Montgomery County Department of Transportation

Planning

Frederick Road (MD 355)

Roberts Tavern Drive Extended

Facility Planning Study - Phase I

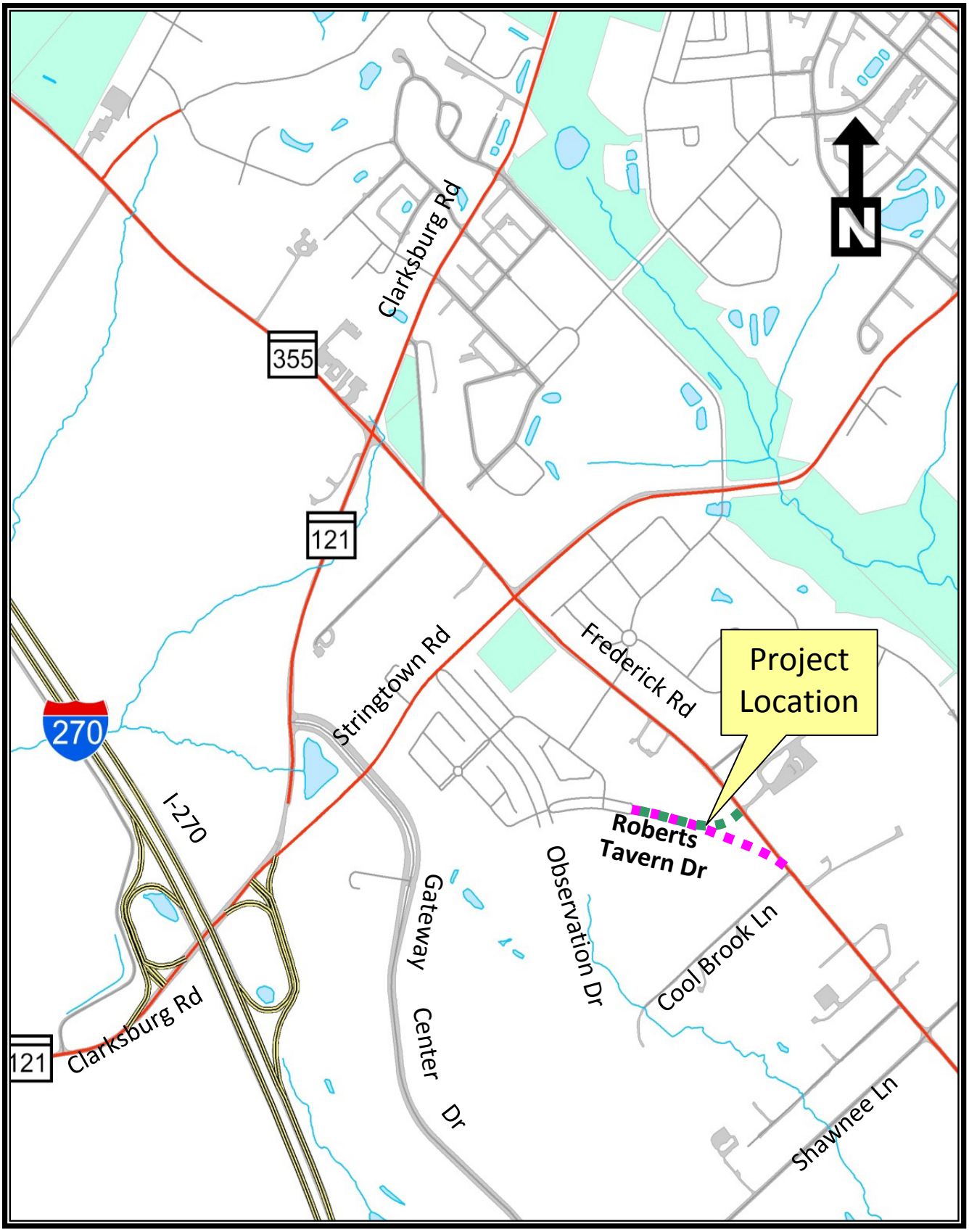
PROJECT PROSPECTUS

Latrobe Lane

Roberts Tavern Drive

June 2010

*http://montgomerycountymd.gov/**dot-dte/index.html***


N
Clarksburg Rd
355
121
Stringtown Rd
Frederick Rd
Project Location
270
I-270
Roberts Tavern Dr
Observation Dr
Gateway Center Dr
Cool Brook Ln
Shawnee Ln
121
Clarksburg Rd

EXECUTIVE SUMMARY

I. Introduction

The Montgomery County Department of Transportation (MCDOT), Division of Transportation Engineering, has completed a Phase I Facility Planning Study to extend Roberts Tavern Drive to MD 355 (Frederick Road) in Clarksburg, Maryland. This Prospectus concludes the Phase I Study and will be used by the Director of MCDOT to determine whether the project should proceed to a Phase II Facility Planning Study.

II. Background and Description

Currently, a 500-foot segment of Roberts Tavern Drive exists between Observation Drive and 200 feet east of Latrobe Lane. This Phase I Facility Planning Study evaluates widening the existing two-lane divided roadway to its master-planned four-lane divided section and completing the 1000-foot extension of Roberts Tavern Drive from its existing terminus east of Latrobe Lane to MD 355.

The Roberts Tavern Drive study area predominantly consists of established residential homes, townhouses, and apartment/condominium properties along MD 355 and planned residential development throughout the study area. Other land uses include industrial park along Gateway Center Drive and existing and planned retail, commercial, office and community spaces in the Town Center. Nearby community facilities include 3 schools (Clarksburg Elementary, Rocky Hill Middle and Clarksburg High), 2 parks, one fire station, one post office and one church. The study area is within the Clarksburg Annual Growth Policy Area.

Roberts Tavern Drive is located along the master planned alignment for relocated MD 355, designated as A-251 in the 1994 *Clarksburg Master Plan & Hyattstown Special Study Area*. A major transportation objective of the master plan is to divert the area's regional through traffic away from the Clarksburg Town Center and historic district. To address this, the *Clarksburg Master Plan & Hyattstown Special Study Area* recommends MD 355 be relocated from north of Cool Brook Lane to Snowden Farm Parkway via future Roberts Tavern Drive and Observation Drive. Between these limits, future relocated MD 355 is proposed as a four-lane divided arterial (A-251) and existing MD 355 is proposed to be reclassified as a business street (B-1) and remain as a two-lane roadway. In addition, the *2005 Countywide Bikeways Functional Master Plan* recommends an off-road shared use bike path (SP-72) along Roberts Tavern Drive / Relocated MD 355.

III. Purpose of the Project

The purpose of Roberts Tavern Drive Extended is to improve mobility and access for people and goods that use MD 355 and the surrounding roadway network. These improvements are necessary to improve travel efficiency, allow for future diversion of regional through traffic around the Clarksburg Town Center and historic district, provide congestion relief, expand neighborhood connections, and enhance multimodal access.

IV. Project Need

The need for extending Roberts Tavern Drive between Latrobe Lane and MD 355 is to:

- Accommodate land use
- Reduce future traffic congestion
- Improve network efficiency
- Provide local neighborhood connection
- Enhance bicycle and pedestrian connections

V. Alternatives Evaluated

As part of the Phase I Facility Planning Study, the following four alternatives were evaluated by the study team and presented to the public for input:

- ***Alternative 1: No Build***
- ***Alternative 2: Master Plan***
- ***Alternative 3: T-Intersection***
- ***Alternative 4: Master Plan Modified***

VI. Recommended Alternative

The recommended alternative (see Figure 2) is a modification of Alternative 3 that provides a T-intersection between Roberts Tavern Drive and MD 355. The intersection will accommodate all traffic movements between Roberts Tavern Drive and includes a direct connection between eastbound Roberts Tavern Drive and southbound MD 355 that follows the ultimate Master Plan alignment. Both MD 355/Roberts Tavern Drive and Observation Drive/Roberts Tavern Drive intersections are recommended to be signalized to facilitate all traffic movements and enhance pedestrian and bicyclist safety. Future studies will determine the viability and feasibility of each signal. The proposed typical section for Roberts Tavern Drive complies with the Montgomery County design standards and includes the following features:

- 120-foot right-of-way
- Four-lane divided roadway with a 24-foot median
- Bike lanes in each direction
- 13-foot landscape buffer with a 5-foot sidewalk along the north side
- 9-foot landscape buffer with an 8-foot shared use path along the south side

The proposed Roberts Tavern Drive typical section is illustrated below in Figure 1. The existing two-lane divided Roberts Tavern Drive is also proposed to be widened to the proposed four-lane divided section.

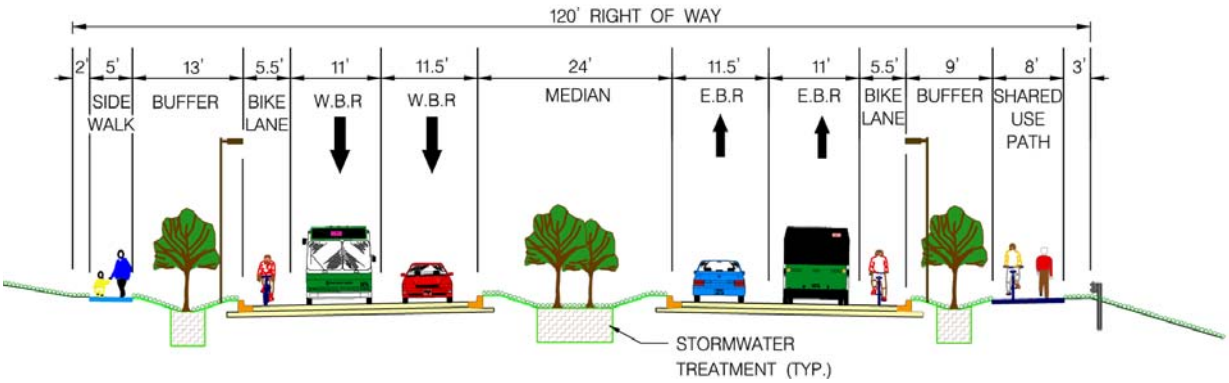


Figure 1 – Proposed Roberts Tavern Drive Typical Section

	CLV	LOS
AM	1247	C
PM	1310	D

	CLV	LOS
AM	1479	E
PM	1399	D

	CLV	LOS
AM	1401	D
PM	1054	B

	CLV	LOS
AM	801	A
PM	832	A

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- LIMIT OF PROPOSED IMPROVEMENTS
- STORMWATER MANAGEMENT POND
- PROPOSED 8' BIKE PATH
- PROPOSED 5' SIDEWALK
- PROPOSED GREEN BUFFER / MEDIAN
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- FUTURE SIDEWALK BY OTHERS
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE

XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

RECOMMENDED ALTERNATIVE

FIGURE 2

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

Estimated impacts for the Recommended Alternative are summarized in Table 1 below.

Table 1: Impacts for Recommended Alternative	
Erodible Soils	Yes
Prime Farmland / Farmland of Statewide Importance	Yes
Forest	1.8 ac.
Specimen Trees (> 24" dbh)	2
Floodplains	None
Waters of the U.S.	None
Wetlands	None
Special Protection Area	Yes
Rare, Threatened and Endangered Species	None
Forest Interior Dwelling Bird Habitat	Low
Historic and Archeological Resources	None
Parks and Recreational Facilities	None
Community Facilities	None
Properties Impacted	10
Right-of-Way Required	2.5 ac.
Displacements	None
Hazardous Material Sites	None
Utilities	Yes

ROBERTS TAVERN DRIVE EXTENDED – SUMMARY TABLE	
PROJECT STUDY INFORMATION	
Name of Project and CIP #	Roberts Tavern Drive Extended, CIP #509337
Study Phase	Facility Planning, Phase I
Transportation Category	Roadway/Pedestrian and Bicycle Facilities
Study Performed by	Montgomery County Department of Transportation (MCDOT) Division of Transportation Engineering
Phase I Project Manager	Greg Hwang, (240)777-7279
Phase I Consultant	Rummel, Klepper & Kahl, LLP (RK&K) Rick Adams, (410)462-9247
Road Name	Roberts Tavern Drive
Project Limits	Observation Drive to MD 355 (Frederick Road)
Project Length	• 1,000 feet Road Extension of Roberts Tavern Drive • 500 feet Road Widening of Existing Roberts Tavern Drive • 1,300 feet Road Improvement of MD 355 to accommodate the extension of Roberts Tavern Drive
Functional Classification of Roadway	Arterial
EXISTING CONDITIONS	
# of Lanes	2
Typical Lane Width	16' including parking
Average Daily Traffic (ADT)	Less than 50
# of Bus Stops	1 (MD 355 at Woodport Rd.)
Signalized Intersections	1 (MD 355/Stringtown Rd.)
Stop-Controlled Intersections	Stringtown Rd./Observation Dr. Latrobe Ln./Roberts Tavern Dr. Roberts Tavern Dr./Observation Dr. Latrobe Ln./Observation Dr. Cool Brook Ln./MD 355 Suncrest Ave./MD 355
Posted Speed	MD 355 north of Suncrest Ave. – 30 mph MD 355 south of Suncrest Ave. – 40 mph Stringtown Rd. – 40 mph
Adjacent Communities	Gateway Commons Highlands at Clarksburg Garnkirk Farms Clarkbrook Estates Brickleys Subdivision
Homes Adjacent to Roberts Tavern Drive	11
Homes with Driveway Access	10 on MD 355
Schools	3 (Clarksburg Elementary, Rocky Hill Middle and Clarksburg High)
Places of Worship	1 (Lakewood Church of God)

Parks	2 (Dowden's Ordinary Special Park, Little Seneca Greenway Stream Valley Park)
Other Places of Interest	Fire Station, Post Office
Portion with Closed/Open Section	Closed Section: 500' Existing Roberts Tavern Drive outside lanes Open Section: 500' Existing Roberts Tavern Drive median
Portion with Sidewalk	300' of Existing Roberts Tavern Drive between Observation Drive and Latrobe Lane
Portion with Shared Use Path	500' of Existing Roberts Tavern Drive
Right-of-Way Widths	Roberts Tavern Drive – 120' MD 355 – Varies 40' to 70' Stringtown Road – 120' Observation Drive – 150'
CRASH HISTORY	
2003 to 2007	MD 355/Stringtown Road Intersection: 13 crashes, no fatalities MD 355, between Cool Brook Lane and Stringtown Rd.: 6 crashes, no fatalities
FACILITY PLANNING, PHASE I SUMMARY	
Transportation Category	Roadway/Pedestrian and Bicycle Facilities
Referenced Master Plans	1994 Clarksburg Master Plan and Hyattstown Special Study Area 2005 Countywide Bikeways Functional Master Plan
Annual Growth Policy Area	Clarksburg
Purpose	• Improve mobility and access for people and goods that use MD 355 and the surrounding roadway network • Allow for future diversion of regional through traffic around the Clarksburg Town Center and historic district • Improve travel efficiency • Provide congestion relief • Expand neighborhood connections • Enhance multimodal access
Need	• Accommodate land use • Reduce future traffic congestion • Improve network efficiency • Provide local neighborhood connection • Enhance bicycle and pedestrian connections
Project Start Date	April 2009
Facility Planning, Phase I Project Prospectus Completion Date	June 2010
Alternatives Evaluated	1. No Build 2. Master Plan 3. T-Intersection 4. Master Plan Modified

Recommended Alternative	The Recommended Alternative is a refinement to Alternative 3 and includes the extension of Roberts Tavern Drive to MD 355 as a signalized T-intersection with a direct connection between eastbound Roberts Tavern Drive and southbound MD 355. • 120-foot right-of-way • Four-lane divided roadway • On-road bicycle lanes • Green space buffer • Sidewalk along the north side • Shared use path along the south side
Recommended Alternative Impacts	<u>Property Impacts</u> • 10 properties • 2.5 acres of right-of-way • 1.0 acre of grading easement • No displacements <u>Natural Environment Impacts</u> • 1.8 acres of forest • 1.3 acres of additional impervious area • 2 specimen trees • Within Clarksburg Special Protection Area <u>Utility Impacts</u> • 6 electric poles w/ luminaries, 1200 ft. • 5 telephone poles (4 for sidewalk, 1 for roadway), 900 ft • 1 water valve, 1 fire hydrant assembly, possible water line conflicts with drainage improvements
PUBLIC OUTREACH	
Public Meeting	November 12, 2009
Newsletters	October 2009 March 2010
Mailing List	143
PERMITS	
Permits Required	• Access Permit – Maryland State Highway Administration • Roadside Tree Permit – Maryland Department of Natural Resources (DNR) • NRI/FSD, Forest Conservation Plan – M-NCPPC • Erosion and Sediment Control and Stormwater Management – Montgomery County Department of Permitting Services

Agencies Requiring Coordination	• Montgomery County Department of Transportation (MCDOT) • Montgomery County Department of Permitting Services (MCDPS) • Montgomery County Department of Environmental Protection (MCDEP) • Maryland-National Capital Park & Planning Commission (M-NCPPC) • Maryland Department of the Environment (MDE) • Maryland Department of Natural Resources (MDNR) • Maryland Historical Trust (MHT) • Maryland State Highway Administration (MDSHA) • US Fish and Wildlife Service (USFWS)
OTHER	
Unresolved Issues	Consolidation/modification of access to adjacent driveways and entrances
Unique Features	None
Basis for Typical Section	The proposed Roberts Tavern Drive typical section is based on the December 2008 Montgomery County Context Sensitive Road Design Standards (Road Code) No. 2004.10, Divided Suburban Arterial Road – 4 Lanes With Bike Lanes. The green space buffers, sidewalk and shared use path are proposed to match the existing roadway cross section.
Basis for Major Decisions of Recommended Alternative	The recommended alternative addresses the following goals: • Meets the project's purpose and need; • Maintains full movement for roadways; • Provides safe, direct pedestrian and bicycle access; • Completes a portion of the master-planned MD 355 Bypass; • Accommodates future construction of the MD 355 Bypass.
Basis for Streetscape, Landscape Panel, Streetlights, etc.	• Master Plan • Montgomery County Context Sensitive Road Design Standards, December 2008 (Road Code) No. 2004.10, Divided Suburban Arterial Road – 4 Lanes With Bike Lanes
Basis for Stormwater Management (SWM) Design	• Incorporate the latest Maryland Stormwater Design Manual including the requirements of the Stormwater Management Act of 2007. • Use low impact development (LID) techniques. • Be coordinated and compatible with design of the future Observation Dr. Extended/MD 355 Bypass.
Planning Board Briefing Date/Comments	TBD
Montgomery County Council's Transportation, Infrastructure, Energy and Environment Committee (T&E) Date/Comments	TBD

STUDY TEAM CONTACT INFORMATION

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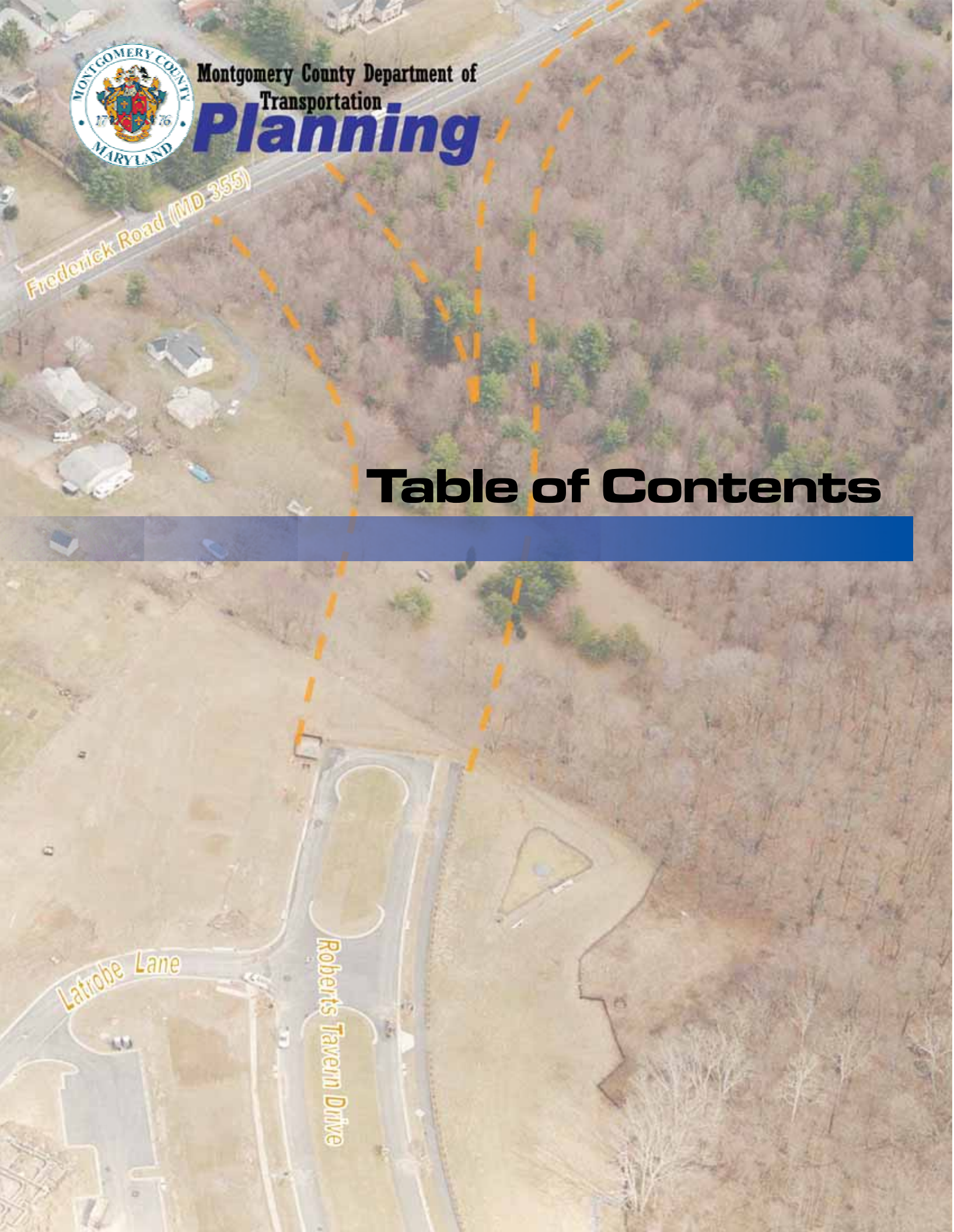

Montgomery County Department of Transportation

Planning

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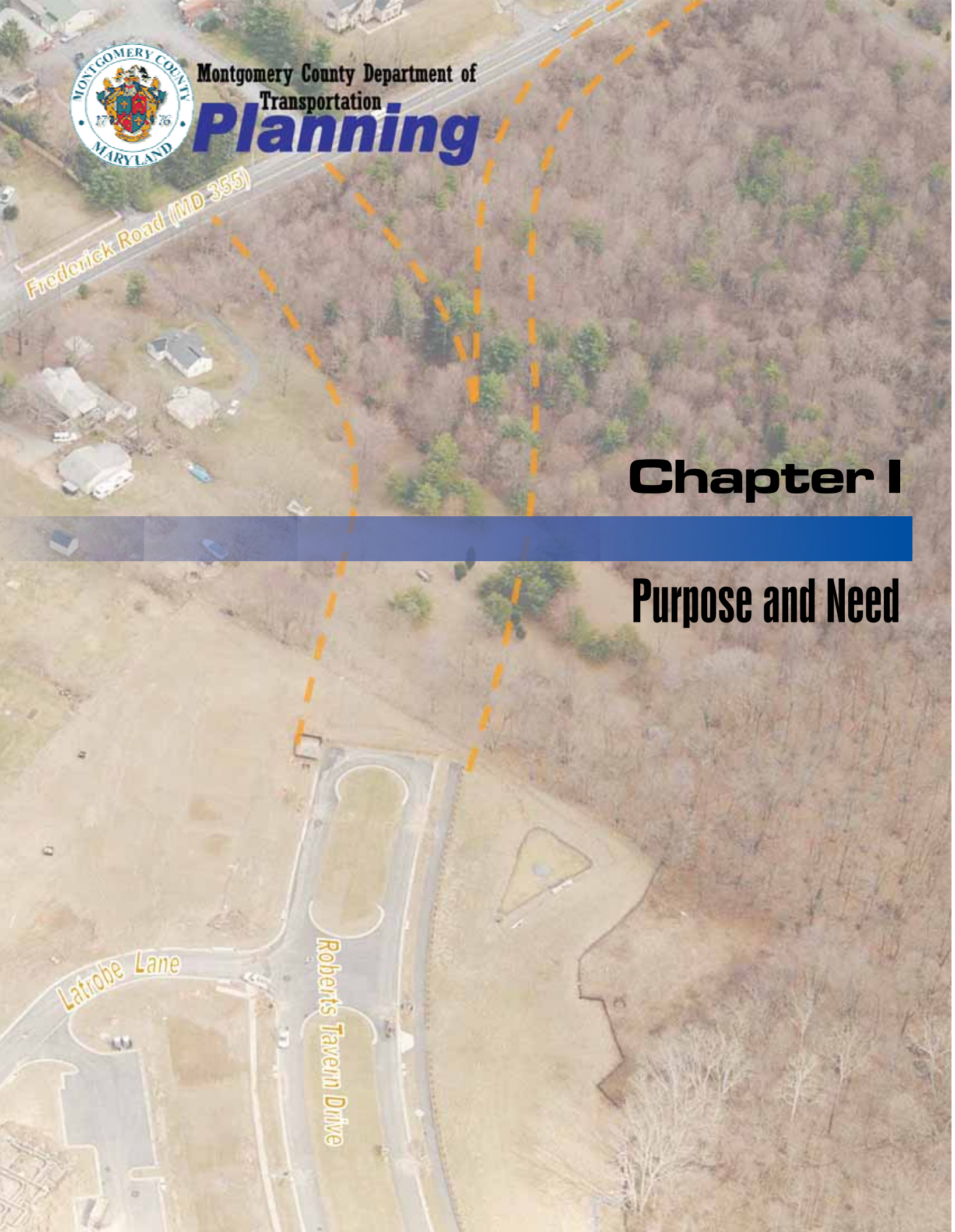
Appendix D	Public Participation Materials
Appendix E	Public Comments
Appendix F	Team Meeting Minutes
Appendix G	October 2009 Purpose and Need
Appendix H	October 2009 Environmental Report (Pages 15 thru 20 provide Land Use, Zoning and Census Data.)
Appendix I	November 2009 Traffic Study



Chapter I

Purpose and Need

I. PROJECT PURPOSE AND NEED

A. Background and Description

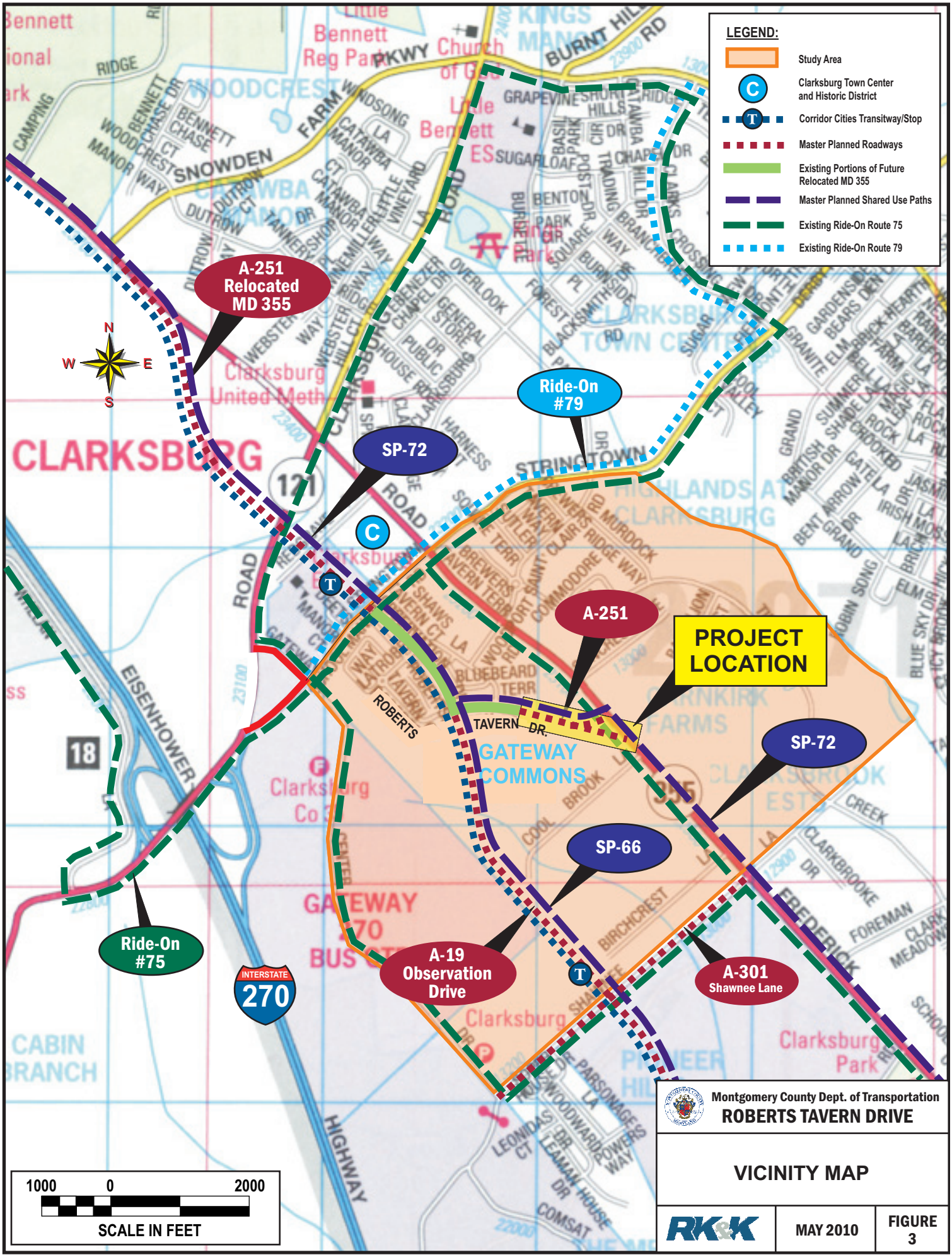
The Montgomery County Department of Transportation (MCDOT) has performed a Phase I Facility Planning Study to extend existing Roberts Tavern Drive from 200 feet east of Latrobe Lane to MD 355 (Frederick Road) in Clarksburg, Maryland (see Vicinity Map and Site Plan on Figures 3 and 4). Currently, a 500-foot segment of Roberts Tavern Drive exists between Observation Drive and 200 feet east of Latrobe Lane. The existing roadway is a 2-lane divided arterial with an 8-foot shared use path along the eastbound roadway and a 5-foot sidewalk along the westbound roadway. This portion of the roadway was constructed in the early 2000s as part of the Gateway Commons development. The Roberts Tavern Drive Extended Phase I Facility Planning Study evaluates widening the existing roadway to its master-planned 4-lane divided section and completing the 1000-foot extension of Roberts Tavern Drive from its existing terminus east of Latrobe Lane to MD 355.

Photo 1 – Roberts Tavern Drive at Latrobe Lane

The project study area (see Figure 4 on page 3) consists of existing and planned residential homes, townhouses, and apartment/condominium units and planned residential development throughout the study area. These are currently connected by MD 355, Observation Drive and Gateway Center Drive which run north-south, and Stringtown Road and Shawnee Lane which run east-west. Other land uses include industrial park along Gateway Center Drive and existing and planned retail, commercial, office and community spaces in the Town Center east of MD 355. There are several community facilities in the immediate vicinity, including 3 schools (Clarksburg Elementary, Rocky Hill Middle and Clarksburg High), 2 parks (Dowden's Ordinary Special Park, Little Seneca Greenway Stream Valley Park), one fire station, one post office and one church (Lakewood Church of God). The study area is within the Clarksburg Annual Growth Policy Area. Two Ride-On bus routes, 75 and 79, operate in the study area. The Clarksburg Historic District and historic Clarksburg Elementary School are located on the northwest side of Stringtown Road adjacent to the study area. The historic Dowden's Ordinary is located at the southwest corner of Stringtown Road and MD 355.

Roberts Tavern Drive is located along the master planned alignment for relocated MD 355, designated as A-251 in the 1994 *Clarksburg Master Plan & Hyattstown Special Study Area*. A major transportation objective of the master plan is to divert the area's regional through traffic away from the Clarksburg Town Center and historic district by relocating MD 355 from north of Cool Brook Lane to Snowden Farm Parkway via Roberts Tavern Drive and Observation Drive as a 4-lane divided arterial with sidewalk and shared use path.

Photo 2 – MD 355 North of Cool Brook Lane

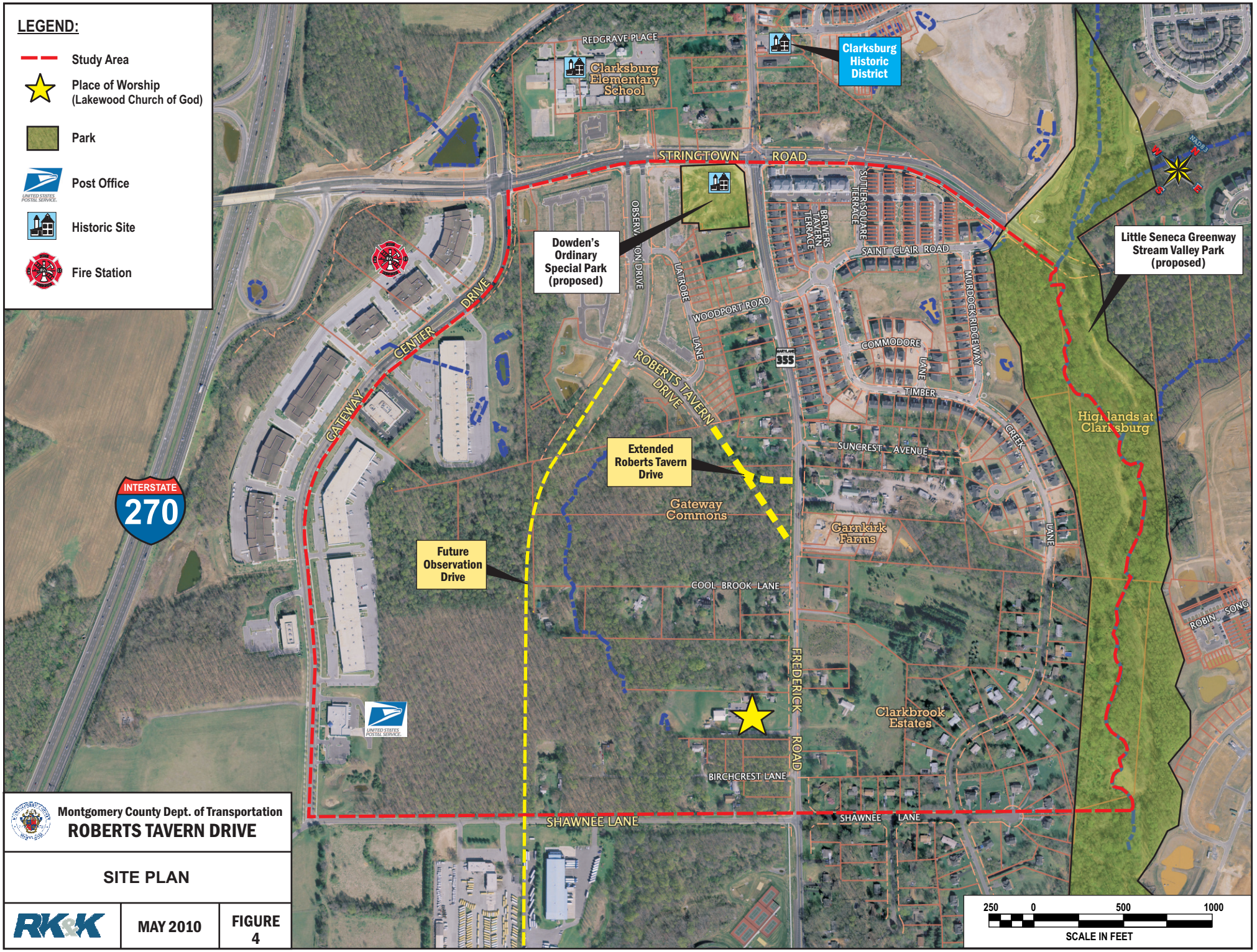


Montgomery County Dept. of Transportation

ROBERTS TAVERN DRIVE

VICINITY MAP

RK&K | MAY 2010 | FIGURE 3


LEGEND:
Study Area
Place of Worship (Lakewood Church of God)
Park
Post Office
Historic Site
Fire Station
REDGRAVE PLACE
Clarksburg Elementary School
Clarksburg Historic District
STRINGTOWN ROAD
Dowden's Ordinary Special Park (proposed)
Little Seneca Greenway Stream Valley Park (proposed)
OBSERVATION DRIVE
LATROBE LANE
WOODPORT ROAD
BREWERS TAVERN TERRACE
SUTLER SQUARE TERRACE
SAINT CLAIR ROAD
MURDOCK RIDGE WAY
COMMODORE LANE
TIMBER GREEN LANE
SUNCREST AVENUE
CENTER DRIVE
GATEWAY DRIVE
ROBERTS TAVERN DRIVE
Extended Roberts Tavern Drive
Future Observation Drive
INTERSTATE 270
MARYLAND 355
Gateway Commons
Garnkirk Farms
Highlands at Clarksburg
COOL BROOK LANE
FREDERICK ROAD
Clarkbrook Estates
BIRCHCREST LANE
SHAWNEE LANE
ROBIN SONG LANE
NAD83
250 0 500 1000
SCALE IN FEET
Montgomery County Dept. of Transportation
ROBERTS TAVERN DRIVE
SITE PLAN
RK&K
MAY 2010
FIGURE 4

In addition, the *2005 Countywide Bikeways Functional Master Plan* recommends an off-road shared use path (SP-72) along Roberts Tavern Drive / Relocated MD 355.

Per the Master Plan, Roberts Tavern Drive will intersect MD 355 between Cool Brook Lane and Suncrest Avenue. Within these limits, MD 355 is currently a 2-lane open section roadway. Between Suncrest Avenue and Stringtown Road, MD 355 has been improved as part of the adjacent subdivision developments into a 3-lane undivided closed section with sidewalk along the northbound road. As MD 355 passes through the Clarksburg Historic District north of Stringtown Road, it returns to a rural 2-lane open section roadway. When MD 355 is ultimately relocated as a four-lane divided arterial along Roberts Tavern Drive and Observation Drive, existing MD 355 is proposed to be reclassified as a business street (B-1) and remain a two-lane roadway. MD 355 is currently posted at 40 mph within the study limits.

B. Purpose of the Project

The purpose of Roberts Tavern Drive Extended is to improve mobility and access for vehicular traffic, transit, bicyclists and pedestrians through the project study area. These improvements are necessary to improve travel efficiency, provide congestion relief, expand neighborhood connections, enhance multimodal access, and allow for future diversion of regional traffic around the Clarksburg Town Center and historic district.

C. Project Need

The need for extending Roberts Tavern Drive between Latrobe Lane and MD 355 is to:

1. Accommodate land use
2. Reduce future traffic congestion
3. Improve network efficiency
4. Provide local neighborhood connection
5. Enhance bicycle and pedestrian connections

1. Accommodate Land Use

The Roberts Tavern Drive study area predominantly consists of established residential properties along MD 355 and planned residential development throughout the study area. Other land uses include industrial park along Gateway Center Drive and existing and planned retail, commercial, office and community spaces in the Town Center east of MD 355. See Appendix H, October 2009 Environmental Report for detailed land use information. Some of the key planned developments include the following:

- The Gateway Commons development will surround Roberts Tavern Drive and Observation Drive and will consist of approximately 400 single family homes, townhouses, and apartment/condominium units.
- The Clarksburg Town Center development bound by Overlook Park Drive to the east, MD 355 to the west, Stringtown Road to the south, and Clarksburg Road to the north, will include approximately 1,300 single-family houses, townhouses, and condos; plus 116,000 square feet of commercial/retail space, with grocery, civic building, library, park, and community center.

- Highlands at Clarksburg is located on the east side of MD 355 near Stringtown Road with approximately 204 single-family houses, townhouses, duplexes, condos and a small retail center.
- Garnkirk Farms is located south of the study area near Observation Drive and Shawnee Lane with approximately 400 planned houses, townhouses, and apartments.

Nearby community facilities include:

- Dowden's Ordinary Special Park at the southwest corner of Stringtown Road and MD 355
- Little Seneca Greenway Stream Valley Park located east of MD 355
- Clarksburg Fire Station 35 on Gateway Center Drive
- Clarksburg Post Office on Gateway Center Drive
- Lakewood Church of God on MD 355 south of Cool Brook Lane
- Clarksburg Elementary School on Redgrave Place north of Stringtown Road
- Clarksburg High School and Rocky Hill Middle School on MD 355 south of Shawnee Lane

2. Reduce Future Traffic Congestion

Traffic operations were analyzed for existing conditions as well as year 2030. The future roadway network is assumed to include the extension of Observation Drive south to Waters Discovery Lane in Germantown, with two lanes in each direction. The Observation Drive/Stringtown Road intersection is also assumed to be signalized by 2030.

The current average daily traffic on MD 355 is approximately 13,525 vehicles and is estimated to grow to approximately 14,425 vehicles per day by 2030. Observation Drive is anticipated to carry approximately 20,425 vehicles per day and Roberts Tavern Drive approximately 3,175 vehicles.

To evaluate traffic congestion, capacity analyses were performed using the Critical Lane Volume (CLV) method at three nearby intersections. Table 2 on the following page summarizes the intersections level of service, critical lane volume, and volume-to-capacity ratio for both the existing (2009) and future (2030) scenarios.

Table 2: Summary of Intersection Level of Service (LOS)

Intersection		Existing (2009)		Future (2030)	
		AM	PM	AM	PM
MD 355 @ Stringtown Rd.	LOS	B	B	E	E
	CLV	1,042	1,060	1,517	1,573
	v/c	0.73	0.74	1.06	1.10
Stringtown Rd. @ Observation Dr.	LOS	A	A	E	E
	CLV	261	368	1,530	1,577
	v/c	0.18	0.26	1.07	1.11
Roberts Tavern Dr. @ Observation Dr.	LOS	*	*	A	A
	CLV	*	*	714	719
	v/c	*	*	0.50	0.50

The traffic analyses indicate that the adjacent major intersections are currently operating at acceptable levels of service (LOS A and B). However, the traffic volumes at MD 355/Stringtown Road and Stringtown Road/Observation Drive are anticipated to increase to over 1500 vehicles per hour by 2030, beyond the County's Clarksburg policy area congestion standard of 1425 vehicles per hour.

The Crash History of MD 355 from Cool Brook Lane to Stringtown Road, including the intersection of MD 355 and Stringtown Road was reviewed for the period beginning January 1, 2003 and ending December 31, 2007. Data for 2008 and 2009 was not available at the time of the evaluation. The data on record indicates that the crash rates on MD 355 are below the statewide averages for similar types of roadways. Since the Roberts Tavern Drive improvements are expected to slightly reduce the volume of traffic that will use this portion of MD 355, no adverse effects on safety are anticipated as a result of this project.

3. Improve Network Efficiency

Between Stringtown Road and Shawnee Lane, Roberts Tavern Drive is the only planned roadway that would provide east-west connectivity between MD 355 and Observation Drive. Both Cool Brook Lane and Birchcrest Lane only serve as property access to local residences and are not maintained by the County. Neither of these two streets is planned as a through roadway to intersect the future Observation Drive. Additional multimodal access is required for the anticipated developments between MD 355, Observation Drive, and Gateway Center Drive. The Roberts Tavern Drive extension will complement the function of Stringtown Road to the north and Shawnee Lane to the south, with an additional east-west connection between MD 355, Observation Drive, and the planned Corridor Cities Transitway. The extension of Roberts Tavern Drive will provide efficient, safe access for vehicular traffic, transit, bicycles and pedestrians.

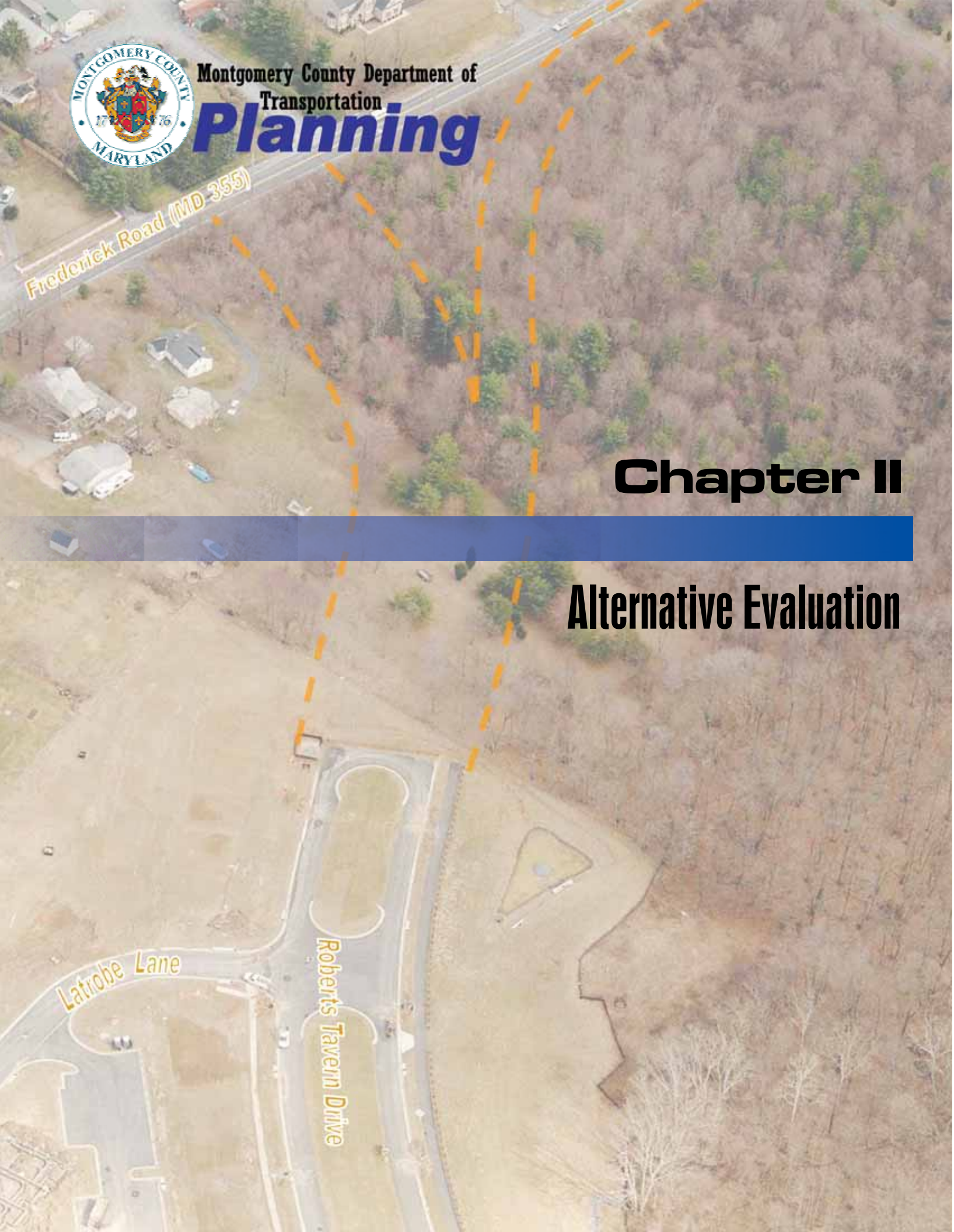
4. Provide Local Neighborhood Connection

Roberts Tavern Drive will provide more efficient and safer access from MD 355 to the planned Gateway Commons residential community that is currently under construction between MD 355 and Gateway Center Drive. Without Roberts Tavern Drive extended, northbound traffic on MD 355 may currently access MD 355 via either Stringtown Road or Woodport Road. The Stringtown Road route is circuitous since it is located at the northern limits of the community, while the Woodport Road intersection is unsignalized and encourages cut-through traffic along local roads like Latrobe Lane. Roberts Tavern Drive extended would provide a more direct connection for local traffic, and would deter cut-through traffic from local roads.

5. Enhance Bicycle and Pedestrian Connections

On-street and off-street bicycle and pedestrian facilities are necessary to provide continuity and connections between nearby neighborhoods, shopping, employment and community facilities. The Clarksburg Master Plan recommends sidewalk and an off-street shared use path along the future relocated MD 355 (A-251). The March 2005 *Countywide Bikeway Functional Master Plan* (CBFMP) also designates SP-72 as a shared use path along Frederick Road (MD 355) in the Germantown and Clarksburg Planning Areas via Roberts Tavern Drive / Relocated MD 355. The CBFMP designates SP-72 with "potential in the future to serve as an important pedestrian connection" since it would connect to proposed SP-66, the shared use bike path planned along extended Observation Drive (A-19), and would link communities along Roberts Tavern Drive and MD 355 to both the Corridor Cities Transitway and the Clarksburg Town Center. For these reasons, the CBFMP considers implementation of such paths a higher priority than other shared use paths. SP-72 and SP-66 are illustrated on Figure 3.

The portion of SP-72 along Observation Drive between Stringtown Road and Roberts Tavern Drive is complete and connects to bike lanes, sidewalks and shared use path along Stringtown Road. No portion of SP-72 has been completed along MD 355 within the project limits. However, sidewalks have been constructed along the east side of MD 355 from Stringtown Road to north of Suncrest Avenue. Sidewalk between Stringtown Road and Roberts Tavern Drive and shared use path between Roberts Tavern Drive and Brink Road along the west side of MD 355 is being planned under a separate MCDOT CIP project. Roberts Tavern Drive Extended will provide pedestrian and bicycle links between MD 355 and Observation Drive.



Chapter II

Alternative Evaluation

II. ALTERNATIVE EVALUATION

A. Introduction

Four alternatives – one No-Build alternative and three Build alternatives – were developed to address the purpose and need for the Roberts Tavern Drive Extended project. Different alignments and intersection configurations were evaluated to provide safe and effective multimodal operations at the intersection of Roberts Tavern Drive/MD 355 while also partially accommodating the ultimate Relocated MD 355 in an environmentally sensitive manner.

The four alternatives were presented to the community at the November 12, 2009 public meeting. Based on the public feedback and comments, a modified version of Alternative 3 was developed and is proposed as the Recommended Alternative.

B. Existing Conditions

1. Roadway Geometry

a. Functional Classification and Existing Lane Configurations

Table 3 below lists the Master-Planned functional classifications for the major roadways in the study area as specified in the *1994 Clarksburg Master Plan and Hyattstown Special Study Area* as well as the existing lane configurations.

Table 3: Functional Classification and Existing Lane Configurations of Study Area Roadways

Roadway Name and Master Plan Designation	Functional Classification	Existing Lane Configuration
Roberts Tavern Drive (A-251)	east-west, two-way, four-lane, divided arterial	east-west, two-way, two-lane, divided arterial (partial section)
Frederick Road (MD 355) (B-1)	north-south, two-way, two-lane, undivided business street	north-south, two-way, two-lane, undivided arterial
Observation Drive (A-19, south of Roberts Tavern Drive) (A-251, north of Roberts Tavern Drive)	north-south, two-way, four-lane, divided arterial	north-south, two-way, four-lane (striped as two lanes), divided arterial north of Roberts Tavern Drive
Stringtown Road (A-260)	east-west, two-way, four-lane, divided arterial	east-west, two-way, four-lane, divided arterial

b. Traffic Control

Traffic analyses were performed for the new intersection of Roberts Tavern Drive and MD 355 and at the following four nearby intersections:

- MD 355 at Stringtown Road
- Stringtown Road at Observation Drive
- Observation Drive at Roberts Tavern Drive
- Roberts Tavern Drive at Latrobe Lane

All of the existing intersections are unsignalized except for MD 355 at Stringtown Road. All of the intersections except Roberts Tavern Drive at Latrobe Lane are assumed to be signalized in 2030.

c. Public Right-Of-Way

Existing right-of-way widths for the major roadways within the study area are summarized in Table 4 below.

Table 4: Right-of-Way Widths

Roadway	Right-of-Way Width
Roberts Tavern Drive	120’
Frederick Road (MD 355)	Varies: 40’-70’
Observation Drive	150’
Stringtown Road	120’

d. Typical Section

The typical section for existing Roberts Tavern Drive between Observation Drive and Latrobe Lane is a partially built section of the Montgomery County standard for a 4-lane divided arterial, since the Gateway Commons developer was only required to build the outside two lanes of the ultimate 4-lane section (See Figure 5 on the following page). The existing typical section consists of one 16-foot outside lane in each direction, a 48-foot open section median, a 13-foot landscape buffer and 5-foot sidewalk along the westbound road and a 9-foot landscape buffer and 8-foot shared use path along the eastbound road. Under the proposed improvements, the median lanes and curb and gutter will be constructed to complete the ultimate four-lane section.

Photo 3 – Roberts Tavern Drive, Latrobe Lane to Observation Drive

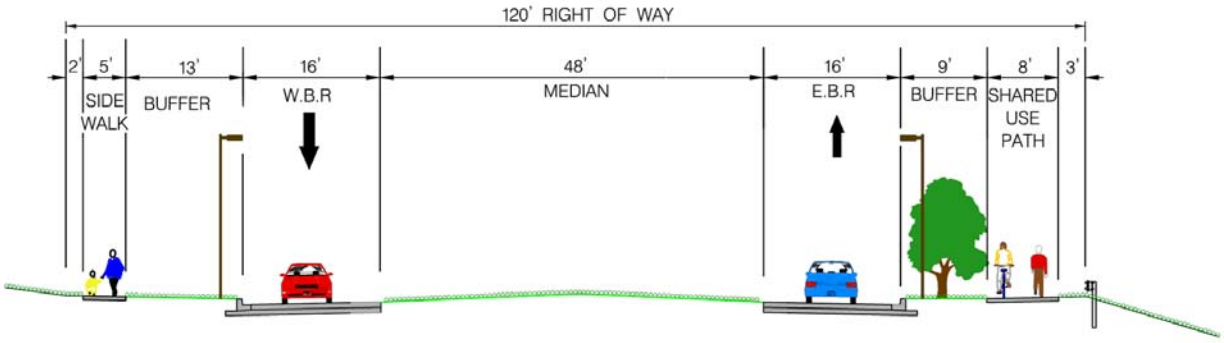


Figure 5 – Existing Roberts Tavern Drive Typical Section

2. Parking

The wide (16-foot) outside curb lane of Roberts Tavern Drive is currently being utilized for parallel parking by residences located along Roberts Tavern Drive. This parking is proposed to be eliminated in the proposed configuration of Roberts Tavern Drive as a through roadway. Parking for the residences is provided along an alley located along the back side of the homes.

3. Transit

Two Ride-On bus routes, 75 and 79, operate in the study area (see Figure 3 on page 2). These routes utilize MD 355, Shawnee Lane, Gateway Center Drive, and Stringtown Road in the study area. The extensions of Roberts Tavern Drive, Observation Drive and the Corridor Cities Transitway would present additional transit route options within the study area.

4. Bicycle/Pedestrian Access

Existing bicycle and sidewalk facilities along the major roadways in the study area are presented in Table 5 below:

Table 5: Bicycle and Pedestrian Facilities

Roadway		Bike Lanes	8-Ft Shared Use Path	5-Foot Sidewalk
Roberts Tavern Drive	Existing	No	Yes	Yes
	Planned	Yes	Yes	Yes
Frederick Road (MD 355)	Existing	No	No	No
	Planned	No	No	Yes
Observation Drive	Existing	No	Yes	Yes
	Planned	Yes	Yes	Yes
Stringtown Road	Existing	Yes	Yes	Yes
	Planned	Yes	Yes	Yes

C. Alternatives Evaluation

1. Proposed Typical Section of Roberts Tavern Drive

The proposed typical section for the extension of Roberts Tavern Drive from Latrobe Lane to MD 355 was developed in accordance with master plan recommendations and the *December 2008 Montgomery County Context Sensitive Road Design Standards (Road Code) No. 2004.10, Divided Suburban Arterial Road – 4 Lanes With Bike Lanes*. The roadway section will match the existing section of roadway west of Latrobe Lane except the roadside grading may be modified to incorporate low impact development (LID) stormwater management facilities (See Figure 6 below). The proposed 120 foot right of way will accommodate two lanes of traffic in each direction, 5 1/2 – foot bike lanes, a 24-foot curbed median, a 13-foot landscape buffer and 5-foot sidewalk along the north side and a 9-foot landscape buffer and 8-foot shared use path along the south side.

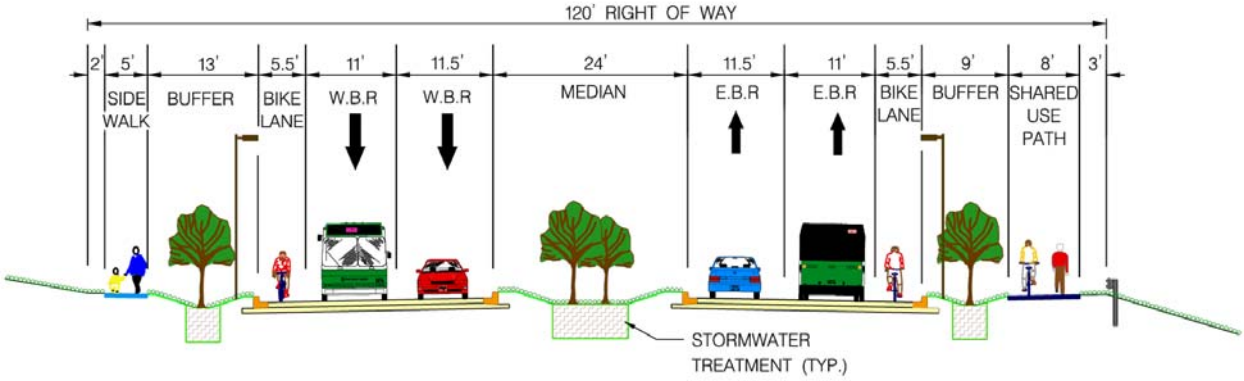


Figure 6 – Proposed Roberts Tavern Drive Typical Section

2. Alternatives Analysis

Four alternatives were developed for evaluation based on the Master Plan recommendations, the project's purpose and need, traffic requirements, and safety. SHA requested that the recommended alternative maintain existing MD 355 as the major through movement and that Roberts Tavern Drive serve as the minor intersecting street as an interim until Relocated MD 355 is constructed in its entirety. The relocation of MD 355 north of Stringtown Road is not anticipated to be programmed by SHA or MCDOT for the near future.

a. Alternatives

i. Alternative 1 – No Build (See Figure 7 on page 14)

The No-Build alternative assumes that all proposed transportation improvements as defined in the 2004 Metropolitan Washington Council of Governments (MWCOG) Constrained Long Range Plan (CLRP) and other

approved planning documents are built for horizon year 2030, except for the extension of Roberts Tavern Drive. The assumed transportation improvements include Observation Drive Extended (A-19), Snowden Farm Parkway (A-305), and the Corridor Cities Transitway.

ii. Alternative 2 – Master Plan (See Figure 8 on page 15)

Alternative 2 follows the master plan and strives to align Roberts Tavern Drive directly with MD 355 so that the improved MD 355/Roberts Tavern Drive corridor can ultimately serve as a bypass around the Clarksburg Historic District. Under the Master Plan, the north leg of MD 355 would be realigned to form a T-intersection with Roberts Tavern Drive. Alternative 2 aligns Roberts Tavern Road along the ultimate MD 355 alignment and forms an interim skewed intersection with MD 355 to accommodate the northbound MD 355 to westbound Roberts Tavern Drive movement.

The intersection of MD 355 and Roberts Tavern Drive would be unsignalized and would not accommodate the eastbound Roberts Tavern Drive to northbound MD 355 movement. The southbound MD 355 to westbound Roberts Tavern Drive movement would be accomplished via a spur with a stop-controlled intersection at Roberts Tavern Drive. Existing MD 355 would be maintained along its current alignment as requested by SHA and widened to provide the necessary auxiliary lanes at the Roberts Tavern Drive intersection.

New crosswalks would be provided at the uncontrolled intersection between Roberts Tavern Drive and MD 355 to provide connectivity for pedestrians and bicyclists.

iii. Alternative 3 – T-Intersection (See Figure 9 on page 16)

Alternative 3 aligns Roberts Tavern Drive to form a conventional T-intersection with MD 355. The alignment deviates from the Master Plan alignment in order to form a perpendicular intersection with MD 355. The intersection of MD 355 and Roberts Tavern Drive would be signalized and would accommodate all traffic movements between Roberts Tavern Drive and MD 355. Existing MD 355 will be maintained along its current alignment as requested by SHA and widened to provide the necessary auxiliary lanes at the Roberts Tavern Drive intersection.

Pedestrian signals and crosswalks would be provided at the signalized intersection between Roberts Tavern Drive and MD 355 to provide connectivity for pedestrians and bicyclists.

iv. Alternative 4 – Master Plan Modified (See Figure 10 on page 17)

Alternative 4 is similar to Alternative 2 but modifies the alignment of westbound Roberts Tavern Drive to form a 90 degree intersection between the westbound leg of Roberts Tavern Drive and MD 355. The eastbound leg of Roberts Tavern Drive would be aligned to connect directly to southbound MD 355 in accordance with the Master Plan.

The intersection of MD 355 and Roberts Tavern Drive would be unsignalized and would not accommodate the eastbound Roberts Tavern Drive to northbound MD 355 movement. The southbound MD 355 to westbound Roberts Tavern Drive movement would be accomplished at the proposed intersection. Existing MD 355 will be maintained along its current alignment as requested by SHA and widened to provide the necessary auxiliary lanes at the Roberts Tavern Drive intersection.

New crosswalks would be provided at the uncontrolled intersection between Roberts Tavern Drive and MD 355 to provide connectivity for pedestrians and bicyclists.

	CLV	LOS
AM	1517	E
PM	1573	E

	CLV	LOS
AM	1530	E
PM	1577	E

	CLV	LOS
AM	714	A
PM	719	A

DETAIL AREA

0 50' 100'

200' 0 200' 400'

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- STORMWATER MANAGEMENT POND
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- EXISTING SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE
- XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

ALTERNATIVE 1 – NO BUILD
FIGURE 7

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

	CLV	LOS
AM	1247	C
PM	1310	D

	CLV	LOS
AM	1479	E
PM	1425	D

	CLV	LOS
AM	802	A
PM	846	A

	CLV	LOS
AM	1343	D
PM	1025	B

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- LIMIT OF PROPOSED IMPROVEMENTS
- STORMWATER MANAGEMENT POND
- PROPOSED 8' BIKE PATH
- PROPOSED 5' SIDEWALK
- PROPOSED GREEN BUFFER / MEDIAN
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE
- XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

DETAIL AREA

200' 0 200' 400'

0 50' 100'

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

ALTERNATIVE 2 – MASTER PLAN
FIGURE 8

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

	CLV	LOS
AM	1247	C
PM	1310	D

	CLV	LOS
AM	1479	E
PM	1399	D

	CLV	LOS
AM	1401	D
PM	1054	B

	CLV	LOS
AM	801	A
PM	832	A

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- LIMIT OF PROPOSED IMPROVEMENTS
- STORMWATER MANAGEMENT POND
- PROPOSED 8' BIKE PATH
- PROPOSED 5' SIDEWALK
- PROPOSED GREEN BUFFER / MEDIAN
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE

XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

DETAIL AREA

0 25' 50'

200' 0 200' 400'

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

ALTERNATIVE 3 – 'T' INTERSECTION
FIGURE 9

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

	CLV	LOS
AM	1247	C
PM	1310	D

	CLV	LOS
AM	1479	E
PM	1425	D

	CLV	LOS
AM	802	A
PM	846	A

	CLV	LOS
AM	1343	D
PM	1025	B

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- LIMIT OF PROPOSED IMPROVEMENTS
- STORMWATER MANAGEMENT POND
- PROPOSED 8' BIKE PATH
- PROPOSED 5' SIDEWALK
- PROPOSED GREEN BUFFER / MEDIAN
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE
- XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

DETAIL AREA

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

ALTERNATIVE 4 – MASTER PLAN (MODIFIED)
FIGURE 10

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

b. Traffic Analysis

Traffic capacity analyses were performed at 5 existing and planned intersections within the study area to evaluate each alternative's effect on operations, levels of service, and delay. The evaluated intersections included:

- MD 355 at Stringtown Road
- Stringtown Road at Observation Drive
- Observation Drive at Roberts Tavern Drive
- Roberts Tavern Drive at Latrobe Lane
- Roberts Tavern Drive at MD 355

The Critical Lane Volume (CLV) analysis methodology was used to evaluate capacity for all of the intersections during the AM and PM peak hours for the Existing 2009 Conditions and the 2030 No-Build and Build alternatives. Performance measures of effectiveness included critical lane volume (CLV), volume-to-capacity ratio (v/c ratio), and level of service (LOS). The total CLV for each peak period was calculated by combining the CLVs for the NB/SB movements and EB/WB movements. The CLV indicates the highest volume for a given approach lane configuration in a given direction. The v/c-ratio is the ratio of actual flow rate to the capacity of the facility. This ratio is often used to determine how sufficient capacity is at a given intersection. Generally speaking, a ratio of 1.0 or less indicates that the intersection is operating at or below capacity. A ratio of greater than 1.0 indicates that the number of vehicles entering the intersection via the critical movements exceeds capacity.

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg policy area established by the Maryland National Capital Park and Planning Commission (M-NCPPC) is a critical lane volume of 1,425 vehicles per hour. The v/c-ratios assume capacity is equivalent to this congestion standard; therefore, any intersection having a CLV greater than 1,425 will have a v/c-ratio greater than 1.0.

Level of Service (LOS) analysis assigns a letter grade from A through F for each intersection based on the delay experienced at the intersection by a vehicle. LOS A is the highest grade and represents negligible delay while LOS F represents the worst grade and represents excessive queues and delays. LOS D is typically established as an acceptable level of service and design goal in urban locations. Table 6 (page 19) shows the level of service thresholds for the CLV method. The CLV, LOS and V/C results for Alternatives 1, 2, 3 and 4 are summarized in Table 7 (page 19) and Figure 11 (page 20). For the complete traffic study, please refer to Appendix I.

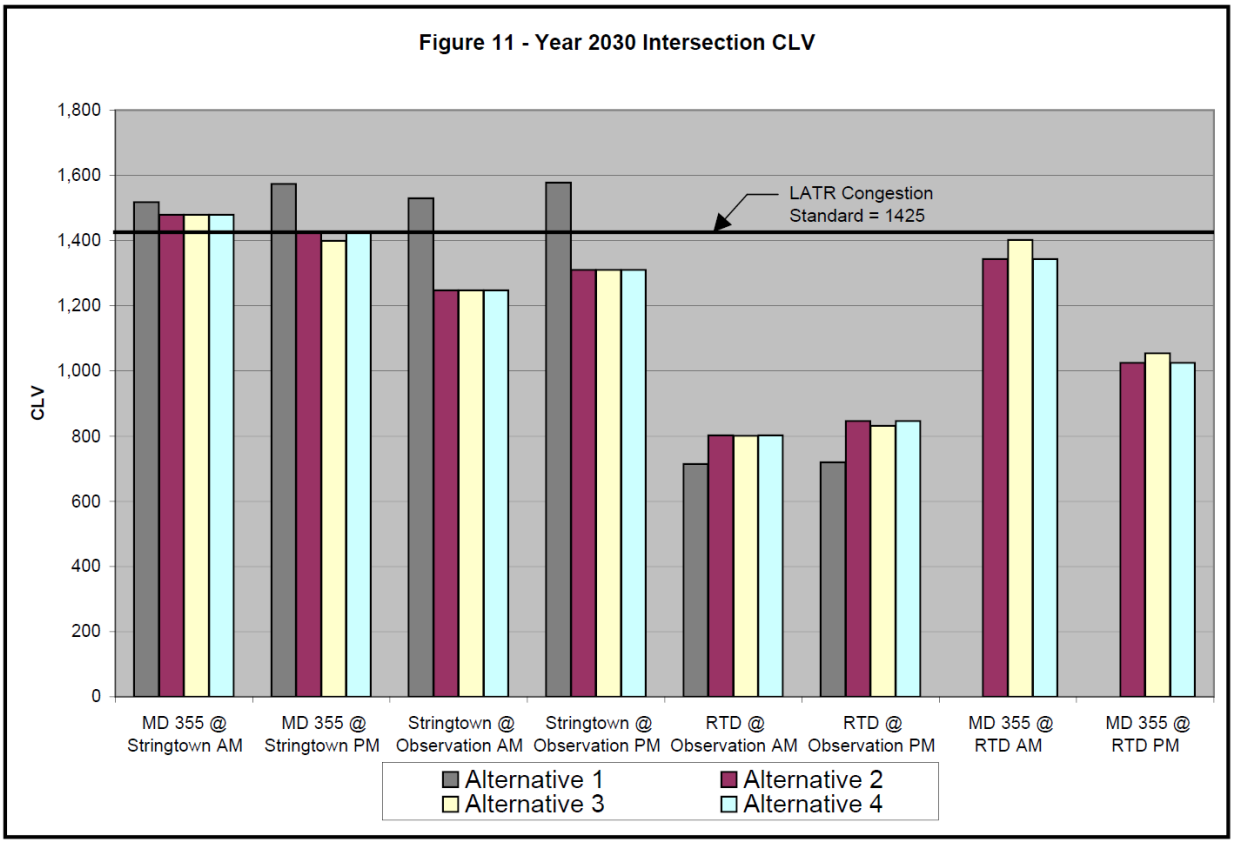
Table 6: Level of Service Parameters		
LOS	**Critical Lane Volume (veh)**	**Expected Problems at Intersection**
A	< 1,000	Negligible delay
B	>1,000 and < 1,150	Short delays
C	> 1,150 and < 1,300	Number of vehicles stopping is significant
D	> 1,300 and < 1,450	Influence of congestion becomes more noticeable
E	> 1,450 and < 1,600	Significant delays causing long queues
F	> 1,600	Oversaturated; Vehicles wait through multiple signal cycles

Table 7: Year 2030 Intersections LOS, CLV, and V/C Ratio

LOS = Level of Service **CLV** = Critical Lane Volume		**MD 355 at Stringtown Road**			**Stringtown Road at Observation Drive**			**Roberts Tavern Drive at Observation Drive**			**Roberts Tavern Drive at Latrobe Lane**			**MD 355 at Roberts Tavern Drive**		
Alternative		**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**
Alternative 1 No-Build	AM	E	1,517	1.06	E	1,530	1.07	A	714	0.5	[1]	[1]	[1]			
	PM	E	1,573	1.1	E	1,577	1.11	A	719	0.5	[1]	[1]	[1]			
Alternative 2 Master Plan	AM	E	1,479	1.04	C	1,247	0.88	A	802	0.56	A	90	0.06	D	1,343	0.94
	PM	D	1,425	1.00	D	1,310	0.92	A	846	0.59	A	102	0.07	B	1,025	0.72
Alternative 3 T-Intersection	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	D	1,401	0.98
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	B	1,054	0.74
Alternative 4 Master Plan Modified	AM	E	1,479	1.04	C	1,247	0.88	A	802	0.56	A	90	0.06	D	1,343	0.94
	PM	D	1,425	1.00	D	1,310	0.92	A	846	0.59	A	102	0.07	B	1,025	0.72

Notes:

1. Under Existing & No-Build Conditions, Roberts Tavern Drive terminates at this intersection. The total peak hour volume entering the intersection is less than 15 vehicles.
2. Gray-shaded cells indicate unsignalized intersections. Non-shaded cells indicate signalized intersections.
3. The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV. The v/c-ratios shown are based on a capacity of 1,425 vehicles. The LOS are based on the standard CLV thresholds, with LOS F corresponding to CLVs of 1,600 or greater.



