BARGE
DESIGN SOLUTIONS

August 6, 2020
Barge File No. 36837-09

Metropolitan Nashville Planning Department
800 Second Avenue South
Nashville, Tennessee 37210

Re: 801 Church Street Modification Requests

Dear Mr. Hammer:

We request modifications to the Major and Collector Street Plan (MCSP), the build-to zone for a small (12.4 SF) aerial encroachment (at the corner of Church Street and Rosa L. Parks Boulevard) and loading from a Primary Street for 801 Church Street. The modifications requested are due in part to the fact that all three streets surrounding the site are classified as "constrained" by the MCSP.

This proposed mixed-use residential building is a critical project to Downtown Nashville that will strengthen Downtown's ability to truly be a place to live, work, and play. It will provide 350 housing units, ground floor retail, and structured parking near the employment-heavy Nashville Yards. This design is a companion to 900 Church Street, a complimentary design, creating an impressive architectural gateway into Downtown Nashville and fully realizing the intent of the DTC Core Subdistrict:

> *The Core is the heart of the Downtown business district, the economic engine of the Middle Tennessee region, and a significant economic force in the Southeast. It is the densest neighborhood in Downtown and has the greatest height allowances. Pedestrian comfort and safety should be prioritized with an interesting sidewalk realm, activity on the ground level of buildings, and controlled vehicular access. (p.20 of the Downtown Code)*

The modifications requested are:

1. 9th Avenue MCSP (T6-M-AB2). Please see the Site Plan/Landscaping Plan and Sections A and B for more information. Note: 9th Ave is classified as "constrained".

   Required Elements:
   - Standard ROW: 58' (29' from centerline)
   - Bikeway Buffer: 0'
   - Bikeway Width: 0'
   - Planting Strip: 4'
   - Sidewalk Width: 8'
   - On-Street Parking: 2 sides

   Provided Elements:
   - 26'-9" to 27'-8" from centerline (varies by location along frontage) through a combination of existing right-of-way and new pedestrian easements.
   - Sidewalk width varies from 9'-9" to 10'-8". Street tree plantings and bike parking facilities are provided.

   Comment: The project team has been looking holistically at the planned cycle track on Church Street, the recently installed Commerce Street cycle track, and the Nashville

615 3RD AVENUE SOUTH // SUITE 700 // NASHVILLE // TENNESSEE // 37210 // 615-254-1500 // BARGEDESIGN.COM

Yards plans for 9th Avenue that show bike lanes on each side of 9th Avenue. Our team recommends that the overall bicycle infrastructure in Downtown would be better served with a cycle track continuing along the east side of 9th Avenue as shown on the accompanying site plan, which would connect to the cycle tracks to the north and south.

2. Church Street MCSP (T6-M-AB4) and Street Tree Requirement. Please see the Site Plan/Landscaping Plan and Sections C, D and E for more information. Note: Church Street is classified as "constrained".

   Required Elements:
   - Standard ROW: 71' (35'-6" from centerline)
   - Planting Strip: 4'
   - Sidewalk Width: 10'
   - Bike Lanes/Cycle Track to be provided on the north side by others

   Provided Elements:
   - 39' from centerline
   - Sidewalk width varies depending on location, from 8'-6" to 11'-4" to 16'-6", including street tree plantings. The different sidewalk widths are due to shifting right-of-way and the need to provide pedestrian circulation around the proposed lay-by lane located at the entrance to the residential lobby.
   - Street Trees and Layby Lane– Street trees are provided at a rate of 1 every 50 feet instead of 1 every 30 feet due to the need to accommodate the layby lane. The layby lane is important developer-provided infrastructure that will allow for the safe loading and unloading of residents, and visitors to the proposed building.

     Comment: The layby lane will serve both rideshare and deliveries associated with supporting urban living without a personal automobile. The proposed sidewalk width is more than ample to provide a clear path of travel and will function like the layby lane at 505 Church Street.

3. Rosa L. Parks Boulevard MCSP (T6-M-AB3). Please see the Site Plan/Landscaping Plan and Sections F and G for more information. Note: Rosa L. Parks Blvd is classified as "constrained".

   Required Elements:
   - Standard ROW: 78' (39' from centerline)
   - Planting Strip: 4'
   - Sidewalk Width: 10'
   - *Bikeway Buffer: 2' and Bikeway Width: 6' (see note below)

   Provided Elements:
   - 39' from centerline
   - The project is compliant with the MCSP except for a tiny sliver of the building (12.4 square feet) that protrudes 15'-6" above the right-of way as described below.

   *Per the Multimodal Mobility Study (page 65) 5.7.11, *8th Avenue Shared Bike Route: 8th Avenue has been identified for a bike facility in several past studies due to its regional*

connections. However, given its regional connectivity, the route is also used heavily by motor vehicles at relatively higher speeds. Furthermore, given the limited right-of-way available on the roadway, the study recommends designating the roadway as a shared bike route only.

4. Aerial Encroachments/Build-to-Zone (Please see the Site Plan/Landscaping Plan and Sections for more information.)

    - Church Street/Rosa Parks intersection – a tiny sliver of the building (12.4 square feet) protrudes over the right-of way at 15'-6" above the sidewalk.

      Comment: Along the 9th Avenue and Church Street frontages, the building projects over the new sidewalks proposed to be in pedestrian easements, but these projections do not extend beyond the existing property lines. As mentioned before, this building in a companion to the 900 Church Street design, taking inspiration from the new Amazon Headquarters and the opportunity that this location will be attractive to Amazon employees for housing. The architect envisioned the residential floors of the building as a series of stacked blocks to complement the design of 900 Church. These floors are set back from the parking podium, creating the opportunity for an outdoor deck on all four sides of the building. The parking podium is designed in such a way to allow for an efficient parking layout but creates a recess at the ground floor to provide more space along the sidewalk for the comfort of pedestrians.

5. Loading on a Primary Street

    - The DTC states on p.83 that service elements such as loading docks and trash collection should not be accessible from Primary Streets unless a Primary Street is the only frontage. This site has 3 frontages – Church Street (Primary Street), Rosa Parks (Primary Street) and 9th Avenue (Secondary Street). The DTC requires each property to choose a Principal Frontage – for this project Church Street is the Principal Frontage – and all other frontages are considered Minor Frontages. Though 9th Avenue is a Secondary Street, it will have more bicycle and pedestrian traffic on it than Rosa Parks will; therefore, Rosa Parks is the logical location for loading services because it is a wide street designed to accommodate all manner of vehicles. Additionally, the project provides a ground floor retail space that fronts the corner of Church Street and Rosa L. Parks and provides activity along this façade.

We respectfully request your support in these modifications, which will allow this architecturally significant design to move forward. Once built, this mixed-use residential building along with its companion building, 900 Church, will create an impressive visual gateway into the heart of the Downtown Nashville. And most importantly, it will provide much needed residential space for the Amazon employees working in Nashville Yards. Based on the development of the Amazon campus in Seattle, residential living spaces are greatly needed. And much care has gone into architectural design, the pedestrian and vehicular arrival to the site, and circulation around it to create an inviting urban experience.

Sincerely,

Kathryn Withers
Planning Manager

\\corp.bwsc.net\data\Projects\36\36837\3683709\02_COMM\LETTERS\2020_08_06_LtrDTCDRC_final.docx
Attachments

PERSPECTIVE VIEW

801 CHURCH STREET / NASHVILLE, TN / GIARRATANA, LLC / 08.05.2020

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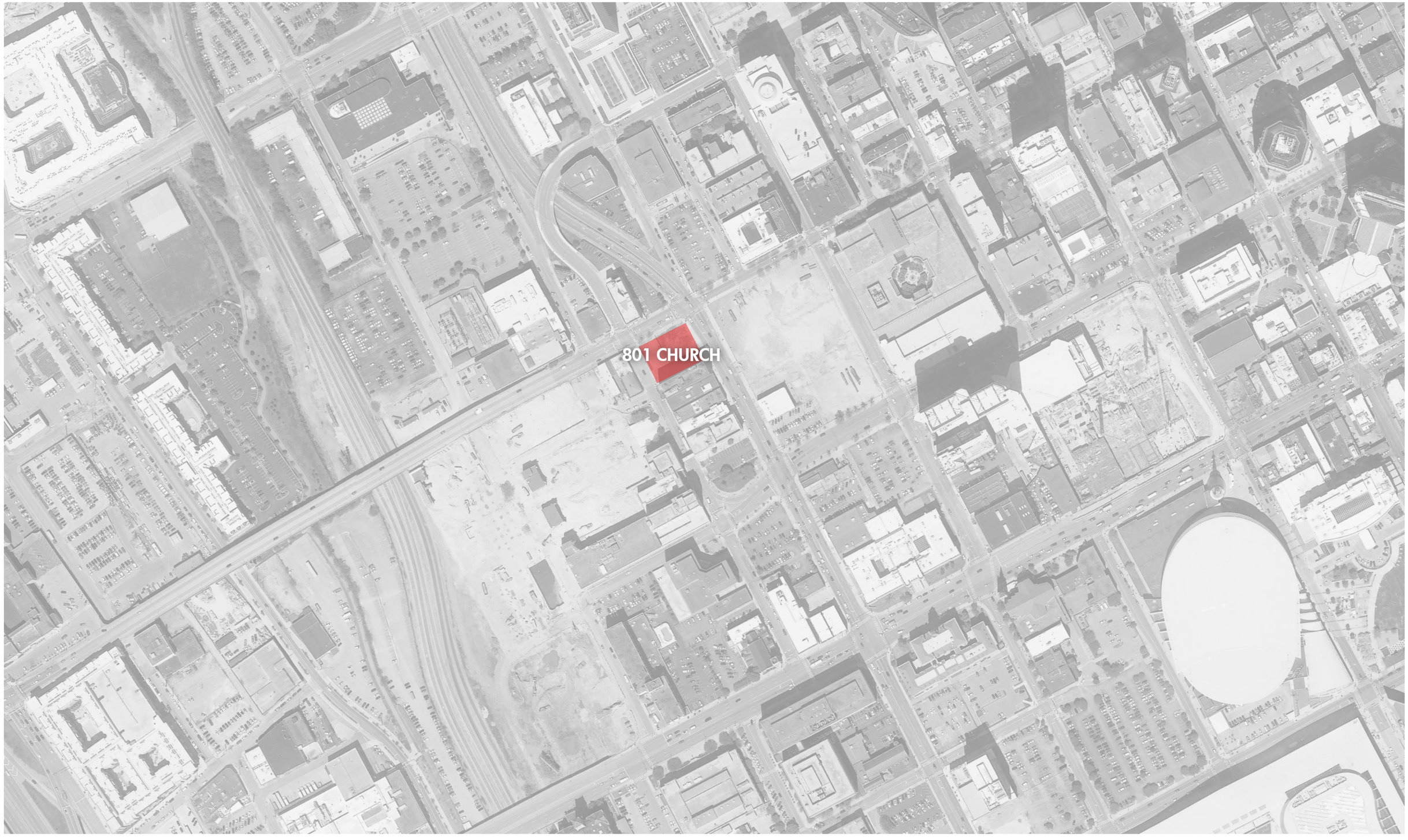
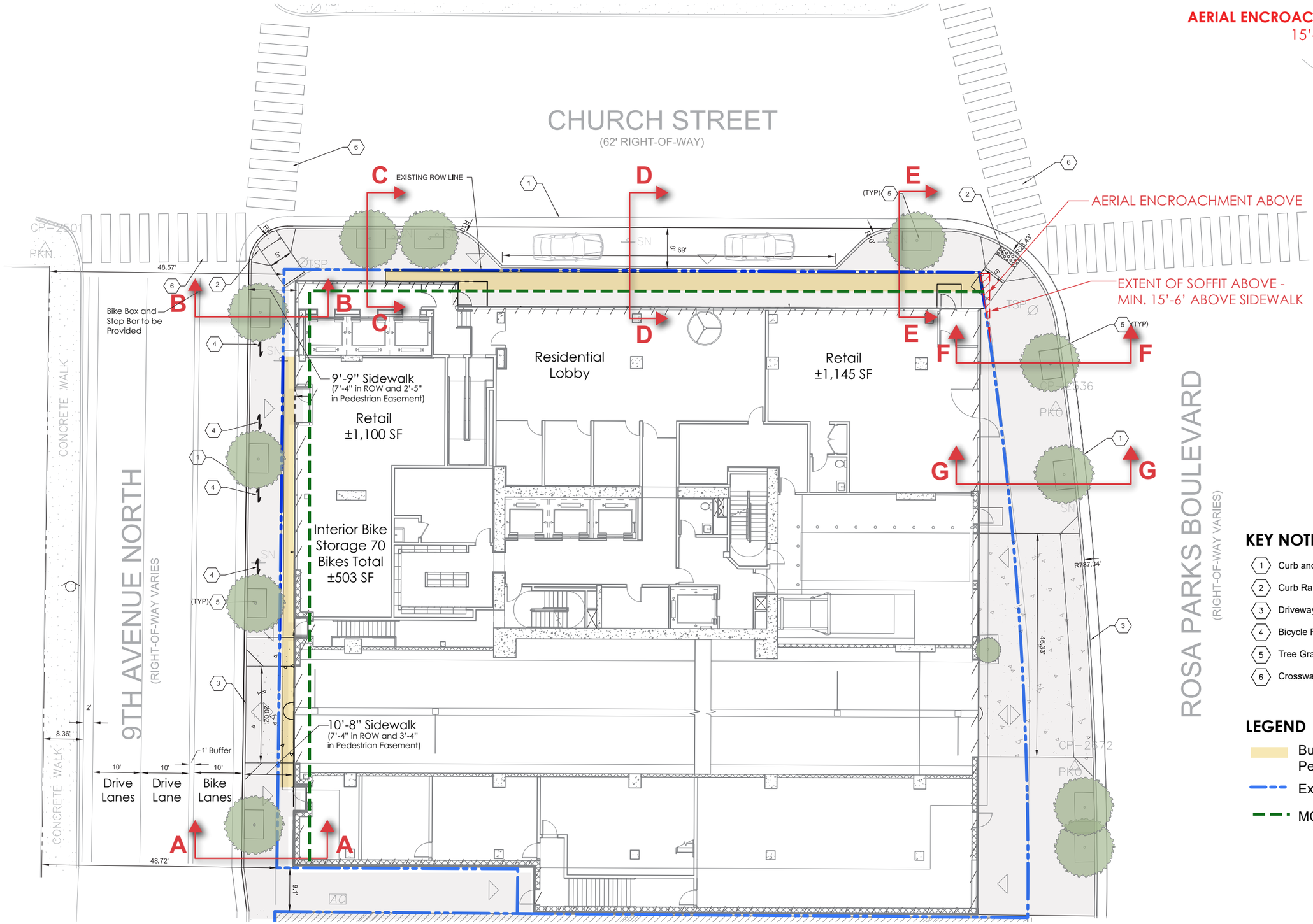


VICINITY PLAN

801 CHURCH STREET / NASHVILLE, TN / GIARRATANA, LLC / 08.05.2020

AERIAL ENCROACHMENT at ROSA L PARKS BLVD
15'-6" FEET ABOVE THE SIDEWALK
12.4 SF



KEY NOTES

1. Curb and Gutter
2. Curb Ramp
3. Driveway Ramp
4. Bicycle Rack
5. Tree Grate
6. Crosswalk

LEGEND

- Building Overhang in Pedestrian Easement
- Existing ROW Line
- MCSP Line

SCALE
0' 10' 20'

SITE PLAN / LANDSCAPING PLAN

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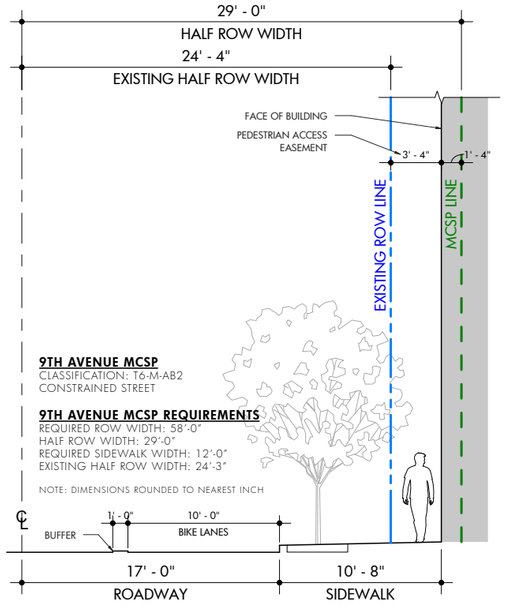
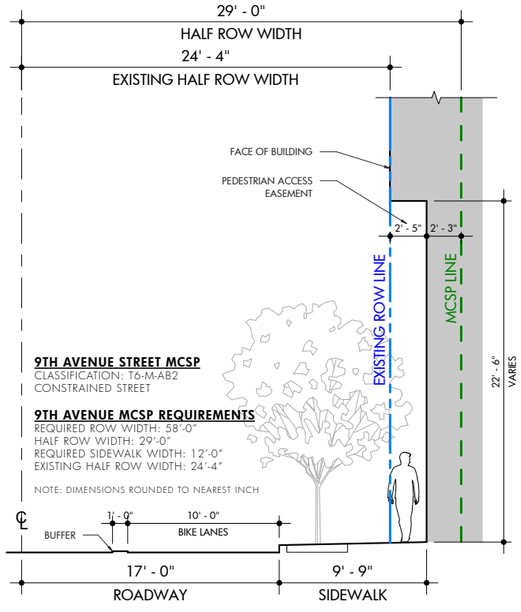
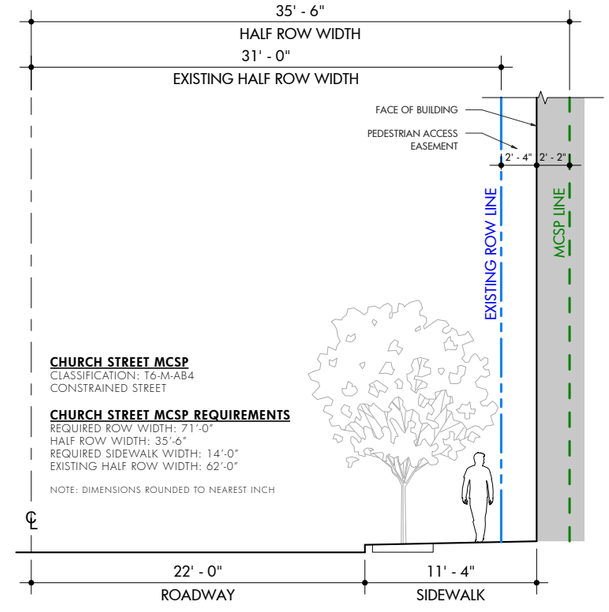


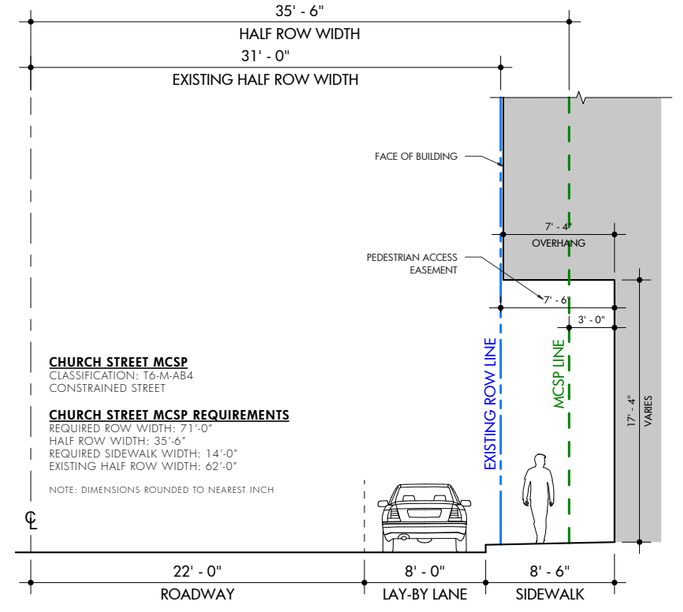
SECTION A
9TH AVENUE



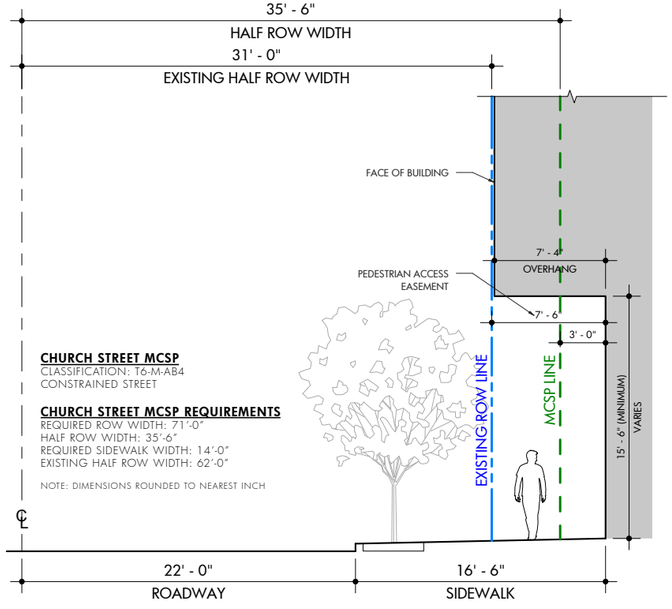
SECTION B
9TH AVENUE



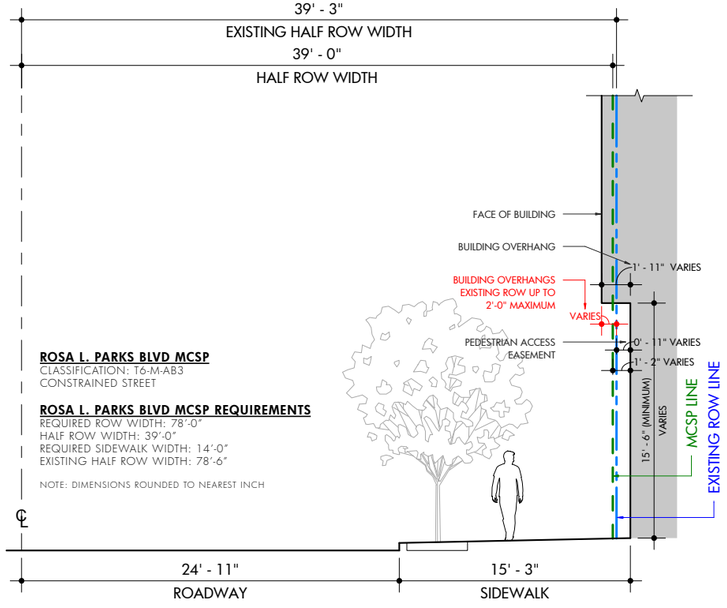
SECTION C
CHURCH STREET



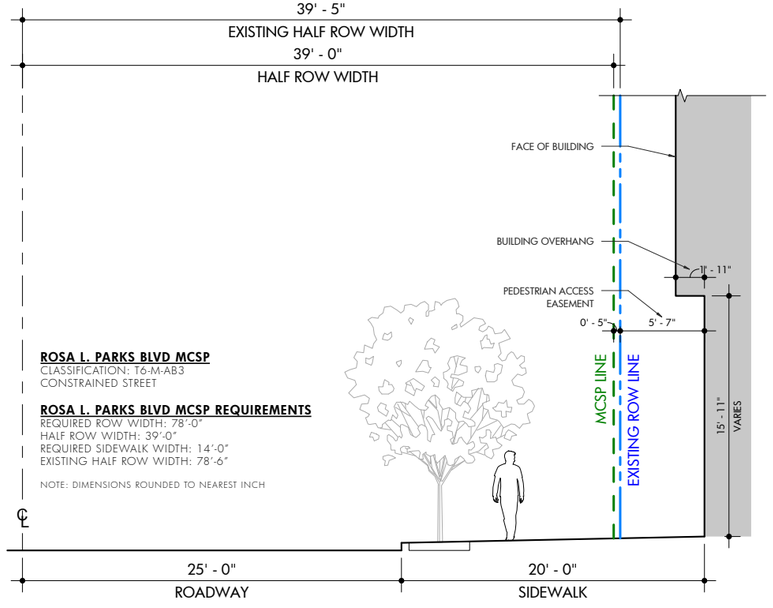
SECTION D
CHURCH STREET



SECTION E
CHURCH STREET



SECTION F
ROSA L. PARKS BOULEVARD



SECTION G
ROSA L. PARKS BOULEVARD

SCALE: N.T.S.

PEDESTRIAN EASEMENT SECTIONS

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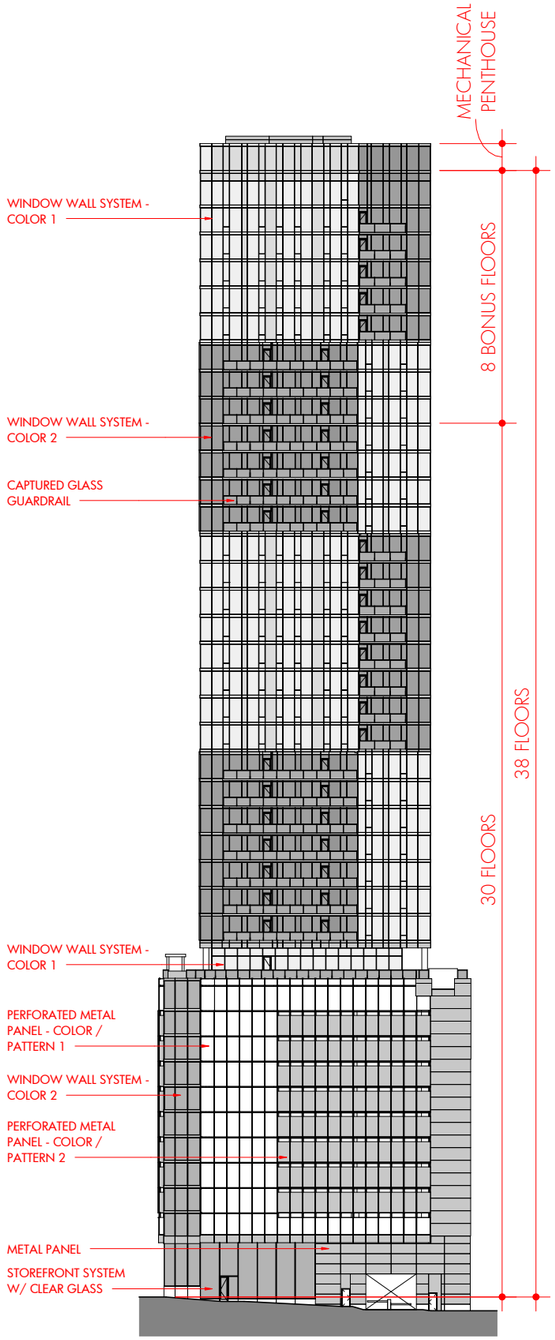
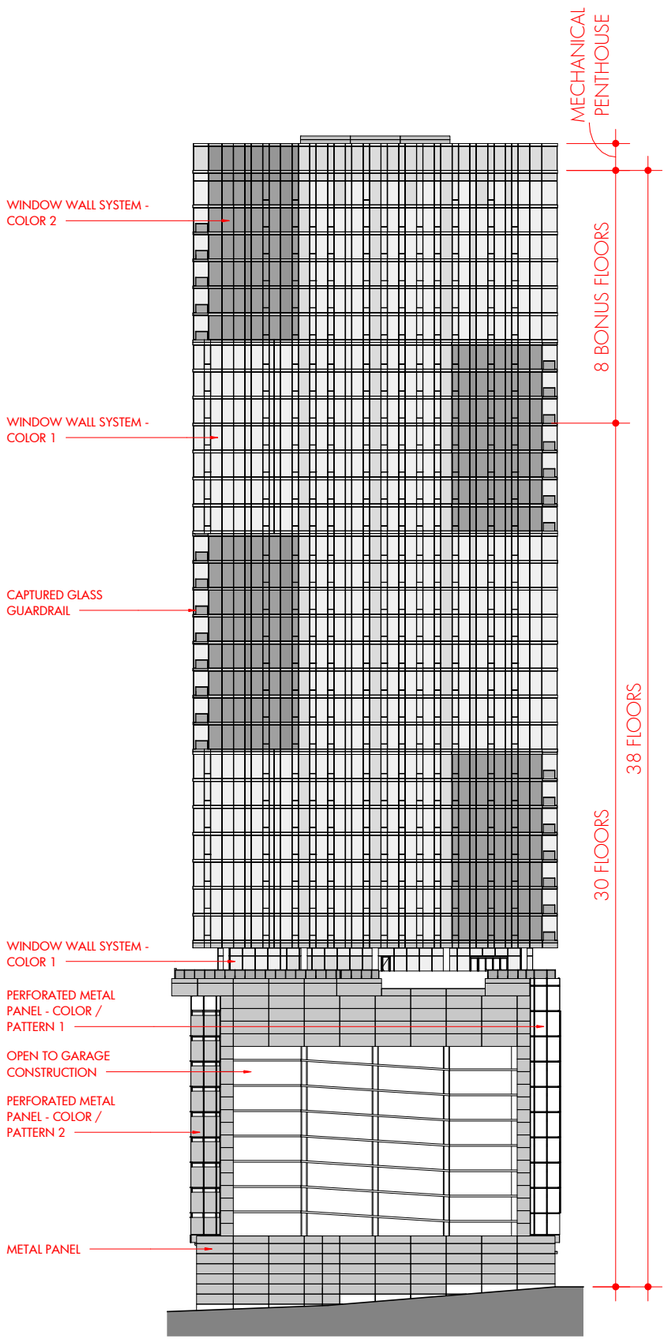
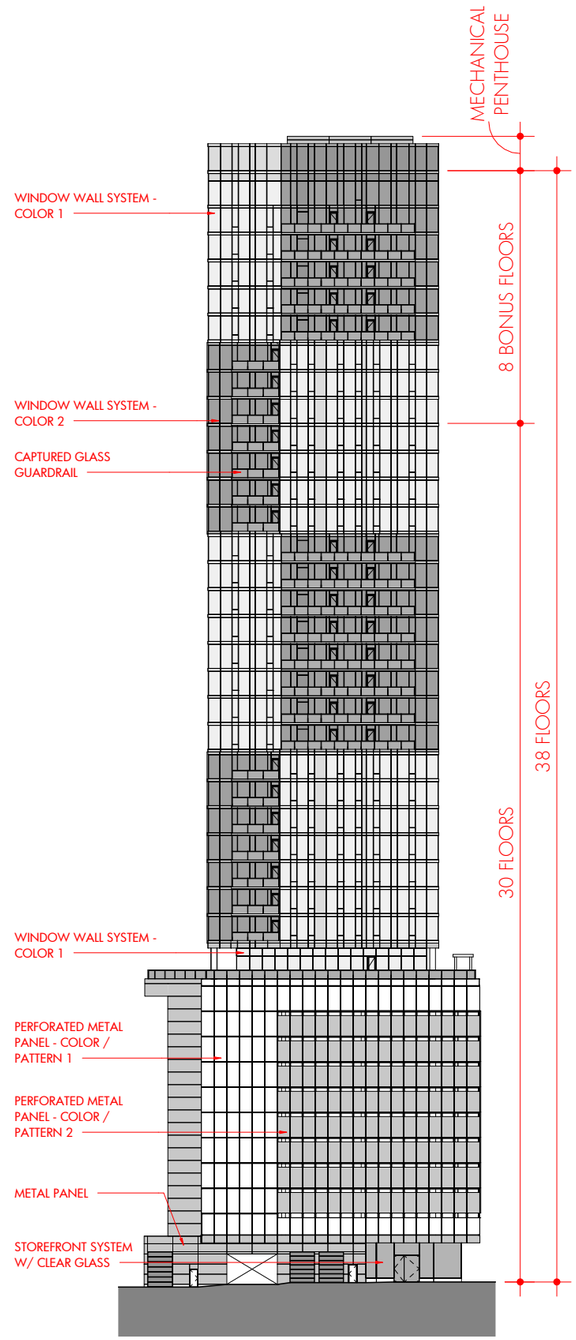


