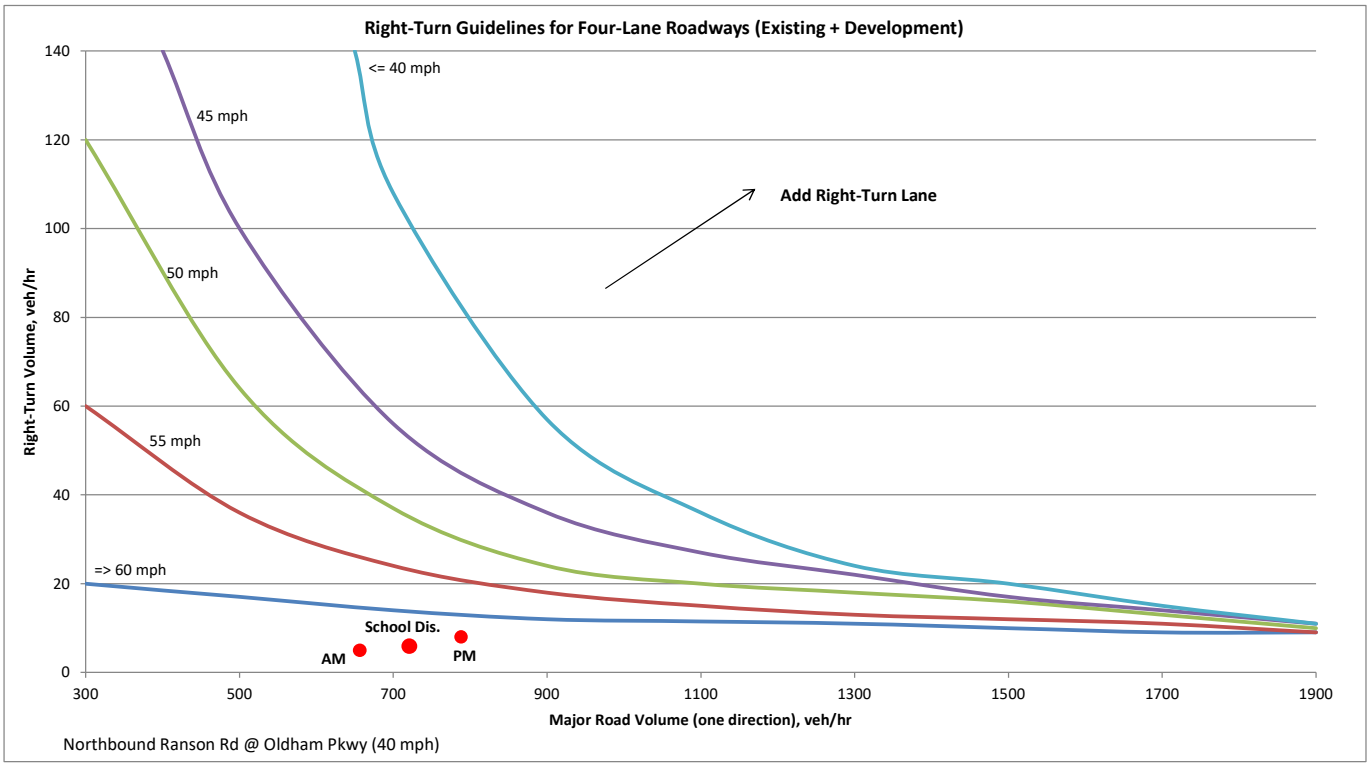
Eastbound Oldham Pkwy @ Ranson Rd



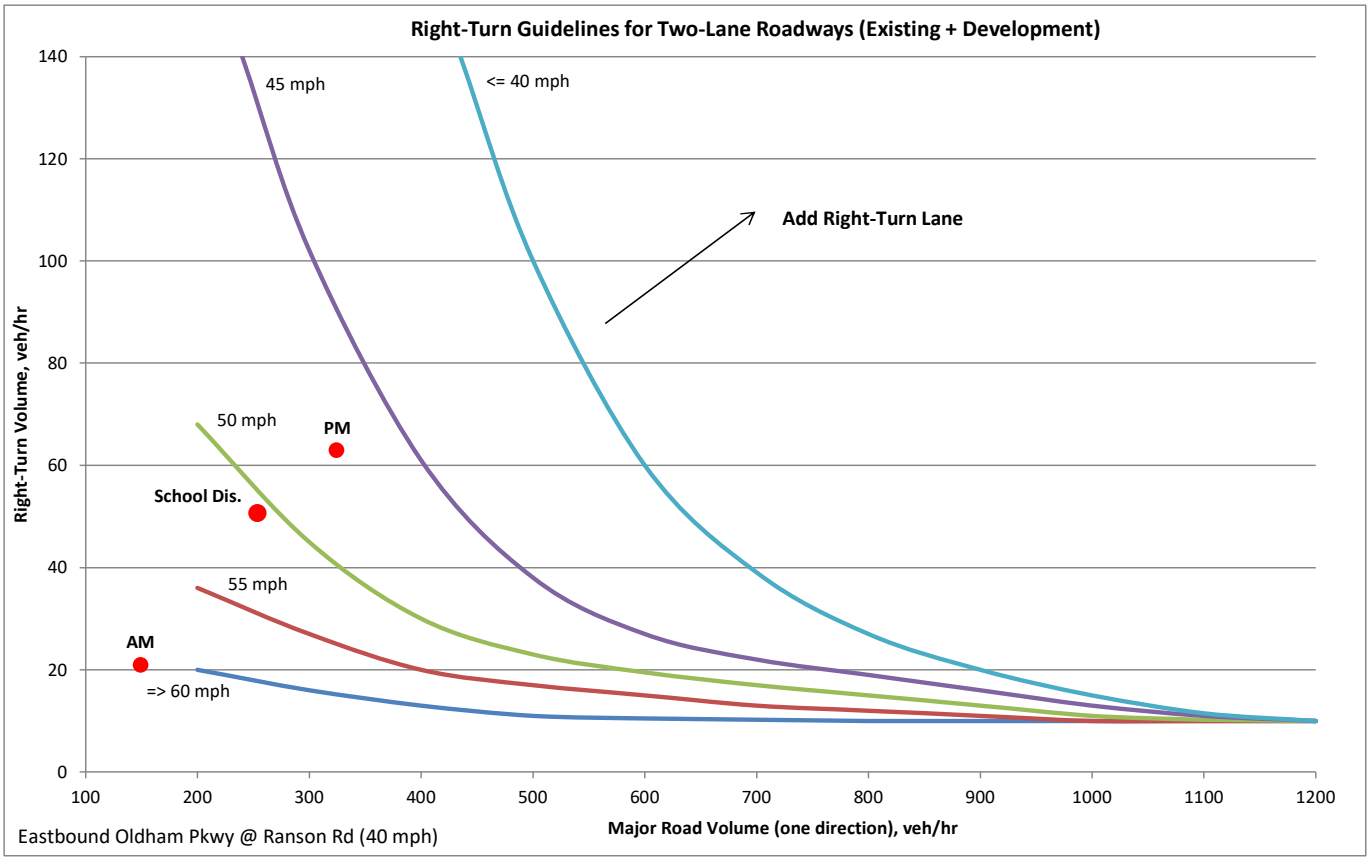
Westbound Oldham Pkwy @ Ranson Rd

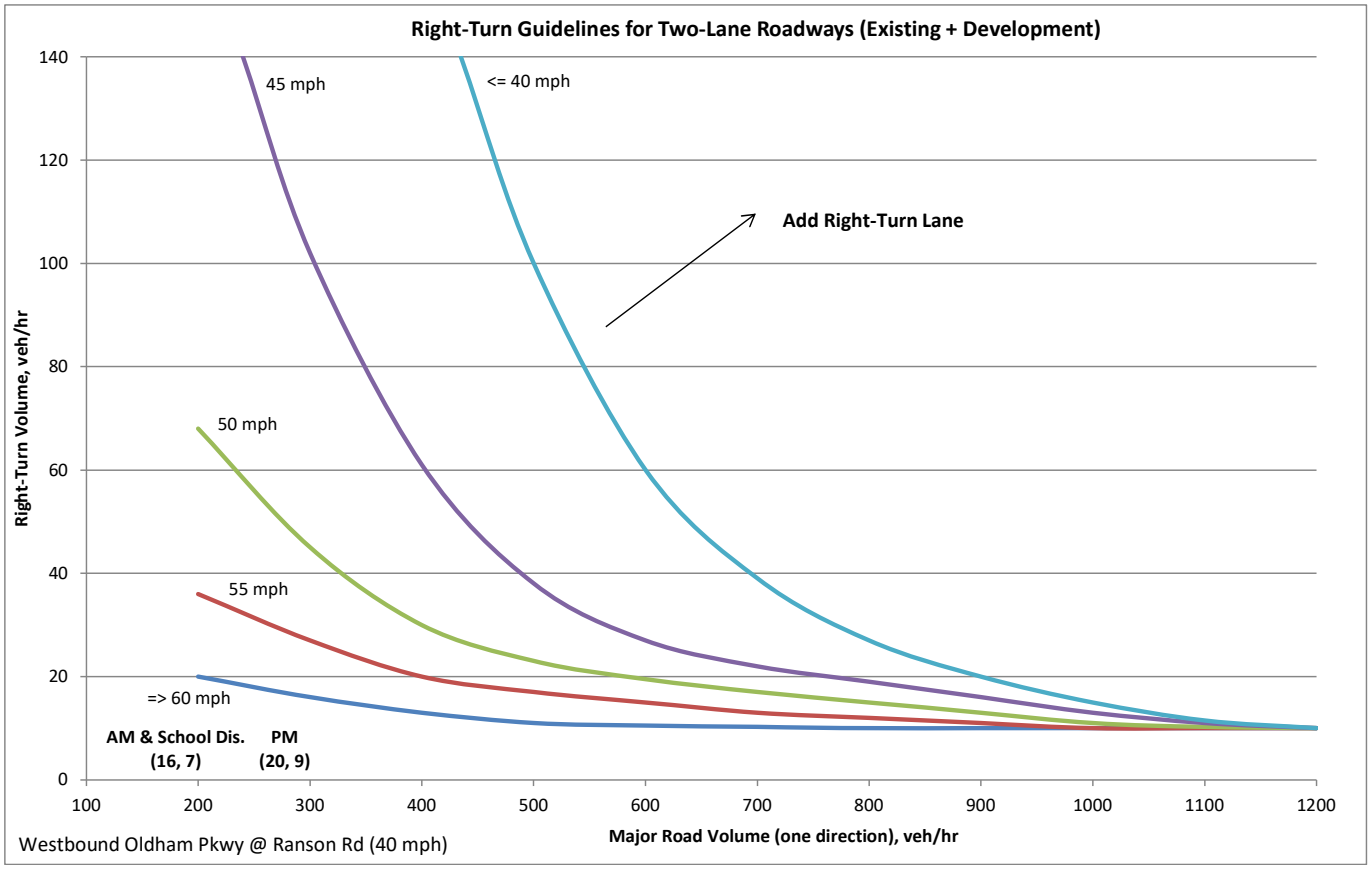


Northbound on Ranson Rd @ Bailey Rd

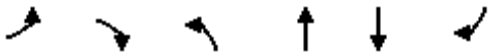


Northbound Ranson Rd @ Oldham Pkwy (40 mph)


Right-Turn Guidelines for Two-Lane Roadways (Existing + Development)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
PM
School Dis.
55 mph
AM
=> 60 mph
Eastbound Oldham Pkwy @ Ranson Rd (40 mph)

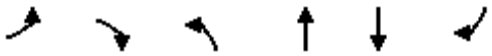

Right-Turn Guidelines for Two-Lane Roadways (Existing + Development)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
55 mph
=> 60 mph
AM & School Dis.
(16, 7)
PM
(20, 9)
Westbound Oldham Pkwy @ Ranson Rd (40 mph)

Capacity Analysis



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	405	99	125	256	164	515
v/c Ratio	0.60	0.15	0.33	0.46	0.29	0.33
Control Delay	14.4	3.1	15.2	15.5	13.7	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	3.1	15.2	15.5	13.7	0.5
Queue Length 50th (ft)	65	0	21	45	27	0
Queue Length 95th (ft)	139	17	61	113	62	0
Internal Link Dist (ft)	1588			795	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1304	1192	1111	1645	1645	1498
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.08	0.11	0.16	0.10	0.34

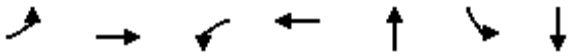
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	336	82	104	220	120	448
Future Volume (veh/h)	336	82	104	220	120	448
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	405	99	125	256	164	515
Peak Hour Factor	0.83	0.83	0.83	0.86	0.73	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	546	486	422	628	628	1018
Arrive On Green	0.31	0.31	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1585	761	1870	1870	1585
Grp Volume(v), veh/h	405	99	125	256	164	515
Grp Sat Flow(s),veh/h/ln	1781	1585	761	1870	1870	1585
Q Serve(g_s), s	6.8	1.5	4.8	3.5	2.1	5.8
Cycle Q Clear(g_c), s	6.8	1.5	6.9	3.5	2.1	5.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	546	486	422	628	628	1018
V/C Ratio(X)	0.74	0.20	0.30	0.41	0.26	0.51
Avail Cap(c_a), veh/h	1540	1371	1051	2175	2175	2329
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	10.4	8.6	10.6	8.6	8.1	3.2
Incr Delay (d2), s/veh	2.0	0.2	0.4	0.4	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.4	0.5	0.8	0.5	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.5	8.8	11.0	9.0	8.3	3.6
LnGrp LOS	B	A	B	A	A	A
Approach Vol, veh/h	504			381	679	
Approach Delay, s/veh	11.7			9.7	4.7	
Approach LOS	B			A	A	

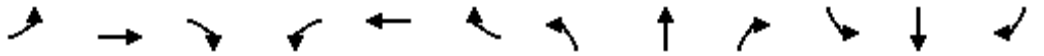
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		17.3		16.3		17.3
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		39.0		29.0		39.0
Max Q Clear Time (g_c+I1), s		8.9		8.8		7.8
Green Ext Time (p_c), s		2.3		1.5		2.8

Intersection Summary	
HCM 6th Ctrl Delay	8.2
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	320	260	8	537	32	148	216
v/c Ratio	0.58	0.18	0.01	0.56	0.11	0.72	0.52
Control Delay	9.7	4.9	12.2	14.4	25.8	55.3	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	4.9	12.2	14.4	25.8	55.3	13.0
Queue Length 50th (ft)	59	42	2	97	12	80	18
Queue Length 95th (ft)	88	66	5	159	16	131	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	630	1469	545	964	346	241	453
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.18	0.01	0.56	0.09	0.61	0.48

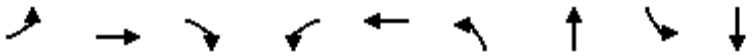
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	195	11	4	228	195	0	11	2	124	14	169
Future Volume (veh/h)	266	195	11	4	228	195	0	11	2	124	14	169
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	320	232	28	8	308	229	0	24	8	148	36	180
Peak Hour Factor	0.83	0.84	0.39	0.50	0.74	0.85	0.25	0.46	0.25	0.84	0.39	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	732	1207	146	684	559	416	0	211	70	276	43	213
Arrive On Green	0.10	0.71	0.71	1.00	1.00	1.00	0.00	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1781	1703	205	1119	1036	770	0	1342	447	1377	271	1355
Grp Volume(v), veh/h	320	0	260	8	0	537	0	0	32	148	0	216
Grp Sat Flow(s),veh/h/ln	1781	0	1908	1119	0	1807	0	0	1790	1377	0	1626
Q Serve(g_s), s	6.6	0.0	4.1	0.0	0.0	0.0	0.0	0.0	1.4	9.3	0.0	11.6
Cycle Q Clear(g_c), s	6.6	0.0	4.1	0.0	0.0	0.0	0.0	0.0	1.4	10.7	0.0	11.6
Prop In Lane	1.00		0.11	1.00		0.43	0.00		0.25	1.00		0.83
Lane Grp Cap(c), veh/h	732	0	1353	684	0	975	0	0	282	276	0	256
V/C Ratio(X)	0.44	0.00	0.19	0.01	0.00	0.55	0.00	0.00	0.11	0.54	0.00	0.84
Avail Cap(c_a), veh/h	904	0	1353	684	0	975	0	0	338	319	0	307
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.93	0.00	0.93	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.2	0.0	4.4	0.0	0.0	0.0	0.0	0.0	32.5	37.1	0.0	36.8
Incr Delay (d2), s/veh	0.4	0.0	0.3	0.0	0.0	2.1	0.0	0.0	0.2	1.6	0.0	16.4
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	2.1	0.0	1.4	0.0	0.0	0.6	0.0	0.0	0.6	3.2	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.6	0.0	4.7	0.0	0.0	2.1	0.0	0.0	32.7	38.7	0.0	53.2
LnGrp LOS	A	A	A	A	A	A	A	A	C	D	A	D
Approach Vol, veh/h		580			545			32			364	
Approach Delay, s/veh		5.8			2.1			32.7			47.3	
Approach LOS		A			A			C			D	

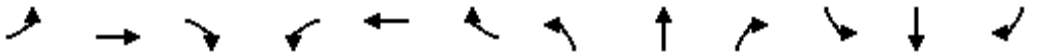
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	15.3	54.6		20.2		69.8		20.2				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	18.0	37.0		17.0		61.0		17.0				
Max Q Clear Time (g_c+I1), s	8.6	2.0		13.6		6.1		3.4				
Green Ext Time (p_c), s	0.7	4.0		0.6		1.6		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		14.9	
HCM 6th LOS		B	



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	244	88	56	524	80	28	20	36
v/c Ratio	0.09	0.16	0.06	0.06	0.36	0.49	0.13	0.12	0.15
Control Delay	2.6	2.3	0.3	3.9	4.9	46.2	21.9	35.1	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	2.3	0.3	3.9	4.9	46.2	21.9	35.1	17.0
Queue Length 50th (ft)	4	17	1	7	82	43	6	10	4
Queue Length 95th (ft)	7	30	0	13	120	77	13	20	4
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	662	1567	1433	891	1452	334	428	336	476
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.16	0.06	0.06	0.36	0.24	0.07	0.06	0.08

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	193	67	34	360	36	67	6	11	12	3	20
Future Volume (veh/h)	39	193	67	34	360	36	67	6	11	12	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	60	244	88	56	480	44	80	12	16	20	8	28
Peak Hour Factor	0.65	0.79	0.76	0.61	0.75	0.82	0.84	0.50	0.69	0.60	0.38	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	673	1492	1265	884	1295	119	190	72	96	197	38	132
Arrive On Green	1.00	1.00	1.00	0.77	0.77	0.77	0.10	0.10	0.10	0.10	0.10	0.10
Sat Flow, veh/h	878	1945	1648	1048	1688	155	1372	727	969	1382	379	1327
Grp Volume(v), veh/h	60	244	88	56	0	524	80	0	28	20	0	36
Grp Sat Flow(s),veh/h/ln	878	1945	1648	1048	0	1843	1372	0	1696	1382	0	1706
Q Serve(g_s), s	0.8	0.0	0.0	1.2	0.0	8.3	5.1	0.0	1.4	1.2	0.0	1.7
Cycle Q Clear(g_c), s	9.1	0.0	0.0	1.2	0.0	8.3	6.9	0.0	1.4	2.6	0.0	1.7
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.57	1.00		0.78
Lane Grp Cap(c), veh/h	673	1492	1265	884	0	1414	190	0	169	197	0	170
V/C Ratio(X)	0.09	0.16	0.07	0.06	0.00	0.37	0.42	0.00	0.17	0.10	0.00	0.21
Avail Cap(c_a), veh/h	673	1492	1265	884	0	1414	389	0	415	397	0	417
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.6	0.0	0.0	2.6	0.0	3.4	40.4	0.0	37.1	38.3	0.0	37.3
Incr Delay (d2), s/veh	0.2	0.2	0.1	0.1	0.0	0.7	1.5	0.0	0.5	0.2	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.2	0.0	2.3	1.7	0.0	0.6	0.4	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.8	0.2	0.1	2.7	0.0	4.2	41.9	0.0	37.6	38.5	0.0	37.9
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	D
Approach Vol, veh/h		392			580			108			56	
Approach Delay, s/veh		0.3			4.0			40.8			38.1	
Approach LOS		A			A			D			D	

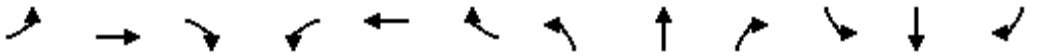
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		75.1		14.9		75.1		14.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		56.0		22.0		56.0		22.0				
Max Q Clear Time (g_c+I1), s		10.3		4.6		11.1		8.9				
Green Ext Time (p_c), s		4.0		0.2		2.1		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			7.9									
HCM 6th LOS			A									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	179	21	37	676	8	602	259
v/c Ratio	0.69	0.07	0.08	0.29	0.02	0.54	0.25
Control Delay	45.8	19.9	6.6	8.6	6.9	12.9	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Total Delay	45.8	19.9	6.6	8.6	6.9	13.1	2.1
Queue Length 50th (ft)	91	6	6	69	1	108	3
Queue Length 95th (ft)	132	19	20	171	m5	415	20
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	428	483	479	2315	531	1113	1050
Starvation Cap Reductn	0	0	0	0	0	97	253
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.04	0.08	0.29	0.02	0.59	0.32

