Traffic Impact Analysis

Catoctin Creek Towne Center

Town of Purcellville, Virginia

December, 2012
(Revised September, 2013)

Prepared for:

Catoctin Creek Apts., L.P.

Prepared by:

Bowman CONSULTING

Bowman Project Number: 5384-01-001

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TRAFFIC IMPACT ANALYSIS REPORT
CATOCTIN CREEK TOWNE CENTER
TOWN OF PURCELLVILLE, VIRGINIA

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TRAFFIC IMPACT ANALYSIS REPORT
CATOCTIN CREEK TOWNE CENTER
TOWN OF PURCELLVILLE, VIRGINIA

1. INTRODUCTION AND SUMMARY

1.1. Purpose and Study Objectives

This report summarizes the findings of the revised traffic impact analysis that was prepared for the proposed Catoctin Creek Towne Center development in the Town of Purcellville, Virginia. The original study was submitted in December, 2012 (under the project name "Catoctin Creek Apartments") in conjunction with a Comprehensive Plan Amendment and Zoning Map Amendment. Since the time of the original submittal, the project has expanded in both size and land uses which necessitated a revised traffic impact analysis. In addition, VDOT issued comments on the original traffic analysis on March 7, 2013. VDOT's comments and concerns have been addressed with this revised analysis. The purpose of this study is to determine the impact to the surrounding roadway network caused by the traffic generated by the proposed development.

1.2. Executive Summary

The subject property is generally located south of Hirst Road, northwest of Maple Avenue, and north of Skyline Drive in the Town of Purcellville, Virginia. The approximately 32.4 acre site is currently zoned Local Service Industrial (CM-1) and Office Commercial (C1) with a portion of the site in the Floodplain District. The Applicant, Catoctin Creek Apts., L.P., is applying for a Comprehensive Plan Amendment for the entire 32.4 acre site and proposes residential multi-family and, to enable a commercial development, mixed use commercial land use designations for the site. The Applicant is also applying for a Zoning Map Amendment to rezone 13.7 acres of the site (western portion) to Planned Development Housing (PDH-15) and to rezone the remaining 18.7 acres to Mixed Commercial (MC). The PDH-15 portion of the site would be developed with 176 multi-family residential units while the MC portion would be developed with commercial recreation uses.

The scope of the original study was developed in consultation with Virginia Department of Transportation (VDOT) and Town of Purcellville staff at a scoping meeting on October 2, 2012. A copy of the signed scoping documents is included in Appendix A. With the expansion of the site to include commercial and recreational uses, the project meets VDOT Chapter 527 thresholds with more than 5,000 trips per day. As such, the scope of the study was expanded to include the Berlin Turnpike (Route 287)/VA Route 7 Bypass Eastbound Ramp intersection.

The Applicant is proposing to develop the western portion of the site with approximately 176 multi-family residential dwelling units and the eastern portion of the site with commercial recreation uses. For purposes of this study, the commercial recreation uses were assumed as follows:

- Outdoor recreation (6.75 acres) to include miniature golf, bumper boats, go karts, and batting cages
- Indoor recreation (approximately 36,300 S.F.) to include bowling, laser tag, arcade, and a restaurant and sports bar.
- Outdoor special event space

For purposes of this analysis, development of the site was assumed to occur by 2014. When complete, it is estimated that on an average weekday, the development would generate approximately 90 new trips during the AM peak hour (18 in and 72 out), 606 new trips during the PM peak hour (394 in and 212 out), and 8,896 new daily trips over a 24-hour period.

The Institute of Transportation Engineer's (ITE) has limited data for commercial recreation uses (one data point) and therefore the trip generation was estimated based on individual land use data within ITE and information provided by the future operator of the facility. The resulting trip generation analysis represents worst case traffic scenarios for typical weekday operation. The conservative trip generation estimate for the commercial recreation is approximately three to eight times the trip generation numbers calculated from the limited ITE commercial recreation data.

Access to the site is proposed via a full movement entrance off of Hirst Road into the residential area and an internal public road that would connect the commercial/recreation portion of the site to both Hirst Road and Maple Avenue. At this time, no vehicular connection between the residential and commercial portion is proposed.

Based on the scoping agreement shown in Appendix A and Chapter 527 guidelines, it was determined that the study area should include the following intersections:

1. Hirst Road (VA Route F962)/21st Street North (VA Route 690)
2. Hirst Road (VA Route F962)/Hatcher Avenue (VA Route 611)
3. Hirst Road (VA Route F962)/Site Entrance #1 (Residential)
4. Hirst Road (VA Route F962)/Maple Avenue (VA Route 722)
5. Hirst Road (VA Route F962)/Berlin Turnpike (VA Route 287)
6. Main Street (VA Route 7 Business)/Hatcher Avenue (VA Route 611)
7. Main Street (VA Route 7 Business)/Maple Avenue (VA Route 722)
8. Hirst Road (VA Route F962)/Site Entrance #2 (Commercial)
9. Maple Avenue (VA Route 722)/Site Entrance #3 (Commercial)
10. Berlin Turnpike (VA Route 287)/VA Route 7 Bypass Eastbound ramps

As part of the proposed development, the Applicant has proffered the improvements which are listed below and shown on Figures EX-1 and EX-2:

- At the Hirst Road/Berlin Turnpike intersection:
    - Convert the southbound right turn lane on Berlin Turnpike into a free flow lane and add a westbound receiving lane (± 380 feet) on Hirst Road
    - Add an eastbound shared left-right turn lane (± 700 feet) on Hirst Road and establish the existing lane as a dedicated left turn lane
    - Add a second northbound through lane (±500 feet) on Berlin Turnpike that would extend through the intersection and connect to

the northbound right turn lane at the Berlin Turnpike/VA Route 7 Bypass Eastbound ramp intersection
    - Modify the existing traffic signal to accommodate the improvements
- Turn lanes at all site entrances as warranted by the Town and VDOT. The warranted turn lanes would include:
    - Westbound left turn lane with 200 feet of storage and an eastbound right turn taper at the Hirst Road/Site Entrance #1 (Residential) intersection
    - Westbound left turn lane with 200 feet of storage and an eastbound right turn lane with 200 feet of storage at the Hirst Road/Site Entrance #2 (Commercial) intersection
    - Southbound right turn taper at the Maple Avenue/Site Entrance #3 (Commercial) intersection

The analysis indicates that **without** the buildout of the Catoctin Creek Towne Center development, traffic conditions would necessitate multiple improvements to the study intersections under existing conditions and in 2014 and 2020. The Hirst Road/Berlin Turnpike currently operates at an LOS F in the AM peak hour with an average overall delay of 132.2 seconds per vehicle.

The buildout of the proposed development would not require any additional improvements at offsite intersections beyond those already required under existing or background (without site) conditions. **With** the improvements being proffered by the site, the Hirst Road/Berlin Turnpike intersection would operate at an LOS C in the AM peak hour with an average overall delay of 23.5 seconds per vehicle. It is noted that the proffered improvements are consistent with the recommendations of the Route 7/Route 287 Interchange Study completed by HNTB (for VDOT) in 2012.

The potential special events (concerts, festivals, etc.) held on the site would be irregular in occurrence and therefore were not included in the typical weekday operations analyzed in this study. The Applicant will provide a Traffic Management Plan for special events at a later date.

CATOCTIN CREEK TOWNE CENTER

PROPOSED ROAD IMPROVEMENTS EXHIBIT

FIGURE EX1

Date: August 22, 2013
Scale: 1" = 100' (11x17)

north

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CATOCTIN CREEK TOWNE CENTER

PROPOSED ROAD IMPROVEMENTS EXHIBIT

INTERSECTION OF HIRST RD AND BERLIN TPK

FIGURE EX2

north

Date: *August 22, 2013*
Scale: *1" = 100' (11x17)*

2. BACKGROUND INFORMATION

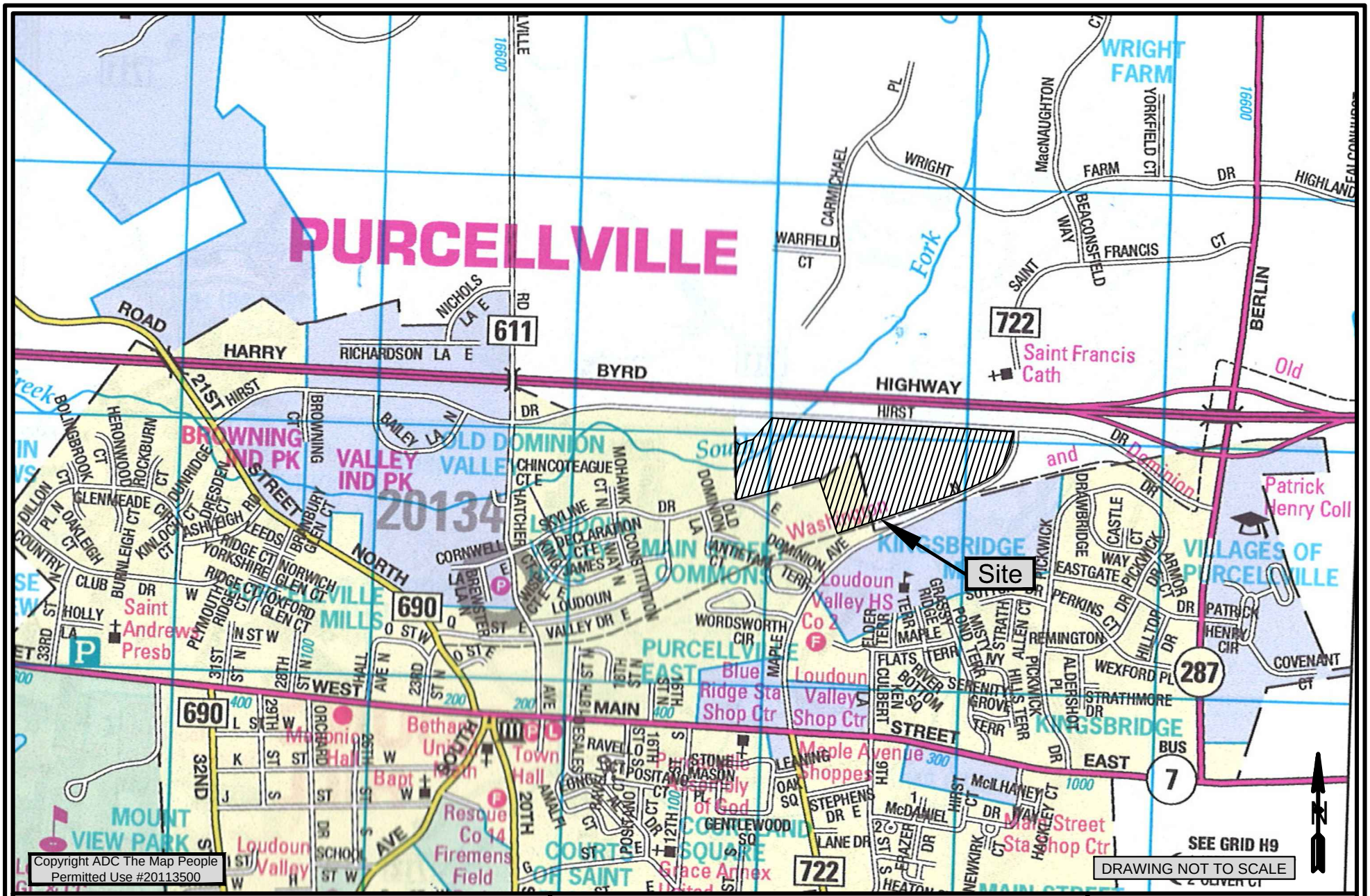
The development is generally located south of Hirst Road, northwest of Maple Avenue, and north of Skyline Drive in the Town of Purcellville, Virginia as shown on Figure 1. The approximately 32.4 acre site is currently zoned Local Service Industrial (CM-1) and Office Commercial (C1) with a portion of the site in the Floodplain District. The Applicant, Catoctin Creek Apts., L.P., is applying for a Comprehensive Plan Amendment for the entire 32.4 acre site and proposes residential multi-family and, to enable a commercial development, mixed use commercial land use designations for the site. The Applicant is also applying for a Zoning Map Amendment to rezone 13.7 acres of the site (western portion) to Planned Development Housing (PDH-15) and to rezone the remaining 18.7 acres to Mixed Commercial (MC). The PDH-15 portion of the site would be developed with 176 multi-family residential units while the MC portion would be developed with commercial recreation uses.

Refer to Figure 2 for a map of the subject parcel including the current zoning and Figure 3 for the Concept Development Plan.

2.1. Existing Land Uses and Zoning

The subject parcel is bordered by a single family residential development to the southwest, Loudoun Valley High School to the south (across Maple Avenue), the Purcellville Volunteer Fire Station to the east (across Maple Avenue) and Hirst Road and VA Route 7 Bypass to the north.

The land surrounding the site is predominantly zoned Transitional (X), Institutional and Public Use (IP), Office Commercial (C-1), and Duplex Residential (R-3). Refer to Figure 4 for the existing zoning in the study area.



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Site Location Map
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 1

Job # 5384-01-001

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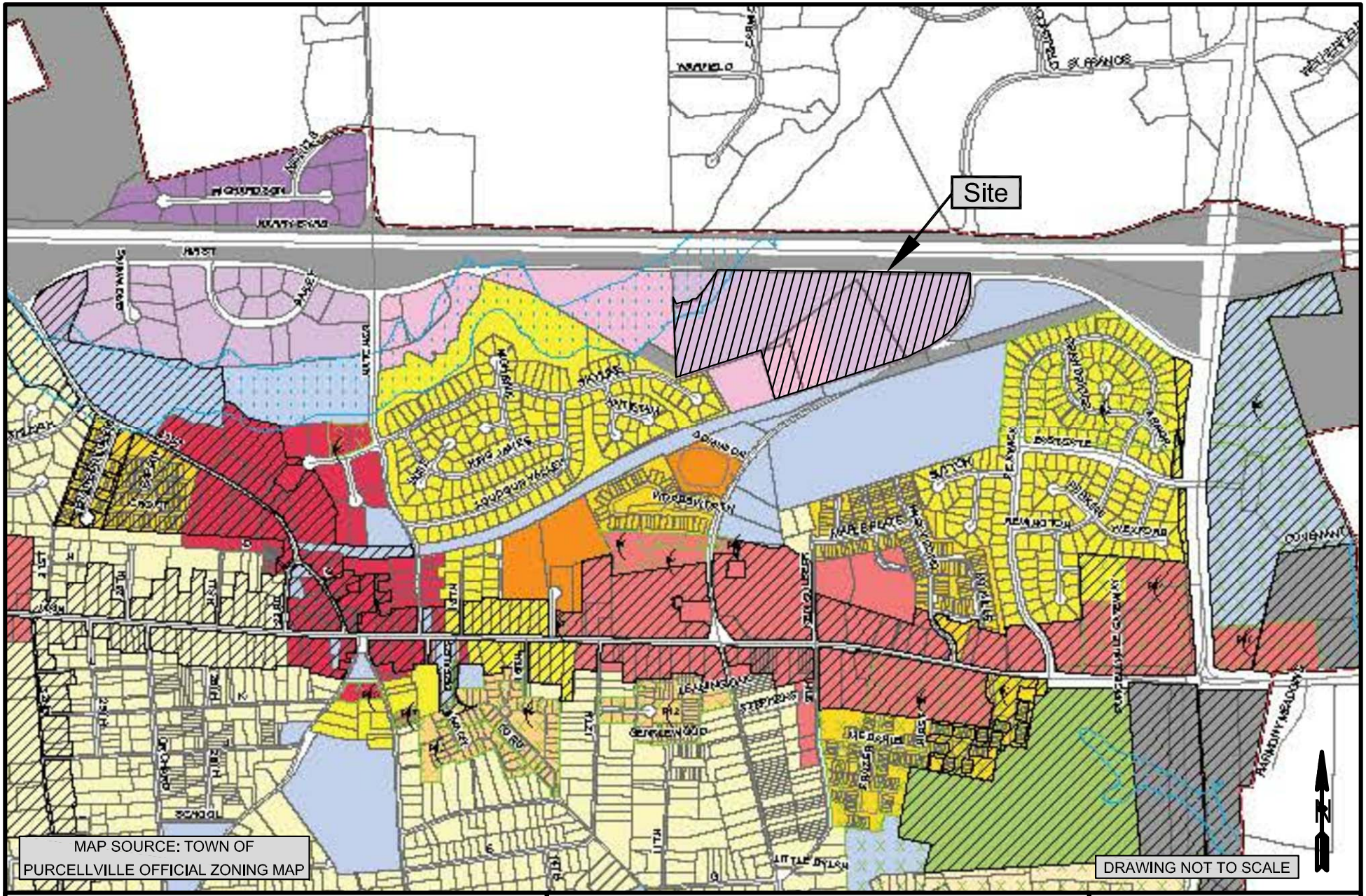

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Subject Parcel Map
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 2

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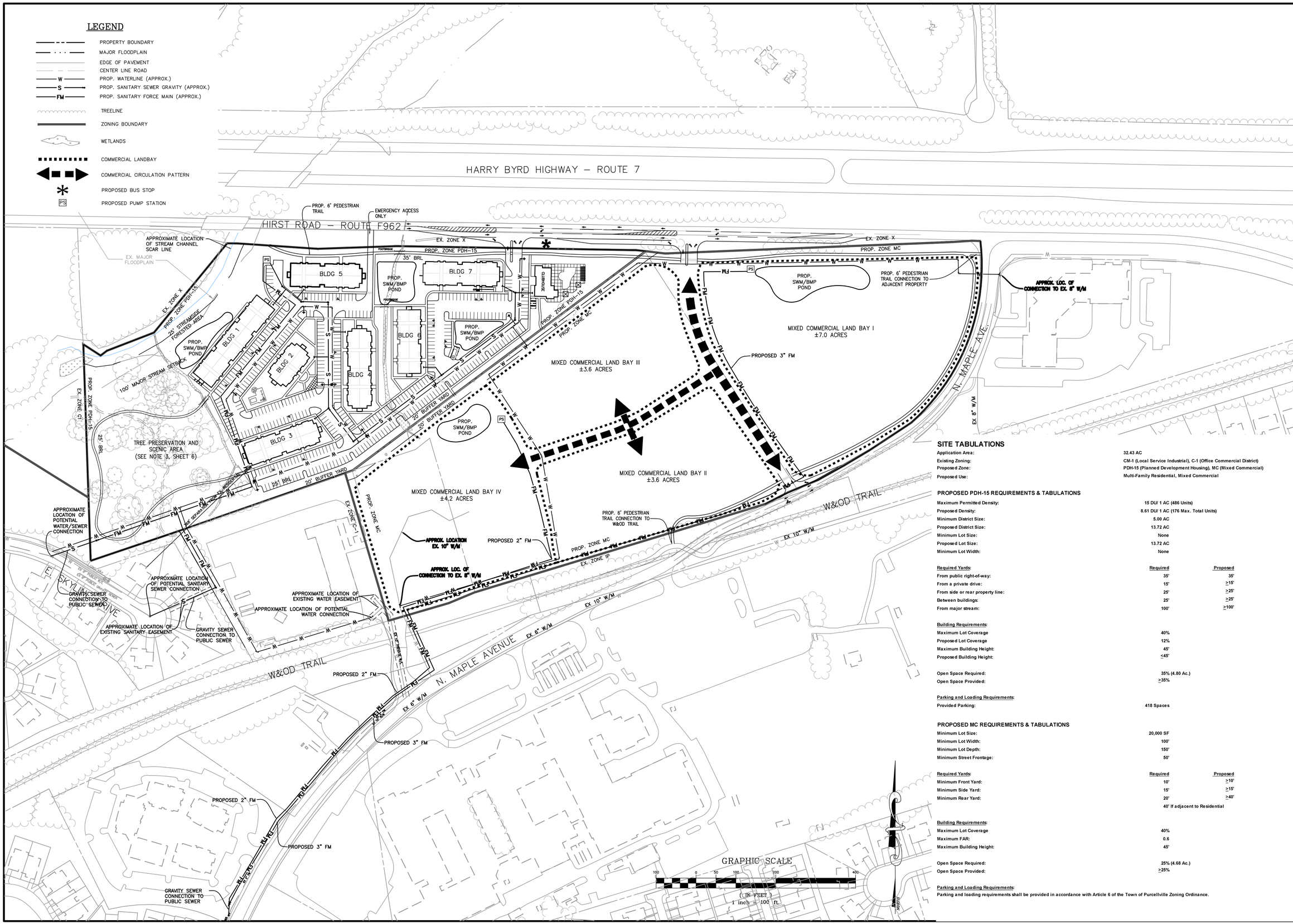

SITE TABULATIONS

Application Area:	32.43 AC
Existing Zoning:	CM-1 (Local Service Industrial), C-1 (Office Commercial District)
Proposed Zone:	PDH-15 (Planned Development Housing), MC (Mixed Commercial)
Proposed Use:	Multi-Family Residential, Mixed Commercial

PROPOSED PDH-15 REQUIREMENTS & TABULATIONS

Maximum Permitted Density:	15 DU/ 1 AC (486 Units)
Proposed Density:	8.61 DU/ 1 AC (176 Max. Total Units)
Minimum District Size:	5.00 AC
Proposed District Size:	13.72 AC
Minimum Lot Size:	None
Proposed Lot Size:	13.72 AC
Minimum Lot Width:	None

Required Yards:	Required	Proposed
From public right-of-way:	35'	35'
From a private drive:	15'	≥15'
From side or rear property line:	25'	≥25'
Between buildings:	25'	≥25'
From major stream:	100'	≥100'

Building Requirements:	
Maximum Lot Coverage	40%
Proposed Lot Coverage	12%
Maximum Building Height:	45'
Proposed Building Height:	≤45'
Open Space Required:	35% (4.80 Ac.)
Open Space Provided:	≥35%

Parking and Loading Requirements:	
Provided Parking:	418 Spaces

PROPOSED MC REQUIREMENTS & TABULATIONS

Minimum Lot Size:	20,000 SF
Minimum Lot Width:	100'
Minimum Lot Depth:	150'
Minimum Street Frontage:	50'

Required Yards:	Required	Proposed
Minimum Front Yard:	10'	≥10'
Minimum Side Yard:	15'	≥15'
Minimum Rear Yard:	20'	≥40'
	40' If adjacent to Residential	

Building Requirements:	
Maximum Lot Coverage	40%
Maximum FAR:	0.6
Maximum Building Height:	45'
Open Space Required:	25% (4.68 Ac.)
Open Space Provided:	≥25%

Parking and Loading Requirements:
Parking and loading requirements shall be provided in accordance with Article 6 of the Town of Purcellville Zoning Ordinance.

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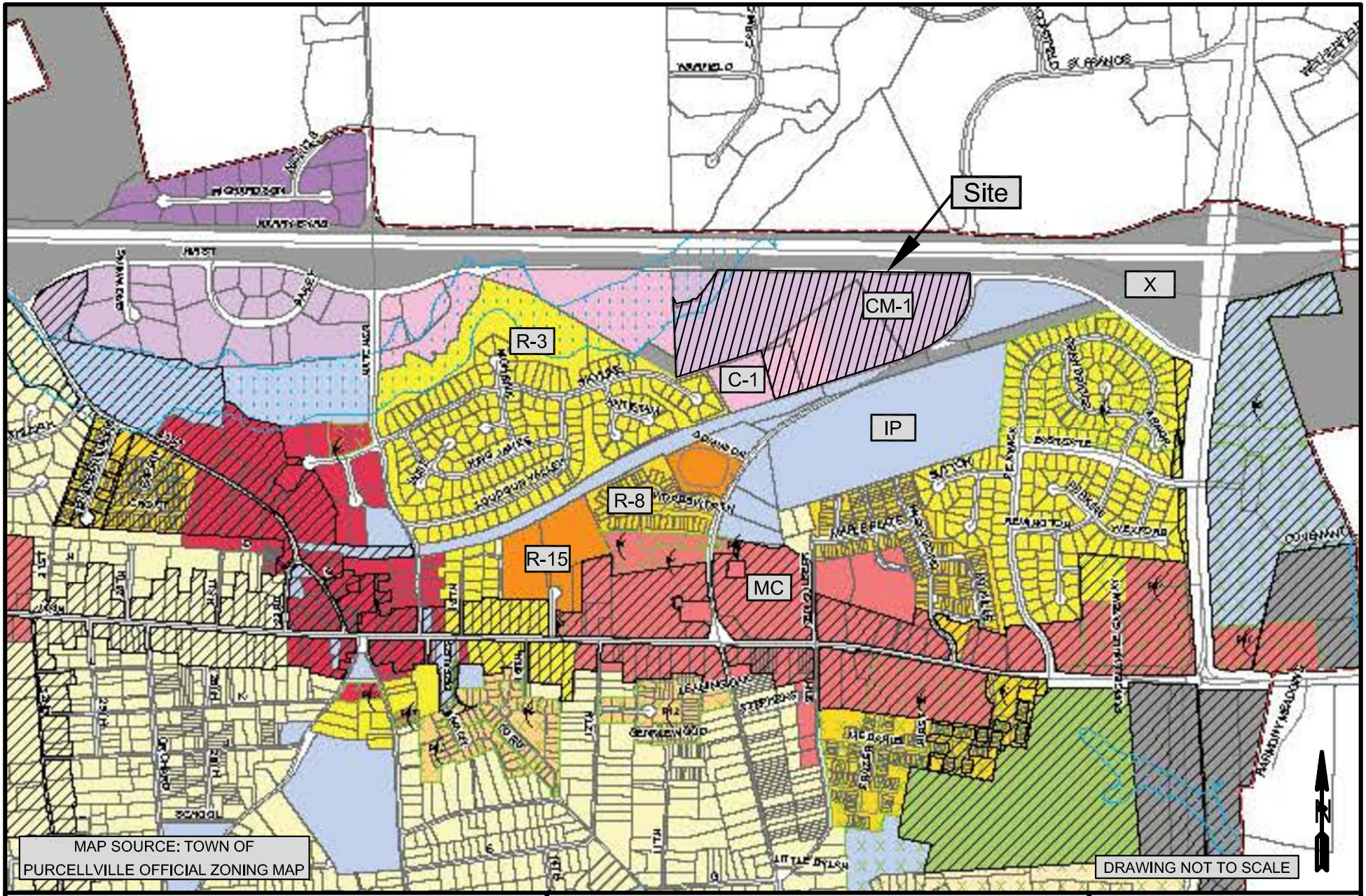
CONCEPT DEVELOPMENT PLAN
CATOCTIN CREEK TOWNE CENTER
COMPREHENSIVE PLAN AMENDMENT
REZONING & SPECIAL USE PERMIT
TOWN OF PURCELLVILLE, VIRGINIA

PLAN STATUS	
DATE	DESCRIPTION

JAE DESIGN	CIM DRAWN	CMM CHKD
SCALE	H: 1"=100' V:	
JOB No.	5384-01-002	
DATE	AUGUST 09, 2013	
FILE No.	5384-D-ZP-002	
SHEET	4 OF 9	

Cad file name: \\Cityds\cive_projects\5384 - Purcellville Town Center Apartments\5384-01-002 (PLN) - Comp Plan Amendment & Rezoning\Planning\RezoneConcept Development Plan.dwg



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Existing Zoning Map
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 4

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2.2. Proposed Land Uses and Zoning

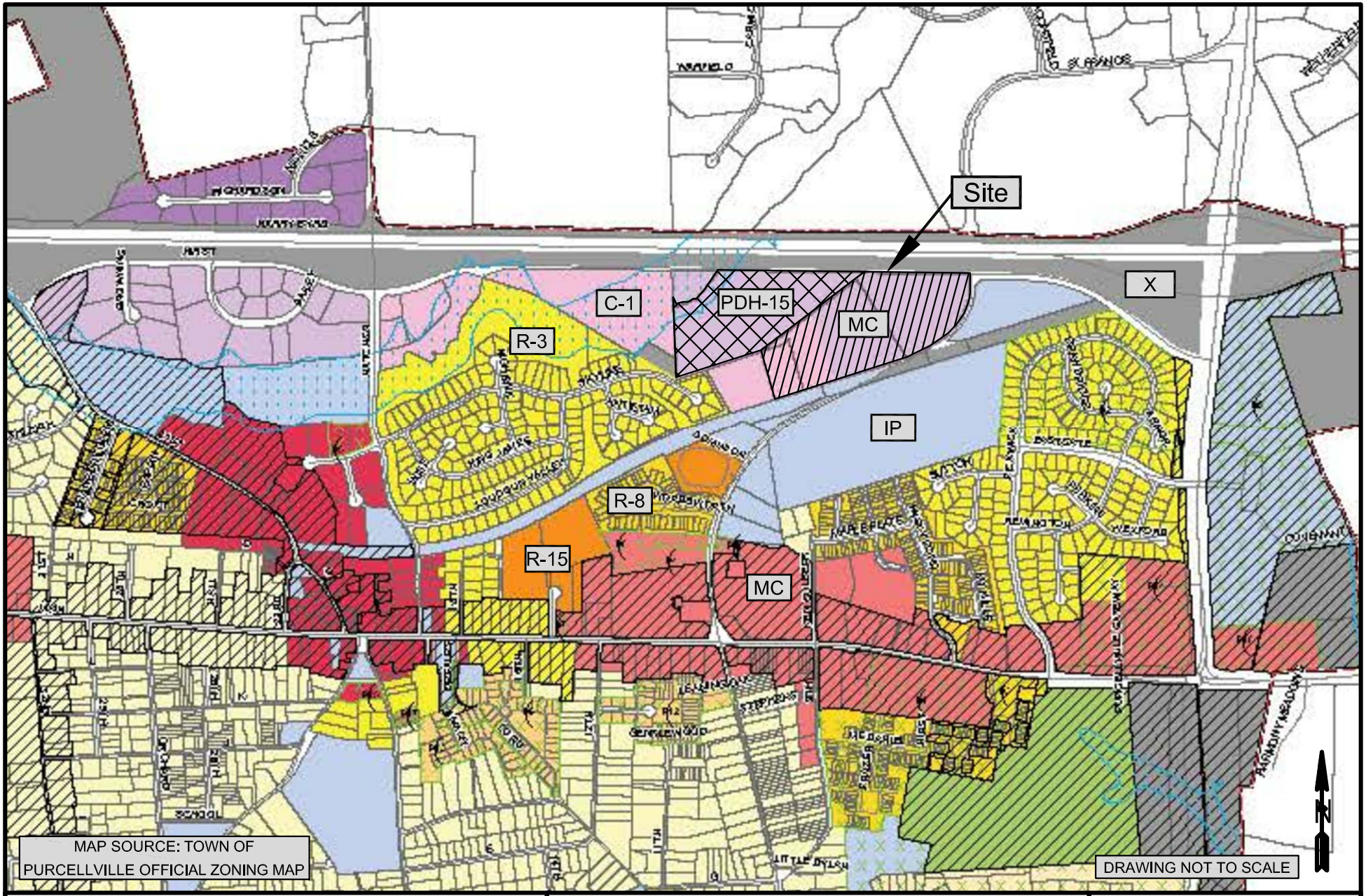
The Applicant is applying for a Comprehensive Plan Amendment for the entire 32.4 acre site and proposes residential multi-family and mixed use commercial land use designations for the site. The Applicant is also applying for a Zoning Map Amendment to rezone 13.7 acres of the site (western portion) to Planned Development Housing (PDH-15) and to rezone the remaining 18.7 acres to Mixed Commercial (MC). The proposed zoning is shown on Figure 5.

2.3. Existing Roadway Network

Regional access to the site would be provided via VA Route 7 Bypass, Berlin Turnpike (VA Route 287) and Main Street (VA Route 7 Business). Local access would be provided via Hirst Road (VA Route F962), Maple Avenue (VA Route 722), Hatcher Avenue (VA Route 611), and 21st Street North (VA Route 690).

Berlin Turnpike (VA Route 287) is a two lane undivided urban minor arterial roadway (VDOT Classification) with a posted speed limit of 45 mph that connects Main Street (VA Route 7 Business) to the south with VA Route 7 Bypass and Charles Town Pike (VA Route 9) to the north. According to the most recent VDOT data (2012), Berlin Turnpike carries approximately 5,600 vehicles per day in the vicinity of the site. Turn lanes are provided at some intersections and the intersection with Hirst Road is signalized. For purposes of this analysis, Berlin Turnpike was assumed to run north/south through the study area.

Main Street (VA Route 7 Business) is a variable two to three lane undivided urban minor arterial roadway (VDOT Classification) with a posted speed limit of 25 mph. Main Street connects Berlin Turnpike to the east with VA Route 7 Bypass to the west and provides east/west access through the Town of Purcellville. According to the most recent VDOT data (2012), Main Street carries approximately 9,900 vehicles per day in the vicinity of the site. Turn lanes are provided at some intersections and the intersections with Maple Avenue and Hatcher Avenue are



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Proposed Zoning Map
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 5

Job # 5384-01-001

signalized. Sidewalks are provided along both sides of the street for the majority of the length of Main Street. For purposes of this analysis, Main Street was assumed to run east/west through the study area.

Hirst Road (Route F962) is a two lane undivided local roadway (VDOT Classification) that serves as a frontage road along VA Route 7 Bypass. Hirst Road has a posted speed limit of 45 miles per hour and connects Berlin Turnpike to the east with 21st Street North to the west. VDOT does not have any historic traffic data for Hirst Road. The Washington and Old Dominion Trail (W&OD), which is a multi-use paved recreational trail described in section 2.4 below, crosses Hirst Road approximately 900 feet west of the intersection with Berlin Turnpike. For purposes of this analysis, Hirst Road was assumed to run east/west through the study area.

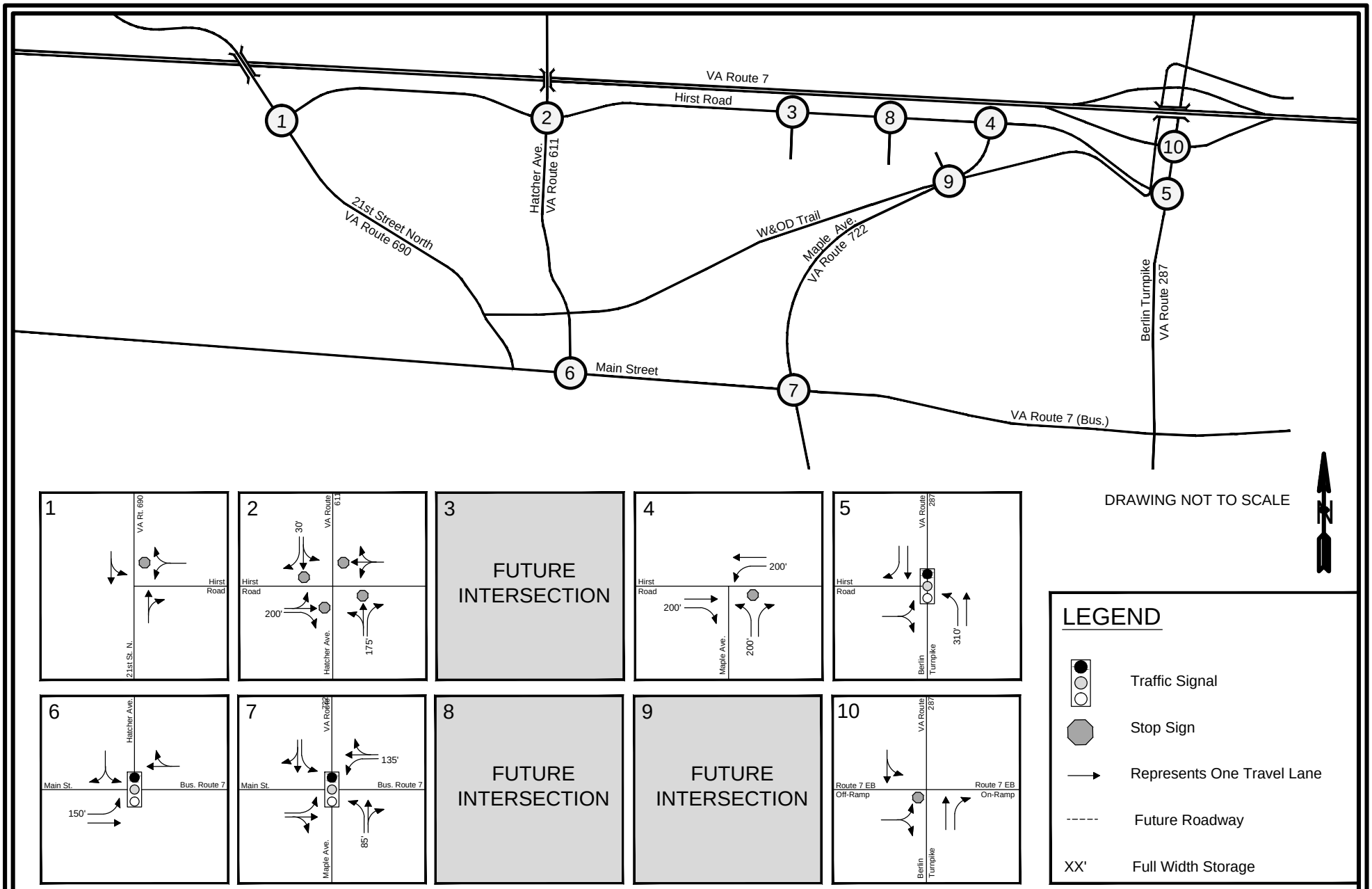
Maple Avenue (VA Route 722) is a variable two to three lane undivided local roadway (VDOT Classification) with a posted speed limit of 25 mph. Maple Avenue connects Hirst Road to the north with Main Street to the south before becoming Lincoln Road. Turn lanes are provided at some intersections and the intersection with Main Street is signalized. Maple Avenue provides access to Loudoun Valley High School and the W&OD trail crosses Maple Avenue approximately 1,100 feet south of the intersection with Hirst Road. A combination sidewalk/trail is provided along the east side of Maple Avenue from Main Street to Hirst Road. According to the most recent VDOT data (2012), Maple Avenue carries approximately 4,900 vehicles per day south of Loudoun Valley High School and 1,200 vehicles per day north of the school. For purposes of this analysis, Maple Avenue was assumed to run north/south through the study area.

Hatcher Avenue (VA Route 611) is a two lane undivided urban collector roadway (VDOT Classification) with a posted speed limit of 25 mph. Hatcher Avenue connects Main Street to the south with Hirst Road to the north before becoming Purcellville Road and continuing on to VA Route 9. Turn lanes are provided at some intersections and the intersection with Main Street is signalized. The W&OD

trail crosses Hatcher Avenue approximately 650 feet north of the intersection with Main Street. Sidewalks are provided along one or both sides of Hatcher Avenue for the majority of the roadway length within the Town. According to the most recent VDOT data (2012), Hatcher Avenue carries approximately 5,200 vehicles per day in the vicinity of the site. For purposes of this analysis, Hatcher Avenue was assumed to run north/south through the study area.

21st Street North (VA Route 690) is a two lane undivided urban minor arterial collector roadway (VDOT Classification) with a posted speed limit of 25 mph. 21st Street North connects Main Street to the south with Hirst Road to the north before becoming Hillsboro Road and continuing on to VA Route 9. Turn lanes are provided at some intersections and the intersection with Main Street is signalized. The W&OD trail terminates at 21st Street North approximately 800 feet north of the intersection with Main Street. Sidewalks are provided along one or both sides of 21st Street North from Main Street to the intersection with the W&OD Trail. According to the most recent VDOT data (2012), 21st Street North carries approximately 2,300 vehicles per day in the vicinity of the site. For purposes of this analysis, 21st Street North was assumed to run north/south through the study area.

Existing lane configurations (number of traffic lanes on the intersection approaches), storage lane lengths, and other intersection and roadway information within the study area were collected through field reconnaissance and are shown on Figure 6.



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Existing Lane Use and Traffic Control
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 6

Job # 5384-01-001

2.4. Other Modes of Transportation

This study also reviews the potential for walking, bicycling, and transit trips to and from the area.

Sidewalks – There are sidewalks along at least one side of Main Street, Maple Avenue, Hatcher Avenue, and 21st Street North in the vicinity of the site. There are no sidewalks along Berlin Turnpike or Hirst Road. The 2009 Townwide Transportation Plan calls for future sidewalks along 21st North from the W&OD trail north to Hirst Road and along Maple Avenue from the high school north to Hirst Road.

On-Street Bicycling Facilities – Currently, there are no bicycling facilities on any of the roadways in the vicinity of the site and the 2009 Townwide Transportation Plan does not call for any future on-street facilities on the study roadways.

Washington and Old Dominion Trail (W&OD Trail) – the W&OD trail is a paved, two-lane, shared use path that originates in Purcellville near the intersection of 21st Street North and 23rd Street North. The path generally follows the east-west alignment of VA Route 7 in Loudoun County and travels 45 miles from Purcellville east to Arlington County. The trail is frequently used both for recreation and commuting purposes. The W&OD Trail has at-grade crossings of Hatcher Avenue, Maple Avenue, and Hirst Road and connects to the sidewalk network at Hatcher Avenue, 21st Street North, and Maple Avenue.

While it is possible that trips to/from the site could be made via walking or biking, in order to be conservative, no trip reduction was applied for walking or biking in this study.

Transit Facilities – The Town of Purcellville is served by two separate bus services that offer local and regional routes. The Virginia Regional Transit (VRT) operates service from several stops within Purcellville to the Loudoun County Government

Center in Leesburg which serves as a hub for other bus routes. The closest stop to the site is located at the Giant Grocery Store (1000 East Main Street) which is approximately 1.25 miles from the site via the W&OD Trail and sidewalks on Maple Avenue and Main Street.

The Loudoun County Transit Commuter bus offers service from Purcellville to various destinations (Rosslyn, Crystal City, The Pentagon, Washington, D.C.) in the Washington D.C. area. The Purcellville stop is located at St. Andrew Presbyterian Church (711 West Main Street) which is approximately 1.75 miles from the site via the W&OD Trail, 21st North, and Main Street. A significant portion of the Main Street portion does not have sidewalks.

Given the distance from the transit stops to the site, it is unlikely that a significant portion of trips would be made exclusively via transit. Therefore, no reduction for transit trips was taken in this study.

2.5. Future Roadway Network and Improvements

At the time of this analysis, there are no known committed or funded improvements to any of the study intersections.

On a more regional basis, the Southern Collector Roadway was completed in summer 2013 (after the existing traffic counts were conducted). The road connects William T. Druham Boulevard to Berlin Turnpike and form the fourth leg of the roundabout at the Berlin Turnpike/Main Street intersection. This improvement is expected to divert some of the existing traffic along Main Street.

The analysis indicates that **without** the buildout of the Catoctin Creek Towne Center development, traffic conditions would necessitate multiple improvements to the study intersections in 2014 and 2020. These improvements include the following:

In 2014:

- Separate westbound left turn lane at the Hirst Road/Hatcher Avenue intersection.
- Separate eastbound left turn lane at the Hirst Road/Berlin Turnpike intersection with associated traffic signal modifications. Although the need for this improvement occurs without development of the site, the Applicant has proffered multiple improvements at this intersection as described below.
- Separate southbound left and eastbound left turn lanes at the Berlin Turnpike/Route 7 Bypass Eastbound Ramps intersection.

In 2020 (in addition to the 2014 improvements noted above):

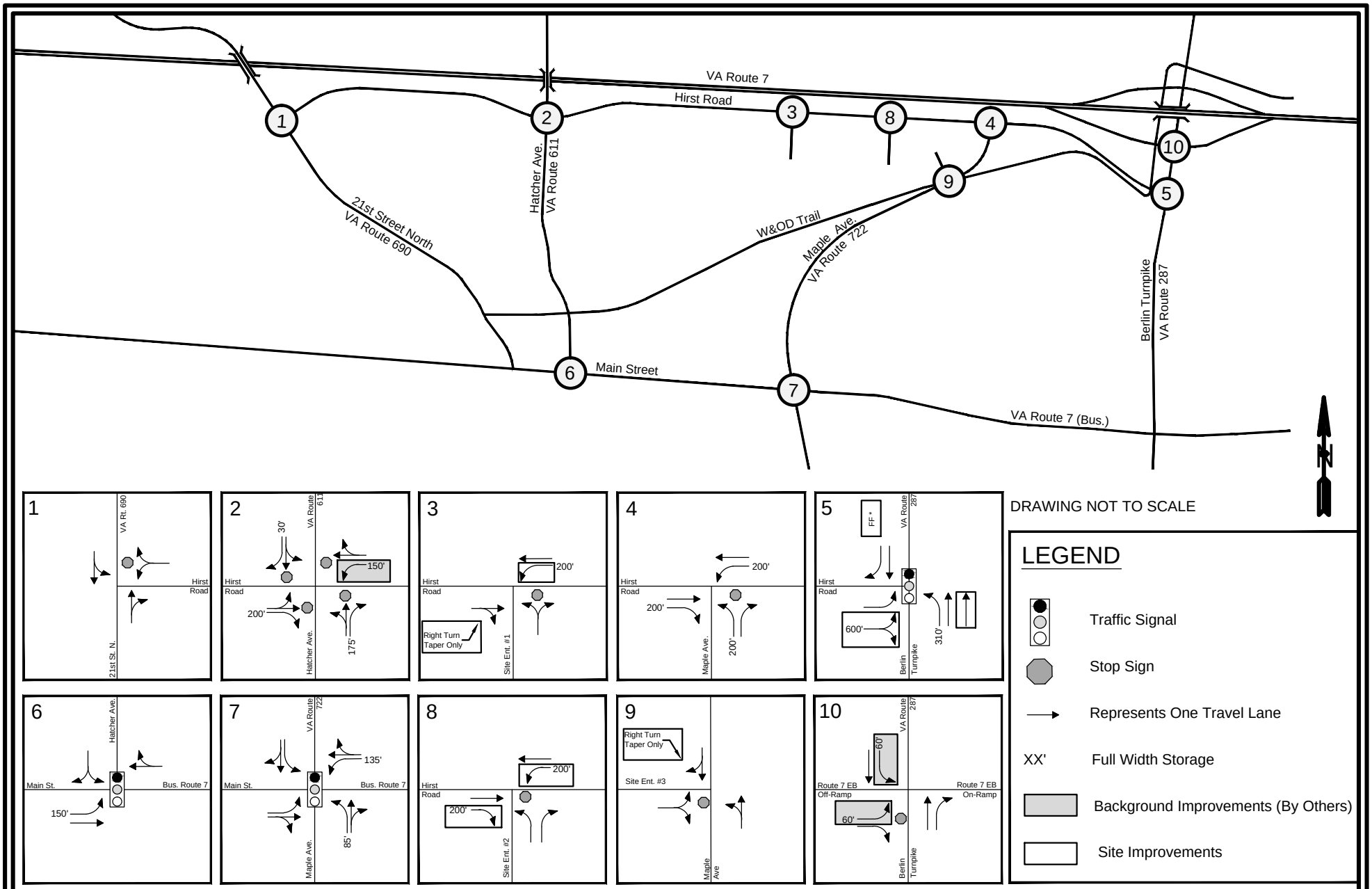
- Separate westbound left turn lane at the Hirst Road/21St Street North intersection
- As recommended in the Route 7 Bypass and Route 287 Interchange Study, a free-flow southbound right turn lane, second northbound through lane, and conversion of the eastbound right turn lane to a shared left-right at the Hirst Road/Berlin Turnpike Intersection. Although the need for these improvements occurs without development of the site, the Applicant has proffered to make multiple improvements at this intersection as described below.

These improvements are necessitated by the existing traffic, assumed 2.0%/year background traffic growth rate and the other approved developments in the study area. These improvements would be required regardless of the development of the Catoctin Creek Towne Center project.

With development of the Catoctin Creek Towne Center project, the Applicant has proffered the improvements which are listed below and shown on Figures EX-1 and EX-2:

- At the Hirst Road/Berlin Turnpike intersection:
    - Convert the southbound right turn lane on Berlin Turnpike into a free flow lane and add a westbound receiving lane (± 380 feet) on Hirst Road
    - Add an eastbound shared left-right turn lane (± 700 feet) on Hirst Road and establish the existing lane as a dedicated left turn lane
    - Add a second northbound through lane (±500 feet) on Berlin Turnpike that would extend through the intersection and connect to the northbound right turn lane at the Berlin Turnpike/VA Route 7 Bypass Eastbound ramp intersection
    - Modifications to the existing traffic signal to accommodate the improvements
- Turn lanes at all site entrances as warranted by the Town and VDOT. The warranted turn lanes would include:
    - Westbound left turn lane with 200 feet of storage and an eastbound right turn taper at the Hirst Road/Site Entrance #1 (Residential) intersection
    - Westbound left turn lane with 200 feet of storage and an eastbound right turn lane with 200 feet of storage at the Hirst Road/Site Entrance #2 (Commercial) intersection
    - Southbound right turn taper at the Maple Avenue/Site Entrance #3 (Commercial) intersection

Figure 7 shows the Future Lane Use and Traffic Control in 2014 with all the improvements noted above. The Recommended Lane Use and Traffic Control (2020) is shown later in the report of Figure 22.



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Future Lane Use and Traffic Control (2014)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 7

Job # 5384-01-001

2.6. Geographic Scope and Limits of Study Area

Based on the scoping agreement shown in Appendix A and Chapter 527 guidelines, it was determined that the study area should include the following intersections:

1. Hirst Road (VA Route F962)/21st Street North (VA Route 690)
2. Hirst Road (VA Route F962)/Hatcher Avenue (VA Route 611)
3. Hirst Road (VA Route F962)/Site Entrance #1 (Residential)
4. Hirst Road (VA Route F962)/Maple Avenue (VA Route 722)
5. Hirst Road (VA Route F962)/Berlin Turnpike (VA Route 287)
6. Main Street (VA Route 7 Business)/Hatcher Avenue (VA Route 611)
7. Main Street (VA Route 7 Business)/Maple Avenue (VA Route 722)
8. Hirst Road (VA Route F962)/Site Entrance #2 (Commercial)
9. Maple Avenue (VA Route 722)/Site Entrance #3 (Commercial)
10. Berlin Turnpike (VA Route 287)/VA Route 7 Bypass Eastbound ramps

2.7. Scenario Scope

Based on the pre-scope of work meeting, the following scenarios were identified to be studied with this report:

- Existing (2012) conditions
- 2014 Background Future Conditions (consists of existing traffic, 2.0% growth in existing traffic compounded annually over 2 years, and partial development of other approved but unbuilt developments as discussed in section 4)
- 2014 Total Future Conditions (consists of existing traffic, 2.0% growth in existing traffic compounded annually over 2 years, partial development of other approved but unbuilt developments as discussed in section 4, and buildout of the proposed Catoctin Creek Towne Center Development)
- 2020 Background Future Conditions (consists of existing traffic, 2.0% growth in existing traffic compounded annually over 8 years, and complete

buildout of other approved but unbuilt developments as discussed in section 4)

- 2020 (Buildout plus six years) Total Future Conditions (consists of existing traffic, 2.0% growth in existing traffic compounded annually over 8 years, complete buildout of other approved but unbuilt developments as discussed in section 4, and buildout of the proposed Catoctin Creek Towne Center Development).

2.8. Traffic Analysis Procedure

The study intersections were analyzed for each scenario using the 2000 Highway Capacity Manual (HCM) methodologies using the computer software package Synchro 8 with SimTraffic. The analysis uses capacity, Level of Service, control delay, and queuing as the criteria for the performance of the intersections.

Capacity, as defined by the HCM, is a measure of the maximum number of vehicles in an hour that can travel through an intersection or section of roadway under typical conditions. Level of Service (LOS) is a marker of the driving conditions and perception of drivers while traveling during the given time period. LOS ranges from LOS “A” which represents free flow conditions, to LOS “F” which represents breakdown conditions. Table 1 shows the LOS for intersections as defined by the HCM.

Table 1 - HCM Level of Service Criteria

Unsignalized Intersections		Signalized Intersections	
Level of Service	Average Control Delay (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤10	A	≤10
B	>10-15	B	>10-20
C	>15-25	C	>20-35
D	>25-35	D	>35-55
E	>35-50	E	>55-80
F	≥50	F	≥80

Typically, LOS “A” through “D” is considered acceptable, while LOS “E” and “F” are considered failing or unacceptable.

Control delay is a measure of the total amount of delay experienced by an individual vehicle and includes delay related to deceleration, queue delay, stopped delay, and acceleration. Table 1 shows the amount of control delay (in seconds per vehicle) that corresponds to the LOS for signalized and unsignalized intersections.

The reported queues, or linear distance of delayed vehicles, in this study are 95th percentile queues. They are reported to ensure that the storage lengths of lanes at intersections are of adequate length and that queued vehicles will not interfere with free flow vehicles or adjacent intersections.

2.9. Traffic Analysis Software Inputs

Signal timing data for existing intersections was provided by VDOT and is included in Appendix B. All signal timings and offsets were optimized under future conditions with and without the development. In accordance with the scoping agreement, data collected in the field was used to input the peak hour factor and heavy vehicle percentage for the existing conditions analysis only. All future scenarios use the default peak hour factor of 0.92, heavy vehicle percentage of 2%, and optimized cycle lengths and splits. All other software defaults remain unchanged.

3. EXISTING TRAFFIC CONDITIONS (2012)

3.1. Existing Peak Hour Traffic Counts

Existing peak hour turning movement traffic counts were conducted by Bowman Consulting at the existing study intersections in May and October, 2012 when public schools were in session. The counts were conducted on a typical weekday from 7:00 to 9:00 AM and 4:00 to 6:00 PM.

The existing traffic counts for the Berlin Turnpike/VA Route 7 Bypass Eastbound Ramps intersection were obtained from the "Route 7 Bypass and Route 287 Interchange Study" prepared by HNTB and dated August 21, 2012

The raw traffic data is included in Appendix C and is summarized on Figure 8. The counts were balanced as necessary, and Figure 8 shows the AM and PM peak hour counts. Estimates of the Average Daily Traffic (ADT) as published in the most recent VDOT data (2012) are also included on Figure 8 for select road segments.

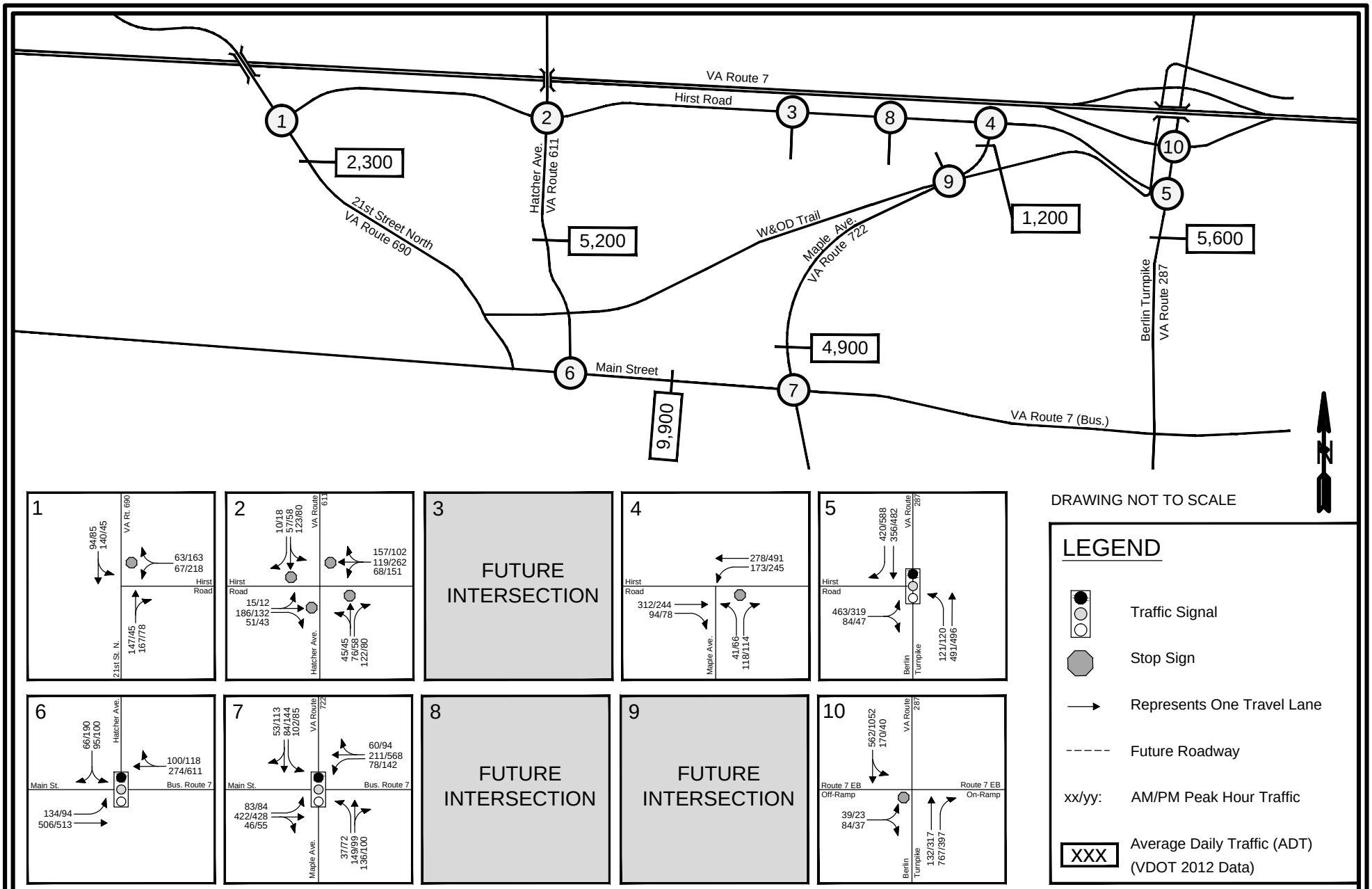
3.2. Analysis of Existing Peak Hour Traffic Conditions

The analysis of existing peak hour traffic conditions was based on the analysis procedures described above, the existing lane use and traffic control shown on Figure 6 and the existing peak hour traffic counts shown on Figure 8.

The calculation worksheets are included in Appendix D and the results of the analysis are summarized in Table 2 and shown graphically on Figure 9. Table 2 also indicates the assumed direction of each roadway at the intersection.

As shown in Table 2, each of the intersections and approaches currently operate at overall LOS "D" or better during each of the peak hours with the following exceptions:

- The westbound shared left-through-right approach to the Hirst Road/Hatcher Avenue intersection (Study Intersection # 2) currently operates at LOS "E" and "F" during the AM and PM peak hours, respectively.