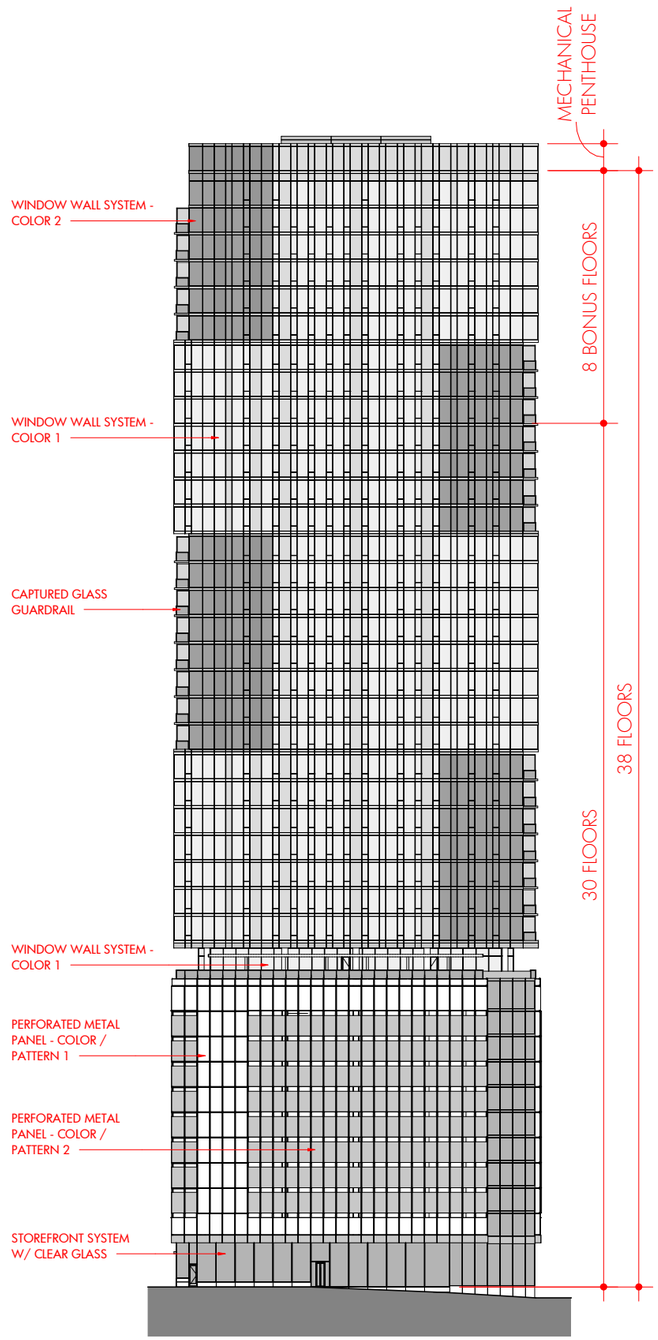
WEST
9TH AVENUE



SOUTH
ADJACENT EXISTING BUILDING



EAST
ROSA L. PARKS BOULEVARD



NORTH
CHURCH STREET

SCALE
0′ 10′ 20′

EXTERIOR ELEVATIONS

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Traffic Impact Study

801 CHURCH STREET

NASHVILLE, TENNESSEE

Prepared for:

801 Church, LLC
424 Church Street, Suite 2900
Nashville, TN 37219

Prepared by:

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Phone: 615.254.1500
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File No. 3683709

Engineer of Record:
Jonathan Smith, PE

July 2020

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EXECUTIVE SUMMARY

This report presents the results of a traffic impact study prepared in support of a proposed multi-family residential and retail development at the southwest corner of Church Street & Rosa L Parks Boulevard in Nashville, Tennessee.

This report assesses projected traffic operations with and without the site in place and uses this comparison to determine whether the proposed development has a detrimental impact on the surrounding roadway network in terms of traffic delay, level of service, or vehicle queuing. **The major finding of this report is that the traffic impacts of the site are minor in context of downtown traffic and will exceed necessary mitigation in promoting multimodal alternatives.**

Proposed Development

The details of the proposed development are shown in Table 1.

Table 1: Proposed Development Program

Development	**801 Church Street**			
Full-Build Year	2023			
Existing Lane Use(s)	Vacant			
Proposed Land Use(s)	350 Residential Units 2645 sf Retail 511 Structured Parking Spaces			
Access Point(s)	***Access #***	***At***	***Control***	***Movement***
	1	Rosa L Parks Blvd	Side Street Stop	Right-In Left-In Right-Out
	2	9th Avenue North	Side Street Stop	Full
Estimated Site Trips	***Weekday***	***AM***	***PM***	
	932	80	92	

Projected Traffic Impacts

Vehicle traffic counts were provided by Metro Public Works covering the AM and PM peak hours of weekday traffic in 2016, which were grown to 2020. These study periods were selected because they represent the times of highest travel demand along the adjacent roadways. Existing roadway conditions and traffic data collection are discussed in Chapter 3, along with a review of the intersection capacity and queuing results for the Existing Conditions analysis.

In order to assess the impacts of the proposed development, this study examined three traffic analysis scenarios:

- **2020 Existing Conditions**, based on current traffic volumes, lane configuration, and traffic control; discussed in Chapter 3
- **2023 Future No-Build Conditions**, which includes 3 years of background growth and any background developments; discussed in Chapter 4
- **2023 Future Full-Build,** which incorporates all projected future traffic passing through the study area, including future no-build growth as well as site-generated traffic; discussed in Chapter 6

These scenarios and their underlying assumptions are discussed in subsequent chapters as noted above. Intersection capacity and queuing analyses were conducted across peak hours and all analysis scenarios using HCM methodology.

Findings and Recommendations

This assessment finds that there are two turning movements that are negatively impacted by the development:

A. Commerce Street & 9th Avenue North, Southbound Through/Right Turn, AM Peak

This turning movement is expected to deteriorate from LOS C to LOS D in the AM peak hour. This development is expected to generate 3 vehicles at this approach in this peak hour, or 1.3% of the overall movement. There are limited options to improve this approach, but the LOS is acceptable for an urban environment.

Church Street & 9th Avenue North, Southbound Through/Left Turn, PM Peak

This turning movement is expected to deteriorate from LOS E to LOS F. This development is expected to generate 4 vehicles at this approach in this peak hour, or 1.2% of the overall movement. It is expected this can be mitigated by the recommendations below.

As a result, the overall finding of this report is that the traffic impacts of the site are minimal and can be addressed by the recommendations below. These conclusions are discussed in more detail in Chapter 8.

The following recommendations are expected to ensure effective and safe traffic operations within the study area:

- Follow multimodal improvements according to the Transportation Management Plan, which may include the following:
    - Decouple parking space from lease agreements
    - Providing residents information on bicycle routes and BCycle memberships
    - Organize bicycle rides with residents

    - Make shared bikes available for checkout in building
    - WeGo bus transit info, transit training, and route updates in resident newsletter
    - Organize walks with residents
    - Shared vehicle fleet for residents
    - Carpool matching service and Vanpool information
    - Off-peak loading / service vehicle schedule
    - Nashville Connecter subscription
    - Install bicycle parking within building and public bicycle parking outside building.
- Install the following bicycle infrastructure improvements, if not included in any other bikeway plans, or work with developer of currently approved plans to adapt them to the following. Any funds previously allocated to new bike lanes on this street in association with other developments in the area to be reallocated to this cycle track.
    - Install bicycle track on the east side of 9th Avenue North extending from Church Street to Commerce Street. Install flexible delineator posts between cycle track and 9th Avenue North as appropriate. Ensure adequate lighting above cycle track.
    - Install bicycle signal and detection on the northbound approach of 9th Avenue North at Church Street in association with proposed cycle track on 9th Avenue North. Stripe bikeway to connect with future Church Street cycle track at the intersection of Church Street and 9th Avenue North. Bicycle signal to coordinate with future bicycle signal phase on the eastbound approach of Church Street.
    - Install bicycle signals and detection on the southbound and westbound approaches of 9th Avenue North and Commerce Street. Stripe cycle track to connect with existing Commerce Street cycle track. Bicycle signals to allow adequate clearance for bicycles to safely traverse intersection.
- Install right turn arrow pavement marking and STOP sign (R1-1) with Right Turn Only sign (R3-5R) sign mounted below facing outbound traffic at the exit of Site Access 2 at Rosa L Parks Boulevard. Channelize exiting lane for right turns only as permitted by street geometry.
- Install STOP sign (R1-1) facing outbound traffic at the exit of Site Access 1 at 9th Avenue North.
- Install parking garage gates for both garage entrances, located a minimum of 40 feet from right of way
- Provide residents with wireless parking garage keys to open gates upon garage entry, to prevent queuing that might result from card/code/fob-based garage entry.
- Install layby lane on Church Street with signage to restrict parking to pickup/drop off only.
- Retime intersection of Church Street and 9th Avenue North if requested by Metro Nashville after development opens, if not already retimed in conjunction with the Church Street bikeway installation.

The Transportation Management Plan is included in Appendix F.

1. INTRODUCTION

This chapter provides a description of the proposed project, the surrounding regional context, and discusses the analysis process that will be used to determine what impacts, if any, the proposed project will have on the surrounding roadway network.

Proposed Development Program

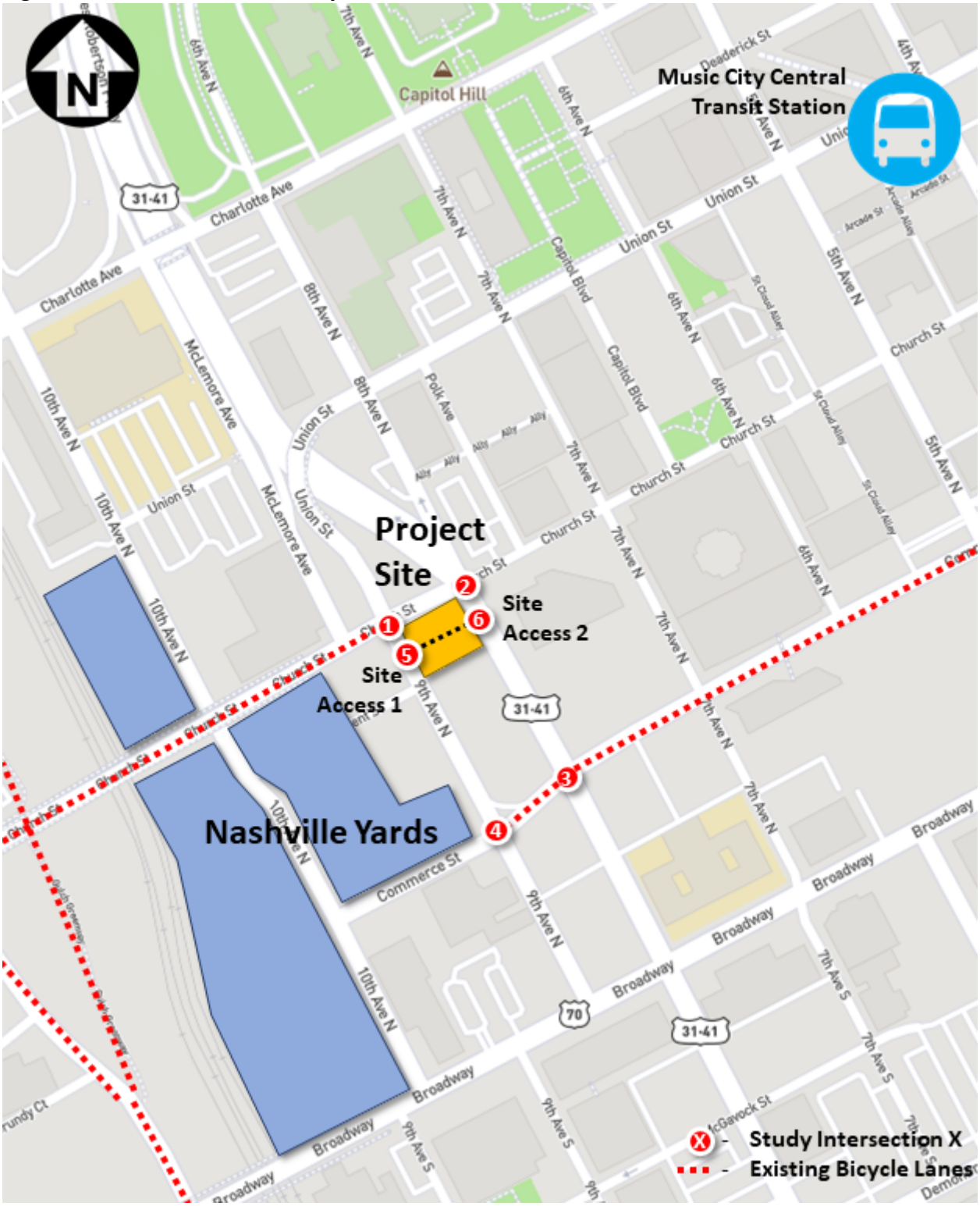
Location and details of the proposed development program are shown in Table 2.

Table 2: Proposed Development Program

Development	**801 Church Street**			
City, State	Nashville, TN			
Location	Church Street & Rosa L Parks Blvd, Southwest Corner			
Full-Build Year	2023			
Existing Lane Use(s)	Vacant			
Proposed Land Use(s)	350 Residential Units 2645 sf Retail 511 Structured Parking Spaces			
Access Point(s)	***Access #***	***At***	***Control***	***Movement***
	1	Rosa L Parks Blvd	Side Street Stop	Right-In Left-In Right-Out
	2	9th Avenue North	Side Street Stop	Full
Estimated Vehicle Trips	***Weekday***	***AM***	***PM***	
	932	80	92	

A map showing the location of the site is included as Figure 1. More information about the site, including the internal configuration and access, is included in Chapter 5.

Figure 1. Site Location and Study Area Intersections



Background Imagery: Openstreetmaps

Regional Context

The site is located along the Church Street and Rosa L Parks Boulevard corridors, north of Broadway in downtown Nashville, Tennessee. Church Street is a major entrance to downtown from the interstate to the west, for both vehicles and bicycles. Rosa L Parks Boulevard is a major north/south corridor, also providing an entrance into downtown from the north. The development site will be configured to face Church Street and the site's primary access points will be on Rosa L Parks Boulevard and 9th Avenue North. A detailed discussion of the existing roadway network serving the site is provided in Chapter 2.

Planned Transportation Improvement Projects

There are no planned changes to the vehicle network of public roadways serving the study area, with the exception of any changes associated with the Nashville Yards development. It is expected that development will reopen Commerce Street west of 9th Avenue and install an at-grade intersection on Church Street at 10th Avenue. Bicycle lanes were recently opened on Commerce Street, which included a change in laneage on Commerce Street.

Significant bike facilities are expected to be added in association with Nashville Yards, including bike lanes on 9th Avenue North (to be addressed later in the study) and a reconfigured bikeway on Church Street. A separated bikeway is planned for Rosa L Parks Boulevard by Metro Public Works.

Nearby Background Development Projects

This development is adjacent to the major Nashville Yards development directly across 9th Avenue North to the west, which is bounded by a property line north of Church Street, 9th Avenue North to the east, Broadway to the south, and a CSX rail line to the west.

There are two other nearby developments. The 127 Rosa L Parks Boulevard development is located on the south side of Commerce Street between 9th Avenue and Rosa L Parks Boulevard. Additionally, Church Street at 11th Avenue North is located on the south side of Church Street on the east side of 11th Avenue South.

Analysis Goals and Approach

The purpose of this report is to determine what impacts, if any, the proposed project will have on traffic operations and roadway infrastructure in the vicinity of the project site.

This determination is conducted through a series of traffic impact analyses which will compare calculated traffic performance metrics between Future No-Build and Future Full-Build conditions with the development. Comparing these two scenarios allows for the impacts of the development to be identified independent of other traffic growth occurring around the study area or in the broader region.

Analysis Methodology

The impact of the site on traffic volumes throughout the study area is determined by calculating the number of new vehicle trips generated by the proposed development site using the *Trip Generation Manual*, 10th edition, published by the Institute of Transportation Engineers (ITE). This industry-standard reference provides a detailed catalog of trip generation rates for various land uses, collected at numerous sites across the country over the course of many decades.

These site-generated traffic volumes are then used in conjunction with traffic counts conducted within the study area to determine the projected volumes under existing, future no-build, and future full-build conditions. A series of traffic models are then built based on these volumes, along with the known roadway laneage and traffic control within the study area, in order to calculate expected intersection capacity and queuing performance metrics. These performance metrics are calculated using industry-standard methodology developed by the Transportation Research Board of the National Academies of Sciences and published in the HCM (Highway Capacity Manual). The analyses that follow are conducted using the HCM 6th Edition and 2000 methodology, as implemented in Synchro version 11.

Determination of Impacts and Mitigations

If this assessment finds any site-specific impacts that require mitigation, this report will identify potential mitigation strategies that could bring the affected intersection or approach back into compliance with City standards. Possible mitigation strategies include but are not limited to:

- Modifications to traffic control;
- Alterations to traffic signal timings and/or phasing;
- Modifications to intersection geometry or site access configuration, including the addition of through lanes or auxiliary turn lanes; and/or
- Expansion of available queueing space.

Any mitigation strategies will be assessed to determine their feasibility and suitability for both the study area and the specific impact identified by the traffic analyses. Any strategies that pass this assessment will be highlighted as recommended mitigation strategies.

2. STUDY AREA EVALUATION

This chapter provides an overview of the major analysis assumptions for the study area and analysis scenarios.

Study Area

The study area for this assessment was determined during scoping with Nashville Metro. The study area for this analysis will include the following intersections:

1. Church Street & 9th Avenue North
2. Church Street & Rosa L Parks Boulevard/8th Avenue North
3. Rosa L Parks Boulevard & Commerce Street
4. 9th Avenue North & Commerce Street
5. 9th Avenue North & Site Access 1 *(future intersection)*
6. Rosa L Parks Boulevard & Site Access 2 *(future intersection)*

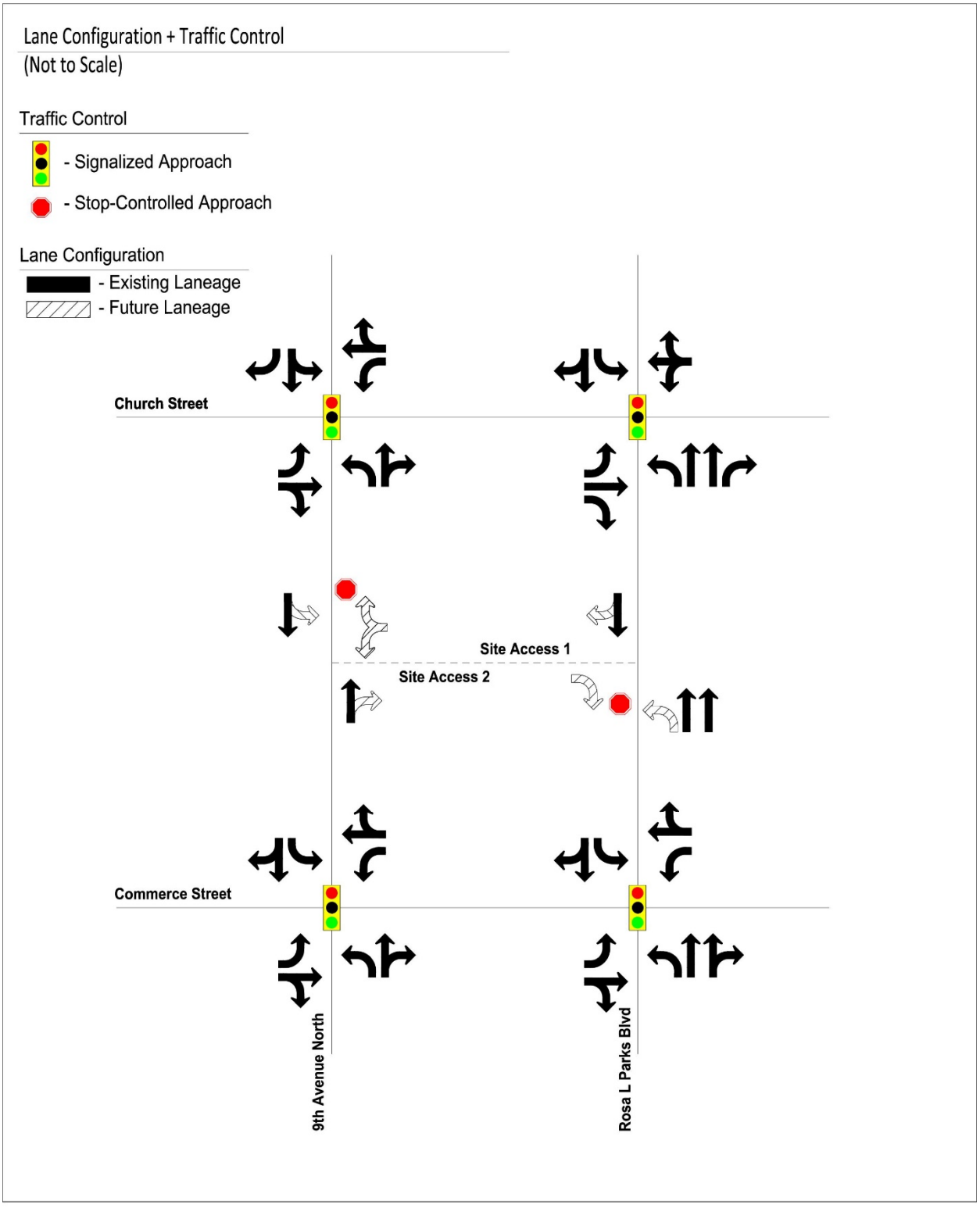
The study area intersections, as well as the location of the proposed development, are shown in Figure 1 in Chapter 1. An annotated site plan showing the planned site layout, internal circulation, and site access points is included as Figure 5 in Chapter 5.

Existing Intersection Geometry and Traffic Control

An inventory of roadway geometry within the study area was conducted in order to determine the laneage and traffic control present at the study area intersections. Figure 2 shows a summary of the existing conditions present within the study area, including the proposed configuration of the development site's access points. This roadway configuration is used as the basis for the intersection analyses that will be conducted in the following chapters.

Signal timing and phasing plans for the signalized intersections within the study area were provided by Metro Public Works.

Figure 2. Existing Lane Configuration and Traffic Control



Roadway Configuration

Descriptions of the roadways within the study area are as follows:

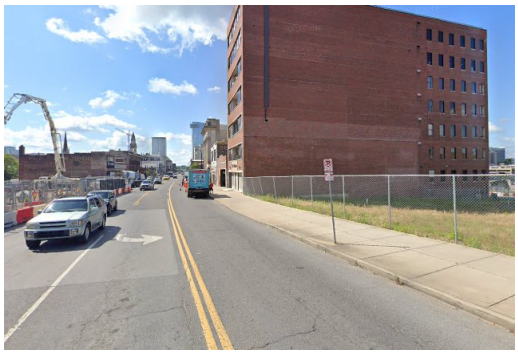
Church Street	
Direction	Two-Way East-West
Lane(s) Each Direction	One (1)
Median	Two-Way Left-Turn Lane *west of Rosa L Parks Blvd*
Classification	Arterial-Boulevard (T6-M-AB2/4)
Posted Speed Limit	30 MPH
Connects ***East***	Downtown
Connects ***West***	I-40/65
Local Transit Stops	None
Bike Facilities	Bike lanes with buffer *from west to 9th Avenue*
On-Street Parking	None
Pedestrian Service	Sidewalk on both sides

Church Street, looking west from Rosa L Parks Blvd
(development site to left)

Commerce Street	
Direction	Two-Way East-West
Lane(s) Each Direction	One (1)
Median	Two-Way Left-Turn Lane
Classification	Arterial-Boulevard (T6-M-AB5) *east of 9th Ave N* Downtown Local Street *west of 9th Ave N*
Posted Speed Limit	30 MPH
Connects ***East***	Downtown
Connects ***West***	10th Avenue North/Nashville Yards
Local Transit Stops	None
Bike Facilities	Buffered Bikeway on north side
On-Street Parking	None
Pedestrian Service	Sidewalk on both sides
Notes	Westbound currently closed west of 9th Avenue North for Nashville Yards construction

Commerce Street, looking west from Rosa L Parks Blvd
(development site to north)

Rosa L Parks Boulevard/8th Avenue North		
Direction	Two-Way North-South	
Lane(s) Each Direction	Two (2)	
Median	Two-Way Left-Turn Lane *South of Church Street*	
Classification	Arterial-Boulevard (T6-M-AB3/4)	
Posted Speed Limit	30 MPH	
Connects	***North*** Charlotte Avenue, James Robertson Pkwy ***South*** Broadway, 8th Avenue South	
Local Transit Stops	MTA #3 West End/White Bridge MTA #5 West End/Bellevue MTA #7 Hillsboro MTA #8 8th Avenue South MTA #96 Nashville/Murfreesboro	
Bike Facilities	None Major Separated Bikeway Planned	
On-Street Parking	Some metered parking on west side south of Church Street	
Pedestrian Service	Sidewalk on both sides south of Church Street	
Notes	Diverges between Rosa L Parks Boulevard (grade-separated arterial) and Rosa L Parks Avenue north of Church Street Becomes 8th Avenue south of Broadway	



Rosa L Parks Boulevard, looking south from Church Street
(development site to right)

9th Avenue North		
Direction	Two-Way North-South	
Lane(s) Each Direction	One (1)	
Median	None	
Classification	Arterial-Boulevard (T6-M-AB2/3)	
Posted Speed Limit	30 MPH	
Connects	***North*** Union Street ***South*** Broadway	
Transit	None	
Bike Facilities	None	
On-Street Parking	None	
Pedestrian Service	Sidewalk on both sides	
Notes	Overpass reorients 9th Ave N to the east-west Union Street north of Church Street	

9th Avenue N, looking south from Church St
(development site to left)

Traffic Control

Descriptions of the intersections within the study area are as follows:

Church Street & 9th Avenue North								
				Speed	Pedestrian Service			
Street	**Approach**	**Laneage [storage]**	**Traffic Control**	**Limit**	**Leg**	**Ramp**	**Crosswalk**	**Signal**
9th Avenue North	*Northbound*	1 x LT [440 ft] 1 x Thru/RT	Signal Permissive	30 mph	*South*	✓	✓	✓
9th Avenue North	*Southbound*	1 x LT/Thru 1 x RT	Signal Permissive	30 mph	*North*	✓	✓	✓
Church Street	*Eastbound*	1 x LT [60 ft to TWLTL] 1 x Thru/RT	Signal Permissive	30 mph	*West*	✓	✓	✓
Church Street	*Westbound*	1 x LT [145 ft to TWLTL] 1 x Thru with Channelized RT	Signal Permissive	30 mph	*East*	✓	✓	✓
Notes	Bicycle box on eastbound approach No pushbuttons							
RT: Right-Turn Lane	*LT: Left-Turn Lane*	*Thru: Through Lane*		*TWLTL: Two-Way Left-Turn Lane*				

Church Street & Rosa L Parks Boulevard								
				Speed	Pedestrian Service			
Street	**Approach**	**Laneage [storage]**	**Traffic Control**	**Limit**	**Leg**	**Ramp**	**Crosswalk**	**Signal**
Rosa L Parks Boulevard	*Northbound*	1 x LT [55 ft to TWTL] 1 x Thru [35 ft] 1 x Thru 1 x RT	Signal Protected-permissive	30 mph	*South*	✓	✓	✓
Rosa L Parks Boulevard	*Southbound*	1 x LT/Thru 1 x RT	Signal Protected-permissive	30 mph	*North*	✓	✓	✓
Church Street	*Eastbound*	1 x LT [20 ft to TWLTL] 1 x Thru 1 x RT	Signal Permissive	30 mph	*West*	✓	✓	✓
Church Street	*Westbound*	1 x LT/Thru/RT	Signal Protected-permissive	30 mph	*East*	✓	✓	✓
Notes	Receiving lanes on north leg diverge between Rosa L Parks Boulevard and Rosa L Parks Avenue Pushbuttons on all legs							
RT: Right-Turn Lane	*LT: Left-Turn Lane*	*Thru: Through Lane*		*TWLTL: Two-Way Left-Turn Lane*				

Rosa L Parks Boulevard and Commerce Street								
				Speed	Pedestrian Service			
Street	**Approach**	**Laneage [storage]**	**Traffic Control**	**Limit**	**Leg**	**Ramp**	**Crosswalk**	**Signal**
9th Avenue North	*Northbound*	1 x LT [90 ft to TWLTL] 1 x Thru 1 x Thru/RT	Signal Permissive	30 mph	*South*	✓	✓	✓
9th Avenue North	*Southbound*	1 x LT [100 ft] 1 x Thru/RT	Signal Protected-permissive	30 mph	*North*	✓	✓	✓
Church Street	*Eastbound*	1 x LT [45 ft] 1 x Thru 1 x Thru/RT	Signal Permissive	30 mph	*West*	✓	✓	✓
Church Street	*Westbound*	1 x LT [95 ft to TWLTL] 1 x Thru 1 x Thru/RT	Signal Protected-permissive	30 mph	*East*	✓	✓	✓
Notes								
RT: Right-Turn Lane		*LT: Left-Turn Lane*	*Thru: Through Lane*		*TWLTL: Two-Way Left-Turn Lane*			

9th Avenue North & Commerce Street								
				Speed	Pedestrian Service			
Street	**Approach**	**Laneage [storage]**	**Traffic Control**	**Limit**	**Leg**	**Ramp**	**Crosswalk**	**Signal**
9th Avenue North	*Northbound*	1 x LT [55 ft] 1 x Thru/RT	Signal Protected-permissive	30 mph	*South*	✓	✓	✓
9th Avenue North	*Southbound*	1 x LT [30 ft] 1 x Thru/RT	Signal Protected-permissive	30 mph	*North*	✓	✓	✓
Commerce Street	*Eastbound*	1 x LT [70 ft to TWLTL] 1 x Thru/RT	Signal Protected-permissive	30 mph	*West*	✓	✓	✓
Commerce Street	*Westbound*	1 x LT [30 ft] 1 x Thru 1 x RT	Signal Protected-permissive	30 mph	*East*	✓	✓	✓
Notes	West leg currently under construction for Nashville Yards							
RT: Right-Turn Lane		*LT: Left-Turn Lane*	*Thru: Through Lane*		*TWLTL: Two-Way Left-Turn Lane*			

Lane configuration and traffic control within the study area are shown in Figure 2.