The results of the traffic study indicate the following:

Traffic Capacity

- No-Build Alternative 1 would result in CLVs exceeding the County Congestion Standard (1,425) at MD 355 / Stringtown Road and at Stringtown Road / Observation Drive.
- Build Alternatives 2, 3 and 4 would result in CLVs below the County Congestion Standard (1,425) in the PM peak hour at MD 355 / Stringtown Road and in the AM and PM peak hours at the four other intersections.
- Build Alternative 3 accommodates all traffic movements between Roberts Tavern Drive and MD 355 at a signalized intersection
- Build Alternatives 2 and 4 are unsignalized and do not accommodate the movement from eastbound Roberts Tavern Drive to northbound MD 355

Pedestrian Crossings

- No-Build Alternative 1 would not improve pedestrian crossings on MD 355
- Build Alternatives 2 and 4 would accommodate pedestrian crossings at MD 355 and Roberts Tavern Drive with marked crosswalks but no pedestrian signalization or stop sign controls.

- Build Alternative 3 would accommodate pedestrian crossings at MD 355 / Roberts Tavern Drive. Future studies will determine the viability and feasibility of signalization for the pedestrian crossings.

c. Comparison of Alternatives

To develop a recommended alternative to be carried forward into Phase 2 of the Facility Planning Process, the alternatives were compared on each alternative's ability to meet the purpose and need of the project, potential environmental impacts, and community support. The specific criteria utilized for the alternatives comparison included the following:

i. Accommodation of planned land use
ii. Reduction in future traffic congestion
iii. Improvement to network efficiency
iv. Provision of local neighborhood connections
v. Enhancement of bicycle and pedestrian connections
vi. Property impacts
vii. Forest Impacts
viii. Public Input / Support

The results of the comparison are summarized in Table 8 on the following page and discussed below.

i. Accommodation of Planned Land Use

Roberts Tavern Drive was included in the Clarksburg Master Plan as a means of supporting multi-modal access to MD 355 and locations south from the planned developments located west of MD 355, such as Gateway Commons. The roadway also forms a portion of "Relocated MD 355" that is identified in the Master Plan as a means of minimizing roadway improvements along existing MD 355 through Clarksburg and preserving the Clarksburg Historic District.

- Alternative 1: No-Build would not provide a multi-modal southern access to the planned development and would not support the future relocation of MD 355 around the Clarksburg Historic District.

Table 8: Alternatives Evaluation Summary				
	Alternative 1: No Build	Alternative 2: Master Plan	Alternative 3: T-Intersection	Alternative 4: Master Plan Modified
Accommodates Planned Land Use	No	Yes	Yes	Yes
Accommodates Future MD 355 Bypass	No	Very Good	Good	Best
Improves Network Efficiency	No	Yes	Yes	Yes
Provides Local Neighborhood Access	No	Yes	Yes	Yes
Enhances Bicycle and Pedestrian Access	No	Good	Best	Good
Roberts Tavern Drive/MD 355 Intersection Control	N/A	Unsignalized	Signalized*	Unsignalized
Number of Properties Impacted	0	9	7	9
ROW Impact Area (Acres)	0	2.4	1.8	2.2
Forest Stand Impact (Acres)	0	1.7	1.3	1.7
Public Support for Option	Low	Moderate	High	Moderate

* *Future studies will determine the viability and feasibility of signalization.*

- Build Alternatives 2, 3 and 4 would provide a multi-modal southern access to MD 355 and would support the relocation of MD 355 around the Clarksburg Historic District. Alternatives 2 and 4 would maximize roadway construction along the ultimate Relocated MD 355 alignment while Alternative 3 would require future reconstruction to develop a direct connection to MD 355.

ii. Reduction in Future Traffic Congestion

- Under Alternative 1: No-Build, two of the four existing intersections in the study area will not meet County Congestion Standards.
- Under Build Alternatives 2, 3 and 4, one of the four existing intersections will not meet County Congestion Standards in the morning peak hour.
- Build Alternatives 2, 3 and 4 all achieve similar levels of service at the four existing intersections and one new intersection at Roberts Tavern Drive / MD 355.

iii. Improvement to Network Efficiency

- Alternative 1: No-Build, would not provide an alternative route between MD 355, Observation Drive and Stringtown Road and, therefore, would not improve network efficiency.
- Build Alternatives 2, 3 and 4 would provide an alternative route between MD 355, Observation Drive and Stringtown Road and, therefore, would improve network efficiency.

iv. Provision of local neighborhood connections

- Alternative 1: No-Build, would not provide a southern access to Gateway Commons and would require more circuitous access from the south via MD 355, Woodport Road, and Stringtown Road.
- Build Alternatives 2, 3 and 4 would provide a southern access to Gateway Commons and reduce cut through traffic on local roads like Latrobe Lane.

v. Enhancement of Bicycle and Pedestrian Connections

- Alternative 1: No-Build, would not provide pedestrian or bicycle connections between the existing facilities along Observation Drive and MD 355 and, therefore, would not enhance bicycle and pedestrian connections.
- Build Alternatives 2, 3 and 4 would provide new sidewalk, bike lane and shared use path connections between Observation Drive, MD 355 and Stringtown Road.
- Build Alternatives 2, 3 and 4 would improve pedestrian crossings at the MD 355 / Roberts Tavern Drive intersection by providing marked cross walks and refuge islands.
- Build Alternative 3 would further improve pedestrian safety by providing pedestrian signals for all pedestrian crossings at the MD 355 / Roberts Tavern Drive intersection.

vi. Property impacts

- Alternative 1: No-Build would not result in any property impacts
- Build Alternative 2 would impact 9 properties and require approximately 2.4 acres of right-of-way acquisition
- Build Alternative 3 would impact 7 properties and require approximately 1.8 acres of right-of-way acquisition
- Build Alternative 4 would impact 9 properties and require approximately 2.2 acres of right-of-way acquisition
- Build Alternatives 2, 3 and 4 do not require displacement of any residences or businesses.

vii. Forest Impacts

- Alternative 1: No-Build would not result in any forest impacts
- Build Alternative 2 would impact 1.7 acres of forest
- Build Alternative 3 would impact 1.3 acres of forest
- Build Alternative 4 would impact 1.7 acres of forest

viii. Public Input / Support

Alternative 1, 2, 3 and 4 were presented to the community for review and comment at a public meeting held on November 12, 2009 at Clarksburg High School. Approximately ten citizens attended the meeting and provided feedback during the meeting. In addition, a total of 18 written comments have been received from citizens. Copies of those comments are included in Appendix E. The comments were summarized as follows:

- Support for creating a MD 355 bypass
- Support of Alternative 3 because it provides a signalized intersection and safest crossings for pedestrians and bicyclists
- Need for sidewalks along MD 355 to accommodate student access to Clarksburg High School and Rocky Hill Middle School
- Need to accommodate access to driveways and entrances along MD 355 in vicinity of intersection with Roberts Tavern Drive

3. Recommended Alternative (See Figure 12 on page 26)

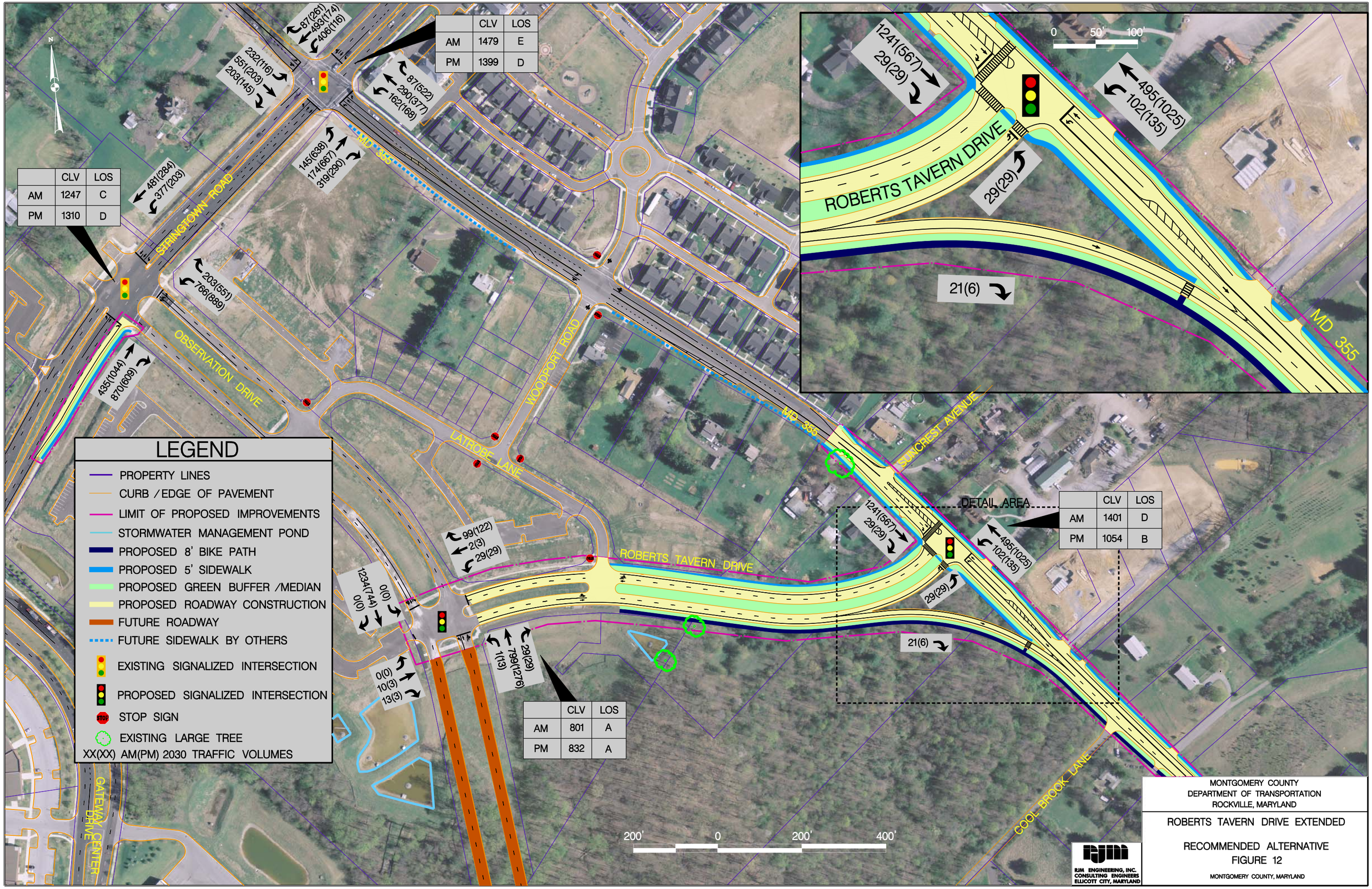
The Recommended Alternative was developed after reviewing the results of the alternatives evaluation and considering each alternative's transportation benefits, ability to meet purpose and need criteria, environmental impacts and public comments. The recommended alternative is a modified version of Alternative 3 T-Intersection and includes the following features:

- The two westbound lanes and eastbound inside lane of Roberts Tavern Drive will intersect MD 355 at a T-intersection as shown in Alternative 3.
- The new T-intersection is recommended to be signalized to facilitate left turn movements and enhance pedestrian and bicyclist safety. Future studies will determine the viability and feasibility of signalization.
- The eastbound outside lane of Roberts Tavern Drive will be aligned to provide a direct connection to southbound MD 355. The direct connection will enable a larger portion of Roberts Tavern Drive to be constructed along the ultimate Relocated MD 355 alignment which will establish the ultimate right-of-way and reduce roadway reconstruction in the future when MD 355 is completely realigned with Roberts Tavern Drive.
- Roberts Tavern Drive Extended will provide sidewalk along the north side and shared use path along the south side for the link between MD 355 and Observation Drive.

- Sidewalk will be constructed along the east side of MD 355 to the southern and northern limits of work including a connection to the existing sidewalk along northbound MD 355 north of Suncrest Avenue.
- On-road bike lanes will be provided on both sides of Roberts Tavern Drive.
- Pedestrian crosswalks are proposed at the new intersection to accommodate pedestrian crossings of MD 355 and Roberts Tavern Drive. Future studies will determine the viability and feasibility of signalization for these pedestrian crossings. An unsignalized crosswalk will also be provided across the single lane direct connection from eastbound Roberts Tavern Drive to southbound MD 355.
- The proposed auxiliary lane along southbound MD 355 will be extended south to provide adequate distance for eastbound Roberts Tavern Drive traffic to accelerate and merge with traffic on southbound MD 355.
- An inside lane will be incorporated along the existing Roberts Tavern Drive for both directions to accommodate the proposed typical section for the Roberts Tavern Drive (see Figure 6 at page 11).
- The Roberts Tavern Drive/Observation Drive intersection is recommended to be signalized to facilitate all traffic movements and enhance pedestrian and bicyclist safety. Future studies will determine the viability and feasibility of signalization.

The recommended alternative is preferred for the following reasons:

- Accommodates all traffic movements between MD 355 and Roberts Tavern Drive including the eastbound Roberts Tavern Drive to northbound MD 355 movement that is not proposed in Alternative 2 (Master Plan) nor Alternative 4 (Master Plan Modified).
- Enhances vehicular and pedestrian operations/safety by providing channelization, crosswalks, and signalization.
- Enhances bicycle and pedestrian connections between MD 355, Observation Drive and Stringtown Road by providing new sidewalk, bike lane and shared use path.
- Constructs the eastbound Roberts Tavern Drive/southbound MD 355 connection along master plan alignment, reducing future reconstruction of Roberts Tavern Drive to fully align with MD 355 as MD 355 Bypass, establishing right-of-way for ultimate master planned MD 355 Bypass, and supporting future construction of MD 355 Bypass north of Stringtown Road around the Clarksburg Historic District.
- Reduces future traffic congestion at area intersections.
- Accommodates planned land use in the study area.
- Improves network efficiency by completing an east-west connector between MD 355 and Observation Drive.
- Provides a local neighborhood connection by constructing a southern access to Gateway Commons and reducing cut through traffic on local roads like Latrobe Lane.
- Does not require any residential or business displacements.
- Does not require substantially greater impacts to adjacent properties and forest than other build alternatives.
- Majority of right-of-way acquisition is undeveloped property
- Supported by the community.



	CLV	LOS
AM	1479	E
PM	1399	D

	CLV	LOS
AM	1247	C
PM	1310	D

	CLV	LOS
AM	801	A
PM	832	A

	CLV	LOS
AM	1401	D
PM	1054	B

LEGEND

- PROPERTY LINES
- CURB / EDGE OF PAVEMENT
- LIMIT OF PROPOSED IMPROVEMENTS
- STORMWATER MANAGEMENT POND
- PROPOSED 8' BIKE PATH
- PROPOSED 5' SIDEWALK
- PROPOSED GREEN BUFFER / MEDIAN
- PROPOSED ROADWAY CONSTRUCTION
- FUTURE ROADWAY
- FUTURE SIDEWALK BY OTHERS
- EXISTING SIGNALIZED INTERSECTION
- PROPOSED SIGNALIZED INTERSECTION
- STOP SIGN
- EXISTING LARGE TREE

XX(XX) AM(PM) 2030 TRAFFIC VOLUMES

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
ROCKVILLE, MARYLAND

ROBERTS TAVERN DRIVE EXTENDED

RECOMMENDED ALTERNATIVE
FIGURE 12

MONTGOMERY COUNTY, MARYLAND

RJM ENGINEERING, INC.
CONSULTING ENGINEERS
ELLICOTT CITY, MARYLAND

4. Bike/Pedestrian Access

Sidewalk, shared use path and bike lanes are proposed along Roberts Tavern Drive and MD 355 within the project limits to enhance the pedestrian/bicycle network and allow for future connectivity. Shared use path will be constructed along the south side of Roberts Tavern Drive and the west side of MD 355 as recommended for shared use bike path SP-72 in the *2005 Countywide Bikeways Functional Master Plan.* The proposed shared use path will be extended to the southern project limit on MD 355 where it will connect to the future shared use path programmed along the west side of MD 355 between Roberts Tavern Drive and Brink Road under Montgomery County CIP #507310.

Sidewalk is proposed along the north side of Roberts Tavern Drive and both sides of MD 355. The proposed sidewalk along the north side of Roberts Tavern Drive will complete the sidewalk link between MD 355 and Observation Drive. The proposed sidewalk along the west side of MD 355 will connect to future sidewalk that is programmed along the west side of MD 355 between Roberts Tavern Drive and Stringtown Road under Montgomery County CIP #507310. The proposed sidewalk along the east side of MD 355 will connect to the existing sidewalk that currently terminates north of Suncrest Avenue.

Bike lanes will be constructed along both sides of Roberts Tavern Drive and will connect to planned bike lanes along Observation Drive, which will connect to the existing bike lanes along Stringtown Road.

5. Stormwater Management

Stormwater management (SWM) facilities will be provided to treat additional impervious area associated with the proposed roadway, sidewalk, shared use path and bike lane construction. SWM design will incorporate the latest Maryland Stormwater Design Manual including the requirements of the Stormwater Management Act of 2007 and be coordinated and compatible with design of the future Observation Dr. extended/MD 355 Bypass. Design strategies will focus on the use of low impact development (LID) techniques such as bio-swales, bio-retention cells, rain gardens, filter strips, vegetated swales, infiltration, and tree boxes in the median and roadside buffer strips. Various permeable pavements including pervious asphalt, concrete and interlocking concrete pavers may also be considered for the proposed roadway, sidewalk and shared use path facilities.

6. Driveway Access along MD 355

There are several residential driveways and one commercial driveway immediately adjacent to the proposed intersection of Roberts Tavern Drive and MD 355. Future design studies will evaluate traffic queues and options to maintain safe and unobstructed access to the driveways. Potential improvement options will

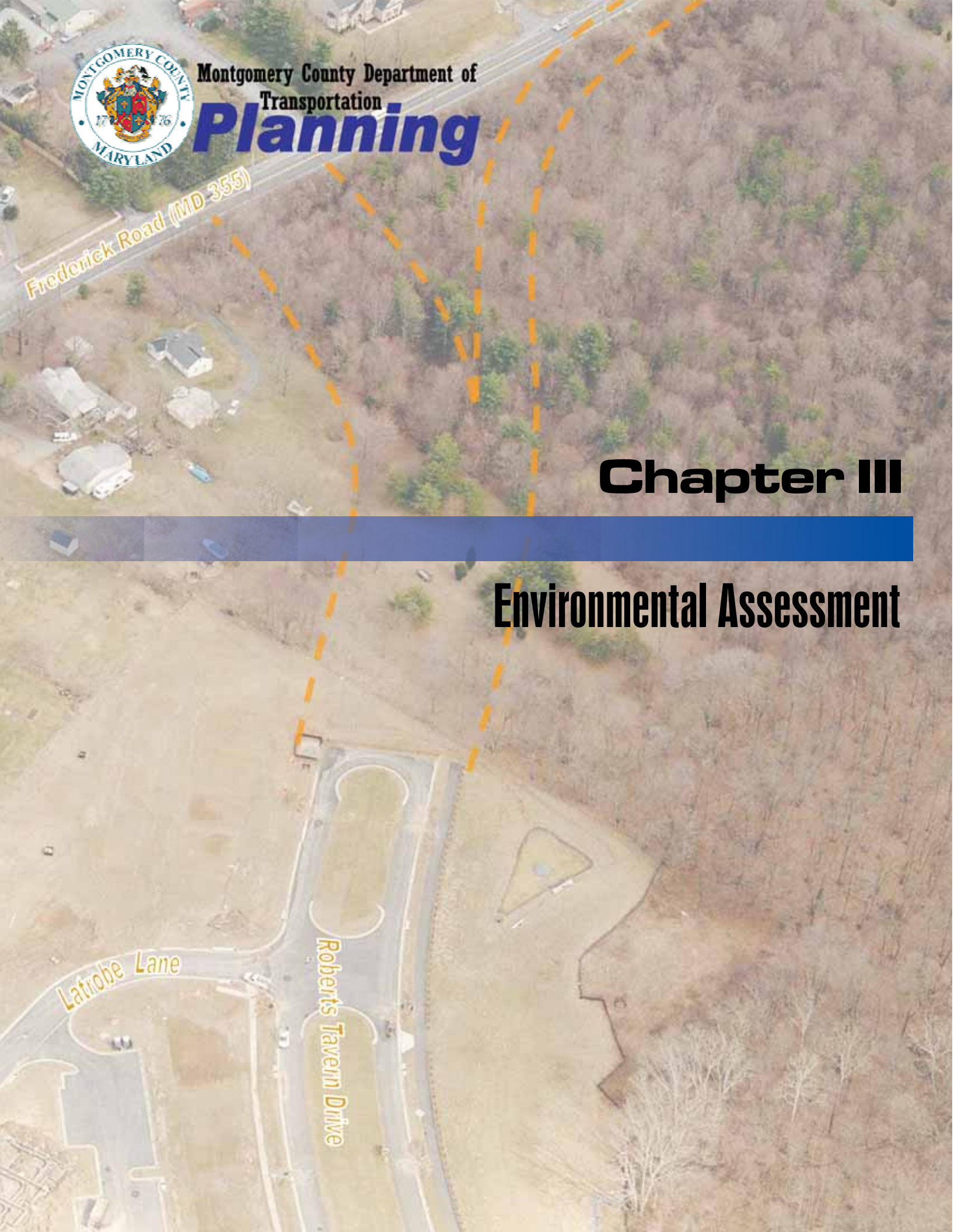
Photo 4 – Entrances along Northbound MD 355

include center turn lanes, auxiliary lanes, channelization, entrance restriction (i.e. right-in/right-out), entrance consolidation and entrance relocation.

7. Recommended Future Off-site Improvement at Stringtown Road/Observation Drive Intersection

The Traffic Analysis (page 19) projects that the Stringtown Road/Observation Drive intersection will exceed the acceptable LOS by year 2030. Eastbound Stringtown Road currently has two through lanes at the Observation Drive intersection. A new right turn lane from eastbound Stringtown Road to southbound Observation Drive will be required in order to maintain the intersection at an acceptable LOS. This new right turn lane is recommended to be constructed under a separate project when it is determined that traffic volumes warrant the additional right turn lane.

Photo 5 – Eastbound Stringtown Road at Observation Drive



Chapter III

Environmental Assessment

III. ENVIRONMENTAL ASSESSMENT

An inventory of the study area's natural, cultural, community and socioeconomic resources was performed to identify the project's potential environmental impacts and to enable the development of environmentally sensitive alternatives. A complete assessment of the project's resources are documented in the *Roberts Tavern Drive Extended, Facility Planning Study – Phase I Environmental Report* (October 2009) located in Appendix H. A brief description of the site resources and the potential impacts to these resources that could result from implementation of the Recommended Alternative are presented on the following pages. A summary of the recommended alternative's estimated environmental impacts is presented in Table 9 below.

Table 9: Impacts for Recommended Alternative	
Erodible Soils	Yes
Prime Farmland / Farmland of Statewide Importance	Yes
Forest	1.8 ac.
Specimen Trees (> 24" dbh)	2
Floodplains	None
Waters of the U.S.	None
Wetlands	None
Special Protection Area	Yes
Rare, Threatened and Endangered Species	None
Forest Interior Dwelling Bird Habitat	Low
Historic and Archeological Resources	None
Parks and Recreational Facilities	None
Community Facilities	None
Properties Impacted	10
Right-of-Way Required	2.5 ac.
Displacements	None
Hazardous Material Sites	None
Utilities	Yes

A. Natural Environment

The inventory of the study area's natural environmental features includes soils; forest stands and specimen trees; watersheds, streams and floodplains; wetlands and other waters of the U.S.; special protection areas; and wildlife including rare, threatened and endangered species. Resources were identified through review of record mapping, databases and field investigations in the proposed Roberts Tavern Drive corridor. The study area's natural resources are illustrated on the Environmental Features Map presented in Figure 13 (page 31).

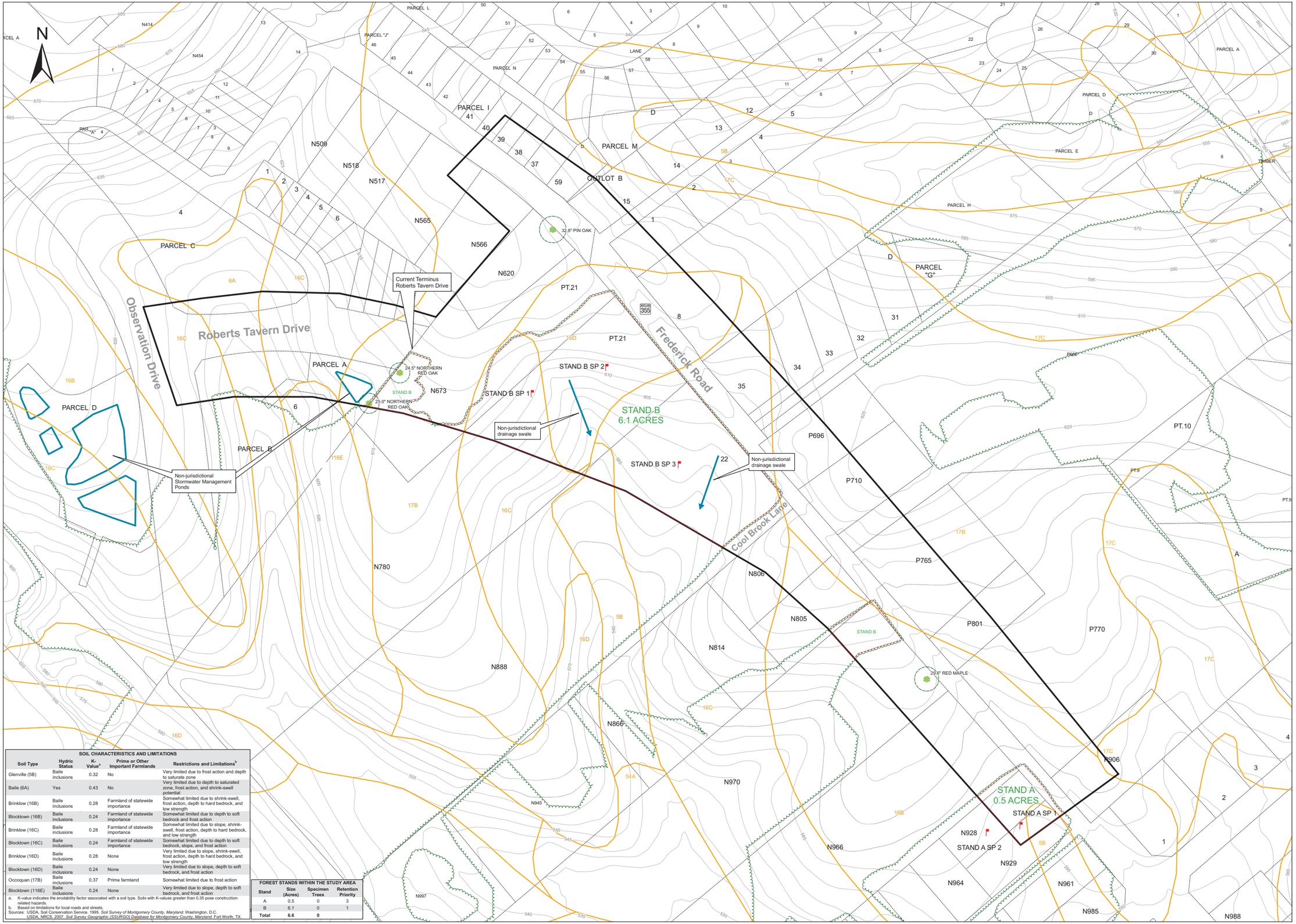
1. Soils and Farmland

Soil types in the project area were identified from the *Soil Survey Geographic (SSURGO) Database for Montgomery County, Maryland (USDA, NRCS, 2007).* Two soil types in the study area were found to be highly erodible: Baile (6A) and Occoquan (17B). Both are found within the alignment of the Recommended Alternative. Four soil types are described as farmland of statewide importance: Brinklow (16B), Blocktown (16B), Brinklow (16C), and Blocktown (16C). Occoquan (17B) is described as prime farmland. Only the Brinklow (16C), Blocktown (16C) and Occoquan (17B) soils are found within the estimated limits of the Recommended Alternative. However, most of proposed project corridor consists of undeveloped forested land and is not being utilized for agricultural purposes. In addition, all of the land within the proposed corridor is zoned for residential development and is located outside of the County's Agricultural Reserve.

2. Forest Stands and Specimen Trees

Two forest stands – Stand A and Stand B - and four specimen trees (diameter > 24") were identified within the study area. Stand A is a 0.5 acre stand dominated by tulip poplar (*Liriodendron tulipifera*) and American sycamore (*Platanus occidentalis*) that is located at the southern limits of the study area between Shawnee Lane and Birchcrest Lane. The stand is bounded by MD 355 to the east, Birchcrest Lane to the north and a driveway to the south. Stand A is not within the proposed project limits and, therefore, will not be impacted by the recommended alternative. Stand B is also located along the west side of MD 355 north of Stand A between Suncrest Avenue and Birchrest Lane and extends west beyond the study area limits. Stand B is a 6.1-acre stand mixed with hardwoods and pines that is dominated by tulip poplar (*L. tulipifera*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and green ash (*Fraxinus pennsylvanica*). Approximately 1.8 acres of Stand B will be impacted by the recommended alternative.

Within Forest Stand B are two specimen trees: a 24.5" northern red oak and a 25.0" northern red oak located near the terminus of existing Roberts Tavern Drive. The Recommended Alternative would impact the 24.5" northern red oak but would avoid the 25.0" northern red oak. Located outside of Stands A and B are two other specimen trees. North of the Recommended Alternative's proposed intersection with MD 355 is a 32.5" pin oak along the frontage of southbound MD 355. The Recommended Alternative may impact this specimen tree with the proposed sidewalk extension. South of the Recommended Alternative's proposed intersection with MD 355 is a 29.6" red maple also located along the frontage of southbound MD 355. This specimen tree is beyond the proposed work limits and will not be impacted by the recommended alternative.



1 inch = 2,000 feet

NOTES:

1. THE ENTIRETY OF THE STUDY AREA LIES WITHIN THE CLARKSBURG SPECIAL PROTECTION AREA (SPA), AS DESIGNATED BY MONTGOMERY COUNTY.
2. THERE IS POTENTIAL FOR FOREST INTERIOR DWELLING SPECIES (FIDS) HABITAT IN THE STUDY AREA. STAND B IS CONSIDERED POTENTIAL FIDS HABITAT BECAUSE IT IS CONTIGUOUS WITH A FOREST STAND THAT IS GREATER THAN 50 ACRES AND CONTAINS INTERIOR FOREST WHICH IS MORE THAN 300 FEET FROM THE EDGE. STAND A, WHILE IT IS CONTIGUOUS WITH A LARGER STAND DOES MEET THE MINIMUM 300 FOOT WIDTH REQUIREMENT.
3. THERE ARE NO STEEP SLOPES WITHIN THE STUDY AREA.
4. THE STUDY AREA DOES NOT INTERSECT THE 100-YEAR FLOODPLAIN OF ANY WATERWAY.
5. THERE ARE NO NATIONAL WETLANDS INVENTORY MAPPED SYSTEMS WITHIN THE STUDY AREA.
6. THE STUDY AREA DOES NOT LIE WITHIN THE CHESAPEAKE BAY CRITICAL AREA.

Legend:

- Study Area
- Forest Stand Boundary
- Sample Plot
- Soil Type Boundary
- Tree Line
- Property Boundary
- 5-Foot Contour
- Specimen Tree with Critical Root Zone

Scale:

1 inch = 100 feet

0 50 100 200 Ft

SOIL CHARACTERISTICS AND LIMITATIONS

Soil Type	Hydric Status	K-Value[a]	Prime or Other Important Farmlands	Restrictions and Limitations[b]
Glenville (5B)	Baile inclusions	0.32	No	Very limited due to frost action and depth to saturate zone
Baile (6A)	Yes	0.43	No	Very limited due to depth to saturated zone, frost action, and shrink-swell potential
Brinklow (16B)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16B)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock and frost action
Brinklow (16C)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16C)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock, slope, and frost action
Brinklow (16D)	Baile inclusions	0.28	None	Very limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16D)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action
Occoquan (17B)	Baile inclusions	0.37	Prime farmland	Somewhat limited due to frost action
Blocktown (116E)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action

a. K-value indicates the erodability factor associated with a soil type. Soils with K-values greater than 0.35 pose construction-related hazards.
b. Based on limitations for local roads and streets.
Sources: USDA, Soil Conservation Service. 1995. *Soil Survey of Montgomery County, Maryland*. Washington, D.C.
USDA, NRCS, 2007. *Soil Survey Geographic (SSURGO) Database for Montgomery County, Maryland*. Fort Worth, TX.

FOREST STANDS WITHIN THE STUDY AREA

Stand	Size (Acres)	Specimen Trees	Retention Priority
A	0.5	0	3
B	6.1	0	1
Total	**6.6**	**0**	

THIS PLAN WAS PREPARED BY:
MATTHEW L. RESCOTT
STRAUGHAN ENVIRONMENTAL SERVICES, INC.
MARYLAND DEPARTMENT OF NATURAL RESOURCES QUALIFIED PROFESSIONAL STATUS (FEB. 14, 2006)

MATTHEW L. RESCOTT DATE
STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 13
Environmental Features Map

Roberts Tavern Drive
Montgomery County, Maryland

July 2009

3. Watersheds, Streams and Floodplains

The study area is within the Seneca Creek watershed which is in the Middle Potomac River basin. There are no waterways or intermittent streams within the study area. During field investigation, two non-jurisdictional drainage swales were identified. Neither swale had a defined bed or hydric soils. There is no 100-year floodplain located within the study area. Consequently, the Recommended Alternative will have no impact on streams and floodplains.

4. Wetlands and Other Waters of the US

Review of the National Wetlands Inventory (NWI) map for Montgomery County indicates that no wetlands have been previously recorded in the study area. During field investigation on June 12, 2009, the project team did not identify any wetlands or other "waters of the US" within the study area. One stormwater management detention pond exists immediately south of existing Roberts Tavern Drive and four other ponds are located on the west side of the existing Roberts Tavern Drive and Observation Drive intersection. While demonstrating wetland hydrology and hydrophytic vegetation, these ponds were created in uplands in non-hydric soils and therefore are not considered jurisdictional. Therefore, the Recommended Alternative will have no impact on wetlands and waters of the US.

5. Special Protection Areas

The entire study area lies within the Clarksburg Special Protection Area (SPA), designated by Montgomery County as an area that has high quality or unusually sensitive water resources that require special protection measures during land development. Since the SPA extends over the entire study area, the Recommended Alternative would impact the SPA. Projects located in SPAs that impact over 5,000 sq ft (0.11 acres) of land area require an approval of a Water Quality Plan. Since the recommended alternative will impact approximately 4 acres of land and create approximately 1.3 acres of impervious area, a water quality plan will be required during final engineering. The process for approval of the Water Quality Plan consists of:

i. A pre-application meeting with several agencies including the Maryland National Capital Parks and Planning Commission (M-NCPPC), the Montgomery County Department of Permitting Services, and the Montgomery County Department of Environmental Protection,
ii. A Preliminary and Final Water Quality Plan, which includes stormwater management and sediment and erosion control concepts,
iii. A public comment period of 15 days; and
iv. Final approval from the Planning Board.

6. Wildlife, including Rare, Threatened and Endangered Species

Information from the United States Fish and Wildlife Service (USFWS), Maryland Department of Natural Resources (MDNR) Wildlife and Heritage Service, and MD DNR's Environmental Review Unit was requested to identify any previously documented rare, threatened and endangered species (RTEs) within or near the study area. In correspondence from USFWS and MDNR Wildlife and Heritage Service dated June 25, 2009 and August 4, 2009, respectively, the agencies indicated that there is no record of federal or state proposed or listed rare, endangered or threatened species within the project area.

The MDNR Wildlife and Heritage Service did state that potential Forest Interior Dwelling Species (FIDS) bird habitat may be present within the study area. Forest Stand B is considered potential FIDS habitat because it is contiguous with a forest stand that is greater than 50 acres and contains interior forest that is more than 300 feet from the edge of adjacent roadways. According to MDNR's guidelines, development should be restricted to the perimeter of the forest and within 300 feet of the existing forest edge. The recommended alternative is estimated to pass along the eastern edge of Forest Stand B and extend a maximum of approximately 170 feet into the forest edge. Consequently, the recommended alternative is not anticipated to have a significant impact on FIDS habitat.

B. Historic and Cultural Resources

There are three historic resources within or adjacent to the study area (see Figure 14 on page 34). The Clarksburg Historic District and Clarksburg Elementary School are located on the northwest side of Stringtown Road, adjacent to the study area. The Recommended Alternative would not affect these resources. Dowden's Ordinary is located at the southwest corner of Stringtown Road and MD 355 and would also not be affected by the Recommended Alternative.

C. Parks and Recreational Facilities

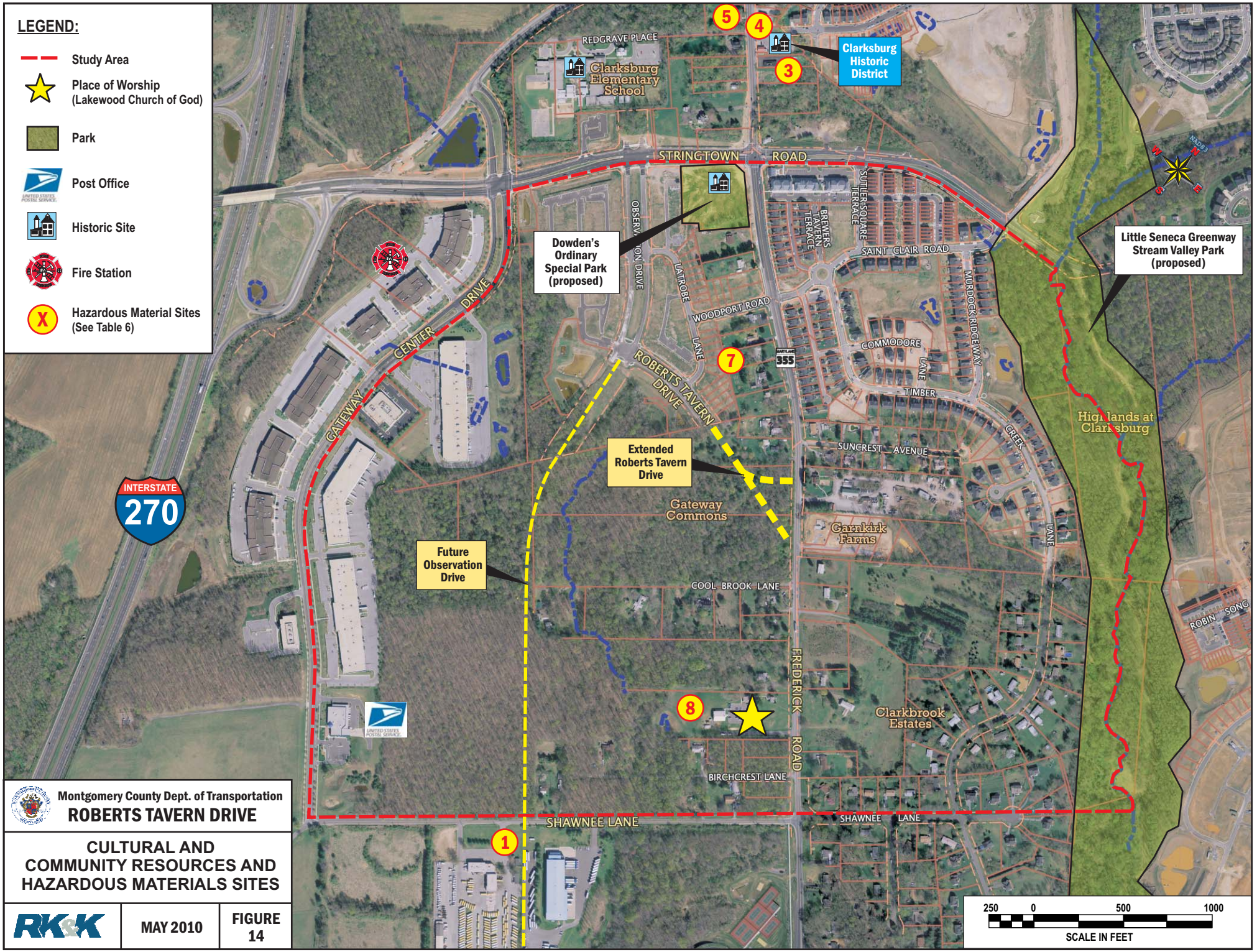
There are two proposed parks within the study area (see Figure 14 on page 34). Dowden's Ordinary Special Park will be located at the southwest corner of the Stringtown Road / MD 355 intersection and Little Seneca Greenway Stream Valley Park is located east of MD 355. Neither of these parks would be affected by the Recommended Alternative.

D. Community and Emergency Facilities and Services

Community and emergency facilities located within the study area include:

- Clarksburg Fire Station 35 on Gateway Center Drive
- Clarksburg Post Office on Gateway Center Drive
- Lakewood Church of God on MD 355 south of Cool Brook Lane

Each of these facilities is located outside the limits of the recommended alternative and would not be adversely affected by the proposed improvements (see Figure 14 on page 34).


LEGEND:
Study Area
Place of Worship (Lakewood Church of God)
Park
Post Office
Historic Site
Fire Station
Hazardous Material Sites (See Table 6)
Clarksburg Historic District
Clarksburg Elementary School
Dowden's Ordinary Special Park (proposed)
Little Seneca Greenway Stream Valley Park (proposed)
Extended Roberts Tavern Drive
Future Observation Drive
STRINGTOWN ROAD
REDGRAVE PLACE
OBSERVATION DRIVE
LATROBE
WOODPORT ROAD
LANE
SUTLER SQUARE TERRACE
BREWERS TAVERN TERRACE
SAINT CLAIR ROAD
MURDOCK RIDGE WAY
COMMODORE
TIMBER
CREEK
SUNCREST AVENUE
ROBERTS TAVERN DRIVE
CENTER DRIVE
GATEWAY
INTERSTATE 270
MARYLAND 355
Gateway Commons
Garnkirk Farms
Highlands at Clarksburg
COOL BROOK LANE
FREDERICK ROAD
Clarkbrook Estates
BIRCHCREST LANE
SHAWNEE LANE
ROBIN SONG
1
3
4
5
7
8
250 0 500 1000
SCALE IN FEET
Montgomery County Dept. of Transportation
ROBERTS TAVERN DRIVE
CULTURAL AND COMMUNITY RESOURCES AND HAZARDOUS MATERIALS SITES
RK&K
MAY 2010
FIGURE 14

All existing schools are located outside the immediate study area including:

- Clarksburg Elementary School on Redgrave Place north of Stringtown Road
- Clarksburg High School and Rocky Hill Middle School on MD 355 south of Shawnee Lane

A new elementary school, fire station and library are planned for the Clarksburg Town Center, located northeast of MD 355/Stringtown Road and outside the limits of the study area. Consequently, these facilities will not be affected by the recommended alternative.

E. Property Impacts

The recommended alternative will impact approximately 10 properties along MD 355 and will require approximately 2.5 acres of right-of-way acquisition. The majority of the proposed right-of-way for the new roadway extension is required from three parcels (N673, N780, and N888) located on the west side of MD 355 between Suncrest Avenue and Cool Brook Lane. Parcel N673, the most northern property, is a 3-acre parcel that contains an existing residence fronting MD 355. Roberts Tavern Drive will bisect the property and will impact the undeveloped portion of the property in the rear of the dwelling. The recommended alternative will utilize approximately 0.8 acre of the property for right-of-way and leave two 1+/- acre parcels remaining on the north and south sides of Roberts Tavern Drive. Access to the truncated property on the south side of Roberts Tavern Drive will need to be provided via Roberts Tavern Drive or through another property via MD 355 or Observation Drive. Alternatively, the County may acquire the land-locked property from the owner. The northern portion of the property containing the existing dwelling will maintain access to MD 355.

The other two parcels, N780 and N880, are undeveloped 11-acre and 13.4-acre properties, respectively that have the same owner. Approximately 1.4 acres of right-of-way will be required from parcel N780 for Roberts Tavern Drive and its intersection with MD 355. Access to the property will need to be provided from Roberts Tavern Drive, future Observation Drive or via MD 355 through an adjacent property.

Approximately 0.2 acres of property will be required from Parcel N880. Access to the property will need to be provided from Roberts Tavern Drive/MD 355, Cool Brook Lane, or future Observation Drive.

In addition to Parcels N673, N780, and N880, approximately seven other properties located along MD 355 may need to provide small strips of property along their MD 355 frontage to accommodate the proposed widening of MD 355.

F. Hazardous Material Sites

A preliminary inventory of hazardous materials was performed by reviewing the following environmental databases: Maryland Department of Environment (MDE) Oil Control Program (OCP), Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), and US Department of Transportation (USDOT) Hazardous Materials Incident Report System. In addition, historical USGS maps and aerial photographs were reviewed. Eight documented contamination releases were identified and are summarized in the table below. Six of the eight sites are depicted on Figure 14 (page 34); the other two sites (Site 2, Clarksburg

Liberty Gas Station, and Site 6, Lockheed Martin Mission Services) are located outside of the study area.

All documented contamination releases were considered minor and all were cleaned up to the satisfaction of the Maryland Department of the Environment. Therefore, the Recommended Alternative is not anticipated to encounter hazardous material sites.

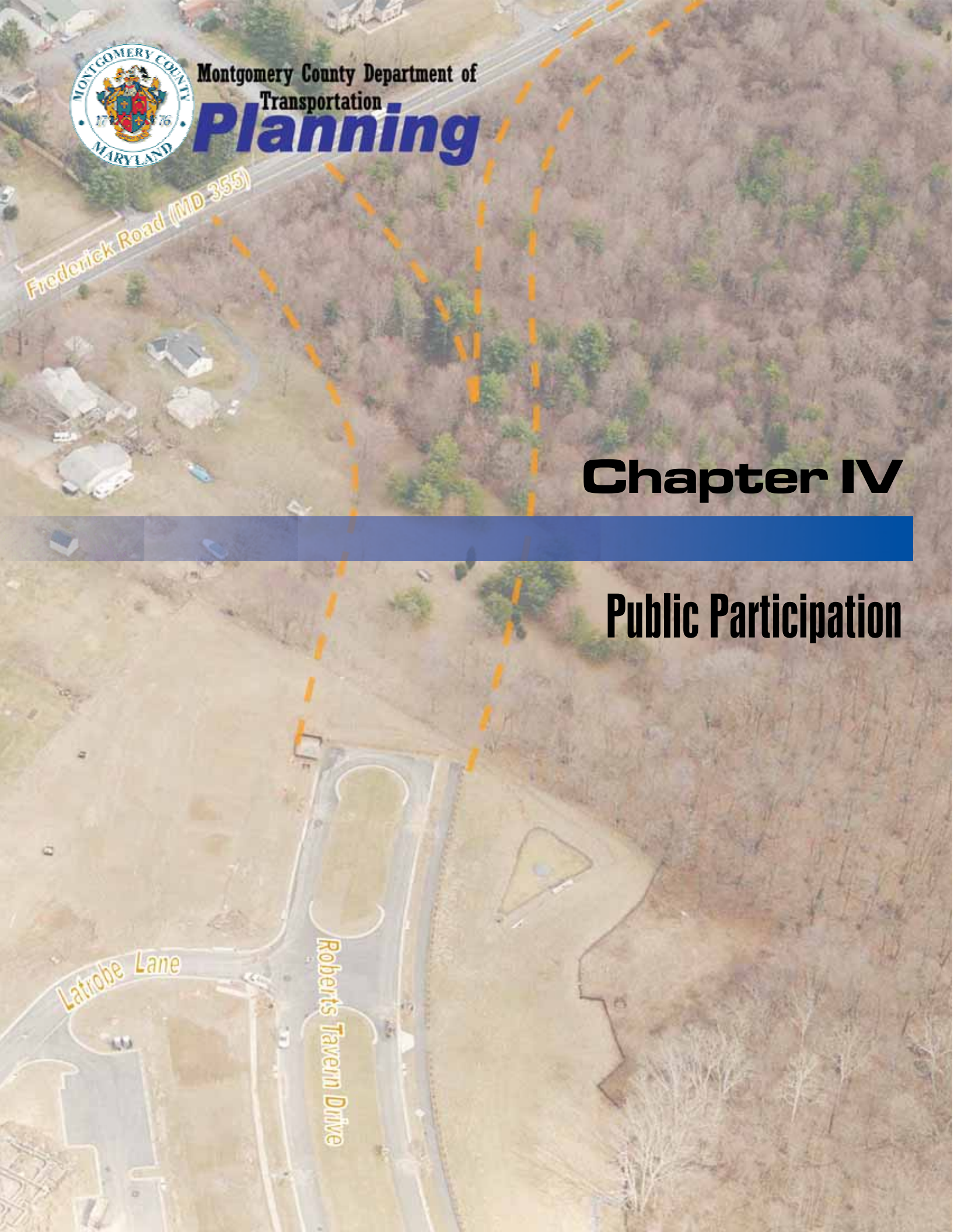
G. Utilities

Utilities were identified within the project road corridors from record plans and field reconnaissance. Overhead and underground utilities along MD 355 may be impacted by the proposed widening and associated storm drain improvements. The utility inventory is presented below in Table 10.

Photo 6 – Overhead Utilities along Northbound MD 355 - North of Cool Brook Lane

Table 10: Utilities Inventory

Owner	Utility	On-Site	Location	Potential Impacts
Allegheny Power	Electric	Yes	Roberts Tavern Drive & MD 355	Roberts Tavern Dr: Low SB MD 355: 6 Poles
AT&T	Telecommunications	No	-	-
BGE	Gas & Electric	No	-	-
Cellular One	Telecommunications	No	-	-
Comcast	Cable Television	Yes	Roberts Tavern Drive & MD 355	MD 355: Overhead and Underground Lines
PEPCO	Electric	No	-	-
Transcontinental Gas	Gas	No	-	-
Verizon	Telecommunications	Yes	Roberts Tavern Drive & MD 355	Roberts Tavern Dr: Low NB MD 355: 5 poles
Washington Gas	Gas	Yes	Roberts Tavern Drive & MD 355	Low
WSSC	Water & Sewer	Yes	Roberts Tavern Drive & MD 355	Moderate



Montgomery County Department of Transportation

Planning

Chapter IV

Public Participation

IV. PUBLIC PARTICIPATION

A. Public Outreach

Community feedback is an important aspect of the Facility Planning process. To provide study information to the public and solicit community feedback, MCDOT issued two newsletters, held one public meeting, and posted project data and plans to the county website during the past year. The first newsletter was mailed to property owners and civic associations in October 2009 with an invitation to the November 12, 2009 public meeting. The public meeting was held at Clarksburg High School to provide an overview of the Roberts Tavern Drive Extended study, present the alternative concepts and obtain public feedback. Approximately ten (10) citizens attended the meeting. A copy of the presentation is included in Appendix D and the presented public meeting materials are posted on MCDOT's website at:
http://www2.montgomerycountymd.gov/DOT-DTE/Projects/ProjectHome.aspx

A second newsletter that presented the Recommended Alternative was distributed to the project mailing list in March 2010. Both newsletters are included in Appendix D.

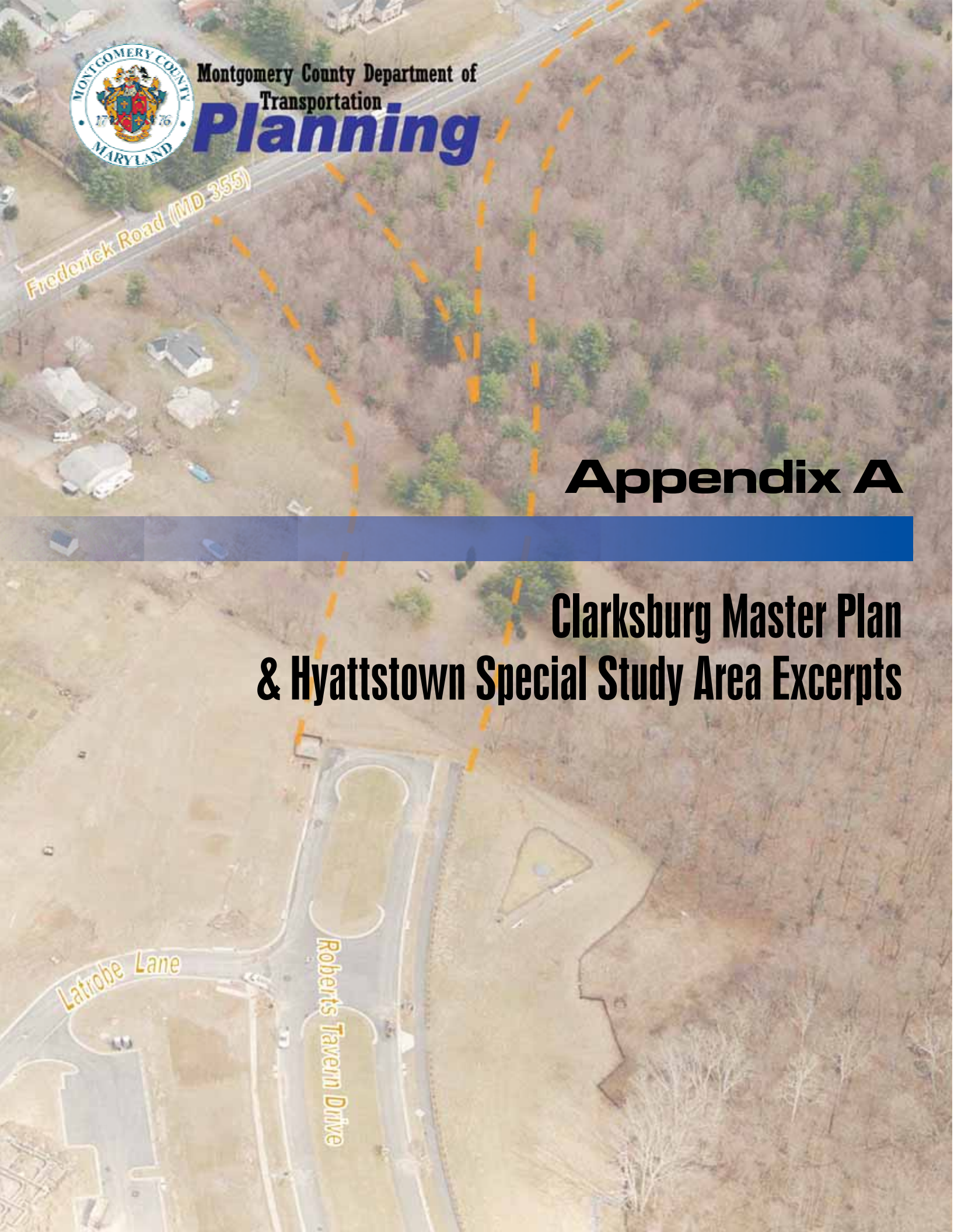
B. Public Comment

As of April 16, 2010, a total of 18 comments have been received from citizens. Copies of those comments are included in Appendix E. Table 11 below provides a summary of those comments.

Table 11: Summary of Public Comments

Prior to Recommended Alternative Recommendation	
Category (# of comments)	**Comment**
Alternative Preference (4)	• Clarksburg Civic Assn. supports the bypass. No collective conclusion but some prefer Alt. 3. • Favors Clarksburg Master Plan which encourages use of the bypass. Prefers Alt. 3. Would accept Alt. 2 or 4 if deemed necessary for environmental concerns. Suggest adding traffic light and left turn from Roberts Tavern Drive to MD 355. • Likes dual bikeway concept. Prefers Alt. 3. Opposes Alt. 1, 2, or 4. • Prefers Alt. 4 due to smaller footprint. Maintain driveway access.
Supports Project, No Alternative Preference (2)	• The faster this is completed the better. • Supports this project. No preference stated. Will provide access for survey work on property.
Opposes Project (1)	• No good-will toward the County project due to past experience.

Table 11: Summary of Public Comments	
Prior to Recommended Alternative Recommendation	
Category (# of comments)	**Comment**
Other Suggestions/Concerns (8)	• Existing creek nearby. County should put money into the Midcounty Corridor Study to solve the existing traffic problem. • Opposes all alternatives studied. Suggests maintaining the Master Plan concept. • Suggests taking traffic off Stringtown Road. • Suggests addressing traffic situations on MD 355 at Brink Road and West Old Baltimore Road first. • Address sight distance issue and safe entry and exit of vehicles on Cool Brook Lane. Provide signage on Roberts Tavern Drive to indicate the approach of Cool Brook Lane. • Consider use of roundabout. Provide safe and reasonable entry and exit of vehicles from the driveways on MD 355. • Need safe bicyclist and pedestrian crossings and interfaces. SHA should fix the shoulders of MD 355 for safer bike path and sidewalk. Make traffic report available on-line. • Alt. 2 is not good for ped/bike safety. The free right in Alt. 4 is not good for ped/bike safety.
After Issuance of Recommended Alternative	
Recommended Alternative (3)	• Approve of Recommended Alternative but concern that driveways on MD 355, particularly those east of the intersection, are too close to the intersection. Recommend diverting entering vehicles to a safe entry point via an access road. • Intersection is improved by allowing all movements. Bicycle and pedestrian friendliness must be built in. Traffic signs and signal timing should encourage use of the bypass. • Wetlands exist where the Recommended Alternative is proposed.



Montgomery County Department of Transportation

Planning

Appendix A

Clarksburg Master Plan & Hyattstown Special Study Area Excerpts

Plan chapter, a park-and-ride lot should be located on Comsat only if coordinated with the property owner.

Street and Highway Plan

The Plan concept for streets and highways is shown in Figure 11. North-south access will be provided by I-270 and A-305, which are intended to accommodate large volumes of traffic. These two roads will be linked by a series of east-west roadways (Stringtown Road, Newcut Road Extended, and Clarksburg Road).

Supporting this basic "rung and ladder" concept will be a series of roadways (Observation Drive and MD 355) which will serve land uses.

The comprehensive system of roadways proposed to implement this concept is shown in Figure 40. All highway segments in the Study Area and vicinity are described in Table 7, which specifies the maximum number of recommended lanes and the minimum required right-of-way width. Master Plan roadway alignments are used to preserve the right-of-way that will be needed for future construction of roadways. This preservation process ensures that land will be available when roadway construction is needed and that development is sited with the appropriate relations to future roads. An alignment can vary slightly, depending on special site needs, as it traverses the parcel so long as any changes made affect only that parcel.

The Study Area roadway network is recommended to consist of freeway, major highway, arterial roadway, business district, and primary residential street classifications. Primary roadways which primarily serve development access, as they are planned in the future, must be designed within the framework of the highway system. A later section of this chapter explains the need for non-standard rights-of-way in selected locations. These cross-sections reflect the variation of the character of roadways within the Town Center and the remainder of the Study Area.

Summary of Key Roadway Recommendations

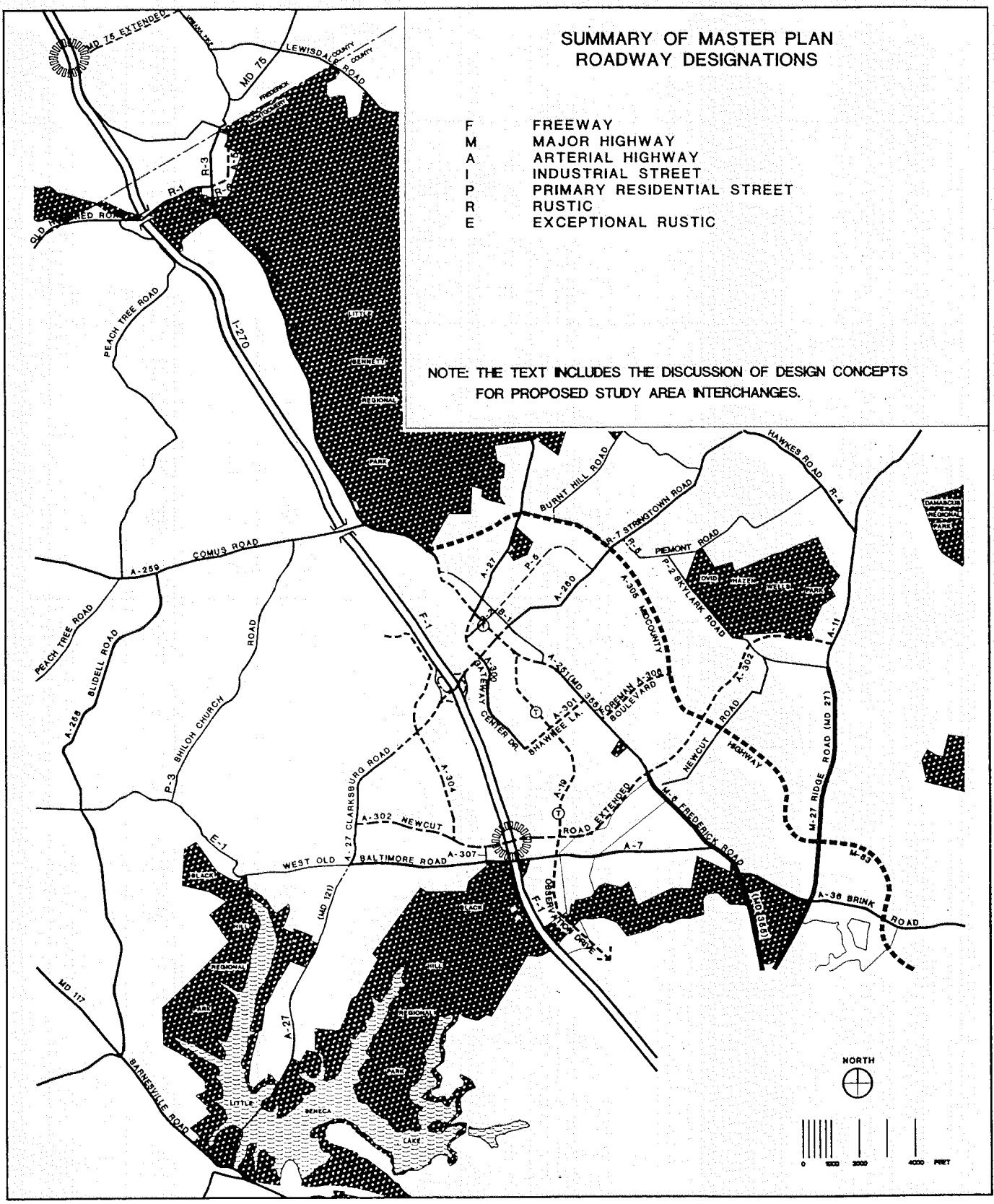
The following discussion presents a brief description of the key roadway system recommendations in this Plan.

I-270 AND ASSOCIATED INTERCHANGES

This Plan recommends that I-270 be widened to no more than eight travel lanes, within a 350-foot right-of-way, between MD 121 and the southern Study Area boundary. Between MD 121 and the Frederick County line, this Plan recommends that I-270 be widened to no more than six travel lanes within the existing variable right-of-way plus 50 feet (plus an additional 50 feet north of Comus Road to allow for the transitway). These right-of-way recommendations would not preclude the design of collector-distributer (C-D) roads within the

Generalized Highway and Transit Plan

Figure 40



Highway and Street Classifications in the Clarksburg Master Plan and Hyattstown Special Study Area

Table 7

Master Plan Roadway Designation	Name	Limits	Number of Travel Lanes[1] Maximum Recommended	Minimum Right-of-way Width[2]
Freeway				
F-1	Washington National Pike (I-270)	Southern Study Area Boundary to MD 121	8 lanes	350'
		MD 121 to Comus Road	6 lanes	250'
		Comus Road to County Line	6 lanes	Existing + 100'
Major Highways				
M-6	Frederick Road (MD 355)	Newcut Road Extended to Southern Study Area Boundary	4 Divided	120'
M-27	Ridge Road (MD 127)	Skylark Road to M-83	4 Divided	120'
		M-83 to Brink Road	6 Divided	150'
M-83	Midcounty Hwy.	Brink Road to MD 27	6 Divided	150'
Arterial Highways				
A-5	Hyattstown Bypass (MD 109)	MD 355 to County Line	2	80'
A-7	West Old Baltimore Road	MD 355 to MD 121	2	80'
A-11	Ridge Road (MD 27)	Northern Study Area boundary to Skylark Road	2	80'
A-19	Observation Drive	Southern Study Area Boundary to MD 355	4 Divided w/transitway	150' (includes 50' for transitway)
A-27	Clarksburg Road (MD 121)	MD 117 (in Boyds) to A-302	2	80'
		A-302 to A-304	4 Divided	120'
		A-304 to I-270	6 Divided	150'
		A-260 to Northern Study Area Boundary	2	80'

Highway and Street Classifications (cont.)

Table 7

Master Plan Roadway Designation	Name	Limits	Number of Travel Lanes[1] Maximum Recommended	Minimum Right-of-way Width[2]
Arterial Highways (cont.)				
A-36	Brink Road	MD 355 to M-83	4 Divided	100'
A-251	Frederick Road (MD 355)	Newcut Road Extended to A-19	4 Divided	120'
		A-19 to A-305	4 Divided w/transitway	150'
		A-305 to Comus Road	2 w/transitway	130'
		Comus Road to Hyattstown Bypass	2	80'
A-258	Slidell Road	Northern to Southern Study Area Boundary	2	80'
A-259	Comus Road	MD 355 to Western Study Area Boundary	2	80'
A-260	Stringtown Road	I-270 to A-305	4 Divided	120'
A-300	Gateway CenterDr.	A-260 to A-301	4 Divided	80'
A-301	Shawnee Lane	Gateway Center Drive to MD 355	4 Divided	120'
A-302	Newcut Road Extended	MD 121 to A-305	4 Divided	120'
		A-305 to MD 27	2	80'
A-304	Proposed Road	Newcut Road Extended (A-302) to Site 30	4 Divided	120'
A-305	Midcounty Hwy.	MD 27 to Stringtown Road	4 Divided	120'
		Stringtown Road to Clarksburg Road (A-27)	2	80'
		Clarksburg Road to MD 355	2	80'
A-306	Foreman Boulevard	MD 355 to A-305	2	80'
A-307	Proposed Road	Newcut Road Extended (A-302) to West Old Baltimore Road	2	80'

Highway and Street Classifications (cont.)

Table 7

Master Plan Roadway Designation	Name	Limits	Number of Travel Lanes[1] Maximum Recommended	Minimum Right-of-way Width[2]
Business Streets				
B-1	"Old Frederick" Rd.	Through Town Center Area	2	50'
Note: See Text for Discussion of this Road.				
B-2	Redgrave Place	A-19 to Little Seneca Creek	2 w/no parking inside historic dist.	70'
Primary Residential Street				
P-2	Skylark Road	Piedmont Road to MD 27	2	70'
P-3	Shiloh Church Rd.	West Old Baltimore Road to Comus Road	2	70'
P-5	Redgrave Place	Little Seneca Creek to A-260	2	70'
Rustic Roads				
R-1	Old Hundred Road (MD 109)	MD 355 to I-270	N/A	80'
R-3	Frederick Road (MD 355)	Hyattstown Bypass to County Line	N/A	80'
R-4	Hawkes Road	Ridge Road (MD 27) to Piedmont Road	N/A	70'
R-5	Piedmont Road[3]	Stringtown Road to Hawkes Road	N/A	70'
R-6	Hyattstown Mill Road	Frederick Road (MD 355) to Park Boundary	N/A	60'
R-7	Stringtown Road	A-305 to Study Area Boundary	N/A	80'
E-1	West Old Baltimore Road	Clarksburg Road (MD 121) to Western Study Area Boundary	N/A	80'

[1] These are the number of planned through travel lanes for each segment, not including lanes for turning, parking, acceleration, deceleration, or other purposes auxiliary to through travel.