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Existing Traffic Counts (2012)
Catoctin Creek Towne Center
Purcellville, Virginia

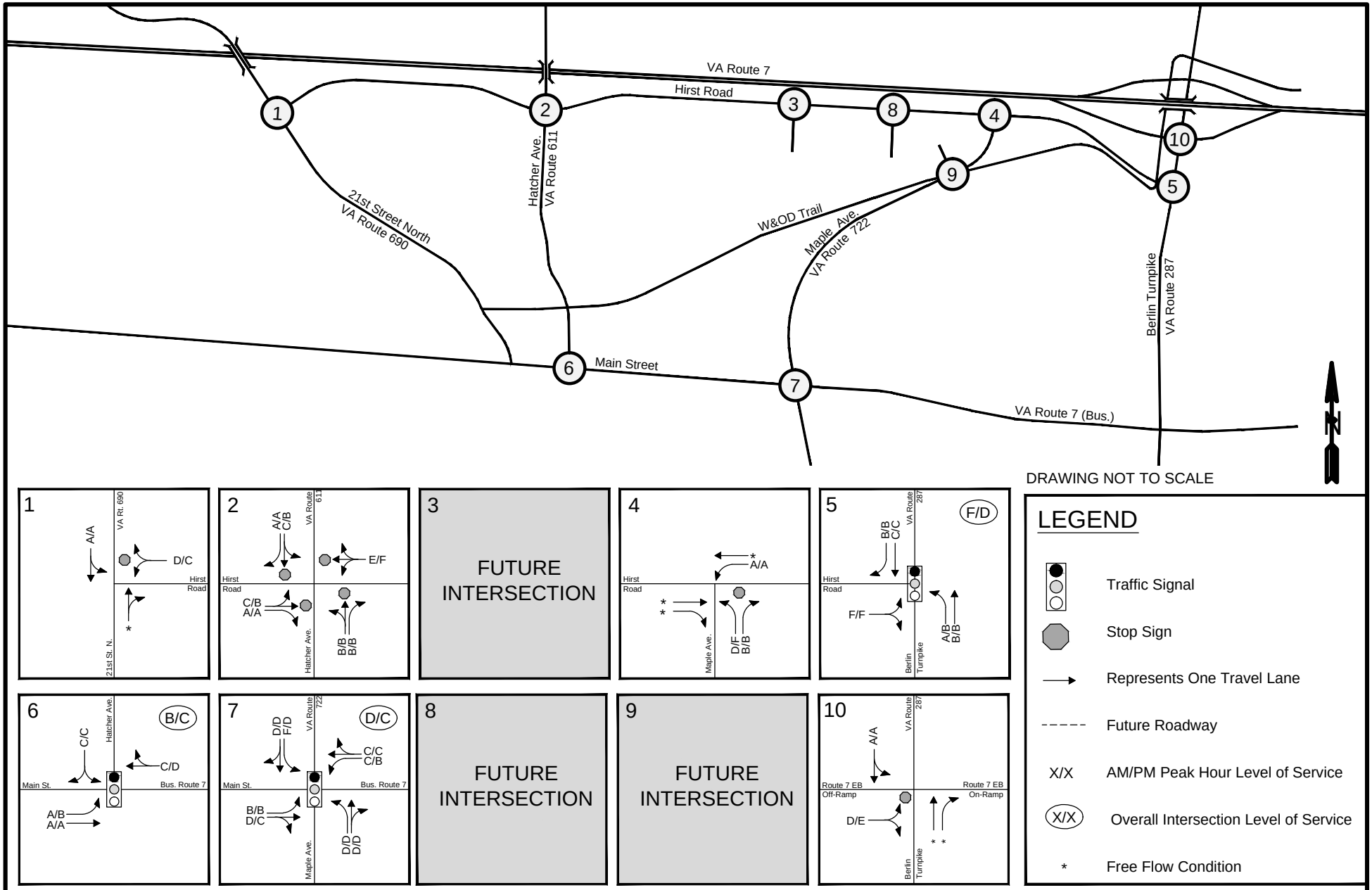
Figure 8

Job # 5384-01-001

Table 2 – Analysis Summary of Existing Peak Hour Conditions

Intersection	Control	Lane Group	Available Storage[1] (ft)	Existing, 2012 AM Peak Hour Lane LOS	AM Peak Hour Lane Delay (sec/veh)	AM Peak Hour Queue [2] (ft)	PM Peak Hour Lane LOS	PM Peak Hour Lane Delay (sec/veh)	PM Peak Hour Queue [2] (ft)
1. Hirst Road (E-W)/		SBTL	~	A	6.2	16	A	3.2	4
21st Street North (N-S)	Stop	WBLR	~	D	25.7	71	C	23.1	146
2. Hirst Road (E-W)/	Stop	NBTL	~	B	14.6	80	B	12.5	68
Hatcher Avenue (N-S)[3]	Stop	NBR	175	B	11.8	61	B	10.4	49
	Stop	SBTL	~	C	20.6	91	B	14.9	76
	Stop	SBR	30	A	9.3	36	A	8.9	47
	Stop	EBTL	~	C	17.3	87	B	12.3	78
	Stop	EBR	200	A	9.9	49	A	9.2	42
	Stop	WBLTR	~	E	44.8	125	F	90.6	233
3. Hirst Road (E-W)/	Stop	NBLR	~	-	-	-	-	-	-
Site Entrance (N-S)		WBTL	~	-	-	-	-	-	-
4. Hirst Road (E-W)/	Stop	NBL	200	D	31.4	29	F	77.4	85
Maple Avenue (N-S)	Stop	NBR	~	B	12.5	33	B	10.9	18
		WBL	200	A	9.3	17	A	9.2	24
5. Hirst Road (E-W)/		NBL	310	A	9.1	232	B	11.6	65
Berlin Turnpike (N-S)		NBT	~	B	10.8	247	B	11.8	293
	Signal	SBT	~	C	20.0	26	C	21.2	424
		SBR	~	B	17.5	#807	B	19.3	55
		EBLR	~	F	435.3	50	F	130.4	#662
	Overall Intersection			**F**	**132.2**		**D**	**37.9**	
6. Main Street (E-W)/		SBLR	~	C	25.6	116	C	31.0	191
Hatcher Avenue	Signal	EBL	150	A	7.5	55	B	14.8	46
		EBT	~	A	9.5	237	A	9.7	274
		WBTL	~	C	21.5	282	D	48.7	#748
	Overall Intersection			**B**	**15.6**		**C**	**30.7**	
7. Main Street (E-W)/	Signal	NBL	85	D	36.9	53	D	38.7	#132
Maple Avenue (N-S)		NBTR	~	D	49.5	281	D	35.2	229
		SBL	~	F	90.4	180	D	35.3	121
		SBTR	~	D	39.1	162	D	43.2	262
		EBL	~	B	19.4	84	B	16.9	40
		EBT	~	D	40.7	694	C	25.5	364
		WBL	150	C	21.2	77	B	13.5	64
		WBTR	~	C	27.5	345	C	30.5	570
	Overall Intersection			**D**	**41.0**		**C**	**30.4**	
8. Hirst Road (E-W)/	Stop	NBL	~	-	-	-	-	-	-
Site Entrance #2 (N-S)	Stop	NBR	~	-	-	-	-	-	-
		WBL	~	-	-	-	-	-	-
9. Maple Avenue (N-S)/		NBTL	~	-	-	-	-	-	-
Site Entrance #3 (E-W)	Stop	EBLR	~	-	-	-	-	-	-
10. Berlin Turnpike (N-S)/		SBTL	~	A	3.0	11	A	1.1	3
Route 7 EB Ramps (E-W)	Stop	EBLR	~	D	26.0	54	E	49.4	52

Notes:
(1) ~ Indicates a continuous lane.
(2) Queues are 95th percentile queues as reported by Synchro.
(3) Queues for this intersection only are 95th percentile queues as reported by SimTraffic as Synchro cannot model queues for all way stop control.
# Indicates 95th percentile volume exceeds capacity, queue may be longer.



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Existing Peak Hour Levels of Service (2012)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 9

Job # 5384-01-001

- The northbound shared left approach to the Hirst Road/Maple Avenue (Study Intersection #4) intersection currently operates at LOS “F” during the PM peak hour.
- The Hirst Road/Berlin Turnpike intersection (Study Intersection #5) currently operates at an overall LOS “F” during the AM peak hour with the eastbound shared left-right approach operating at LOS “F” during both the AM and PM peak hours.
- The southbound left turn lane at the Main Street/Maple Avenue intersection currently operates at LOS “F” during the AM peak hour.
- The eastbound shared left-right approach to the Berlin Turnpike/VA Route 7 Bypass Eastbound Ramps intersection currently operates at LOS “E” during the PM peak hour.

As shown in Table 2, each of the 95th percentile queues are adequately contained within the available storage.

4. BACKGROUND FUTURE TRAFFIC CONDITIONS (2014)

In order to analyze future traffic conditions, without the development of the proposed Catoctin Creek Towne Center project, background traffic conditions were forecasted based on the existing traffic counts, the existing traffic that would divert, or change paths, to use the Southern Collector, other proposed but unbuilt developments in the area, and historic traffic growth.

4.1. Southern Collector Roadway Diversions

The Southern Collector Roadway was completed in summer 2013 and connects William T. Druhan Boulevard to Berlin Turnpike and form the fourth leg of the roundabout at the Berlin Turnpike/Main Street intersection.

In order to account for traffic that would utilize the new roadway, existing traffic diversions were developed based on information contained in the “Route 7 Bypass and Route 287 Interchange Study” prepared by HNTB and dated August 21, 2012. The HNTB references other recently approved traffic studies (“Catoctin Corner

Revised Traffic Impact Analysis" prepared by PHR+A and dated May 28, 2010) which assume a 48% reduction in existing traffic for the eastbound approach to the Main Street/Berlin Turnpike intersection.

Since the Southern Collector connects Berlin Turnpike with William T. Druhan Boulevard and eventually Maple Avenue, it is reasonable to assume that some existing traffic at the Main Street/Maple Avenue would divert from the existing path to utilize the Southern Collector.

Based on the HNTB study, it was assumed that 48% of the existing northbound right and westbound left turn traffic would divert and use the Southern Collector. These diversions are shown on Figure 10.

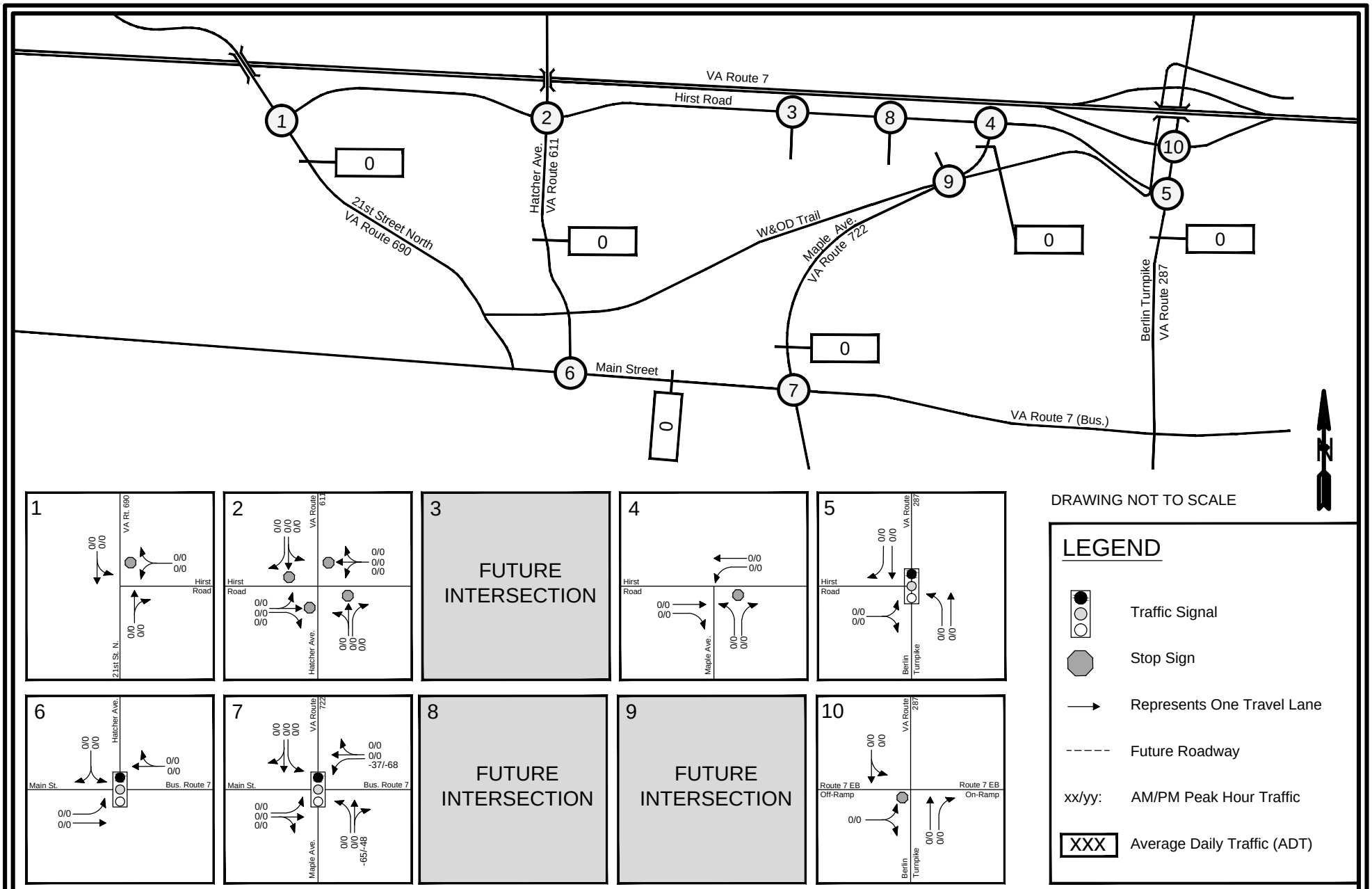
4.2. Other Developments

In accordance with the scoping agreement, there are four other developments in the vicinity of the site. These developments include:

1. Catoctin Corner – 48,900 S.F. of commercial space
2. Purcellville Gateway – partially built in 2012. At full buildout, the development would include an additional 27,500 S.F. of retail space, 22,000 S.F. of office space, and 6 single family dwelling units.
3. Loudoun Valley Shopping Center – Phase I is built and occupied. Phase II would add an additional 60,815 S.F. of commercial space.
4. Patrick Henry College – expansion to include facilities for 700 additional students.

In accordance with the scoping agreement, 35% of Catoctin Corner (17,115) and all retail/office space (no residential) at Purcellville Gateway was assumed to be built and occupied by 2014. The remainder of the developments were assumed to be complete and occupied by 2020.

The location of the other developments is shown on Figure 11 and the trips that would be generated by the 2014 levels of development are shown in Table 3.



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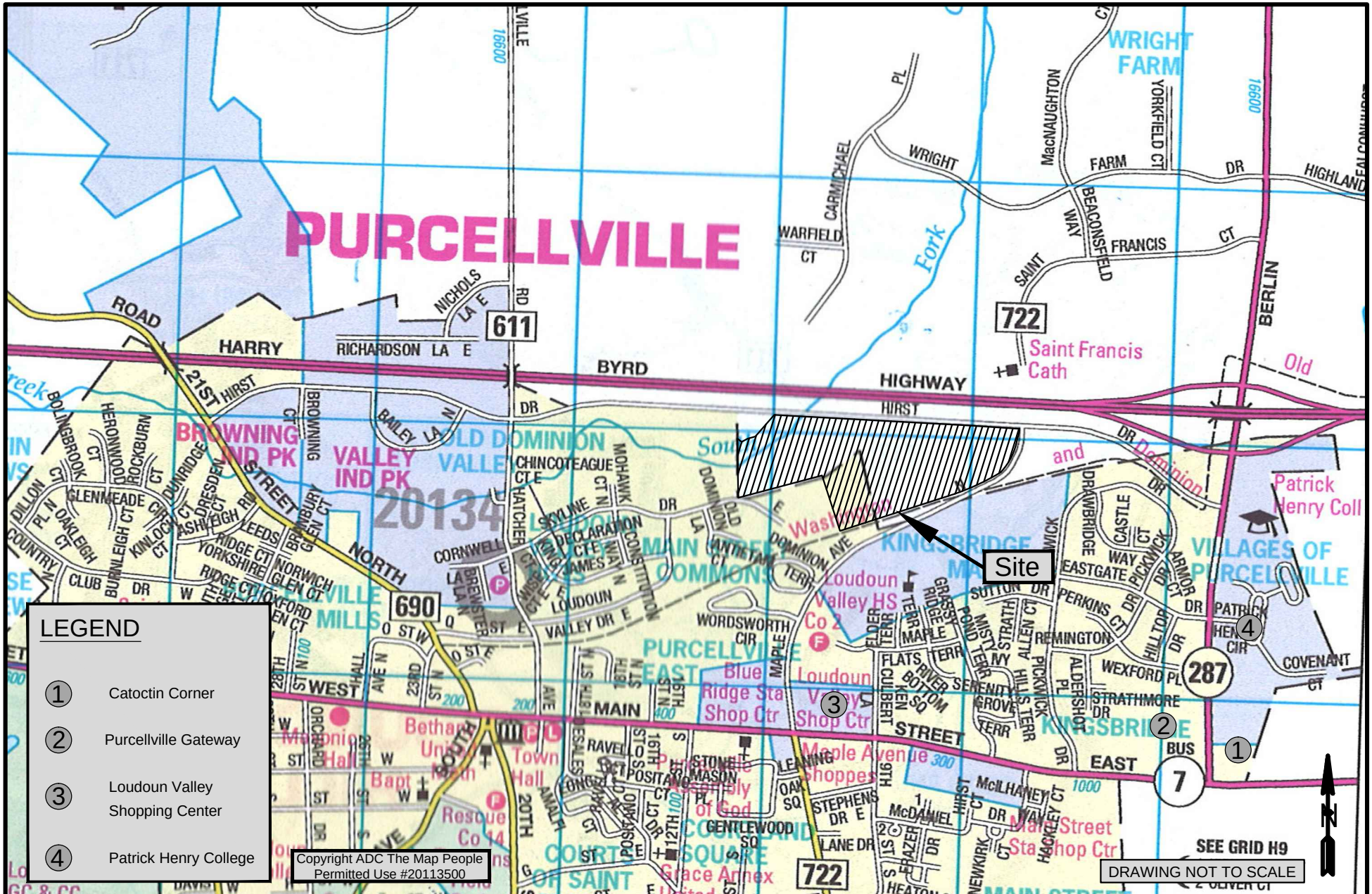
Existing Traffic Diversions for Southern Collector

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 10

Job # 5384-01-001



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Location of Other Developments
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 11

Job # 5384-01-001

Table 3 – Other Development Trip Generation Analysis (2014)

Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily Trips
Background Developments -2014										
Catoctin Corner(1)										
Commercial	17,115	S.F.		85	76	161	141	129	270	2,975
Purcellville Gateway(2)										
Retail	27,500	S.F.		98	79	177	214	201	415	3,699
Office	22,000	S.F.	710	49	7	56	18	85	103	416
Total Purcellville Gateway Trips				*147*	*86*	*233*	*232*	*286*	*518*	*4,115*
Total Background Development Trips - 2014				**232**	**162**	**394**	**373**	**415**	**788**	**7,090**

Notes: (1) Assumes 35% Development by 2014. Trip generation taken from Table 6B of "Catoctin Corner Revised Traffic Impact Analysis" prepared by PHR+A dated May 28,2010. Table 6B trips were multiplied by 35% for assumed 2014 levels.

(2) Retail portion of development under construction at time of existing traffic counts. Grocery store and 4/14 of retail stores (28.6 % or 11,000 S.F.) were open at time of existing traffic counts. 2014 Development levels assume completion of remainder of retail (71.4% or 27,500 S.F.) and all office (22,000 S.F.) Trips taken from Table 3-2 in Appendix K of "Loudoun Valley Shopping Center Traffic Impact Analysis" prepared by Wells + Associates dated May 21, 2010.

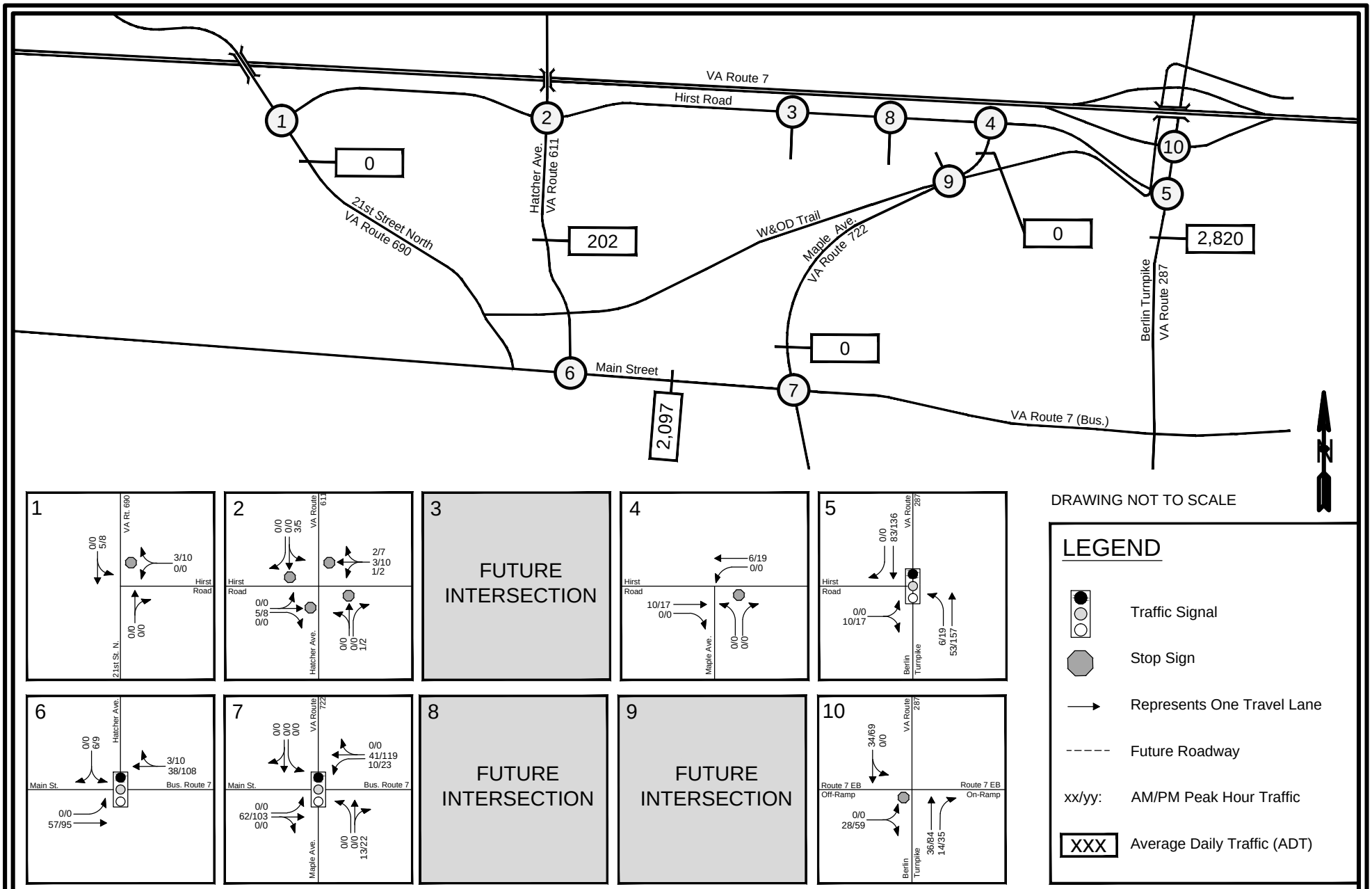
4.3. Other Development Trip Distribution and Assignment

The trips that would be generated by the other developments were taken directly from their respective traffic studies as indicated in the footnotes of Table 3. The traffic assignments for each development are shown in Appendix E and summed on Figure 12.

4.4. Background Traffic Growth

In order to account for development outside of the study area, a background traffic growth rate of 2% per year, compounded annually, was agreed upon in the scoping agreement.

In order to determine 2014 traffic conditions, the annual 2.0% growth rate was compounded annually for the two-year period from the date of the existing counts. Background traffic growth was, therefore, estimated at 4.04% for the 2014 scenario. This growth rate was applied to all movements on the roadways.



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Other Development Traffic Assignments (2014)

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 12

Job # 5384-01-001

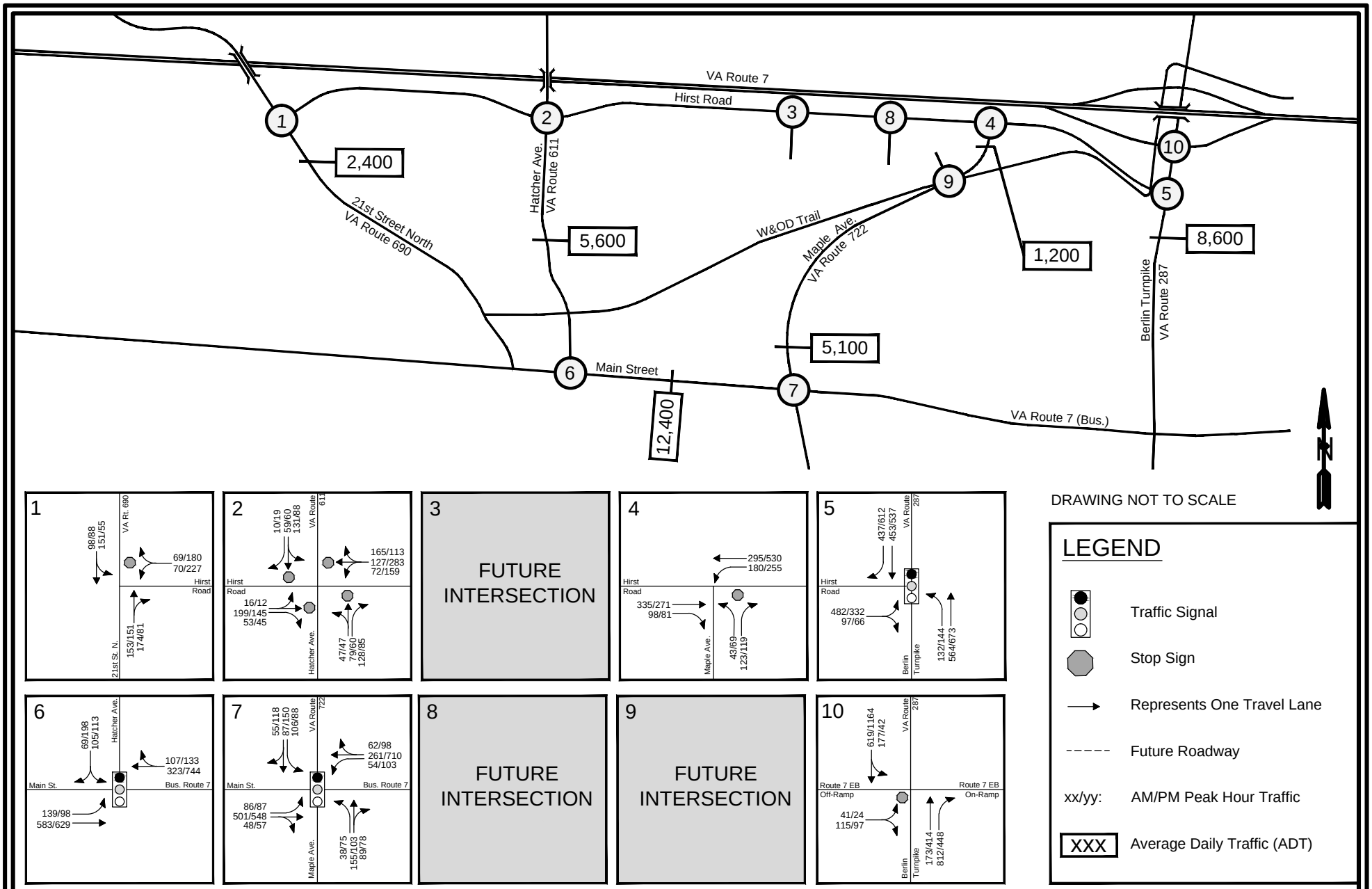
4.5. 2014 Background Future Traffic Forecasts (without Development)

The background traffic growth discussed above was then added to the Existing Traffic Counts shown on Figure 8, the Existing Traffic Diversions shown on Figure 10, and the Other Development Traffic Assignments (2014) shown on Figure 12 to yield the 2014 Total Background Traffic Forecasts (2014). These forecasts are shown on Figure 13 and show the AM and PM peak hour forecasts as well as the weekday ADT (rounded to the nearest 100).

4.6. Analysis of 2014 Background Peak Hour Traffic Conditions (without Development)

The analysis of 2014 Background Peak Hour Traffic Conditions was based on the analysis procedures described above, the future lane use and traffic control shown on Figure 7, and the Total Background Traffic Forecasts (2014) shown on Figure 13. As indicated in Section 2.9, all future analysis scenarios assume a default peak hour factor of 0.92 and heavy vehicle percentage of 2.0% along with optimized cycle lengths and splits.

The calculation worksheets are included in Appendix F and the results of the analysis are summarized in Table 4 and shown graphically on Figure 14 (with the required improvements noted below). Table 4 also indicates the assumed direction of each roadway at the intersection.



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Background Future Traffic Forecasts (2014)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 13

Job # 5384-01-001

Table 4 – Analysis Summary of Background (2014) Peak Hour Conditions

Intersection	Control	Lane Group	Available Storage[1] (ft)	Background, 2014 AM Peak Hour Lane LOS	Background, 2014 AM Peak Hour Lane Delay (sec/veh)	Background, 2014 AM Peak Hour Queue [2] (ft)	Background, 2014 PM Peak Hour Lane LOS	Background, 2014 PM Peak Hour Lane Delay (sec/veh)	Background, 2014 PM Peak Hour Queue [2] (ft)	Total Future, 2014 AM Peak Hour Lane LOS	Total Future, 2014 AM Peak Hour Lane Delay (sec/veh)	Total Future, 2014 AM Peak Hour Queue [2] (ft)	Total Future, 2014 PM Peak Hour Lane LOS	Total Future, 2014 PM Peak Hour Lane Delay (sec/veh)	Total Future, 2014 PM Peak Hour Queue [2] (ft)
1. Hirst Road (E-W)/		SBTL	~	A	5.6	12	A	3.3	4	A	5.6	12	A	4.4	6
21st Street North (N-S)	Stop	WBLR	~	C	15.8	33	C	21.1	130	C	16.2	36	D	28.5	181
2. Hirst Road (E-W)/	Stop	NBTL	~	B	12.2	68	B	11.8	60	B	12.5	83	B	12.3	68
Hatcher Avenue (N-S)[3]	Stop	NBR	175	B	10.6	77	A	9.9	45	B	10.9	62	B	11.6	74
	Stop	SBTL	~	C	15.4	97	B	13.4	79	C	15.9	90	C	15.3	73
	Stop	SBR	30	A	8.5	44	A	8.8	46	A	8.7	57	A	9.1	50
	Stop	EBTL	~	B	14.5	87	B	12.0	84	C	15.1	68	B	14.7	85
	Stop	EBR	200	A	8.8	42	A	8.5	49	A	8.9	53	A	8.9	43
	Stop	WBLTR	~	C	23.8	136	F	71.6	207	D	27.7	118	F	136.9	273
with construction of a separate	Stop	NBTL	~	B	11.4	64	B	11.2	56	B	11.6	78	B	12.0	63
westbound left turn lane with	Stop	NBR	175	A	9.9	65	A	9.3	48	B	10.1	65	B	11.2	74
150' of storage.	Stop	SBTL	~	B	14.1	106	B	12.6	80	B	14.5	141	B	14.9	77
	Stop	SBR	30	A	8.1	38	A	8.4	47	A	8.2	49	A	8.9	50
	Stop	EBTL	~	B	13.6	93	B	11.5	78	B	14.0	63	B	14.5	78
	Stop	EBR	200	A	8.4	37	A	8.2	45	A	8.5	52	A	8.9	49
	Stop	WBL	150	B	10.1	53	B	11.5	61	B	10.3	41	B	13.2	115
	Stop	WBTR	~	B	14.9	106	C	20.7	106	C	16.2	83	D	32.4	170
3. Hirst Road (E-W)/	Stop	NBLR	~	-	-	-	-	-	-	B	14.5	15	C	18.5	12
Site Entrance (N-S)		WBL	200	-	-	-	-	-	-	A	8.4	1	A	8.6	4
4. Hirst Road (E-W)/	Stop	NBL	200	D	28.5	22	F	83.0	85	D	31.3	27	F	524.4	233
Maple Avenue (N-S)		NBR	~	B	11.6	18	B	10.8	16	B	11.9	19	B	12.3	22
		WBL	200	A	9.0	16	A	9.0	23	A	9.2	17	A	10.0	34
5. Hirst Road (E-W)/		NBL	310	B	20.0	89	C	20.7	101	C	22.4	#96	E	67.9	#227
Berlin Turnpike (N-S)		NBT	~	C	23.6	425	B	18.7	588	C	24.1	400	B	18.2	416
	Signal	SBT	~	D	37.2	#437	C	32.0	728	D	40.6	#426	D	51.6	#607
		SBR	~	C	25.2	69	C	23.7	67	C	24.6	68	C	24.6	85
		EBLR	~	D	52.0	#691	E	72.0	526	D	53.4	#584	F	106.2	#571
	Overall Intersection			**C**	**34.2**		**C**	**32.1**		**D**	**35.6**		**D**	**47.5**	
with proffered improvements by		NBL	310	-	-	-	-	-		B	16.2	79	C	23.7	#152
Catoctin Creek Towne Center		NBT	~	-	-	-	-	-	-	B	13.6	145	A	7.9	127
(EBLR lane, SBR free flow lane,	Signal	SBT	~	-	-	-	-	-	-	C	32.6	#384	C	29.2	#550
second NBT lane)		SBR	~	-	-	-	-	-	-	A	0.5	0	A	1.3	0
		EBL, LR	~	-	-	-	-	-	-	D	44.5	#450	D	39.5	213
	Overall Intersection			**-**	**-**		**-**	**-**		**C**	**23.5**		**B**	**17.9**	
6. Main Street (E-W)/		SBLR	~	C	24.7	137	D	50.2	#293	C	24.7	140	E	58.4	#330
Hatcher Avenue	Signal	EBL	150	A	7.2	53	C	25.5	#87	A	7.3	54	E	67.1	#180
		EBT	~	A	8.8	263	A	9.6	308	A	8.9	265	A	9.7	309
		WBTL	~	B	19.5	272	D	36.9	#843	B	19.6	273	D	41.5	#869
	Overall Intersection			**B**	**14.2**		**C**	**29.5**		**B**	**14.3**		**D**	**36.0**	
7. Main Street (E-W)/	Signal	NBL	85	C	27.6	57	D	45.4	119	C	25.1	54	E	63.6	#149
Maple Avenue (N-S)		NBTR	~	C	33.3	273	D	40.0	198	C	30.1	249	D	42.0	206
		SBL	~	C	33.6	146	D	40.3	125	C	32.0	153	D	43.3	140
		SBTR	~	C	29.4	157	D	47.2	305	C	26.6	143	E	55.8	#361
		EBL	~	B	10.3	53	C	20.3	49	B	11.0	55	C	22.0	64
		EBT	~	C	23.1	501	C	21.9	515	C	23.3	484	C	20.6	489
		WBL	150	B	13.0	37	B	13.0	56	B	12.5	37	B	12.3	52
		WBTR	~	B	18.5	256	C	34.5	#923	B	17.1	251	C	34.3	#930
	Overall Intersection			**C**	**24.1**		**C**	**32.1**		**C**	**23.0**		**C**	**33.8**	
8. Hirst Road (E-W)/	Stop	NBL	~	-	-	-	-	-	-	A	0.0	0	F	53.4	41
Site Entrance #2 (N-S)	Stop	NBR	~	-	-	-	-	-	-	A	0.0	0	B	11.7	14
		WBL	~	-	-	-	-	-	-	A	0.0	0	A	9.1	15
9. Maple Avenue (N-S)/		NBTL	~	-	-	-	-	-	-	A	0.0	0	A	0.7	1
Site Entrance #3 (E-W)	Stop	EBLR	~	-	-	-	-	-	-	A	0.0	0	B	12.6	6
10. Berlin Turnpike (N-S)/		SBTL	~	A	3.2	12	A	1.6	3	A	3.2	12	A	2.6	3
Route 7 EB Ramps (E-W)	Stop	EBLR	~	E	35.8	91	F	126.0	165	E	36.3	92	F	254.9	225
with improvements outlined in		SBL	175	A	8.0	12	A	8.4	3	A	8.0	12	A	8.5	3
Route 7/Route 287 interchange	Stop	EBL	60	E	44.5	33	F	106.8	42	E	44.9	34	F	208.9	61
study (separate EBL and SBL)	Stop	EBR	~	C	15.9	28	E	39.3	65	C	16.0	28	F	61.6	92

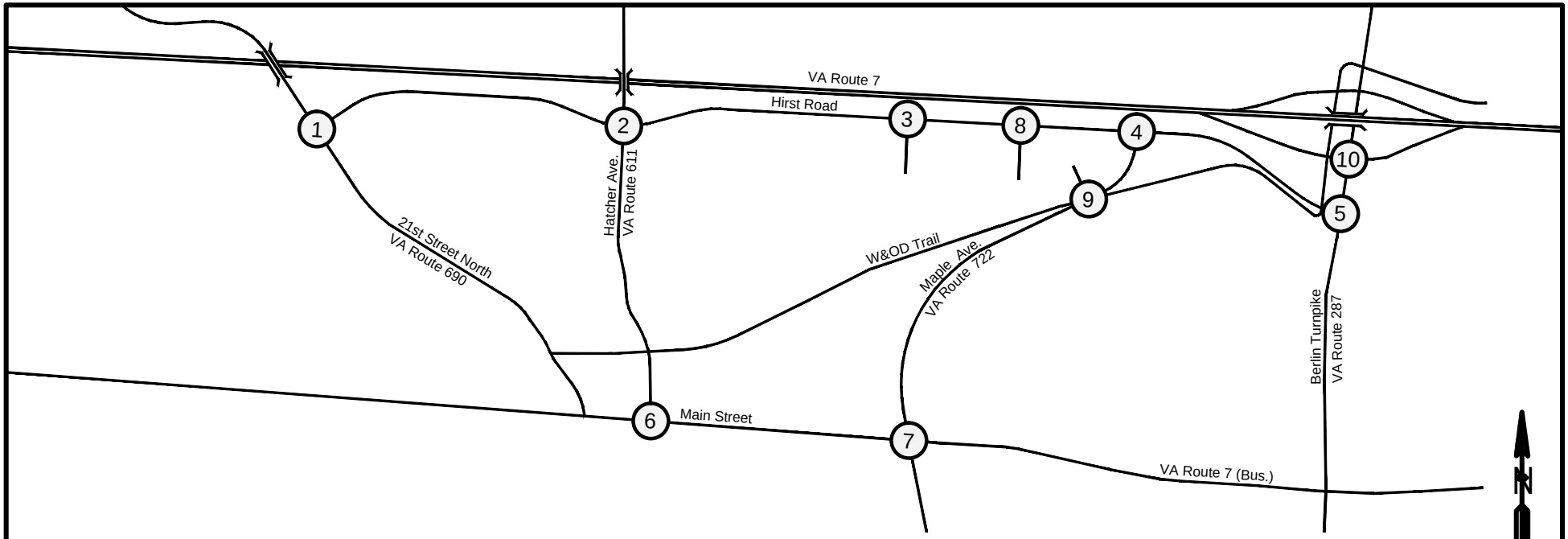
Notes:

(1) ~ Indicates a continuous lane.

(2) Queues are 95th percentile queues as reported by Synchro.

(3) Queues for this intersection only are 95th percentile queues as reported by SimTraffic as Synchro cannot model queues for all way stop control.

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



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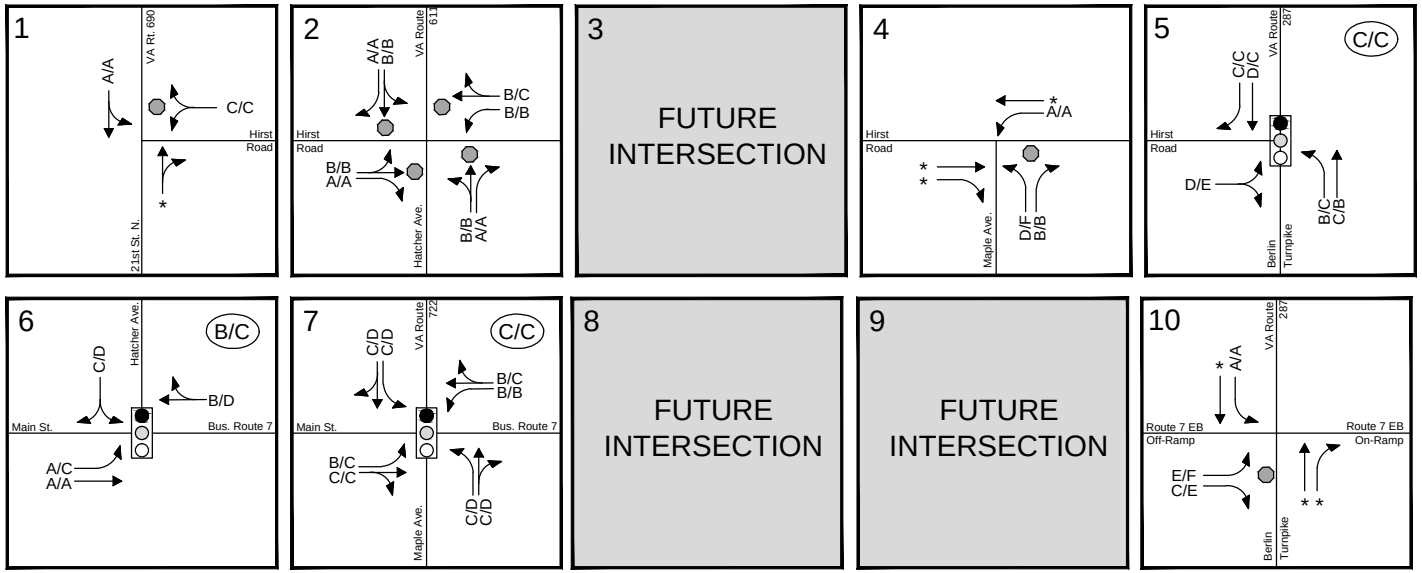

LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- Future Roadway
- X/X — AM/PM Peak Hour Level of Service
- (X/X) — Overall Intersection Level of Service
- * — Free Flow Condition

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Background Future Peak Hour Levels of Service (2014)

Catoctin Creek Towne Center
Purcellville, Virginia

Figure 14

Job # 5384-01-001

As shown on Table 4, each of the intersections and approaches would continue to operate at LOS "D" or better with the following exceptions:

- The westbound shared left-through-right approach to the Hirst Road/Hatcher Avenue (Study Intersection #2) intersection would operate at LOS "F" during the PM peak hour.
  - Suggested Mitigation (By others): With construction of a separate westbound left turn lane with 150 feet of storage, the westbound left turn lane and shared through-right turn lane would operate at LOS "B" and "C", respectively in the PM peak hour.

- The northbound left turn lane at the Hirst Road/Maple Avenue intersection (Study Intersection #4) would operate at LOS "F" during the PM peak hour.
  - Suggested Mitigation (By others): Given the low volume of traffic (69 vehicles in the PM peak hour) making a northbound left turn, no mitigation is recommended.

- The eastbound shared left-right approach to the Hirst Road/Berlin Turnpike intersection (Study Intersection #5) would operate at LOS "E" (72.0 seconds of average delay and a 95th percentile queue of 526 feet) during the PM peak hour.
  - Suggested Mitigation: While the need for improvement is caused by existing and background traffic, the Applicant has proffered multiple improvements at this intersection as described above.

- The eastbound shared left-right approach to the Berlin Turnpike/VA Route 7 Bypass Eastbound Ramps intersection would operate at LOS "E" and "F" during the AM and PM peak hours, respectively.
  - Suggested Mitigation (By Others): The HNTB "Route 7 Bypass and Route 287 Interchange Study" calls for construction of a separate southbound left turn lane and separate eastbound left turn lane.

5. SITE TRIP GENERATION

The Applicant is proposing to develop the site with approximately 176 multi-family residential dwelling units and approximately 10.5 acres of commercial recreation.

The average weekday AM and PM peak hour and average daily trips that are expected to be generated by the residential land uses were estimated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th edition and are shown in Table 5.

Traffic to be generated by the commercial recreation has been determined by a use of both ITE information and operator estimates on typical peak hour time periods. Refer to Table 5 for the commercial recreation trip generation breakdown.

Based on the proposed development plan, the commercial recreation will provide individual uses to include an outdoor area (mini golf, bumper boats, go karts, batting cages, arcade, and 10,000 S.F. of food services) and an indoor facility (bowling, sports bar, general restaurant, arcade, laser tag, and party rooms). The ITE Trip Generation Manual does have a land use description (Code 435) that covers the proposed facility. However, there are few studies for this type of land use and the calculated trip generation numbers indicate total PM peak hour numbers on the range of 61 vph to 175 vph.

Since the ITE calculations for the entire entertainment facility are questionable, the chosen method for calculating the entertainment facility takes a more individual land use approach and determined PM peak hour traffic conditions for each use housed in both the outdoor and indoor facilities on an individual basis. Where good ITE information is available, PM peak hour calculations have been determined for each individual use. Where no ITE data is available, operator information has been obtained and used to determine the individual land use trip generation numbers.

Directional splits (entering / exiting) for the commercial recreation have been determined by utilizing ITE trip generation information. Comparable land uses

indicate an entering percentage split of 55% to 60% for a commercial recreation type land use. For this study we assumed a 65% split for entering commercial recreation site trips and a corresponding split of 35% for exiting commercial recreation site trips. A higher inbound rate was utilized to further a 'worst' case traffic operation for analysis.

Average daily traffic (ADT) volumes for the commercial recreation were determined based on ITE information for a similar land use to that of the proposed site. Information obtained provided a PM peak hour rate to that of a daily rate for ITE land use code 435. The ITE relationship was utilized to determine the commercial recreation ADT by factoring the PM peak hour total trips determined from the individual land use method used to estimate the PM peak hour site trips by 15.66 to estimate the ADT.

Site residential and commercial recreation trip generation numbers have been summarized in Table 5. As shown in Table 5, the proposed development would generate approximately 90 new trips during the AM peak hour (18 in and 72 out), 606 new trips during the PM peak hour (394 in and 212 out), and 8,896 new daily trips over a 24-hour period.

Also, it should be noted that no internal trip reductions have been applied between residential and commercial uses. More importantly, no reductions between the individual commercial recreation uses have been taken. Again, this method furthers the "worst case" traffic operation for this analysis.

Table 5 – Site Trip Generation Analysis

Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily Trips
Proposed Catoctin Creek Towne Center Development - ITE Trips(1)										
Residential										
Apartments	176	D.U.	220	18	72	90	74	40	114	1,190
Commercial Recreation(2)										
Outdoor										
Miniature Golf(3)	36	Holes	431	0	0	0	8	4	12	188
Go Karts/Bumper Boats(4)	12 boats/1,000 S.F.			0	0	0	78	42	120	1,880
Batting Cages	9	Cages	433	0	0	0	13	7	20	313
Service Building	10,000	S.F.	932	0	0	0	46	24	70	1,096
Indoor										
Bowling	16,000	S.F.	437	0	0	0	17	10	27	423
Sportsbar	8,400	S.F.	932	0	0	0	54	29	83	1,300
Laser Tag(4)	4,500	S.F.		0	0	0	65	35	100	1,566
Party Rooms(4)	3,300	S.F.		0	0	0	39	21	60	940
Commercial Recreation Totals				0	0	0	320	172	492	7,706
Total Catoctin Creek Towne Center Trips				**18**	**72**	**90**	**394**	**212**	**606**	**8,896**

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 8th Edition.
(2) In/Out distribution based on assumption that 65% of traffic would enter in the PM peak hour.
(3) Trips shown are peak hour of generator.
(4) Trips shown are based on information provided by the operator.

6. SITE TRIP DISTRIBUTION AND ASSIGNMENTS

6.1 Site Trip Distribution and Assignments

Site trip distributions were based on the nature of the development, the location within the Town, local/regional employment, and the local roadway network. Separate distributions were developed for both the residential and commercial recreation components of the site with the residential based more on local/regional employment and the commercial recreation based on the number of houses within a market draw of 15 miles.

Specifically, the residential site trip distributions were assumed as follows and as shown on Figure 15A:

- 30% to/from the East on VA Route 7 Bypass
- 30% to/from the Commercial Center
- 15% to/from the Business Center
- 15% to/from the Industrial Center
- 5% to/from Loudoun Valley High School
- 5% to/from Woodgrove High School

Specifically, the commercial recreation site trip distributions were assumed as follows and as shown on Figure 15B:

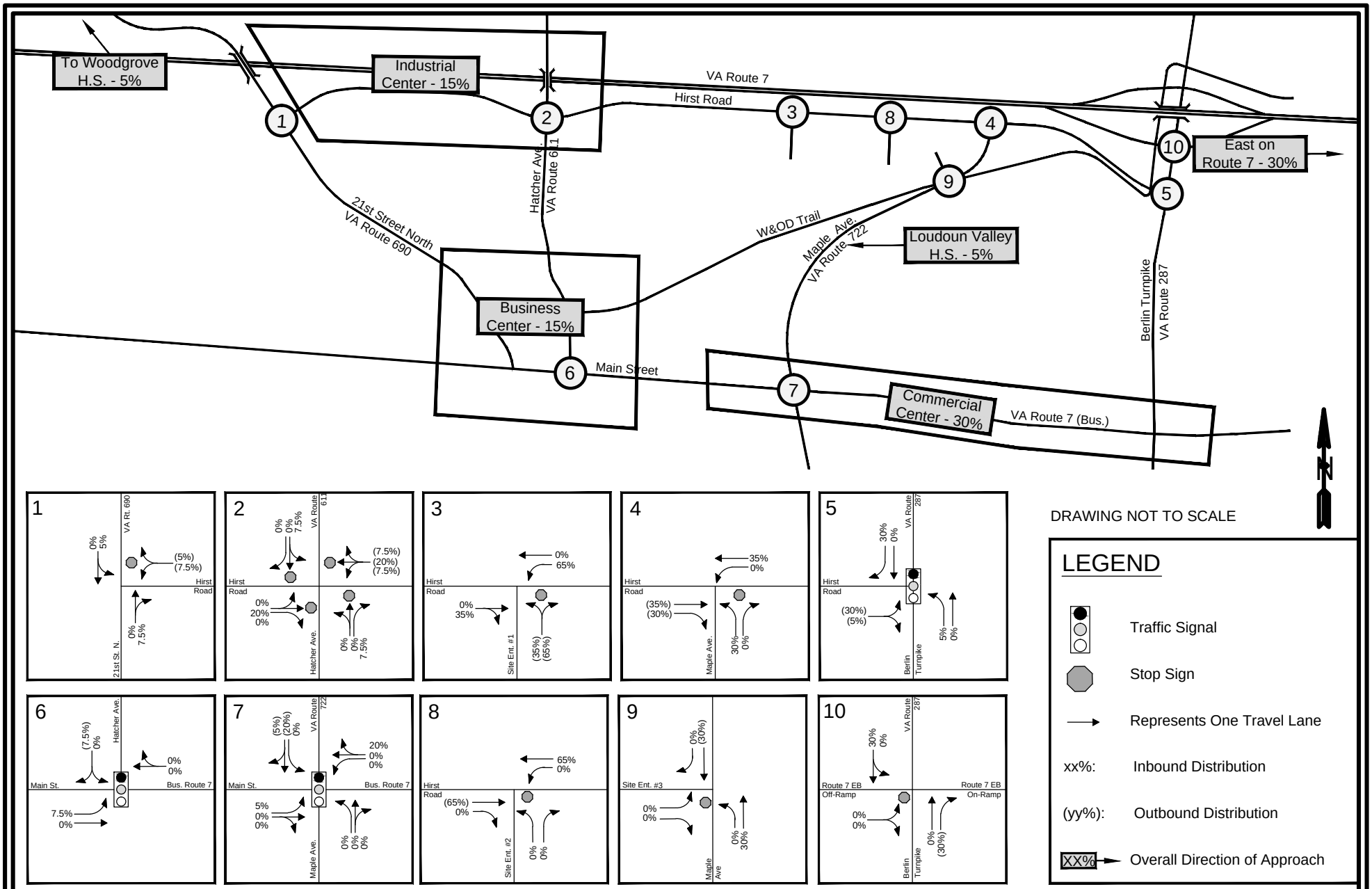
- 15% to/from the North on Berlin Turnpike
- 30% to/from the East on VA Route 7 Bypass
- 15% to/from the East on VA Route 7 Business
- 5% to/from the South on the Southern Collector
- 20% to/from the West on Main Street (VA Route 7 Business)
- 10% to/from the North on VA Route 690
- 5% to/from the North on VA Route 611

The overall distributions were then assigned to the local roadway network and site entrance as shown on Figures 15A and 15B for the residential and commercial recreation trips, respectively. The trips shown in Table 5 were then distributed to the study intersections using the percentages shown on Figures 15A and 15B. The resulting Site Generated Traffic Assignments are shown on Figure 16.

7. 2014 TOTAL FUTURE TRAFFIC CONDITIONS

7.1. 2014 Total Future Traffic Forecasts (with Development)

The Site Traffic Assignments shown on Figure 16 were then added to the Total Background Traffic Forecasts (2014) shown on Figure 14 to yield to Total Future Traffic Forecasts (2014). These forecasts are shown on Figure 17 and show the AM and PM peak hour forecasts as well as the weekday ADT (rounded to the nearest 100).