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	2	21	7	2	7	34	617	5	7	554	238
Future Volume (veh/h)	126	2	21	7	2	7	34	617	5	7	554	238
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	2	25	9	3	9	37	671	5	8	602	259
Peak Hour Factor	0.83	0.83	0.83	0.78	0.78	0.78	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	257	2	30	144	58	108	537	2320	17	525	1156	980
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.03	0.64	0.64	0.02	1.00	1.00
Sat Flow, veh/h	1235	16	203	584	388	729	1781	3615	27	1781	1870	1585
Grp Volume(v), veh/h	179	0	0	21	0	0	37	330	346	8	602	259
Grp Sat Flow(s),veh/h/ln	1455	0	0	1702	0	0	1781	1777	1866	1781	1870	1585
Q Serve(g_s), s	9.8	0.0	0.0	0.0	0.0	0.0	0.7	7.3	7.4	0.1	0.0	0.0
Cycle Q Clear(g_c), s	10.7	0.0	0.0	0.9	0.0	0.0	0.7	7.3	7.4	0.1	0.0	0.0
Prop In Lane	0.85		0.14	0.43		0.43	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	290	0	0	310	0	0	537	1140	1197	525	1156	980
V/C Ratio(X)	0.62	0.00	0.00	0.07	0.00	0.00	0.07	0.29	0.29	0.02	0.52	0.26
Avail Cap(c_a), veh/h	522	0	0	558	0	0	615	1140	1197	646	1156	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	37.1	0.0	0.0	33.0	0.0	0.0	5.6	7.1	7.1	5.7	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.0	0.0	0.1	0.0	0.0	0.1	0.6	0.6	0.0	1.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	0.4	0.0	0.0	0.2	2.5	2.6	0.0	0.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	0.0	0.0	33.1	0.0	0.0	5.6	7.7	7.7	5.7	1.6	0.6
LnGrp LOS	D	A	A	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		179			21			713			869	
Approach Delay, s/veh		39.2			33.1			7.6			1.3	
Approach LOS		D			C			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	63.7		19.3	9.0	61.6		19.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	37.0		28.0	7.0	37.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	9.4		12.7	2.7	2.0		2.9				
Green Ext Time (p_c), s	0.0	4.1		0.7	0.0	5.2		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		8.0
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	196	6	32	275	5	28
Future Vol, veh/h	196	6	32	275	5	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	60	60
Heavy Vehicles, %	2	80	80	2	80	80
Mvmt Flow	236	7	39	331	8	47

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	243	0	649	240
Stage 1	-	-	-	-	240	-
Stage 2	-	-	-	-	409	-
Critical Hdwy	-	-	4.9	-	7.2	7
Critical Hdwy Stg 1	-	-	-	-	6.2	-
Critical Hdwy Stg 2	-	-	-	-	6.2	-
Follow-up Hdwy	-	-	2.92	-	4.22	4.02
Pot Cap-1 Maneuver	-	-	976	-	333	640
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	531	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	976	-	320	640
Mov Cap-2 Maneuver	-	-	-	-	320	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	510	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	556	-	-	976	-
HCM Lane V/C Ratio	0.099	-	-	0.04	-
HCM Control Delay (s)	12.2	-	-	8.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	7.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	170	54	292	260	47	248
Future Vol, veh/h	170	54	292	260	47	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	87	87	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	65	336	299	57	299

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	1209	238
Stage 1	-	-	-	-	238	-
Stage 2	-	-	-	-	971	-
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	-	-	1293	-	202	801
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	367	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1293	-	149	801
Mov Cap-2 Maneuver	-	-	-	-	149	-
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	272	-

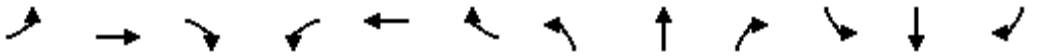
Approach	EB	WB	NB
HCM Control Delay, s	0	4.6	17.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	149	801	-	-	1293	-
HCM Lane V/C Ratio	0.38	0.373	-	-	0.26	-
HCM Control Delay (s)	43.3	12.1	-	-	8.8	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	1.6	1.7	-	-	1	-

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	303	164	602	260	128	789
v/c Ratio	0.60	0.40	0.46	0.35	0.33	0.32
Control Delay	41.0	5.1	23.7	6.7	4.0	4.2
Queue Delay	0.0	0.0	0.5	0.3	0.0	0.0
Total Delay	41.0	5.2	24.2	7.0	4.0	4.2
Queue Length 50th (ft)	83	0	152	9	5	117
Queue Length 95th (ft)	119	0	197	96	7	m101
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	556	433	1305	748	392	2502
Starvation Cap Reductn	0	0	319	155	0	0
Spillback Cap Reductn	0	3	0	0	0	50
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.38	0.61	0.44	0.33	0.32

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	0	113	0	0	0	0	524	226	102	686	0
Future Volume (vph)	264	0	113	0	0	0	0	524	226	102	686	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.36	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	641	3539	
Peak-hour factor, PHF	0.87	0.25	0.69	1.00	1.00	1.00	1.00	0.87	0.87	0.80	0.87	1.00
Adj. Flow (vph)	303	0	164	0	0	0	0	602	260	128	789	0
RTOR Reduction (vph)	0	0	140	0	0	0	0	0	164	0	0	0
Lane Group Flow (vph)	303	0	24	0	0	0	0	602	96	128	789	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2 4	
Permitted Phases									2	2		
Actuated Green, G (s)	13.3		13.3					33.2	33.2	41.3	63.5	
Effective Green, g (s)	13.3		13.3					33.2	33.2	41.3	63.5	
Actuated g/C Ratio	0.15		0.15					0.37	0.37	0.46	0.71	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	507		233					1305	583	390	2496	
v/s Ratio Prot	c0.09		0.02					c0.17		0.03	c0.22	
v/s Ratio Perm									0.06	0.12		
v/c Ratio	0.60		0.10					0.46	0.16	0.33	0.32	
Uniform Delay, d1	35.8		33.2					21.6	19.1	19.5	5.0	
Progression Factor	1.00		1.00					1.03	1.97	0.16	0.79	
Incremental Delay, d2	2.2		0.3					1.1	0.6	0.4	0.0	
Delay (s)	38.1		33.5					23.4	38.2	3.5	4.0	
Level of Service	D		C					C	D	A	A	
Approach Delay (s)		36.5			0.0			27.8			3.9	
Approach LOS		D			A			C			A	

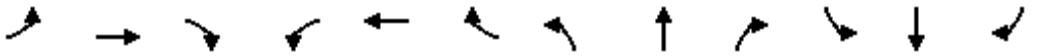
Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	421	297	177	731	751	339
v/c Ratio	1.41	0.67	0.53	0.30	0.59	0.45
Control Delay	235.9	19.5	15.5	4.2	15.6	10.0
Queue Delay	0.0	0.0	0.0	0.0	2.5	1.3
Total Delay	235.9	19.5	15.5	4.2	18.2	11.3
Queue Length 50th (ft)	~326	44	40	95	176	110
Queue Length 95th (ft)	#482	82	99	115	237	183
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	298	442	333	2469	1263	747
Starvation Cap Reductn	0	0	0	0	374	227
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.41	0.67	0.53	0.30	0.84	0.65

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.



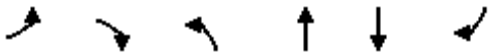
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	366	0	226	159	629	0	0	422	508
Future Volume (vph)	0	0	0	366	0	226	159	629	0	0	422	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.95	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3210	1441
Flt Permitted				0.95		1.00	0.25	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	443	3539			3210	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.87	1.00	0.76	0.90	0.86	1.00	1.00	0.87	0.84
Adj. Flow (vph)	0	0	0	421	0	297	177	731	0	0	485	605
RTOR Reduction (vph)	0	0	0	0	0	175	0	0	0	0	72	213
Lane Group Flow (vph)	0	0	0	421	0	122	177	731	0	0	679	126
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				15.2		15.2	42.1	62.7			33.4	33.4
Effective Green, g (s)				15.2		15.2	42.1	56.1			33.4	33.4
Actuated g/C Ratio				0.17		0.17	0.47	0.62			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				298		267	329	2205			1191	534
v/s Ratio Prot				c0.24		0.08	c0.05	c0.21			c0.21	
v/s Ratio Perm							0.20					0.09
v/c Ratio				1.41		0.46	0.54	0.33			0.57	0.24
Uniform Delay, d1				37.4		33.7	26.0	8.0			22.6	19.5
Progression Factor				1.00		1.00	0.53	0.74			0.71	3.26
Incremental Delay, d2				204.5		1.7	1.5	0.1			1.8	1.0
Delay (s)				241.9		35.4	15.4	6.0			17.9	64.6
Level of Service				F		D	B	A			B	E
Approach Delay (s)		0.0			156.5			7.8			32.4	
Approach LOS		A			F			A			C	

Intersection Summary			
HCM 2000 Control Delay	57.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

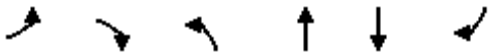
2: Ranson Rd (Rt RA) & Bailey Rd

05/07/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	461	106	58	259	324	291
v/c Ratio	0.66	0.15	0.18	0.44	0.55	0.18
Control Delay	16.8	3.1	14.3	16.1	18.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	3.1	14.3	16.1	18.0	0.3
Queue Length 50th (ft)	86	0	10	49	64	0
Queue Length 95th (ft)	197	21	36	133	168	0
Internal Link Dist (ft)	1588			795	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1385	1261	791	1409	1409	1552
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.08	0.07	0.18	0.23	0.19

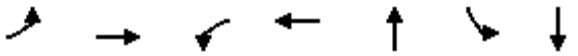
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	401	92	48	238	295	253
Future Volume (veh/h)	401	92	48	238	295	253
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	461	106	58	259	324	291
Peak Hour Factor	0.87	0.87	0.83	0.92	0.91	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	604	538	346	588	588	1036
Arrive On Green	0.34	0.34	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1781	1585	807	1870	1870	1585
Grp Volume(v), veh/h	461	106	58	259	324	291
Grp Sat Flow(s),veh/h/ln	1781	1585	807	1870	1870	1585
Q Serve(g_s), s	8.0	1.6	2.2	3.8	5.0	2.7
Cycle Q Clear(g_c), s	8.0	1.6	7.2	3.8	5.0	2.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	604	538	346	588	588	1036
V/C Ratio(X)	0.76	0.20	0.17	0.44	0.55	0.28
Avail Cap(c_a), veh/h	1748	1555	884	1835	1835	2093
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	10.2	8.1	12.8	9.5	9.8	2.5
Incr Delay (d2), s/veh	2.0	0.2	0.2	0.5	0.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.4	0.3	1.0	1.3	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.2	8.3	13.1	10.0	10.7	2.7
LnGrp LOS	B	A	B	A	B	A
Approach Vol, veh/h	567			317	615	
Approach Delay, s/veh	11.5			10.5	6.9	
Approach LOS	B			B	A	

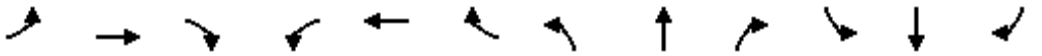
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		16.9		17.8		16.9
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		9.2		10.0		7.0
Green Ext Time (p_c), s		1.7		1.8		2.8

Intersection Summary	
HCM 6th Ctrl Delay	9.4
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	198	293	4	402	39	263	288
v/c Ratio	0.38	0.23	0.01	0.48	0.09	0.81	0.47
Control Delay	11.0	9.4	18.0	20.7	20.8	49.9	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	9.4	18.0	20.7	20.8	49.9	5.9
Queue Length 50th (ft)	47	72	2	187	14	137	2
Queue Length 95th (ft)	89	123	2	279	23	211	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	542	1287	458	842	513	396	689
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.23	0.01	0.48	0.08	0.66	0.42

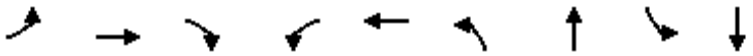
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	257	2	1	212	142	5	14	4	231	2	246
Future Volume (veh/h)	178	257	2	1	212	142	5	14	4	231	2	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	198	289	4	4	233	169	10	23	6	262	5	283
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	585	1098	15	541	445	323	104	221	50	375	8	457
Arrive On Green	0.08	0.57	0.57	0.85	0.85	0.85	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	1781	1914	26	1086	1048	760	184	756	171	1381	28	1562
Grp Volume(v), veh/h	198	0	293	4	0	402	39	0	0	262	0	288
Grp Sat Flow(s),veh/h/ln	1781	0	1940	1086	0	1808	1111	0	0	1381	0	1589
Q Serve(g_s), s	5.3	0.0	6.8	0.1	0.0	5.4	0.2	0.0	0.0	9.4	0.0	14.1
Cycle Q Clear(g_c), s	5.3	0.0	6.8	0.1	0.0	5.4	14.3	0.0	0.0	23.7	0.0	14.1
Prop In Lane	1.00		0.01	1.00		0.42	0.26		0.15	1.00		0.98
Lane Grp Cap(c), veh/h	585	0	1114	541	0	768	376	0	0	375	0	465
V/C Ratio(X)	0.34	0.00	0.26	0.01	0.00	0.52	0.10	0.00	0.00	0.70	0.00	0.62
Avail Cap(c_a), veh/h	656	0	1114	541	0	768	404	0	0	400	0	494
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.92	0.00	0.92	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	9.6	3.9	0.0	4.3	23.4	0.0	0.0	32.8	0.0	27.5
Incr Delay (d2), s/veh	0.3	0.0	0.6	0.0	0.0	2.3	0.1	0.0	0.0	4.9	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	2.8	0.0	0.0	1.8	0.6	0.0	0.0	5.9	0.0	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.9	0.0	10.2	3.9	0.0	6.6	23.5	0.0	0.0	37.8	0.0	29.6
LnGrp LOS	B	A	B	A	A	A	C	A	A	D	A	C
Approach Vol, veh/h		491			406			39			550	
Approach Delay, s/veh		10.9			6.6			23.5			33.5	
Approach LOS		B			A			C			C	

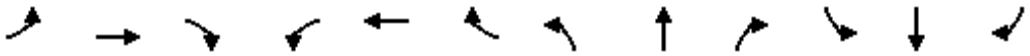
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	13.4	44.2		32.3		57.7		32.3				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	11.0	33.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	7.3	7.4		25.7		8.8		16.3				
Green Ext Time (p_c), s	0.2	2.6		0.7		1.8		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	461	132	63	256	169	77	41	89
v/c Ratio	0.10	0.34	0.11	0.11	0.21	0.68	0.21	0.16	0.22
Control Delay	4.0	4.5	0.4	7.1	6.6	47.3	10.9	29.4	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	4.5	0.4	7.1	6.6	47.3	10.9	29.4	12.9
Queue Length 50th (ft)	8	53	0	11	45	90	6	20	14
Queue Length 95th (ft)	14	73	0	22	98	113	18	40	47
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	757	1344	1251	585	1239	477	638	482	733
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.34	0.11	0.11	0.21	0.35	0.12	0.09	0.12

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	364	100	40	206	17	125	8	54	34	26	47
Future Volume (veh/h)	50	364	100	40	206	17	125	8	54	34	26	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	77	461	132	63	224	32	169	13	64	41	29	60
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	769	1298	1100	630	1068	153	284	55	270	291	113	233
Arrive On Green	1.00	1.00	1.00	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1124	1945	1648	824	1601	229	1308	275	1352	1322	565	1169
Grp Volume(v), veh/h	77	461	132	63	0	256	169	0	77	41	0	89
Grp Sat Flow(s),veh/h/ln	1124	1945	1648	824	0	1829	1308	0	1627	1322	0	1735
Q Serve(g_s), s	0.6	0.0	0.0	2.5	0.0	4.9	11.3	0.0	3.6	2.4	0.0	3.9
Cycle Q Clear(g_c), s	5.4	0.0	0.0	2.5	0.0	4.9	15.2	0.0	3.6	6.0	0.0	3.9
Prop In Lane	1.00		1.00	1.00		0.13	1.00		0.83	1.00		0.67
Lane Grp Cap(c), veh/h	769	1298	1100	630	0	1220	284	0	325	291	0	346
V/C Ratio(X)	0.10	0.36	0.12	0.10	0.00	0.21	0.59	0.00	0.24	0.14	0.00	0.26
Avail Cap(c_a), veh/h	769	1298	1100	630	0	1220	503	0	597	512	0	636
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.2	0.0	0.0	5.4	0.0	5.8	36.8	0.0	30.3	32.8	0.0	30.4
Incr Delay (d2), s/veh	0.2	0.7	0.2	0.3	0.0	0.4	2.0	0.0	0.4	0.2	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	0.0	0.2	0.1	0.4	0.0	1.7	3.6	0.0	1.4	0.8	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.4	0.7	0.2	5.7	0.0	6.2	38.8	0.0	30.6	33.0	0.0	30.8
LnGrp LOS	A	A	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		670			319			246			130	
Approach Delay, s/veh		0.5			6.1			36.2			31.5	
Approach LOS		A			A			D			C	

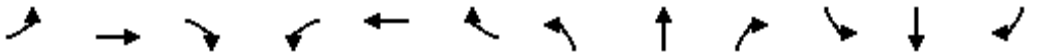
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		66.0		24.0		66.0		24.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		45.0		33.0		45.0		33.0				
Max Q Clear Time (g_c+I1), s		6.9		8.0		7.4		17.2				
Green Ext Time (p_c), s		2.0		0.6		3.9		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			11.2									
HCM 6th LOS			B									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	297	21	32	741	8	622	201
v/c Ratio	0.81	0.05	0.09	0.36	0.02	0.63	0.22
Control Delay	46.6	15.9	9.7	12.3	4.0	12.1	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	15.9	9.7	12.3	4.0	12.1	2.1
Queue Length 50th (ft)	150	5	7	103	0	168	0
Queue Length 95th (ft)	214	17	22	214	m2	#357	42
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	466	504	357	2060	416	982	930
Starvation Cap Reductn	0	0	0	0	0	8	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.04	0.09	0.36	0.02	0.64	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	3	50	7	2	7	29	675	6	7	572	185
Future Volume (veh/h)	206	3	50	7	2	7	29	675	6	7	572	185
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	237	3	57	9	3	9	32	734	7	8	622	201
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	341	3	65	201	77	166	492	2013	19	418	1005	852
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.56	0.56	0.02	1.00	1.00
Sat Flow, veh/h	1159	15	279	619	333	714	1781	3607	34	1781	1870	1585
Grp Volume(v), veh/h	297	0	0	21	0	0	32	362	379	8	622	201
Grp Sat Flow(s),veh/h/ln	1452	0	0	1666	0	0	1781	1777	1864	1781	1870	1585
Q Serve(g_s), s	16.9	0.0	0.0	0.0	0.0	0.0	0.7	10.2	10.2	0.2	0.0	0.0
Cycle Q Clear(g_c), s	17.7	0.0	0.0	0.8	0.0	0.0	0.7	10.2	10.2	0.2	0.0	0.0
Prop In Lane	0.80		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	409	0	0	443	0	0	492	992	1040	418	1005	852
V/C Ratio(X)	0.73	0.00	0.00	0.05	0.00	0.00	0.07	0.36	0.36	0.02	0.62	0.24
Avail Cap(c_a), veh/h	555	0	0	596	0	0	537	992	1040	499	1005	852
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	33.3	0.0	0.0	26.9	0.0	0.0	8.5	11.0	11.0	8.9	0.0	0.0
Incr Delay (d2), s/veh	3.1	0.0	0.0	0.0	0.0	0.0	0.1	1.0	1.0	0.0	2.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	0.0	0.3	0.0	0.0	0.2	3.8	4.0	0.1	0.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	0.0	0.0	26.9	0.0	0.0	8.6	12.1	12.0	8.9	2.7	0.6
LnGrp LOS	D	A	A	C	A	A	A	B	B	A	A	A
Approach Vol, veh/h		297			21			773			831	
Approach Delay, s/veh		36.4			26.9			11.9			2.3	
Approach LOS		D			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	56.2		26.9	8.8	54.4		26.9				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	12.2		19.7	2.7	2.0		2.8				
Green Ext Time (p_c), s	0.0	4.5		1.1	0.0	5.1		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		11.7	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	365	9	23	177	5	27
Future Vol, veh/h	365	9	23	177	5	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	60	60
Heavy Vehicles, %	2	80	80	2	80	80
Mvmt Flow	440	11	28	213	8	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	451	0	715	446
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	269	-
Critical Hdwy	-	-	4.9	-	7.2	7
Critical Hdwy Stg 1	-	-	-	-	6.2	-
Critical Hdwy Stg 2	-	-	-	-	6.2	-
Follow-up Hdwy	-	-	2.92	-	4.22	4.02
Pot Cap-1 Maneuver	-	-	797	-	302	478
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	797	-	291	478
Mov Cap-2 Maneuver	-	-	-	-	291	-
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	604	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	14.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	434	-	-	797	-
HCM Lane V/C Ratio	0.123	-	-	0.035	-
HCM Control Delay (s)	14.5	-	-	9.7	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	343	49	129	172	28	150
Future Vol, veh/h	343	49	129	172	28	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	413	59	155	207	36	192

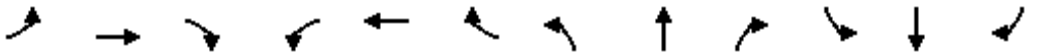
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	472	0	960	443
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	517	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1090	-	285	615
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	598	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1090	-	245	615
Mov Cap-2 Maneuver	-	-	-	-	245	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	245	615	-	-	1090	-
HCM Lane V/C Ratio	0.147	0.313	-	-	0.143	-
HCM Control Delay (s)	22.2	13.5	-	-	8.9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	1.3	-	-	0.5	-