[2] This minimum may be increased at time of subdivision on the basis of more detailed engineering studies.

[3] Realignment of Piedmont Road is recommended to allow appropriate distance from A-305/Stringtown Road intersection.

envelope of individual interchanges recommended by this Plan. This design will provide for a balanced transportation facility which offers both automobile and transit as viable travel options. Additional transit or High Occupancy Vehicle (HOV) facilities on I-270 may be considered south of Comus Road. The Plan recognizes that the addition of travel lane capacity on I-270, beyond the recommended number of travel lanes, may seriously undercut transit demand between Frederick County and Montgomery County. Further, such a design may not meet auto emissions attainment standards mandated by the Clean Air Act of 1990 and thus may not qualify for federal project funding.

Currently, the Clarksburg area is served by interchanges with I-270 at MD 121 and MD 109 (Hyattstown). However, to support the levels of future development envisioned in the Study Area and preserve the character of MD 355, the Plan recognizes the need to identify additional interchange capacity along I-270. This Plan recommends the addition of one new interchange in the Study Area and recommends one interchange near Urbana in Frederick County. These recommendations are described below.

The Land Use Plan illustrates general designs for each of the recommended interchanges along I-270. While these designs are still at a preliminary stage, the environmental and traffic operations constraints require extensive analysis to determine the location and designs shown. The design will provide guidance to the Maryland State Highway Administration (SHA) in their design work for I-270. Each of these interchanges is discussed in greater detail below.

I-270 AT NEWCUT ROAD EXTENDED

This Plan recommends a new interchange with I-270 at Newcut Road Extended (A-302). This interchange, which would serve the southern portion of the Study Area in the vicinity of Comsat, is proposed to be located at I-270, approximately 800 feet north of West Old Baltimore Road.

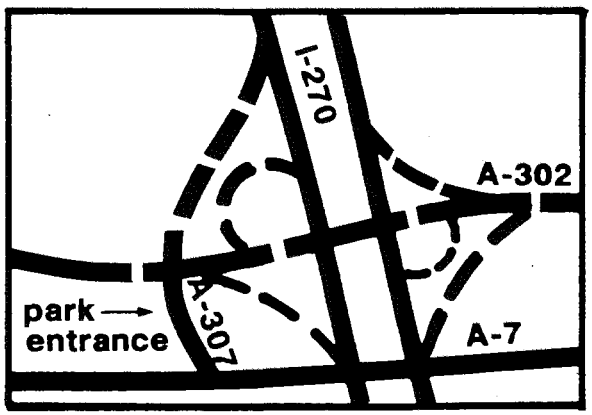
Figure 41 shows the new interchange to be designed as a full movement interchange and located to:

- Maintain the minimum interchange spacing standard of one mile from the MD 121 interchange. This Plan intends that this interchange will help improve access to Comsat (see A-19 discussion).
- Minimize wetland impacts on the west side of I-270.
- Maximize the distance between the end of the ramps and the Observation Drive (A-19)/Newcut Road intersection.
- Provide improved access from the north to Black Hill Regional Park.
- Minimize the amount of land needed from adjacent properties.
- Avoid negative impacts on Black Hill Regional Park.

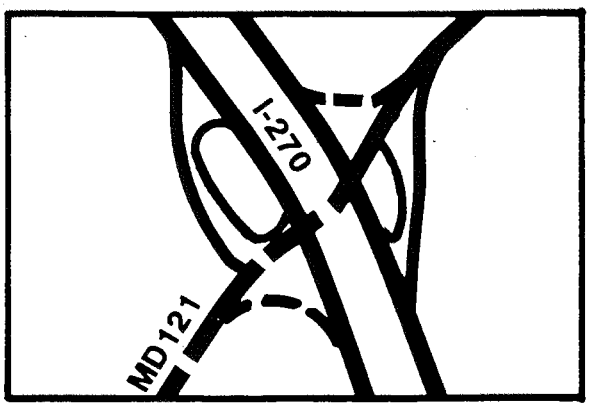
The design is conceptual and may change as a result of more design studies.

Proposed Interchange Design Concepts

Figure 41



Proposed Interchange -
I-270 at Newcut Road



Existing Interchange -
(with currently designed
modifications) - I-270 at MD 121

I-270 AT CLARKSBURG ROAD (MD 121)

This existing I-270/MD 121 interchange is currently programmed for ramp reconstruction as part of the widening and upgrading of I-270 to six lanes from Clarksburg Road (MD 121) to Darnestown-Germantown Road (MD 118). Construction of this project is anticipated to be completed by 1997. The Plan envisions that this interchange will serve central Clarksburg, including the Town Center area.

Figure 41 shows the existing interchange with currently designed modifications. This Plan recommends further improvements to the interchange to achieve the following goals:

- Provide improved access to the Town Center and Transit Corridor Districts.
- Encourage the relocation of the SHA salt and sand storage building to a less conspicuous location.
- Minimize the amount of land required and the associated impacts on adjacent properties.

I-270 AT OLD HUNDRED ROAD (MD 109)

This Plan recommends the closure of this interchange in conjunction with the opening of a proposed new interchange in the Urbana area of Frederick County (located at a westward extension of MD 75 to a connection with I-270 in the vicinity of Dr. Perry Road). Presently, MD 75 traffic uses MD 355 through Hyattstown to reach the I-270 interchange at MD 109. As development in the Green Valley/Urbana area continues, this traffic pressure will increase, necessitating the provision of additional capacity along MD 355. This increased capacity could entail the widening of MD 355, the provision of a bypass roadway around Hyattstown, or some combination of these two options. However, any potential capacity improvement would entail onerous community, historic preservation, and/or environmental impacts and thus would be highly undesirable (see Land Use Plan chapter). Further, the MD 109 interchange is of substandard design and any capacity improvements of this facility would be severely restricted by physical and environmental concerns.

The proposed interchange at MD 75 would allow traffic to access I-270 north of Hyattstown, reduce traffic pressure on MD 355, and avoid the negative impacts associated with providing for additional traffic capacity in the Hyattstown Historic District.

MIDCOUNTY HIGHWAY (M-83/A-305)

This Plan proposes two different classifications for Midcounty Highway as it traverses Clarksburg.

This Plan recommends the extension of M-83 as a six-lane divided limited

access highway from Germantown to MD 27. It recommends the extension of Midcounty Highway as a four-lane divided arterial roadway from Ridge Road (M-27) to Stringtown Road (A-260) within a 120-foot right-of-way. It recommends that the roadway transition to a two-lane arterial is within a 100-foot right-of-way between A-260 and Clarksburg Road, and is within an 80-foot right-of-way between Clarksburg Road and its termination at MD 355.

M-83/A-305 is designed to:

- Provide connections between Clarksburg, Germantown, and Gaithersburg.
- Provide traffic capacity parallel to I-270, A-19, and MD 355.
- Provide access to residential development in the eastern areas of Clarksburg, Germantown, and Gaithersburg.
- Provide a bypass of the office and industrial areas along I-270.

This Plan recommends that M-83 be constructed within a 150-foot right-of-way with a design which would allow for the construction of the outside lanes with a wide median for future widening. This design would set the outside edges of the roadway so that future widening could be achieved without additional impact to adjacent properties or the acquisition of additional right-of-way.

M-83 will be designed to mitigate its impact on Wildcat Branch in the Great Seneca Creek watershed and its tributaries. The need for M-83 will be reexamined in the context of the next update to the *Germantown Master Plan*.

RIDGE ROAD (MD 27)

Ridge Road (MD 27) is the major roadway connecting Damascus and Germantown. This two-lane roadway is also the eastern boundary of the Study Area for much of its length. Ridge Road (M-27) is currently designated as a major highway (four to six lanes).

The Adopted 1992 Damascus Master Plan Amendment recommends that MD 27 not be widened beyond two lanes through the Damascus Planning Area. This Plan supports that recommendation and continues Ridge Road as a two-lane arterial to Skylark Road. Development in Clarksburg will necessitate Ridge Road being widened south of Skylark Road as it traverses the Clarksburg Study Area.

FREDERICK ROAD (MD 355)

Frederick Road (MD 355) is a two-lane roadway that is the historical connection between Georgetown and the City of Frederick. The Adopted 1989 Germantown Master Plan Amendment established the current designation of MD 355 as a major highway throughout the Study Area.

The Plan recommendations for Frederick Road have been developed in response to the following concerns:

- **The character of MD 355 (Frederick Road) between Germantown and Clarksburg Town Center should be compatible with existing and proposed residential uses.**

  This Plan recommends that the classification of MD 355 be changed from a major highway to an arterial to support the Plan's objective that the existing character of MD 355 be continued. The only section of MD 355 in Clarksburg which will continue as a major highway is south of Newcut Road.

- **MD 355 should not be widened in the Clarksburg Historic District.**

  The section of MD 355 which runs through the Clarksburg Historic District has severe limitations on its ability to be widened. This Plan recommends that Frederick Road not be widened due to impacts on historic structures and the character of the Clarksburg Historic District. This Plan acknowledges that intersection improvements may be necessary. Such improvements should result in minimum impacts to contributing structures and the historic setting. To avoid widening the section of MD 355 through the historic district, this Plan recommends that MD 355 be relocated approximately 500' west of the district, beginning at Suncrest Avenue and running north to existing Frederick Road.

- **MD 355 should not be widened in the Hyattstown Historic District.**

  Like the Clarksburg Historic District, the section of MD 355 that runs through the Hyattstown Historic District has severe limitations on its ability to be widened. This Plan recommends that MD 355 not be widened due to impacts on historic structures and the character of the district and proposes designating this portion of MD 355 as rustic. The current traffic congestion problems in the district are, for the most part, the result of traffic traveling through the area between I-270 and MD 75 via MD 109 and MD 355.

  This Plan recommends that the I-270 interchange with MD 109 be closed and replaced with an interchange at MD 75 (extended) in Frederick County. If the MD 109 interchange is maintained or improved, then this Plan recommends that a bypass of the Hyattstown Historic District be provided. Frederick Road should become a secondary residential street through the Hyattstown Historic District if the bypass is constructed. The bypass recommended by this Plan extends MD 109 from its intersection with MD 355 eastward and then northward to intersect with MD 355 north of the County line. The northern end of MD 355 will be a "T" intersection with MD 109 as the primary movement. This alignment:

  - Minimizes the traffic volumes along Frederick Road.
  - Limits the need for traffic improvements along MD 355 to the intersections with MD 109 and the bridge over Little Bennett Creek.

- Utilizes the least problematic alignment with regards to environmental impacts and road construction.

A-19 (OBSERVATION DRIVE EXTENDED)

This Plan recommends the construction of Observation Drive Extended (A-19) as a four-lane divided arterial with a 150-foot right-of-way. This roadway is an extremely important element of the *Clarksburg Master Plan* for several reasons:

- It will one day connect with Observation Drive in Germantown, thereby offering an alternative route to MD 355.
- The road is proposed to be wide enough to accommodate a separate bus lane or light rail.
- The road will help provide additional access to the Study Area's major employment areas.

The Master Plan proposed alignment for Observation Drive is shown on Figure 40.

The spacing between A-19 and I-270 along Newcut Road is limited to about 900 feet due to the location of the Comsat satellite groundstation and a branch of Little Seneca Creek. This may result in inadequate weaving distance for northbound traffic exiting I-270 onto Newcut Road and then turning left onto A-19. Much of the traffic making this movement would be bound for the Comsat property. If weaving distance between A-19 and I-270 along Newcut Road is determined to be inadequate, alternative actions may be necessary as determined by the Maryland State Highway Administration. These alternative actions should provide direct access to the Comsat property while considering the safety and efficient movement of traffic along A-19.

This Plan recommends that the intersection spacing standards in the current road code for an arterial roadway be modified for A-19. The general intent is to alternate intersections which cross the transitway with those that do not cross (right-in, right-out). This will allow for transit serviceable land uses while minimizing the number of intersections that would require traffic signals.

MD 121 - CLARKSBURG ROAD (A-27)

Clarksburg Road (MD 121) traverses the Study Area in an east-west direction. The land use pattern proposed along MD 121 ranges from rural and open space west of I-270 to retail and higher-density housing between MD 121 and I-270. The character of MD 121 will change as it serves different levels of development. West of I-270, this Plan recommends that MD 121 be classified as an arterial roadway (A-27, two lanes) rather than a major highway between MD 117 and A-302. Between A-302 and A-304, this Plan recommends a four-lane divided arterial roadway. Between A-304 and I-270, this Plan recommends a six-lane divided arterial roadway. Currently, this section is classified as a major highway. This Plan recommends that the portion of MD 121 that is within a one-half

mile of I-270 be relocated due to the reconfiguration of the I-270/MD 121 interchange. Due to this reconfiguration, the western section of Clarksburg Road will directly connect with the extension of Stringtown Road, which is also designated as an arterial road (A-260).

The section of Clarksburg Road between I-270 and A-19 is recommended for realignment and will provide for a right-in, right-out intersection at A-260. Gateway Center Drive presently crosses the alignment of Stringtown Road Extended and connects with Clarksburg Road. Gateway Center Drive (A-300) remains in its existing configuration, but the turning movements at its intersection with A-260 (Relocated Clarksburg Road) may need to be restricted because of its proximity to the I-270 interchange. These restrictions may be required to reduce the negative traffic impacts of a full movement intersection located at a substandard distance from the MD 121/I-270 interchange.

STRINGTOWN ROAD (A-260)

This Plan recommends that Stringtown Road be constructed as a four-lane divided arterial roadway between I-270 and A-305. This Plan recommends that the 1968 Clarksburg and Vicinity Master Plan alignment of Stringtown Road be modified between MD 355 and Piedmont Road. The recommended alignment follows the existing road in order to utilize the existing crossing point of Little Seneca Creek and avoid two tributaries to the north of this crossing. The existing crossing will need to be widened to accommodate two additional lanes. When widened, this crossing is recommended to include areas for bike paths along Stringtown Road and for the Little Seneca Creek greenway, which will cross under Stringtown Road.

SHAWNEE LANE (A-301)

This Plan recommends that Shawnee Lane be reconstructed as a four-lane divided arterial roadway between Gateway Center Drive and MD 355.

GATEWAY CENTER DRIVE (A-300)

Gateway Center Drive is the main street for Gateway I-270, a major employment center located in the Transit Corridor District of the Study Area in the vicinity of the MD 121 interchange. This Plan recommends Gateway Center Drive to be classified as a four-lane divided arterial roadway within a variable 80- to 120-foot right-of-way.

NEWCUT ROAD EXTENDED (A-302)

Existing Newcut Road is a two-lane road that connects Piedmont Road to MD 355. This Plan recommends that Newcut Road be relocated adjacent to the stream buffer of Little Seneca Creek and extended to the east to connect with MD 27 and to the west to cross I-270 (with an interchange) and connect with

MD 121. (See discussion of Newcut Road Interchange in this chapter.) The Plan also recommends Newcut Road Extended be classified as a four-lane divided arterial highway between MD 121 and A-305 and as a two-lane arterial from A-305 to MD 27.

Within the Newcut Road Neighborhood, the character of Newcut Road Extended is intended to be conducive to pedestrian crossings and provide access to the residential and retail areas in the village. To do so, the road should be narrow with frequent intersections, sidewalks, and retail and office uses located close to the street.

The existing intersection of Newcut Road with MD 355 is recommended for abandonment with property access provided from the northeast by Newcut Road Extended. In addition, other areas along the existing portions of Newcut Road will require modification in order to access the relocated road. In the vicinity of the relocated roadway's intersection with Skylark Road, the alignment is recommended to be located to provide an area of 20 usable acres between Newcut and Skylark Roads and Ovid Hazen Wells Recreational Park for a middle school site.

The Newcut Road Extended crossing of Little Seneca Creek occurs in a highly sensitive area of wetlands. Careful siting of this crossing is necessary to assure that the environmental impacts and need for potential mitigation are minimized.

A-304

This Plan recommends a four-lane arterial road parallel to I-270 to serve the Cabin Branch Neighborhood. The location of this road is shown on the approximate location of the ridge line between Cabin Branch and an unnamed tributary of Little Seneca Creek. This roadway serves as a boundary between residential and employment areas within the Cabin Branch Neighborhood. In order to provide access to Site 30 and employment uses in the vicinity of the northwest quadrant of the MD 121/I-270 interchange, this Plan recommends the reservation of a 120-foot right-of-way to allow for the construction of a four-lane divided arterial roadway north of MD 121. Given that this alignment crosses through large parcels, this Plan recommends that the specific alignment of the road be developed when these properties develop, whether together or individually. This will allow the road to serve the properties in the most effective manner. Modification of the road alignment is not intended to imply or endorse a change in the actual zoning boundary.

FOREMAN BOULEVARD (A-306)

This Plan recommends the construction of Foreman Boulevard (A-306) as a two-lane arterial roadway within an 80-foot right-of-way between MD 355 and A-305. This roadway traverses land recommended for residential development and will provide access to the recommended local park adjacent to the Little Seneca Creek Greenway.

WEST OLD BALTIMORE ROAD (A-7 AND E-1)

West Old Baltimore Road is a historical connection between this part of Montgomery County and the City of Baltimore. Currently, the road is in a wide variety of conditions. East of I-270, West Old Baltimore Road is typical of streets in the Up-County area where residences front on two-lane roads. Approaching I-270, the surrounding area is dominated by agricultural land and the satellite ground stations on the Comsat property. On the west side of I-270, the road serves as access to Black Hill Regional Park, farms, and scattered houses. As West Old Baltimore Road approaches MD 121, the condition of the road becomes more rustic, going from a standard two-lane cross-section with adequate clearance along the side of the road to a substandard width with trees and brush directly adjacent to the road.

This Plan recognizes and continues the rural character of West Old Baltimore Road in those areas where the Plan's recommended land uses for agricultural and open space preservation support the recommended character of the road. (See Rustic Road Recommendations.)

This Plan recommends that West Old Baltimore Road between Ten Mile Creek and Little Seneca Creek contain a hiking/biking path to connect the greenways.

REDGRAVE PLACE (P-5)

This Plan recommends that Redgrave Place be classified as a two-lane business district street within a 70-foot right-of-way to the tributary of Little Seneca Creek. North of that point, this Plan recommends that the roadway be classified as a primary residential street.

This Plan recommends that Redgrave Place serve as a pedestrian and vehicular linkage between the eastern area of the Town Center and the Town Center transit station. To do so, an extension of Redgrave Place to the east is recommended. This recommendation would require the relocation of a structure within the historic district. Redgrave Place is intended to connect the Town Center transit station to the greenway.

At the intersection of Redgrave Place with MD 355 (B-1), both roads should maintain a two-lane cross-section without turning lanes and include sidewalks on both sides of the (70-foot right-of-way) street. The design and construction of sidewalks along Redgrave Place should protect the existing chestnut tree to the maximum extent possible. While this may create a substandard design for the intersection, this serves to protect the traditional character of the district and accommodate pedestrian crossings.

Right-of-Way Recommendations

This Plan recommends increases in the minimum right-of-way width of major highways and arterial roads to permit adequate space for continuous turn lanes, additional buffer/landscape space, and medians, as well as the typical street, sidewalk, and bikepath requirements. Attainment of the full recommended right-of-way in developed areas may not be feasible in all locations or cases. In the absence of detailed engineering studies, dedication of the minimum right-of-way will be required at the time of subdivision.

Major highways have been increased from a master planned right-of-way of 120 feet to 150 feet, with an increase from 80 feet to 120 feet for divided arterials to provide for separated bikeways.

This Plan recommends that the right-of-way of an arterial road or major highway be widened at intersections with other arterial roads and/or major highways. This increased width will provide space for an additional left-turn lane and a right-turn lane on the approach side of the intersection, as well as an adjustment area on the departure side. The amount of additional right-of-way on the approach side is 24 feet wide for 500 feet from the intersection with a 400-foot taper. The departure side is 12 feet wide for 200 feet with a 180-foot taper. Both a divided arterial and a major highway with a 30-foot median can accommodate two left-turn lanes; only 12 feet of additional right-of-way is needed in those cases. An undivided arterial road needs an additional 8 feet of width to provide a median at the intersection for pedestrian and vehicular safety.

In the case of the transitway designation, the rights-of-way are increased 50 feet over that which would otherwise be required for the roadway right-of-way. The location or alignment of the additional 50 feet is on one side or the other of the existing right- of-way, or equivalently split off the center line.

Recommended Rustic Road Designations

Montgomery County has enacted a Rustic Roads Program to preserve those historic and scenic roadways that reflect the agricultural character and rural origins of the County. The legislation creating the Rustic Roads Program (adopted in March, 1993) defines two categories of rustic roads; the criteria for classification is summarized in Table 8.

The legislation includes an Interim List of Rustic Roads; this list has been evaluated in the context of the land use and transportation recommendations of this Plan. Table 9 and the accompanying map (see Figure 42, page 128) summarize this Plan's recommendations regarding rustic and exceptional rustic roads. A more detailed discussion of the rustic and exceptional rustic road recommendations of this Plan is presented in the Technical Appendix.

Appendix B

Bikeway Master Plan Excerpts

CHAPTER 2
Countywide Bikeway Network Concept Plan

Background

This plan focuses on identifying the "countywide bikeways network", which includes bikeways of countywide significance. **Countywide bikeways form the basic structure or framework of the County's bikeway network**. These bikeways are expected to carry a substantial share of long distance bicycle traffic in the county, for recreation and transportation, as well as most of the bicycle traffic to transit centers, activity centers, municipalities and central business districts.

This plan attempts to achieve a balance of on-road and off-road bicycling accommodations, providing bikeway facilities separated from motorized traffic (e.g., shared use paths and bike lanes) as well as shared use roadways (Class III bikeways) that often provide critical local connections or long distance recreational bicycling in the County's rural areas. Where both on-road and off-road accommodation may be desirable, the plan also recommends certain roadways for dual bikeways, which are road corridors with two types of bikeways, either shared use path and bike lanes, or shared use path and shared roadway.

The countywide bikeway network is largely composed of bikeways identified and approved in previous community master plans, sector plans, and functional plans such as the 1998 Countywide Park Trails Plan. Several new bikeways are proposed by this plan, mostly to fill in gaps and improve regional, countywide connectivity, as well as to enhance access to transit stations and community facilities. The plan occasionally makes a recommendation for a different type of bikeway for a particular segment of road than currently proposed in existing plans.

Table 2-2 at the end of this chapter describes all countywide bikeways in more detail. The recommended countywide bikeway network is depicted on the large map that accompanies this plan.

Bikeway Types and Desirable Applications

There are generally three types of bikeways recognized by this plan for including in the countywide bikeway network:

1) Existing or proposed shared use paths

2) Existing or proposed bike lanes; and

3) Key signed shared roadways that provide direct or indirect connections to transit centers, activity centers, employment centers and central business districts. Signed shared roadways are often simply called bike routes.

Certain types of bikeways are generally more appropriate for certain types of roads. Shared use paths are more appropriate where there are fewer driveways and intersecting roads. Bike lanes are more appropriate in more urban areas where a defined space for bicyclists is desired. Shared roadways are appropriate where motor vehicle speeds and volumes are lower, where inadequate right-of-way make bike lanes or a shared use path infeasible, or in more rural areas or areas where adequate right of way exists for bikeable shoulders. In many cases, more than one type of facility may be appropriate or desirable, what this plan calls "dual bikeways."

Table 2-1 on the following pages includes general characteristics, benefits, desirable applications and issues associated with the three main types of bikeways. The information about desirable applications is partly derived from research conducted by Michael King on bicycle facility selection guidelines. These guidelines are not intended to be unbreakable rules, but rather guiding principles that help determine which type(s) of bikeways are more appropriate for certain types of roads and traffic conditions.

Table 2-1
Types of Bikeways and Applications

Bikeway Type	General Characteristics	Benefits	Desirable Applications	Discussion
Shared Use Path (formerly called Class I Bikeway)	▪ Two-way bikeway located within right-of-way of a road or transitway ▪ Separated from travel lanes by a landscape panel ▪ If along road, located on one side of a road and intended for two-way bicycle travel ▪ 8-12 feet wide ▪ 8-10 feet vertical clearance ▪ Built to AASHTO standards ▪ Signs meet MUTCD guidelines ▪ Asphalt or Concrete ▪ Implemented by transportation agency, or under supervision of transportation agency ▪ Maintained by transportation agency ▪ Motor vehicles are prohibited ▪ May be part of a dual bikeway (road also is proposed for bike lanes or shared roadway) ▪ Signed as a bike route, unless part of a dual bikeway in which case the on-road bikeway is signed and marked as the official bike route	▪ Offers dedicated facility completely separate from motor vehicle traffic, fewer potential conflicts with motor vehicles ▪ Preferred type of facility for beginner or intermediate skill levels, especially child bicyclists ▪ Meets the needs of 90-95% of bicyclists ▪ Intended/designed for bicycle travel, but accommodates other users (pedestrians, joggers, roller-bladers)	▪ Along roads with high speeds (40 mph and higher) and high traffic volumes (15,000 ADT and higher) where complete separation from motor vehicle lanes is desired ▪ Along roads with few driveways and intersections, especially commercial driveways unless it connects to a local designation (retail center, school, library, community center, neighborhood park) ▪ Along roads that provide a connection to other shared use paths or to hard surface park trails ▪ In suburban or semi-rural crossroad communities (Olney, Potomac)	▪ Proper design (good signage and lighting) at intersections and driveway crossings is very important to minimize risk of conflict with motor vehicles ▪ Shared use paths should not be confused with sidewalks which are more narrow and are designed and intended for pedestrians. ▪ Shared use path must be maintained and cleared of debris and overhanging branches to effectively encourage people to use them ▪ For dual bikeways, the on-road bikeway should be recognized as the primary bicycle facility (e.g., signs and marking). The shared use path is considered supplementary.

Countywide Bikeways

Table 2-2 identifies and describes the bikeways that are included in the countywide bikeway network. Each bikeway description contains the following information:

Route Number. A unique route number identifies each bikeway in the county, similar to the system developed for the 1978 plan and the system used for the Master Plan of Highways. Assigning a number allows for quick reference. "SP" indicates a shared use path, "BL" indicates bike lanes, "SR" indicates shared roadway, and "DB" indicates dual bikeway. The types of bikeways in a dual bikeway are listed under *Bikeway Type*. Bikeways are generally numbered west to east, south to north direction with only a few exceptions.

1978 Route Number. The column adjacent to the Route Number column identifies the corresponding number from the 1978 plan, if applicable.

Bikeway Name. Each bikeway is assigned a bikeway name, which usually corresponds to the name of the road on which it is located. Roads with multiple types of bikeways along their length are subdivided into segments corresponding to the stretch of road or transit for which each type applies.

Bikeway Type. This column highlights the type(s) of bikeway facility proposed or existing: shared use path, bike lanes, signed shared roadway or dual bikeway.

Limits. The starting point and ending point are identified, generally west to east, south to north.

Plan Reference. This column identifies in which master plan(s) the bikeway is already proposed or recommended, if applicable.

Status/Condition. The condition of each bikeway is briefly described, including pavement condition, safety issues/hazards and major gaps.

Maryland Department of Transportation BLOC score. Each state highway in the County received a Bicycle Level of Comfort (BLOC) score as part of the 2003 Maryland Bicycle and Pedestrian Master Plan. The score which ranges from A (excellent) to F (poor), reflects the level to which the roadway currently meets the needs of bicyclists. A poor BLOC score typically indicates a higher priority in this plan.

Discussion. This column includes a generalized discussion of implementation issues, including important connections and presence of existing segments that may already be implemented or built.

The specific routes and types in Table 2-2 are strongly preferred. However, if during the design of a bikeway the specific route or type is found to entail costs or impacts disproportionate to its benefits, then an alternative route or type that serves the same general purpose and need may be built and would be consistent with this plan. Furthermore, a bikeway segment not identified in Table 2-2 may be implemented if it offers significant benefit to the plan and its goals.

Countywide Bikeway Numbering System

Locating specific bikeways or segments of bikeways on a map can be difficult, especially when readers are not familiar with actual locations of roads. Most master plans include a table listing all existing and proposed bikeways that includes a unique identifier: a number or combination of letters and numbers. Page-size maps are often too small to include street names. M-NCPPC has traditionally developed numbering systems in order to make it easier for readers to more quickly and efficiently identify bikeways on a map and refer to an accompanying table to obtain important bikeway attribute information.

The 1978 system used a series of letters and numbers to help readers determine whether a bikeway was existing (E), scheduled/planned (S) or proposed (P). This system becomes outdated as facilities are built or implemented.

This plan takes a new approach that groups countywide bikeways into three general categories: 1) Shared Use Paths; 2) Bike Lanes; 3) Signed Shared Roadways; and 4) Dual Bikeway. Based on this approach, this plan recommends a new system of letters and numbers:

- "SP" for shared use path
- "BL" for bike lanes; and
- "SR" for signed shared roadway.
- "DB" for a dual bikeway

As such, each countywide bikeway has been given a unique identifier (e.g., SP-1, BL-1, SR-1, DB-1, etc.). Numbering order is generally west to east, south to north. As such, SR-1, Bradley Lane is located in the southwest corner of the County, while DB-30 (Woodfield Road - North) is located in the northeast corner.

This numbering order coincides with Table 2-2, which lists countywide bikeways in this general order as well. These numbers are for planning purposes only. DPWT will be responsible for developing a system for numbering bike routes for wayfinding purposes as part of its annual bikeways program.

Complex Routes

Several routes follow complex routes along local and neighborhood streets. The countywide map included in this plan cannot depict these detailed routes very well. Therefore, figures 2-4 through 2-6 are page size maps to help the reader better understand the precise routes these bikeways follow:

- SR-10, NIH-CCT Connector
- SR-11, NIH-Georgetown Branch Trail Connector
- SR-17, Connecticut Avenue (MD 185) Corridor
- SR-19 & SR-20, Georgia Avenue (MD 97) and Georgia Avenue Alternative
- SR-21, Veirs Mill Road (MD 586) Alternative

In addition, countywide bikeways tend to be concentrated in areas of the County in which street networks are dense. Again, the countywide map cannot accurately show the precise routes these bikeways follow. Therefore, figures 2-8 through 2-15 are detailed page-size maps of the following areas of the County:

- Bethesda/Friendship Heights
- Silver Spring/Takoma Park
- Wheaton/Aspen Hill
- North Bethesda/White Flint
- Rockville
- Gaithersburg
- Germantown/Clarksburg

(NOTE: The maps on the following pages show both existing and proposed countywide bikeways. The maps neither indicate County priorities nor represent current bicycling routes, and are intended for planning purposes only. Refer to Chapter 4 of this plan for bikeway priorities, and to the DPWT Bicycle Routes Map *for current bicycle routes)*

Figure 2-15

Existing, Planned and Proposed Countywide Bikeways
Small Area Map: Clarksburg

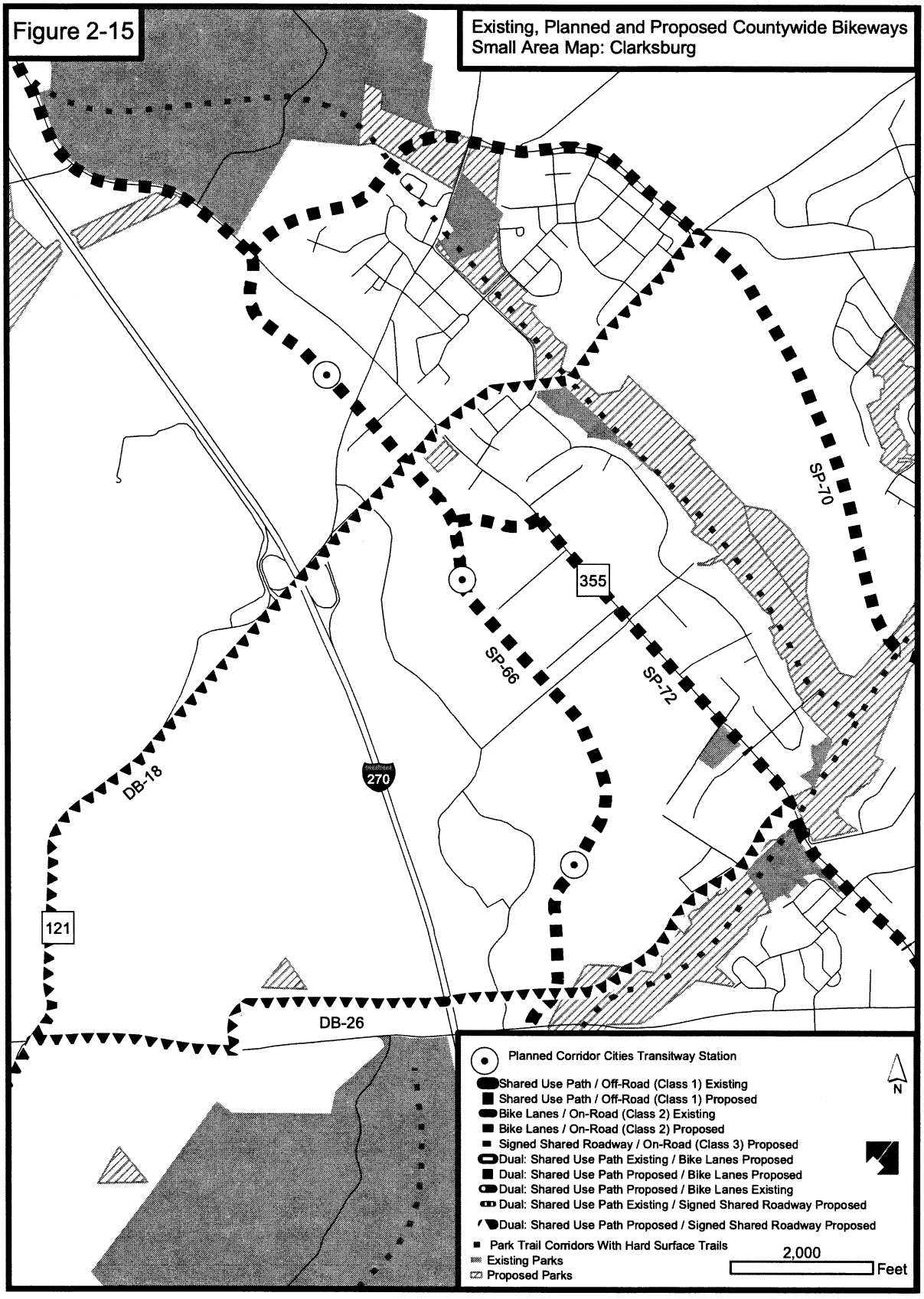


Table 2-2 Countywide Bikeways

Route #	1978 Route # reference	Bikeway Name	Bikeway Type	Limits		Plan Reference	Status/ Condition	BLOC Score*	Discussion
				From	To				
SP-65		Richter Farm Road	Shared use path	Great Seneca Highway (MD119)	Clopper Road (MD117)		New proposal		To be built incrementally by developers
SP-66		Corridor Cities Transitway bike path	Shared use path	Shady Grove Metrorail Station	Frederick Road (MD355)	I-270/US15 Corridor Study	Proposed, although already exists in segments as part of other bikeways		Connects most of the major employment centers in the I-270 Corridor north of Rockville; to be implemented fully as part of CCT project
BL-33		Seneca Road	Bike lanes	River Road (MD190)	Darnestown Road (MD28)	Gaithersburg Vicinity	Proposed, although portion exists at intersection f Seneca and MD28		Connects River Road dual bikeway with upcounty bikeway system
BL-36		Snouffer School Road	Bike lanes	Woodfield Road (MD124)	Centerway Road		New proposal		Provides continuation of bike lanes on Muncaster Mill Road north to Centerway Road
SP-28		Snouffer School Road	Shared use path	Centerway Road	Goshen Road		New proposal		Provides continuation of the BL-36 bikeway north to the East Village of Montgomery Village
Germantown & Clarksburg									
DB-25		Germantown Road (MD118)	DUAL BIKEWAY; shared use path and signed shared roadway	Darnestown Road (MD28)	Frederick Road (MD355)	Germantown	Modified proposal; segment of path between Clopper Road (MD117) and Germantown Park Road is existing; other path segments proposed or exist only in short segments; wide outside travel lanes to be provided when road is widened or reconstructed	E,F	Major connection to and through Germantown Center
SP-68		Father Hurley Boulevard/Ridge Road (MD 27)	Shared use path	Germantown Road (MD118)	Brink Road	Germantown	Proposed	No score	Provides connection to Germantown Center; segment of path will be built as part of Father Hurley Boulevard extension (project underway in 2003)
SP-69		Observation Drive	Shared use path	Germantown Road (MD118)	Frederick Road (MD355)	Germantown	Segment between MD118 and Little Seneca Creek is existing; segment between Little Seneca Creek and MD355 is proposed		Provides direct connection through Clarksburg
SP-70		MidCounty Highway	Shared use path	ICC	Frederick Road (MD355)	Clarksburg, Germantown, Gaithersburg and Vicinity	Proposed		Major north-side off-road connection; may extend to ICC; Will be built as part of future roadway construction and/or improvements
SP-71		Middlebrook Road	Shared use path	Father Hurley Boulevard	Midcounty Highway	Germantown	Exists in segments, otherwise proposed		Good connection to Germantown Center

SP = Shared Use Path (Class I); BL= Bike Lanes (Class II); SR = Signed Shared Roadway (Class III); DB = Dual Bikeway

(*BLOC = bicycle level of comfort score for state highways, see p. 29)

Table 2-2 Countywide Bikeways

Route #	1978 Route # reference	Bikeway Name	Bikeway Type	Limits		Plan Reference	Status/ Condition	BLOC Score*	Discussion
				From	To				
SP-72		Frederick Road (MD355)-Upcounty	Shared use path	Watkins Mill Road	Frederick County line	Germantown	Exists in segments, otherwise proposed	B	Provides excellent connections to downtown Gaithersburg and Clarksburg Town Center; Will be built incrementally as part of future SHA projects as well as by developers
DB-18		Clarksburg Road (MD121)/ Stringtown Road	DUAL BIKEWAY; shared use path and shared roadway	Clopper Road (MD117)	Midcounty Highway	Germantown	Proposed	No score	Provides good connections to Clarksburg Town Center, Black Hill Regional Park; path to be built mostly by developers; shared roadway requires only signage improvements
DB-26		Old Baltimore Road/New Cut Road	DUAL BIKEWAY; shared use path and signed shared roadway	Clarksburg Road (MD121)	Frederick Road (MD355)	Clarksburg	Proposed		Minor connection to Clarksburg; part of important connection to Black Hill Regional Park
DB-27		Watkins Mill Road	DUAL BIKEWAY; shared use path and signed shared roadway	Frederick Road (MD355)	Midcounty Highway	Germantown	Proposed; section between Seneca Creek and Midcounty Highway is a new proposal		Forms part of connection to City of Gaithersburg
BL-34		Riffle Ford Road	Bike lanes	Darnestown Road (MD28)	Germantown Road (MD118)		New proposal		Important connection to South Germantown Park
SP-75		CCT-Black Hill connector	Shared use path	Crystal Rock Drive	Black Hill Regional Park		New proposal		Connects the Corridor Cities Transitway and Germantown to Black Hill Regional Park
Agricultural Crescent									
SR-39		Ridge Road (MD27)	Signed shared roadway	Brink Road	Howard County line		New proposal	No score	Provides connection between Damascus and Germantown
DB-30		Woodfield Road (MD124) - North	DUAL BIKEWAY; Signed shared roadway and shared use path	Woodfield Elementary School	Ridge Road (MD27)	Damascus	New proposal	Mostly F, A, B	Forms part of a connection between Damascus and Gaithersburg; consistent with Damascus Master Plan update currently underway
SR-61		Woodfield Road (MD124) - Central	Signed shared roadway	Warfield Road	Woodfield Elementary School	Damascus		F	Forms part of a connection between Damascus and Gaithersburg; primarily passes through farmland, for which on-road accommodation is highly desirable, but a shared use path is less desirable
DB-28		Woodfield Road (MD 124) - South	DUAL BIKEWAY; Signed shared roadway and shared use path	Midcounty Highway	Warfield Road	1978 MPB; Gaithersburg Vicinity	New proposal	F	Provides important connection to Gaithersburg from the northeast
SR-62		Sundown Road/Brink Road	Signed shared roadway	Frederick Road (MD 355)	Damascus Road (MD 650)	Olney	Modified proposal		Provides rare east-west route in this part of the county, connecting Town of Laytonsville with I-270 corridor and the countywide bikeway network
SR-40		Barnesville Road (MD117)/Barnesville Road	Signed shared roadway	Clarksburg Road (MD121)	Beallsville Road (MD109)		New proposal	E,F	Provides connection between Barnesville and Germantown; needs shoulder improvements
SR-41		Darnestown Road (MD28) Poolesville	Signed shared roadway	Seneca Road	Beallsville Road (MD109)		New proposal	F	Provides connection between Poolesville and Countywide Bikeway Network; needs shoulder improvements

SP = Shared Use Path (Class I); BL= Bike Lanes (Class II); SR = Signed Shared Roadway (Class III); DB = Dual Bikeway

(*BLOC = bicycle level of comfort score for state highways, see p. 29)

Montgomery County Department of Transportation

Planning

Appendix C

December 2008 Montgomery County Context Sensitive Road Design Standards (Road Code) No. 2004.10, Divided Suburban Arterial Road – 4 Lanes With Bike Lanes

ARTERIAL/MINOR ARTERIAL/ COUNTRY ARTERIAL/ COUNTRY ROAD (continued)

Std. No.	Sum of Cross Section	Maintenance Offset	Sidewalk Width	Buffer Width	Parking Lane Width	Bike Lane / Shoulder	Outside Lane Width	Inside Lane Width	Median/Center Lane Width	Inside Lane Width	Outside Lane Width	Bike Lane / Shoulder	Parking Lane Width	Buffer Width	Sidewalk Width	Maintenance Offset	Notes
2004.07	Suburban Arterial Road - 4 Lanes																
	80'	2	5	8	0	0	14	11	0	11	14	0	0	8	5	2	
2004.08	Suburban Arterial Road - 4 Lanes With Bike Lanes																
	80'	2	5	6.5	0	5.5	10	11	0	11	10	5.5	0	6.5	5	2	
2004.09	Divided Suburban Arterial Road - 4 Lanes																
	100'	2	5	9	0	0	14	11.5	17	11.5	14	0	0	9	5	2	2
2004.10	Divided Suburban Arterial Road - 4 Lanes With Bike Lanes																
	100'	2	5	6.5	0	5.5	11	11.5	17	11.5	11	5.5	0	6.5	5	2	2
2004.11	Suburban Arterial Road - 5 Lanes																
	90'	2	5	7	0	0	14	11	11	11	14	0	0	7	5	2	1
2004.12	Suburban Arterial Road - 5 Lanes With Bike Lanes																
	90'	2	5	5.5	0	5.5	10	11	11	11	10	5.5	0	5.5	5	2	1,5
2004.14	Suburban Arterial Road - 4 Lanes - Open Section With Bike Lanes																
	110'	2	5	21	0	5	11	11	0	11	11	5	0	21	5	2	6

Notes: 1. Median is TWLTL

2. For 40 mph, adjust the curbside dimension to accommodate tree in the maintenance offset area

3. Use Suburban Open Section Standard 2004.14 to accommodate sidewalks and 2004.16 to accommodate sidewalks & median

4. Std. 2004.06 is preferred

5. Std 2004.10 is preferred

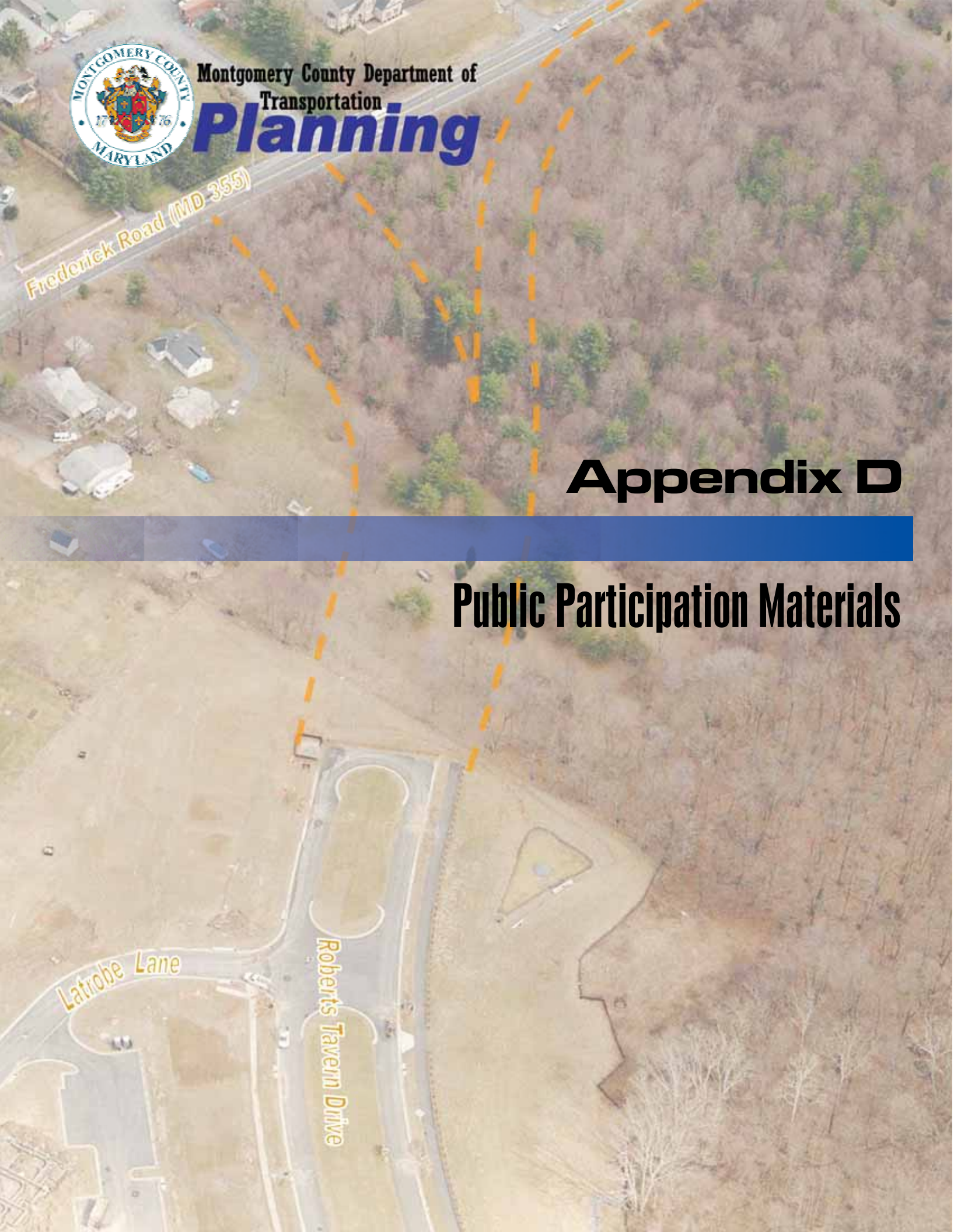
6. Std 2004.16 is preferred

General note: 14' or 14.5' outside lane widths are intended to provide one or more of the following:

> Improved bike accomodation on busier streets without bike lanes.

> Space for off-peak parking on arterials and major highways while maintaining bike accomodation

> Improved accomodation for transit vehicles (and stops) on heavily traveled streets



Montgomery County Department of Transportation

Planning

Appendix D

Public Participation Materials

November 12, 2009

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus To Frederick Road (MD 355)

Isiah Leggett
Montgomery County Executive

Arthur Holmes, Jr. – Director
Department of Transportation

Division of
Transportation Engineering
100 Edison Park Drive, 4th Flr
Gaithersburg, MD 20878
Phone: 240-777-7223
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Bruce Johnston, P.E.
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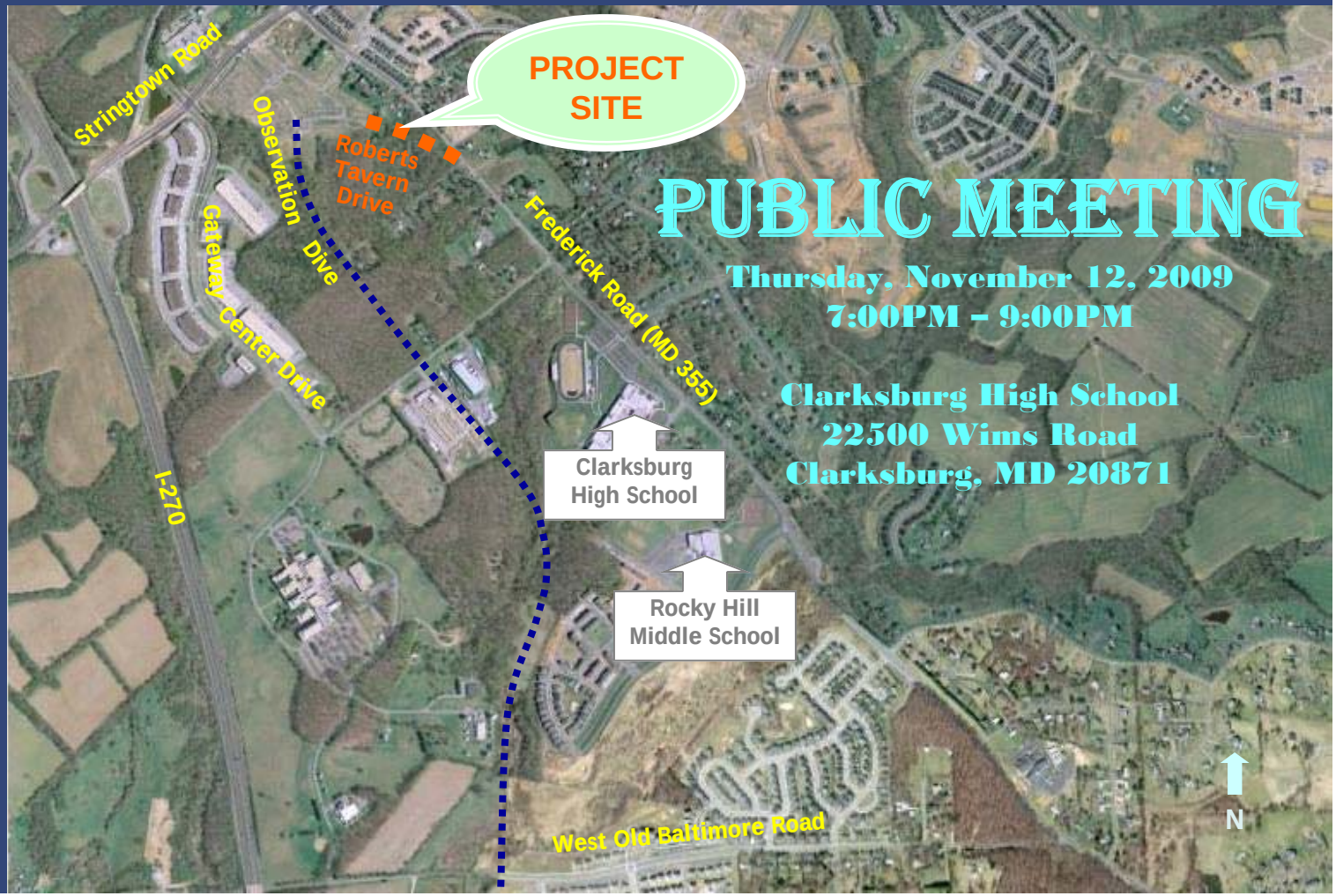
Holger Serrano, P.E.
Deputy

Sogand Seirafi, P.E.
Planning & Design

Tom M. Reise
Property Acquisition

Tim H. Cupples, P.E.
Construction



Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

PURPOSE OF PUBLIC MEETING

- Introduce project team
- Explain project procedure and schedule
- Provide project overview
- Share the background data
- Present alternatives and draft concepts
- Listen to community's concerns and gather feedback.

Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

PROJECT PROCEDURE & SCHEDULE

Complete Fall 2010

FACILITY PLANNING – PHASE I

- Collect data, obtain public input, develop concept plans
- Evaluate Improvement Impacts
- Select Recommended Alternate
- Obtain Director's Approval
- Project Prospectus

WE ARE HERE

Complete Winter 2012

FACILITY PLANNING – PHASE II

- Develop 35% Design Plans
- Detail Project Schedule
- Detail Project Cost
- Preliminary Plan

SUBMIT TO COUNTY COUNCIL

For Approval to Include in Capital Improvement Program (CIP)

2 Years

FINAL DESIGN

Design progresses from 35% to 100%.

1 1/2 Years

CONSTRUCTION

Improvements are constructed.

FUNDED

NOT FUNDED

MCDOT Planning
DIVISION OF TRANSPORTATION ENGINEERING

Isiah Leggett
Montgomery County Executive

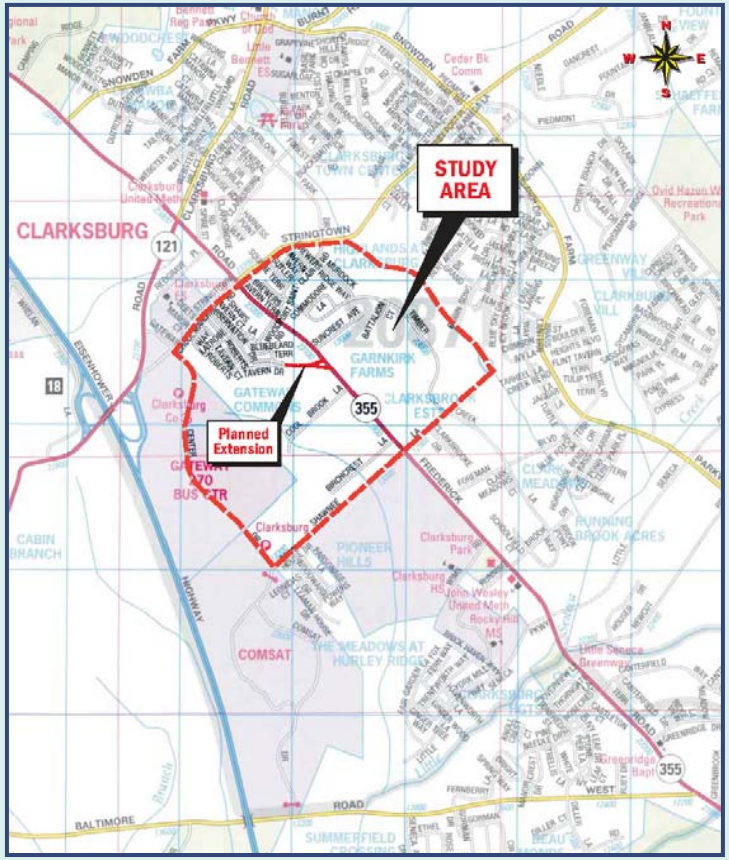
November 12, 2009

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

PROJECT STUDY AREA & LIMITS



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Montgomery County Executive

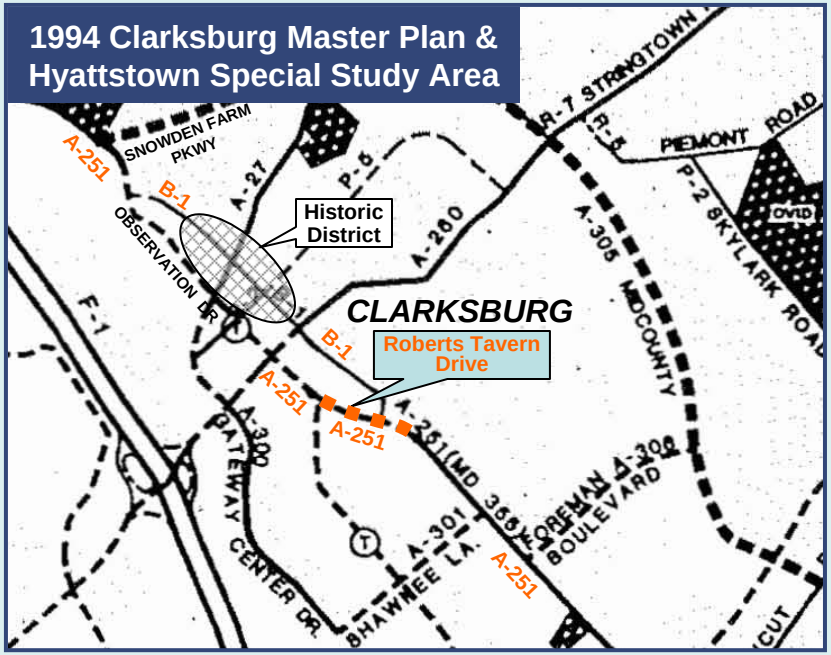
Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

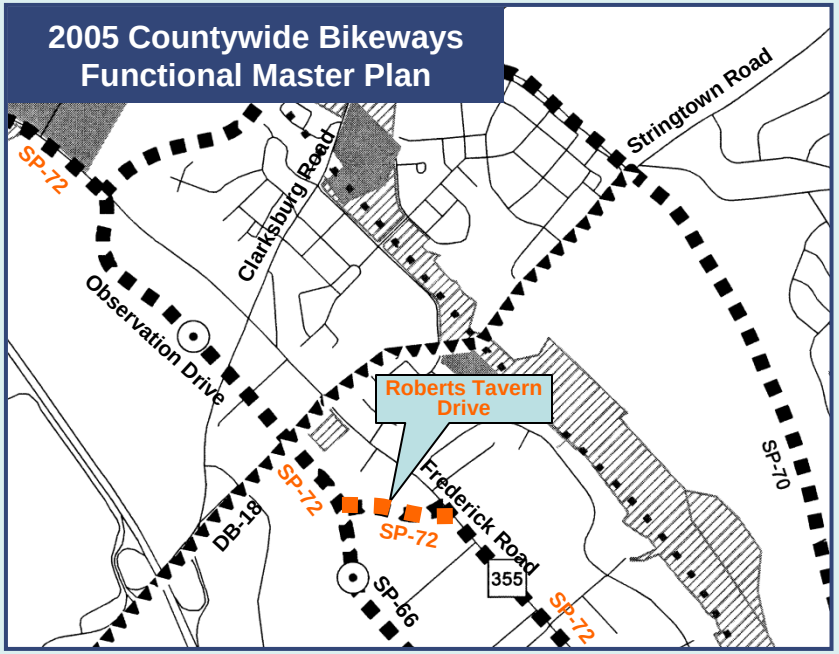
MASTER PLAN RECOMMENDATIONS

1994 Clarksburg Master Plan & Hyattstown Special Study Area



- **A-251 : Frederick Road (MD 355) be relocated approximately 500' west to bypass the Clarksburg Historic District and be classified as Arterial Road w/ 4 lanes divided**
- **B-1: The old MD 355 be reclassified from Major Highway to Business Street w/ 2 lanes**

2005 Countywide Bikeways Functional Master Plan



- **SP-72: Shared Use Bike Path Class I**

Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

PURPOSE OF PROJECT

- Improve mobility and access for people and goods that use MD 355 and the surrounding roadway network
- Divert regional through traffic around the Clarksburg Town Center and its historic district
- Improve travel efficiency, provide congestion relief, expand neighborhood connections, and enhance multimodal access.

Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

NEED FOR PROJECT

- Accommodate land use
- Reduce future traffic congestion
- Improve network efficiency
- Provide local neighborhood connection
- Enhance bicycle and pedestrian connections.

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

COMPLETED TO DATE

- Environmental Assessment
- Traffic Analysis
- Purpose and Need
- Alternatives and Draft Concepts.

Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

NEXT STEP FOR PHASE I STUDY

- Obtain community input
- Refine concepts per public input
- Select Recommended Alternative
- Brief Maryland-National Capital Park and Planning Commission (M-NCPPC)
- Obtain approval from Montgomery County Council's Transportation, Infrastructure, Energy and Environment Committee (T&E) and DOT Director.

Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

CONTACT PROJECT MANAGER

Project Manager: Greg Hwang

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100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Phone: 240-777-7279
Fax: 240-777-7277
e-mail: Greg.Hwang@montgomerycountymd.gov

DTE Home Page:
http://www2.montgomerycountymd.gov/DOT-DTE/Common/home.aspx

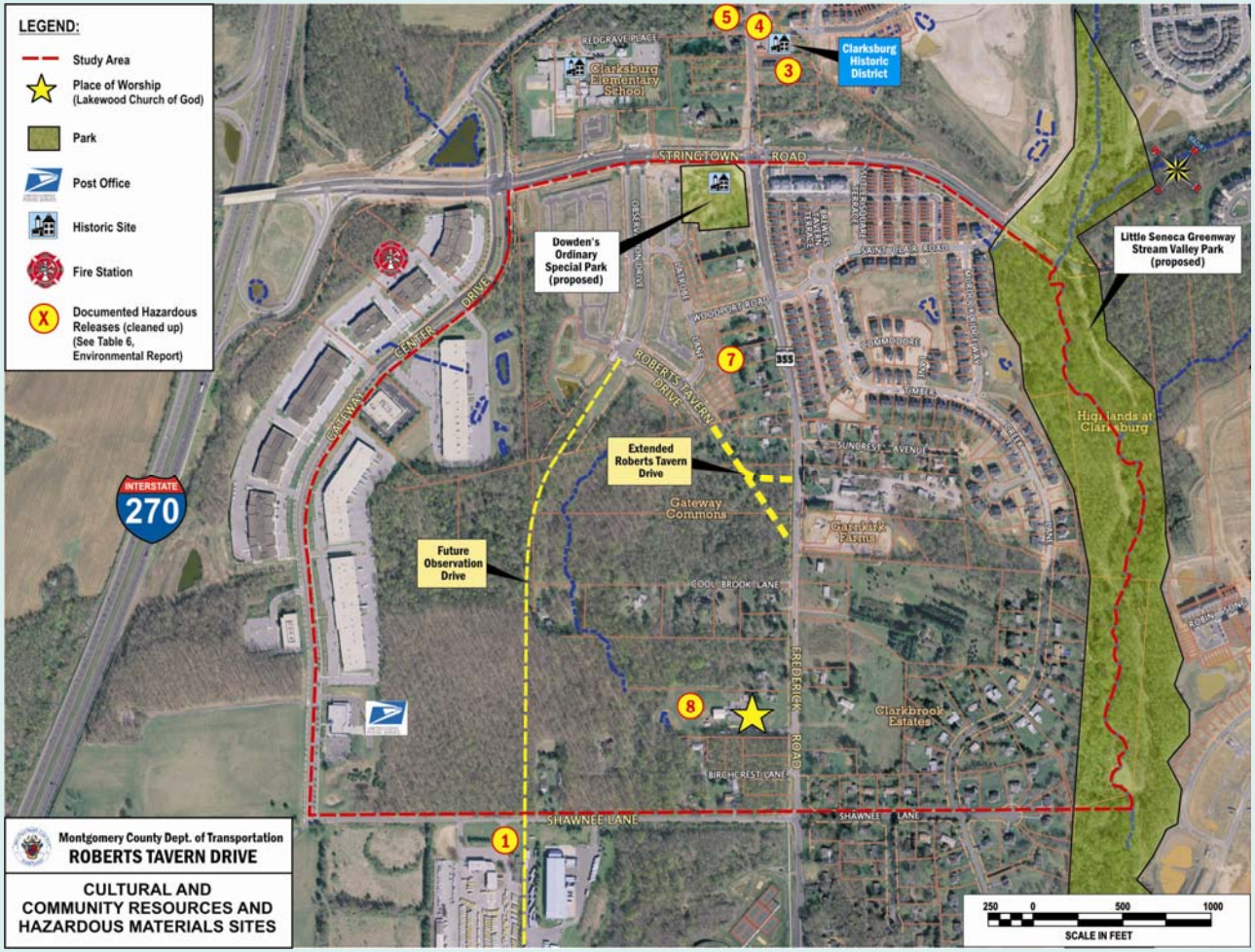
MCDOT DIVISION OF TRANSPORTATION ENGINEERING
Planning
Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

EXISTING SITE CONDITIONS



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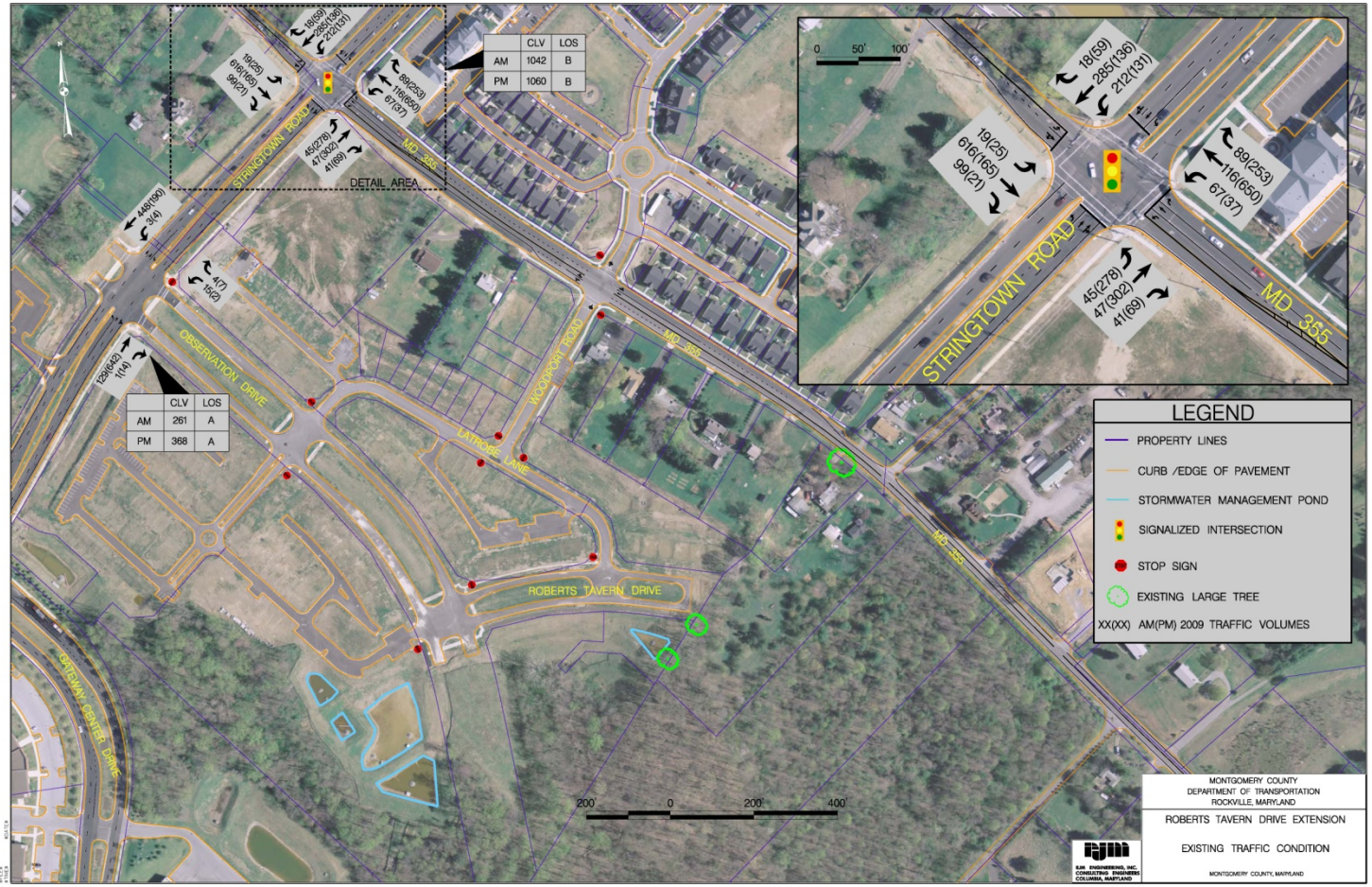
ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

EXISTING TRAFFIC CONDITION



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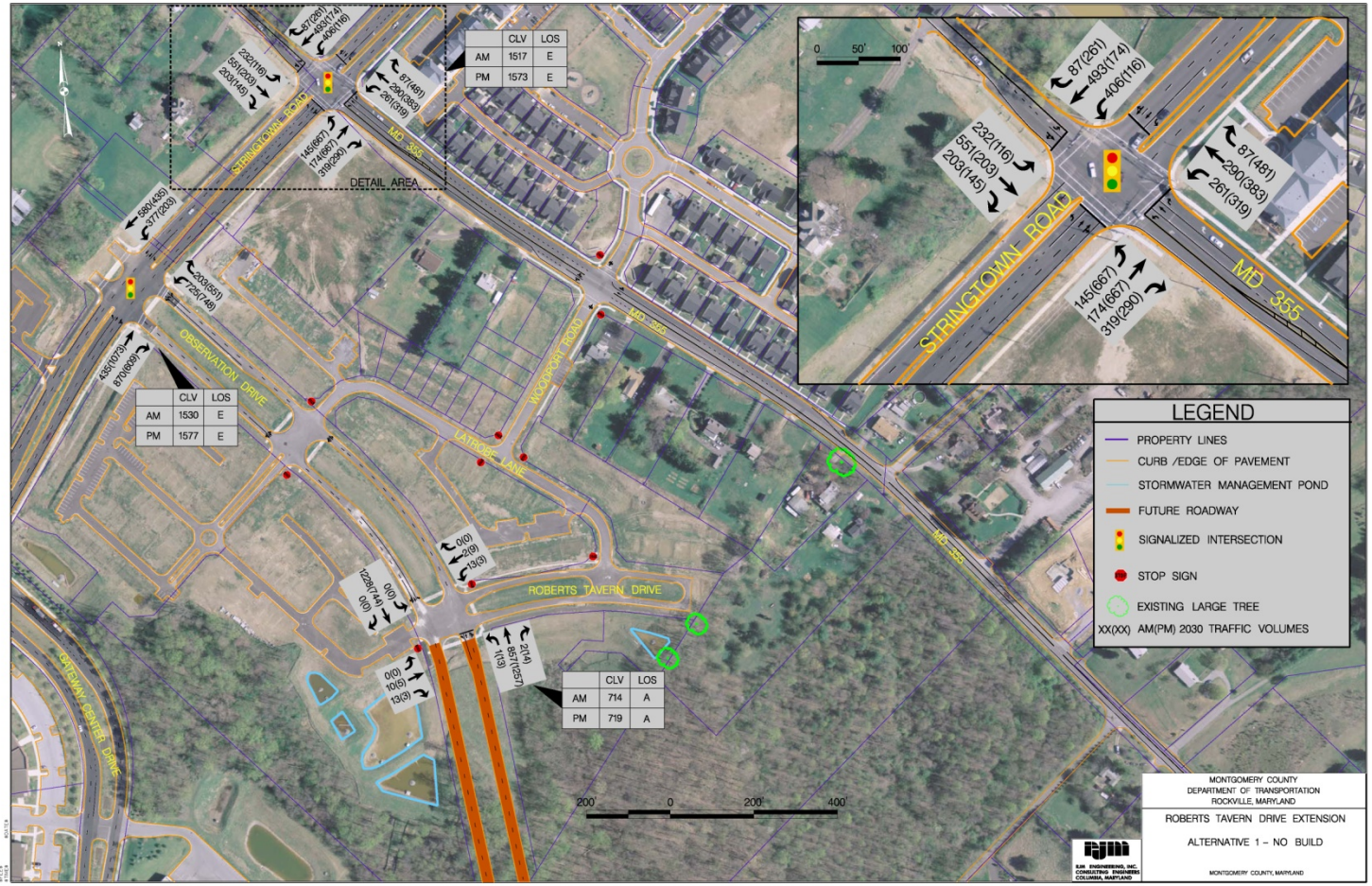
Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

ALTERNATIVE 1 – NO BUILD



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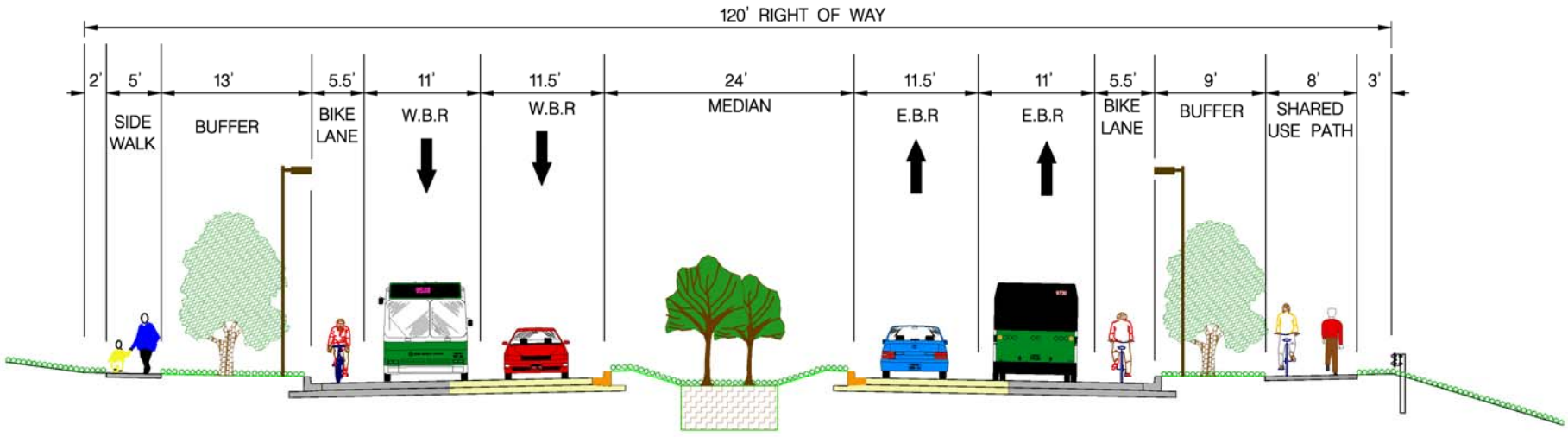
Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

TYPICAL SECTION – OBSERVATION TO LATROBE



PROPOSED ROBERTS TAVERN DRIVE
OBSERVATION DRIVE TO LATROBE LANE

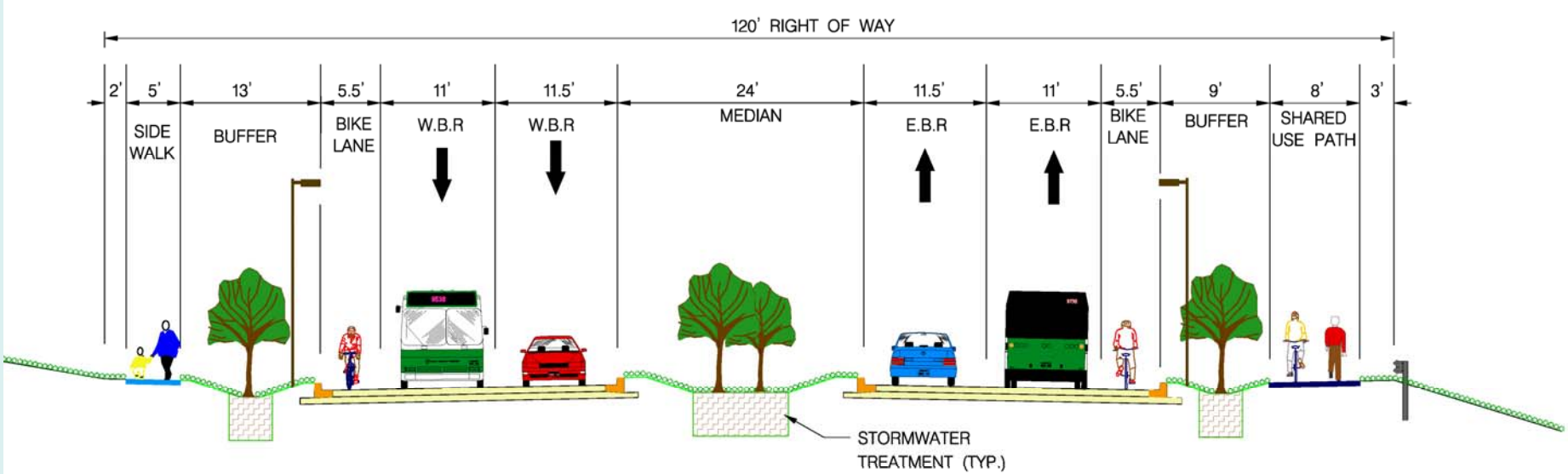
MCDOT DIVISION OF TRANSPORTATION ENGINEERING
Planning
Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

TYPICAL SECTION – LATROBE TO MD 355



PROPOSED ROBERTS TAVERN DRIVE
LATROBE LANE TO FREDERICK ROAD

MCDOT Planning
DIVISION OF TRANSPORTATION ENGINEERING

Isiah Leggett
Montgomery County Executive

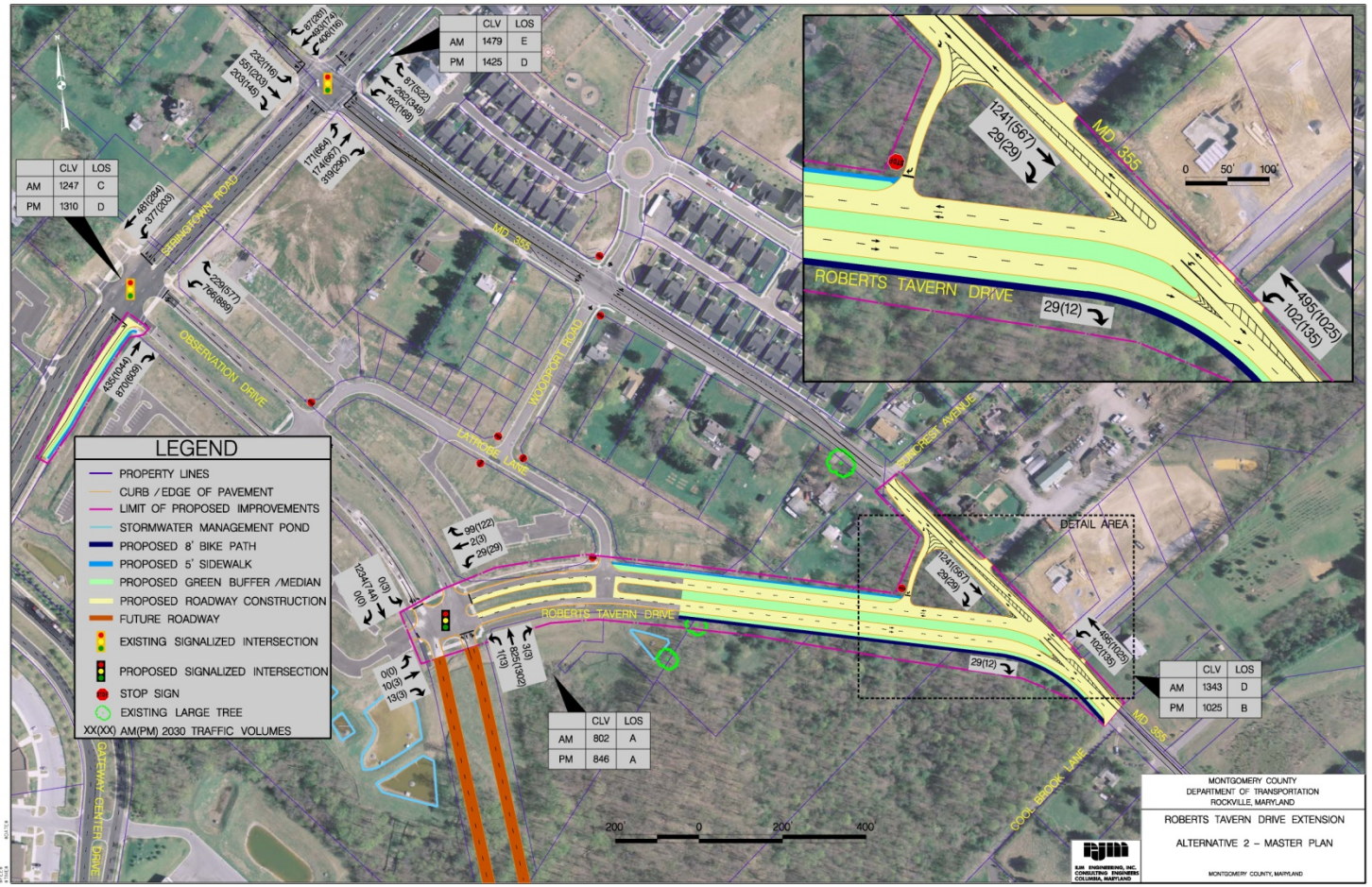
November 12, 2009

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

ALTERNATIVE 2 – Master Plan



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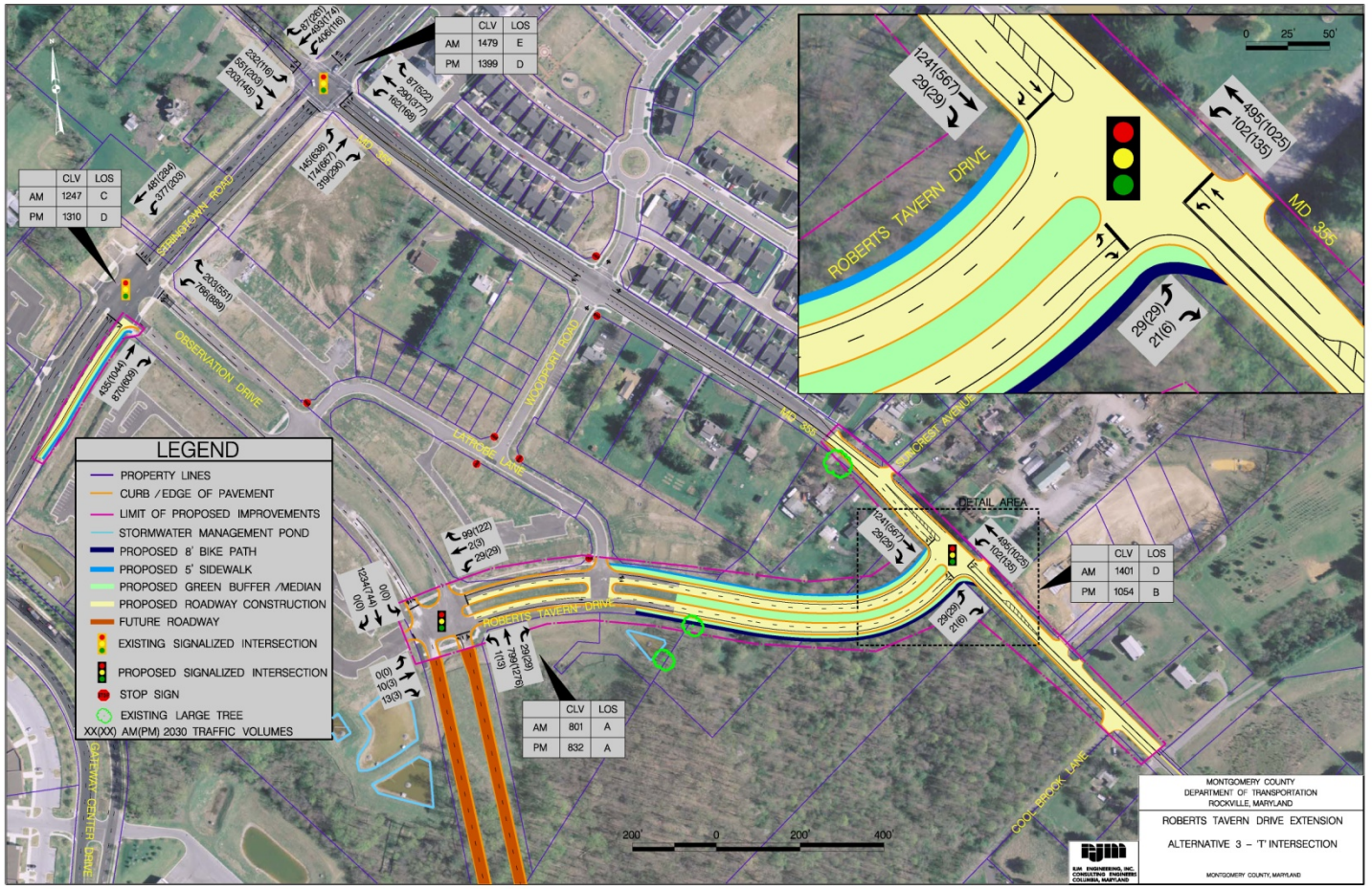
Isiah Leggett
Montgomery County Executive

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

ALTERNATIVE 3 – 'T' Intersection



MCDOT DIVISION OF TRANSPORTATION ENGINEERING

Planning

Isiah Leggett

Montgomery County Executive

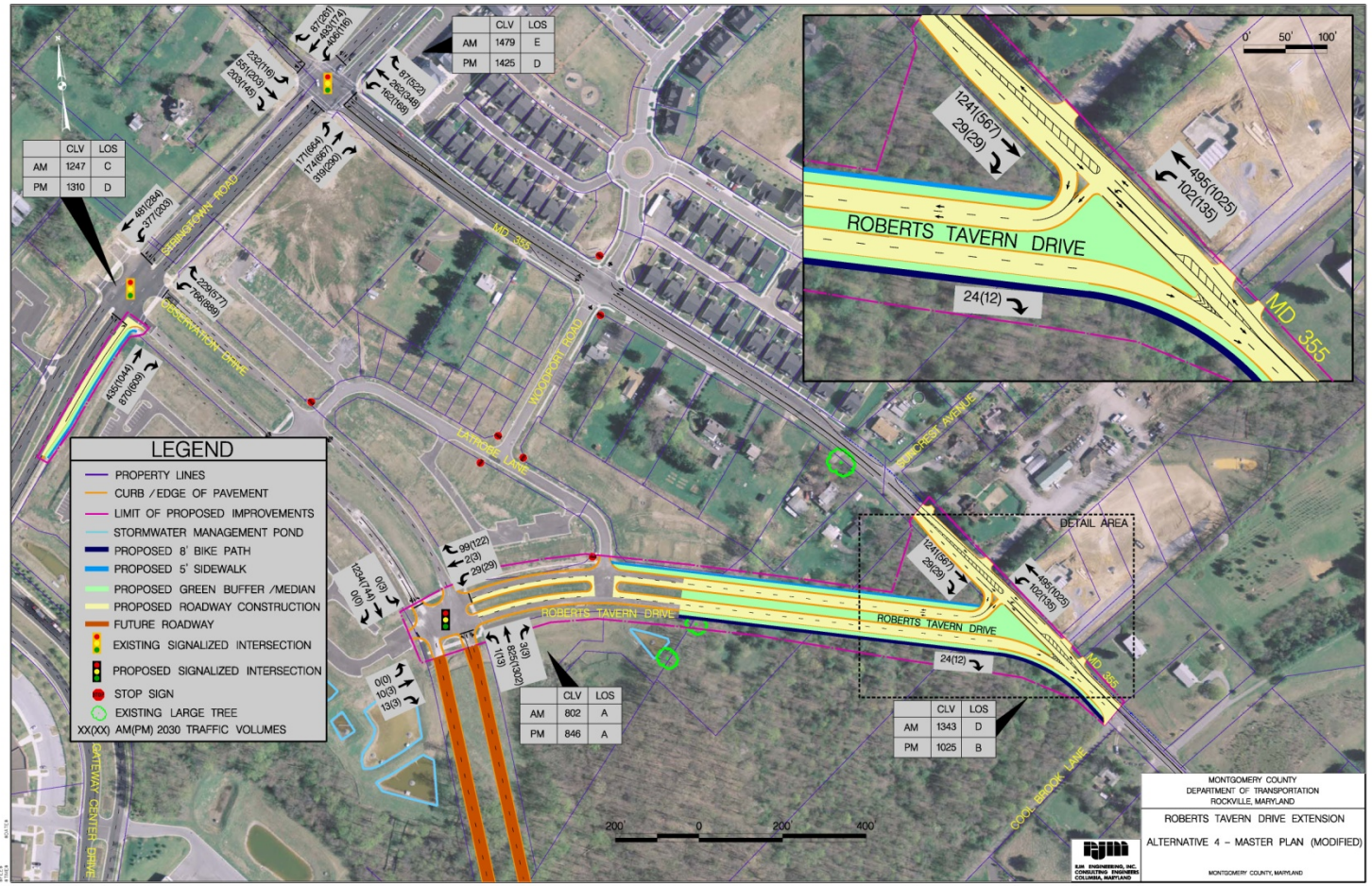
November 12, 2009

Facility Planning Study – Phase I

ROBERTS TAVERN DRIVE EXTENDED

From Existing Roberts Tavern Drive East Terminus
To Frederick Road (MD 355)

ALTERNATIVE 4 – Master Plan (Mod)



ISIAH LEGGETT
Montgomery County Executive

OCTOBER 2009

Division of
Transportation Engineering

100 Edison Park Drive, 4th Flr
Gaithersburg, MD 20878
Phone: 240-777-7223
Fax: 240-777-7277

Bruce Johnston, P.E.
Division Chief

Holger Serrano, P.E.
Deputy

Sogand Seirafi, P.E.
Planning & Design

Tom M. Reise
Property Acquisition Chief

Tim Cupples, P.E.
Construction

For alternative formats of this newsletter, contact the Division of Transportation Engineering at 240-777-7220
TTY users call MD relay.

The Plan Ahead is a project newsletter published by MCDOT to encourage community participation.

THE PLAN AHEAD

Arthur Holmes, Jr. , Director, Department of Transportation

Roberts Tavern Drive Extended Facility Planning Study in Progress

The Montgomery County Department of Transportation (MCDOT) is performing a planning study to determine the need to extend existing Roberts Tavern Drive to MD 355 (Frederick Road) in Clarksburg, Maryland.

Currently, a 500-foot segment of Roberts Tavern Drive between Observation Drive and Latrobe Lane exists. This existing section has two lanes, a sidewalk and a bikepath. Facility Planning Phase I will evaluate the extension of existing Roberts Tavern Drive to MD 355 (Frederick Road), which is approximately 1,000 feet.

MASTER PLAN RECOMMENDATIONS

As with all new transportation projects, MCDOT refers to the recommendations set forth in the adopted and approved Master Plans to implement and enhance the proposed visions of the area. Two area Master Plans encompass the Roberts Tavern Drive, including: (1) *1994 Clarksburg Master Plan & Hyattstown Special Protection Area* and; (2) *2005 Countywide Bikeway Functional Master Plan.*

Roberts Tavern Drive is located along the master planned alignment for future relocated Frederick Road (MD 355), designated as A-251 in the *1994 Clarksburg Master Plan & Hyattstown Special Study Area*. The master plan objective is to divert the area's regional through traffic away from the Clarksburg Town Center and its historic district. To address this, the master plan recommends MD 355 be relocated from north of Cool Brook Lane to Snowden Farm Parkway through future Roberts Tavern Drive and Observation Drive. Between these limits, existing MD 355 will be reclassified as a business street, remaining as a two-lane roadway, and future relocated MD 355 is proposed as a four-lane divided arterial.

The purpose of Roberts Tavern Drive Extended is to improve mobility, access and vehicular, bicycle, and pedestrian connections between MD 355 and Observation Drive and the surrounding roadway network. These improvements will improve travel efficiency, divert regional through traffic around the Clarksburg Town Center and its historic district, provide congestion relief, expand neighborhood connections, and enhance multimodal access. The roadway connection is important to relieve future congestion on MD 355, and improve transportation network efficiency by providing an additional east-west connection between MD 355 and Observation Drive.

PUBLIC MEETING

This newsletter is to provide a brief overview of this project and to invite you to attend the public meeting where you can learn more information regarding this project and provide us with your input.

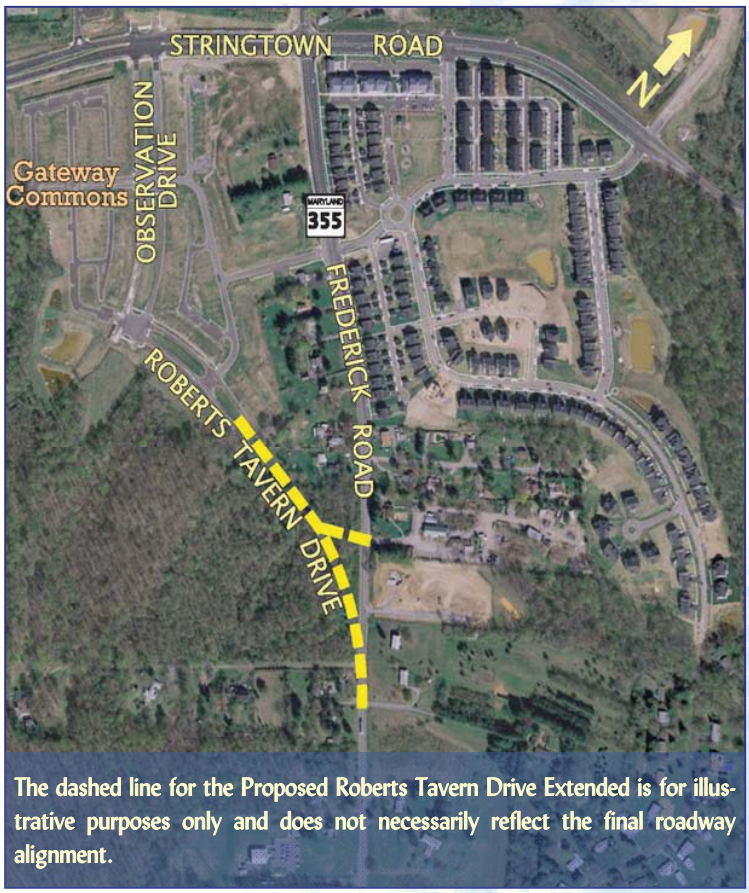
ROBERTS TAVERN DRIVE EXTENDED
Public Meeting
Thursday, November 12, 2009
7:00-9:00 PM
Clarksburg High School, Cafeteria
22500 Wims Road
Clarksburg, MD 20871

(Continued on page 2)

(Continued from page 1)

The objective of the public meeting is to:

1. Introduce the Study Team and establish meaningful lines of communication between the Study Team and the public;
2. Share project information with the public in an all-inclusive manner;
3. Present and discuss the planning study and accompanying roadway concepts;
4. Clarify any issues concerning the master-planned improvements;
5. Gather feedback from the public.



The dashed line for the Proposed Roberts Tavern Drive Extended is for illustrative purposes only and does not necessarily reflect the final roadway alignment.

Frequently Asked Questions

Why is it important for me to attend this meeting?

MCDOT believes that public input is the key to an effective planning process because it allows the Study Team and decision makers to understand the needs of the community. The public meeting will also allow you to learn more about the project and provide an opportunity to voice your concerns.

What should I expect at the public workshop?

At the public workshop you will get an opportunity to meet the representatives from different agencies who are a part of the Study Team. Displays will be arranged where you can learn about the Facility Planning process and the alternatives being evaluated. You may ask questions of the Study Team and offer any suggestions that would meet the objectives of the project.

What if I cannot attend the meeting? Is there any other way that I can be certain that you will receive my input?

We certainly understand that your schedule may not permit you to attend the public meeting. You may share your comments by completing and returning the postage-paid Public Comments Form by **December 3, 2009** or by contacting the Project Manager, Greg Hwang at 240. 777. 7279 or e-mail to: **Greg.Hwang@montgomerycountymd.gov**

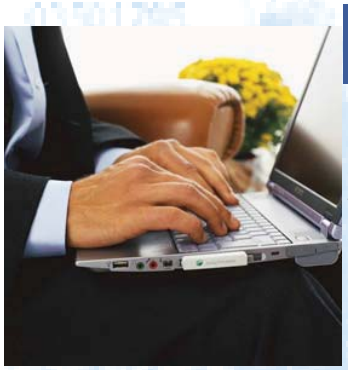
What is Facility Planning?

Facility Planning for transportation improvements is an evaluation process that furnishes design plans which are approximately 35% complete. It is managed in two phases. Phase I addresses two essential questions:

- What will the improvements be?
- Why are the improvements necessary?

Phase II addresses:

- How will the improvements be performed?



MCDOT WANTS YOUR FEEDBACK

MCDOT encourages you to provide your concerns on the postage-paid Public Comments Form included with this newsletter. If you have access to the internet, you may e-mail your comments directly to the project manager at: **Greg.Hwang@montgomerycountymd.gov**

Your input is important, it allows MCDOT, decision makers and elected officials to understand the concerns of the community. Your comments become a part of public records and may be included and/or summarized in the Roberts Tavern Drive Extended Project Prospectus. Due to the high volume of comments we receive, we regret that we may be unable to respond to each inquiry. MCDOT assures you that all comments will be read and evaluated.

For mor
www2.n

- How long will the design/construction take?
- How much will the improvements cost?

The components of both Phase I and II provide enough information for elected officials to determine whether or not the project is justified to be fully funded for design and construction.

What stage is the Roberts Tavern Drive Extended Study?

Roberts Tavern Drive Extended is in Phase I of the Facility Planning Process, which is the beginning stage of the analysis. Phase I generally provides 15% design and involves:

1. Collecting background data, reviewing the Master Plan and identifying pending developments within the project limits;
2. Obtaining public input;
3. Developing concept plans and selecting a Recommended Alternative.

What happens after this meeting?

Your comments and concerns will be taken into consideration as the Study Team refines and finalizes the concepts. The concept that best addresses the project's purpose and need and the concerns of the community will be selected as the Recommended Alternative. A newsletter will be mailed informing the community of the Recommended Alternative.

Who receives this newsletter?

The newsletter is mailed to Home Owner Associations representing the subject Study Area and property owners directly abutting the subject roadway whose names appear on the County's Geographical Information System (GIS) database. If you would like to receive future newsletters on the Roberts Tavern Drive Extended Study, MCDOT would be pleased to have your name added to the project's mailing list. Please contact the Project Manager, Greg Hwang at 240. 777. 7279 or e-mail to: Greg.Hwang@montgomerycountymd.gov

The Life of a Transportation Project

FACILITY PLANNING-PHASE I

Collect data, obtain public input, develop concept plans, evaluate and select preferred alignment/cross section. Obtain Director's and Montgomery County Council's Transportation Infrastructure, Energy and Environment committee (T&E) approval.

FACILITY PLANNING-PHASE II

Develop 35% design plans, cost estimate and project schedule.

Submit to County Council for approval to include in Capital Improvement Program. (CIP).

If approved for full funding and is included in the CIP, complete final design and construction.

LEGEND

CURRENTLY FUNDED

NOT FUNDED

Public input is the key to an effective planning process. Let MCDOT hear from you!

e information on the Roberts Tavern Drive Extended study, log onto
ontgomerycountymd.gov/DOT-DTE/FacilityPlanning/FPHome.aspx
and scroll to Roberts Tavern Drive Extended.

Planning
Montgomery County Department of Transportation

Montgomery County Department of Transportation (MCDOT)
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878
Phone: 240. 777. 7223 • Fax: 240. 777. 7277

Roberts Tavern Drive Extended Public Meeting

Thursday, November 12, 2009, 7:00—9:00 PM

Clarksburg High School, Cafeteria, 22500 Wims Road, Clarksburg, MD 20871

Directions to Public Meeting

From North

From intersection of Stringtown Road and Frederick Road (MD 355), head south approximately 1 mile along MD 355. Turn into parking entrances on the right.

From South

From intersection of West Old Baltimore Road and Frederick Road (MD 355), head north approximately 1 mile along MD 355. Turn into parking entrances on the left.

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

For alternative formats of this Comment Form, please contact the Division of Transportation Engineering at: 240. 777. 7220 (voice). TTY users call MD Relay.

October 2009

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

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Name

Address

Phone

E-mail

Comments:

Montgomery County Department of Transportation (MCDOT)
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

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DIVISION OF TRANSPORTATION ENGINEERING
101 MONROE STREET
ROCKVILLE MD 20897-5008

The Montgomery County Department of Transportation (MCDOT) always welcomes your feedback. This is an opportunity for you to provide your comments and concerns with MCDOT.

ROBERTS TAVERN DRIVE EXTENDED PROJECT
OCTOBER 2009

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MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION

Project Manager: GREG HWANG
Greg.Hwang@montgomerycountymd.gov

MCDOT
DIVISION OF TRANSPORTATION ENGINEERING
Planning

THE PLAN AHEAD

Arthur Holmes, Jr. , Director, Department of Transportation

ISIAH LEGGETT
Montgomery County Executive

MARCH 2010

DIVISION OF
TRANSPORTATION
ENGINEERING

100 Edison Park Drive, 4th Flr
Gaithersburg, MD 20878

Phone: 240-777-7223
Fax: 240-777-7277

Bruce Johnston, P.E.
Division Chief

Holger Serrano, P.E.
Deputy Chief

Sogand Seirafi, P.E.
Planning & Design Section

Tom M. Reise
Property Acquisition Section

Tim Cupples, P.E.
Construction Section

For alternative formats of this newsletter, contact the Division of Transportation Engineering at 240-777-7220
TTY users call MD relay.

The Plan Ahead is a project newsletter published by MCDOT to encourage community participation.

Roberts Tavern Drive Extended Study Selects Recommended Alternative

In November 2009, the Montgomery County Department of Transportation (MCDOT) held a public meeting to discuss the commencement of the Roberts Tavern Drive Extended, Facility Planning, Phase I Study. At the public meeting, MCDOT presented three concepts to the public and solicited comments.

NEWSLETTER PURPOSE

The purpose of this newsletter is to present the Recommended Alternative, and continue to solicit your comments on the Roberts Tavern Drive Extended Study.

ROBERTS TAVERN DRIVE

Roberts Tavern Drive is located along the master planned alignment for relocated Frederick Road (MD 355), designated as A-251 in the *1994 Clarksburg Master Plan & Hyattstown Special Study Area*. The master plan objective is to divert the area's regional through traffic away from the Clarksburg Town Center and historic district. To address this, the master plan recommends MD 355 be relocated from north of Cool Brook Lane to Snowden Farm Parkway through future Roberts Tavern Drive and Observation Drive. Between these limits, existing MD 355 will be reclassified as a business street, remaining as a two-lane roadway, and future relocated MD 355 is proposed as a four-lane divided arterial.

Currently, the northern 500-foot segment of Roberts Tavern Drive between Observation Drive and Latrobe Lane has been constructed. Facility Planning Phase I will evaluate the extension of existing Roberts Tavern Drive to MD 355 (Frederick Road), which is approximately 1,000 feet.

PUBLIC COMMENTS SUMMARY

Fifteen public comments were received after the November 2009 public meeting. The Majority of the comments were in support of the project and its dual bikeway feature. Comments included enhancing safe bicyclist and pedestrian crossings; installing traffic signal at the proposed intersection; permitting northbound left turns from Roberts Tavern Drive to MD 355; and maintaining driveway access onto MD 355.

The existing terminus of Roberts Tavern Drive, which is being evaluated to be extended under the Roberts Tavern Drive/MD 355 Bypass planning study.

For more information, please contact
Mr. Greg Hwang - Project Manager
Phone: 240. 777. 7279
Email: Greg.Hwang@montgomerycountymd.gov
http://www2.montgomerycountymd.gov/DOT-DTE/Projects/ProjectHome.aspx

(Continued from page 1)

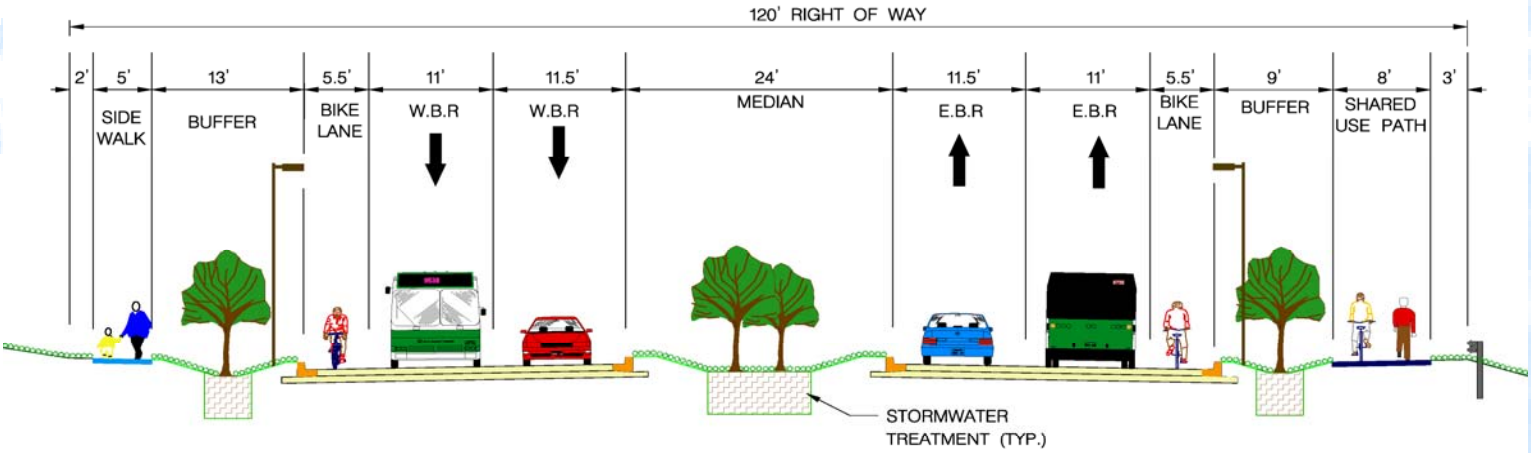
RECOMMENDED ALTERNATIVE

Based on the public comments we received and input from agency stakeholders, the Recommended Alternative (see page 3 for details) is a refinement of the November 2009 Alternate 3. This alternative accommodates all vehicular movements, provides safe, direct pedestrian and bicycle access, and completes a portion of the master-planned MD 355 Bypass.

The Recommended Alternative for Roberts Tavern Drive Extended addresses the following goals: (1) complete an efficient multi-modal transportation network that provides accessibility between and within the study limits; (2) identify and address the potential social, economic, and environmental impacts and benefits; (3) provide transportation facilities that comply with nationally recognized transportation standards; (4) provide for future transportation facilities that effectively balance costs and benefits, while minimizing need for future reconstruction; and (5) respond to planned land uses.

Specifically, Roberts Tavern Drive Extended will provide a vehicular, bicycle, and pedestrian connection between MD 355 and Observation Drive, improve transportation network efficiency, and relieve future congestion on MD 355. Ultimately, with the planned relocation of MD 355, extending Roberts Tavern Drive to MD 355 would also divert regional through traffic around the Clarksburg Town Center and historic district.

Existing Roberts Tavern Drive between Latrobe Lane and Observation Drive.



PROPOSED ROADWAY TYPICAL SECTION

Montgomery County Department of Transportation
Planning

MCDOT WANTS YOUR FEEDBACK

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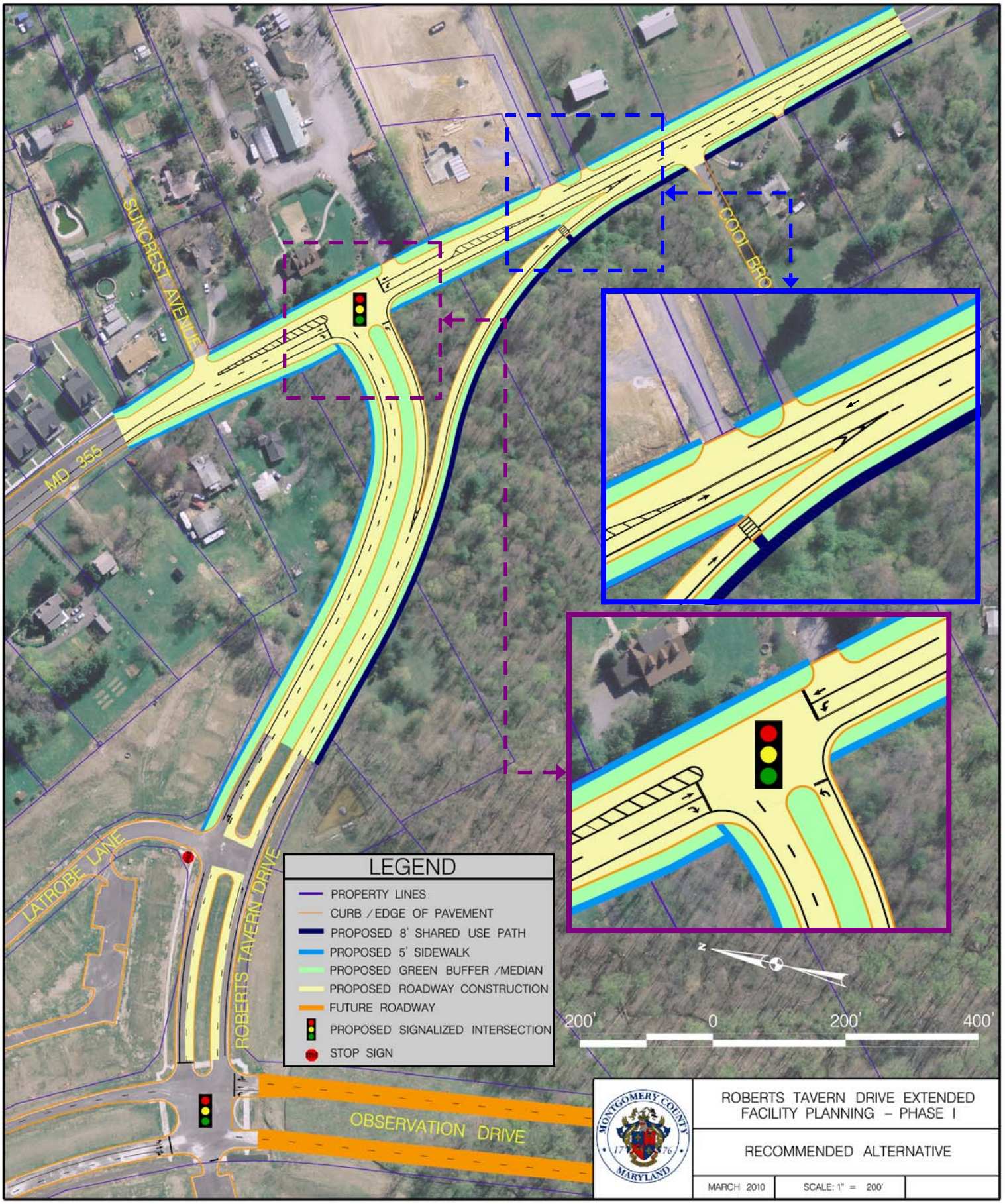
Public input is the key to an effective planning process, since it allows decision makers and elected officials to understand the concerns of the community. Once received, your comments become part of public files and may be included and/or summarized in the *Roberts Tavern Drive Extended Project Prospectus*. Regretfully, due to the high volume of comments we receive, MCDOT will not be able to reply directly to all comments. It will be appreciated if comments can be supplied by April 7, 2010.


SUNCREST AVENUE
MD 355
COOL BRO
LATROBE LANE
ROBERTS TAVERN DRIVE
OBSERVATION DRIVE
LEGEND
PROPERTY LINES
CURB / EDGE OF PAVEMENT
PROPOSED 8' SHARED USE PATH
PROPOSED 5' SIDEWALK
PROPOSED GREEN BUFFER / MEDIAN
PROPOSED ROADWAY CONSTRUCTION
FUTURE ROADWAY
PROPOSED SIGNALIZED INTERSECTION
STOP SIGN
N
200' 0 200' 400'
MONTGOMERY COUNTY MARYLAND
ROBERTS TAVERN DRIVE EXTENDED
FACILITY PLANNING – PHASE I
RECOMMENDED ALTERNATIVE
MARCH 2010
SCALE: 1" = 200'

Montgomery County Department of Transportation (MCDOT)
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878
Phone: 240. 777. 7223 ▪ Fax: 240. 777. 7277

The Next Steps

PROJECT PROSPECTUS

The *Project Prospectus* is the culmination of the Phase I Planning Study, documenting the evaluation of concepts, analysis of impacts, and participation and comments from the public and other stakeholders. The *Project Prospectus* is reviewed by MCDOT's Director, the M-NCPPC Planning Board, and the Montgomery County Council. The Prospectus is anticipated to be completed in Summer 2010.

FACILITY PLANNING PHASE II

Once the Project Prospectus is approved, the Roberts Tavern Drive Extended project advances to Facility Planning, Phase II. A new MDCOT Project Manager will be assigned, and he/she will continue open dialogue regarding the Roberts Tavern Drive Extended project with the public and all stakeholders. As part of the Facility Planning Phase II process, a preliminary plan (35% design) of the improvements will be developed, as well as a detailed schedule and cost estimate. The Facility Planning Phase II for Roberts Tavern Drive Extended is estimated to be completed in Fall 2012.

The project will then be proposed to the County Council to be included as part of the CIP to receive funding for final design and construction.

During the life of the Roberts Tavern Drive/MD 355 Bypass (N. Cool Brook Lane-Existing Roberts Tavern Drive), your feedback and input is vital. MCDOT encourages you to stay involved!

Planning
Montgomery County Department of Transportation

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

April 7, 2010

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

For alternative formats of this Comment Form, please contact the Division of Transportation Engineering at: 240. 777. 7220 (voice). TTY users call MD Relay.

March 2010

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

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Name

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Phone

E-mail

Comments:

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ROBERTS TAVERN DRIVE EXTENDED PROJECT
MARCH 2010

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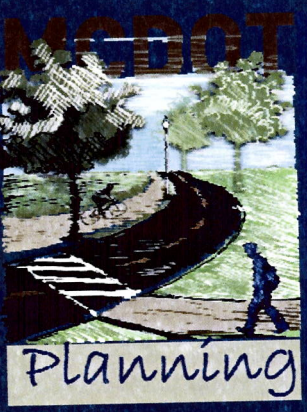
Project Manager: GREG HWANG
Greg.Hwang@montgomerycountymd.gov

Appendix E

Public Comments



ISIAH LEGGETT
ontgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

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December 3, 2009

Montgomery County
Department of Transportation
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Name David Borchardt

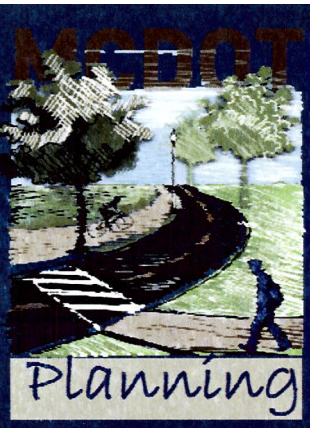
Address 12604 Clark Meadows Ct
Clarksburg MD 20871

Phone 301 515-1646

E-mail dborchardt@verizon.net

Comments:

The faster this is completed the better.



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Name Eric Chesser

Address 23100 Frederick Rd
Clarksburg Md 20871

Phone 301 540 1771

E-mail

Comments:

There is a creek in this area that they have tried to cover it up. I have lived here sence 1976 Nov the creek has all ways had water in it even in the drouts

Put your money in the mid county conector to help traffic problem that we have now

Eric Chesser

DIVISION OF TRANSPORTATION ENGINEERING

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
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Name PATRICK DARBY

Address 6125 TUCKERMAN LANE
ROCKVILLE, MD. 20852

Phone 301-530-6446

E-mail PATADARBY@VERIZON.NET

Comments:

ALTERNATIVES NEED TO TAKE INTO ACCOUNT NEARBY DRIVEWAY ACCESS AND THE FUTURE AVALON SCHOOL TRAFFIC FLOW.

I PREFER ALTERNATIVE 4 WHICH REDUCES THE FOOTPRINT OF LAND USE, PROVIDES EASIER BIKE AND PEDESTRIAN CROSSING, AND ACTS AS A SPEED CONTROL OF TURNING CARS FOR VEHICLE AND PEDESTRIAN SAFETY. PLEASE KEEP IN MIND DRIVEWAYS AND THE AVALON SCHOOL. ALT. 4 COULD CONCEIVABLY BE CONVERTED INTO A SIGNALIZED T-INTERSECTION IN THE FUTURE.

PRESIDENT, CLARKSBURG CHAMBER OF COMMERCE

From: Cherian Eapen [mailto:cherianeapen@hotmail.com]
Sent: Wednesday, December 02, 2009 1:28 PM
To: Hwang, Gwo-Ruey (Greg); cherian.eapen@mncppc-mc.org; Reena Mathews; lfantle@aol.com; Kathie Hulley
Subject: Roberts Tavern Drive Extended - Facility Planning Study Phase I Comments

Hi Greg:

I wanted to provide you the following comments on DOT's Roberts Tavern Drive Extended - Facility Planning Study Phase I project.

I fully support the project and am happy to see that DOT is taking the lead in designing and implementing improvements to this section of MD 355. However, in reviewing the alternatives presented for this project, I think that none of the alternatives capture the intent of the master plan.

The above comment is based on my reading and review of the master plan, which depicts the realigned MD 355 to retain the main-line function of the roadway, bypassing the Clarksburg Historic District. The future Business MD 355 connection to the relocated MD 355 is then expected serve as a local road, serving area residents and patrons of the Historic District. The master plan depicts this business street to intersect relocated MD 355 as a T-intersection, similar to the Latrobe Lane intersection with Roberts Tavern Drive, possibly with a traffic signal (if warranted). Please note that the master plan does not show any direct connection between the Relocated MD 355 and the Business MD 355, as shown in all of the alternatives developed by DOT. I however do think a healthy level of pass-thru traffic through the Historic District is essential for the survival of Historic District and Clarksburg Town Center businesses.

I therefore suggest that DOT take another look at the Master Plan Alternative, possibly with a signal.

Please contact me if you need additional information or if you have any questions.

Cherian Eapen
23118 Birch Mead Road
Clarksburg, MD 20871
240-994-6766

From: Albert J. Fahey [mailto:albert.fahey@gmail.com]
Sent: Thursday, August 20, 2009 8:17 PM
To: Hwang, Gwo-Ruey (Greg); radams@rkk.com
Subject: Roberts Tavern Drive Extended

Dear Sirs,

I received a letter dated June 1, 2009 about this project. I am happy to provide any access to my property for field survey work. I would, however, like to ask if there is a map of the proposed new route that you could send to me or point me to on the web. Primarily because I am curious and would like to know. I am in favor of new routes and better routes in Montgomery County.

Thanks

Albert

--
Dr. Albert J. Fahey
Clarksburg, MD 20871
Home: 301-515-0075
Office: 301-975-2185
FAX: 301-417-1321
("Yeah, Hogan, drive. Cheeseburger first." Iron Man)

From: bfantle@aol.com [mailto:bfantle@aol.com]
Sent: Wednesday, December 02, 2009 8:01 PM
To: Hwang, Gwo-Ruey (Greg)
Subject: Roberts Tavern Bypass

Greg,

On November 23rd, 2009, The Clarksburg Civic Association motioned, seconded and approved support for the bypass. Besides being part of the Clarksburg Master Plan this bypass is very important to Clarksburg as it will help reduce traffic and congestion when going north/south on 355 through the historic district.

CCA has not yet taken an official position on which alternative it supports, but various members that have been involved support Alternative 3 - "T" Intersection.

Thanks
Barry Fantle
Vice-President, Clarksburg Civic Association

From: John [mailto:jfbicycle@gmail.com]
Sent: Tuesday, November 17, 2009 9:44 PM
To: Hwang, Gwo-Ruey (Greg)
Cc: Lynne Rosenbusch
Subject: Roberts Tavern Drive Extended Citizen Comments

26517 Aiken Drive
Clarksburg, MD 20871
November 17, 2009
Greg Hwang
Division of Transportation Engineering (DTE)
100 Edison Park Drive, 4th Floor
Gaithersburg, MD 20878
Mr. Hwang:
The following are my comments about the Roberts Tavern Drive Extended project in Clarksburg. I have the materials that were provide at the public meeting at the Rocky Hill High School. Note that I could not access any of the additional information that was to be provided via the web site that was identified in those materials.

The “Typical Section” as presented is excellent. I especially like the dual bikeway concept that provides bike lanes in both directions, as well as, the shared use path. I've noticed that about half of the experienced bicyclists who commute do use the shared use paths while the other half uses the road. In this case, the bike lanes should attract many of the experience bicyclists who otherwise would use the path. Both of the facilities are available for the more casual bicyclists also. Note that this is excellent and can be compared with both experienced and casual car drivers using the provided roads.

Of the four presented alternatives, I prefer Alternative 3, the 'T' Intersection. Clarksburg is a town becoming a city of an estimated 40,000 people. This project is near Clarksburg's center. This alternative will help provide the necessary traffic calming on MD 355 and the bypass. This alternative also provides a safer interface of the bike lanes, the shared use path, and the sidewalk along Roberts Tavern Drive Extended at MD 355 than the other alternatives. It also allows a safer bicycle and pedestrian crossing of the intersection at MD 355 of the bypass than the other alternatives. This alternative is also less confusing to the car drivers since the proposed intersection configuration at MD 355 is a more usual configuration than the other alternatives offer. The car drivers while approaching MD 355 can easily see that they can turn either left or right from Roberts Tavern Drive Extended onto MD 355. From either direction on MD 355, the road users can easily go straight or turn onto the bypass safely in a manor that they are used to. The additional traffic light should not impact traffic since there are additional traffic lights on both MD 355 and Observation Drive. In fact, the additional traffic light can be used to control the speed of the traffic and help minimize how much traffic backs up at the other intersections. Alternative 3 will help keep the traffic at a reasonable rate past the Historic District, past the Rocky Hill High School, and along the bypass in both directions on all of these roads.

Alternative 1, the No Build alternative is unacceptable. MD 355 needs to be bypassed around the Historic District. This project is the first phase at creating that bypass. Another alternative needs to be provided to the current MD 355 Frederick Road.

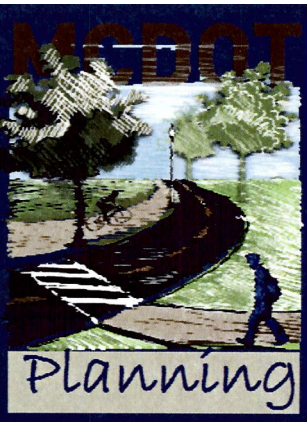
Alternative 2, the first 'Y' alternative, is also not acceptable. While it may be better at encouraging traffic to take the bypass, it creates an unsafe intersection for the non-motorized users, provides a confusing intersection for all roadway users, and it does not calm the traffic as should be expected in a pedestrian friendly city environment. There is a conflict of drivers traveling north on MD 355 and turning left onto the bypass with the drivers heading south on MD 355 and continuing through the intersection. It is not clear who has the right-of-way and who would yield. Traffic going towards MD 355 on the bypass would be concentrating on turning right onto MD 355 and yielding into any MD 355 traffic and not looking for pedestrian and bicycle traffic that is also going southbound on MD 355 or also merging from the bypass onto MD 355. All users of the bypass and approaching MD 355 would be confused that they do not have an option of turning left on MD 355. This is an unusual intersection for this area that would confuse both the local car drivers and those from other jurisdictions that are commuting through. There is no traffic calming in this alternative for traffic going through the Historic District or past the Rocky Hill High School. For all of these reasons, this alternative would be a mistake.

Alternative 4, the second 'Y' option, has all of the problems of Alternative 2. I believe that both Alternative 2 and 4 would be confusing to the roadway users and ensure that serious accidents occur.

For years, I have been discouraging the merging of exits from one road onto another since they are not safe. The merging drivers tend to look towards their rear left and speed up in order to merge into the oncoming traffic on the intersecting road. They do not look as much in front of them or to their left. This sets up an extremely dangerous situations for the other roadway users such as bicyclists and pedestrians. We should not be moving forwards with unsafe designs, especially in an environment where the Master Plan was attempting to encourage forms of non-motorized transportation.

Phase II of the Facility Planning Study and the Project Design needs to provide more detail with how the shared use path, the sidewalk, and the bike lanes on the bypass interface with those at MD 355. How will pedestrians and bicyclists be able to safely cross MD 355 at Roberts Tavern Drive Extended? How will these users on MD 355 be able to cross Roberts Tavern Drive safely without going out of their way? These would be easier issues to solve if Alternative 3 is chosen rather than for Alternatives 2 or 4.

Sincerely yours,
John Fauerby



DIVISION OF TRANSPORTATION ENGINEERING

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

For alternative formats of this Comment Form, please contact the Division of Transportation Engineering at: 240. 777. 7220 (voice). TTY users call MD Relay.

October 2009

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

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Name Serge & Irene Khoury

Address 23225 Murdock Ridge Way
Clarksburg, MD 20871

Phone

E-mail

Comments:

Take traffic off Stringtown Rd
- bad accidents always
happen at St. Clair Rd
and Stringtown Rd.

From: Paul Majewski [mailto:pmajewski123@comcast.net]
Sent: Thursday, December 03, 2009 9:17 AM
To: Hwang, Gwo-Ruey (Greg)
Subject: Clarksburg Bypass - Roberts Tavern Drive Extended

December 3, 2009 9am

Mr. Hwang -

1. In summary:

- I favor that Roberts Tavern Drive be extended to intersect with 355.
- The intersection and any traffic lights or signage should be constructed and maintained such as to encourage use of the bypass for many more (twice as many?) cars as projected in the Nov 12 presentation.
- I favor some configuration not yet shown.
- If I must choose from the intersections shown, I favor alternative 3, with traffic signal timing/configuration to favor the bypass's use.
- If the amount of road surface is deemed to be too harsh on the environment, I would accept Alternative 2 or 4, which appear to use much less surface.
- As other residents have pointed out, bicycle and pedestrian friendliness and safety must be built in from the start.

2. Details:

Clarksburg needs traffic relief that the bypass will be a part of. Although Observation Drive will help tremendously, I trust the Clarksburg Master Plan (CMP) and current traffic studies that show the bypass to be beneficial, even before the eventual extension of Observation Drive north beyond Stringtown Road. I am disappointed that the shape of the intersection differs from that in the CMP. The CMP shows a shape that seems to encourage use of the bypass. If that shape is not used, then the intersection should encourage the use of the bypass. The future of Clarksburg's commercial and offices near its historic district is at stake; congestion there will deter its use and proper destiny. Perhaps, if 355 is to remain straight there, I encourage strongly that your report show that the traffic signs and/or traffic light timing and configuration be maintained to encourage use of the bypass.

I attended the November 12, 2009 presentation and open house. I do not fully understand why the traffic light is only shown for Alternative 3. Nor do I understand not allowing a left turn from Roberts Tavern Drive to go north on 355. Alternative 3 might be perceived to be the best for the presence of those two items - traffic light, and the allowed left. If use of the bypass can not be so encouraged, I believe that the engineers and designers should try again to achieve the CMP shape that allows the left turn previously discussed, and that allows for an optional traffic light that enourages the bypass use.

Paul Majewski, 12233 Piedmont Road, Clarksburg MD 20871-9329
pmajewski123@comcast.net
H: 301-972-6031

From: hal-ed [mailto:mccordh@mccordfamily.net]
Sent: Wednesday, November 04, 2009 8:15 PM
To: Hwang, Gwo-Ruey (Greg)
Subject: Roberts Tavern Drive extension
Dear Mr. Hwang,

My name is Hal McCord and I'm an affected landowner for your Roberts Tavern Drive extension project. I'll save the small talk and get directly to the point. I don't like what you represent and I'm not particularly inclined to be anything less than hostile to the county's transportation plan for northern Montgomery County, to include your project.

I didn't start out that way. Back in Sept 2001 when I approached some surveyors under contract to US-Home that were in my back yard and they told me what you were planning, I though, "OK. This is about 20 years earlier than I was expecting. They'll give me a fair best and highest usage price and I'll move along.".

Then two really stupid things were done:

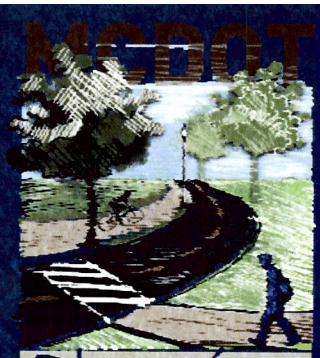
I went down to the county offices on Georgia Avenue to ask questions and was treated by the folks there the same way one gets treated by the DMV when renewing their license... bored indifference. I was actually told by the staff that I should have known this was coming because it was in the 1994 Master Plan and it was MY responsibility to keep up with such things. Can you spell Hitchhiker's Guide?... no humor intended. I went and purchased one, by the way, and as a certified photogramatrist/GIS specialists (at the time), that little inch and a half graphic left a lot of room for interpretation. Entirely unprofessional and lacking in sensitivity.

The second stupid thing was making US-Home responsible for the negotiations with me (and others) as a condition of the permits for their Gateway Commons project. Have you ever heard the phrase "poisoning the well"? That's the legacy those guys left for you to clean up.

Based on my past experience with the County and its agents; I am not inclined to be helpful or agreeable, and you all have used up whatever good will you might have been able to leverage.

Regards,

Hal McCord



ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

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October 2009

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

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Name Wallace Norris

Address 12621 Foreman Blvd
Clarksburg, MD 20871

Phone 301 251 7650

E-mail Wallace.norris@nrc.gov

Comments:

I am only in favor of the extension if Route 355 is modified to address the traffic situations at Brink Road, and at West old Baltimore are first addressed. Traffic often backs up to the park near Father Hurley Blvd. Additional traffic onto Rt 355 will only exacerbate traffic.

DIVISION OF TRANSPORTATION ENGINEERING

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

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Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
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100 Edison Park Drive, 4th Floor
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Name Shane Pollin
Address 1701 Elton Rd
Silver Spring, MD 20903
Phone 301 434-3040 Ext 800
E-mail spollin@duffieinc.com

Comments:

We are the owner of a property on Cool Brook Ln.

(1) Will the extension create a sight distance issue for vehicles exiting Cool Brook Lane? Has the grade and curvature been analyzed to allow for the safe entry and exit of vehicles on Cool Brook Lane.

(2) Will signage be provided on [redacted] the extension indicating the approach of Cool Brook Lane?

DIVISION OF TRANSPORTATION ENGINEERING

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
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100 Edison Park Drive, 4th Floor
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October 2009

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Name Lynne Rosenbusch

Address 26517 Aiken Dr.
Clarksburg, Md. 20871

Phone 301-253-1748

E-mail lynnerosenbusch@yahoo.com

Comments:

Need a way to accomodate bus/cars & peds on 355 when crossing Roberts Tavern Way in Alternatives 2 & 3. Traffic will not stop at the Triangle. Speed bumps? Grade separated interchange? Raised Cross Walk? Speed Cameras?

Make traffic report available online. We don't have time to read it tonight.

Bike lanes are good.

She needs to fix 355 shoulders so its safer to bike & walk.

DIVISION OF TRANSPORTATION ENGINEERING

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

December 3, 2009

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

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October 2009

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Name Gail Tait Nouri

Address

Phone

E-mail

Comments:

Alt. 2 -
This does not look very good for ped/bike safety. Especially the spur.

Alt. 4 -
The free right is not good for ped/bike safety.

From: Chris Tivoli [mailto:conathlib@yahoo.com]
Sent: Wednesday, December 02, 2009 11:38 PM
To: Hwang, Gwo-Ruey (Greg)
Subject: Roberts Tavern Drive Extended

Mr. Hwang,

I would like to offer my comments on the Roberts Tavern Drive Extended project.

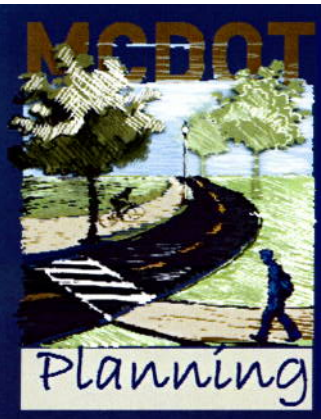
Although out of the scope of this discussion, if the goal is to reduce traffic on Rt 355 then completing Observation Drive should be a higher priority than extending Roberts Tavern Drive. That said, my primary comment is that none of the alternatives offer a safe, reasonable way for vehicles coming out of the private driveways on the East side of Rt 355 to turn left and go South (the most common direction).

Only a few driveways are involved however there are 5 houses on one driveway and another driveway belongs to Green Gardens Landscaping which has active vehicle traffic all day long.

I would like you to reconsider the possibility of a small traffic circle. In addition to addressing my concern, this avoids a traffic light (Alternative 3) and avoids crossing traffic flows (Alternatives 2 & 4). I realize this may not be the ideal conditions for a traffic circle however in the long run it encourages traffic off of Rt 355 and onto Roberts Tavern Drive. Both a traffic light and turn pockets are actually disincentives to using Roberts Tavern Drive.

If any of Alternatives 2, 3 or 4 are ultimately taken, please ensure that there is a safe way for vehicles entering from the driveways on the East side of Rt 355 to turn South (U-turns at the light, U-turn in a median on Roberts Tavern Drive, slide the left-turn pocket North or South so only one lane must be crossed to go South, etc.).

Thank you for your consideration,
Chris Tivoli
23003 Frederick Rd
Clarksburg, MD 20871
conathlib@yahoo.com
301-540-8078



ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

April 7, 2010

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

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March 2010

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

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Name PATRICK DARBY, CLARKSBURG CHAMBER OF COMMERCE

Address 6125 TUCKERMAN LANE
ROCKVILLE, MD 20852

Phone 301.530-6446

E-mail PATADARBY@VERIZON.NET

Comments:

I APPROVE OF THE RECOMMENDED ALTERNATIVE. HOWEVER, SEVERAL PRIVATE DRIVEWAYS EAST OF 355 ARE TOO CLOSE TO THE INTERSECTION. I, AND THE CHAMBER, RECOMMEND AN ACCESS LANE BE CREATED TO DIVERT ENTERING VEHICLES TO A SAFE ENTRY POINT ALONG 355. SEVERAL HOMES ON THE WEST SIDE OF 355 MAY HAVE THE SAME PROBLEM, BUT IT'S HARD TO EVALUATE FROM THE DIAGRAM.

From: Paul Majewski [mailto:pmajewski123@comcast.net]
Sent: Wednesday, April 07, 2010 9:30 AM
To: Hwang, Gwo-Ruey (Greg)
Subject: Clarksburg Bypass - Roberts Tavern Drive Extended - Recommended Alternative

April 7, 2010 9:30am

Mr. Hwang –

I congratulate your team for improving on the intersection.

So far, I see advantages, as a driver, to MCDOT's recent recommended intersection, moreso than the other alternatives presented in the fall.

This intersection allows a LHT from Roberts that alt. 4 had not allowed.

It is probably great for RHTs from Roberts. They don't have to worry about the confusion of an intersection (and maybe topography/ line of sight) to make a RT on red that alt. 3 would require; and they can get up to speed; and they have a distance of acceleration lane before yielding in.

If the amount of road surface is deemed to be too harsh on the environment, I would accept the right hand lane staying in the intersection, or another alteration that might use much less surface.

I appreciate that, although the Master Plan more gradual shape is not used, the above features encourage the use of the bypass.

As other residents have pointed out, bicycle and pedestrian friendliness and safety must be built in from the start.

The future of Clarksburg's commercial and offices near its historic district is at stake; congestion there will deter its use and proper destiny. I applaud and encourage you to continue to show that the traffic signs and/or traffic light timing and configuration should be maintained to encourage use of the bypass, while maximizing safety.

Paul Majewski, 12233 Piedmont Road, Clarksburg MD 20871-9329
pmajewski123@comcast.net
301-972-6031

March 2010

COMMENTS FORM

ARTHUR HOLMES, JR. - *Director*
Department of Transportation

ISIAH LEGGETT
Montgomery County Executive

ROBERTS TAVERN DRIVE EXTENDED

Your input is important!

Please provide comments by:

April 7, 2010

Montgomery County
Department of Transportation
DIVISION OF TRANSPORTATION ENGINEERING
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Project Manager:
GREG HWANG
P: 240. 777. 7279
F: 240. 777. 7277

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Name J R Chesser

Address 23100 Frederick Rd
Clarksburg Md 20871

Phone 301 540 1771

E-mail

Comments:

I have livied here sents Nov 1976
There is a creek back there they
tried to beary they shot off Dyamite
for 2 years to change path of
creek now there is water in your
new road all the time they put
a pood in to help that is total
wet lands back there

Appendix F

Team Meeting Minutes

DTE planning design construction Division of Transportation Engineering

Division of Transportation Engineering

101 Monroe Street, 9th Floor
Rockville, MD 20850
Phone: 240-777-7223
Fax: 240-777-7277

Bruce Johnston, P.E.
Division Chief

Holger Serrano, P.E.
Deputy

Sogand Seirafi, P.E.
Planning & Design Chief

Tom M. Reise
Property Acquisition Chief

Tim Cupples
Construction Chief

****

Project Name:
Robert's Tavern Drive Extended, Facility Planning Phase I Study

Limits:
From Observation Drive to MD 355

Length: To be determined

Location:
Clarksburg

Project Overview:
This project provides Facility Planning, Phase I to study the completion of the southern connection between Observation Drive and MD 355. Approximately 600 feet northern Robert's Tavern Drive has been constructed by developer.

Project Manager
Greg Hwang
Phone: 240-777-7279
greg.hwang@montgomerycountymd.gov

ROBERT'S TAVERN DRIVE EXTENDED FACILITY PLANNING, PHASE I

Meeting: Kick-off Meeting

Date/Time: May 11, 2009, 9:00 – 11:00 a.m.

MEETING MINUTES

DATE OF MINUTES: June 4, 2009

ATTENDEES:

Name	Organization	Phone	Email
Rick Adams	RK&K	410-462-9247	radams@rkk.com
Jewru Bandeh	Upcounty Regional Services Center	240-777-8043	Jewru.bandeh@montgomerycountymd.gov
Eric Beckett	SHA	410-545-5666	ebeckett@sha.state.md.us
Ron Cashion	M-NCPPC	301-650-5671	ronald.cashion@mncppc-mc.org
AJ Durham	Straughan Environmental	301-362-9200	adurham@straughanenvironmental.com
Justin Haynes	Straughan Environmental	301-362-9200	dfretz@aacounty.org
Greg Hwang	MCDOT, Planning	240-777-7279	Greg.Hwang@montgomerycountymd.gov
Aruna Miller	MCDOT, Planning	240-777-7240	Aruna.Miller@montgomerycountymd.gov
Jeff Parker	RK&K	410-462-9276	jparker@rkk.com
Dennis Robinson	MCDOT, Real Estate	240-777-7255	Dennis.Robinson@montgomerycountymd.gov
Bob Simpson	MCDOT, Director's Office	240-777-7193	Bob.Simpsons@montgomerycountymd.gov
Carl Starkey	MCDOT, Traffic	240-777-8780	Carl.Starky@montgomerycountymd.gov
Joan Wang	RJM	410-730-1001	joanw@rjmengineering.com
Jake Wilson	RK&K	410-462-9124	jwilson@rkk.com

MINUTES:

The kickoff meeting was held to discuss the scope of the Roberts Tavern Drive Extended, Facility Planning Phase I Study, familiarize County staff and the project team with the project's objectives, and allow for discussion of the initial planning tasks.

Introductions were made to start the meeting. Greg Hwang provided a brief synopsis of the project, and highlighted the major tasks to be accomplished in the project, including an Environmental Site Assessment, Traffic Study, Purpose and Need document, preliminary engineering plans, public outreach, and Project Prospectus report.

Rick Adams then gave an overview of the Clarksburg Master Plan, 1994, and how it relates to Roberts Tavern Drive. Roberts Tavern Drive is shown in the Master Plan as part of a bypass for MD 355. It is listed as A-251, from Newcut Road Extended to Observation Drive (A-19), and is shown as a 4-lane divided highway with 120' minimum right-of-way. Rick also presented the Master Plan Bikeway Plan, which identifies a Class I (off-street) shared use path for Roberts Tavern Drive.

Bob Simpson expressed that since this road may ultimately become the MD 355 bypass per the Master Plan, we should consider SHA's input as they may prefer to have on-road bike lanes, as this would follow their standards.

Rick Adams presented the Land Use from the Clarksburg Master Plan, which shows residential and private conservation areas near the project area.