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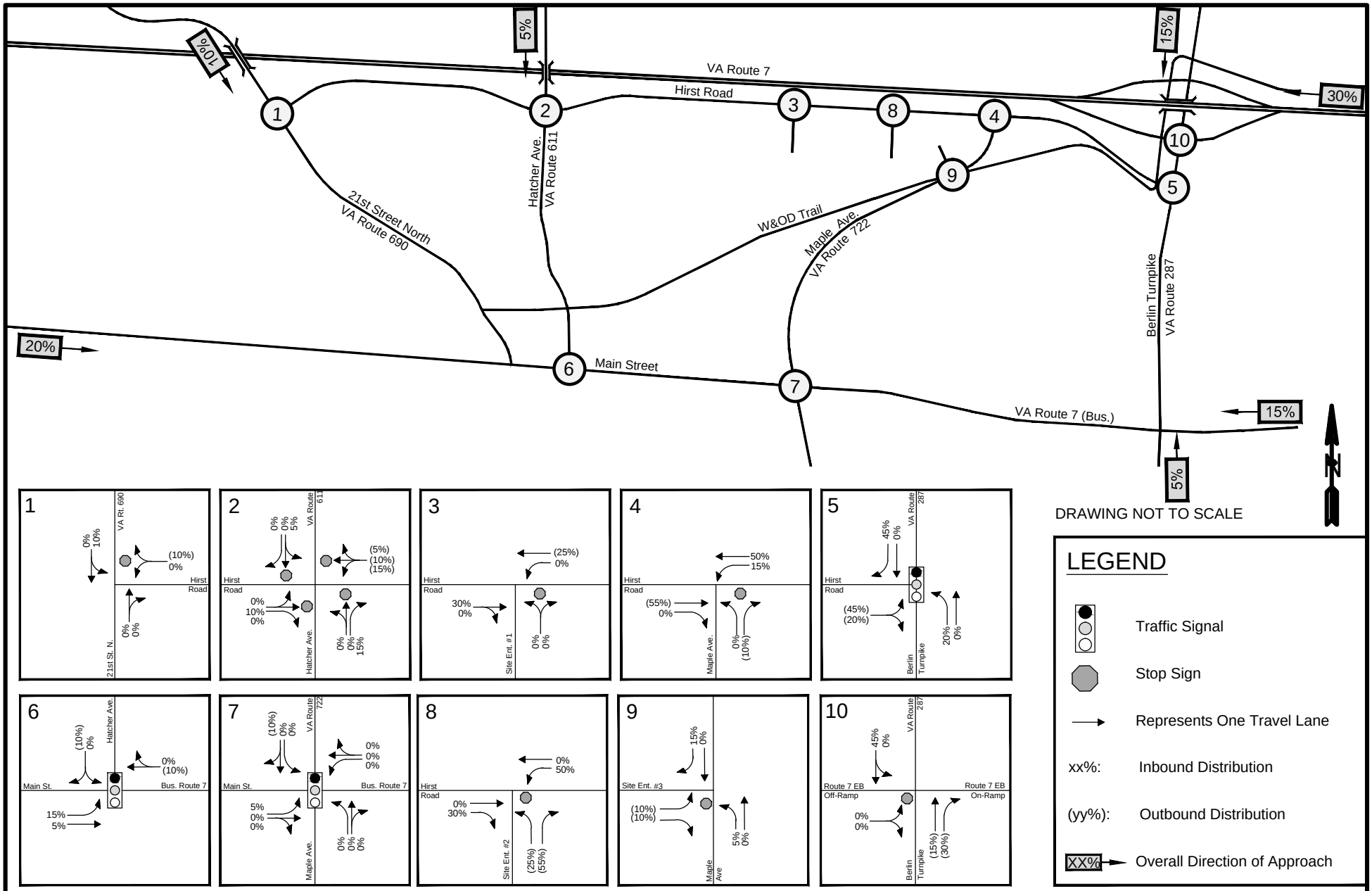
Site Generated Trip Distributions - Residential

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 15A

Job # 5384-01-001



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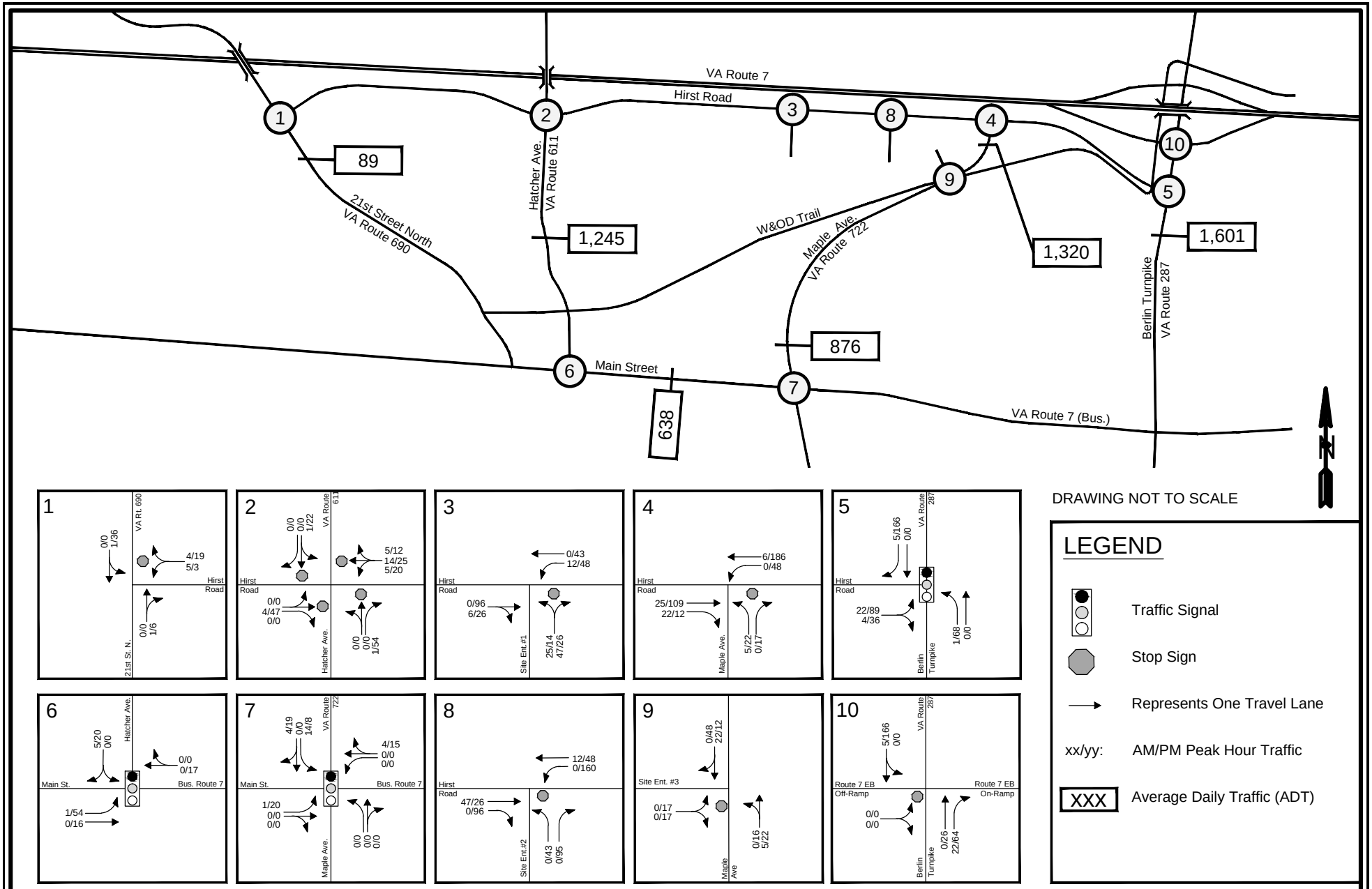
Site Generated Trip Distributions - Commercial

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 15B

Job # 5384-01-001



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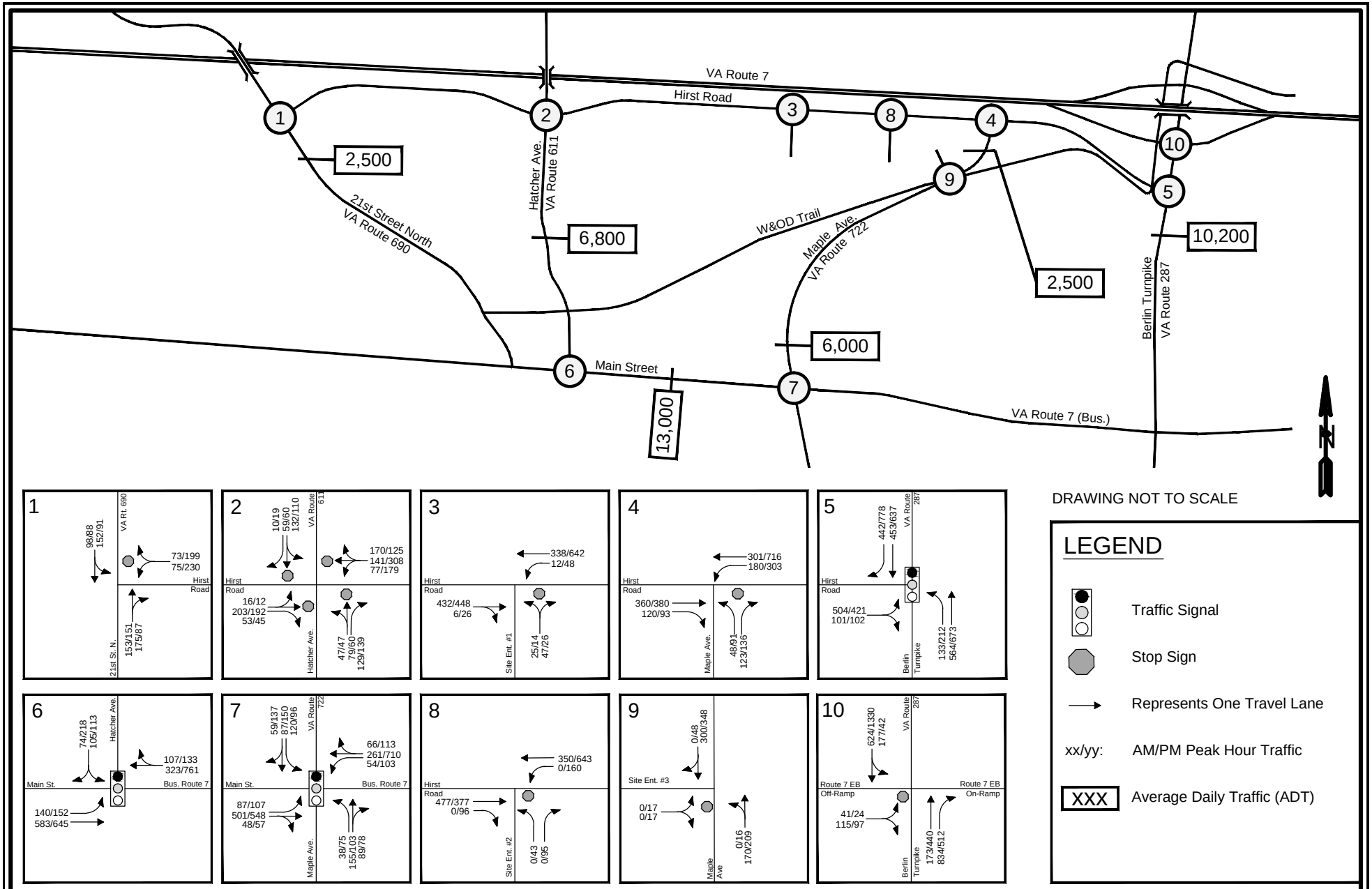
Site Generated Traffic Assignments
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 16

Job # 5384-01-001



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Total Future Traffic Forecasts (2014)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 17

Job # 5384-01-001

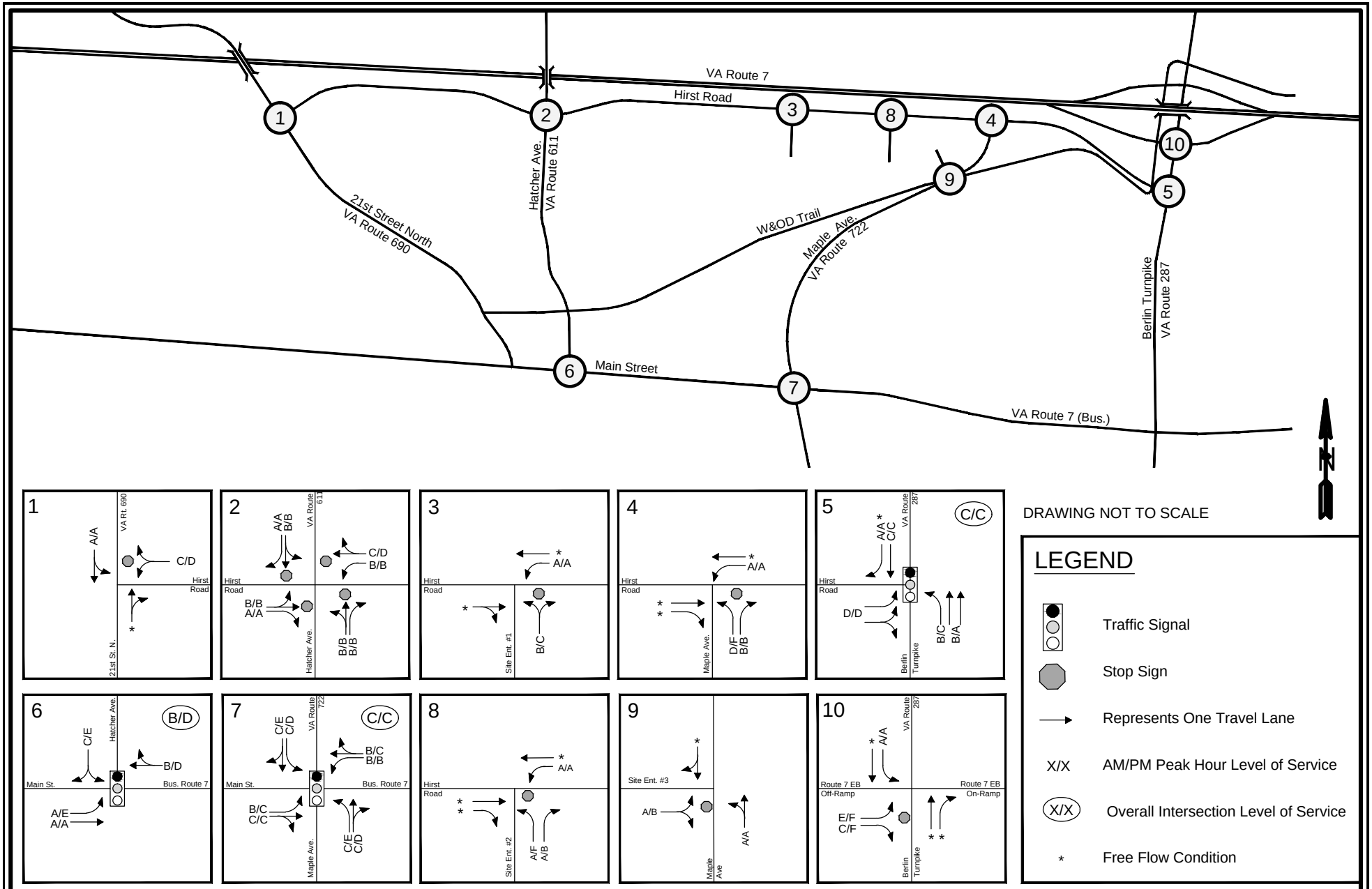
7.2. Analysis of 2014 Total Future Peak Hour Traffic Conditions

The analysis of 2014 Total Future Peak Hour Traffic Conditions was based on the analysis procedures described above, the future lane use and traffic control shown on Figure 7 and the Total Future Traffic Forecasts (2014) shown on Figure 17.

The calculation worksheets are included in Appendix G and the results of the analysis are summarized in Table 4 and shown graphically on Figure 18. Table 4 also indicates the assumed direction of each roadway at the intersection.

As shown in Table 4, under Total Future 2014 conditions and with the improvements committed to by the site, each of the intersections are expected to operate at comparable or better levels of service to the background conditions.

As shown in Table 4, under Total Future 2014 conditions, each of the 95th percentile queues are expected to continue to be contained within the available storage with the exceptions noted under background conditions.



DRAWING NOT TO SCALE

LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- X/X — AM/PM Peak Hour Level of Service
- (X/X) — Overall Intersection Level of Service
- * — Free Flow Condition

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Total Future Peak Hour Levels of Service (2014)

Catoctin Creek Towne Center
Purcellville, Virginia

Figure 18

Job # 5384-01-001

8. BACKGROUND FUTURE TRAFFIC CONDITIONS (2020)

In order to analyze future traffic conditions beyond the buildout of the site, a Buildout Plus Six Years Scenario (2020) was developed. This accounts for development of the site and complete development of any other developments in the vicinity.

In order to develop forecasts for 2020 traffic conditions, background traffic was forecasted based on the existing traffic counts, existing traffic diversions for the Southern Collector, full buildout of the other proposed but unbuilt developments discussed above, and historic traffic growth.

8.1. Other Developments

As discussed in Section 4, we are aware of four other developments in the study area. It was assumed that all four developments would be completely built and occupied by 2020.

The trips that would be generated by the completed developments are shown in Table 6.

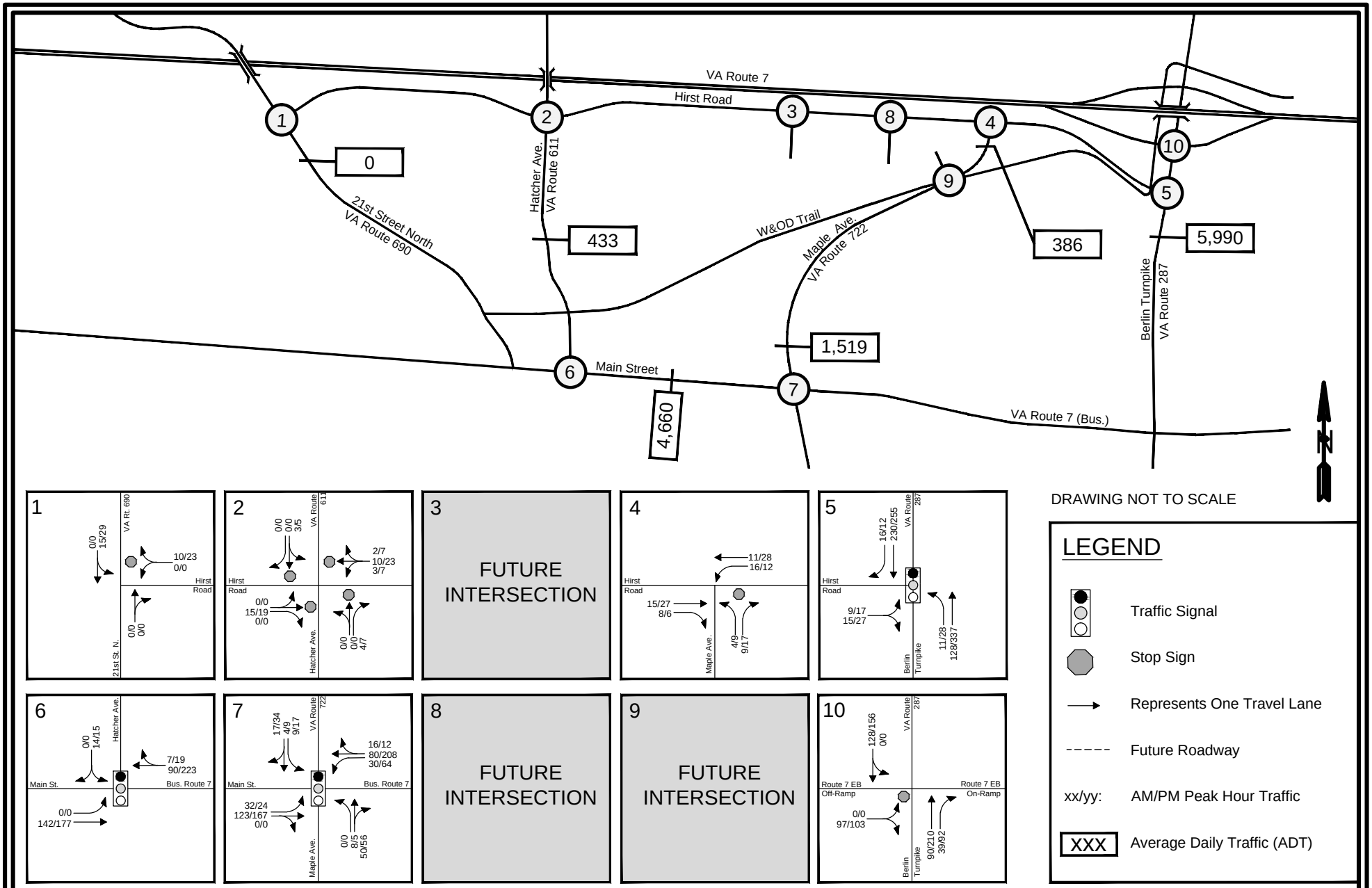
Table 6 – Other Development Site Trip Generation Analysis (2020)

Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily Trips
Background Developments -2020(1)										
Catoctin Corner(2)										
Commercial	48,900	S.F.		244	218	462	403	369	772	8,501
Purcellville Gateway(3)										
Residential	6	D.U.	210	1	4	5	4	2	6	57
Retail	27,500	S.F.		98	79	177	214	201	415	3,699
Office	22,000	S.F.	710	49	7	56	18	85	103	416
Total Purcellville Gateway Trips				*148*	*90*	*238*	*236*	*288*	*524*	*4,172*
Loudoun Valley Shopping Center - Phase 2(4)										
Commercial	60,815	S.F.		157	84	241	120	174	294	2,575
Patrick Henry College Expansion(5)										
University/College	700	Students	550	118	29	147	44	103	147	1,666
Total Background Development Trips - 2020				**520**	**335**	**855**	**571**	**648**	**1,219**	**12,799**

Notes: (1) Table shows trips total trips generated by development.
(2) Assumes complete development by 2020. Trip generation taken from Table 6B of "Catoctin Corner Revised Traffic Impact Analysis" prepared by PHR+A dated May 28,2010.
(3) Assumes complete development by 2020 which would add 6 Single Family Residential units. Trips taken from Table 3-2 in Appendix K of "Loudoun Valley Shopping Center Traffic Impact Analysis" prepared by Wells + Associates dated May 21, 2010.
(4) Trips shown are "Total New Trips" of Table 5-2 minus "Total New Trips" of Table 5-1 in "Loudoun Valley Shopping Center Traffic Impact Analysis" prepared by Wells + Associates dated May 21, 2010.
(5) Trips taken from Table 4 of "Catoctin Corner Revised Traffic Impact Analysis" prepared by PHR+A dated May 28,2010.

8.2. Other Development Trip Distribution and Assignment

The trips that would be generated by the other developments were taken directly from their respective traffic studies as indicated in the footnotes of Table 6. The traffic assignments for each development are shown in Appendix H and summed on Figure 19.



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Other Development Traffic Assignments (2020)

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 19

Job # 5384-01-001

8.3. Background Traffic Growth

In order to determine 2020 traffic conditions, the annual 2.0% growth rate discussed in Section 4.3 was compounded annually for the eight-year period from the date of the existing counts. Background traffic growth was, therefore, estimated at 17.07% for the 2020 scenario.

This growth rate was applied to all movements on the roadways.

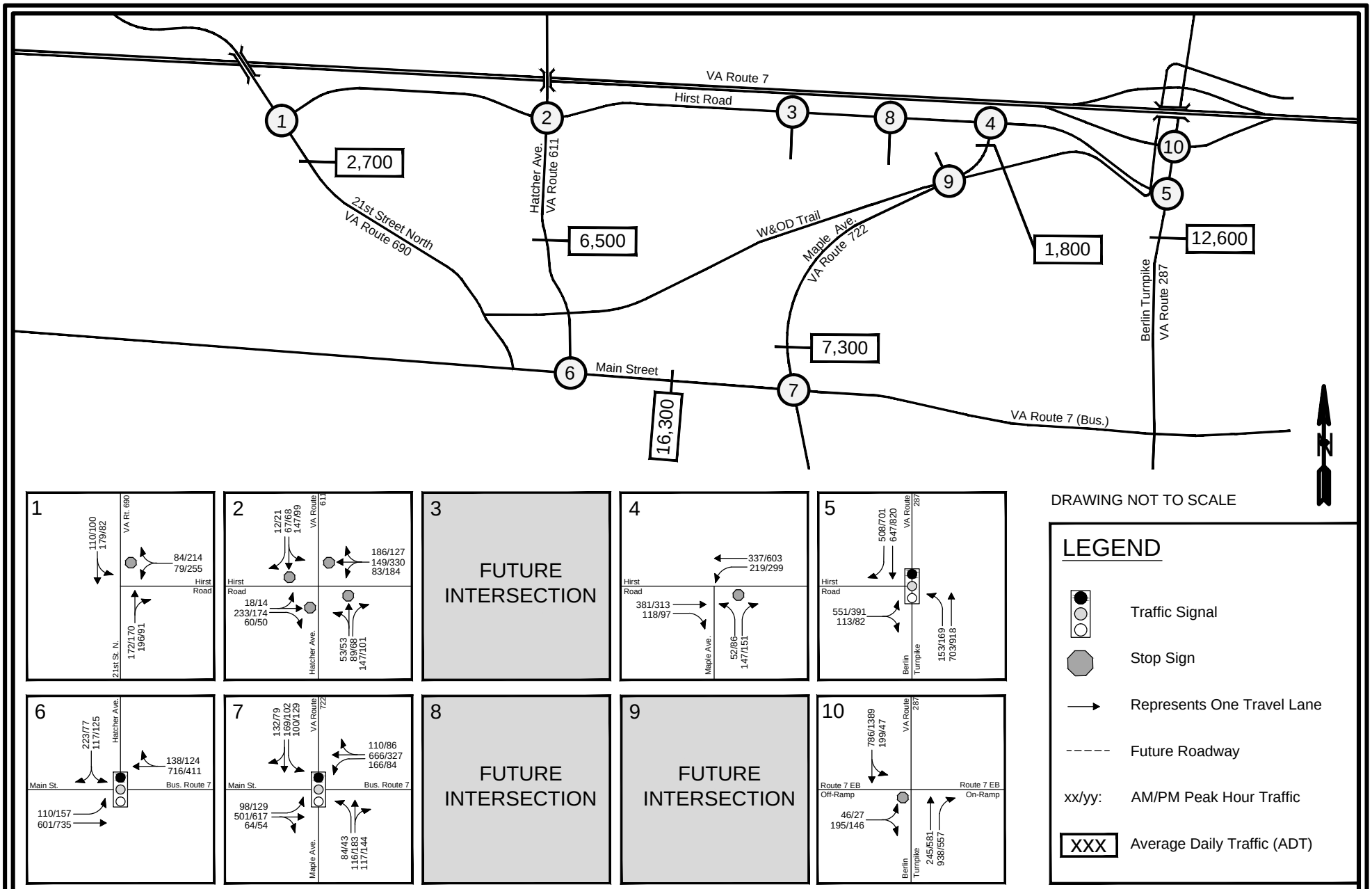
8.4. 2020 Total Background Traffic Forecasts

The background traffic growth discussed above was then added to the Existing Traffic Counts shown on Figure 8, the Existing Traffic Diversions shown on Figure 10, and the Other Development Traffic Assignments (2020) shown on Figure 19 to yield the Total Background Traffic Forecasts (2020). These forecasts are shown on Figure 20 which shows the AM and PM peak hour forecasts as well as the weekday ADT (rounded to the nearest 100).

8.5. Analysis of 2020 Background Peak Hour Traffic Conditions (without Development)

The analysis of 2020 Background Peak Hour Traffic Conditions was based on the analysis procedures described above, the future lane use and traffic control shown on Figure 7 and the Total Background Traffic Forecasts (2020) shown on Figure 20. As indicated in Section 2.9, all future analysis scenarios assume a default peak hour factor of 0.92 and heavy vehicle percentage of 2.0% along with optimized cycle lengths and splits.

The calculation worksheets are included in Appendix I and the results of the analysis are summarized in Table 7 and shown graphically on Figure 21 (with the improvements noted below). Table 7 also indicates the assumed direction of each roadway at the intersection.



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Background Future Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

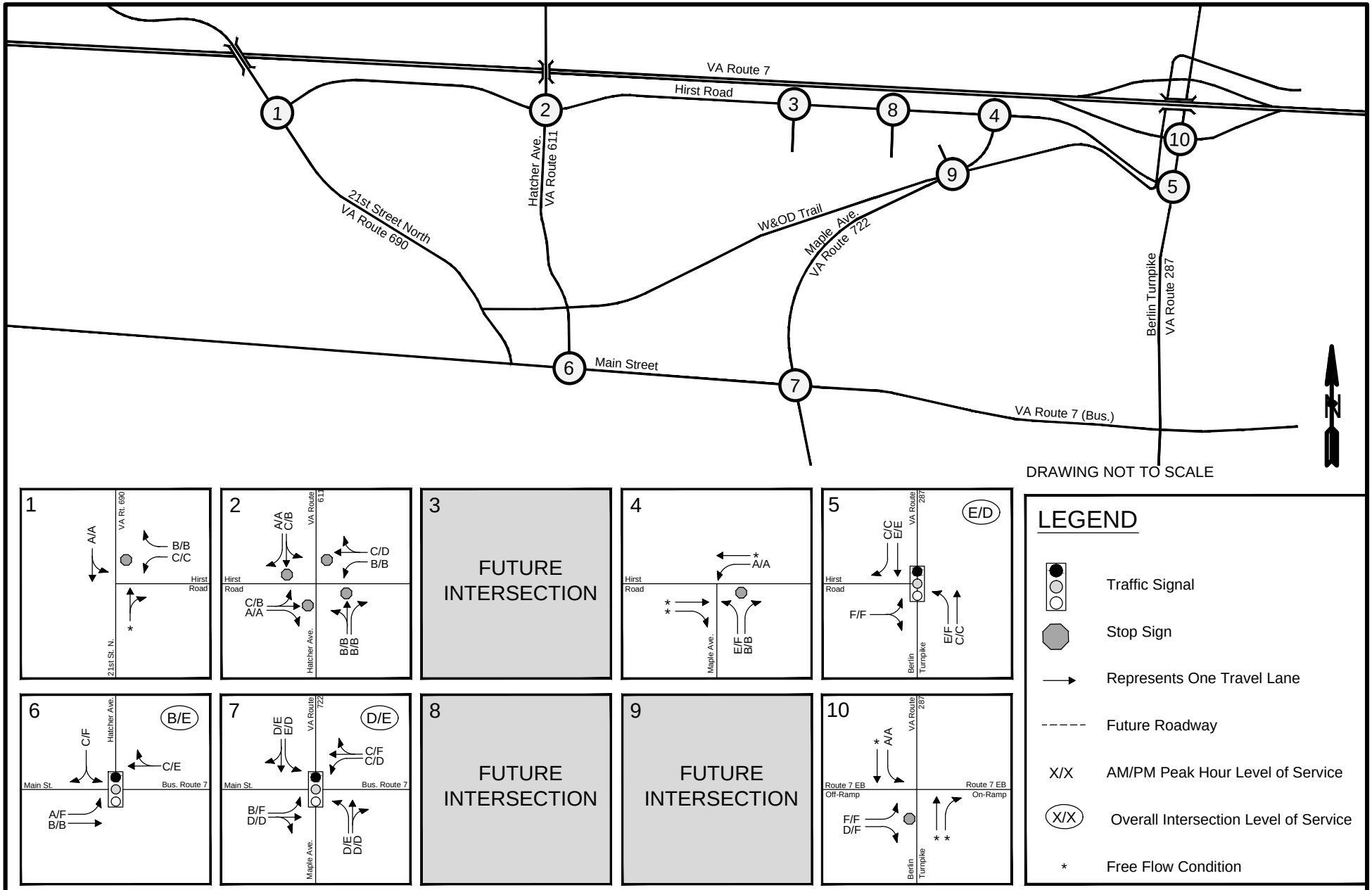
Figure 20

Job # 5384-01-001

Table 7 – Analysis Summary of Total Future (2020) Peak Hour Conditions

Intersection	Control	Lane Group	Available Storage[1] (ft)	Background, 2020 AM Peak Hour Lane LOS	Background, 2020 AM Peak Hour Lane Delay (sec/veh)	Background, 2020 AM Peak Hour Queue[2] (ft)	Background, 2020 PM Peak Hour Lane LOS	Background, 2020 PM Peak Hour Lane Delay (sec/veh)	Background, 2020 PM Peak Hour Queue[2] (ft)	Total Future, 2020 AM Peak Hour Lane LOS	Total Future, 2020 AM Peak Hour Lane Delay (sec/veh)	Total Future, 2020 AM Peak Hour Queue[2] (ft)	Total Future, 2020 PM Peak Hour Lane LOS	Total Future, 2020 PM Peak Hour Lane Delay (sec/veh)	Total Future, 2020 PM Peak Hour Queue[2] (ft)
1. Hirst Road (E-W)/		SBTL	~	A	6.0	15	A	3.9	6	A	6.0	15	A	4.8	8
21st Street North (N-S)	Stop	WBLR	~	C	19.3	50	E	38.5	244	C	20.0	55	F	64.2	346
with construction of a separate		SBTL	~	A	6.0	15	A	3.9	6	A	6.0	15	A	4.8	8
westbound left turn lane with	Stop	WBL	150	C	22.2	30	C	22.3	90	C	22.8	32	D	29.8	121
150' of storage.		WBR	~	B	10.5	10	B	11.3	30	B	10.5	11	B	11.6	34
2. Hirst Road (E-W)/	Stop	NBTL	~	B	14.3	74	B	12.6	78	B	14.8	81	B	13.2	57
Hatcher Avenue (N-S)[3]	Stop	NBR	175	B	12.5	73	B	10.5	50	B	13.0	79	B	12.5	74
	Stop	SBTL	~	C	19.5	97	B	14.8	89	C	20.6	145	C	17.1	116
	Stop	SBR	30	A	9.3	43	A	9.0	57	A	9.5	60	A	9.4	70
	Stop	EBTL	~	C	19.4	85	B	13.7	92	C	20.7	101	C	17.5	115
	Stop	EBR	200	A	9.7	51	A	8.9	60	A	9.9	49	A	9.3	64
	Stop	WBLTR	~	E	42.4	123	F	149.2	222	F	54.4	212	F	236.8	389
with construction of a separate	Stop	NBTL	~	B	13.0	99	B	12.5	64	B	13.2	64	B	13.2	7
westbound left turn lane with	Stop	NBR	175	B	11.3	71	B	10.3	47	B	11.5	68	B	12.6	66
150' of storage.	Stop	SBTL	~	C	17.2	94	B	14.6	118	C	17.6	124	C	17.2	120
	Stop	SBR	30	A	8.7	43	A	8.9	56	A	8.8	65	A	9.4	60
	Stop	EBTL	~	C	17.3	94	B	13.7	77	C	17.9	102	C	18.0	92
	Stop	EBR	200	A	9.1	52	A	8.9	58	A	9.2	42	A	9.5	47
	Stop	WBL	150	B	11.0	99	B	13.1	97	B	11.2	58	C	15.5	148
	Stop	WBTR	~	C	20.6	139	D	36.0	171	C	23.1	136	F	66.3	227
3. Hirst Road (E-W)/	Stop	NBLR	~	-	-	-	-	-	-	C	16.2	18	C	21.7	15
Site Entrance #1 (N-S)		WBL	200	-	-	-	-	-	-	A	8.6	1	A	8.8	4
4. Hirst Road (E-W)/	Stop	NBL	200	E	44.8	42	F	263.5	175	F	51.5	51	F	Err	Err
Maple Avenue (N-S)		NBR	~	B	12.5	25	B	11.7	23	B	12.9	26	B	13.6	32
		WBL	200	A	9.6	22	A	9.6	30	A	9.8	24	B	10.8	45
5. Hirst Road (E-W)/		NBL	310	E	64.9	#183	F	94.5	#286	E	65.5	#169	F	161.5	#287
Berlin Turnpike (N-S)	Signal	NBT	~	C	28.4	565	C	31.3	1,004	C	28.1	#581	D	37.6	#802
		SBT	~	E	71.9	#701	E	62.5	#1144	F	82.1	#658	F	121.2	#842
		SBR	~	C	24.5	69	C	29.1	163.0	C	23.1	68	C	26.6	164
		EBLR	~	F	112.2	#762	F	98.4	#757	F	131.6	#741	F	169.5	#680
	Overall Intersection			**E**	**61.1**		**D**	**52.9**		**E**	**68.5**		**F**	**86.2**	**-**
with proffered improvements by		NBL	310	-	-	-	-	-	-	D	53.0	#163	F	122.9	#276
Catoctin Creek Towne Center		NBT	~	-	-	-	-	-	-	B	13.5	172	A	9.6	187
(EBLR lane, SBR free flowlane,	Signal	SBT	~	-	-	-	-	-	-	E	58.0	#627	E	68.7	#792
second NBT lane)		SBR	~	-	-	-	-	-	-	A	0.6	0	A	1.7	0
		EBL, LR	~	-	-	-	-	-	-	F	94.9	#587	D	43.3	#273
	Overall Intersection			**-**	**-**		**-**	**-**		**D**	**44.7**		**D**	**35.4**	
6. Main Street (E-W)/		SBLR	~	C	29.4	179	F	107.3	#561	C	29.7	183	F	112.2	#429
Hatcher Avenue	Signal	EBL	150	A	9.2	66	F	80.7	#182	A	9.2	67	F	130.5	#214
		EBT	~	B	11.5	428	B	13.3	530	B	11.6	429	B	11.5	416
		WBTL	~	C	21.8	381	E	71.4	#1538	C	21.8	382	F	98.7	#1166
	Overall Intersection			**B**	**16.9**		**E**	**57.9**		**B**	**17.0**		**F**	**74.6**	
7. Main Street (E-W)/	Signal	NBL	85	D	36.0	82	E	59.9	#166	C	29.2	60	F	167.8	#200
Maple Avenue (N-S)		NBTR	~	D	46.2	488	D	46.9	292	D	37.8	343	D	46.1	271
		SBL	~	E	67.9	263	D	50.9	185	E	62.5	#236	E	61.1	#213
		SBTR	~	D	38.6	253	E	55.4	435	C	31.4	178	E	66.7	#481
		EBL	~	B	15.9	120	F	109.2	#223	B	13.8	86	F	87.1	#220
		EBT	~	D	36.9	975	D	39.3	878	C	33.2	716	C	32.6	760
		WBL	150	C	21.6	81	D	35.1	129	C	20.2	59	C	25.8	93
		WBTR	~	C	25.4	498	F	98.4	#1471	C	24.8	378	F	98.3	#1337
	Overall Intersection			**D**	**36.2**		**E**	**66.9**		**C**	**32.2**		**E**	**68.8**	
8. Hirst Road (E-W)/	Stop	NBL	~	-	-	-	-	-	-	A	0.0	0	F	76.6	54
Site Entrance #2 (N-S)	Stop	NBR	~	-	-	-	-	-	-	A	0.0	0	B	12.4	16
		WBL	~	-	-	-	-	-	-	A	0.0	0	A	9.4	16
9. Maple Avenue (N-S)/		NBTL	~	-	-	-	-	-	-	A	0.0	0	A	0.6	1
Site Entrance #3 (E-W)	Stop	EBLR	~	-	-	-	-	-	-	A	0.0	0	B	13.8	7
10. Berlin Turnpike (N-S)/		SBL	~	A	3.9	15	A	4.5	4	A	3.9	15	A	9.4	4
Route 7 EB Ramps (E-W)	Stop	EBLR	~	F	176.7	330	F	606.2	414	F	180.7	334	F	956.9	473
with improvements outlined in		SBL	175	A	8.3	15	A	9.1	4	A	8.3	15	A	9.2	5
Route 7/Route 287 interchange	Stop	EBL	60	F	105.4	71	F	540.7	94	F	107.1	71	F	1047.6	110
study (separate EBL and SBL)	Stop	EBR	~	D	28.6	91	F	155.2	210	D	29.0	92	F	283.0	272

Notes:
(1) ~ Indicates a continuous lane.
(2) Queues are 95th percentile queues as reported by Synchro.
(3) Queues for this intersection only are 95th percentile queues as reported by SimTraffic as Synchro cannot model queues for all way stop control.
# Indicates 95th percentile volume exceeds capacity, queue may be longer.
Err indicates delay in excess of 999.9 seconds.



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Background Future Peak Hour Levels of Service (2020)

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 21

Job # 5384-01-001

As shown in Table 7, under Background 2020 conditions, each of the intersections and approaches would continue to operate at LOS "D" or better with the following exceptions:

- The westbound shared left-right approach to the Hirst Road/21st Street North intersection (Study Intersection #1) would operate at LOS "E" during the PM peak hour.
    - Mitigation (By others): With construction of a separate westbound left turn lane with 150' of storage, the westbound left and right turn lanes would operate at a LOS "C" and "B", respectively, during the PM peak hour.

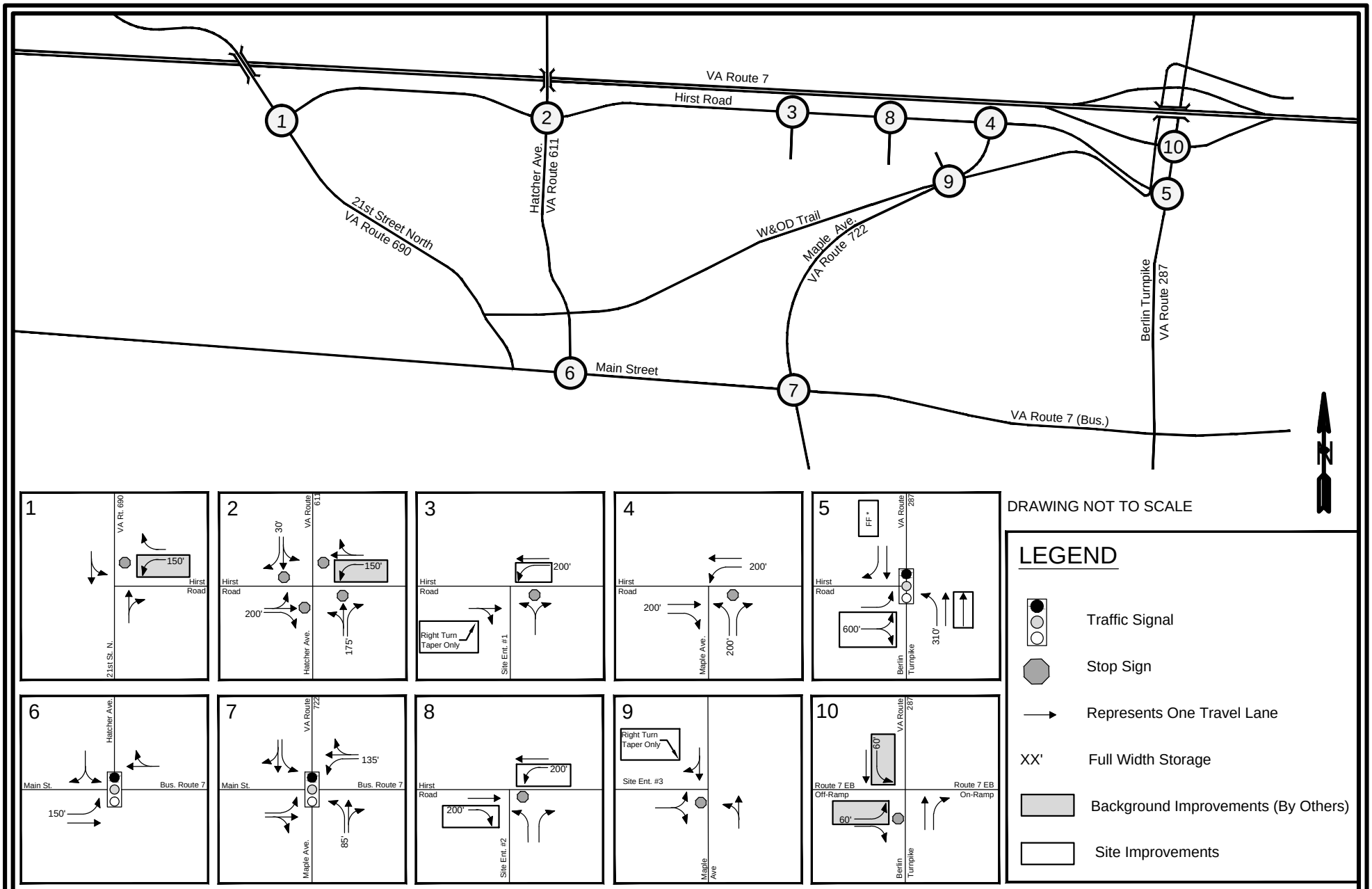
- The northbound left turn lane at the Hirst Road/Maple Avenue intersection (Study Intersection #4) would operate at LOS "E" and "F" during the AM and PM peak hours.
    - Mitigation (By others): Given the low volume of traffic (86 vehicles in the PM peak hour) making a northbound left turn, no mitigation is recommended.

- Multiple approaches to the Hirst Road/Berlin Turnpike intersection (Study Intersection #5) would operate at LOS "E" or "F" during both peak hours with the overall intersection operating at LOS "E" and "F" during the AM and PM peak hours, respectively.
    - Suggested Mitigation: While the need for improvement is caused by existing and background traffic, the Applicant has proffered multiple improvements at this intersection as described above.

- Both the Main Street/Hatcher Avenue and Main Street/Maple Avenue intersections (Study Intersections #6 and #7) would operate at an overall LOS "E" during the PM peak hours with 95th percentile queues extending beyond the available storage.
    - Mitigation: Given the tight right-of-way and downtown nature of the intersections, no mitigation is recommended.

- The eastbound shared left-right approach to the Berlin Turnpike/VA Route 7 Bypass Eastbound Ramps intersection would operate at LOS "F" during both peak hours.
    - o Suggested Mitigation (By Others): The HNTB "Route 7 Bypass and Route 287 Interchange Study" calls for construction of a separate southbound left turn lane and separate eastbound left turn lane. This improvement would reduce the 95th percentile queue but the eastbound left and right lanes would still operate at LOS "F" during the PM peak hour.

The Recommended Lane Use and Traffic Control (2020) is shown on Figure 22.



DRAWING NOT TO SCALE

LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- XX' Full Width Storage
- Background Improvements (By Others)
- Site Improvements

Bowman CONSULTING

Recommended Lane Use and Traffic Control (2020)

Catoctin Creek Towne Center

Purcellville, Virginia

Figure 22

Job # 5384-01-001

9. 2020 TOTAL FUTURE TRAFFIC CONDITIONS

9.1. 2020 Total Future Traffic Forecasts (with Development)

The Site Traffic Assignments shown on Figure 16 were then added to the Total Background Traffic Forecasts (2020) shown on Figure 20 to yield to Total Future Traffic Forecasts (2020). These forecasts are shown on Figure 23 and show the AM and PM peak hour forecasts as well as the weekday ADT (rounded to the nearest 100).

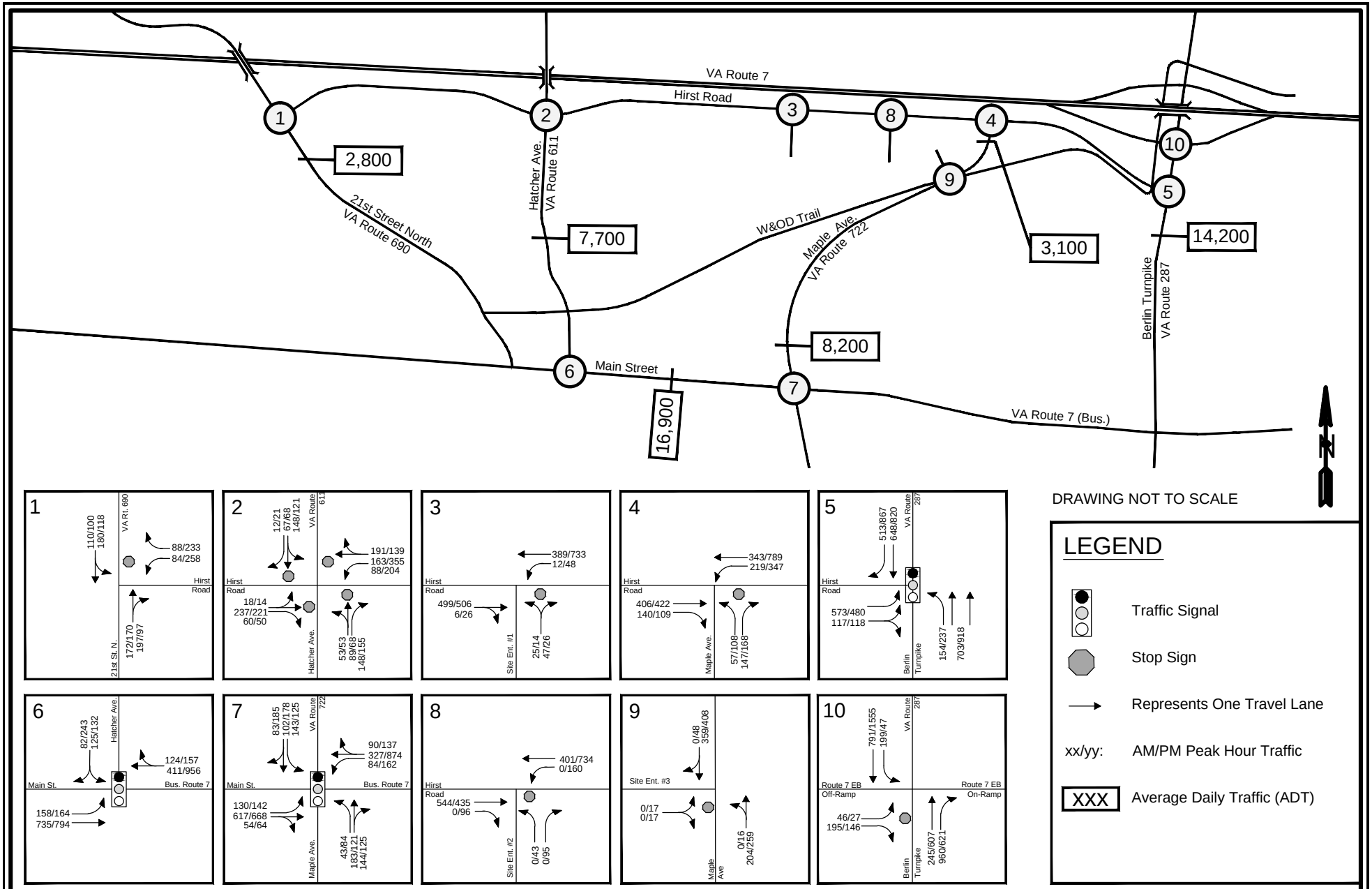
9.2. Analysis of 2020 Total Future Peak Hour Traffic Conditions

The analysis of 2020 Total Future Peak Hour Traffic Conditions was based on the analysis procedures described above, the Recommended Future Lane Use and Traffic Control shown (2020) on Figure 22 and the Total Future Traffic Forecasts (2020) shown on Figure 23.

The calculation worksheets are included in Appendix J and the results of the analysis are summarized in Table 7 and shown graphically on Figure 24. Table 7 also indicates the assumed direction of each roadway at the intersection.

As shown in Table 7, under Total Future 2020 conditions and with the improvements committed to by the site and the recommended 2020 improvements, each of the intersections are expected to operate at comparable or better levels of service to the background conditions.

As shown in Table 7, under Total Future 2020 conditions, each of the 95th percentile queues are expected to continue to be contained within the available storage with the exceptions noted under background conditions.



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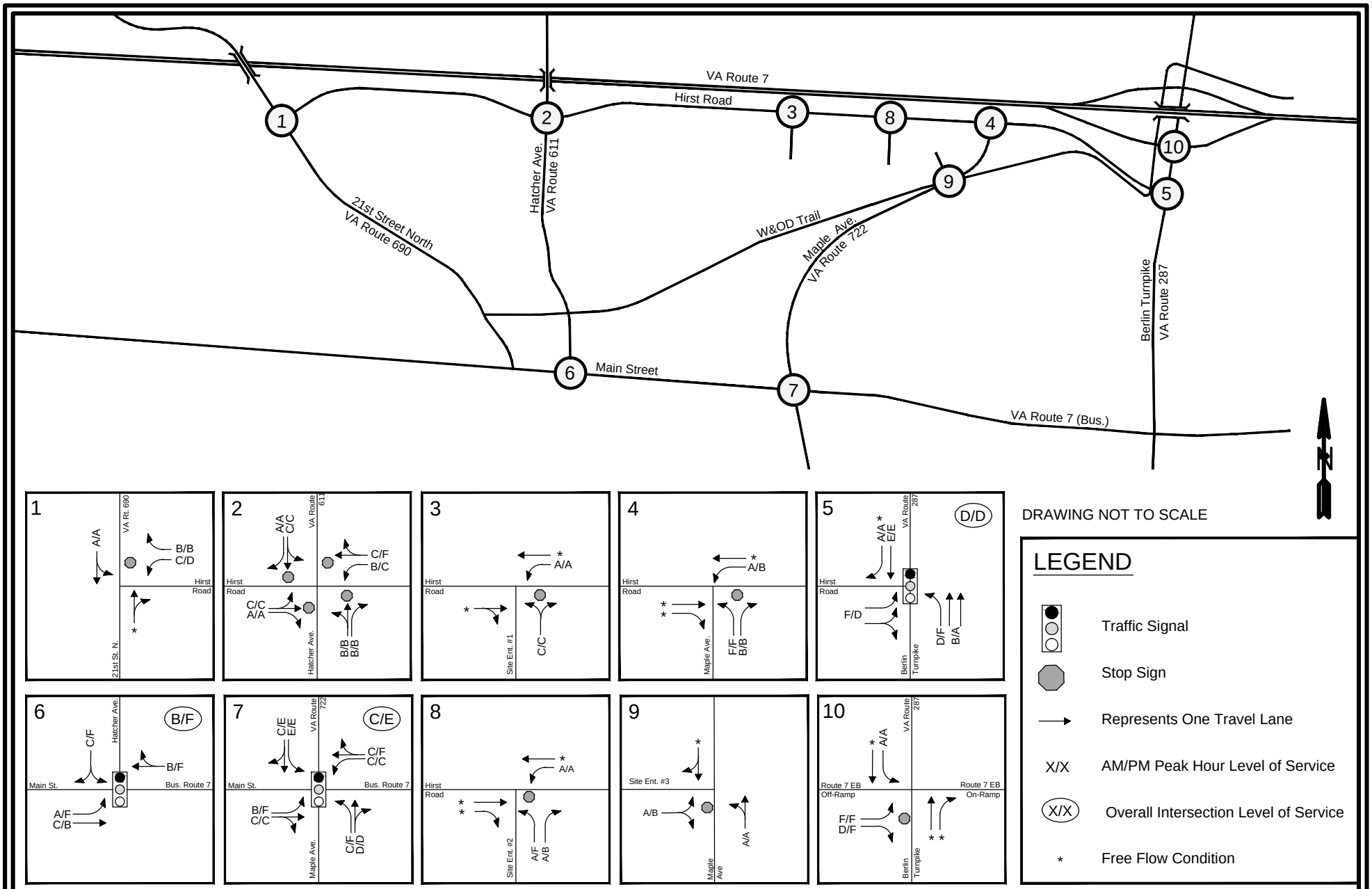
Total Future Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure 23

Job # 5384-01-001



DRAWING NOT TO SCALE

LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- X/X — AM/PM Peak Hour Level of Service
- (X/X) — Overall Intersection Level of Service
- * — Free Flow Condition

Bowman CONSULTING

Total Future Peak Hour Levels of Service (2020)

Catoctin Creek Towne Center
Purcellville, Virginia

Figure 24

Job # 5384-01-001

10. TURN LANE WARRANT ANALYSIS

An analysis was conducted to see if right and left turn lanes would be warranted at the site entrances on Hirst Road and Maple Avenue (Study Intersections #3, #8, and #9). The analysis was completed using the Total Future Traffic Forecasts for 2014 and 2020 shown on Figures 17 and 23, respectively, and Figures 3-5, 3-6, 3-11, 3-14 and 3-26 from Appendix F of the VDOT Road Design Manual. The results of the analyses are included in Appendix K and summarized in Table 8.

Table 8 – Turn Lane Warrant Analysis Summary

Intersection	Approach	Total Future, 2014 Turn Lane Warranted?	Total Future, 2020 Turn Lane Warranted?
3. Hirst Road/ Site Entrance #1	Eastbound Right Westbound Left	Taper Only Yes (200' Storage)	Taper Only Yes (200' Storage)
8. Hirst Road/ Site Entrance #2	Eastbound Right Westbound Left	Yes (200' Storage) Yes (200' Storage)	Yes (200' Storage) Yes (200' Storage)
9. Maple Avenue/ Site Entrance #3	Southbound Right Northbound Left	Taper Only No	Taper Only No

As shown in Table 8, the warranted turn lanes would include:

- Westbound left turn lane with 200 feet of storage and an eastbound right turn taper at the Hirst Road/Site Entrance #1 (Residential) intersection
- Westbound left turn lane with 200 feet of storage and an eastbound right turn lane with 200 feet of storage at the Hirst Road/Site Entrance #2 (Commercial) intersection

- Southbound right turn taper at the Maple Avenue/Site Entrance #3 (Commercial) intersection

11. CONCLUSIONS

The conclusions of the Traffic Impact Analysis completed for the proposed Catoctin Creek Towne Center development indicate that **without** the buildout of the Catoctin Creek Towne Center development, traffic conditions would necessitate multiple improvements to the study intersections under existing conditions and in 2014 and 2020. The Hirst Road/Berlin Turnpike currently operates at an LOS F in the AM peak hour with an average overall delay of 132.2 seconds per vehicle.

The buildout of the proposed development would not require any additional improvements at offsite intersections beyond those already required under existing or background (without site) conditions. **With** the improvements being proffered by the site, the Hirst Road/Berlin Turnpike intersection would operate at an LOS C in the AM peak hour with an average overall delay of 23.5 seconds per vehicle.

The potential special events (concerts, festivals, etc.) held on the site would be irregular in occurrence and therefore were not included in the typical weekday operations analyzed in this study. The Applicant will provide a Traffic Management Plan for special events at a later date.

APPENDIX A

SCOPING AGREEMENT

VDOT Virginia Department of Transportation

PRE-SCOPE OF WORK MEETING FORM

Information on the Project
Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information	
Consultant Name: Tele: E-mail:	Erich Strohhacker, PE, PTOE 804 616-3240 estrohhacker@bowmancg.com
Developer/Owner Name: Tele: E-mail:	S.L. Nusbaum Realty Company

Project Information				
Project Name:	Catoctin Creek Apartments		Locality/County:	Purcellville
Project Location: (Attach regional and site specific location map)	Refer to the attached site location map (Figure 1).			
Submission Type	Comp Plan ☐	Rezoning ☒	Site Plan ☐	Subd Plat ☐
Project Description: (Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)	A 13.72 acres site with an existing zoning of X (transitional). Proposed zoning to be PDH-15 (Planned Development Housing). The site is to consist of 176 apartment units with a single point of access to Hirst Road. Refer to the attached site plan for further details.			
Proposed Use(s): (Check all that apply; attach additional pages as necessary)	Residential ☒	Commercial ☐	Mixed Use ☐	Other ☐
	Residential Uses(s) Number of Units: 176 ITE LU Code(s): 220 ____ ____ **Commercial Use(s)** ITE LU Code(s): ____ ____ ____ Square Ft or Other Variable:		**Other Use(s)** ITE LU Code(s): ____ ____ ____ Independent Variable(s): ____ ____ ____	
Total Peak Hour Trip Projection:	Less than 100 ☐	100 – 499 ☒	500 – 999 ☐	1,000 or more ☐

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Traffic Impact Analysis Assumptions			
Study Period	Existing Year: 2012	Build-out Year: 2014	Design Year: 2020
Study Area Boundaries (Attach map)	North: Hirst Road	South: Main Street	
	East: Berlin Turnpike	West: 21st Street North	
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	Patrick Henry College (information to be obtained from the HNTB Corridor Study / no growth for 2014 / 700 students for 2020); Purcellville Gateway Development (Grocery in operation 2012 / 28% of general retail in operation 2012 / Phase one in operation by 2014 / full buildout by 2020); Catoctin Corner (HNTB Study / 35% of development in operation by 2014 / full buildout by 2020); Loudoun Valley Shopping Center (full buildout in operation 2012 / no need to consider an approved background development)		
Consistency With Comprehensive Plan (Land use, transportation plan)	Will seek to obtain Comprehensive Plan Amendment		
Available Traffic Data (Historical, forecasts)	BCG will collect all relevant traffic data needs.		
Trip Distribution (Attach sketch)	Road Name: Route 7 - East 20%	Road Name: Hirst - East 55% / West 45%	
	Road Name: Main - East 30% / West 20%	Road Name: Hatcher - 10% ; 21st - 10% ; Maple - 30%	
Annual Vehicle Trip Growth Rate:	2%	Peak Period for Study (check all that apply)	☒ AM ☒ PM ☐ SAT
		Peak Hour of the Generator	
Study Intersections and/or Road Segments (Attach additional sheets as necessary)	1.Hirst / Berlin	6.Main / Hatcher	
	2.Hirst / Maple	7.	
	3.Hirst / Hatcher	8.	
	4.Hirst / 21st Street North	9.	
	5.Main / Maple	10.	
Trip Adjustment Factors	Internal allowance: ☐ Yes ☒ No Reduction: _____% trips	Pass-by allowance: ☐ Yes ☒ No Reduction: _____% trips	
Software Methodology	☒ Synchro ☐ HCS (v.2000/+) ☐ aaSIDRA ☐ CORSIM ☐ Other _____		
Traffic Signal Proposed or Affected (Analysis software to be used,	Hirst / Berlin; Main / Maple; Main / Hatcher - Timings to be obtained from VDOT and Town.		

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

progression speed, cycle length)	
Improvement(s) Assumed or to be Considered	No improvements assumed within study area.
Background Traffic Studies Considered	HNTB Berlin Corridor Study; Catoctin Corner TIA; Loudoun Valley Shopping Center TIA
Plan Submission	☐ Master Development Plan (MDP) ☒ Generalized Development Plan (GDP) ☐ Preliminary/Sketch Plan ☐ Other Plan type (Final Site, Subd. Plan)
Additional Issues to be Addressed	☒ Queuing analysis ☐ Actuation/Coordination ☐ Weaving analysis ☐ Merge analysis ☒ Bike/Ped Accommodations ☒ Intersection(s) ☐ TDM Measures ☐ Other _____

NOTES on ASSUMPTIONS: Existing traffic conditions to be analyzed assuming count peak hour factors. All subsequent analysis scenarios to assume a peak hour factor of 0.92. Per BCG field reconnaissance, Loudoun Valley Shopping Center Phase 1 is built out and will not need to be included as part of the background development numbers. Loudoun Valley Shopping Center Phase 2 will not be included in this study. Comprehensive plan amendment to assume 6.71 acre commercial site to the east of the development on the southwest quadrant of the intersection of Hirst and Maple. Traffic from this property to be assumed in 2020 buildout analysis. Access to adjacent commercial property will be separate from proposed residential access location. Hatcher / Main Bank development and East Cornwall Vet Facility to be assumed in the 2% growth for background traffic conditions. South Connector will be in place; however, traffic conditions will not be adjusted to reflect change in traffic patterns due to new facility. Study to provide a total of 5 analysis scenarios (existing, background, buildout, background plus 6, buildout plus 6). Report figures to follow Chapter 527 formatting. Study will inventory bike/ped facilities. Access management standards to be based on Town requirements. Site distribution percentages to be based on local demographic. All Level of Service, delay, and queues will be reported by movement.

SIGNED: _____ DATE: 10/17/12
Applicant or Consultant

PRINT NAME: Erich Stockhacker
Applicant or Consultant

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

SCOPE OF WORK MEETING CONCLUSIONS

ADDITIONS TO THE VDOT REQUIRED ELEMENTS, CHANGES TO THE METHODOLOGY OR STANDARD ASSUMPTIONS, AND SIGNATURE PAGE

Any additions to the VDOT Required Elements or changes to the Methodology or Standard Assumptions due to special circumstances that are approved by VDOT:

The applicant will contact VDOT and the locality prior to the preparation of the traffic impact analysis study in the event there are any substantial changes in the existing conditions that will affect the scope of the study.

