*Traffic Impact Study*
*for Submittal to*
*Knoxville-Knox County*
*Metropolitan Planning Commission and*
*the Knox County Engineering Department*

# Cottage Landing

# Knox County, Tennessee

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# 1.0 EXECUTIVE SUMMARY

The proposed development (Cottage Landing) will consist of 86 apartment units. The site is located south of Cherokee Trail approximately three-fourths of a mile east of the Medical Center intersection which serves the University of Tennessee Medical Center. The site is bounded by The Orchard at Knoxville to the east. The expected build-out year for the proposed development is 2014.

This traffic impact study is consistent with a Level II study and Appendix B "Traffic Access and Impact Study Guidelines and Procedures" within the *Knoxville – Knox County Minimum Subdivision Regulations*. This report summarizes the data collection, analysis of traffic impacts, proposed access, and conclusions from the analysis.

The two (2) study intersections are the intersection of University of Tennessee Medical Center Entrance at Cherokee Trail and the intersection of Cherokee Trail at the Proposed Driveway. This study analyzed Existing 2013, Background 2014, and Future 2014 conditions.

The recommended improvements within this study focus on the two (2) intersections directly impacted by the proposed development. These improvements mostly consist of driveway configuration, signs, and pavement markings that are described in Section 8.0 (Recommended Improvements).

# 2.0 INTRODUCTION

**Purpose of Study**

The purpose of this Traffic Impact Study is to determine the traffic impact of the proposed development on the adjacent roadway network, review of the proposed site access points, and the review of intersection geometry. This study investigates the impacts of the development to determine if the site and surrounding roadway facilities will be able to accommodate the increase in projected traffic under the existing roadway conditions. Based upon these analyses, recommendations may be developed for the existing adjacent roadway network to mitigate the impacts of the development.

**Development Information**

The proposed development (Cottage Landing) will consist of 86 apartment units. The site is located south of Cherokee Trail approximately three-fourths of a mile east of the Medical Center intersection which serves the University of Tennessee Medical Center. The site is bounded by The Orchard at Knoxville to the east. The location of the proposed development is illustrated on a map in **Figure 1** and on an aerial image in **Figure 2**. The expected build-out year for the proposed development is 2014.

**Planned Improvements**

There are planned improvements at the interchange of UTMC and Alcoa Highway which is adjacent to the intersection of UTMC / Cherokee Trail, located directly to the southwest of the project intersection. The planned improvements are in the environmental phase currently, and TDOT hopes to have NEPA documentation approved in 2013. The project is fully funded through the PE-Final Design phase and an interchange modification study is planned prior to the determination of the final design. A slide presentation presented to the University of Tennessee Medical Center (UTMC) from 2009 illustrates a potential laneage configuration for the planned improvements. The proposed configuration illustrates a fourth leg at the intersection of UTMC / Cherokee Trail. The proposed fourth leg would serve as the on-ramp for the northbound traffic

along Alcoa Highway and the off-ramp for the northbound traffic along Alcoa Highway. This scenario is analyzed as one of the Future (2014) Build scenarios.

**Land Use**

The existing zoning is PR (Planned Residential Zone). The Sector Plan indicates SLPA (Slope Protection Area). The site is currently undeveloped.

**Site Access**

Access to the proposed site will be provided by one (1) driveway, labeled the Proposed Driveway for the purposes of this study. It is a connection to Cherokee Trail, approximately three-fourths of a mile east of the Medical Center intersection.

The proposed site plan for the development is provided in **Appendix A**.


| | | | |
|---|---|---|---|
| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Site Location | Figure 1 |

NORTH


| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Aerial Image | Figure 2 |
|---|---|---|---|

**Study Area**

The study area includes two (2) existing intersections:

- University of Tennessee Medical Center Entrance at Cherokee Trail
- Cherokee Trail at Proposed Driveway

For purposes of this traffic impact study, Cherokee trail is considered an east-west oriented roadway. University of Tennessee Medical Center Entrance and the Proposed Driveway are considered north-south oriented roadways.

**Study Methodology**

The methodology used for this study consisted of data collection, analysis of existing traffic conditions, and development of a traffic impact study. Intersection turning movement counts were collected at the one (1) existing study intersections to evaluate existing traffic conditions providing a background for traffic generated by the future development. A 24-hour tube count was also completed just east of the Proposed Driveway and historical 24-hour road tube counts were also obtained from the Tennessee Department of Transportation (TDOT) to determine the anticipated traffic growth rate within the study area.

An existing conditions analysis was completed for the study area to provide a basis of comparison to future traffic conditions. Intersection capacity analyses were also completed to discover traffic congestion problems that may exist. The existing conditions analysis serves as a basis of comparison to the future year conditions.

This traffic impact study meets the requirements for a Level II study as defined by Appendix B "Traffic Access and Impact Study Guidelines and Procedures" within the *Knoxville – Knox County Minimum Subdivision Regulations*. The elements included in this study consist of data collection, determining the number of trips expected to be generated by the development and the directional distribution of these trips, analyses of the study intersections with and without the development, and the development of recommendations to mitigate the impacts of the development on the study area roadway network.

# 3.0 EXISTING CONDITIONS

Traffic volume information, intersection configurations, and an intersection capacity analyses were completed to evaluate the existing conditions of the surrounding roadway network.

**Intersection Geometry**

The intersection of University of Tennessee Medical Center at Cherokee Trail has the following features:

- A traffic signal is located at this intersection, and the existing signal timings were obtained from the signal controller during a site visit.
- The intersection is a T-intersection with University of Tennessee Medical Center in a north-south orientation and Cherokee Trail to the east.
- The northbound approach along University of Tennessee Medical Center consists of one through lane and one channelized right-turn lane.
- The southbound approach along University of Tennessee Medical Center consists of one through lane and one shared through / left-turn lane. The left-turn movement is controlled by protected/permissive left-turn phasing.
- The westbound approach along Cherokee Trail consists of two left-turn lanes and one channelized right-turn lane. The left-turn movement is protected because there is no eastbound approach.

Site photos of the roadway network adjacent to the proposed development are included in **Appendix B**.

**Traffic Counts and Field Review**

Weekday morning and afternoon peak period vehicle turning movement counts were performed at the study intersection. The volumes were collected in 15-minute intervals to determine the AM and PM peak hour volumes as well as the peak hour factors. Counts were collected on Tuesday, January 22, 2013 and Wednesday, January 23, 2013, with the following peak periods identified:

- AM Peak Hour = 7:30 to 8:30 AM
- PM Peak Hour = 5:00 to 6:00 PM

Additionally, a 24-hour tube count was collected just to the west of the proposed driveway for Cottage Landing along Cherokee Trail. The tube count was completed from noon on Tuesday, January 22, 2013 to noon on Wednesday, January 23, 2013.

A field review was also completed at the intersection of University of Tennessee Medical Center and Cherokee Trail. During the field review intersection geometry and signal phasing were collected along with intersection sight distance calculations and local controller settings for the existing signal timings. Additionally, local law enforcement officers periodically patrol the area during peak periods. This was not observed during the field review, however; it will be taken into considered for analysis. Police officers are reported to control traffic at two locations, the first location is at the intersection of Cherokee Trail and the UTMC entrance, and the second is along Cherokee Trail just east of UTMC at an unsignalized parking garage entrance. It is unknown whether or not the officers manual control the traffic signal at Cherokee Trail / UTMC.

The Existing 2013 Conditions (intersection geometry and peak hour traffic volumes) are illustrated in **Figure 3**. The peak hour turning movement counts and 24-hour tune counts are provided in **Appendix C**.

**Directional Distribution, Laneage, and Speed Limits**

Based on the 24-hour tube count, the peak hour directional distribution of traffic along Cherokee Trail is approximately 13/87 percent eastbound/westbound during the AM peak hour and approximately 63/37 percent eastbound/westbound during the PM peak hour.

In the project vicinity, Cherokee Trail is a 2-lane undivided facility with a posted speed limit of 30 MPH. Between the proposed driveway at Cottage Landing and the University of Tennessee Medical Center intersection, Cherokee Trail transitions to a two-lane undivided facility with a two-way left-turn lane and a posted speed limit of 40 MPH. TDOT classifies this roadway as an

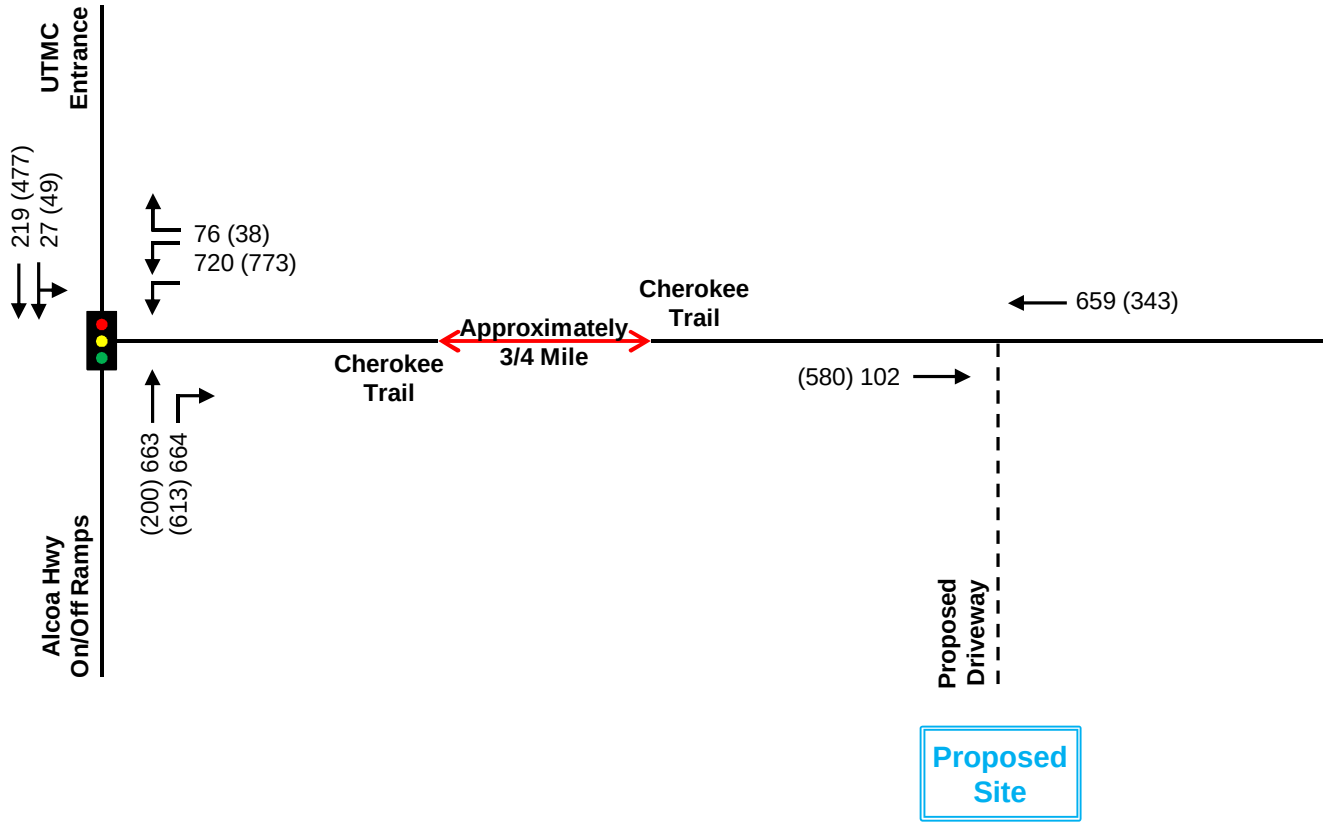
Urban Collector. The westbound left-turn movement from Cherokee Trail onto southbound UTMC to access Alcoa Highway operates with a lane utilization factor of 0.55. This lane utilization factor is representative of a 90% / 10% split of traffic for the westbound left-turn lanes.

In the project vicinity, University of Tennessee Medical Center is a 4-lane divided facility with a posted speed limit of 20 MPH. This roadway functions primarily as a driveway to the University of Tennessee Medical Center and thus, is not assigned a functional classification by TDOT.

The existing traffic signal settings do not represent optimal traffic signal timing at the intersection of Cherokee Trail and UTMC. The signal would function more efficiently if the demand adjusted max time (Max 3) setting was utilized in addition to the standard Max 1 and Max 2 settings. The existing PEEK 3000 traffic signal controller has the ability utilize the setting Max 3, and it is particularly useful in locations with a large flush of traffic in a narrow window of time, for example, a shift change at a hospital.

According to the PEEK 3000 Operating Manual, "Max 3 timing provides the ability to vary max times dynamically at FREE running intersections…" The basic concept is that if a phase maxes out a specified number of times in a row then the normal max time value will be increased by one value of the adjustment amount (*Max 3 Adjust*). If it maxes out the specified number in a row again, it increases by one more adjustment amount. This can continue until the *Max Limit* value is reached."

In order to more accurately reflect the potential existing signal operations, timings in the existing and future Synchro models have been optimized to reflect the potential signal operations. All timings were optimized in order to give a consistent comparison on the level of service and queue lengths utilizing optimized signal settings




LEGEND

- Existing Intersection Geometry
- Existing Traffic Signal
- Existing STOP Sign
- XX AM Peak Hour Traffic Volumes
- (XX) PM Peak Hour Traffic Volumes

| | | | |
|---|---|---|---|
| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Existing 2013 Conditions | Figure 3 |

# 4.0 BACKGROUND CONDITIONS

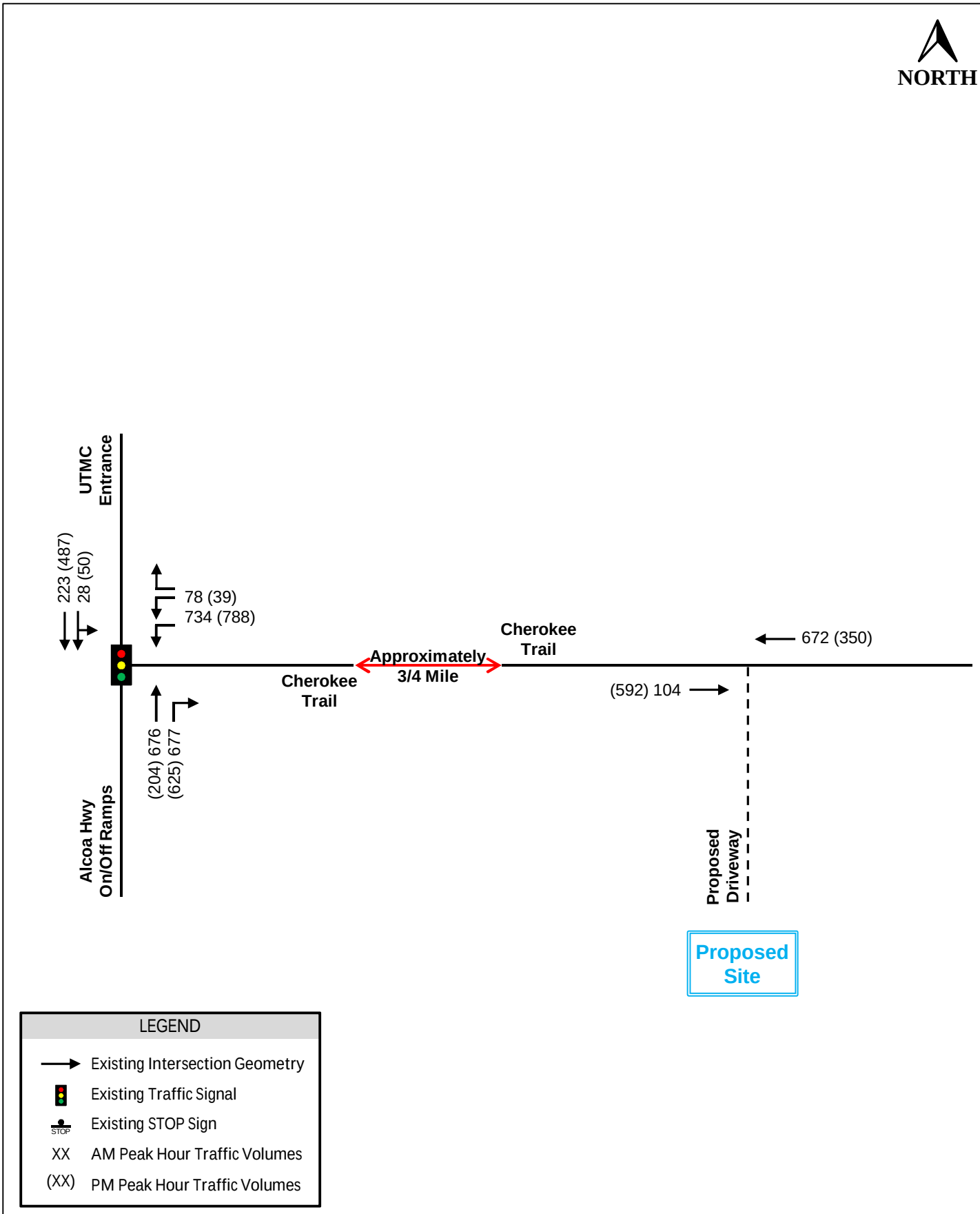
Background traffic is defined as the anticipated traffic conditions on the roadway network in the future years. This includes background traffic growth, traffic associated with future approved developments, and future roadway/intersection improvements. It does not include traffic associated with the proposed development.