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	474	220	686	351	224	640
v/c Ratio	0.43	0.34	0.53	0.44	0.63	0.34
Control Delay	25.8	4.9	21.0	5.0	21.8	9.7
Queue Delay	0.0	0.0	0.5	0.2	0.0	0.0
Total Delay	25.8	4.9	21.5	5.2	21.8	9.8
Queue Length 50th (ft)	109	0	107	3	59	77
Queue Length 95th (ft)	132	45	183	58	93	113
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	653	1305	805	357	1895
Starvation Cap Reductn	0	0	254	88	0	0
Spillback Cap Reductn	0	8	0	0	0	144
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.34	0.65	0.49	0.63	0.37

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	379	0	194	0	0	0	0	590	298	199	570	0
Future Volume (vph)	379	0	194	0	0	0	0	590	298	199	570	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.30	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	546	3539	
Peak-hour factor, PHF	0.80	0.25	0.88	1.00	1.00	1.00	1.00	0.86	0.85	0.89	0.89	1.00
Adj. Flow (vph)	474	0	220	0	0	0	0	686	351	224	640	0
RTOR Reduction (vph)	0	0	150	0	0	0	0	0	222	0	0	0
Lane Group Flow (vph)	474	0	70	0	0	0	0	686	129	224	640	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1090		503					1305	583	357	1895	
v/s Ratio Prot	c0.14		0.04					0.19		c0.06	0.18	
v/s Ratio Perm									0.08	c0.23		
v/c Ratio	0.43		0.14					0.53	0.22	0.63	0.34	
Uniform Delay, d1	24.3		21.9					22.2	19.5	25.6	11.9	
Progression Factor	1.00		1.00					0.87	1.39	0.78	0.78	
Incremental Delay, d2	0.4		0.2					1.4	0.8	2.8	0.1	
Delay (s)	24.7		22.1					20.7	27.9	22.8	9.3	
Level of Service	C		C					C	C	C	A	
Approach Delay (s)		23.9			0.0			23.1			12.8	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

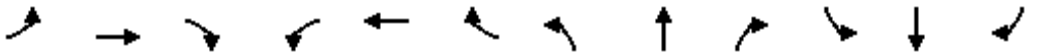
17: Ranson Rd (Rt RA)/Todd George Pkwy & US-50 WB Ramps

05/07/2020

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	210	167	140	1109	747	323
v/c Ratio	0.79	0.35	0.42	0.44	0.60	0.44
Control Delay	58.4	2.0	12.5	3.8	23.3	7.2
Queue Delay	0.0	0.0	0.0	0.0	3.3	1.0
Total Delay	58.4	2.0	12.5	3.8	26.6	8.2
Queue Length 50th (ft)	116	0	20	127	211	71
Queue Length 95th (ft)	#196	0	26	77	281	116
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	335	2528	1246	737
Starvation Cap Reductn	0	0	0	0	387	210
Spillback Cap Reductn	0	1	0	19	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.35	0.42	0.44	0.87	0.61

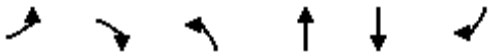
Intersection Summary

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



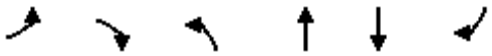
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	176	0	115	115	854	0	0	593	344
Future Volume (vph)	0	0	0	176	0	115	115	854	0	0	593	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3321	1441
Flt Permitted				0.95		1.00	0.25	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	447	3539			3321	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.84	1.00	0.69	0.82	0.77	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	210	0	167	140	1109	0	0	645	425
RTOR Reduction (vph)	0	0	0	0	0	142	0	0	0	0	13	203
Lane Group Flow (vph)	0	0	0	210	0	25	140	1109	0	0	734	120
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				13.6		13.6	42.2	63.9			33.4	33.4
Effective Green, g (s)				13.6		13.6	42.2	63.9			33.4	33.4
Actuated g/C Ratio				0.15		0.15	0.47	0.71			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				267		239	333	2512			1232	534
v/s Ratio Prot				c0.12		0.02	0.04	c0.31			c0.22	
v/s Ratio Perm							0.16					0.08
v/c Ratio				0.79		0.11	0.42	0.44			0.60	0.22
Uniform Delay, d1				36.8		33.0	14.6	5.5			22.8	19.4
Progression Factor				1.00		1.00	0.83	0.60			0.94	2.12
Incremental Delay, d2				14.9		0.3	0.8	0.1			2.0	0.9
Delay (s)				51.7		33.2	12.9	3.4			23.6	42.0
Level of Service				D		C	B	A			C	D
Approach Delay (s)		0.0			43.5			4.5			29.2	
Approach LOS		A			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	462	94	42	324	405	275
v/c Ratio	0.68	0.14	0.15	0.51	0.64	0.17
Control Delay	19.0	3.7	14.2	16.9	19.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	3.7	14.2	16.9	19.7	0.2
Queue Length 50th (ft)	98	0	8	67	89	0
Queue Length 95th (ft)	232	22	29	175	225	0
Internal Link Dist (ft)	1588			795	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1297	1185	590	1319	1319	1521
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.08	0.07	0.25	0.31	0.18

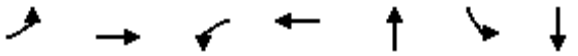
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	402	82	35	298	369	239
Future Volume (veh/h)	402	82	35	298	369	239
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	462	94	42	324	405	275
Peak Hour Factor	0.87	0.87	0.83	0.92	0.91	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	595	530	315	636	636	1069
Arrive On Green	0.33	0.33	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1585	760	1870	1870	1585
Grp Volume(v), veh/h	462	94	42	324	405	275
Grp Sat Flow(s),veh/h/ln	1781	1585	760	1870	1870	1585
Q Serve(g_s), s	8.6	1.5	1.8	5.1	6.7	2.5
Cycle Q Clear(g_c), s	8.6	1.5	8.5	5.1	6.7	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	595	530	315	636	636	1069
V/C Ratio(X)	0.78	0.18	0.13	0.51	0.64	0.26
Avail Cap(c_a), veh/h	1644	1463	758	1726	1726	1993
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.0	8.7	13.8	9.7	10.2	2.4
Incr Delay (d2), s/veh	2.2	0.2	0.2	0.6	1.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.4	0.2	1.4	1.8	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.2	8.8	14.0	10.3	11.3	2.5
LnGrp LOS	B	A	B	B	B	A
Approach Vol, veh/h	556			366	680	
Approach Delay, s/veh	12.5			10.8	7.7	
Approach LOS	B			B	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		18.5		18.3		18.5
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		10.5		10.6		8.7
Green Ext Time (p_c), s		2.0		1.8		3.2

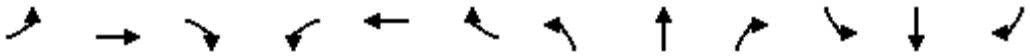
Intersection Summary	
HCM 6th Ctrl Delay	10.1
HCM 6th LOS	B



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	247	351	4	512	48	278	362
v/c Ratio	0.57	0.28	0.01	0.65	0.11	0.83	0.53
Control Delay	14.9	10.2	22.0	29.7	20.5	51.2	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	10.2	22.0	29.7	20.5	51.2	6.1
Queue Length 50th (ft)	64	93	2	258	17	144	3
Queue Length 95th (ft)	110	149	2	#338	26	#229	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	461	1264	407	791	494	392	738
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.28	0.01	0.65	0.10	0.71	0.49

Intersection Summary

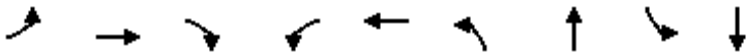
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	309	2	1	249	200	6	17	5	245	3	308
Future Volume (veh/h)	222	309	2	1	249	200	6	17	5	245	3	308
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	247	347	4	4	274	238	12	28	8	278	8	354
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	471	1066	12	477	370	321	91	194	47	347	11	484
Arrive On Green	0.10	0.56	0.56	0.77	0.77	0.77	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1781	1919	22	1030	961	834	131	625	151	1372	35	1555
Grp Volume(v), veh/h	247	0	351	4	0	512	48	0	0	278	0	362
Grp Sat Flow(s),veh/h/ln	1781	0	1941	1030	0	1795	907	0	0	1372	0	1590
Q Serve(g_s), s	7.1	0.0	8.8	0.1	0.0	13.7	0.4	0.0	0.0	9.3	0.0	18.3
Cycle Q Clear(g_c), s	7.1	0.0	8.8	0.1	0.0	13.7	18.7	0.0	0.0	28.0	0.0	18.3
Prop In Lane	1.00		0.01	1.00		0.46	0.25		0.17	1.00		0.98
Lane Grp Cap(c), veh/h	471	0	1078	477	0	692	332	0	0	347	0	495
V/C Ratio(X)	0.52	0.00	0.33	0.01	0.00	0.74	0.14	0.00	0.00	0.80	0.00	0.73
Avail Cap(c_a), veh/h	544	0	1078	477	0	692	332	0	0	347	0	495
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.89	0.00	0.89	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.4	0.0	10.9	6.4	0.0	7.9	22.8	0.0	0.0	34.2	0.0	27.6
Incr Delay (d2), s/veh	0.9	0.0	0.8	0.0	0.0	6.3	0.2	0.0	0.0	12.5	0.0	5.5
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	2.7	0.0	3.7	0.0	0.0	3.8	0.7	0.0	0.0	7.1	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.3	0.0	11.7	6.4	0.0	14.2	23.0	0.0	0.0	46.7	0.0	33.1
LnGrp LOS	B	A	B	A	A	B	C	A	A	D	A	C
Approach Vol, veh/h		598			516			48			640	
Approach Delay, s/veh		13.2			14.1			23.0			39.1	
Approach LOS		B			B			C			D	

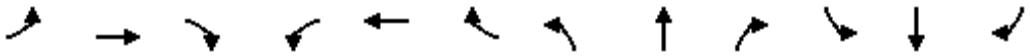
Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	15.3	40.7		34.0		56.0		34.0				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	13.0	31.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	9.1	15.7		30.0		10.8		20.7				
Green Ext Time (p_c), s	0.3	3.0		0.0		2.2		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			22.9									
HCM 6th LOS			C									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	505	164	79	326	211	96	52	112
v/c Ratio	0.15	0.40	0.14	0.16	0.28	0.74	0.22	0.18	0.23
Control Delay	6.5	6.8	1.6	9.2	8.6	46.9	9.1	27.0	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	6.8	1.6	9.2	8.6	46.9	9.1	27.0	11.1
Queue Length 50th (ft)	12	70	0	16	70	112	7	24	16
Queue Length 95th (ft)	26	128	10	30	144	131	18	44	50
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	661	1275	1198	507	1177	453	631	460	723
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.40	0.14	0.16	0.28	0.47	0.15	0.11	0.15

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	399	125	50	263	21	156	10	68	43	32	59
Future Volume (veh/h)	63	399	125	50	263	21	156	10	68	43	32	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	97	505	164	79	286	40	211	16	80	52	36	76
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	650	1212	1027	457	1000	140	325	66	330	335	136	287
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1054	1945	1648	768	1605	225	1281	271	1355	1300	557	1176
Grp Volume(v), veh/h	97	505	164	79	0	326	211	0	96	52	0	112
Grp Sat Flow(s),veh/h/ln	1054	1945	1648	768	0	1830	1281	0	1626	1300	0	1733
Q Serve(g_s), s	4.2	11.9	3.7	5.3	0.0	7.4	14.3	0.0	4.3	3.0	0.0	4.7
Cycle Q Clear(g_c), s	11.5	11.9	3.7	17.2	0.0	7.4	19.1	0.0	4.3	7.3	0.0	4.7
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.83	1.00		0.68
Lane Grp Cap(c), veh/h	650	1212	1027	457	0	1140	325	0	396	335	0	423
V/C Ratio(X)	0.15	0.42	0.16	0.17	0.00	0.29	0.65	0.00	0.24	0.16	0.00	0.27
Avail Cap(c_a), veh/h	650	1212	1027	457	0	1140	469	0	578	480	0	616
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)	0.84	0.84	0.84	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.4	8.6	7.1	13.0	0.0	7.8	35.2	0.0	27.3	30.3	0.0	27.5
Incr Delay (d2), s/veh	0.4	0.9	0.3	0.8	0.0	0.6	2.2	0.0	0.3	0.2	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	4.6	1.2	1.0	0.0	2.7	4.5	0.0	1.6	1.0	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.8	9.5	7.4	13.8	0.0	8.4	37.4	0.0	27.7	30.5	0.0	27.8
LnGrp LOS	B	A	A	B	A	A	D	A	C	C	A	C
Approach Vol, veh/h		766			405			307			164	
Approach Delay, s/veh		9.2			9.5			34.3			28.7	
Approach LOS		A			A			C			C	

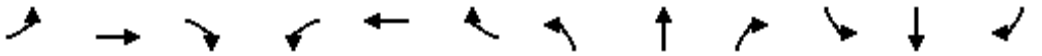
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		62.1		27.9		62.1		27.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		46.0		32.0		46.0		32.0				
Max Q Clear Time (g_c+I1), s		19.2		9.3		13.9		21.1				
Green Ext Time (p_c), s		2.6		0.8		4.5		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			15.9									
HCM 6th LOS			B									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	372	28	39	818	10	692	251
v/c Ratio	0.89	0.06	0.15	0.43	0.03	0.76	0.28
Control Delay	52.5	14.8	11.5	14.6	4.8	18.1	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Total Delay	52.5	14.8	11.5	14.6	4.8	18.3	2.9
Queue Length 50th (ft)	185	6	10	138	1	196	1
Queue Length 95th (ft)	#314	21	25	241	m3	#578	70
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	463	500	252	1912	346	915	905
Starvation Cap Reductn	0	0	0	0	0	22	165
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.06	0.15	0.43	0.03	0.77	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	4	63	9	3	9	36	744	8	9	637	231
Future Volume (veh/h)	257	4	63	9	3	9	36	744	8	9	637	231
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	295	5	72	12	4	12	39	809	9	10	692	251
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	395	5	79	236	89	201	403	1824	20	345	906	768
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.03	0.51	0.51	0.02	0.97	0.97
Sat Flow, veh/h	1150	19	281	635	316	714	1781	3600	40	1781	1870	1585
Grp Volume(v), veh/h	372	0	0	28	0	0	39	399	419	10	692	251
Grp Sat Flow(s),veh/h/ln	1450	0	0	1665	0	0	1781	1777	1863	1781	1870	1585
Q Serve(g_s), s	21.2	0.0	0.0	0.0	0.0	0.0	1.0	12.9	12.9	0.2	4.0	0.7
Cycle Q Clear(g_c), s	22.3	0.0	0.0	1.1	0.0	0.0	1.0	12.9	12.9	0.2	4.0	0.7
Prop In Lane	0.79		0.19	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	479	0	0	525	0	0	403	900	944	345	906	768
V/C Ratio(X)	0.78	0.00	0.00	0.05	0.00	0.00	0.10	0.44	0.44	0.03	0.76	0.33
Avail Cap(c_a), veh/h	554	0	0	603	0	0	440	900	944	422	906	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	31.1	0.0	0.0	23.6	0.0	0.0	10.7	14.1	14.1	11.3	0.8	0.7
Incr Delay (d2), s/veh	5.9	0.0	0.0	0.0	0.0	0.0	0.1	1.6	1.5	0.0	5.7	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	0.0	0.4	0.0	0.0	0.4	5.0	5.3	0.1	1.8	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	0.0	0.0	23.7	0.0	0.0	10.9	15.7	15.6	11.3	6.5	1.8
LnGrp LOS	D	A	A	C	A	A	B	B	B	B	A	A
Approach Vol, veh/h		372			28			857			953	
Approach Delay, s/veh		37.1			23.7			15.5			5.3	
Approach LOS		D			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	51.6		31.3	9.1	49.6		31.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	14.9		24.3	3.0	6.0		3.1				
Green Ext Time (p_c), s	0.0	4.9		1.0	0.0	6.0		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		14.8	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	397	14	52	194	40	53
Future Vol, veh/h	397	14	52	194	40	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	478	17	63	234	62	82

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	495	0	847	487
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	360	-
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	-	-	1069	-	332	581
Stage 1	-	-	-	-	618	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1069	-	312	581
Mov Cap-2 Maneuver	-	-	-	-	312	-
Stage 1	-	-	-	-	618	-
Stage 2	-	-	-	-	664	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	424	-	-	1069	-
HCM Lane V/C Ratio	0.337	-	-	0.059	-
HCM Control Delay (s)	17.8	-	-	8.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.5	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	448	2	35	239	7	36
Future Vol, veh/h	448	2	35	239	7	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	540	2	42	288	11	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	542	0	913	541
Stage 1	-	-	-	-	541	-
Stage 2	-	-	-	-	372	-
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	-	-	1027	-	304	541
Stage 1	-	-	-	-	583	-
Stage 2	-	-	-	-	697	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1027	-	292	541
Mov Cap-2 Maneuver	-	-	-	-	292	-
Stage 1	-	-	-	-	583	-
Stage 2	-	-	-	-	668	-

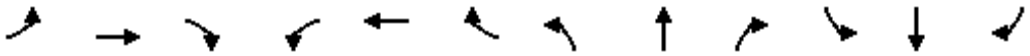
Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	292	541	-	-	1027	-
HCM Lane V/C Ratio	0.037	0.102	-	-	0.041	-
HCM Control Delay (s)	17.8	12.4	-	-	8.7	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.3	-	-	0.1	-

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	595	241	762	336	313	718
v/c Ratio	0.55	0.38	0.58	0.42	0.96	0.38
Control Delay	27.6	7.2	21.2	5.3	56.9	11.1
Queue Delay	0.0	0.0	0.6	0.2	0.0	0.0
Total Delay	27.6	7.2	21.8	5.5	56.9	11.1
Queue Length 50th (ft)	142	15	121	1	88	77
Queue Length 95th (ft)	187	68	230	m71	#100	131
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	642	1305	796	327	1895
Starvation Cap Reductn	0	0	225	93	0	0
Spillback Cap Reductn	0	8	0	0	0	164
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.38	0.71	0.48	0.96	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



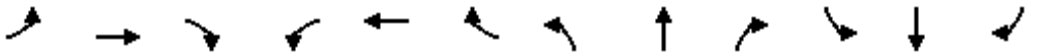
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	518	0	224	0	0	0	0	701	309	260	653	0
Future Volume (vph)	518	0	224	0	0	0	0	701	309	260	653	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.26	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	467	3539	
Peak-hour factor, PHF	0.87	0.50	0.93	1.00	1.00	1.00	1.00	0.92	0.92	0.83	0.91	1.00
Adj. Flow (vph)	595	0	241	0	0	0	0	762	336	313	718	0
RTOR Reduction (vph)	0	0	139	0	0	0	0	0	212	0	0	0
Lane Group Flow (vph)	595	0	102	0	0	0	0	762	124	313	718	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1090		503					1305	583	328	1895	
v/s Ratio Prot	c0.17		0.06					0.22		c0.09	0.20	
v/s Ratio Perm									0.08	c0.35		
v/c Ratio	0.55		0.20					0.58	0.21	0.95	0.38	
Uniform Delay, d1	25.3		22.4					22.8	19.4	27.8	12.2	
Progression Factor	1.00		1.00					0.84	1.55	0.80	0.86	
Incremental Delay, d2	0.7		0.3					1.7	0.7	31.9	0.1	
Delay (s)	26.0		22.7					20.9	30.9	54.1	10.6	
Level of Service	C		C					C	C	D	B	
Approach Delay (s)		25.1			0.0			24.0			23.8	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	188	150	192	1163	896	388
v/c Ratio	0.72	0.32	0.68	0.46	0.72	0.50
Control Delay	53.1	1.8	44.3	4.0	25.4	7.6
Queue Delay	0.0	0.0	0.0	0.0	19.6	1.5
Total Delay	53.1	1.8	44.3	4.0	45.0	9.1
Queue Length 50th (ft)	102	0	62	166	270	95
Queue Length 95th (ft)	#165	0	109	202	353	135
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	282	2540	1247	778
Starvation Cap Reductn	0	0	0	0	365	222
Spillback Cap Reductn	0	6	0	79	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.31	0.68	0.47	1.02	0.70

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 (vph)	0	0	0	160	0	126	161	1058	0	0	753	388
Future Volume (vph)	0	0	0	160	0	126	161	1058	0	0	753	388
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3332	1441
Flt Permitted				0.95		1.00	0.17	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	308	3539			3332	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.85	0.50	0.84	0.84	0.91	1.00	1.00	0.95	0.79
Adj. Flow (vph)	0	0	0	188	0	150	192	1163	0	0	793	491
RTOR Reduction (vph)	0	0	0	0	0	128	0	0	0	0	11	244
Lane Group Flow (vph)	0	0	0	188	0	22	192	1163	0	0	885	144
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				13.3		13.3	42.2	64.2			33.4	33.4
Effective Green, g (s)				13.3		13.3	42.2	64.2			33.4	33.4
Actuated g/C Ratio				0.15		0.15	0.47	0.71			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				261		233	281	2524			1236	534
v/s Ratio Prot				c0.11		0.01	0.07	c0.33			c0.27	
v/s Ratio Perm							0.25					0.10
v/c Ratio				0.72		0.10	0.68	0.46			0.72	0.27
Uniform Delay, d1				36.6		33.1	16.1	5.5			24.2	19.8
Progression Factor				1.00		1.00	2.71	0.63			0.92	2.32
Incremental Delay, d2				10.0		0.2	5.6	0.1			3.3	1.1
Delay (s)				46.6		33.4	49.3	3.6			25.5	47.1
Level of Service				D		C	D	A			C	D
Approach Delay (s)		0.0			40.7			10.0			32.0	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX D