Ron Cashion emphasized the importance of the master plan provisions relative to the roadway study and the roadway's ultimate function and connection from MD 355 to the future bypass and extension of Observation Drive together with the planned alignment of the Corridor Cities Transitway (CCT). He stated that ultimately the RTD alignment configuration should move northbound 355 traffic volume directly to the planned bypass. He pointed out that significant added development could occur in the Town Center and Transit Corridor Districts adding to the importance of the subject roadway. He added that the Clarksburg Historic District includes an area that extends to the future alignment of Observation Drive, north of Stringtown Road in the Town Center District.

Ron also stated that there is significant interest from the community about why the roadway is named Robert's Tavern Drive. The origin of this roadway naming should be determined.

Also discussed were plans for existing and proposed institutions in the Clarksburg area. Jewru Bandeh indicated that there are no immediate plans for Clarksburg Elementary School. There are plans for a new Fire Station in 2013, but it would be outside the study area and response times are not likely to be affected by Roberts Tavern Drive. A new library is also being discussed for the Clarksburg area, but no firm decisions have been made at this time.

Jake Wilson presented a summary of the existing typical section, typical section per the old and new County Road Code, and a potential proposed typical. The two major issues were the presence of bike facilities and right-of-way width. The currently constructed Roberts Tavern Drive uses a 120' right-of-way while the new Road Code indicates a 100' right-of-way and the Master Plan indicates a 120' right-of-way.

Bob Simpson stated that the northern boundary of the RTD study should not include the future extension of observation drive beyond Stringtown Road, and there seemed to be a consensus in that regard. The Roberts Tavern Drive study limits were discussed to include Stringtown Road on the north, Shawnee Lane on the south, Gateway Center Drive on the west, and the Greenway to the east. He stated that the Master Plan 120' right-of-way should govern, especially considering the short length of the project. And considering the 120' right-of-way and wide existing median, there are opportunities to provide bike lanes while maintaining the same existing curb-to-curb distance.

The existing short section of Roberts Tavern Drive does not include the ultimate pavement width, and the issue of developer obligations was brought up. It is unknown at this time whether the developer has any further obligations for building the ultimate width or extending the roadway to MD 355. Cathy Bishop (M-NCPPC) was suggested as a potential point of contact for determining what the developer's obligations would be. The team agreed that the northern project limit should extend to the intersection at Observation Drive.

There was a discussion of the options for the intersection of Roberts Tavern Drive and MD 355. The two options currently identified are a right-angle intersection at the parking lot entrance south of Suncrest Avenue, or a taper-like entrance further to the south. It was pointed out that the taper intersection makes sense if Roberts Tavern Drive will function as a bypass for MD 355, but for typical operations, a perpendicular intersection may be preferable. Both options will be considered as concepts and evaluated during preliminary engineering.

Jeff Parker presented the anticipated traffic studies to be performed by RK&K. He will be examining the existing conditions, 2030 no-build, and 2030 build options. He will use the MWCOG model created for the Observation Drive study, modified to include the proposed Roberts Tavern Drive improvements. He noted that the Observation Drive model did not use the latest version of the MWCOG model. Therefore, Jeff will compare the results between the old and the new model, and revise the old version numbers accordingly. It was pointed out that the intended Observation Drive extension (MD 355 Bypass) through the historic district may not occur for several years. Consequently, the team decided that that Observation Drive (Northern section of MD 355 Bypass) north of Stringtown Road would not be included in the traffic models. The exclusive right-turn lane from Stringtown Road to southbound MD 355 will be included in the model, as it is scheduled to be constructed in the near term once a utility relocation is complete.

AJ Durham presented the anticipated environmental evaluation. The proposed study boundaries were further discussed, and the limits of Stringtown Road on the north, Shawnee Lane on the south, Gateway Center Drive on the west, and the Greenway to the east were identified. In advance of his field work, the property owners need to be notified via letter, and it was suggested that RK&K prepare the letter for County approval. AJ mentioned that the only potential historical resource was the marker on the southwest corner of Stringtown Road and MD 355. It was pointed out that the Archeological/Historic information for this area was available from the Stringtown Road project and may be included in the Observation Drive Prospectus, which Greg agreed to provide to the RK&K Team.

The next topic was public outreach, including potential community contacts. The Clarksburg Civic Association (CCA) and Clarksburg Chamber of Commerce were suggested as good contacts, as they are both involved in local issues and realize the importance of an effective roadway network. Ron suggested that the CCA planning committee would welcome a review of the study early in the process. The CCA planning committee meets on the third Monday of the month and the Clarksburg Civic Association meets on the fourth Monday of each month. Kathy Mitchell, head of the Clarksburg Ombudsman Office was also suggested as a potential contact for coordination with the Clarksburg community.

It was suggested by Greg Hwang and Aruna Miller that there would be two public meetings, with a newsletter distributed in advance of the first meeting to acquaint the public with the project. This first meeting will be held in September/October and will serve as an opportunity to present the preliminary alternatives, the environmental site assessment, the traffic study and purpose and

need. The second meeting will be held in January after the engineering and evaluation of the final alternatives is completed.

MCDOT will also be adding the project to its website.

RK&K Action Items:

- Prepare property owner notification letter for MCDOT approval and distribution
- Assemble list of property owner names and addresses
- Begin traffic analyses

Straughan Action Items:

- Begin environmental field work after property owners have been notified

RJM Action Items:

- None

MCDOT Action Items:

- Provide Observation Drive Prospectus

M-NCPPC Action Items:

- Identify developer obligations for Roberts Tavern Drive

The next project meeting will be scheduled for June/July after development of the Draft Traffic Report and Environmental Site Assessment Report.

cc: Attendees
Deanna Archey, MCDOT, Division of Transit Services
Mark Terry, MCDOT, Division of Traffic Engineering and Operations
Gail Tait-Nouri, MCDOT, Division of Transportation Engineering
Ki Kim, M-NCPPC





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Tom M. Reise
Property Acquisition Chief

Tim Cupples
Construction Chief

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Project Name:
Robert's Tavern Drive Extended, Facility Planning Phase I Study

Limits:
From Observation Drive to MD 355

Length: To be determined

Location:
Clarksburg

Project Overview:
This project provides Facility Planning, Phase I to study the completion of the southern connection between Observation Drive and MD 355. Approximately 500 feet northern Robert's Tavern Drive has been constructed by developer.

Project Manager
Greg Hwang
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greg.hwang@montgomerycountymd.gov

ROBERT'S TAVERN DRIVE EXTENDED FACILITY PLANNING, PHASE I

Meeting: Team Meeting #2

Date/Time: September 21, 2009, 10:00 – 12:00 a.m.

MEETING MINUTES

DATE OF MINUTES: October 21, 2009

ATTENDEES:

Name	Organization	Phone	Email
Greg Hwang	MCDOT, Planning	240-777-7279	Greg.Hwang@montgomerycountymd.gov
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Gail Tait-Nouri	MCDOT, Planning	240-777-7243	Gail.Nouri@montgomerycountymd.gov
Dennis Robinson	MCDOT, Property Acquisition	240-777-7255	Dennis.Robinson@montgomerycountymd.gov
Bob Simpson	MCDOT, Director's Office	240-777-7193	Bob.Simpson@montgomerycountymd.gov
Carl Starkey	MCDOT, Traffic	240-777-8780	Carl.Starkey@montgomerycountymd.gov
Mark Terry	MCDOT, Traffic	240-777-2198	Mark.Terry@montgomerycountymd.gov
Rick Adams	RK&K	410-462-9247	radams@rkk.com
Monica Toole	RK&K	410-462-9266	mtoole@rkk.com
Jeff Parker	RK&K	410-462-9276	jparker@rkk.com
A.J. Durham	Straughan Environmental	301-362-9200	adurham@straughanenvironmental.com
Matt Rescott	Straughan Environmental	301-362-9200	mrescott@straughanenvironmental.com
Joan Wang	RJM	410-730-1001	joanw@rjmengineering.com
Eric Beckett	SHA-OPPE-RIPD	410-545-5666	ebeckett@sha.state.md.us
Ki Kim	M-NCPPC	301-495-4538	Ki.Kim@mncppc-mc.org
Ron Cashion	M-NCPPC	301-650-5671	Ronald.Cashion@mncppc-mc.org

MINUTES:

The purpose of this meeting was to discuss the Purpose and Need and the results of the Environmental Site Assessment, Traffic Study, and Alternatives Development for the Roberts Tavern Drive Phase I Facility Planning project, and to determine the next steps required to finalize these documents and prepare for the first Public Meeting on the project.

- Following team introductions, Monica Toole (RK&K) initiated the meeting.

- Matt Rescott (SES) summarized the Natural Resource component of the Environmental Site Assessment
    - No wetlands or other "waters of the U.S." identified
    - Existing SWM facilities were shown on the environmental features map for information purposes only
    - Four (4) specimen trees were identified – one of which may be impacted by the Roberts Tavern Drive alignment (master-planned or otherwise)
    - Tree line based on aerial imagery

- A. J. Durham (SES) noted the only nearby significant cultural resource is Dowden's Ordinary
    - Proposed location for a park
    - Not impacted by Roberts Tavern Drive extension

- A. J. Durham (SES) stated that contact had been made with Maryland DNR Environmental Review but no written response has been received yet.

- Matt Rescott (SES) added that a response from MDNR Wildlife & Heritage Service has been received. There are no rare, threatened, or endangered species known to exist in the project area. It was confirmed that the project area contains Forest Interior Dwelling Species (FIDS) habitat.

- Ron Cashion (M-NCPPC) commented that the local residents want additional information regarding the history of the Roberts Tavern Drive street name
    - Carl Starkey (MCDOT) replied that M-NCPPC is responsible for assigning street names
    - Mark Terry (MCDOT) replied that the street name could not be changed without difficulty, if there are established businesses or residences with active addresses on the street.

- Ron Cashion (M-NCPPC) cautioned that the design of Roberts Tavern Drive extended should not preclude the future completion of the master-planned MD 355 Bypass

- Monica Toole (RK&K) identified the community and emergency service locations and hazardous materials sites on the environmental features map

- Jeff Parker described the alignment and intersection traffic control differences between the three (3) Build alternatives evaluated in the traffic study

- Jeff Parker (RK&K) summarized the updated findings of the traffic study
    - Analyses conducted using Synchro, SIDRA and the CLV method
    - Differences in analysis methodologies led to differing analysis results
    - Alternative 2 (Master Plan Alignment) would divert some traffic away from the MD 355/Stringtown Road intersection compared to No-Build
    - Alternatives 3 and 4 would each divert fewer vehicles away from the MD 355/Stringtown Road intersection than Alternative 2 due to the proposed alignment of Roberts Tavern Drive
    - The volume of traffic diverted under Alternatives 3 and 4 was estimated by reducing the 2030 No-Build northbound left turn volume at the MD 355/Stringtown Road intersection until that left turn movement improved from LOS F to LOS D
    - The operational trends shown by the Synchro analyses also apply to the CLV analyses, although the CLV analyses reported poorer levels of service than Synchro

- Ron Cashion (M-NCPPC) asked if the roadway network used in the traffic analysis was based on master-planned facilities or just facilities that were included in the CLRP
    - Jeff Parker (RK&K) replied that the roadway network was based on the CLRP, and the traffic projections used the same assumptions as the previous RK&K study for Observation Drive Extended, for consistency

- Mark Terry (MCDOT) questioned whether the Synchro analysis results accounted for the effects of adjacent traffic signals and recommended submitting the Synchro analysis to MCDOT Traffic Management for their review
    - Jeff Parker replied that the adjacent MD 355/Clarksburg Road and Stringtown Road/Gateway Center Drive signalized intersections were not evaluated as part of this study
    - Mark Terry added that the Synchro results appeared to be better than the traffic operations he has observed in the field
    - Following the meeting, RK&K reviewed the traffic analysis based on this comment and found that coding additional signalized intersections into the model would increase the effect of metering on the traffic entering the study area roadway network (i.e., adding adjacent signals would constrain the traffic entering the network, producing better LOS and delay results). Therefore, the analysis results presented in the draft traffic report without these adjacent signals are actually more conservative estimates of the traffic operations. No additional intersections will be added to the study area for analysis.

- Carl Starkey (MCDOT) asked if RK&K assumed the capacity value used to calculate the v/c-ratios using the CLV method was based on the Clarksburg Policy Area's congestion standard (1,425 vehicles) or the standard capacity of 1,600 vehicles
    - Jeff Parker replied that the standard capacity of 1,600 vehicles was used
    - Ki Kim (M-NCPPC) stated that the policy area congestion standard (1,425 vehicles) should be used but the level of service (LOS) thresholds should not be changed (i.e., CLVs of 1,600 vehicles or more are still equivalent to LOS F).

- Jeff Parker (RK&K) summarized the benefits and disadvantages of each Build alternative
    - Alternative 1 (No-Build) would not divert any traffic away from the MD 355/Stringtown Road intersection
    - Alternative 2 (Master Plan Alignment) would require southbound traffic on MD 355 to make a left turn at Roberts Tavern Drive to remain on MD 355, which is undesirable
    - Alternative 3 (T-Intersection with Signal) would require two southbound through lanes to achieve acceptable levels of service
    - Alternative 4 (T-Intersection with Roundabout) would have several multi-lane entries and exits, possibly requiring pedestrian-actuated signals in the future per U.S. Access Board recommendations

- For Alternative 3, Greg Hwang (MCDOT) asked how far would the second through lane need to extend downstream of the traffic signal
    - Carl Starkey replied that SHA would make that determination
    - Eric Beckett (SHA) concurred

- Aruna Miller (MCDOT) asked for additional details regarding the benefits and disadvantages of roundabouts, especially regarding bicycle safety, and about the general traffic operations in roundabouts

- Jeff Parker replied that roundabouts have been found to be safer for bicyclists than signalized intersections because roundabouts force drivers to reduce speed upon entry
- Modern roundabout design provides on-road bicyclists with the option of exiting the roadway onto a shared use path bypassing the roundabout, or traveling through the roundabout as if they were vehicles (i.e., by "claiming the lane").
- Modern roundabouts are different from traditional "traffic circles" because circulating traffic has the right-of-way in roundabouts and entering traffic must yield, and roundabouts are smaller than traffic circles with greater deflection for entering vehicles, forcing them to slow down as they enter and exit.

- Mark Terry (MCDOT) mentioned the difficulty some drivers have in understanding how to travel through a multi-lane roundabout.
  - Jeff Parker replied that the MUTCD includes guidance for the proper signing and marking of multi-lane roundabouts
  - Carl Starkey added that improving driver behavior in roundabouts is an educational issue

- Mark Terry (MCDOT) suggested that RK&K allow SHA's Office of Traffic and Safety (Mike Niederhauser) to review the roundabout traffic analysis that has been performed

- Joan Wang (RJM) described the existing and proposed typical sections for Roberts Tavern Drive
  - The existing section differs from the Montgomery County Standard Typical Roadway Section
  - The proposed typical section would differ from both the existing section and the County standard section by providing on-road bike lanes per SHA standards, since Roberts Tavern Drive would eventually becomes part of the MD 355 Bypass and be transferred to SHA for maintenance
  - The wide median and buffer areas between the roadway and the sidewalk/bike path could allow for the use of micro-bioretention, bio-swale, or landscape infiltration stormwater management techniques.

- Carl Starkey noted that the typical section dimensions presented in the handout do not match the dimensions in the latest version of the County Road Code

- Joan Wang (RJM) suggested the County consider permeable pavement types for the bike path and sidewalk because tests revealed the type of soils in the project area are on Hydrologic Soil group B, which can provide good subgrade infiltration.
  - Mark Terry (MCDOT) responded that the County has not adopted a standard for permeable pavements due to a lack of success from the test projects in which it has been used so far

- Mark Terry (MCDOT) stated that the County standard 6" curb with 16" gutter pan should be used in the typical section because of the uncertainty surrounding the MD 355 Bypass and the corresponding transfer of Roberts Tavern Drive to SHA.
  - However, he also noted that the SHA standard 8" curb with a 12" gutter pan was preferable for bicyclists because the pan intrudes less into the designated bike lane

- Monica Toole (RK&K) summarized the items that would be covered in the Purpose and Need statement

- Rick Adams (RK&K) asked MCDOT if there was a desire to build Roberts Tavern Drive initially with a 4-lane typical section, or if a 2-lane section would be acceptable.

- Aruna Miller (MCDOT) stated that a 2-lane section would be preferred initially, based on the traffic volume projections presented in the traffic study

- Aruna Miller (MCDOT) expressed concern about the traffic analysis results for Build Alternatives 2, 3, and 4 because they appear to show poorer levels of service and higher delays at the Stringtown Road/Observation Drive intersection than Alternative 1 (No-Build).
    - Jeff Parker (RK&K) replied that the additional volume diverted to this intersection as a result of the completion of Roberts Tavern Drive would require the addition of a separate right turn lane along eastbound Stringtown Road at Observation Drive to provide better levels of service; however, this improvement was not incorporated into the analysis presented in the handout
    - Aruna Miller (MCDOT) stated that this off-site improvement should be included as part of the Roberts Tavern Drive project, should be incorporated into the traffic analysis, and should be shown on the displays used at the public meeting

- The project team agreed that two (2) build alternatives needed to be presented to the public in detail
    - We will state to the public that Alternative 4 (Roundabout) was also evaluated but not studied in greater detail due to an inordinate number of disadvantages compared to the other build alternatives

RK&K Action Items:

- Submit revised traffic analyses to include separate right turn lane on eastbound Stringtown Road at Observation Drive

- Finalize the ESA and Traffic Study. Submit draft Purpose and Need statement

- Submit roundabout analysis results to SHA-OOTS (to Mike Niederhauser, cc: Eric Beckett-RIPD) for review and comment *(M. Niederhauser comments received on 9/24/09)*

- Prepare draft displays for the upcoming Public Meeting

Straughan Action Items:

- Submit initiation letters to Maryland Historical Trust and Montgomery County Historic Preservation Commission so their responses can be included as part of the project record

RJM Action Items:

- Revise the proposed typical section dimensions to correspond to the latest version of the Road Code

- Begin to develop Alt. 2 (Master Plan Alignment) and Alt. 3 (T-intersection)

- Prepare cost estimates for both a 2-lane and a 4-lane typical section

MCDOT Action Items:

- Present recommendation to develop Alt. 2 (Master Plan Alignment) and Alt. 3 (T-intersection) to MCDOT upper management.

M-NCPPC Action Items:

- Research origin of the Roberts Tavern Drive street name *(Item completed by MCDOT 9/22/09)*

cc: Attendees
Reena Matthews, SHA – OPPE
Jewru Bandeh, Upcounty Regional Services Center
Deanna Archey, MCDOT – Transit

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Property Acquisition Chief

Tim Cupples
Construction Chief

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Project Name:
Robert's Tavern Drive Extended, Facility Planning Phase I Study

Limits:
From Observation Drive to MD 355

Length: To be determined

Location:
Clarksburg

Project Overview:
This project provides Facility Planning, Phase I to study the completion of the southern connection between Observation Drive and MD 355. Approximately 500 feet northern Robert's Tavern Drive has been constructed by developer.

Project Manager
Greg Hwang
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ROBERT'S TAVERN DRIVE EXTENDED FACILITY PLANNING, PHASE I

Meeting: Team Meeting #3

Date/Time: October 28, 2009, 1:30 – 3:00 p.m.

MEETING MINUTES

DATE OF MINUTES: December 28, 2009

ATTENDEES:

Name	Organization	Phone	Email
Sogand Seirafi	MCDOT, DTE	240-777-7260	Sogand.Seirafi@montgomerycountymd.gov
Greg Hwang	MCDOT, Planning	240-777-7279	Greg.Hwang@montgomerycountymd.gov
Aruna Miller	MCDOT, Planning	240-777-7240	Aruna.Miller@montgomerycountymd.gov
Dennis Robinson	MCDOT, Property Acquisition	240-777-7255	Dennis.Robinson@montgomerycountymd.gov
Bob Simpson	MCDOT, Director's Office	240-777-7193	Bob.Simpson@montgomerycountymd.gov
Carl Starkey	MCDOT, Traffic	240-777-8780	Carl.Starkey@montgomerycountymd.gov
Mark Terry	MCDOT, Traffic	240-777-2198	Mark.Terry@montgomerycountymd.gov
Rick Adams	RK&K	410-462-9247	radams@rkk.com
Monica Toole	RK&K	410-462-9266	mtoole@rkk.com
Joan Wang	RJM	410-730-1001	joanw@rjmengineering.com
Ki Kim	M-NCPPC	301-495-4538	Ki.Kim@mncppc-mc.org

MINUTES:

The purpose of this meeting was to review build alternatives, determine build alternatives that will be presented in the November 12, 2009 public meeting, and discuss details of the public meeting.

- Following team introductions, Monica Toole (RK&K) initiated the meeting.
- Alternatives 1 (No Build), 2A, 2B, 2C, 3, and 4 were reviewed by the team. Both intermediate condition (before Relocated MD 355 is fully completed (per master plan)) and final condition were presented for each build alternative.
- The group decided that Alternative 2C would be re-named as Alternative 2 and would be shown at the public meeting. Alternatives 2A and 2B would not be discussed in detail at the public meeting but would still be evaluated in the Traffic Study. Only the intermediate condition of Alternatives 2, 3, and 4 would be shown at the public meeting. The final condition for Alternative 2 would be available if needed or requested at the public meeting.

- Modifications to all alternatives displayed shall include the following:
    - Alternative 2 – only indicate a single right-turn (striping and pavement) from southbound MD 355 to westbound Roberts Tavern Drive Extended.
    - Each alternative shall differentiate what has been built (by the developer) and what has not.
- Sogand Seirafi informed the group that a recent directive had been issued that there would be no handouts available at the public meeting. If any citizen requests printed materials it would be provided after the meeting. (Note: subsequent to this meeting, it was decided that a handout of selected presentation slides would be made available at the meeting to provide essential project information.)

RK&K/RJM Action Items:

- Prepare one set of displays of the alternatives and the build alternatives' typical sections.
- Prepare their portion of the PowerPoint presentation.
- Prepare nametags for staff attending the public meeting.
- Bring copies of the Traffic Study, Environmental Report, and Purpose & Need for display.

MCDOT Action Item:

- Prepare public meeting sign-in sheets.
- Prepare their portion of the PowerPoint presentation and finalize the complete PowerPoint slides.
- Prepare public meeting handout. (subsequent to this meeting)

If there are any additions and/or modifications to the above, please promptly notify Greg Hwang at (240)777-7279 or Greg.Hwang@montgomerycountymd.gov. Otherwise the contents of these minutes will be presumed to be acceptable and work will proceed accordingly.

cc: Attendees
Reena Mathews, SHA – OPPE
Eric Beckett, SHA – OPPE
Jewru Bandeh, Upcounty Regional Services Center
Gail Tait-Nouri, MCDOT – Transportation Engineering
Deanna Archey, MCDOT – Transit
Ron Cashion, M-NCPPC





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Tom M. Reise
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****

Project Name:
Robert's Tavern Drive Extended, Facility Planning Phase I Study

Limits:
From Observation Drive to MD 355

Length: To be determined

Location:
Clarksburg

Project Overview:
This project provides Facility Planning, Phase I to study the completion of the southern connection between Observation Drive and MD 355. Approximately 500 feet northern Robert's Tavern Drive has been constructed by developer.

Project Manager
Greg Hwang
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ROBERT'S TAVERN DRIVE EXTENDED FACILITY PLANNING, PHASE I

Meeting: Team Meeting #4

Date/Time: December 22, 2009, 1:00 – 3:00 p.m.

MEETING MINUTES

DATE OF MINUTES: January 4, 2010

ATTENDEES:

Name	Organization	Phone	Email
Aruna Miller	MCDOT, Planning	240-777-7240	Aruna.Miller@montgomerycountymd.gov
Greg Hwang	MCDOT, Planning	240-777-7279	Greg.Hwang@montgomerycountymd.gov
Gail Tait-Nouri	MCDOT, Planning	240-777-7243	Gail.Nouri@montgomerycountymd.gov
Dennis Robinson	MCDOT, Property Acquisition	240-777-7255	Dennis.Robinson@montgomerycountymd.gov
Bob Simpson	MCDOT, Director's Office	240-777-7193	Bob.Simpson@montgomerycountymd.gov
Mark Terry	MCDOT, Traffic	240-777-2198	Mark.Terry@montgomerycountymd.gov
Rick Adams	RK&K	410-462-9247	radams@rkk.com
Monica Toole	RK&K	410-462-9266	mtoole@rkk.com
Joan Wang	RJM	410-730-1001	joanw@rjmengineering.com
Gary Johnson (portion of the meeting)	MCDOT	240-777-7265	Gary.Johnson@montgomerycountymd.gov

CONFERENCE IN BY PHONE:

Name	Organization	Phone	Email
Carl Starkey	MCDOT, Traffic	240-777-8780	Carl.Starkey@montgomerycountymd.gov
Ki Kim	M-NCPPC	301-495-4538	Ki.Kim@mncppc-mc.org
Ron Cashion	M-NCPPC	301-650-5671	Ronald.Cashion@mncppc-mc.org

MINUTES:

The The purpose of this meeting was to select the recommended alternative.

- Monica Toole and Greg Hwang briefly summarized the November 12, 2009 public meeting. The public comment period was extended to December 10, 2009. A handout was distributed that summarized the comments received. Ki Kim clarified that Cherian Eapen's comment was not given on behalf of M-NCPPC but rather as a private citizen.
- Regarding agency comments received, Greg informed the group that he had received a comment from SHA that they preferred Alternative 4; however, they added that the storage for the northbound left on MD 355 should be lengthened. Their formal response will be submitted in early January after internal coordination is completed.
- Ki added that M-NCPPC prefers Alternative 2 or 4, with preference for Alternative 2 because it is more conducive for the master plan of Relocated MD 355. Alternative 4 could be supported as a solution for the interim condition of extending existing Roberts Tavern Drive to MD 355 (this study's scope).
- After much discussion among the group about Alternatives 2 through 4, individual votes were taken regarding preference for the selected alternative. All attending and participating by phone stated preference for Alternative 4 except Joan Wang and Gail Tait-Nouri. Joan stated a preference for a modified Alternative 2 for which she brought a concept to the meeting. In particular, this modified concept addressed driveway access from Roberts Tavern Drive Extended to the residential properties on the east side of MD 355. Gail stated a preference for Alternative 3 because the alignment was simpler for pedestrians to navigate.
- While refinements to pedestrian and bicycle access was being discussed, Gary Johnson, the project manager for MD 355 sidewalk and bike path improvements from Stringtown Road to Brink Road, briefly described the status and scope of improvements for that project (which currently has funding for planning through FY12).
- The following summarizes the refinements to Alternative 4 discussed at this meeting:
    - Consider lengthening the left-turn storage for northbound left from MD 355 (as referenced above, from SHA)
    - Assume that the right-of-way needed to accommodate the geometry for the eventual Master Plan Alignment for southbound existing MD 355 (business) will be acquired for Alternative 4.
    - Assume that the existing sidewalk on the west side of MD 355 at Woodport Road will be extended south to the proposed intersection of Roberts Tavern Drive Extended. This work will be assumed to be performed as part of the MD 355 sidewalk and bike path improvements that Gary Johnson is studying.
    - South of the intersection of Roberts Tavern Drive Extended and MD 355, the shared use path assumed on Roberts Tavern Drive Extended will be extended on the west side of MD 355. This work will also be assumed to be performed as part of the MD 355 sidewalk and bike path improvements that Gary Johnson is studying.
    - The driveway to the commercial property on the east side of MD 355 should be investigated to be combined with the other driveway (to the north) also accessing this parcel.
    - The existing sidewalk on the east side of MD 355 that ends north of Suncrest Avenue will be assumed to be extended to the pedestrian crossing at the proposed intersection MD 355 and Roberts Tavern Drive Extended. A crosswalk will be assumed to be provided across MD 355, providing refuge in the striped portion between the north and southbound lanes on the north approach. (Comment: perhaps it should be a refuge island) Southbound pedestrians from the west side of MD 355 will likewise cross the southbound right and have refuge in the island between the southbound right and northbound left turns. Southbound pedestrian

access will continue along the west side of MD 355 to then cross eastbound Roberts Tavern Drive Extended (assumed to be only one lane) to connect with the shared use path proposed on Roberts Tavern Drive that will extend on the west side of MD 355.
    - For stormwater management purposes, the most conservative typical section should be assumed within the work limits on MD 355.
    - No direct vehicular access from eastbound Roberts Tavern Drive to the residential properties on the east side of MD 355 will be provided.

- Greg Hwang presented the schedule for the remainder of the Phase I study. Tentatively, the next team meeting is scheduled for March 2010 to discuss comments on the draft prospectus and the refinements to the Selected Alternative.

If there are any additions and/or modifications to the above, please promptly notify Greg Hwang, DTE-MCDOT at (240)777-7279 or Greg.Hwang@montgomerycountymd.gov. Otherwise the contents of these minutes will be presumed to be acceptable and work will proceed accordingly.

cc: Attendees
Reena Mathews, SHA – OPPE
Eric Beckett, SHA – OPPE
Jewru Bandeh, Upcounty Regional Services Center
Deanna Archey, MCDOT – Transit

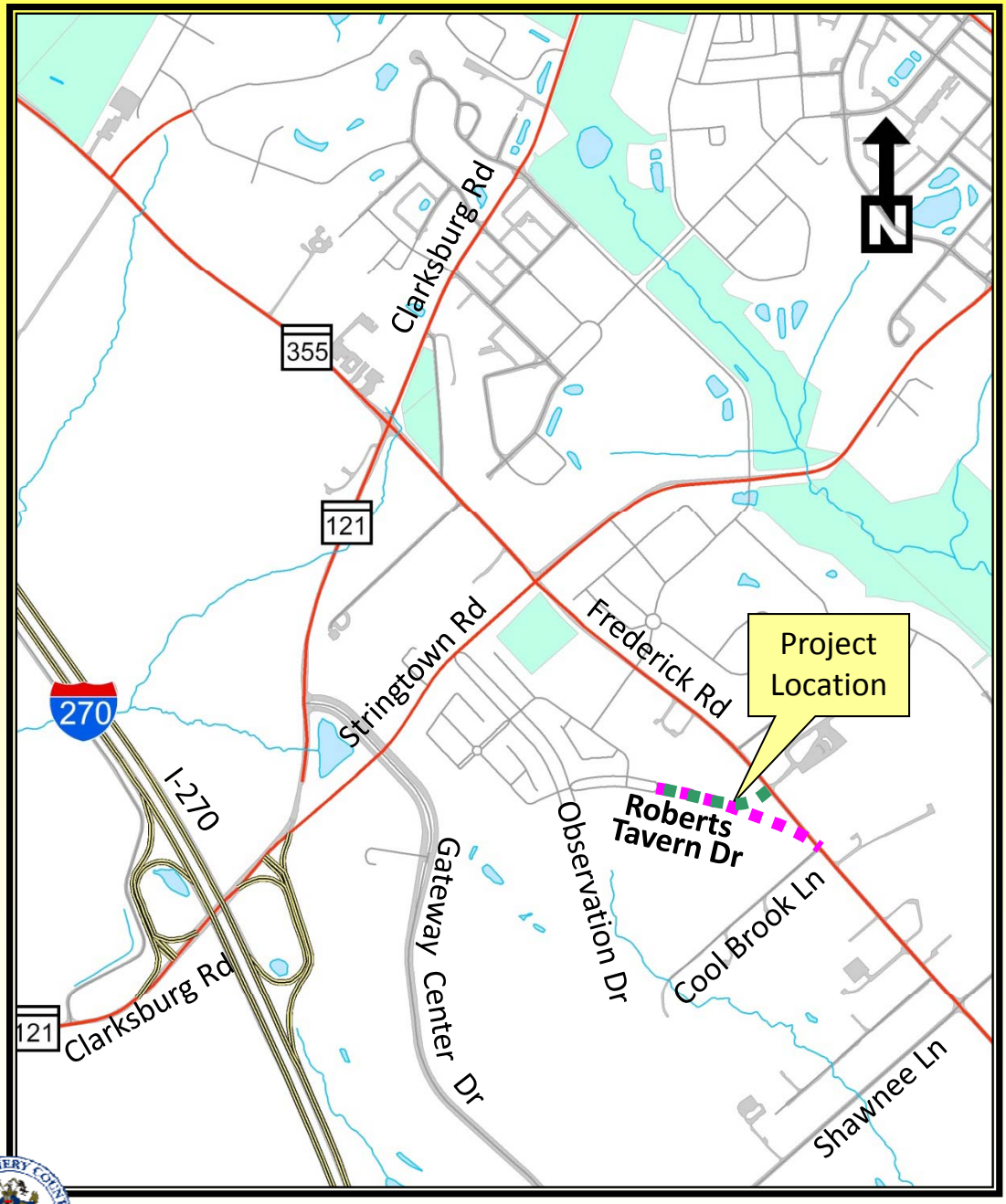
Appendix G

October 2009 Purpose and Need

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Purpose & Need



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Montgomery County Department of Transportation
Planning

P&N

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Purpose and Need

FINAL - October 2009

Montgomery County Department of Transportation
Planning

Prepared for:
Montgomery County
Department of Transportation
Division of Transportation Engineering
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

RK&K
Prepared by:
Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, Maryland 21217

I. Background and Description

The Montgomery County Department of Transportation (MCDOT) is performing a Phase I Facility Planning Study to determine the need to extend existing Roberts Tavern Drive to MD 355 (Frederick Road) in Clarksburg, Maryland.

Roberts Tavern Drive is located along the master planned alignment for relocated Frederick Road (MD 355), designated as A-251 in the 1994 *Clarksburg Master Plan & Hyattstown Special Study Area* (**Figure 1**). One of the master plan's stated transportation objectives is to divert the area's regional through traffic from the Clarksburg Town Center and historic district. To address this, the master plan recommends MD 355 be relocated from north of Cool Brook Lane to Snowden Farm Parkway through future Roberts Tavern Drive and Observation Drive. Through these limits, existing MD 355 will be reclassified as a business street remaining as a two-lane roadway, and future relocated MD 355 is proposed as a four-lane divided arterial.

Currently, the northern 500-foot segment of Roberts Tavern Drive between Observation Drive and Latrobe Lane has been constructed. Facility Planning, Phase I will evaluate the extension of existing Roberts Tavern Drive to MD 355 (Frederick Road), which is approximately 1000 feet.

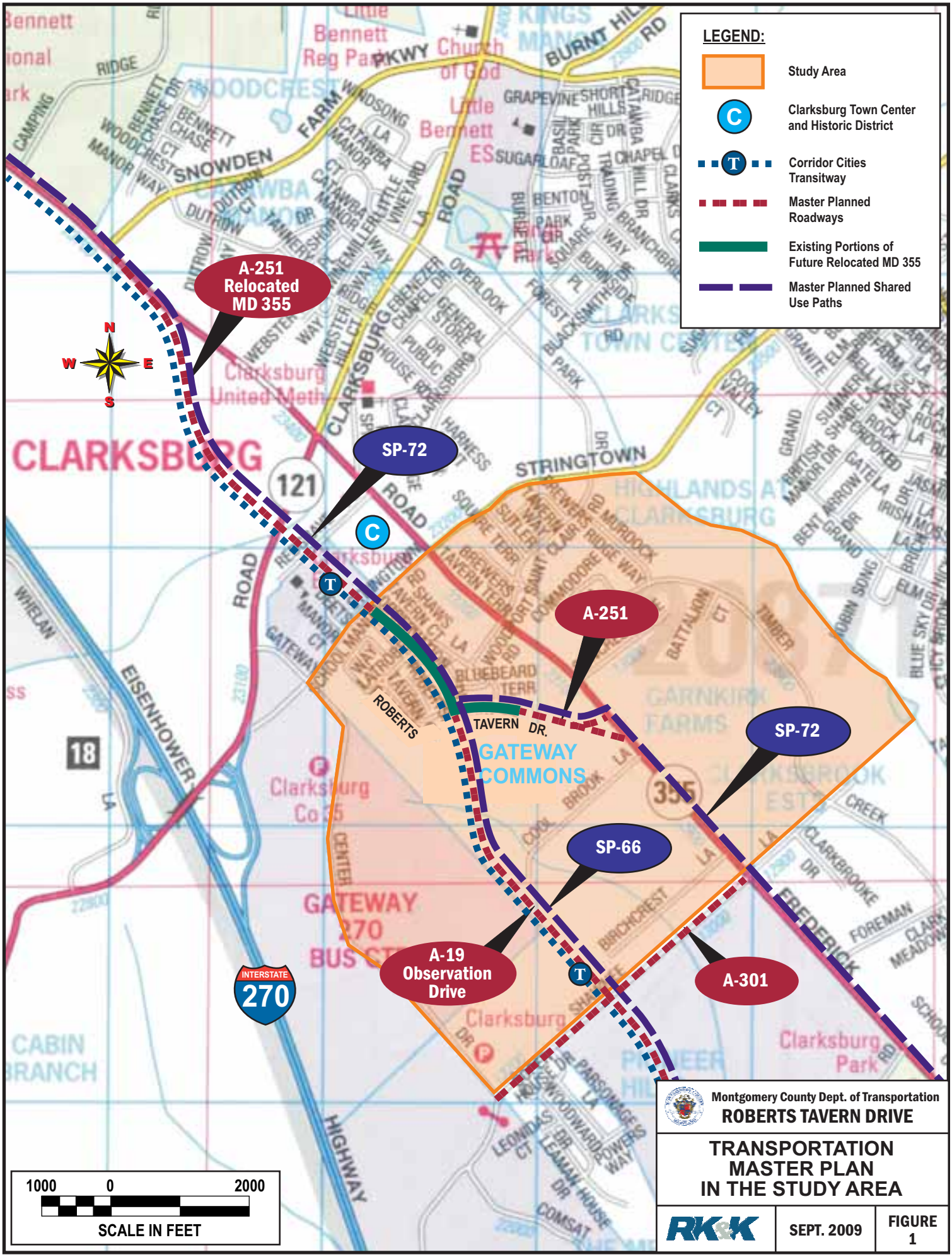
II. Purpose of the Project

The purpose of Roberts Tavern Drive Extended is to improve mobility and access for people and goods that use MD 355 and the surrounding roadway network. These improvements are necessary to improve travel efficiency, divert regional through traffic around the Clarksburg Town Center and historic district, provide congestion relief, expand neighborhood connections, and enhance multimodal access.

III. Project Need

The need for extending Roberts Tavern Drive between north of Cool Brook Lane and existing Roberts Tavern Drive is to:

A. Accommodate land use
B. Reduce future traffic congestion
C. Improve network efficiency
D. Provide local neighborhood connection
E. Enhance bicycle and pedestrian connections.



Montgomery County Dept. of Transportation

ROBERTS TAVERN DRIVE

TRANSPORTATION MASTER PLAN IN THE STUDY AREA

RK&K | SEPT. 2009 | FIGURE 1

A. Reduce Future Traffic Congestion

Traffic operations for existing conditions were analyzed as well as the conditions projected to occur by 2030. In addition to projected traffic growth, the future roadway network is assumed to include Observation Drive being extended to the south to Waters Discovery Lane in Germantown, with two through lanes in each direction. The Observation Drive/Stringtown Road intersection is assumed to be signalized by 2030.

The table below summarizes intersections level of service, critical lane volume, and volume-to-capacity ratio for both the existing (2009) and future (2030) scenarios:

Table 1: Summary of Intersection Level of Service (LOS), Critical Lane Volume (CLV), and Volume-to-Capacity (v/c) Ratios

Intersection		Existing (2009)		Future (2030)	
		AM	PM	AM	PM
MD 355 @ Stringtown Rd.	LOS	B	B	E	E
	CLV	1,042	1,060	1,517	1,573
	v/c	0.73	0.74	1.06	1.10
Stringtown Rd. @ Observation Dr.	LOS	A	A	E	E
	CLV	261	368	1,530	1,577
	v/c	0.18	0.26	1.07	1.11
Roberts Tavern Dr. @ Observation Dr.	LOS	*	*	A	A
	CLV	*	*	714	719
	v/c	*	*	0.50	0.50

Source: Roberts Tavern Drive Extended Traffic Study, October 2009.
Notes:
Shaded cells indicate unsignalized intersections.
Unshaded cells indicate signalized intersections.
The CLV method was developed for evaluating signalized intersections; however, results for unsignalized stop-controlled intersections are provided for the purpose of comparison.
The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV. The v/c-ratios shown are based on a capacity of 1,425 vehicles. The LOS are based on the standard CLV thresholds, with LOS F corresponding to CLVs of 1,600 or greater.
*Under Existing Conditions, Observation Drive terminates at this intersection. The total peak hour volume entering the intersection is less than 10 vehicles.

The table above indicates that the intersection of MD 355 and Stringtown Road currently operates at level of service (LOS) B during both the AM and PM peak hours. In 2030, the critical lane volume at this intersection will increase due to traffic growth, resulting in LOS E during both the AM and PM peak hours.

The intersection of Stringtown Road and Observation Drive is currently unsignalized, and all approaches are operating at LOS A or better during both the AM and PM peak hours. Projected 2030 traffic will meet MUTCD volume warrants and this intersection will be signalized. Additionally, Observation Drive potentially will extend to Germantown and function as an arterial roadway. As a result, the critical lane volume will drop to a LOS E during both the AM and the PM peak hours.

Much of the Gateway Commons development adjacent to the Roberts Tavern Drive/Observation Drive intersection has not yet been constructed, nor has the extension of Observation Drive been built. With so little traffic volume (less than 10 vehicles per hour), all approaches at this

unsignalized intersection currently operate at LOS A during both the AM and PM peak hours. Year 2030 volumns projections indicate that the CLV at this intersection will increase to over 700 due to the extension of Observation Drive to Germantown, however the unsignalized Roberts Tavern Drive/Observation Drive intersection will continue to operate at LOS A during AM and PM peak hours.

B. Improve Network Efficiency

Between Stringtown Road and Shawnee Lane, there is no other direct east-west access from MD 355 to the north-south roadways Gateway Center Drive or extended Observation Drive. Additional access for planned residential development between MD 355, Observation Drive and Gateway Center Drive is needed for efficient movement to these larger capacity north-south arterials. An additional east-west connection is needed to complete the transportation grid. This connection would complement the function of Stringtown Road to the north and Shawnee Lane to the south, both of which connect to MD 355, extended Observation Drive, and eventually the planned Corridor Cities Transitway.

Neither Cool Brook Lane nor Birchcrest Lane is proposed to intersect extended Observation Drive. Both of these streets are very narrow and serve as property access to a few residences. . Neither is maintained by the county nor intended as a thoroughfare.

C. Provide Local Neighborhood Connection

Existing development (Gateway Commons) must access MD 355 via either Stringtown Road or Woodport Road. Both connections are either indirect (via Stringtown Road) or unsignalized off of a minor connector (via Woodport Road). Existing and planned development southwest of MD 355 would have additional direct access to MD 355 via the proposed arterial extension of Roberts Tavern Drive.

D. Enhance Bicycle and Pedestrian Connections

Off-street bicycle paths are necessary to provide continuity and connections among neighborhoods, shopping, employment areas, and community facilities. The Clarksburg master plan recommends an off-street bikeway along the future relocated MD 355 (A-251). More recently, the March 2005 *Countywide Bikeway Functional Master Plan* (CBFMP) designates SP-72, Frederick Road (MD 355)-Upcounty, as a shared use path extending along Roberts Tavern Drive as part of A-251. The CBFMP designates SP-72 with "potential in the future to serve as an important pedestrian connection" since it would connect to proposed SP-66, the Corridor Cities Transitway shared use bike path along extended Observation Drive (A-19) and link to both the transitway and to the Clarksburg Town Center. For these reasons, the CBFMP considers implementation of such paths a higher priority than other shared use paths. Both SP-72 and SP-66 are illustrated on **Figure 1**.

Montgomery County Department of Transportation

Planning

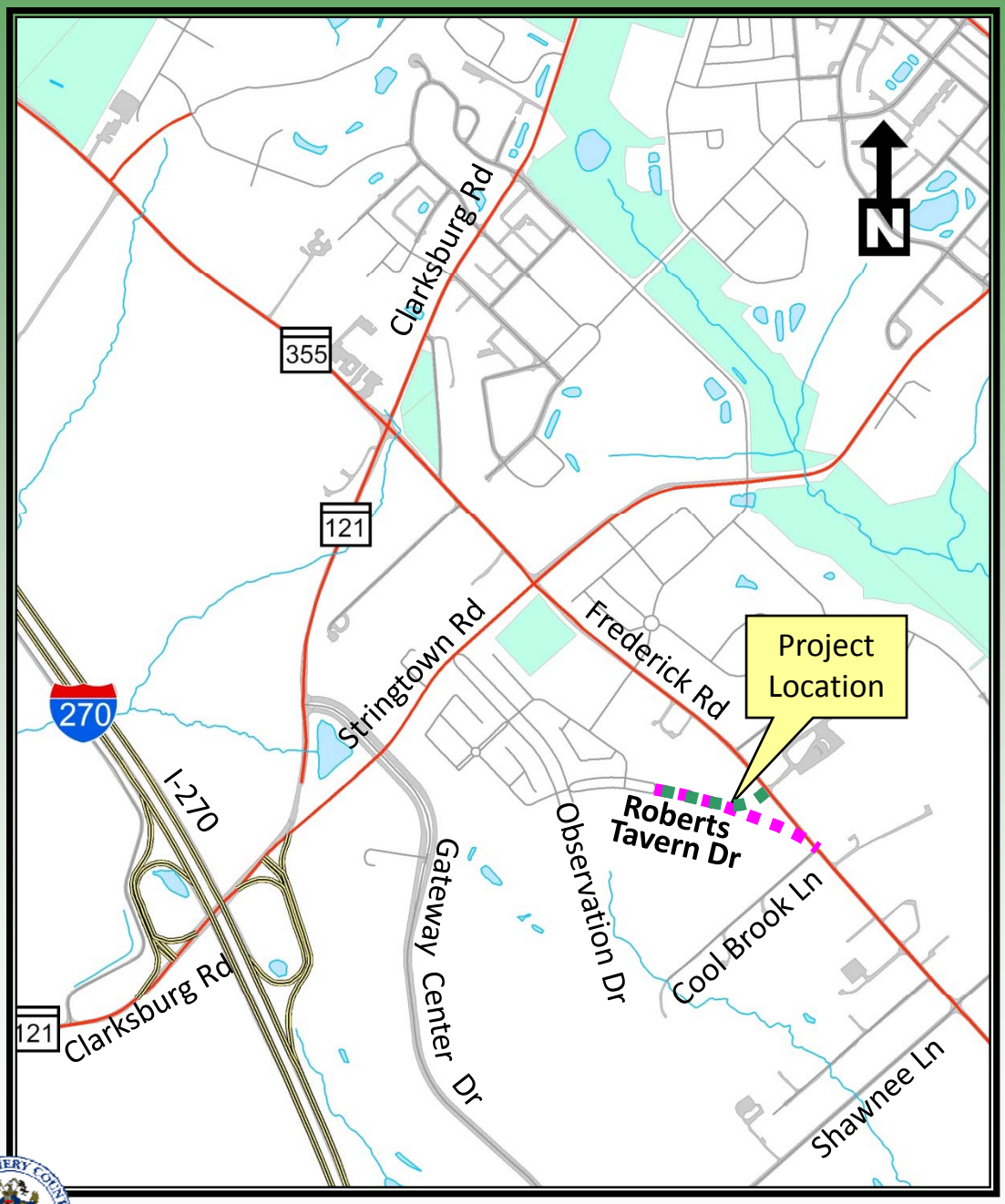
Appendix H

October 2009 Environmental Report

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Environmental Report



FINAL - October 2009

Montgomery County Department of Transportation

Planning

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Environmental Report

FINAL - October 2009

Montgomery County Department of Transportation
Planning

Prepared for:
Montgomery County
Department of Transportation
Division of Transportation Engineering
100 Edison Park Drive, 4th Floor
Gaithersburg, Maryland 20878

Prepared by:
Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, Maryland 21217
In association with
STRAUGHAN ENVIRONMENTAL SERVICES, INC.

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I. Introduction

In May 2009, the Montgomery County Department of Transportation (MCDOT) initiated a Facility Planning Study to evaluate the extension of Roberts Tavern Drive from Observation Drive to MD 355 (Frederick Road). Existing Roberts Tavern Drive is located along the southern edge of Clarksburg. The MCDOT has a long-standing investment in conserving natural, cultural, and socioeconomic resources. As part of the Roberts Tavern Drive Extended Facility Planning Study's efforts, this report has been prepared to assess existing conditions and identify any natural environmental, cultural and socioeconomic resources within the study area (**Figure 1**), as a basis for determining impacts from potential improvements. The study area lies within the master plan area of the 1994 *Clarksburg Master Plan & Hyattstown Special Study Area*. Within the study area, natural environmental, cultural, and socioeconomic resources were identified using a variety of available data including the master plan, interactive internet mapping resources supplied by Maryland-National Capital Park and Planning Commission (M-NCPPC) and supplementary field reviews. Federal, state and local agencies were contacted to assist in the development of this inventory, including the U.S. Fish and Wildlife Service (USFWS), the Maryland Department of the Environment (MDE), Maryland Department of Natural Resources (DNR), MCDOT, M-NCPPC, Montgomery County Office of Historic Preservation, and Montgomery County Department of Parks (see appendix for agency correspondence).

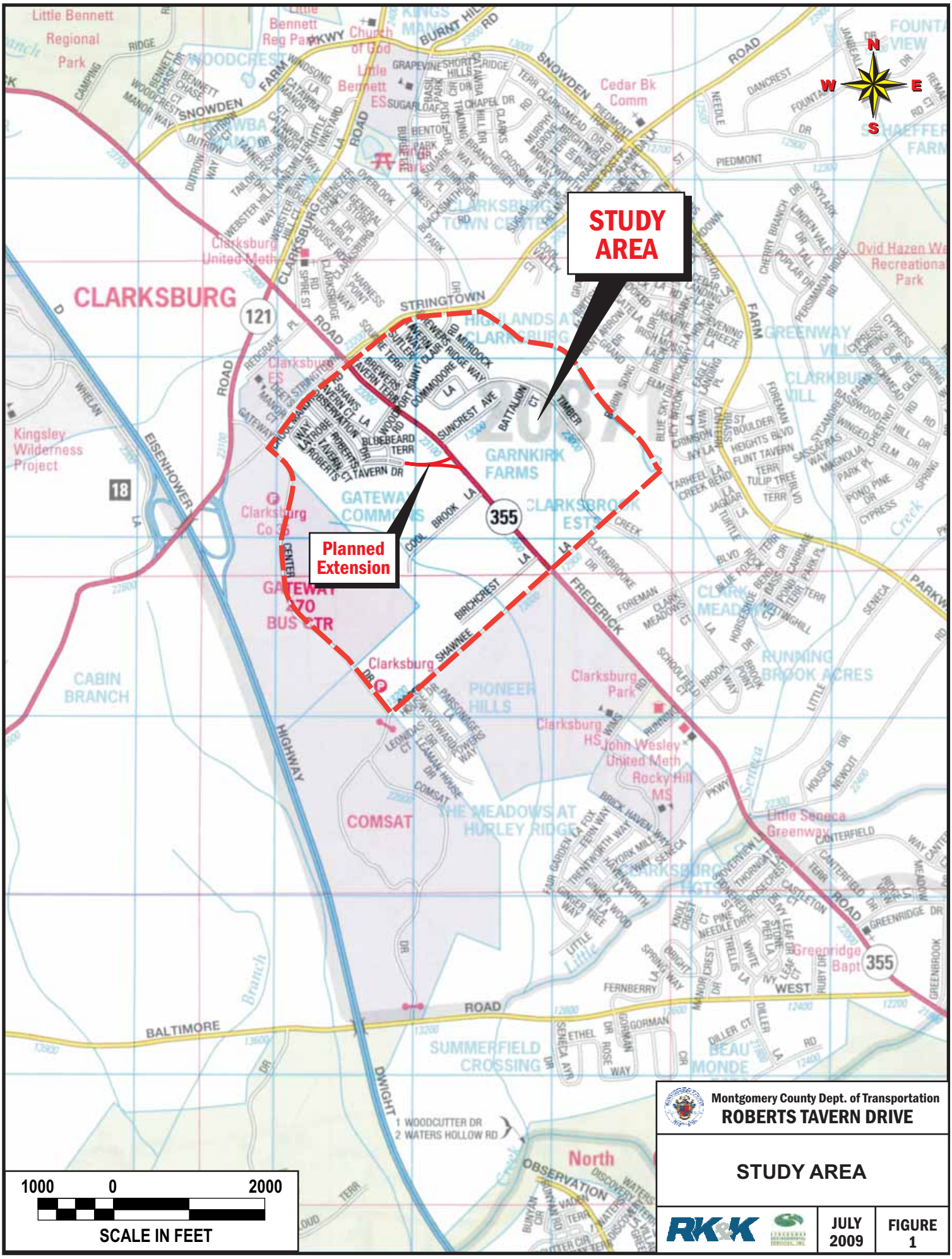
II. Natural Environment

The inventory of the natural environmental features includes topography, geology and soils; vegetation; wetlands and other Waters of the US; floodplain boundaries; and wildlife, including rare, threatened and endangered species. The study area for the natural environmental features, including field inventories, included a smaller area around existing Roberts Tavern Drive and along MD 355, as depicted on **Figure 2**, Environmental Features Map.

Topography, Geology and Soils

Topography

The study area is characterized by generally level topography sloping gently to the southeast with several shallow swales. Elevations in the study area range from 570 feet to 640 feet according to the United States Geological Survey 7.5 Minute Topographic Quadrangle for Germantown, Maryland (USGS, 1953).



Montgomery County Dept. of Transportation

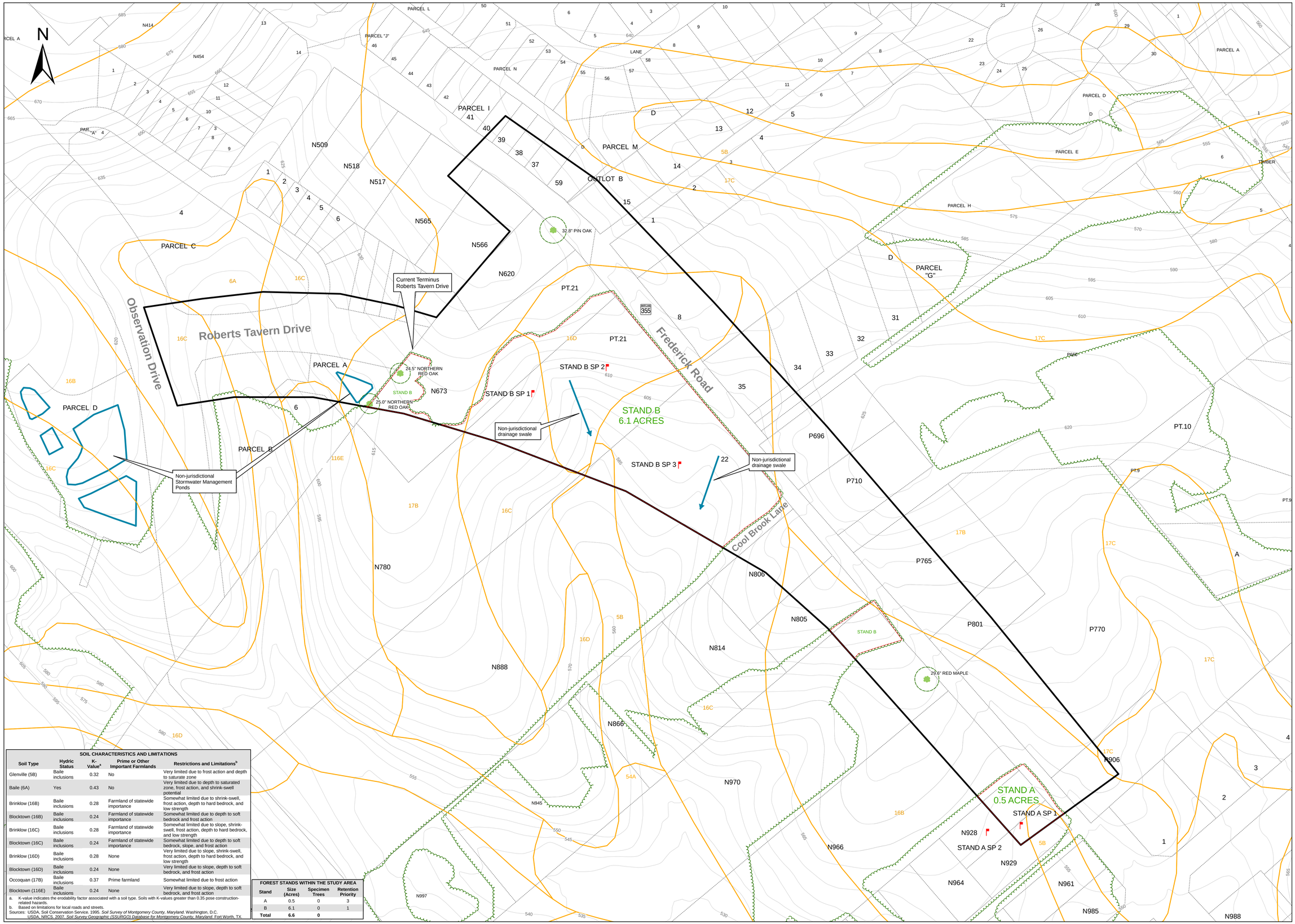
ROBERTS TAVERN DRIVE

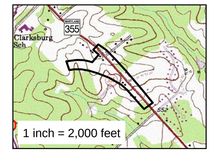
STUDY AREA

RK&K

JULY 2009

FIGURE 1





NOTES:

1. THE ENTIRETY OF THE STUDY AREA LIES WITHIN THE CLARKSBURG SPECIAL PROTECTION AREA (SPA), AS DESIGNATED BY MONTGOMERY COUNTY.
2. THERE IS POTENTIAL FOR FOREST INTERIOR DWELLING SPECIES (FIDS) HABITAT IN THE STUDY AREA. STAND B IS CONSIDERED POTENTIAL FIDS HABITAT BECAUSE IT IS CONTIGUOUS WITH A FOREST STAND THAT IS GREATER THAN 50 ACRES AND CONTAINS INTERIOR FOREST WHICH IS MORE THAN 300 FEET FROM THE EDGE. STAND A, WHILE IT IS CONTIGUOUS WITH A LARGER STAND DOES MEET THE MINIMUM 300 FOOT WIDTH REQUIREMENT.
3. THERE ARE NO STEEP SLOPES WITHIN THE STUDY AREA.
4. THE STUDY AREA DOES NOT INTERSECT THE 100-YEAR FLOODPLAIN OF ANY WATERWAY.
5. THERE ARE NO NATIONAL WETLANDS INVENTORY MAPPED SYSTEMS WITHIN THE STUDY AREA.
6. THE STUDY AREA DOES NOT LIE WITHIN THE CHESAPEAKE BAY CRITICAL AREA.

Legend:

- Study Area
- Forest Stand Boundary
- Sample Plot
- Soil Type Boundary
- Tree Line
- Property Boundary
- 5-Foot Contour
- Specimen Tree with Critical Root Zone

Scale:

1 inch = 100 feet

0 50 100 200 Ft

SOIL CHARACTERISTICS AND LIMITATIONS

Soil Type	Hydric Status	K-Value[a]	Prime or Other Important Farmlands	Restrictions and Limitations[b]
Glenville (5B)	Baile inclusions	0.32	No	Very limited due to frost action and depth to saturate zone
Baile (6A)	Yes	0.43	No	Very limited due to depth to saturated zone, frost action, and shrink-swell potential
Brinklow (16B)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16B)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock and frost action
Brinklow (16C)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16C)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock, slope, and frost action
Brinklow (16D)	Baile inclusions	0.28	None	Very limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16D)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action
Occoquan (17B)	Baile inclusions	0.37	Prime farmland	Somewhat limited due to frost action
Blocktown (116E)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action

a. K-value indicates the erodability factor associated with a soil type. Soils with K-values greater than 0.35 pose construction-related hazards.
b. Based on limitations for local roads and streets.
Sources: USDA, Soil Conservation Service. 1995. *Soil Survey of Montgomery County, Maryland*. Washington, D.C.
USDA, NRCS. 2007. *Soil Survey Geographic (SSURGO) Database for Montgomery County, Maryland*. Fort Worth, TX.

FOREST STANDS WITHIN THE STUDY AREA

Stand	Size (Acres)	Specimen Trees	Retention Priority
A	0.5	0	3
B	6.1	0	1
Total	**6.6**	**0**	

MONTGOMERY COUNTY 1776 MARYLAND

RK&K

STRAUGHAN ENVIRONMENTAL SERVICES, INC.

THIS PLAN WAS PREPARED BY:
MATTHEW L. RESCOTT
STRAUGHAN ENVIRONMENTAL SERVICES, INC.
MARYLAND DEPARTMENT OF NATURAL RESOURCES QUALIFIED PROFESSIONAL STATUS (FEB. 14, 2006)

MATTHEW L. RESCOTT DATE
STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 2:
Environmental Features Map

Roberts Tavern Drive
Montgomery County, Maryland

July 2009

Geology and Soils

The study area is located in the Upland Section of the Piedmont Plateau Physiographic Province. According to the *Soil Survey Geographic (SSURGO) Database for Montgomery County, Maryland* (USDA, NRCS, 2007), the following five soil series occur within the study area (see **Table 1**):

- Baile (6A) – very deep, poorly drained soils located on upland depressions and footslopes.
- Brinklow-Blocktown (16B, 16C, 16D, 116E):
  - Brinklow – moderately deep, well drained soils on uplands.
  - Blocktown – shallow, well drained soils on uplands.
- Glenville (5B) – very deep, moderately well to somewhat poorly-drained soils on uplands.
- Occoquan (17B) – deep, well to somewhat excessively drained soils on uplands.

Table 1
TYPICAL SOIL PROFILE

Soil Series	Depth (Inches)	Color	Texture
Baile	0-9	Dark gray (10YR 4/1)	Silt loam
	9-14	Gray (10YR 5/1)	Silty clay loam
	14-22	Gray (5Y 5/1)	Silty clay loam
	22-32	Gray (N5/0)	Silty clay loam
	32-65	Bluish gray (5B 6/1)	Loam
Blocktown	0-6	Yellowish red (5Y 4/6)	Channery silt loam
	6-17	Red (2.5YR 4/6)	Very channery silt loam
	17-21	Variegated red (2.5YR 4/6) and yellowish red (5Y 5/6)	Soft bedrock that crushes into extremely channery silt loam
	21+	Hard phyllite bedrock	
Brinklow	0-10	Brown (7.5YR 5/4)	Channery silt loam
	10-19	Strong brown (7.5YR 5/8)	Channery silt loam
	19-25	Variegated strong brown (7.5YR 5/8), reddish yellow (7.5YR 7/6), and yellowish red (5YR 5/6)	Channery loam
	25-35	Reddish yellow (5YR 7/6)	Soft bedrock that crushes to very channery loam
	35+	Hard phyllite bedrock	

Table 1 TYPICAL SOIL PROFILE			
Soil Series	**Depth (Inches)**	**Color**	**Texture**
Glenville	0-9	Dark yellowish brown (10YR 4/4)	Silt loam
	9-16	Yellowish brown (10YR 5/6)	Silt loam
	16-19	Yellowish brown (10YR 5/6) with mottles	Silt loam
	19-25	Brown (10YR 5/3)	Silt loam
	25-33	Light brownish gray (10YR 6/2) and brown (10YR 5/3)	Silt loam
	33-39	Yellowish brown (10YR 5/4)	Silt loam
	39-82	Yellowish brown (10YR 5/4)	Channery loam
Occoquan	2-0	Partially decomposed hardwood leaves and twigs	
	0-2	Dark grayish brown (10YR 4/2)	Sandy loam
	2-9	Pale brown (10YR 6/3)	Sandy loam
	9-17	Strong brown (7.5YR 5/8)	Loam
	17-53	Multicolored in shades of brown, yellow, red, and white	Sandy loam
	53-72	Partially weathered granite gneiss that crushes to sandy loam	

The *SSURGO Database for Montgomery County, Maryland* (USDA, NRCS, 2007) lists the Baile soil series as hydric. The Glenville, Brinklow-Blocktown, and Occoquan soil series have Baile hydric inclusions in flats.

The Baile and Occoquan soil series have a reported K-value (erodibility factor) greater than 0.35 (0.43 and 0.37, respectively), which would indicate that the soils pose construction-related hazards. The Occoquan and Brinklow-Blocktown (16B & 16C) soil series are described as prime farmland or farmland of statewide importance in the *SSURGO Database for Montgomery County, Maryland* (USDA, NRCS, 2007). **Table 2** provides additional information and limitations for each soil subclass.

Table 2
SOIL CHARACTERISTICS AND LIMITATIONS

Soil Type	Hydric Status	K-Value[a]	Prime or Other Important Farmlands	Restrictions and Limitations[b]
Glenville (5B)	Baile inclusions	0.32	No	Very limited due to frost action and depth to saturate zone
Baile (6A)	Yes	0.43	No	Very limited due to depth to saturated zone, frost action, and shrink-swell potential
Brinklow (16B)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16B)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock and frost action
Brinklow (16C)	Baile inclusions	0.28	Farmland of statewide importance	Somewhat limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16C)	Baile inclusions	0.24	Farmland of statewide importance	Somewhat limited due to depth to soft bedrock, slope, and frost action
Brinklow (16D)	Baile inclusions	0.28	None	Very limited due to slope, shrink-swell, frost action, depth to hard bedrock, and low strength
Blocktown (16D)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action
Occoquan (17B)	Baile inclusions	0.37	Prime farmland	Somewhat limited due to frost action
Blocktown (116E)	Baile inclusions	0.24	None	Very limited due to slope, depth to soft bedrock, and frost action

a. K-value indicates the erodibility factor associated with a soil type. Soils with K-values greater than 0.35 pose construction-related hazards.
b. Based on limitations for local roads and streets.

Sources:
USDA, Soil Conservation Service. 1995. *Soil Survey of Montgomery County, Maryland*. Washington, D.C.
USDA, NRCS. 2007. *Soil Survey Geographic (SSURGO) Database for Montgomery County, Maryland*. Fort Worth, TX.

Vegetation

On June 12, 2009 the project team conducted a full Forest Stand Delineation (FSD) to characterize forest stands within the study area using the sample plot method. Maryland Department of Natural Resources (MD DNR) requires specimen trees within the study area to be identified, measured, and flagged. Specimen trees are defined by the MD DNR as those trees having a diameter of 30 inches or more (measured at 4.5 feet above ground), or trees having 75% or more of the diameter of the current Maryland state champion of that species (MD DNR, 1997). Additionally, Montgomery County requires individual trees in good health with a diameter of 24 inches or more to be measured and the location flagged.

Two forest stands and four specimen trees were identified within the study area. Two of the specimen trees are not associated with a forest stand: a 32.8-inch pin oak (*Quercus palustris*) and a 29.6-inch red maple (*Acer rubrum*). The project team characterized each stand by

collecting data from one sample plot every four acres, with a minimum of two per stand. Each stand is delineated on **Figure 2,** Environmental Features Map, and the forest stands are described below.

Stand A

Stand A is located in the southeastern portion of the study area and is bounded by MD 355 to the east, driveways to the north and south, and a residential property to the south. The approximately 0.5-acre deciduous stand is dominated by tulip poplar (*Liriodendron tulipifera*) and American sycamore (*Platanus occidentalis*). **Table 3** summarizes the investigation results.

Table 3
GENERAL CHARACTERISTICS OF FOREST STAND A

Topography	Gentle slopes to the south
Approximate size within study area	0.5 acre
Wetlands	None
Endangered species habitat	None according to USFWS and MD DNR Wildlife & Heritage Service; awaiting response from MD DNR Environmental Review Unit
Streams	None
Successional stage	Early
Dominant species/ co-dominant species	Tulip poplar (*L. tulipifera*) – Dominant and co-dominant American sycamore (*P. occidentalis*) – co-dominant
Size class of dominant species	20 to 29.9 inches DBH (range from MD DNR approved datasheet; there were no trees greater than 24 inches DBH)
Basal area	155 square feet/acre
Percent canopy closure	100%
Common understory species	American holly (*Ilex opaca*) Red maple (*Acer rubrum*) Northern spicebush (*Lindera benzoin*) Eastern red cedar (*Juniperus virginiana*) Privet species (*Ligustrum* sp.)* Japanese barberry (*Berberis thunbergii*)* Southern arrowwood (*Viburnum dentatum*) Poison ivy (*Toxicodendron radicans*) Sweet cherry (*Prunus avium*)* Black cherry (*Prunus serotina*) Wine raspberry (*Rubus phoenicolasius*)* Blackhaw viburnum (*Viburnum prunifolium*)
Percent understory cover	100%

Table 3 GENERAL CHARACTERISTICS OF FOREST STAND A	
Common herbaceous species	Black cherry (*P. serotina*) Common greenbrier (*Smilax rotundifolia*) Japanese honeysuckle (*Lonicera japonica*)* Multiflora rose (*Rosa multiflora*)* Virginia creeper (*Parthenocissus quinquefolia)* Green ash (*Fraxinus pennsylvanica*) Bush honeysuckle (*Lonicera* sp.)* Sassafras (*Sassafras albidum*) Poison ivy (*T. radicans*) Spicebush (*L. benzoin*) Sweet cherry (*P. avium*)*
Percent herbaceous cover	100%
Invasive species	See species above with an *
Percent invasive cover	Herbaceous – 50%, Understory – 37%, Tree – 0
Number of standing dead trees greater than 6" DBH per acre	10
Specimen trees	None
Priority ranking	Priority 3; this stand does not contain any sensitive areas and has a very high percentage of invasive species within the herbaceous and understory levels

Stand B

Stand B is located within the west/central portion of the study area. Stand B is bounded by residential property to the west and MD 355 and Cool Brook Lane to the east. Stand B continues beyond the study area to the southwest. The 6.1-acre stand is mixed with hardwoods and pines and is dominated by tulip poplar (*L. tulipifera*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and green ash (*Fraxinus pennsylvanica*). **Table 4** summarizes the investigation results.