**Background Traffic Growth**

The proposed development is scheduled for completion in the year 2014. Therefore, the existing 2013 traffic volumes were increased by an annual growth rate for one (1) year to reflect background 2014 traffic volumes. Historical traffic data from the TDOT count stations was used to evaluate historic traffic trends and determine an appropriate growth rate for the study area. Based on review of the TDOT historical data, a growth rate of two (2) percent was applied to the existing traffic volumes to obtain background 2014 traffic volumes. The TDOT historical data are provided in **Appendix D**.

For the westbound left-turn movement from Cherokee Trail onto southbound UTMC to access Alcoa Highway, two scenarios were analyzed for the 2014 background conditions. The first scenario is representative of a 90% / 10% split of traffic for the westbound left-turn lanes; this is what is currently experienced in the field. The second scenario is representative of a 60% / 40% split of traffic for the westbound left-turn lanes; this is analyzed in order to assess the potential split of traffic if proposed improvements to the Alcoa Highway interchange are made. The two scenarios represent the same volumes for each movement of traffic, but incorporate varying signal timings to represent the differing distribution of the volumes.

**Figure 4** summarizes the AM and PM peak hour traffic volumes for the Background 2014 conditions.




| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Background 2014 Conditions | Figure 4 |
|---|---|---|---|

# 5.0 PROJECT TRAFFIC

Project traffic used in this analysis is defined as the vehicle trips expected to be generated by the proposed development distributed onto the study area roadway network. The anticipated traffic associated with the development was forecasted by using trip generation, trip distribution, and trip assignment.

## Trip Generation

The proposed development will consist of 340 beds within 86 apartment units. Traffic expected to be generated by the proposed development was calculated using equations provided in the *Trip Generation, 8th Edition: An ITE Informational Report* published by the Institute of Transportation Engineers (ITE). Daily, AM peak hour, and PM peak hour trips were calculated.

The trip generation potential for the site is summarized in **Table 1**.

**Table 1. Trip Generation – Cottage Landing**

| Land Use | ITE Code | Density | Daily Trips | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Enter | Exit | Total | Enter | Exit |
| Apartment | 220 | 340 Persons* | 1,244 | 99 | 20 | 79 | 135 | 88 | 47 |
| **New Trips:** | | | **1,244** | **99** | **20** | **79** | **135** | **88** | **47** |

*340 beds within 86 apartment units

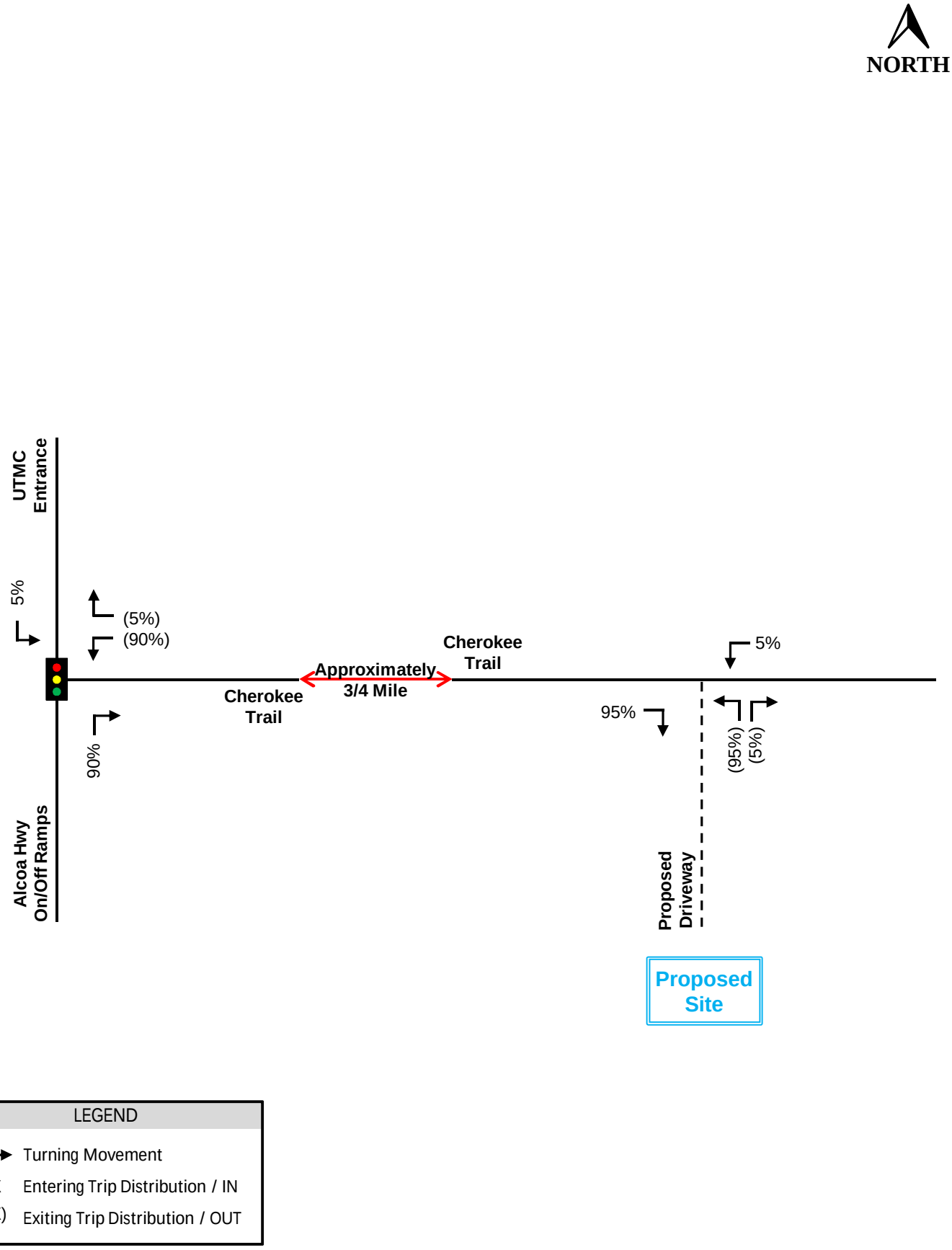
## Trip Distribution and Assignment

Distribution of project traffic was determined based on the existing directional distribution of traffic along Cherokee Trail and review of existing land uses. Site traffic is mostly anticipated to travel west along Cherokee Trail to the University of Tennessee Medical Center and continue towards US 129 / Alcoa Highway. The trip distribution is illustrated in **Figure 5**, and the trip assignment is illustrated in **Figure 6**.

Worksheets that illustrate the trip generation for the proposed development and the volume worksheets for each of the study intersections are provided in **Appendix D**.

# 6.0 FUTURE CONDITIONS

The Future 2014 conditions are defined as the expected roadway/intersection geometry and traffic volumes on the roadway network. This includes background traffic growth, future roadway/intersection improvements, and site traffic associated with the proposed development. Three scenarios were analyzed for the Future 2014 conditions. The first two scenarios represent no improvements to the geometry at the intersection of UTMC / Cherokee Trail. One of these scenarios represents a 90% / 10% lane utilization, and the other scenario represents a 60% / 40% lane utilization, similar to the conditions assessed in the Background conditions. The third scenario represents a full build of the proposed interchange and a fourth (eastbound) leg of the Cherokee Trail / UTMC intersection has been added. The weekday AM and PM peak hour traffic volumes and anticipated intersection geometry for this Future 2014 Full Build condition is summarized in **Figure 8**. The weekday AM and PM peak hour traffic volumes and anticipated intersection geometry for all other Future 2014 conditions are summarized in **Figure 7**.

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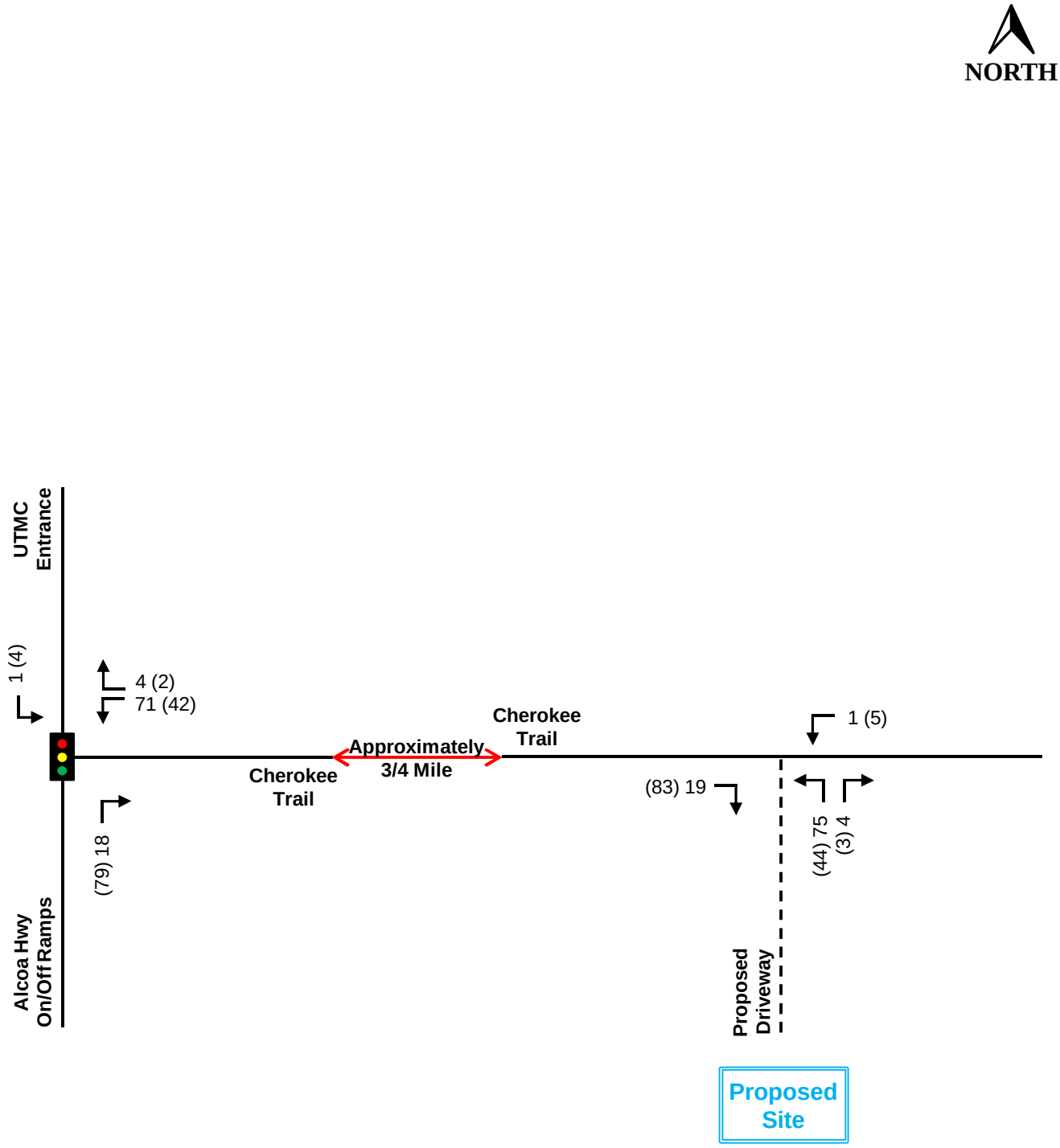
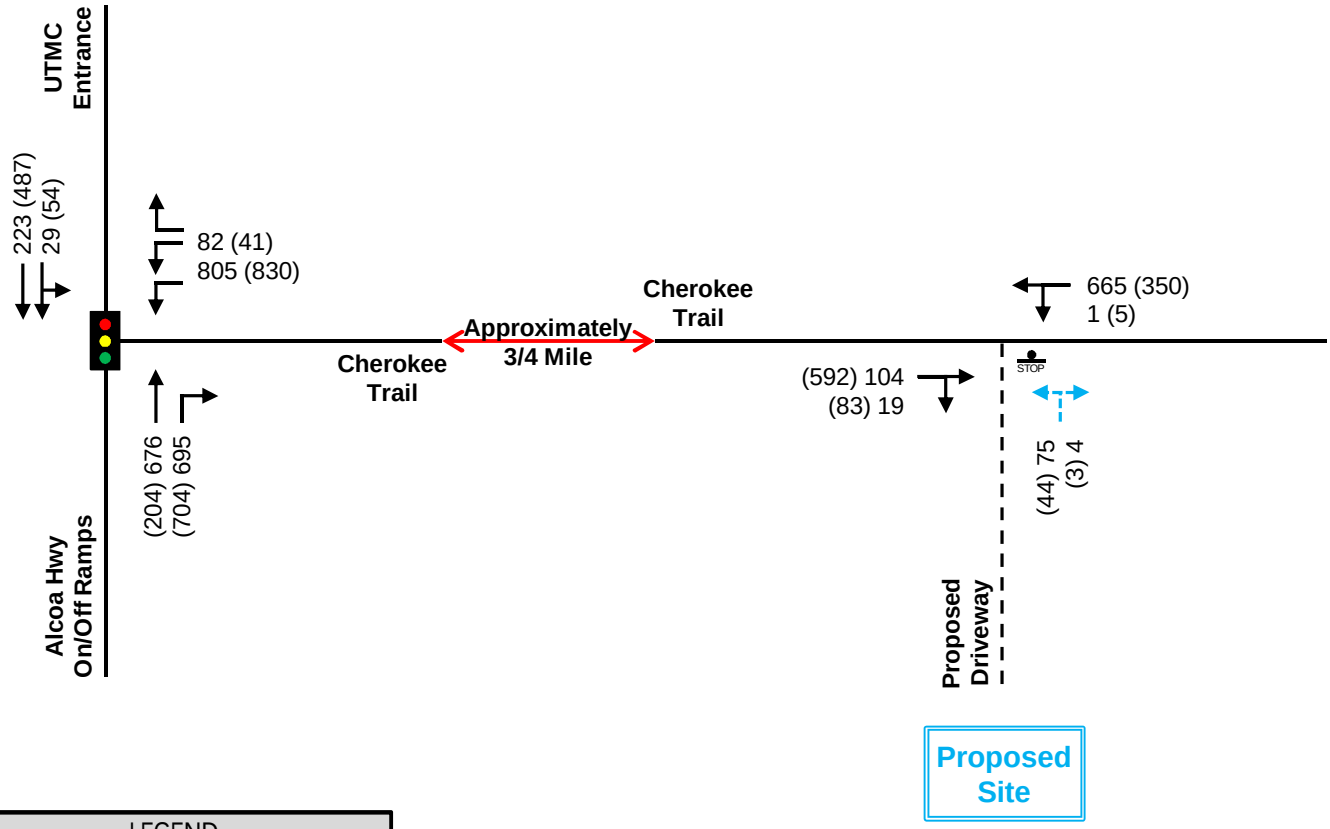
| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Trip Distribution | Figure 5 |