Study Area Traffic Characteristics

Peak Hours	8:00 – 9:00 AM 4:00– 5:00 PM
TDOT Count Stations	0000163 – Rosa L Parks Blvd south of Church Street 0000174 – Church Street on Bridge 0000409 – Church Street east of Rosa L Parks Blvd 0000419 – 9th Avenue south of Commerce St 0000490 – Commerce Street east of Rosa L Parks Blvd
Observed Traffic Growth 2009 - 2018 (local) 2016 - 2019	 2.65% 7.40%
Report Year	2020
Full-Build Year	2023

An understanding of travel patterns and traffic growth is an important element of this traffic assessment. These items will be discussed in more detail later in this report, but this section provides a contextual overview. Commerce Street provides important service within downtown, terminating at the future Nashville Yards development to the west. 9th Avenue provides local access from major streets like Church Street and Broadway and reorients to east-west Union Street. Church Street is one of the primary accesses between downtown and the interstate. Rosa L Parks Boulevard provides access among downtown, the Germantown area to the north, and the James Robertson Parkway bridge across the Cumberland River downtown to East Nashville.

Existing Multimodal Facilities

As expected downtown, all streets within the study area have full sidewalk facilities, with the exception of Rosa L Parks Boulevard north of Church Street, which is grade-separated. Also, complete pedestrian crossing facilities are provided at all study intersections.

Downtown also includes substantial bicycle facilities, with major bike lanes on Church Street, Commerce Street, the Gulch, Charlotte Avenue, and Division Street. There is a bicycle box located on the eastbound approach of Church Street to allow bikers safe movement from the Church Street bike lanes to unprotected facilities. There is a B-Cycle bike sharing station on the north west corner of the intersection of Church Street and 9th Avenue, which includes hourly, daily, weekly, monthly, and yearly memberships.

There are several transit stops within the area. Foremost, the project is located approximately a half mile from the Music City Central bus station, which is the downtown hub for all Nashville MTA WeGo bus transit routes. Additionally, there are several major stops within walking distance of the proposed development. A full summary of local transit service is provided in Table 3.

Table 3: Local Transit Service

Route	Stop Location(s)	Route Description
Music City Central	0.5 miles to northeast	Most WeGo bus routes
#3 – West End / White Bridge	850 ft south on Rosa L Parks Boulevard 650 ft south on Rosa L Parks Boulevard	Downtown to White Bridge/Charlotte via West End and White Bridge
#5 – West End / Bellevue	850 ft south on Rosa L Parks Boulevard 650 ft south on Rosa L Parks Boulevard	Downtown to Bellevue via West End/Harding
# 7 – Hillsboro	850 ft south on Rosa L Parks Boulevard 650 ft south on Rosa L Parks Boulevard	Downtown to Green Hills via Broadway/21st/Hillsboro
#8 – 8th Avenue South	850 ft south on Rosa L Parks Boulevard 650 ft south on Rosa L Parks Boulevard 952 ft south on Rosa L Parks Boulevard	Downtown to 100 Oaks via 8th Avenue/Thompson Lane
#17 – 12th Avenue South	1500 ft north on Charlotte Avenue	Downtown to Lipscomb University via 11th Ave N/12th Ave S
#18 – Airport*	952 ft south on Rosa L Parks Boulevard	Downtown to BNA Airport via Interstate 40 and Elm Hill
#50 – Charlotte Pike	1500 ft north on Charlotte Avenue	Downtown to Hillwood Walmart via Charlotte Pike
#87 – Gallatin*	1200 ft south on Broadway	Commuter route from Downtown to Gallatin TN via Wedgewood, Ellington Parkway, I-65, and Vietnam Veterans Parkway
#89 – Springfield/Joelton*	1200 ft south on Broadway	Commuter route from Downtown to Joelton TN via Wedgewood/I-24
#92 – Hendersonville*	1200 ft south on Broadway	Commuter route from Downtown to Hendersonville via Wedgewood, Ellington Parkway, I-65, and Vietnam Veterans Parkway
#93 – Star West End Shuttle	1200 ft south on Broadway	Music City Star rail station to West End, 21st, Wedgewood, Demonbreun, Edgehill, 8th Ave, Korean veterans
#96 – Nashville Murfreesboro*	850 ft south on Rosa L Parks Boulevard	Commuter route from Downtown to Smyrna, Murfreesboro, and MTSU via I-24/Murfreesboro Pike

**Indicates route currently suspended due to COVID-19. Route descriptions are pre-COVID modifications*

Future Multimodal Facilities

Due to the project site's proximity to several major downtown developments, there are many new facilities to be constructed near the study area in association with the Nashville Yards project. The bike lanes on Church Street are proposed to be relocated to as cycle track the north side of Church Street. These bike lanes will still terminate on 9th Avenue North. Additionally, bike lanes are expected to be installed on 9th Avenue North (to be addressed later in the study). A separated bikeway is planned for Rosa L Parks Boulevard.

3. EXISTING TRAFFIC CONDITIONS

This chapter provides a review of existing traffic conditions within the study area, building upon the discussion of the existing study area contained in Chapter 2. This includes the results of collected data quantifying existing traffic volumes. This data is then incorporated into a traffic model in order to calculate expected intersection delay and queuing as part of the existing conditions capacity analysis.

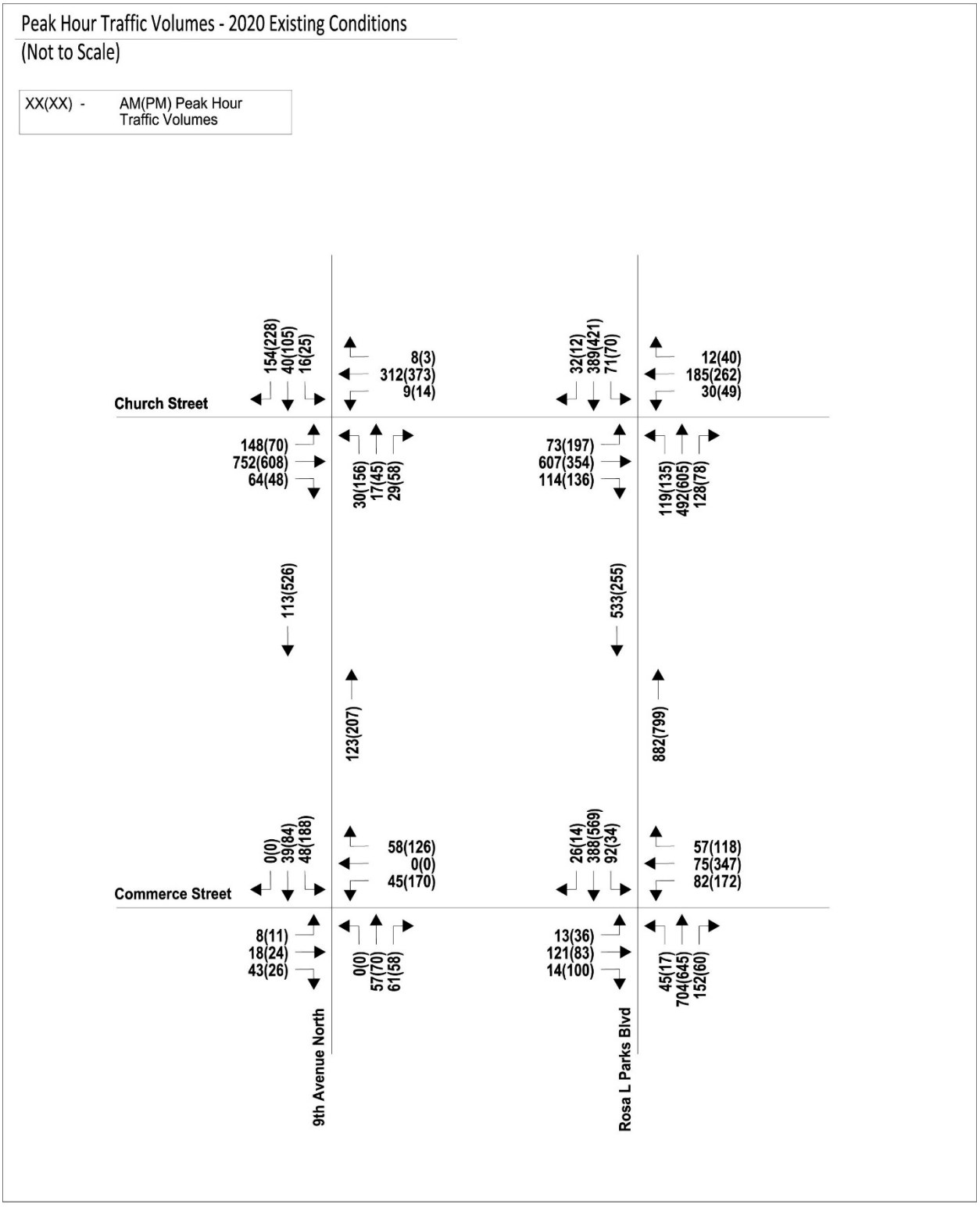
Existing Traffic Volumes

Traffic data was received from Metro for the four existing study area intersections conducted on June 6, 2016. Vehicle turning movement and classification counts were conducted during a morning rush period from 8:00 - 9:00 AM and an evening rush from 4:00 - 5:00 PM. New counts could not be collected due to the effects of the COVID-19 pandemic quarantine. However, counts were available at the two study intersections on Commerce Street from September 24, 2019. Therefore, according to Metro recommendations, a growth rate was calculated between the years of 2016 and 2019, found to be 7.40%. This growth rate was applied to 2016 volumes linearly for 4 years to estimate the existing 2020 traffic volumes. Additionally, volumes entering the west leg of Commerce Street at 9th Avenue North were altered to zero since the street is currently closed, and 2019 volumes were substituted for exiting vehicles at that approach. A figure of the estimated 2020 data is included in Figure 3.

Raw data from the counts are included as Appendix C.

All study intersections will be analyzed during the peak hour of each individual intersection within the AM and PM peak periods. For this reason, the traffic volumes presented in Figure 3 do not balance between adjacent intersections.

Figure 3. Peak Hour Traffic Volumes: 2020 Existing Conditions



Intersection Capacity Analysis

The study intersections were analyzed to determine how they operate in existing conditions. Traffic studies typically assess automobile traffic service quality in terms of capacity impact, which can be calculated qualitatively using industry-standard methodologies and models. This section discusses the performance metrics used in this report before presenting the results of the existing conditions capacity analysis.

Traffic Impact Thresholds

Delay and LOS (Level of Service)

The primary service quality measure used in traffic analysis is the average delay, in seconds, experienced by a vehicle at a given intersection. For two-way stop-controlled intersections, delays can be calculated for all minor street lane groups as well as non-free-flow movements on the major street which may experience delay, such as left-turning movements. At all other intersection types, delay can be calculated for all lane groups as well as for the overall intersection.

Delay can further be summarized in terms of LOS, a letter grade based on the calculated delay that ranges from A, being the best, to F, being the worst. The relationship between control delay and LOS for signalized and unsignalized intersections is summarized in Table 4.

Table 4. Level of Service Criteria

Level of Service	Description	Average Control Delay (seconds per vehicle)	
		Signalized Intersections	Unsignalized Intersections
A	*Free flow*	≤ 10	≤ 10
B	*Stable flow, slight delay*	> 10 - 20	> 10 - 15
C	*Stable flow, acceptable delay*	> 20 - 35	> 15 - 25
D	*Near-unstable flow, tolerable delay*	> 35 - 55	> 25 - 35
E	*Unstable flow, intolerable delay*	> 55 - 80	> 35 - 50
F	*Forced flow, failure*	> 80	> 50

Source: Highway Capacity Manual (HCM 6th Edition, 2000), Exhibits 18-4 and 19-1

Queue Length

Vehicle queues are not a direct intersection capacity measure themselves but rather give an indication of when capacity issues may exist. Queues are typically expressed in terms of the 95th percentile queue length, which represents a worst-case situation that is expected to be exceeded no more than 5% of the time during the analysis period.

Traffic Analysis Methodology

As discussed in Chapter 1, the performance measures noted above are calculated using industry-standard methodology developed by the Transportation Research Board of the National Academies of Sciences and published in the HCM (Highway Capacity Manual). The analyses that follow are conducted using the HCM 6th Edition methodology, as implemented in Synchro version 11. Due to the configuration of Rosa L Parks Boulevard and Church Street, that intersection must be analyzed according to HCM 2000 methodology.

Traffic analysis models were built in Synchro based on the lane use and traffic controls outlined in Figure 2 in conjunction with the existing peak hour traffic volumes presented in Figure 3. The results of these analyses are summarized in the following sections, with detailed traffic analysis worksheets included in Appendix E.

Intersection Capacity Analysis Results

Table 5 summarizes the delay, LOS, and queue results of the traffic analyses in the existing scenario. As shown in Table 5, some approaches encounter significant delay and queue issues, particularly in the PM peak hour.

Full capacity analysis reports are included in Appendix E.

Table 5. Intersection Capacity and Queueing Results: Existing Conditions

Average Delay (in seconds), Level of Service (letter grade, A-F), and 95th Percentile Queue Length (# of vehicles)

			AM Peak Hour			*PM Peak Hour*		
			Existing			**Existing**		
Intersection	**Control**	**Approach**	Delay	LOS	Queue	Delay	LOS	Queue
1. Church Street & 9th Avenue	**Signal**	**Overall**	**14.9**	**B**	**--**	**26.9**	**C**	**--**
		Eastbound	8.8	A	--	12.7	B	--
		EB Left	*4.3*	*A*	*1.9*	*7.1*	*A*	*1.4*
		EB Thru/Right	*9.7*	*A*	*15.1*	*13.3*	*B*	*16.5*
		Westbound	0.6	A	--	0.6	A	--
		WB Left	*5.5*	*A*	*0.2*	*5.3*	*A*	*0.2*
		WB Thru/Right	*0.4*	*A*	*0.3*	*0.5*	*A*	*0.3*
		Northbound	48.0	D	--	70.6	**E**	**--**
		NB Left	*50.1*	*D*	*1.7*	*89.0*	***F***	***11.8***
		NB Thru/Right	*46.7*	*D*	*2.4*	*42.5*	*D*	*5.5*
		Southbound	53.2	D	--	52.7	D	--
		SB Thru/Left	*46.8*	*D*	*2.9*	*43.0*	*D*	*7.0*
		SB Right	*55.5*	***E***	***8.9***	*58.2*	***E***	***13.3***
2. Church Street & Rosa L Parks Blvd	**Signal**	**Overall**	**40.3**	**D**	**--**	**76.2**	**E**	**--**
		Eastbound	48.7	D	--	107.9	**F**	**--**
		EB Left/Thru	*51.5*	*D*	*32.3*	*125.2*	***F***	***34.5***
		EB Right	*32.1*	*C*	*1.9*	*37.9*	*D*	*3.0*
		Westbound	21.8	C	--	41.9	D	--
		WB Shared	*21.8*	*C*	*8.2*	*41.9*	*D*	*19.9*
		Northbound	22.1	C	--	77.0	**E**	**--**
		NB Left	*38.3*	*D*	***4.7***	*46.0*	*D*	***6.4***
		NB Shared	*20.3*	*C*	*5.1*	*51.2*	*D*	*13.7*
		NB Right	*14.1*	*B*	*0.1*	*300.0+*	***F***	***2.2***
		Southbound	62.7	**E**	**--**	55.4	**E**	**--**
		SB Left	*27.6*	*C*	*2.8*	*28.2*	*C*	*2.5*
		SB Thru/Right	*68.5*	***E***	***22.7***	*59.8*	***E***	***22.3***
3. Commerce St & Rosa L Parks Blvd	**Signal**	**Overall**	**19.9**	**B**	**--**	**32.9**	**C**	**--**
		Eastbound	56.8	**E**	**--**	59.1	**E**	**--**
		EB Left	*52.9*	*D*	*0.7*	*67.7*	***E***	***1.9***
		EB Thru/Right	*57.2*	***E***	***5.8***	*57.5*	***E***	***8.1***
		Westbound	42.3	D	--	48.6	D	--
		WB Left	*44.5*	*D*	***4.2***	*40.0*	*D*	***8.6***
		WB Thru/Right	*41.0*	*D*	*6.7*	*51.8*	*D*	*23.6*
		Northbound	14.6	B	--	21.9	C	--
		NB Left	*11.5*	*B*	*1.1*	*28.1*	*C*	*0.7*
		NB Thru	*14.8*	*B*	*11.6*	*21.7*	*C*	*12.1*
		NB Right	*14.8*	*B*	*11.5*	*21.7*	*C*	*12.3*
		Southbound	9.1	A	--	20.1	C	--
		SB Left	*9.9*	*A*	*1.7*	*15.5*	*B*	*0.9*
		SB Thru/Right	*8.9*	*A*	*8.5*	*20.3*	*C*	*18.6*
4. Commerce St & 9th Avenue	**Signal**	**Overall**	**45.7**	**D**	**--**	**68.6**	**E**	**--**
		Eastbound	--	--	--	--	--	--
		EB Left			*--*	*--*	*--*	*--*
		EB Thru/Right	*7.7*	*A*	*1.2*	*13.9*	*B*	*1.4*
		Westbound	25.9	C	--	17.7	B	--
		WB Left	*59.2*	***E***	***2.8***	*60.9*	***E***	***8.7***
		WB Thru/Right	*0.0*	*A*	*0.0*	*0.0*	*A*	*0.0*
		Northbound	44.6	D	--	65.9	**E**	**--**
		NB Left	*--*	*--*	*--*	*--*	*--*	*--*
		NB Thru/Right	*61.1*	***E***	***7.4***	*65.9*	***E***	***8.5***
		Southbound	44.6	D	--	84.7	**F**	**--**
		SB Left	*46.8*	*D*	***2.6***	*103.6*	***F***	***8.8***
		SB Thru/Right	*41.8*	*D*	*1.9*	*42.4*	*D*	*4.4*

4. FUTURE NO-BUILD TRAFFIC CONDITIONS

This chapter provides projections of the additional vehicle traffic volume that will be added to the study area roadways by the expected full build-out year of the development, assuming the development is not built. This assessment of conditions without the project is based on additional traffic from off-site, or "background", sources. This chapter assesses conditions during a scenario under future no-build traffic conditions to assess the impacts when the project is included in subsequent chapters.

Background Traffic Development and Growth Calculations

In order to determine the level of impact of the site, an estimate of traffic volumes without the site for the full build-out year must be determined. This allows for a direct comparison of future conditions with and without the development. Background traffic volumes come from two sources:

- **Background developments**, namely specifically approved developments within the study area.
- **Background growth**, the increase in traffic passing through the study area due to regional development and general population growth.

Background Growth

Background growth is generally calculated based on observed growth rates at nearby TDOT-collected count stations. This data, included in Appendix B, was previously discussed in Chapter 1. As was seen in that chapter, nearby TDOT count stations show a growth rate within the study area of +2.65% annually since 2008. The resulting background growth factor of +2.65% per year was applied to the existing volumes.

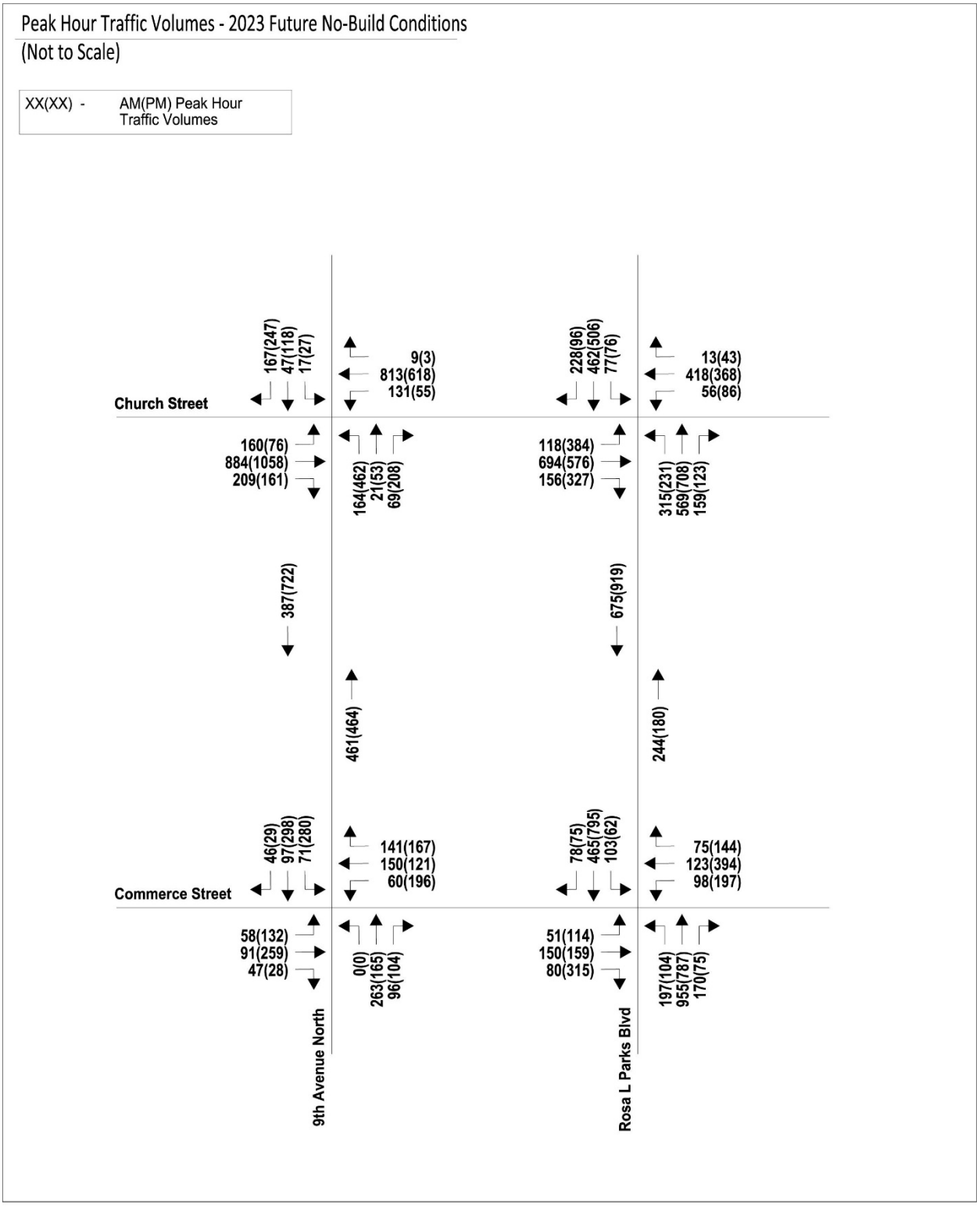
Background Developments

Three background projects were identified. This development is adjacent to the major Nashville Yards development directly across 9th Avenue North to the west, bounded by a property line north of Church Street, 9th Avenue North to the east, Broadway to the south, and a CSX rail line to the west. This development will include approximately 3.5 million sf office space, 1000 residential units, 400,000 sf of retail and entertainment space, and 1,100 hotel rooms.

There are two other nearby developments. The 127 Rosa L Parks Boulevard development is located on the south side of Commerce Street between 9th Avenue and Rosa L Parks Boulevard and includes 426 hotel rooms. Additionally, Church Street at 11th Avenue North is located on the south side of Church Street on the east side of 11th Avenue South. It is expected to include 529,065 sf of office, 12,857 sf of retail, and 8,300 of restaurant.

Trip assignment from these background developments were added to the background growth volumes to collect the total future no-build traffic volumes. These calculated background volumes are shown in Figure 4.

Figure 4. Peak Hour Traffic Volumes: Future No-Build Conditions



Intersection Capacity Analysis

Capacity and queueing analyses were performed using the projected Future No-Build volumes from Figure 4, with the same assumed laneage and traffic control as in the Existing conditions analysis from Chapter 3. A dedicated bicycle phase is expected to be installed at the intersection of Church Street and 9th Avenue North in association with Nashville Yards based on proposed signal plans (KCI Technologies, approved September 11, 2018). This phase is currently untimed but would expect to further deteriorate operations at that intersection. The results of this analysis are shown in Table 6. Intersection capacity and queuing conditions within the study area experience extensive deterioration throughout the study network.

Several movements suffer extreme failure of more than 300 seconds per vehicle, which is represented in the table as 300.0+. Extremely long queues were also estimated as expected by analysis methods past failure. This is particularly a result of the severe impact of Nashville Yards within the immediate study area.