AGREED: _____ DATE: 10/17/12
Applicant or Consultant

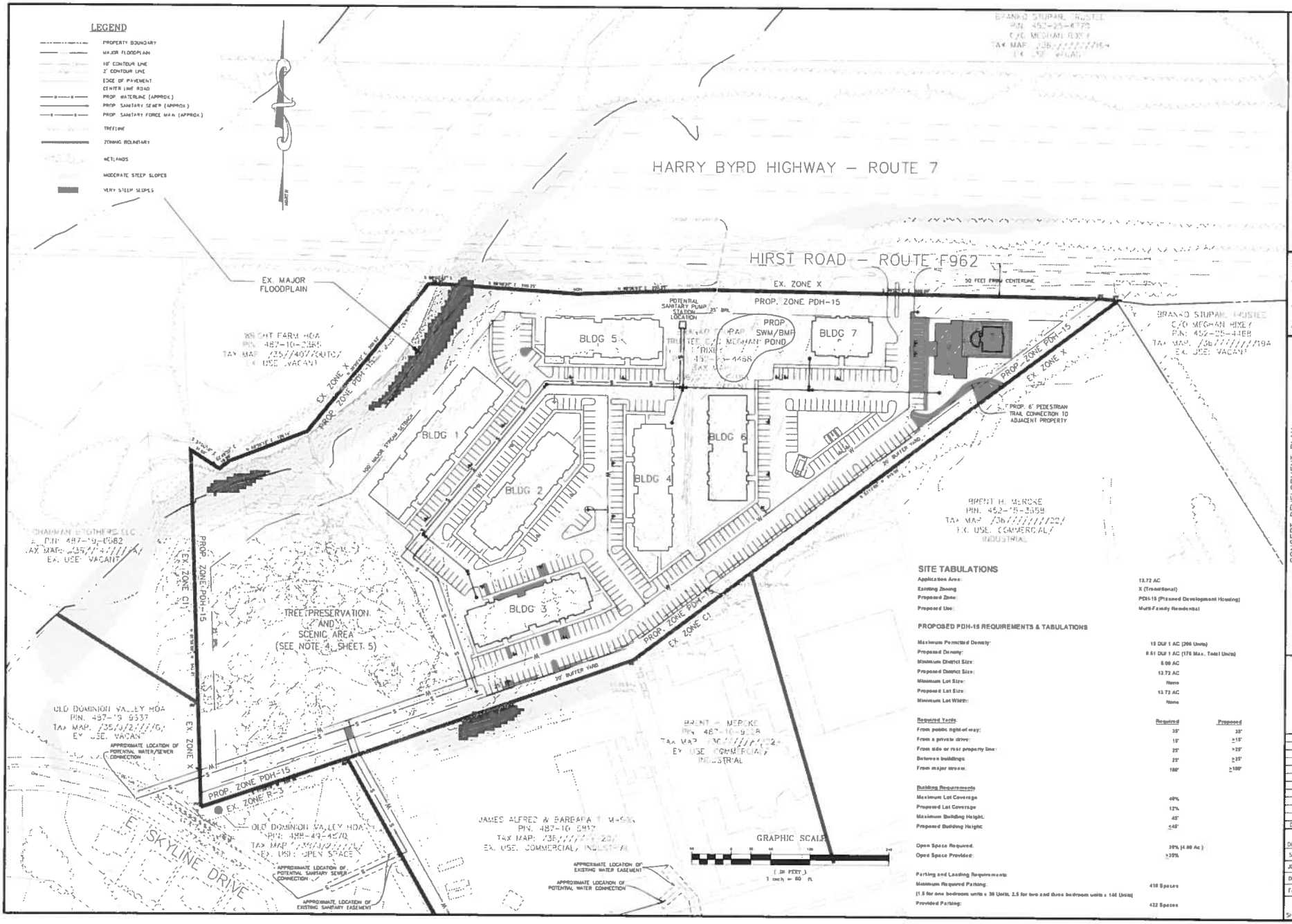
PRINT NAME: Erick Strohhacker
Applicant or Consultant

SIGNED: _____ DATE: _____
VDOT Representative

PRINT NAME: _____
VDOT Representative

SIGNED: _____ DATE: _____
Local Government Representative

PRINT NAME: _____
Local Government Representative



SITE TABULATIONS

Application Area:	13.72 AC
Existing Zoning:	X (Transitional)
Proposed Zone:	PDH-15 (Planned Development Housing)
Proposed Use:	Multi-Family Residential

PROPOSED PDH-15 REQUIREMENTS & TABULATIONS

Maximum Permitted Density:	15 DU 1 AC (206 Units)
Proposed Density:	8.61 DU 1 AC (175 Max. Total Units)
Minimum District Size:	5.00 AC
Proposed District Size:	13.72 AC
Minimum Lot Size:	None
Proposed Lot Size:	13.72 AC
Minimum Lot Width:	None

	Required	Proposed
Required Yards:		
From public right-of-way:	35'	35'
From a private drive:	15'	≥15'
From side or rear property line:	25'	≥25'
Between buildings:	25'	≥25'
From major stream:	100'	≥100'

Building Requirements	
Maximum Lot Coverage	40%
Proposed Lot Coverage	12%
Maximum Building Height:	45'
Proposed Building Height:	≤45'
Open Space Required:	30% (4.00 Ac.)
Open Space Provided:	≥30%

Parking and Loading Requirements:

Minimum Required Parking:	410 Spaces
(1.5 for one bedroom units = 38 Units, 2.5 for two and three bedroom units = 140 Units)	
Provided Parking:	422 Spaces

Bowman CONSULTING

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www.bowmanconsulting.com

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CONCEPT DEVELOPMENT PLAN

CATOCTIN CREEK APARTMENTS

ZONING MAP AMENDMENT & COMPREHENSIVE PLAN AMENDMENT

TOWN OF PURCELLVILLE, VIRGINIA

PLAN STATUS

DATE	DESCRIPTION

JAC DESIGN	JAC DRAWN	CMM CHKD

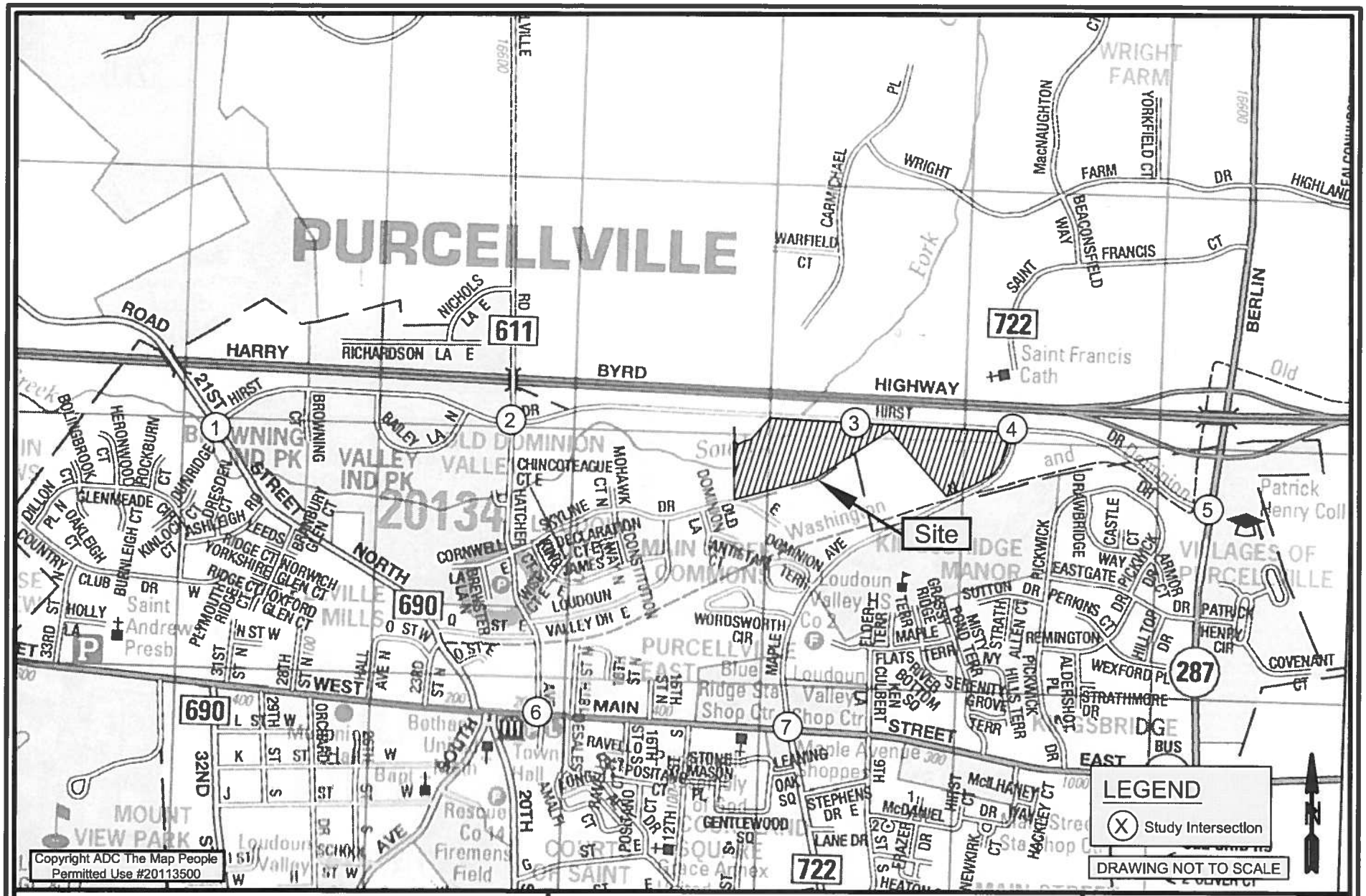
SCALE H: 1"=60' V:

JOB No. 5384-01-001

DATE AUGUST 31, 2012

FILE No. 5384-D-ZP-001

SHEET 4 OF 6



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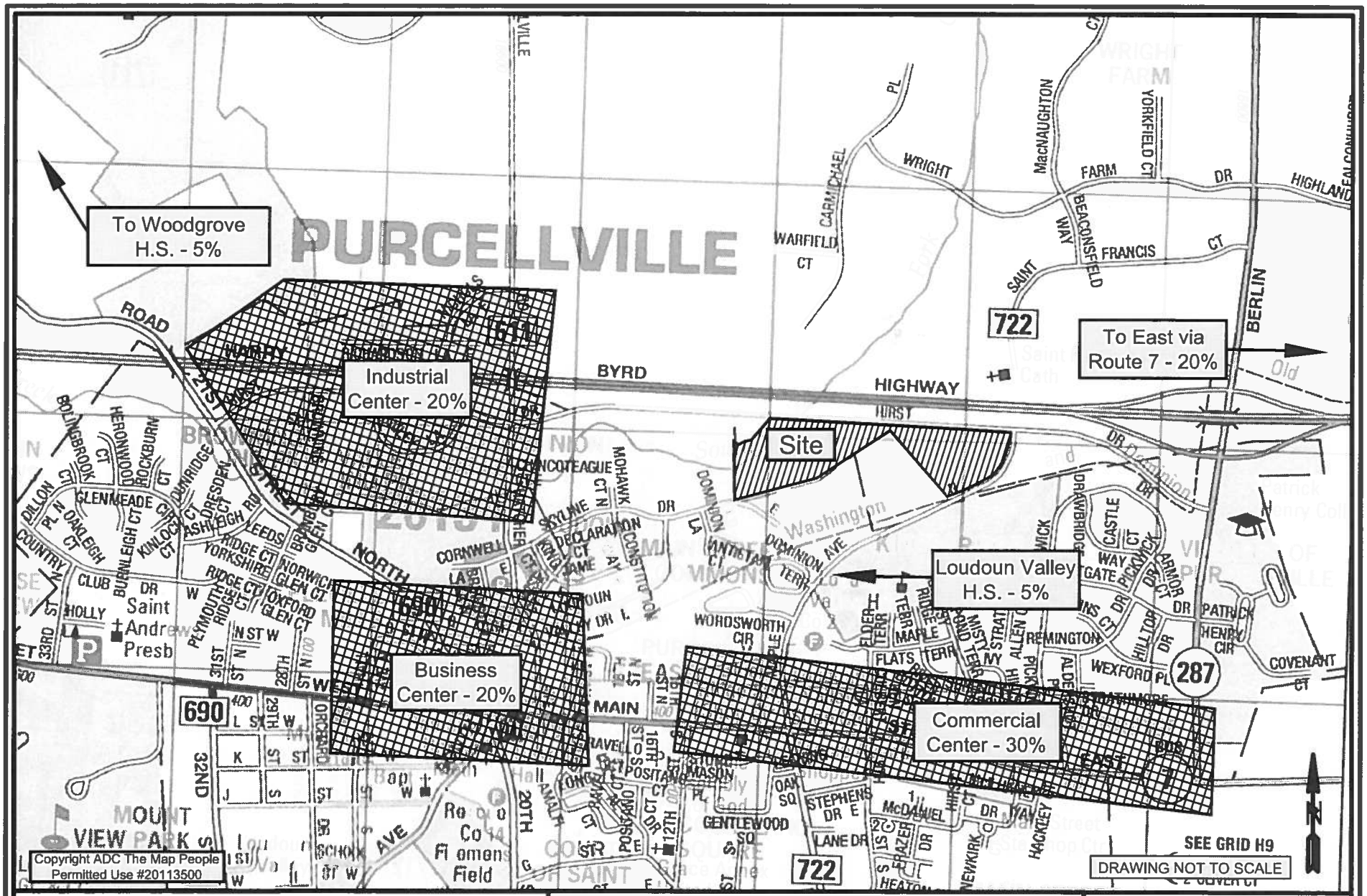
Site Location and Study Intersections Map
Catoctin Creek Apartments
Purcellville, Virginia

Figure 1

Job # 5384-01-001



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Site Trip Distributions
Catoctin Creek Apartments
Purcellville, Virginia

Figure 2

Job # 5384-01-001

Table 1 - ITE Site Trip Generation Analysis

Land Use	Size	Units	Land Use Code	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily Trips
Proposed Catoctin Creek Apartments Development - ITE Trips[1]										
Residential										
Apartments	176	D.U.	220	18	72	90	74	40	114	1,190

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 8th Edition.

Town of Purcellville Virginia
Community Development Department

MEMO via email

Date: October 22, 2012

To: Eric Strohhacker, PD, PTOE

CC: Samer Beidas, Dale E. Lehnig, Alex Vanegas, Geoff Giffin, Tracey Shiflet, Thomas VanPoole

From: Patrick Sullivan, AICP CED

Re: VDOT Scoping Documentation

The town through its traffic consultant Kimley-Horn has reviewed the VDOT scoping documentation for the Catoctin Creek Apartments that was signed and dated 10/16/2012. The Town has the following comments:

Page 1, Submission Type - this should include Comprehensive Plan as well as the rezoning. The plan and the rezoning will be reviewed concurrently.

Page 1, Project Description -suggest mentioning the adjacent commercial property and Comprehensive Plan Amendment

Page 1, Proposed Uses – Should add adjoining commercial property assumed land uses and quantities

Page 2, External Factors – Consider adding Phase 2 of Loudoun Valley Shopping Center (LVSC)

Page 2, External Factors – Consideration should be given to the Southern Collector connection and the resulting traffic pattern changes

Page 2, Available Traffic Data – HNTB's study has some traffic count data that could be used

Page 2, Trip Distribution – It seems that the distribution assumption understates the traffic to/from the east along Route 7. I would expect a higher percentage in that direction due to the significant employment and activity centers to the east.

Page 3, Improvements Assumed to be Considered – the Southern Collector Road connection will be complete by the project build-out and will change traffic patterns through town.

Page 3, Additional Issues – Add turn lane warrants (as requested by VDOT)

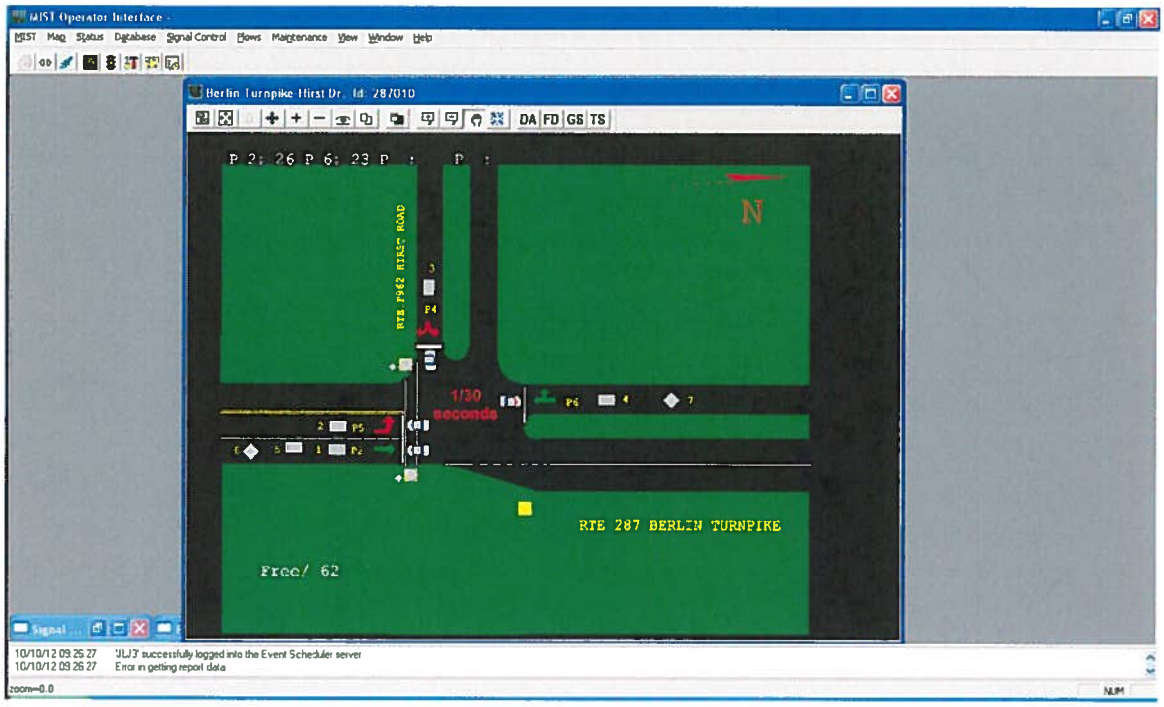
Page 3, Notes on Assumptions – similar comments as before 1) Do not exclude LVSC Phase 2; and 2) suggest providing specific assumptions for the commercial property

Patrick Sullivan, AICP CED, Director
Community Development Department
Town of Purcellville
psullivan@purcellvilleva.gov

Mailing Address:
Community Development Department
Town of Purcellville
221 South Nursery Avenue
Purcellville, VA 20132
540-338-2304 www.purcellvilleva.gov

APPENDIX B

EXISTING SIGNAL TIMINGS


MIST Operator Interface -
MIST Map Status Database Signal Control Flows Maintenance View Window Help
Berlin Turnpike First Dr. Id: 287010
DA FD GS TS
P 2: 26 P 6: 23 P : P :
N
RTE 2942 FIRST ROAD
1/30 seconds
RTE 287 BERLIN TURNPIKE
Free/ 62
10/10/12 09:26:27 'UJ3' successfully logged into the Event Scheduler server
10/10/12 09:26:27 Error in getting report data
zoom=0.0
NUM

Site: 287010 Berlin Turnpike Hirst Dr - Type: FIELD Data Last Uploaded: October 10, 2012 09:50:20

File Timing Sheets Help

Save Validate Download Print Export

TIME BASED COORDINATION EVENTS

Bank 1

<C+0+9=0.1>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	62	☑	☑	☑	☑	☑	☑	☑
1	6	30	1	☐	☑	☑	☑	☑	☑	☐
2	8	5	9	☐	☑	☑	☑	☑	☑	☐
3	8	40	9	☐	☑	☑	☑	☑	☑	☐
4	9	0	62	☐	☑	☑	☑	☑	☑	☐
5	14	0	3	☐	☑	☑	☑	☑	☑	☐
6	19	0	62	☐	☑	☑	☑	☑	☑	☐
7	15	30	12	☐	☑	☑	☑	☑	☑	☐
8	16	30	12	☐	☑	☑	☑	☑	☑	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

Bank 2

<C+0+9=0.2>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	0	☐	☐	☐	☐	☐	☐	☐
1	0	0	0	☐	☐	☐	☐	☐	☐	☐
2	0	0	0	☐	☐	☐	☐	☐	☐	☐
3	0	0	0	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

start

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PHASE TIMING BANK #1

Phase <C+0+F=1>

Column Number ->	1	2	3	4	5	6	7	8
0 - Ped Walk	0	0	0	7	0	0	0	0
1 - Ped FDW	0	0	0	14	0	0	0	0
2 - Min Green	0	20	0	7	5	20	0	0
3 - Type 3 Disconnect	0	0	0	0	0	0	0	0
4 - Added per Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 - Veh Extension	0.0	3.5	0.0	3.5	2.5	3.5	0.0	0.0
6 - Max Gap	0.0	3.5	0.0	3.5	2.5	3.5	0.0	0.0
7 - Min Gap	0.0	3.5	0.0	3.5	2.5	3.5	0.0	0.0
8 - Max Limit	0	65	0	40	25	65	0	0
9 - Max Limit 2	0	0	0	0	0	0	0	0
A - Adv/Delay Walk	0	0	0	0	0	0	0	0
B - RR Min Ped FDW	0	0	0	0	0	0	0	0
C - Cond Serv Check	0	0	0	0	0	0	0	0
D - Reduce Every	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E - Yellow Change	0.0	4.5	0.0	4.5	4.5	4.5	0.0	0.0
F - Red Clear	0.0	2.0	0.0	2.5	3.0	2.0	0.0	0.0

Column Numbers ->	9	A	B	C	D
	Max Initial	Alt Walk	Alt FDW	Alt Initial	Alt Extension
1 - Phase 1	0	0	0	0	0.0
2 - Phase 2	0	0	0	0	0.0
3 - Phase 3	0	0	0	0	0.0
4 - Phase 4	0	0	0	0	0.0
5 - Phase 5	0	0	0	0	0.0
6 - Phase 6	0	0	0	0	0.0
7 - Phase 7	0	0	0	0	0.0
8 - Phase 8	0	0	0	0	0.0

All Red Start

<(F/1+C+0)> 0

Red Revert

<(F/1+0+F)> 5.0

start

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COORDINATION AND TIMING PARAMETERS

Phase Functions

<C+0+F=1 > Column F

Phase #/LED #	1	2	3	4	5	6	7	8
0 - Permit	☐	☑	☐	☑	☑	☑	☐	☐
1 - Red Lock	☐	☐	☐	☐	☐	☐	☐	☐
2 - Yellow Lock	☐	☐	☐	☐	☐	☐	☐	☐
3 - Min Recall	☐	☑	☐	☐	☐	☑	☐	☐
4 - Ped Recall	☐	☐	☐	☐	☐	☐	☐	☐
6 - Rest in Walk	☐	☐	☐	☐	☐	☐	☐	☐
7 - Red Rest	☐	☐	☐	☐	☐	☐	☐	☐
8 - Dual Entry	☐	☐	☐	☐	☐	☐	☐	☐
9 - Max Recall	☐	☐	☐	☐	☐	☐	☐	☐
A - Soft Recall	☐	☐	☐	☐	☐	☐	☐	☐
B - Max 2	☐	☐	☐	☐	☐	☐	☐	☐
C - Cond. Service	☐	☐	☐	☐	☐	☐	☐	☐
D - Man Cntrl Calls	☐	☑	☐	☑	☑	☑	☐	☐
E - Yellow Start	☐	☐	☐	☐	☐	☐	☐	☐
F - First Phases	☐	☑	☐	☐	☐	☑	☐	☐

Phases

	1	2	3	4	5	6	7	8
Coord Extra <C/5+1+C>	☐	☐	☐	☐	☐	☐	☐	☐
Excess Time <C/5+1+D>	☐	☐	☐	☐	☐	☐	☐	☐
External Lag <F/1+E+E>	☐	☑	☐	☑	☐	☑	☐	☑
Lag Free <F/1+E+F>	☐	☑	☐	☑	☐	☑	☐	☑

Note: The LED lights are not used to display the values for Coord Extra and Excess Time. These values are displayed as the decimal equivalent of the binary number represented by the phase check boxes.

For example, if the checkboxes for phases 1, 2, and 3 are checked, the controller will display the decimal value 7.

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COORDINATION SHEET #1

<C+0+C=1>

Plans 1 - 15

Column Number ->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	100	0	100	120	0	0	100	0	100	0	100	150	0	0	0
1 - Phase 1 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 - Phase 2 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 - Phase 3 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 - Phase 4 Force Off	28	0	30	34	0	0	38	0	38	0	40	40	0	0	0
5 - Phase 5 Force Off	46	0	47	52	0	0	55	0	55	0	57	59	0	0	0
6 - Phase 6 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Phase 7 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - Phase 8 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 - Ring Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Offset 1	21	0	88	112	0	0	21	0	21	0	88	112	0	0	0
D - Perm 1 End	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
E - Hold Release	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
F - Zone Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<C+0+C=3>

Plans 16 - 30

Column Numbers ->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 - Phase 1 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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COORDINATION SHEET 2: Plans 1-8

<C+0+C=2>

	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5	Plan 6	Plan 7	Plan 8
Column Numbers ->	1	2	3	4	5	6	7	8
0 - Ped Adjustment	0	0	0	0	0	0	0	0
1 - Perm 2 Start	0	0	0	0	0	0	0	0
2 - Perm 2 End	0	0	0	0	0	0	0	0
3 - Perm 3 Start	0	0	0	0	0	0	0	0
4 - Perm 3 End	0	0	0	0	0	0	0	0
5 - Reservice Time	0	0	0	0	0	0	0	0

	Plan 1 <C+0+C=1> Column 1								Plan 2 <C+0+C=1> Column 2								Plan 3 <C+0+C=1> Column 3							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
B - Sync Phases	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
C - Leg Phases	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

	<C+0+C=2> Column 1								<C+0+C=2> Column 2								<C+0+C=2> Column 3							
6 - Reservice Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Max Inhibit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 - Pretimed Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 - Max Recall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Perm1 Veh Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B - Perm1 Ped Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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PHASE TIMING BANK #1

<C+0+F=1>

Column Number ->	1	2	3	4	5	6	7	8
0 - Ped Walk	0	0	0	7	0	7	0	0
1 - Ped FDW	0	0	0	13	0	16	0	0
2 - Min Green	0	15	0	5	5	15	0	0
3 - Type 3 Disconnect	0	0	0	0	0	0	0	0
4 - Added per Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 - Veh Extension	0.0	6.0	0.0	4.0	2.0	6.0	0.0	0.0
6 - Max Gap	0.0	6.0	0.0	4.0	2.0	6.0	0.0	0.0
7 - Min Gap	0.0	6.0	0.0	4.0	2.0	6.0	0.0	0.0
8 - Max Limit	0	80	0	25	15	80	0	0
9 - Max Limit 2	0	80	0	25	15	80	0	0
A - Adv/Delay Walk	0	0	0	0	0	0	0	0
B - RR Min Ped FDW	0	0	0	0	0	0	0	0
C - Cond Serv Check	0	0	0	0	0	0	0	0
D - Reduce Every	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E - Yellow Change	0.0	4.0	0.0	4.0	4.0	4.0	0.0	0.0
F - Red Clear	0.0	2.5	0.0	2.0	2.0	2.5	0.0	0.0

Column Numbers ->	9	A	B	C	D
	Max Initial	Alt Walk	Alt FDW	Alt Initial	Alt Extension
1 - Phase 1	0	0	0	0	0.0
2 - Phase 2	0	0	0	0	0.0
3 - Phase 3	0	0	0	0	0.0
4 - Phase 4	0	0	0	0	0.0
5 - Phase 5	0	0	0	0	0.0
6 - Phase 6	0	0	0	0	0.0
7 - Phase 7	0	0	0	0	0.0
8 - Phase 8	0	0	0	0	0.0

Range 0-255; Default=0

All Red Start

<(F/1+C+0)> 0

Red Revert

<(F/1+0+F)> 5.0

start

100 sec cycles

~~84~~

5

2

6

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COORDINATION AND TIMING PARAMETERS

Phase Functions

<C+0+F=1> Column F

Phase #/LED #	1	2	3	4	5	6	7	8
0 - Permit	☐	☑	☐	☑	☑	☑	☐	☐
1 - Red Lock	☐	☐	☐	☐	☐	☐	☐	☐
2 - Yellow Lock	☐	☐	☐	☑	☐	☐	☐	☐
3 - Min Recall	☐	☑	☐	☐	☐	☑	☐	☐
4 - Ped Recall	☐	☐	☐	☐	☐	☐	☐	☐
6 - Rest in Walk	☐	☐	☐	☐	☐	☐	☐	☐
7 - Red Rest	☐	☐	☐	☐	☐	☐	☐	☐
8 - Dual Entry	☐	☐	☐	☐	☐	☐	☐	☐
9 - Max Recall	☐	☐	☐	☐	☐	☐	☐	☐
A - Soft Recall	☐	☐	☐	☐	☐	☐	☐	☐
B - Max 2	☐	☐	☐	☐	☐	☐	☐	☐
C - Cond. Service	☐	☐	☐	☐	☐	☐	☐	☐
D - Man Cntrl Calls	☑	☑	☑	☑	☑	☑	☑	☑
E - Yellow Start	☐	☐	☐	☐	☐	☐	☐	☐
F - First Phases	☐	☑	☐	☐	☐	☑	☐	☐

Phases

	1	2	3	4	5	6	7	8
Coord Extra <C/5+1+C>	☐	☐	☐	☐	☐	☐	☐	☐
Excess Time <C/5+1+D>	☐	☐	☐	☐	☐	☐	☐	☐
External Lag <F/1+E+E>	☐	☐	☐	☐	☐	☐	☐	☐
Lag Free <F/1+E+F>	☐	☑	☐	☑	☐	☑	☐	☑

Note: The LED lights are not used to display the values for Coord Extra and Excess Time. These values are displayed as the decimal equivalent of the binary number represented by the phase check boxes.
For example, if the checkboxes for phases 1, 2, and 3 are checked, the controller will display the decimal value 7.

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COORDINATION SHEET #1

<C+0+C=1>

Plans 1 - 15

Column Number ->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1 - Phase 1 Force Off	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
2 - Phase 2 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 - Phase 3 Force Off	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
4 - Phase 4 Force Off	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
5 - Phase 5 Force Off	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
6 - Phase 6 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Phase 7 Force Off	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
8 - Phase 8 Force Off	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
9 - Ring Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Offset 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D - Perm 1 End	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
E - Hold Release	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
F - Zone Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<C+0+C=3>

Plans 16 -30

Column Numbers ->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 - Phase 1 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

start

1 PLAN

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COORDINATION SHEET 2: Plans 1-8

<C+0+C=2>

Column Numbers ->	Plan 1 (1)	Plan 2 (2)	Plan 3 (3)	Plan 4 (4)	Plan 5 (5)	Plan 6 (6)	Plan 7 (7)	Plan 8 (8)
0 - Ped Adjustment	0	0	0	0	0	0	0	0
1 - Perm 2 Start	0	0	0	0	0	0	0	0
2 - Perm 2 End	0	0	0	0	0	0	0	0
3 - Perm 3 Start	0	0	0	0	0	0	0	0
4 - Perm 3 End	0	0	0	0	0	0	0	0
5 - Reservice Time	0	0	0	0	0	0	0	0

	Plan 1 <C+0+C=1> Column 1								Plan 2 <C+0+C=1> Column 2								Plan 3 <C+0+C=1> Column 3							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
B - Sync Phases	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
C - Lag Phases	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

	<C+0+C=2> Column 1								<C+0+C=2> Column 2								<C+0+C=2> Column 3							
6 - Reservice Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Max Inhibit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - Pretimed Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 - Max Recall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Perm1 Veh Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B - Perm1 Ped Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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TIME BASED COORDINATION EVENTS

Bank 1

<C+0+9=0.1>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	62	☑	☑	☑	☑	☑	☑	☑
1	0	0	0	☐	☐	☐	☐	☐	☐	☐
2	0	0	0	☐	☐	☐	☐	☐	☐	☐
3	0	0	0	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

Bank 2

<C+0+9=0.2>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	0	☐	☐	☐	☐	☐	☐	☐
1	0	0	0	☐	☐	☐	☐	☐	☐	☐
2	0	0	0	☐	☐	☐	☐	☐	☐	☐
3	0	0	0	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

start

Site: 7280 Main St N Hatcher Ave - Type: FIELD Data - Last Uploaded: October 10, 2012 10:04:28

File Timing Sheets Help

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TIME OF DAY FUNCTIONS

Normal TOD Functions

Column 4

<C+0+7=1> <C+0+E=27>

Day of Week | Phase/Bits

Row	Hour	Min	Funct	S	M	T	W	T	F	S	1	2	3	4	5	6	7	8
0	7	0	11	☐	☑	☑	☑	☑	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐
1	9	0	11	☐	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	16	0	11	☐	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☑	☐	☐
3	18	0	11	☐	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

TOD Function Definitions

0=Exclusives Phases
1=Red Lock
2=Yellow Lock
3=Vehicle Min Recall
4=Ped Recall
5=not used
6=Rest in Walk
7=Red Rest
8=Double Entry
9=Vehicle Max Recall
10=Vehicle Soft Recall
11=Max 2
12=Conditional Service

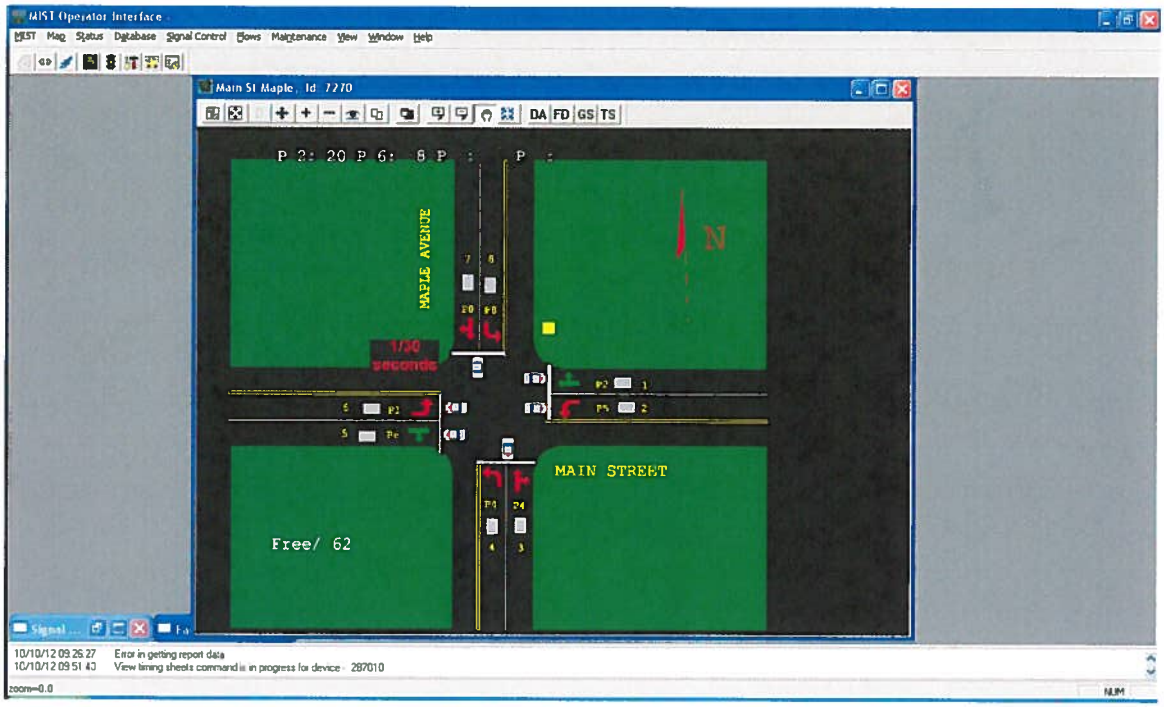
13=Lag Phases
14=Bit 1 - Local Override
Bit 4 - Disable Det OFF Monitor
Bit 8 - Real-time Split Monitor
15=TOD Output Bits 1-8

Holiday TOD Functions

Column 4

<C+0+7=2> <C+0+E=28>

start | MSI Operat... | Site: 7280 M... | Doc1 - Micros... | Doc2 - Micros... | Doc3 - Micros... | Doc4 - Micros... | Doc5 - Micros... | Documents - ...


MIST Operator Interface
MIST Map Status Database Signal Control Flows Maintenance View Window Help
Main St Maple Id 7270
DA FD GS TS
P 2: 20 P 6: 8 P : P :
MAPLE AVENUE
N
1/30 seconds
MAIN STREET
Free/ 62
10/10/12 09:26:27 Error in getting report data
10/10/12 09:51:43 View timing sheets command is in progress for device 287010
zoom=0.0
NUM

Site: 7270 Main St Maple - Type: FIELD Data - Last Uploaded: October 10, 2012 09:57:37

File Timing Sheets Help

Save Values Download Print Export

PHASE TIMING BANK #1

Phase <C+0+F=1>

Column Number ->	1	2	3	4	5	6	7	8
0 - Ped Walk	0	7	0	7	0	7	0	7
1 - Ped FDW	0	21	0	14	0	17	0	21
2 - Min Green	5	15	0	6	5	15	0	6
3 - Type 3 Disconnect	0	0	0	0	0	0	0	0
4 - Added per Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 - Veh Extension	2.0	6.0	0.0	4.0	2.0	6.0	0.0	4.0
6 - Max Gap	2.0	6.0	0.0	4.0	2.0	6.0	0.0	4.0
7 - Min Gap	2.0	6.0	0.0	4.0	2.0	6.0	0.0	4.0
8 - Max Limit	20	65	0	25	20	65	0	25
9 - Max Limit 2	20	65	0	70	45	65	0	70
A - Adv/Delay Walk	0	0	0	0	0	0	0	0
B - RR Min Ped FDW	0	0	0	0	0	0	0	0
C - Cond Serv Check	0	0	0	0	0	0	0	0
D - Reduce Every	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E - Yellow Change	4.0	4.0	0.0	4.5	4.0	4.0	0.0	4.5
F - Red Clear	2.5	3.0	0.0	3.0	2.5	3.0	0.0	3.0

Column Numbers ->	9	A	B	C	D
	Max Initial	Alt Walk	Alt FDW	Alt Initial	Alt Extension
1 - Phase 1	0	0	0	0	0 0
2 - Phase 2	0	0	0	0	0 0
3 - Phase 3	0	0	0	0	0 0
4 - Phase 4	0	0	0	0	0 0
5 - Phase 5	0	0	0	0	0 0
6 - Phase 6	0	0	0	0	0 0
7 - Phase 7	0	0	0	0	0 0
8 - Phase 8	0	0	0	0	0 0

All Red Start

<(F/1+C+0)> 0

Red Revert

<(F/1+0+F)> 5.0

start MSST Operator Interf... Doc1 - Microsoft Word Document2 - Microsof... Site: 7270 Main St M...

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COORDINATION AND TIMING PARAMETERS

Phase Functions

<C+0+F=1> Column F

Phase # /LED #	1	2	3	4	5	6	7	8
0 - Permit	☑	☑	☐	☑	☑	☑	☐	☑
1 - Red Lock	☐	☐	☐	☐	☐	☐	☐	☐
2 - Yellow Lock	☐	☐	☐	☐	☐	☐	☐	☐
3 - Min Recall	☐	☑	☐	☐	☐	☑	☐	☐
4 - Ped Recall	☐	☐	☐	☐	☐	☐	☐	☐
6 - Rest in Walk	☐	☐	☐	☐	☐	☐	☐	☐
7 - Red Rest	☐	☐	☐	☐	☐	☐	☐	☐
8 - Dual Entry	☐	☐	☐	☑	☐	☐	☐	☑
9 - Max Recall	☐	☐	☐	☐	☐	☐	☐	☐
A - Soft Recall	☐	☐	☐	☐	☐	☐	☐	☐
B - Max 2	☐	☐	☐	☐	☐	☐	☐	☐
C - Cond. Service	☐	☐	☐	☐	☐	☐	☐	☐
D - Man Cntrl Calls	☑	☑	☐	☑	☑	☑	☐	☑
E - Yellow Start	☐	☐	☐	☐	☐	☐	☐	☐
F - First Phases	☐	☑	☐	☐	☐	☑	☐	☐

Phases

	1	2	3	4	5	6	7	8
Coord Extra <C/5+1+C>	☐	☐	☐	☐	☐	☐	☐	☐
Excess Time <C/5+1+D>	☐	☐	☐	☐	☐	☐	☐	☐
External Lag <F/1+E+E>	☐	☐	☐	☐	☐	☐	☐	☐
Lag Free <F/1+E+F>	☐	☑	☐	☑	☐	☑	☐	☐

Note: The LED lights are not used to display the values for Coord Extra and Excess Time. These values are displayed as the decimal equivalent of the binary number represented by the phase check boxes

For example, if the checkboxes for phases 1, 2, and 3 are checked, the controller will display the decimal value 7.

start MIST Operator Interf... Doc1 - Microsoft Word Doc2 - Microsoft Word Document1 - Microsof... Site: 7270 Main St M...

Site: 7270 Main St Maple - Type: FIELD Data - Last Uploaded: October 10, 2012 09:57:37

File Timing Sheets Help

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COORDINATION SHEET #1

<C+0+C=1>

Plans 1 - 15

Column Number -->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	150	120	150	90	90	100	100	100	100	0	0	0	0	0	0
1 - Phase 1 Force Off	64	74	67	41	49	55	55	55	55	0	0	0	0	0	0
2 - Phase 2 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 - Phase 3 Force Off	0	0	0	0	0	20	20	20	20	0	0	0	0	0	0
4 - Phase 4 Force Off	47	43	42	26	34	40	40	40	40	0	0	0	0	0	0
5 - Phase 5 Force Off	64	63	57	41	49	55	55	55	55	0	0	0	0	0	0
6 - Phase 6 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Phase 7 Force Off	0	0	0	0	0	20	20	20	20	0	0	0	0	0	0
8 - Phase 8 Force Off	0	0	0	0	0	40	40	40	40	0	0	0	0	0	0
9 - Ring Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Offset 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D - Perm 1 End	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
E - Hold Release	255	255	255	255	255	255	255	255	255	0	0	0	0	0	0
F - Zone Offset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<C+0+C=3>

Plans 16 - 30

Column Numbers -->	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 - Cycle Length	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 - Phase 1 Force Off	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

start MIST - Operator Interf... Doc1 - Microsoft Word Doc2 - Microsoft Word Doc3 - Microsoft Word Document4 - Microsof... Site: 7270 Main St M... 10:30 A

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COORDINATION SHEET 2: Plans 1-8

<C+0+C=2>

Column Numbers ->	Plan 1 1	Plan 2 2	Plan 3 3	Plan 4 4	Plan 5 5	Plan 6 6	Plan 7 7	Plan 8 8
0 - Ped Adjustment	0	0	0	0	0	0	0	0
1 - Perm 2 Start	0	0	0	0	0	0	0	0
2 - Perm 2 End	0	0	0	0	0	0	0	0
3 - Perm 3 Start	0	0	0	0	0	0	0	0
4 - Perm 3 End	0	0	0	0	0	0	0	0
5 - Reservice Time	0	0	0	0	0	0	0	0

	Plan 1 <C+0+C=1> Column 1								Plan 2 <C+0+C=1> Column 2								Plan 3 <C+0+C=1> Column 3							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
B - Sync Phases	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
C - Lag Phases	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

	<C+0+C=2> Column 1								<C+0+C=2> Column 2								<C+0+C=2> Column 3							
6 - Reservice Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 - Max Inhibit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 - Pretmed Phases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 - Max Recall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A - Perm1 Veh Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B - Perm1 Ped Phase	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

start MSIT Operator 1 Doc1 - Microsoft ... Doc2 - Microsoft ... Doc3 - Microsoft ... Doc4 - Microsoft Document5 - Mic... Site: 7270 Main ... 10:30 AM

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File Timing Sheets Help

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TIME BASED COORDINATION EVENTS

Bank 1

<C+0+9=0.1>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	62	☑	☑	☑	☑	☑	☑	☑
1	0	0	0	☐	☐	☐	☐	☐	☐	☐
2	0	0	0	☐	☐	☐	☐	☐	☐	☐
3	0	0	0	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

Bank 2

<C+0+9=0.2>

Day of Week

Row	Hour	Min	Plan	S	M	T	W	T	F	S
0	0	0	0	☐	☐	☐	☐	☐	☐	☐
1	0	0	0	☐	☐	☐	☐	☐	☐	☐
2	0	0	0	☐	☐	☐	☐	☐	☐	☐
3	0	0	0	☐	☐	☐	☐	☐	☐	☐
4	0	0	0	☐	☐	☐	☐	☐	☐	☐
5	0	0	0	☐	☐	☐	☐	☐	☐	☐
6	0	0	0	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐

start

Site: 7270 Main St Maple - Type: FIELD Data - Last Uploaded: October 10, 2012 09:57:37

File Timing Sheets Help

Save Validate Download Print Export

TIME OF DAY FUNCTIONS

Normal TOD Functions

Row	Hour	Min	Funct	S	M	T	W	T	F	S	1	2	3	4	5	6	7	8
				<C+0+7=1> Day of Week							Column 4 <C+0+E=27> Phase/Bits							
0	8	0	11	☐	☑	☑	☑	☑	☑	☐	☑	☑	☐	☑	☑	☑	☐	☑
1	9	0	11	☐	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	15	20	11	☐	☑	☑	☑	☑	☑	☐	☑	☑	☐	☑	☑	☑	☐	☑
3	16	20	11	☐	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	0	0	11	☑	☑	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐
5	10	0	11	☑	☐	☐	☐	☐	☐	☐	☑	☑	☐	☑	☑	☑	☐	☑
6	13	0	11	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
A	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
C	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
E	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F	0	0	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Holiday TOD Functions

Column 4

TOD Function Definitions

0=Exclusives Phases
1=Red Lock
2=Yellow Lock
3=Vehicle Min Recall
4=Ped Recall
5=not used
6=Rest in Walk
7=Red Rest
8=Double Entry
9=Vehicle Max Recall
10=Vehicle Soft Recall
11=Max 2
12=Conditional Service

13=Lag Phases
14=Bit 1 - Local Override
Bit 4 - Disable Det OFF Monitor
Bit 8 - Real-time Split Monitor
15=TOD Output Bits 1-8

start MIST - Operator Interf... 2 Microsoft Office ... Site: 7270 Main St Ft...

APPENDIX C
RAW TRAFFIC DATA

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N AM
Site Code : 00003333
Start Date : 10/12/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

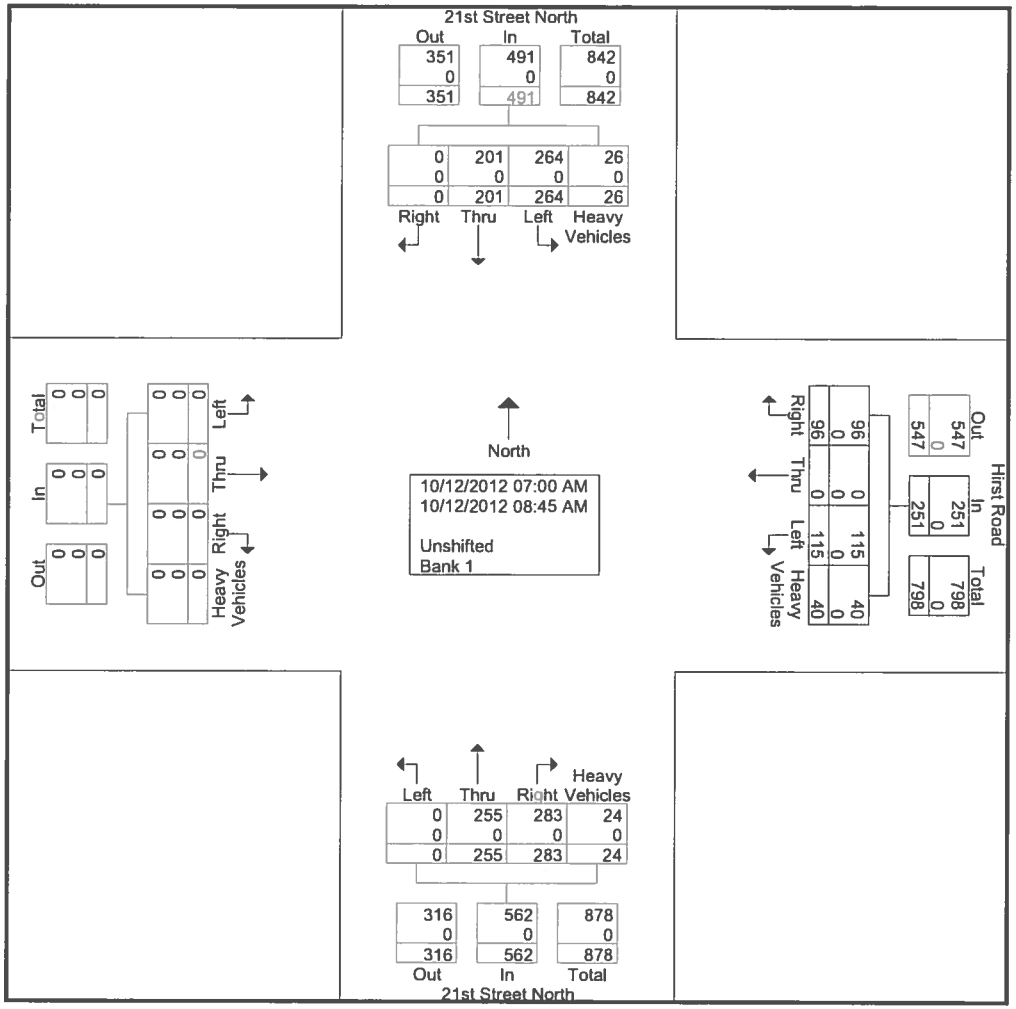
	21st Street North From North					Hirst Road From East					21st Street North From South					From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
07:00 AM	0	17	34	4	55	8	0	8	3	19	35	12	0	0	47	0	0	0	0	0	121
07:15 AM	0	34	34	1	69	4	0	12	2	18	31	24	0	3	58	0	0	0	0	0	145
07:30 AM	0	21	33	4	58	12	0	13	1	26	22	41	0	7	70	0	0	0	0	0	154
07:45 AM	0	35	45	2	82	5	0	19	0	24	41	23	0	1	65	0	0	0	0	0	171
Total	0	107	146	11	264	29	0	52	6	87	129	100	0	11	240	0	0	0	0	0	591
08:00 AM	0	19	37	5	61	8	0	13	1	22	39	29	0	1	69	0	0	0	0	0	152
08:15 AM	0	18	34	3	55	24	0	18	15	57	40	47	0	4	91	0	0	0	0	0	203
08:30 AM	0	22	24	3	49	26	0	17	15	58	47	48	0	6	101	0	0	0	0	0	208
08:45 AM	0	35	23	4	62	9	0	15	3	27	28	31	0	2	61	0	0	0	0	0	150
Total	0	94	118	15	227	67	0	63	34	164	154	155	0	13	322	0	0	0	0	0	713
Grand Total	0	201	264	26	491	96	0	115	40	251	283	255	0	24	562	0	0	0	0	0	1304
Apprch %	0	40.9	53.8	5.3		38.2	0	45.8	15.9		50.4	45.4	0	4.3		0	0	0	0		
Total %	0	15.4	20.2	2	37.7	7.4	0	8.8	3.1	19.2	21.7	19.6	0	1.8	43.1	0	0	0	0	0	
Unshifted	0	201	264	26	491	96	0	115	40	251	283	255	0	24	562	0	0	0	0	0	1304
% Unshifted	0	100	100	100	100	100	0	100	100	100	100	100	0	100	100	0	0	0	0	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N AM
Site Code : 00003333
Start Date : 10/12/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N AM
Site Code : 00003333
Start Date : 10/12/2012
Page No : 3

	21st Street North From North					Hirst Road From East					21st Street North From South					From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	**35**	**45**	2	**82**	5	0	**19**	0	24	41	23	0	1	65	0	0	0	0	0	171
08:00 AM	0	19	37	**5**	61	8	0	13	1	22	39	29	0	1	69	0	0	0	0	0	152
08:15 AM	0	18	34	3	55	24	0	18	**15**	57	40	47	0	4	91	0	0	0	0	0	203
08:30 AM	0	22	24	3	49	**26**	0	17	15	**58**	**47**	**48**	0	**6**	**101**	0	0	0	0	0	**208**
Total Volume	0	94	140	13	247	63	0	67	31	161	167	147	0	12	326	0	0	0	0	0	734
% App. Total	0	38.1	56.7	5.3		39.1	0	41.6	19.3		51.2	45.1	0	3.7		0	0	0	0		
PHF	.000	.671	.778	.650	.753	.606	.000	.882	.517	.694	.888	.766	.000	.500	.807	.000	.000	.000	.000	.000	.882

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N PM
Site Code : 00003333
Start Date : 10/11/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

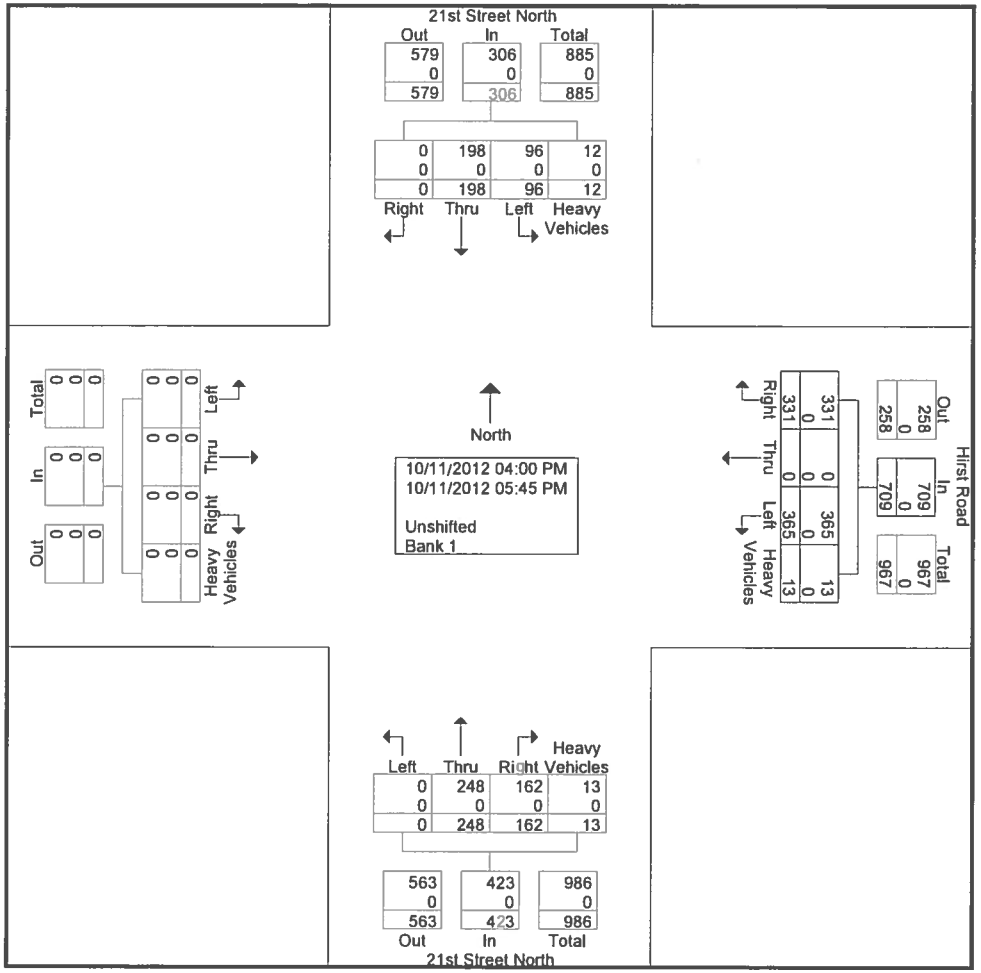
	21st Street North From North					Hirst Road From East					21st Street North From South					From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
04:00 PM	0	35	17	8	60	28	0	42	1	71	22	25	0	1	48	0	0	0	0	0	179
04:15 PM	0	25	8	2	35	48	0	33	0	81	12	23	0	1	36	0	0	0	0	0	152
04:30 PM	0	29	14	1	44	48	0	36	2	86	20	29	0	5	54	0	0	0	0	0	184
04:45 PM	0	24	12	0	36	44	0	36	0	80	30	26	0	4	60	0	0	0	0	0	176
Total	0	113	51	11	175	168	0	147	3	318	84	103	0	11	198	0	0	0	0	0	691
05:00 PM	0	18	7	0	25	42	0	50	2	94	18	29	0	1	48	0	0	0	0	0	167
05:15 PM	0	24	15	1	40	52	0	61	2	115	24	30	0	1	55	0	0	0	0	0	210
05:30 PM	0	25	8	0	33	36	0	56	2	94	21	42	0	0	63	0	0	0	0	0	190
05:45 PM	0	18	15	0	33	33	0	51	4	88	15	44	0	0	59	0	0	0	0	0	180
Total	0	85	45	1	131	163	0	218	10	391	78	145	0	2	225	0	0	0	0	0	747
Grand Total	0	198	96	12	306	331	0	365	13	709	162	248	0	13	423	0	0	0	0	0	1438
Apprch %	0	64.7	31.4	3.9		46.7	0	51.5	1.8		38.3	58.6	0	3.1		0	0	0	0		
Total %	0	13.8	6.7	0.8	21.3	23	0	25.4	0.9	49.3	11.3	17.2	0	0.9	29.4	0	0	0	0	0	
Unshifted	0	198	96	12	306	331	0	365	13	709	162	248	0	13	423	0	0	0	0	0	1438
% Unshifted	0	100	100	100	100	100	0	100	100	100	100	100	0	100	100	0	0	0	0	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N PM
Site Code : 00003333
Start Date : 10/11/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and 21St N PM
Site Code : 00003333
Start Date : 10/11/2012
Page No : 3

	21st Street North From North					Hirst Road From East					21st Street North From South					From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	18	7	0	25	42	0	50	2	94	18	29	0	1	48	0	0	0	0	0	167
05:15 PM	0	24	**15**	**1**	**40**	**52**	0	**61**	2	**115**	**24**	30	0	1	55	0	0	0	0	0	**210**
05:30 PM	0	**25**	8	0	33	36	0	56	2	94	21	42	0	0	**63**	0	0	0	0	0	190
05:45 PM	0	18	15	0	33	33	0	51	4	88	15	**44**	0	0	59	0	0	0	0	0	180
Total Volume	0	85	45	1	131	163	0	218	10	391	78	145	0	2	225	0	0	0	0	0	747
% App. Total	0	64.9	34.4	0.8		41.7	0	55.8	2.6		34.7	64.4	0	0.9		0	0	0	0		
PHF	.000	.850	.750	.250	.819	.784	.000	.893	.625	.850	.813	.824	.000	.500	.893	.000	.000	.000	.000	.000	.889

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catcotin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher AM
Site Code : 00002222
Start Date : 10/4/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

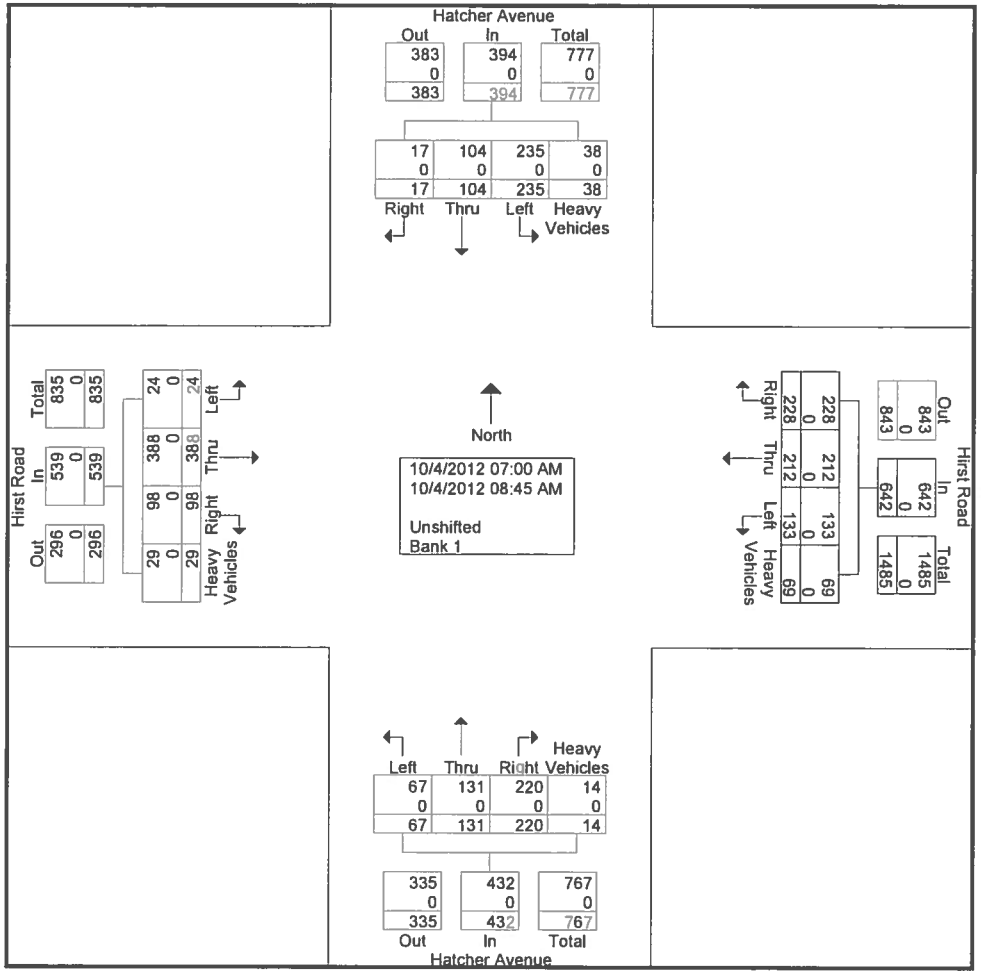
	Hatcher Avenue From North					Hirst Road From East					Hatcher Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
07:00 AM	0	5	26	3	34	14	21	14	4	53	24	15	7	0	46	15	57	3	5	80	213
07:15 AM	0	7	21	3	31	17	23	15	3	58	19	13	5	2	39	11	68	4	3	86	214
07:30 AM	3	10	28	3	44	20	18	11	2	51	31	21	3	2	57	10	40	1	5	56	208
07:45 AM	4	20	42	1	67	24	22	15	4	65	23	15	10	0	48	17	49	5	3	74	254
Total	7	42	117	10	176	75	84	55	13	227	97	64	25	4	190	53	214	13	16	296	889
08:00 AM	5	12	22	2	41	41	21	21	3	86	31	23	6	0	60	9	53	2	6	70	257
08:15 AM	1	10	24	1	36	46	31	19	25	121	34	15	17	5	71	11	43	6	1	61	289
08:30 AM	0	15	35	7	57	46	45	13	24	128	34	23	12	4	73	14	41	2	3	60	318
08:45 AM	4	25	37	18	84	20	31	25	4	80	24	6	7	1	38	11	37	1	3	52	254
Total	10	62	118	28	218	153	128	78	56	415	123	67	42	10	242	45	174	11	13	243	1118
Grand Total	17	104	235	38	394	228	212	133	69	642	220	131	67	14	432	98	388	24	29	539	2007
Apprch %	4.3	26.4	59.6	9.6		35.5	33	20.7	10.7		50.9	30.3	15.5	3.2		18.2	72	4.5	5.4		
Total %	0.8	5.2	11.7	1.9	19.6	11.4	10.6	6.6	3.4	32	11	6.5	3.3	0.7	21.5	4.9	19.3	1.2	1.4	26.9	
Unshifted	17	104	235	38	394	228	212	133	69	642	220	131	67	14	432	98	388	24	29	539	2007
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catcotin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher AM
Site Code : 00002222
Start Date : 10/4/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catcotin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher AM
Site Code : 00002222
Start Date : 10/4/2012
Page No : 3