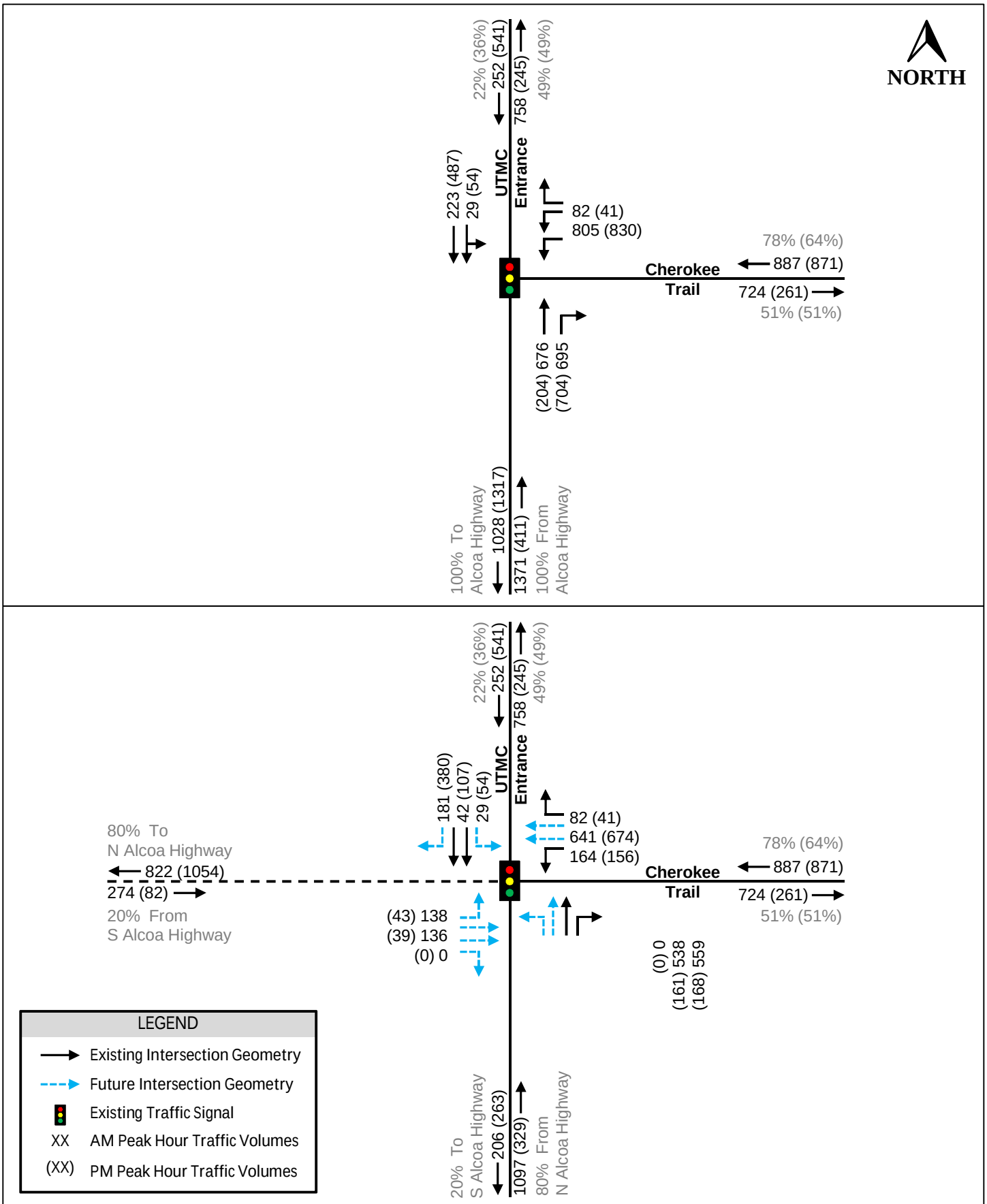

LEGEND

| | |
|---|---|
| → | Turning Movement |
| XX | AM Peak Hour Trip Assignment |
| (XX) | PM Peak Hour Trip Assignment |

| | | | |
|---|---|---|---|
| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Trip Assignment | Figure 6 |




| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Future 2014 Conditions | Figure 7 |
|---|---|---|---|

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| Kimley-Horn and Associates, Inc. | Cottage Landing Traffic Impact Study | Future 2014 Full Build Conditions | Figure 8 |

# 7.0 INTERSECTION CAPACITY ANALYSIS

The *Highway Capacity Manual 2010* provides insight and guidance on control delay, level of service (LOS), signalized intersection LOS, and unsignalized intersection LOS.

Control Delay:

> "Control delay – the delay brought about by the presence of a traffic control device – is the principal service measure in the HCM for evaluating LOS at signalized and unsignalized intersections. Control delay includes delay associated with vehicles slowing in advance of an intersection, the time spent stopped on an intersection approach, the time spent as vehicles move up in the queue, and the time needed for vehicles to accelerate to their desired speed." (Source: *Highway Capacity Manual 2010*, Chapter 4)

LOS:

> "LOS is a quantitative stratification of a performance measure or measures that represent quality of service. The measures used to determine LOS for transportation system elements are called service measures. The HCM defines six levels of service, ranging from A to F, for each service measure, or for the output from a mathematical model based on multiple performance measures. LOS A represents the best operating conditions from the traveler's perspective and LOS F the worst. For cost, environmental impact, and other reasons, roadways are not typically designed to provide LOS A conditions during peak periods, but rather some lower LOS that reflects a balance between the individual travelers' desires and society's desires and financial resources. Nevertheless, during low-volume periods of the day, a system element may operate at LOS A." (Source: *Highway Capacity Manual 2010*, Chapter 5)

Signalized Intersection LOS:

- Control delay alone is used to characterize LOS for the entire intersection or an approach
- Control delay and volume-to-capacity ratios are used to characterize LOS for a lane group.
- Delay quantifies the increase in travel time due to traffic signal control. It is also a surrogate measure of driver discomfort and fuel consumption.

The LOS criteria for signalized intersections are summarized in **Table 2**.

**Table 2. Signalized Intersection Level of Service (LOS)**

| LOS | Control Delay (seconds/vehicle) | Comments |
|---|---|---|
| A | ≤ 10 | Volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping. |
| B | > 10 – 20 | Volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A. |
| C | > 20 – 35 | Progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping. |
| D | > 35 – 55 | Volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable. |
| E | > 55 – 80 | Volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent. |
| F | > 80 | Volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue. |

Source: *Highway Capacity Manual 2010*, Chapter 18

Unsignalized (two-way stop-controlled) intersection LOS:

- For motor vehicles, LOS is determined for each minor-street movement (or shared movement) as well as the major-street left turns…LOS is not defined for the intersection as a whole or for major-street approaches
- The LOS criteria for unsignalized intersections are somewhat different from the criteria for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable than they are at signals, which can reduce users' delay tolerance.

The LOS criteria for unsignalized intersections are summarized in **Table 3**.

**Table 3. Unsignalized Intersection Level of Service (LOS)**

| LOS | Control Delay (seconds/vehicle) | Comments |
|---|---|---|
| A | 0 – 10 | Usually no conflicting traffic |
| B | > 10 – 15 | Occasionally some delay due to conflicting traffic |
| C | > 15 – 25 | Delay noticeable to vehicles, but not inconveniencing |
| D | > 25 – 35 | Delay noticeable and irritating, increased likelihood of risk taking |
| E | > 35 – 50 | Delay approaches tolerance level, risk-taking behavior likely |
| F | > 50 | Delay exceeds tolerance level, high likelihood of vehicle risk taking |

Source: *Highway Capacity Manual 2010*, Chapter 19

For existing roadways, municipalities typically consider LOS A through LOS D as the range of acceptable overall intersection operations, while LOS E and LOS F are considered unacceptable. Roadway laneage, traffic signalization, or other improvements are normally required at those intersections which operate within the range of unacceptable Level of Service.

The operating conditions for each traffic condition were analyzed for the weekday AM and PM peak hours using the *Synchro 8* software which uses the methodologies contained in the *Highway Capacity Manual 2000*. The following intersections were analyzed:

- University of Tennessee Medical Center / Cherokee Trail
- Cherokee Trail / Proposed Driveway

Intersection capacity analyses were conducted for the following conditions within the study area:

- Existing 2013 Conditions
- Background 2014 Conditions – 90%/10% Westbound Left-Turn Lane Utilization
- Background 2014 Conditions – 60%/40% Westbound Left-Turn Lane Utilization
- Future 2014 Conditions – 90%/10% Westbound Left-Turn Lane Utilization
- Future 2014 Conditions – 60%/40% Westbound Left-Turn Lane Utilization
- Future 2014 Conditions – Full Build

Under all conditions, including existing, background and future conditions, traffic signal timings were modified at the University of Tennessee Medical Center / Cherokee Trail intersection, as outline in Section 3 of this document, in order to demonstrate the level of service the intersection will operate at under optimized signal control conditions.

A summary of the capacity analyses for the AM peak hour and PM peak hour are provided in **Table 4** and **Table 5**, respectively.

**Table 4. Capacity Analysis Results – AM Peak Hour**

| Intersection | | Existing 2013 Conditions | Background 2014 Conditions | | Future 2014 Conditions | | |
|---|---|---|---|---|---|---|---|
| | | 90/10 | 90/10 | 60/40 | 90/10 | 60/40 | Full Build |
| **UT Medical Center At Cherokee Trail** | Westbound Approach | E (70.8) [1.05] | E (70.9) [1.05] | D (43.0) [0.93] | E (70.0) [1.03] | D (42.8) [0.93] | C (28.0) [0.76] |
| | Northbound Approach | D (45.1) [1.03] | D (48.0) [1.02] | C (22.3) [0.90] | E (60.1) [1.02] | C (24.2) [0.91] | C (24.0) [0.57] |
| | Southbound Approach | B (14.2) [0.21] | B (15.7) [0.22] | A (8.5) [0.17] | B (19.8) [0.24] | A (9.5) [0.17] | B (13.9) [0.12] |
| | Eastbound Approach | -- | -- | -- | -- | -- | C (28.6) [0.63] |
| | Overall Intersection | **D (50.1) [0.97]** | **D (52.0) [0.97]** | **C (27.5) [0.83]** | **E (59.5) [0.98]** | **C (28.9) [0.85]** | **C (24.8) [0.60]** |
| **Cherokee Trail At Proposed Driveway** | Eastbound Approach | -- | -- | -- | A (0.0) [0.08] | A (0.0) [0.08] | A (0.0) [0.08] |
| | Westbound Approach | -- | -- | -- | A (0.0) [0.00] | A (0.0) [0.00] | A (0.0) [0.00] |
| | Northbound Approach | -- | -- | -- | C (19.2) [0.25] | C (19.2) [0.25] | C (19.2) [0.25] |
| | Overall Intersection | -- | -- | -- | **A (1.7) [0.47]** | **A (1.7) [0.47]** | **A (1.7) [0.47]** |

X – Level of Service; (XX.X) – Control Delay in Seconds; [X.XX] – Volume-to-Capacity Ratio

The intersection capacity analyses for the AM peak hour indicate that under existing conditions the westbound approach operates at a level of service E and the overall intersection operates at a level of service D, but is less than five (5) seconds of delay short of a level of service E. In the 2014 Background Conditions the results are consistent with the results for the Existing Conditions, however; all delays are increased due to the slight increase in background traffic volumes. With the addition of the project trips, the LOS E threshold is breached for the overall

intersection in the 90% / 10% lane utilization scenario with no improvements. By comparison, the proposed improvements for the Alcoa Highway interchange improve the overall intersection delay and allow the intersection to continue operation at a level of service C.

**Table 5. Capacity Analysis Results – PM Peak Hour**

| Intersection | | Existing 2013 Conditions | Background 2014 Conditions | | Future 2014 Conditions | | |
|---|---|---|---|---|---|---|---|
| | | **90/10** | **90/10** | **60/40** | **90/10** | **60/40** | **Full Build** |
| **UT Medical Center At Cherokee Trail** | Westbound Approach | D (35.2) [0.94] | C (34.7) [0.94] | C (24.6) [0.86] | D (37.1) [0.96] | C (26.4) [0.87] | C (21.9) [0.72] |
| | Northbound Approach | C (25.7) [0.58] | C (26.5) [0.61] | B (16.4) [0.50] | C (28.3) [0.64] | B (17.2) [0.52] | C (21.5) [0.26] |
| | Southbound Approach | C (25.1) [0.72] | C (27.0) [0.76] | B (13.2) [0.57] | C (30.9) [0.82] | B (13.7) [0.56] | B (14.1) [0.42] |
| | Eastbound Approach | -- | -- | -- | -- | -- | C (26.5) [0.29] |
| | Overall Intersection | **C (28.9) [0.85]** | **C (29.6) [0.870** | **B (18.3) [0.69]** | **C (32.1) [0.91]** | **B (19.5) [0.69]** | **B (19.7) [0.62]** |
| **Cherokee Trail At Proposed Driveway** | Eastbound Approach | -- | -- | -- | A (0.0) [0.43] | A (0.0) [0.43] | A (0.0) [0.43] |
| | Westbound Approach | -- | -- | -- | A (0.2) [0.01] | A (0.2) [0.01] | A (0.2) [0.01] |
| | Northbound Approach | -- | -- | -- | C (22.4) [0.20] | C (22.4) [0.20] | C (22.4) [0.20] |
| | Overall Intersection | -- | -- | -- | **A (1.1) [0.46]** | **A (1.1) [0.46]** | **A (1.1) [0.46]** |

X – Level of Service; (XX.X) – Control Delay in Seconds; [X.XX] – Volume-to-Capacity Ratio

The intersection capacity analyses for the PM peak hour indicate that all study intersections are anticipated to operate at an acceptable LOS in all scenarios.

A queuing analysis was performed at the intersection of the University of Tennessee Medical Center / Cherokee Trail for the westbound approach:

- Distance from westbound stop bar to the nearest Medical Center driveway – 1100 feet
- 95th Percentile Queue Length, Existing AM 2013 conditions – 628 feet, or queuing of approximately 25 vehicles.
- 95th Percentile Queue Length, Existing PM 2013 conditions – 548 feet, or queuing of approximately 22 vehicles.
- 95th Percentile Queue Length, Background AM 2014 conditions (90/10) – 705 feet, or queuing of approximately 28 vehicles.
- 95th Percentile Queue Length, Background PM 2014 conditions (90/10) – 552 feet, or queuing of approximately 22 vehicles.
- 95th Percentile Queue Length, Background AM 2014 conditions (60/40) – 294 feet, or queuing of approximately 11 vehicles.
- 95th Percentile Queue Length, Background PM 2014 conditions (60/40) – 217 feet, or queuing of approximately 9 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (90/10) – 877 feet, or queuing of approximately 35 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (90/10) – 587 feet, or queuing of approximately 23 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (60/40) – 331 feet, or queuing of approximately 13 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (60/40) – 245 feet, or queuing of approximately 10 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (Full Build) – 247 feet, or queuing of approximately 10 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (Full Build) – 213 feet, or queuing of approximately 9 vehicles.

A queuing analysis was performed at the intersection of the University of Tennessee Medical Center / Cherokee Trail for the northbound approach:

- 95th Percentile Queue Length, Existing AM 2013 conditions – 640 feet, or queuing of approximately 26 vehicles.
- 95th Percentile Queue Length, Existing PM 2013 conditions – 153 feet, or queuing of approximately 6 vehicles.
- 95th Percentile Queue Length, Background AM 2014 conditions (90/10) – 705 feet, or queuing of approximately 28 vehicles.
- 95th Percentile Queue Length, Background PM 2014 conditions (90/10) – 159 feet, or queuing of approximately 6 vehicles.
- 95th Percentile Queue Length, Background AM 2014 conditions (60/40) – 505 feet, or queuing of approximately 20 vehicles.
- 95th Percentile Queue Length, Background PM 2014 conditions (60/40) – 105 feet, or queuing of approximately 4 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (90/10) – 822 feet, or queuing of approximately 33 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (90/10) – 162 feet, or queuing of approximately 6 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (60/40) – 536 feet, or queuing of approximately 21 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (60/40) – 109 feet, or queuing of approximately 4 vehicles.
- 95th Percentile Queue Length, Future AM 2014 conditions (Full Build) – 194 feet, or queuing of approximately 8 vehicles.
- 95th Percentile Queue Length, Future PM 2014 conditions (Full Build) – 65 feet, or queuing of approximately 3 vehicles.

Theoretically, the existing and future 95th percentile queue lengths for the westbound approach along Cherokee Trail should not extend past the nearest University of Tennessee Medical Center

driveway to the east of the intersection. However, field conditions such as weather, driver expectancy and route familiarity, etc. may cause these queue lengths to be more or less than those summarized above.