Table 6. Intersection Capacity and Queueing Results: Future No-Build Conditions

Average Delay (in seconds), Level of Service (letter grade, A-F), and 95th Percentile Queue Length (# of vehicles)

			AM Peak Hour						*PM Peak Hour*					
			Existing			**Future No-Build**			**Existing**			**Future No-Build**		
Intersection	**Control**	**Approach**	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue
1. Church Street & 9th Avenue	**Signal**	**Overall**	**14.9**	**B**	**--**	**71.9**	**E**	**--**	**26.9**	**C**	**--**	**300.0+**	**F**	**--**
		Eastbound	8.8	A	--	68.1	**E**	**--**	12.7	B	--	98.0	**F**	**--**
		EB Left	*4.3*	*A*	*1.9*	*12.3*	*B*	***4.3***	*7.1*	*A*	*1.4*	*7.6*	*A*	*1.6*
		EB Thru/Right	*9.7*	*A*	*15.1*	*76.3*	***E***	***59.1***	*13.3*	*B*	*16.5*	*103.7*	***F***	***78.8***
		Westbound	0.6	A	--	90.9	**F**	**--**	0.6	A	--	8.8	A	--
		WB Left	*5.5*	*A*	*0.2*	*659.6*	***F***	***20.4***	*5.3*	*A*	*0.2*	*105.9*	***F***	***3.8***
		WB Thru/Right	*0.4*	*A*	*0.3*	*0.6*	*A*	*0.3*	*0.5*	*A*	*0.3*	*0.2*	*A*	*0.1*
		Northbound	48.0	D	--	48.9	D	--	70.6	**E**	**--**	300.0+	**F**	**--**
		NB Left	*50.1*	*D*	*1.7*	*55.3*	***E***	***9.6***	*89.0*	***F***	***11.8***	*300.0+*	***F***	***94.1***
		NB Thru/Right	*46.7*	*D*	*2.4*	*37.2*	*D*	*4.3*	*42.5*	*D*	*5.5*	*68.4*	***E***	***16.0***
		Southbound	53.2	D	--	39.3	D	--	52.7	D	--	65.6	**E**	**--**
		SB Thru/Left	*46.8*	*D*	*2.9*	*36.2*	*D*	*2.9*	*43.0*	*D*	*7.0*	*65.7*	***E***	***10.2***
		SB Right	*55.5*	***E***	***8.9***	*40.5*	*D*	*8.3*	*58.2*	***E***	***13.3***	*65.5*	***E***	***15.0***
2. Church Street & Rosa L Parks Blvd	**Signal**	**Overall**	**40.3**	**D**	**--**	**300.0+**	**F**	**--**	**76.2**	**E**	**--**	**300.0+**	**F**	**--**
		Eastbound	48.7	D	--	188.6	**F**	**--**	107.9	**F**	**--**	300.0+	**F**	**--**
		EB Left/Thru	*51.5*	*D*	*32.3*	*217.8*	***F***	***37.3***	*125.2*	***F***	***34.5***	*300.0+*	***F***	***53.8***
		EB Right	*32.1*	*C*	*1.9*	*37.0*	*D*	*1.7*	*37.9*	*D*	*3.0*	*38.5*	*D*	*5.4*
		Westbound	21.8	C	--	300.0+	**F**	**--**	41.9	D	--	300.0+	**F**	**--**
		WB Shared	*21.8*	*C*	*8.2*	*300.0+*	***F***	***32.2***	*41.9*	*D*	*19.9*	*300.0+*	***F***	***45.0***
		Northbound	22.1	C	--	162.3	**F**	**--**	77.0	**E**	**--**	69.5	**E**	**--**
		NB Left	*38.3*	*D*	***4.7***	*300.0+*	***F***	***23.3***	*46.0*	*D*	***6.4***	*127.9*	***F***	***13.6***
		NB Shared	*20.3*	*C*	*5.1*	*20.7*	*C*	*7.6*	*51.2*	*D*	*13.7*	*44.5*	*D*	*14.5*
		NB Right	*14.1*	*B*	*0.1*	*13.4*	*B*	*0.9*	*300.0+*	***F***	***2.2***	*104.3*	***F***	***3.1***
		Southbound	62.7	**E**	**--**	282.4	**F**	**--**	55.4	**E**	**--**	136.0	**F**	**--**
		SB Left	*27.6*	*C*	*2.8*	*27.7*	*C*	*3.0*	*28.2*	*C*	*2.5*	*26.4*	*C*	*2.7*
		SB Thru/Right	*68.5*	***E***	***22.7***	*300.0+*	***F***	***42.9***	*59.8*	***E***	***22.3***	*149.9*	***F***	***36.3***
3. Commerce St & Rosa L Parks Blvd	**Signal**	**Overall**	**19.9**	**B**	**--**	**29.0**	**C**	**--**	**32.9**	**C**	**--**	**91.3**	**F**	**--**
		Eastbound	56.8	**E**	**--**	65.6	**E**	**--**	59.1	**E**	**--**	257.7	**F**	**--**
		EB Left	*52.9*	*D*	*0.7*	*50.3*	*D*	***3.0***	*67.7*	***E***	***1.9***	*198.9*	***F***	***10.8***
		EB Thru/Right	*57.2*	***E***	***5.8***	*68.9*	***E***	***14.0***	*57.5*	***E***	***8.1***	*271.9*	***F***	***46.9***
		Westbound	42.3	D	--	36.9	D	--	48.6	D	--	57.2	**E**	**--**
		WB Left	*44.5*	*D*	***4.2***	*39.3*	*D*	***4.7***	*40.0*	*D*	***8.6***	*66.6*	***E***	***11.6***
		WB Thru/Right	*41.0*	*D*	*6.7*	*35.7*	*D*	*9.0*	*51.8*	*D*	*23.6*	*53.8*	*D*	*27.5*
		Northbound	14.6	B	--	26.1	C	--	21.9	C	--	58.2	**E**	**--**
		NB Left	*11.5*	*B*	*1.1*	*31.3*	*C*	***9.0***	*28.1*	*C*	*0.7*	*300.0+*	***F***	***14.4***
		NB Thru	*14.8*	*B*	*11.6*	*25.1*	*C*	*19.2*	*21.7*	*C*	*12.1*	*28.9*	*C*	*16.6*
		NB Right	*14.8*	*B*	*11.5*	*25.2*	*C*	*19.3*	*21.7*	*C*	*12.3*	*28.8*	*C*	*16.9*
		Southbound	9.1	A	--	15.6	B	--	20.1	C	--	47.6	D	--
		SB Left	*9.9*	*A*	*1.7*	*17.7*	*B*	*2.4*	*15.5*	*B*	*0.9*	*19.9*	*B*	*1.9*
		SB Thru/Right	*8.9*	*A*	*8.5*	*15.2*	*B*	*14.4*	*20.3*	*C*	*18.6*	*49.6*	*D*	***42.1***
4. Commerce St & 9th Avenue	**Signal**	**Overall**	**45.7**	**D**	**--**	**30.4**	**C**	**--**	**68.6**	**E**	**--**	**65.6**	**E**	**--**
		Eastbound	--	--	--	16.0	B	--	--	--	--	19.2	B	--
		EB Left				*14.0*	*B*	*1.5*	*--*	*--*	*--*	*14.6*	*B*	***3.8***
		EB Thru/Right	*7.7*	*A*	*1.2*	*16.9*	*B*	*4.3*	*13.9*	*B*	*1.4*	*21.3*	*C*	*10.1*
		Westbound	25.9	C	--	7.5	A	--	17.7	B	--	8.4	A	--
		WB Left	*59.2*	***E***	***2.8***	*13.7*	*B*	***1.5***	*60.9*	***E***	***8.7***	*13.8*	*B*	***3.7***
		WB Thru/Right	*0.0*	*A*	*0.0*	*6.2*	*A*	*3.1*	*0.0*	*A*	*0.0*	*4.7*	*A*	*2.0*
		Northbound	44.6	D	--	59.9	**E**	**--**	65.9	**E**	**--**	65.5	**E**	**--**
		NB Left	*--*	*--*	*--*	*0.0*	*A*	*0.0*	*--*	*--*	*--*	*0.0*	*A*	*0.0*
		NB Thru/Right	*61.1*	***E***	***7.4***	*59.9*	***E***	***19.0***	*65.9*	***E***	***8.5***	*65.5*	***E***	***15.9***
		Southbound	44.6	D	--	31.5	C	--	84.7	**F**	**--**	143.2	**F**	**--**
		SB Left	*46.8*	*D*	***2.6***	*35.7*	*D*	***3.1***	*103.6*	***F***	***8.8***	*262.4*	***F***	***24.1***
		SB Thru/Right	*41.8*	*D*	*1.9*	*29.5*	*C*	*6.0*	*42.4*	*D*	*4.4*	*41.5*	*D*	*15.4*

5. SITE TRAFFIC CONDITIONS

This chapter provides a review of the proposed development program and discusses the expected number of trips that the proposed site is expected to generate at full build-out.

Proposed Development Program

The details of the proposed development are shown in Table 7.

Table 7: Proposed Development Program

Development	**801 Church Street**			
City, State	Nashville, TN			
Location	Church Street & Rosa L Parks Blvd, Southwest Corner			
Full-Build Year	2023 (single phase)			
Existing Lane Use(s)	Vacant			
Proposed Land Use(s)	350 Apartments 1700 sf Retail 511 Structured Parking Spaces			
Access Point(s)	***Access #***	***At***	***Control***	***Movement***
	1	Rosa L Parks Blvd	Side Street Stop	Right-In Right-Out Left-In
	2	9th Avenue North	Side Street Stop	Full
Estimated Site Trips	***Total***	***AM***	***PM***	
	932	80	92	

A site plan of the proposed development and its site access points is included in Figure 5. The proposed development's location was previously shown in Figure 1 in Chapter 1.

Site Access Points

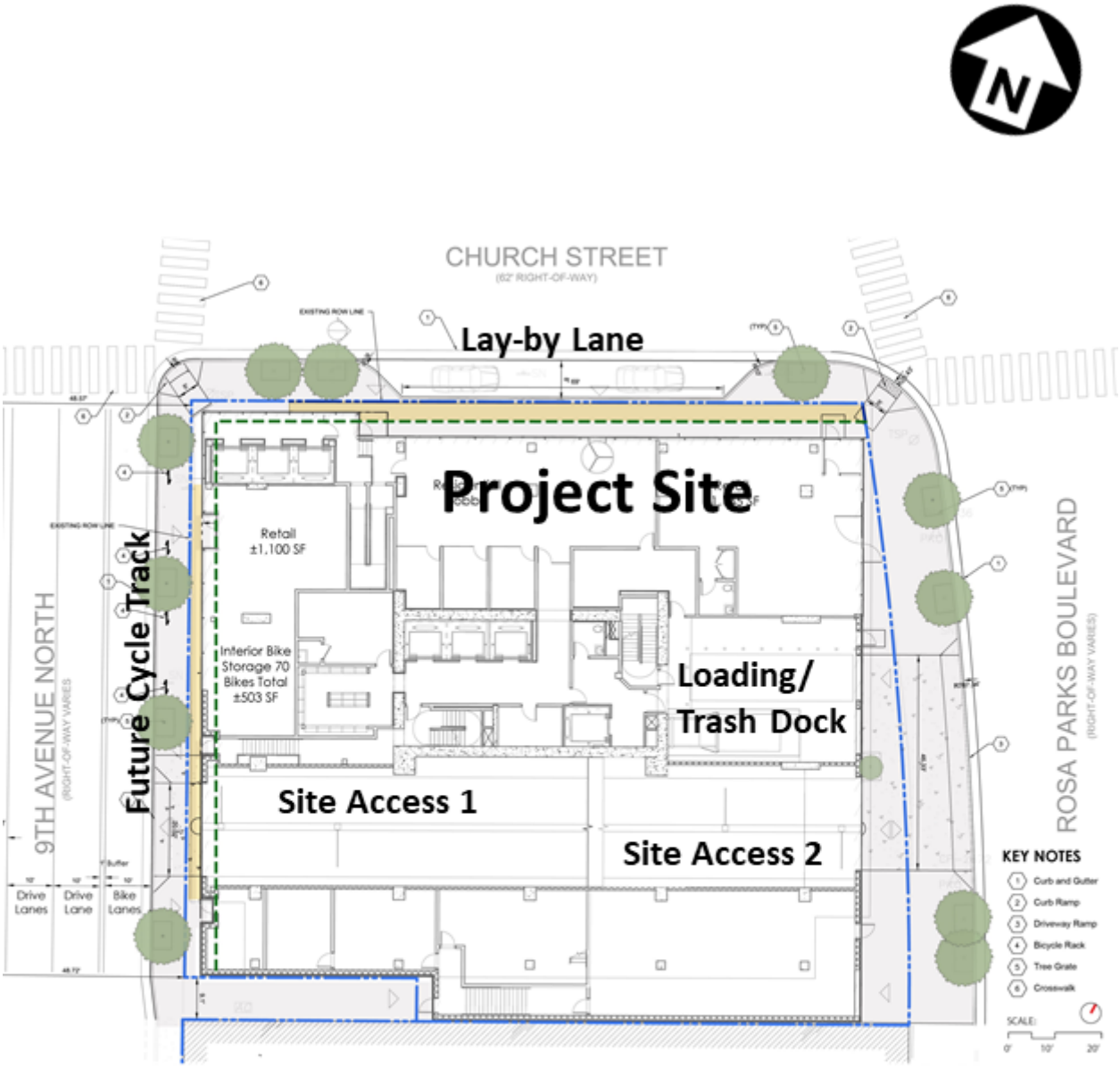
The site is served by two access points, outlined above in Table 7 and shown in Figure 5. Deliveries and trash service are expected to use the loading bay on Church street adjacent to Site Access 2.

Additionally, there will be a pickup/drop off layby lane on Church Street. This layby lane is expected to provide easier navigation to the proposed development for any taxi/rideshare/transit services and eliminate possible access confusion that may result in queues in Rosa L Parks Boulevard or the proposed cycle track on 9th Avenue North. All loading and deliveries are expected to be directed to the loading bay adjacent to Site Access 2.

Internal Circulation

Internal circulation within the site will be provided by the garage within the building.

Figure 5. Site Plan



Proposed Development Traffic

Next, trips directly attributable to the proposed development must be computed. Projected site-generated trips are calculated using industry-standard trip generation rates applied over the amount of development that is expected on the site. These trips are then applied across the study area roadways based on expected routing patterns.

Trip Generation

The trips generated by the proposed development were forecasted using *Trip Generation*, 10th Edition, published by ITE (Institute of Transportation Engineers).

It is expected that the trips generated by the proposed residential development in downtown will not be primarily vehicle trips as expected in a traditional suburban development. Therefore, the trip generation was filtered by the setting Center City Core and trip types filtered by vehicle only, rather than total person trips. This trip generation automatically accounts for reduction in vehicle trips due to other modes, such as transit or walking, according to 10th Edition methodologies. This is a conservatively greater estimate of trip generation, as the development is targeting more aggressive vehicle trip reductions in the Transportation Management Plan.

The expected trip generation is summarized in Table 8. Detailed trip generation calculations are included in Appendix D.

Table 8. Summary of Site Trip Generation

Total Vehicle Trips										
ITE Code	Land Use	Quantity	Unit Type	Daily Trips	AM Peak Hour			PM Peak Hour		
					Enter	*Exit*	*Total*	*Enter*	*Exit*	*Total*
222	Multifamily Housing (High-Rise)	350	units	756	29	1	77	47	34	81
876	Apparel	2645	sf	176	2	1	3	6	5	11
			SUM	**932**	**31**	**49**	**80**	**53**	**39**	**92**

Trip Distribution

A distribution of the trips generated by the project site was forecasted using traffic counts, historical traffic data, and knowledge of existing travel patterns. The expected distribution of new trips is shown in Figure 6. These distributions are summarized in Table 9.

.

Table 9. Summary of Trip Distribution Assumptions

Direction of Approach	Assumed Distribution
New Trips	
to/from **North** via **9th Avenue North**	**10%**
to/from **North** via **Rosa L Parks Avenue**	**15%**
to/from **South** via **9th Avenue North**	**10%**
to/from **South** via **Rosa L Parks Avenue**	**15%**
to/from **East** via **Church Street**	**10%**
to/from **East** via **Commerce Street**	**15%**
to/from **West** via **Church Street**	**25%**

Traffic Assignment

The generated trips were assigned to the roadway network using the expected distributions from the previous section, rounded at each intersection. The expected assignment of new site-generated trips is shown in Figure 7.

Figure 6. Site-Generated Trip Distribution

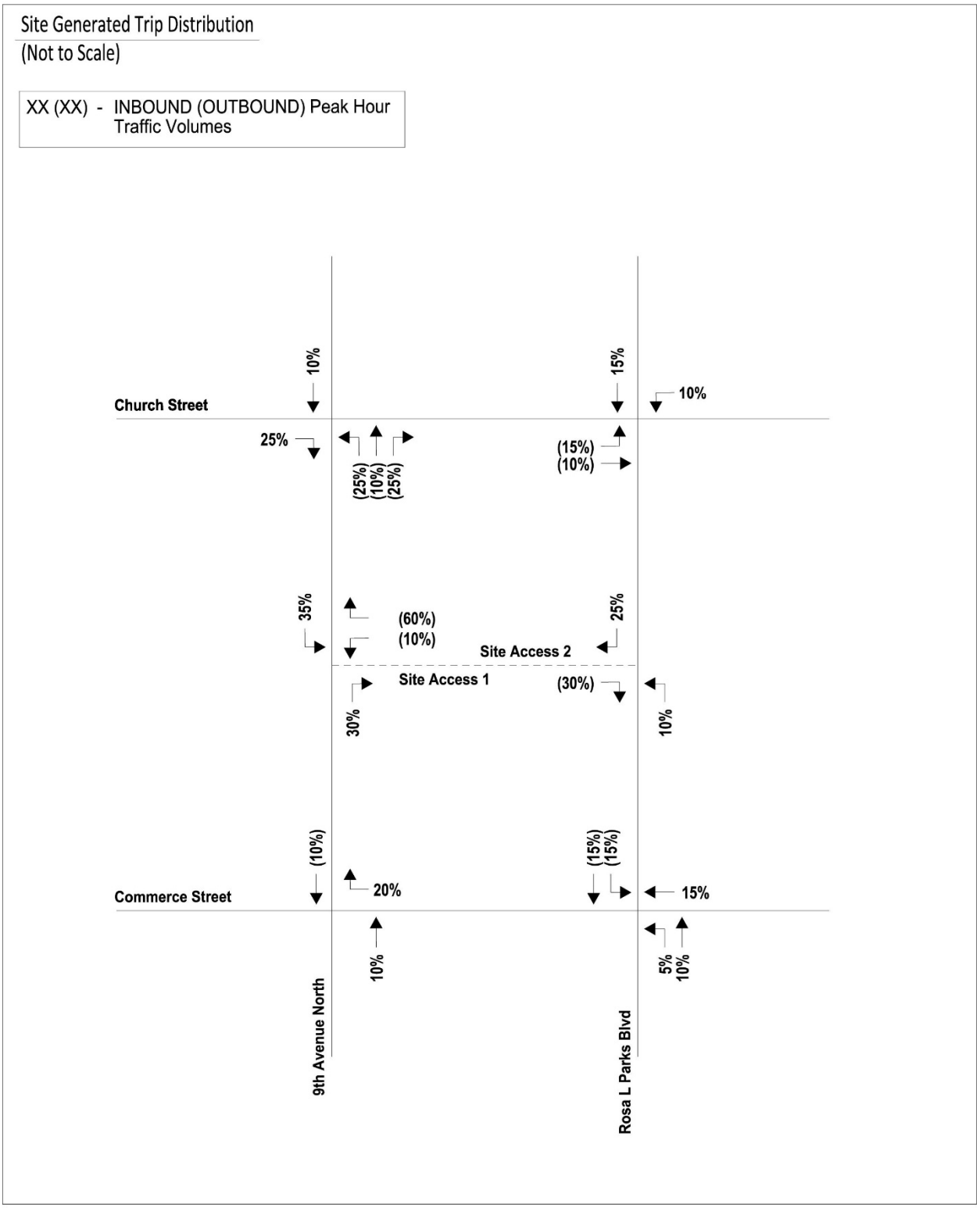
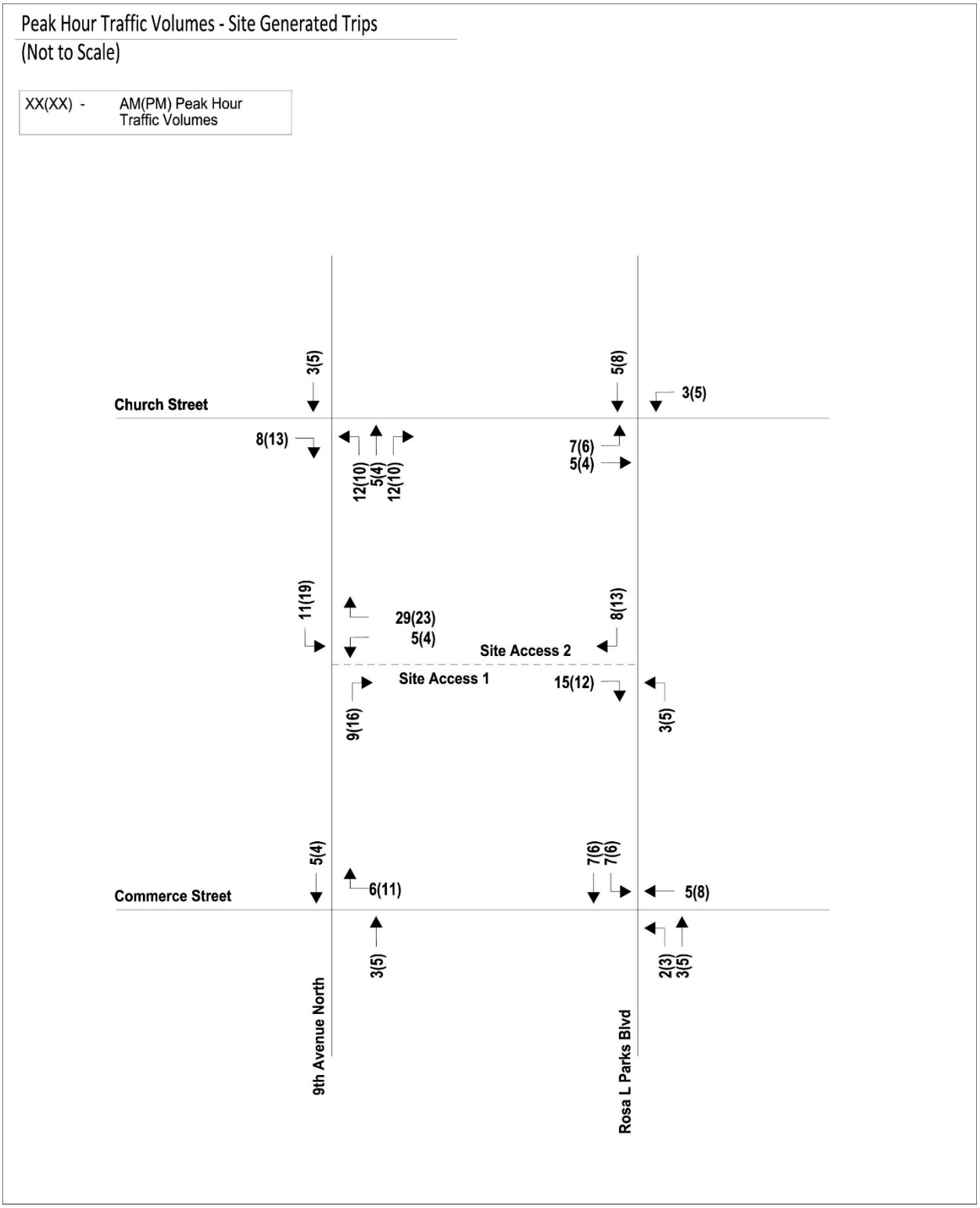


Figure 7. Site-Generated Trip Assignment



6. FUTURE FULL-BUILD TRAFFIC CONDITIONS

This chapter provides projections of the additional vehicle traffic volume that will be added to the study area roadways by the expected full build-out year of the development, 2023, and the additional traffic generated by the development. This assessment of conditions with the project is based on trip generation, distribution, and assignment performed in the previous chapter. This chapter assesses conditions during a scenario under future traffic conditions with the project in place in order to assess the impacts compared to Future No-Build Traffic conditions.

Projected Total Future Traffic Volumes

The expected trip assignments from Figure 7 were added to the future no-build traffic volumes from Figure 4 to find the total projected traffic volumes. The projected traffic volumes represent the expected traffic in the study area after the opening of the proposed development. The total projected volumes are shown in Figure 8.

Intersection Capacity Analysis

Capacity and queueing analyses were performed using the projected Future Full-Build volumes from Figure 8, with the same assumed laneage and traffic control as in the existing conditions analysis. The results of this analysis are shown in Table 10. As shown in Table 10, the study intersections have relatively minimal impact from the proposed development. Although substantial failure exists throughout the system in no-build and full-build conditions, approaches with expected trips assigned from the proposed development experienced minimal increases in queues, another measure of capacity.

These identified impacts will be discussed further in Chapter 7.

Figure 8. Peak Hour Traffic Volumes: Future Full-Build Future Traffic Conditions

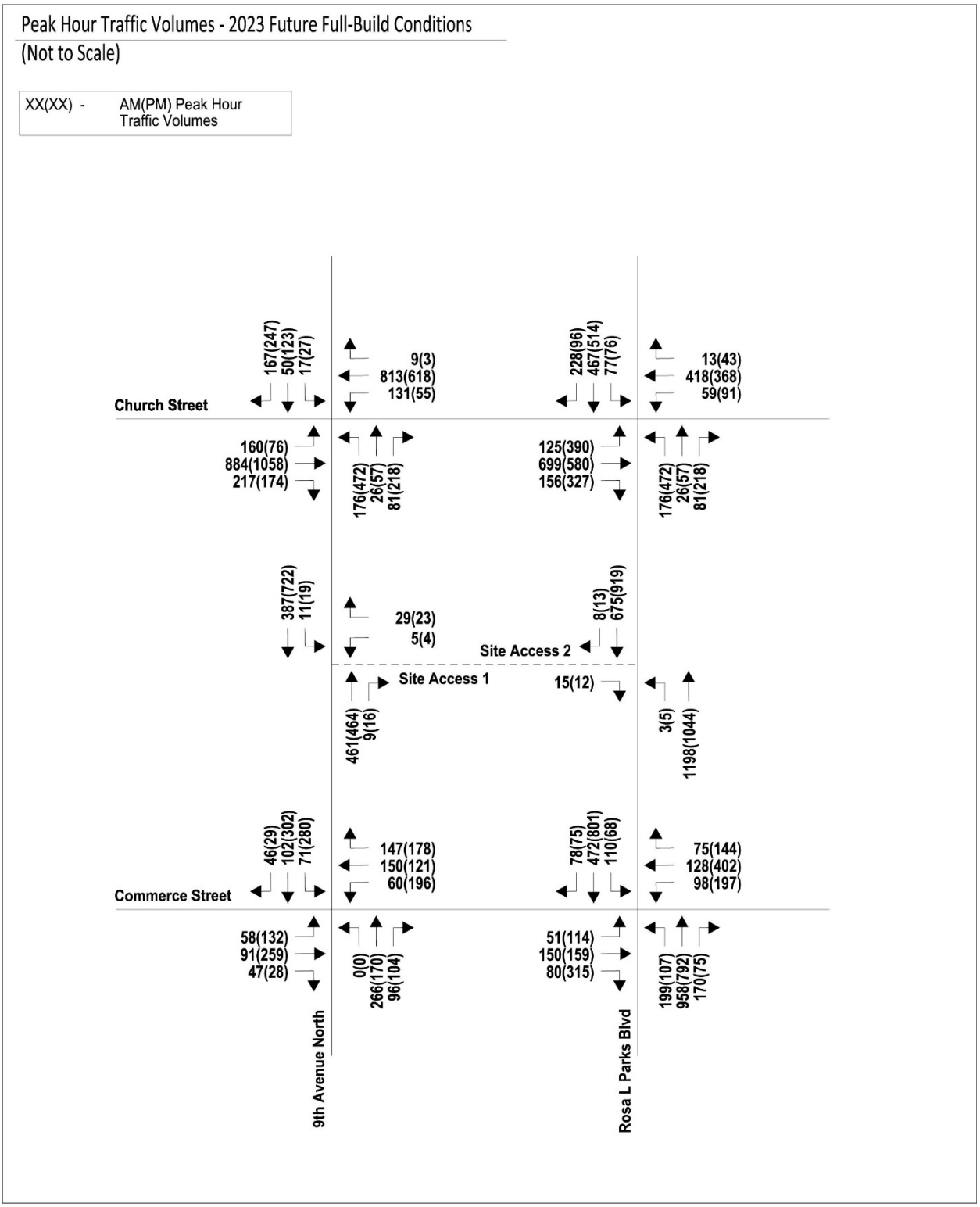


Table 10. Complete Intersection Capacity and Queueing Results

Average Delay (in seconds), Level of Service (letter grade, A-F), and 95th Percentile Queue Length (# of vehicles)