	Hatcher Avenue From North					Hirst Road From East					Hatcher Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	**20**	**42**	1	**67**	24	22	15	4	65	23	15	10	0	48	**17**	49	5	3	**74**	254
08:00 AM	**5**	12	22	2	41	41	21	**21**	3	86	31	**23**	6	0	60	9	**53**	2	**6**	70	257
08:15 AM	1	10	24	1	36	**46**	31	19	**25**	121	**34**	15	**17**	**5**	71	11	43	**6**	1	61	289
08:30 AM	0	15	35	**7**	57	46	**45**	13	24	**128**	34	23	12	4	**73**	14	41	2	3	60	**318**
Total Volume	10	57	123	11	201	157	119	68	56	400	122	76	45	9	252	51	186	15	13	265	1118
% App. Total	5	28.4	61.2	5.5		39.2	29.8	17	14		48.4	30.2	17.9	3.6		19.2	70.2	5.7	4.9		
PHF	.500	.713	.732	.393	.750	.853	.661	.810	.560	.781	.897	.826	.662	.450	.863	.750	.877	.625	.542	.895	.879

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher PM
Site Code : 00000222
Start Date : 10/3/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

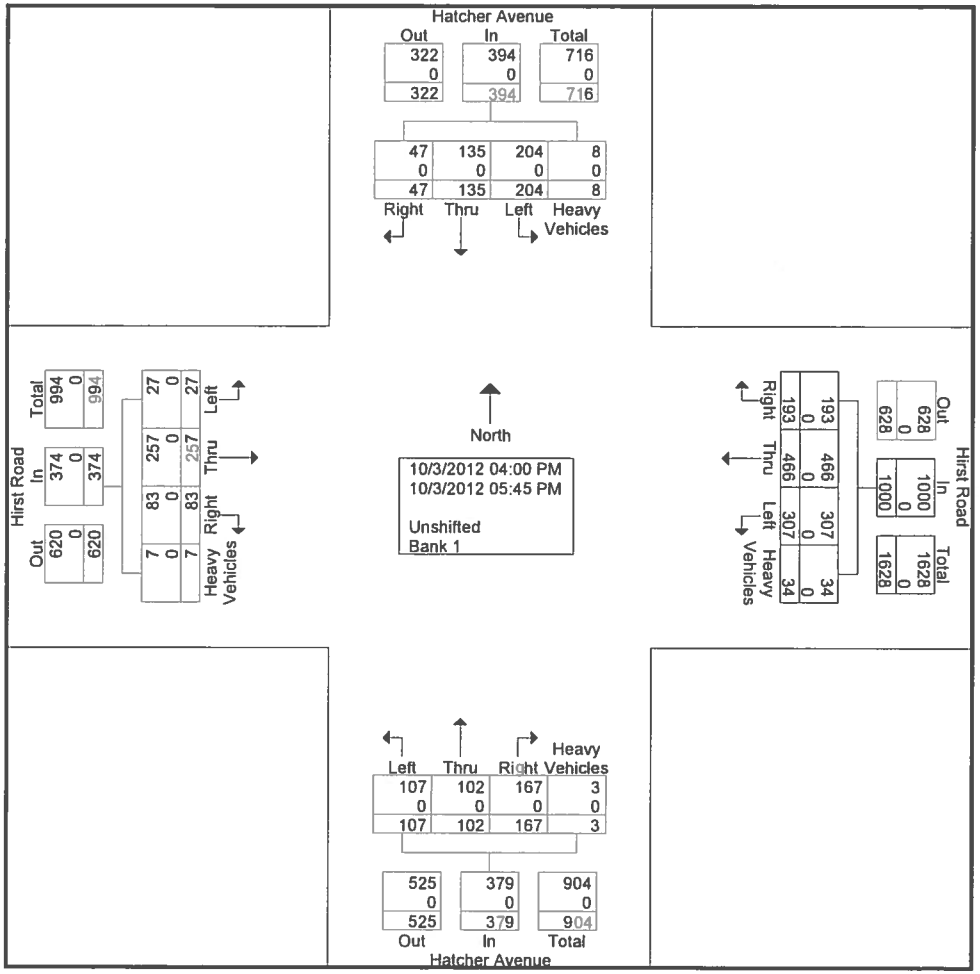
	Hatcher Avenue From North					Hirst Road From East					Hatcher Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
04:00 PM	6	39	59	5	109	29	49	44	2	124	30	16	12	0	58	7	44	4	3	58	349
04:15 PM	10	11	21	2	44	23	51	37	8	119	13	11	20	0	44	6	27	5	1	39	246
04:30 PM	8	12	22	0	42	23	52	41	5	121	20	7	17	0	44	18	23	1	2	44	251
04:45 PM	5	15	22	0	42	16	52	34	0	102	24	10	13	0	47	9	31	5	0	45	236
Total	29	77	124	7	237	91	204	156	15	466	87	44	62	0	193	40	125	15	6	186	1082
05:00 PM	6	14	25	0	45	17	64	38	3	122	27	13	10	2	52	19	34	5	0	58	277
05:15 PM	5	10	14	0	29	27	75	38	5	145	21	10	15	0	46	8	35	1	1	45	265
05:30 PM	3	21	21	1	46	31	67	29	5	132	16	17	9	0	42	8	28	2	0	38	258
05:45 PM	4	13	20	0	37	27	56	46	6	135	16	18	11	1	46	8	35	4	0	47	265
Total	18	58	80	1	157	102	262	151	19	534	80	58	45	3	186	43	132	12	1	188	1065
Grand Total	47	135	204	8	394	193	466	307	34	1000	167	102	107	3	379	83	257	27	7	374	2147
Apprch %	11.9	34.3	51.8	2		19.3	46.6	30.7	3.4		44.1	26.9	28.2	0.8		22.2	68.7	7.2	1.9		
Total %	2.2	6.3	9.5	0.4	18.4	9	21.7	14.3	1.6	46.6	7.8	4.8	5	0.1	17.7	3.9	12	1.3	0.3	17.4	
Unshifted	47	135	204	8	394	193	466	307	34	1000	167	102	107	3	379	83	257	27	7	374	2147
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher PM
Site Code : 00000222
Start Date : 10/3/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Hatcher PM
Site Code : 00000222
Start Date : 10/3/2012
Page No : 3

	Hatcher Avenue From North					Hirst Road From East					Hatcher Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	6	**39**	**59**	**5**	**109**	**29**	49	**44**	2	**124**	**30**	**16**	12	0	**58**	7	**44**	4	**3**	**58**	**349**
04:15 PM	**10**	11	21	2	44	23	51	37	**8**	119	13	11	**20**	0	44	6	27	**5**	1	39	246
04:30 PM	8	12	22	0	42	23	**52**	41	5	121	20	7	17	0	44	**18**	23	1	2	44	251
04:45 PM	5	15	22	0	42	16	52	34	0	102	24	10	13	0	47	9	31	5	0	45	236
Total Volume	29	77	124	7	237	91	204	156	15	466	87	44	62	0	193	40	125	15	6	186	1082
% App. Total	12.2	32.5	52.3	3		19.5	43.8	33.5	3.2		45.1	22.8	32.1	0		21.5	67.2	8.1	3.2		
PHF	.725	.494	.525	.350	.544	.784	.981	.886	.469	.940	.725	.688	.775	.000	.832	.556	.710	.750	.500	.802	.775

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple AM
Site Code : 00000111
Start Date : 10/2/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

	From North					Hirst Road From East					Maple Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	35	10	0	45	18	0	2	0	20	13	78	0	9	100	165
07:15 AM	0	0	0	0	0	0	49	16	1	66	16	0	6	1	23	13	77	0	6	96	185
07:30 AM	0	0	0	0	0	0	59	38	2	99	29	0	4	1	34	17	87	0	3	107	240
07:45 AM	0	0	0	0	0	0	58	46	8	112	15	0	14	0	29	22	82	0	3	107	248
Total	0	0	0	0	0	0	201	110	11	322	78	0	26	2	106	65	324	0	21	410	838
08:00 AM	0	0	0	0	0	0	71	41	1	113	20	0	12	0	32	18	57	0	3	78	223
08:15 AM	0	0	0	0	0	0	90	48	30	168	54	0	11	5	70	37	86	0	4	127	365
08:30 AM	0	0	0	0	0	0	90	62	21	173	53	0	28	17	98	40	84	0	8	132	403
08:45 AM	0	0	0	0	0	0	49	34	3	86	38	0	27	5	70	35	74	0	8	117	273
Total	0	0	0	0	0	0	300	185	55	540	165	0	78	27	270	130	301	0	23	454	1264
Grand Total	0	0	0	0	0	0	501	295	66	862	243	0	104	29	376	195	625	0	44	864	2102
Apprch %	0	0	0	0		0	58.1	34.2	7.7		64.6	0	27.7	7.7		22.6	72.3	0	5.1		
Total %	0	0	0	0	0	0	23.8	14	3.1	41	11.6	0	4.9	1.4	17.9	9.3	29.7	0	2.1	41.1	
Unshifted	0	0	0	0	0	0	501	295	66	862	243	0	104	29	376	195	625	0	44	864	2102
% Unshifted	0	0	0	0	0	0	100	100	100	100	100	0	100	100	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple AM
Site Code : 00000111
Start Date : 10/2/2012
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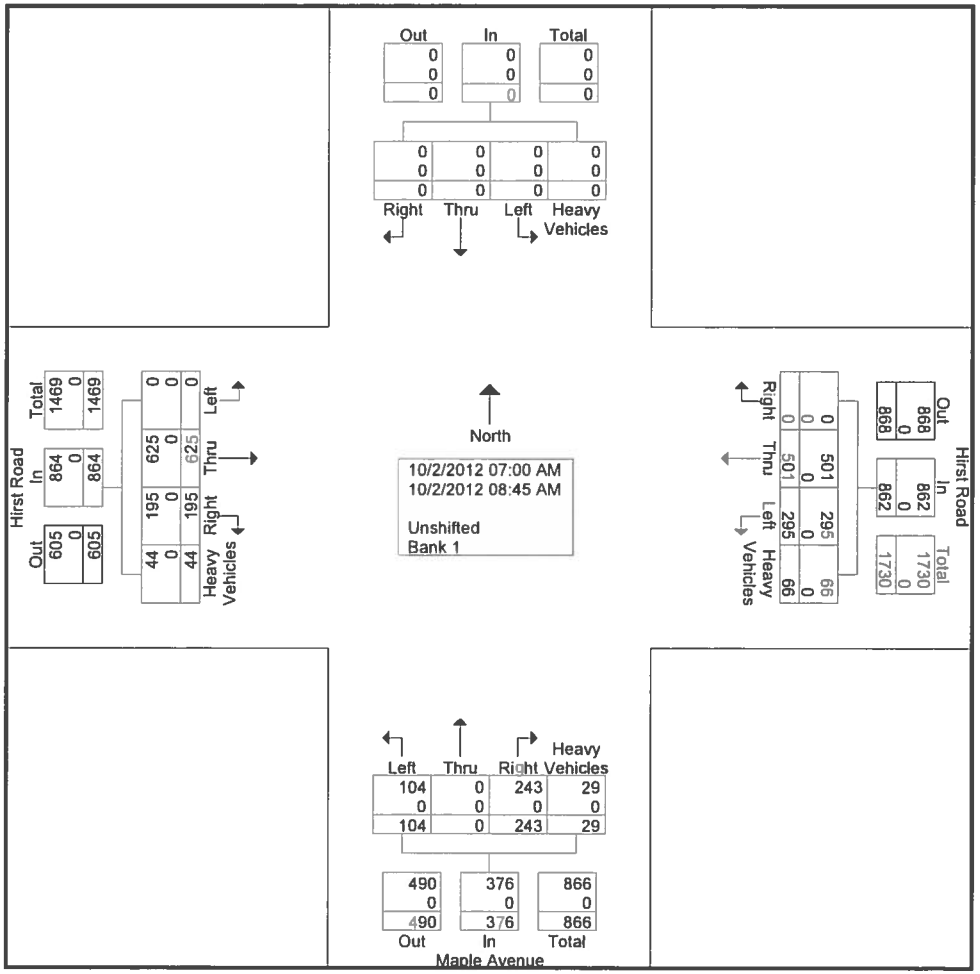


BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple AM
Site Code : 00000111
Start Date : 10/2/2012
Page No : 3

	From North					Hirst Road From East					Maple Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	71	41	1	113	20	0	12	0	32	18	57	0	3	78	223
08:15 AM	0	0	0	0	0	0	**90**	48	**30**	168	**54**	0	11	5	70	37	**86**	0	4	127	365
08:30 AM	0	0	0	0	0	0	90	**62**	21	**173**	53	0	**28**	**17**	**98**	**40**	84	0	**8**	**132**	**403**
08:45 AM	0	0	0	0	0	0	49	34	3	86	38	0	27	5	70	35	74	0	8	117	273
Total Volume	0	0	0	0	0	0	300	185	55	540	165	0	78	27	270	130	301	0	23	454	1264
% App. Total	0	0	0	0		0	55.6	34.3	10.2		61.1	0	28.9	10		28.6	66.3	0	5.1		
PHF	.000	.000	.000	.000	.000	.000	.833	.746	.458	.780	.764	.000	.696	.397	.689	.813	.875	.000	.719	.860	.784

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple PM
Site Code : 00000111
Start Date : 10/1/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

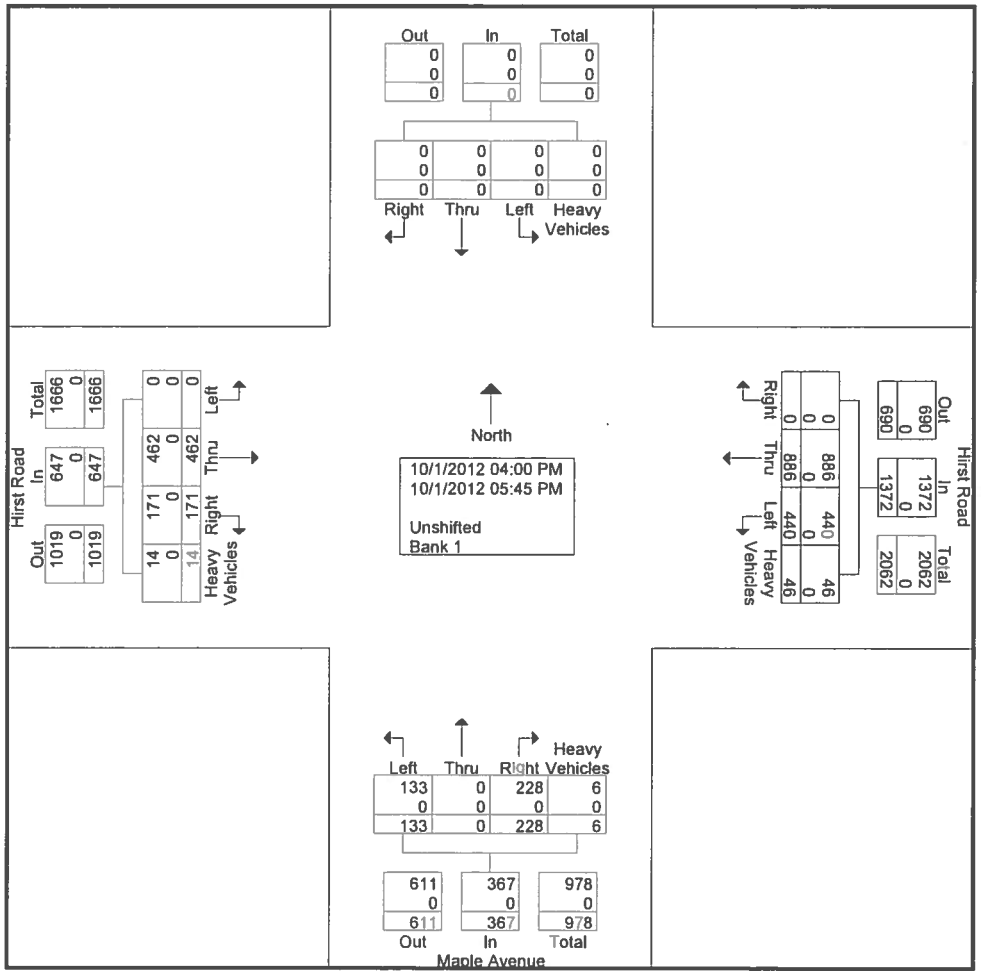
	From North					Hirst Road From East					Maple Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	75	40	2	117	46	0	17	5	68	35	74	0	6	115	300
04:15 PM	0	0	0	0	0	0	101	50	7	158	18	0	18	1	37	25	53	0	4	82	277
04:30 PM	0	0	0	0	0	0	108	40	7	155	26	0	18	0	44	17	47	0	2	66	265
04:45 PM	0	0	0	0	0	0	111	65	6	182	24	0	14	0	38	16	44	0	1	61	281
Total	0	0	0	0	0	0	395	195	22	612	114	0	67	6	187	93	218	0	13	324	1123
05:00 PM	0	0	0	0	0	0	128	71	2	201	25	0	16	0	41	28	70	0	0	98	340
05:15 PM	0	0	0	0	0	0	123	56	5	184	27	0	20	0	47	19	73	0	0	92	323
05:30 PM	0	0	0	0	0	0	113	52	10	175	36	0	19	0	55	16	52	0	1	69	299
05:45 PM	0	0	0	0	0	0	127	66	7	200	26	0	11	0	37	15	49	0	0	64	301
Total	0	0	0	0	0	0	491	245	24	760	114	0	66	0	180	78	244	0	1	323	1263
Grand Total	0	0	0	0	0	0	886	440	46	1372	228	0	133	6	367	171	462	0	14	647	2386
Apprch %	0	0	0	0		0	64.6	32.1	3.4		62.1	0	36.2	1.6		26.4	71.4	0	2.2		
Total %	0	0	0	0	0	0	37.1	18.4	1.9	57.5	9.6	0	5.6	0.3	15.4	7.2	19.4	0	0.6	27.1	
Unshifted	0	0	0	0	0	0	886	440	46	1372	228	0	133	6	367	171	462	0	14	647	2386
% Unshifted	0	0	0	0	0	0	100	100	100	100	100	0	100	100	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple PM
Site Code : 00000111
Start Date : 10/1/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Bruce Clarke
Weather:

File Name : Hirst and Maple PM
Site Code : 00000111
Start Date : 10/1/2012
Page No : 3

	From North					Hirst Road From East					Maple Avenue From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	**128**	**71**	2	**201**	25	0	16	0	41	**28**	70	0	0	**98**	**340**
05:15 PM	0	0	0	0	0	0	123	56	5	184	27	0	**20**	0	47	19	**73**	0	0	92	323
05:30 PM	0	0	0	0	0	0	113	52	**10**	175	**36**	0	19	0	**55**	16	52	0	1	69	299
05:45 PM	0	0	0	0	0	0	127	66	7	200	26	0	11	0	37	15	49	0	0	64	301
Total Volume	0	0	0	0	0	0	491	245	24	760	114	0	66	0	180	78	244	0	1	323	1263
% App. Total	0	0	0	0		0	64.6	32.2	3.2		63.3	0	36.7	0		24.1	75.5	0	0.3		
PHF	.000	.000	.000	.000	.000	.000	.959	.863	.600	.945	.792	.000	.825	.000	.818	.696	.836	.000	.250	.824	.929

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst AM
Site Code : 00000000
Start Date : 6/1/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

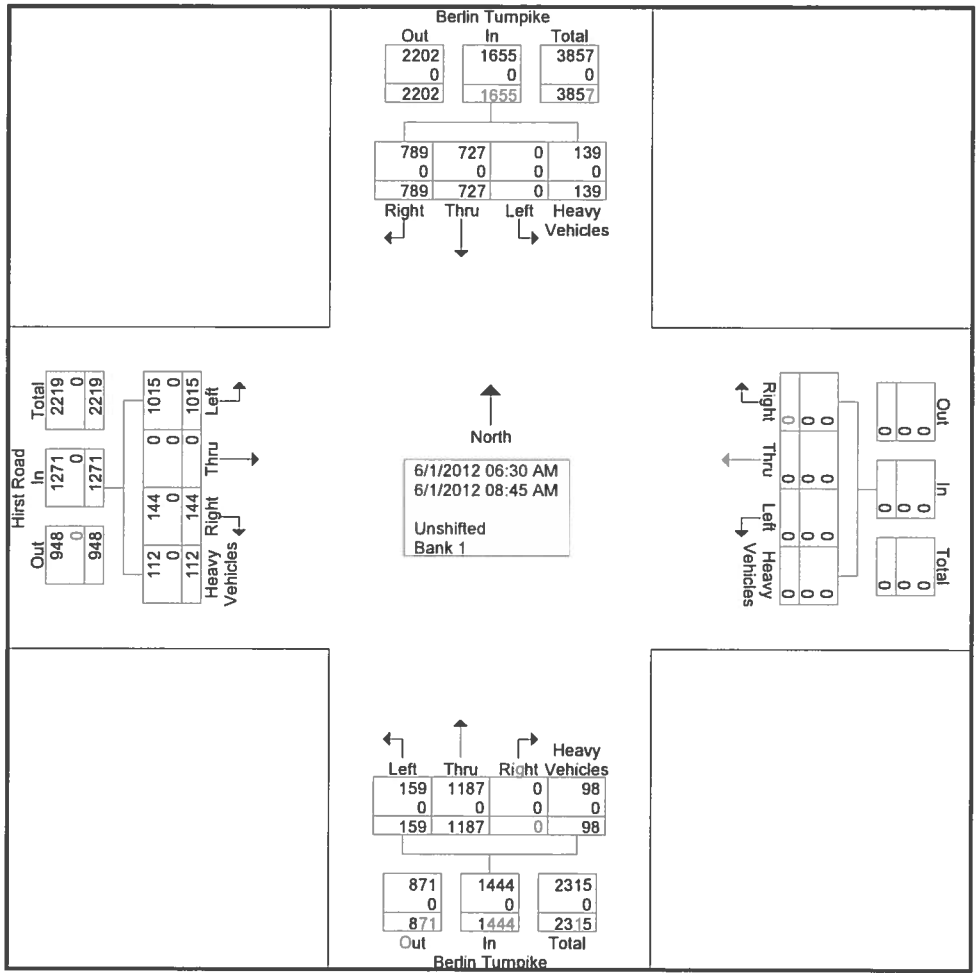
	Berlin Turnpike From North					From East					Berlin Turnpike From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
06:30 AM	41	27	0	6	74	0	0	0	0	0	0	101	5	4	110	11	0	57	16	84	268
06:45 AM	39	48	0	6	93	0	0	0	0	0	0	110	2	7	119	8	0	76	8	92	304
Total	80	75	0	12	167	0	0	0	0	0	0	211	7	11	229	19	0	133	24	176	572
07:00 AM	35	42	0	12	89	0	0	0	0	0	0	136	4	9	149	2	0	119	13	134	372
07:15 AM	75	78	0	13	166	0	0	0	0	0	0	117	3	7	127	11	0	103	13	127	420
07:30 AM	61	92	0	17	170	0	0	0	0	0	0	130	7	7	144	8	0	103	8	119	433
07:45 AM	78	79	0	10	167	0	0	0	0	0	0	144	17	6	167	12	0	136	7	155	489
Total	249	291	0	52	592	0	0	0	0	0	0	527	31	29	587	33	0	461	41	535	1714
08:00 AM	106	108	0	33	247	0	0	0	0	0	0	124	16	5	145	20	0	116	11	147	539
08:15 AM	105	95	0	14	214	0	0	0	0	0	0	119	46	37	202	22	0	111	10	143	559
08:30 AM	131	74	0	9	214	0	0	0	0	0	0	104	42	10	156	30	0	100	17	147	517
08:45 AM	118	84	0	19	221	0	0	0	0	0	0	102	17	6	125	20	0	94	9	123	469
Total	460	361	0	75	896	0	0	0	0	0	0	449	121	58	628	92	0	421	47	560	2084
Grand Total	789	727	0	139	1655	0	0	0	0	0	0	1187	159	98	1444	144	0	1015	112	1271	4370
Apprch %	47.7	43.9	0	8.4		0	0	0	0		0	82.2	11	6.8		11.3	0	79.9	8.8		
Total %	18.1	16.6	0	3.2	37.9	0	0	0	0	0	0	27.2	3.6	2.2	33	3.3	0	23.2	2.6	29.1	
Unshifted	789	727	0	139	1655	0	0	0	0	0	0	1187	159	98	1444	144	0	1015	112	1271	4370
% Unshifted	100	100	0	100	100	0	0	0	0	0	0	100	100	100	100	100	0	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst AM
Site Code : 00000000
Start Date : 6/1/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst AM
Site Code : 00000000
Start Date : 6/1/2012
Page No : 3

	Berlin Turnpike From North					From East					Berlin Turnpike From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	78	79	0	10	167	0	0	0	0	0	0	**144**	17	6	167	12	0	**136**	7	**155**	489
08:00 AM	106	**108**	0	**33**	**247**	0	0	0	0	0	0	124	16	5	145	20	0	116	11	147	539
08:15 AM	105	95	0	14	214	0	0	0	0	0	0	119	**46**	**37**	**202**	22	0	111	10	143	**559**
08:30 AM	**131**	74	0	9	214	0	0	0	0	0	0	104	42	10	156	**30**	0	100	**17**	147	517
Total Volume	420	356	0	66	842	0	0	0	0	0	0	491	121	58	670	84	0	463	45	592	2104
% App. Total	49.9	42.3	0	7.8		0	0	0	0		0	73.3	18.1	8.7		14.2	0	78.2	7.6		
PHF	.802	.824	.000	.500	.852	.000	.000	.000	.000	.000	.000	.852	.658	.392	.829	.700	.000	.851	.662	.955	.941

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst PM
Site Code : 00000000
Start Date : 5/31/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

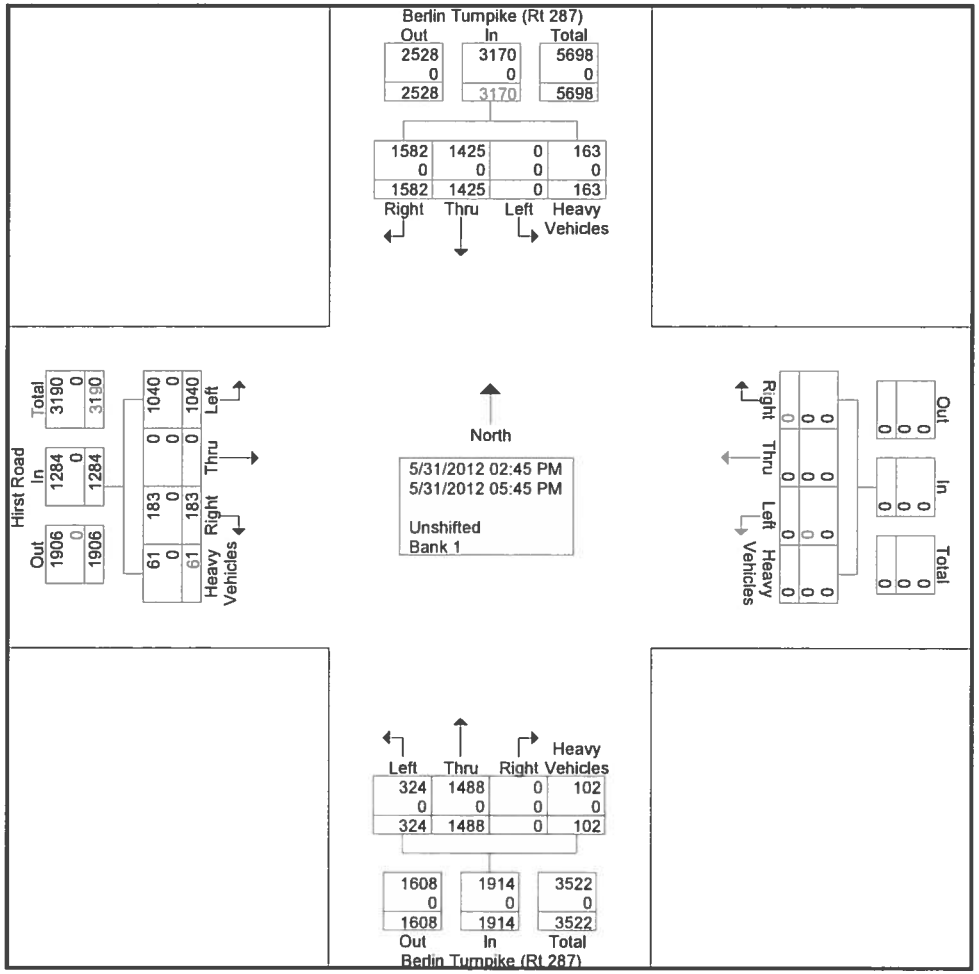
	Berlin Turnpike (Rt 287) From North					From East					Berlin Turnpike (Rt 287) From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
02:45 PM	100	103	0	7	210	0	0	0	0	0	0	111	16	13	140	8	0	71	13	92	442
Total	100	103	0	7	210	0	0	0	0	0	0	111	16	13	140	8	0	71	13	92	442
03:00 PM	77	92	0	16	185	0	0	0	0	0	0	101	12	6	119	12	0	62	7	81	385
03:15 PM	95	120	0	27	242	0	0	0	0	0	0	87	15	3	105	16	0	77	10	103	450
03:30 PM	109	111	0	21	241	0	0	0	0	0	0	102	25	16	143	8	0	57	2	67	451
03:45 PM	106	113	0	9	228	0	0	0	0	0	0	134	44	31	209	11	0	108	1	120	557
Total	387	436	0	73	896	0	0	0	0	0	0	424	96	56	576	47	0	304	20	371	1843
04:00 PM	127	98	0	14	239	0	0	0	0	0	0	116	17	4	137	39	0	110	14	163	539
04:15 PM	127	98	0	4	229	0	0	0	0	0	0	109	25	4	138	11	0	95	3	109	476
04:30 PM	124	106	0	10	240	0	0	0	0	0	0	110	26	5	141	13	0	70	2	85	466
04:45 PM	129	102	0	9	240	0	0	0	0	0	0	122	24	5	151	18	0	71	2	91	482
Total	507	404	0	37	948	0	0	0	0	0	0	457	92	18	567	81	0	346	21	448	1963
05:00 PM	150	128	0	10	288	0	0	0	0	0	0	121	28	7	156	17	0	74	4	95	539
05:15 PM	125	105	0	5	235	0	0	0	0	0	0	145	37	3	185	12	0	91	3	106	526
05:30 PM	160	135	0	18	313	0	0	0	0	0	0	131	25	3	159	5	0	85	0	90	562
05:45 PM	153	114	0	13	280	0	0	0	0	0	0	99	30	2	131	13	0	69	0	82	493
Total	588	482	0	46	1116	0	0	0	0	0	0	496	120	15	631	47	0	319	7	373	2120
Grand Total	1582	1425	0	163	3170	0	0	0	0	0	0	1488	324	102	1914	183	0	1040	61	1284	6368
Apprch %	49.9	45	0	5.1		0	0	0	0		0	77.7	16.9	5.3		14.3	0	81	4.8		
Total %	24.8	22.4	0	2.6	49.8	0	0	0	0	0	0	23.4	5.1	1.6	30.1	2.9	0	16.3	1	20.2	
Unshifted	1582	1425	0	163	3170	0	0	0	0	0	0	1488	324	102	1914	183	0	1040	61	1284	6368
% Unshifted	100	100	0	100	100	0	0	0	0	0	0	100	100	100	100	100	0	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst PM
Site Code : 00000000
Start Date : 5/31/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Purcellville Town Center Apt
Counter: Jesse Bogart
Weather:

File Name : Berlin and Hirst PM
Site Code : 00000000
Start Date : 5/31/2012
Page No : 3

	Berlin Turnpike (Rt 287) From North					From East					Berlin Turnpike (Rt 287) From South					Hirst Road From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 02:45 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	150	128	0	10	288	0	0	0	0	0	0	121	28	7	156	17	0	74	4	95	539
05:15 PM	125	105	0	5	235	0	0	0	0	0	0	145	37	3	185	12	0	91	3	106	526
05:30 PM	160	135	0	18	313	0	0	0	0	0	0	131	25	3	159	5	0	85	0	90	562
05:45 PM	153	114	0	13	280	0	0	0	0	0	0	99	30	2	131	13	0	69	0	82	493
Total Volume	588	482	0	46	1116	0	0	0	0	0	0	496	120	15	631	47	0	319	7	373	2120
% App. Total	52.7	43.2	0	4.1		0	0	0	0		0	78.6	19	2.4		12.6	0	85.5	1.9		
PHF	.919	.893	.000	.639	.891	.000	.000	.000	.000	.000	.000	.855	.811	.536	.853	.691	.000	.876	.438	.880	.943

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Ed Tatum
Weather:

File Name : Main and Hatcher AM
Site Code : 00000002
Start Date : 10/12/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

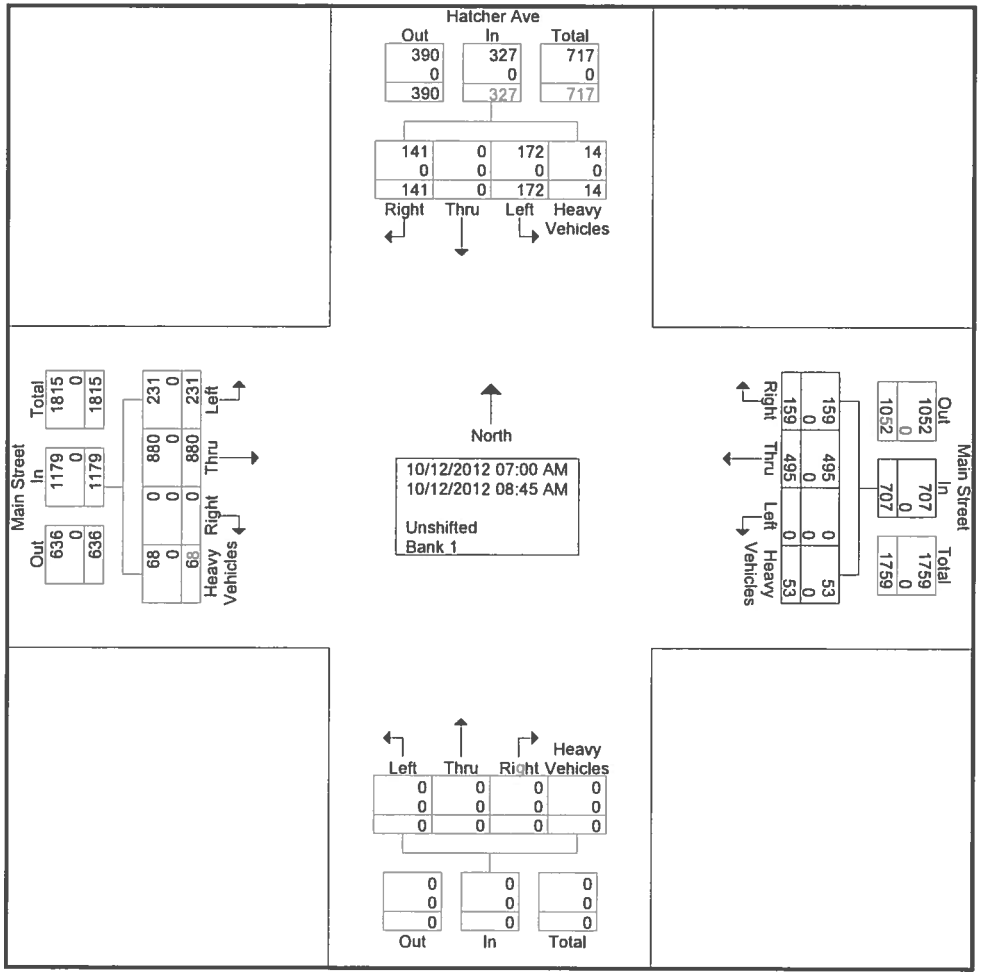
	Hatcher Ave From North					Main Street From East					From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
07:00 AM	11	0	8	0	19	16	32	0	5	53	0	0	0	0	0	0	70	19	5	94	166
07:15 AM	15	0	13	1	29	11	44	0	5	60	0	0	0	0	0	0	84	23	9	116	205
07:30 AM	14	0	21	3	38	14	42	0	6	62	0	0	0	0	0	0	116	30	4	150	250
07:45 AM	14	0	31	1	46	20	69	0	10	99	0	0	0	0	0	0	152	35	8	195	340
Total	54	0	73	5	132	61	187	0	26	274	0	0	0	0	0	0	422	107	26	555	961
08:00 AM	24	0	24	1	49	22	60	0	10	92	0	0	0	0	0	0	101	26	4	131	272
08:15 AM	15	0	16	4	35	22	68	0	3	93	0	0	0	0	0	0	129	36	18	183	311
08:30 AM	13	0	24	1	38	36	77	0	9	122	0	0	0	0	0	0	124	37	15	176	336
08:45 AM	35	0	35	3	73	18	103	0	5	126	0	0	0	0	0	0	104	25	5	134	333
Total	87	0	99	9	195	98	308	0	27	433	0	0	0	0	0	0	458	124	42	624	1252
Grand Total	141	0	172	14	327	159	495	0	53	707	0	0	0	0	0	0	880	231	68	1179	2213
Apprch %	43.1	0	52.6	4.3		22.5	70	0	7.5		0	0	0	0		0	74.6	19.6	5.8		
Total %	6.4	0	7.8	0.6	14.8	7.2	22.4	0	2.4	31.9	0	0	0	0	0	0	39.8	10.4	3.1	53.3	
Unshifted	141	0	172	14	327	159	495	0	53	707	0	0	0	0	0	0	880	231	68	1179	2213
% Unshifted	100	0	100	100	100	100	100	0	100	100	0	0	0	0	0	0	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Ed Tatum
Weather:

File Name : Main and Hatcher AM
Site Code : 00000002
Start Date : 10/12/2012
Page No : 2



BOWMAN CONSULTING

3951 Westerre Parkway
Suite 150
Richmond, Virginia 23233

Project: Catoctin Corner
Counter: Ed Tatum
Weather:

File Name : Main and Hatcher AM
Site Code : 00000002
Start Date : 10/12/2012
Page No : 3

	Hatcher Ave From North					Main Street From East					From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	14	0	**31**	1	46	20	69	0	**10**	99	0	0	0	0	0	0	**152**	35	8	**195**	**340**
08:00 AM	**24**	0	24	1	**49**	22	60	0	10	92	0	0	0	0	0	0	101	26	4	131	272
08:15 AM	15	0	16	**4**	35	22	68	0	3	93	0	0	0	0	0	0	129	36	**18**	183	311
08:30 AM	13	0	24	1	38	**36**	**77**	0	9	**122**	0	0	0	0	0	0	124	**37**	15	176	336
Total Volume	66	0	95	7	168	100	274	0	32	406	0	0	0	0	0	0	506	134	45	685	1259
% App. Total	39.3	0	56.5	4.2		24.6	67.5	0	7.9		0	0	0	0		0	73.9	19.6	6.6		
PHF	.688	.000	.766	.438	.857	.694	.890	.000	.800	.832	.000	.000	.000	.000	.000	.000	.832	.905	.625	.878	.926

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Project: Catoctin Corner
Counter: Ed Tatum
Weather:

File Name : Main and Hatcher PM
Site Code : 00000002
Start Date : 10/11/2012
Page No : 1

Groups Printed- Unshifted - Bank 1

	Hatcher Avenue From North					Main Street From East					From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
04:00 PM	30	0	33	0	63	35	139	0	9	183	0	0	1	0	1	0	100	19	6	125	372
04:15 PM	44	0	27	0	71	22	127	0	5	154	0	0	0	0	0	0	100	20	6	126	351
04:30 PM	42	0	22	1	65	18	143	0	4	165	0	0	0	0	0	0	127	22	9	158	388
04:45 PM	46	0	24	0	70	30	147	0	4	181	0	0	0	0	0	0	114	21	6	141	392
Total	162	0	106	1	269	105	556	0	22	683	0	0	1	0	1	0	441	82	27	550	1503
05:00 PM	41	0	24	0	65	32	166	0	3	201	0	0	0	0	0	0	102	19	7	128	394
05:15 PM	57	0	27	0	84	34	141	0	1	176	0	0	0	0	0	0	134	29	4	167	427
05:30 PM	44	0	24	0	68	26	152	0	1	179	0	0	0	0	0	0	128	30	1	159	406
05:45 PM	48	0	25	0	73	26	152	0	1	179	0	0	0	0	0	0	149	16	6	171	423
Total	190	0	100	0	290	118	611	0	6	735	0	0	0	0	0	0	513	94	18	625	1650
Grand Total	352	0	206	1	559	223	1167	0	28	1418	0	0	1	0	1	0	954	176	45	1175	3153
Apprch %	63	0	36.9	0.2		15.7	82.3	0	2		0	0	100	0		0	81.2	15	3.8		
Total %	11.2	0	6.5	0	17.7	7.1	37	0	0.9	45	0	0	0	0	0	0	30.3	5.6	1.4	37.3	
Unshifted	352	0	206	1	559	223	1167	0	28	1418	0	0	1	0	1	0	954	176	45	1175	3153
% Unshifted	100	0	100	100	100	100	100	0	100	100	0	0	100	0	100	0	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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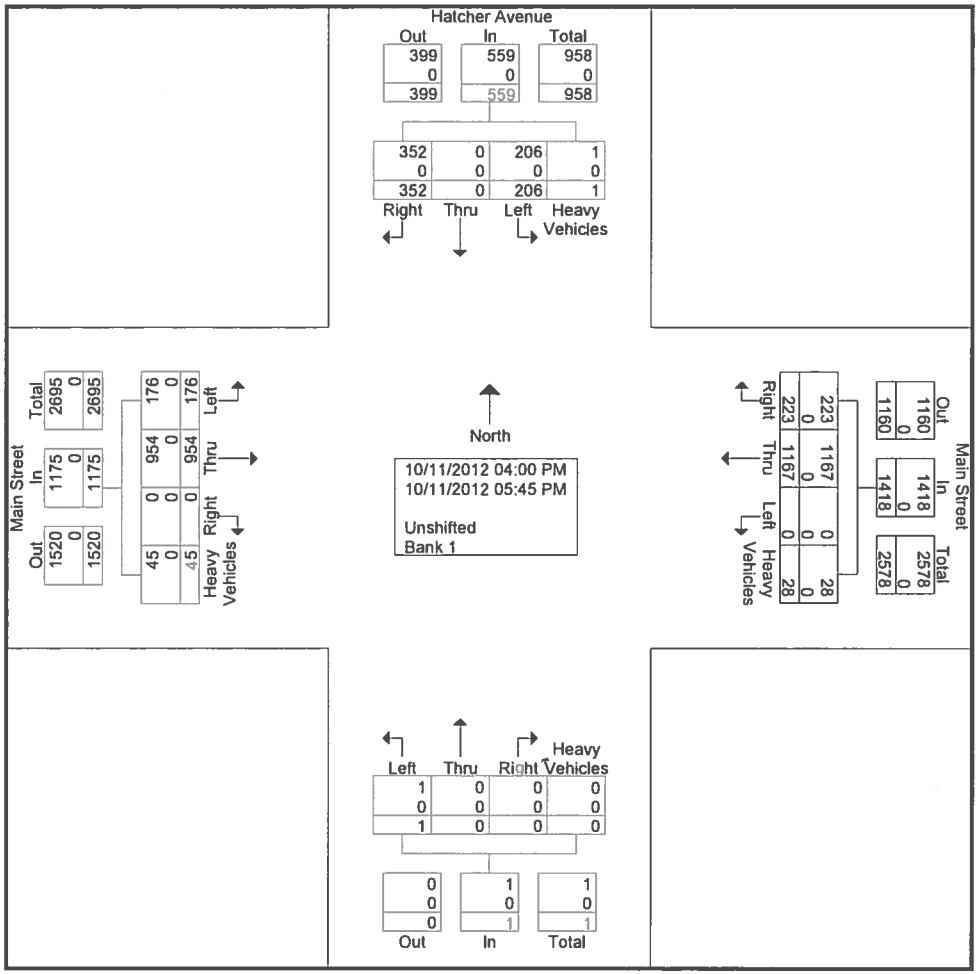

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	Hatcher Avenue From North					Main Street From East					From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	41	0	24	0	65	32	**166**	0	**3**	**201**	0	0	0	0	0	0	102	19	**7**	128	394
05:15 PM	**57**	0	**27**	0	**84**	**34**	141	0	1	176	0	0	0	0	0	0	134	29	4	167	**427**
05:30 PM	44	0	24	0	68	26	152	0	1	179	0	0	0	0	0	0	128	**30**	1	159	406
05:45 PM	48	0	25	0	73	26	152	0	1	179	0	0	0	0	0	0	**149**	16	6	**171**	423
Total Volume	190	0	100	0	290	118	611	0	6	735	0	0	0	0	0	0	513	94	18	625	1650
% App. Total	65.5	0	34.5	0		16.1	83.1	0	0.8		0	0	0	0		0	82.1	15	2.9		
PHF	.833	.000	.926	.000	.863	.868	.920	.000	.500	.914	.000	.000	.000	.000	.000	.000	.861	.783	.643	.914	.966

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Start Date : 10/11/2012
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Groups Printed- Unshifted - Bank 1

	Maple Avenue From North					Main Street From East					Maple Avenue From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
07:00 AM	6	3	15	1	25	5	28	9	8	50	46	15	4	1	66	11	92	11	2	116	257
07:15 AM	5	11	23	2	41	12	25	5	4	46	44	10	11	3	68	6	109	10	8	133	288
07:30 AM	8	17	17	0	42	15	43	5	8	71	40	28	3	0	71	12	93	15	7	127	311
07:45 AM	14	18	23	5	60	9	66	21	11	107	32	29	8	1	70	16	133	18	4	171	408
Total	33	49	78	8	168	41	162	40	31	274	162	82	26	5	275	45	427	54	21	547	1264
08:00 AM	13	27	34	3	77	22	47	23	8	100	28	32	16	3	79	11	100	27	7	145	401
08:15 AM	18	22	28	10	78	14	55	29	17	115	36	60	10	14	120	7	96	23	18	144	457
08:30 AM	23	31	24	13	91	41	63	14	10	128	26	84	15	20	145	8	103	48	16	175	539
08:45 AM	25	28	50	13	116	34	77	14	5	130	26	46	12	3	87	10	97	34	9	150	483
Total	79	108	136	39	362	111	242	80	40	473	116	222	53	40	431	36	396	132	50	614	1880
Grand Total	112	157	214	47	530	152	404	120	71	747	278	304	79	45	706	81	823	186	71	1161	3144
Apprch %	21.1	29.6	40.4	8.9		20.3	54.1	16.1	9.5		39.4	43.1	11.2	6.4		7	70.9	16	6.1		
Total %	3.6	5	6.8	1.5	16.9	4.8	12.8	3.8	2.3	23.8	8.8	9.7	2.5	1.4	22.5	2.6	26.2	5.9	2.3	36.9	
Unshifted	112	157	214	47	530	152	404	120	71	747	278	304	79	45	706	81	823	186	71	1161	3144
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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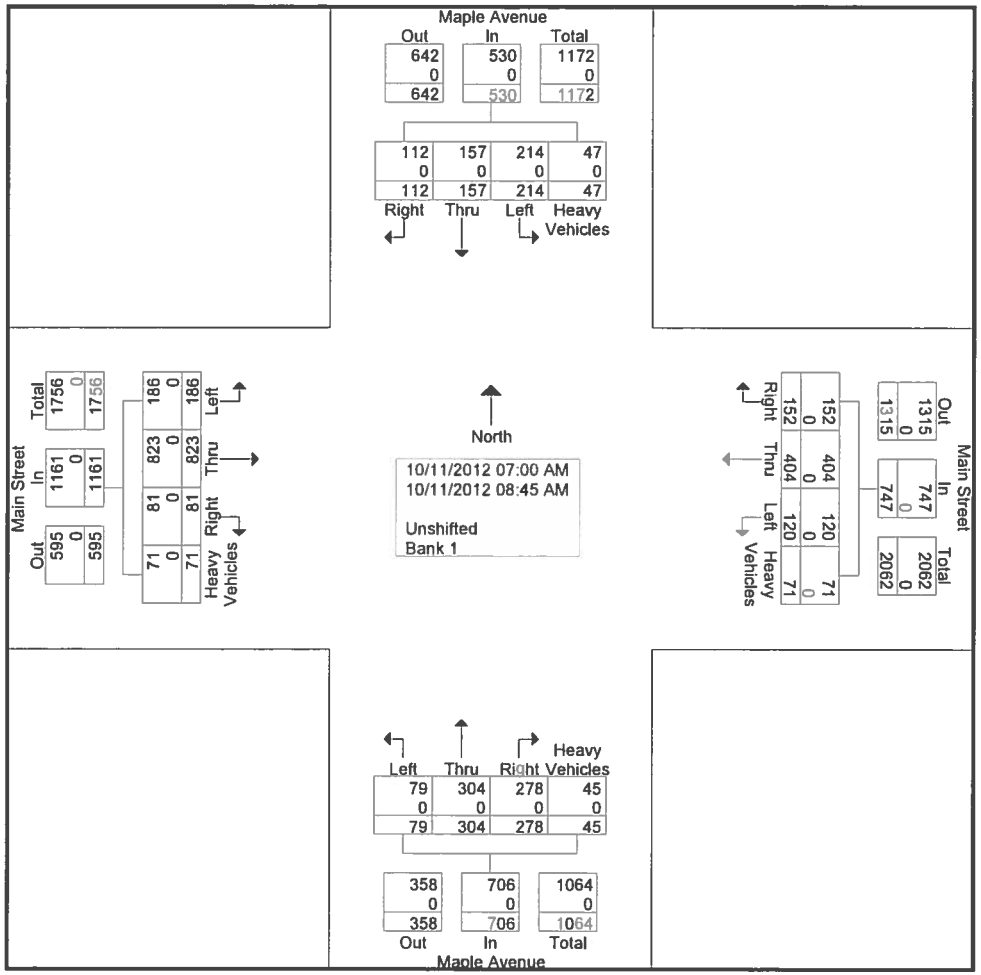

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	Maple Avenue From North					Main Street From East					Maple Avenue From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	13	27	34	3	77	22	47	23	8	100	28	32	**16**	3	79	**11**	100	27	7	145	401
08:15 AM	18	22	28	10	78	14	55	**29**	**17**	115	**36**	60	10	14	120	7	96	23	**18**	144	457
08:30 AM	23	**31**	24	**13**	91	**41**	63	14	10	128	26	**84**	15	**20**	**145**	8	**103**	**48**	16	**175**	**539**
08:45 AM	**25**	28	**50**	13	**116**	34	**77**	14	5	**130**	26	46	12	3	87	10	97	34	9	150	483
Total Volume	79	108	136	39	362	111	242	80	40	473	116	222	53	40	431	36	396	132	50	614	1880
% App. Total	21.8	29.8	37.6	10.8		23.5	51.2	16.9	8.5		26.9	51.5	12.3	9.3		5.9	64.5	21.5	8.1		
PHF	.790	.871	.680	.750	.780	.677	.786	.690	.588	.910	.806	.661	.828	.500	.743	.818	.961	.688	.694	.877	.872

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Groups Printed- Unshifted - Bank 1

	Maple Avenue From North					Main Street From East					Maple Avenue From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
04:00 PM	46	53	35	31	165	15	107	30	2	154	30	14	17	1	62	18	93	26	7	144	525
04:15 PM	30	32	46	4	112	26	114	35	1	176	30	15	16	3	64	9	91	17	5	122	474
04:30 PM	29	26	21	1	77	15	126	34	2	177	21	12	22	0	55	14	90	17	6	127	436
04:45 PM	23	28	17	2	70	29	132	27	6	194	36	15	12	0	63	12	82	13	6	113	440
Total	128	139	119	38	424	85	479	126	11	701	117	56	67	4	244	53	356	73	24	506	1875
05:00 PM	23	40	26	2	91	20	145	33	3	201	16	18	17	0	51	16	95	14	5	130	473
05:15 PM	35	22	17	0	74	17	154	32	1	204	35	29	20	0	84	10	129	25	7	171	533
05:30 PM	26	31	24	0	81	27	140	36	1	204	25	26	20	1	72	14	112	24	2	152	509
05:45 PM	29	51	18	0	98	30	129	41	0	200	24	26	15	1	66	15	92	21	1	129	493
Total	113	144	85	2	344	94	568	142	5	809	100	99	72	2	273	55	428	84	15	582	2008
Grand Total	241	283	204	40	768	179	1047	268	16	1510	217	155	139	6	517	108	784	157	39	1088	3883
Apprch %	31.4	36.8	26.6	5.2		11.9	69.3	17.7	1.1		42	30	26.9	1.2		9.9	72.1	14.4	3.6		
Total %	6.2	7.3	5.3	1	19.8	4.6	27	6.9	0.4	38.9	5.6	4	3.6	0.2	13.3	2.8	20.2	4	1	28	
Unshifted	241	283	204	40	768	179	1047	268	16	1510	217	155	139	6	517	108	784	157	39	1088	3883
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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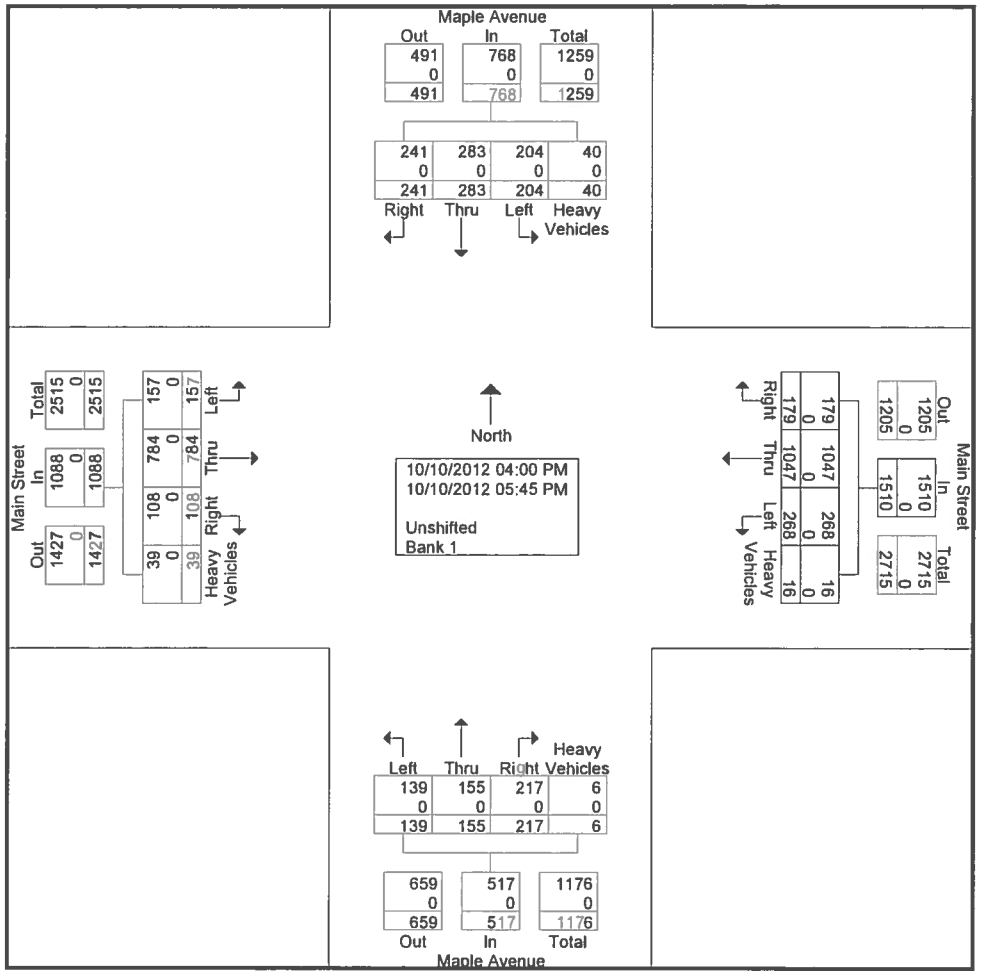