Future Planned Development Conditions

ITE Sheets

Land Use: 210
Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

Single-Family Detached Housing
(210)

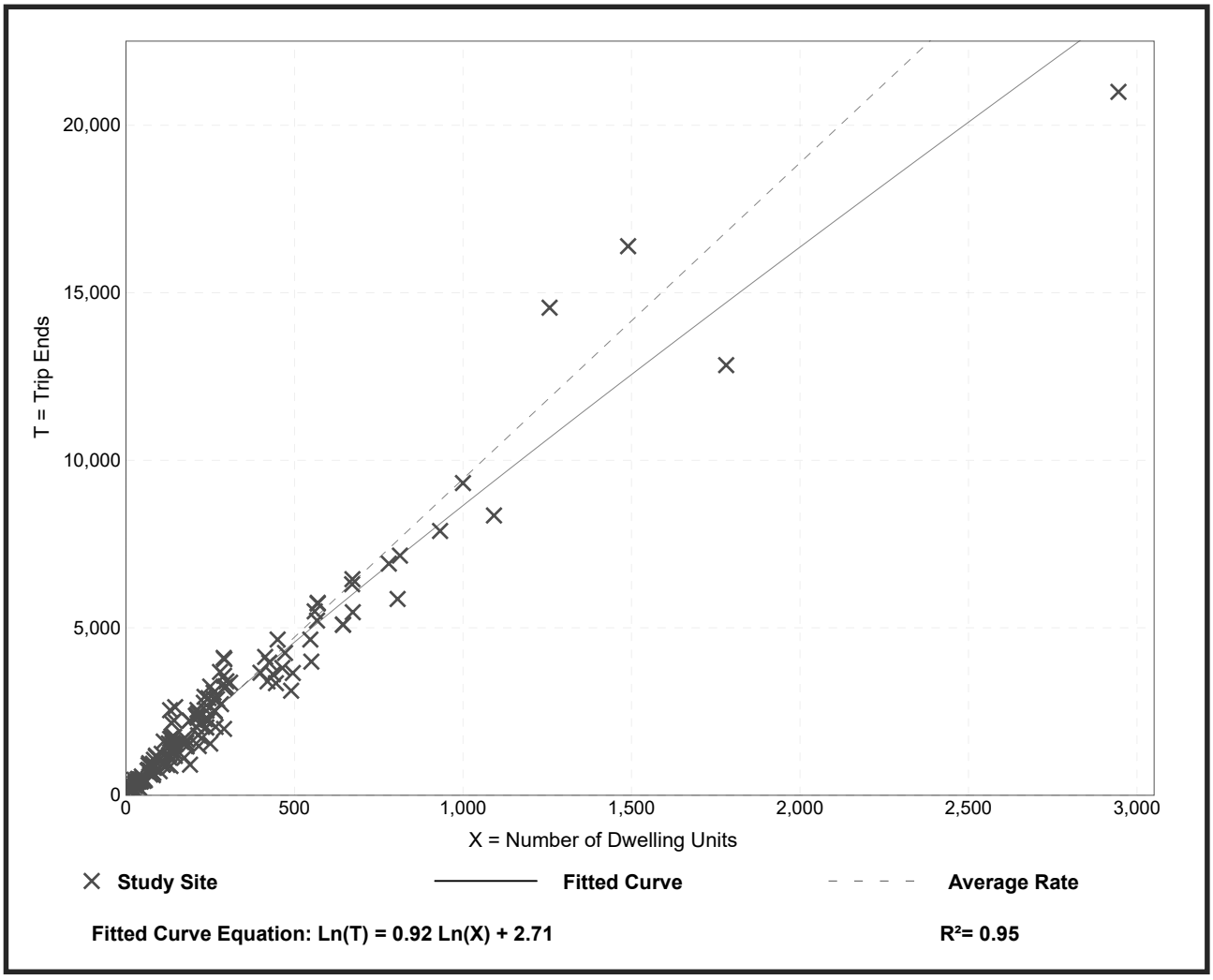
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

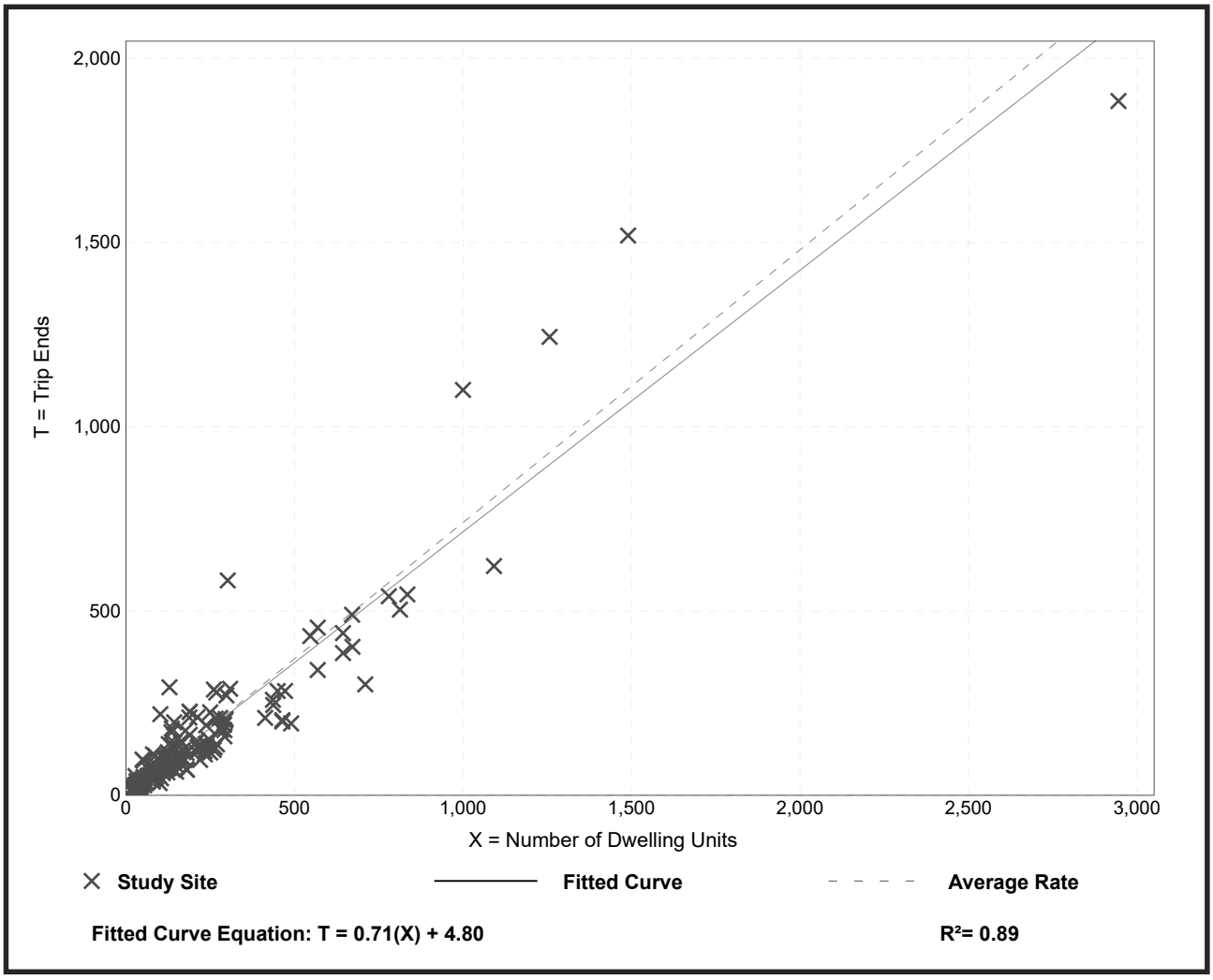
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

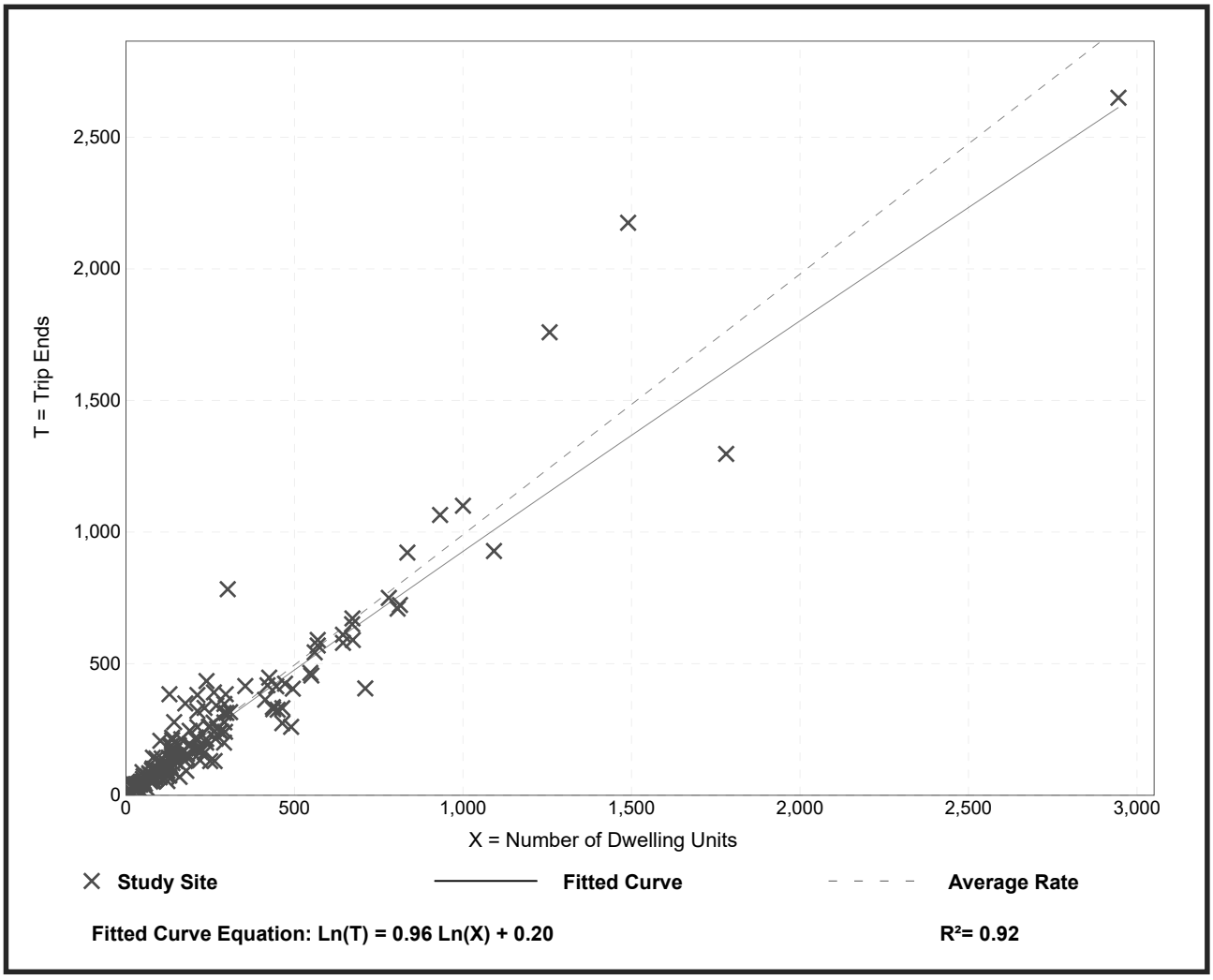
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

Land Use	210 Single-Family Detached Housing						220 Multifamily Housing (Low-Rise)							
Setting	General Urban/Suburban						General Urban/Suburban						Dense Multi-Use Urban	
Time Period	Weekday		Saturday		Sunday		Weekday		Saturday		Sunday		Weekday	
Trip Type	Vehicle		Vehicle		Vehicle		Vehicle		Vehicle		Vehicle		Vehicle	
# Data Sites	6		2		1		10		1		1		1	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
12:00	0.3	5.5	0.9	7.6	1.0	6.8	0.7	5.4	0.0	8.0	0.0	12.3	0.0	5.0
12:15	0.3	5.6	0.7	8.8	1.0	9.4	0.7	5.3	0.0	10.6	0.0	12.3	0.0	4.6
12:30	0.2	5.8	0.6	9.3	0.5	9.9	0.6	5.2	0.0	11.7	0.0	12.3	0.0	4.2
12:45	0.2	6.1	0.7	8.5	1.0	7.3	0.5	4.9	0.0	9.6	0.0	10.3	0.0	3.8
1:00	0.2	6.0	0.5	8.2	1.0	7.8	0.4				)	12.3	0.0	5.0
1:15	0.2	6.1	0.5	7.7	1.0	4.7	0.3				)	8.9	0.0	7.3
1:30	0.2	6.2	0.4	6.8	0.5	5.2	0.3				)	8.2	0.0	8.0
1:45	0.1	6.2	0.4	8.2	0.0	6.3	0.3				)	8.2	0.0	8.6
2:00	0.1	6.6	0.4	8.6	0.0	4.2	0.3	5.7	0.0	5.3	0.0	8.2	0.0	8.0
2:15	0.1	6.8	0.4	9.2	0.0	4.2	0.4	5.7	0.0	5.9	0.0	8.2	0.0	7.6
2:30	0.1	6.7	0.4	9.4	0.0	3.6	0.4	6.3	0.0	5.3	0.0	6.2	0.0	7.6
2:45	0.1	7.1	0.4	9.3	0.0	2.6	0.3	5.9	0.0	5.9	0.0	6.2	0.0	6.5
3:00	0.2	7.2	0.6	10.0	0.5	5.2	0.4	6.2	0.0	5.9	0.0	3.4	0.4	7.3
3:15	0.2	7.7	0.9	8.2	0.5	7.3	0.3	6.5	0.0	6.9	0.0	5.5	0.4	6.1
3:30	0.3	8.5	0.8	8.6	0.5	8.9	0.4				0.0	6.8	0.4	6.9
3:45	0.5	8.9	0.8	7.2	0.5	11.5	0.6				0.0	6.2	0.4	7.3
4:00	0.6	9.0	0.6	6.2	0.0	9.9	0.6	7.6	0.0	6.2	0.0	6.2	0.4	6.9
4:15	0.7	8.9	0.2	7.0	1.0	9.9	0.7	8.1	0.0	6.4	0.0	2.7	0.4	6.5
4:30	1.0	8.9	0.5	7.3	1.6	9.9	0.8	8.8	0.5	9.0	0.7	4.1	0.4	6.1
4:45	1.0	8.9	0.6	7.7	2.1	10.4	1.0	9.2	1.1	8.5	1.4	6.2	1.1	5.7
5:00	1.2	8.8	0.9	8.0	2.1	11.5	1.3	9.1	1.1	10.1	1.4	7.5	0.8	6.1
5:15	1.6	8.6	1.1	7.4	1.6	10.4	1.6	9.2	1.1	10.1	1.4	8.9	2.3	6.9
5:30	2.0	8.3	0.9	6.5	1.0	9.4	1.9	9.0	0.5	9.6	0.7	8.9	3.1	7.3
5:45	2.9	7.9	0.9	5.9	1.0	6.8	2.4	8.2	0.0	11.2	0.7	6.2	4.6	8.4
6:00	3.8	7.2	0.9	5.4	1.6	7.3	2.9	7.9	1.1	8.5	1.4	4.8	5.0	9.2
6:15	4.5	6.7	1.2	5.6	1.0	6.8	3.8	7.2	2.1	6.4	2.7	4.8	5.0	9.5
6:30	5.4	6.0	1.5	5.3	1.6	7.3	4.9	6.6	2.1	4.8	2.7	3.4	6.9	8.4
6:45	6.2	5.6	1.9	5.9	2.1	8.9	6.3	6.4	2.1	3.7	2.1	3.4	8.0	6.9
7:00	6.7	5.2	1.9	5.6	2.1	6.8	7.4	5.7	2.7	2.7	1.4	3.4	11.1	5.0
7:15	7.3	5.0	2.5	5.8	3.1	6.3	7.7	5.4	1.6	4.3	2.7	4.1	9.9	4.6
7:30	7.1	4.8	3.5	5.8	3.6	5.7	7.7	5.4	1.6	4.8	4.1	2.7	8.8	3.8
7:45	6.6	4.7	3.8	5.4	3.6	4.2	6.9	4.9	2.7	4.3	6.2	2.7	7.3	3.8
8:00	6.2	4.7	4.3	5.0	3.1	5.2	6.3	5.1	1.6	3.7	6.8	2.7	4.6	5.7
8:15	5.7	4.5	4.7	3.6	2.6	4.2	6.0	4.8	2.7	4.8	6.2	0.7	5.0	3.8
8:30	5.1	4.3	4.0	3.2	3.1	2.6	5.6	4.1	4.3	4.3	6.2	1.4	3.8	6.9
8:45	4.9	3.7	4.8	2.8	2.1	1.6	5.5	4.1	4.3	3.2	4.8	1.4	3.1	8.8
9:00	4.3	3.4	5.2	2.1	3.6	0.0	5.3	3.6	6.9	3.7	6.2	0.7	2.7	6.9
9:15	4.1	2.8	5.4	2.2	5.2	0.0	5.1	3.6	9.0	2.7	5.5	2.1	2.7	8.0
9:30	4.4	2.3	6.0	2.1	6.3	0.0	4.6	3.6	10.1	3.2	5.5	1.4	3.4	5.0
9:45	4.4	2.0	7.3	1.5	10.9	0.5	4.1	3.3	12.2	4.3	8.9	2.1	4.2	3.1
10:00	4.8	1.6	7.9	1.3	12.5	0.5	4.0	2.9	9.6	3.7	10.3	2.7	4.6	2.3
10:15	5.0	1.3	8.1	0.9	13.0	0.5	4.3	2.2	7.4	2.1	11.6	1.4	4.2	1.5
10:30	5.0	1.2	7.7	0.9	11.5	0.5	4.7	1.8	6.4	2.7	11.6	1.4	3.1	1.1
10:45	5.2	1.2	6.2	0.8	9.4	0.0	5.2	1.4	5.9	1.6	8.9	0.7	1.9	0.8
11:00	5.2	1.0	6.5	1.4	7.3	0.0	5.3	1.2	10.6	1.6	8.2	0.0	1.9	1.5
11:15	5.3	0.8	6.5	1.4	6.3	0.0	5.3	1.0	11.2	1.6	10.3	0.0	3.1	0.8
11:30	5.4	0.7	7.2	1.5	5.7	1.0	5.2	0.8	11.2	0.0	11.6	0.0	4.2	0.8
11:45	5.4	0.4	7.9	1.3	6.3	1.0	5.4	0.7	10.6	0.0	13.7	0.0	5.0	0.8

7.2% of daily trips occurred during 3-4pm. (7.2/9 = 80%). Thus 3-4pm is 80% of PM peak hour LU 210 trips.

4pm was peak hour. 9% of daily trips occured during PM peak.

Percent of Daily Traffic During the 60-Minute Period Beginning at Displayed Time

Trip Generation & Distribution

Bailey Farm Trip Generation

Daily Trip Generation

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	Daily Trips	Trip Distribution Enter	Trip Distribution Exit	Daily Trips Enter	Daily Trips Exit
210	Single-Family Detached Homes	300	Dwelling Units	Equation	2,857	50%	50%	1,429	1,428
Total					**2,857**			**1,429**	**1,428**

AM Peak Hour Trip Generation (Peak Hour of Adjacent Street Traffic, 7-9 AM)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	AM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	AM Peak Hour Trips Enter	AM Peak Hour Trips Exit
210	Single-Family Detached Homes	300	Dwelling Units	Equation	218	25%	75%	55	163
Total					**218**			**55**	**163**

School Dismisal Peak Hour Trip Generation (PM Peak Hour of Generator)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
210	Single-Family Detached Homes	300	Dwelling Units	Equation	234	63%	37%	147	87
Total					**234**			**147**	**87**

Note: Methods to generate trips during a school dismissal peak hour (3-4 PM) are not provided. Based on trime of day data provided in Appendix A of the Trip Generation Manual, trips during this time are expected to be approximately 80% of (or 20% less than) the PM peak hour.