			AM Peak Hour									*PM Peak Hour*								
			Existing			**Future No-Build**			**Future Full-Build**			**Existing**			**Future No-Build**			**Future Full-Build**		
Intersection	**Control**	**Approach**	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue	Delay	LOS	Queue
1. Church Street & 9th Avenue	**Signal**	**Overall**	**14.9**	**B**	**--**	**71.9**	**E**	**--**	**74.0**	**E**	**--**	**26.9**	**C**	**--**	**300.0+**	**F**	**--**	**300.0+**	**F**	**--**
		Eastbound	8.8	A	--	68.1	E	--	72.0	E	--	12.7	B	--	98.0	F	--	103.6	F	--
		EB Left	*4.3*	*A*	*1.9*	*12.3*	*B*	***4.3***	*12.4*	*B*	***4.3***	*7.1*	*A*	*1.4*	*7.6*	*A*	*1.6*	*7.6*	*A*	*1.6*
		EB Thru/Right	*9.7*	*A*	*15.1*	*76.3*	***E***	***59.1***	*80.6*	***F***	***61.0***	*13.3*	*B*	*16.5*	*103.7*	***F***	***78.8***	*109.6*	***F***	***81.7***
		Westbound	0.6	A	--	90.9	F	--	90.9	F	--	0.6	A	--	8.8	A	--	8.8	A	--
		WB Left	*5.5*	*A*	*0.2*	*659.6*	***F***	***20.4***	*300.0+*	***F***	***20.4***	*5.3*	*A*	*0.2*	*105.9*	***F***	***3.8***	*105.9*	***F***	***3.8***
		WB Thru/Right	*0.4*	*A*	*0.3*	*0.6*	*A*	*0.3*	*0.6*	*A*	*0.3*	*0.5*	*A*	*0.3*	*0.2*	*A*	*0.1*	*0.2*	*A*	*0.1*
		Northbound	48.0	D	--	48.9	D	--	54.5	D	--	70.6	E	--	300.0+	F	--	300.0+	F	--
		NB Left	*50.1*	*D*	*1.7*	*55.3*	***E***	***9.6***	*64.8*	***E***	***11.0***	*89.0*	***F***	***11.8***	*300.0+*	***F***	***94.1***	*300.0+*	***F***	***97.0***
		NB Thru/Right	*46.7*	*D*	*2.4*	*37.2*	*D*	*4.3*	*37.6*	*D*	*5.1*	*42.5*	*D*	*5.5*	*68.4*	***E***	***16.0***	*86.4*	***F***	***18.8***
		Southbound	53.2	D	--	39.3	D	--	39.1	D	--	52.7	D	--	65.6	E	--	75.5	E	--
		SB Thru/Left	*46.8*	*D*	*2.9*	*36.2*	*D*	*2.9*	*36.1*	*D*	*3.0*	*43.0*	*D*	*7.0*	*65.7*	***E***	***10.2***	*91.9*	***F***	***12.1***
		SB Right	*55.5*	***E***	***8.9***	*40.5*	*D*	*8.3*	*40.3*	*D*	*8.3*	*58.2*	***E***	***13.3***	*65.5*	***E***	***15.0***	*65.5*	***E***	***15.0***
2. Church Street & Rosa L Parks Blvd	**Signal**	**Overall**	**40.3**	**D**	**--**	**300.0+**	**F**	**--**	**300.0+**	**F**	**--**	**76.2**	**E**	**--**	**300.0+**	**F**	**--**	**300.0+**	**F**	**--**
		Eastbound	48.7	D	--	188.6	F	--	207.0	F	--	107.9	F	--	300.0+	F	--	300.0+	F	--
		EB Left/Thru	*51.5*	*D*	*32.3*	*217.8*	***F***	***37.3***	*239.1*	***F***	***37.5***	*125.2*	***F***	***34.5***	*300.0+*	***F***	***53.8***	*300.0+*	***F***	***54.0***
		EB Right	*32.1*	*C*	*1.9*	*37.0*	*D*	*1.7*	*37.6*	*D*	*1.3*	*37.9*	*D*	*3.0*	*38.5*	*D*	*5.4*	*38.3*	*D*	*5.3*
		Westbound	21.8	C	--	300.0+	F	--	300.0+	F	--	41.9	D	--	300.0+	F	--	300.0+	F	--
		WB Shared	*21.8*	*C*	*8.2*	*300.0+*	***F***	***32.2***	*300.0+*	***F***	***34.5***	*41.9*	*D*	*19.9*	*300.0+*	***F***	***45.0***	*300.0+*	***F***	***45.7***
		Northbound	22.1	C	--	162.3	F	--	162.2	F	--	77.0	E	--	69.5	E	--	69.4	E	--
		NB Left	*38.3*	*D*	***4.7***	*300.0+*	***F***	***23.3***	*300.0+*	***F***	***23.3***	*46.0*	*D*	***6.4***	*127.9*	***F***	***13.6***	*127.1*	***F***	***13.5***
		NB Shared	*20.3*	*C*	*5.1*	*20.7*	*C*	*7.6*	*20.5*	*C*	*7.3*	*51.2*	*D*	*13.7*	*44.5*	*D*	*14.5*	*44.5*	*D*	*14.4*
		NB Right	*14.1*	*B*	*0.1*	*13.4*	*B*	*0.9*	*13.4*	*B*	*0.9*	*300.0+*	***F***	***2.2***	*104.3*	***F***	***3.1***	*104.4*	***F***	***3.1***
		Southbound	62.7	E	--	282.4	F	--	288.3	F	--	55.4	E	--	136.0	F	--	142.1	F	--
		SB Left	*27.6*	*C*	*2.8*	*27.7*	*C*	*3.0*	*27.7*	*C*	*3.0*	*28.2*	*C*	*2.5*	*26.4*	*C*	*2.7*	*26.4*	*C*	*2.7*
		SB Thru/Right	*68.5*	***E***	***22.7***	*300.0+*	***F***	***42.9***	*300.0+*	***F***	***43.5***	*59.8*	***E***	***22.3***	*149.9*	***F***	***36.3***	*156.6*	***F***	***36.8***
3. Commerce St & Rosa L Parks Blvd	**Signal**	**Overall**	**19.9**	**B**	**--**	**29.0**	**C**	**--**	**29.2**	**C**	**--**	**32.9**	**C**	**--**	**91.3**	**F**	**--**	**94.8**	**F**	**--**
		Eastbound	56.8	E	--	65.6	E	--	65.6	E	--	59.1	E	--	257.7	F	--	263.9	F	--
		EB Left	*52.9*	*D*	*0.7*	*50.3*	*D*	***3.0***	*50.3*	*D*	***3.0***	*67.7*	***E***	***1.9***	*198.9*	***F***	***10.8***	*230.8*	***F***	***11.6***
		EB Thru/Right	*57.2*	***E***	***5.8***	*68.9*	***E***	***14.0***	*68.9*	***E***	***14.0***	*57.5*	***E***	***8.1***	*271.9*	***F***	***46.9***	*271.9*	***F***	***46.9***
		Westbound	42.3	D	--	36.9	D	--	36.9	D	--	48.6	D	--	57.2	E	--	58.7	E	--
		WB Left	*44.5*	*D*	***4.2***	*39.3*	*D*	***4.7***	*39.3*	*D*	***4.7***	*40.0*	*D*	***8.6***	*66.6*	***E***	***11.6***	*66.6*	***E***	***11.6***
		WB Thru/Right	*41.0*	*D*	*6.7*	*35.7*	*D*	*9.0*	*35.8*	*D*	*9.2*	*51.8*	*D*	*23.6*	*53.8*	*D*	*27.5*	*55.8*	***E***	***28.3***
		Northbound	14.6	B	--	26.1	C	--	26.5	C	--	21.9	C	--	58.2	E	--	64.8	E	--
		NB Left	*11.5*	*B*	*1.1*	*31.3*	*C*	***9.0***	*32.1*	*C*	***9.2***	*28.1*	*C*	*0.7*	*300.0+*	***F***	***14.4***	*353.6*	***F***	***15.6***
		NB Thru	*14.8*	*B*	*11.6*	*25.1*	*C*	*19.2*	*25.5*	*C*	*19.4*	*21.7*	*C*	*12.1*	*28.9*	*C*	*16.6*	*29.3*	*C*	*16.8*
		NB Right	*14.8*	*B*	*11.5*	*25.2*	*C*	*19.3*	*25.6*	*C*	*19.5*	*21.7*	*C*	*12.3*	*28.8*	*C*	*16.9*	*29.2*	*C*	*17.1*
		Southbound	9.1	A	--	15.6	B	--	15.8	B	--	20.1	C	--	47.6	D	--	48.8	D	--
		SB Left	*9.9*	*A*	*1.7*	*17.7*	*B*	*2.4*	*18.0*	*B*	*2.6*	*15.5*	*B*	*0.9*	*19.9*	*B*	*1.9*	*20.2*	*C*	*2.1*
		SB Thru/Right	*8.9*	*A*	*8.5*	*15.2*	*B*	*14.4*	*15.3*	*B*	*14.6*	*20.3*	*C*	*18.6*	*49.6*	*D*	***42.1***	*51.1*	*D*	***43.0***
4. Commerce St & 9th Avenue	**Signal**	**Overall**	**45.7**	**D**	**--**	**30.4**	**C**	**--**	**31.9**	**C**	**--**	**68.6**	**E**	**--**	**65.6**	**E**	**--**	**67.9**	**E**	**--**
		Eastbound	--	--	--	16.0	B	--	16.2	B	--	--	--	--	19.2	B	--	19.5	B	--
		EB Left			*--*	*14.0*	*B*	*1.5*	*14.1*	*B*	*1.5*	*--*	*--*	*--*	*14.6*	*B*	***3.8***	*14.8*	*B*	***3.8***
		EB Thru/Right	*7.7*	*A*	*1.2*	*16.9*	*B*	*4.3*	*17.0*	*B*	*4.3*	*13.9*	*B*	*1.4*	*21.3*	*C*	*10.1*	*21.6*	*C*	*10.2*
		Westbound	25.9	C	--	7.5	A	--	7.6	A	--	17.7	B	--	8.4	A	--	8.5	A	--
		WB Left	*59.2*	***E***	***2.8***	*13.7*	*B*	***1.5***	*13.8*	*B*	***1.5***	*60.9*	***E***	***8.7***	*13.8*	*B*	***3.7***	*14.0*	*B*	***3.7***
		WB Thru/Right	*0.0*	*A*	*0.0*	*6.2*	*A*	*3.1*	*6.3*	*A*	*3.2*	*0.0*	*A*	*0.0*	*4.7*	*A*	*2.0*	*5.0*	*A*	*2.1*
		Northbound	44.6	D	--	59.9	E	--	60.1	E	--	65.9	E	--	65.5	E	--	65.9	E	--
		NB Left	*--*	*--*	*--*	*0.0*	*A*	*0.0*	*0.0*	*A*	*0.0*	*--*	*--*	*--*	*0.0*	*A*	*0.0*	*0.0*	*A*	*0.0*
		NB Thru/Right	*61.1*	***E***	***7.4***	*59.9*	***E***	***19.0***	*60.1*	***E***	***19.1***	*65.9*	***E***	***8.5***	*65.5*	***E***	***15.9***	*65.9*	***E***	***16.2***
		Southbound	44.6	D	--	31.5	C	--	39.1	D	--	84.7	F	--	143.2	F	--	150.2	F	--
		SB Left	*46.8*	*D*	***2.6***	*35.7*	*D*	***3.1***	*36.7*	*D*	***3.2***	*103.6*	***F***	***8.8***	*262.4*	***F***	***24.1***	*264.2*	***F***	***24.1***
		SB Thru/Right	*41.8*	*D*	*1.9*	*29.5*	*C*	*6.0*	*40.2*	*D*	*8.2*	*42.4*	*D*	*4.4*	*41.5*	*D*	*15.4*	*53.9*	*D*	*18.3*
5. 9th Avenue & Site Access 1	**TWSC**	WB Left	--	--	--	--	--	--	12.8	B	0.2	--	--	--	--	--	--	12.9	B	0.2
		SB Left	--	--	--	--	--	--	8.5	A	0.0	--	--	--	--	--	--	8.5	A	0.1
6. 8th Avenue & Site Access 2	**TWSC**	NB Left	--	--	--	--	--	--	9.2	A	0.0	--	--	--	--	--	--	10.3	B	0.0
		EB Left	--	--	--	--	--	--	14.0	B	0.1	--	--	--	--	--	--	17.9	C	0.1

7. SUMMARY OF FINDINGS

This chapter compares the forecast roadway conditions without and with the proposed development in order to identify any adverse impacts.

Comparison of Capacity and Queuing Results

Table 10 in Chapter 6 presents a comparison of all intersection capacity and queueing results side-by-side for the 2020 Existing, 2023 Future No-Build, and 2023 Full-Build Future conditions. The latter two scenarios represent roadway conditions without and with the proposed development, respectively.

Identified Impacts

Based on the evaluation criteria listed in the previous section, this comparison identified a total of one area that is projected to experience a deterioration in service quality after the opening of the proposed development:

Commerce Street & 9th Avenue North, Southbound Through/Right Turn, AM Peak

This turning movement is expected to deteriorate from LOS C to LOS D in the AM peak hour. This development is expected to generate 3 vehicles at this approach in this peak hour, or 1.3% of the overall movement. LOS D is considered acceptable for an urban environment but will still be evaluated for mitigation.

Church Street & 9th Avenue North, Southbound Through/Left Turn, PM Peak

This turning movement is expected to deteriorate from LOS E to LOS F. This development is expected to generate 4 vehicles at this approach in this peak hour, or 1.2% of the overall movement.

Potential Mitigation Measures

This review focused on identifying potential mitigation measures at the impacted intersection. Potential strategies that were investigated as part of this assessment are shown in Table 11.

.

Table 11. Potential Mitigation Measures

Mitigation Measure	Commerce St + 9th Avenue Southbound Through/Right AM Peak	Church St + 9th Avenue Southbound Through/Left PM Peak
Upgrades to Intersection Traffic Control	The intersection is already signalized, so improvements to traffic control are not applicable in this situation. **Not applicable.**	The intersection is already signalized, so improvements to traffic control are not applicable in this situation. **Not applicable.**
Adjustments to signal phasing and/or cycle length	This effort analyzed several potential adjustments to traffic signal operations. None of these strategies provided improvements to the impacted movements, and actually may worsen performance at the intersection. **Does not address issue.**	This effort looked at several potential adjustments to traffic signal operations, including adding a protected phase for the impacted movement, since it is currently permissive only. None of these strategies provided improvements to the impacted movements, and actually may worsen performance at the intersection. **Does not address issue.**
Reallocating traffic signal green time split lengths	Reallocating green time between phases at the signal proved to be potentially effective. This mitigation should be considered after the proposed development is complete. **Addresses issue.**	Reallocating green time between phases at the signal did not prove to be effective. **Does not address issue.**
Corridor widening	Any more involved measures are not possible due to restricted downtown right-of-way and are disproportionate to the impact of the proposed development. **Not applicable.**	Any more involved measures are not possible due to restricted downtown right-of-way and are disproportionate to the impact of the proposed development. **Not applicable.**
Multimodal Investment	As included in the recommendations, this development is expected to provide substantial investment in physical bicycle facilities and encouraging multimodal travel. **Addresses issue.**	As included in the recommendations, this development is expected to provide substantial investment in physical bicycle facilities and encouraging multimodal travel. **Addresses issue.**

8. RECOMMENDATIONS

This assessment finds that there are two turning movements that are negatively impacted by the development:

B. Commerce Street & 9th Avenue North, Southbound Through/Right Turn, AM Peak

This turning movement is expected to deteriorate from LOS C to LOS D in the AM peak hour. This development is expected to generate 3 vehicles at this approach in this peak hour, or 1.3% of the overall movement. There are limited options to improve this approach, but the LOS is acceptable for an urban environment.

Church Street & 9th Avenue North, Southbound Through/Left Turn, PM Peak

This turning movement is expected to deteriorate from LOS E to LOS F. This development is expected to generate 4 vehicles at this approach in this peak hour, or 1.2% of the overall movement. It is expected this can be mitigated by the recommendations below.

As a result, the overall finding of this report is that the traffic impacts of the site are minimal and can be addressed by the recommendations below.

The Transportation Management Plan provides much additional information on proposed travel demand management measures in association with this study.

The proposed bicycle facilities are expected to provide excellent bicycle connectivity between the major cycle track facilities on Commerce Street and proposed on Church Street. The proposed cycle track is expected to provide better connectivity between the other cycle tracks compared to the traditional split bicycle lanes shown on plans associated with Nashville Yards. It is assumed that funds have been allocated to those bicycle lanes from other developments; those funds should be reallocated to the bicycle recommendations. Funding beyond this expected to be provided by the developer.

Due to the expected conditions in downtown Nashville, it is difficult to mitigate vehicular impacts in association with no build conditions or with the proposed development. However, these recommendations represent substantial investment in alternative transportation modes, which is aligns with the needs of downtown Nashville and the goals of Metro Public Works.

The following recommendations are expected to ensure effective and safe traffic operations within the study area:

- Follow multimodal improvements according to the Transportation Management Plan, which may include the following:
    - Decouple parking space from lease agreements
    - Providing residents information on bicycle routes and BCycle memberships
    - Organize bicycle rides with residents

    - Make shared bikes available for checkout in building
    - WeGo bus transit info, transit training, and route updates in resident newsletter
    - Organize walks with residents
    - Shared vehicle fleet for residents
    - Carpool matching service and Vanpool information
    - Off-peak loading / service vehicle schedule
    - Nashville Connecter subscription
    - Install bicycle parking within building and public bicycle parking outside building.
- Install the following bicycle infrastructure improvements, if not included in any other bikeway plans, or work with developer of currently approved plans to adapt them to the following. Any funds previously allocated to new bike lanes on this street in association with other developments in the area to be reallocated to this cycle track.
    - Install bicycle track on the east side of 9th Avenue North extending from Church Street to Commerce Street. Install flexible delineator posts between cycle track and 9th Avenue North as appropriate. Ensure adequate lighting above cycle track.
    - Install bicycle signal and detection on the northbound approach of 9th Avenue North at Church Street in association with proposed cycle track on 9th Avenue North. Stripe bikeway to connect with future Church Street cycle track at the intersection of Church Street and 9th Avenue North. Bicycle signal to coordinate with future bicycle signal phase on the eastbound approach of Church Street.
    - Install bicycle signals and detection on the southbound and westbound approaches of 9th Avenue North and Commerce Street. Stripe cycle track to connect with existing Commerce Street cycle track. Bicycle signals to allow adequate clearance for bicycles to safely traverse intersection.
- Install right turn arrow pavement marking and STOP sign (R1-1) with Right Turn Only sign (R3-5R) sign mounted below facing outbound traffic at the exit of Site Access 2 at Rosa L Parks Boulevard. Channelize exiting lane for right turns only as permitted by street geometry.
- Install STOP sign (R1-1) facing outbound traffic at the exit of Site Access 1 at 9th Avenue North.
- Install parking garage gates for both garage entrances, located a minimum of 40 feet from right of way
- Provide residents with wireless parking garage keys to open gates upon garage entry, to prevent queuing that might result from card/code/fob-based garage entry.
- Install layby lane on Church Street with signage to restrict parking to pickup/drop off only.
- Retime intersection of Church Street and 9th Avenue North if requested by Metro Nashville after development opens, if not already retimed in conjunction with the Church Street bikeway installation.

The Transportation Management Plan is included in Appendix F.

APPENDIX A – METRO FORM A

FORM A – INITIAL TRAFFIC STUDY SCREENING EVALUATION
Nashville-Davidson County Traffic Study Screening

Submit this form to the Metro Public Works Department in advance of requesting a Pre-Study Scope Determination Conference. Its purpose is to help determine the need for a traffic study, and if so, the type of study to be conducted. The Metro Public Works Department will notify the applicant if a conference needs to be scheduled.

Date Submitted:	**Codes or Planning Case No:**	

Metro Public Works Department Contact Numbers

Metro Public Works – Traffic and Parking Section (615) 862-8760 (615) 880-2012(f)

Project Name and Location (specific):	801 Church		
Nearest Major Cross Streets and Functional Classification:	Rosa L Parks Blvd (T6-M-AB3) and Church Street (T6-M-AB4)		
Applicant or Project Developer:	Tony Giarratana	Phone:	615-512-0559
Traffic Study Preparer:	Barge Design Solutions	Phone:	615-254-1500

Has a study been prepared for this location within the past 5-years?	Yes Date:	Title/Case No:
	X No	

Include the Following Materials with this Form (Unless this is a Rezoning)

- Two sets of site plans showing all existing and proposed structures, parking and loading areas, driveways, sidewalks and bike paths/lanes, and on/off site circulation.

Screening Thresholds	**Rezoning Analysis (250/pkhr)**	**Traffic Access Study (50-99/pkhr)**	**Traffic Impact Statement (100-249/pkhr)**	**Traffic Impact Analysis (250+/pkhr)**

Please complete Prior to Meeting

Trip Generation Calculation

	Zoning District (List Each District) Use Additional Sheet if Necessary	**Land Use** (List Each Use) Use Additional Sheet if Necessary	**Project Size** (Square Feet or Dwelling Units)	**Peak Hour Trips**		**Daily Trips**
				AM	**PM**	
Existing	DTC -Core	Vacant	0	0	0	0
Total						
Proposed	DTC- Core	222	350 DU	111	128	686
Total						
Net Increase/Decrease (+ or -) Above/Below Existing Trips				111	128	686

Metro Reviewer Comments:

Recommended Traffic Study Type (circle one)	**None (Issue Form B)**	**Rezoning Analysis**	**Traffic Access Study**	**Traffic Impact Statement**	**Traffic Impact Analysis**

Evaluated by: _____ **Phone:** _____

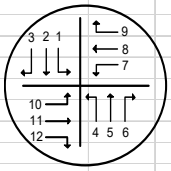
Metro Reviewer (Print)

Signature: _____ **Date:** _____

APPENDIX B – COUNT DATA

Station	163	174	409	419	490
County	Davidson	Davidson	Davidson	Davidson	Davidson
Location	8TH AVE N-B/T CHURCH & BROADWAY	CHURCH ST - ON VIADUCT	CHURCH ST. - CBD	9TH AVE - INSIDE INTERLOOP	COMMERCE ST-NEAR 8TH AVE S

Route	SR006	3242	0E255	3274	3243
2018	15241	22618	8246	5179	8922
2017	12824	16298	8306	4062	6120
2016	12017	15710	8208	2679	5942
2015	13073	15952	8283	2625	5488
2014	12637	15684	8170	2727	6455
2013	10719	14775	7988	2499	5133
2012	10349	15269	8431	2868	5346
2011	10350	15450	8643	3172	4795
2010	12060	14511	8285	2879	4655
2009	12219	14190	7702	3136	4718
2008	11592	14321	8107	3312	5597
2007	10575	13172	8499	4426	4995
2006	11695	15016	7108	4297	8263
2005	11598	13348	6072	4400	8577
2004	10175	15516	5896	4314	8314
2003	11310	14325	5778	4485	8261
2002	14703	15441	5610	4448	8649
2001	16388	18386	5738	4564	8397
2000	14209	14151	5420	4089	8003
1999	17668	17888	6474	5958	7902
1998	13662	14562	7730	4572	7520
1997	13857	14121	7720	5246	7510
1996	13973	14200	8193	5183	14946
1995	11913	14533	7109	4795	5265
1994	14529	14231	6296	4759	8853
1993	12697	13313	6308	4865	7240
1992	11362	10842	6644	6273	9661
1991	16667	8593	2978	5865	NA
1990	15500	10000	3300	6634	NA
1989	15452	9596	3371	5820	NA
1988	12429	13917	5781	6303	NA
1987	16797	16426	6703	6566	NA
1986	11889	16642	6336	4975	NA
1985	16040	14630	7106	6871	NA
1984	NA	NA	NA	NA	NA
1983	NA	NA	NA	NA	NA



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Commerce St & 9th Ave
DATE: 06/29/2016
RECORDER: Nathan Quinn
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	9th Ave			9th Ave			Commerce St			Commerce St			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**65**
6:30-6:45													**125**
6:45-7:00													**208**
7:00-7:15	4	9			11	3	11	7	12		7	1	**282**
7:15-7:30	8	10	1	1	5	4	3	5	17	1	3	2	**298**
7:30-7:45	6	7	2	1	14	4	7	11	17		11	3	**318**
7:45-8:00	1	8		2	15	5	8	9	14	3	8	1	**315**
8:00-8:15	9	5			11	8	11	11	12		12	2	**326**
8:15-8:30	7	10	2		10	17	7	9	7	1	7	3	**245**
8:30-8:45	6	13	1	1	7	10	9	6	13	1	12	1	**165**
8:45-9:00	8	9			16	12	8	7	13	1	9	2	**85**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
10:30-10:45													
10:45-11:00													
11:00-11:15													
11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
12:00-12:15													
12:15-12:30													
12:30-12:45													
12:45-1:00													
1:00-1:15													
1:15-1:30													
1:30-1:45													
1:45-2:00													
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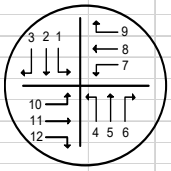
2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**152**
3:30-3:45													**328**
3:45-4:00													**518**
4:00-4:15	15	33	1	2	12	14	24	10	19	1	15	6	**713**
4:15-4:30	19	44	1		8	8	33	13	29		17	4	**756**
4:30-4:45	15	33		2	17	12	36	21	24	1	15	14	**776**
4:45-5:00	16	35		2	17	11	38	21	25	1	15	14	**743**
5:00-5:15	17	33		1	10	8	33	31	36	1	16	9	**677**
5:15-5:30	9	39		3	9	8	39	37	34	2	11	5	**598**
5:30-5:45	7	34			6	9	34	21	27	3	11	5	**516**
5:45-6:00	9	29			11	6	32	16	18		7	1	**433**
6:00-6:15	7	19	3	1	3	7	33	17	22		2	2	**349**
6:15-6:30	6	15	1		5	4	32	19	23		7	2	**233**
6:30-6:45	4	17		1	3	3	24	8	12		2		**119**
6:45-7:00	1	12			4	3	14	6	3	1	1		**45**
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	174	414	12	17	194	156	436	285	377	17	188	77	
AM PK HR	30	37	3	1	44	47	35	33	45	3	40	8	8:00 AM - 9:00 AM
MID PK HR													
PM PK HR	65	145	2	6	54	45	131	65	97	3	62	38	4:00 PM - 5:00 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: 8th Avenue & Commerce Street
DATE: 6/29/2016
RECORDER: SCU311/Zack Murphy
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	8th Avenue			8th Avenue			Commerce Street			Commerce Street			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**286**
6:30-6:45													**543**
6:45-7:00													**862**
7:00-7:15	7	60	9	14	127	16	13	10	15	4	7	4	**1,200**
7:15-7:30	14	50	5	15	107	20	13	6	11	2	11	3	**1,270**
7:30-7:45	15	61	3	20	142	18	11	15	11	1	18	4	**1,345**
7:45-8:00	21	63	7	11	153	32	16	13	8		13	1	**1,368**
8:00-8:15	18	79	5	13	144	29	18	14	10	1	20	5	**1,364**
8:15-8:30	12	70	6	9	135	30	13	14	12	3	27	1	**1,008**
8:30-8:45	19	80	5	5	125	33	16	17	10	2	25	5	**676**
8:45-9:00	22	70	4	8	139	25	16	13	12	4	21		**334**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
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11:15-11:30													
11:30-11:45													
11:45-12:00 PM													
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12:15-12:30													
12:30-12:45													
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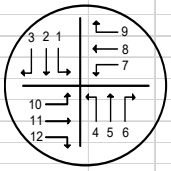
2:00-2:15													
2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**374**
3:30-3:45													**807**
3:45-4:00													**1,251**
4:00-4:15	6	97	2	2	105	6	38	58	17	9	16	18	**1,694**
4:15-4:30	5	112	2	3	143	10	34	59	26	3	13	23	**1,801**
4:30-4:45	9	120	2	3	124	8	31	77	28	10	16	16	**1,800**
4:45-5:00	6	110	5	5	126	22	30	74	20	6	19	20	**1,811**
5:00-5:15	10	107	4	5	130	9	41	99	32	7	19	18	**1,780**
5:15-5:30	10	100	3	5	131	5	39	92	21	2	11	13	**1,687**
5:30-5:45	11	120	2	4	126	19	34	85	28	6	11	9	**1,570**
5:45-6:00	5	104	1	2	135	17	39	63	22	5	8	11	**1,379**
6:00-6:15	4	108			117	13	25	77	28	4	5	7	**1,170**
6:15-6:30	6	78	4	2	85	12	33	61	19	5	4	6	**782**
6:30-6:45	6	60	2		79	14	33	45	17	1	2	5	**467**
6:45-7:00	3	74		1	50	11	15	36	8	1	2	2	**203**
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	209	1,723	71	127	2,423	349	508	928	355	76	268	171	
AM PK HR	71	299	20	35	543	117	63	58	44	10	93	11	8:00 AM - 9:00 AM
MID PK HR													
PM PK HR	26	439	11	13	498	46	133	268	91	28	64	77	4:00 PM - 5:00 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: 9th Ave & Church Street
DATE: 06/29/2016
RECORDER: Nathan Quinn
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	9th Ave			9th Ave			Church St			Church St			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**241**
6:30-6:45													**508**
6:45-7:00													**804**
7:00-7:15		11	18	7	6	1	6	53		21	108	10	**1,110**
7:15-7:30	1	8	30	8	2	2	4	53		16	127	16	**1,173**
7:30-7:45	5	7	29	8	4	1	3	75		20	126	18	**1,208**
7:45-8:00	1	6	30	8	11	3	1	64	2	27	143	10	**1,196**
8:00-8:15	2	5	30	5	4	8	2	57		40	139	12	**1,217**
8:15-8:30	2	7	25	5	3	5	1	55	3	26	158	12	**913**
8:30-8:45	6	11	29	6	2	2	2	56	2	23	131	14	**611**
8:45-9:00	2	8	35	7	4	7	2	73	1	25	152	11	**327**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
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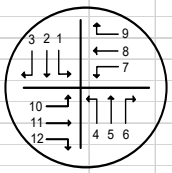
2:00-2:15													
2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**305**
3:30-3:45													**653**
3:45-4:00													**993**
4:00-4:15	5	17	40	30	15	13	2	65	2	16	99	1	**1,337**
4:15-4:30	6	21	48	22	11	14	3	75		18	121	9	**1,367**
4:30-4:45	5	23	52	35	3	9	1	74		11	111	16	**1,371**
4:45-5:00	3	20	36	33	6	9	5	74		9	138	11	**1,359**
5:00-5:15	1	22	35	42	7	4		80		7	126	11	**1,360**
5:15-5:30	5	19	48	41	5	2	3	93		14	107	15	**1,316**
5:30-5:45	3	15	41	29	4	5	1	86		11	108	25	**1,235**
5:45-6:00	3	16	36	18	6	5	1	107		7	123	23	**1,114**
6:00-6:15	2	4	35	24	4	6		96		7	98	15	**936**
6:15-6:30	5	9	29	23	4	3	3	91		6	91	7	**645**
6:30-6:45	1	12	31	12	3	4	4	64		6	62	8	**374**
6:45-7:00	2	8	21	15	2	1		51		8	58	1	**167**
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	60	249	678	378	106	104	44	1,442	10	318	2,326	245	
AM PK HR	12	31	119	23	13	22	7	241	6	114	580	49	8:00 AM - 9:00 AM
MID PK HR													
PM PK HR	19	81	176	120	35	45	11	288	2	54	469	37	4:00 PM - 5:00 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: 8th Avenue & ChurchStreet
DATE: 6/29/2016
RECORDER: SCU3FB/Zack Murphy
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	8th Avenue			8th Avenue			Church Street			Church Street			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:00-6:15 AM													
6:15-6:30													**369**
6:30-6:45													**730**
6:45-7:00													**1,136**
7:00-7:15	9	62	6	28	95	11	4	32	6	21	82	13	**1,585**
7:15-7:30	10	50	4	23	82	20	3	32	7	13	100	17	**1,651**
7:30-7:45	12	65	7	27	106	13	1	40	7	13	102	13	**1,715**
7:45-8:00	8	72	1	27	106	30	3	44	5	12	119	22	**1,739**
8:00-8:15	10	83	4	26	98	21	8	31	3	12	120	19	**1,738**
8:15-8:30	17	71	8	17	102	24	5	30	1	11	123	16	**1,303**
8:30-8:45	17	76	7	18	86	27	5	45	5	11	108	25	**878**
8:45-9:00	11	70	6	31	94	27	5	37		22	117	28	**448**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
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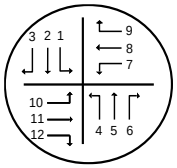
2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**422**
3:30-3:45													**890**
3:45-4:00													**1,348**
4:00-4:15	9	77	1	23	107	13	12	51	8	37	67	17	**1,819**
4:15-4:30	23	77	2	25	110	18	12	52	7	41	73	28	**1,873**
4:30-4:45	11	91	1	25	131	12	8	50	8	35	52	34	**1,841**
4:45-5:00	11	80	5	30	119	17	6	49	8	39	81	26	**1,844**
5:00-5:15	9	80	5	21	129	14	12	59	15	26	76	30	**1,822**
5:15-5:30	13	77	1	35	106	12	7	59	10	20	67	29	**1,774**
5:30-5:45	12	80	8	25	122	19	10	60	9	13	63	40	**1,687**
5:45-6:00	6	63	2	28	112	16	10	72	10	36	57	37	**1,505**
6:00-6:15	8	66	3	26	116	16	8	71	5	14	58	37	**1,294**
6:15-6:30	3	57	3	28	75	11	10	60	5	15	64	18	**866**
6:30-6:45	7	53	1	23	64	11	7	45	5	14	42	7	**517**
6:45-7:00	3	58	2	15	49	2	8	35	2	16	38	10	**238**
7:00-7:15													
7:15-7:30													
7:30-7:45													
7:45-8:00													
8:00-8:15													
8:15-8:30													
8:30-8:45													
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	209	1,408	77	501	2,009	334	144	954	126	421	1,609	466	
AM PK HR	55	300	25	92	380	99	23	143	9	56	468	88	8:00 AM - 9:00 AM
MID PK HR													
PM PK HR	54	325	9	103	467	60	38	202	31	152	273	105	4:00 PM - 5:00 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: 9TH AVE & COMMERCE
DATE: 9/24/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	**9TH AVE**			**9TH AVE**			**COMMERCE**			**COMMERCE**			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**57**
6:30-6:45													**138**
6:45-7:00													**238**
7:00-7:15		7			11	9	20		6		2	2	**371**
7:15-7:30	3	10			17	19	17		2	3	3	7	**401**
7:30-7:45	4	8			16	25	28		4	1	6	8	**414**
7:45-8:00	1	15			22	32	44		5	3	3	8	**381**
8:00-8:15	4	9			10	18	27		5	1	2	11	**312**
8:15-8:30	7	16			4	2	34		5	3	7	16	**225**
8:30-8:45	4	12			2		36		4	1	5	3	**131**
8:45-9:00	3	17				2	22		10		4	6	**64**
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00													
10:00-10:15													
10:15-10:30													
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2:15-2:30													
2:30-2:45													
2:45-3:00													
3:00-3:15													
3:15-3:30													**167**
3:30-3:45													**333**
3:45-4:00													**528**
4:00-4:15	6	32			13	10	67		16	3	7	13	**704**
4:15-4:30	5	43			6	8	69		14	3	8	10	**733**
4:30-4:45	4	45			14	16	73		19	5	8	11	**753**
4:45-5:00	6	44			18	11	76		11	2	5	3	**731**
5:00-5:15	9	39			21	11	83		14	3	9	7	**690**
5:15-5:30	7	41			20	11	78		16	4	3	6	**494**
5:30-5:45	6	26			17	20	67		18	2	7	10	**308**
5:45-6:00	4	19		1	6	18	66		7	3	7	4	**135**
6:00-6:15													
6:15-6:30													
6:30-6:45													
6:45-7:00													
7:00-7:15													
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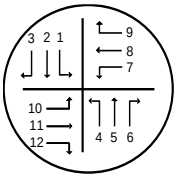
8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	73	383		1	197	212	807		156	37	86	125	
AM PK HR	16	48			52	77	133		19	8	18	43	7:30 AM - 8:30 AM
MID PK HR													
PM PK HR	28	150			76	53	304		59	11	24	26	4:45 PM - 5:45 PM