The results of the intersection capacity analyses and queue reports are included in **Appendix E**.

# 8.0 RECOMMENDED IMPROVEMENTS

This study has analyzed the anticipated traffic impact of the proposed development on the two (2) study intersections. Future 2014 traffic volumes and intersection geometry have considered the existing conditions, background growth, and site traffic associated with the proposed development (Cottage Landing). The recommendations are summarized below.

**University of Tennessee Medical Center / Cherokee Trail**

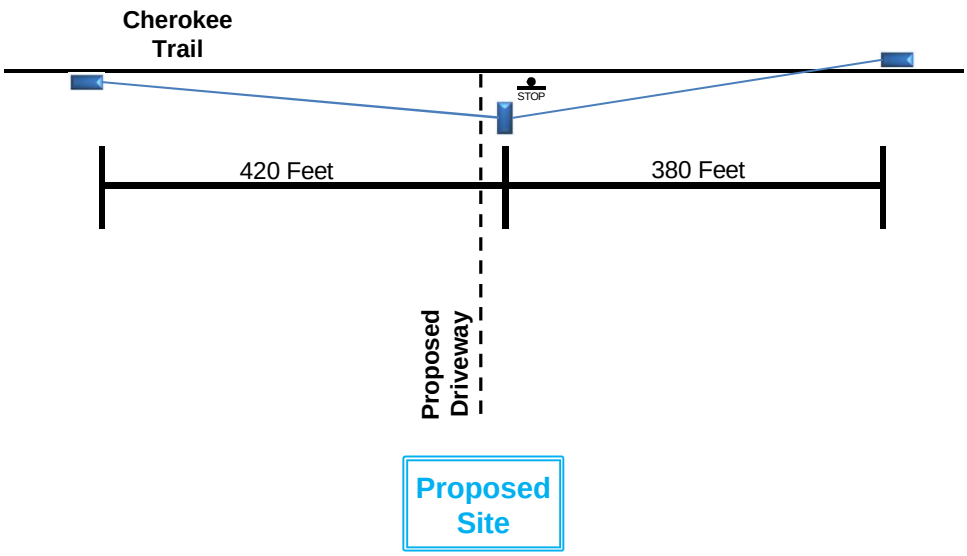
- Revisions to signal timings can improve level-of-service for the entire intersection. Detailed information about the use of Max 3 settings was described in Section 3 of this report. In order to maximize the benefit of this setting additional detection should be added to the northbound and southbound through movements in order to make the signal fully actuated.
- Proposed improvements to the adjacent interchange with Alcoa Highway will alleviate existing traffic concerns and improve the level-of-service for the entire intersection. A proposed scenario for these improvements was analyzed as part of this study. This project is fully funded and is currently under design. While the proposed interchange redesign may have geometry that differs from the analyzed scenario, it is assumed that an acceptable level of service will be reached for the proposed design.
- An interim improvement might include the addition of a second northbound through lane along University of Tennessee Medical Center. This would create an interim northbound approach laneage that would include a through lane and a shared through and right-turn lane.

**Cherokee Trail / Proposed Driveway**

- Provide the Proposed Driveway approximately three-fourths mile east of University of Tennessee Medical Center / Cherokee Trail on the south side of Cherokee Trail.
- Construct one (1) lane for vehicular ingress and one (1) lane for vehicular egress.
- Install STOP control along the northbound approach of the Proposed Driveway.

- Install signs and pavement markings in accordance with the standards provided in the *Manual on Uniform Traffic Control Devices* (MUTCD).
- Maintain an intersection sight distance of 335 feet in each direction along Cherokee Trail, which is the TDOT recommended sight distance for a two lane undivided roadway (*TDOT Standard Roadway Drawing RD01-SD-3*). Intersection sight distance measurements of 420 feet looking west and 380 feet looking east were obtained during a field visit to the proposed intersection site, which currently satisfies this TDOT standard. A graphical representation of these calculations is shown in **Figure 9**.

NORTH




**TDOT Standard Roadway Drawing RD01-SD-3**
**Two Lane Undivided Roadway – Symmetrical**
**Passenger Vehicle (Feet)**

| Design Speed (MPH) | D | $D_l$ | $D_r$ |
|---|---|---|---|
| 25 | 275 | 195 | 125 |
| 30 | 335 | 240 | 150 |
| 35 | 390 | 240 | 150 |

LEGEND

STOP Future STOP Sign

# APPENDIX A:
# Site Plan

Version 16 Multi Family

PRELIMINARY

| Project Data | |
|---|---|
| Developer Owner | Authorized Agent |
| Cottage Landing Partners, LLC | SouthView Design & Consulting |
| 110 Tanglewood Dr. | PO Box 1023 |
| Athens, GA 30606 | Athens, Georgia 30602 |
| (706) 296-7380 | |
| | (706) 247-9646 cadamson485@gmail.com |
| Location Tract A 12.40 Ac. | 1444 #A Cherokee Trail Parcel 108 - 003 |
| Tract B 7.70 Ac. | 1423 Cherokee Trail Parcel 108 - 00401 |
| Owner | NIF HINES GARY & JANICE |
| Boundary Information | xxxxxx |
| Contour Interval | 2 Ft. Field Run |
| Existing Zoning | RR -1 7.5 DU / AC |
| Proposed Zoning | RR -1 4.28 DU / AC |
| Proposed DU/ AC | 3.77 |
| Total Project Impact Acreage | 9.65 Acres (approximate) |
| Current Use | Borrow area |
| Proposed Use | Student Oriented Housing |
| Impervious Cover (Pre) | 23.00% |
| Impervious Cover (Post) | 19.39% |
| Existing & Future Right-of-Way | Varies |
| Surface Parking (9 x 20) | 204 |
| Covered Parking (9 x 18) | 132 |
| Compact (8 x 18) | 5 |
| Amenity (9 x 20) | 14 |
| Handicap (13x20) | 7 |
| Total | 362 |

| Area And Percentage Of Lot Covered By: | | |
|---|---|---|
| Post Development | Total Tracts Acres = | 20.100 |
| Land Use | Area (sf.) | % of Total |
| Parking | 93,149 | 10.64% |
| Structures Commercial | 76,599 | 8.75% |
| Structures Other | 0 | 0.00% |
| Sidewalks | 0 | 0.00% |
| Undisturbed | 420,426 | 48.02% |
| Landscaped | 285,382 | 32.59% |

Density Units

| Building Type | Bedrooms Per Building Type | Number of Buildings | Density units Per Building | Total Units | Total Bedrooms Per Building |
|---|---|---|---|---|---|
| Multi Family | 28 | 7 | 8 | 56 | 196 |
| Multi Family | 14 | 1 | 4 | 4 | 14 |
| Single Cottage | 5 | 14 | 1 | 14 | 70 |
| Duplex Cottage | 10 | 6 | 2 | 12 | 60 |
| Totals | | 28 | | 86 | 340 |

| | |
|---|---|
| Total Acreage | 20.1 |
| Total Units | 86 |
| Density Units per Acre | 4.28 |

PRELIMINARY

Prismoidal Volume Results

| | |
|---|---|
| Original Surface Model: | Existing |
| Final Surface Model: | Whole site interp from 3df |
| Cut Compaction Factor: | 0.00 % |
| Fill Compaction Factor: | 15.00 % |
| Raw Cut Volume: | 108247.92 cu yd |
| Compacted Cut Volume: | 0.00 cu yd |
| Total Cut Volume: | 108247.92 cu yd |
| Raw Fill Volume: | 81889.60 cu yd |
| Compacted Fill Volume: | 12283.44 cu yd |
| Total Fill Volume: | 94173.04 cu yd |

Pump Station
Access Gates
Modular Entrance Walls
102 Lf x 8ft
Concrete Wall 1
1,112 Lf x 10 ft
Typical Duplex
Compactor
LOT 1
ORCHARD AT KNOXVILLE
INSTR. NO. 20100527-0074128
ORCHARD AT KNOXVILLE
HOMEOWNERS ASSOCIATION
INSTR. NO. 20110216-0049553
Modular Wall 1
268 Lf x 8ft
UNIVERSITY OF TENNESSEE
D.B. 1247, PG.666
Typical Cottage
TRACT 2
AREA: 336,489 SQ. FT.
OR
7.725 ACRES
Covered Parking
With Multifamily
Units Above
(Typical)
Concrete Wall 2
394 Lf x 10 ft
Overlook
Common Area
Clubhouse
Mail Service
Field
Amphitheater
Spa
Trail Network
Overlook
JWR HOLDINGS LL
UNIVERSITY RESIDENCES KNO
AND CAPSTONE REALTY A
INSTR. NO. 20090113-0
Pool
Modular Wall 2
175 Lf x 4 ft
TRACT 1
AREA: 539,832 SQ. FT.
OR
12.393 ACRES
Amenity Area
Field
Amphitheater
Trellis
Low Point
Concrete Wall 3
for detention area
288 Lf,
height varies 2' to 18' tall
4,740 SF
(Concept Only)
Covered Parking
With Multifamily
Units Above
(Typical)
Concrete Wall 3
405 Lf x 10 ft
JWR HOLDIN
UNIVERSITY RESIDENCE
AND CAPSTONE REA
INSTR. NO. 20090
Trail Network
Overlook
UNIVERSITY OF TENNESSEE
D.B. 1247, PG.666
RSITY OF TENNESSEE
.B. 1247, PG.666

GEORGIA REGISTERED No. 1127 PROFESSIONAL LANDSCAPE ARCHITECT CHRISTOPHER P. ADAMSON

OWNER & 24 HOUR CONTACT
FISKE HOPKINS
JM CAPITOL
XX.
XX DRIVE
XX, GA 30027
XXXXXX

CHEROKEE TRAIL
0000000000000000000
KNOX COUNTY, TN.
1000 ACRES

SouthView
Design & Consulting
Land Planning
Landscape Architecture
Site Engineering
485 Southview Drive
Athens Georgia 30605
706.247.9646

| No. | Revision/Issue | Date |
|---|---|---|
| - | Original Issue | 1-10-2013 |
| 01 | | |
| 02 | | |
| 03 | | |
| 04 | | |
| 05 | | |
| 06 | | |

SITE
PLAN
V-16

3

# APPENDIX B:
# Site Photos

Kimley-Horn and Associates, Inc.
209 Tenth Avenue South
Suite 501
Nashville, Tennessee 37203

# Cottage Landing

## Photograph Sheet

KHA Job No.: 118062000
KHA Rep.: EAO
Date: January 25, 2013
Page: 1 of 3

Photo No. 1

Comments:
Controller Cabinet, Cherokee Trail at UTMC/Alcoa Highway Access

Photo No. 2

Comments:
UT Medical Center/Alcoa Highway Access at Cherokee Trail, Northbound Approach

Kimley-Horn and Associates, Inc.
209 Tenth Avenue South
Suite 501
Nashville, Tennessee 37203

Cottage Landing

Photograph Sheet

KHA Job No.: 118062000
KHA Rep.: EAO
Date: January 25, 2013


Photo No. 3

Comments:
Cherokee Trail at UT Medical Center/Alcoa Highway Access, Westbound Approach (far)

Photo No. 4

Comments:
Cherokee Trail at UT Medical Center/Alcoa Highway Access, Westbound Approach (near)

Kimley-Horn and Associates, Inc.
209 Tenth Avenue South
Suite 501
Nashville, Tennessee 37203

Cottage Landing

Photograph Sheet

KHA Job No.: 118062000
KHA Rep.: EAO
Date: January 25, 2013
Page: 3 of 3

Photo No. 5

Comments:
UT Medical Center driveway at Cherokee Trail, Southbound Approach (far)

Photo No. 6

Comments:
UT Medical Center driveway at Cherokee Trail, Southbound Approach (near)

# APPENDIX C:
# Turning Movement Counts

Tennessee Transportation Assistance Program
UT Center for Transportation Research
1-800-252-ROAD, TTAP@utk.edu
http://ctr.utk.edu/ttap

- Intersection of Cherokee Trail & Medical Center/Alcoa Highway Exit
- Vehicle data has not had a correction factor apllied to it.

File Name : Cherokee Trail - Medical Center TMC data
Site Code : 00000888
Start Date : 1/22/2013


**Groups Printed- Vehicles**

| | Medical Center From North | | | | Cherokee Trail From East | | | | Alcoa Hwy Exit From South | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Peds | App. Total | Left | Right | Peds | App. Total | Thru | Right | Peds | App. Total | Int. Total |
| 03:00 PM | 10 | 141 | 0 | 151 | 170 | 6 | 0 | 176 | 83 | 76 | 0 | 159 | 486 |
| 03:15 PM | 9 | 138 | 0 | 147 | 152 | 6 | 0 | 158 | 72 | 97 | 0 | 169 | 474 |
| 03:30 PM | 13 | 164 | 0 | 177 | 164 | 2 | 0 | 166 | 67 | 181 | 0 | 248 | 591 |
| 03:45 PM | 8 | 142 | 0 | 150 | 140 | 2 | 0 | 142 | 70 | 148 | 0 | 218 | 510 |
| Total | 40 | 585 | 0 | 625 | 626 | 16 | 0 | 642 | 292 | 502 | 0 | 794 | 2061 |
| 04:00 PM | 8 | 197 | 0 | 205 | 129 | 1 | 1 | 131 | 40 | 96 | 0 | 136 | 472 |
| 04:15 PM | 10 | 147 | 0 | 157 | 168 | 3 | 0 | 171 | 43 | 105 | 0 | 148 | 476 |
| 04:30 PM | 13 | 198 | 0 | 211 | 246 | 11 | 0 | 257 | 43 | 88 | 0 | 131 | 599 |
| 04:45 PM | 20 | 158 | 0 | 178 | 228 | 4 | 0 | 232 | 64 | 118 | 0 | 182 | 592 |
| Total | 51 | 700 | 0 | 751 | 771 | 19 | 1 | 791 | 190 | 407 | 0 | 597 | 2139 |
| 05:00 PM | 17 | 187 | 0 | 204 | 227 | 4 | 0 | 231 | 50 | 182 | 2 | 234 | 669 |
| 05:15 PM | 16 | 135 | 0 | 151 | 220 | 4 | 0 | 224 | 67 | 172 | 0 | 239 | 614 |
| 05:30 PM | 8 | 87 | 0 | 95 | 179 | 12 | 0 | 191 | 38 | 161 | 0 | 199 | 485 |
| 05:45 PM | 8 | 68 | 0 | 76 | 147 | 18 | 0 | 165 | 45 | 98 | 0 | 143 | 384 |
| Total | 49 | 477 | 0 | 526 | 773 | 38 | 0 | 811 | 200 | 613 | 2 | 815 | 2152 |
| *** BREAK *** | | | | | | | | | | | | | |
| 06:00 AM | 4 | 11 | 0 | 15 | 30 | 5 | 0 | 35 | 40 | 121 | 0 | 161 | 211 |
| 06:15 AM | 2 | 16 | 0 | 18 | 37 | 4 | 0 | 41 | 68 | 221 | 0 | 289 | 348 |
| 06:30 AM | 4 | 21 | 0 | 25 | 55 | 14 | 0 | 69 | 89 | 214 | 0 | 303 | 397 |
| 06:45 AM | 4 | 32 | 0 | 36 | 77 | 7 | 0 | 84 | 110 | 155 | 0 | 265 | 385 |
| Total | 14 | 80 | 0 | 94 | 199 | 30 | 0 | 229 | 307 | 711 | 0 | 1018 | 1341 |
| 07:00 AM | 10 | 107 | 0 | 117 | 104 | 11 | 0 | 115 | 105 | 110 | 0 | 215 | 447 |
| 07:15 AM | 9 | 75 | 0 | 84 | 157 | 20 | 0 | 177 | 110 | 122 | 0 | 232 | 493 |
| 07:30 AM | 8 | 59 | 0 | 67 | 185 | 24 | 0 | 209 | 139 | 180 | 0 | 319 | 595 |
| 07:45 AM | 9 | 51 | 0 | 60 | 156 | 19 | 0 | 175 | 192 | 214 | 0 | 406 | 641 |
| Total | 36 | 292 | 0 | 328 | 602 | 74 | 0 | 676 | 546 | 626 | 0 | 1172 | 2176 |
| 08:00 AM | 7 | 50 | 0 | 57 | 193 | 22 | 0 | 215 | 187 | 137 | 0 | 324 | 596 |
| 08:15 AM | 3 | 59 | 0 | 62 | 186 | 11 | 0 | 197 | 145 | 133 | 0 | 278 | 537 |
| 08:30 AM | 4 | 43 | 0 | 47 | 185 | 13 | 0 | 198 | 151 | 89 | 0 | 240 | 485 |
| 08:45 AM | 3 | 67 | 0 | 70 | 179 | 21 | 0 | 200 | 154 | 86 | 0 | 240 | 510 |
| Total | 17 | 219 | 0 | 236 | 743 | 67 | 0 | 810 | 637 | 445 | 0 | 1082 | 2128 |
| Grand Total | 207 | 2353 | 0 | 2560 | 3714 | 244 | 1 | 3959 | 2172 | 3304 | 2 | 5478 | 11997 |
| Apprch % | 8.1 | 91.9 | 0 | | 93.8 | 6.2 | 0 | | 39.6 | 60.3 | 0 | | |
| Total % | 1.7 | 19.6 | 0 | 21.3 | 31 | 2 | 0 | 33 | 18.1 | 27.5 | 0 | 45.7 | |