PM Peak Hour Trip Generation (Peak Hour of Adjacent Street Traffic, 4-6 PM)

ITE Code/Page	Land Use	Size		Trip Gen. Avg. Rate/Eq.	PM Peak Hour Trips	Trip Distribution Enter	Trip Distribution Exit	PM Peak Hour Trips Enter	PM Peak Hour Trips Exit
210	Single-Family Detached Homes	300	Dwelling Units	Equation	292	63%	37%	184	108
Total					**292**			**184**	**108**

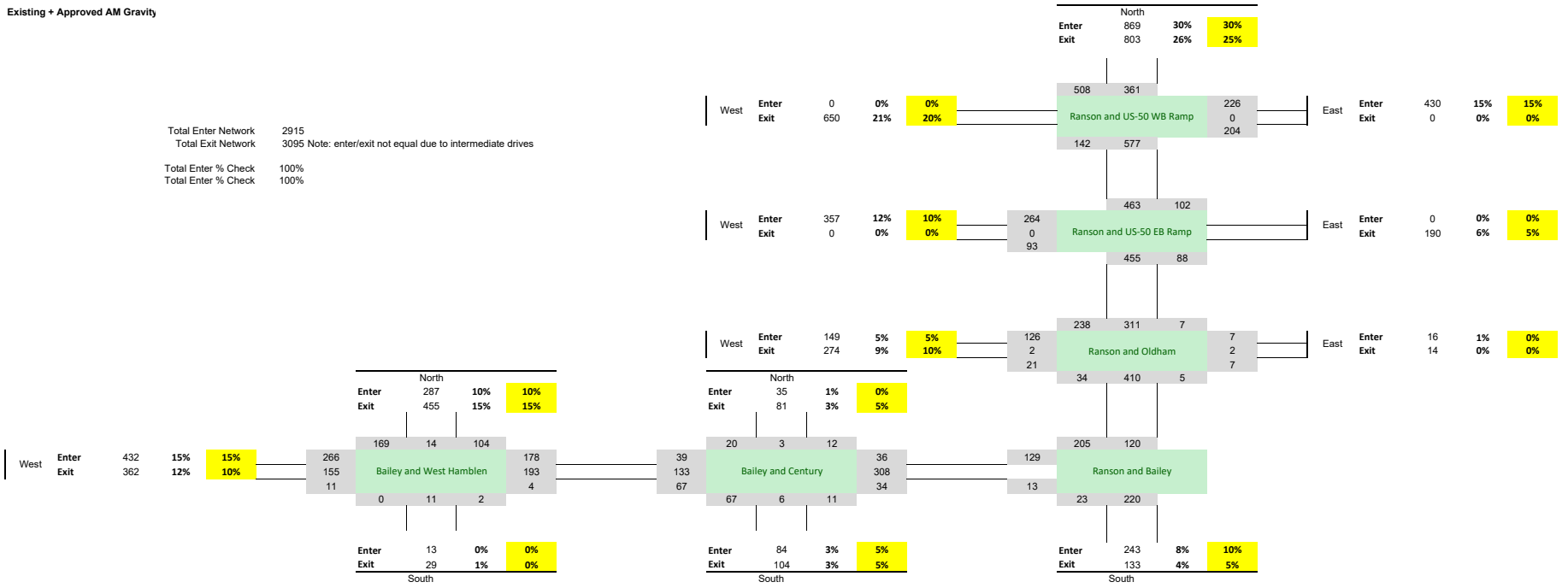
Bailey Farm Development	
Direction	Primary Trips (To/From)
Bailey Rd (West)	15%
Hamblen Rd (North)	15%
Century Dr (North)	3%
Todd George Pkwy (North)	15%
Ranson Rd (South)	10%
US-50 (East)	10%
US-50 (West)	30%
Oldham Pkwy (West)	2%
Total	100%

Existing Volume Gravity (Used in Part to Determine Bailey Farm Trip Distribution)

Existing + Approved AM Gravity

Total Enter Network 2915
Total Exit Network 3095 Note: enter/exit not equal due to intermediate drives

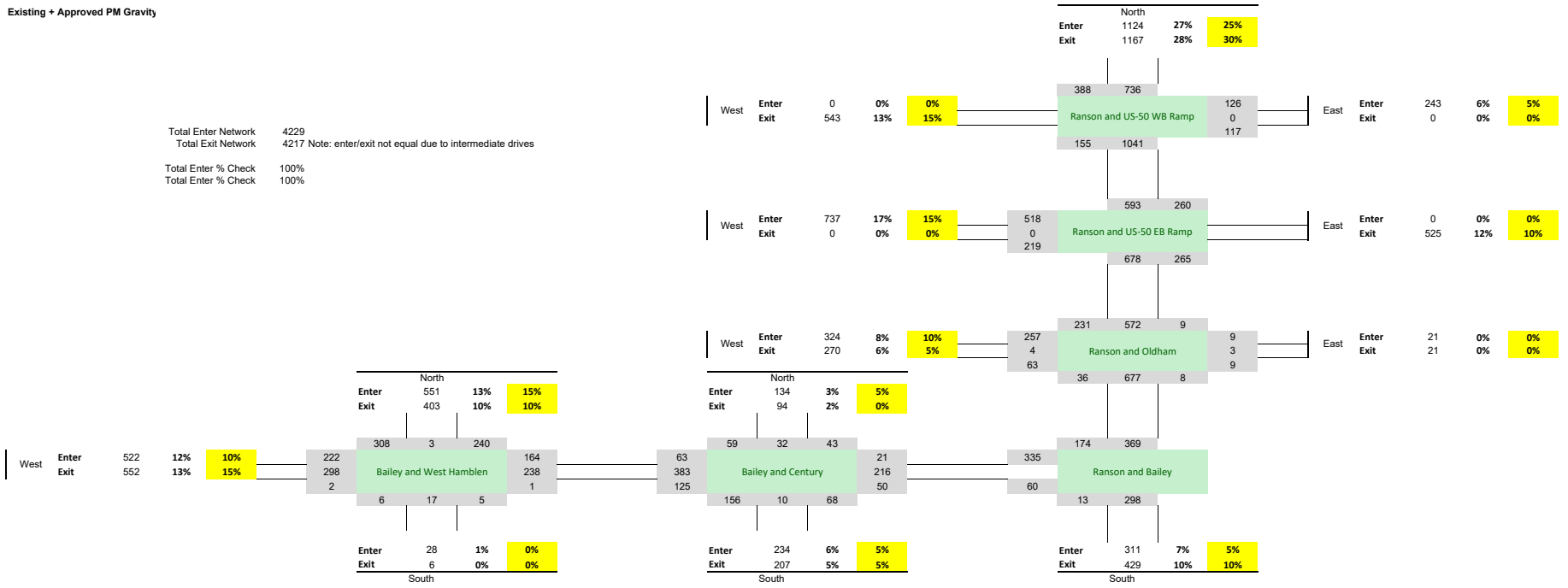
Total Enter % Check 100%
Total Enter % Check 100%



Existing + Approved PM Gravity

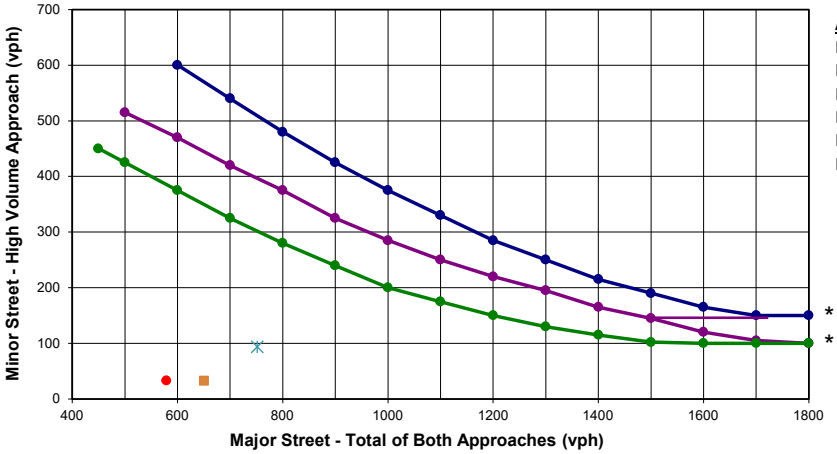
Total Enter Network 4229
Total Exit Network 4217 Note: enter/exit not equal due to intermediate drives

Total Enter % Check 100%
Total Enter % Check 100%



Signal Warrants

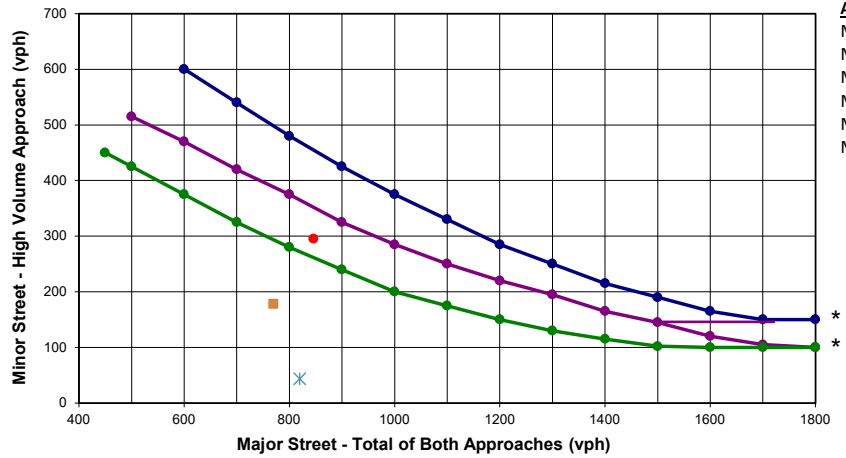
Peak Hour Volume Warrant (Future)
Bailey Rd and Drive 1



AM & PM Volumes:
Major (AM) - 579
Minor (AM) - 33
Major (School Dis.) - 651
Minor (School Dis.) - 32
Major (PM) - 752
Minor (PM) - 93

*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.

Peak Hour Volume Warrant (Future)
Bailey Road & Drive 2



AM & PM Volumes:
Major (AM) - 846
Minor (AM) - 295
Major (School Dis.) - 770
Minor (School Dis.) - 178
Major (PM) - 820
Minor (PM) - 43

*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.

Lane Warrants

Lee's Summit AMC Lane Warrants (Applied along Bailey Rd)

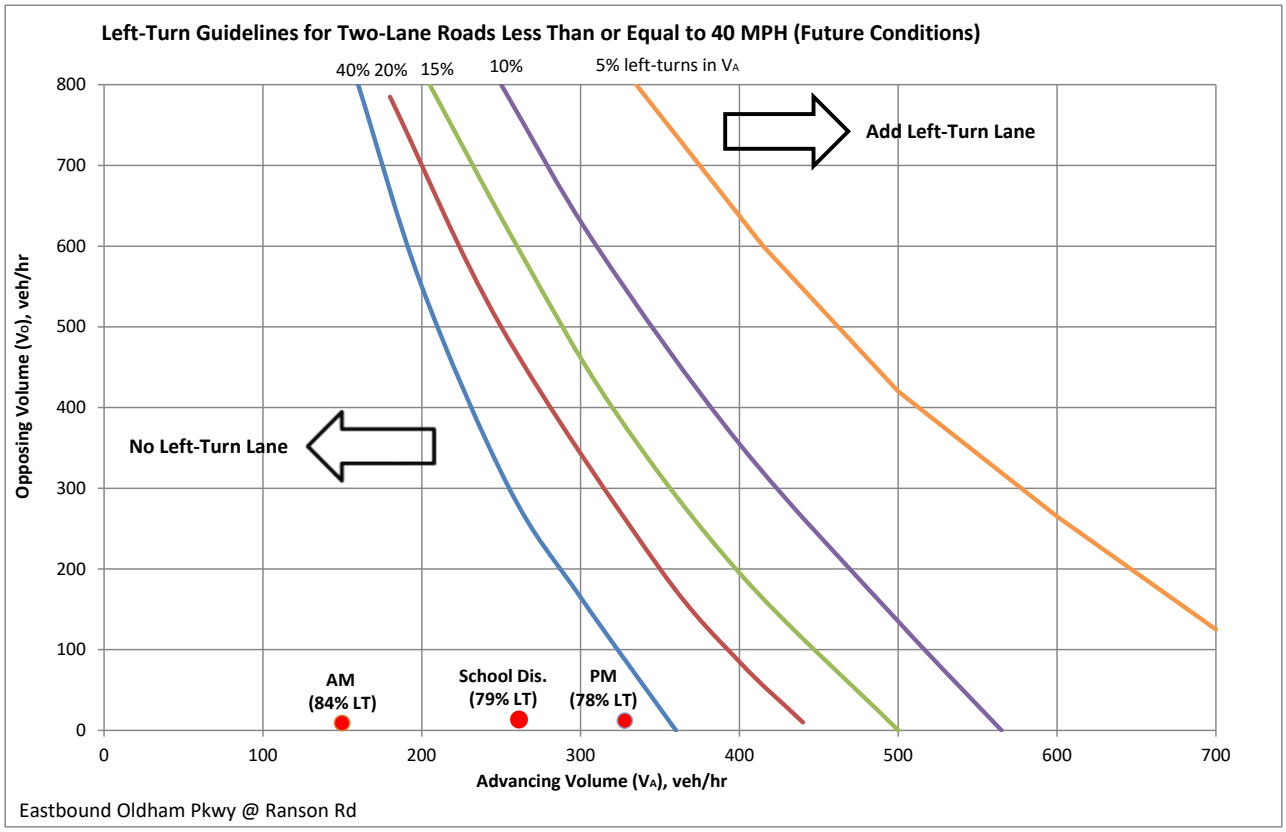
Future Conditions

Left Turns

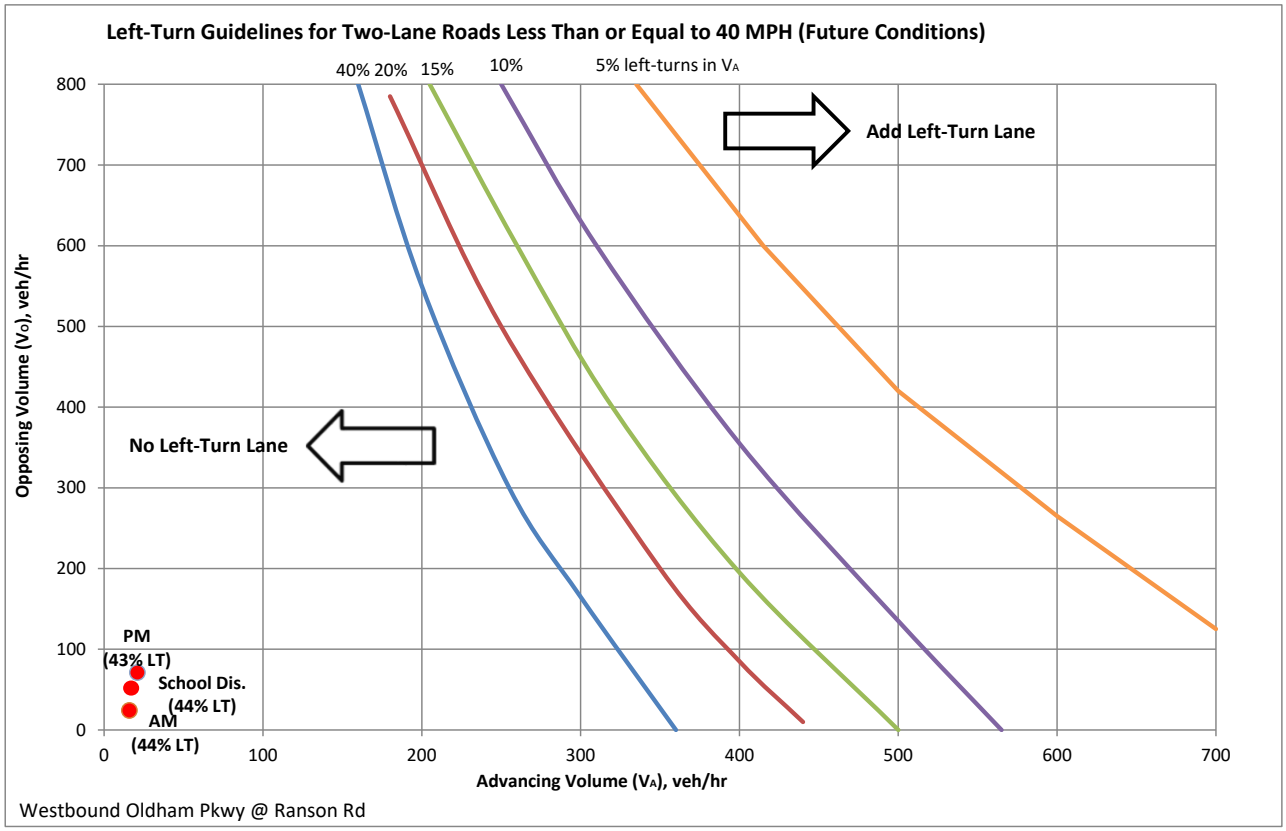
- Hamblen Rd (west) and Bailey Rd
  - EB, SB, WB existing or planned
  - NB warranted under existing
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - NB existing
  - EB, WB, SB warranted under existing
- Ranson Rd & Bailey
  - LS Criterial only applied to EB approach. N/S approach MoDOT road.
  - EB warranted under existing
- School Drive 1 & Bailey
  - WB warranted under plus development
  - NB warranted under plus development
- School Drive 2 & Bailey
  - WB warranted under plus development
  - NB warranted under plus development

Right Turns

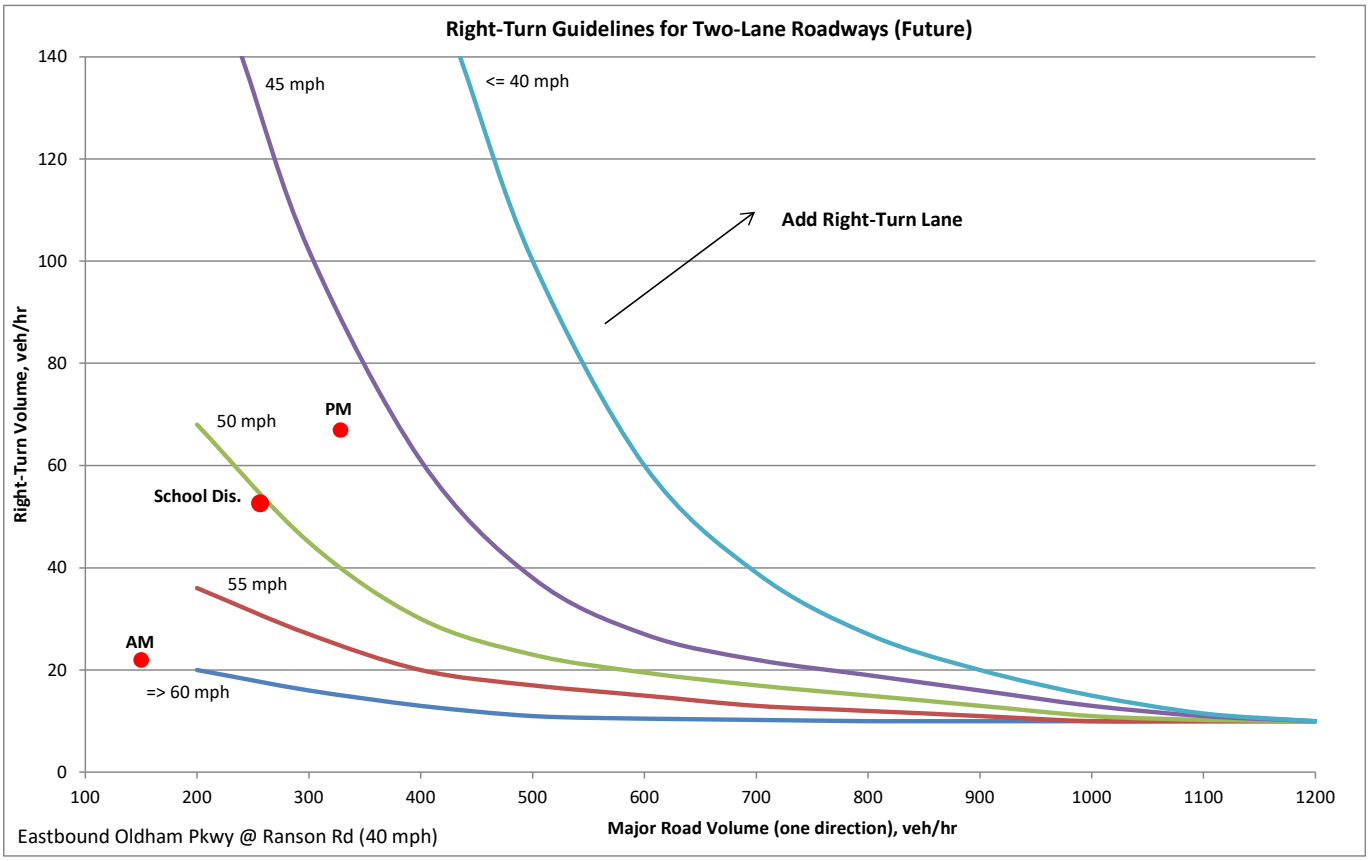
- Hamblen Rd (west) and Bailey Rd
  - WB, SB warranted under existing
- Hamblen Rd (east) / Century Dr and Bailey Rd
  - EB existing
  - NB warranted under existing
- Ranson Rd & Bailey
  - LS Criteria only applied to EB approach. N/S approach MoDOT road.
  - EB warranted under existing