North

INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: ROSA PARKS-8TH & COMMERCE
DATE: 9/24/2019
RECORDER: ZHIWAR RASHID
NOTES:

	Southbound			Northbound			Westbound			Eastbound			
LOCATION	ROSA/8TH			ROSA/8TH			COMMERCE			COMMERCE			
TIME	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	
6:00-6:15 AM													
6:15-6:30													**347**
6:30-6:45													**719**
6:45-7:00													**1,197**
7:00-7:15	12	63	5	6	154	46	26	16	8	3	8		**1,655**
7:15-7:30	19	81	2	4	149	51	20	12	13	1	17	3	**1,719**
7:30-7:45	17	90	6	6	181	75	17	22	23	7	24	10	**1,747**
7:45-8:00	28	105	8	10	151	62	21	26	13	6	27	1	**1,678**
8:00-8:15	19	106	7	2	134	61	18	25	15	1	17	6	**1,631**
8:15-8:30	24	93	5	6	134	59	18	26	19	2	8	6	**1,220**
8:30-8:45	16	107	8	7	150	55	20	26	11	4	4	1	**820**
8:45-9:00	23	115	5	7	151	53	19	18	12		2	6	**411**
9:00-9:15													
9:15-9:30													
9:30-9:45													
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2:45-3:00													
3:00-3:15													
3:15-3:30													**475**
3:30-3:45													**965**
3:45-4:00													**1,409**
4:00-4:15	9	102	3	1	154	14	31	77	60	5	10	9	**1,907**
4:15-4:30	5	79	4	2	178	15	51	77	56	9	7	7	**1,962**
4:30-4:45	10	70	2	1	151	19	37	74	57	6	10	7	**1,978**
4:45-5:00	9	93	6	1	176	18	35	79	59	3	11	8	**2,050**
5:00-5:15	8	75	5	1	186	22	44	90	68	3	16	12	**2,049**
5:15-5:30	11	72		3	174	18	53	87	69	6	8	5	**1,519**
5:30-5:45	7	77	5	1	173	23	54	81	62	11	16	6	**1,013**
5:45-6:00	14	82	6		177	26	51	66	43	9	15	8	**497**
6:00-6:15													
6:15-6:30													
6:30-6:45													
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8:45-9:00													
9:00-9:15													
9:15-9:30													
9:30-9:45													
9:45-10:00 PM													
TOTAL	231	1,410	77	58	2,573	617	515	802	588	76	200	95	
AM PK HR	88	394	26	24	600	257	74	99	70	16	76	23	7:30 AM - 8:30 AM
MID PK HR													
PM PK HR	35	317	16	6	709	81	186	337	258	23	51	31	4:45 PM - 5:45 PM

APPENDIX D – TRIP GENERATION WORKSHEETS

801 CHURCH TRIP GENERATION

ITE CODE	LAND USE	# UNITS	UNIT TYPE	Weekday/ADT	AM Enter	AM Exit	AM Total	PM Enter	PM Exit	PM Total
222	Multifamily Housing (High-Rise)	350	units	756	29	48	77	47	34	81
			ITE Rate per Unit	*2.16*	*38%*	*62%*	*0.22*	*58%*	*42%*	*0.23*
876	Apparel	2.645	ksf	176	2	1	3	6	5	11
			ITE Rate per Unit	*66.4*	*80%*	*20%*	*1*	*51%*	*49%*	*4.12*
		Total New Vehicle Trips		**932**	31	49	**80**	53	39	**92**

APPENDIX E – CAPACITY ANALYSIS REPORTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	752	64	9	312	8	30	17	29	16	40	154
Future Volume (veh/h)	148	752	64	9	312	8	30	17	29	16	40	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	161	817	70	10	339	9	33	18	32	17	43	167
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	779	1183	101	350	1263	34	168	73	130	80	170	192
Arrive On Green	0.77	0.77	0.77	1.00	1.00	1.00	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	930	1529	131	564	1632	43	1055	543	966	305	1262	1427
Grp Volume(v), veh/h	161	0	887	10	0	348	33	0	50	60	0	167
Grp Sat Flow(s),veh/h/ln	930	0	1660	564	0	1676	1055	0	1509	1567	0	1427
Q Serve(g_s), s	5.7	0.0	31.2	0.7	0.0	0.0	3.5	0.0	3.6	0.0	0.0	13.8
Cycle Q Clear(g_c), s	5.7	0.0	31.2	31.9	0.0	0.0	7.3	0.0	3.6	3.8	0.0	13.8
Prop In Lane	1.00		0.08	1.00		0.03	1.00		0.64	0.28		1.00
Lane Grp Cap(c), veh/h	779	0	1284	350	0	1296	168	0	203	250	0	192
V/C Ratio(X)	0.21	0.00	0.69	0.03	0.00	0.27	0.20	0.00	0.25	0.24	0.00	0.87
Avail Cap(c_a), veh/h	779	0	1284	350	0	1296	281	0	365	412	0	345
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.81	0.00	0.81	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	0.0	6.6	5.4	0.0	0.0	49.9	0.0	46.5	46.6	0.0	50.9
Incr Delay (d2), s/veh	0.6	0.0	3.1	0.1	0.0	0.4	0.2	0.0	0.2	0.2	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.9	0.0	15.1	0.2	0.0	0.3	1.7	0.0	2.4	2.9	0.0	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.3	0.0	9.7	5.5	0.0	0.4	50.1	0.0	46.7	46.8	0.0	55.5
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	E
Approach Vol, veh/h		1048			358			83			227	
Approach Delay, s/veh		8.8			0.6			48.0			53.2	
Approach LOS		A			A			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	97.8	22.2	97.8	22.2
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	80.0	29.0	80.0	29.0
Max Q Clear Time (g_c+I1), s	33.2	15.8	33.9	9.3
Green Ext Time (p_c), s	6.0	0.4	1.5	0.2

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

Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	739	124	247	129	535	139	77	458
v/c Ratio	0.95	0.16	0.50	0.67	0.54	0.26	0.29	0.97
Control Delay	48.1	4.7	24.6	44.2	22.6	3.7	25.4	78.6
Queue Delay	43.9	1.2	0.3	0.0	0.0	0.0	0.0	0.0
Total Delay	92.0	5.9	24.9	44.2	22.6	3.7	25.4	78.6
Queue Length 50th (ft)	542	0	124	20	188	34	37	349
Queue Length 95th (ft)	#804	m47	205	#117	126	3	69	#566
Internal Link Dist (ft)	132		285		188			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	775	776	492	199	988	538	290	472
Starvation Cap Reductn	198	481	0	0	0	0	0	0
Spillback Cap Reductn	0	0	39	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	0.42	0.55	0.65	0.54	0.26	0.27	0.97

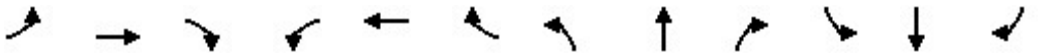
Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	607	114	30	185	12	119	492	128	71	389	32
Future Volume (vph)	73	607	114	30	185	12	119	492	128	71	389	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1668	1425		1654		1593	3185	1425	1593	1657	
Flt Permitted		0.93	1.00		0.59		0.16	1.00	1.00	0.36	1.00	
Satd. Flow (perm)		1561	1425		989		270	3185	1425	604	1657	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	660	124	33	201	13	129	535	139	77	423	35
RTOR Reduction (vph)	0	0	64	0	2	0	0	0	96	0	2	0
Lane Group Flow (vph)	0	739	60	0	245	0	129	535	43	77	456	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		58.5	58.5		58.5		45.7	37.2	37.2	41.3	35.0	
Effective Green, g (s)		58.5	58.5		58.5		45.7	37.2	37.2	41.3	35.0	
Actuated g/C Ratio		0.49	0.49		0.49		0.38	0.31	0.31	0.34	0.29	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		760	694		482		196	987	441	259	483	
v/s Ratio Prot							c0.05	0.17		0.02	c0.28	
v/s Ratio Perm		c0.47	0.04		0.25		0.20		0.03	0.09		
v/c Ratio		0.97	0.09		0.51		0.66	0.54	0.10	0.30	0.94	
Uniform Delay, d1		30.0	16.5		21.0		28.2	34.3	29.5	27.4	41.5	
Progression Factor		0.96	1.94		1.00		1.17	0.58	0.48	1.00	1.00	
Incremental Delay, d2		22.7	0.2		0.8		5.4	0.3	0.0	0.2	27.0	
Delay (s)		51.5	32.1		21.8		38.3	20.3	14.1	27.6	68.5	
Level of Service		D	C		C		D	C	B	C	E	
Approach Delay (s)		48.7			21.8			22.1			62.7	
Approach LOS		D			C			C			E	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

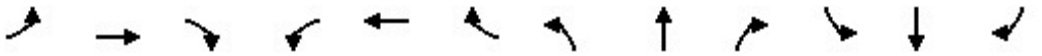
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	121	14	82	75	57	45	704	152	92	388	26
Future Volume (veh/h)	13	121	14	82	75	57	45	704	152	92	388	26
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	132	15	89	82	62	49	765	165	100	422	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	184	164	19	187	208	158	604	1727	372	396	1181	78
Arrive On Green	0.03	0.03	0.03	0.06	0.21	0.21	0.59	0.59	0.59	0.04	0.68	0.68
Sat Flow, veh/h	1244	1649	187	1781	988	747	940	2907	627	1781	1735	115
Grp Volume(v), veh/h	14	0	147	89	0	144	49	468	462	100	0	450
Grp Sat Flow(s),veh/h/ln	1244	0	1837	1781	0	1736	940	1777	1757	1781	0	1850
Q Serve(g_s), s	1.3	0.0	9.5	5.2	0.0	8.6	2.8	17.4	17.4	2.5	0.0	12.3
Cycle Q Clear(g_c), s	1.3	0.0	9.5	5.2	0.0	8.6	4.7	17.4	17.4	2.5	0.0	12.3
Prop In Lane	1.00		0.10	1.00		0.43	1.00		0.36	1.00		0.06
Lane Grp Cap(c), veh/h	184	0	183	187	0	366	604	1055	1044	396	0	1259
V/C Ratio(X)	0.08	0.00	0.80	0.48	0.00	0.39	0.08	0.44	0.44	0.25	0.00	0.36
Avail Cap(c_a), veh/h	324	0	390	211	0	586	604	1055	1044	538	0	1259
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.00	0.09	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.9	0.0	56.9	43.7	0.0	40.7	11.3	13.4	13.4	9.8	0.0	8.1
Incr Delay (d2), s/veh	0.0	0.0	0.3	0.7	0.0	0.3	0.3	1.3	1.4	0.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	0.0	5.8	4.2	0.0	6.7	1.1	11.6	11.5	1.7	0.0	8.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	0.0	57.2	44.5	0.0	41.0	11.5	14.8	14.8	9.9	0.0	8.9
LnGrp LOS	D	A	E	D	A	D	B	B	B	A	A	A
Approach Vol, veh/h		161			233			979			550	
Approach Delay, s/veh		56.8			42.3			14.6			9.1	
Approach LOS		E			D			B			A	

Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	10.4	77.8	13.4	18.5		88.2		31.8				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	4.0	46.5	8.5	25.5		66.5		40.5				
Max Q Clear Time (g_c+I1), s	4.5	19.4	7.2	11.5		14.3		10.6				
Green Ext Time (p_c), s	0.1	4.5	0.0	0.4		2.0		0.5				

Intersection Summary	
HCM 6th Ctrl Delay	19.9
HCM 6th LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	18	43	45	0	58	0	57	61	48	39	0
Future Volume (veh/h)	8	18	43	45	0	58	0	57	61	48	39	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	9	20	47	49	0	63	0	62	66	52	42	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	2	0	2	2	2	2	0
Cap, veh/h	0	323	758	124	0	0	0	79	84	151	330	0
Arrive On Green	0.74	0.65	0.65	0.04	0.00	0.00	0.00	0.10	0.10	0.04	0.18	0.00
Sat Flow, veh/h	0	496	1165	1781	49		0	829	882	1781	1870	0
Grp Volume(v), veh/h	0	0	67	49	59.2		0	0	128	52	42	0
Grp Sat Flow(s),veh/h/ln	0	0	1661	1781	E		0	0	1712	1781	1870	0
Q Serve(g_s), s	0.0	0.0	1.8	3.3			0.0	0.0	8.8	3.1	2.3	0.0
Cycle Q Clear(g_c), s	0.0	0.0	1.8	3.3			0.0	0.0	8.8	3.1	2.3	0.0
Prop In Lane	0.00		0.70	1.00			0.00		0.52	1.00		0.00
Lane Grp Cap(c), veh/h	0	0	1081	124			0	0	163	151	330	0
V/C Ratio(X)	0.00	0.00	0.06	0.39			0.00	0.00	0.78	0.35	0.13	0.00
Avail Cap(c_a), veh/h	0	0	1081	217			0	0	521	303	569	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	0.97			0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	7.6	57.3			0.0	0.0	53.1	45.5	41.6	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.1	2.0			0.0	0.0	8.0	1.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	0.0	1.2	2.8			0.0	0.0	7.4	2.6	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	7.7	59.2			0.0	0.0	61.1	46.8	41.8	0.0
LnGrp LOS	A	A	A	E			A	A	E	D	D	A
Approach Vol, veh/h		67						128			94	
Approach Delay, s/veh		7.7						61.1			44.6	
Approach LOS		A						E			D	

Timer - Assigned Phs	1	2		4	5		7	8				
Phs Duration (G+Y+Rc), s	9.8	83.6		26.7	93.3		9.7	16.9				
Change Period (Y+Rc), s	5.5	5.5		5.5	4.5		5.5	5.5				
Max Green Setting (Gmax), s	10.5	36.5		36.5	5.0		14.5	36.5				
Max Q Clear Time (g_c+I1), s	5.3	3.8		4.3	0.0		5.1	10.8				
Green Ext Time (p_c), s	0.0	0.3		0.2	0.0		0.1	0.7				

Intersection Summary	
HCM 6th Ctrl Delay	45.7
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	608	48	14	373	3	156	45	58	25	105	228
Future Volume (veh/h)	70	608	48	14	373	3	156	45	58	25	105	228
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	76	661	52	15	405	3	170	49	63	27	114	248
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	664	1066	84	361	1155	9	194	149	192	81	306	318
Arrive On Green	0.69	0.69	0.69	1.00	1.00	1.00	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	880	1540	121	663	1669	12	918	669	860	214	1371	1427
Grp Volume(v), veh/h	76	0	713	15	0	408	170	0	112	141	0	248
Grp Sat Flow(s),veh/h/ln	880	0	1662	663	0	1681	918	0	1529	1585	0	1427
Q Serve(g_s), s	3.8	0.0	30.1	1.0	0.0	0.0	19.7	0.0	8.0	1.3	0.0	21.3
Cycle Q Clear(g_c), s	3.8	0.0	30.1	31.1	0.0	0.0	29.0	0.0	8.0	9.3	0.0	21.3
Prop In Lane	1.00		0.07	1.00		0.01	1.00		0.56	0.19		1.00
Lane Grp Cap(c), veh/h	664	0	1150	361	0	1164	194	0	341	387	0	318
V/C Ratio(X)	0.11	0.00	0.62	0.04	0.00	0.35	0.88	0.00	0.33	0.36	0.00	0.78
Avail Cap(c_a), veh/h	664	0	1150	361	0	1164	194	0	341	387	0	318
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.56	0.00	0.56	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.7	0.0	10.8	5.2	0.0	0.0	57.0	0.0	42.3	42.8	0.0	47.5
Incr Delay (d2), s/veh	0.3	0.0	2.5	0.1	0.0	0.5	32.1	0.0	0.2	0.2	0.0	10.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.4	0.0	16.5	0.2	0.0	0.3	11.8	0.0	5.5	7.0	0.0	13.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.1	0.0	13.3	5.3	0.0	0.5	89.0	0.0	42.5	43.0	0.0	58.2
LnGrp LOS	A	A	B	A	A	A	F	A	D	D	A	E
Approach Vol, veh/h		789			423			282			389	
Approach Delay, s/veh		12.7			0.6			70.6			52.7	
Approach LOS		B			A			E			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	95.0	35.0	95.0	35.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	90.0	29.0	80.0	29.0
Max Q Clear Time (g_c+I1), s	32.1	23.3	33.1	31.0
Green Ext Time (p_c), s	4.0	0.5	1.8	0.0

Intersection Summary	
HCM 6th Ctrl Delay	26.9
HCM 6th LOS	C

Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	599	148	381	145	658	85	76	471
v/c Ratio	1.14	0.20	0.81	0.63	0.59	0.15	0.31	0.92
Control Delay	113.9	11.0	46.2	45.6	53.0	16.2	23.6	68.0
Queue Delay	2.1	1.3	39.3	0.0	0.0	0.0	0.0	12.7
Total Delay	116.0	12.4	85.4	45.6	53.0	16.2	23.6	80.6
Queue Length 50th (ft)	~591	14	275	103	276	18	36	373
Queue Length 95th (ft)	#858	74	#495	m159	341	m55	63	#555
Internal Link Dist (ft)	132		285		188			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	527	737	470	261	1122	583	328	557
Starvation Cap Reductn	114	421	0	0	0	0	0	0
Spillback Cap Reductn	0	74	111	0	0	0	0	75
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.45	0.47	1.06	0.56	0.59	0.15	0.23	0.98

Intersection Summary

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

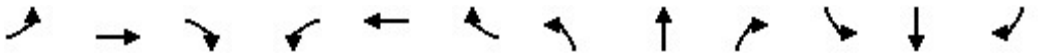
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	354	136	49	262	40	133	605	78	70	421	12
Future Volume (vph)	197	354	136	49	262	40	133	605	78	70	421	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		0.98		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1647	1425		1640		1593	3185	1425	1593	1670	
Flt Permitted		0.67	1.00		0.60		0.17	1.00	1.00	0.31	1.00	
Satd. Flow (perm)		1120	1425		993		278	3185	1425	516	1670	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	385	148	53	285	43	145	658	85	76	458	13
RTOR Reduction (vph)	0	0	68	0	3	0	0	0	55	0	1	0
Lane Group Flow (vph)	0	599	80	0	378	0	145	658	30	76	470	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		60.0	60.0		60.0		56.6	45.5	45.5	47.4	40.9	
Effective Green, g (s)		60.0	60.0		60.0		56.6	45.5	45.5	47.4	40.9	
Actuated g/C Ratio		0.46	0.46		0.46		0.44	0.35	0.35	0.36	0.31	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		516	657		458		233	1114	498	241	525	
v/s Ratio Prot							c0.05	c0.21		0.02	c0.28	
v/s Ratio Perm		c0.53	0.06		0.38		0.22		0.02	0.10		
v/c Ratio		1.16	0.12		0.82		0.62	0.59	0.06	0.32	0.90	
Uniform Delay, d1		35.0	20.0		30.4		27.0	34.6	28.0	28.0	42.5	
Progression Factor		1.02	1.88		1.00		1.58	1.46	11.74	1.00	1.00	
Incremental Delay, d2		89.4	0.3		11.5		3.3	0.5	0.0	0.3	17.3	
Delay (s)		125.2	37.9		41.9		46.0	51.2	329.3	28.2	59.8	
Level of Service		F	D		D		D	D	F	C	E	
Approach Delay (s)		107.9			41.9			77.0			55.4	
Approach LOS		F			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	76.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	107.5%	ICU Level of Service	G
Analysis Period (min)	15		

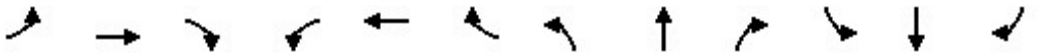
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	83	100	172	347	118	17	645	60	34	569	14
Future Volume (veh/h)	36	83	100	172	347	118	17	645	60	34	569	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	39	90	109	187	377	128	18	701	65	37	618	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	110	137	166	306	436	148	336	1659	154	356	1043	25
Arrive On Green	0.06	0.06	0.06	0.10	0.33	0.33	0.50	0.50	0.50	0.02	0.57	0.57
Sat Flow, veh/h	894	770	933	1781	1335	453	794	3288	305	1781	1818	44
Grp Volume(v), veh/h	39	0	199	187	0	505	18	379	387	37	0	633
Grp Sat Flow(s),veh/h/ln	894	0	1703	1781	0	1789	794	1777	1816	1781	0	1862
Q Serve(g_s), s	5.6	0.0	14.9	10.8	0.0	34.4	1.9	17.4	17.5	1.3	0.0	28.6
Cycle Q Clear(g_c), s	20.8	0.0	14.9	10.8	0.0	34.4	21.6	17.4	17.5	1.3	0.0	28.6
Prop In Lane	1.00		0.55	1.00		0.25	1.00		0.17	1.00		0.02
Lane Grp Cap(c), veh/h	110	0	303	306	0	584	336	897	916	356	0	1068
V/C Ratio(X)	0.35	0.00	0.66	0.61	0.00	0.86	0.05	0.42	0.42	0.10	0.00	0.59
Avail Cap(c_a), veh/h	140	0	360	316	0	626	336	897	916	438	0	1068
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.00	0.09	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.6	0.0	57.3	37.7	0.0	41.1	27.8	20.3	20.3	15.4	0.0	17.9
Incr Delay (d2), s/veh	0.1	0.0	0.2	2.3	0.0	10.8	0.3	1.5	1.4	0.0	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.9	0.0	8.1	8.6	0.0	23.6	0.7	12.1	12.3	0.9	0.0	18.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.7	0.0	57.5	40.0	0.0	51.8	28.1	21.7	21.7	15.5	0.0	20.3
LnGrp LOS	E	A	E	D	A	D	C	C	C	B	A	C
Approach Vol, veh/h		238			692			784			670	
Approach Delay, s/veh		59.1			48.6			21.9			20.1	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	8.9	72.1	19.3	29.6		81.0		49.0				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	9.0	54.5	13.5	27.5		61.5		45.5				
Max Q Clear Time (g_c+I1), s	3.3	23.6	12.8	22.8		30.6		36.4				
Green Ext Time (p_c), s	0.0	3.4	0.0	0.4		3.0		1.5				

Intersection Summary	
HCM 6th Ctrl Delay	32.9
HCM 6th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	24	26	170	0	126	0	70	58	188	84	0
Future Volume (veh/h)	11	24	26	170	0	126	0	70	58	188	84	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	0	1870	0	1870	1870	1870	1870	0
Adj Flow Rate, veh/h	12	26	28	185	0	137	0	76	63	204	91	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	2	0	2	2	2	2	0
Cap, veh/h	0	450	485	255	0	0	0	94	78	212	402	0
Arrive On Green	0.71	0.55	0.55	0.11	0.00	0.00	0.00	0.10	0.10	0.07	0.22	0.00
Sat Flow, veh/h	0	824	887	1781	185		0	946	784	1781	1870	0
Grp Volume(v), veh/h	0	0	54	185	60.9		0	0	139	204	91	0
Grp Sat Flow(s),veh/h/ln	0	0	1711	1781	E		0	0	1729	1781	1870	0
Q Serve(g_s), s	0.0	0.0	1.9	13.4			0.0	0.0	10.2	9.5	5.2	0.0
Cycle Q Clear(g_c), s	0.0	0.0	1.9	13.4			0.0	0.0	10.2	9.5	5.2	0.0
Prop In Lane	0.00		0.52	1.00			0.00		0.45	1.00		0.00
Lane Grp Cap(c), veh/h	0	0	935	255			0	0	172	212	402	0
V/C Ratio(X)	0.00	0.00	0.06	0.73			0.00	0.00	0.81	0.96	0.23	0.00
Avail Cap(c_a), veh/h	0	0	935	255			0	0	459	212	496	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	0.36			0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	13.8	57.2			0.0	0.0	57.3	52.3	42.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.1	3.7			0.0	0.0	8.6	51.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.0	0.0	1.4	8.7			0.0	0.0	8.5	8.8	4.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	13.9	60.9			0.0	0.0	65.9	103.6	42.4	0.0
LnGrp LOS	A	A	B	E			A	A	E	F	D	A
Approach Vol, veh/h		54						139			295	
Approach Delay, s/veh		13.9						65.9			84.7	
Approach LOS		B						E			F	

Timer - Assigned Phs	1	2		4	5		7	8				
Phs Duration (G+Y+Rc), s	20.0	76.5		33.5	96.5		15.0	18.5				
Change Period (Y+Rc), s	5.5	5.5		5.5	4.5		5.5	5.5				
Max Green Setting (Gmax), s	14.5	49.5		34.5	5.0		9.5	34.5				
Max Q Clear Time (g_c+I1), s	15.4	3.9		7.2	0.0		11.5	12.2				
Green Ext Time (p_c), s	0.0	0.3		0.4	0.0		0.0	0.7				