# Basic Volume Report: CHEROKEE TRAIL

**Station ID : CHEROKEE TRAIL**

Info Line 1 :
Info Line 2 :
GPS Lat/Lon :
DB File : CHEROKEE TRAIL.DB

Last Connected Device Type : Apollo
Version Number : 1.62
Serial Number : 16848

Number of Lanes : 1
Posted Speed Limit :

## Lane #1 Configuration

| # | Dir. | Information | Volume Mode | Volume Sensors | Divide By 2 | Comment |
|---|---|---|---|---|---|---|
| 1. | | | | | | |

## Lane #1 Basic Volume Data From: 12:00 - 01/22/2013 To: 11:59 - 01/23/2013

| Date | Time | :00 | :15 | :30 | :45 | Total |
|---|---|---|---|---|---|---|
| 01/22/13 | 12:00 | 61 | 61 | 107 | 91 | 320 |
| Tue | 13:00 | 46 | 66 | 58 | 71 | 241 |
| | 14:00 | 119 | 120 | 97 | 63 | 399 |
| | 15:00 | 72 | 75 | 179 | 134 | 460 |
| | 16:00 | 120 | 99 | 106 | 138 | 463 |
| | 17:00 | 180 | 173 | 130 | 97 | 580 |
| | 18:00 | 99 | 94 | 121 | 92 | 406 |
| | 19:00 | 85 | 87 | 93 | 91 | 356 |
| | 20:00 | 91 | 78 | 81 | 82 | 332 |
| | 21:00 | 87 | 93 | 75 | 66 | 321 |
| | 22:00 | 64 | 66 | 38 | 48 | 216 |
| | 23:00 | 42 | 29 | 32 | 28 | 131 |
| Day Total : | | | | | | 4225 |

| | | | | | |
|---|---|---|---|---|---|
| AM Total : | | Peak AM Hour : | | Peak AM Factor : | Average Period : 88.0 |
| PM Total : | 4225 (100.0%) | Peak PM Hour : | 16:45 = 621 (14.7%) | Peak PM Factor : 0.863 | Average Hour : 352.1 |

| Date | Time | :00 | :15 | :30 | :45 | Total |
|---|---|---|---|---|---|---|
| 01/23/13 | 00:00 | 28 | 17 | 22 | 11 | 78 |
| Wed | 01:00 | 16 | 8 | 9 | 8 | 41 |
| | 02:00 | 4 | 7 | 6 | 4 | 21 |
| | 03:00 | 8 | 2 | 5 | 4 | 19 |
| | 04:00 | 1 | 3 | 1 | 1 | 6 |
| | 05:00 | 1 | 2 | 4 | 11 | 18 |
| | 06:00 | 8 | 20 | 21 | 15 | 64 |
| | 07:00 | 22 | 23 | 22 | 23 | 90 |
| | 08:00 | 21 | 33 | 24 | 24 | 102 |
| | 09:00 | 16 | 29 | 21 | 32 | 98 |
| | 10:00 | 61 | 63 | 51 | 46 | 221 |
| | 11:00 | 66 | 75 | 39 | 59 | 239 |
| Day Total : | | | | | | 997 |

| | | | | | |
|---|---|---|---|---|---|
| AM Total : | 997 (100.0%) | Peak AM Hour : 11:00 = | 239 (24.0%) | Peak AM Factor : 0.797 | Average Period : 20.8 |
| PM Total : | | Peak PM Hour : | | Peak PM Factor : | Average Hour : 83.1 |

# Lane #3 Configuration

| # | Dir. | Information | Volume Mode | Volume Sensors | Divide By 2 | Comment |
|---|---|---|---|---|---|---|
| 3. | | | | | | |

## Lane #3 Basic Volume Data From: 12:00 - 01/22/2013 To: 11:59 - 01/23/2013

| Date | Time | :00 | :15 | :30 | :45 | Total |
|---|---|---|---|---|---|---|
| 01/22/13 | 12:00 | 85 | 78 | 53 | 74 | 290 |
| Tue | 13:00 | 70 | 60 | 104 | 88 | 322 |
| | 14:00 | 57 | 66 | 53 | 64 | 240 |
| | 15:00 | 101 | 92 | 59 | 68 | 320 |
| | 16:00 | 67 | 68 | 101 | 76 | 312 |
| | 17:00 | 73 | 86 | 95 | 89 | 343 |
| | 18:00 | 85 | 87 | 67 | 61 | 300 |
| | 19:00 | 65 | 61 | 37 | 52 | 215 |
| | 20:00 | 29 | 17 | 25 | 31 | 102 |
| | 21:00 | 41 | 24 | 44 | 33 | 142 |
| | 22:00 | 15 | 19 | 19 | 10 | 63 |
| | 23:00 | 16 | 22 | 7 | 12 | 57 |
| Day Total : | | | | | | 2706 |

| | | | | | |
|---|---|---|---|---|---|
| AM Total : | | Peak AM Hour : | | Peak AM Factor : | Average Period : 56.4 |
| PM Total : | 2706 (100.0%) | Peak PM Hour : 17:30 = | 356 (13.2%) | Peak PM Factor : 0.856 | Average Hour : 225.5 |

| Date | Time | :00 | :15 | :30 | :45 | Total |
|---|---|---|---|---|---|---|
| 01/23/13 | 00:00 | 15 | 7 | 14 | 12 | 48 |
| Wed | 01:00 | 8 | 5 | 1 | 3 | 17 |
| | 02:00 | 5 | 2 | 2 | 2 | 11 |
| | 03:00 | 0 | 2 | 3 | 2 | 7 |
| | 04:00 | 1 | 7 | 3 | 4 | 15 |
| | 05:00 | 7 | 19 | 31 | 27 | 84 |
| | 06:00 | 49 | 51 | 73 | 95 | 268 |
| | 07:00 | 117 | 186 | 207 | 149 | 659 |
| | 08:00 | 183 | 206 | 121 | 77 | 587 |
| | 09:00 | 100 | 90 | 141 | 109 | 440 |
| | 10:00 | 63 | 62 | 101 | 97 | 323 |
| | 11:00 | 49 | 53 | 72 | 94 | 268 |
| Day Total : | | | | | | 2727 |

| | | | | | |
|---|---|---|---|---|---|
| AM Total : | 2727 (100.0%) | Peak AM Hour : 07:30 = | 745 (27.3%) | Peak AM Factor : 0.900 | Average Period : 56.8 |
| PM Total : | | Peak PM Hour : | | Peak PM Factor : | Average Hour : 227.3 |

# Basic Volume Summary: CHEROKEE TRAIL

**Grand Total For Data From: 12:00 - 01/22/2013 To: 11:59 - 01/23/2013**

| Lane | Total Count | | # Of Days | ADT | Avg. Period | Avg. Hour | AM Total & Percent | PM Total & Percent |
|---|---|---|---|---|---|---|---|---|
| #1. | 5222 | (49.0%) | 1.00 | 5222 | 54.4 | 217.6 | 997 (19.1%) | 4225 (80.9%) |
| #3. | 5433 | (51.0%) | 1.00 | 5433 | 56.6 | 226.4 | 2727 (50.2%) | 2706 (49.8%) |
| ALL | 10655 | | 1.00 | 10655 | 111.0 | 444.0 | 3724 (35.0%) | 6931 (65.0%) |

| Lane | Peak AM Hour | | Date | Peak AM Factor | Peak PM Hour | | Date | Peak PM Factor |
|---|---|---|---|---|---|---|---|---|
| #1. | 11:00 = | 239 | 01/23/2013 | 0.797 | 16:45 = | 621 | 01/22/2013 | 0.863 |
| #3. | 07:30 = | 745 | 01/23/2013 | 0.900 | 17:30 = | 356 | 01/22/2013 | 0.856 |

# APPENDIX D:
# Growth Rate, Trip Generation, and Volume Worksheets

UT Medical Center at Cherokee Trail

| START TIME | Cherokee Trail | | | | UT Medical Center | | | | UT Medical Center | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WBL | WBT | WBR | Ped | NBL | NBT | NBR | Ped | SBL | SBT | SBR | Ped |
| 6:00 | 30 | | 5 | 0 | | 40 | 121 | 0 | 4 | 11 | | 0 |
| 6:15 | 37 | | 4 | 0 | | 68 | 221 | 0 | 2 | 16 | | 0 |
| 6:30 | 55 | | 14 | 0 | | 89 | 214 | 0 | 4 | 21 | | 0 |
| 6:45 | 77 | | 7 | 0 | | 110 | 155 | 0 | 4 | 32 | | 0 |
| 7:00 | 104 | | 11 | 0 | | 105 | 110 | 0 | 10 | 107 | | 0 |
| 7:15 | 157 | | 20 | 0 | | 110 | 122 | 0 | 9 | 75 | | 0 |
| 7:30 | 185 | | 24 | 0 | | 139 | 180 | 0 | 8 | 59 | | 0 |
| 7:45 | 156 | | 19 | 0 | | 192 | 214 | 0 | 9 | 51 | | 0 |
| 8:00 | 193 | | 22 | 0 | | 187 | 137 | 0 | 7 | 50 | | 0 |
| 8:15 | 186 | | 11 | 0 | | 145 | 133 | 0 | 3 | 59 | | 0 |
| 8:30 | 185 | | 13 | 0 | | 151 | 89 | 0 | 4 | 43 | | 0 |
| 8:45 | 179 | | 21 | 0 | | 154 | 86 | 0 | 3 | 67 | | 0 |
| 12:45 | | | | | | | | | | | | |
| 15:00 | 170 | | 6 | 0 | | 83 | 76 | 0 | 10 | 141 | | 0 |
| 15:15 | 152 | | 6 | 0 | | 72 | 97 | 0 | 9 | 138 | | 0 |
| 15:30 | 164 | | 2 | 0 | | 67 | 181 | 0 | 13 | 164 | | 0 |
| 15:45 | 140 | | 2 | 0 | | 70 | 148 | 0 | 8 | 142 | | 0 |
| 16:00 | 129 | | 1 | 1 | | 40 | 96 | 0 | 8 | 197 | | 0 |
| 16:15 | 168 | | 3 | 0 | | 43 | 105 | 0 | 10 | 147 | | 0 |
| 16:30 | 246 | | 11 | 0 | | 43 | 88 | 0 | 13 | 198 | | 0 |
| 16:45 | 228 | | 4 | 0 | | 64 | 118 | 0 | 20 | 158 | | 0 |
| 17:00 | 227 | | 4 | 0 | | 50 | 182 | 2 | 17 | 187 | | 0 |
| 17:15 | 220 | | 4 | 0 | | 67 | 172 | 0 | 16 | 135 | | 0 |
| 17:30 | 179 | | 12 | 0 | | 38 | 161 | 0 | 8 | 87 | | 0 |
| 17:45 | 147 | | 18 | 0 | | 45 | 98 | 0 | 8 | 68 | | 0 |

| TOTAL | 3714 | 0 | 244 | 1 | 0 | 2172 | 3304 | 2 | 207 | 2353 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

| AM PEAK | 720 | 0 | 76 | 0 | 0 | 663 | 664 | 0 | 27 | 219 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PHF | 0.93 | 0.00 | 0.79 | | 0.00 | 0.86 | 0.78 | | 0.75 | 0.93 | 0.00 | |
| PHF | 0.93 | | | | 0.82 | | | | 0.92 | | | |
| PHF | 0.92 | | | | | | | | | | | |

| PM PEAK | 773 | 0 | 38 | 0 | 0 | 200 | 613 | 2 | 49 | 477 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PHF | 0.85 | 0.00 | 0.53 | | 0.00 | 0.75 | 0.84 | | 0.72 | 0.64 | 0.00 | |
| PHF | 0.88 | | | | 0.85 | | | | 0.64 | | | |
| PHF | 0.81 | | | | | | | | | | | |

Cherokee Trail: ADT

| START TIME | Cherokee Trail | | | | Cherokee Trail | | | |
|---|---|---|---|---|---|---|---|---|
| | EBL | EBT | EBR | Ped | WBL | WBT | WBR | Ped |
| 0:00 | | 78 | | | | 48 | | |
| 1:00 | | 41 | | | | 17 | | |
| 2:00 | | 21 | | | | 11 | | |
| 3:00 | | 19 | | | | 7 | | |
| 4:00 | | 6 | | | | 15 | | |
| 5:00 | | 18 | | | | 84 | | |
| 6:00 | | 64 | | | | 268 | | |
| 7:00 | | 90 | | | | 659 | | |
| 8:00 | | 102 | | | | 587 | | |
| 9:00 | | 98 | | | | 440 | | |
| 10:00 | | 221 | | | | 323 | | |
| 11:00 | | 239 | | | | 268 | | |
| 12:00 | | 320 | | | | 290 | | |
| 13:00 | | 241 | | | | 322 | | |
| 14:00 | | 399 | | | | 240 | | |
| 15:00 | | 460 | | | | 320 | | |
| 16:00 | | 463 | | | | 312 | | |
| 17:00 | | 580 | | | | 343 | | |
| 18:00 | | 406 | | | | 300 | | |
| 19:00 | | 356 | | | | 215 | | |
| 20:00 | | 332 | | | | 102 | | |
| 21:00 | | 321 | | | | 142 | | |
| 22:00 | | 216 | | | | 63 | | |
| 23:00 | | 131 | | | | 57 | | |

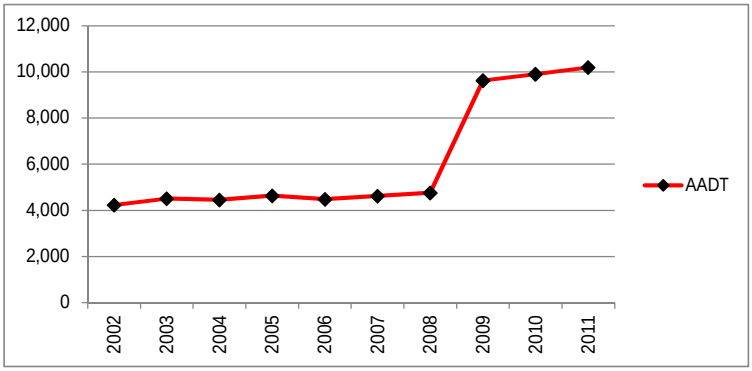
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 0 | 5222 | 0 | 0 | 0 | 5433 | 0 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AM PEAK | | 102 | | | | 659 | | |

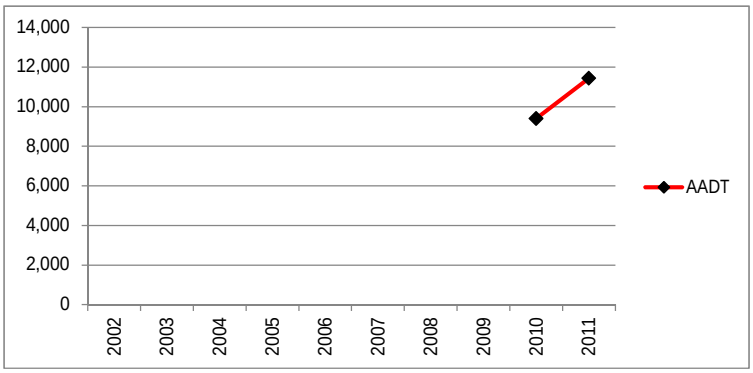
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PM PEAK | | 580 | | | | 343 | | |