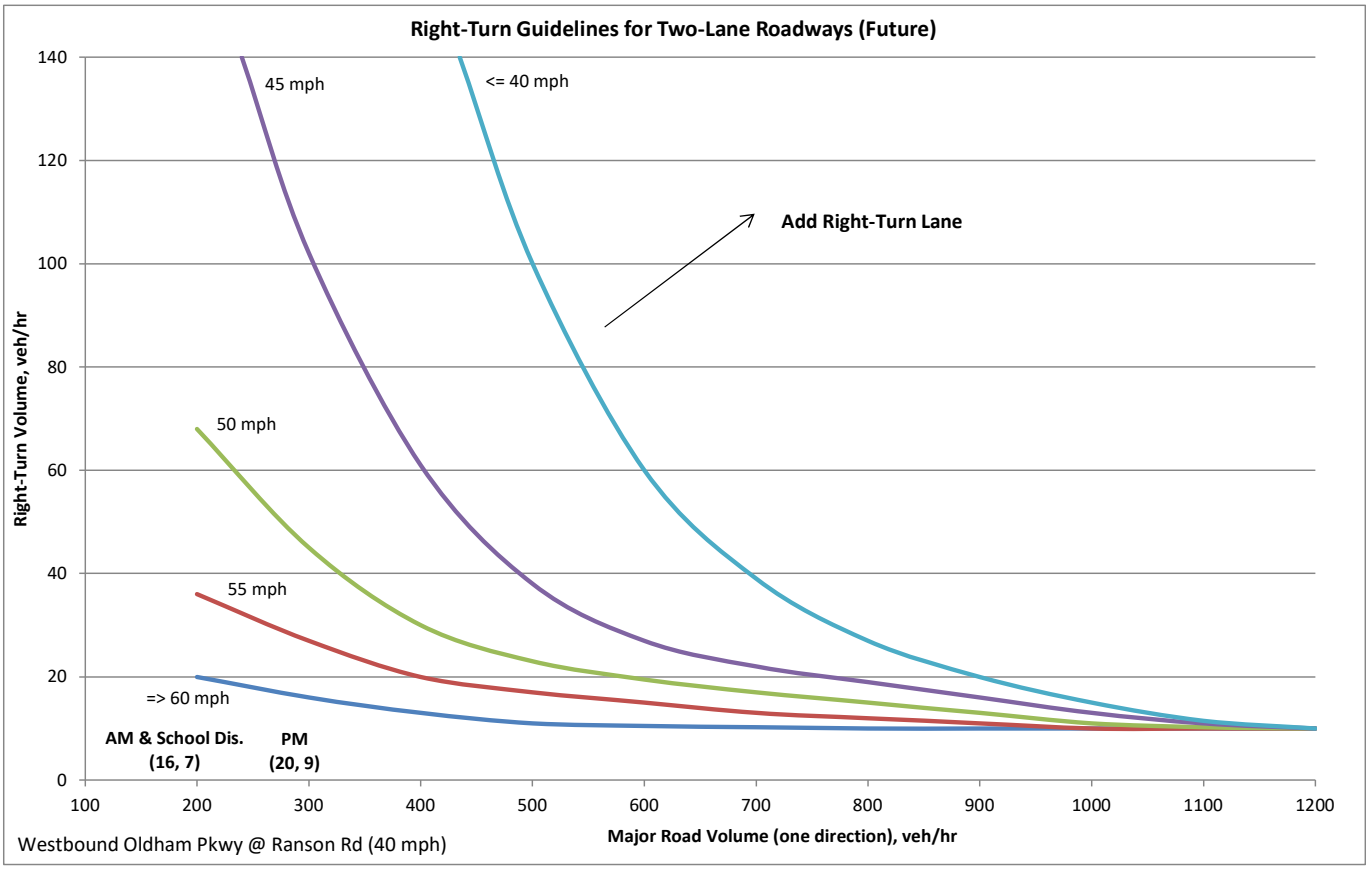


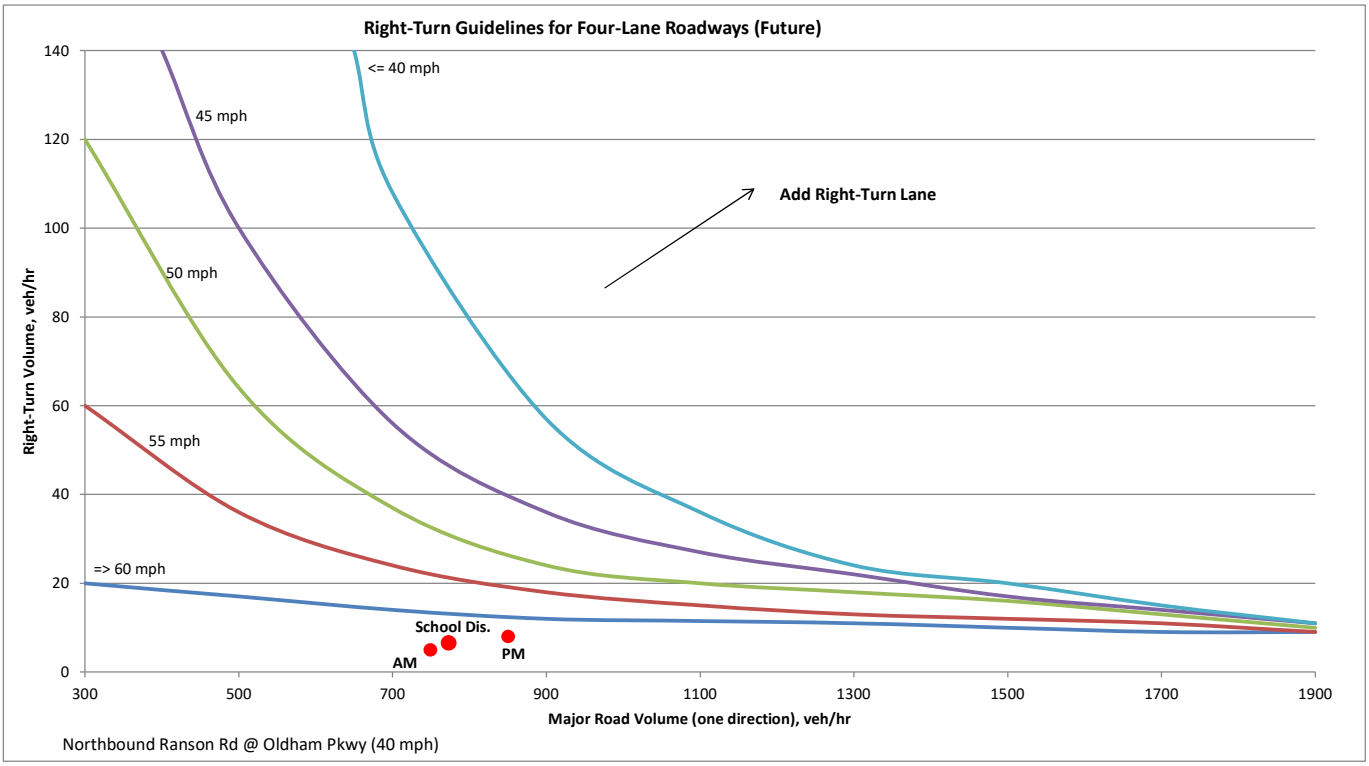
Eastbound Oldham Pkwy @ Ranson Rd



Westbound Oldham Pkwy @ Ranson Rd


Right-Turn Guidelines for Two-Lane Roadways (Future)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
55 mph
=> 60 mph
PM
School Dis.
AM
0
20
40
60
80
100
120
140
100
200
300
400
500
600
700
800
900
1000
1100
1200
Eastbound Oldham Pkwy @ Ranson Rd (40 mph)

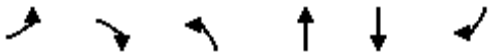

Right-Turn Guidelines for Two-Lane Roadways (Future)
Right-Turn Volume, veh/hr
Major Road Volume (one direction), veh/hr
45 mph
<= 40 mph
Add Right-Turn Lane
50 mph
55 mph
=> 60 mph
AM & School Dis.
(16, 7)
PM
(20, 9)
0
20
40
60
80
100
120
140
100
200
300
400
500
600
700
800
900
1000
1100
1200
Westbound Oldham Pkwy @ Ranson Rd (40 mph)


Right-Turn Guidelines for Four-Lane Roadways (Future)
140
120
100
80
60
40
20
0
Right-Turn Volume, veh/hr
<= 40 mph
45 mph
50 mph
55 mph
=> 60 mph
Add Right-Turn Lane
School Dis.
AM
PM
300
500
700
900
1100
1300
1500
1700
1900
Major Road Volume (one direction), veh/hr
Northbound Ranson Rd @ Oldham Pkwy (40 mph)

Capacity Analysis

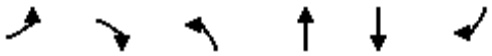
Queues
2: Ranson Rd (Rt RA) & Bailey Rd

05/07/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	461	99	125	309	186	533
v/c Ratio	0.65	0.14	0.33	0.54	0.32	0.34
Control Delay	16.2	3.1	16.1	17.8	14.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	3.1	16.1	17.8	14.8	0.6
Queue Length 50th (ft)	86	0	23	62	34	0
Queue Length 95th (ft)	175	17	66	148	74	0
Internal Link Dist (ft)	532			579	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1198	1104	1022	1544	1544	1553
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.09	0.12	0.20	0.12	0.34

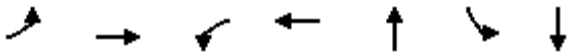
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	383	82	104	266	136	464
Future Volume (veh/h)	383	82	104	266	136	464
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	461	99	125	309	186	533
Peak Hour Factor	0.83	0.83	0.83	0.86	0.73	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	591	526	394	649	649	1076
Arrive On Green	0.33	0.33	0.35	0.35	0.35	0.35
Sat Flow, veh/h	1781	1585	733	1870	1870	1585
Grp Volume(v), veh/h	461	99	125	309	186	533
Grp Sat Flow(s),veh/h/ln	1781	1585	733	1870	1870	1585
Q Serve(g_s), s	8.7	1.7	5.6	4.8	2.7	6.1
Cycle Q Clear(g_c), s	8.7	1.7	8.3	4.8	2.7	6.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	591	526	394	649	649	1076
V/C Ratio(X)	0.78	0.19	0.32	0.48	0.29	0.50
Avail Cap(c_a), veh/h	1384	1231	906	1954	1954	2181
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.3	8.9	11.8	9.5	8.8	2.9
Incr Delay (d2), s/veh	2.3	0.2	0.5	0.5	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.4	0.6	1.3	0.7	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.5	9.1	12.3	10.1	9.1	3.3
LnGrp LOS	B	A	B	B	A	A
Approach Vol, veh/h	560			434	719	
Approach Delay, s/veh	12.7			10.7	4.8	
Approach LOS	B			B	A	

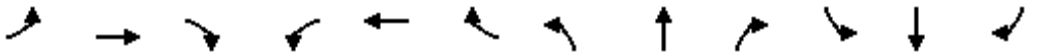
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		19.0		18.4		19.0
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		39.0		29.0		39.0
Max Q Clear Time (g_c+I1), s		10.3		10.7		8.1
Green Ext Time (p_c), s		2.7		1.7		3.0

Intersection Summary		
HCM 6th Ctrl Delay		8.9
HCM 6th LOS		A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	320	270	8	599	32	157	216
v/c Ratio	0.64	0.18	0.02	0.63	0.11	0.75	0.52
Control Delay	11.8	5.0	13.0	16.8	25.7	57.5	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	5.0	13.0	16.8	25.7	57.5	12.8
Queue Length 50th (ft)	61	45	2	112	11	84	17
Queue Length 95th (ft)	88	69	5	172	16	138	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	579	1462	528	945	346	241	453
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.18	0.02	0.63	0.09	0.65	0.48

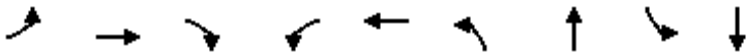
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	203	11	4	252	219	0	11	2	132	14	169
Future Volume (veh/h)	266	203	11	4	252	219	0	11	2	132	14	169
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	320	242	28	8	341	258	0	24	8	157	36	180
Peak Hour Factor	0.83	0.84	0.39	0.50	0.74	0.85	0.25	0.46	0.25	0.84	0.39	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	706	1214	140	678	554	419	0	212	71	276	43	214
Arrive On Green	0.10	0.71	0.71	1.00	1.00	1.00	0.00	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1781	1712	198	1109	1028	778	0	1342	447	1377	271	1355
Grp Volume(v), veh/h	320	0	270	8	0	599	0	0	32	157	0	216
Grp Sat Flow(s),veh/h/ln	1781	0	1910	1109	0	1805	0	0	1790	1377	0	1626
Q Serve(g_s), s	6.6	0.0	4.3	0.0	0.0	0.0	0.0	0.0	1.4	9.9	0.0	11.6
Cycle Q Clear(g_c), s	6.6	0.0	4.3	0.0	0.0	0.0	0.0	0.0	1.4	11.3	0.0	11.6
Prop In Lane	1.00		0.10	1.00		0.43	0.00		0.25	1.00		0.83
Lane Grp Cap(c), veh/h	706	0	1354	678	0	974	0	0	282	276	0	256
V/C Ratio(X)	0.45	0.00	0.20	0.01	0.00	0.62	0.00	0.00	0.11	0.57	0.00	0.84
Avail Cap(c_a), veh/h	878	0	1354	678	0	974	0	0	338	319	0	307
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.91	0.00	0.91	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.2	0.0	4.4	0.0	0.0	0.0	0.0	0.0	32.5	37.4	0.0	36.8
Incr Delay (d2), s/veh	0.5	0.0	0.3	0.0	0.0	2.7	0.0	0.0	0.2	1.8	0.0	16.3
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	2.1	0.0	1.4	0.0	0.0	0.7	0.0	0.0	0.6	3.4	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.7	0.0	4.8	0.0	0.0	2.7	0.0	0.0	32.7	39.2	0.0	53.1
LnGrp LOS	A	A	A	A	A	A	A	A	C	D	A	D
Approach Vol, veh/h		590			607			32			373	
Approach Delay, s/veh		5.8			2.6			32.7			47.3	
Approach LOS		A			A			C			D	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	15.3	54.5		20.2		69.8		20.2				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	18.0	37.0		17.0		61.0		17.0				
Max Q Clear Time (g_c+I1), s	8.6	2.0		13.6		6.3		3.4				
Green Ext Time (p_c), s	0.7	4.7		0.6		1.7		0.1				

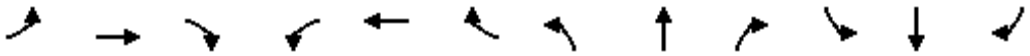
Intersection Summary												
HCM 6th Ctrl Delay			14.8									
HCM 6th LOS			B									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	265	88	56	594	80	28	22	36
v/c Ratio	0.10	0.17	0.06	0.06	0.41	0.49	0.13	0.13	0.15
Control Delay	2.7	2.4	0.3	3.9	5.3	46.2	21.9	35.4	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	2.4	0.3	3.9	5.3	46.2	21.9	35.4	17.0
Queue Length 50th (ft)	4	18	1	7	99	43	6	11	4
Queue Length 95th (ft)	7	33	m0	13	141	77	13	21	4
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	604	1567	1433	875	1452	334	428	336	476
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.17	0.06	0.06	0.41	0.24	0.07	0.07	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	209	67	34	408	41	67	6	11	13	3	20
Future Volume (veh/h)	39	209	67	34	408	41	67	6	11	13	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	60	265	88	56	544	50	80	12	16	22	8	28
Peak Hour Factor	0.65	0.79	0.76	0.61	0.75	0.82	0.84	0.50	0.69	0.60	0.38	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	620	1492	1265	869	1294	119	190	72	96	197	38	132
Arrive On Green	1.00	1.00	1.00	0.77	0.77	0.77	0.10	0.10	0.10	0.10	0.10	0.10
Sat Flow, veh/h	823	1945	1648	1028	1687	155	1372	727	969	1382	379	1327
Grp Volume(v), veh/h	60	265	88	56	0	594	80	0	28	22	0	36
Grp Sat Flow(s),veh/h/ln	823	1945	1648	1028	0	1842	1372	0	1696	1382	0	1706
Q Serve(g_s), s	1.0	0.0	0.0	1.2	0.0	10.0	5.1	0.0	1.4	1.3	0.0	1.7
Cycle Q Clear(g_c), s	11.0	0.0	0.0	1.2	0.0	10.0	6.9	0.0	1.4	2.7	0.0	1.7
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.57	1.00		0.78
Lane Grp Cap(c), veh/h	620	1492	1265	869	0	1413	190	0	169	197	0	170
V/C Ratio(X)	0.10	0.18	0.07	0.06	0.00	0.42	0.42	0.00	0.17	0.11	0.00	0.21
Avail Cap(c_a), veh/h	620	1492	1265	869	0	1413	389	0	415	397	0	417
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.8	0.0	0.0	2.6	0.0	3.6	40.4	0.0	37.1	38.3	0.0	37.3
Incr Delay (d2), s/veh	0.3	0.2	0.1	0.1	0.0	0.9	1.5	0.0	0.5	0.2	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.2	0.0	2.7	1.7	0.0	0.6	0.5	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.1	0.2	0.1	2.7	0.0	4.5	41.9	0.0	37.6	38.6	0.0	37.9
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	D
Approach Vol, veh/h		413			650			108			58	
Approach Delay, s/veh		0.3			4.4			40.8			38.2	
Approach LOS		A			A			D			D	

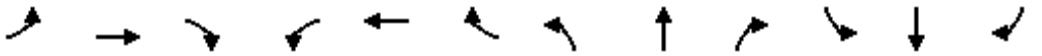
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		75.0		15.0		75.0		15.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		56.0		22.0		56.0		22.0				
Max Q Clear Time (g_c+I1), s		12.0		4.7		13.0		8.9				
Green Ext Time (p_c), s		4.7		0.2		2.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			7.8									
HCM 6th LOS			A									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	181	21	40	773	8	636	259
v/c Ratio	0.70	0.07	0.09	0.33	0.02	0.57	0.25
Control Delay	45.7	19.9	6.7	9.0	6.9	13.7	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Total Delay	45.7	19.9	6.7	9.0	6.9	13.9	2.1
Queue Length 50th (ft)	92	6	6	82	1	118	4
Queue Length 95th (ft)	133	19	21	200	m4	439	20
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	430	483	453	2314	483	1111	1048
Starvation Cap Reductn	0	0	0	0	0	77	254
Spillback Cap Reductn	0	0	0	11	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.04	0.09	0.34	0.02	0.62	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	2	22	7	2	7	37	707	5	7	585	238
Future Volume (veh/h)	126	2	22	7	2	7	37	707	5	7	585	238
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	152	2	27	9	3	9	40	768	5	8	636	259
Peak Hour Factor	0.83	0.83	0.83	0.78	0.78	0.78	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	257	2	33	144	58	109	525	2317	15	477	1151	975
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.04	0.64	0.64	0.02	1.00	1.00
Sat Flow, veh/h	1223	16	217	583	386	727	1781	3619	24	1781	1870	1585
Grp Volume(v), veh/h	181	0	0	21	0	0	40	377	396	8	636	259
Grp Sat Flow(s),veh/h/ln	1456	0	0	1697	0	0	1781	1777	1866	1781	1870	1585
Q Serve(g_s), s	9.9	0.0	0.0	0.0	0.0	0.0	0.7	8.7	8.7	0.1	0.0	0.0
Cycle Q Clear(g_c), s	10.8	0.0	0.0	0.9	0.0	0.0	0.7	8.7	8.7	0.1	0.0	0.0
Prop In Lane	0.84		0.15	0.43		0.43	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	292	0	0	311	0	0	525	1138	1195	477	1151	975
V/C Ratio(X)	0.62	0.00	0.00	0.07	0.00	0.00	0.08	0.33	0.33	0.02	0.55	0.27
Avail Cap(c_a), veh/h	523	0	0	557	0	0	601	1138	1195	597	1151	975
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	37.0	0.0	0.0	32.9	0.0	0.0	5.6	7.4	7.4	5.9	0.0	0.0
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.1	0.0	0.0	0.1	0.8	0.7	0.0	1.8	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	0.0	0.4	0.0	0.0	0.2	2.9	3.1	0.0	0.6	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	0.0	0.0	33.0	0.0	0.0	5.7	8.2	8.1	5.9	1.8	0.6
LnGrp LOS	D	A	A	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		181			21			813			903	
Approach Delay, s/veh		39.2			33.0			8.0			1.5	
Approach LOS		D			C			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	63.6		19.5	9.2	61.4		19.5				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	7.0	37.0		28.0	7.0	37.0		28.0				
Max Q Clear Time (g_c+I1), s	2.1	10.7		12.8	2.7	2.0		2.9				
Green Ext Time (p_c), s	0.0	4.7		0.7	0.0	5.5		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		8.2	
HCM 6th LOS		A	

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	213	6	32	328	5	28
Future Vol, veh/h	213	6	32	328	5	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	60	60
Heavy Vehicles, %	2	80	80	2	80	80
Mvmt Flow	257	7	39	395	8	47

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	264	0	734	261
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	473	-
Critical Hdwy	-	-	4.9	-	7.2	7
Critical Hdwy Stg 1	-	-	-	-	6.2	-
Critical Hdwy Stg 2	-	-	-	-	6.2	-
Follow-up Hdwy	-	-	2.92	-	4.22	4.02
Pot Cap-1 Maneuver	-	-	956	-	293	621
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	492	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	956	-	281	621
Mov Cap-2 Maneuver	-	-	-	-	281	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	525	-	-	956	-
HCM Lane V/C Ratio	0.105	-	-	0.04	-
HCM Control Delay (s)	12.7	-	-	8.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	7.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	187	54	292	313	47	248
Future Vol, veh/h	187	54	292	313	47	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	87	87	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	225	65	336	360	57	299

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	290	0	1290	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	1032	-
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	-	-	1272	-	180	781
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	344	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1272	-	132	781
Mov Cap-2 Maneuver	-	-	-	-	132	-
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	253	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.3	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	132	781	-	-	1272	-
HCM Lane V/C Ratio	0.429	0.383	-	-	0.264	-
HCM Control Delay (s)	51.3	12.4	-	-	8.8	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	1.9	1.8	-	-	1.1	-

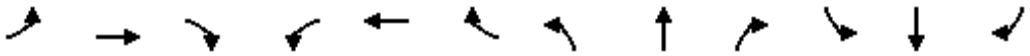
14: Ranson Rd (Rt RA) & US-50 EB Ramps

05/07/2020

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	303	188	687	278	128	805
v/c Ratio	0.60	0.46	0.53	0.37	0.36	0.32
Control Delay	41.0	7.5	23.6	6.5	5.4	4.2
Queue Delay	0.0	0.0	0.6	0.3	0.0	0.0
Total Delay	41.0	7.6	24.3	6.9	5.4	4.2
Queue Length 50th (ft)	83	0	176	20	5	125
Queue Length 95th (ft)	119	8	224	72	10	m105
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	556	433	1305	759	356	2501
Starvation Cap Reductn	0	0	286	151	0	0
Spillback Cap Reductn	0	3	0	0	0	59
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.44	0.67	0.46	0.36	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	0	130	0	0	0	0	598	242	102	700	0
Future Volume (vph)	264	0	130	0	0	0	0	598	242	102	700	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.30	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	545	3539	
Peak-hour factor, PHF	0.87	0.25	0.69	1.00	1.00	1.00	1.00	0.87	0.87	0.80	0.87	1.00
Adj. Flow (vph)	303	0	188	0	0	0	0	687	278	128	805	0
RTOR Reduction (vph)	0	0	160	0	0	0	0	0	175	0	0	0
Lane Group Flow (vph)	303	0	28	0	0	0	0	687	103	128	805	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2 4	
Permitted Phases									2	2		
Actuated Green, G (s)	13.3		13.3					33.2	33.2	41.3	63.5	
Effective Green, g (s)	13.3		13.3					33.2	33.2	41.3	63.5	
Actuated g/C Ratio	0.15		0.15					0.37	0.37	0.46	0.71	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	507		233					1305	583	355	2496	
v/s Ratio Prot	c0.09		0.02					c0.19		0.03	c0.23	
v/s Ratio Perm									0.06	0.13		
v/c Ratio	0.60		0.12					0.53	0.18	0.36	0.32	
Uniform Delay, d1	35.8		33.3					22.2	19.2	21.4	5.1	
Progression Factor	1.00		1.00					0.98	1.95	0.21	0.79	
Incremental Delay, d2	2.2		0.3					1.5	0.6	0.5	0.0	
Delay (s)	38.1		33.6					23.4	38.1	5.0	4.0	
Level of Service	D		C					C	D	A	A	
Approach Delay (s)		36.4			0.0			27.6			4.2	
Approach LOS		D			A			C			A	

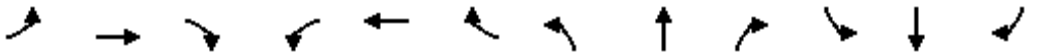
Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	428	297	231	760	760	339
v/c Ratio	1.44	0.67	0.70	0.31	0.60	0.45
Control Delay	246.4	19.5	26.1	4.0	15.9	10.0
Queue Delay	0.0	0.0	0.0	0.0	2.7	1.3
Total Delay	246.4	19.5	26.1	4.0	18.6	11.3
Queue Length 50th (ft)	~334	44	79	96	180	110
Queue Length 95th (ft)	#491	82	#164	114	242	183
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	298	442	330	2469	1261	747
Starvation Cap Reductn	0	0	0	0	370	227
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.44	0.67	0.70	0.31	0.85	0.65

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.