Table 4 GENERAL CHARACTERISTICS OF FOREST STAND B	
Topography	Gentle to moderate slopes to the south
Approximate size within study area	6.1 acres
Wetlands	None
Endangered species habitat	None according to USFWS and MD DNR Wildlife & Heritage Service; awaiting response from MD DNR Environmental Review Unit
Streams	None
Successional stage	Early

Table 4 GENERAL CHARACTERISTICS OF FOREST STAND B	
Dominant species/ co-dominant species	Tulip poplar (*L. tulipifera*) – Dominant Black cherry (*P. serotina*) – Dominant and Co-dominant Green ash (*F. pennsylvanica*) – Dominant and Co-dominant Red maple (*A. rubrum*) – Dominant and Co-dominant Black gum (*Nyssa sylvatica*) – Co-dominant Flowering dogwood (*Cornus florida*) – Co-dominant Sassafras (*Sassafras albidum*) – Co-dominant Norway maple (*Acer platanoides*) – Co-dominant*
Size class of dominant species	6 to 11.9 inches DBH
Basal area	82.5 square feet/acre
Percent canopy closure	100%
Common understory species	Bush honeysuckle (*Lonicera* sp.)* Eastern red cedar (*J. virginiana*) Red maple (*A. rubrum*) Poison ivy (*T. radicans*) Grape vine (*Vitis* sp.) Southern arrowwood (*V. dentatum*) Oriental bittersweet (*Celastrus orbiculatus*)* Autumn olive (*Eleaegnus umbellate*)* Black cherry (*P. serotina*) American holly (*Ilex opaca*)
Percent understory cover	100%
Common herbaceous species	Common greenbrier (*S. rotundifolia*) Virginia creeper (*P. quinquefolia*) Poison ivy (*T. radicans*) Oriental bittersweet (*C. orbiculatus*)* Japanese honeysuckle (*L. japonica*)* Green ash (*F. pennsylvanica*) Wine raspberry (*R. phoenicolasius*)* Blackhaw viburnum (*V. prunifolium*) American elm (*Ulmus americana*)
Percent herbaceous cover	100%
Invasive species	See species above with an *
Percent invasive cover	25%
Number of standing dead trees greater than 6” DBH per acre	3
Specimen trees	24.5” Northern red oak (*Quercus rubra*) 25.0” Northern red oak (*Q. rubra*)
Priority ranking	Priority 1; although the stand is comprised mostly of colonizing species, it is contiguous to a mature oak stand southwest of the study area, providing a valuable buffer.

Watersheds, Streams, and Floodplains

The project area is located in the Seneca Creek watershed which is in the Middle Potomac River basin. It drains to the south to Little Seneca Creek, which conveys flow to Great Seneca Creek and then to the Potomac River, eventually leading to the greater Chesapeake Bay.

There are no mapped waterways within the study area. During the field investigation, no waterways or intermittent streams were identified. There were several drainage features identified during the field investigation; however, these areas did not exhibit the typical characteristics of a jurisdictional waterway. The drainageways did not have defined bed or bank, nor did they have hydric soils.

The *Q3 Flood Data; Delaware, District of Columbia, Maryland* (FEMA, 1998) indicates that the study area is located outside of the 100-year floodplain. The nearest 100-year floodplain is approximately 3.5 miles south (tributary to Gunner's Branch).

Wetlands and Other Waters of the US

Review of the National Wetlands Inventory (NWI) map for Montgomery County indicates that no wetlands were previously recorded in the study area.

The project team conducted a routine wetland delineation in the study area. All fieldwork was performed according to the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) using the routine on-site method. The manual outlines a three-parameter approach to delineating wetlands. All three parameters (hydrophytic vegetation, hydric soils, and hydrology) must be evident to classify an area as a wetland, unless the site has been disturbed (atypical) or is considered a problem area. In the case of disturbed or problem areas, only two parameters must be evident to classify an area as wetland.

During the field investigation on June 12, 2009, the project team did not identify any wetlands or other "waters of the US" within the study area. The study area is made up of both upland forest and newly constructed areas. There are two drainage swales within the study area; however, hydric soils were not present in either, and hydrophytic vegetation was not supported in most areas. Additionally, there is a stormwater management (SWM) facility located within the study area. This SWM facility, while demonstrating wetland hydrology and hydrophytic vegetation, was created in upland and non-hydric soils and therefore was not delineated.

Special Protection Areas

The entire study area lies within the Clarksburg Special Protection Area (SPA), as designated by Montgomery County. SPAs are areas that have high quality or unusually sensitive water resources that require special water quality protection measures during land development. Projects located in SPAs that impact over 5,000 sq ft typically require an approval of a Water Quality Plan.

The process for approval consists of:

- a pre-application meeting with several agencies including Maryland National Capital Parks and Planning Commission (MNCPPC), Montgomery County Department of Permit Services, and Montgomery County Department of Environmental Protection,

- a Preliminary and Final Water Quality Plan, which includes stormwater management and sediment and erosion control concepts,
- a public comment period of 15 days; and
- approval from the Parks and Planning Board.

The Roberts Tavern Drive project will require an approved Water Quality Plan. Coordination with the Montgomery County Department of Permit Services should be conducted in order to set up the pre-application meeting.

Wildlife, including Rare, Threatened and Endangered Species

The Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01) governs the listing of rare, threatened, and endangered (RTE) species in the State of Maryland.

Information from the United States Department of the Interior Fish and Wildlife Service (USFWS), MD DNR's Wildlife and Heritage Service, and MD DNR's Environmental Review Unit was requested to identify any previously documented RTE species in or near the study area. In correspondence dated June 25, 2009 (see **Appendix**), the USFWS indicated that there are no federally proposed or listed endangered or threatened species existing within the project area. According to geo-referenced data from the MD DNR, potential Forest Interior Dwelling Species (FIDS) bird habitat may be present in the study area (MDNR, 2003). The August 4, 2009 response from MD DNR's Wildlife and Heritage Service (see **Appendix**) included the following guidelines to help minimize project impacts on potential FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forest habitat.

2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.

4. Maintain grass height at least 10" during breeding season (April-August).

These guidelines should be taken into consideration during the construction phase of the project.

A response from MD DNR's Environmental Review Unit is pending.

III. Historic and Cultural Resources

The project team has initiated coordination with the Montgomery County Historic Preservation Commission, completed background research at Maryland Historical Trust, and conducted field reconnaissance to determine the potential of the Roberts Tavern Drive study area to contain historic sites or districts protected under the Montgomery County preservation ordinance (Chapter 24A of the Montgomery County Code, "Historic Resources Preservation"). Additionally, the "Locational Atlas and Index of Historic Sites in Montgomery County" (the Atlas) was accessed online at the MC MAPS website.

Several historic resources associated with the early development of Clarksburg are listed on the Atlas and/or the National Register of Historic Places, and just within or immediately outside of the study area. These include the Clarksburg Historic District, the Clarksburg Elementary School, and Dowden's Ordinary.

The only historic resource located within the study area is the Dowden's Ordinary site. Dowden's Ordinary is located at the corner of Stringtown Road and MD 355. The property was built in 1753 along a major travel route from Frederick to Georgetown and served as a residence as well as a tavern and inn for over a century. It is said that many travelers, including General Braddock, George Washington and Andrew Jackson, were customers at the Ordinary. The building was demolished in 1924.

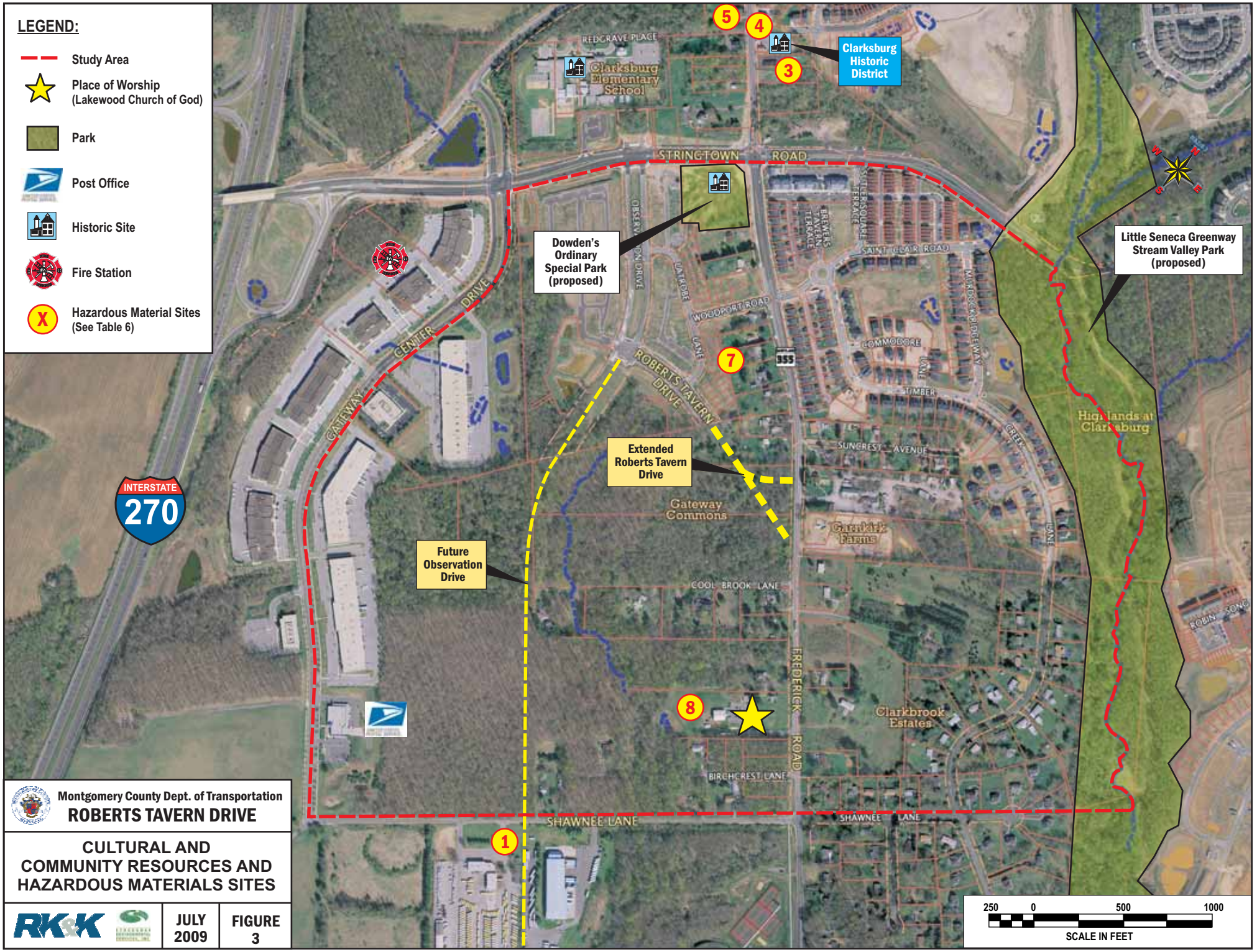
The Clarksburg Historic District and Clarksburg Elementary School are located further north of the study area. None of these resources, including Dowden's Ordinary, or their environmental settings is anticipated to be affected by the project.

Although coordination has been initiated with both Maryland Historical Trust and the Montgomery County Historic Preservation Commission, no formal response has been received yet.

Figure 3 depicts the location of the recorded historic resources mentioned above.

IV. Parks and Recreational Facilities

Figure 3 depicts the location of two proposed parks within the study area. Dowden's Ordinary Special Park is a proposed park that will be deeded to M-NCPPC as a condition of the approval of the Gateway Commons development. The detailed plans for the park's amenities include a re-creation of the original Dowden's Ordinary, play equipment, trails, and benches. For Little Seneca Greenway Stream Valley Park, portions of the proposed park have not yet been dedicated; however, some portions of the planned trails have been completed.


LEGEND:
Study Area
Place of Worship (Lakewood Church of God)
Park
Post Office
Historic Site
Fire Station
Hazardous Material Sites (See Table 6)
Clarksburg Historic District
Dowden's Ordinary Special Park (proposed)
Little Seneca Greenway Stream Valley Park (proposed)
Extended Roberts Tavern Drive
Future Observation Drive
STRINGTOWN ROAD
Clarksburg Elementary School
REDGRAVE PLACE
CENTER DRIVE
GATEWAY
OBSERVATION DRIVE
LATROBE
WOODPORT ROAD
LANE
ROBERTS TAVERN DRIVE
SAINT CLAIR ROAD
SUTTER SQUARE TERRACE
BREMEN TAVERN TERRACE
MURDOCK RIDGE WAY
COMMODORE
TIMBER
SUNCREST AVENUE
Highlands at Clarksburg
Gateway Commons
Clarkdale Farms
COOL BROOK LANE
FREDERICK ROAD
Clarkbrook Estates
BIRCHCREST LANE
SHAWNEE LANE
ROBIN SONG
INTERSTATE 270
355
1
3
4
5
7
8
250 0 500 1000
SCALE IN FEET
Montgomery County Dept. of Transportation
ROBERTS TAVERN DRIVE
CULTURAL AND COMMUNITY RESOURCES AND HAZARDOUS MATERIALS SITES
RK&K
JULY 2009
FIGURE 3

V. Community and Emergency Facilities and Services

Existing community facilities and services include a fire station and rescue service (Clarksburg Company 35), post office, and one place of worship. These are shown on **Figure 3**. The study area is currently served by the following schools: Little Bennett Elementary School, Clarksburg Elementary School, Rocky Hill Middle School, and Clarksburg High School. All existing and planned schools are located outside the immediate study area. A new elementary school, fire station and library are planned for the Clarksburg Town Center but outside the project study limits. The fire station is planned to be completed in 2013; no firm plans are currently available for the school and library. The nearest police station and library are currently located in Germantown.

Table 5. Community and Emergency Facilities and Services

Facility	Name	Location
Fire Station/EMS	Clarksburg Station 35	22610 Gateway Center Drive
Post Office	Clarksburg	22505 Gateway Center Drive
Place of Worship	Lakewood Church of God	22820 Frederick Road
Schools	Little Bennett ES	Burdette Forest Road, north of the study area
	Clarksburg ES	Redgrave Place, immediately northwest of the study area
	Rocky Hill MS	Brick Haven Way, southeast of the study area
	Clarksburg HS	Wims Road, southeast of the study area
Police	5th District	Aircraft Drive, Germantown, south of study area

VI. Hazardous Materials

A preliminary inventory of hazardous materials was performed by reviewing the following environmental databases: Maryland Department of Environment (MDE) Oil Control Program (OCP), Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), and US Department of Transportation (USDOT) Hazardous Materials Incident Report System. In addition, historical USGS maps and aerial photographs were reviewed. Eight (8) documented contamination releases were identified and are summarized in the table below. These sites are also depicted on **Figure 3** (except for Site 2, Clarksburg Liberty Gas Station, and Site 6, Lockheed Martin Mission Services, which are outside of the study area).

Table 6. Documented Hazardous Material Contamination Releases and Status

Site (see Figure 3)	Address	Cleanup Status
MDE Oil Control Program Database – Petroleum Releases		
1. Clarksburg Maintenance Depot	13100 Shawnee Lane	Cleaned up during tank closure
2. Clarksburg Liberty Gas Station*	23300 Clarksburg Road (northwest of study area)	Water well and/or groundwater contamination by motor oil; cleanup unreported
3. Post Office (former)	23321 Frederick Road	Cleaned up
4. Clarksburg Grocery	23329 Frederick Road	Soil contamination by motor oil; cleanup unreported
5. Private Residence	23340 Frederick Road	Cleaned up
EPA Resource Conservation and Recovery Act (RCRA) Databases – Large Quantity Generator		
6. Lockheed Martin Mission Services*	22300 Comsat Drive (south of study area)	Received written informal notices of violations, all later achieving compliance
USDOT Hazardous Materials Incident Report System Database – Spills Involving Heating Oil (1 gal or less)		
7. Private Residence	23122 Frederick Road	Successfully contained and cleaned up
8. Lakewood Church of God	22820 Frederick Road	Successfully contained and cleaned up

*not shown on Figure 3

The above releases were considered minor and all were cleaned up to the satisfaction of MDE; therefore, they are not expected to impact the proposed project. Based on the available information, the risk that the proposed project would encounter any significant cost impacts due to subsurface contamination appears to be minimal.

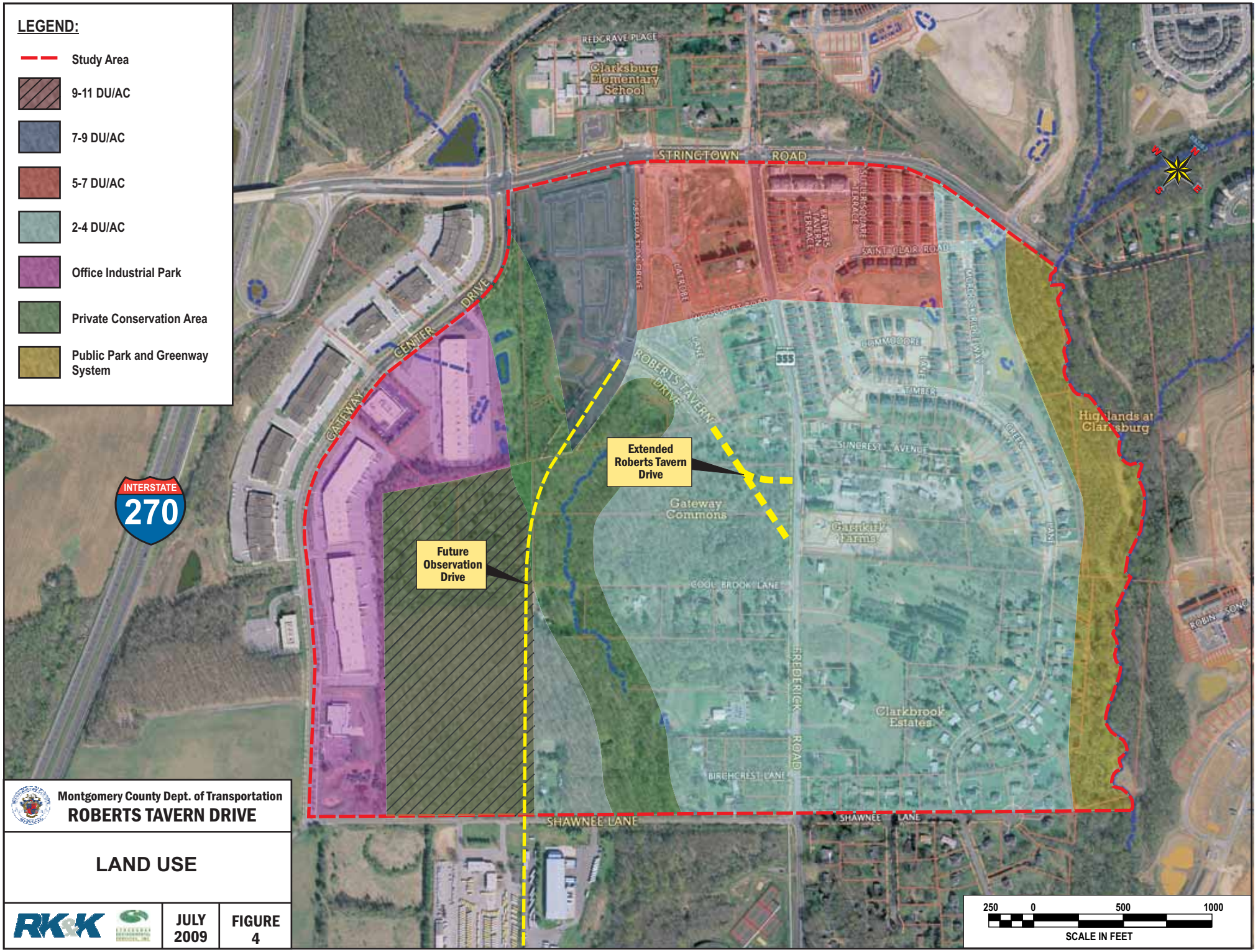
VII. Socioeconomic Environment

An inventory of the socioeconomic resources in the project area included a review of data from the US Census Bureau, the Clarksburg Master Plan, current land use and zoning maps (from the Clarksburg Master Plan) and field review.

Land Use and Zoning

Land use in the study area is primarily residential as illustrated in **Figure 4**.

The majority of the land in the study area is zoned residential, allowing for a variety of housing densities (**Figure 5**). The zones and their descriptions are described in **Table 7**.



Montgomery County Dept. of Transportation

ROBERTS TAVERN DRIVE

LAND USE

RK&K

JULY 2009

FIGURE 4

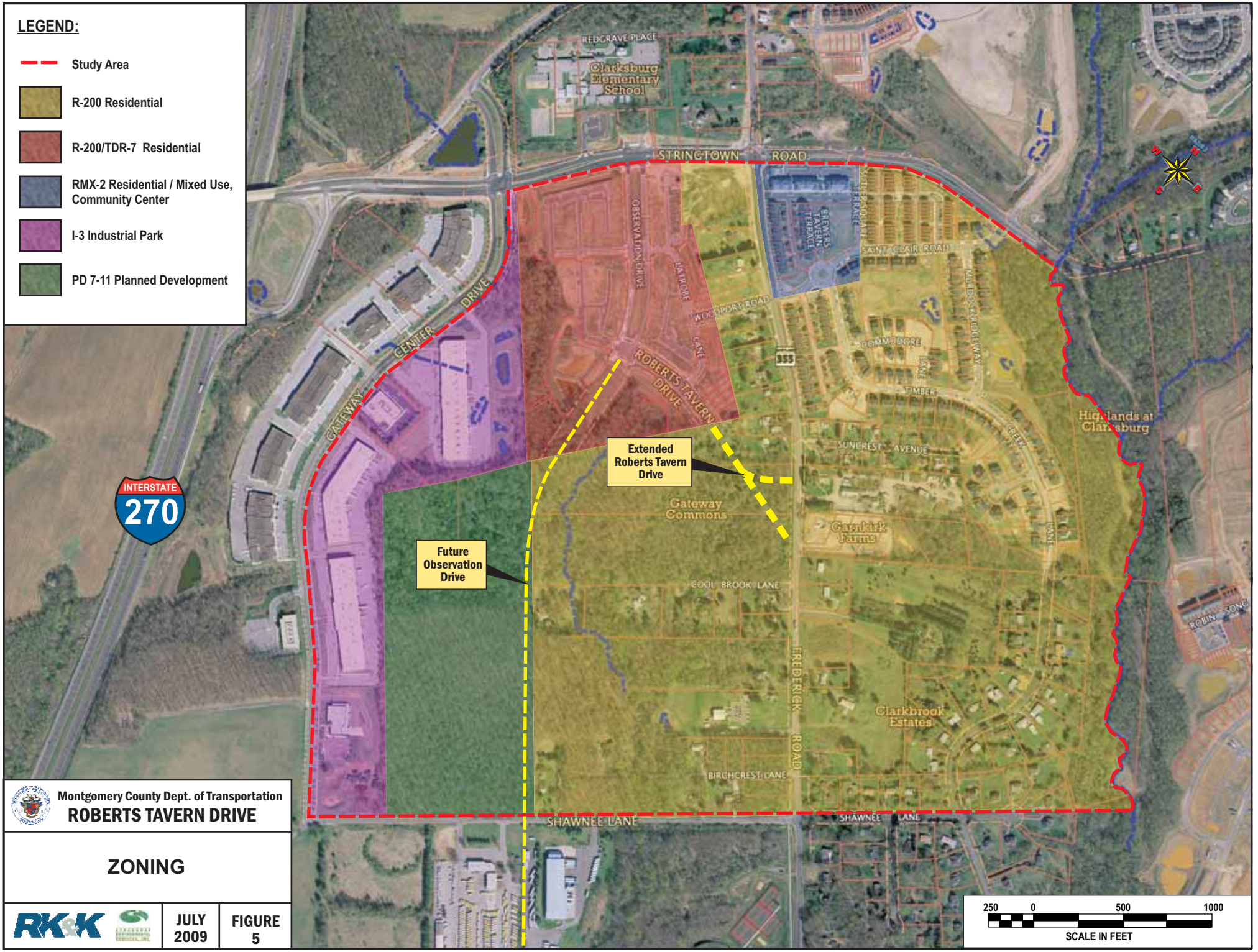

LEGEND:
Study Area
R-200 Residential
R-200/TDR-7 Residential
RMX-2 Residential / Mixed Use, Community Center
I-3 Industrial Park
PD 7-11 Planned Development
Extended Roberts Tavern Drive
Future Observation Drive
STRINGTOWN ROAD
SAINT CLAIR ROAD
ROBERTS TAVERN DRIVE
OBSERVATION DRIVE
GATEWAY CENTER DRIVE
FREDERICK ROAD
SHAWNEE LANE
COOL BROOK LANE
BIRCHCREST LANE
SUNCREST AVENUE
Clarksburg Elementary School
Gateway Commons
Clarkbrook Estates
Highlands at Clarksburg
INTERSTATE 270
355
Montgomery County Dept. of Transportation
ROBERTS TAVERN DRIVE
ZONING
RK&K
JULY 2009
FIGURE 5
250 0 500 1000
SCALE IN FEET

Table 7. Zoning

Zoning	Description
I-3	Industrial Park
R-200/TDR-7	Residential Transfer Development Rights from Agricultural Reserve
R-200	Single-Family
RMX-2	Residential/Mixed-Use, Community Center
PD 7-11	Planned Development

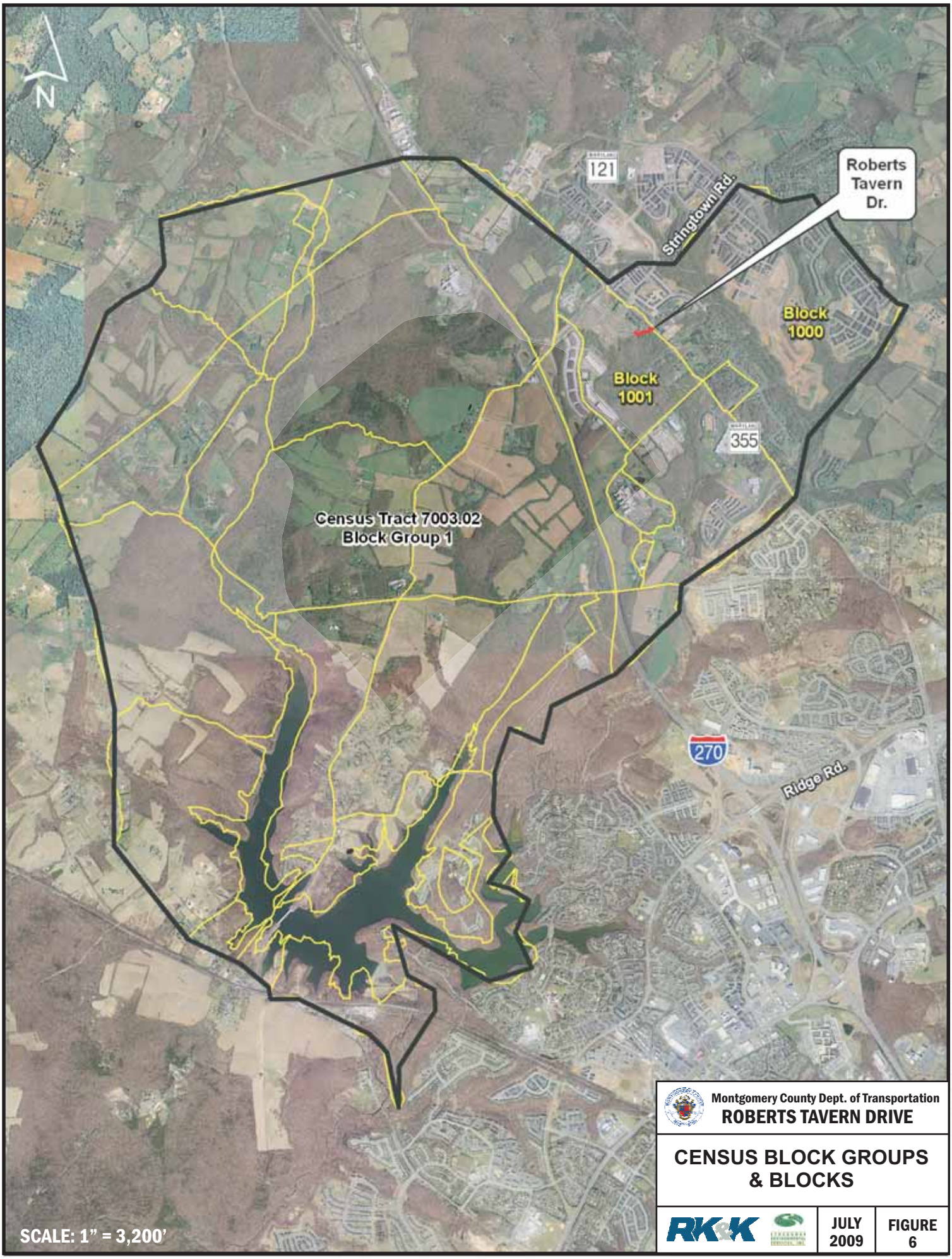
Four residential developments exist within the study area. A description of each is described below:

Table 8. Residential Communities and Developments

Community	Location	Type of Housing
Gateway Commons	SW quadrant of Stringtown Road and MD 355	Townhouses and single family attached and detached (under development)
Highlands at Clarksburg	SE quadrant of Stringtown Road and MD 355	Single family
Garnkirk Farms	East of MD 355, south of Suncrest Avenue	Single family
Clarkbrook Estates	East of MD 355 at Shawnee Lane	Single family

Demographics

Population and income characteristics for the study area were developed using U.S. Census 2000 information. The study area is located within census tract 7003.02, Block Group 1, Blocks 1000 and 1001 within Montgomery County (**Figure 6**). Data for these blocks were compared with data for Montgomery County as a whole and Maryland to determine the proportions of minority and low-income populations that may be affected by the project. These data are summarized in **Table 9**.



Montgomery County Dept. of Transportation

ROBERTS TAVERN DRIVE

CENSUS BLOCK GROUPS & BLOCKS

RK&K

JULY 2009

FIGURE 6

Table 9. Population

Area	Total Population	% White	% Black	% Native American	% Asian	% Hawaiian & Pacific Islander	% Other	% Two or more Races	% Hispanic*
Maryland	5,296,486	64.0	27.9	0.3	4.0	0.0	1.8	2.0	4.3
Montgomery County	873,341	64.8	15.1	0.3	11.3	0.0	5.0	3.4	11.5
Census Tract 7003.02, Block Group 1, Block 1000	246	88.2	2.0	0.0	4.9	0.0	4.9	0.0	6.1
Census Tract 7003.02, Block Group 1, Block 1001	68	79.4	10.3	0.0	1.5	0.0	0.0	8.8	4.4

* Persons of Hispanic origin are considered a minority population but are not within a designated racial group.
Source: US Census Bureau on-line, 2000 census data

The racial makeup of the study area is comparable to the county and state, particularly given the low population and small study area.

Census income information is available only on the block group level. The study area is located within census tract 7003.02, Block Group 1 within Montgomery County (**Figure 6**). Income and poverty status were also compared among the study area, county and state.

Table 10. Income and Proportion below Poverty Level (1999)

Area	Median Household Income	% of Population below Poverty Level
Maryland	$52,868	8.5%
Montgomery County	$71,551	5.4%
Census Tract 7003.02, Block Group 1	$81,373	4.4%

Source: US Census Bureau on-line, 2000 census data

The median household income for the census block group exceeds both the state and county levels. The proportion of low income population within this census block group is less than for the county and state. Thus, in combination with the racial makeup of the study area, no potential environmental justice issues are apparent.

VIII. Utilities

An inventory of existing utilities in the study area was performed by collecting record maps from public and private utilities and through field review. A list of the inventoried utilities is presented in **Table 11**.

Table 11. Utilities Inventory

Owner	Utility	On-Site
BGE	Gas & Electric	No
Washington Gas	Gas	Yes
WSSC	Water & Sewer	Yes
Verizon	Overhead and Underground Telecommunications	Yes
AT&T	Telecommunications	No
Comcast of Montgomery County	Cable Television	Yes (pending confirmation)
Allegheny Power	Electric	Yes
Transcontinental Gas	Gas	No
Cellular One	Telecommunications	No
PEPCO	Electric	No

The WSSC facilities include a 1½" pressure sewer, and 8" water line underneath the westbound side of existing Roberts Tavern Drive, as well as a 16" water line running along MD 355.

The Washington Gas facilities include a gas line along the northern side of Roberts Tavern Drive between Latrobe Lane and the existing terminus. They also include a gas line along the east side of MD 355, from approximately 200' north of the intersection at Suncrest Avenue, extending to the north.

The Verizon facilities include underground lines along the northern side of Roberts Tavern Drive between Latrobe Lane and the existing terminus. They also include overhead and underground along the east side of MD 355, the underground is approximately 120' north of the intersection of Suncrest Avenue, extending to the north and the overhead extends north and south.

The Allegheny Power facilities include underground lines along the northern side of Roberts Tavern Drive between Latrobe Lane and the existing terminus. They also include overhead lines along the west side of MD 355 south of Suncrest Avenue extending to the south and underground lines along the east side of MD 355 north of Suncrest Avenue extending to the north.

IX. ADA Standards and Compliance

The purpose of the Americans with Disabilities Act (July, 1990) is to ensure that no individual with a disability is excluded, denied services, segregated or otherwise treated differently than other individuals because of the absence of accommodations. In designing the Roberts Tavern Drive extension, accommodations will be included to make the public right-of-way accessible to all users. These accommodations will include sidewalks, pedestrian curb ramps and landings, and pedestrian refuges in any planned medians and crosswalks in compliance with the Public Rights-of-Way Access Advisory Committee Final Report (January 2001).

X. Summary

The following is a summary of existing conditions for the natural environment, cultural resources, community facilities and socio-economic resources within the Roberts Tavern Drive Extended study area:

- Highly erodible soils exist with the Baile and Occoquan soil series.
- The Occoquan and Brinklow-Blocktown (16B & 16C) soil series are described as prime farmland or farmland of statewide importance.
- Two forest stands and four specimen trees were identified within the study area.
- There are no mapped waterways within the study area. During the field investigation, no waterways or intermittent streams were identified.
- There are no wetlands of "waters of the US" located in the study area.
- The entire study area lies within the Clarksburg Special Protection Area (SPA), as designated by Montgomery County.
- No rare, threatened, and endangered (RTE) species are known to exist in the study area.
- Forest Interior Dwelling Species (FIDS) bird habitat may be present in the study area.
- The only historic resource located within the study area is the Dowden's Ordinary site, located at the corner of Stringtown Road and MD 355.
- Dowden's Ordinary Special Park is a proposed park that will be deeded to M-NCPPC as a condition of the approval of the Gateway Commons development.
- All documented contamination releases were considered minor and all were cleaned up to the satisfaction of MDE; therefore, they are not expected to impact the proposed project.
- Land use in the study area is primarily residential.
- The majority of the land in the study area is zoned residential.
- The racial makeup and income profile of the study area indicate that there are no apparent environmental justice issues.
- The following utilities are located in the study area: gas, water, sewer, telecommunications, electric, and cable television (pending confirmation).

XI. References

Annotated Code of Maryland. The Nongame and Endangered Species Conservation Act. Natural Resources Article, §§4-2A-01—4-2A-09 and 10-2A-01—10-2A-09, Annotated Code of Maryland. Annapolis, MD.

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APPENDIX

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575

RECEIVED
JUL 0 3 2009

June 25, 2009

Mr. Alverna R. Durham, Jr.
Straughan Environmental Services, Inc.
9135 Guilford Road, Suite 100
Columbia, Maryland 21046

RE: Roberts Tavern Drive Extended, Facility, Planning Phase I Study (From Observation Drive to MD 355), Clarksburg, Maryland

Dear Mr. Durham:

This responds to your letter, received June 8, 2009, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the vicinity of the above reference project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 Consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delist) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle will still be protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act. As a result, starting on August 8, 2007, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007.

If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at:

http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities. This proposed permit process will not be available until the Service issues a final rule for the issuance of these take permits under the Bald and Golden Eagle Protection Act.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interests in these resources. If you have any questions or need further assistance, please contact Devin Ray at (410) 573-4531.

Sincerely,

Leopoldo Miranda
Field Supervisor

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

RECEIVED
AUG 07 2009

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Eric Schwaab, Deputy Secretary

August 4, 2009

Mr. Alverna R. Durham, Jr.
Straughan Environmental Services, Inc.
9135 Guilford Road, Suite 100
Columbia, MD 21046-2579

RE: Environmental Review for Roberts Tavern Drive Extended, from Observation Drive to MD 355, Clarksburg, Montgomery County, Maryland.

Dear Mr. Durham:

The Wildlife and Heritage Service has determined that there are no State or Federal records for rare, threatened or endangered species within the boundaries of the project site as delineated. This statement should not be interpreted however as meaning that rare, threatened or endangered species are not in fact present. If appropriate habitat is available, certain species could be present without documentation because adequate surveys have not been conducted. It is also important to note that the utilization of state funds, or the need to obtain a state authorized permit may warrant additional evaluations that could lead to protection or survey recommendations by the Wildlife and Heritage Service. If this project falls into one of these categories, please contact us for further coordination.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources. The following guidelines will help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.

2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.

4. Maintain grass height at least 10" during the breeding season (April-August).

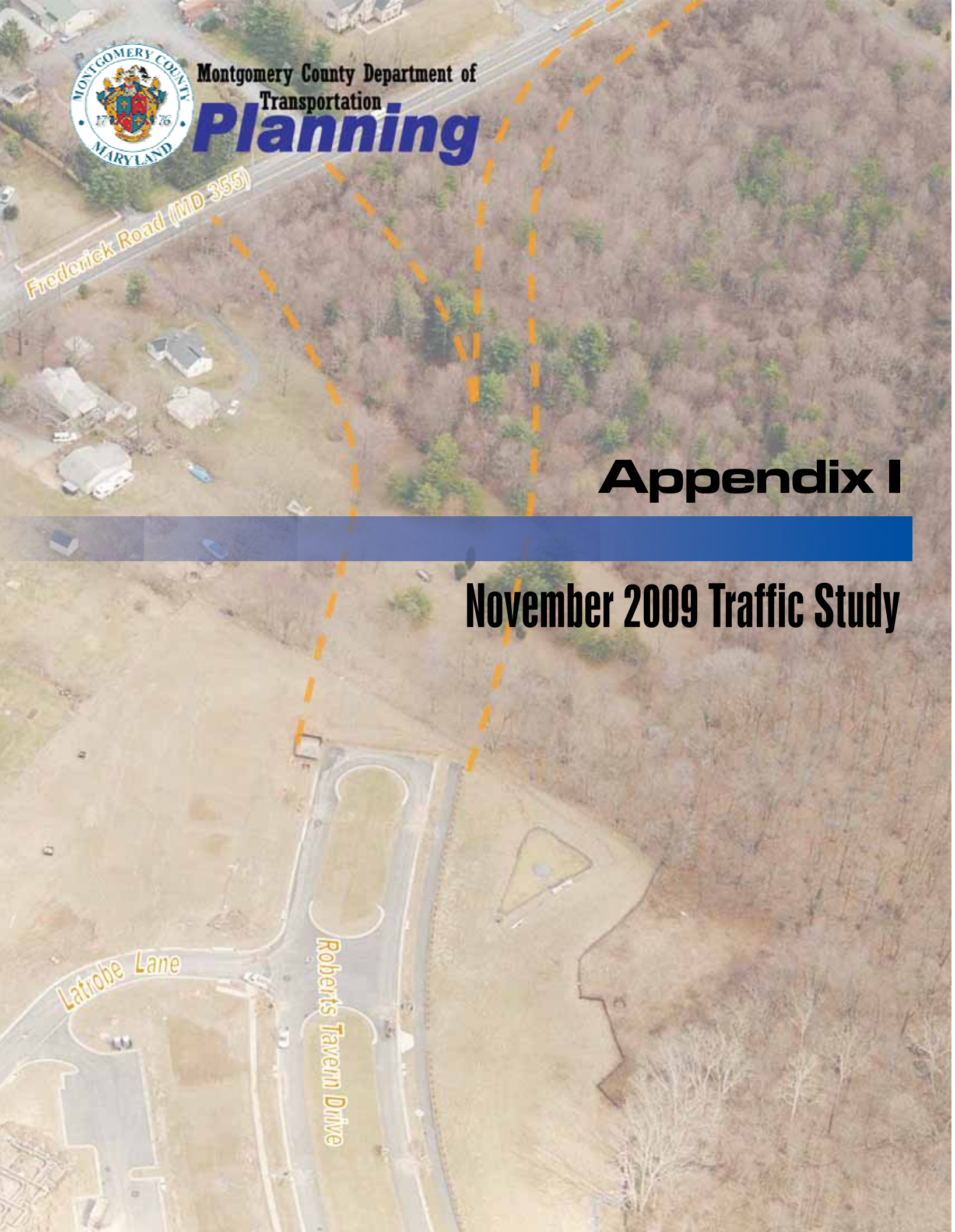
Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER # 2009.0918.mo



Montgomery County Department of Transportation

Planning

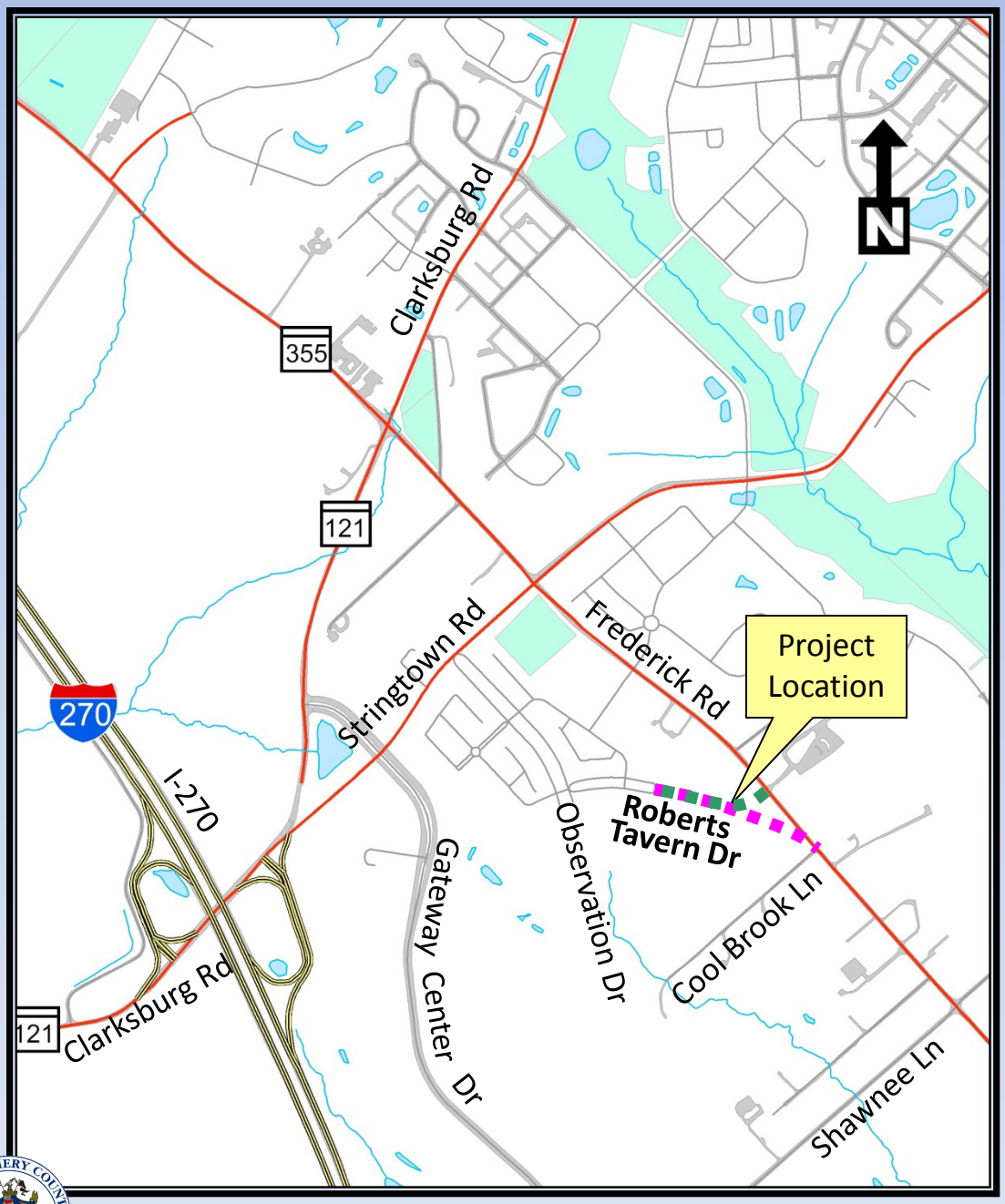
Appendix I

November 2009 Traffic Study

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Traffic Study



FINAL – November 2009

Montgomery County Department of Transportation

Planning

Executive Summary

Montgomery County Department of Transportation (MCDOT) has initiated a Facility Planning, Phase I study for Roberts Tavern Drive Extended from the terminus of existing Roberts Tavern Drive to MD 355 (Frederick Road) north of Cool Brook Lane. This segment of Roberts Tavern Drive would eventually become part of the master-planned "Relocated MD 355" around the Clarksburg Historic District. The purpose of this traffic study is to evaluate and develop improvements that address current traffic issues, changes in infrastructure, and future travel demand.

The study area for Roberts Tavern Drive Extended is located within greater Clarksburg, a rapidly growing community located in northern Montgomery County, Maryland. Roberts Tavern Drive is master-planned as a 4-lane divided arterial roadway. This project would extend Roberts Tavern Drive approximately 1,000 feet east of its existing terminus from Latrobe Lane to Frederick Road (MD 355).

The following existing and proposed intersections were analyzed within the project limits:

- MD 355 at Stringtown Road
- Stringtown Road at Observation Drive
- Roberts Tavern Drive at Observation Drive
- Roberts Tavern Drive at Latrobe Lane
- MD 355 at Roberts Tavern Drive (proposed)

This study summarizes the results of traffic operations analyses that were performed for Existing 2009 conditions plus the following year 2030 alternatives:

- Alternative 1 – No-Build
- Alternative 2 – Maintain Existing MD 355 Alignment and build Roberts Tavern Drive along the Master Plan Alignment. Prohibit left turns from eastbound Roberts Tavern Drive. Provide spur for southbound right turns from MD 355.
- Alternative 2 – Final – Build Roberts Tavern Drive along the Master Plan Alignment, with a Signal at MD 355, maintaining the existing MD 355 alignment for northbound traffic only. Left turns from eastbound Roberts Tavern Drive onto northbound MD 355 would be prohibited.
- Alternative 2A – Build Roberts Tavern Drive along the Master Plan Alignment, with a Signal at MD 355, maintaining the existing MD 355 alignment for northbound traffic only. Left turns from eastbound Roberts Tavern Drive onto northbound MD 355 would be allowed.
- Alternative 2B – Build Roberts Tavern Drive along the Master Plan Alignment, with a Signal at MD 355, using a new channelized right-turn lane at the signal instead of using existing MD 355 for northbound traffic.
- Alternative 3 – Maintain Existing MD 355 Alignment with Traditional Signalized T-Intersection at Roberts Tavern Drive

- Alternative 3A – Maintain Existing MD 355 Alignment with Traditional Unsignalized T-Intersection at Roberts Tavern Drive
- Alternative 3B – Maintain Existing MD 355 Alignment with Unsignalized "Maryland Tee" intersection at Roberts Tavern Drive
- Alternative 3C – Maintain Existing MD 355 Alignment with Signalized "Maryland Tee" intersection at Roberts Tavern Drive
- Alternative 4 – Maintain Existing MD 355 Alignment and build Roberts Tavern Drive along the Master Plan Alignment. Prohibit left turns from eastbound Roberts Tavern Drive. Provide channelized free right turns from southbound MD 355.
- Alternative 5 – Maintain Existing MD 355 Alignment with a Roundabout at Roberts Tavern Drive

The Synchro traffic operations analysis results show that each of the Build alternatives would result in a net reduction in delay at the key intersections in the study area, compared to the No-Build alternative.

An evaluation of the recent (2003 through 2007) crash history along Frederick Road (MD 355) between Cool Brook Lane and Stringtown Road indicates that crash rates have dropped significantly since peaking in 2005. The crash rate along this corridor was 353.3 crashes per 100-million vehicle-miles traveled in 2005, compared to a rate of 78.8 crashes per 100-million vehicle-miles traveled in 2007. The rates for every crash category along this segment of MD 355 were lower than the statewide rates.

Facility Planning Study - Phase I

Roberts Tavern Drive Extended

Traffic Study

FINAL - November 2009

Montgomery County Department of Transportation
Planning

Prepared for:
Montgomery County
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Division of Transportation Engineering
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Gaithersburg, Maryland 20878

RK&K

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Baltimore, Maryland 21217

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I. Introduction

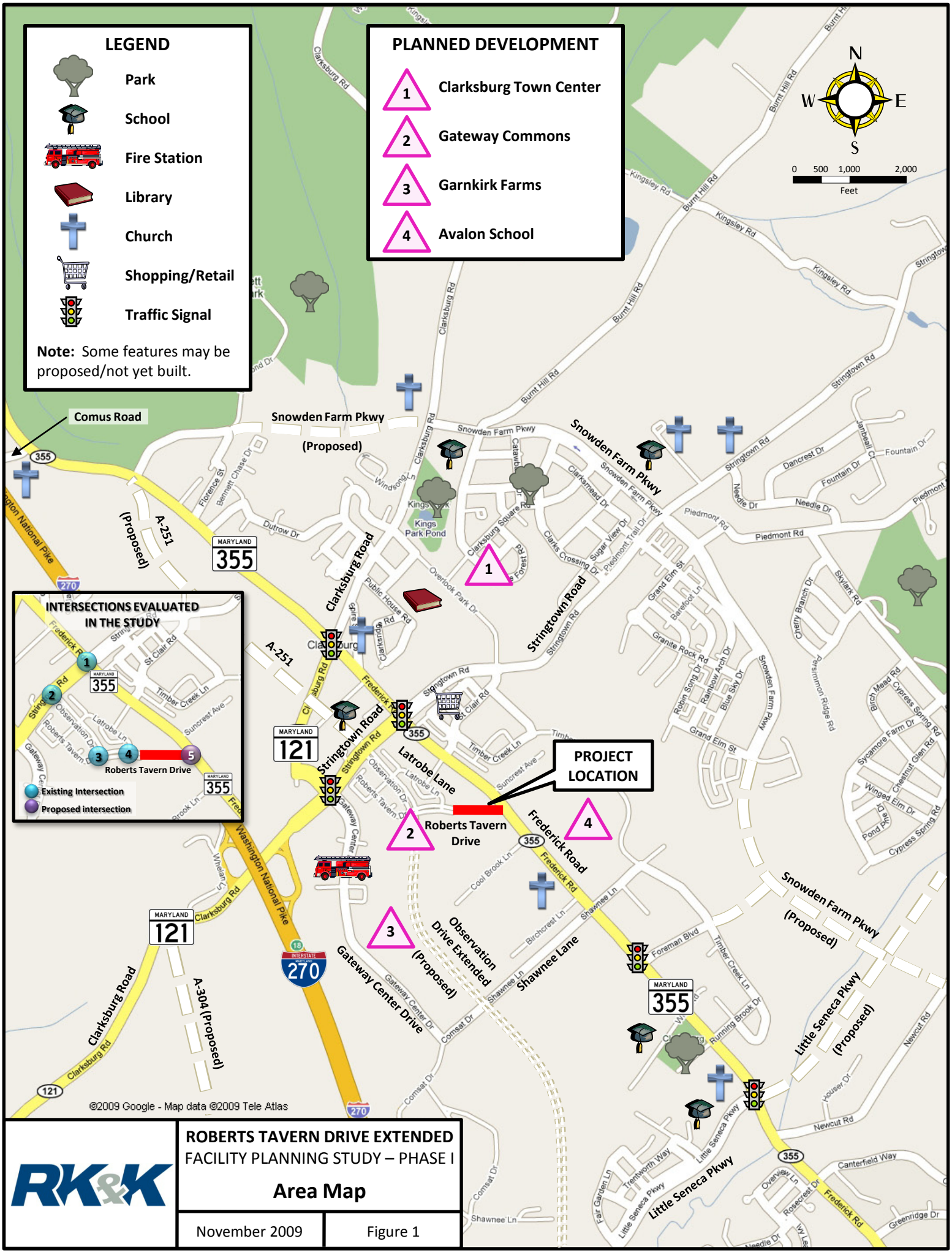
Montgomery County Department of Transportation (MCDOT) has initiated a Facility Planning, Phase I study for Roberts Tavern Drive Extended from the terminus of existing Roberts Tavern Drive to MD 355 (Frederick Road) north of Cool Brook Lane. This segment of Roberts Tavern Drive would eventually become part of the master-planned "Relocated MD 355" around the Clarksburg Historic District. The purpose of this traffic study is to evaluate and develop improvements that address current traffic issues, changes in infrastructure, and future travel demand.

The primary objectives of the study are as follows:

1. Develop a comprehensive understanding of traffic volumes and trip patterns within the study area.
2. Evaluate the crash history of the study area.
3. Forecast the traffic impacts of future developments and changes to the street network using computer models.
4. Identify locations that currently operate at unacceptable levels of service or are projected to operate at unacceptable levels of service for year 2030.
5. Evaluate the impacts of strategic improvements to address current deficiencies or future growth.
6. Recommend roadway network improvements.

Roberts Tavern Drive is a master-planned 4-lane divided arterial roadway in the Clarksburg area of Montgomery County (see **Figure 1**). The roadway is not identified by name in the Clarksburg Master Plan but is located along the planned alignment for Relocated Frederick Road (A-251), which the Master Plan proposes to realign around the Clarksburg historic district between Cool Brook Lane to the south and Snowden Farm Parkway (A-305) to the north. This project would extend Roberts Tavern Drive approximately 1,000 feet east of its existing terminus from Latrobe Lane to Frederick Road (MD 355). The existing 500 foot segment of Roberts Tavern Drive between Observation Drive and Latrobe Lane was recently completed as part of the adjacent Gateway Commons residential development; however, only the two (2) outside lanes of the ultimate 4-lane divided section were constructed. Therefore, the Build alternatives in this study may include construction of the third and fourth lanes of the existing roadway. Together, Roberts Tavern Drive and Observation Drive would form the portion of the planned Relocated MD 355 south of Stringtown Road.

The limits of the greater Clarksburg study area are Comus Road to the north, Little Seneca Parkway to the south, Snowden Farm Parkway to the east, and Interstate 270 to the west. Data collected for this study included vehicular traffic volumes, intersection and mid-block lane configurations and turn lane storage lengths, posted speed limits, intersection traffic controls, recent crash history, and residential unit counts for trip generation. The analyses performed for this study include intersection capacity, level of service and delay calculations based on peak hour volumes, and a crash trends evaluation.



ROBERTS TAVERN DRIVE EXTENDED
FACILITY PLANNING STUDY – PHASE I

Area Map

November 2009 | Figure 1

II. Ongoing and Planned Development

The study area for Roberts Tavern Drive Extended is located within greater Clarksburg, a rapidly growing community located in northern Montgomery County, Maryland. The following is a list of ongoing and planned developments in the vicinity of the study area, provided by the Montgomery County Planning Department (M-NCPPC):

1. **Clarksburg Town Center** – This residential development, currently under construction, will consist of 712 single-family townhouses, 224 single-family detached houses, and 338 apartment/condominium units.
2. **Gateway Commons** – This residential development, currently under construction, will consist of 93 single-family townhouses, 27 single-family detached houses, and 166 apartment/ condominium units.
3. **Garnkirk Farms** – This proposed residential development will consist of 203 single-family townhouses, 21 single-family detached houses, and 184 apartment/condominium units.
4. **Avalon School** – This is a proposed private school consisting of approximately 110,000 square feet of floor space.

The approximate location of each of these planned developments is shown on the **Figure 1** Study Area Map.

III. Study Area Transportation Network

The following existing and proposed intersections were analyzed within the project limits and are shown within the inset on **Figure 1**:

1. MD 355 at Stringtown Road
2. Stringtown Road at Observation Drive
3. Roberts Tavern Drive at Observation Drive
4. Roberts Tavern Drive at Latrobe Lane
5. MD 355 at Roberts Tavern Drive (proposed)

The major existing and planned roadways in the Roberts Tavern Drive Extended study area include Frederick Road (MD 355), Stringtown Road (A-260), Observation Drive (A-19/A-251), and Roberts Tavern Drive (A-251). Clarksburg Road (MD 121) is another key roadway in the vicinity of the study area; however, Roberts Tavern Drive Extended would not impact traffic volumes or operations along this roadway, so it is not discussed in any significant detail in this report. Roadway class designations (e.g., A-19) are consistent with those provided in the *Clarksburg Master Plan*. These roads are shown on **Figure 1**. The following is a description of these roadways:

- **Frederick Road (MD 355):** Frederick Road is a two-way, two-lane, undivided arterial roadway that runs in a north-south direction through the study area. The posted speed limit in each direction is 40 mph south of Suncrest Avenue but transitions to 30 mph in each direction north of Suncrest Avenue, continuing north through the Stringtown Road intersection. There is a

continuous sidewalk along the east side of Frederick Road from the Stringtown Road intersection southward to about 200 feet north of Suncrest Avenue. South of that point, there is a narrow paved shoulder that continues southward to the study area boundary. There are no sidewalks or shoulders along the west side of Frederick Road south of Stringtown Road, except for a short segment of sidewalk near the Woodport Road intersection. There are no sidewalks or shoulders along either side of Frederick Road north of Stringtown Road. There is continuous roadway lighting along Frederick Road throughout the study area. A portion of Ride-On Bus Route No. 75 (from the Montgomery County Correctional Facility to the Germantown Transit Center by way of Clarksburg Town Center) travels along MD 355 within the study area.

- **Stringtown Road (A-260):** Stringtown Road is a two-way, four-lane, divided arterial roadway that runs in an east-west direction through the study area, from the intersection of Clarksburg Road (MD 121) and Gateway Center Drive in the west, to Snowden Farm Parkway in the east. West of Gateway Center Drive, Stringtown Road becomes Clarksburg Road (MD 121) and provides access to Interstate 270. Stringtown Road is classified as a rustic road east of Snowden Farm Parkway. The posted speed limit in each direction along Stringtown Road is 40 mph east and west of Frederick Road. There is a continuous paved shared-use path along the north side of Stringtown Road, and a continuous concrete sidewalk along the south side of Stringtown Road. There is continuous roadway lighting along Stringtown Road. A portion of Ride-On Bus Route No. 79 (from Gateway Center to Shady Grove Metro Station by way of Clarksburg Town Center) travels along Stringtown Road within the study area.

- **Observation Drive (A-19 and A-251):** Observation Drive is planned as a two-way, four-lane divided arterial roadway that will run in a north-south direction through the study area. The median along Observation Drive is wide enough to accommodate the planned Corridor Cities Transitway, which would travel along Observation Drive through the study area. The portion of Observation Drive south of the study area, from Germantown Road (MD 118) to Waters Discovery Lane (north of Ridge Road), has already been constructed, as well as the segment of Observation Drive within the study area from Roberts Tavern Drive to Stringtown Road. The un-built two-mile portion of Observation Drive between Waters Discovery Lane and Roberts Tavern Drive is designated as A-19 in the master plan and is currently in the Facility Planning Phase of MCDOT's capital improvement program (CIP). The built segment north of Roberts Tavern Drive is designated as A-251 (which is the same designation as Roberts Tavern Drive). A-251 is the master plan designation for the planned Relocated MD 355 around the Clarksburg historic district, which includes Roberts Tavern Drive and the northern portion of Observation Drive.

  The segment of Observation Drive between Roberts Tavern Drive and Stringtown Road currently has a single through lane in each direction, with on-street parallel parking allowed. This road is currently incomplete and is not publicly maintained; therefore, no speed limit has been posted. There is a continuous paved shared-use path along the west side of Observation Drive, and a

continuous concrete sidewalk along the east side. Continuous roadway lighting is provided along Observation Drive.

- **Roberts Tavern Drive (A-251):** Roberts Tavern Drive is planned as a two-way, four-lane divided arterial roadway that will run in an east-west direction between Observation Drive and Frederick Road. The Clarksburg Master Plan shows Roberts Tavern Drive as part of a Relocated MD 355 around the Clarksburg historic district. A portion of Roberts Tavern Drive has been constructed between Observation Drive and Latrobe Lane. This segment currently has a single through lane in each direction, with on-street parallel parking allowed. This road is currently incomplete and is not publicly maintained; therefore, no speed limit has been posted. There is a continuous paved shared-use path along the south side of Roberts Tavern Drive, and a continuous concrete sidewalk along the north side. Continuous roadway lighting is provided along Roberts Tavern Drive.

The following is a list of yet-to-be-completed master-planned roadways that are located in the greater Clarksburg area but are outside of the study limits for Roberts Tavern Drive Extended. The approximate alignments of these roads are shown on **Figure 1**.

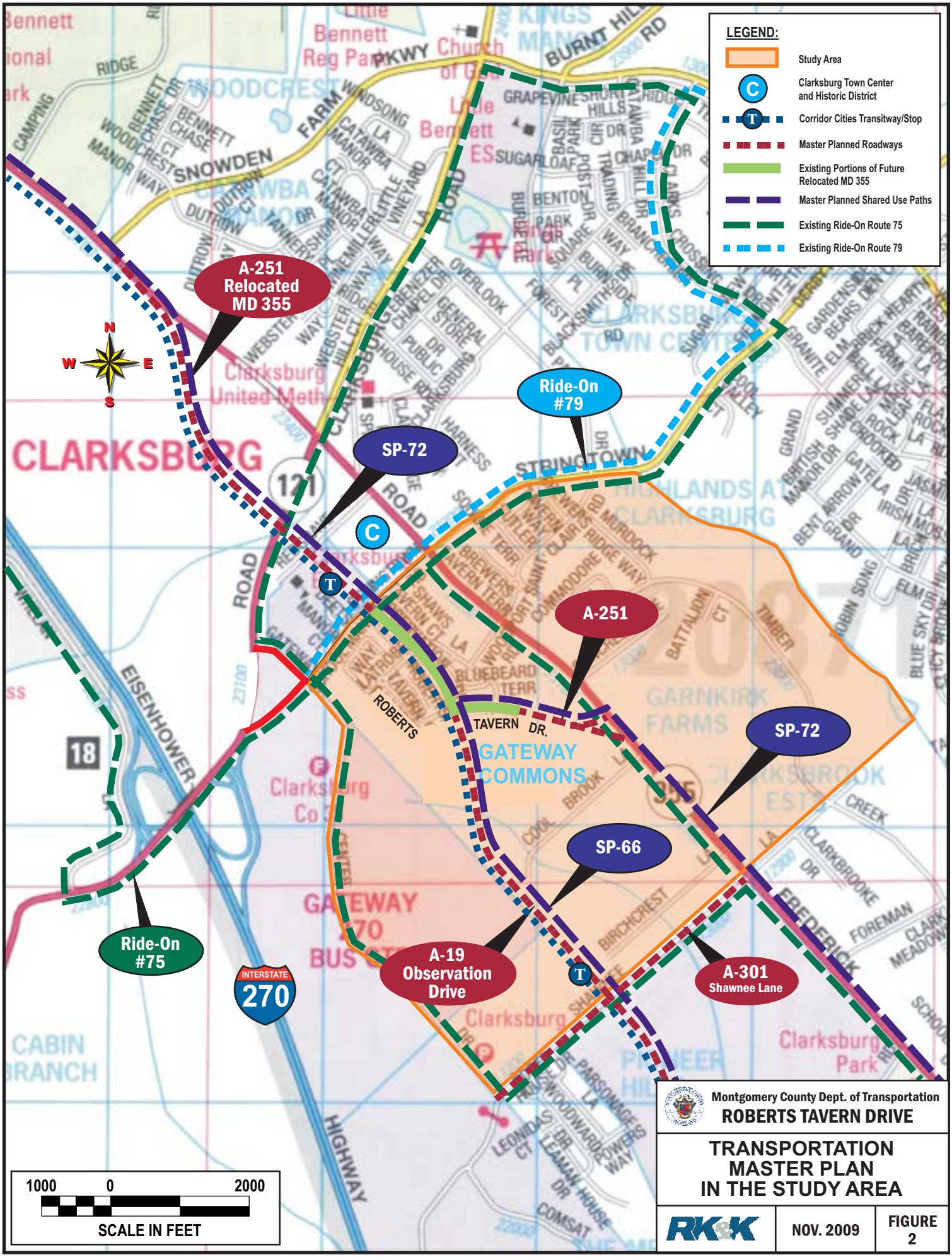
- **Snowden Farm Parkway (A-305):** A partially-completed north-south 4-lane divided arterial roadway on new alignment east of Frederick Road
- **Little Seneca Parkway (A-302):** A partially-completed east-west 4-lane divided arterial roadway on new alignment south of the study area
- **Unnamed Roadway (A-304):** A proposed north-south 4-lane divided arterial roadway on new alignment west of I-270
- **Shawnee Lane (A-301):** An existing east-west 2-lane undivided roadway that would be widened to a 4-lane divided arterial roadway

Pedestrian/Bicycle Transportation System

The *Countywide Bikeways Functional Master Plan* (March 2005) proposes two bikeways in the project area: SP-66, a Corridor Cities Transitway bike path as a shared use path, and SP-72, Frederick Road (MD 355)-Upcounty, as a shared use path extending along Roberts Tavern Drive. Through the study area, SP-66 follows the alignment of Observation Drive and the Corridor Cities Transitway. SP-72 follows existing MD 355 and then proposed relocated MD 355 (which includes extended Roberts Tavern Drive and Observation Drive extended to north of Stringtown Road). **Figure 2** shows the proposed shared-use paths in the study area.

Transit System

Two (2) Ride-On bus routes, Routes 75 and 79, currently operate in or near the study area. Route 75 originates at the Montgomery County Correctional Facility west of I-270 and terminates at the Germantown Transit Center. From the correctional facility, depending on the time of day, the route



Montgomery County Dept. of Transportation

ROBERTS TAVERN DRIVE

TRANSPORTATION MASTER PLAN IN THE STUDY AREA

RK&K | NOV. 2009 | FIGURE 2

alternates either to Gateway Center Drive and Shawnee Lane or through the Clarksburg Town Center east of MD 355, before using MD 355 to reach Germantown. When destined for Clarksburg Town Center, it uses the portion of MD 355 from Shawnee Lane to Stringtown Road through the extended Robert Tavern Drive study area. Service is Monday through Friday from 5:00 AM to approximately 8:00 PM.

Route 79 originates at Gateway Center Drive and Stringtown Road, travelling through Clarksburg on the east side of MD 355 and Germantown before reaching the Shady Grove Metro Station. The route does not use MD 355 in the project area. One-way service is Monday through Friday from 5:00 AM-9:00 AM southbound and 3:30 PM-8:00 PM northbound.

According to the master plan, the Corridor Cities Transitway is proposed along Observation Drive through the study area. However, this segment is not currently included as part of the Maryland Transit Administration's study of the Corridor Cities Transitway between Shady Grove Road and COMSAT, which is south of the Roberts Tavern Drive study area. A map showing these existing and proposed transit lines is shown on **Figure 2.**

IV. Alignment Alternatives

This study summarizes the results of traffic operations analyses that were performed for Existing 2009 conditions plus several year 2030 alternatives:

- **Alternative 1 – No-Build:** This alternative assumes all other local master-planned transportation facilities *except* Roberts Tavern Drive Extended and the portion of the Relocated MD 355 (A-251) north of Stringtown Road would be completed by 2030. Completed facilities would include, but are not limited to, Observation Drive Extended (A-19), Snowden Farm Parkway (A-305), and the Corridor Cities Transitway.

- **Alternative 2 – Existing MD 355 Alignment and Master Plan Alignment, without Signal:** This alternative would prohibit left turns from eastbound Roberts Tavern Drive onto northbound MD 355. A free-flow right turn lane would be provided for eastbound right turns onto southbound MD 355. MD 355 would remain on its existing alignment carrying northbound and southbound traffic. Roberts Tavern Drive would be built along the master plan alignment. A right turn spur would be provided for turns from southbound MD 355 onto westbound Roberts Tavern Drive, with a stop-controlled T-intersection at the end of the spur.

- **Alternative 2 Final – Master Plan Alignment with a Signal using Existing MD 355 as NB Spur, No EB Left Turns:** This alternative would realign MD 355 south of Roberts Tavern Drive such that it would tie in directly to the Roberts Tavern Drive extension. MD 355 north of Roberts Tavern Drive would be realigned to terminate at a T-intersection at the Roberts Tavern Drive extension. Vehicles traveling south along MD 355 from Clarksburg Town Center and the historic district would be required to turn left at this intersection to continue south on MD 355. *Left turns from eastbound Roberts Tavern Drive onto northbound MD 355 would be prohibited.* This intersection

would be signalized to accommodate the relatively high volume of traffic making this southbound left turn movement to remain on MD 355. Vehicles on northbound MD 355 would continue straight along the existing alignment to remain on MD 355. The alignment of Roberts Tavern Drive proposed under this alternative would accommodate the master-planned realignment of Frederick Road (Relocated MD 355) around the Clarksburg historic district; therefore, this alternative is only presented for consideration when Relocated MD 355 is completed.

- **Alternative 2A - Master Plan Alignment with a Signal, using Existing MD 355 as NB Spur:** This alternative is identical to Alternative 2 except left turns would be permitted from eastbound Roberts Tavern Drive onto northbound MD 355.