# TABLE D1. Historic Traffic Data (Source: TDOT)

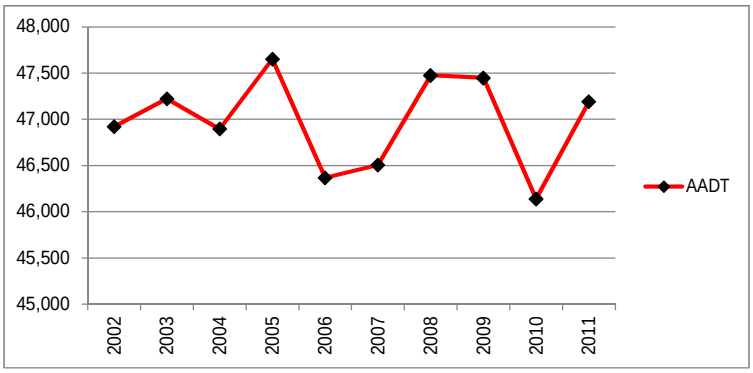
| Station | 000273 |
|---|---|
| Route | Cherokee Trail |
| Location | West of Cherokee Bluff Drive |
| 2002 | 4,229 |
| 2003 | 4,511 |
| 2004 | 4,455 |
| 2005 | 4,636 |
| 2006 | 4,482 |
| 2007 | 4,616 |
| 2008 | 4,754 |
| 2009 | 9,619 |
| 2010 | 9,895 |
| 2011 | 10,192 |




| Station | 00490 |
|---|---|
| Route | Cherokee Trail |
| Location | East of Cherokee Bluff Drive |
| 2002 | |
| 2003 | |
| 2004 | |
| 2005 | |
| 2006 | |
| 2007 | |
| 2008 | |
| 2009 | |
| 2010 | 9,403 |
| 2011 | 11,429 |




| Station | 00317 |
|---|---|
| Route | Alcoa Highway |
| Location | South of UT Medical Center |
| 2002 | 46,921 |
| 2003 | 47,223 |
| 2004 | 46,896 |
| 2005 | 47,651 |
| 2006 | 46,367 |
| 2007 | 46,505 |
| 2008 | 47,476 |
| 2009 | 47,448 |
| 2010 | 46,139 |
| 2011 | 47,189 |



# TABLE D2. Trip Generation

| ITE LUC | Land Use | Density | | Daily Trips | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total | In | Out | Total | In | Out |
| | | | | | | | | | | |
| 220 | Apartment | 340 | Persons | 2,184 | 99 | 20 | 79 | 135 | 88 | 47 |
| | | | | | | | | | | |
| Alternative Mode Reduction | | 0% | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | |
| TOTAL | | | | 2,184 | 99 | 20 | 79 | 135 | 88 | 47 |

## TABLE D3. Intersection Volume Worksheet

UT Medical Center at Cherokee Trail
AM PEAK HOUR

| Description | UT Medical Center Northbound | | | UT Medical Center Southbound | | | Cherokee Trail Eastbound | | | Cherokee Trail Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right |
| Existing 2013 AM Volumes | 0 | 663 | 664 | 27 | 219 | 0 | 0 | 0 | 0 | 720 | 0 | 76 |
| Existing Peak Hour Factor | 0.00 | 0.86 | 0.78 | 0.75 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.79 |
| Heavy Vehicle % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Annual Growth Rate | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Growth Factor | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Growth Trips | 0 | 13 | 13 | 1 | 4 | 0 | 0 | 0 | 0 | 14 | 0 | 2 |
| Background 2014 AM Volumes | 0 | 676 | 677 | 28 | 223 | 0 | 0 | 0 | 0 | 734 | 0 | 78 |
| Future Peak Hour Factor | 0.00 | 0.86 | 0.78 | 0.75 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.79 |
| Trip Distribution IN | | | 90% | 5% | | | | | | | | |
| Trip Distribution OUT | | | | | | | | | | 90% | | 5% |
| Project Trips | 0 | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 71 | 0 | 4 |
| Total Project Trips | 0 | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 71 | 0 | 4 |
| Future 2014 AM Volumes | 0 | 676 | 695 | 29 | 223 | 0 | 0 | 0 | 0 | 805 | 0 | 82 |

UT Medical Center at Cherokee Trail
PM PEAK HOUR

| Description | UT Medical Center Northbound | | | UT Medical Center Southbound | | | Cherokee Trail Eastbound | | | Cherokee Trail Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right |
| Existing 2013 PM Volumes | 0 | 200 | 613 | 49 | 477 | 0 | 0 | 0 | 0 | 773 | 0 | 38 |
| Existing Peak Hour Factor | 0.00 | 0.75 | 0.84 | 0.72 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85 | 0.00 | 0.53 |
| Heavy Vehicle % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Annual Growth Rate | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Growth Factor | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Growth Trips | 0 | 4 | 12 | 1 | 10 | 0 | 0 | 0 | 0 | 15 | 0 | 1 |
| Background 2014 PM Volumes | 0 | 204 | 625 | 50 | 487 | 0 | 0 | 0 | 0 | 788 | 0 | 39 |
| Future Peak Hour Factor | 0.00 | 0.75 | 0.84 | 0.72 | 0.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.85 | 0.00 | 0.53 |
| Trip Distribution IN | | | 90% | 5% | | | | | | | | |
| Trip Distribution OUT | | | | | | | | | | 90% | | 5% |
| Project Trips | 0 | 0 | 79 | 4 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 2 |
| Total Project Trips | 0 | 0 | 79 | 4 | 0 | 0 | 0 | 0 | 0 | 42 | 0 | 2 |
| Future 2014 PM Volumes | 0 | 204 | 704 | 54 | 487 | 0 | 0 | 0 | 0 | 830 | 0 | 41 |

## TABLE D4. Intersection Volume Worksheet

Cherokee Trail at Proposed Driveway
AM PEAK HOUR

| Description | Proposed Driveway Northbound | | | Southbound | | | Cherokee Trail Eastbound | | | Cherokee Trail Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right |
| Existing 2013 AM Volumes | | | | | | | | 102 | | | 659 | |
| Existing Peak Hour Factor | | | | | | | | 0.92 | | | 0.92 | |
| Heavy Vehicle % | | | | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Annual Growth Rate | | | | | | | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Growth Factor | | | | | | | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Growth Trips | | | | | | | 0 | 2 | 0 | 0 | 13 | 0 |
| Background 2014 AM Volumes | | | | | | | 0 | 104 | 0 | 0 | 672 | 0 |
| Future Peak Hour Factor | | | | | | | 0.00 | 0.92 | 0.00 | 0.00 | 0.92 | 0.00 |
| Trip Distribution IN | | | | | | | | | 95% | 5% | | |
| Trip Distribution OUT | 95% | | 5% | | | | | | | | | |
| Project Trips | 75 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 19 | 1 | 0 | 0 |
| Total Project Trips | 75 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 19 | 1 | 0 | 0 |
| Future 2014 AM Volumes | 75 | 0 | 4 | 0 | 0 | 0 | 0 | 104 | 19 | 1 | 672 | 0 |

Cherokee Trail at Proposed Driveway
PM PEAK HOUR

| Description | Proposed Driveway Northbound | | | Southbound | | | Cherokee Trail Eastbound | | | Cherokee Trail Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Through | Right | Left | Through | Right | Left | Through | Right | Left | Through | Right |
| Existing 2013 PM Volumes | | | | | | | | 580 | | | 343 | |
| Existing Peak Hour Factor | | | | | | | | 0.92 | | | 0.92 | |
| Heavy Vehicle % | | | | | | | 2 | 2 | 2 | 2 | 2 | 2 |
| Annual Growth Rate | | | | | | | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |
| Growth Factor | | | | | | | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 |
| Growth Trips | | | | | | | 0 | 12 | 0 | 0 | 7 | 0 |
| Background 2014 PM Volumes | | | | | | | 0 | 592 | 0 | 0 | 350 | 0 |
| Future Peak Hour Factor | | | | | | | 0.00 | 0.92 | 0.00 | 0.00 | 0.92 | 0.00 |
| Trip Distribution IN | | | | | | | | | 95% | 5% | | |
| Trip Distribution OUT | 95% | | 5% | | | | | | | | | |
| Project Trips | 44 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 83 | 5 | 0 | 0 |
| Total Project Trips | 44 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 83 | 5 | 0 | 0 |
| Future 2014 PM Volumes | 44 | 0 | 3 | 0 | 0 | 0 | 0 | 592 | 83 | 5 | 350 | 0 |