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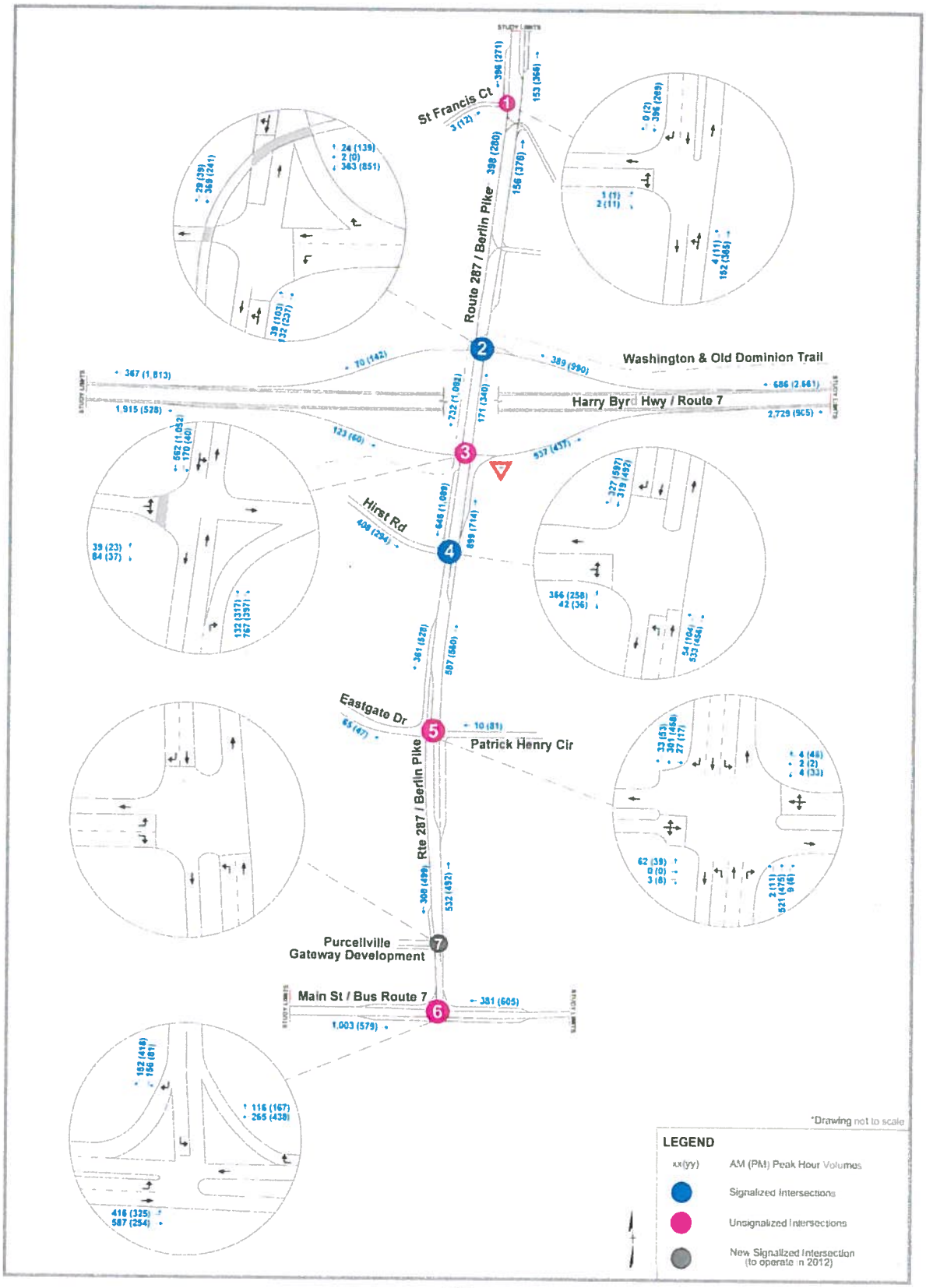
	Maple Avenue From North					Main Street From East					Maple Avenue From South					Main Street From West					
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	23	40	**26**	**2**	91	20	145	33	**3**	201	16	18	17	0	51	**16**	95	14	5	130	473
05:15 PM	**35**	22	17	0	74	17	**154**	32	1	**204**	**35**	**29**	**20**	0	**84**	10	**129**	**25**	**7**	**171**	**533**
05:30 PM	26	31	24	0	81	27	140	36	1	204	25	26	20	1	72	14	112	24	2	152	509
05:45 PM	29	**51**	18	0	**98**	**30**	129	**41**	0	200	24	26	15	1	66	15	92	21	1	129	493
Total Volume	113	144	85	2	344	94	568	142	5	809	100	99	72	2	273	55	428	84	15	582	2008
% App. Total	32.8	41.9	24.7	0.6		11.6	70.2	17.6	0.6		36.6	36.3	26.4	0.7		9.5	73.5	14.4	2.6		
PHF	.807	.706	.817	.250	.878	.783	.922	.866	.417	.991	.714	.853	.900	.500	.813	.859	.829	.840	.536	.851	.942

Exhibit 10: Existing (2011) AM and PM Peak Hour Volumes



APPENDIX D

EXISTING PEAK HOUR ANALYSIS WORKSHEETS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	67	63	147	167	140	94
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.61	0.88	0.77	0.89	0.67	0.78
Hourly flow rate (vph)	110	72	191	188	209	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	823	285			379	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	823	285			379	
tC, single (s)	6.6	6.4			4.1	
tC, 2 stage (s)						
tF (s)	3.7	3.5			2.2	
p0 queue free %	58	90			82	
cM capacity (veh/h)	263	715			1164	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	181	379	329
Volume Left	110	0	209
Volume Right	72	188	0
cSH	351	1700	1164
Volume to Capacity	0.52	0.22	0.18
Queue Length 95th (ft)	71	0	16
Control Delay (s)	25.7	0.0	6.2
Lane LOS	D		A
Approach Delay (s)	25.7	0.0	6.2
Approach LOS	D		

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	218	163	145	78	45	85
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.78	0.82	0.81	0.75	0.85
Hourly flow rate (vph)	245	209	177	96	60	100
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	445	225			273	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	445	225			273	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	55	74			95	
cM capacity (veh/h)	542	812			1296	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	454	273	160
Volume Left	245	0	60
Volume Right	209	96	0
cSH	640	1700	1296
Volume to Capacity	0.71	0.16	0.05
Queue Length 95th (ft)	146	0	4
Control Delay (s)	23.1	0.0	3.2
Lane LOS	C		A
Approach Delay (s)	23.1	0.0	3.2
Approach LOS	C		

Intersection Summary			
Average Delay	12.4		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	186	51	68	119	157	45	76	122	123	57	10
Peak Hour Factor	0.63	0.88	0.75	0.81	0.66	0.85	0.66	0.83	0.90	0.73	0.71	0.50
Hourly flow rate (vph)	24	211	68	84	180	185	68	92	136	168	80	20

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	235	68	449	160	136	249	20
Volume Left (vph)	24	0	84	68	0	168	0
Volume Right (vph)	0	68	185	0	136	0	20
Hadj (s)	0.14	-0.61	0.03	0.28	-0.63	0.42	-0.61
Departure Headway (s)	7.8	7.0	7.2	8.2	7.3	8.3	7.2
Degree Utilization, x	0.51	0.13	0.89	0.36	0.27	0.57	0.04
Capacity (veh/h)	425	489	449	413	471	419	473
Control Delay (s)	17.3	9.9	44.8	14.6	11.8	20.6	9.3
Approach Delay (s)	15.6		44.8	13.3		19.8	
Approach LOS	C		E	B		C	

Intersection Summary			
Delay	25.9		
Level of Service	D		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	95	70	128	85	66	103	51
Average Queue (ft)	53	18	77	48	39	57	8
95th Queue (ft)	87	49	125	80	61	91	36
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						21	1
Queuing Penalty (veh)						2	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	132	43	151	262	102	45	58	80	80	58	18
Peak Hour Factor	0.60	0.94	0.57	0.82	0.87	0.82	0.75	0.81	0.74	0.75	0.69	0.80
Hourly flow rate (vph)	20	140	75	184	301	124	60	72	108	107	84	22

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	160	75	610	132	108	191	23
Volume Left (vph)	20	0	184	60	0	107	0
Volume Right (vph)	0	75	124	0	108	0	23
Hadj (s)	0.08	-0.68	0.01	0.26	-0.67	0.30	-0.68
Departure Headway (s)	7.1	6.4	6.5	7.7	6.8	7.8	6.8
Degree Utilization, x	0.32	0.13	1.09	0.28	0.20	0.41	0.04
Capacity (veh/h)	482	538	548	451	509	449	509
Control Delay (s)	12.3	9.2	90.6	12.5	10.4	14.9	8.9
Approach Delay (s)	11.3		90.6	11.6		14.2	
Approach LOS	B		F	B		B	

Intersection Summary			
Delay	49.0		
Level of Service	E		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	92	49	244	75	49	77	54
Average Queue (ft)	46	20	139	42	26	48	12
95th Queue (ft)	78	42	233	68	49	76	47
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						19	1
Queuing Penalty (veh)						3	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	312	94	173	278	41	118
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.64	0.90	0.77	0.73	0.55
Hourly flow rate (vph)	347	147	192	361	56	215
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			494		1092	347
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			494		1092	347
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			81		71	69
cM capacity (veh/h)			1035		192	692

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	347	147	192	361	56	215
Volume Left	0	0	192	0	56	0
Volume Right	0	147	0	0	0	215
cSH	1700	1700	1035	1700	192	692
Volume to Capacity	0.20	0.09	0.19	0.21	0.29	0.31
Queue Length 95th (ft)	0	0	17	0	29	33
Control Delay (s)	0.0	0.0	9.3	0.0	31.4	12.5
Lane LOS			A		D	B
Approach Delay (s)	0.0		3.2		16.4	
Approach LOS					C	

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	244	78	245	491	66	114
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.70	0.86	0.96	0.83	0.79
Hourly flow rate (vph)	290	111	285	511	80	144
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			402		1372	290
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			402		1372	290
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			75		35	81
cM capacity (veh/h)			1151		122	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	290	111	285	511	80	144
Volume Left	0	0	285	0	80	0
Volume Right	0	111	0	0	0	144
cSH	1700	1700	1151	1700	122	753
Volume to Capacity	0.17	0.07	0.25	0.30	0.65	0.19
Queue Length 95th (ft)	0	0	24	0	85	18
Control Delay (s)	0.0	0.0	9.2	0.0	77.4	10.9
Lane LOS			A		F	B
Approach Delay (s)	0.0		3.3		34.5	
Approach LOS					D	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	463	84	121	491	356	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1649		1656	1743	1759	1495
Flt Permitted	0.96		0.35	1.00	1.00	1.00
Satd. Flow (perm)	1649		611	1743	1759	1495
Peak-hour factor, PHF	0.85	0.70	0.66	0.85	0.82	0.80
Adj. Flow (vph)	545	120	183	578	434	525
RTOR Reduction (vph)	8	0	0	0	0	272
Lane Group Flow (vph)	657	0	183	578	434	253
Heavy Vehicles (%)	8%	8%	9%	9%	8%	8%
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	21.5		65.0	65.0	48.2	48.2
Effective Green, g (s)	21.5		65.0	65.0	48.2	48.2
Actuated g/C Ratio	0.22		0.65	0.65	0.48	0.48
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	354		494	1132	847	720
v/s Ratio Prot	c0.40		0.03	c0.33	0.25	
v/s Ratio Perm			0.21			0.17
v/c Ratio	1.86		0.37	0.51	0.51	0.35
Uniform Delay, d1	39.2		8.8	9.2	17.8	16.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	396.1		0.3	1.6	2.2	1.3
Delay (s)	435.3		9.1	10.8	20.0	17.5
Level of Service	F		A	B	C	B
Approach Delay (s)	435.3			10.4	18.6	
Approach LOS	F			B	B	

Intersection Summary			
HCM 2000 Control Delay	132.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	665	183	578	434	525
v/c Ratio	1.84	0.38	0.51	0.51	0.53
Control Delay	413.5	9.6	11.1	20.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	413.5	9.6	11.1	20.9	3.6
Queue Length 50th (ft)	~648	43	174	184	0
Queue Length 95th (ft)	#807	50	232	247	26
Internal Link Dist (ft)	1865		1079	434	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	362	505	1132	847	992
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.84	0.36	0.51	0.51	0.53

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	319	47	120	496	482	588
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1749		1770	1863	1827	1553
Flt Permitted	0.96		0.32	1.00	1.00	1.00
Satd. Flow (perm)	1749		597	1863	1827	1553
Peak-hour factor, PHF	0.88	0.69	0.81	0.86	0.89	0.92
Adj. Flow (vph)	362	68	148	577	542	639
RTOR Reduction (vph)	5	0	0	0	0	273
Lane Group Flow (vph)	425	0	148	577	542	366
Heavy Vehicles (%)	2%	2%	2%	2%	4%	4%
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	33.5		103.0	103.0	86.0	86.0
Effective Green, g (s)	33.5		103.0	103.0	86.0	86.0
Actuated g/C Ratio	0.22		0.69	0.69	0.57	0.57
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	390		484	1279	1047	890
v/s Ratio Prot	c0.24		0.02	c0.31	c0.30	
v/s Ratio Perm			0.19			0.24
v/c Ratio	1.09		0.31	0.45	0.52	0.41
Uniform Delay, d1	58.2		11.3	10.7	19.4	17.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	72.2		0.3	1.2	1.8	1.4
Delay (s)	130.4		11.6	11.8	21.2	19.3
Level of Service	F		B	B	C	B
Approach Delay (s)	130.4			11.8	20.2	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	430	148	577	542	639
v/c Ratio	1.09	0.31	0.45	0.52	0.55
Control Delay	123.6	10.1	12.0	21.9	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	123.6	10.1	12.0	21.9	3.1
Queue Length 50th (ft)	~467	47	238	310	0
Queue Length 95th (ft)	#662	65	293	424	55
Internal Link Dist (ft)	1865		1079	414	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	395	500	1279	1047	1162
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.09	0.30	0.45	0.52	0.55

Intersection Summary

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

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	134	506	274	100	95	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.96		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	1776	1683		1672	
Flt Permitted	0.29	1.00	1.00		0.97	
Satd. Flow (perm)	515	1776	1683		1672	
Peak-hour factor, PHF	0.91	0.83	0.89	0.69	0.77	0.69
Adj. Flow (vph)	147	610	308	145	123	96
RTOR Reduction (vph)	0	0	15	0	32	0
Lane Group Flow (vph)	147	610	438	0	187	0
Heavy Vehicles (%)	7%	7%	8%	8%	4%	4%
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	40.5	40.5	25.8		14.1	
Effective Green, g (s)	40.5	40.5	25.8		14.1	
Actuated g/C Ratio	0.60	0.60	0.38		0.21	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	462	1071	647		351	
v/s Ratio Prot	0.04	c0.34	c0.26		c0.11	
v/s Ratio Perm	0.15					
v/c Ratio	0.32	0.57	0.68		0.53	
Uniform Delay, d1	7.4	8.0	17.2		23.6	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.4	4.3		2.0	
Delay (s)	7.5	9.5	21.5		25.6	
Level of Service	A	A	C		C	
Approach Delay (s)		9.1	21.5		25.6	
Approach LOS		A	C		C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	147	610	453	219
v/c Ratio	0.32	0.57	0.69	0.57
Control Delay	8.1	11.3	23.8	27.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.1	11.3	23.8	27.2
Queue Length 50th (ft)	23	133	143	67
Queue Length 95th (ft)	55	237	282	116
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	671	1514	835	780
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.22	0.40	0.54	0.28

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	94	513	611	118	100	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1752	1845	1838		1698	
Flt Permitted	0.10	1.00	1.00		0.98	
Satd. Flow (perm)	191	1845	1838		1698	
Peak-hour factor, PHF	0.78	0.86	0.92	0.87	0.93	0.83
Adj. Flow (vph)	121	597	664	136	108	229
RTOR Reduction (vph)	0	0	6	0	84	0
Lane Group Flow (vph)	121	597	794	0	253	0
Heavy Vehicles (%)	3%	3%	1%	1%	0%	0%
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	45.2	45.2	32.7		16.8	
Effective Green, g (s)	45.2	45.2	32.7		16.8	
Actuated g/C Ratio	0.61	0.61	0.44		0.23	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	252	1119	806		382	
v/s Ratio Prot	0.04	c0.32	c0.43		c0.15	
v/s Ratio Perm	0.25					
v/c Ratio	0.48	0.53	0.98		0.66	
Uniform Delay, d1	14.2	8.5	20.7		26.3	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.2	28.1		4.7	
Delay (s)	14.8	9.7	48.7		31.0	
Level of Service	B	A	D		C	
Approach Delay (s)		10.5	48.7		31.0	
Approach LOS		B	D		C	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	121	597	800	337
v/c Ratio	0.42	0.54	0.97	0.71
Control Delay	13.0	12.0	50.1	26.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.0	12.0	50.1	26.9
Queue Length 50th (ft)	21	142	~376	99
Queue Length 95th (ft)	46	274	#748	191
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	550	1468	824	765
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.22	0.41	0.97	0.44

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	422	46	78	211	60	37	149	136	102	84	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1687	1747		1597	1618		1703	1685		1556	1540	
Flt Permitted	0.48	1.00		0.20	1.00		0.59	1.00		0.29	1.00	
Satd. Flow (perm)	861	1747		337	1618		1064	1685		477	1540	
Peak-hour factor, PHF	0.77	0.79	0.72	0.67	0.80	0.68	0.58	0.62	0.85	0.75	0.78	0.74
Adj. Flow (vph)	108	534	64	116	264	88	64	240	160	136	108	72
RTOR Reduction (vph)	0	2	0	0	6	0	0	12	0	0	12	0
Lane Group Flow (vph)	108	596	0	116	346	0	64	388	0	136	168	0
Heavy Vehicles (%)	7%	7%	7%	13%	13%	13%	6%	6%	6%	16%	16%	16%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	75.9	66.3		84.3	70.5		47.8	47.8		47.8	47.8	
Effective Green, g (s)	75.9	66.3		84.3	70.5		47.8	47.8		47.8	47.8	
Actuated g/C Ratio	0.51	0.45		0.57	0.47		0.32	0.32		0.32	0.32	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	492	777		307	766		341	540		153	494	
v/s Ratio Prot	0.01	c0.34		c0.03	c0.21			0.23			0.11	
v/s Ratio Perm	0.10			0.18			0.06			c0.29		
v/c Ratio	0.22	0.77		0.38	0.45		0.19	0.72		0.89	0.34	
Uniform Delay, d1	19.4	34.8		21.0	26.3		36.5	44.6		48.0	38.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	5.9		0.3	1.2		0.4	4.9		42.4	0.6	
Delay (s)	19.4	40.7		21.2	27.5		36.9	49.5		90.4	39.1	
Level of Service	B	D		C	C		D	D		F	D	
Approach Delay (s)		37.4			25.9			47.7			61.2	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	148.9	Sum of lost time (s)	21.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	108	598	116	352	64	400	136	180
v/c Ratio	0.22	0.77	0.38	0.46	0.19	0.72	0.89	0.36
Control Delay	18.4	46.4	20.5	31.4	36.9	50.1	97.3	35.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	46.4	20.5	31.4	36.9	50.1	97.3	35.8
Queue Length 50th (ft)	46	489	49	222	44	326	124	119
Queue Length 95th (ft)	84	694	77	345	53	281	180	162
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	604	776	583	997	508	814	227	744
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.77	0.20	0.35	0.13	0.49	0.60	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	428	55	142	568	94	72	99	100	85	144	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1814		1787	1835		1787	1726		1787	1766	
Flt Permitted	0.16	1.00		0.25	1.00		0.32	1.00		0.47	1.00	
Satd. Flow (perm)	293	1814		476	1835		602	1726		889	1766	
Peak-hour factor, PHF	0.84	0.83	0.86	0.87	0.92	0.78	0.90	0.85	0.71	0.82	0.71	0.81
Adj. Flow (vph)	100	516	64	163	617	121	80	116	141	104	203	140
RTOR Reduction (vph)	0	4	0	0	6	0	0	31	0	0	17	0
Lane Group Flow (vph)	100	576	0	163	732	0	80	226	0	104	326	0
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	54.4	47.5		58.6	49.6		25.4	25.4		25.4	25.4	
Effective Green, g (s)	54.4	47.5		58.6	49.6		25.4	25.4		25.4	25.4	
Actuated g/C Ratio	0.53	0.46		0.57	0.48		0.25	0.25		0.25	0.25	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	252	837		385	884		148	426		219	435	
v/s Ratio Prot	0.03	0.32		c0.04	c0.40			0.13			c0.18	
v/s Ratio Perm	0.18			0.20			0.13			0.12		
v/c Ratio	0.40	0.69		0.42	0.83		0.54	0.53		0.47	0.75	
Uniform Delay, d1	16.5	21.9		13.3	23.0		33.7	33.6		33.1	35.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	3.6		0.3	7.6		5.0	1.6		2.2	7.4	
Delay (s)	16.9	25.5		13.5	30.5		38.7	35.2		35.3	43.2	
Level of Service	B	C		B	C		D	D		D	D	
Approach Delay (s)		24.2			27.5			36.0			41.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	102.9	Sum of lost time (s)	21.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	100	580	163	738	80	257	104	343
v/c Ratio	0.40	0.69	0.42	0.83	0.54	0.56	0.48	0.76
Control Delay	12.7	26.2	11.4	31.7	54.3	36.6	46.0	48.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	26.2	11.4	31.7	54.3	36.6	46.0	48.3
Queue Length 50th (ft)	24	288	41	395	46	126	59	199
Queue Length 95th (ft)	40	364	64	570	#132	229	121	262
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	467	1161	551	1176	147	455	218	451
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.50	0.30	0.63	0.54	0.56	0.48	0.76

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	39	0	84	0	0	0	0	132	767	170	562	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	42	0	91	0	0	0	0	143	834	185	611	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								514				
pX, platoon unblocked												
vC, conflicting volume	1124	1124	611	1215	1124	143	611			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1124	1124	611	1215	1124	143	611			143		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	100	82	100	100	100	100			87		
cM capacity (veh/h)	165	179	494	116	179	904	968			1439		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	134	143	834	796
Volume Left	42	0	0	185
Volume Right	91	0	834	0
cSH	302	1700	1700	1439
Volume to Capacity	0.44	0.08	0.49	0.13
Queue Length 95th (ft)	54	0	0	11
Control Delay (s)	26.0	0.0	0.0	3.0
Lane LOS	D			A
Approach Delay (s)	26.0	0.0		3.0
Approach LOS	D			

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		

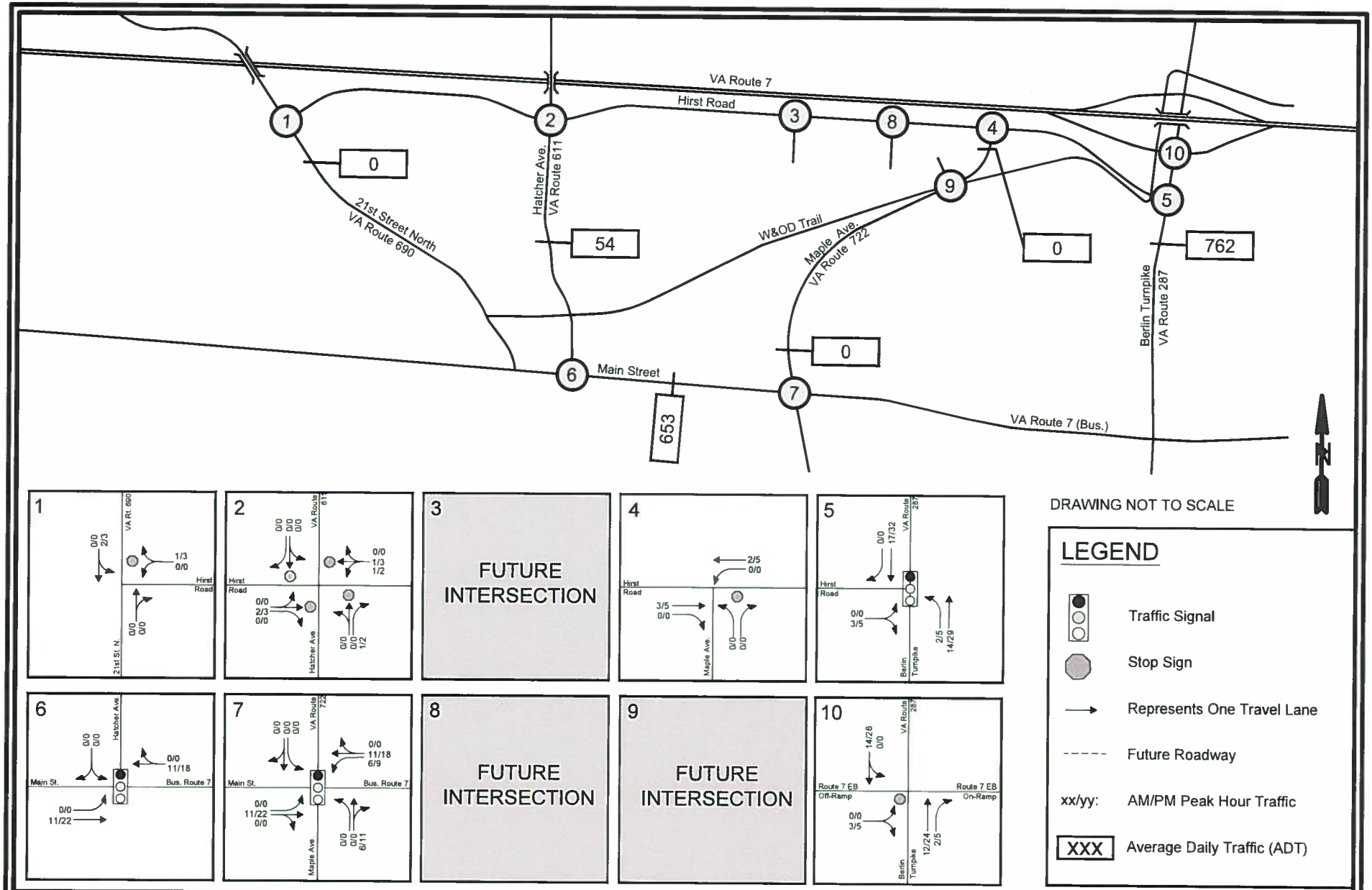
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	0	37	0	0	0	0	317	397	40	1052	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	0	40	0	0	0	0	345	432	43	1143	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								494				
pX, platoon unblocked												
vC, conflicting volume	1575	1575	1143	1615	1575	345	1143			345		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1575	1575	1143	1615	1575	345	1143			345		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	100	83	100	100	100	100			96		
cM capacity (veh/h)	87	106	243	68	106	698	611			1214		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	65	345	432	1187
Volume Left	25	0	0	43
Volume Right	40	0	432	0
cSH	144	1700	1700	1214
Volume to Capacity	0.45	0.20	0.25	0.04
Queue Length 95th (ft)	52	0	0	3
Control Delay (s)	49.4	0.0	0.0	1.1
Lane LOS	E			A
Approach Delay (s)	49.4	0.0		1.1
Approach LOS	E			

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		

APPENDIX E

OTHER DEVELOPMENT TRAFFIC ASSIGNMENTS (2014)

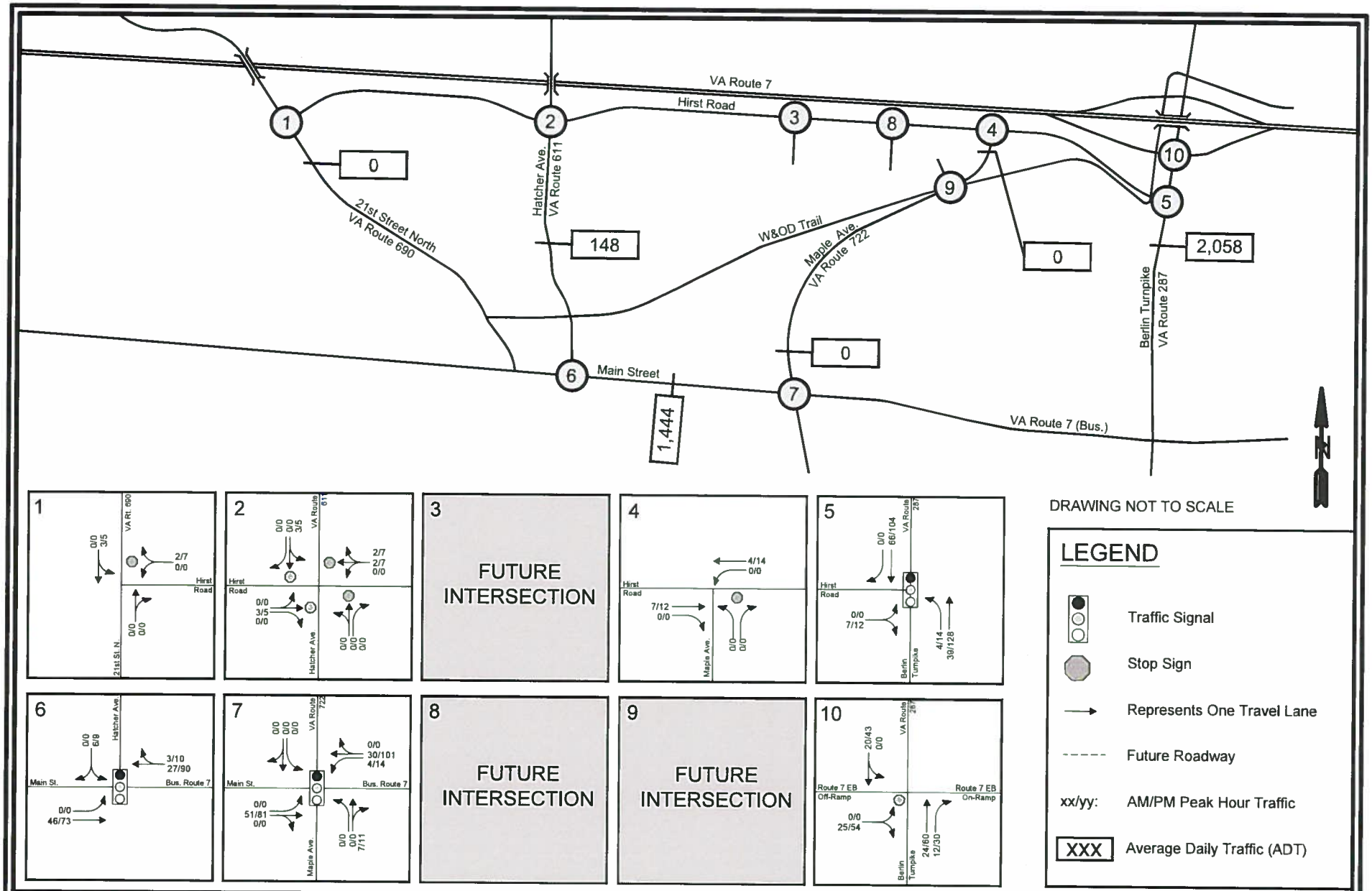


Bowman CONSULTING

Catoctin Corner Traffic Forecasts (2014)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure E.1

Job # 5384-01-001



Bowman CONSULTING

Purcellville Gateway Traffic Forecasts (2014)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure E.2

Job # 5384-01-001

APPENDIX F
BACKGROUND (2014) PEAK HOUR
ANALYSIS WORKSHEETS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	70	69	153	174	151	98
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	75	166	189	164	107
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	696	261			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	696	261			355	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	90			86	
cM capacity (veh/h)	352	778			1203	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	151	355	271
Volume Left	76	0	164
Volume Right	75	189	0
cSH	484	1700	1203
Volume to Capacity	0.31	0.21	0.14
Queue Length 95th (ft)	33	0	12
Control Delay (s)	15.8	0.0	5.6
Lane LOS	C		A
Approach Delay (s)	15.8	0.0	5.6
Approach LOS	C		

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	227	180	151	81	55	88
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	247	196	164	88	60	96
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	423	208			252	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	423	208			252	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	76			95	
cM capacity (veh/h)	561	832			1313	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	442	252	155
Volume Left	247	0	60
Volume Right	196	88	0
cSH	655	1700	1313
Volume to Capacity	0.68	0.15	0.05
Queue Length 95th (ft)	130	0	4
Control Delay (s)	21.1	0.0	3.3
Lane LOS	C		A
Approach Delay (s)	21.1	0.0	3.3
Approach LOS	C		

Intersection Summary			
Average Delay	11.6		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	16	199	53	72	127	165	47	79	128	131	59	10
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
Hourly flow rate (vph)	17	216	58	78	138	179	51	86	139	142	64	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	234	58	396	137	139	207	11
Volume Left (vph)	17	0	78	51	0	142	0
Volume Right (vph)	0	58	179	0	139	0	11
Hadj (s)	0.07	-0.67	-0.20	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.0	6.3	6.5	7.5	6.6	7.7	6.6
Degree Utilization, x	0.45	0.10	0.71	0.28	0.25	0.44	0.02
Capacity (veh/h)	482	534	540	438	501	435	495
Control Delay (s)	14.5	8.8	23.8	12.2	10.6	15.4	8.5
Approach Delay (s)	13.4		23.8	11.4		15.0	
Approach LOS	B		C	B		C	

Intersection Summary			
Delay	16.7		
Level of Service	C		
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	86	49	190	68	85	113	54
Average Queue (ft)	55	24	74	42	40	64	11
95th Queue (ft)	87	42	136	68	77	97	44
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						24	1
Queuing Penalty (veh)						2	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	145	45	159	283	113	47	60	85	88	60	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	158	49	173	308	123	51	65	92	96	65	21

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	171	49	603	116	92	161	21
Volume Left (vph)	13	0	173	51	0	96	0
Volume Right (vph)	0	49	123	0	92	0	21
Hadj (s)	0.07	-0.67	-0.03	0.25	-0.67	0.33	-0.67
Departure Headway (s)	6.9	6.1	6.2	7.6	6.7	7.7	6.7
Degree Utilization, x	0.33	0.08	1.04	0.25	0.17	0.34	0.04
Capacity (veh/h)	504	562	572	460	520	453	517
Control Delay (s)	12.0	8.5	71.6	11.8	9.9	13.4	8.8
Approach Delay (s)	11.2		71.6	11.0		12.9	
Approach LOS	B		F	B		B	

Intersection Summary			
Delay	41.5		
Level of Service	E		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	88	49	224	74	48	77	54
Average Queue (ft)	55	21	124	31	24	53	14
95th Queue (ft)	84	49	207	60	45	79	46
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						19	1
Queuing Penalty (veh)						4	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	16	199	53	72	127	165	47	79	128	131	59	10
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
Hourly flow rate (vph)	17	216	58	78	138	179	51	86	139	142	64	11

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	234	58	78	317	137	139	207	11
Volume Left (vph)	17	0	78	0	51	0	142	0
Volume Right (vph)	0	58	0	179	0	139	0	11
Hadj (s)	0.07	-0.67	0.53	-0.36	0.22	-0.67	0.38	-0.67
Departure Headway (s)	6.7	6.0	7.0	6.1	7.1	6.2	7.3	6.2
Degree Utilization, x	0.44	0.10	0.15	0.54	0.27	0.24	0.42	0.02
Capacity (veh/h)	508	562	485	563	469	542	467	533
Control Delay (s)	13.6	8.4	10.1	14.9	11.4	9.9	14.1	8.1
Approach Delay (s)	12.6		14.0		10.6		13.8	
Approach LOS	B		B		B		B	

Intersection Summary			
Delay	12.8		
Level of Service	B		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	108	27	50	132	53	69	119	55
Average Queue (ft)	57	23	31	59	39	37	67	9
95th Queue (ft)	93	37	53	106	64	65	106	38
Link Distance (ft)	2674			4479	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	100			175		30
Storage Blk Time (%)				1			26	0
Queuing Penalty (veh)				1			3	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	145	45	159	283	113	47	60	85	88	60	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	158	49	173	308	123	51	65	92	96	65	21

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	171	49	173	430	116	92	161	21
Volume Left (vph)	13	0	173	0	51	0	96	0
Volume Right (vph)	0	49	0	123	0	92	0	21
Hadj (s)	0.07	-0.67	0.53	-0.17	0.25	-0.67	0.33	-0.67
Departure Headway (s)	6.7	5.9	6.6	5.9	7.2	6.3	7.3	6.3
Degree Utilization, x	0.32	0.08	0.32	0.71	0.23	0.16	0.33	0.04
Capacity (veh/h)	510	567	526	590	467	529	461	525
Control Delay (s)	11.5	8.2	11.5	20.7	11.2	9.3	12.6	8.4
Approach Delay (s)	10.8		18.1		10.4		12.1	
Approach LOS	B		C		B		B	

Intersection Summary			
Delay	14.5		
Level of Service	B		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	73	45	68	110	71	48	79	54
Average Queue (ft)	55	21	39	69	31	26	53	14
95th Queue (ft)	78	45	61	106	56	48	80	47
Link Distance (ft)	2674			4485	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)							19	1
Queuing Penalty (veh)							4	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	335	98	180	295	43	123
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	364	107	196	321	47	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			471		1076	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			471		1076	364
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		77	80
cM capacity (veh/h)			1091		199	681

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	364	107	196	321	47	134
Volume Left	0	0	196	0	47	0
Volume Right	0	107	0	0	0	134
cSH	1700	1700	1091	1700	199	681
Volume to Capacity	0.21	0.06	0.18	0.19	0.23	0.20
Queue Length 95th (ft)	0	0	16	0	22	18
Control Delay (s)	0.0	0.0	9.0	0.0	28.5	11.6
Lane LOS			A		D	B
Approach Delay (s)	0.0		3.4		16.0	
Approach LOS					C	

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	271	81	255	530	69	119
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	88	277	576	75	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			383		1425	295
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			383		1425	295
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		34	83
cM capacity (veh/h)			1176		114	745

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	295	88	277	576	75	129
Volume Left	0	0	277	0	75	0
Volume Right	0	88	0	0	0	129
cSH	1700	1700	1176	1700	114	745
Volume to Capacity	0.17	0.05	0.24	0.34	0.66	0.17
Queue Length 95th (ft)	0	0	23	0	85	16
Control Delay (s)	0.0	0.0	9.0	0.0	83.0	10.8
Lane LOS			A		F	B
Approach Delay (s)	0.0		2.9		37.3	
Approach LOS					E	

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	482	97	132	564	453	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1748		1770	1863	1863	1583
Flt Permitted	0.96		0.19	1.00	1.00	1.00
Satd. Flow (perm)	1748		355	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	524	105	143	613	492	475
RTOR Reduction (vph)	7	0	0	0	0	310
Lane Group Flow (vph)	622	0	143	613	492	165
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	37.8		48.7	48.7	34.7	34.7
Effective Green, g (s)	37.8		48.7	48.7	34.7	34.7
Actuated g/C Ratio	0.38		0.49	0.49	0.35	0.35
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	660		264	907	646	549
v/s Ratio Prot	c0.36		0.04	c0.33	c0.26	
v/s Ratio Perm			0.23			0.10
v/c Ratio	0.94		0.54	0.68	0.76	0.30
Uniform Delay, d1	30.0		18.2	19.6	29.0	23.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	22.0		1.8	4.0	8.3	1.4
Delay (s)	52.0		20.0	23.6	37.2	25.2
Level of Service	D		B	C	D	C
Approach Delay (s)	52.0			23.0	31.3	
Approach LOS	D			C	C	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	629	143	613	492	475
v/c Ratio	0.94	0.55	0.68	0.76	0.55
Control Delay	53.5	24.0	24.7	38.7	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	53.5	24.0	24.7	38.7	5.1
Queue Length 50th (ft)	368	51	295	281	0
Queue Length 95th (ft)	#591	89	425	#437	69
Internal Link Dist (ft)	1865		1079	427	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	688	261	906	645	859
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.91	0.55	0.68	0.76	0.55

Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	332	66	144	673	637	612
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1748		1770	1863	1863	1583
Flt Permitted	0.96		0.19	1.00	1.00	1.00
Satd. Flow (perm)	1748		346	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	361	72	157	732	692	665
RTOR Reduction (vph)	5	0	0	0	0	319
Lane Group Flow (vph)	428	0	157	732	692	346
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	41.0		95.5	95.5	78.0	78.0
Effective Green, g (s)	41.0		95.5	95.5	78.0	78.0
Actuated g/C Ratio	0.27		0.64	0.64	0.52	0.52
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	477		315	1186	968	823
v/s Ratio Prot	c0.24		0.03	c0.39	c0.37	
v/s Ratio Perm			0.28			0.22
v/c Ratio	0.90		0.50	0.62	0.71	0.42
Uniform Delay, d1	52.5		19.8	16.3	27.5	22.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	19.5		0.9	2.4	4.5	1.6
Delay (s)	72.0		20.7	18.7	32.0	23.7
Level of Service	E		C	B	C	C
Approach Delay (s)	72.0			19.1	27.9	
Approach LOS	E			B	C	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	433	157	732	692	665
v/c Ratio	0.90	0.50	0.62	0.71	0.58
Control Delay	73.2	17.9	20.1	34.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	73.2	17.9	20.1	34.2	3.8
Queue Length 50th (ft)	398	61	420	523	0
Queue Length 95th (ft)	526	101	588	728	67
Internal Link Dist (ft)	1865		1079	425	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	541	327	1186	969	1142
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.48	0.62	0.71	0.58

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	139	583	323	107	105	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1770	1863	1800		1711	
Flt Permitted	0.28	1.00	1.00		0.97	
Satd. Flow (perm)	530	1863	1800		1711	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	634	351	116	114	75
RTOR Reduction (vph)	0	0	13	0	26	0
Lane Group Flow (vph)	151	634	454	0	163	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	39.8	39.8	25.5		12.9	
Effective Green, g (s)	39.8	39.8	25.5		12.9	
Actuated g/C Ratio	0.61	0.61	0.39		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	481	1137	703		338	
v/s Ratio Prot	0.04	c0.34	c0.25		c0.10	
v/s Ratio Perm	0.15					
v/c Ratio	0.31	0.56	0.65		0.48	
Uniform Delay, d1	7.1	7.5	16.2		23.2	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.3	3.3		1.5	
Delay (s)	7.2	8.8	19.5		24.7	
Level of Service	A	A	B		C	
Approach Delay (s)		8.5	19.5		24.7	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	151	634	467	189
v/c Ratio	0.31	0.56	0.66	0.52
Control Delay	7.5	10.3	21.4	27.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	10.3	21.4	27.0
Queue Length 50th (ft)	21	128	139	55
Queue Length 95th (ft)	53	263	272	137
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	521	1690	1334	698
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.38	0.35	0.27

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	98	629	744	133	113	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1825		1672	
Flt Permitted	0.07	1.00	1.00		0.98	
Satd. Flow (perm)	126	1863	1825		1672	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	684	809	145	123	215
RTOR Reduction (vph)	0	0	6	0	65	0
Lane Group Flow (vph)	107	684	948	0	273	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	64.0	64.0	53.0		19.5	
Effective Green, g (s)	64.0	64.0	53.0		19.5	
Actuated g/C Ratio	0.67	0.67	0.55		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	169	1242	1007		339	
v/s Ratio Prot	0.03	c0.37	c0.52		c0.16	
v/s Ratio Perm	0.39					
v/c Ratio	0.63	0.55	0.94		0.81	
Uniform Delay, d1	19.9	8.4	20.0		36.5	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	5.6	1.1	16.8		13.8	
Delay (s)	25.5	9.6	36.9		50.2	
Level of Service	C	A	D		D	
Approach Delay (s)		11.7	36.9		50.2	
Approach LOS		B	D		D	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	107	684	954	338
v/c Ratio	0.63	0.55	0.94	0.84
Control Delay	28.6	10.9	39.3	46.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	28.6	10.9	39.3	46.9
Queue Length 50th (ft)	22	214	540	157
Queue Length 95th (ft)	#87	308	#843	#293
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	170	1276	1045	447
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.54	0.91	0.76

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	501	48	54	261	62	38	155	89	106	87	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1838		1770	1809		1770	1760		1770	1755	
Flt Permitted	0.46	1.00		0.27	1.00		0.66	1.00		0.48	1.00	
Satd. Flow (perm)	855	1838		508	1809		1227	1760		886	1755	
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)	93	545	52	59	284	67	41	168	97	115	95	60
RTOR Reduction (vph)	0	2	0	0	5	0	0	11	0	0	12	0
Lane Group Flow (vph)	93	595	0	59	346	0	41	254	0	115	143	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	50.7	43.2		47.1	41.4		22.6	22.6		22.6	22.6	
Effective Green, g (s)	50.7	43.2		47.1	41.4		22.6	22.6		22.6	22.6	
Actuated g/C Ratio	0.55	0.47		0.51	0.45		0.24	0.24		0.24	0.24	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	542	858		336	809		299	430		216	428	
v/s Ratio Prot	c0.01	c0.32		0.01	0.19			c0.14			0.08	
v/s Ratio Perm	0.08			0.08			0.03			0.13		
v/c Ratio	0.17	0.69		0.18	0.43		0.14	0.59		0.53	0.33	
Uniform Delay, d1	10.3	19.4		13.0	17.5		27.3	30.9		30.4	28.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.6		0.1	1.0		0.3	2.4		3.2	0.6	
Delay (s)	10.3	23.1		13.0	18.5		27.6	33.3		33.6	29.4	
Level of Service	B	C		B	B		C	C		C	C	
Approach Delay (s)		21.4			17.7			32.5			31.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	21.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	93	597	59	351	41	265	115	155
v/c Ratio	0.17	0.69	0.16	0.45	0.14	0.60	0.53	0.35
Control Delay	9.6	25.6	9.7	20.0	33.0	38.0	44.7	31.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	25.6	9.7	20.0	33.0	38.0	44.7	31.3
Queue Length 50th (ft)	20	264	12	127	19	128	58	66
Queue Length 95th (ft)	53	501	37	256	57	273	146	157
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	610	1779	417	1745	855	1230	616	1227
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.34	0.14	0.20	0.05	0.22	0.19	0.13

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	548	57	103	710	98	75	103	78	88	150	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.94		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1836		1770	1829		1770	1742		1770	1740	
Flt Permitted	0.10	1.00		0.26	1.00		0.36	1.00		0.55	1.00	
Satd. Flow (perm)	187	1836		475	1829		667	1742		1018	1740	
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)	95	596	62	112	772	107	82	112	85	96	163	128
RTOR Reduction (vph)	0	3	0	0	4	0	0	22	0	0	22	0
Lane Group Flow (vph)	95	655	0	112	875	0	82	175	0	96	269	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	68.5	61.9		68.9	62.1		25.5	25.5		25.5	25.5	
Effective Green, g (s)	68.5	61.9		68.9	62.1		25.5	25.5		25.5	25.5	
Actuated g/C Ratio	0.59	0.54		0.60	0.54		0.22	0.22		0.22	0.22	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	201	986		360	985		147	385		225	385	
v/s Ratio Prot	c0.03	0.36		0.02	c0.48			0.10			c0.15	
v/s Ratio Perm	0.25			0.17			0.12			0.09		
v/c Ratio	0.47	0.66		0.31	0.89		0.56	0.46		0.43	0.70	
Uniform Delay, d1	19.7	19.2		12.8	23.5		39.8	38.8		38.6	41.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.7		0.2	11.0		5.6	1.2		1.8	5.9	
Delay (s)	20.3	21.9		13.0	34.5		45.4	40.0		40.3	47.2	
Level of Service	C	C		B	C		D	D		D	D	
Approach Delay (s)		21.7			32.0			41.6			45.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	115.2	Sum of lost time (s)	21.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	95	658	112	879	82	197	96	291
v/c Ratio	0.47	0.67	0.31	0.89	0.56	0.49	0.43	0.72
Control Delay	16.6	23.9	10.6	37.5	58.8	39.4	47.8	49.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	23.9	10.6	37.5	58.8	39.4	47.8	49.9
Queue Length 50th (ft)	27	373	32	615	60	122	69	203
Queue Length 95th (ft)	49	515	56	#923	119	198	125	305
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	215	1169	368	1161	188	512	287	512
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.56	0.30	0.76	0.44	0.38	0.33	0.57

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	41	0	115	0	0	0	0	173	812	177	619	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	45	0	125	0	0	0	0	188	883	192	673	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								507				
pX, platoon unblocked												
vC, conflicting volume	1246	1246	673	1371	1246	188	673			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1246	1246	673	1371	1246	188	673			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	100	73	100	100	100	100			86		
cM capacity (veh/h)	135	150	455	80	150	854	918			1386		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	170	188	883	865
Volume Left	45	0	0	192
Volume Right	125	0	883	0
cSH	280	1700	1700	1386
Volume to Capacity	0.61	0.11	0.52	0.14
Queue Length 95th (ft)	91	0	0	12
Control Delay (s)	35.8	0.0	0.0	3.2
Lane LOS	E			A
Approach Delay (s)	35.8	0.0		3.2
Approach LOS	E			

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	0	97	0	0	0	0	414	448	42	1164	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	26	0	105	0	0	0	0	450	487	46	1265	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								505				
pX, platoon unblocked												
vC, conflicting volume	1807	1807	1265	1912	1807	450	1265			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1807	1807	1265	1912	1807	450	1265			450		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	56	100	49	100	100	100	100			96		
cM capacity (veh/h)	59	76	207	24	76	609	549			1110		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	132	450	487	1311
Volume Left	26	0	0	46
Volume Right	105	0	487	0
cSH	138	1700	1700	1110
Volume to Capacity	0.95	0.26	0.29	0.04
Queue Length 95th (ft)	165	0	0	3
Control Delay (s)	126.0	0.0	0.0	1.6
Lane LOS	F			A
Approach Delay (s)	126.0	0.0		1.6
Approach LOS	F			

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	108.6%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	41	0	115	0	0	0	0	173	812	177	619	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	45	0	125	0	0	0	0	188	883	192	673	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								497				
pX, platoon unblocked												
vC, conflicting volume	1246	1246	673	1371	1246	188	673			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1246	1246	673	1371	1246	188	673			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	100	73	100	100	100	100			86		
cM capacity (veh/h)	135	150	455	80	150	854	918			1386		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	45	125	188	883	192	673
Volume Left	45	0	0	0	192	0
Volume Right	0	125	0	883	0	0
cSH	135	455	1700	1700	1386	1700
Volume to Capacity	0.33	0.27	0.11	0.52	0.14	0.40
Queue Length 95th (ft)	33	28	0	0	12	0
Control Delay (s)	44.5	15.9	0.0	0.0	8.0	0.0
Lane LOS	E	C			A	
Approach Delay (s)	23.4		0.0		1.8	
Approach LOS	C					

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	0	97	0	0	0	0	414	448	42	1164	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	26	0	105	0	0	0	0	450	487	46	1265	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								502				
pX, platoon unblocked												
vC, conflicting volume	1807	1807	1265	1912	1807	450	1265			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1807	1807	1265	1912	1807	450	1265			450		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	56	100	49	100	100	100	100			96		
cM capacity (veh/h)	59	76	207	24	76	609	549			1110		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	26	105	450	487	46	1265
Volume Left	26	0	0	0	46	0
Volume Right	0	105	0	487	0	0
cSH	59	207	1700	1700	1110	1700
Volume to Capacity	0.44	0.51	0.26	0.29	0.04	0.74
Queue Length 95th (ft)	42	65	0	0	3	0
Control Delay (s)	106.8	39.3	0.0	0.0	8.4	0.0
Lane LOS	F	E			A	
Approach Delay (s)	52.7		0.0		0.3	
Approach LOS	F					

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

APPENDIX G
TOTAL FUTURE (2014) PEAK HOUR
ANALYSIS WORKSHEETS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	75	73	153	175	152	98
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	79	166	190	165	107
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	698	261			357	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	698	261			357	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	90			86	
cM capacity (veh/h)	351	777			1202	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	161	357	272
Volume Left	82	0	165
Volume Right	79	190	0
cSH	481	1700	1202
Volume to Capacity	0.33	0.21	0.14
Queue Length 95th (ft)	36	0	12
Control Delay (s)	16.2	0.0	5.6
Lane LOS	C		A
Approach Delay (s)	16.2	0.0	5.6
Approach LOS	C		

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	230	199	151	87	91	88
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	216	164	95	99	96
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	505	211			259	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	505	211			259	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	49	74			92	
cM capacity (veh/h)	487	829			1306	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	466	259	195
Volume Left	250	0	99
Volume Right	216	95	0
cSH	602	1700	1306
Volume to Capacity	0.77	0.15	0.08
Queue Length 95th (ft)	181	0	6
Control Delay (s)	28.5	0.0	4.4
Lane LOS	D		A
Approach Delay (s)	28.5	0.0	4.4
Approach LOS	D		

Intersection Summary			
Average Delay	15.4		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	16	203	53	77	141	170	47	79	129	132	59	10
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
Hourly flow rate (vph)	17	221	58	84	153	185	51	86	140	143	64	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	238	58	422	137	140	208	11
Volume Left (vph)	17	0	84	51	0	143	0
Volume Right (vph)	0	58	185	0	140	0	11
Hadj (s)	0.07	-0.67	-0.19	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.1	6.4	6.5	7.6	6.7	7.8	6.7
Degree Utilization, x	0.47	0.10	0.76	0.29	0.26	0.45	0.02
Capacity (veh/h)	475	525	537	429	490	426	484
Control Delay (s)	15.1	8.9	27.7	12.5	10.9	15.9	8.7
Approach Delay (s)	13.9		27.7	11.7		15.5	
Approach LOS	B		D	B		C	

Intersection Summary			
Delay	18.5		
Level of Service	C		
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	72	72	131	92	70	98	55
Average Queue (ft)	43	29	75	44	37	57	20
95th Queue (ft)	68	53	118	83	62	90	57
Link Distance (ft)	2673		2817	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						24	1
Queuing Penalty (veh)						2	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	192	45	179	308	125	47	60	139	110	60	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	209	49	195	335	136	51	65	151	120	65	21

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	222	49	665	116	151	185	21
Volume Left (vph)	13	0	195	51	0	120	0
Volume Right (vph)	0	49	136	0	151	0	21
Hadj (s)	0.06	-0.67	-0.03	0.25	-0.67	0.36	-0.67
Departure Headway (s)	7.2	6.5	6.6	7.8	6.9	8.0	7.0
Degree Utilization, x	0.45	0.09	1.22	0.25	0.29	0.41	0.04
Capacity (veh/h)	479	530	540	444	500	434	492
Control Delay (s)	14.7	8.9	136.9	12.3	11.6	15.3	9.1
Approach Delay (s)	13.7		136.9	11.9		14.7	
Approach LOS	B		F	B		B	

Intersection Summary			
Delay	71.7		
Level of Service	F		
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	94	50	304	77	96	79	52
Average Queue (ft)	55	21	175	41	40	49	17
95th Queue (ft)	85	43	273	68	74	73	50
Link Distance (ft)	2673		2817	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						21	1
Queuing Penalty (veh)						4	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	16	203	53	77	141	170	47	79	129	132	59	10
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
Hourly flow rate (vph)	17	221	58	84	153	185	51	86	140	143	64	11

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	238	58	84	338	137	140	208	11
Volume Left (vph)	17	0	84	0	51	0	143	0
Volume Right (vph)	0	58	0	185	0	140	0	11
Hadj (s)	0.07	-0.67	0.53	-0.35	0.22	-0.67	0.38	-0.67
Departure Headway (s)	6.8	6.0	7.1	6.2	7.2	6.3	7.4	6.3
Degree Utilization, x	0.45	0.10	0.16	0.58	0.27	0.24	0.42	0.02
Capacity (veh/h)	503	556	483	551	462	533	460	525
Control Delay (s)	14.0	8.5	10.3	16.2	11.6	10.1	14.5	8.2
Approach Delay (s)	12.9		15.0		10.8		14.1	
Approach LOS	B		C		B		B	

Intersection Summary			
Delay	13.4		
Level of Service	B		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	69	75	48	84	93	71	228	54
Average Queue (ft)	51	22	28	58	49	39	65	14
95th Queue (ft)	63	52	41	83	78	65	141	49
Link Distance (ft)	2674			2819	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)							22	2
Queuing Penalty (veh)							2	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	192	45	179	308	125	47	60	139	110	60	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	209	49	195	335	136	51	65	151	120	65	21

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	222	49	195	471	116	151	185	21
Volume Left (vph)	13	0	195	0	51	0	120	0
Volume Right (vph)	0	49	0	136	0	151	0	21
Hadj (s)	0.06	-0.67	0.53	-0.17	0.25	-0.67	0.36	-0.67
Departure Headway (s)	7.2	6.4	7.1	6.4	7.7	6.8	7.9	6.8
Degree Utilization, x	0.44	0.09	0.38	0.83	0.25	0.28	0.40	0.04
Capacity (veh/h)	479	525	493	554	442	499	433	488
Control Delay (s)	14.5	8.9	13.2	32.4	12.0	11.2	14.9	8.9
Approach Delay (s)	13.5		26.8		11.6		14.3	
Approach LOS	B		D		B		B	

Intersection Summary			
Delay	19.5		
Level of Service	C		
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	76	49	174	259	69	91	100	55
Average Queue (ft)	57	21	53	86	42	42	45	15
95th Queue (ft)	78	49	115	170	63	74	77	50
Link Distance (ft)	2674			2819	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)				1			21	1
Queuing Penalty (veh)				3			4	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	432	6	12	338	25	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	470	7	13	367	27	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			476		866	473
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			476		866	473
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	91
cM capacity (veh/h)			1086		320	591

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	476	13	367	78
Volume Left	0	13	0	27
Volume Right	7	0	0	51
cSH	1700	1086	1700	457
Volume to Capacity	0.28	0.01	0.22	0.17
Queue Length 95th (ft)	0	1	0	15
Control Delay (s)	0.0	8.4	0.0	14.5
Lane LOS		A		B
Approach Delay (s)	0.0	0.3		14.5
Approach LOS				B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	448	26	48	642	14	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	487	28	52	698	15	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			515		1303	501
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			515		1303	501
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		91	95
cM capacity (veh/h)			1050		168	570

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	515	52	698	43
Volume Left	0	52	0	15
Volume Right	28	0	0	28
cSH	1700	1050	1700	311
Volume to Capacity	0.30	0.05	0.41	0.14
Queue Length 95th (ft)	0	4	0	12
Control Delay (s)	0.0	8.6	0.0	18.5
Lane LOS		A		C
Approach Delay (s)	0.0	0.6		18.5
Approach LOS				C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	360	120	180	301	48	123
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	391	130	196	327	52	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			522		1110	391
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			522		1110	391
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		72	80
cM capacity (veh/h)			1045		188	657

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	391	130	196	327	52	134
Volume Left	0	0	196	0	52	0
Volume Right	0	130	0	0	0	134
cSH	1700	1700	1045	1700	188	657
Volume to Capacity	0.23	0.08	0.19	0.19	0.28	0.20
Queue Length 95th (ft)	0	0	17	0	27	19
Control Delay (s)	0.0	0.0	9.2	0.0	31.3	11.9
Lane LOS			A		D	B
Approach Delay (s)	0.0		3.5		17.3	
Approach LOS					C	

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	380	93	303	716	91	136
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	413	101	329	778	99	148
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			514		1850	413
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			514		1850	413
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		0	77
cM capacity (veh/h)			1051		56	639

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	413	101	329	778	99	148
Volume Left	0	0	329	0	99	0
Volume Right	0	101	0	0	0	148
cSH	1700	1700	1051	1700	56	639
Volume to Capacity	0.24	0.06	0.31	0.46	1.76	0.23
Queue Length 95th (ft)	0	0	34	0	233	22
Control Delay (s)	0.0	0.0	10.0	0.0	524.4	12.3
Lane LOS			A		F	B
Approach Delay (s)	0.0		3.0		217.6	
Approach LOS					F	

Intersection Summary			
Average Delay	30.5		
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	504	101	133	564	453	442
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1748		1770	1863	1863	1583
Flt Permitted	0.96		0.16	1.00	1.00	1.00
Satd. Flow (perm)	1748		305	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	548	110	145	613	492	480
RTOR Reduction (vph)	8	0	0	0	0	326
Lane Group Flow (vph)	650	0	145	613	492	154
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	34.7		41.8	41.8	28.8	28.8
Effective Green, g (s)	34.7		41.8	41.8	28.8	28.8
Actuated g/C Ratio	0.39		0.46	0.46	0.32	0.32
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	673		231	865	596	506
v/s Ratio Prot	c0.37		0.04	c0.33	c0.26	
v/s Ratio Perm			0.25			0.10
v/c Ratio	0.97		0.63	0.71	0.83	0.30
Uniform Delay, d1	27.1		17.9	19.2	28.3	23.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	26.3		4.6	4.9	12.3	1.5
Delay (s)	53.4		22.4	24.1	40.6	24.6
Level of Service	D		C	C	D	C
Approach Delay (s)	53.4			23.8	32.7	
Approach LOS	D			C	C	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	658	145	613	492	480
v/c Ratio	0.97	0.64	0.71	0.83	0.58
Control Delay	55.4	29.7	24.9	42.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	55.4	29.7	24.9	42.0	5.4
Queue Length 50th (ft)	351	48	270	258	0
Queue Length 95th (ft)	#584	#96	400	#426	68
Internal Link Dist (ft)	1865		1079	429	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	687	227	866	596	833
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.96	0.64	0.71	0.83	0.58

Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	421	102	212	673	637	778
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1744		1770	1863	1863	1583
Flt Permitted	0.96		0.09	1.00	1.00	1.00
Satd. Flow (perm)	1744		176	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	458	111	230	732	692	846
RTOR Reduction (vph)	10	0	0	0	0	518
Lane Group Flow (vph)	559	0	230	732	692	328
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	26.0		50.5	50.5	34.9	34.9
Effective Green, g (s)	26.0		50.5	50.5	34.9	34.9
Actuated g/C Ratio	0.29		0.56	0.56	0.39	0.39
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	503		242	1045	722	613
v/s Ratio Prot	c0.32		0.09	c0.39	0.37	
v/s Ratio Perm			c0.45			0.21
v/c Ratio	1.11		0.95	0.70	0.96	0.54
Uniform Delay, d1	32.0		23.8	14.3	26.8	21.3
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	74.2		44.1	3.9	24.7	3.3
Delay (s)	106.2		67.9	18.2	51.6	24.6
Level of Service	F		E	B	D	C
Approach Delay (s)	106.2			30.1	36.8	
Approach LOS	F			C	D	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	569	230	732	692	846
v/c Ratio	1.11	0.96	0.70	0.96	0.75
Control Delay	104.6	71.4	18.8	53.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	104.6	71.4	18.8	53.3	6.4
Queue Length 50th (ft)	~368	82	280	376	0
Queue Length 95th (ft)	#571	#227	416	#607	85
Internal Link Dist (ft)	622		1079	429	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	513	239	1045	722	1131
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.11	0.96	0.70	0.96	0.75