- **Alternative 2B – Master Plan Alignment with a Signal, without Existing MD 355 Spur:** This alternative would be identical to Alternative 2A, except northbound traffic on MD 355 would use a new channelized right turn lane at the traffic signal to continue north on MD 355.

- **Alternative 3 – Traditional T-intersection at MD 355 with a Signal:** This alternative would also extend Roberts Tavern Drive to MD 355. However, it would terminate at a T-intersection controlled by a traffic signal at MD 355. MD 355 would not be realigned, and would remain the through roadway under Alternative 3.

- **Alternative 3A – Traditional T-intersection at MD 355 without Signal:** This alternative is identical to Alternative 3, except the eastbound Roberts Tavern Drive approach would be controlled by a stop sign and traffic on MD 355 would be free-flowing.

- **Alternative 3B – "Maryland Tee" Intersection at MD 355 without Signal:** This alternative is similar to Alternative 3A, except under the Maryland Tee configuration, a raised median would be used along MD 355 to channelize northbound left turns from MD 355 and eastbound right turns onto MD 355. A center acceleration lane would be provided north of the intersection allowing eastbound left turns to merge into the northbound traffic stream after they turn left across the southbound lane on MD 355. This configuration would allow vehicles to make left turns from Roberts Tavern Drive after finding a gap only in the southbound traffic on MD 355 instead of waiting for simultaneous gaps along both directions of MD 355.

- **Alternative 3C – "Maryland Tee" Intersection at MD 355 with a Signal:** This alternative is identical to Alternative 3B, except a traffic signal would control northbound left turns, eastbound left turns, and southbound through traffic.

- **Alternative 4 – Existing MD 355 Alignment and Master Plan Alignment, without a Signal:** This alternative is identical to Alternative 2, except a channelized free right turn lane would carry vehicles turning right from southbound MD 355 onto Roberts Tavern Drive.

- **Alternative 5 – Existing MD 355 Alignment with a Roundabout at the T-Intersection**

  This alternative would extend Roberts Tavern Drive to MD 355, where it would terminate at a T-intersection controlled by a roundabout. MD 355 would not be realigned, and would remain the through roadway under Alternative 3.

Under Alternative 1 – No-Build, it was assumed that Observation Drive Extended from Waters Discovery Lane (north of Ridge Road) to Stringtown Road would be complete, with two through lanes per direction and a traffic signal at the Stringtown Road intersection. Under the build alternatives, the currently unsignalized intersections of Observation Drive at Stringtown Road, and Observation Drive at Roberts Tavern Drive, are assumed to be signalized. The existing segment of Roberts Tavern Drive would be improved under the build alternatives by adding a second through lane in each direction with left-turn lanes in the median to accommodate the anticipated traffic growth through the 2030 design year. A separate right turn lane would be added along eastbound Stringtown Road at Observation Drive under all build alternatives. Photos of the existing roadway conditions along MD 355 near the proposed intersection of Roberts Tavern Drive are shown in **Appendix A**. Intersection lane configuration diagrams are provided in **Appendix B**.

V. Traffic Volumes

Existing 2009 Volumes

The current (2009) average daily traffic (ADT) volume on MD 355 (Frederick Road) south of Stringtown Road is estimated to be approximately 13,525 vehicles. The traffic volumes used for the existing conditions analysis at the intersection of MD 355 and Stringtown Road were obtained from a traffic count performed on May 14, 2009. The other existing intersections are located along Observation Drive and Roberts Tavern Drive, neither of which have been completed. Therefore, all traffic currently using these roads was assumed to be generated by the Gateway Commons residential development, which is located adjacent to both roadways, and the volumes for the analysis of these existing intersections were determined by applying ITE Trip Generation rates to the number of homes that have been completed in the development.

Projected 2030 Volumes

By 2030, the ADT on MD 355 south of Stringtown Road is expected to increase to approximately 14,425 vehicles. This represents an annual traffic growth rate of less than ½ of one percent between 2009 and 2030. However, this projected year 2030 ADT (as well as the peak hour volume projections and operational analyses for this study) assumes the completion of Observation Drive Extended from north of MD 27 (Ridge Road) to Stringtown Road. Observation Drive Extended, which does not exist under current 2009 conditions, would carry approximately 20,425 vehicles per day in 2030. If Observation Drive Extended were not built, much of this volume would use MD 355, resulting in a higher annual traffic growth rate on MD 355 between 2009 and 2030.

The projected year 2030 traffic volumes used for Alternatives 1 through 4 were developed using output from the Metropolitan Washington Council of Governments (COG) regional travel demand model that was previously used for the *Observation Drive Extended Traffic Report* completed in March 2007. The volumes from the Observation Drive traffic study were based on Version 2.1D of the COG model with Round 6.4a land use forecasts. These volumes were updated to correspond to the current versions of the COG model (Version 2.2) and land use forecasts (Round 7.1) by comparing the trips generated in the Clarksburg area from both model versions. The comparison showed the trips estimated using the current model version and land use forecasts are about 16 percent (16%) higher than the trips estimated using the previous model and land use forecasts. Therefore, the 2030 traffic volumes from the Observation Drive Extended study were increased by 16 percent for use in the Roberts Tavern Drive study. Diagrams showing the AM and PM peak hour traffic volumes used for the traffic operations analysis are provided in **Appendix B**.

Alternatives 2 Final, 2A and 2B: Due to the proposed realignment of MD 355 under these alternatives, the distribution of traffic onto Roberts Tavern Drive for these alternatives assumed the majority of traffic traveling from points south of Clarksburg to points west of Clarksburg (and vice-versa) would divert onto Observation Drive and Roberts Tavern Drive, bypassing the MD 355/Stringtown Road intersection.

Alternatives 2, 3, 3A, 3B, 3C, 4 and 5: Since MD 355 would not be realigned to tie directly into Roberts Tavern Drive under these alternatives, it is unlikely that a significant volume of traffic would divert off of northbound MD 355 or eastbound Stringtown Road and use Roberts Tavern Drive to bypass the MD 355/Stringtown Road intersection. To estimate the volume of traffic likely to divert onto Roberts Tavern Drive, RK&K used Synchro to perform a sensitivity analysis on the northbound MD 355 left turn movement at the Stringtown Road intersection. The projected 2030 No-Build peak hour traffic volumes were subtracted from this left turn movement in small increments until the level of service for this movement improved from LOS F (see Section VI) to LOS D. The total volume subtracted from the left turn movement was assumed to be the volume that would divert from northbound MD 355 onto westbound Roberts Tavern Drive to bypass the MD 355/Stringtown Road intersection. Since the eastbound approach of Stringtown Road at MD 355 would have a separate right turn lane for traffic to go south on MD 355, and this right turn movement would operate at LOS D or better under 2030 No-Build alternative (see Section VI), it was assumed that no traffic along eastbound Stringtown Road would divert onto Observation Drive and Roberts Tavern Drive to bypass the MD 355/Stringtown Road intersection. Therefore, the only traffic assumed to use eastbound Roberts Tavern Drive would be traffic generated by the adjacent Gateway Commons development, along with some traffic heading toward Clarksburg from the south along Observation Drive. For Alternatives 2 and 4, which prohibit left turns from eastbound Roberts Tavern Drive onto northbound MD 355, the prohibited left turn traffic would be diverted to Stringtown Road, where it could turn left onto northbound MD 355.

VI. Analysis of Traffic Operations

The traffic analyses were performed using Synchro version 7 and the Critical Lane Volume (CLV) method. The signalized intersections were evaluated using the Synchro and CLV methodologies, whereas the unsignalized intersections were evaluated using the Highway Capacity (HCM) Unsignalized Intersection methodology as well as the CLV methodology. (However, note that the CLV method was not developed to evaluate traffic operations at unsignalized intersections.) **Table 1** contains a summary of the intersection levels of service (LOS) and delays per vehicle for the Existing 2009 conditions as well as the 2030 No-Build and Build alternatives using Synchro and the HCM method. The LOS is a letter designation that corresponds to a certain range of roadway operating conditions. The levels of service range from A to F, with A indicating the best operating conditions and F indicating the worst, or a failing, operating condition. Lane configuration diagrams corresponding to each alternative are provided in **Appendix B**.

A comparison of the Synchro analysis results for the 2030 No-Build and Build alternatives shows the following:

- The delay at the intersection of MD 355 and Stringtown Road would be lower under each of the Build alternatives than it would be under the No-Build alternative.
- Looking at overall intersection performance during both the AM and PM peak hours, Alternative 2B would have the least delay at the MD 355/Stringtown Road intersection. However, although this alternative would have acceptable traffic operations at the MD 355/Roberts Tavern Drive intersection, the southbound MD 355 traffic volume under this alternative would be required to make a left turn at Roberts Tavern Drive to continue traveling south on MD 355. This is the highest-volume movement at the intersection during the AM peak hour (820 vehicles).
- The eastbound left turn movement at the MD 355/Roberts Tavern Drive intersection would operate at LOS F under Alternatives 3A and 3B (unsignalized traditional T and "Maryland T" intersections) during the AM and PM peak hours. Both of these alternatives would require a traffic signal (e.g., Alternatives 3 and 3C) to provide acceptable operations for the eastbound left turn movement.
- Alternatives 2 and 4 would eliminate the eastbound left turn movement and, therefore, would not require signalization to provide acceptable operations for all remaining movements.

The Synchro, HCM Unsignalized Intersection and SIDRA reports are provided in **Appendix C**.

The Critical Lane Volume (CLV) analysis methodology was used to evaluate capacity for all of the intersections (excluding intersections with dead-end streets) during the AM and PM peak hours for the Existing 2009 Conditions and the 2030 No-Build and Build alternatives. However, this method was developed for the evaluation of signalized intersections and, therefore, typically produces performance results at unsignalized intersections that are significantly better than results calculated using the HCM methodology. Furthermore, the CLV method is limited because it does not consider factors such as metered arrivals caused by upstream signals, various vehicle and driver characteristics, signal timing, roadway grades, etc., all of which are accounted for in the Synchro methodology. The CLV reports are provided in **Appendix C**.

Table 1: Summary of Intersection Levels of Service (LOS) and Delays (sec/veh) – Synchro/HCM/SIDRA Results

LOS = Level of Service Delay (seconds per vehicle)		MD 355 at Stringtown Road		Stringtown Road at Observation Drive		Roberts Tavern Drive at Observation Drive		Roberts Tavern Drive at Latrobe Lane		MD 355 at Roberts Tavern Drive	
Alternative		**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**
Existing Conditions 2009	AM	C	30.2	B	10.1	A	9.0	A	8.3		
	PM	C	24.3	B	11.8	A	9.0	A	8.3		
Alternative 1: 2030 No-Build	AM	D	51.0	C	20.4	C	21.9	A	8.3		
	PM	D	41.4	D	44.9	D	27.5	A	8.3		
Alternative 2: 2030 Master Plan & Existing MD 355 Alignment, No Signal, No EB Left Turn	AM	D	40.6	B	16.5	A	4.7	A	9.6	B	13.5
	PM	C	33.2	C	20.8	A	7.0	A	9.4	A	9.3
Alternative 2 Final: 2030 Master Plan Alignment w/ Signal, NB Spur & No EB Lefts	AM	D	37.2	C	20.4	A	6.3	B	10.9	B	18.2
	PM	C	33.4	B	19.1	B	13.2	B	10.4	B	15.5
Alternative 2A: 2030 Master Plan Alignment w/ Signal & NB Spur	AM	C	34.9	C	21.5	A	6.4	B	11.0	B	19.3
	PM	C	32.8	C	20.7	B	13.4	B	10.4	B	12.9
Alternative 2B: 2030 Master Plan Alignment w/ Signal, No NB Spur	AM	C	34.4	C	21.5	A	6.1	B	11.1	B	18.4
	PM	C	32.3	C	20.7	B	13.1	B	10.4	B	10.8
Alternative 3: 2030 T-intersection w/ Signal	AM	D	46.7	B	19.4	A	5.0	A	9.6	B	17.9
	PM	C	29.1	C	23.5	A	5.3	A	9.4	A	6.2
Alternative 3A: 2030 T-intersection, No Signal	AM	D	46.7	B	19.4	A	4.7	A	9.6	F	167
	PM	C	30.6	C	23.5	A	5.0	A	9.4	F	122
Alternative 3B: 2030 Md. T-intersection, No Signal	AM	D	46.7	B	19.4	A	4.7	A	9.6	F	55.4
	PM	C	30.6	C	23.5	A	5.0	A	9.4	C	20.4
Alternative 3C: 2030 Md. T-intersection, w/ Signal	AM	D	46.7	B	19.4	A	4.7	A	9.6	C	22.7
	PM	C	29.9	C	23.6	A	5.2	A	9.4	A	4.1
Alternative 4: 2030 Master Plan & Existing MD 355 Alignment, No Signal, No EB Left Turn	AM	D	40.7	B	15.5	A	4.4	A	9.6	B	13.5
	PM	C	31.3	C	25.0	A	5.4	A	9.4	A	9.3
Alternative 5: 2030 T-intersection w/ Roundabout	AM	D	46.7	B	19.4	A	5.0	A	9.6	A*	4.3*
	PM	C	29.1	C	23.5	A	5.3	A	9.4	A*	4.2*

Notes: Gray-shaded cells indicate unsignalized intersections with two-way stop control (TWSC). Non-shaded cells indicate signalized intersections. The analysis results for TWSC unsignalized intersections are based on the HCM methodology. The LOS and delays shown above for TWSC unsignalized intersections correspond to the worst-performing stop-controlled approach, not the overall intersection. The overall intersection LOS and delay cannot be calculated for TWSC unsignalized intersections using the HCM methodology.

*Under Alternative 5, the intersection of MD 355 at Roberts Tavern Drive would be a roundabout. The results shown in the table for this roundabout under Alternative 4 were generated using SIDRA.

Table 2: Level of Service Parameters

LOS	Volume (veh)	Expected Problems at Intersection
A	< 1,000	Negligible delay
B	>1,000 and < 1,150	Short delays
C	> 1,150 and < 1,300	Number of vehicles stopping is significant
D	> 1,300 and < 1,450	Influence of congestion becomes more noticeable
E	> 1,450 and < 1,600	Significant delays causing long queues
F	> 1,600	Oversaturated; Vehicles wait through multiple signal cycles

Table 2 shows the level of service thresholds for the CLV method, and **Table 3** summarizes the intersection levels of service, critical lane volumes and volume-to-capacity (v/c) ratios calculated using the CLV method. Performance measures of effectiveness include critical lane volume (CLV), volume-to-capacity ratio (v/c ratio), and level of service (LOS). The total CLV for each peak period is calculated by combining the CLVs for the NB/SB movements and EB/WB movements. The CLV indicates the highest volume for a given approach lane configuration in a given direction. The v/c-ratio is the ratio of current flow rate to the capacity of the facility. This ratio is often used to determine how sufficient capacity is at a given intersection. Generally speaking, a ratio of 1.0 indicates that the intersection is operating at capacity. A ratio of greater than 1.0 indicates that the number of vehicles entering the intersection via the critical movements exceeds capacity.

The Montgomery County Planning Department has established intersection congestion standards for the various policy areas of the county. These standards are critical lane volume thresholds that, if exceeded due to new development, require the developer to implement traffic impact mitigation measures to reduce the CLV to a level less than or equal to the congestion standard. The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg policy area is a critical lane volume of 1,425 vehicles per hour. *The v/c-ratios shown in **Table 3** assume capacity is equivalent to this congestion standard; therefore, any intersection having a CLV greater than 1,425 will have a v/c-ratio greater than 1.0.*

The results of the traffic operations analyses for each of the five (5) key study area intersections are described below for the Existing 2009 Conditions and the 2030 No-Build and Build alternatives. Intersection lane configuration diagrams are provided in **Appendix B**.

MD 355 at Stringtown Road

The results of the Synchro analyses indicate that the intersection of MD 355 and Stringtown Road currently operates at level of service (LOS) C during both the AM and PM peak hours. Under Alternative 1 (2030 No-Build), delay at this intersection would increase due to traffic growth, resulting in LOS D operations during both the AM and PM peak hours. Several individual turning movements would operate at LOS F under Alternative 1, including the northbound left turn movement from MD 355 (see **Appendix C** for reports showing detailed analysis results by turning movement and by approach). This

intersection would perform at LOS D during the AM peak hour and LOS C during the PM peak hour with Alternative 2. Under Alternatives 2A and 2B, this intersection would operate at LOS C during both the

Table 3: Summary of Intersection Levels of Service (LOS) and Delays (sec/veh) – CLV Analysis Results

LOS = Level of Service Delay (seconds per vehicle)		MD 355 at Stringtown Road			Stringtown Road at Observation Drive			Roberts Tavern Drive at Observation Drive			Roberts Tavern Drive at Latrobe Lane			MD 355 at Roberts Tavern Drive		
Alternative		**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**	**LOS**	**CLV**	**v/c**
Existing Conditions 2009	AM	B	1,042	0.73	A	261	0.18	[1]	[1]	[1]	[2]	[2]	[2]			
	PM	B	1,060	0.74	A	368	0.26	[1]	[1]	[1]	[2]	[2]	[2]			
Alternative 1: 2030 No-Build	AM	E	1,517	1.06	E	1,530	1.07	A	714	0.50	[2]	[2]	[2]			
	PM	E	1,573	1.10	E	1,577	1.11	A	719	0.50	[2]	[2]	[2]			
Alternative 2: 2030 Master Plan & Existing MD 355 Alignment, No Signal, No EB Left Turn	AM	E	1,479	1.04	C	1,247	0.88	A	802	0.56	A	90	0.06	D	1,343	0.94
	PM	D	1,425	1.00	D	1,310	0.92	A	846	0.59	A	102	0.07	B	1,025	0.72
Alternative 2 Final: 2030 Master Plan Alignment w/ Signal, NB Spur & No EB Lefts	AM	C	1,285	0.90	E	1,566	1.10	A	827	0.58	A	212	0.15	B	1,138	0.71
	PM	D	1,428	1.00	C	1,243	0.87	B	1,032	0.72	A	192	0.13	A	473	0.33
Alternative 2A: 2030 Master Plan Alignment w/ Signal & Spur	AM	C	1,285	0.90	E	1,566	1.10	A	827	0.58	A	212	0.15	B	1,138	0.80
	PM	D	1,399	0.98	C	1,243	0.87	B	1,032	0.72	A	192	0.13	A	502	0.35
Alternative 2B: 2030 Master Plan Alignment w/ Signal, No Spur	AM	C	1,285	0.90	E	1,566	1.10	A	827	0.58	A	212	0.15	C	1,215	0.85
	PM	D	1,399	0.98	C	1,243	0.87	B	1,032	0.72	A	192	0.13	A	915	0.64
Alternative 3: 2030 T-intersection w/ Signal	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	D	1,401	0.98
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	B	1,054	0.74
Alternative 3A: 2030 T-intersection, No Signal	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	D	1,401	0.98
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	B	1,054	0.74
Alternative 3B: 2030 Md. T-intersection, No Signal	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	D	1,401	0.98
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	A	760	0.53
Alternative 3C: 2030 Md. T-intersection, w/ Signal	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	D	1,401	0.98
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	A	760	0.53
Alternative 4: 2030 Master Plan & Existing MD 355 Alignment, No Signal, No EB Left Turn	AM	E	1,479	1.04	C	1,247	0.88	A	802	0.56	A	90	0.06	D	1,343	0.94
	PM	D	1,425	1.00	D	1,310	0.92	A	846	0.59	A	102	0.07	B	1,025	0.72
Alternative 5: 2030 T-intersection w/ Roundabout	AM	E	1,479	1.04	C	1,247	0.88	A	801	0.56	A	89	0.06	[3]	[3]	[3]
	PM	D	1,399	0.98	D	1,310	0.92	A	832	0.58	A	99	0.07	[3]	[3]	[3]

Notes: Gray-shaded cells indicate unsignalized intersections. Non-shaded cells indicate signalized intersections. The CLV method was developed for evaluating signalized intersections; however, results for unsignalized stop-controlled intersections are provided for the purpose of comparison. When the only difference between alternatives is the type of intersection control (i.e., signalized or unsignalized), the CLV method will not show a difference in results.

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV. The v/c-ratios shown are based on a capacity of 1,425 vehicles. The LOS are based on the standard CLV thresholds, with LOS F corresponding to CLVs of 1,600 or greater.

1 – Under Existing Conditions, Observation Drive terminates at this intersection. The total peak hour volume entering the intersection is less than 10 vehicles.

2 – Under Existing & No-Build Conditions, Roberts Tavern Drive terminates at this intersection. The total peak hour volume entering the intersection is less than 15 vehicles.

3 – The Critical Lane Volume (CLV) method is not applicable to roundabouts.

AM and PM peak hours. Under Alternatives 2, 3, 3A, 3B, 3C, 4 and 5, this intersection would operate at LOS D during the AM peak hour and LOS C during the PM peak hour. The AM peak hour delay would be lower under Alternatives 2 Final, 2A and 2B than under the Alternative 3 variations and Alternatives 4 and 5 because the alignment of Roberts Tavern Drive under Alternatives 2 Final, 2A and 2B is assumed to divert a higher volume of traffic away from the MD 355/Stringtown Road intersection.

The Critical Lane Volume (CLV) method analysis yielded slightly different results. According to this method, the intersection of MD 355 at Stringtown Road currently operates at LOS B during both the AM and PM peak hours, with CLVs below the LATR Intersection Congestion Standard of 1,425 vehicles per hour. Under Alternative 1 (2030 No-Build), intersection performance would worsen to LOS E during both the AM and PM peak hours due to traffic growth, with CLVs exceeding the congestion standard. The completion of Roberts Tavern Drive Extended under each of the Build alternatives would result in improved traffic operations at the MD 355/Stringtown Road intersection compared to the No-Build alternative. The CLVs under Alternatives 2 Final, 2A and 2B would be lower than or approximately equal to the congestion standard for this policy area. However, the CLVs under Alternatives 2, 3, 3A, 3B, 3C, 4 and 5 would exceed the congestion standard during the AM peak hour, although they would remain lower than the No-Build CLVs.

Stringtown Road at Observation Drive

The intersection of Stringtown Road and Observation Drive is currently unsignalized, and analyses using the HCM methodology show that all approaches are operating at LOS B or better during both the AM and PM peak hours. Under Alternative 1 (2030 No-Build), this intersection would operate at LOS C during the AM peak hour and LOS D during the PM peak hour. Under each Build alternative, a separate right turn lane would be provided on eastbound Stringtown Road, resulting in a small AM peak hour delay reduction under Alternatives 2, 3, 3A, 3B, 3C, 4 and 5, and resulting in a significant PM peak hour delay reduction under all of the Build alternatives. Under Alternatives 2 Final, 2A and 2B, the AM peak hour delay would remain relatively unchanged compared to No-Build, even with the higher volume of eastbound right-turning traffic under these three alternatives.

According to the CLV method, which is intended for application to signalized intersections, this unsignalized intersection currently operates at LOS A during both the AM and PM peak hours, which is better performance than the levels of service calculated using the HCM methodology for unsignalized intersections. However, this intersection is assumed to be signalized in 2030 under the No-Build alternative and each of the Build alternatives. The results of the CLV analysis for this intersection in 2030 show the same trends exhibited by the Synchro results. The intersection would operate at LOS E under Alternative 1 (2030 No-Build) during both the AM and PM peak hours. Due to the higher eastbound right

turn volume under Alternatives 2 Final, 2A and 2B, the AM peak hour CLVs at the intersection under these alternatives would be in the LOS E range. The intersection would operate at LOS C during the PM peak hour. The intersection performance under Alternatives 2, 3, 3A, 3B, 3C, 4 and 5 would be LOS C during the AM peak hour and LOS D during the PM peak hour, results that are significantly better than the No-Build alternative. However, due to the limitations of the CLV analysis methodology, the LOS results generated by Synchro are more likely to represent the actual intersection performance that can be expected in 2030.

Roberts Tavern Drive at Observation Drive

Much of the Gateway Commons residential development adjacent to Roberts Tavern Drive has not yet been constructed, nor has the extension of Observation Drive to Waters Discovery Lane been built. As a result, according to the HCM methodology, all approaches at this unsignalized intersection currently operate at LOS A during both the AM and PM peak hours. In 2030, the extension of Observation Drive and full build-out of the Gateway Commons development are assumed to be completed, resulting in higher traffic volumes at this intersection. Under Alternative 1 (2030 No-Build), the stop-controlled approach with the highest delay at the unsignalized Roberts Tavern Drive/Observation Drive intersection would operate at LOS C during the AM peak hour and LOS D during the PM peak hour. Under Build Alternatives 2 Final, 2A and 2B, with a higher volume of westbound right turn traffic than the other Build alternatives, this intersection would operate at LOS A during the AM peak hour and LOS B during the PM peak hour. Under Alternatives 2, 3, 3A, 3B, 3C, 4 and 5, the intersection would operate at LOS A during both the AM and PM peak hours. The lane configuration at this intersection would be the same on all approaches under No-Build and the Build alternatives.

Since the current traffic volume entering this intersection during the AM and PM peak hours under existing conditions is less than 10 vehicles per hour, no CLV analysis was performed here for the existing conditions. As an unsignalized intersection in 2030 under Alternative 1, the CLV analysis shows LOS A operations during both the AM and PM peak hours. Under each of the Build alternatives, this intersection is assumed to be signalized. Under Alternatives 2 Final, 2A and 2B, the intersection would function at LOS A during the AM peak hour and LOS B during the PM peak hour. The intersection would operate at LOS A during both the AM and PM peak hours under the remaining Build alternatives.

Roberts Tavern Drive at Latrobe Lane

The HCM analysis shows the stop-controlled approach (Latrobe Lane) at this unsignalized intersection operates at LOS A during both the AM and PM peak hours under existing conditions, and would continue to operate at LOS A under Alternative 1 (2030 No-Build). Each of the Build alternatives would divert traffic from Frederick Road onto Roberts Tavern Drive, resulting in an increase in traffic passing through the Latrobe Lane intersection. In 2030, more traffic is assumed to pass through this unsignalized intersection under Alternatives 2 Final, 2A and 2B than under the other Build alternatives. Therefore, according to the HCM methodology, the stop-controlled approach would operate at LOS B during both

the AM and PM peak hours under these three alternatives. Under the remaining Build alternatives, the stop-controlled approach would operate at LOS A during both the AM and PM peak hours.

Since the current traffic volume entering this intersection during the AM and PM peak hours under existing conditions and under Alternative 1 (2030 No-Build) is less than 15 vehicles per hour, no CLV analysis was performed here for either of these two scenarios. The completion of Roberts Tavern Drive under each of the Build alternatives would increase the volume of traffic passing through this intersection; however, according to the CLV analysis method, this unsignalized intersection would operate at LOS A during both the AM and PM peak hours under each of the Build alternatives.

MD 355 at Roberts Tavern Drive

Each of the Build alternatives that were evaluated represents a different configuration or traffic control type at the proposed intersection of MD 355 and Roberts Tavern Drive:

Alternative 2 - Existing MD 355 Alignment and Master Plan Alignment, without a Signal

This alternative would prohibit left turns from eastbound Roberts Tavern Drive onto northbound MD 355. A free-flow right turn lane would be provided for eastbound right turns onto southbound MD 355. MD 355 would remain on its existing alignment carrying northbound and southbound traffic. Roberts Tavern Drive would be built along the master plan alignment. A right turn spur would be provided for turns from southbound MD 355 onto westbound Roberts Tavern Drive, with a stop-controlled T-intersection at the end of the spur.

Alternative 2 Final – Master Plan Alignment with a Signal using Existing MD 355 as NB Spur, No EB Lefts

A channelized free-flow right turn movement would be provided for northbound traffic desiring to continue north on MD 355, using the existing MD 355 alignment. MD 355 approaching from the north would end at this T-intersection with a separate left and right turn lanes, requiring traffic to turn left to continue south on MD 355 or turn right onto Roberts Tavern Drive. Left turns from eastbound Roberts Tavern Drive onto northbound MD 355 would be prohibited.

Alternative 2A – Master Plan Alignment with a Signal using Existing MD 355 as NB Spur

A channelized free-flow right turn movement would be provided for northbound traffic desiring to continue north on MD 355, using the existing MD 355 alignment. MD 355 approaching from the north would end at this T-intersection with a separate left and right turn lanes, requiring traffic to turn left to continue south on MD 355 or turn right onto Roberts Tavern Drive. Left turns from eastbound Roberts Tavern Drive onto northbound MD 355 would be permitted.

Alternative 2B – Master Plan Alignment with a Signal without using Existing MD 355 as a NB Spur

The existing segment of MD 355 adjacent to the relocated intersection would be removed. A new separate channelized right-turn lane with Yield control would be provided at the new intersection for vehicles on northbound MD 355. A single through lane would be provided for traffic on northbound MD 355 heading to Roberts Tavern Drive. The lane arrangements on the remaining tow approaches would be identical to those for Alternative 2A.

Alternative 3 – Traditional T-intersection at MD 355 with a Signal

Roberts Tavern Drive would end as the west leg of a traditional T-intersection at MD 355, with a separate left turn lane and a separate right turn lane. The northbound MD 355 approach would consist of a left turn lane and a single through lane. The southbound MD 355 approach would consist of a single shared through/right-turn lane.

Alternative 3A – Traditional T-intersection at MD 355 without a Signal

The lane arrangements for this alternative would be the same as for Alternative 3, except the eastbound Roberts Tavern Drive approach would be controlled by a stop sign and traffic on MD 355 would be free-flowing.

Alternative 3B – "Maryland Tee" Intersection at MD 355 without a Signal

This alternative is similar to Alternative 3A, except under the Maryland Tee configuration, a raised median would be used along MD 355 to channelize northbound left turns from MD 355 and eastbound right turns onto MD 355. A center acceleration lane would be provided north of the intersection allowing eastbound left turns to merge into the northbound traffic stream after they turn left across the southbound lane on MD 355.

Alternative 3C – "Maryland Tee" Intersection at MD 355 with a Signal

This alternative is identical to Alternative 3B, except a traffic signal would control northbound left turns, eastbound left turns, and southbound through traffic.

Alternative 4 – Existing MD 355 Alignment and Master Plan Alignment, without a Signal

This alternative is identical to Alternative 2, except a channelized free right turn lane would carry vehicles turning right from southbound MD 355 onto Roberts Tavern Drive.

Alternative 5 – T-intersection with Roundabout

The alignment of MD 355 and Roberts Tavern Drive is the same for Alternative 4 as it is for Alternative 3; however, Alternative 4 features a roundabout at this intersection whereas Alternative 3 includes a traffic signal. Approaching the roundabout from the west, Roberts Tavern Drive would consist of a left turn lane and a right turn lane, both of which would enter the roundabout (i.e., no

right turn slip lanes or bypass lanes would be provided). The northbound MD 355 approach would consist of a single lane entering the roundabout. The southbound MD 355 approach would consist of two lanes entering the roundabout. Therefore, the southbound half of the roundabout would consist of two circulating lanes, and there would be a two lane exit southbound from the roundabout. The rightmost lane in the southbound direction would drop south of the roundabout.

According to Synchro, with Alternatives 2 and 4, the left turn movement from northbound MD 355 onto westbound Roberts Tavern Drive would operate at LOS B during the AM peak hour and LOS A during the PM peak hour, without a traffic signal at this location. Under Alternatives 2 Final, 2A and 2B, the intersection of MD 355 and Roberts Tavern Drive would operate at LOS B during both the AM and PM peak hours in 2030. Under Alternative 3, this intersection would operate at LOS B during the AM peak hour and LOS A during the PM peak hour. Alternative 3A, which would be unsignalized, would result in LOS F operations on the stop-controlled eastbound approach. Under Alternative 3B, the eastbound stop-controlled approach would still operate at LOS F during the AM peak hour. However, this alternative would provide improved traffic operations (LOS C) for the eastbound approach during the PM peak hour compared to Alternative 3A. Alternative 3C would signalize the eastbound approach from Alternative 3B, resulting in LOS C for the intersection during the AM peak hour and LOS A during the PM peak hour. For Alternative 5, the SIDRA analysis results show the roundabout would operate at LOS A during both the AM and PM peak hours. however, the v/c ratio for the northbound approach along MD 355 (shown in the SIDRA results in **Appendix C**) would be 0.85 during the PM peak hour. A v/c ratio of 0.85 or greater indicates that traffic operations at the roundabout may become unstable, resulting in delays that are higher than those reported by the analysis software.

Using the CLV analysis method, under Alternatives 2 and 4, the intersection of MD 355 and Roberts Tavern Drive would operate at LOS D during the AM peak hour and LOS B during the PM peak hour. However, this would be an unsignalized intersection under these two alternatives, so only the northbound left turn movement would experience any measurable delay. This intersection would operate at LOS B during the AM peak hour and LOS A during the PM peak hour under Alternatives 2 Final and 2A, which both include a traffic signal. Alternative 2B does not provide a free-flow right-turn lane for traffic on northbound MD 355 and, therefore, the intersection would operate at LOS C during the AM peak hour, compared to LOS B for Alternatives 2 Final and 2A. The intersection would operate at LOS A during the PM peak hour, just as it would for Alternatives 2 Final and 2A; however, the v/c-ratio for Alternative 2B would be 0.64 during the PM peak hour, compared to 0.33 for Alternative 2 Final and 0.35 for Alternative 2A. Under Alternative 3, the intersection would operate at LOS D during the AM peak hour and LOS B during the PM peak hour. With Alternative 3C, the intersection configuration would remove the northbound through movement on MD 355 from the CLV calculation, resulting in LOS A during the PM peak hour. The AM peak hour CLV and LOS would be the same as for Alternative 3 since the southbound through volume is highest during the AM peak hour and the Maryland Tee configuration would not affect the southbound through movement. Since Alternatives 3A and 3B are identical to Alternatives 3 and 3C, respectively, except for the type of traffic control, the CLVs and LOS for these unsignalized alternatives would be the same as the signalized alternatives. The CLV method

does not differentiate between signalized and unsignalized intersections, but only the movements subject to stop or yield control, or those crossing a free-flow movement, would experience any measurable delay. The CLVs at this intersection under all of the Build alternatives would be below the intersection congestion standard for this policy area. The CLV analysis method is not applicable for roundabouts; therefore, no CLV analysis was performed at this intersection under Alternative 5.

VII. Crash History

Crash data for the intersection of MD 355 (Frederick Road) and Stringtown Road, and for the MD 355 corridor from Cool Brook Lane to Stringtown Road, were provided by the Maryland State Highway Administration for a period beginning January 1, 2003 and ending December 31, 2007. Data for 2008 was not available at the time of the writing of this report. The SHA crash data reports are provided in the appendix. The purpose for evaluating the crash history along this segment of MD 355 is to determine if there are existing safety issues and if the changes in traffic patterns caused by the completion of Roberts Tavern Drive might have an effect on safety along the corridor. Constructing Roberts Tavern Drive is expected to divert some traffic off of this segment of MD 355 and onto Observation Drive.

The four-legged signalized intersection at MD 355 and Stringtown Road/Stringtown Road Extended opened to traffic in February 2007. Prior to this date, this was a signalized three-legged intersection in a temporary state of construction. During construction, there were traffic shifts on MD 355 as the roadway profile was lowered to align with Stringtown Road Extended. Traffic shifts were also present on Stringtown Road east of MD 355 during this period as the roadway was being widened to a divided section.

According to SHA, there were thirteen (13) crashes reported at the intersection of MD 355 and Stringtown Road between January 2003 and December 2007. The following patterns were identified:

- Ten (10) of these crashes involved vehicles traveling northbound on MD 355, and three (3) crashes involved vehicles traveling southbound.
- There were eight (8) angle collisions, three (3) rear-end crashes (two (2) along northbound MD 355 and one (1) along southbound MD 355), and three (3) left-turn crashes involving northbound and southbound through vehicles.
- Eleven (11) crashes resulted in injuries, and two (2) crashes caused property damage only.
- Eleven (11) crashes occurred during the daytime hours.
- Ten (10) crashes took place on dry pavement.
- Three (3) of the thirteen (13) crashes occurred after February 2007, which is when Stringtown Road Extended opened to traffic, completing this four-legged intersection.

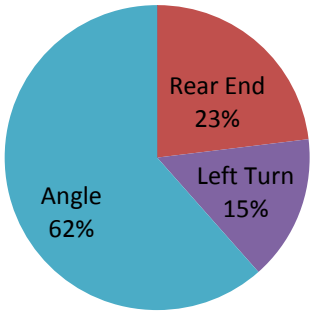
During the same five year period, there were six (6) crashes reported along MD 355 between Cool Brook Lane and Stringtown Road. The crash history along this segment exhibited no defined trends. There was one rear-end crash, one opposite direction crash, one crash involving a parked vehicle, one left-turn collision (at a driveway) and two fixed-object crash in which a pole was struck. Three (3) crashes resulted in injuries and three (3) crashes caused property damage only. Three crashes occurred during the

daytime, and five crashes occurred on dry pavement. The crash rates along this segment of MD 355 for all collision categories were below the statewide average rates for similar roadways.

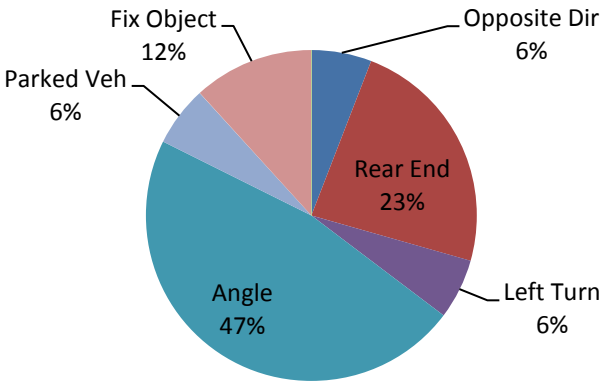
Based on these data, there does not appear to be a safety problem along this segment of MD 355. Since the construction of Roberts Tavern Drive is expected to slightly reduce the volume of traffic using this portion of MD 355, no adverse effects on safety are anticipated as a result of this project.

Figure 3 and **Figure 4** summarize the percentages of crash types at the intersection of Frederick Road (MD 355) and Stringtown Road, and along Frederick Road from Cool Brook Lane to Stringtown Road, respectively. The crashes at the intersection are also included in the total number of crashes along the roadway segment.

Frederick Road (MD 355) at Stringtown Rd
Figure 3 - Crash Type Summary (2003 - 2007)



Frederick Road (MD 355) from Cool Brook Lane to Stringtown Road
Figure 4 - Crash Type Summary (2003 - 2007)



VIII. Conclusions

The following is a summary of the anticipated pros and cons associated with Alternative 1 (2030 No-Build) and each of the Build alternatives:

Alternative 1: 2030 No-Build

Pros:

- None related to the transportation system.

Cons:

- There would be more traffic on Frederick Road (MD 355), resulting in significantly higher delays and reduced levels of service at the intersection of MD 355 and Stringtown Road during the AM and PM peak hours.
- The master-planned Frederick Road (MD 355)/Upcounty bikeway (designated as SP-72) would follow the planned alignment for Roberts Tavern Road even if the road is not extended, resulting in a segment of the bikeway that would not be parallel to a roadway. Although such bikeways are common, pairing the bikeway with an active street would improve personal safety for bikeway users, and is a recognized Crime Prevention Through Environmental Design (CPTED) strategy.
- No capacity improvements would be made at the intersection of Stringtown Road and Observation Drive, which would operate at LOS E during the AM and PM peak hours in 2030 (based on the CLV method) regardless of whether Roberts Tavern Drive is built.

Alternative 2: Existing MD 355 Alignment and Roberts Tavern Master Plan Alignment, Unsignalized

Pros:

- Until the completion of the entire Relocated MD 355 north of Stringtown Road, Alternative 2 reduces the volume making turns at the MD 355/Roberts Tavern Drive intersection by maintaining the existing alignment of MD 355 as the through roadway.
- Diverts some traffic (i.e., less traffic than Alternatives 2 Final, 2A and 2B) away from a portion of Frederick Road by providing an alternate connection to Observation Drive, resulting in reduced delay and improved LOS at the intersection of MD 355 and Stringtown Road during the AM and PM peak hours.
- Reduces potential future road construction impacts to the surrounding area by following the master-planned alignment for the proposed Relocated MD 355.
- Improves personal safety for users of the planned Frederick Road (MD 355)/Upcounty bikeway (designated as SP-72) by providing an active street adjacent to the path, a recognized CPTED strategy.
- Completes the grid network and would improve access from MD 355 to proposed local development along Observation Drive.
- Does not require signalization to provide adequate levels of service to all permitted movements.

Cons:

- Prohibits left turns from eastbound Roberts Tavern Drive onto northbound MD 355, requiring a relatively small volume of traffic to be diverted to the north along Observation Drive onto eastbound Stringtown Road to access northbound MD 355.

Alternative 2 Final: Master Plan Alignment with a Signal using Existing MD 355 as a NB Spur; No EB Lefts from Roberts Tavern Drive

Alternative 2 Final would only be a viable option in conjunction with, or following, the future completion of Relocated Frederick Road (MD 355) around Clarksburg. The traffic operations associated with this alternative were included in this study for the purpose of comparison with the other alternatives; however, due to the uncertainty surrounding the future completion of Relocated Frederick Road, this alternative is not being considered for further study at this time.

Pros:

- Diverts a significant volume of traffic away from a portion of Frederick Road by providing a direct connection to Observation Drive, resulting in reduced delay and improved LOS at the intersection of MD 355 and Stringtown Road during the AM and PM peak hours.
- Reduces potential future road construction impacts to the surrounding area by following the master-planned alignment for the proposed Relocated MD 355.
- Improves personal safety for users of the planned Frederick Road (MD 355)/Upcounty bikeway (designated as SP-72) by providing an active street adjacent to the path, a recognized CPTED strategy.
- Completes the grid network and would improve access from MD 355 to proposed local development along Observation Drive.
- Allows traffic along northbound MD 355 to bypass the new signal at MD 355 and Roberts Tavern Drive to continue traveling north along MD 355.

Cons:

- Until the completion of the entire Relocated MD 355 north of Stringtown Road, Alternative 2A increases the volume of turning vehicles at the intersection of MD 355 and Roberts Tavern Drive, as the majority of traffic at the intersection would need to make a southbound left turn at the new traffic signal to remain on MD 355.
- Prohibits left turns from eastbound Roberts Tavern Drive onto northbound MD 355, requiring a relatively small volume of traffic to be diverted to the north along Observation Drive onto eastbound Stringtown Road to access northbound MD 355.

Alternative 2A: Master Plan Alignment with a Signal without using Existing MD 355 as a NB Spur

This alternative has the same pros and cons as Alternative 2, except traffic on eastbound Roberts Tavern Drive would be permitted to turn left to travel north on MD 355.

Alternative 2B: Master Plan Alignment with a Signal without using Existing MD 355 as a NB Spur

This alternative has the same pros and cons as Alternative 2A, except traffic on northbound MD 355 would not be able to bypass the new signal at Roberts Tavern Drive to continue traveling north on MD 355.

Alternative 3: Roberts Tavern Drive Traditional T-Intersection at MD 355 with a Signal

Pros:

- Until the completion of the entire Relocated MD 355 north of Stringtown Road, Alternative 3 reduces the volume making turns at the MD 355/Roberts Tavern Drive intersection by maintaining the existing alignment of MD 355 as the through roadway.
- Diverts some traffic (i.e., less traffic than Alternatives 2 Final, 2A and 2B) away from a portion of Frederick Road by providing an alternate connection to Observation Drive, resulting in reduced delay and improved LOS at the intersection of MD 355 and Stringtown Road during the AM and PM peak hours.
- Improves personal safety for users of the planned Frederick Road (MD 355)/Upcounty bikeway (designated as SP-72) by providing an active street adjacent to the path, a recognized CPTED strategy.
- Completes the grid network and would improve access from MD 355 to proposed local development along Observation Drive.

Cons:

- Adds a new traffic signal along MD 355.

Alternative 3A: Roberts Tavern Drive Traditional T-Intersection at MD 355 with Stop Control

Pros:

- Same as for Alternative 3.

Cons:

- Unacceptable delay and poor LOS for the eastbound approach along Roberts Tavern Drive at MD 355 during both the AM and PM peak hours.

Alternative 3B: Roberts Tavern Drive Maryland Tee Intersection at MD 355 with Stop Control

Pros:

- Same as for Alternative 3.

Cons:

- Unacceptable delay and poor LOS for the eastbound approach along Roberts Tavern Drive at MD 355 during the AM peak hour.

Alternative 3C: Roberts Tavern Drive Maryland Tee Intersection at MD 355 with a Signal

Pros:

- Same as for Alternative 3.

Cons:

- The traffic signal at the MD 355/Roberts Tavern Drive intersection would only be justified by the need to provide an acceptable level of service for the low-volume left-turn movement from eastbound Roberts Tavern Drive onto northbound MD 355. If this movement were prohibited, a traffic signal would not be needed.

Alternative 4: Existing MD 355 Alignment and Roberts Tavern Master Plan Alignment, Unsignalized

This alternative has the same pros and cons as Alternative 2. However, less of the pavement needed for the ultimate master plan alignment of Roberts Tavern Drive and Relocated MD 355 would be constructed under Alternative 4. This alternative only provides a small-radius channelized free-flow right turn lane from southbound MD 355 onto westbound Roberts Tavern Drive, whereas Alternative 2 provides a full right turn spur roadway with a separate stop-controlled intersection at Roberts Tavern Drive.

Alternative 5: Roberts Tavern Drive T-Intersection at MD 355 with Roundabout

Traffic operations for Alternative 5 were evaluated as part of this study. However, due to the significant number of negative issues and impacts associated with this alternative, it is not being considered for further study.

Pros:

- Allows some traffic to divert off of a portion of Frederick Road by providing a direct connection to Observation Drive, resulting in reduced delay and improved LOS at the intersection of MD 355 and Stringtown Road during the AM and PM peak hours.
- Improves personal safety for users of the planned Frederick Road (MD 355)/Upcounty bikeway (designated as SP-72) by providing an active street adjacent to the path, a recognized CPTED strategy.
- Completes grid network and improves access from MD 355 to local development and Observation Drive.
- Studies have shown that roundabouts are safer for bicyclists compared to traffic signals due to the slower speeds of vehicles entering and exiting the roundabout. The state of the practice is to provide off-ramps to an adjacent shared-use path around the roundabout so that less experienced cyclists can navigate the intersection as a pedestrian. Experienced bicyclists riding on the road are encouraged to claim their entire lane and navigate the roundabout as a vehicle would.

- Roundabouts have maintenance benefits: Signals have many moving parts that are subject to power outages and electronic malfunctions. Roundabouts work even when the power is out. Community groups can be encouraged to adopt and maintain the central island of a roundabout, reducing the burden of maintenance by County staff.
- Although not evaluated for this specific study or location, off-peak delay is typically lower at roundabouts than at signalized intersections – where motorists are often forced to stop at red lights waiting for a green light when there is no opposing traffic.
- Roundabouts have been documented to typically reduce the frequency and severity of accidents.

Cons:

- U.S. Access Board pending rule-making will require pedestrian actuated signals at all multi-lane crossings (entries or exits) because studies have shown that many motorists do not yield to pedestrians in crosswalks on multi-lane entries and exits at roundabouts, causing problems for all pedestrians, but primarily for visually-impaired pedestrians. The roundabout proposed under Alternative 5 would have several multi-lane pedestrian crossings, which might need to be retrofitted with pedestrian-actuated signals in the future.
- Roundabouts are beneficial for moving high volumes of left turn traffic efficiently. The proposed roundabout would have a relatively low volume of left turning traffic – there would be no left turning traffic from southbound MD 355, and low left turn volumes from northbound MD 355 and from eastbound Roberts Tavern Drive. Therefore, the volume of left turning traffic does not necessitate the construction of a roundabout at this location.
- There is a significant imbalance between the high volume of traffic on MD 355 and the relatively low traffic volume on Roberts Tavern Drive, which is not an ideal characteristic for a roundabout to function most efficiently.
- The proposed roundabout would need to be designed with a diameter large enough to accommodate WB-50 and WB-67 design vehicles, which would likely require a larger footprint than the intersection layouts proposed under Alternatives 3, 3A, 3B, and 3C.

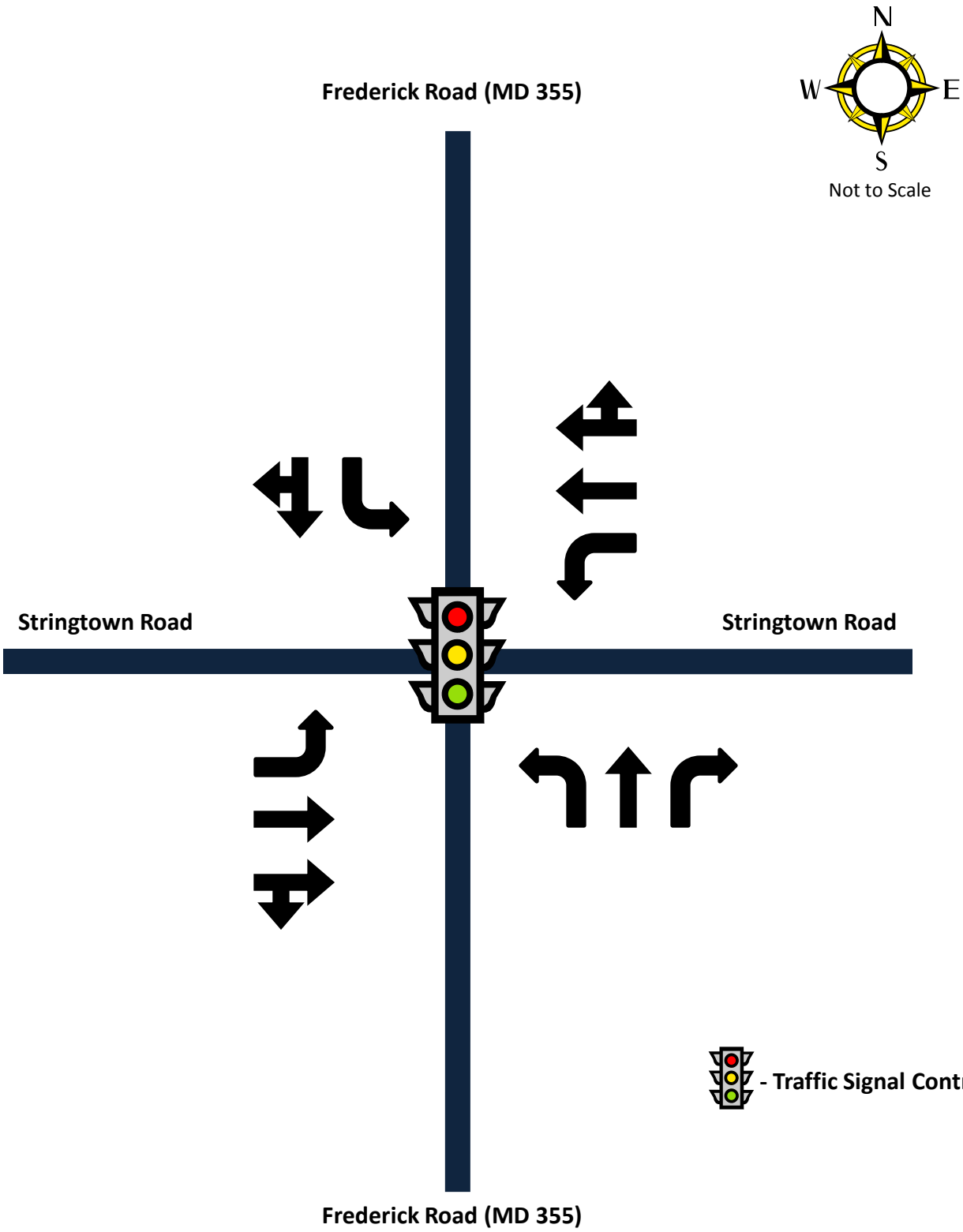
Appendix A:
Photos of the Proposed Intersection Location on MD 355

#1: Looking north along MD 355 (Frederick Road) toward Cool Brook Lane (on left)
The proposed Roberts Tavern Drive intersection would be located just beyond this intersection

#2: Looking north along MD 355 from Cool Brook Lane, toward the proposed location of the Roberts Tavern Drive intersection

#3: Looking south along MD 355 from Suncrest Avenue, toward the proposed location of the Roberts Tavern Drive intersection

Appendix B:
Traffic Volume and Lane Configuration Diagrams



Existing Intersection Lane Configuration
Frederick Road (MD 355) and Stringtown Road
Clarksburg, MD

Eastbound Stringtown Road at Frederick Road (MD 355)

Northbound Frederick Road (MD 355) at Stringtown Road

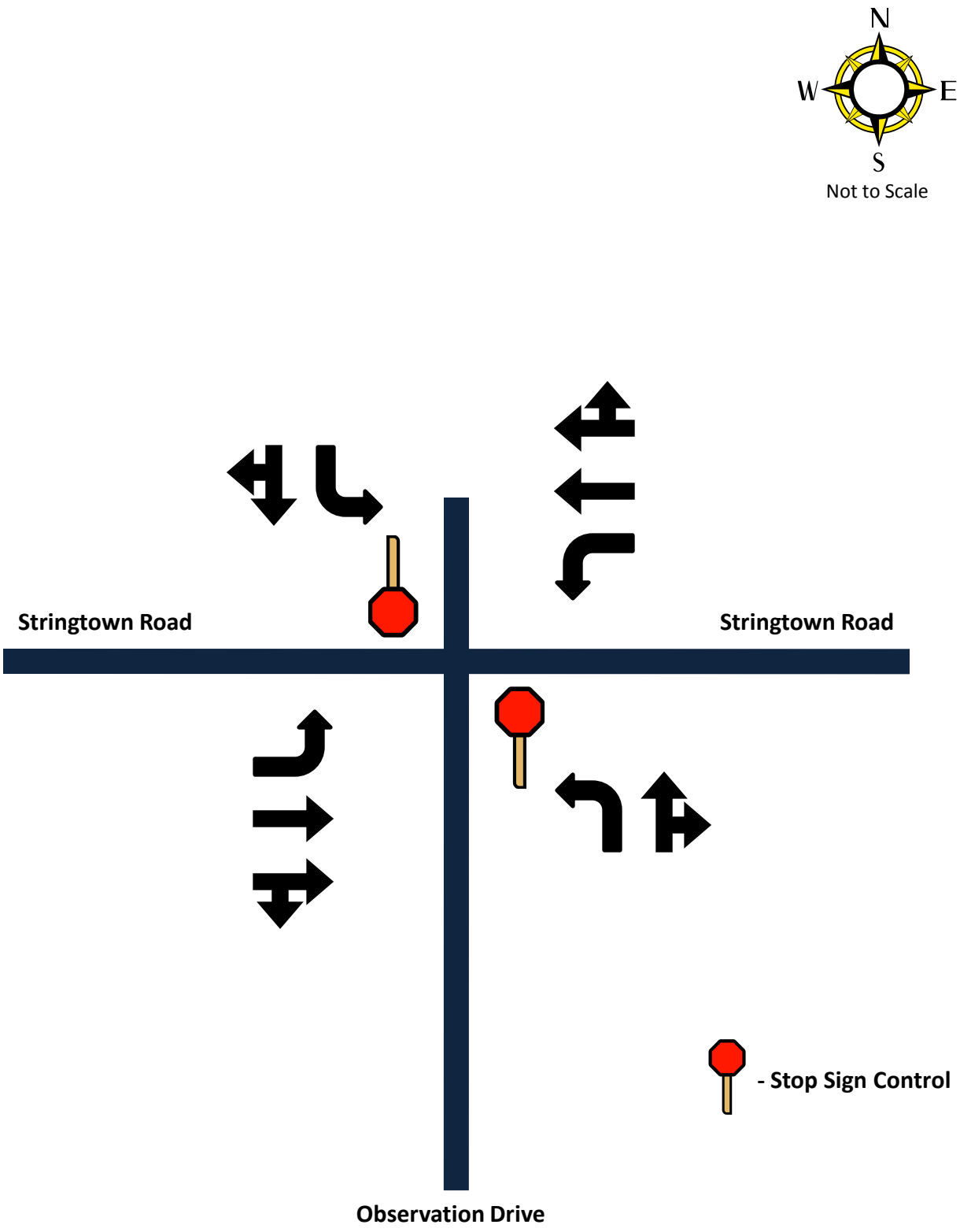
Southbound Frederick Road (MD 355) at Stringtown Road

Westbound Stringtown Road at Frederick Road (MD 355)

Existing Intersection Photos
Frederick Road (MD 355) and Stringtown Road
Clarksburg, MD

RK&K

MONTGOMERY COUNTY MARYLAND



Existing Intersection Lane Configuration
Stringtown Road and Observation Drive
Clarksburg, MD

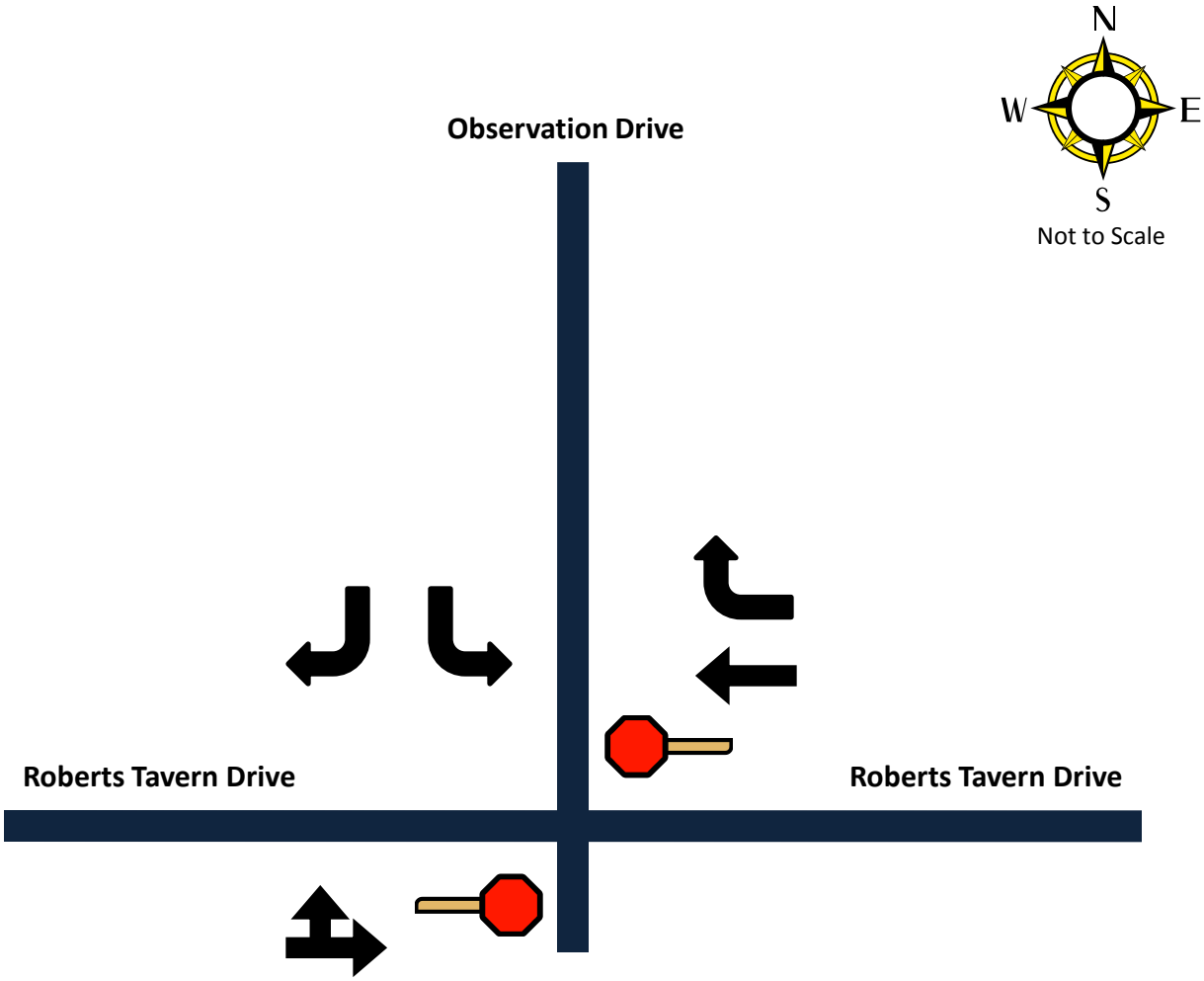
Eastbound Stringtown Road at Observation Drive

Northbound Observation Drive at Stringtown Road

Southbound Observation Drive at Stringtown Road

Westbound Stringtown Road at Observation Drive

Existing Intersection Photos
Stringtown Road and Observation Drive
Clarksburg, MD



Existing Intersection Lane Configuration
Observation Drive and Roberts Tavern Drive
Clarksburg, MD

Eastbound Roberts Tavern Drive at Observation Drive

Northbound Observation Drive at Roberts Tavern Drive

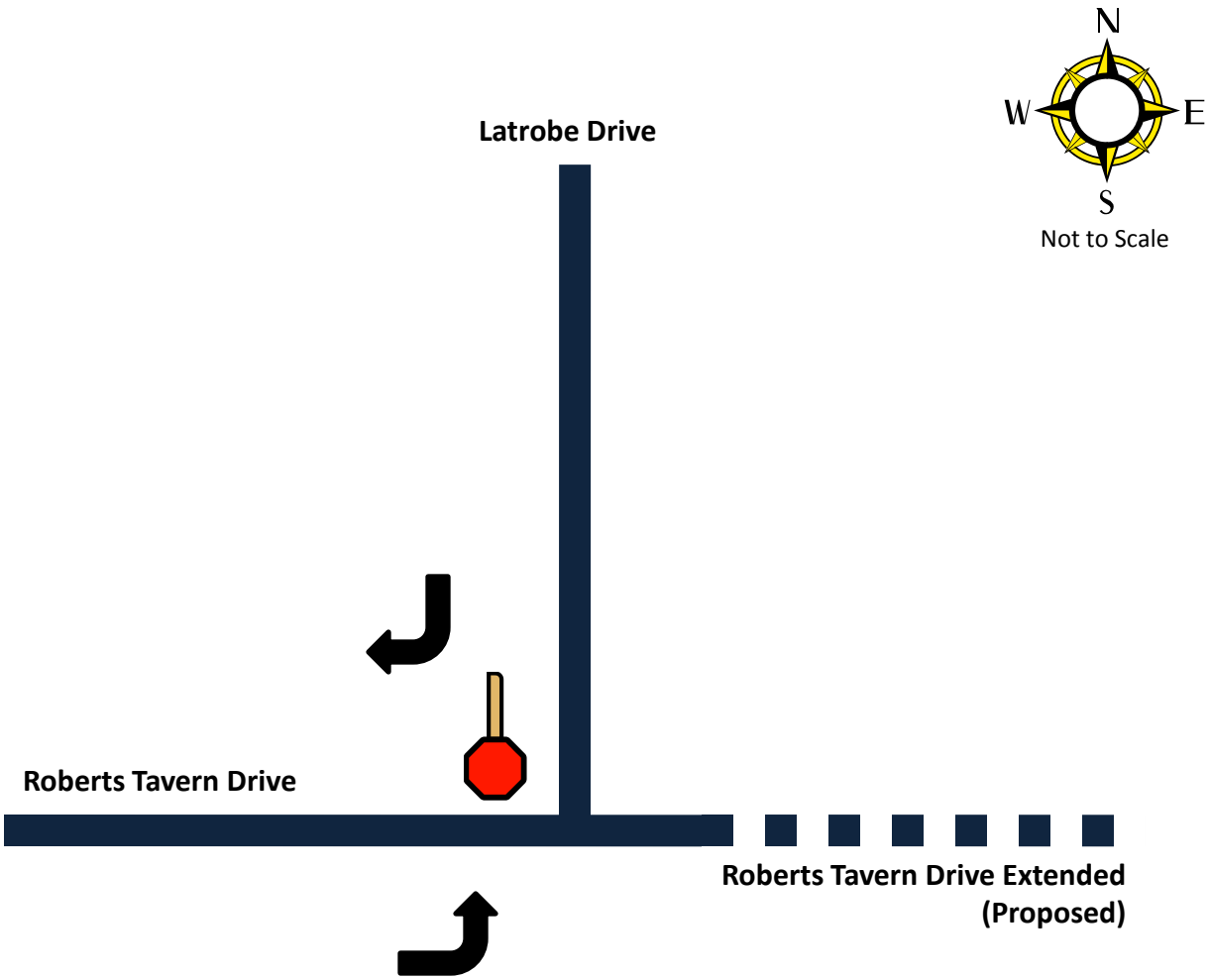
Southbound Observation Drive at Roberts Tavern Drive

Westbound Roberts Tavern Drive at Observation Drive

Existing Intersection Photos
Observation Drive and Roberts Tavern Drive
Clarksburg, MD

RK&K

MONTGOMERY COUNTY MARYLAND



- Stop Sign Control

Existing Intersection Lane Configuration
Roberts Tavern Drive and Latrobe Lane
Clarksburg, MD

Eastbound Roberts Tavern Drive at Latrobe Lane

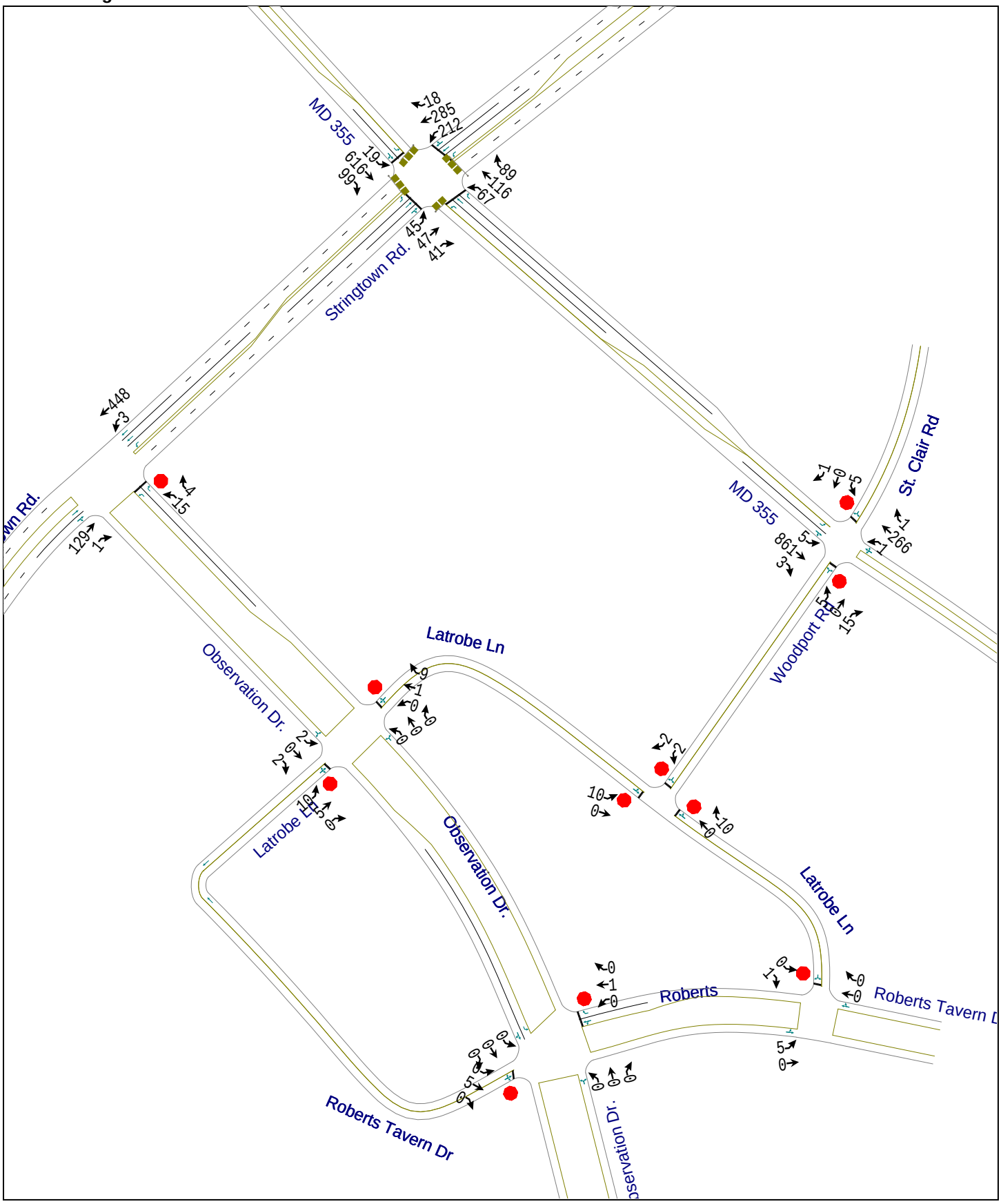
Southbound Latrobe Lane at Roberts Tavern Drive

Westbound Roberts Tavern Drive at Latrobe Lane

Existing Intersection Photos
Roberts Tavern Drive and Latrobe Lane
Clarksburg, MD