# APPENDIX E:
# Intersection Capacity Analyses
# and
# Queue Reports

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 720 | 76 | 663 | 664 | 27 | 219 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.56 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 0.99 |
| Satd. Flow (prot) | 2137 | 1603 | 1881 | 1599 | | 3906 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.65 |
| Satd. Flow (perm) | 2137 | 1603 | 1881 | 1599 | | 2575 |
| Peak-hour factor, PHF | 0.93 | 0.79 | 0.86 | 0.78 | 0.75 | 0.93 |
| Adj. Flow (vph) | 774 | 96 | 771 | 851 | 36 | 235 |
| RTOR Reduction (vph) | 0 | 48 | 0 | 397 | 0 | 0 |
| Lane Group Flow (vph) | 774 | 48 | 771 | 454 | 0 | 271 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 31.0 | 31.0 | 36.0 | 36.0 | | 42.0 |
| Effective Green, g (s) | 31.0 | 31.0 | 36.0 | 36.0 | | 42.0 |
| Actuated g/C Ratio | 0.34 | 0.34 | 0.40 | 0.40 | | 0.47 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 736 | 552 | 752 | 639 | | 1290 |
| v/s Ratio Prot | c0.36 | | c0.41 | | | c0.01 |
| v/s Ratio Perm | | 0.03 | | 0.28 | | 0.08 |
| v/c Ratio | 1.05 | 0.09 | 1.03 | 0.71 | | 0.21 |
| Uniform Delay, d1 | 29.5 | 19.9 | 27.0 | 22.6 | | 14.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 47.6 | 0.1 | 39.4 | 3.1 | | 0.0 |
| Delay (s) | 77.1 | 20.0 | 66.4 | 25.7 | | 14.2 |
| Level of Service | E | C | E | C | | B |
| Approach Delay (s) | 70.8 | | 45.1 | | | 14.2 |
| Approach LOS | E | | D | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 50.1 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 90.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 65.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 773 | 38 | 200 | 613 | 49 | 477 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.55 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 2098 | 1603 | 1881 | 1599 | | 3916 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.87 |
| Satd. Flow (perm) | 2098 | 1603 | 1881 | 1599 | | 3407 |
| Peak-hour factor, PHF | 0.85 | 0.53 | 0.75 | 0.84 | 0.72 | 0.64 |
| Adj. Flow (vph) | 909 | 72 | 267 | 730 | 68 | 745 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 551 | 0 | 0 |
| Lane Group Flow (vph) | 909 | 38 | 267 | 179 | 0 | 813 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 35.8 | 35.8 | 19.1 | 19.1 | | 25.1 |
| Effective Green, g (s) | 35.8 | 35.8 | 19.1 | 19.1 | | 25.1 |
| Actuated g/C Ratio | 0.46 | 0.46 | 0.25 | 0.25 | | 0.32 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 964 | 736 | 461 | 392 | | 1136 |
| v/s Ratio Prot | c0.43 | | 0.14 | | | c0.06 |
| v/s Ratio Perm | | 0.02 | | 0.11 | | c0.18 |
| v/c Ratio | 0.94 | 0.05 | 0.58 | 0.46 | | 0.72 |
| Uniform Delay, d1 | 20.1 | 11.7 | 25.9 | 25.0 | | 23.3 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 17.0 | 0.0 | 1.1 | 0.3 | | 1.8 |
| Delay (s) | 37.1 | 11.7 | 27.0 | 25.3 | | 25.1 |
| Level of Service | D | B | C | C | | C |
| Approach Delay (s) | 35.2 | | 25.7 | | | 25.1 |
| Approach LOS | D | | C | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 28.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 77.9 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 63.3% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 734 | 78 | 676 | 677 | 28 | 223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.55 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 0.99 |
| Satd. Flow (prot) | 2098 | 1603 | 1881 | 1599 | | 3906 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.64 |
| Satd. Flow (perm) | 2098 | 1603 | 1881 | 1599 | | 2499 |
| Peak-hour factor, PHF | 0.93 | 0.79 | 0.86 | 0.78 | 0.75 | 0.93 |
| Adj. Flow (vph) | 789 | 99 | 786 | 868 | 37 | 240 |
| RTOR Reduction (vph) | 0 | 43 | 0 | 358 | 0 | 0 |
| Lane Group Flow (vph) | 789 | 56 | 786 | 510 | 0 | 277 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 36.0 | 36.0 | 41.0 | 41.0 | | 47.0 |
| Effective Green, g (s) | 36.0 | 36.0 | 41.0 | 41.0 | | 47.0 |
| Actuated g/C Ratio | 0.36 | 0.36 | 0.41 | 0.41 | | 0.47 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 755 | 577 | 771 | 655 | | 1258 |
| v/s Ratio Prot | c0.38 | | c0.42 | | | c0.01 |
| v/s Ratio Perm | | 0.04 | | 0.32 | | 0.09 |
| v/c Ratio | 1.05 | 0.10 | 1.02 | 0.78 | | 0.22 |
| Uniform Delay, d1 | 32.0 | 21.2 | 29.5 | 25.6 | | 15.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 45.1 | 0.1 | 37.4 | 5.3 | | 0.0 |
| Delay (s) | 77.1 | 21.3 | 66.9 | 30.9 | | 15.7 |
| Level of Service | E | C | E | C | | B |
| Approach Delay (s) | 70.9 | | 48.0 | | | 15.7 |
| Approach LOS | E | | D | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 52.0 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 66.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 788 | 39 | 204 | 625 | 50 | 487 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.55 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 2098 | 1603 | 1881 | 1599 | | 3916 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.85 |
| Satd. Flow (perm) | 2098 | 1603 | 1881 | 1599 | | 3335 |
| Peak-hour factor, PHF | 0.85 | 0.53 | 0.75 | 0.84 | 0.72 | 0.64 |
| Adj. Flow (vph) | 927 | 74 | 272 | 744 | 69 | 761 |
| RTOR Reduction (vph) | 0 | 35 | 0 | 567 | 0 | 0 |
| Lane Group Flow (vph) | 927 | 39 | 272 | 177 | 0 | 830 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 36.7 | 36.7 | 18.6 | 18.6 | | 24.6 |
| Effective Green, g (s) | 36.7 | 36.7 | 18.6 | 18.6 | | 24.6 |
| Actuated g/C Ratio | 0.47 | 0.47 | 0.24 | 0.24 | | 0.31 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 983 | 751 | 446 | 379 | | 1092 |
| v/s Ratio Prot | c0.44 | | 0.14 | | | c0.06 |
| v/s Ratio Perm | | 0.02 | | 0.11 | | c0.18 |
| v/c Ratio | 0.94 | 0.05 | 0.61 | 0.47 | | 0.76 |
| Uniform Delay, d1 | 19.8 | 11.3 | 26.6 | 25.6 | | 24.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 16.8 | 0.0 | 1.6 | 0.3 | | 2.8 |
| Delay (s) | 36.6 | 11.4 | 28.2 | 25.9 | | 27.0 |
| Level of Service | D | B | C | C | | C |
| Approach Delay (s) | 34.7 | | 26.5 | | | 27.0 |
| Approach LOS | C | | C | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 29.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.87 | | |
| Actuated Cycle Length (s) | 78.3 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 64.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 734 | 78 | 676 | 677 | 28 | 223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | 0.97 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 0.99 |
| Satd. Flow (prot) | 3701 | 1603 | 1881 | 1599 | | 3906 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.75 |
| Satd. Flow (perm) | 3701 | 1603 | 1881 | 1599 | | 2936 |
| Peak-hour factor, PHF | 0.93 | 0.79 | 0.86 | 0.78 | 0.75 | 0.93 |
| Adj. Flow (vph) | 789 | 99 | 786 | 868 | 37 | 240 |
| RTOR Reduction (vph) | 0 | 76 | 0 | 466 | 0 | 0 |
| Lane Group Flow (vph) | 789 | 23 | 786 | 402 | 0 | 277 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 17.0 | 17.0 | 34.5 | 34.5 | | 40.5 |
| Effective Green, g (s) | 17.0 | 17.0 | 34.5 | 34.5 | | 40.5 |
| Actuated g/C Ratio | 0.23 | 0.23 | 0.46 | 0.46 | | 0.54 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 844 | 365 | 871 | 740 | | 1674 |
| v/s Ratio Prot | c0.21 | | c0.42 | | | c0.01 |
| v/s Ratio Perm | | 0.01 | | 0.25 | | 0.08 |
| v/c Ratio | 0.93 | 0.06 | 0.90 | 0.54 | | 0.17 |
| Uniform Delay, d1 | 28.2 | 22.5 | 18.4 | 14.3 | | 8.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 17.3 | 0.1 | 12.3 | 0.4 | | 0.0 |
| Delay (s) | 45.5 | 22.6 | 30.7 | 14.8 | | 8.5 |
| Level of Service | D | C | C | B | | A |
| Approach Delay (s) | 43.0 | | 22.3 | | | 8.5 |
| Approach LOS | D | | C | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 27.5 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 74.5 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 66.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 788 | 39 | 204 | 625 | 50 | 487 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | 0.97 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 3701 | 1603 | 1881 | 1599 | | 3916 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.91 |
| Satd. Flow (perm) | 3701 | 1603 | 1881 | 1599 | | 3567 |
| Peak-hour factor, PHF | 0.85 | 0.53 | 0.75 | 0.84 | 0.72 | 0.64 |
| Adj. Flow (vph) | 927 | 74 | 272 | 744 | 69 | 761 |
| RTOR Reduction (vph) | 0 | 52 | 0 | 529 | 0 | 0 |
| Lane Group Flow (vph) | 927 | 22 | 272 | 215 | 0 | 830 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 16.0 | 16.0 | 15.8 | 15.8 | | 21.8 |
| Effective Green, g (s) | 16.0 | 16.0 | 15.8 | 15.8 | | 21.8 |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | 0.29 | | 0.40 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1080 | 468 | 542 | 461 | | 1457 |
| v/s Ratio Prot | c0.25 | | 0.14 | | | c0.06 |
| v/s Ratio Perm | | 0.01 | | 0.13 | | c0.16 |
| v/c Ratio | 0.86 | 0.05 | 0.50 | 0.47 | | 0.57 |
| Uniform Delay, d1 | 18.3 | 13.9 | 16.2 | 16.0 | | 12.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 7.2 | 0.1 | 0.3 | 0.3 | | 0.3 |
| Delay (s) | 25.5 | 14.0 | 16.5 | 16.3 | | 13.2 |
| Level of Service | C | B | B | B | | B |
| Approach Delay (s) | 24.6 | | 16.4 | | | 13.2 |
| Approach LOS | C | | B | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 18.3 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 54.8 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 64.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 805 | 82 | 676 | 695 | 29 | 223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.55 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 0.99 |
| Satd. Flow (prot) | 2098 | 1603 | 1881 | 1599 | | 3905 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.60 |
| Satd. Flow (perm) | 2098 | 1603 | 1881 | 1599 | | 2350 |
| Peak-hour factor, PHF | 0.93 | 0.79 | 0.86 | 0.78 | 0.75 | 0.93 |
| Adj. Flow (vph) | 866 | 104 | 786 | 891 | 39 | 240 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 306 | 0 | 0 |
| Lane Group Flow (vph) | 866 | 70 | 786 | 585 | 0 | 279 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 48.0 | 48.0 | 49.0 | 49.0 | | 55.0 |
| Effective Green, g (s) | 48.0 | 48.0 | 49.0 | 49.0 | | 55.0 |
| Actuated g/C Ratio | 0.40 | 0.40 | 0.41 | 0.41 | | 0.46 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 839 | 641 | 768 | 652 | | 1154 |
| v/s Ratio Prot | c0.41 | | c0.42 | | | c0.01 |
| v/s Ratio Perm | | 0.04 | | 0.37 | | 0.10 |
| v/c Ratio | 1.03 | 0.11 | 1.02 | 0.90 | | 0.24 |
| Uniform Delay, d1 | 36.0 | 22.6 | 35.5 | 33.2 | | 19.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 39.6 | 0.1 | 38.5 | 14.7 | | 0.0 |
| Delay (s) | 75.6 | 22.7 | 74.0 | 47.8 | | 19.8 |
| Level of Service | E | C | E | D | | B |
| Approach Delay (s) | 70.0 | | 60.1 | | | 19.8 |
| Approach LOS | E | | E | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 59.5 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 0.98 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 68.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 104 | 19 | 1 | 672 | 75 | 4 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 113 | 21 | 1 | 730 | 82 | 4 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 134 | | 856 | 123 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 134 | | 856 | 123 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 75 | 100 |
| cM capacity (veh/h) | | | 1451 | | 328 | 927 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 134 | 732 | 86 |
| Volume Left | 0 | 1 | 82 |
| Volume Right | 21 | 0 | 4 |
| cSH | 1700 | 1451 | 339 |
| Volume to Capacity | 0.08 | 0.00 | 0.25 |
| Queue Length 95th (ft) | 0 | 0 | 25 |
| Control Delay (s) | 0.0 | 0.0 | 19.2 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.0 | 19.2 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.7 | | |
| Intersection Capacity Utilization | 47.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 830 | 41 | 204 | 704 | 54 | 487 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | *0.55 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 2098 | 1603 | 1881 | 1599 | | 3915 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.81 |
| Satd. Flow (perm) | 2098 | 1603 | 1881 | 1599 | | 3194 |
| Peak-hour factor, PHF | 0.85 | 0.53 | 0.75 | 0.84 | 0.72 | 0.64 |
| Adj. Flow (vph) | 976 | 77 | 272 | 838 | 75 | 761 |
| RTOR Reduction (vph) | 0 | 34 | 0 | 648 | 0 | 0 |
| Lane Group Flow (vph) | 976 | 43 | 272 | 190 | 0 | 836 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 38.5 | 38.5 | 18.0 | 18.0 | | 24.0 |
| Effective Green, g (s) | 38.5 | 38.5 | 18.0 | 18.0 | | 24.0 |
| Actuated g/C Ratio | 0.48 | 0.48 | 0.23 | 0.23 | | 0.30 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1016 | 776 | 425 | 362 | | 1018 |
| v/s Ratio Prot | c0.47 | | 0.14 | | | c0.06 |
| v/s Ratio Perm | | 0.03 | | 0.12 | | c0.19 |
| v/c Ratio | 0.96 | 0.06 | 0.64 | 0.52 | | 0.82 |
| Uniform Delay, d1 | 19.8 | 10.9 | 27.8 | 27.0 | | 25.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 19.5 | 0.0 | 2.5 | 0.6 | | 5.2 |
| Delay (s) | 39.2 | 10.9 | 30.3 | 27.6 | | 30.9 |
| Level of Service | D | B | C | C | | C |
| Approach Delay (s) | 37.1 | | 28.3 | | | 30.9 |
| Approach LOS | D | | C | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 32.1 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.91 | | |
| Actuated Cycle Length (s) | 79.5 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 67.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 592 | 83 | 5 | 350 | 44 | 3 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 1.00 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 643 | 90 | 5 | 350 | 48 | 3 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 734 | | 1049 | 689 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 734 | | 1049 | 689 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 99 | | 81 | 99 |
| cM capacity (veh/h) | | | 871 | | 250 | 446 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 734 | 355 | 51 |
| Volume Left | 0 | 5 | 48 |
| Volume Right | 90 | 0 | 3 |
| cSH | 1700 | 871 | 257 |
| Volume to Capacity | 0.43 | 0.01 | 0.20 |
| Queue Length 95th (ft) | 0 | 0 | 18 |
| Control Delay (s) | 0.0 | 0.2 | 22.4 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.2 | 22.4 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.1 | | |
| Intersection Capacity Utilization | 46.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 805 | 82 | 676 | 695 | 29 | 223 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | 0.97 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 0.99 |
| Satd. Flow (prot) | 3701 | 1603 | 1881 | 1599 | | 3905 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.72 |
| Satd. Flow (perm) | 3701 | 1603 | 1881 | 1599 | | 2839 |
| Peak-hour factor, PHF | 0.93 | 0.79 | 0.86 | 0.78 | 0.75 | 0.93 |
| Adj. Flow (vph) | 866 | 104 | 786 | 891 | 39 | 240 |
| RTOR Reduction (vph) | 0 | 78 | 0 | 461 | 0 | 0 |
| Lane Group Flow (vph) | 866 | 26 | 786 | 430 | 0 | 279 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 20.0 | 20.0 | 36.7 | 36.7 | | 42.7 |
| Effective Green, g (s) | 20.0 | 20.0 | 36.7 | 36.7 | | 42.7 |
| Actuated g/C Ratio | 0.25 | 0.25 | 0.46 | 0.46 | | 0.54 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 928 | 402 | 866 | 736 | | 1601 |
| v/s Ratio Prot | c0.23 | | c0.42 | | | c0.01 |
| v/s Ratio Perm | | 0.02 | | 0.27 | | 0.08 |
| v/c Ratio | 0.93 | 0.06 | 0.91 | 0.58 | | 0.17 |
| Uniform Delay, d1 | 29.2 | 22.7 | 19.9 | 15.9 | | 9.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 16.0 | 0.1 | 12.8 | 0.8 | | 0.0 |
| Delay (s) | 45.2 | 22.8 | 32.7 | 16.6 | | 9.5 |
| Level of Service | D | C | C | B | | A |
| Approach Delay (s) | 42.8 | | 24.2 | | | 9.5 |
| Approach LOS | D | | C | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 28.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 79.7 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 68.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 104 | 19 | 1 | 672 | 75 | 4 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 113 | 21 | 1 | 730 | 82 | 4 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 134 | | 856 | 123 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 134 | | 856 | 123 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 75 | 100 |
| cM capacity (veh/h) | | | 1451 | | 328 | 927 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 134 | 732 | 86 |
| Volume Left | 0 | 1 | 82 |
| Volume Right | 21 | 0 | 4 |
| cSH | 1700 | 1451 | 339 |
| Volume to Capacity | 0.08 | 0.00 | 0.25 |
| Queue Length 95th (ft) | 0 | 0 | 25 |
| Control Delay (s) | 0.0 | 0.0 | 19.2 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.0 | 19.2 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.7 | | |
| Intersection Capacity Utilization | 47.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

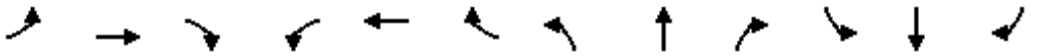
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (vph) | 830 | 41 | 204 | 704 | 54 | 487 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 15 | 13 | 12 | 12 | 15 | 15 |
| Grade (%) | 4% | | -2% | | | -2% |
| Total Lost time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 |
| Lane Util. Factor | 0.97 | 1.00 | 1.00 | 1.00 | | 0.95 |
| Frt | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Satd. Flow (prot) | 3701 | 1603 | 1881 | 1599 | | 3915 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 1.00 | | 0.90 |
| Satd. Flow (perm) | 3701 | 1603 | 1881 | 1599 | | 3539 |
| Peak-hour factor, PHF | 0.85 | 0.53 | 0.75 | 0.84 | 0.72 | 0.64 |
| Adj. Flow (vph) | 976 | 77 | 272 | 838 | 75 | 761 |
| RTOR Reduction (vph) | 0 | 54 | 0 | 580 | 0 | 0 |
| Lane Group Flow (vph) | 976 | 23 | 272 | 258 | 0 | 836 |
| Turn Type | NA | Perm | NA | Perm | pm+pt | NA |
| Protected Phases | 4 | | 2 | | 1 | 1 2 |
| Permitted Phases | | 4 | | 2 | 1 2 | |
| Actuated Green, G (s) | 17.9 | 17.9 | 18.2 | 18.2 | | 24.2 |
| Effective Green, g (s) | 17.9 | 17.9 | 18.2 | 18.2 | | 24.2 |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.31 | 0.31 | | 0.41 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | | |
| Vehicle Extension (s) | 4.0 | 4.0 | 2.0 | 2.0 | | |
| Lane Grp Cap (vph) | 1120 | 485 | 579 | 492 | | 1487 |
| v/s Ratio Prot | c0.26 | | 0.14 | | | c0.06 |
| v/s Ratio Perm | | 0.01 | | 0.16 | | c0.17 |
| v/c Ratio | 0.87 | 0.05 | 0.47 | 0.52 | | 0.56 |
| Uniform Delay, d1 | 19.5 | 14.6 | 16.5 | 16.9 | | 13.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 |
| Incremental Delay, d2 | 7.8 | 0.1 | 0.2 | 0.5 | | 0.3 |
| Delay (s) | 27.4 | 14.6 | 16.8 | 17.3 | | 13.7 |
| Level of Service | C | B | B | B | | B |
| Approach Delay (s) | 26.4 | | 17.2 | | | 13.7 |
| Approach LOS | C | | B | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.5 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 59.1 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 67.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 592 | 83 | 5 | 350 | 44 | 3 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 1.00 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 643 | 90 | 5 | 350 | 48 | 3 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 734 | | 1049 | 689 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 734 | | 1049 | 689 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 99 | | 81 | 99 |
| cM capacity (veh/h) | | | 871 | | 250 | 446 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 734 | 355 | 51 |
| Volume Left | 0 | 5 | 48 |
| Volume Right | 90 | 0 | 3 |
| cSH | 1700 | 871 | 257 |
| Volume to Capacity | 0.43 | 0.01 | 0.20 |
| Queue Length 95th (ft) | 0 | 0 | 18 |
| Control Delay (s) | 0.0 | 0.2 | 22.4 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.2 | 22.4 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.1 | | |
| Intersection Capacity Utilization | 46.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