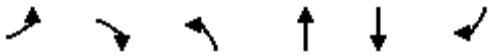


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	372	0	226	208	654	0	0	430	508
Future Volume (vph)	0	0	0	372	0	226	208	654	0	0	430	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.95	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3212	1441
Flt Permitted				0.95		1.00	0.24	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	434	3539			3212	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.87	1.00	0.76	0.90	0.86	1.00	1.00	0.87	0.84
Adj. Flow (vph)	0	0	0	428	0	297	231	760	0	0	494	605
RTOR Reduction (vph)	0	0	0	0	0	175	0	0	0	0	70	213
Lane Group Flow (vph)	0	0	0	428	0	122	231	760	0	0	690	126
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				15.2		15.2	42.1	62.7			33.4	33.4
Effective Green, g (s)				15.2		15.2	42.1	56.1			33.4	33.4
Actuated g/C Ratio				0.17		0.17	0.47	0.62			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				298		267	326	2205			1192	534
v/s Ratio Prot				c0.24		0.08	c0.07	c0.21			0.21	
v/s Ratio Perm							c0.26					0.09
v/c Ratio				1.44		0.46	0.71	0.34			0.58	0.24
Uniform Delay, d1				37.4		33.7	26.8	8.1			22.7	19.5
Progression Factor				1.00		1.00	0.68	0.70			0.71	3.26
Incremental Delay, d2				214.5		1.7	6.0	0.1			1.9	1.0
Delay (s)				251.9		35.4	24.1	5.8			18.1	64.6
Level of Service				F		D	C	A			B	E
Approach Delay (s)		0.0			163.2			10.0			32.4	
Approach LOS		A			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	58.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

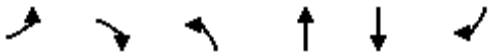
Queues
2: Ranson Rd (Rt RA) & Bailey Rd

05/07/2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	490	106	58	286	370	339
v/c Ratio	0.68	0.15	0.20	0.48	0.61	0.21
Control Delay	18.1	3.2	15.7	17.3	20.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	3.2	15.7	17.3	20.1	0.3
Queue Length 50th (ft)	102	0	11	59	81	0
Queue Length 95th (ft)	229	21	39	158	210	0
Internal Link Dist (ft)	532			579	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1295	1186	635	1318	1318	1558
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.09	0.09	0.22	0.28	0.22

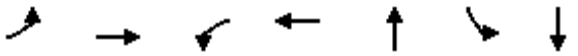
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	426	92	48	263	337	295
Future Volume (veh/h)	426	92	48	263	337	295
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	490	106	58	286	370	339
Peak Hour Factor	0.87	0.87	0.83	0.92	0.91	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	622	553	316	628	628	1086
Arrive On Green	0.35	0.35	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1585	740	1870	1870	1585
Grp Volume(v), veh/h	490	106	58	286	370	339
Grp Sat Flow(s),veh/h/ln	1781	1585	740	1870	1870	1585
Q Serve(g_s), s	9.4	1.8	2.7	4.6	6.2	3.3
Cycle Q Clear(g_c), s	9.4	1.8	8.9	4.6	6.2	3.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	622	553	316	628	628	1086
V/C Ratio(X)	0.79	0.19	0.18	0.46	0.59	0.31
Avail Cap(c_a), veh/h	1589	1414	728	1669	1669	1968
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.1	8.7	14.2	9.9	10.5	2.4
Incr Delay (d2), s/veh	2.3	0.2	0.3	0.5	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.5	0.3	1.2	1.7	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.4	8.8	14.4	10.4	11.4	2.6
LnGrp LOS	B	A	B	B	B	A
Approach Vol, veh/h	596			344	709	
Approach Delay, s/veh	12.6			11.1	7.2	
Approach LOS	B			B	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		18.8		19.3		18.8
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		10.9		11.4		8.2
Green Ext Time (p_c), s		1.9		1.9		3.3

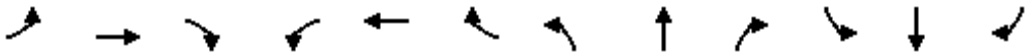
Intersection Summary	
HCM 6th Ctrl Delay	9.9
HCM 6th LOS	A



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	198	317	4	432	39	288	288
v/c Ratio	0.41	0.25	0.01	0.53	0.09	0.84	0.45
Control Delay	11.9	10.0	17.0	22.0	20.4	52.6	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	10.0	17.0	22.0	20.4	52.6	5.8
Queue Length 50th (ft)	51	84	1	138	13	149	2
Queue Length 95th (ft)	89	134	2	297	23	#252	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	501	1259	434	816	515	396	689
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.25	0.01	0.53	0.08	0.73	0.42

Intersection Summary

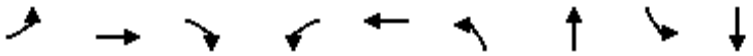
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	279	2	1	225	155	5	14	4	253	2	246
Future Volume (veh/h)	178	279	2	1	225	155	5	14	4	253	2	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	198	313	4	4	247	185	10	23	6	288	5	283
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	544	1076	14	516	424	318	110	236	54	395	8	477
Arrive On Green	0.08	0.56	0.56	0.82	0.82	0.82	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1781	1916	24	1063	1033	773	197	772	176	1381	28	1562
Grp Volume(v), veh/h	198	0	317	4	0	432	39	0	0	288	0	288
Grp Sat Flow(s),veh/h/ln	1781	0	1941	1063	0	1806	1144	0	0	1381	0	1589
Q Serve(g_s), s	5.4	0.0	7.7	0.1	0.0	7.4	0.2	0.0	0.0	11.2	0.0	13.8
Cycle Q Clear(g_c), s	5.4	0.0	7.7	0.1	0.0	7.4	14.0	0.0	0.0	25.2	0.0	13.8
Prop In Lane	1.00		0.01	1.00		0.43	0.26		0.15	1.00		0.98
Lane Grp Cap(c), veh/h	544	0	1089	516	0	742	400	0	0	395	0	485
V/C Ratio(X)	0.36	0.00	0.29	0.01	0.00	0.58	0.10	0.00	0.00	0.73	0.00	0.59
Avail Cap(c_a), veh/h	612	0	1089	516	0	742	409	0	0	403	0	494
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.92	0.00	0.92	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.4	0.0	10.3	4.7	0.0	5.4	22.6	0.0	0.0	32.5	0.0	26.5
Incr Delay (d2), s/veh	0.4	0.0	0.7	0.0	0.0	3.1	0.1	0.0	0.0	6.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	3.2	0.0	0.0	2.3	0.6	0.0	0.0	6.6	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	0.0	11.0	4.8	0.0	8.5	22.7	0.0	0.0	39.0	0.0	28.4
LnGrp LOS	B	A	B	A	A	A	C	A	A	D	A	C
Approach Vol, veh/h		515			436			39			576	
Approach Delay, s/veh		11.7			8.4			22.7			33.7	
Approach LOS		B			A			C			C	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	13.6	43.0		33.5		56.5		33.5				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	11.0	33.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	7.4	9.4		27.2		9.7		16.0				
Green Ext Time (p_c), s	0.2	2.8		0.2		2.0		0.1				

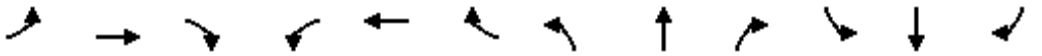
Intersection Summary												
HCM 6th Ctrl Delay			19.1									
HCM 6th LOS			B									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	516	132	63	290	169	77	46	89
v/c Ratio	0.11	0.38	0.11	0.12	0.23	0.68	0.21	0.18	0.22
Control Delay	4.0	4.7	0.5	7.2	6.8	47.3	10.9	29.8	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	4.7	0.5	7.2	6.8	47.3	10.9	29.8	12.9
Queue Length 50th (ft)	8	59	0	11	53	90	6	22	14
Queue Length 95th (ft)	m14	80	m2	22	111	113	18	43	47
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	733	1344	1246	540	1238	477	638	482	733
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.38	0.11	0.12	0.23	0.35	0.12	0.10	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	408	100	40	232	20	125	8	54	38	26	47
Future Volume (veh/h)	50	408	100	40	232	20	125	8	54	38	26	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	77	516	132	63	252	38	169	13	64	46	29	60
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	738	1298	1100	602	1059	160	284	55	270	291	113	233
Arrive On Green	1.00	1.00	1.00	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1089	1945	1648	783	1588	239	1308	275	1352	1322	565	1169
Grp Volume(v), veh/h	77	516	132	63	0	290	169	0	77	46	0	89
Grp Sat Flow(s),veh/h/ln	1089	1945	1648	783	0	1827	1308	0	1627	1322	0	1735
Q Serve(g_s), s	0.7	0.0	0.0	2.6	0.0	5.7	11.3	0.0	3.6	2.7	0.0	3.9
Cycle Q Clear(g_c), s	6.3	0.0	0.0	2.6	0.0	5.7	15.2	0.0	3.6	6.3	0.0	3.9
Prop In Lane	1.00		1.00	1.00		0.13	1.00		0.83	1.00		0.67
Lane Grp Cap(c), veh/h	738	1298	1100	602	0	1219	284	0	325	291	0	346
V/C Ratio(X)	0.10	0.40	0.12	0.10	0.00	0.24	0.59	0.00	0.24	0.16	0.00	0.26
Avail Cap(c_a), veh/h	738	1298	1100	602	0	1219	503	0	597	512	0	636
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.83	0.83	0.83	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.3	0.0	0.0	5.4	0.0	5.9	36.8	0.0	30.3	32.9	0.0	30.4
Incr Delay (d2), s/veh	0.2	0.8	0.2	0.3	0.0	0.5	2.0	0.0	0.4	0.3	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	0.0	0.3	0.1	0.4	0.0	2.0	3.6	0.0	1.4	0.9	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.5	0.8	0.2	5.8	0.0	6.4	38.8	0.0	30.6	33.2	0.0	30.8
LnGrp LOS	A	A	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		725			353			246			135	
Approach Delay, s/veh		0.6			6.3			36.2			31.6	
Approach LOS		A			A			D			C	

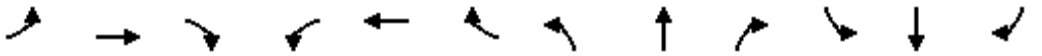
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		66.0		24.0		66.0		24.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		45.0		33.0		45.0		33.0				
Max Q Clear Time (g_c+I1), s		7.7		8.3		8.3		17.2				
Green Ext Time (p_c), s		2.3		0.6		4.4		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			10.9									
HCM 6th LOS			B									

Lane Group	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	301	21	34	793	8	710	201
v/c Ratio	0.82	0.05	0.12	0.39	0.02	0.73	0.22
Control Delay	46.6	15.9	10.1	12.6	5.3	16.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	15.9	10.1	12.6	5.3	17.0	2.1
Queue Length 50th (ft)	151	5	7	112	1	213	3
Queue Length 95th (ft)	217	17	23	231	m3	#590	40
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	468	503	290	2055	391	979	927
Starvation Cap Reductn	0	0	0	0	0	2	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.04	0.12	0.39	0.02	0.73	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	3	53	7	2	7	31	723	6	7	653	185
Future Volume (veh/h)	206	3	53	7	2	7	31	723	6	7	653	185
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	237	3	61	9	3	9	34	786	7	8	710	201
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	340	3	69	202	78	167	464	2005	18	393	998	846
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.56	0.56	0.02	1.00	1.00
Sat Flow, veh/h	1145	14	295	617	331	711	1781	3609	32	1781	1870	1585
Grp Volume(v), veh/h	301	0	0	21	0	0	34	387	406	8	710	201
Grp Sat Flow(s),veh/h/ln	1454	0	0	1658	0	0	1781	1777	1865	1781	1870	1585
Q Serve(g_s), s	17.1	0.0	0.0	0.0	0.0	0.0	0.8	11.1	11.1	0.2	0.0	0.0
Cycle Q Clear(g_c), s	18.0	0.0	0.0	0.8	0.0	0.0	0.8	11.1	11.1	0.2	0.0	0.0
Prop In Lane	0.79		0.20	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	412	0	0	446	0	0	464	987	1036	393	998	846
V/C Ratio(X)	0.73	0.00	0.00	0.05	0.00	0.00	0.07	0.39	0.39	0.02	0.71	0.24
Avail Cap(c_a), veh/h	555	0	0	594	0	0	506	987	1036	474	998	846
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	33.2	0.0	0.0	26.7	0.0	0.0	8.7	11.4	11.4	9.1	0.0	0.0
Incr Delay (d2), s/veh	3.3	0.0	0.0	0.0	0.0	0.0	0.1	1.2	1.1	0.0	4.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.0	0.0	0.3	0.0	0.0	0.3	4.1	4.3	0.1	1.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	0.0	0.0	26.7	0.0	0.0	8.7	12.5	12.5	9.2	4.0	0.6
LnGrp LOS	D	A	A	C	A	A	A	B	B	A	A	A
Approach Vol, veh/h		301			21			827			919	
Approach Delay, s/veh		36.4			26.7			12.3			3.3	
Approach LOS		D			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	56.0		27.1	8.9	54.0		27.1				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	13.1		20.0	2.8	2.0		2.8				
Green Ext Time (p_c), s	0.0	4.8		1.1	0.0	6.1		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		12.0	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	413	9	23	206	5	27
Future Vol, veh/h	413	9	23	206	5	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	60	60
Heavy Vehicles, %	2	80	80	2	80	80
Mvmt Flow	498	11	28	248	8	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	509	0	808	504
Stage 1	-	-	-	-	504	-
Stage 2	-	-	-	-	304	-
Critical Hdwy	-	-	4.9	-	7.2	7
Critical Hdwy Stg 1	-	-	-	-	6.2	-
Critical Hdwy Stg 2	-	-	-	-	6.2	-
Follow-up Hdwy	-	-	2.92	-	4.22	4.02
Pot Cap-1 Maneuver	-	-	753	-	262	440
Stage 1	-	-	-	-	474	-
Stage 2	-	-	-	-	601	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	753	-	252	440
Mov Cap-2 Maneuver	-	-	-	-	252	-
Stage 1	-	-	-	-	474	-
Stage 2	-	-	-	-	579	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	15.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	394	-	-	753	-
HCM Lane V/C Ratio	0.135	-	-	0.037	-
HCM Control Delay (s)	15.6	-	-	10	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	391	49	129	201	28	150
Future Vol, veh/h	391	49	129	201	28	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	471	59	155	242	36	192

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	530	0	1053	501
Stage 1	-	-	-	-	501	-
Stage 2	-	-	-	-	552	-
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	-	-	1037	-	251	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1037	-	214	570
Mov Cap-2 Maneuver	-	-	-	-	214	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	491	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.6	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	214	570	-	-	1037	-
HCM Lane V/C Ratio	0.168	0.337	-	-	0.15	-
HCM Control Delay (s)	25.2	14.5	-	-	9.1	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	1.5	-	-	0.5	-

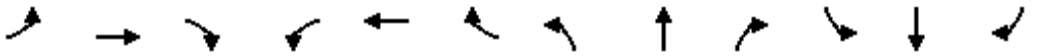
14: Ranson Rd (Rt RA) & US-50 EB Ramps

05/07/2020

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	474	270	731	361	224	682
v/c Ratio	0.43	0.42	0.56	0.45	0.66	0.36
Control Delay	25.8	8.8	21.6	5.2	23.7	10.0
Queue Delay	0.0	0.0	0.6	0.2	0.0	0.0
Total Delay	25.8	8.8	22.1	5.4	23.7	10.0
Queue Length 50th (ft)	109	26	112	2	59	83
Queue Length 95th (ft)	132	82	197	67	90	m122
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	643	1305	811	339	1895
Starvation Cap Reductn	0	0	238	86	0	0
Spillback Cap Reductn	0	9	0	0	0	156
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.43	0.69	0.50	0.66	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



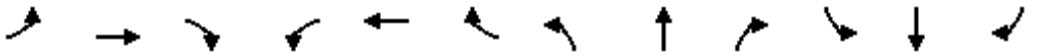
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	379	0	238	0	0	0	0	629	307	199	607	0
Future Volume (vph)	379	0	238	0	0	0	0	629	307	199	607	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.28	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	498	3539	
Peak-hour factor, PHF	0.80	0.25	0.88	1.00	1.00	1.00	1.00	0.86	0.85	0.89	0.89	1.00
Adj. Flow (vph)	474	0	270	0	0	0	0	731	361	224	682	0
RTOR Reduction (vph)	0	0	141	0	0	0	0	0	228	0	0	0
Lane Group Flow (vph)	474	0	129	0	0	0	0	731	133	224	682	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1090		503					1305	583	339	1895	
v/s Ratio Prot	c0.14		0.08					0.21		c0.06	0.19	
v/s Ratio Perm									0.08	c0.24		
v/c Ratio	0.43		0.26					0.56	0.23	0.66	0.36	
Uniform Delay, d1	24.3		22.8					22.6	19.6	26.2	12.0	
Progression Factor	1.00		1.00					0.87	1.47	0.77	0.79	
Incremental Delay, d2	0.4		0.4					1.6	0.8	3.9	0.1	
Delay (s)	24.7		23.2					21.3	29.6	24.0	9.5	
Level of Service	C		C					C	C	C	A	
Approach Delay (s)		24.1			0.0			24.1			13.1	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	227	167	172	1126	762	331
v/c Ratio	0.83	0.35	0.52	0.45	0.61	0.45
Control Delay	63.5	2.0	19.6	3.9	23.7	7.2
Queue Delay	0.0	0.0	0.0	0.0	3.9	1.1
Total Delay	63.5	2.0	19.6	3.9	27.6	8.2
Queue Length 50th (ft)	126	0	34	128	217	71
Queue Length 95th (ft)	#220	0	36	76	288	116
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	329	2518	1245	742
Starvation Cap Reductn	0	0	0	0	386	209
Spillback Cap Reductn	0	1	0	13	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.35	0.52	0.45	0.89	0.62