Intersection Summary	
HCM 6th Ctrl Delay	68.6
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	884	209	131	813	9	164	21	69	17	47	167
Future Volume (veh/h)	160	884	209	131	813	9	164	21	69	17	47	167
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	174	961	227	142	884	10	178	23	75	18	51	182
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	434	879	208	60	1109	13	252	83	272	111	287	343
Arrive On Green	0.67	0.67	0.67	1.00	1.00	1.00	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	560	1316	311	424	1661	19	1033	347	1132	306	1192	1427
Grp Volume(v), veh/h	174	0	1188	142	0	894	178	0	98	69	0	182
Grp Sat Flow(s),veh/h/ln	560	0	1627	424	0	1680	1033	0	1480	1498	0	1427
Q Serve(g_s), s	18.0	0.0	80.1	0.0	0.0	0.0	20.3	0.0	6.5	0.0	0.0	13.3
Cycle Q Clear(g_c), s	18.0	0.0	80.1	80.1	0.0	0.0	26.8	0.0	6.5	6.5	0.0	13.3
Prop In Lane	1.00		0.19	1.00		0.01	1.00		0.77	0.26		1.00
Lane Grp Cap(c), veh/h	434	0	1087	60	0	1122	252	0	356	398	0	343
V/C Ratio(X)	0.40	0.00	1.09	2.37	0.00	0.80	0.71	0.00	0.28	0.17	0.00	0.53
Avail Cap(c_a), veh/h	434	0	1087	60	0	1122	254	0	358	400	0	345
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.6	0.0	19.9	40.1	0.0	0.0	48.0	0.0	37.1	36.1	0.0	39.7
Incr Delay (d2), s/veh	2.7	0.0	56.3	619.6	0.0	0.6	7.3	0.0	0.2	0.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.3	0.0	59.1	20.4	0.0	0.3	9.6	0.0	4.3	2.9	0.0	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	0.0	76.3	659.6	0.0	0.6	55.3	0.0	37.2	36.2	0.0	40.5
LnGrp LOS	B	A	F	F	A	A	E	A	D	D	A	D
Approach Vol, veh/h		1362			1036			276			251	
Approach Delay, s/veh		68.1			90.9			48.9			39.3	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	85.1		34.9		85.1		34.9					
Change Period (Y+Rc), s	5.0		6.0		5.0		6.0					
Max Green Setting (Gmax), s	80.0		29.0		80.0		29.0					
Max Q Clear Time (g_c+I1), s	82.1		15.3		82.1		28.8					
Green Ext Time (p_c), s	0.0		0.5		0.0		0.0					

Intersection Summary												
HCM 6th Ctrl Delay		71.9										
HCM 6th LOS		E										

Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	882	170	529	342	618	173	84	750
v/c Ratio	1.37	0.22	3.02	1.99	0.62	0.31	0.35	1.61
Control Delay	200.6	9.9	942.0	485.5	23.0	3.3	26.6	314.1
Queue Delay	2.4	2.7	8.7	0.0	0.0	0.0	0.0	0.1
Total Delay	203.0	12.6	950.7	485.5	23.0	3.3	26.6	314.1
Queue Length 50th (ft)	~905	32	~585	~361	163	10	40	~828
Queue Length 95th (ft)	m#929	m42	#803	#580	188	m22	75	#1069
Internal Link Dist (ft)	132		285		188			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	643	769	175	172	1000	566	263	466
Starvation Cap Reductn	172	488	0	0	0	0	0	0
Spillback Cap Reductn	0	0	63	0	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.87	0.60	4.72	1.99	0.62	0.31	0.32	1.62

Intersection Summary

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

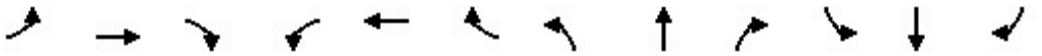
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	694	156	56	418	13	315	569	159	77	462	228
Future Volume (vph)	118	694	156	56	418	13	315	569	159	77	462	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	0.95	
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1664	1425		1661		1593	3185	1425	1593	1593	
Flt Permitted		0.78	1.00		0.21		0.11	1.00	1.00	0.30	1.00	
Satd. Flow (perm)		1308	1425		354		178	3185	1425	508	1593	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	754	170	61	454	14	342	618	173	84	502	248
RTOR Reduction (vph)	0	0	70	0	1	0	0	0	119	0	15	0
Lane Group Flow (vph)	0	882	100	0	528	0	342	618	54	84	735	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		57.8	57.8		57.8		46.7	37.7	37.7	41.7	35.2	
Effective Green, g (s)		57.8	57.8		57.8		46.7	37.7	37.7	41.7	35.2	
Actuated g/C Ratio		0.48	0.48		0.48		0.39	0.31	0.31	0.35	0.29	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		630	686		170		175	1000	447	235	467	
v/s Ratio Prot							c0.15	0.19		0.02	0.46	
v/s Ratio Perm		0.67	0.07		c1.49		c0.61		0.04	0.10		
v/c Ratio		1.40	0.15		3.11		1.95	0.62	0.12	0.36	1.57	
Uniform Delay, d1		31.1	17.3		31.1		30.6	35.0	29.3	27.4	42.4	
Progression Factor		1.10	2.13		1.00		1.60	0.57	0.46	1.00	1.00	
Incremental Delay, d2		183.5	0.2		962.9		444.4	0.6	0.0	0.3	268.6	
Delay (s)		217.8	37.0		994.0		493.3	20.7	13.4	27.7	311.0	
Level of Service		F	D		F		F	C	B	C	F	
Approach Delay (s)		188.6			994.0			162.3			282.4	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	322.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	154.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	150	80	98	123	75	197	955	170	103	465	78
Future Volume (veh/h)	51	150	80	98	123	75	197	955	170	103	465	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	55	163	87	107	134	82	214	1038	185	112	505	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	250	187	100	197	304	186	412	1558	277	259	954	161
Arrive On Green	0.05	0.05	0.05	0.06	0.28	0.28	0.52	0.52	0.52	0.04	0.61	0.61
Sat Flow, veh/h	1165	1148	613	1781	1086	665	826	3015	536	1781	1560	263
Grp Volume(v), veh/h	55	0	250	107	0	216	214	611	612	112	0	590
Grp Sat Flow(s),veh/h/ln	1165	0	1760	1781	0	1751	826	1777	1774	1781	0	1823
Q Serve(g_s), s	5.4	0.0	16.9	5.8	0.0	12.2	24.1	30.4	30.5	3.4	0.0	22.3
Cycle Q Clear(g_c), s	5.4	0.0	16.9	5.8	0.0	12.2	35.0	30.4	30.5	3.4	0.0	22.3
Prop In Lane	1.00		0.35	1.00		0.38	1.00		0.30	1.00		0.14
Lane Grp Cap(c), veh/h	250	0	286	197	0	491	412	919	917	259	0	1115
V/C Ratio(X)	0.22	0.00	0.87	0.54	0.00	0.44	0.52	0.67	0.67	0.43	0.00	0.53
Avail Cap(c_a), veh/h	308	0	374	211	0	591	412	919	917	388	0	1115
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.98	0.00	0.98	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.1	0.0	55.5	38.3	0.0	35.5	26.7	21.3	21.4	17.2	0.0	13.4
Incr Delay (d2), s/veh	0.2	0.0	13.4	1.0	0.0	0.2	4.6	3.8	3.8	0.4	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.0	0.0	14.0	4.7	0.0	9.0	9.0	19.2	19.3	2.4	0.0	14.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	0.0	68.9	39.3	0.0	35.7	31.3	25.1	25.2	17.7	0.0	15.2
LnGrp LOS	D	A	E	D	A	D	C	C	C	B	A	B
Approach Vol, veh/h		305			323			1437			702	
Approach Delay, s/veh		65.6			36.9			26.1			15.6	
Approach LOS		E			D			C			B	

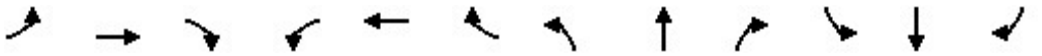
Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	11.3	68.5	14.1	26.0		79.9		40.1				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	14.0	46.5	8.5	25.5		66.5		40.5				
Max Q Clear Time (g_c+I1), s	5.4	37.0	7.8	18.9		24.3		14.2				
Green Ext Time (p_c), s	0.1	4.7	0.0	0.6		2.8		0.8				

Intersection Summary	
HCM 6th Ctrl Delay	29.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	91	47	60	150	141	0	263	96	71	97	46
Future Volume (veh/h)	58	91	47	60	150	141	0	263	96	71	97	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	63	99	51	65	163	153	0	286	104	77	105	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	604	580	299	674	447	419	360	317	115	170	399	190
Arrive On Green	0.03	0.50	0.50	0.05	0.84	0.84	0.00	0.24	0.24	0.05	0.33	0.33
Sat Flow, veh/h	1781	1163	599	1781	887	833	1781	1309	476	1781	1197	570
Grp Volume(v), veh/h	63	0	150	65	0	316	0	0	390	77	0	155
Grp Sat Flow(s),veh/h/ln	1781	0	1762	1781	0	1720	1781	0	1785	1781	0	1768
Q Serve(g_s), s	2.1	0.0	5.6	2.1	0.0	5.1	0.0	0.0	25.4	3.8	0.0	7.7
Cycle Q Clear(g_c), s	2.1	0.0	5.6	2.1	0.0	5.1	0.0	0.0	25.4	3.8	0.0	7.7
Prop In Lane	1.00		0.34	1.00		0.48	1.00		0.27	1.00		0.32
Lane Grp Cap(c), veh/h	604	0	879	674	0	866	360	0	432	170	0	589
V/C Ratio(X)	0.10	0.00	0.17	0.10	0.00	0.36	0.00	0.00	0.90	0.45	0.00	0.26
Avail Cap(c_a), veh/h	714	0	879	775	0	866	573	0	543	305	0	589
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.87	0.00	0.87	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.9	0.0	16.5	13.6	0.0	5.1	0.0	0.0	44.1	33.8	0.0	29.3
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.1	0.0	1.0	0.0	0.0	15.8	1.9	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	4.3	1.5	0.0	3.1	0.0	0.0	19.0	3.1	0.0	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.0	0.0	16.9	13.7	0.0	6.2	0.0	0.0	59.9	35.7	0.0	29.5
LnGrp LOS	B	A	B	B	A	A	A	A	E	D	A	C
Approach Vol, veh/h		213			381			390			232	
Approach Delay, s/veh		16.0			7.5			59.9			31.5	
Approach LOS		B			A			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	65.3	0.0	45.5	8.6	65.9	10.9	34.6
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.0	5.5	5.5	5.5
Max Green Setting (Gmax), s	10.5	36.5	14.5	36.5	11.0	36.5	14.5	36.5
Max Q Clear Time (g_c+I1), s	4.1	7.6	0.0	9.7	4.1	7.1	5.8	27.4
Green Ext Time (p_c), s	0.1	0.9	0.0	0.9	0.1	2.1	0.1	1.6

Intersection Summary	
HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	1058	161	55	618	3	462	53	208	27	118	247
Future Volume (veh/h)	76	1058	161	55	618	3	462	53	208	27	118	247
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	83	1150	175	60	672	3	502	58	226	29	128	268
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	531	988	150	55	1159	5	60	67	261	43	154	318
Arrive On Green	0.69	0.69	0.69	1.00	1.00	1.00	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	687	1427	217	372	1674	7	890	301	1172	46	689	1427
Grp Volume(v), veh/h	83	0	1325	60	0	675	502	0	284	157	0	268
Grp Sat Flow(s),veh/h/ln	687	0	1644	372	0	1682	890	0	1472	736	0	1427
Q Serve(g_s), s	5.5	0.0	90.0	0.0	0.0	0.0	0.7	0.0	24.1	4.2	0.0	23.4
Cycle Q Clear(g_c), s	5.5	0.0	90.0	90.0	0.0	0.0	29.0	0.0	24.1	28.3	0.0	23.4
Prop In Lane	1.00		0.13	1.00		0.00	1.00		0.80	0.18		1.00
Lane Grp Cap(c), veh/h	531	0	1138	55	0	1164	60	0	328	197	0	318
V/C Ratio(X)	0.16	0.00	1.16	1.08	0.00	0.58	8.35	0.00	0.86	0.80	0.00	0.84
Avail Cap(c_a), veh/h	531	0	1138	55	0	1164	60	0	328	197	0	318
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.0	0.0	20.0	45.0	0.0	0.0	65.0	0.0	48.6	47.0	0.0	48.3
Incr Delay (d2), s/veh	0.6	0.0	83.7	60.9	0.0	0.2	3341.4	0.0	19.8	18.7	0.0	17.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.6	0.0	78.8	3.8	0.0	0.1	94.1	0.0	16.0	10.2	0.0	15.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.6	0.0	103.7	105.9	0.0	0.2	3406.4	0.0	68.4	65.7	0.0	65.5
LnGrp LOS	A	A	F	F	A	A	F	A	E	E	A	E
Approach Vol, veh/h		1408			735			786			425	
Approach Delay, s/veh		98.0			8.8			2200.3			65.6	
Approach LOS		F			A			F			E	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	95.0	35.0	95.0	35.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	90.0	29.0	80.0	29.0
Max Q Clear Time (g_c+I1), s	92.0	30.3	92.0	31.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	567.0
HCM 6th LOS	F

Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1043	355	540	251	770	134	83	654
v/c Ratio	2.70	0.52	14.59	1.13	0.64	0.22	0.34	1.20
Control Delay	783.6	22.7	6173.3	123.2	46.7	19.0	22.9	143.9
Queue Delay	1.1	52.8	20.0	0.0	0.0	0.0	0.0	3.1
Total Delay	784.7	75.5	6193.3	123.2	46.7	19.0	22.9	147.0
Queue Length 50th (ft)	~1499	159	~895	~203	303	41	37	~665
Queue Length 95th (ft)	m#1340	m135	#1121	m#338	m361	m78	68	#903
Internal Link Dist (ft)	132		285		188			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	387	689	37	222	1208	623	319	546
Starvation Cap Reductn	39	362	0	0	0	0	0	0
Spillback Cap Reductn	0	109	13	0	0	0	0	161
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	3.00	1.09	22.50	1.13	0.64	0.22	0.26	1.70

Intersection Summary

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

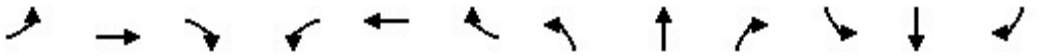
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	384	576	327	86	368	43	231	708	123	76	506	96
Future Volume (vph)	384	576	327	86	368	43	231	708	123	76	506	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected		0.98	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1644	1425		1643		1593	3185	1425	1593	1636	
Flt Permitted		0.55	1.00		0.05		0.08	1.00	1.00	0.27	1.00	
Satd. Flow (perm)		917	1425		82		137	3185	1425	447	1636	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	417	626	355	93	400	47	251	770	134	83	550	104
RTOR Reduction (vph)	0	0	87	0	3	0	0	0	83	0	5	0
Lane Group Flow (vph)	0	1043	268	0	537	0	251	770	51	83	649	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		55.0	55.0		55.0		63.0	49.3	49.3	50.7	43.0	
Effective Green, g (s)		55.0	55.0		55.0		63.0	49.3	49.3	50.7	43.0	
Actuated g/C Ratio		0.42	0.42		0.42		0.48	0.38	0.38	0.39	0.33	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		387	602		34		223	1207	540	242	541	
v/s Ratio Prot							c0.12	0.24		0.02	c0.40	
v/s Ratio Perm		1.14	0.19		c6.57		0.42		0.04	0.11		
v/c Ratio		2.70	0.45		15.80		1.13	0.64	0.09	0.34	1.20	
Uniform Delay, d1		37.5	26.7		37.5		40.4	33.0	26.0	26.1	43.5	
Progression Factor		1.20	1.45		1.00		0.97	1.33	4.01	1.00	1.00	
Incremental Delay, d2		763.5	0.2		6714.9		88.7	0.6	0.0	0.3	106.4	
Delay (s)		808.4	38.9		6752.4		127.9	44.5	104.3	26.4	149.9	
Level of Service		F	D		F		F	D	F	C	F	
Approach Delay (s)		613.0			6752.4			69.5			136.0	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	1222.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	8.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	157.3%	ICU Level of Service	H
Analysis Period (min)	15		

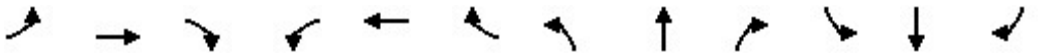
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	159	315	197	394	144	104	787	75	62	795	75
Future Volume (veh/h)	114	159	315	197	394	144	104	787	75	62	795	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	124	173	342	214	428	157	113	855	82	67	864	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	119	235	240	477	175	81	1496	143	270	899	85
Arrive On Green	0.07	0.07	0.07	0.10	0.37	0.37	0.46	0.46	0.46	0.03	0.53	0.53
Sat Flow, veh/h	830	561	1109	1781	1305	479	593	3276	314	1781	1682	160
Grp Volume(v), veh/h	124	0	515	214	0	585	113	464	473	67	0	946
Grp Sat Flow(s),veh/h/ln	830	0	1671	1781	0	1784	593	1777	1814	1781	0	1842
Q Serve(g_s), s	7.3	0.0	27.5	11.9	0.0	40.2	5.6	24.9	24.9	2.5	0.0	63.9
Cycle Q Clear(g_c), s	27.5	0.0	27.5	11.9	0.0	40.2	59.4	24.9	24.9	2.5	0.0	63.9
Prop In Lane	1.00		0.66	1.00		0.27	1.00		0.17	1.00		0.09
Lane Grp Cap(c), veh/h	102	0	353	240	0	652	81	811	828	270	0	985
V/C Ratio(X)	1.22	0.00	1.46	0.89	0.00	0.90	1.40	0.57	0.57	0.25	0.00	0.96
Avail Cap(c_a), veh/h	102	0	353	240	0	652	81	811	828	337	0	985
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.36	0.00	0.36	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.6	0.0	60.5	36.4	0.0	38.9	64.1	26.0	26.0	19.8	0.0	28.9
Incr Delay (d2), s/veh	126.3	0.0	211.4	30.1	0.0	14.8	237.4	2.9	2.9	0.2	0.0	20.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.8	0.0	46.9	11.6	0.0	27.5	14.4	16.6	16.9	1.9	0.0	42.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	198.9	0.0	271.9	66.6	0.0	53.8	301.5	28.9	28.8	19.9	0.0	49.6
LnGrp LOS	F	A	F	E	A	D	F	C	C	B	A	D
Approach Vol, veh/h		639			799			1050			1013	
Approach Delay, s/veh		257.7			57.2			58.2			47.6	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	10.1	65.9	20.0	34.0		76.0		54.0				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	4.0	54.5	13.5	27.5		61.5		45.5				
Max Q Clear Time (g_c+I1), s	4.5	61.4	13.9	29.5		65.9		42.2				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		0.0		0.9				

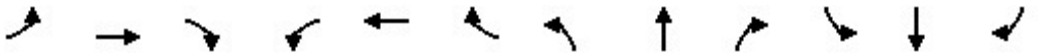
Intersection Summary	
HCM 6th Ctrl Delay	91.3
HCM 6th LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	259	28	196	121	167	0	165	104	280	298	29
Future Volume (veh/h)	132	259	28	196	121	167	0	165	104	280	298	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	282	30	213	132	182	0	179	113	304	324	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	667	817	87	608	368	508	197	202	127	213	509	50
Arrive On Green	0.06	0.49	0.49	0.13	0.86	0.86	0.00	0.19	0.19	0.07	0.30	0.30
Sat Flow, veh/h	1781	1662	177	1781	712	982	1781	1072	677	1781	1675	165
Grp Volume(v), veh/h	143	0	312	213	0	314	0	0	292	304	0	356
Grp Sat Flow(s),veh/h/ln	1781	0	1839	1781	0	1694	1781	0	1749	1781	0	1841
Q Serve(g_s), s	5.1	0.0	13.5	7.9	0.0	4.8	0.0	0.0	21.2	9.5	0.0	21.7
Cycle Q Clear(g_c), s	5.1	0.0	13.5	7.9	0.0	4.8	0.0	0.0	21.2	9.5	0.0	21.7
Prop In Lane	1.00		0.10	1.00		0.58	1.00		0.39	1.00		0.09
Lane Grp Cap(c), veh/h	667	0	904	608	0	876	197	0	329	213	0	559
V/C Ratio(X)	0.21	0.00	0.35	0.35	0.00	0.36	0.00	0.00	0.89	1.43	0.00	0.64
Avail Cap(c_a), veh/h	773	0	904	668	0	876	326	0	464	213	0	559
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.5	0.0	20.2	13.8	0.0	4.6	0.0	0.0	51.4	45.7	0.0	39.1
Incr Delay (d2), s/veh	0.2	0.0	1.0	0.0	0.0	0.1	0.0	0.0	14.1	216.6	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	0.0	10.1	3.7	0.0	2.0	0.0	0.0	15.9	24.1	0.0	15.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.6	0.0	21.3	13.8	0.0	4.7	0.0	0.0	65.5	262.4	0.0	41.5
LnGrp LOS	B	A	C	B	A	A	A	A	E	F	A	D
Approach Vol, veh/h		455			527			292			660	
Approach Delay, s/veh		19.2			8.4			65.5			143.2	
Approach LOS		B			A			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.6	69.4	0.0	45.0	12.3	72.7	15.0	30.0
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.0	5.5	5.5	5.5
Max Green Setting (Gmax), s	14.5	49.5	9.5	34.5	15.0	49.5	9.5	34.5
Max Q Clear Time (g_c+I1), s	9.9	15.5	0.0	23.7	7.1	6.8	11.5	23.2
Green Ext Time (p_c), s	0.2	2.0	0.0	1.6	0.2	2.2	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	65.6
HCM 6th LOS	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	884	217	131	813	9	176	26	81	17	50	167
Future Volume (veh/h)	160	884	217	131	813	9	176	26	81	17	50	167
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	174	961	236	142	884	10	191	28	88	18	54	182
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	433	870	214	60	1107	13	242	86	272	104	283	345
Arrive On Green	0.67	0.67	0.67	1.00	1.00	1.00	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	560	1305	321	421	1661	19	1030	358	1124	276	1172	1427
Grp Volume(v), veh/h	174	0	1197	142	0	894	191	0	116	72	0	182
Grp Sat Flow(s),veh/h/ln	560	0	1626	421	0	1680	1030	0	1481	1449	0	1427
Q Serve(g_s), s	18.0	0.0	80.0	0.0	0.0	0.0	21.2	0.0	7.7	0.1	0.0	13.3
Cycle Q Clear(g_c), s	18.0	0.0	80.0	80.0	0.0	0.0	29.0	0.0	7.7	7.8	0.0	13.3
Prop In Lane	1.00		0.20	1.00		0.01	1.00		0.76	0.25		1.00
Lane Grp Cap(c), veh/h	433	0	1084	60	0	1120	242	0	358	388	0	345
V/C Ratio(X)	0.40	0.00	1.10	2.37	0.00	0.80	0.79	0.00	0.32	0.19	0.00	0.53
Avail Cap(c_a), veh/h	433	0	1084	60	0	1120	242	0	358	388	0	345
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.7	0.0	20.0	40.0	0.0	0.0	49.9	0.0	37.4	36.1	0.0	39.6
Incr Delay (d2), s/veh	2.8	0.0	60.6	619.6	0.0	0.6	14.9	0.0	0.2	0.1	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.3	0.0	61.0	20.4	0.0	0.3	11.0	0.0	5.1	3.0	0.0	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	80.6	659.6	0.0	0.6	64.8	0.0	37.6	36.1	0.0	40.3
LnGrp LOS	B	A	F	F	A	A	E	A	D	D	A	D
Approach Vol, veh/h		1371			1036			307			254	
Approach Delay, s/veh		72.0			90.9			54.5			39.1	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	85.0	35.0	85.0	35.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	80.0	29.0	80.0	29.0
Max Q Clear Time (g_c+I1), s	82.0	15.3	82.0	31.0
Green Ext Time (p_c), s	0.0	0.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	74.0
HCM 6th LOS	E

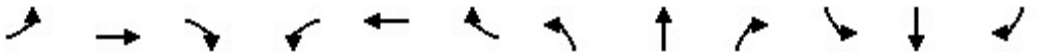
Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	896	170	532	342	618	173	84	756
v/c Ratio	1.42	0.22	3.69	1.99	0.62	0.31	0.35	1.63
Control Delay	219.5	10.1	1243.4	485.3	22.9	3.3	26.6	321.1
Queue Delay	2.3	2.7	10.4	0.0	0.0	0.0	0.0	0.1
Total Delay	221.8	12.8	1253.8	485.3	22.9	3.3	26.6	321.1
Queue Length 50th (ft)	~935	33	~639	~361	161	10	40	~839
Queue Length 95th (ft)	m#935	m40	#859	#580	183	m22	75	#1082
Internal Link Dist (ft)	132		285		62			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	633	769	144	172	1000	566	263	465
Starvation Cap Reductn	161	488	0	0	0	0	0	0
Spillback Cap Reductn	0	0	54	0	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.90	0.60	5.91	1.99	0.62	0.31	0.32	1.64

Intersection Summary

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

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

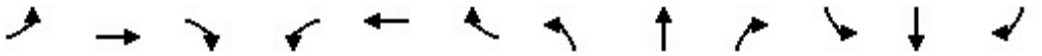
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	699	156	59	418	13	315	569	159	77	467	228
Future Volume (vph)	125	699	156	59	418	13	315	569	159	77	467	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		1.00		1.00	1.00	0.85	1.00	0.95	
Flt Protected		0.99	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1664	1425		1661		1593	3185	1425	1593	1594	
Flt Permitted		0.77	1.00		0.18		0.11	1.00	1.00	0.30	1.00	
Satd. Flow (perm)		1287	1425		293		178	3185	1425	508	1594	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	760	170	64	454	14	342	618	173	84	508	248
RTOR Reduction (vph)	0	0	70	0	1	0	0	0	119	0	14	0
Lane Group Flow (vph)	0	896	100	0	531	0	342	618	54	84	742	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		57.8	57.8		57.8		46.7	37.7	37.7	41.7	35.2	
Effective Green, g (s)		57.8	57.8		57.8		46.7	37.7	37.7	41.7	35.2	
Actuated g/C Ratio		0.48	0.48		0.48		0.39	0.31	0.31	0.35	0.29	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		619	686		141		175	1000	447	235	467	
v/s Ratio Prot							c0.15	0.19		0.02	0.47	
v/s Ratio Perm		0.70	0.07		c1.81		c0.61		0.04	0.10		
v/c Ratio		1.45	0.15		3.77		1.95	0.62	0.12	0.36	1.59	
Uniform Delay, d1		31.1	17.3		31.1		30.6	35.0	29.3	27.4	42.4	
Progression Factor		1.11	2.16		1.00		1.61	0.57	0.46	1.00	1.00	
Incremental Delay, d2		204.5	0.1		1261.7		444.2	0.6	0.0	0.3	274.9	
Delay (s)		239.1	37.6		1292.8		493.3	20.5	13.4	27.7	317.3	
Level of Service		F	D		F		F	C	B	C	F	
Approach Delay (s)		207.0			1292.8			162.2			288.3	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	373.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	3.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	157.8%	ICU Level of Service	H
Analysis Period (min)	15		

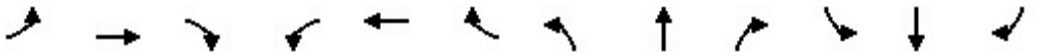
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	150	80	98	128	75	199	958	170	110	472	78
Future Volume (veh/h)	51	150	80	98	128	75	199	958	170	110	472	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	55	163	87	107	139	82	216	1041	185	120	513	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	187	100	197	309	182	406	1552	275	261	957	159
Arrive On Green	0.05	0.05	0.05	0.06	0.28	0.28	0.51	0.51	0.51	0.05	0.61	0.61
Sat Flow, veh/h	1160	1148	613	1781	1103	651	820	3016	535	1781	1564	259
Grp Volume(v), veh/h	55	0	250	107	0	221	216	612	614	120	0	598
Grp Sat Flow(s),veh/h/ln	1160	0	1760	1781	0	1753	820	1777	1774	1781	0	1824
Q Serve(g_s), s	5.5	0.0	16.9	5.8	0.0	12.5	24.8	30.6	30.8	3.7	0.0	22.7
Cycle Q Clear(g_c), s	5.5	0.0	16.9	5.8	0.0	12.5	35.9	30.6	30.8	3.7	0.0	22.7
Prop In Lane	1.00		0.35	1.00		0.37	1.00		0.30	1.00		0.14
Lane Grp Cap(c), veh/h	249	0	286	197	0	491	406	914	913	261	0	1115
V/C Ratio(X)	0.22	0.00	0.87	0.54	0.00	0.45	0.53	0.67	0.67	0.46	0.00	0.54
Avail Cap(c_a), veh/h	307	0	374	211	0	592	406	914	913	385	0	1115
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.98	0.00	0.98	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	50.1	0.0	55.5	38.3	0.0	35.6	27.2	21.6	21.6	17.5	0.0	13.5
Incr Delay (d2), s/veh	0.2	0.0	13.4	1.0	0.0	0.2	4.9	3.9	3.9	0.5	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.0	0.0	14.0	4.7	0.0	9.2	9.2	19.4	19.5	2.6	0.0	14.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	0.0	68.9	39.3	0.0	35.8	32.1	25.5	25.6	18.0	0.0	15.3
LnGrp LOS	D	A	E	D	A	D	C	C	C	B	A	B
Approach Vol, veh/h		305			328			1442			718	
Approach Delay, s/veh		65.6			36.9			26.5			15.8	
Approach LOS		E			D			C			B	

Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	11.6	68.2	14.1	26.0		79.9		40.1				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	14.0	46.5	8.5	25.5		66.5		40.5				
Max Q Clear Time (g_c+I1), s	5.7	37.9	7.8	18.9		24.7		14.5				
Green Ext Time (p_c), s	0.1	4.4	0.0	0.6		2.9		0.9				