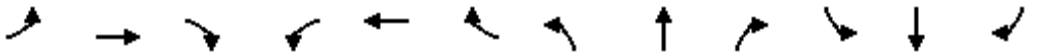
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 138 | 136 | 0 | 164 | 641 | 82 | 0 | 538 | 559 | 29 | 45 | 181 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 12 | 12 | 12 | 15 | 12 | 13 | 12 | 12 | 12 | 15 | 15 | 12 |
| Grade (%) | | 0% | | | 4% | | | -2% | | | -2% | |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | 1908 | 3468 | 1603 | | 3575 | 1599 | 1966 | 3932 | 1599 |
| Flt Permitted | 0.29 | 1.00 | | 0.50 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.30 | 1.00 | 1.00 |
| Satd. Flow (perm) | 540 | 3539 | | 996 | 3468 | 1603 | | 3575 | 1599 | 629 | 3932 | 1599 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.93 | 0.92 | 0.79 | 0.92 | 0.86 | 0.78 | 0.75 | 0.93 | 0.92 |
| Adj. Flow (vph) | 150 | 148 | 0 | 176 | 697 | 104 | 0 | 626 | 717 | 39 | 48 | 197 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 76 | 0 | 0 | 470 | 0 | 0 | 110 |
| Lane Group Flow (vph) | 150 | 148 | 0 | 176 | 697 | 28 | 0 | 626 | 247 | 39 | 48 | 87 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | 1 | 1 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 1 2 | | 1 2 |
| Actuated Green, G (s) | 22.6 | 16.5 | | 33.4 | 21.9 | 21.9 | | 25.5 | 25.5 | 31.6 | 36.6 | 36.6 |
| Effective Green, g (s) | 22.6 | 16.5 | | 33.4 | 21.9 | 21.9 | | 25.5 | 25.5 | 31.6 | 36.6 | 36.6 |
| Actuated g/C Ratio | 0.27 | 0.20 | | 0.40 | 0.27 | 0.27 | | 0.31 | 0.31 | 0.38 | 0.44 | 0.44 |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 4.0 | | 4.0 | 3.0 | 3.0 | | 2.0 | 2.0 | 1.0 | | |
| Lane Grp Cap (vph) | 238 | 706 | | 529 | 919 | 425 | | 1103 | 493 | 339 | 1742 | 708 |
| v/s Ratio Prot | c0.05 | 0.04 | | 0.05 | c0.20 | | | c0.18 | | 0.01 | 0.01 | |
| v/s Ratio Perm | 0.13 | | | 0.09 | | 0.02 | | | 0.15 | 0.04 | | c0.05 |
| v/c Ratio | 0.63 | 0.21 | | 0.33 | 0.76 | 0.06 | | 0.57 | 0.50 | 0.12 | 0.03 | 0.12 |
| Uniform Delay, d1 | 23.9 | 27.6 | | 16.3 | 27.9 | 22.7 | | 23.9 | 23.3 | 16.4 | 13.0 | 13.5 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.3 | 0.2 | | 0.5 | 3.6 | 0.1 | | 0.4 | 0.3 | 0.1 | 0.0 | 0.0 |
| Delay (s) | 29.3 | 27.8 | | 16.9 | 31.5 | 22.8 | | 24.3 | 23.6 | 16.4 | 13.0 | 13.6 |
| Level of Service | C | C | | B | C | C | | C | C | B | B | B |
| Approach Delay (s) | | 28.6 | | | 28.0 | | | 24.0 | | | 13.9 | |
| Approach LOS | | C | | | C | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 24.8 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 82.6 | Sum of lost time (s) | 23.0 |
| Intersection Capacity Utilization | 63.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 104 | 19 | 1 | 672 | 75 | 4 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 113 | 21 | 1 | 730 | 82 | 4 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 134 | | 856 | 123 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 134 | | 856 | 123 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 75 | 100 |
| cM capacity (veh/h) | | | 1451 | | 328 | 927 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 134 | 732 | 86 |
| Volume Left | 0 | 1 | 82 |
| Volume Right | 21 | 0 | 4 |
| cSH | 1700 | 1451 | 339 |
| Volume to Capacity | 0.08 | 0.00 | 0.25 |
| Queue Length 95th (ft) | 0 | 0 | 25 |
| Control Delay (s) | 0.0 | 0.0 | 19.2 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.0 | 19.2 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.7 | | |
| Intersection Capacity Utilization | 47.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 43 | 39 | 0 | 156 | 674 | 41 | 0 | 161 | 168 | 54 | 107 | 380 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 12 | 12 | 12 | 15 | 12 | 13 | 12 | 12 | 12 | 15 | 15 | 12 |
| Grade (%) | | 0% | | | 4% | | | -2% | | | -2% | |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | 1908 | 3468 | 1603 | | 3575 | 1599 | 1966 | 3932 | 1599 |
| Flt Permitted | 0.46 | 1.00 | | 0.43 | 1.00 | 1.00 | | 1.00 | 1.00 | 0.62 | 1.00 | 1.00 |
| Satd. Flow (perm) | 856 | 3539 | | 865 | 3468 | 1603 | | 3575 | 1599 | 1277 | 3932 | 1599 |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.85 | 0.92 | 0.53 | 0.92 | 0.75 | 0.84 | 0.72 | 0.64 | 0.92 |
| Adj. Flow (vph) | 47 | 42 | 0 | 184 | 733 | 77 | 0 | 215 | 200 | 75 | 167 | 413 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 154 | 0 | 0 | 131 |
| Lane Group Flow (vph) | 47 | 42 | 0 | 184 | 733 | 23 | 0 | 215 | 46 | 75 | 167 | 282 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 2 | | 1 | 1 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | 2 | 1 2 | | 1 2 |
| Actuated Green, G (s) | 10.8 | 8.7 | | 28.4 | 20.3 | 20.3 | | 15.9 | 15.9 | 23.7 | 28.7 | 28.7 |
| Effective Green, g (s) | 10.8 | 8.7 | | 28.4 | 20.3 | 20.3 | | 15.9 | 15.9 | 23.7 | 28.7 | 28.7 |
| Actuated g/C Ratio | 0.16 | 0.13 | | 0.41 | 0.29 | 0.29 | | 0.23 | 0.23 | 0.34 | 0.42 | 0.42 |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | | |
| Vehicle Extension (s) | 3.0 | 4.0 | | 4.0 | 3.0 | 3.0 | | 2.0 | 2.0 | 1.0 | | |
| Lane Grp Cap (vph) | 161 | 445 | | 562 | 1018 | 470 | | 822 | 367 | 515 | 1633 | 664 |
| v/s Ratio Prot | 0.01 | 0.01 | | c0.06 | c0.21 | | | 0.06 | | 0.02 | 0.04 | |
| v/s Ratio Perm | 0.04 | | | 0.07 | | 0.01 | | | 0.03 | 0.03 | | c0.18 |
| v/c Ratio | 0.29 | 0.09 | | 0.33 | 0.72 | 0.05 | | 0.26 | 0.13 | 0.15 | 0.10 | 0.42 |
| Uniform Delay, d1 | 25.3 | 26.7 | | 13.6 | 21.9 | 17.5 | | 21.8 | 21.1 | 15.5 | 12.3 | 14.3 |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.0 | 0.1 | | 0.5 | 2.5 | 0.0 | | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 |
| Delay (s) | 26.3 | 26.8 | | 14.0 | 24.4 | 17.5 | | 21.9 | 21.1 | 15.6 | 12.3 | 14.5 |
| Level of Service | C | C | | B | C | B | | C | C | B | B | B |
| Approach Delay (s) | | 26.5 | | | 21.9 | | | 21.5 | | | 14.1 | |
| Approach LOS | | C | | | C | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.7 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 69.1 | Sum of lost time (s) | 23.0 |
| Intersection Capacity Utilization | 58.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 592 | 83 | 5 | 350 | 44 | 3 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 1.00 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 643 | 90 | 5 | 350 | 48 | 3 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 734 | | 1049 | 689 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 734 | | 1049 | 689 |
| tC, single (s) | | | 4.1 | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 99 | | 81 | 99 |
| cM capacity (veh/h) | | | 871 | | 250 | 446 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total | 734 | 355 | 51 |
| Volume Left | 0 | 5 | 48 |
| Volume Right | 90 | 0 | 3 |
| cSH | 1700 | 871 | 257 |
| Volume to Capacity | 0.43 | 0.01 | 0.20 |
| Queue Length 95th (ft) | 0 | 0 | 18 |
| Control Delay (s) | 0.0 | 0.2 | 22.4 |
| Lane LOS | | A | C |
| Approach Delay (s) | 0.0 | 0.2 | 22.4 |
| Approach LOS | | | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.1 | | |
| Intersection Capacity Utilization | 46.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 774 | 96 | 771 | 851 | 271 |
| v/c Ratio | 1.05 | 0.16 | 1.03 | 0.82 | 0.21 |
| Control Delay | 78.2 | 8.2 | 68.0 | 13.3 | 11.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.2 | 8.2 | 68.0 | 13.3 | 11.1 |
| Queue Length 50th (ft) | ~433 | 9 | ~472 | 77 | 38 |
| Queue Length 95th (ft) | #628 | 32 | #640 | 120 | 58 |
| Internal Link Dist (ft) | 843 | | 716 | | 695 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 736 | 600 | 752 | 1036 | 1319 |
| 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 | 1.05 | 0.16 | 1.03 | 0.82 | 0.21 |

Intersection Summary

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

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 909 | 72 | 267 | 730 | 813 |
| v/c Ratio | 0.94 | 0.09 | 0.58 | 0.77 | 0.69 |
| Control Delay | 40.2 | 4.6 | 32.0 | 8.9 | 24.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.2 | 4.6 | 32.0 | 8.9 | 24.0 |
| Queue Length 50th (ft) | 375 | 2 | 117 | 0 | 157 |
| Queue Length 95th (ft) | #548 | 7 | 153 | 55 | 135 |
| Internal Link Dist (ft) | 843 | | 715 | | 700 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 999 | 796 | 484 | 953 | 1222 |
| 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 | 0.91 | 0.09 | 0.55 | 0.77 | 0.67 |

Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 789 | 99 | 786 | 868 | 277 |
| v/c Ratio | 1.05 | 0.16 | 1.02 | 0.86 | 0.22 |
| Control Delay | 77.7 | 9.5 | 68.0 | 17.8 | 12.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 77.7 | 9.5 | 68.0 | 17.8 | 12.5 |
| Queue Length 50th (ft) | ~499 | 13 | ~514 | 156 | 44 |
| Queue Length 95th (ft) | #705 | 38 | #705 | 195 | 66 |
| Internal Link Dist (ft) | 843 | | 715 | | 697 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 755 | 619 | 771 | 1013 | 1283 |
| 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 | 1.05 | 0.16 | 1.02 | 0.86 | 0.22 |

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.

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 927 | 74 | 272 | 744 | 830 |
| v/c Ratio | 0.94 | 0.09 | 0.61 | 0.79 | 0.73 |
| Control Delay | 39.3 | 4.3 | 33.8 | 9.4 | 26.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 39.3 | 4.3 | 33.8 | 9.4 | 26.0 |
| Queue Length 50th (ft) | 378 | 2 | 122 | 0 | 165 |
| Queue Length 95th (ft) | #552 | 6 | 159 | 56 | 142 |
| Internal Link Dist (ft) | 843 | | 710 | | 698 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 1019 | 812 | 456 | 952 | 1153 |
| 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 | 0.91 | 0.09 | 0.60 | 0.78 | 0.72 |

Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 789 | 99 | 786 | 868 | 277 |
| v/c Ratio | 0.93 | 0.22 | 0.90 | 0.72 | 0.16 |
| Control Delay | 48.8 | 7.1 | 34.6 | 5.0 | 6.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.8 | 7.1 | 34.6 | 5.0 | 6.1 |
| Queue Length 50th (ft) | 186 | 0 | 319 | 0 | 24 |
| Queue Length 95th (ft) | #294 | 26 | #505 | 18 | 37 |
| Internal Link Dist (ft) | 843 | | 713 | | 692 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 844 | 441 | 883 | 1211 | 1733 |
| 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 | 0.93 | 0.22 | 0.89 | 0.72 | 0.16 |

Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 927 | 74 | 272 | 744 | 830 |
| v/c Ratio | 0.86 | 0.14 | 0.50 | 0.75 | 0.55 |
| Control Delay | 28.8 | 5.3 | 20.1 | 7.6 | 11.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.8 | 5.3 | 20.1 | 7.6 | 11.1 |
| Queue Length 50th (ft) | 146 | 0 | 73 | 0 | 81 |
| Queue Length 95th (ft) | #217 | 6 | 105 | 48 | 74 |
| Internal Link Dist (ft) | 843 | | 717 | | 692 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 1080 | 520 | 549 | 993 | 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 | 0.86 | 0.14 | 0.50 | 0.75 | 0.54 |

Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 866 | 104 | 786 | 891 | 279 |
| v/c Ratio | 1.03 | 0.15 | 1.02 | 0.93 | 0.24 |
| Control Delay | 75.5 | 11.9 | 74.2 | 31.1 | 16.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 75.5 | 11.9 | 74.2 | 31.1 | 16.4 |
| Queue Length 50th (ft) | ~654 | 22 | ~648 | 334 | 58 |
| Queue Length 95th (ft) | #877 | 48 | #822 | 354 | 83 |
| Internal Link Dist (ft) | 843 | | 713 | | 700 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 839 | 675 | 768 | 958 | 1174 |
| 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 | 1.03 | 0.15 | 1.02 | 0.93 | 0.24 |

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.

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 976 | 77 | 272 | 838 | 836 |
| v/c Ratio | 0.96 | 0.10 | 0.64 | 0.83 | 0.79 |
| Control Delay | 41.9 | 4.2 | 35.8 | 10.9 | 29.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.9 | 4.2 | 35.8 | 10.9 | 29.3 |
| Queue Length 50th (ft) | 403 | 3 | 124 | 0 | 171 |
| Queue Length 95th (ft) | #587 | 6 | 162 | 57 | 146 |
| Internal Link Dist (ft) | 843 | | 707 | | 689 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 1029 | 820 | 426 | 1010 | 1059 |
| 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 | 0.95 | 0.09 | 0.64 | 0.83 | 0.79 |

Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 866 | 104 | 786 | 891 | 279 |
| v/c Ratio | 0.93 | 0.22 | 0.91 | 0.74 | 0.17 |
| Control Delay | 47.8 | 6.7 | 36.7 | 6.0 | 6.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.8 | 6.7 | 36.7 | 6.0 | 6.9 |
| Queue Length 50th (ft) | 218 | 0 | 347 | 10 | 27 |
| Queue Length 95th (ft) | #331 | 26 | #536 | 27 | 42 |
| Internal Link Dist (ft) | 843 | | 713 | | 700 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 928 | 479 | 872 | 1199 | 1647 |
| 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 | 0.93 | 0.22 | 0.90 | 0.74 | 0.17 |

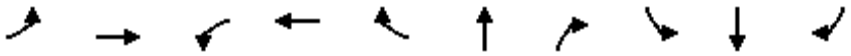
Intersection Summary

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

| Lane Group | WBL | WBR | NBT | NBR | SBT |
|---|---|---|---|---|---|
| Lane Group Flow (vph) | 976 | 77 | 272 | 838 | 836 |
| v/c Ratio | 0.87 | 0.14 | 0.47 | 0.78 | 0.54 |
| Control Delay | 30.4 | 5.4 | 19.7 | 8.0 | 11.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.4 | 5.4 | 19.7 | 8.0 | 11.7 |
| Queue Length 50th (ft) | 171 | 0 | 77 | 0 | 89 |
| Queue Length 95th (ft) | #245 | 6 | 109 | 48 | 81 |
| Internal Link Dist (ft) | 843 | | 707 | | 689 |
| Turn Bay Length (ft) | 315 | 190 | | 200 | |
| Base Capacity (vph) | 1128 | 541 | 605 | 1082 | 1596 |
| 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 | 0.87 | 0.14 | 0.45 | 0.77 | 0.52 |

Intersection Summary

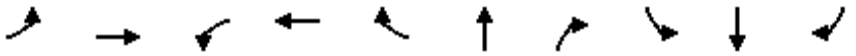
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 150 | 148 | 176 | 697 | 104 | 626 | 717 | 39 | 48 | 197 |
| v/c Ratio | 0.64 | 0.21 | 0.34 | 0.76 | 0.19 | 0.57 | 0.75 | 0.11 | 0.03 | 0.24 |
| Control Delay | 33.1 | 30.2 | 18.4 | 34.5 | 1.5 | 26.6 | 8.3 | 14.3 | 13.3 | 3.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 33.1 | 30.2 | 18.4 | 34.5 | 1.5 | 26.6 | 8.3 | 14.3 | 13.3 | 3.1 |
| Queue Length 50th (ft) | 52 | 35 | 62 | 184 | 0 | 147 | 14 | 11 | 7 | 0 |
| Queue Length 95th (ft) | #106 | 65 | 106 | 247 | 0 | 194 | 39 | 24 | 17 | 36 |
| Internal Link Dist (ft) | | 1005 | | 843 | | 713 | | | 700 | |
| Turn Bay Length (ft) | 250 | | 315 | | 190 | | 200 | 250 | | |
| Base Capacity (vph) | 236 | 739 | 587 | 1103 | 625 | 1269 | 1006 | 345 | 1973 | 900 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.20 | 0.30 | 0.63 | 0.17 | 0.49 | 0.71 | 0.11 | 0.02 | 0.22 |

Intersection Summary

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



| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 47 | 42 | 184 | 733 | 77 | 215 | 200 | 75 | 167 | 413 |
| v/c Ratio | 0.21 | 0.07 | 0.34 | 0.70 | 0.12 | 0.25 | 0.34 | 0.14 | 0.09 | 0.49 |
| Control Delay | 16.3 | 24.2 | 14.9 | 24.9 | 0.4 | 24.8 | 2.9 | 14.9 | 13.6 | 9.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 16.3 | 24.2 | 14.9 | 24.9 | 0.4 | 24.8 | 2.9 | 14.9 | 13.6 | 9.8 |
| Queue Length 50th (ft) | 12 | 7 | 50 | 152 | 0 | 43 | 0 | 20 | 23 | 55 |
| Queue Length 95th (ft) | 30 | 21 | 84 | 213 | 0 | 65 | 11 | 39 | 32 | 148 |
| Internal Link Dist (ft) | | 1005 | | 843 | | 707 | | | 689 | |
| Turn Bay Length (ft) | 250 | | 315 | | 190 | | 200 | 250 | | |
| Base Capacity (vph) | 220 | 903 | 601 | 1504 | 803 | 886 | 601 | 597 | 1737 | 831 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.21 | 0.05 | 0.31 | 0.49 | 0.10 | 0.24 | 0.33 | 0.13 | 0.10 | 0.50 |

Intersection Summary