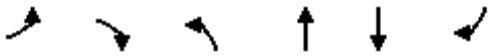
Intersection Summary

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



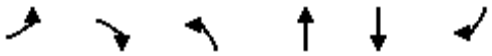
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	191	0	115	141	867	0	0	615	344
Future Volume (vph)	0	0	0	191	0	115	141	867	0	0	615	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3327	1441
Flt Permitted				0.95		1.00	0.24	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	432	3539			3327	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.84	1.00	0.69	0.82	0.77	1.00	1.00	0.92	0.81
Adj. Flow (vph)	0	0	0	227	0	167	172	1126	0	0	668	425
RTOR Reduction (vph)	0	0	0	0	0	141	0	0	0	0	11	208
Lane Group Flow (vph)	0	0	0	227	0	26	172	1126	0	0	751	123
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				13.8		13.8	42.2	63.7			33.4	33.4
Effective Green, g (s)				13.8		13.8	42.2	63.7			33.4	33.4
Actuated g/C Ratio				0.15		0.15	0.47	0.71			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				271		242	327	2504			1234	534
v/s Ratio Prot				c0.13		0.02	0.05	c0.32			c0.23	
v/s Ratio Perm							0.19					0.09
v/c Ratio				0.84		0.11	0.53	0.45			0.61	0.23
Uniform Delay, d1				37.0		32.8	15.0	5.6			23.0	19.5
Progression Factor				1.00		1.00	1.28	0.59			0.95	2.11
Incremental Delay, d2				20.4		0.3	1.4	0.1			2.1	1.0
Delay (s)				57.4		33.1	20.6	3.5			23.9	42.0
Level of Service				E		C	C	A			C	D
Approach Delay (s)		0.0			47.1			5.7			29.4	
Approach LOS		A			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	498	94	42	358	464	334
v/c Ratio	0.72	0.14	0.17	0.54	0.70	0.21
Control Delay	21.7	3.9	15.2	17.9	21.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	3.9	15.2	17.9	21.9	0.3
Queue Length 50th (ft)	122	0	8	83	117	0
Queue Length 95th (ft)	283	24	31	198	271	0
Internal Link Dist (ft)	532			579	1562	
Turn Bay Length (ft)		200	200			200
Base Capacity (vph)	1191	1096	449	1212	1212	1578
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.09	0.09	0.30	0.38	0.21

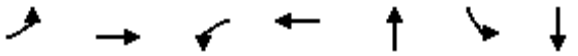
Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	433	82	35	329	422	291
Future Volume (veh/h)	433	82	35	329	422	291
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	498	94	42	358	464	334
Peak Hour Factor	0.87	0.87	0.83	0.92	0.91	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	617	549	279	684	684	1129
Arrive On Green	0.35	0.35	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1781	1585	681	1870	1870	1585
Grp Volume(v), veh/h	498	94	42	358	464	334
Grp Sat Flow(s),veh/h/ln	1781	1585	681	1870	1870	1585
Q Serve(g_s), s	10.6	1.7	2.3	6.3	8.7	3.2
Cycle Q Clear(g_c), s	10.6	1.7	11.0	6.3	8.7	3.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	617	549	279	684	684	1129
V/C Ratio(X)	0.81	0.17	0.15	0.52	0.68	0.30
Avail Cap(c_a), veh/h	1454	1293	586	1526	1526	1843
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	12.3	9.5	15.8	10.4	11.2	2.2
Incr Delay (d2), s/veh	2.6	0.1	0.2	0.6	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	0.5	0.3	1.8	2.6	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.9	9.6	16.1	11.0	12.3	2.3
LnGrp LOS	B	A	B	B	B	A
Approach Vol, veh/h	592			400	798	
Approach Delay, s/veh	14.1			11.5	8.2	
Approach LOS	B			B	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		21.2		20.4		21.2
Change Period (Y+Rc), s		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		34.0		34.0
Max Q Clear Time (g_c+I1), s		13.0		12.6		10.7
Green Ext Time (p_c), s		2.2		1.9		3.8

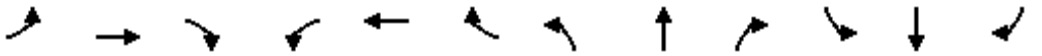
Intersection Summary		
HCM 6th Ctrl Delay		10.9
HCM 6th LOS		B



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	247	383	4	548	48	309	362
v/c Ratio	0.64	0.31	0.01	0.72	0.10	0.87	0.52
Control Delay	18.1	11.0	21.0	32.6	20.0	55.2	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	11.0	21.0	32.6	20.0	55.2	5.9
Queue Length 50th (ft)	68	110	2	285	16	159	3
Queue Length 95th (ft)	113	164	2	#393	26	#283	0
Internal Link Dist (ft)		572		1216	551		473
Turn Bay Length (ft)	250		90			110	
Base Capacity (vph)	414	1232	378	758	507	392	738
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.31	0.01	0.72	0.09	0.79	0.49

Intersection Summary

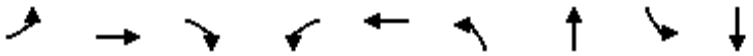
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	337	2	1	265	216	6	17	5	272	3	308
Future Volume (veh/h)	222	337	2	1	265	216	6	17	5	272	3	308
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1870	1870	1945	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	247	379	4	4	291	257	12	28	8	309	8	354
Peak Hour Factor	0.90	0.89	0.50	0.25	0.91	0.84	0.50	0.61	0.63	0.88	0.38	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	441	1067	11	465	367	324	91	194	47	347	11	484
Arrive On Green	0.10	0.56	0.56	0.77	0.77	0.77	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1781	1921	20	1000	953	841	131	625	151	1372	35	1555
Grp Volume(v), veh/h	247	0	383	4	0	548	48	0	0	309	0	362
Grp Sat Flow(s),veh/h/ln	1781	0	1942	1000	0	1794	907	0	0	1372	0	1590
Q Serve(g_s), s	7.1	0.0	9.8	0.1	0.0	16.2	0.4	0.0	0.0	9.3	0.0	18.3
Cycle Q Clear(g_c), s	7.1	0.0	9.8	0.1	0.0	16.2	18.7	0.0	0.0	28.0	0.0	18.3
Prop In Lane	1.00		0.01	1.00		0.47	0.25		0.17	1.00		0.98
Lane Grp Cap(c), veh/h	441	0	1079	465	0	691	332	0	0	347	0	495
V/C Ratio(X)	0.56	0.00	0.36	0.01	0.00	0.79	0.14	0.00	0.00	0.89	0.00	0.73
Avail Cap(c_a), veh/h	514	0	1079	465	0	691	332	0	0	347	0	495
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.88	0.00	0.88	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.1	0.0	11.1	6.4	0.0	8.2	22.8	0.0	0.0	35.3	0.0	27.6
Incr Delay (d2), s/veh	1.1	0.0	0.9	0.0	0.0	8.1	0.2	0.0	0.0	23.5	0.0	5.5
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	2.7	0.0	4.1	0.0	0.0	4.4	0.7	0.0	0.0	9.0	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.2	0.0	12.0	6.4	0.0	16.3	23.0	0.0	0.0	58.8	0.0	33.1
LnGrp LOS	B	A	B	A	A	B	C	A	A	E	A	C
Approach Vol, veh/h		630			552			48			671	
Approach Delay, s/veh		13.6			16.2			23.0			44.9	
Approach LOS		B			B			C			D	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	15.3	40.7		34.0		56.0		34.0				
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s	13.0	31.0		28.0		50.0		28.0				
Max Q Clear Time (g_c+I1), s	9.1	18.2		30.0		11.8		20.7				
Green Ext Time (p_c), s	0.3	3.0		0.0		2.5		0.1				

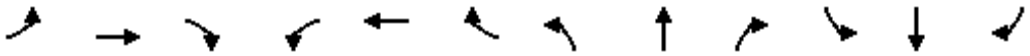
Intersection Summary												
HCM 6th Ctrl Delay			25.7									
HCM 6th LOS			C									



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	575	164	79	366	211	96	59	112
v/c Ratio	0.16	0.45	0.14	0.18	0.31	0.74	0.22	0.20	0.23
Control Delay	6.9	7.6	2.2	9.5	9.0	46.9	9.1	27.4	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	7.6	2.2	9.5	9.0	46.9	9.1	27.4	11.1
Queue Length 50th (ft)	12	82	0	16	81	112	7	27	16
Queue Length 95th (ft)	m27	151	m15	30	164	131	18	49	50
Internal Link Dist (ft)		1216			2933		281		334
Turn Bay Length (ft)	250		100	250		110		150	
Base Capacity (vph)	623	1275	1193	450	1177	453	631	460	723
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.45	0.14	0.18	0.31	0.47	0.15	0.13	0.15

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	454	125	50	295	24	156	10	68	49	32	59
Future Volume (veh/h)	63	454	125	50	295	24	156	10	68	49	32	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1945	1945	1870	1870	1870	1870	1870	1870	1870	1945	1870
Adj Flow Rate, veh/h	97	575	164	79	321	45	211	16	80	59	36	76
Peak Hour Factor	0.65	0.79	0.76	0.63	0.92	0.53	0.74	0.63	0.85	0.83	0.89	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	617	1212	1027	414	1000	140	325	66	330	335	136	287
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1016	1945	1648	720	1605	225	1281	271	1355	1300	557	1176
Grp Volume(v), veh/h	97	575	164	79	0	366	211	0	96	59	0	112
Grp Sat Flow(s),veh/h/ln	1016	1945	1648	720	0	1830	1281	0	1626	1300	0	1733
Q Serve(g_s), s	4.5	14.2	3.7	5.9	0.0	8.5	14.3	0.0	4.3	3.4	0.0	4.7
Cycle Q Clear(g_c), s	13.0	14.2	3.7	20.2	0.0	8.5	19.1	0.0	4.3	7.7	0.0	4.7
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.83	1.00		0.68
Lane Grp Cap(c), veh/h	617	1212	1027	414	0	1140	325	0	396	335	0	423
V/C Ratio(X)	0.16	0.47	0.16	0.19	0.00	0.32	0.65	0.00	0.24	0.18	0.00	0.27
Avail Cap(c_a), veh/h	617	1212	1027	414	0	1140	469	0	578	480	0	616
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)	0.81	0.81	0.81	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.1	9.1	7.1	14.5	0.0	8.0	35.2	0.0	27.3	30.4	0.0	27.5
Incr Delay (d2), s/veh	0.4	1.1	0.3	1.0	0.0	0.7	2.2	0.0	0.3	0.2	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	5.5	1.2	1.0	0.0	3.1	4.5	0.0	1.6	1.1	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.5	10.2	7.4	15.5	0.0	8.7	37.4	0.0	27.7	30.7	0.0	27.8
LnGrp LOS	B	B	A	B	A	A	D	A	C	C	A	C
Approach Vol, veh/h		836			445			307			171	
Approach Delay, s/veh		9.8			9.9			34.3			28.8	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		62.1		27.9		62.1		27.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		46.0		32.0		46.0		32.0				
Max Q Clear Time (g_c+I1), s		22.2		9.7		16.2		21.1				
Green Ext Time (p_c), s		2.8		0.8		5.1		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			16.0									
HCM 6th LOS			B									

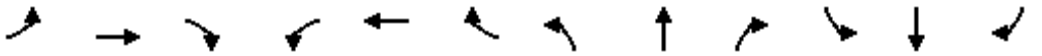
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	28	41	883	10	802	251
v/c Ratio	0.89	0.06	0.22	0.46	0.03	0.88	0.28
Control Delay	52.6	14.8	13.1	15.1	6.0	28.2	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.9	0.2
Total Delay	52.6	14.8	13.1	15.1	6.0	29.1	3.0
Queue Length 50th (ft)	187	6	11	154	1	~491	8
Queue Length 95th (ft)	#319	21	26	264	m3	#724	69
Internal Link Dist (ft)	902	861		210		257	
Turn Bay Length (ft)			150		140		
Base Capacity (vph)	465	499	186	1905	318	913	895
Starvation Cap Reductn	0	0	0	0	0	21	165
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.06	0.22	0.46	0.03	0.90	0.34

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	4	67	9	3	9	38	804	8	9	738	231
Future Volume (veh/h)	257	4	67	9	3	9	38	804	8	9	738	231
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	295	5	77	12	4	12	41	874	9	10	802	251
Peak Hour Factor	0.87	0.87	0.87	0.78	0.78	0.78	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	394	5	84	237	89	202	337	1815	19	319	898	761
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.04	0.50	0.50	0.02	0.96	0.96
Sat Flow, veh/h	1136	19	297	632	314	710	1781	3603	37	1781	1870	1585
Grp Volume(v), veh/h	377	0	0	28	0	0	41	431	452	10	802	251
Grp Sat Flow(s),veh/h/ln	1452	0	0	1657	0	0	1781	1777	1864	1781	1870	1585
Q Serve(g_s), s	21.5	0.0	0.0	0.0	0.0	0.0	1.0	14.3	14.3	0.2	10.7	0.8
Cycle Q Clear(g_c), s	22.6	0.0	0.0	1.1	0.0	0.0	1.0	14.3	14.3	0.2	10.7	0.8
Prop In Lane	0.78		0.20	0.43		0.43	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	484	0	0	528	0	0	337	895	939	319	898	761
V/C Ratio(X)	0.78	0.00	0.00	0.05	0.00	0.00	0.12	0.48	0.48	0.03	0.89	0.33
Avail Cap(c_a), veh/h	554	0	0	601	0	0	373	895	939	396	898	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	31.0	0.0	0.0	23.4	0.0	0.0	11.5	14.6	14.6	11.6	1.1	0.9
Incr Delay (d2), s/veh	6.2	0.0	0.0	0.0	0.0	0.0	0.2	1.9	1.8	0.0	12.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.0	0.0	0.4	0.0	0.0	0.4	5.6	5.9	0.1	3.6	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.2	0.0	0.0	23.5	0.0	0.0	11.6	16.5	16.4	11.6	13.3	2.0
LnGrp LOS	D	A	A	C	A	A	B	B	B	B	B	A
Approach Vol, veh/h		377			28			924			1063	
Approach Delay, s/veh		37.2			23.5			16.2			10.6	
Approach LOS		D			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	51.3		31.6	9.2	49.2		31.6				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	37.0		30.0	5.0	37.0		30.0				
Max Q Clear Time (g_c+I1), s	2.2	16.3		24.6	3.0	12.7		3.1				
Green Ext Time (p_c), s	0.0	5.3		1.0	0.0	6.9		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		17.1
HCM 6th LOS		B

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	458	14	52	229	40	53
Future Vol, veh/h	458	14	52	229	40	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	552	17	63	276	62	82

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	569	0	963	561
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	402	-
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	-	-	1003	-	284	527
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1003	-	266	527
Mov Cap-2 Maneuver	-	-	-	-	266	-
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	633	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	20.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	371	-	-	1003	-
HCM Lane V/C Ratio	0.386	-	-	0.062	-
HCM Control Delay (s)	20.7	-	-	8.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.8	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	509	2	35	274	7	36
Future Vol, veh/h	509	2	35	274	7	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	65	65
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	613	2	42	330	11	55

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	615	0	1028	614
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	414	-
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	-	-	965	-	259	492
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	667	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	965	-	248	492
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	638	-

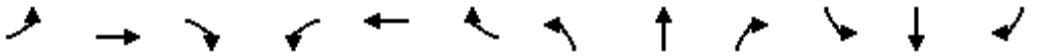
Approach	EB	WB	NB
HCM Control Delay, s	0	1	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	248	492	-	-	965	-
HCM Lane V/C Ratio	0.043	0.113	-	-	0.044	-
HCM Control Delay (s)	20.2	13.2	-	-	8.9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.4	-	-	0.1	-

Lane Group	EBL	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	595	300	815	348	313	768
v/c Ratio	0.55	0.47	0.62	0.43	1.02	0.41
Control Delay	27.6	10.8	21.8	5.5	72.0	11.6
Queue Delay	0.0	0.1	0.7	0.2	0.0	0.1
Total Delay	27.6	10.9	22.5	5.7	72.0	11.7
Queue Length 50th (ft)	142	39	127	1	90	88
Queue Length 95th (ft)	187	109	247	m81	#142	143
Internal Link Dist (ft)			257			581
Turn Bay Length (ft)	625	310			200	
Base Capacity (vph)	1090	642	1305	803	308	1895
Starvation Cap Reductn	0	0	204	95	0	0
Spillback Cap Reductn	0	15	0	0	0	274
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.48	0.74	0.49	1.02	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



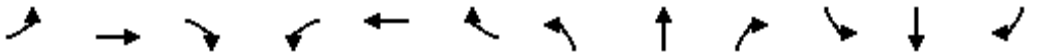
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	518	0	279	0	0	0	0	750	320	260	699	0
Future Volume (vph)	518	0	279	0	0	0	0	750	320	260	699	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)	6.4		6.4					6.8	6.8	6.8	6.8	
Lane Util. Factor	0.97		1.00					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433		1583					3539	1583	1711	3539	
Flt Permitted	0.95		1.00					1.00	1.00	0.23	1.00	
Satd. Flow (perm)	3433		1583					3539	1583	415	3539	
Peak-hour factor, PHF	0.87	0.50	0.93	1.00	1.00	1.00	1.00	0.92	0.92	0.83	0.91	1.00
Adj. Flow (vph)	595	0	300	0	0	0	0	815	348	313	768	0
RTOR Reduction (vph)	0	0	139	0	0	0	0	0	220	0	0	0
Lane Group Flow (vph)	595	0	161	0	0	0	0	815	128	313	768	0
Turn Type	Prot		Prot					NA	Perm	D.P+P	NA	
Protected Phases	3		3					2		1	1 2	
Permitted Phases									2	2		
Actuated Green, G (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Effective Green, g (s)	28.6		28.6					33.2	33.2	41.4	48.2	
Actuated g/C Ratio	0.32		0.32					0.37	0.37	0.46	0.54	
Clearance Time (s)	6.4		6.4					6.8	6.8	6.8		
Vehicle Extension (s)	4.0		4.0					4.0	4.0	3.0		
Lane Grp Cap (vph)	1090		503					1305	583	308	1895	
v/s Ratio Prot	c0.17		0.10					0.23		c0.09	0.22	
v/s Ratio Perm									0.08	c0.37		
v/c Ratio	0.55		0.32					0.62	0.22	1.02	0.41	
Uniform Delay, d1	25.3		23.3					23.3	19.5	28.9	12.4	
Progression Factor	1.00		1.00					0.84	1.66	0.76	0.89	
Incremental Delay, d2	0.7		0.5					1.9	0.7	48.7	0.1	
Delay (s)	26.0		23.8					21.6	33.2	70.6	11.1	
Level of Service	C		C					C	C	E	B	
Approach Delay (s)		25.3			0.0			25.1			28.3	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	209	150	230	1181	915	398
v/c Ratio	0.78	0.31	0.83	0.47	0.73	0.51
Control Delay	58.0	1.7	59.6	4.1	26.0	7.5
Queue Delay	0.0	0.0	0.0	0.0	24.9	1.5
Total Delay	58.0	1.7	59.6	4.1	51.0	9.1
Queue Length 50th (ft)	115	0	91	166	278	95
Queue Length 95th (ft)	#199	0	#180	202	364	136
Internal Link Dist (ft)				581	235	
Turn Bay Length (ft)		70	200			
Base Capacity (vph)	277	484	276	2528	1247	785
Starvation Cap Reductn	0	0	0	0	362	220
Spillback Cap Reductn	0	5	0	73	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.31	0.83	0.48	1.03	0.70

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 (vph)	0	0	0	178	0	126	193	1075	0	0	781	388
Future Volume (vph)	0	0	0	178	0	126	193	1075	0	0	781	388
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	12	12	12	12	12
Total Lost time (s)				5.9		5.9	6.2	6.2			6.6	6.6
Lane Util. Factor				1.00		1.00	1.00	0.95			0.91	0.91
Frt				1.00		0.85	1.00	1.00			0.98	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1711	3539			3339	1441
Flt Permitted				0.95		1.00	0.16	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	292	3539			3339	1441
Peak-hour factor, PHF	1.00	1.00	1.00	0.85	0.50	0.84	0.84	0.91	1.00	1.00	0.95	0.79
Adj. Flow (vph)	0	0	0	209	0	150	230	1181	0	0	822	491
RTOR Reduction (vph)	0	0	0	0	0	127	0	0	0	0	9	250
Lane Group Flow (vph)	0	0	0	209	0	23	230	1181	0	0	906	148
Turn Type				Prot		Prot	D.P+P	NA			NA	Perm
Protected Phases				7		7	5	5 6 8			6	
Permitted Phases							6					6
Actuated Green, G (s)				13.6		13.6	42.2	63.9			33.4	33.4
Effective Green, g (s)				13.6		13.6	42.2	63.9			33.4	33.4
Actuated g/C Ratio				0.15		0.15	0.47	0.71			0.37	0.37
Clearance Time (s)				5.9		5.9	6.2				6.6	6.6
Vehicle Extension (s)				4.0		4.0	3.0				4.0	4.0
Lane Grp Cap (vph)				267		239	275	2512			1239	534
v/s Ratio Prot				c0.12		0.01	c0.08	c0.33			0.27	
v/s Ratio Perm							c0.31					0.10
v/c Ratio				0.78		0.09	0.84	0.47			0.73	0.28
Uniform Delay, d1				36.8		32.9	16.9	5.7			24.4	19.8
Progression Factor				1.00		1.00	2.80	0.63			0.92	2.30
Incremental Delay, d2				14.6		0.2	15.7	0.1			3.5	1.2
Delay (s)				51.4		33.1	63.1	3.7			26.0	46.9
Level of Service				D		C	E	A			C	D
Approach Delay (s)		0.0			43.8			13.4			32.3	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.7
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			


STATE OF MISSOURI
SHANNON
JEFFRIES
NUMBER
PE-2008000069
PROFESSIONAL ENGINEER
05.08.2020

LSR7 MIDDLE SCHOOL

Lee’s Summit, Missouri

May 2020

Olsson Project No. 020-0103