Intersection Summary	
HCM 6th Ctrl Delay	29.2
HCM 6th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	91	47	60	150	147	0	266	96	71	102	46
Future Volume (veh/h)	58	91	47	60	150	147	0	266	96	71	102	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	63	99	51	65	163	160	0	289	104	77	111	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	597	578	298	672	435	427	360	320	115	170	409	184
Arrive On Green	0.03	0.50	0.50	0.05	0.84	0.84	0.00	0.24	0.24	0.01	0.11	0.11
Sat Flow, veh/h	1781	1163	599	1781	867	851	1781	1313	472	1781	1221	550
Grp Volume(v), veh/h	63	0	150	65	0	323	0	0	393	77	0	161
Grp Sat Flow(s),veh/h/ln	1781	0	1762	1781	0	1717	1781	0	1785	1781	0	1771
Q Serve(g_s), s	2.1	0.0	5.6	2.2	0.0	5.3	0.0	0.0	25.6	3.8	0.0	10.0
Cycle Q Clear(g_c), s	2.1	0.0	5.6	2.2	0.0	5.3	0.0	0.0	25.6	3.8	0.0	10.0
Prop In Lane	1.00		0.34	1.00		0.50	1.00		0.26	1.00		0.31
Lane Grp Cap(c), veh/h	597	0	876	672	0	862	360	0	435	170	0	593
V/C Ratio(X)	0.11	0.00	0.17	0.10	0.00	0.37	0.00	0.00	0.90	0.45	0.00	0.27
Avail Cap(c_a), veh/h	707	0	876	773	0	862	574	0	543	305	0	593
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	0.86	0.00	0.86	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.0	0.0	16.6	13.7	0.0	5.3	0.0	0.0	44.0	34.8	0.0	40.0
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.1	0.0	1.1	0.0	0.0	16.0	1.9	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	4.3	1.5	0.0	3.2	0.0	0.0	19.1	3.2	0.0	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.1	0.0	17.0	13.8	0.0	6.3	0.0	0.0	60.1	36.7	0.0	40.2
LnGrp LOS	B	A	B	B	A	A	A	A	E	D	A	D
Approach Vol, veh/h		213			388			393			238	
Approach Delay, s/veh		16.2			7.6			60.1			39.1	
Approach LOS		B			A			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	65.1	0.0	45.6	8.6	65.7	10.9	34.7
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.0	5.5	5.5	5.5
Max Green Setting (Gmax), s	10.5	36.5	14.5	36.5	11.0	36.5	14.5	36.5
Max Q Clear Time (g_c+I1), s	4.2	7.6	0.0	12.0	4.1	7.3	5.8	27.6
Green Ext Time (p_c), s	0.1	0.9	0.0	0.9	0.1	2.2	0.1	1.6

Intersection Summary	
HCM 6th Ctrl Delay	31.9
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	29	461	9	11	387
Future Vol, veh/h	5	29	461	9	11	387
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	32	501	10	12	421

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	951	506	0	0	511	0
Stage 1	506	-	-	-	-	-
Stage 2	445	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	288	566	-	-	1054	-
Stage 1	606	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	284	566	-	-	1054	-
Mov Cap-2 Maneuver	284	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	636	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	494	1054	-
HCM Lane V/C Ratio	-	-	0.075	0.011	-
HCM Control Delay (s)	-	-	12.9	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

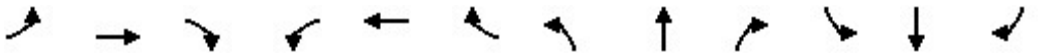
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	3	1081	675	8
Future Vol, veh/h	0	15	3	1081	675	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	-	0	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	3	1175	734	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	739	743	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.23	4.13	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	0	416	862	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	416	862	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	862	-	416	-	-
HCM Lane V/C Ratio	0.004	-	0.039	-	-
HCM Control Delay (s)	9.2	-	14	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	1058	174	55	618	3	472	57	218	27	123	247
Future Volume (veh/h)	76	1058	174	55	618	3	472	57	218	27	123	247
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	83	1150	189	60	672	3	513	62	237	29	134	268
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	531	976	160	55	1159	5	55	68	260	38	139	318
Arrive On Green	0.69	0.69	0.69	1.00	1.00	1.00	0.07	0.07	0.07	0.22	0.22	0.22
Sat Flow, veh/h	687	1410	232	367	1674	7	885	305	1168	26	623	1427
Grp Volume(v), veh/h	83	0	1339	60	0	675	513	0	299	163	0	268
Grp Sat Flow(s),veh/h/ln	687	0	1642	367	0	1682	885	0	1473	649	0	1427
Q Serve(g_s), s	5.5	0.0	90.0	0.0	0.0	0.0	0.0	0.0	26.2	2.8	0.0	23.4
Cycle Q Clear(g_c), s	5.5	0.0	90.0	90.0	0.0	0.0	29.0	0.0	26.2	29.0	0.0	23.4
Prop In Lane	1.00		0.14	1.00		0.00	1.00		0.79	0.18		1.00
Lane Grp Cap(c), veh/h	531	0	1137	55	0	1164	55	0	329	177	0	318
V/C Ratio(X)	0.16	0.00	1.18	1.08	0.00	0.58	9.26	0.00	0.91	0.92	0.00	0.84
Avail Cap(c_a), veh/h	531	0	1137	55	0	1164	55	0	329	177	0	318
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.0	0.0	20.0	45.0	0.0	0.0	74.7	0.0	58.9	47.7	0.0	48.3
Incr Delay (d2), s/veh	0.6	0.0	89.6	60.9	0.0	0.2	3754.2	0.0	27.5	44.2	0.0	17.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.6	0.0	81.7	3.8	0.0	0.1	97.0	0.0	18.8	12.1	0.0	15.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.6	0.0	109.6	105.9	0.0	0.2	3828.9	0.0	86.4	91.9	0.0	65.5
LnGrp LOS	A	A	F	F	A	A	F	A	F	F	A	E
Approach Vol, veh/h		1422			735			812			431	
Approach Delay, s/veh		103.6			8.8			2450.8			75.5	
Approach LOS		F			A			F			E	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	95.0	35.0	95.0	35.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	90.0	29.0	80.0	29.0
Max Q Clear Time (g_c+I1), s	92.0	31.0	92.0	31.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	640.1
HCM 6th LOS	F

Lane Group	EBT	EBR	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1054	355	546	251	770	134	83	663
v/c Ratio	2.72	0.52	17.06	1.13	0.64	0.22	0.34	1.21
Control Delay	796.2	22.6	7290.8	122.5	46.6	19.0	22.9	150.2
Queue Delay	1.1	56.5	20.9	0.0	0.0	0.0	0.0	3.2
Total Delay	797.3	79.1	7311.7	122.5	46.6	19.0	22.9	153.4
Queue Length 50th (ft)	~1519	158	~913	~203	303	41	37	~681
Queue Length 95th (ft)	m#1344	m133	#1139	m#336	m358	m77	68	#919
Internal Link Dist (ft)	132		285		62			308
Turn Bay Length (ft)				60				
Base Capacity (vph)	387	688	32	222	1208	623	319	546
Starvation Cap Reductn	39	364	0	0	0	0	0	0
Spillback Cap Reductn	0	111	11	0	0	0	0	164
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	3.03	1.10	26.00	1.13	0.64	0.22	0.26	1.74

Intersection Summary

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

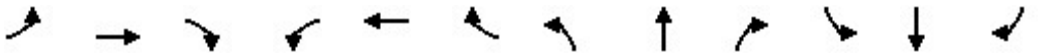
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	390	580	327	91	368	43	231	708	123	76	514	96
Future Volume (vph)	390	580	327	91	368	43	231	708	123	76	514	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85		0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected		0.98	1.00		0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1643	1425		1642		1593	3185	1425	1593	1637	
Flt Permitted		0.55	1.00		0.04		0.08	1.00	1.00	0.27	1.00	
Satd. Flow (perm)		916	1425		71		137	3185	1425	447	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	630	355	99	400	47	251	770	134	83	559	104
RTOR Reduction (vph)	0	0	85	0	3	0	0	0	83	0	5	0
Lane Group Flow (vph)	0	1054	270	0	543	0	251	770	51	83	658	0
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)		55.0	55.0		55.0		63.0	49.3	49.3	50.7	43.0	
Effective Green, g (s)		55.0	55.0		55.0		63.0	49.3	49.3	50.7	43.0	
Actuated g/C Ratio		0.42	0.42		0.42		0.48	0.38	0.38	0.39	0.33	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.0	2.0		2.0		1.5	2.0	2.0	1.5	2.0	
Lane Grp Cap (vph)		387	602		30		223	1207	540	242	541	
v/s Ratio Prot							c0.12	0.24		0.02	c0.40	
v/s Ratio Perm		1.15	0.19		c7.63		0.42		0.04	0.11		
v/c Ratio		2.72	0.45		18.10		1.13	0.64	0.09	0.34	1.22	
Uniform Delay, d1		37.5	26.7		37.5		40.4	33.0	26.0	26.1	43.5	
Progression Factor		1.19	1.43		1.00		0.97	1.33	4.02	1.00	1.00	
Incremental Delay, d2		776.2	0.2		7759.7		88.0	0.6	0.0	0.3	113.1	
Delay (s)		820.9	38.3		7797.2		127.1	44.5	104.4	26.4	156.6	
Level of Service		F	D		F		F	D	F	C	F	
Approach Delay (s)		623.7			7797.2			69.4			142.1	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	1380.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	10.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	158.7%	ICU Level of Service	H
Analysis Period (min)	15		

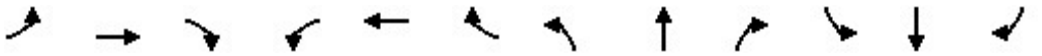
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	159	315	197	402	144	107	792	75	68	801	75
Future Volume (veh/h)	114	159	315	197	402	144	107	792	75	68	801	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	124	173	342	214	437	157	116	861	82	74	871	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	119	235	240	480	172	76	1488	142	271	900	85
Arrive On Green	0.07	0.07	0.07	0.10	0.37	0.37	0.45	0.45	0.45	0.03	0.53	0.53
Sat Flow, veh/h	823	561	1109	1781	1314	472	589	3279	312	1781	1683	158
Grp Volume(v), veh/h	124	0	515	214	0	594	116	467	476	74	0	953
Grp Sat Flow(s),veh/h/ln	823	0	1671	1781	0	1785	589	1777	1814	1781	0	1842
Q Serve(g_s), s	6.4	0.0	27.5	11.9	0.0	41.1	4.6	25.3	25.3	2.8	0.0	64.9
Cycle Q Clear(g_c), s	27.5	0.0	27.5	11.9	0.0	41.1	59.0	25.3	25.3	2.8	0.0	64.9
Prop In Lane	1.00		0.66	1.00		0.26	1.00		0.17	1.00		0.09
Lane Grp Cap(c), veh/h	96	0	353	240	0	652	76	807	824	271	0	985
V/C Ratio(X)	1.30	0.00	1.46	0.89	0.00	0.91	1.52	0.58	0.58	0.27	0.00	0.97
Avail Cap(c_a), veh/h	96	0	353	240	0	652	76	807	824	333	0	985
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.36	0.00	0.36	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	72.9	0.0	60.5	36.4	0.0	39.2	64.4	26.3	26.3	20.0	0.0	29.2
Incr Delay (d2), s/veh	158.0	0.0	211.4	30.1	0.0	16.6	289.2	3.0	3.0	0.2	0.0	21.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.6	0.0	46.9	11.6	0.0	28.3	15.6	16.8	17.1	2.1	0.0	43.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	230.8	0.0	271.9	66.6	0.0	55.8	353.6	29.3	29.2	20.2	0.0	51.1
LnGrp LOS	F	A	F	E	A	E	F	C	C	C	A	D
Approach Vol, veh/h		639			808			1059			1027	
Approach Delay, s/veh		263.9			58.7			64.8			48.8	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	10.5	65.5	20.0	34.0		76.0		54.0				
Change Period (Y+Rc), s	6.0	6.5	6.5	6.5		6.5		6.5				
Max Green Setting (Gmax), s	4.0	54.5	13.5	27.5		61.5		45.5				
Max Q Clear Time (g_c+I1), s	4.8	61.0	13.9	29.5		66.9		43.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		0.0		0.7				

Intersection Summary	
HCM 6th Ctrl Delay	94.8
HCM 6th LOS	F



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	259	28	196	121	178	0	170	104	280	302	29
Future Volume (veh/h)	132	259	28	196	121	178	0	170	104	280	302	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	282	30	213	132	193	0	185	113	304	328	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	655	811	86	604	353	516	178	208	127	213	514	50
Arrive On Green	0.06	0.49	0.49	0.13	0.86	0.86	0.00	0.19	0.19	0.02	0.10	0.10
Sat Flow, veh/h	1781	1662	177	1781	686	1003	1781	1087	664	1781	1677	164
Grp Volume(v), veh/h	143	0	312	213	0	325	0	0	298	304	0	360
Grp Sat Flow(s),veh/h/ln	1781	0	1839	1781	0	1690	1781	0	1751	1781	0	1841
Q Serve(g_s), s	5.2	0.0	13.6	7.9	0.0	5.2	0.0	0.0	21.6	9.5	0.0	24.4
Cycle Q Clear(g_c), s	5.2	0.0	13.6	7.9	0.0	5.2	0.0	0.0	21.6	9.5	0.0	24.4
Prop In Lane	1.00		0.10	1.00		0.59	1.00		0.38	1.00		0.09
Lane Grp Cap(c), veh/h	655	0	897	604	0	868	178	0	335	213	0	565
V/C Ratio(X)	0.22	0.00	0.35	0.35	0.00	0.37	0.00	0.00	0.89	1.43	0.00	0.64
Avail Cap(c_a), veh/h	760	0	897	663	0	868	307	0	465	213	0	565
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.7	0.0	20.5	14.0	0.0	4.9	0.0	0.0	51.2	47.2	0.0	51.5
Incr Delay (d2), s/veh	0.2	0.0	1.1	0.0	0.0	0.1	0.0	0.0	14.6	217.0	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	0.0	10.2	3.7	0.0	2.1	0.0	0.0	16.2	24.1	0.0	18.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	21.6	14.0	0.0	5.0	0.0	0.0	65.9	264.2	0.0	53.9
LnGrp LOS	B	A	C	B	A	A	A	A	E	F	A	D
Approach Vol, veh/h		455			538			298			664	
Approach Delay, s/veh		19.5			8.5			65.9			150.2	
Approach LOS		B			A			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.7	68.9	0.0	45.4	12.3	72.3	15.0	30.4
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.0	5.5	5.5	5.5
Max Green Setting (Gmax), s	14.5	49.5	9.5	34.5	15.0	49.5	9.5	34.5
Max Q Clear Time (g_c+I1), s	9.9	15.6	0.0	26.4	7.2	7.2	11.5	23.6
Green Ext Time (p_c), s	0.2	2.0	0.0	1.3	0.2	2.3	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	67.9
HCM 6th LOS	E

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	23	464	16	19	334
Future Vol, veh/h	4	23	464	16	19	334
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	25	504	17	21	363

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	918	513	0	0	521	0
Stage 1	513	-	-	-	-	-
Stage 2	405	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	561	-	-	1045	-
Stage 1	601	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	294	561	-	-	1045	-
Mov Cap-2 Maneuver	294	-	-	-	-	-
Stage 1	601	-	-	-	-	-
Stage 2	656	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	494	1045	-
HCM Lane V/C Ratio	-	-	0.059	0.02	-
HCM Control Delay (s)	-	-	12.7	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	12	5	1044	919	13
Future Vol, veh/h	0	12	5	1044	919	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	-	0	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	13	5	1135	999	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1006	1013	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.23	4.13	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	0	292	682	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	292	682	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.9	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	682	-	292	-	-
HCM Lane V/C Ratio	0.008	-	0.045	-	-
HCM Control Delay (s)	10.3	-	17.9	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

APPENDIX F – TRANSPORTATION MANAGEMENT PLAN

801 Church Street

Transportation Management Plan

July 24, 2020

Prepared by: BARGE DESIGN SOLUTIONS

Template Provided by Nashville Connector

Table of Contents

Introduction

Giarratana, LLC plans to redevelop a site at 801 Church Street. The plans for the site include a 38-story, 350-unit multi-family residential building with two retail spaces totaling 2,145 square feet.

Currently, the site is vacant with no structures on it. It is located in Downtown Nashville adjacent to the Nashville Yards, which is a mixed-use development on almost 15 acres featuring Amazon office towers. This proposed multi-family residential building will provide convenient and walkable residential opportunities for those who work in the new office towers.

This Transportation Management Plan (TMP) outlines the ways in which Giarratana, LLC will achieve goals of managing traffic generation to and from the site. These goals will be achieved by land use selection, site design, and single occupancy vehicle (SOV) reduction goals (see mode split goals on page 7).

Implementation strategies will encourage use of alternate modes of travel, enhance pedestrian and bicycle friendliness, and achieve a balance in the needs of all users of the transportation system.

Guiding Policies

Nashville has adopted several plans that shape transportation solutions at the 801 Church Street site. These plans incorporate guiding principles about mixed-use development, urban design and multimodal transportation accessibility, and support the use of transportation demand management (TDM) measures to improve accessibility.

The **NashvilleNext Plan**, adopted in 2015 and updated in 2017, guides growth, development and preservation in Nashville through 2040. One of the guiding principles of the plan states that Nashville:

> "...will provide transportation choices in all communities so people have the choice to travel by foot, bicycle, car, or transit to make jobs, education, and daily needs accessible while creating a healthier and more sustainable community." (I-126)

Access Nashville 2040, the city's transportation plan included in NashvilleNext further calls on the city to create:

> "a multimodal transportation network focused on providing access. By 2040, efficient land use policies and strategic investments in Nashville's transportation network will link all road users, regardless of their mode of transportation, with meaningful access to social and economic opportunities." (V-24)

TDM strategies also support additional goals and policies of NashvilleNext, including:

- **Land Use, Transportation and Infrastructure Goal 6 (I-167)**
  Nashville uses housing infill along mobility corridors to provide more housing choices that support walking and transit use and to transition gracefully between residential neighborhoods and more intense mixed use and commercial centers and corridors.
- **Land Use, Transportation and Infrastructure Goal 7 (I-167)**
  Nashville residents have safe, meaningful transportation choices within their neighborhoods for commuting to work, meeting daily needs, and getting to all of the places Nashvillians want to go throughout the county.
- **Built Environment Policy 3.1 (I-888)**
  Support access throughout the county for all users (including walkers, cyclists, transit riders, and drivers) of roadways and greenways.
- **Natural Resource Policy 1.5 (I-192)**
  Invest in robust and diversified infrastructure including transportation choices which prioritize the maintenance of existing streets, expansion of mass transit service, and the creation of more walking and biking options in order to reduce sprawling development patterns, improve air and water quality, and preserve existing open spaces in Nashville.

Guiding Policies (cont.)

NashvilleNext incorporates Community Plans that have guidance specific to neighborhoods. The 801 Church Street development falls in the **Downtown Community Plan, Core Neighborhood (09-T6-DN-Core-1).** The applicable language to transportation goals of the Downtown Community Plan are:

Pg. 17 The Concept Map for Downtown, shown in Figure DT–1, illustrates the key concepts listed above by: strategically locating new development and infill; enhancing centers and corridors to provide more desired retail and services; and adding more connectivity, through bikeways, greenways, multi-use paths and enhanced transit.

Pg. 19 The Centers included in the Concept Map build on existing commercial center areas to evolve into active, mixed-use places serving as a neighborhood or community gathering place. Centers are anticipated to become pedestrian-friendly areas with frequent transit service that contain a dense mix of homes, shops, jobs, and parks, as well as services, schools, and cultural amenities.

Pg. 24 The Downtown Community Plan provides opportunities for continued robust growth combined with urban design elements that make the buildings, streetscapes, and open spaces enticing. Important components of the Downtown Community Plan include creating active and attractive streets, creating additional green spaces, and providing for improved mobility.

Pg. 25 Efficient mobility into and within Downtown is crucial to the Core's continued economic growth. Downtown has limited ability to expand roads. This limitation paired with the increased interest in living and working Downtown, means that future transportation planning will need to put a strong emphasis on expanding other modes of transportation including walking, cycling, and transit.

Pg. 33 Downtown's physical setting and the relationships between elements of its built environment establish its quality as a place. Streets, sidewalks, buildings, and open spaces are the primary components that shape Downtown's urban design character. The image of the city is also influenced by a myriad of smaller features — streetlights, signage, plantings, and pavement — that overlay and enhance its basic structure.

Pedestrian, Bicycle, and Transit Use

801 Church Street is located in a prime area for walking, bicycling or taking transit and has a Walk Score of 94[1]. Easily accessible employment and entertainment areas via these transportation modes include:

- Tennessee State Capitol
- Downtown Arts District
- Nashville Yards
- Church Street Park
- H G Hill Urban Market
- Downtown Public Library
- Hume-Fogg High School
- WeGo Central

Pedestrian

The site plan lays out several amenities to enhance the pedestrian environment including:

- Active ground floor retail uses with glazing.
- Street trees and sidewalk widths consistent with the intent of the Major and Collector Street Plan (MCSP) standards.

A typical pedestrian capture area is one mile. Based on this, the site will promote pedestrian traffic to the following:

- Nashville Yards (<0.1 Miles)*
- Hume-Fogg Academic High School (0.2 Miles)*
- Tennessee State Capitol (0.4 Miles)
- Nashville Farmers Market and Bicentennial Park (0.7 Miles)
- The Gulch (<0.9 Miles)
- Vanderbilt University (1.4 Mile)

*Locations less than ¼ of a mile away are considered highly connected.

Nearby access to transit (see figure 3) will generate more people walking in the area for 801 Church Street.

Bicycle

Figure 1 illustrates the nearby existing low-stress bikeways and Figure 2 shows the existing and planned bicycle network. The site is well situated to access the bikeways connecting Downtown routes. Church Street dedicated bike lanes connect to the site and the new cycle track on Commerce Street is one block away.

Existing and Proposed Bikeways (Fig. 1) - Downtown Multimodal Mobility Study

- Church Street Bike Lanes
- Commerce Street Cycle Track (recently completed)

Planned Bikeways (Fig. 2) – WalknBike 2017

- A planned protected bikeway is shown on Rosa L. Parks Boulevard and along with several other potential routes on nearby streets

[1] https://www.walkscore.com/score/801-church-st-nashville-tn-37203

Figure 1: Existing and Proposed Bikeways (Nashville's Downtown Multimodal Mobility Study, page 59) https://maps.nashville.gov/MCSP/ Note 5.7.14 on pg 65: *9th Avenue North Shared Bike Route: Instead of providing bike lanes on 8th Avenue in the Downtown area, this project calls for providing bike lanes on 9th Avenue, from Church Street to Demonbreun Street, as 9th Avenue has lower traffic volumes and slower speeds. This will likely require removing on-street parking on 9th Avenue due to the narrow pavement width.*

Figure 2: Planned Bikeways (WalknBike 2017; https://maps.nashville.gov/MCSP)

Transit

This site is easily accessible by transit. Figure 3 shows the WeGo transit system map in relation to the site, which can be accessed at nashvillemta.org. If 9th Ave becomes the main connection for bicyclists from the Commerce Street to Church, then Rosa Parks could become the main transit route and potentially have dedicated transit lanes. Note: The WeGo Central bus terminal is within 0.5 miles of the site.

A transit capture area is .25 miles from the site. The routes in the area are listed below:

- 3 – West End / White Bridge
- 5 – West End / Bellevue
- 7 – Hillsboro
- 8 – 8th Avenue South
- 17 –12th Avenue South
- 18 – Airport*
- 24 – Bellevue*~
- 50 – Charlotte Pike
- 35 – Rivergate*~
- 84 – Murfreesboro*~
- 86 – Smyrna/La Vergne*~
- 87 – Gallatin*
- 88 – Dickson*
- 89 – Springfield/Joelton*
- 91 – Franklin*
- 92 – Hendersonville*
- 96 – Nashville/Murfreesboro*

Figure 3: Nearby Transit Lines (WeGo Transit System Map, 2019; http://www.nashvillemta.org/news/pub184.pdf)
~indicates this route is currently suspended
*indicates commuter/limited stops route

Site-Generated Traffic

The number of vehicle trips generated by the proposed redevelopment has been estimated through a Traffic Impact Study (TIS) for the weekday AM and PM peak periods. The estimated volume of site-generated trips and resulting new trips for each land use is summarized below.

Trip Generation Estimates

ITE CODE	LAND USE	# UNITS	UNIT TYPE	Average Weekday	AM			PM		
					Enter	Exit	Total	Enter	Exit	Total
222	Multifamily Housing (High-Rise)	350	units	756	29	48	77	47	34	81
876	Apparel	2645	sf	176	2	1	3	6	5	11
Total New Vehicle Trips				**932**	**31**	**49**	**80**	**53**	**39**	**92**
Total Person Trips for All Modes				*2825*	*60*	*171*	*231*	*110*	*83*	*193*
% Vehicle Trips of Person Trips				33%			35%			48%

Source: Trip Generation Manual, 10th Edition

National ITE trip generation standards include data for both vehicle trips and total person trips (all transportation modes) for high-rise residential land uses. As shown, the new vehicle trips are expected to represent approximately 33% of the total trips generated by the development. These numbers also correspond to data of similar developments Downtown. As outlined below, the proposed TDM strategies will target a smaller percentage of vehicle trips. In comparison, a similar development located outside a walkable Downtown would be expected to generate many times more vehicle trips.

Transportation Demand Management Strategies

Mode Split Goals

To succeed, this Transportation Management Plan (TMP) will help manage congestion and traffic in Nashville. The following mode split goals for the project have been identified by the developer:

Mode Split Goals

Transportation Mode	Split Goal
Drive Alone	15%
Carpool/Vanpool	2%
Transit	3%
Walk/Bicycle/Scooter	80%

Appendix 1 outlines specific Transportation Demand Management strategies to be implemented by the owner/property manager of this site as identified by the developer. Implementation of the items noted will encourage use of alternate modes of travel, enhance pedestrian friendliness, and achieve a balance in the needs of all users of the transportation system.

TMP Approach Phases

1. Before Final Site Plan	Completed	Notes
• Designate property TDM Liaison to coordinate ongoing TDM strategies.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com
• Create mode split goals.		See Page 7
2. Before Use and Occupancy Permit		
• TDM Liaison meets with Nashville Connector to coordinate specific management strategies.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com
3. Year 1		
• With the assistance of Nashville Connector, conduct a statistically valid baseline resident and employee commuter survey.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com
• Assess management strategies and review effectiveness.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com
4. Following Years		
• With the assistance of Nashville Connector, conduct a resident, employee, and visitor commuter survey every two years after the original baseline survey, for ten years or until the TMP non-SOV mode split goals are achieved.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com
• After each round of biennial commuter surveys, prepare a status report and review the TMP in conjunction with Nashville Connector to determine its effectiveness.		Jenny McClain, (615) 254-0555 Jenny@giarratana.com

Giarratana, LLC and their successors will work with the Nashville Connector program to implement items as identified by the developer in Appendix 1.

Appendix 1 – TDM Management Strategies

	Comprehensive	Notes
✓	Create Transportation Management Plan (TMP) • Include Mode Split Goals	See Page 7
✓	Identify Position as TMP Manager/Point of Contact	Jenny McClain, Giarratana (see page 8)
✓	Conduct Annual Transportation Surveys	Jenny McClain, Giarratana (see page 8)
✓	Submit Annual TMP Report	Jenny McClain, Giarratana (see page 8)

	Bicycle / Dockless Shared Urban Mobility Devices (SUMDs)	Notes
✓	BCycle will be provided at 900 Church. Memberships will be available to residents	Information will be provided in resident e-newsletter
✓	Provide information to Residents on nearby bicycle routes	Information will be provided in resident e-newsletter
✓	Shared bikes will be available for checkout in the building	Information will be provided in resident e-newsletter
✓	Organized bicycle rides with residents	Information will be provided in resident e-newsletter

	Transit	Notes
✓	WeGo Information with a link to Maps/ Schedules	Information will be provided in resident e-newsletter
✓	Provide Transit Training information from WeGo	Information will be provided in resident e-newsletter
✓	Email transit updates such as route, schedule, holiday changes to residents	Information will be provided in resident e-newsletter

	Pedestrian	Notes
✓	Organize walks with residents	Information will be provided in resident e-newsletter
✓	801 Church is located next to Nashville Yards and surrounded by employment opportunities	This significant investment will have a huge positive impact on walkability

	Automobile and Service Loading	Notes
✓	Parking space rent decoupled from lease Agreements	This item will have a large impact on encouraging alternative modes
✓	Shared vehicle fleet available to tenants	Info provided in lease packet

✓	Provide Carpool Matching Service/Software links and information on their rewards programs (example: https://hytch.me/)	Information will be provided in resident e-newsletter
✓	Provide Vanpool Information/ Matching information (example: https://vanstar.com/)	Information will be provided in resident e-newsletter
✓	Develop Loading / Service Vehicle Plan for Off-Peak Hours	To be developed

	Information and Communications	**Notes**
✓	Subscribe to Nashville Connector updates and share applicable information with residents (nashconnector.org)	Jenny McClain, Giarratana, to subscribe and share with residents
✓	Provide new residents with information on transportation options and benefits	Will be provided in lease packet
✓	Provide regular email about transportation options/benefits	Information will be provided in resident e-newsletter
✓	Email transit updates on route, schedule, Holiday changes and transit events	Information will be provided in resident e-newsletter
✓	Send Nashville Connector announcements, events, newsletters, campaigns/contests	Information will be provided in resident e-newsletter

	Miscellaneous	**Notes**
✓	Encourage participation in Nashville Connector Commuter Challenges	Information will be provided in resident e-newsletter
✓	Promote Bike Month and Walk Month activities	Information will be provided in resident e-newsletter
✓	Remote office(s) provided in the residential units	This investment encourages telecommuting

	Memberships and Recognitions	**Notes**
✓	Walk Bike Nashville Business Membership www.walkbikenashville.org/join	Giarratana plan to join
	Bike Friendly Business Designation www.bikeleague.org/bfa	We may pursue this recognition or one that applies to a residential building
	Best Workplaces for Commuters Designation www.bestworkplaces.org/	We may pursue this recognition or one that applies to a residential building