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	504	101	133	564	453	442
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	4.0
Lane Util. Factor	*0.60		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	2092		1770	3539	1863	1583
Flt Permitted	0.96		0.21	1.00	1.00	1.00
Satd. Flow (perm)	2092		383	3539	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	548	110	145	613	492	480
RTOR Reduction (vph)	11	0	0	0	0	0
Lane Group Flow (vph)	647	0	145	613	492	480
Turn Type	NA		pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases			2			Free
Actuated Green, G (s)	30.6		45.9	45.9	32.1	90.0
Effective Green, g (s)	30.6		45.9	45.9	32.1	90.0
Actuated g/C Ratio	0.34		0.51	0.51	0.36	1.00
Clearance Time (s)	7.0		7.5	6.5	6.5	
Vehicle Extension (s)	3.5		2.5	3.5	3.5	
Lane Grp Cap (vph)	711		292	1804	664	1583
v/s Ratio Prot	c0.31		0.03	0.17	c0.26	
v/s Ratio Perm			0.22			c0.30
v/c Ratio	0.91		0.50	0.34	0.74	0.30
Uniform Delay, d1	28.4		15.2	13.1	25.3	0.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	16.1		1.0	0.5	7.3	0.5
Delay (s)	44.5		16.2	13.6	32.6	0.5
Level of Service	D		B	B	C	A
Approach Delay (s)	44.5			14.1	16.8	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	658	145	613	492	480
v/c Ratio	0.91	0.51	0.34	0.74	0.30
Control Delay	46.4	19.5	14.0	34.1	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	46.4	19.5	14.0	34.1	0.5
Queue Length 50th (ft)	280	44	107	248	0
Queue Length 95th (ft)	#450	79	145	#384	0
Internal Link Dist (ft)	653		1079	429	
Turn Bay Length (ft)	600	310			
Base Capacity (vph)	754	287	1805	665	1583
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.87	0.51	0.34	0.74	0.30

Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	421	102	212	673	637	778
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	4.0
Lane Util. Factor	*0.93		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	3233		1770	3539	1863	1583
Flt Permitted	0.96		0.14	1.00	1.00	1.00
Satd. Flow (perm)	3233		267	3539	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	458	111	230	732	692	846
RTOR Reduction (vph)	24	0	0	0	0	0
Lane Group Flow (vph)	545	0	230	732	692	846
Turn Type	NA		pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases			2			Free
Actuated Green, G (s)	19.3		57.2	57.2	41.3	90.0
Effective Green, g (s)	19.3		57.2	57.2	41.3	90.0
Actuated g/C Ratio	0.21		0.64	0.64	0.46	1.00
Clearance Time (s)	7.0		7.5	6.5	6.5	
Vehicle Extension (s)	3.5		2.5	3.5	3.5	
Lane Grp Cap (vph)	693		309	2249	854	1583
v/s Ratio Prot	c0.17		0.07	0.21	c0.37	
v/s Ratio Perm			0.40			c0.53
v/c Ratio	0.79		0.74	0.33	0.81	0.53
Uniform Delay, d1	33.4		14.8	7.5	21.0	0.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1		8.9	0.4	8.2	1.3
Delay (s)	39.5		23.7	7.9	29.2	1.3
Level of Service	D		C	A	C	A
Approach Delay (s)	39.5			11.7	13.8	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	569	230	732	692	846
v/c Ratio	0.79	0.75	0.33	0.81	0.53
Control Delay	40.4	27.0	8.3	31.0	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	27.0	8.3	31.0	1.3
Queue Length 50th (ft)	153	53	94	338	0
Queue Length 95th (ft)	213	#152	127	#550	0
Internal Link Dist (ft)	622		1079	429	
Turn Bay Length (ft)	600	310			
Base Capacity (vph)	777	308	2248	853	1583
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.75	0.33	0.81	0.53

Intersection Summary

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	140	583	323	107	105	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1770	1863	1800		1709	
Flt Permitted	0.28	1.00	1.00		0.97	
Satd. Flow (perm)	529	1863	1800		1709	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	634	351	116	114	80
RTOR Reduction (vph)	0	0	13	0	27	0
Lane Group Flow (vph)	152	634	454	0	167	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	39.9	39.9	25.6		13.1	
Effective Green, g (s)	39.9	39.9	25.6		13.1	
Actuated g/C Ratio	0.61	0.61	0.39		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	479	1134	703		341	
v/s Ratio Prot	0.04	c0.34	c0.25		c0.10	
v/s Ratio Perm	0.15					
v/c Ratio	0.32	0.56	0.65		0.49	
Uniform Delay, d1	7.1	7.6	16.3		23.2	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.3	3.3		1.5	
Delay (s)	7.3	8.9	19.6		24.7	
Level of Service	A	A	B		C	
Approach Delay (s)		8.6	19.6		24.7	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	152	634	467	194
v/c Ratio	0.32	0.56	0.66	0.53
Control Delay	7.6	10.4	21.5	27.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.6	10.4	21.5	27.1
Queue Length 50th (ft)	22	128	140	57
Queue Length 95th (ft)	54	265	273	140
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	520	1686	1330	696
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.38	0.35	0.28

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	152	645	761	133	113	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1825		1669	
Flt Permitted	0.07	1.00	1.00		0.98	
Satd. Flow (perm)	124	1863	1825		1669	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	701	827	145	123	237
RTOR Reduction (vph)	0	0	6	0	70	0
Lane Group Flow (vph)	165	701	966	0	290	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	66.3	66.3	54.3		19.9	
Effective Green, g (s)	66.3	66.3	54.3		19.9	
Actuated g/C Ratio	0.67	0.67	0.55		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	183	1251	1004		336	
v/s Ratio Prot	c0.05	0.38	c0.53		c0.17	
v/s Ratio Perm	0.55					
v/c Ratio	0.90	0.56	0.96		0.86	
Uniform Delay, d1	27.9	8.5	21.2		38.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	39.2	1.2	20.2		20.3	
Delay (s)	67.1	9.7	41.5		58.4	
Level of Service	E	A	D		E	
Approach Delay (s)		20.7	41.5		58.4	
Approach LOS		C	D		E	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	98.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	165	701	972	360
v/c Ratio	0.90	0.56	0.96	0.89
Control Delay	65.6	10.9	43.3	53.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	65.6	10.9	43.3	53.6
Queue Length 50th (ft)	54	215	562	171
Queue Length 95th (ft)	#180	309	#869	#330
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	183	1256	1014	424
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.56	0.96	0.85

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	501	48	54	261	66	38	155	89	120	87	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1838		1770	1806		1770	1760		1770	1750	
Flt Permitted	0.48	1.00		0.25	1.00		0.66	1.00		0.50	1.00	
Satd. Flow (perm)	891	1838		475	1806		1222	1760		924	1750	
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)	95	545	52	59	284	72	41	168	97	130	95	64
RTOR Reduction (vph)	0	3	0	0	8	0	0	17	0	0	20	0
Lane Group Flow (vph)	95	594	0	59	348	0	41	248	0	130	139	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	42.8	37.8		42.2	37.5		20.7	20.7		20.7	20.7	
Effective Green, g (s)	42.8	37.8		42.2	37.5		20.7	20.7		20.7	20.7	
Actuated g/C Ratio	0.51	0.45		0.50	0.45		0.25	0.25		0.25	0.25	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	505	825		310	804		300	432		227	430	
v/s Ratio Prot	c0.01	c0.32		0.01	0.19			c0.14			0.08	
v/s Ratio Perm	0.08			0.08			0.03			0.14		
v/c Ratio	0.19	0.72		0.19	0.43		0.14	0.58		0.57	0.32	
Uniform Delay, d1	10.9	18.9		12.4	16.0		24.8	27.9		27.9	26.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	4.4		0.1	1.1		0.3	2.2		4.1	0.6	
Delay (s)	11.0	23.3		12.5	17.1		25.1	30.1		32.0	26.6	
Level of Service	B	C		B	B		C	C		C	C	
Approach Delay (s)		21.6			16.5			29.4			29.0	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	84.2	Sum of lost time (s)	21.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	95	597	59	356	41	265	130	159
v/c Ratio	0.18	0.72	0.17	0.44	0.14	0.59	0.58	0.35
Control Delay	9.7	25.9	10.1	18.9	30.5	34.5	43.7	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	25.9	10.1	18.9	30.5	34.5	43.7	27.8
Queue Length 50th (ft)	19	249	12	121	17	115	61	58
Queue Length 95th (ft)	55	484	37	251	54	249	153	143
Internal Link Dist (ft)		1116		1752		3283		2486
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	552	1425	353	1386	629	917	475	914
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.42	0.17	0.26	0.07	0.29	0.27	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	548	57	103	710	113	75	103	78	96	150	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.94		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1836		1770	1824		1770	1742		1770	1729	
Flt Permitted	0.10	1.00		0.27	1.00		0.29	1.00		0.53	1.00	
Satd. Flow (perm)	182	1836		496	1824		547	1742		995	1729	
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)	116	596	62	112	772	123	82	112	85	104	163	149
RTOR Reduction (vph)	0	3	0	0	5	0	0	21	0	0	25	0
Lane Group Flow (vph)	116	655	0	112	890	0	82	176	0	104	287	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	71.6	64.3		71.0	64.0		24.4	24.4		24.4	24.4	
Effective Green, g (s)	71.6	64.3		71.0	64.0		24.4	24.4		24.4	24.4	
Actuated g/C Ratio	0.61	0.55		0.61	0.55		0.21	0.21		0.21	0.21	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	210	1011		378	1000		114	364		208	361	
v/s Ratio Prot	c0.03	0.36		0.02	c0.49			0.10			c0.17	
v/s Ratio Perm	0.30			0.16			0.15			0.10		
v/c Ratio	0.55	0.65		0.30	0.89		0.72	0.48		0.50	0.79	
Uniform Delay, d1	20.2	18.3		12.2	23.3		43.0	40.6		40.8	43.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.3		0.2	11.1		20.7	1.4		2.6	12.0	
Delay (s)	22.0	20.6		12.3	34.3		63.6	42.0		43.3	55.8	
Level of Service	C	C		B	C		E	D		D	E	
Approach Delay (s)		20.8			31.9			48.3			52.7	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	116.7	Sum of lost time (s)	21.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	116	658	112	895	82	197	104	312
v/c Ratio	0.55	0.65	0.30	0.90	0.73	0.51	0.50	0.81
Control Delay	19.7	22.3	9.5	36.7	81.4	42.2	53.2	58.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	22.3	9.5	36.7	81.4	42.2	53.2	58.4
Queue Length 50th (ft)	32	358	30	615	64	126	77	225
Queue Length 95th (ft)	64	489	52	#930	#149	206	140	#361
Internal Link Dist (ft)		1116		1752		3283		2486
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	236	1191	391	1167	136	455	248	456
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.55	0.29	0.77	0.60	0.43	0.42	0.68

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	477	0	0	350	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	518	0	0	380	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			518		899	518
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			518		899	518
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1048		310	557

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	518	0	0	380	0	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.30	0.00	0.00	0.22	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		0.0	
Approach LOS					A	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	377	96	160	643	43	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	410	104	174	699	47	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			514		1457	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			514		1457	410
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		61	84
cM capacity (veh/h)			1051		119	642

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	410	104	174	699	47	103
Volume Left	0	0	174	0	47	0
Volume Right	0	104	0	0	0	103
cSH	1700	1700	1051	1700	119	642
Volume to Capacity	0.24	0.06	0.17	0.41	0.39	0.16
Queue Length 95th (ft)	0	0	15	0	41	14
Control Delay (s)	0.0	0.0	9.1	0.0	53.4	11.7
Lane LOS			A		F	B
Approach Delay (s)	0.0		1.8		24.7	
Approach LOS					C	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	170	300	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	185	326	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	511	326	326			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	511	326	326			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	523	715	1234			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	185	326
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1234	1700
Volume to Capacity	0.00	0.00	0.19
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	17	16	209	348	48
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	17	227	378	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	666	404	430			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	666	404	430			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	97	98			
cM capacity (veh/h)	418	646	1129			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	37	245	430
Volume Left	18	17	0
Volume Right	18	0	52
cSH	508	1129	1700
Volume to Capacity	0.07	0.02	0.25
Queue Length 95th (ft)	6	1	0
Control Delay (s)	12.6	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	41	0	115	0	0	0	0	173	834	177	624	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	45	0	125	0	0	0	0	188	907	192	678	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	1251	1251	678	1376	1251	188	678			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1251	1251	678	1376	1251	188	678			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	100	72	100	100	100	100			86		
cM capacity (veh/h)	133	149	452	79	149	854	914			1386		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	170	188	907	871
Volume Left	45	0	0	192
Volume Right	125	0	907	0
cSH	278	1700	1700	1386
Volume to Capacity	0.61	0.11	0.53	0.14
Queue Length 95th (ft)	92	0	0	12
Control Delay (s)	36.3	0.0	0.0	3.2
Lane LOS	E			A
Approach Delay (s)	36.3	0.0		3.2
Approach LOS	E			

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	0	97	0	0	0	0	440	512	42	1330	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	26	0	105	0	0	0	0	478	557	46	1446	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	2015	2015	1446	2121	2015	478	1446			478		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2015	2015	1446	2121	2015	478	1446			478		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	38	100	35	100	100	100	100			96		
cM capacity (veh/h)	42	56	162	12	56	587	469			1084		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	132	478	557	1491
Volume Left	26	0	0	46
Volume Right	105	0	557	0
cSH	103	1700	1700	1084
Volume to Capacity	1.27	0.28	0.33	0.04
Queue Length 95th (ft)	225	0	0	3
Control Delay (s)	254.9	0.0	0.0	2.6
Lane LOS	F			A
Approach Delay (s)	254.9	0.0		2.6
Approach LOS	F			

Intersection Summary			
Average Delay	14.1		
Intersection Capacity Utilization	121.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	41	0	115	0	0	0	0	173	834	177	624	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	45	0	125	0	0	0	0	188	907	192	678	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	1251	1251	678	1376	1251	188	678			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1251	1251	678	1376	1251	188	678			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	100	72	100	100	100	100			86		
cM capacity (veh/h)	133	149	452	79	149	854	914			1386		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	45	125	188	907	192	678
Volume Left	45	0	0	0	192	0
Volume Right	0	125	0	907	0	0
cSH	133	452	1700	1700	1386	1700
Volume to Capacity	0.33	0.28	0.11	0.53	0.14	0.40
Queue Length 95th (ft)	34	28	0	0	12	0
Control Delay (s)	44.9	16.0	0.0	0.0	8.0	0.0
Lane LOS	E	C			A	
Approach Delay (s)	23.6		0.0		1.8	
Approach LOS	C					

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

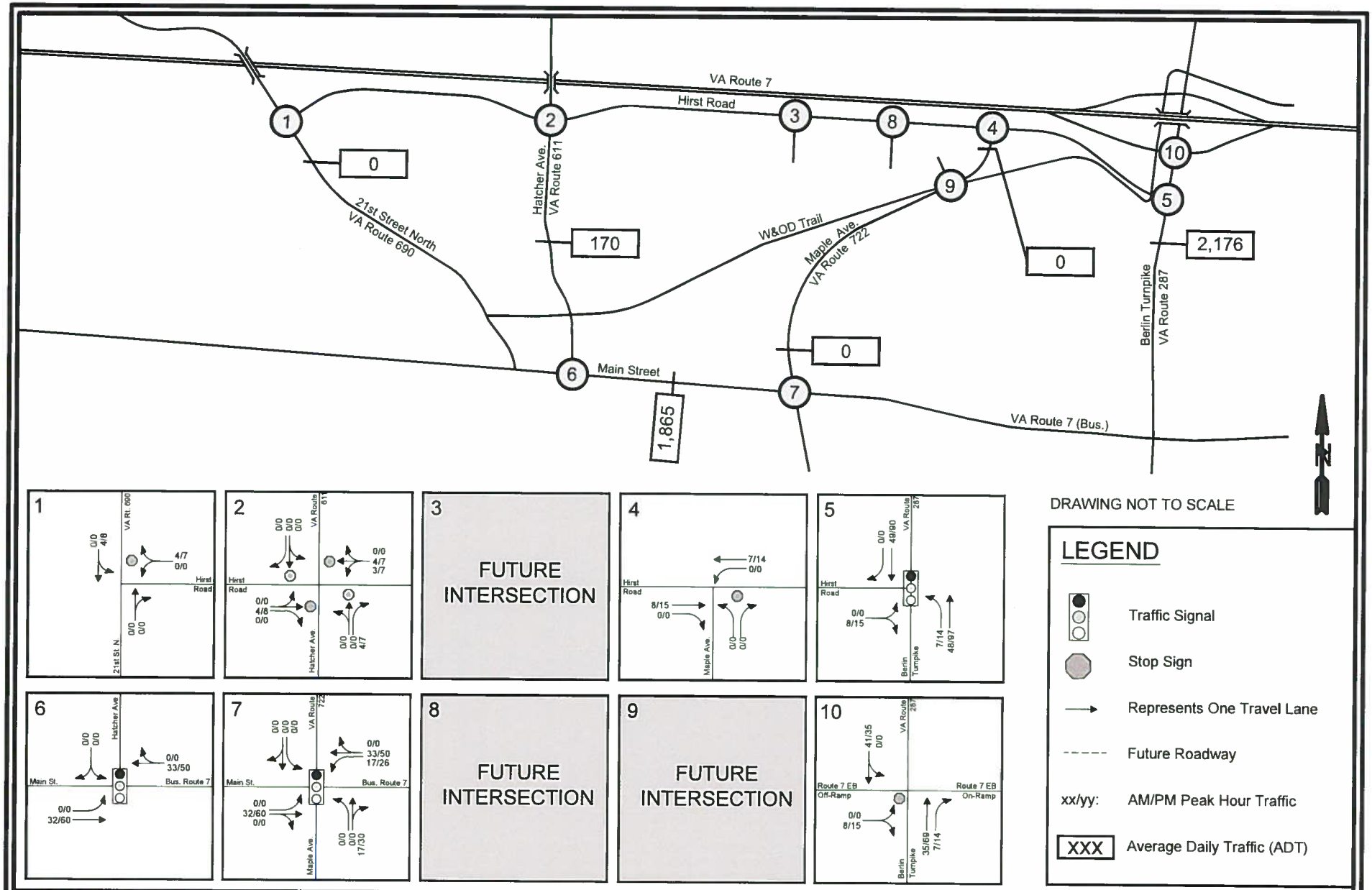
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	0	97	0	0	0	0	440	512	42	1330	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	105	0	0	0	0	478	557	46	1446	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	2015	2015	1446	2121	2015	478	1446			478		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2040	2040	1446	2150	2040	429	1446			429		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	32	100	35	100	100	100	100			96		
cM capacity (veh/h)	39	52	162	11	52	597	469			1078		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	26	105	478	557	46	1446
Volume Left	26	0	0	0	46	0
Volume Right	0	105	0	557	0	0
cSH	39	162	1700	1700	1078	1700
Volume to Capacity	0.68	0.65	0.28	0.33	0.04	0.85
Queue Length 95th (ft)	61	92	0	0	3	0
Control Delay (s)	208.9	61.6	0.0	0.0	8.5	0.0
Lane LOS	F	F			A	
Approach Delay (s)	90.8		0.0		0.3	
Approach LOS	F					

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

APPENDIX H

OTHER DEVELOPMENT TRAFFIC ASSIGNMENTS (2020)

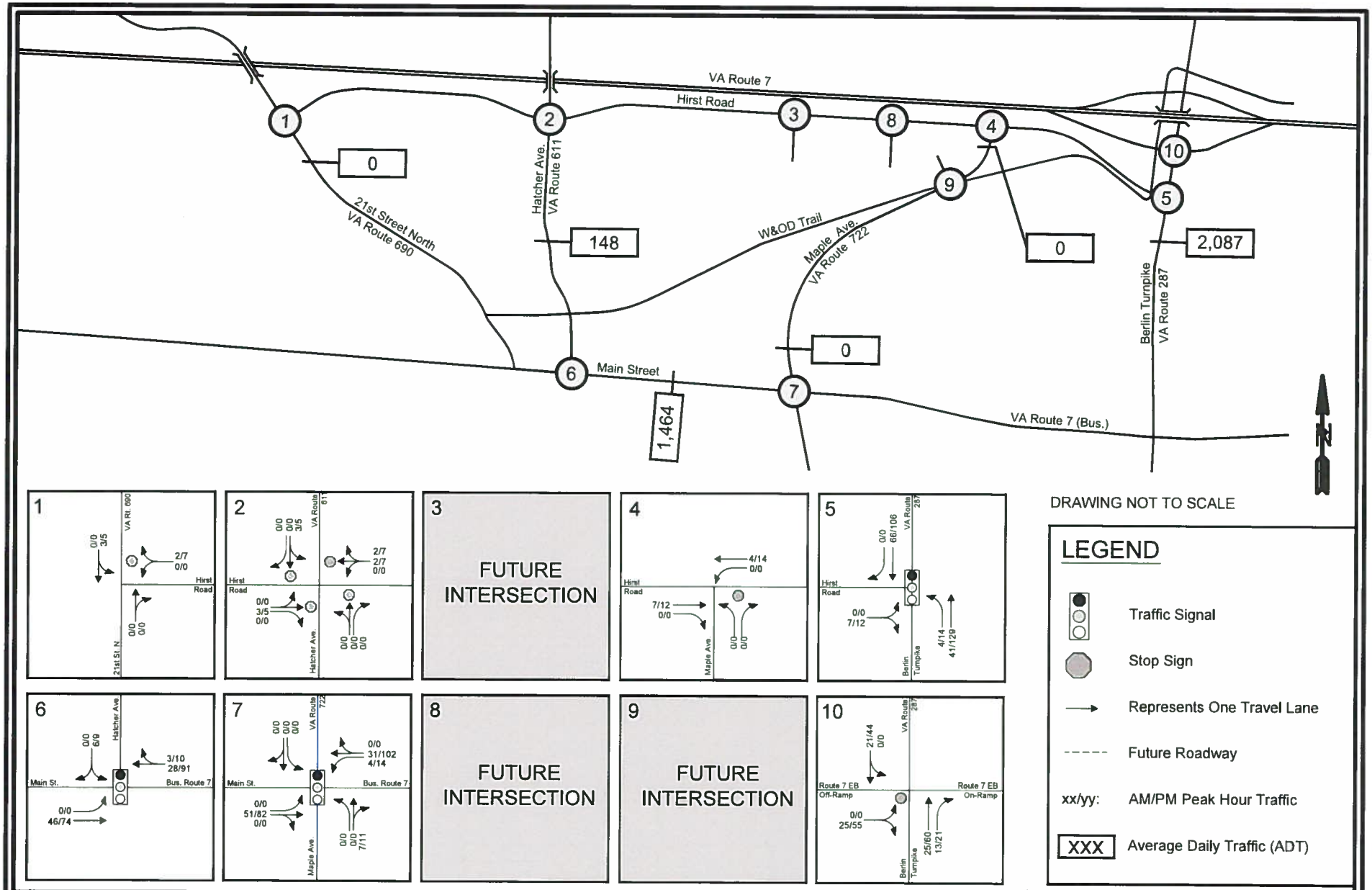


Bowman CONSULTING

Catoctin Corner Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure H.1

Job # 5384-01-001

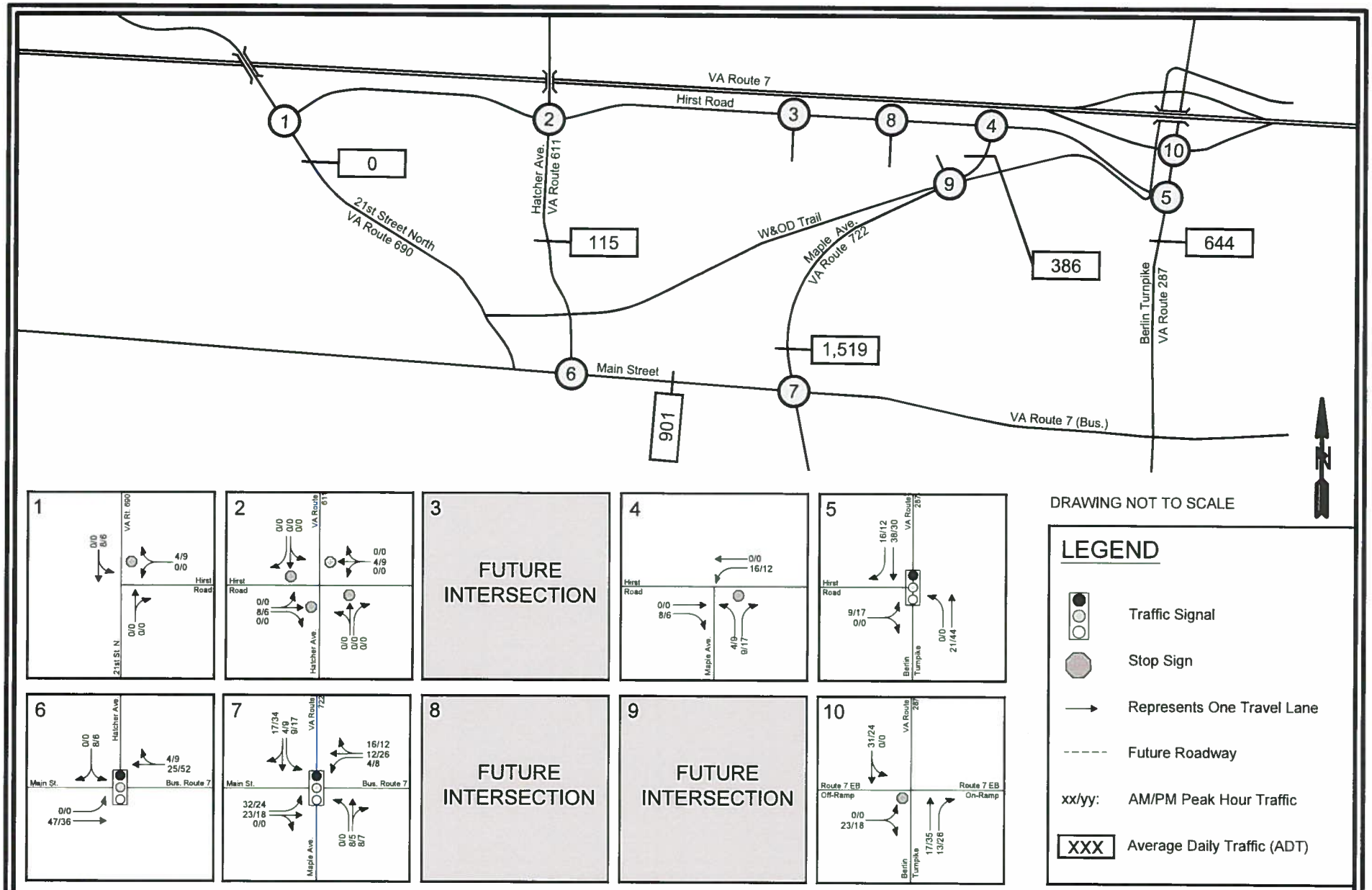


Bowman CONSULTING

Purcellville Gateway Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure H.2

Job # 5384-01-001

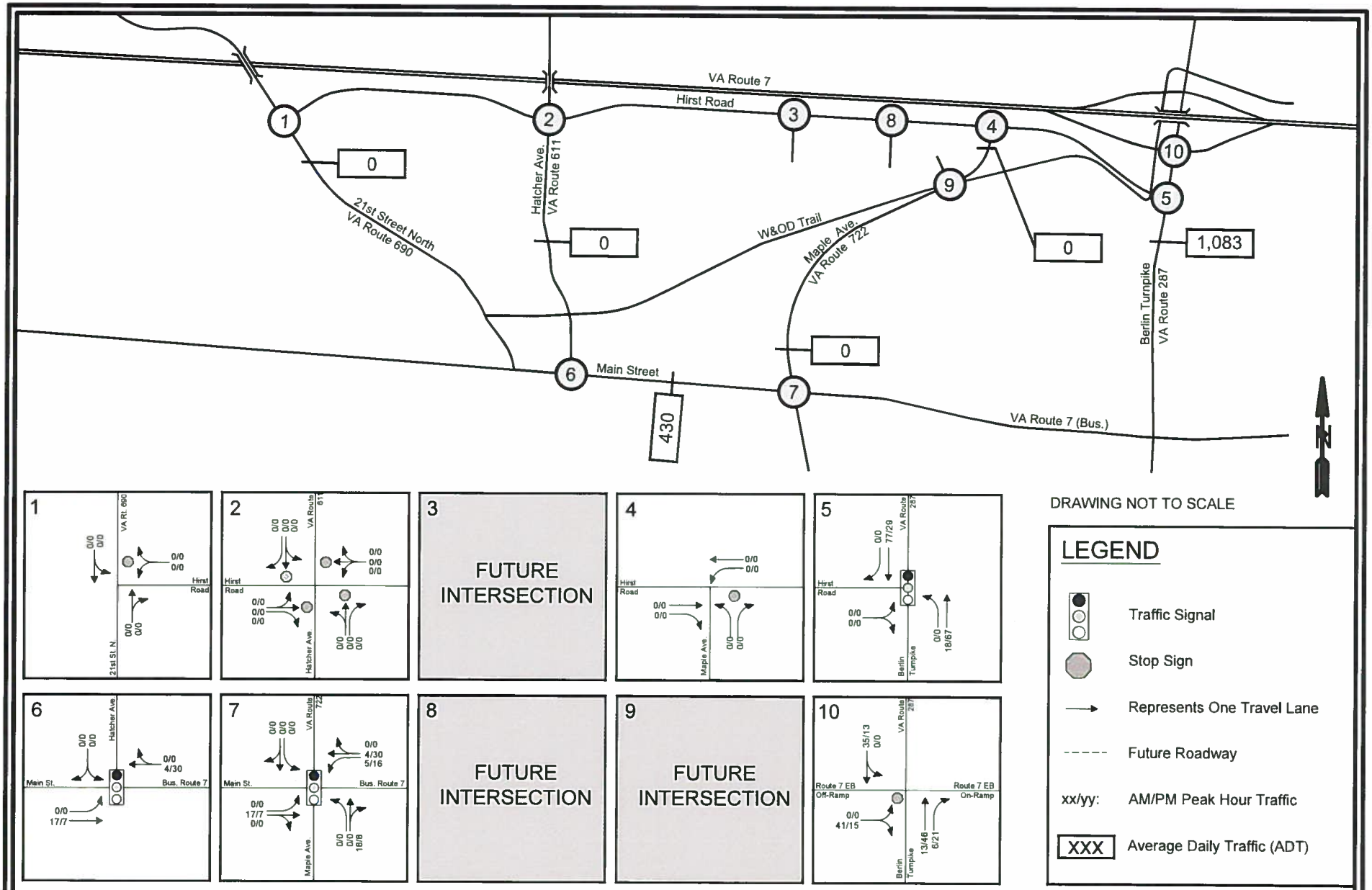


Bowman CONSULTING

Loudoun Valley Shopping Center
Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure H.3

Job # 5384-01-001



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Patrick Henry College Traffic Forecasts (2020)
Catoctin Creek Towne Center
Purcellville, Virginia

Figure H.4

Job # 5384-01-001

APPENDIX I
BACKGROUND (2020) PEAK HOUR
ANALYSIS WORKSHEETS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	79	84	172	196	179	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	91	187	213	195	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	802	293			400	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	802	293			400	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	88			83	
cM capacity (veh/h)	294	746			1159	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	177	400	314
Volume Left	86	0	195
Volume Right	91	213	0
cSH	427	1700	1159
Volume to Capacity	0.41	0.24	0.17
Queue Length 95th (ft)	50	0	15
Control Delay (s)	19.3	0.0	6.0
Lane LOS	C		A
Approach Delay (s)	19.3	0.0	6.0
Approach LOS	C		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	255	214	170	91	82	100
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	277	233	185	99	89	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	521	234			284	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	521	234			284	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	42	71			93	
cM capacity (veh/h)	480	805			1279	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	510	284	198
Volume Left	277	0	89
Volume Right	233	99	0
cSH	588	1700	1279
Volume to Capacity	0.87	0.17	0.07
Queue Length 95th (ft)	244	0	6
Control Delay (s)	38.5	0.0	3.9
Lane LOS	E		A
Approach Delay (s)	38.5	0.0	3.9
Approach LOS	E		

Intersection Summary			
Average Delay	20.6		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	79	84	172	196	179	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	91	187	213	195	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	802	293			400	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	802	293			400	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	88			83	
cM capacity (veh/h)	294	746			1159	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	86	91	400	314
Volume Left	86	0	0	195
Volume Right	0	91	213	0
cSH	294	746	1700	1159
Volume to Capacity	0.29	0.12	0.24	0.17
Queue Length 95th (ft)	30	10	0	15
Control Delay (s)	22.2	10.5	0.0	6.0
Lane LOS	C	B		A
Approach Delay (s)	16.2		0.0	6.0
Approach LOS	C			

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	255	214	170	91	82	100
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	277	233	185	99	89	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	521	234			284	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	521	234			284	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	42	71			93	
cM capacity (veh/h)	480	805			1279	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	277	233	284	198
Volume Left	277	0	0	89
Volume Right	0	233	99	0
cSH	480	805	1700	1279
Volume to Capacity	0.58	0.29	0.17	0.07
Queue Length 95th (ft)	90	30	0	6
Control Delay (s)	22.3	11.3	0.0	3.9
Lane LOS	C	B		A
Approach Delay (s)	17.3		0.0	3.9
Approach LOS	C			

Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	233	60	83	149	186	53	89	147	147	67	12
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
Hourly flow rate (vph)	20	253	65	90	162	202	58	97	160	160	73	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	273	65	454	154	160	233	13
Volume Left (vph)	20	0	90	58	0	160	0
Volume Right (vph)	0	65	202	0	160	0	13
Hadj (s)	0.07	-0.67	-0.19	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.6	6.9	7.0	8.2	7.3	8.4	7.3
Degree Utilization, x	0.58	0.12	0.88	0.35	0.32	0.54	0.03
Capacity (veh/h)	436	486	454	413	468	413	465
Control Delay (s)	19.4	9.7	42.4	14.3	12.5	19.5	9.3
Approach Delay (s)	17.5		42.4	13.4		19.0	
Approach LOS	C		E	B		C	

Intersection Summary			
Delay	25.2		
Level of Service	D		
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	96	51	131	75	91	119	55
Average Queue (ft)	56	28	82	47	38	57	10
95th Queue (ft)	85	51	123	74	73	97	43
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						29	1
Queuing Penalty (veh)						3	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	14	174	50	184	330	127	53	68	101	99	68	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	189	54	200	359	138	58	74	110	108	74	23

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	204	54	697	132	110	182	23
Volume Left (vph)	15	0	200	58	0	108	0
Volume Right (vph)	0	54	138	0	110	0	23
Hadj (s)	0.07	-0.67	-0.03	0.25	-0.67	0.33	-0.67
Departure Headway (s)	7.1	6.4	6.5	7.8	6.9	7.9	6.9
Degree Utilization, x	0.40	0.10	1.25	0.28	0.21	0.40	0.04
Capacity (veh/h)	486	540	543	447	504	441	501
Control Delay (s)	13.7	8.9	149.2	12.6	10.5	14.8	9.0
Approach Delay (s)	12.7		149.2	11.7		14.1	
Approach LOS	B		F	B		B	

Intersection Summary			
Delay	80.6		
Level of Service	F		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	113	50	236	76	49	96	54
Average Queue (ft)	55	31	156	49	32	64	22
95th Queue (ft)	92	60	222	78	50	89	57
Link Distance (ft)	2673		4479	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						29	2
Queuing Penalty (veh)						6	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	233	60	83	149	186	53	89	147	147	67	12
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
Hourly flow rate (vph)	20	253	65	90	162	202	58	97	160	160	73	13

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	273	65	90	364	154	160	233	13
Volume Left (vph)	20	0	90	0	58	0	160	0
Volume Right (vph)	0	65	0	202	0	160	0	13
Hadj (s)	0.07	-0.67	0.53	-0.35	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.2	6.5	7.5	6.6	7.6	6.7	7.8	6.7
Degree Utilization, x	0.54	0.12	0.19	0.67	0.32	0.30	0.50	0.02
Capacity (veh/h)	480	526	460	524	441	505	429	497
Control Delay (s)	17.3	9.1	11.0	20.6	13.0	11.3	17.2	8.7
Approach Delay (s)	15.7		18.7		12.1		16.7	
Approach LOS	C		C		B		C	

Intersection Summary			
Delay	16.1		
Level of Service	C		
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hirst Road & Hatcher Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	95	52	174	217	139	72	103	55
Average Queue (ft)	59	28	38	69	51	46	58	10
95th Queue (ft)	94	52	99	139	99	71	94	43
Link Distance (ft)	2674			4485	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)				1			29	1
Queuing Penalty (veh)				1			4	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	14	174	50	184	330	127	53	68	101	99	68	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	189	54	200	359	138	58	74	110	108	74	23

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	204	54	200	497	132	110	182	23
Volume Left (vph)	15	0	200	0	58	0	108	0
Volume Right (vph)	0	54	0	138	0	110	0	23
Hadj (s)	0.07	-0.67	0.53	-0.16	0.25	-0.67	0.33	-0.67
Departure Headway (s)	7.1	6.4	7.0	6.3	7.7	6.8	7.8	6.8
Degree Utilization, x	0.40	0.10	0.39	0.87	0.28	0.21	0.39	0.04
Capacity (veh/h)	481	530	501	564	447	501	440	497
Control Delay (s)	13.7	8.9	13.1	36.0	12.5	10.3	14.6	8.9
Approach Delay (s)	12.7		29.5		11.5		13.9	
Approach LOS	B		D		B		B	

Intersection Summary			
Delay	21.0		
Level of Service	C		
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	94	70	114	220	72	49	164	54
Average Queue (ft)	48	32	58	101	34	31	63	20
95th Queue (ft)	77	58	97	171	64	47	118	56
Link Distance (ft)	2672			4479	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)				1			24	2
Queuing Penalty (veh)				3			5	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	381	118	219	337	52	147
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	414	128	238	366	57	160
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			542		1257	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			542		1257	414
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			77		61	75
cM capacity (veh/h)			1026		145	638

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	414	128	238	366	57	160
Volume Left	0	0	238	0	57	0
Volume Right	0	128	0	0	0	160
cSH	1700	1700	1026	1700	145	638
Volume to Capacity	0.24	0.08	0.23	0.22	0.39	0.25
Queue Length 95th (ft)	0	0	22	0	42	25
Control Delay (s)	0.0	0.0	9.6	0.0	44.8	12.5
Lane LOS			A		E	B
Approach Delay (s)	0.0		3.8		20.9	
Approach LOS					C	

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	313	97	299	603	86	151
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	340	105	325	655	93	164
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			446		1646	340
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			446		1646	340
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		0	77
cM capacity (veh/h)			1115		77	702

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	340	105	325	655	93	164
Volume Left	0	0	325	0	93	0
Volume Right	0	105	0	0	0	164
cSH	1700	1700	1115	1700	77	702
Volume to Capacity	0.20	0.06	0.29	0.39	1.21	0.23
Queue Length 95th (ft)	0	0	30	0	175	23
Control Delay (s)	0.0	0.0	9.6	0.0	263.5	11.7
Lane LOS			A		F	B
Approach Delay (s)	0.0		3.2		103.1	
Approach LOS					F	

Intersection Summary			
Average Delay	17.6		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	551	113	153	703	647	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1747		1770	1863	1863	1583
Flt Permitted	0.96		0.09	1.00	1.00	1.00
Satd. Flow (perm)	1747		168	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	599	123	166	764	703	552
RTOR Reduction (vph)	8	0	0	0	0	348
Lane Group Flow (vph)	714	0	166	764	703	204
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	36.0		50.5	50.5	36.9	36.9
Effective Green, g (s)	36.0		50.5	50.5	36.9	36.9
Actuated g/C Ratio	0.36		0.50	0.50	0.37	0.37
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	628		182	940	687	584
v/s Ratio Prot	c0.41		0.06	c0.41	c0.38	
v/s Ratio Perm			0.40			0.13
v/c Ratio	1.14		0.91	0.81	1.02	0.35
Uniform Delay, d1	32.0		22.5	20.8	31.6	22.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	80.2		42.4	7.6	40.4	1.6
Delay (s)	112.2		64.9	28.4	71.9	24.5
Level of Service	F		E	C	E	C
Approach Delay (s)	112.2			34.9	51.1	
Approach LOS	F			C	D	

Intersection Summary			
HCM 2000 Control Delay	61.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	722	166	764	703	552
v/c Ratio	1.14	0.92	0.81	1.02	0.59
Control Delay	110.2	70.4	29.4	72.9	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	110.2	70.4	29.4	72.9	4.9
Queue Length 50th (ft)	~536	57	392	~479	0
Queue Length 95th (ft)	#762	#183	565	#701	69
Internal Link Dist (ft)	1865		1079	425	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	636	180	940	687	932
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.14	0.92	0.81	1.02	0.59

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	391	82	169	918	820	701
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1747		1770	1863	1863	1583
Flt Permitted	0.96		0.05	1.00	1.00	1.00
Satd. Flow (perm)	1747		92	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	425	89	184	998	891	762
RTOR Reduction (vph)	5	0	0	0	0	348
Lane Group Flow (vph)	509	0	184	998	891	414
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	43.0		93.5	93.5	73.4	73.4
Effective Green, g (s)	43.0		93.5	93.5	73.4	73.4
Actuated g/C Ratio	0.29		0.62	0.62	0.49	0.49
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	500		198	1161	911	774
v/s Ratio Prot	c0.29		0.08	c0.54	c0.48	
v/s Ratio Perm			0.50			0.26
v/c Ratio	1.02		0.93	0.86	0.98	0.53
Uniform Delay, d1	53.5		50.7	22.9	37.5	26.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	44.9		43.8	8.4	25.0	2.6
Delay (s)	98.4		94.5	31.3	62.5	29.1
Level of Service	F		F	C	E	C
Approach Delay (s)	98.4			41.1	47.1	
Approach LOS	F			D	D	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	514	184	998	891	762
v/c Ratio	1.02	0.93	0.86	0.98	0.68
Control Delay	95.9	89.3	32.3	62.3	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	95.9	89.3	32.3	62.3	6.6
Queue Length 50th (ft)	~525	131	754	839	41
Queue Length 95th (ft)	#757	#286	1004	#1144	163
Internal Link Dist (ft)	1865		1079	422	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	505	198	1161	911	1123
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.02	0.93	0.86	0.98	0.68

Intersection Summary

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

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	157	735	411	124	125	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1770	1863	1804		1714	
Flt Permitted	0.22	1.00	1.00		0.97	
Satd. Flow (perm)	412	1863	1804		1714	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	799	447	135	136	84
RTOR Reduction (vph)	0	0	12	0	23	0
Lane Group Flow (vph)	171	799	570	0	197	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	47.3	47.3	33.0		15.3	
Effective Green, g (s)	47.3	47.3	33.0		15.3	
Actuated g/C Ratio	0.63	0.63	0.44		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	409	1173	792		349	
v/s Ratio Prot	0.05	c0.43	0.32		c0.11	
v/s Ratio Perm	0.22					
v/c Ratio	0.42	0.68	0.72		0.56	
Uniform Delay, d1	8.9	9.0	17.3		26.9	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	2.5	4.5		2.5	
Delay (s)	9.2	11.5	21.8		29.4	
Level of Service	A	B	C		C	
Approach Delay (s)		11.1	21.8		29.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	171	799	582	220
v/c Ratio	0.42	0.69	0.73	0.60
Control Delay	9.3	13.5	23.8	32.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.3	13.5	23.8	32.8
Queue Length 50th (ft)	28	210	208	81
Queue Length 95th (ft)	66	428	381	179
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	429	1566	1220	589
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.40	0.51	0.48	0.37

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	110	778	939	157	132	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1827		1674	
Flt Permitted	0.04	1.00	1.00		0.98	
Satd. Flow (perm)	76	1863	1827		1674	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	846	1021	171	143	242
RTOR Reduction (vph)	0	0	4	0	40	0
Lane Group Flow (vph)	120	846	1188	0	345	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	106.5	106.5	92.5		31.0	
Effective Green, g (s)	106.5	106.5	92.5		31.0	
Actuated g/C Ratio	0.71	0.71	0.62		0.21	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	144	1322	1126		345	
v/s Ratio Prot	0.04	c0.45	c0.65		c0.21	
v/s Ratio Perm	0.55					
v/c Ratio	0.83	0.64	1.06		1.00	
Uniform Delay, d1	49.9	11.6	28.8		59.5	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	30.8	1.7	42.6		47.8	
Delay (s)	80.7	13.3	71.4		107.3	
Level of Service	F	B	E		F	
Approach Delay (s)		21.6	71.4		107.3	
Approach LOS		C	E		F	

Intersection Summary			
HCM 2000 Control Delay	57.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	120	846	1192	385
v/c Ratio	0.83	0.64	1.05	1.00
Control Delay	72.6	14.3	70.9	95.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	72.6	14.3	70.9	95.9
Queue Length 50th (ft)	66	404	~1269	338
Queue Length 95th (ft)	#182	530	#1538	#561
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	144	1322	1130	386
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.83	0.64	1.05	1.00

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	617	54	84	327	86	43	183	144	129	102	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.93		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1840		1770	1805		1770	1740		1770	1741	
Flt Permitted	0.38	1.00		0.15	1.00		0.56	1.00		0.32	1.00	
Satd. Flow (perm)	703	1840		274	1805		1052	1740		603	1741	
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)	140	671	59	91	355	93	47	199	157	140	111	86
RTOR Reduction (vph)	0	2	0	0	5	0	0	15	0	0	15	0
Lane Group Flow (vph)	140	728	0	91	443	0	47	341	0	140	182	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	75.3	65.6		74.9	65.4		39.5	39.5		39.5	39.5	
Effective Green, g (s)	75.3	65.6		74.9	65.4		39.5	39.5		39.5	39.5	
Actuated g/C Ratio	0.56	0.48		0.55	0.48		0.29	0.29		0.29	0.29	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	466	890		256	870		306	506		175	507	
v/s Ratio Prot	0.02	c0.40		c0.02	0.25			0.20			0.10	
v/s Ratio Perm	0.15			0.17			0.04			c0.23		
v/c Ratio	0.30	0.82		0.36	0.51		0.15	0.67		0.80	0.36	
Uniform Delay, d1	15.7	29.9		21.3	24.1		35.6	42.4		44.4	38.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.0		0.3	1.3		0.3	3.9		23.5	0.6	
Delay (s)	15.9	36.9		21.6	25.4		36.0	46.2		67.9	38.6	
Level of Service	B	D		C	C		D	D		E	D	
Approach Delay (s)		33.5			24.8			45.0			50.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	135.6	Sum of lost time (s)	21.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	140	730	91	448	47	356	140	197
v/c Ratio	0.30	0.83	0.36	0.52	0.16	0.69	0.81	0.38
Control Delay	15.5	41.6	17.9	28.3	41.9	50.0	83.0	38.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	41.6	17.9	28.3	41.9	50.0	83.0	38.9
Queue Length 50th (ft)	48	527	31	253	30	259	112	121
Queue Length 95th (ft)	120	975	81	498	82	488	263	253
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	510	1409	278	1366	571	954	327	955
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.52	0.33	0.33	0.08	0.37	0.43	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	668	64	162	874	122	84	121	125	117	178	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1838		1770	1828		1770	1721		1770	1728	
Flt Permitted	0.05	1.00		0.12	1.00		0.27	1.00		0.43	1.00	
Satd. Flow (perm)	97	1838		220	1828		500	1721		801	1728	
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)	133	726	70	176	950	133	91	132	136	127	193	180
RTOR Reduction (vph)	0	2	0	0	3	0	0	25	0	0	22	0
Lane Group Flow (vph)	133	794	0	176	1080	0	91	243	0	127	351	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	84.4	76.9		90.6	80.0		41.5	41.5		41.5	41.5	
Effective Green, g (s)	84.4	76.9		90.6	80.0		41.5	41.5		41.5	41.5	
Actuated g/C Ratio	0.56	0.51		0.60	0.53		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	138	942		242	974		138	476		221	478	
v/s Ratio Prot	0.05	0.43		c0.05	c0.59			0.14			c0.20	
v/s Ratio Perm	0.49			0.39			0.18			0.16		
v/c Ratio	0.96	0.84		0.73	1.11		0.66	0.51		0.57	0.73	
Uniform Delay, d1	44.5	31.4		26.2	35.0		48.0	45.7		46.7	49.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	64.8	8.0		8.9	63.4		11.9	1.2		4.3	6.1	
Delay (s)	109.2	39.3		35.1	98.4		59.9	46.9		50.9	55.4	
Level of Service	F	D		D	F		E	D		D	E	
Approach Delay (s)		49.3			89.5			50.2			54.2	
Approach LOS		D			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	66.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	108.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	796	176	1083	91	268	127	373
v/c Ratio	0.96	0.84	0.72	1.11	0.66	0.54	0.57	0.75
Control Delay	102.0	41.3	31.8	96.3	72.3	44.5	58.6	55.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	102.0	41.3	31.8	96.3	72.3	44.5	58.6	55.6
Queue Length 50th (ft)	80	653	67	~1204	79	196	107	309
Queue Length 95th (ft)	#223	878	129	#1471	#166	292	185	435
Internal Link Dist (ft)		1116		1752		3283		3611
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	138	945	264	978	138	500	221	500
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.84	0.67	1.11	0.66	0.54	0.57	0.75

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	195	0	0	0	0	245	938	199	786	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	50	0	212	0	0	0	0	266	1020	216	854	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								505				
pX, platoon unblocked												
vC, conflicting volume	1553	1553	854	1765	1553	266	854			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1553	1553	854	1765	1553	266	854			266		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	38	100	41	100	100	100	100			83		
cM capacity (veh/h)	80	94	358	23	94	772	785			1298		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	262	266	1020	1071
Volume Left	50	0	0	216
Volume Right	212	0	1020	0
cSH	216	1700	1700	1298
Volume to Capacity	1.21	0.16	0.60	0.17
Queue Length 95th (ft)	330	0	0	15
Control Delay (s)	176.7	0.0	0.0	3.9
Lane LOS	F			A
Approach Delay (s)	176.7	0.0		3.9
Approach LOS	F			

Intersection Summary			
Average Delay	19.3		
Intersection Capacity Utilization	135.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	146	0	0	0	0	581	557	47	1389	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	29	0	159	0	0	0	0	632	605	51	1510	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								502				
pX, platoon unblocked												
vC, conflicting volume	2243	2243	1510	2402	2243	632	1510			632		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2243	2243	1510	2402	2243	632	1510			632		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	0	0	100	100	100			95		
cM capacity (veh/h)	29	40	148	0	40	481	443			951		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	188	632	605	1561
Volume Left	29	0	0	51
Volume Right	159	0	605	0
cSH	90	1700	1700	951
Volume to Capacity	2.10	0.37	0.36	0.05
Queue Length 95th (ft)	414	0	0	4
Control Delay (s)	606.2	0.0	0.0	4.5
Lane LOS	F			A
Approach Delay (s)	606.2	0.0		4.5
Approach LOS	F			

Intersection Summary			
Average Delay	40.5		
Intersection Capacity Utilization	130.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	195	0	0	0	0	245	938	199	786	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	50	0	212	0	0	0	0	266	1020	216	854	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								513				
pX, platoon unblocked												
vC, conflicting volume	1553	1553	854	1765	1553	266	854			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1553	1553	854	1765	1553	266	854			266		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	38	100	41	100	100	100	100			83		
cM capacity (veh/h)	80	94	358	23	94	772	785			1298		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	50	212	266	1020	216	854
Volume Left	50	0	0	0	216	0
Volume Right	0	212	0	1020	0	0
cSH	80	358	1700	1700	1298	1700
Volume to Capacity	0.62	0.59	0.16	0.60	0.17	0.50
Queue Length 95th (ft)	71	91	0	0	15	0
Control Delay (s)	105.4	28.6	0.0	0.0	8.3	0.0
Lane LOS	F	D			A	
Approach Delay (s)	43.3		0.0		1.7	
Approach LOS	E					

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	146	0	0	0	0	581	557	47	1389	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	29	0	159	0	0	0	0	632	605	51	1510	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								503				
pX, platoon unblocked	0.90	0.90		0.90	0.90	0.90				0.90		
vC, conflicting volume	2243	2243	1510	2402	2243	632	1510			632		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2323	2323	1510	2498	2323	539	1510			539		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	0	0	100	100	100			95		
cM capacity (veh/h)	23	32	148	0	32	490	443			930		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	29	159	632	605	51	1510
Volume Left	29	0	0	0	51	0
Volume Right	0	159	0	605	0	0
cSH	23	148	1700	1700	930	1700
Volume to Capacity	1.29	1.07	0.37	0.36	0.05	0.89
Queue Length 95th (ft)	94	210	0	0	4	0
Control Delay (s)	540.7	155.2	0.0	0.0	9.1	0.0
Lane LOS	F	F			A	
Approach Delay (s)	215.4		0.0		0.3	
Approach LOS	F					

Intersection Summary			
Average Delay	13.7		
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		

APPENDIX J
TOTAL FUTURE (2020) PEAK HOUR
ANALYSIS WORKSHEETS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	84	88	172	197	180	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	91	96	187	214	196	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	805	294			401	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	805	294			401	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	87			83	
cM capacity (veh/h)	292	745			1158	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	187	401	315
Volume Left	91	0	196
Volume Right	96	214	0
cSH	424	1700	1158
Volume to Capacity	0.44	0.24	0.17
Queue Length 95th (ft)	55	0	15
Control Delay (s)	20.0	0.0	6.0
Lane LOS	C		A
Approach Delay (s)	20.0	0.0	6.0
Approach LOS	C		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	258	233	170	97	118	100
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	280	253	185	105	128	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	603	238			290	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	603	238			290	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	33	68			90	
cM capacity (veh/h)	416	801			1272	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	534	290	237
Volume Left	280	0	128
Volume Right	253	105	0
cSH	539	1700	1272
Volume to Capacity	0.99	0.17	0.10
Queue Length 95th (ft)	346	0	8
Control Delay (s)	64.2	0.0	4.8
Lane LOS	F		A
Approach Delay (s)	64.2	0.0	4.8
Approach LOS	F		

Intersection Summary			
Average Delay	33.4		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	84	88	172	197	180	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	91	96	187	214	196	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	805	294			401	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	805	294			401	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	87			83	
cM capacity (veh/h)	292	745			1158	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	91	96	401	315
Volume Left	91	0	0	196
Volume Right	0	96	214	0
cSH	292	745	1700	1158
Volume to Capacity	0.31	0.13	0.24	0.17
Queue Length 95th (ft)	32	11	0	15
Control Delay (s)	22.8	10.5	0.0	6.0
Lane LOS	C	B		A
Approach Delay (s)	16.5		0.0	6.0
Approach LOS	C			

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	258	233	170	97	118	100
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	280	253	185	105	128	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	603	238			290	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	603	238			290	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	33	68			90	
cM capacity (veh/h)	416	801			1272	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	280	253	290	237
Volume Left	280	0	0	128
Volume Right	0	253	105	0
cSH	416	801	1700	1272
Volume to Capacity	0.67	0.32	0.17	0.10
Queue Length 95th (ft)	121	34	0	8
Control Delay (s)	29.8	11.6	0.0	4.8
Lane LOS	D	B		A
Approach Delay (s)	21.2		0.0	4.8
Approach LOS	C			

Intersection Summary			
Average Delay	11.7		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	237	60	88	163	191	53	89	148	148	67	12
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
Hourly flow rate (vph)	20	258	65	96	177	208	58	97	161	161	73	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	277	65	480	154	161	234	13
Volume Left (vph)	20	0	96	58	0	161	0
Volume Right (vph)	0	65	208	0	161	0	13
Hadj (s)	0.07	-0.67	-0.19	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.8	7.1	7.1	8.4	7.5	8.6	7.5
Degree Utilization, x	0.60	0.13	0.95	0.36	0.33	0.56	0.03
Capacity (veh/h)	450	495	499	423	471	415	467
Control Delay (s)	20.7	9.9	54.4	14.8	13.0	20.6	9.5
Approach Delay (s)	18.7		54.4	13.9		20.0	
Approach LOS	C		F	B		C	

Intersection Summary			
Delay	30.2		
Level of Service	D		
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	117	71	241	108	84	186	54
Average Queue (ft)	68	27	120	46	42	75	21
95th Queue (ft)	101	49	212	81	79	145	60
Link Distance (ft)	2673		2817	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						33	2
Queuing Penalty (veh)						4	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	14	221	50	204	355	139	53	68	155	121	68	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	240	54	222	386	151	58	74	168	132	74	23

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	255	54	759	132	168	205	23
Volume Left (vph)	15	0	222	58	0	132	0
Volume Right (vph)	0	54	151	0	168	0	23
Hadj (s)	0.06	-0.67	-0.03	0.25	-0.67	0.35	-0.67
Departure Headway (s)	7.5	6.8	6.9	8.1	7.1	8.2	7.2
Degree Utilization, x	0.53	0.10	1.46	0.29	0.33	0.47	0.05
Capacity (veh/h)	465	510	524	432	485	423	477
Control Delay (s)	17.5	9.3	236.8	13.2	12.5	17.1	9.4
Approach Delay (s)	16.0		236.8	12.8		16.3	
Approach LOS	C		F	B		C	

Intersection Summary			
Delay	120.3		
Level of Service	F		
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	LT	R	LT	R
Maximum Queue (ft)	119	74	427	53	91	136	55
Average Queue (ft)	75	33	202	38	46	72	29
95th Queue (ft)	115	64	389	57	74	116	70
Link Distance (ft)	2673		2817	2619		3915	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		200			175		30
Storage Blk Time (%)						36	3
Queuing Penalty (veh)						8	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	237	60	88	163	191	53	89	148	148	67	12
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
Hourly flow rate (vph)	20	258	65	96	177	208	58	97	161	161	73	13

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	277	65	96	385	154	161	234	13
Volume Left (vph)	20	0	96	0	58	0	161	0
Volume Right (vph)	0	65	0	208	0	161	0	13
Hadj (s)	0.07	-0.67	0.53	-0.34	0.22	-0.67	0.38	-0.67
Departure Headway (s)	7.3	6.5	7.5	6.7	7.7	6.8	7.9	6.8
Degree Utilization, x	0.56	0.12	0.20	0.71	0.33	0.30	0.51	0.02
Capacity (veh/h)	475	519	458	522	435	497	423	489
Control Delay (s)	17.9	9.2	11.2	23.1	13.2	11.5	17.6	8.8
Approach Delay (s)	16.3		20.8		12.3		17.2	
Approach LOS	C		C		B		C	

Intersection Summary			
Delay	17.1		
Level of Service	C		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	110	50	68	150	71	73	134	55
Average Queue (ft)	64	30	35	73	38	43	74	25
95th Queue (ft)	102	42	58	136	64	68	124	65
Link Distance (ft)	2672			2819	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)				1			35	2
Queuing Penalty (veh)				1			4	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	14	221	50	204	355	139	53	68	155	121	68	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	240	54	222	386	151	58	74	168	132	74	23

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	255	54	222	537	132	168	205	23
Volume Left (vph)	15	0	222	0	58	0	132	0
Volume Right (vph)	0	54	0	151	0	168	0	23
Hadj (s)	0.06	-0.67	0.53	-0.16	0.25	-0.67	0.35	-0.67
Departure Headway (s)	7.6	6.9	7.5	6.8	8.1	7.2	8.3	7.3
Degree Utilization, x	0.54	0.10	0.46	1.01	0.30	0.34	0.47	0.05
Capacity (veh/h)	460	502	472	537	433	485	424	475
Control Delay (s)	18.0	9.5	15.5	66.3	13.2	12.6	17.2	9.4
Approach Delay (s)	16.5		51.4		12.9		16.4	
Approach LOS	C		F		B		C	

Intersection Summary			
Delay	32.4		
Level of Service	D		
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 2: Hatcher Avenue & Hirst Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	LT	R	LT	R
Maximum Queue (ft)	96	50	175	264	74	88	120	55
Average Queue (ft)	66	24	77	122	39	38	73	19
95th Queue (ft)	92	47	148	227	70	66	120	60
Link Distance (ft)	2672			2819	2612		3909	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	150			175		30
Storage Blk Time (%)			0	5			45	2
Queuing Penalty (veh)			0	11			10	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	499	6	12	389	25	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	542	7	13	423	27	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			549		995	546
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			549		995	546
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		90	91
cM capacity (veh/h)			1021		268	538

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	549	13	423	78
Volume Left	0	13	0	27
Volume Right	7	0	0	51
cSH	1700	1021	1700	399
Volume to Capacity	0.32	0.01	0.25	0.20
Queue Length 95th (ft)	0	1	0	18
Control Delay (s)	0.0	8.6	0.0	16.2
Lane LOS		A		C
Approach Delay (s)	0.0	0.3		16.2
Approach LOS				C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	506	26	48	733	14	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	550	28	52	797	15	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			578		1465	564
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			578		1465	564
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		89	95
cM capacity (veh/h)			995		134	525

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	578	52	797	43
Volume Left	0	52	0	15
Volume Right	28	0	0	28
cSH	1700	995	1700	259
Volume to Capacity	0.34	0.05	0.47	0.17
Queue Length 95th (ft)	0	4	0	15
Control Delay (s)	0.0	8.8	0.0	21.7
Lane LOS		A		C
Approach Delay (s)	0.0	0.5		21.7
Approach LOS				C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	406	140	219	343	57	147
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	441	152	238	373	62	160
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			593		1290	441
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			593		1290	441
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		55	74
cM capacity (veh/h)			983		137	616

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	441	152	238	373	62	160
Volume Left	0	0	238	0	62	0
Volume Right	0	152	0	0	0	160
cSH	1700	1700	983	1700	137	616
Volume to Capacity	0.26	0.09	0.24	0.22	0.45	0.26
Queue Length 95th (ft)	0	0	24	0	51	26
Control Delay (s)	0.0	0.0	9.8	0.0	51.5	12.9
Lane LOS			A		F	B
Approach Delay (s)	0.0		3.8		23.7	
Approach LOS					C	

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	422	109	347	789	108	168
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	459	118	377	858	117	183
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			577		2071	459
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			577		2071	459
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			62		0	70
cM capacity (veh/h)			996		37	602

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	459	118	377	858	117	183
Volume Left	0	0	377	0	117	0
Volume Right	0	118	0	0	0	183
cSH	1700	1700	996	1700	37	602
Volume to Capacity	0.27	0.07	0.38	0.50	3.18	0.30
Queue Length 95th (ft)	0	0	45	0	Err	32
Control Delay (s)	0.0	0.0	10.8	0.0	Err	13.6
Lane LOS			B		F	B
Approach Delay (s)	0.0		3.3		3920.9	
Approach LOS					F	

Intersection Summary			
Average Delay	558.9		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	573	117	154	703	648	513
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1748		1770	1863	1863	1583
Flt Permitted	0.96		0.10	1.00	1.00	1.00
Satd. Flow (perm)	1748		189	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	623	127	167	764	704	558
RTOR Reduction (vph)	8	0	0	0	0	360
Lane Group Flow (vph)	742	0	167	764	704	198
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	32.0		44.5	44.5	32.0	32.0
Effective Green, g (s)	32.0		44.5	44.5	32.0	32.0
Actuated g/C Ratio	0.36		0.49	0.49	0.36	0.36
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	621		181	921	662	562
v/s Ratio Prot	c0.42		0.05	c0.41	c0.38	
v/s Ratio Perm			0.41			0.13
v/c Ratio	1.19		0.92	0.83	1.06	0.35
Uniform Delay, d1	29.0		20.4	19.5	29.0	21.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	102.6		45.1	8.6	53.1	1.7
Delay (s)	131.6		65.5	28.1	82.1	23.1
Level of Service	F		E	C	F	C
Approach Delay (s)	131.6			34.8	56.0	
Approach LOS	F			C	E	

Intersection Summary			
HCM 2000 Control Delay	68.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	750	167	764	704	558
v/c Ratio	1.19	0.94	0.83	1.06	0.61
Control Delay	130.2	73.3	29.2	83.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	130.2	73.3	29.2	83.2	5.1
Queue Length 50th (ft)	~518	52	356	~446	0
Queue Length 95th (ft)	#741	#169	#581	#658	68
Internal Link Dist (ft)	1865		1079	429	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	629	178	921	662	922
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.19	0.94	0.83	1.06	0.61

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	480	118	237	918	820	867
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1743		1770	1863	1863	1583
Flt Permitted	0.96		0.09	1.00	1.00	1.00
Satd. Flow (perm)	1743		169	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	128	258	998	891	942
RTOR Reduction (vph)	10	0	0	0	0	525
Lane Group Flow (vph)	640	0	258	998	891	417
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	26.0		50.5	50.5	36.5	36.5
Effective Green, g (s)	26.0		50.5	50.5	36.5	36.5
Actuated g/C Ratio	0.29		0.56	0.56	0.41	0.41
Clearance Time (s)	7.0		7.5	6.5	6.5	6.5
Vehicle Extension (s)	3.5		2.5	3.5	3.5	3.5
Lane Grp Cap (vph)	503		210	1045	755	641
v/s Ratio Prot	c0.37		0.09	c0.54	0.48	
v/s Ratio Perm			c0.60			0.26
v/c Ratio	1.27		1.23	0.96	1.18	0.65
Uniform Delay, d1	32.0		24.1	18.7	26.8	21.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	137.5		137.4	18.9	94.5	5.0
Delay (s)	169.5		161.5	37.6	121.2	26.6
Level of Service	F		F	D	F	C
Approach Delay (s)	169.5			63.0	72.6	
Approach LOS	F			E	E	

Intersection Summary			
HCM 2000 Control Delay	86.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	107.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	258	998	891	942
v/c Ratio	1.27	1.23	0.96	1.18	0.81
Control Delay	164.6	161.4	39.2	121.8	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	164.6	161.4	39.2	121.8	8.9
Queue Length 50th (ft)	~468	~134	500	~613	20
Queue Length 95th (ft)	#680	#287	#802	#842	164
Internal Link Dist (ft)	622		1079	429	
Turn Bay Length (ft)		310			400
Base Capacity (vph)	513	209	1045	755	1167
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.27	1.23	0.96	1.18	0.81

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	573	117	154	703	648	513
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	4.0
Lane Util. Factor	*0.60		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	2092		1770	3539	1863	1583
Flt Permitted	0.96		0.10	1.00	1.00	1.00
Satd. Flow (perm)	2092		177	3539	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	623	127	167	764	704	558
RTOR Reduction (vph)	10	0	0	0	0	0
Lane Group Flow (vph)	740	0	167	764	704	558
Turn Type	NA		pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases			2			Free
Actuated Green, G (s)	29.0		47.5	47.5	34.5	90.0
Effective Green, g (s)	29.0		47.5	47.5	34.5	90.0
Actuated g/C Ratio	0.32		0.53	0.53	0.38	1.00
Clearance Time (s)	7.0		7.5	6.5	6.5	
Vehicle Extension (s)	3.5		2.5	3.5	3.5	
Lane Grp Cap (vph)	674		190	1867	714	1583
v/s Ratio Prot	c0.35		c0.05	0.22	c0.38	
v/s Ratio Perm			0.41			0.35
v/c Ratio	1.10		0.88	0.41	0.99	0.35
Uniform Delay, d1	30.5		19.6	12.8	27.5	0.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	64.4		33.5	0.7	30.4	0.6
Delay (s)	94.9		53.0	13.5	58.0	0.6
Level of Service	F		D	B	E	A
Approach Delay (s)	94.9			20.6	32.6	
Approach LOS	F			C	C	

Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	750	167	764	704	558
v/c Ratio	1.10	0.89	0.41	0.99	0.35
Control Delay	94.2	60.2	13.6	59.7	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	94.2	60.2	13.6	59.7	0.6
Queue Length 50th (ft)	~402	48	130	389	0
Queue Length 95th (ft)	#587	#163	172	#627	0
Internal Link Dist (ft)	653		1079	429	
Turn Bay Length (ft)	600	310			
Base Capacity (vph)	684	188	1867	714	1583
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.10	0.89	0.41	0.99	0.35

Intersection Summary

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

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	480	118	237	918	820	867
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		7.5	6.5	6.5	4.0
Lane Util. Factor	*0.93		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	0.96		0.95	1.00	1.00	1.00
Satd. Flow (prot)	3233		1770	3539	1863	1583
Flt Permitted	0.96		0.08	1.00	1.00	1.00
Satd. Flow (perm)	3233		153	3539	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	128	258	998	891	942
RTOR Reduction (vph)	23	0	0	0	0	0
Lane Group Flow (vph)	627	0	258	998	891	942
Turn Type	NA		pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases			2			Free
Actuated Green, G (s)	20.4		56.1	56.1	41.1	90.0
Effective Green, g (s)	20.4		56.1	56.1	41.1	90.0
Actuated g/C Ratio	0.23		0.62	0.62	0.46	1.00
Clearance Time (s)	7.0		7.5	6.5	6.5	
Vehicle Extension (s)	3.5		2.5	3.5	3.5	
Lane Grp Cap (vph)	732		230	2205	850	1583
v/s Ratio Prot	c0.19		0.09	0.28	0.48	
v/s Ratio Perm			c0.60			c0.59
v/c Ratio	0.86		1.12	0.45	1.05	0.60
Uniform Delay, d1	33.4		27.0	8.9	24.4	0.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	9.9		96.0	0.7	44.3	1.7
Delay (s)	43.3		122.9	9.6	68.7	1.7
Level of Service	D		F	A	E	A
Approach Delay (s)	43.3			32.9	34.3	
Approach LOS	D			C	C	

Intersection Summary			
HCM 2000 Control Delay	35.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	258	998	891	942
v/c Ratio	0.86	1.13	0.45	1.05	0.60
Control Delay	45.0	122.7	9.8	70.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	122.7	9.8	70.1	1.7
Queue Length 50th (ft)	181	~123	145	~564	0
Queue Length 95th (ft)	#273	#276	187	#792	0
Internal Link Dist (ft)	622		1079	429	
Turn Bay Length (ft)	600	310			
Base Capacity (vph)	776	228	2207	851	1583
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	1.13	0.45	1.05	0.60

Intersection Summary

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

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	158	735	411	124	125	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1770	1863	1804		1712	
Flt Permitted	0.22	1.00	1.00		0.97	
Satd. Flow (perm)	412	1863	1804		1712	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	172	799	447	135	136	89
RTOR Reduction (vph)	0	0	12	0	25	0
Lane Group Flow (vph)	172	799	570	0	200	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	47.4	47.4	33.1		15.4	
Effective Green, g (s)	47.4	47.4	33.1		15.4	
Actuated g/C Ratio	0.63	0.63	0.44		0.20	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	409	1172	792		350	
v/s Ratio Prot	0.05	c0.43	0.32		c0.12	
v/s Ratio Perm	0.22					
v/c Ratio	0.42	0.68	0.72		0.57	
Uniform Delay, d1	9.0	9.1	17.3		27.0	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	2.5	4.5		2.7	
Delay (s)	9.2	11.6	21.8		29.7	
Level of Service	A	B	C		C	
Approach Delay (s)		11.1	21.8		29.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	18.5
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	172	799	582	225
v/c Ratio	0.42	0.69	0.74	0.60
Control Delay	9.4	13.5	23.8	32.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.4	13.5	23.8	32.8
Queue Length 50th (ft)	28	210	209	83
Queue Length 95th (ft)	67	429	382	183
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	428	1562	1217	589
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.40	0.51	0.48	0.38

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	164	794	956	157	132	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.5	6.5		6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1827		1670	
Flt Permitted	0.06	1.00	1.00		0.98	
Satd. Flow (perm)	117	1863	1827		1670	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	863	1039	171	143	264
RTOR Reduction (vph)	0	0	6	0	66	0
Lane Group Flow (vph)	178	863	1204	0	341	0
Turn Type	pm+pt	NA	NA		NA	
Protected Phases	5	2	6		4	
Permitted Phases	2					
Actuated Green, G (s)	68.5	68.5	57.5		19.0	
Effective Green, g (s)	68.5	68.5	57.5		19.0	
Actuated g/C Ratio	0.68	0.68	0.58		0.19	
Clearance Time (s)	6.0	6.5	6.5		6.0	
Vehicle Extension (s)	2.0	6.0	6.0		4.0	
Lane Grp Cap (vph)	162	1276	1050		317	
v/s Ratio Prot	0.05	c0.46	c0.66		c0.20	
v/s Ratio Perm	0.69					
v/c Ratio	1.10	0.68	1.15		1.07	
Uniform Delay, d1	30.9	9.2	21.2		40.5	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	99.6	2.2	77.4		71.7	
Delay (s)	130.5	11.5	98.7		112.2	
Level of Service	F	B	F		F	
Approach Delay (s)		31.8	98.7		112.2	
Approach LOS		C	F		F	

Intersection Summary			
HCM 2000 Control Delay	74.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	178	863	1210	407
v/c Ratio	1.09	0.68	1.15	1.06
Control Delay	119.6	12.6	99.9	96.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	119.6	12.6	99.9	96.1
Queue Length 50th (ft)	~77	285	~910	~242
Queue Length 95th (ft)	#214	416	#1166	#429
Internal Link Dist (ft)		744	988	2618
Turn Bay Length (ft)	150			
Base Capacity (vph)	163	1276	1056	383
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.09	0.68	1.15	1.06

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	617	54	84	327	90	43	183	144	143	102	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.93		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1840		1770	1802		1770	1740		1770	1738	
Flt Permitted	0.33	1.00		0.16	1.00		0.59	1.00		0.35	1.00	
Satd. Flow (perm)	622	1840		293	1802		1091	1740		646	1738	
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)	141	671	59	91	355	98	47	199	157	155	111	90
RTOR Reduction (vph)	0	3	0	0	8	0	0	23	0	0	23	0
Lane Group Flow (vph)	141	727	0	91	445	0	47	333	0	155	178	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	60.8	52.2		53.4	48.5		32.0	32.0		32.0	32.0	
Effective Green, g (s)	60.8	52.2		53.4	48.5		32.0	32.0		32.0	32.0	
Actuated g/C Ratio	0.55	0.47		0.49	0.44		0.29	0.29		0.29	0.29	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	433	872		207	793		317	505		187	505	
v/s Ratio Prot	c0.03	c0.40		0.02	0.25			0.19			0.10	
v/s Ratio Perm	0.15			0.19			0.04			c0.24		
v/c Ratio	0.33	0.83		0.44	0.56		0.15	0.66		0.83	0.35	
Uniform Delay, d1	13.6	25.2		19.7	22.9		28.9	34.3		36.5	30.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	8.0		0.5	1.9		0.3	3.5		26.1	0.6	
Delay (s)	13.8	33.2		20.2	24.8		29.2	37.8		62.5	31.4	
Level of Service	B	C		C	C		C	D		E	C	
Approach Delay (s)		30.1			24.0			36.8			45.0	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.1	Sum of lost time (s)	21.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	730	91	453	47	356	155	201
v/c Ratio	0.33	0.83	0.39	0.59	0.15	0.67	0.82	0.38
Control Delay	14.1	36.4	17.1	27.3	33.1	39.6	72.9	29.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	36.4	17.1	27.3	33.1	39.6	72.9	29.7
Queue Length 50th (ft)	47	484	30	244	27	225	113	104
Queue Length 95th (ft)	86	716	59	378	60	343	#236	178
Internal Link Dist (ft)		1116		1752		3283		2486
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	456	1123	242	1044	446	731	264	730
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.65	0.38	0.43	0.11	0.49	0.59	0.28

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	142	668	64	162	874	137	84	121	125	125	178	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1838		1770	1825		1770	1721		1770	1720	
Flt Permitted	0.06	1.00		0.14	1.00		0.19	1.00		0.41	1.00	
Satd. Flow (perm)	108	1838		258	1825		354	1721		762	1720	
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)	154	726	70	176	950	149	91	132	136	136	193	201
RTOR Reduction (vph)	0	2	0	0	4	0	0	28	0	0	29	0
Lane Group Flow (vph)	154	794	0	176	1095	0	91	240	0	136	365	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	77.0	68.9		79.6	70.2		31.7	31.7		31.7	31.7	
Effective Green, g (s)	77.0	68.9		79.6	70.2		31.7	31.7		31.7	31.7	
Actuated g/C Ratio	0.59	0.53		0.61	0.54		0.24	0.24		0.24	0.24	
Clearance Time (s)	6.5	7.0		6.5	7.0		7.5	7.5		7.5	7.5	
Vehicle Extension (s)	2.0	6.0		2.0	6.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	166	966		265	977		85	416		184	416	
v/s Ratio Prot	c0.06	0.43		0.05	c0.60			0.14			0.21	
v/s Ratio Perm	0.49			0.36			c0.26			0.18		
v/c Ratio	0.93	0.82		0.66	1.12		1.07	0.58		0.74	0.88	
Uniform Delay, d1	39.0	25.9		21.0	30.4		49.6	43.7		45.8	47.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	48.1	6.7		4.8	67.9		118.1	2.3		15.3	18.9	
Delay (s)	87.1	32.6		25.8	98.3		167.8	46.1		61.1	66.7	
Level of Service	F	C		C	F		F	D		E	E	
Approach Delay (s)		41.4			88.3			76.9			65.3	
Approach LOS		D			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	68.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	131.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	111.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	154	796	176	1099	91	268	136	394
v/c Ratio	0.93	0.82	0.66	1.12	1.07	0.60	0.74	0.89
Control Delay	84.1	34.7	22.8	97.1	165.8	44.3	70.4	65.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.1	34.7	22.8	97.1	165.8	44.3	70.4	65.9
Queue Length 50th (ft)	80	545	54	~1072	~85	175	107	297
Queue Length 95th (ft)	#220	760	93	#1337	#200	271	#213	#481
Internal Link Dist (ft)		1116		1752		3283		2486
Turn Bay Length (ft)			135		85		150	
Base Capacity (vph)	166	969	289	982	85	444	184	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.82	0.61	1.12	1.07	0.60	0.74	0.89

Intersection Summary

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

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	544	0	0	401	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	591	0	0	436	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			591		1027	591
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			591		1027	591
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			984		260	507

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	591	0	0	436	0	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.35	0.00	0.00	0.26	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS					A	A
Approach Delay (s)	0.0		0.0		0.0	
Approach LOS					A	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	435	96	160	734	43	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	473	104	174	798	47	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			577		1618	473
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			577		1618	473
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		50	83
cM capacity (veh/h)			996		94	591

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	473	104	174	798	47	103
Volume Left	0	0	174	0	47	0
Volume Right	0	104	0	0	0	103
cSH	1700	1700	996	1700	94	591
Volume to Capacity	0.28	0.06	0.17	0.47	0.50	0.17
Queue Length 95th (ft)	0	0	16	0	54	16
Control Delay (s)	0.0	0.0	9.4	0.0	76.6	12.4
Lane LOS			A		F	B
Approach Delay (s)	0.0		1.7		32.4	
Approach LOS					D	

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	204	359	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	222	390	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	612	390	390			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	612	390	390			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	457	658	1168			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	222	390
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1168	1700
Volume to Capacity	0.00	0.00	0.23
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	17	17	16	259	408	48
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	17	282	443	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	786	470	496			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	786	470	496			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	97	98			
cM capacity (veh/h)	355	594	1068			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	37	299	496
Volume Left	18	17	0
Volume Right	18	0	52
cSH	444	1068	1700
Volume to Capacity	0.08	0.02	0.29
Queue Length 95th (ft)	7	1	0
Control Delay (s)	13.8	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	13.8	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	195	0	0	0	0	245	960	199	791	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	50	0	212	0	0	0	0	266	1043	216	860	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	1559	1559	860	1771	1559	266	860			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1559	1559	860	1771	1559	266	860			266		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	37	100	40	100	100	100	100			83		
cM capacity (veh/h)	80	94	356	23	94	772	782			1298		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	262	266	1043	1076
Volume Left	50	0	0	216
Volume Right	212	0	1043	0
cSH	214	1700	1700	1298
Volume to Capacity	1.22	0.16	0.61	0.17
Queue Length 95th (ft)	334	0	0	15
Control Delay (s)	180.7	0.0	0.0	3.9
Lane LOS	F			A
Approach Delay (s)	180.7	0.0		3.9
Approach LOS	F			

Intersection Summary			
Average Delay	19.5		
Intersection Capacity Utilization	136.7%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	146	0	0	0	0	607	621	47	1555	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	29	0	159	0	0	0	0	660	675	51	1690	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	2452	2452	1690	2611	2452	660	1690			660		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2452	2452	1690	2611	2452	660	1690			660		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	0	0	100	100	100			94		
cM capacity (veh/h)	20	29	115	0	29	463	378			928		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	188	660	675	1741
Volume Left	29	0	0	51
Volume Right	159	0	675	0
cSH	67	1700	1700	928
Volume to Capacity	2.83	0.39	0.40	0.06
Queue Length 95th (ft)	473	0	0	4
Control Delay (s)	956.9	0.0	0.0	9.1
Lane LOS	F			A
Approach Delay (s)	956.9	0.0		9.1
Approach LOS	F			

Intersection Summary			
Average Delay	60.0		
Intersection Capacity Utilization	143.4%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	195	0	0	0	0	245	960	199	791	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	50	0	212	0	0	0	0	266	1043	216	860	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked												
vC, conflicting volume	1559	1559	860	1771	1559	266	860			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1559	1559	860	1771	1559	266	860			266		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	37	100	40	100	100	100	100			83		
cM capacity (veh/h)	80	94	356	23	94	772	782			1298		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	50	212	266	1043	216	860
Volume Left	50	0	0	0	216	0
Volume Right	0	212	0	1043	0	0
cSH	80	356	1700	1700	1298	1700
Volume to Capacity	0.63	0.60	0.16	0.61	0.17	0.51
Queue Length 95th (ft)	71	92	0	0	15	0
Control Delay (s)	107.1	29.0	0.0	0.0	8.3	0.0
Lane LOS	F	D			A	
Approach Delay (s)	43.9		0.0		1.7	
Approach LOS	E					

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

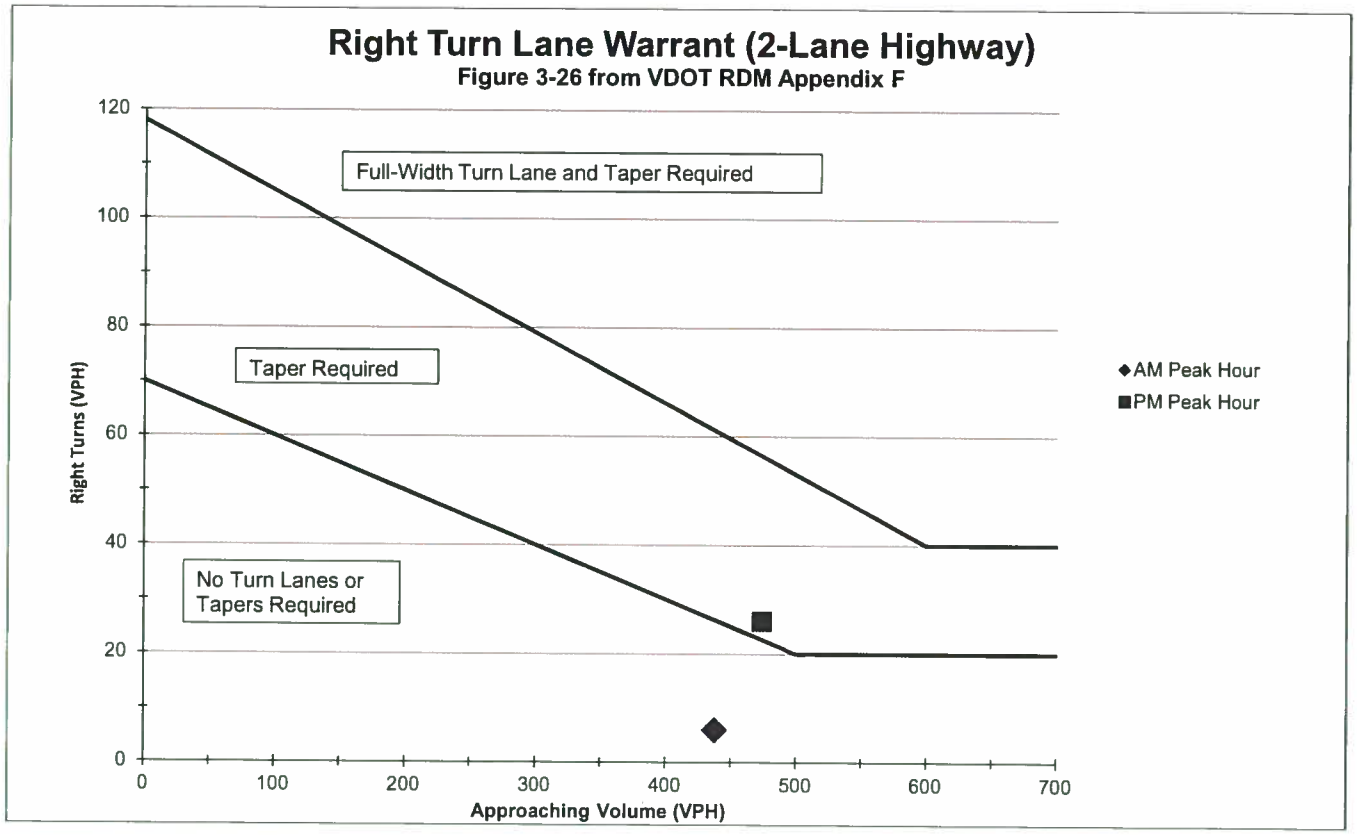
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	146	0	0	0	0	607	621	47	1555	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	159	0	0	0	0	660	675	51	1690	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								509				
pX, platoon unblocked	0.88	0.88		0.88	0.88	0.88				0.88		
vC, conflicting volume	2452	2452	1690	2611	2452	660	1690			660		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2587	2587	1690	2768	2587	541	1690			541		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	0	0	100	100	100			94		
cM capacity (veh/h)	14	21	115	0	21	474	378			900		

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	29	159	660	675	51	1690
Volume Left	29	0	0	0	51	0
Volume Right	0	159	0	675	0	0
cSH	14	115	1700	1700	900	1700
Volume to Capacity	2.08	1.37	0.39	0.40	0.06	0.99
Queue Length 95th (ft)	110	272	0	0	5	0
Control Delay (s)	1047.6	283.0	0.0	0.0	9.2	0.0
Lane LOS	F	F			A	
Approach Delay (s)	402.3		0.0		0.3	
Approach LOS	F					

Intersection Summary			
Average Delay	23.3		
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

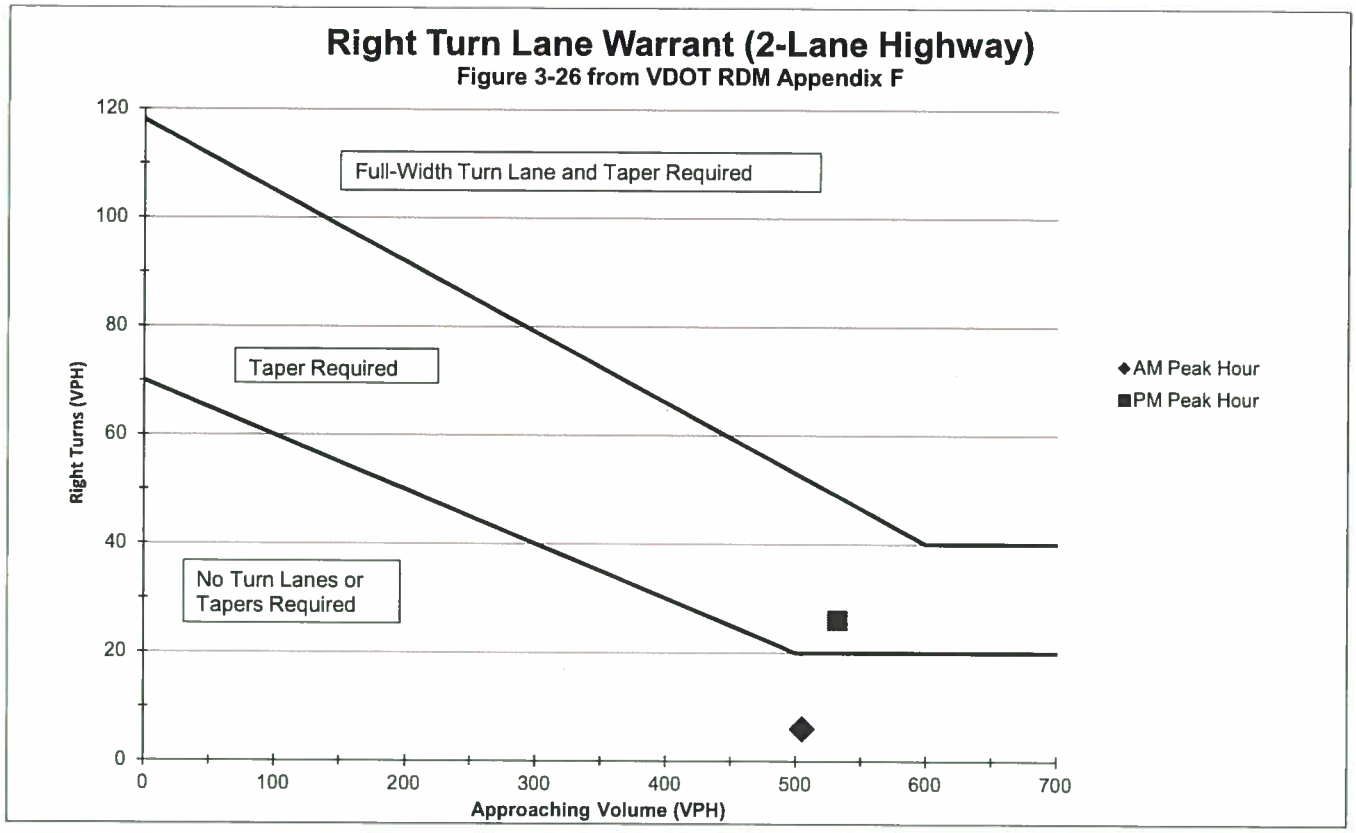
APPENDIX K

TURN LANE WARRANT ANALYSIS



Intersection: Hirst Road/Site Entrance #1 (Study Intersection #3)
Approach: Eastbound Right
Sceanrio: Total Future 2014
Speed Limit: 45 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	438	474
Right Turns	6	26
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A



Intersection: Hirst Road/Site Entrance #1 (Study Intersection #3)
Approach: Eastbound Right
Sceanrio: Total Future 2020
Speed Limit: 45 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	505	532
Right Turns	6	26
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

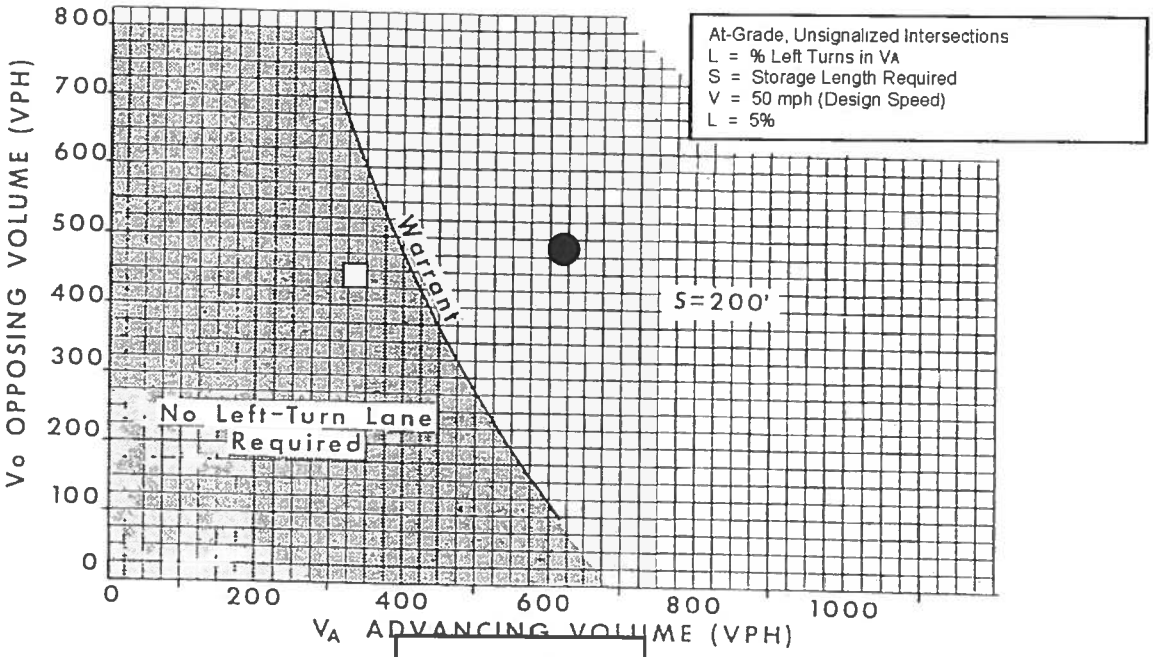
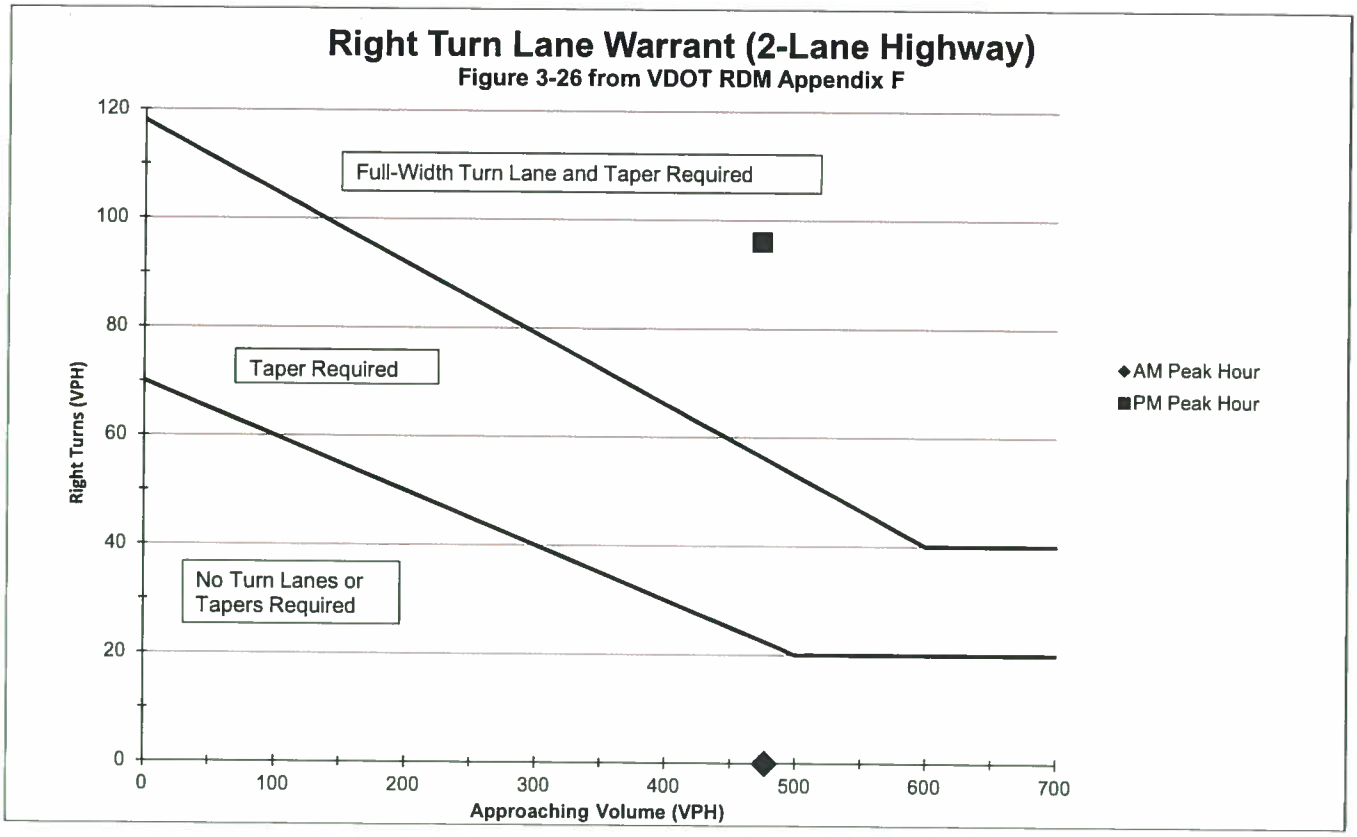


FIGURE 3-11

Intersection: Hirst Road/Site Entrance #1 (Study Intersection #3)
Approach: Westbound Left
Scenario: Total Future 2014

	AM Peak Hour	PM Peak Hour
VO, Opposing Volume	438	474
VA, Advancing Volume	350	690
VL, Left Turning Volume	12	48
Percent Left Turns	3.4%	7.0%
Symbol	□	●



Intersection: Hirst Road/Site Entrance #2 (Study Intersection #8)
Approach: Eastbound Right
Sceanrio: Total Future 2014
Speed Limit: 45 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	477	473
Right Turns	0	96
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

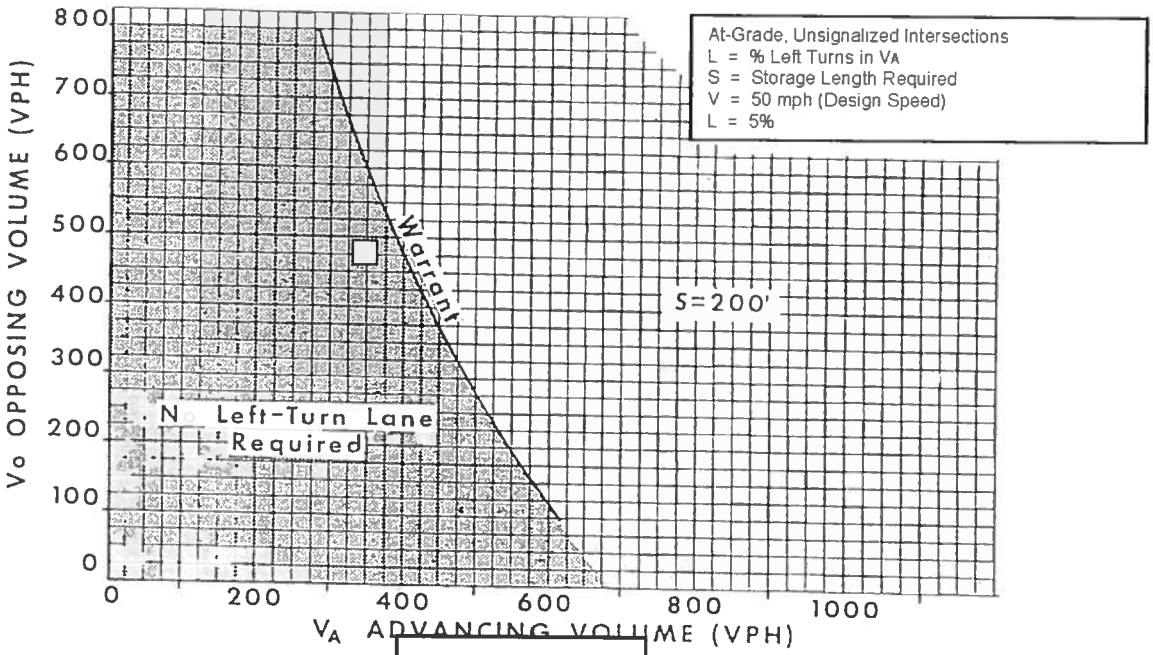


FIGURE 3-11

Intersection: Hirst Road/Site Entrance #2 (Study Intersection #8)
Approach: Westbound Left
Scenario: Total Future 2014

	AM Peak Hour
VO, Opposing Volume	477
VA, Advancing Volume	350
VL, Left Turning Volume	0
Percent Left Turns	0%
Symbol	□

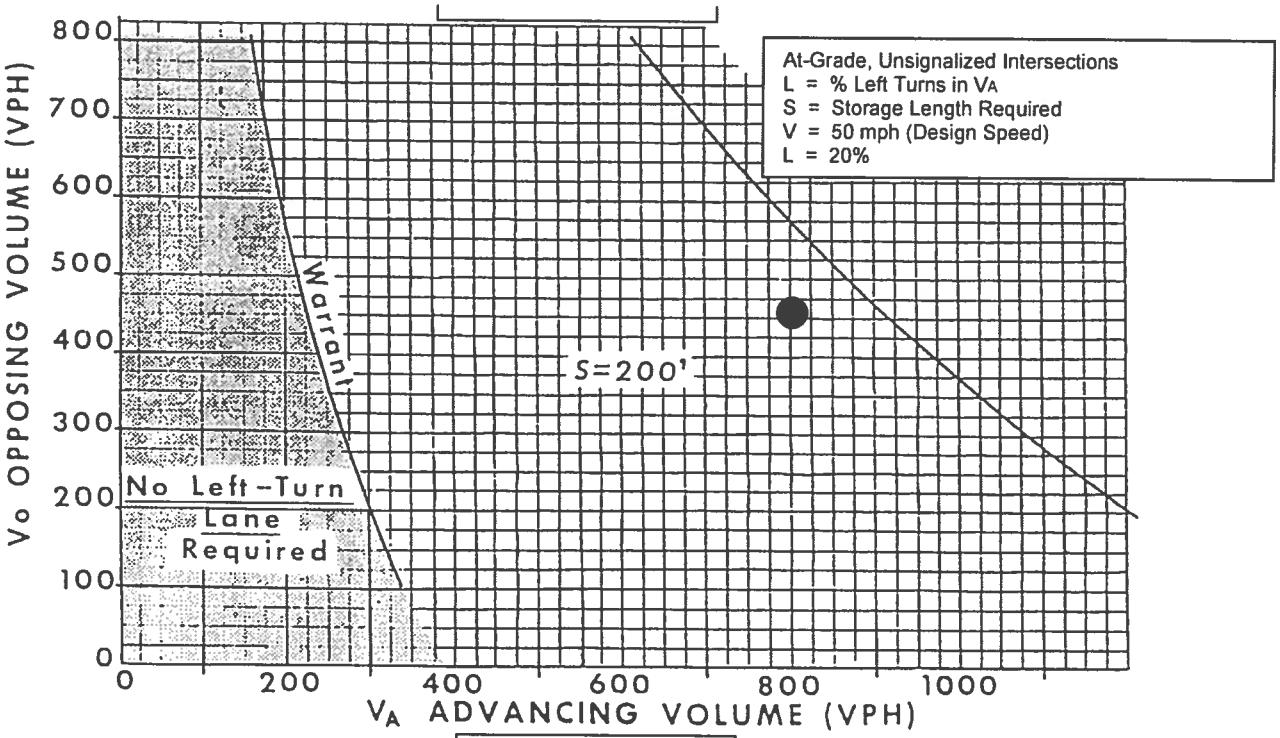
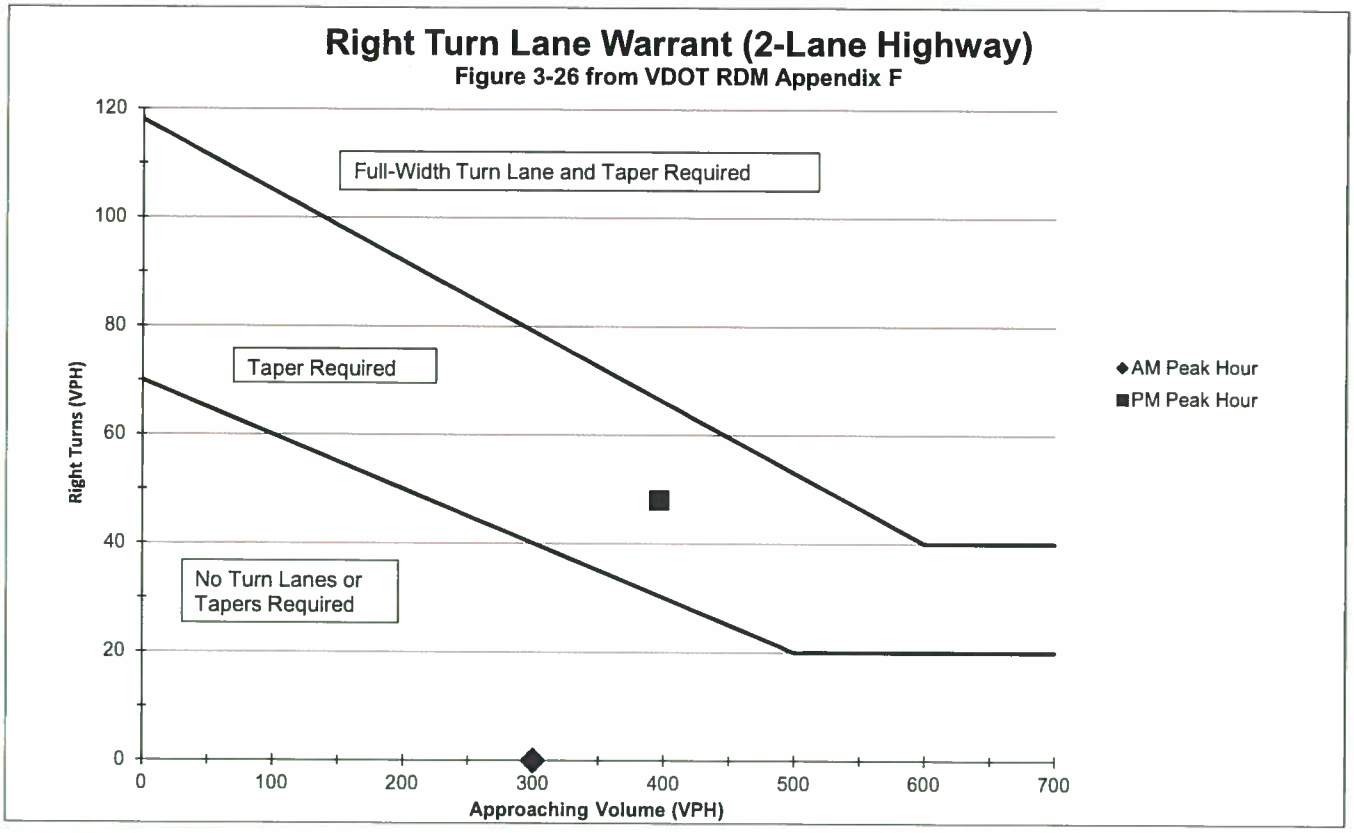


FIGURE 3-14

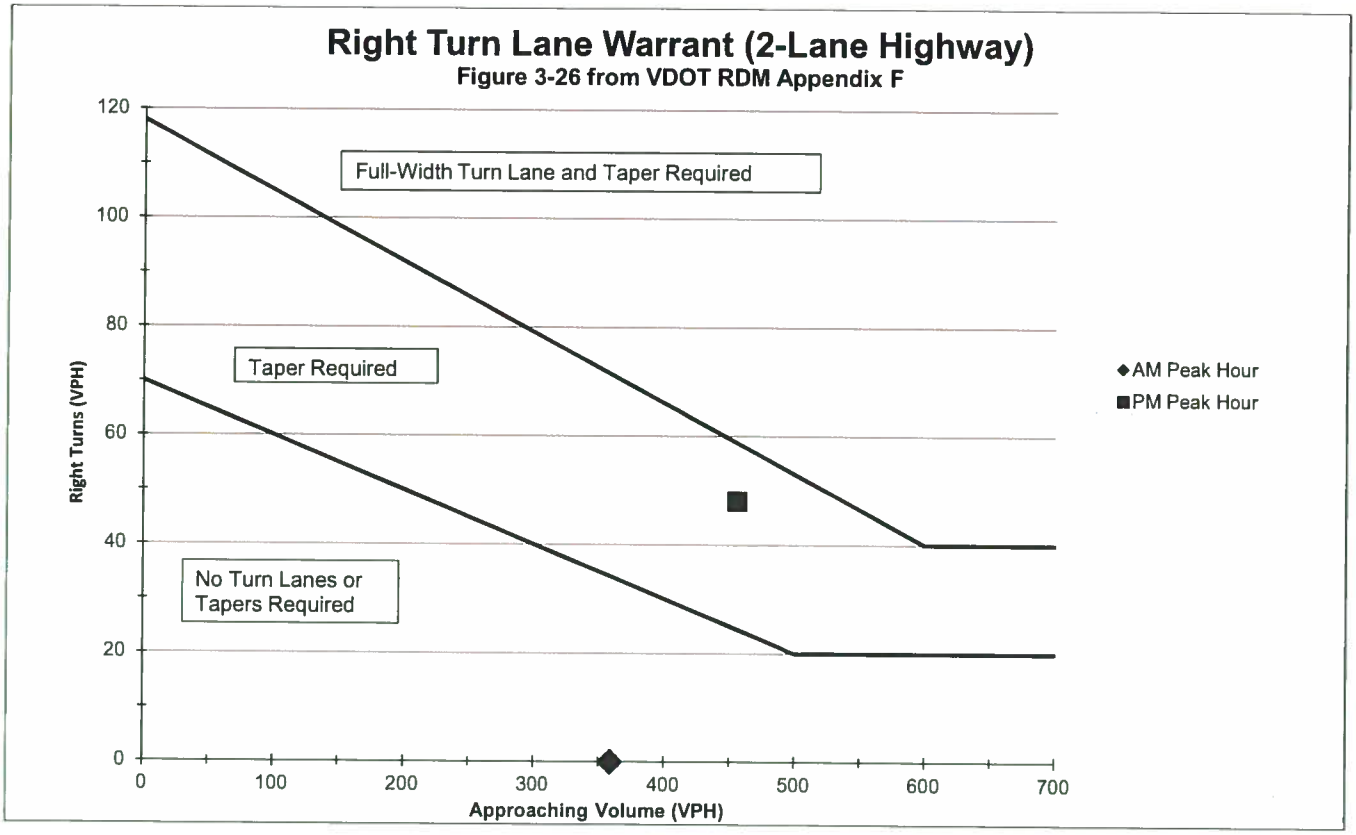
Intersection: Hirst Road/Site Entrance #2 (Study Intersection #8)
Approach: Westbound Left
Scenario: Total Future 2014

	PM Peak Hour
VO, Opposing Volume	473
VA, Advancing Volume	803
VL, Left Turning Volume	160
Percent Left Turns	19.9%
Symbol	●



Intersection: Maple Avenue/Site Entrance #3 (Study Intersection #10)
Approach: Southbound Right
Sceanrio: Total Future 2014
Speed Limit: 25 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	300	396
Right Turns	0	48
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A



Intersection: Maple Avenue/Site Entrance #3 (Study Intersection #10)
Approach: Southbound Right
Sceanrio: Total Future 2020
Speed Limit: 25 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	359	456
Right Turns	0	48
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

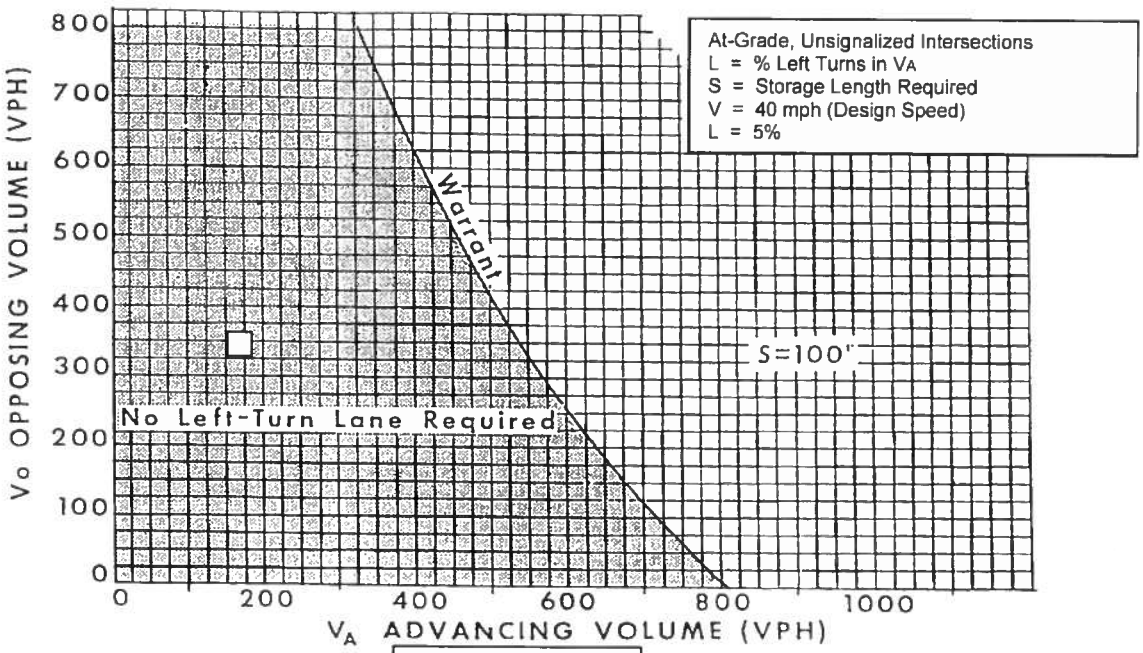


FIGURE 3-5

Intersection: Maple Avenue/Site Entrance #3 (Study Intersection #9)
Approach: Northbound Left
Scenario: Total Future 2014

	AM Peak Hour
VO, Opposing Volume	300
VA, Advancing Volume	170
VL, Left Turning Volume	0
Percent Left Turns	0%
Symbol	□

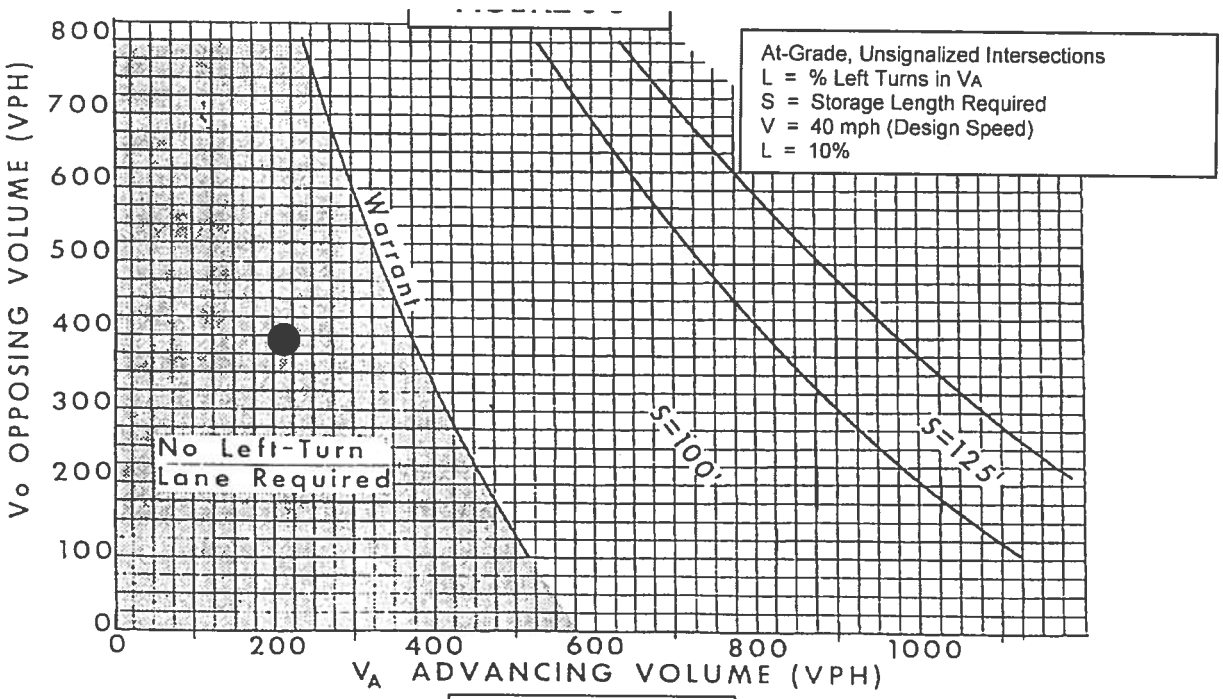


FIGURE 3-6

Intersection: Maple Avenue/Site Entrance #3 (Study Intersection #9)
Approach: Northbound Left
Scenario: Total Future 2014

	PM Peak Hour
VO, Opposing Volume	396
VA, Advancing Volume	225
VL, Left Turning Volume	16
Percent Left Turns	7.1%
Symbol	●

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

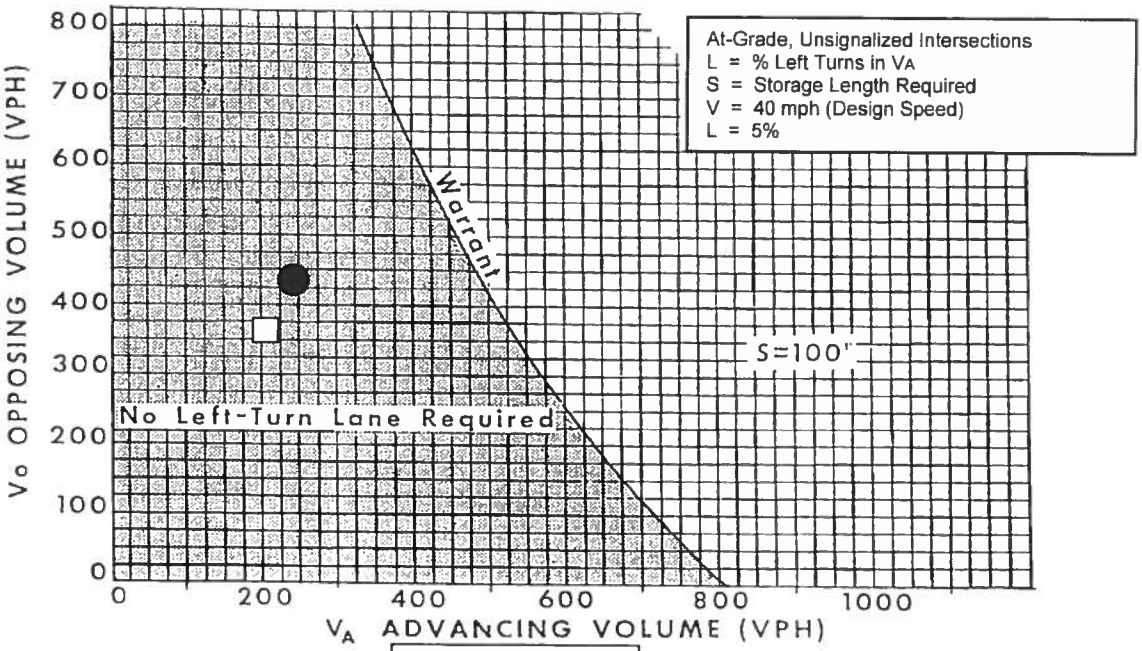


FIGURE 3-5

Intersection: Maple Avenue/Site Entrance #3 (Study Intersection #9)
Approach: Northbound Left
Scenario: Total Future 2020

	AM Peak Hour	PM Peak Hour
VO, Opposing Volume	359	456
VA, Advancing Volume	204	275
VL, Left Turning Volume	0	16
Percent Left Turns	0%	5.8%
Symbol	□	●