2009 Existing **AM Peak**

Lane Configurations and Volumes

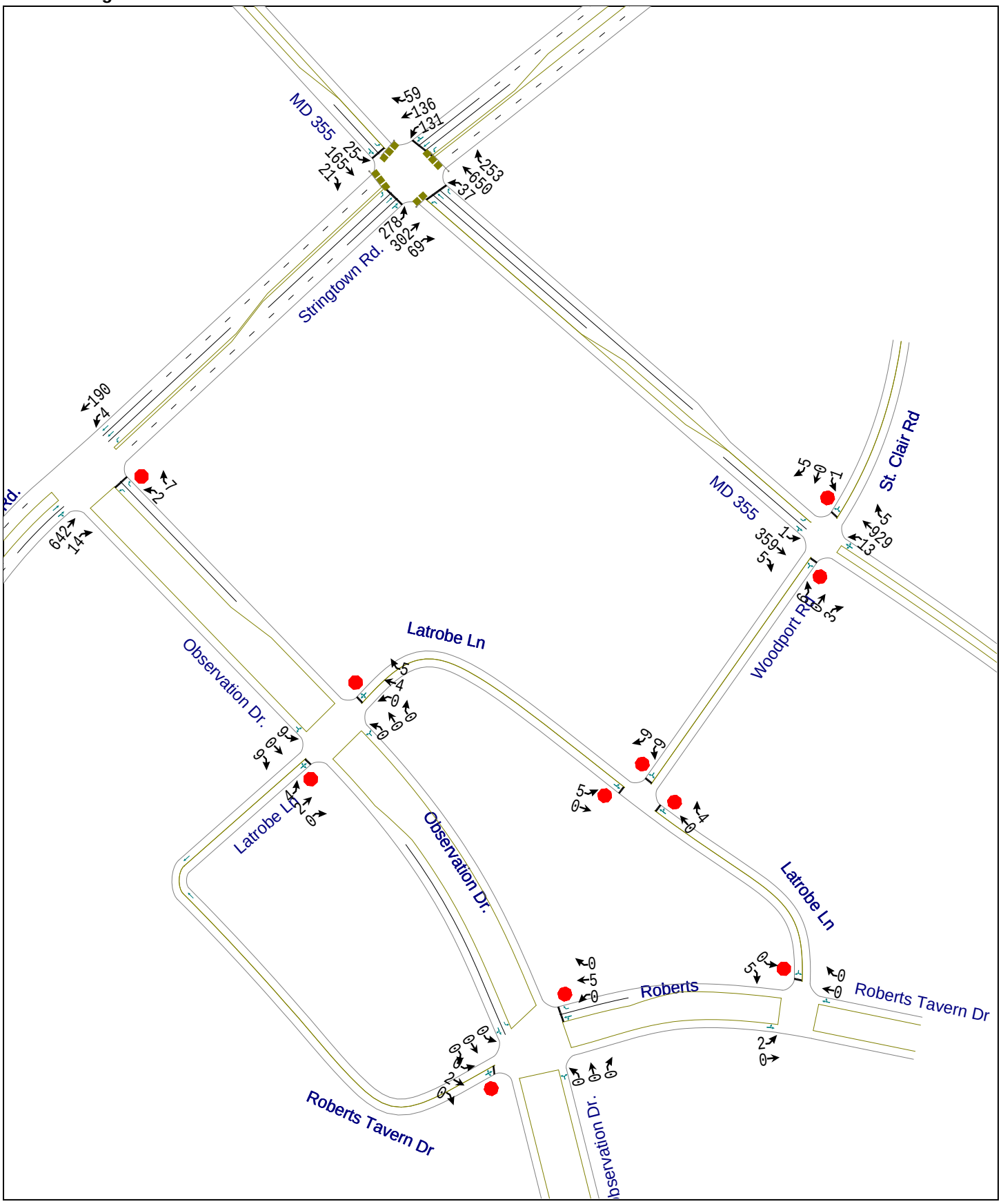


RK&K

Map - Roberts Tavern Drive Extended

2009 Existing **PM Peak**

Lane Configurations and Volumes

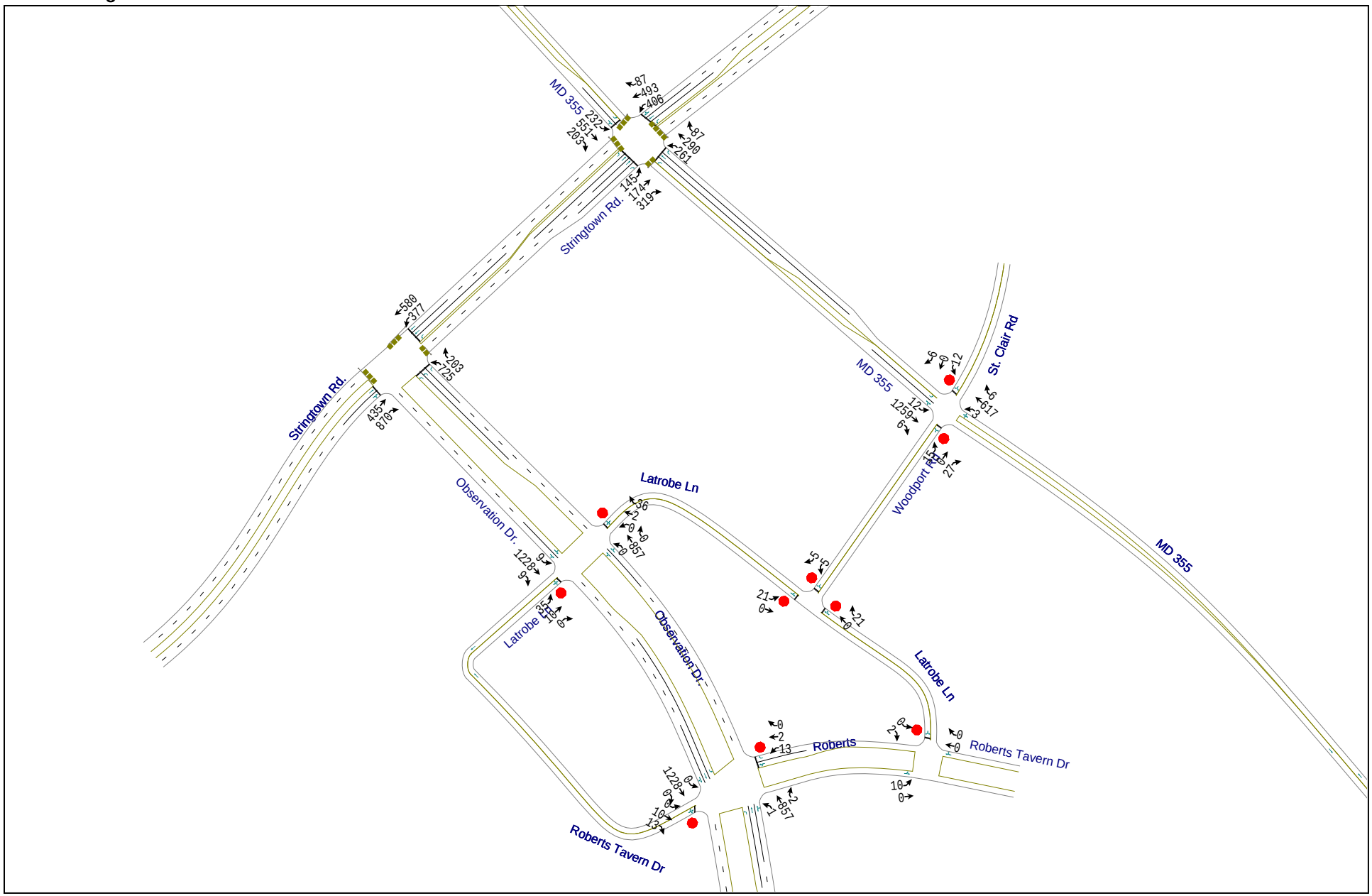


RK&K

Map - Roberts Tavern Drive Extended

2030 Alternative 1: No Build **AM Peak**

Lane Configurations and Volumes

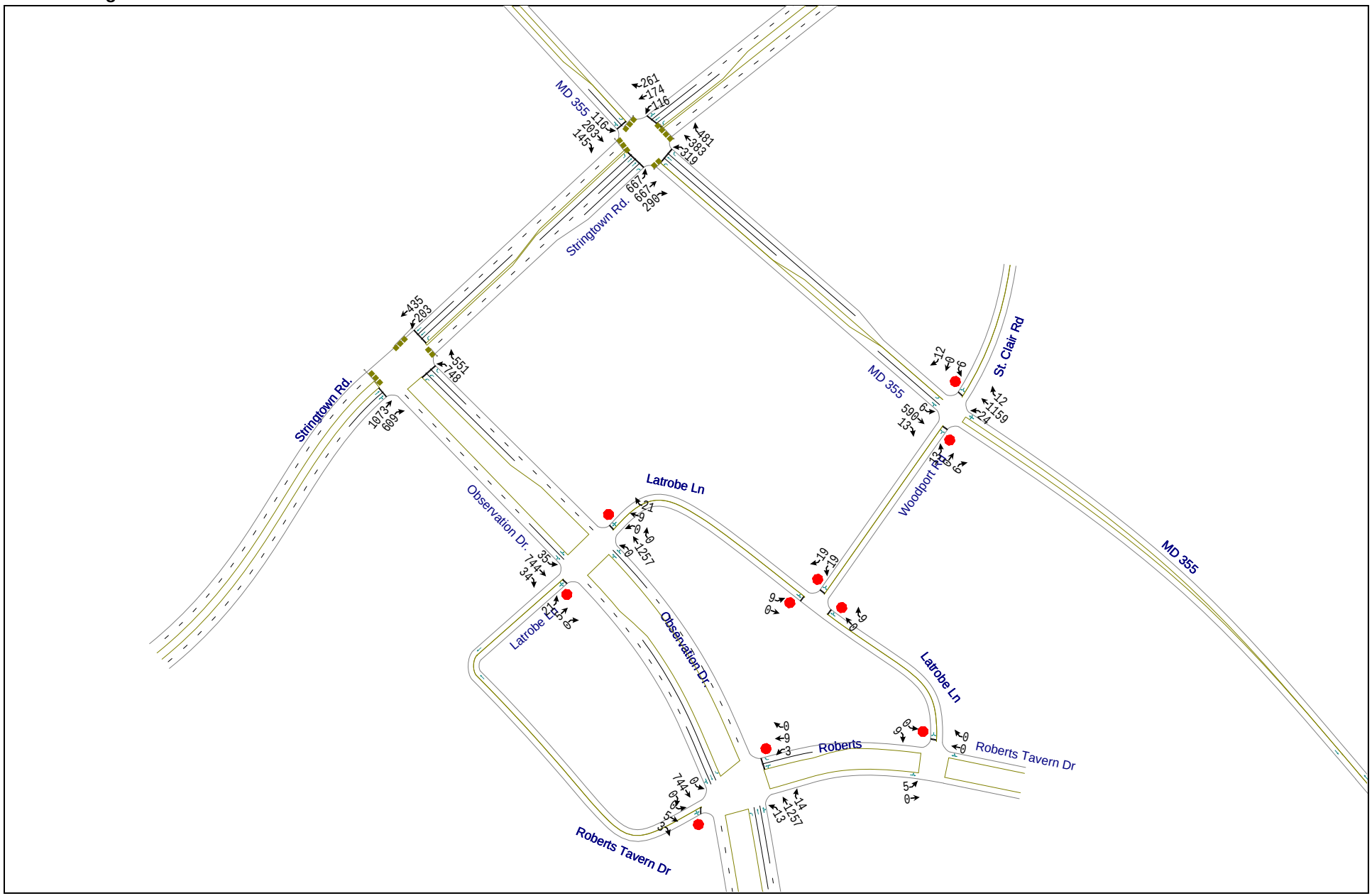


RK&K

Roberts Tavern Drive Extended

2030 Alternative 1: No-Build **PM Peak**

Lane Configurations and Volumes

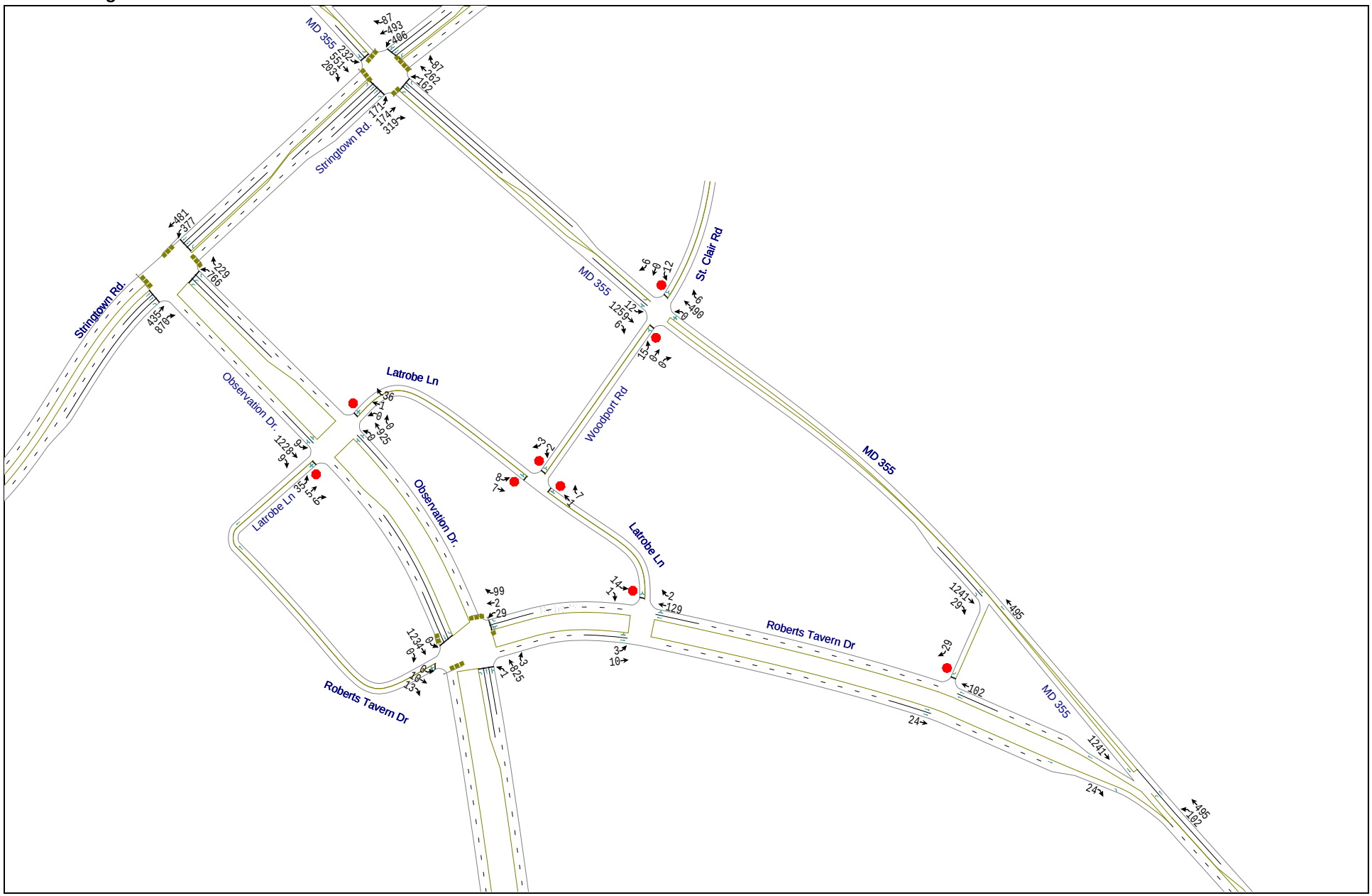


RK&K

Map - Roberts Tavern Drive Extended

2030 Alternative 2 **AM Peak**

Lane Configurations and Volumes



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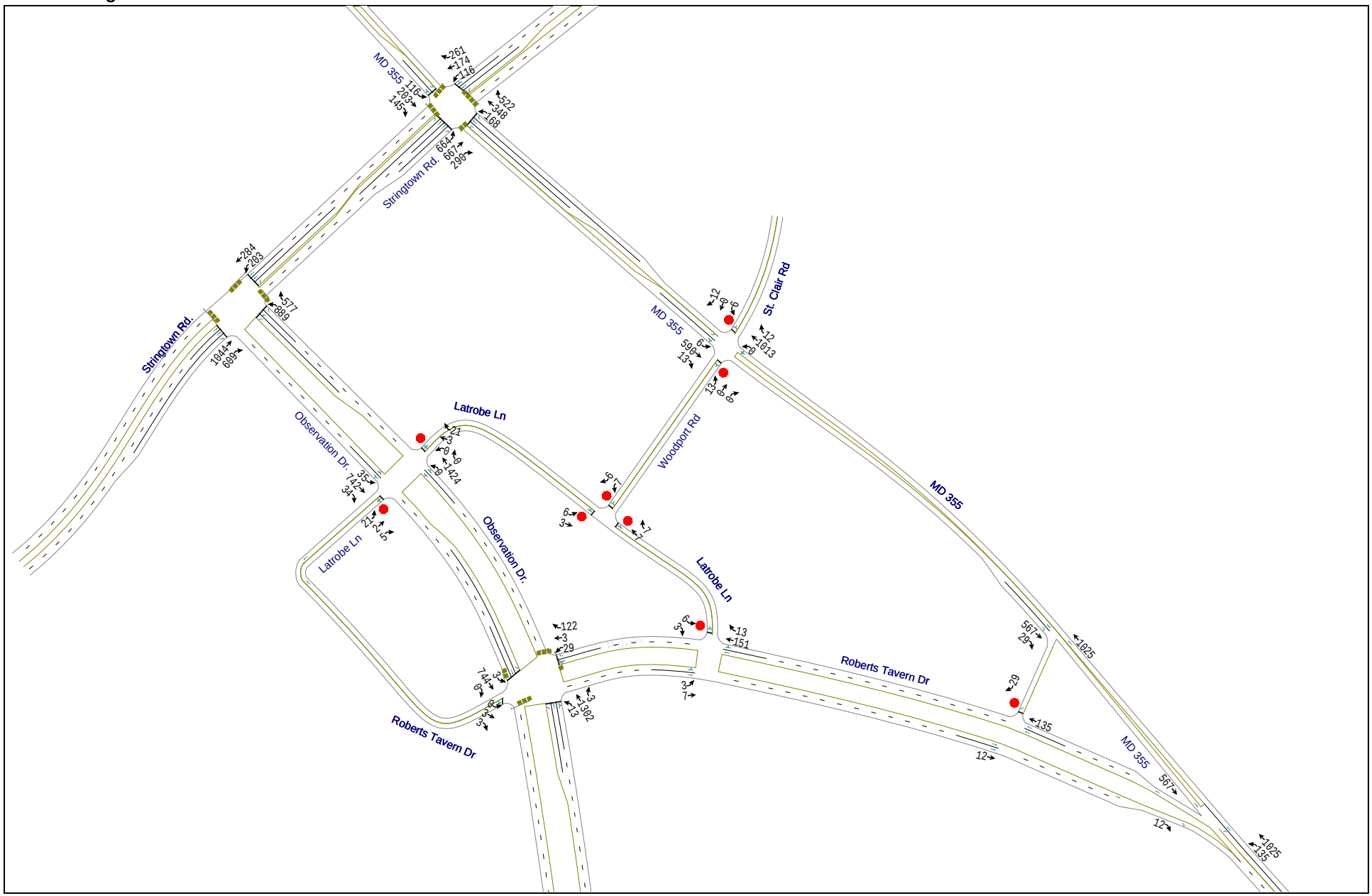
Roberts Tavern Drive Extended

2030 Alternative 2 **PM Peak**

Lane Configurations and Volumes



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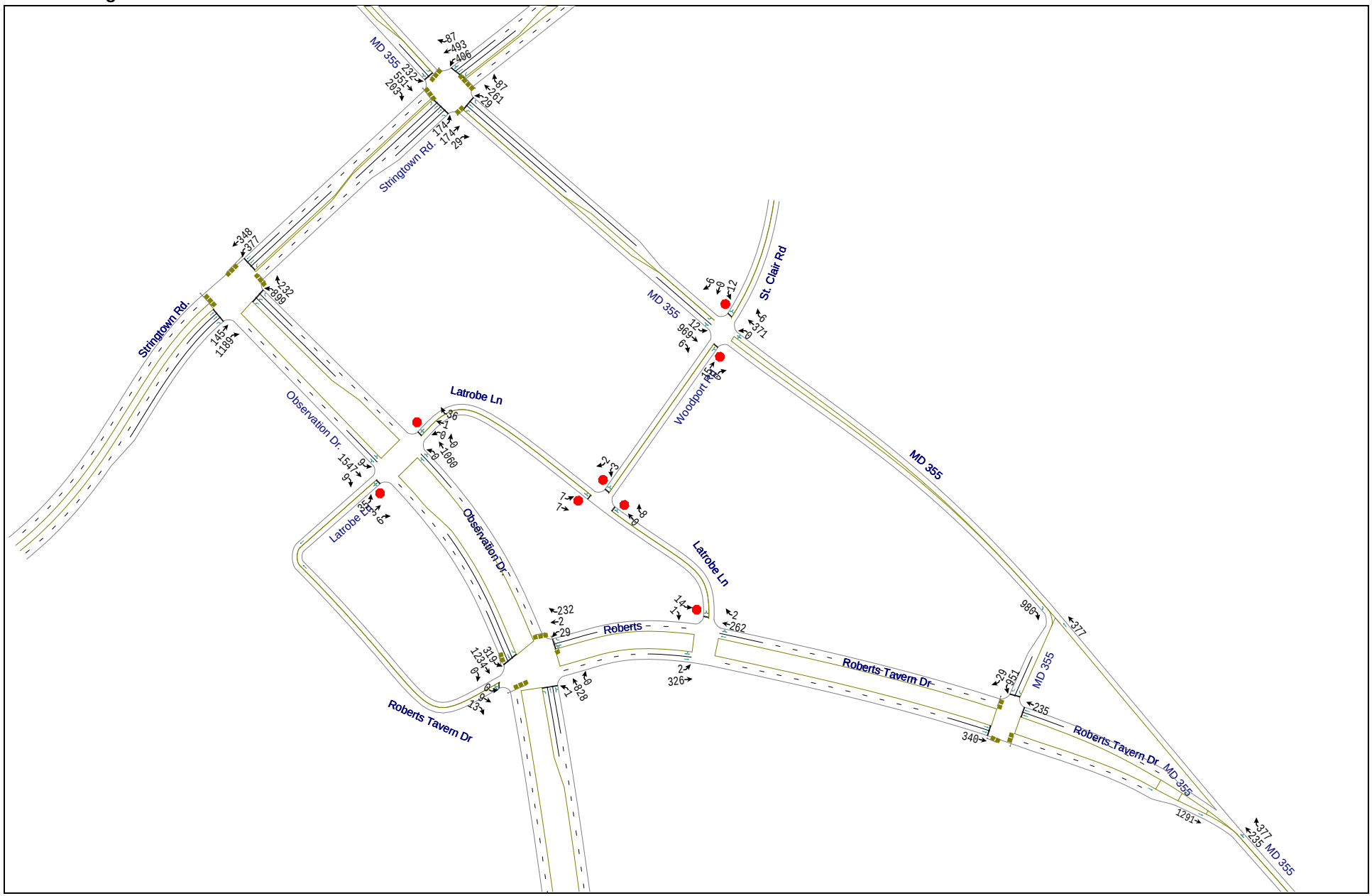
Roberts Tavern Drive Extended

2030 Alternative 2 Final **AM Peak**

Lane Configurations and Volumes

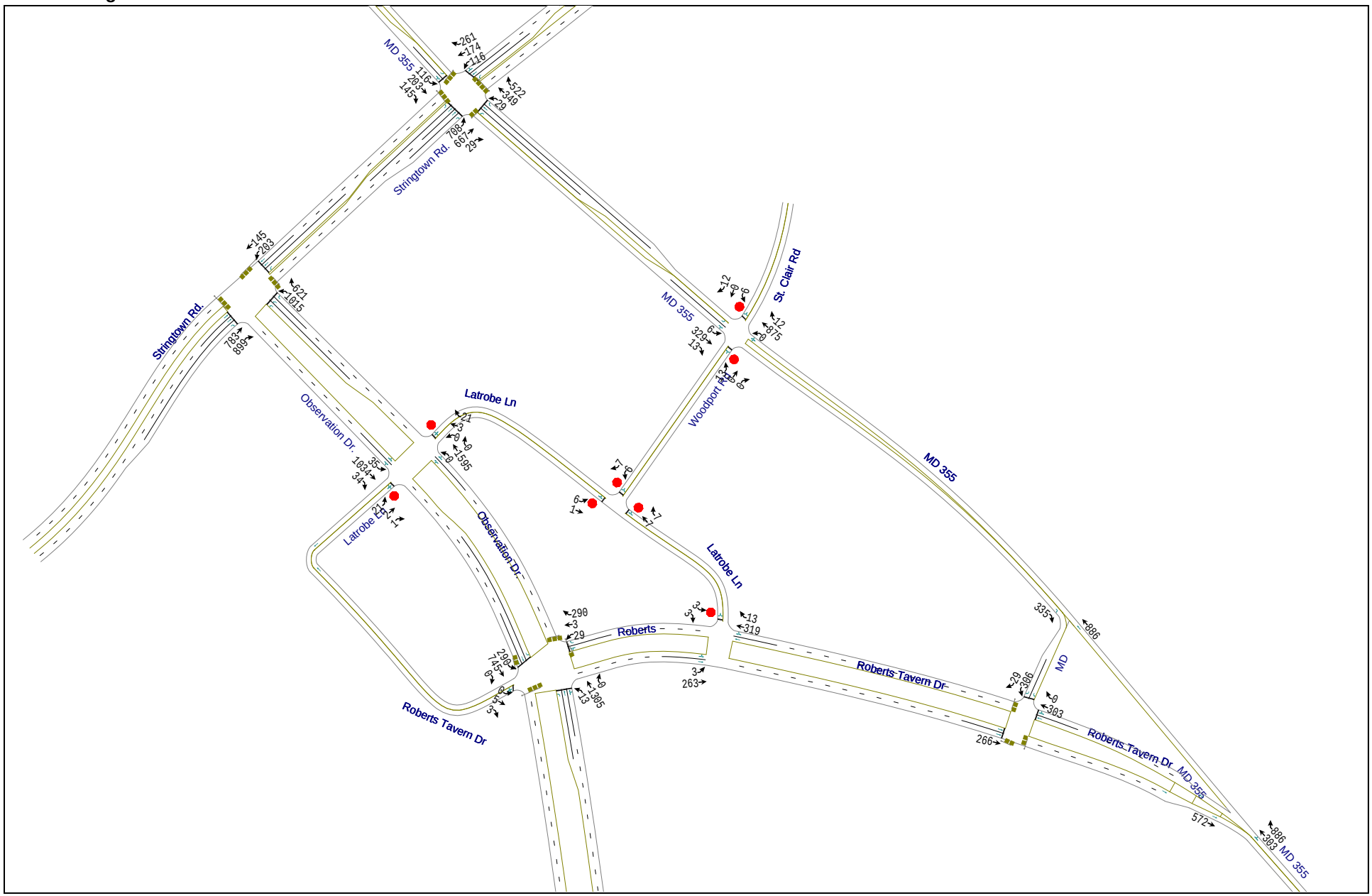


RK&K

Roberts Tavern Drive Extended

2030 Alternative 2 Final **PM Peak**

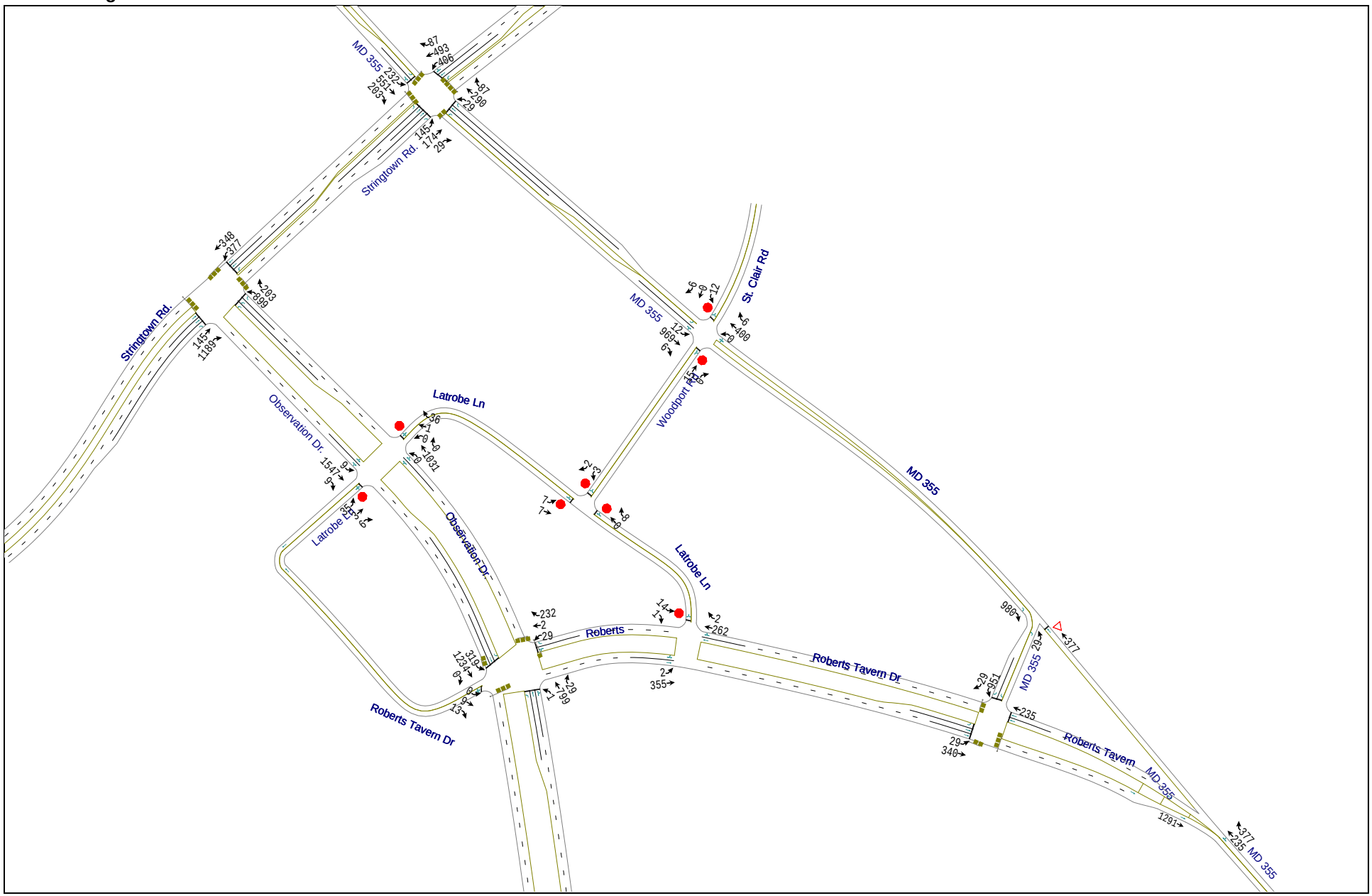
Lane Configurations and Volumes



RK&K

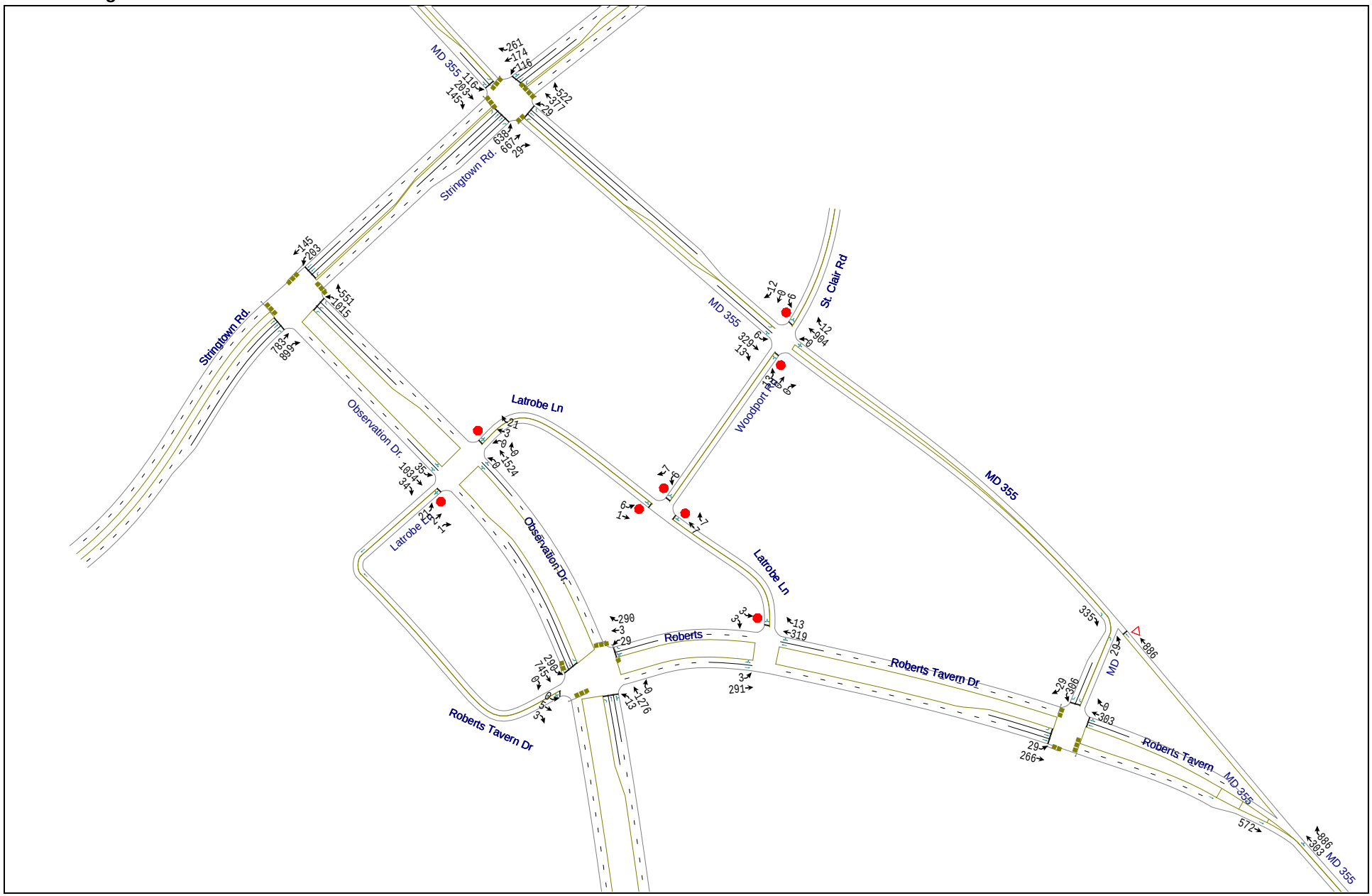
Roberts Tavern Drive Extended

2030 Alternative 2A: Master Plan Alignment **AM Peak**
Lane Configurations and Volumes



RK&K
Map - Roberts Tavern Drive

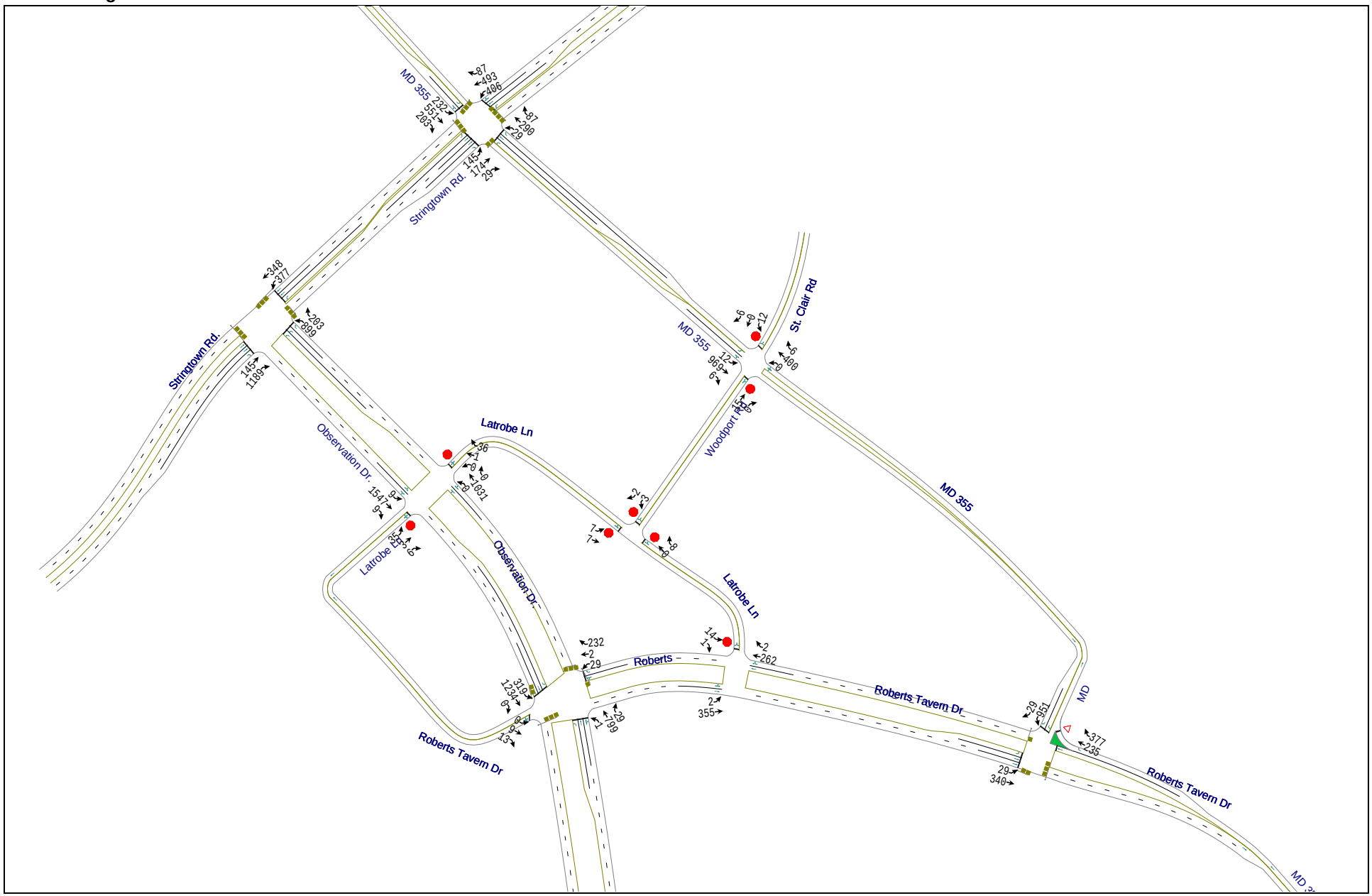
2030 Alternative 2A: Master Plan Alignment **PM Peak**
Lane Configurations and Volumes



RK&K
Map - Roberts Tavern Drive Extended

2030 Alternative 2B-Channelized: Master Plan Alignment **AM Peak**

Lane Configurations and Volumes

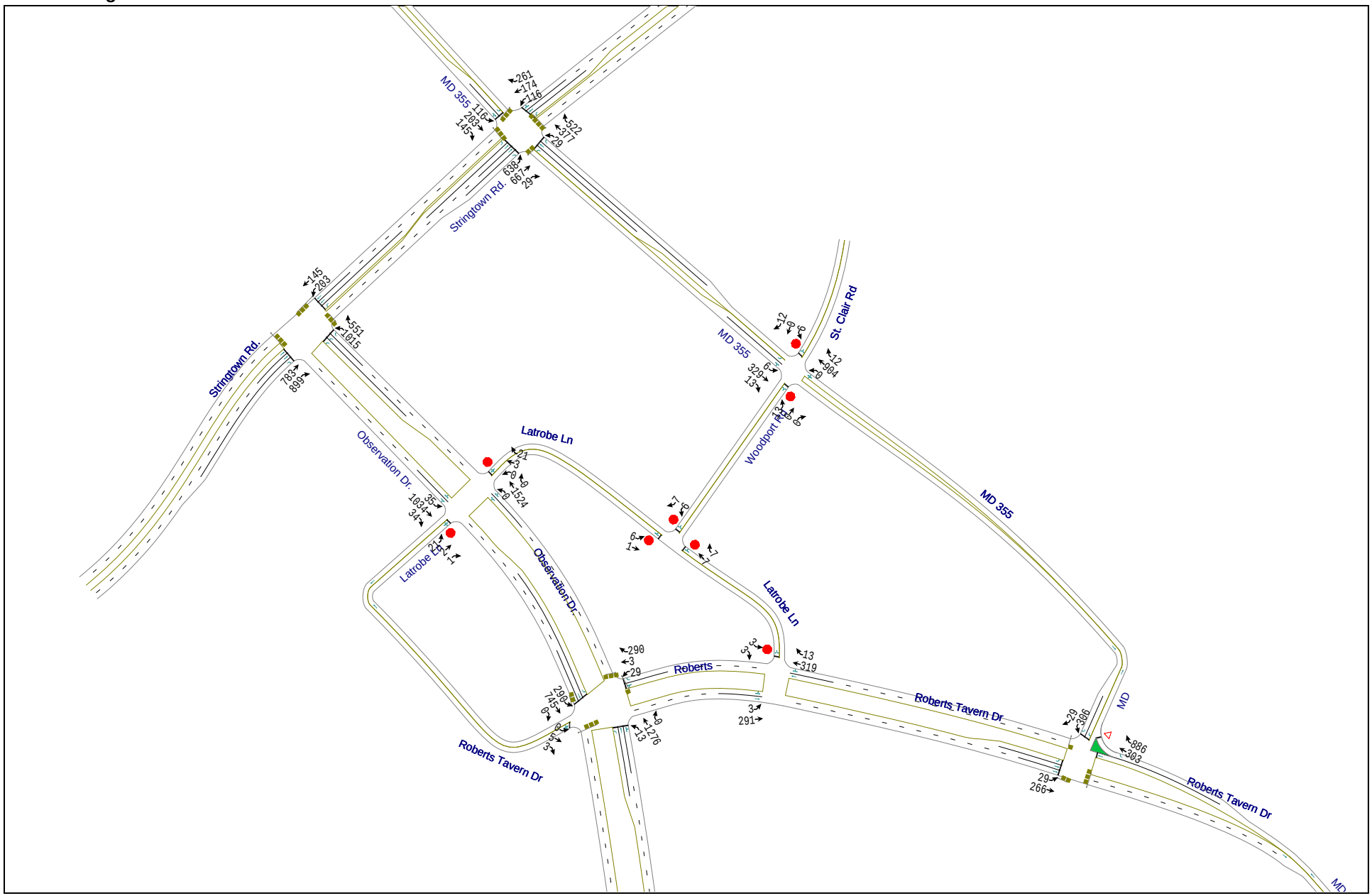


RK&K

Map - Roberts Tavern Drive

2030 Alternative 2B-Channelized: Master Plan Alignment **PM Peak**

Lane Configurations and Volumes

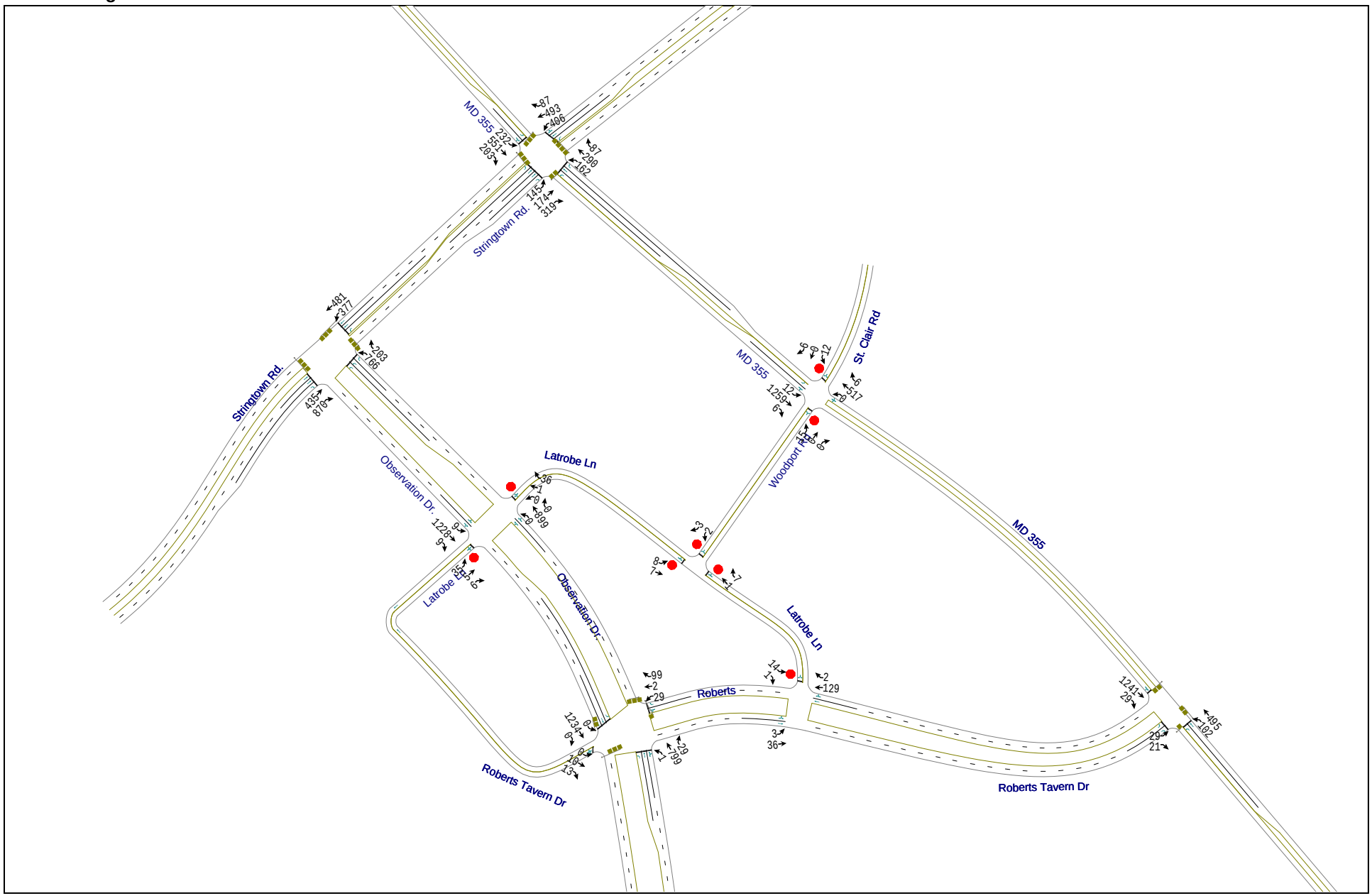


RK&K

Map - Roberts Tavern Drive Extended

2030 Alternative 3 **AM Peak**

Lane Configurations and Volumes



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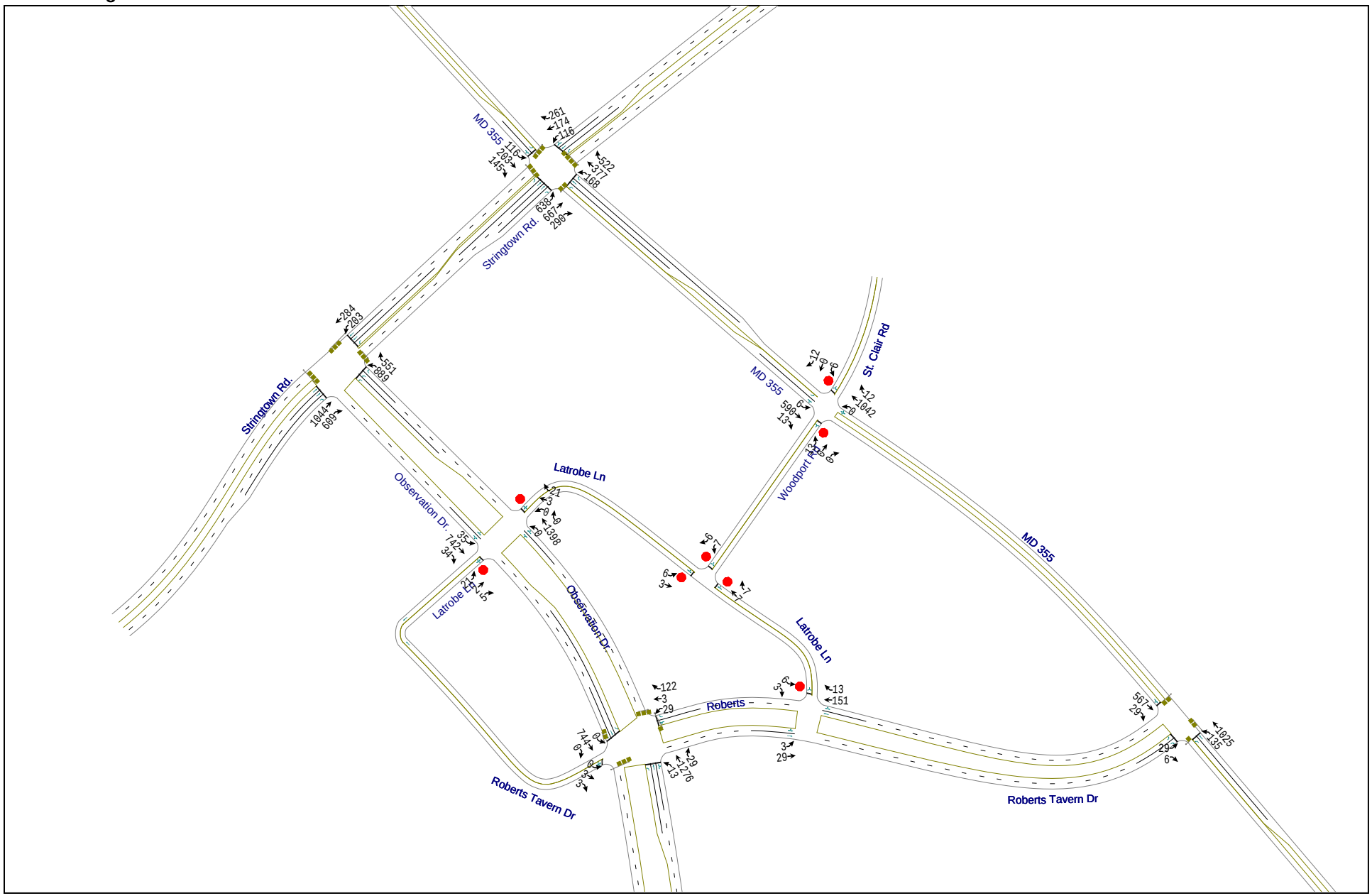
Roberts Tavern Drive Extended

2030 Alternative 3 **PM Peak**

Lane Configurations and Volumes



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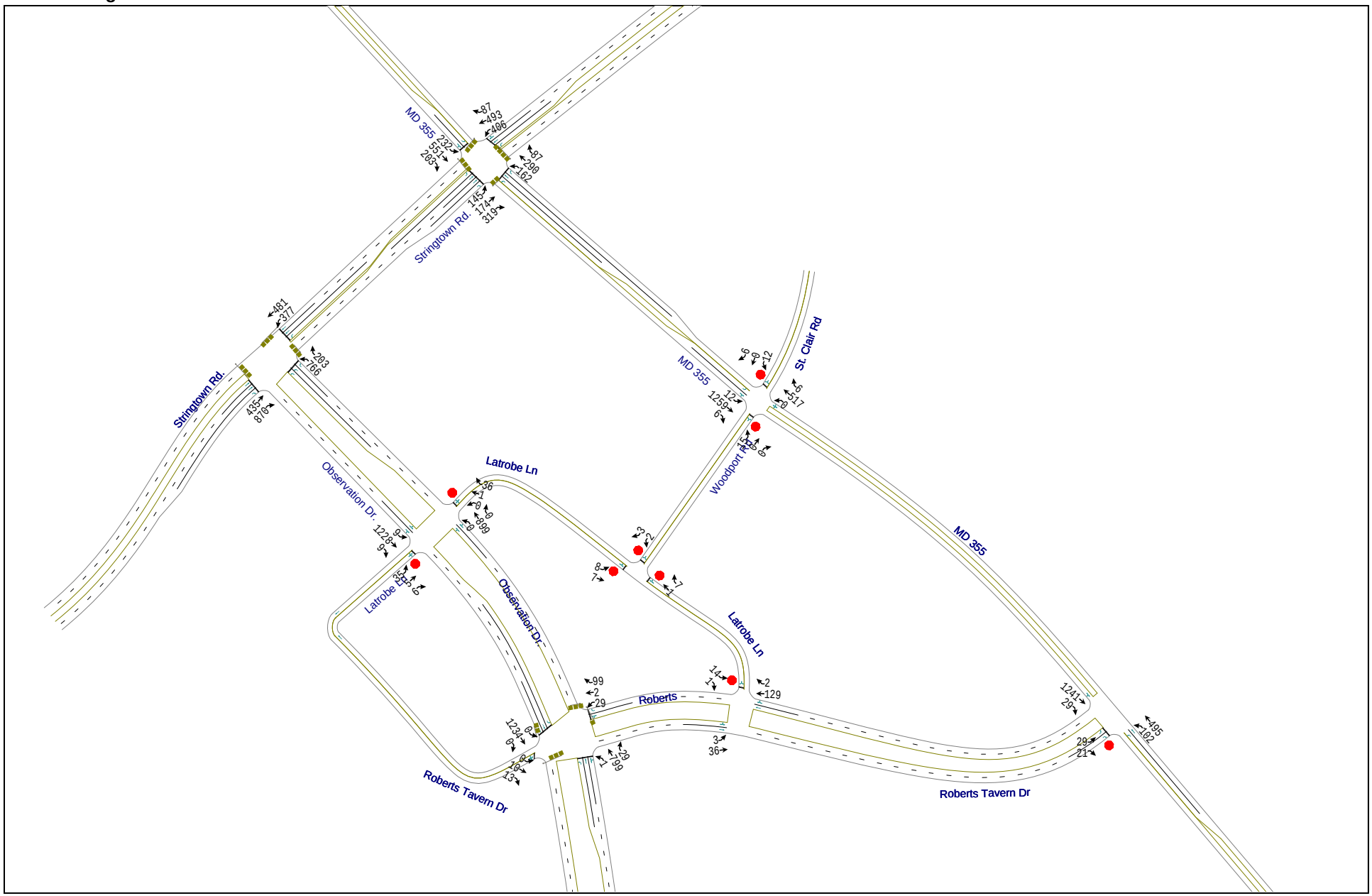
Roberts Tavern Drive Extended

2030 Alternative 3A **AM Peak**

Lane Configurations and Volumes

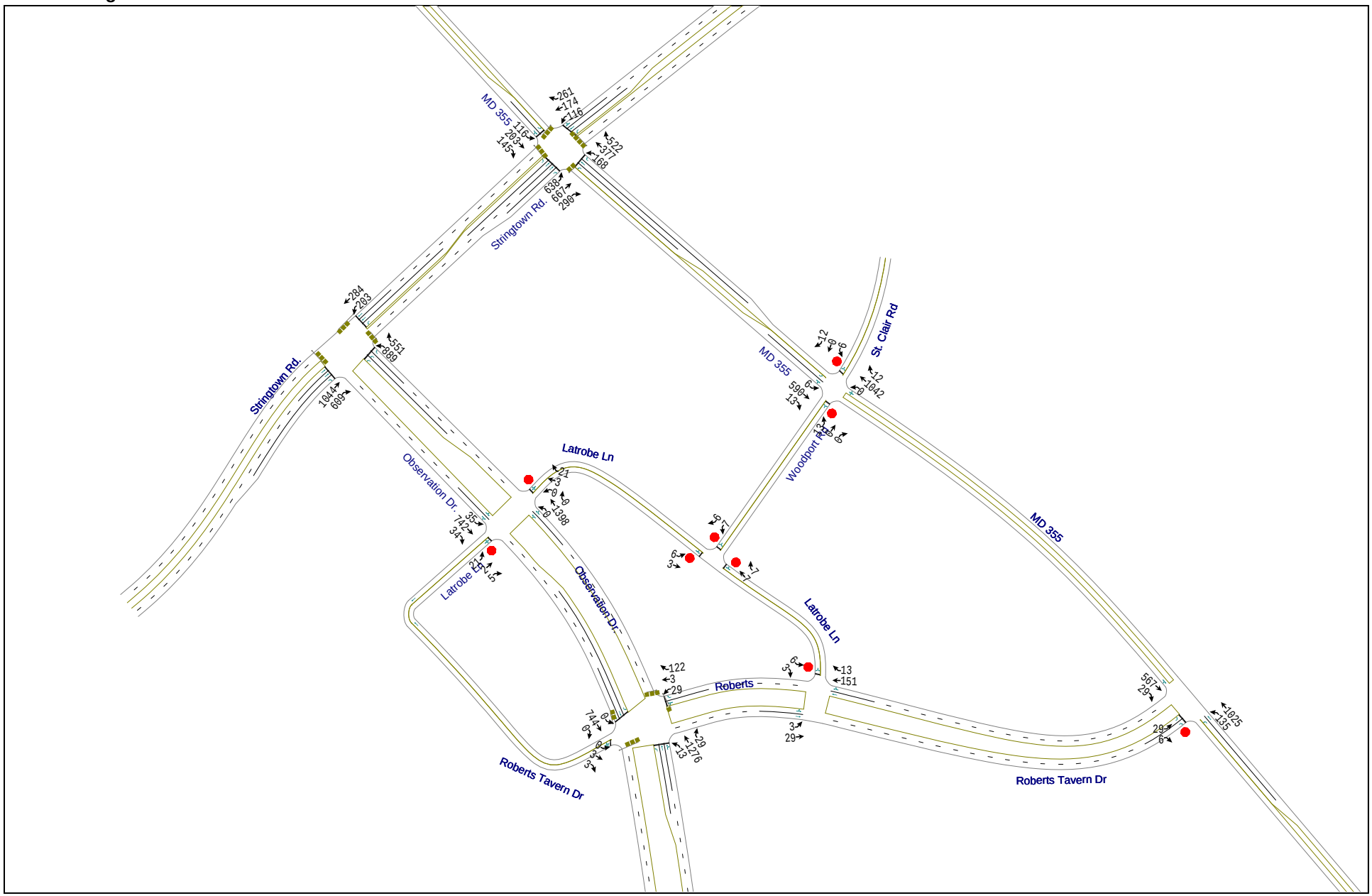


RK&K

Roberts Tavern Drive Extended

2030 Alternative 3A **PM Peak**

Lane Configurations and Volumes

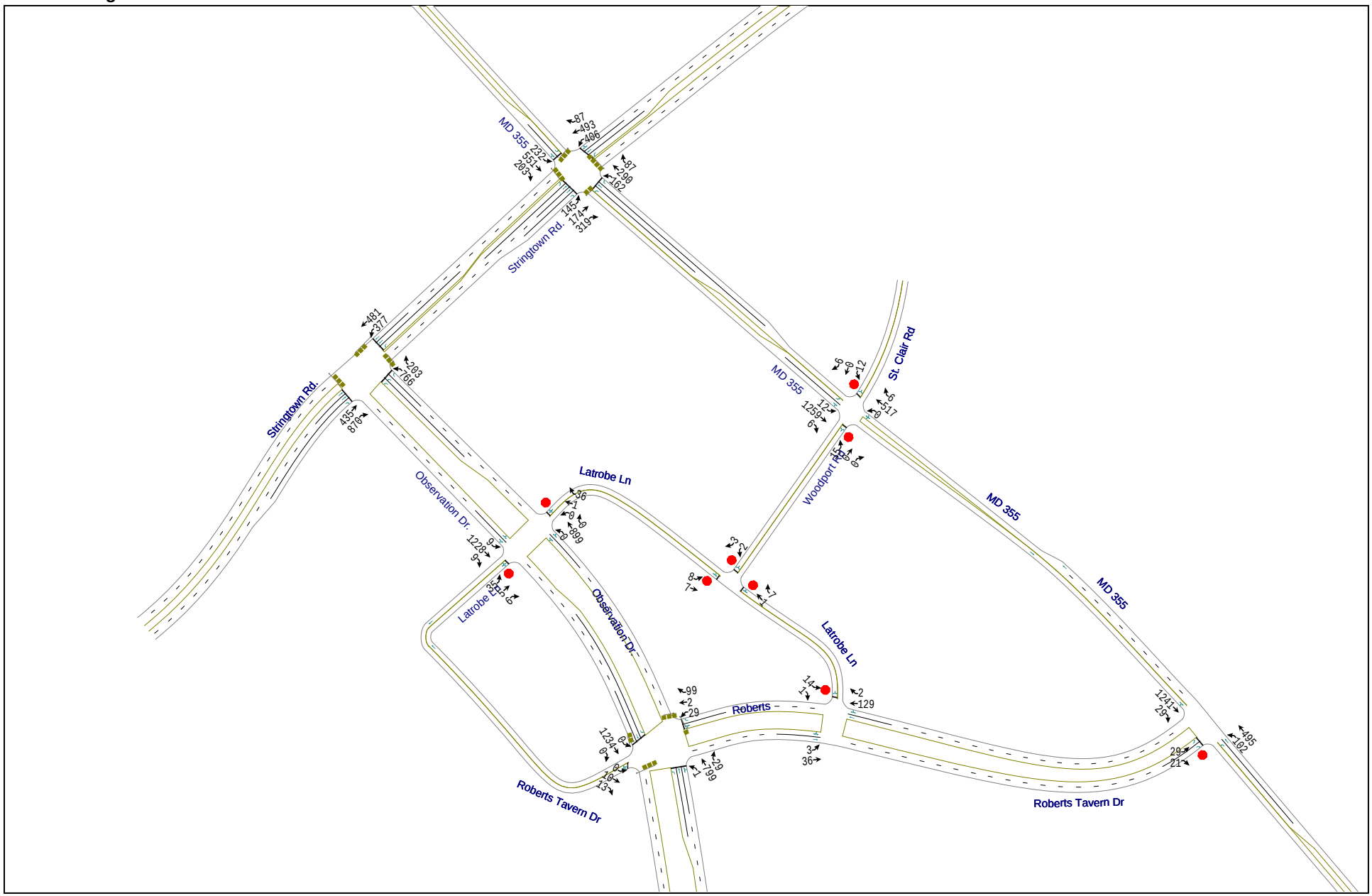


RK&K

Roberts Tavern Drive Extended

2030 Alternative 3B **AM Peak**

Lane Configurations and Volumes

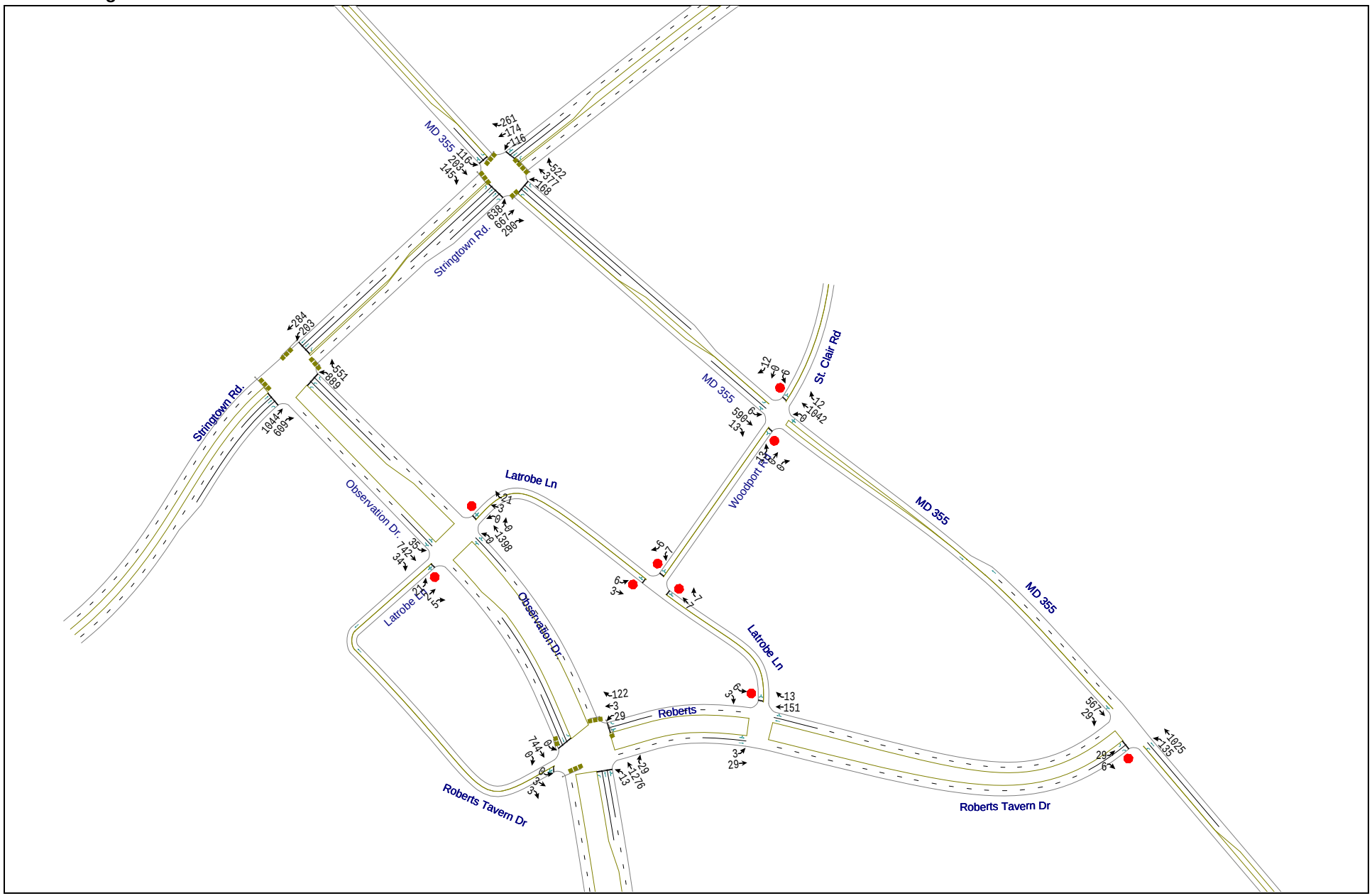


RK&K

Roberts Tavern Drive Extended

2030 Alternative 3B **PM Peak**

Lane Configurations and Volumes

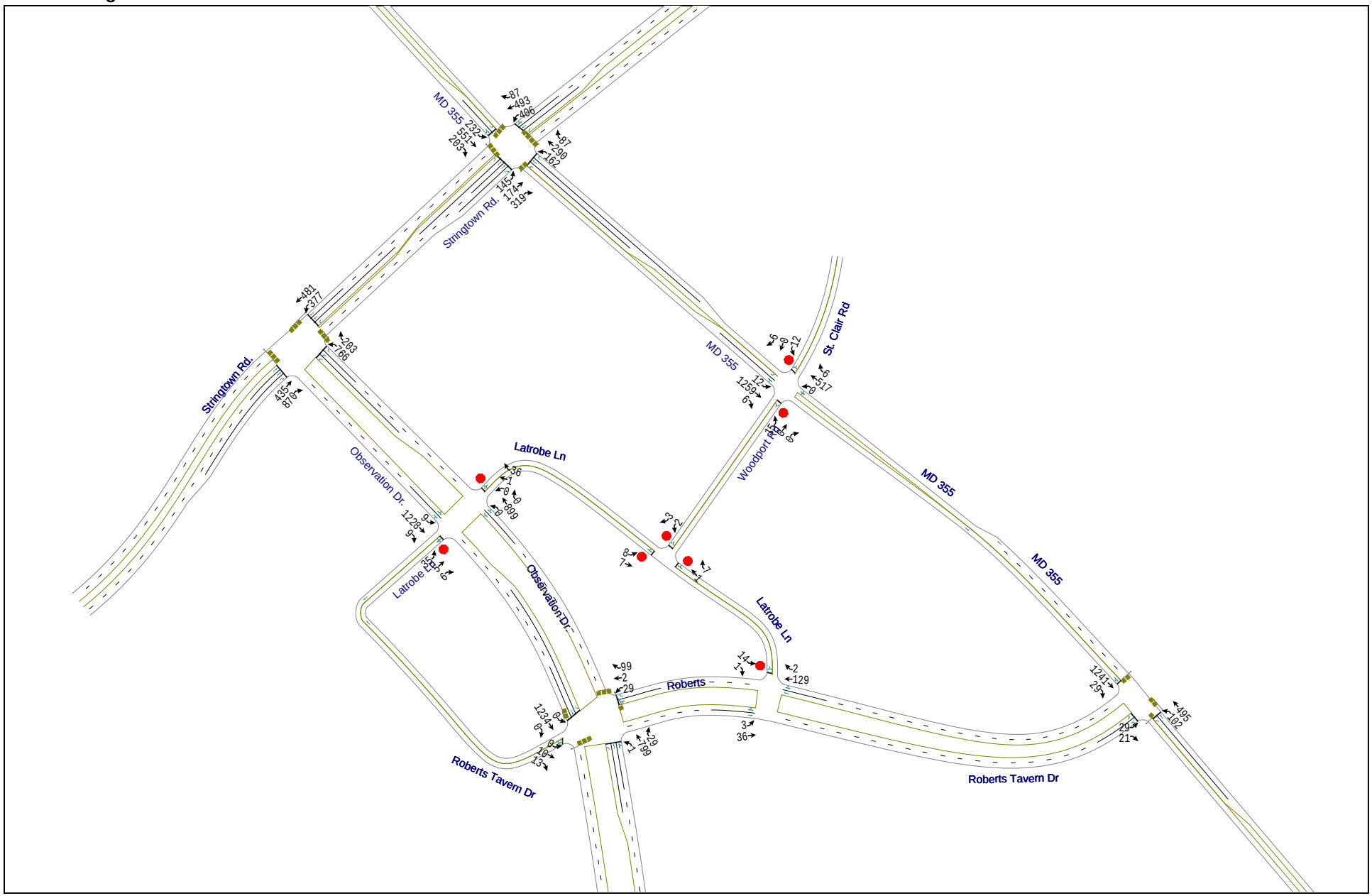


RK&K

Roberts Tavern Drive Extended

2030 Alternative 3C **AM Peak**

Lane Configurations and Volumes



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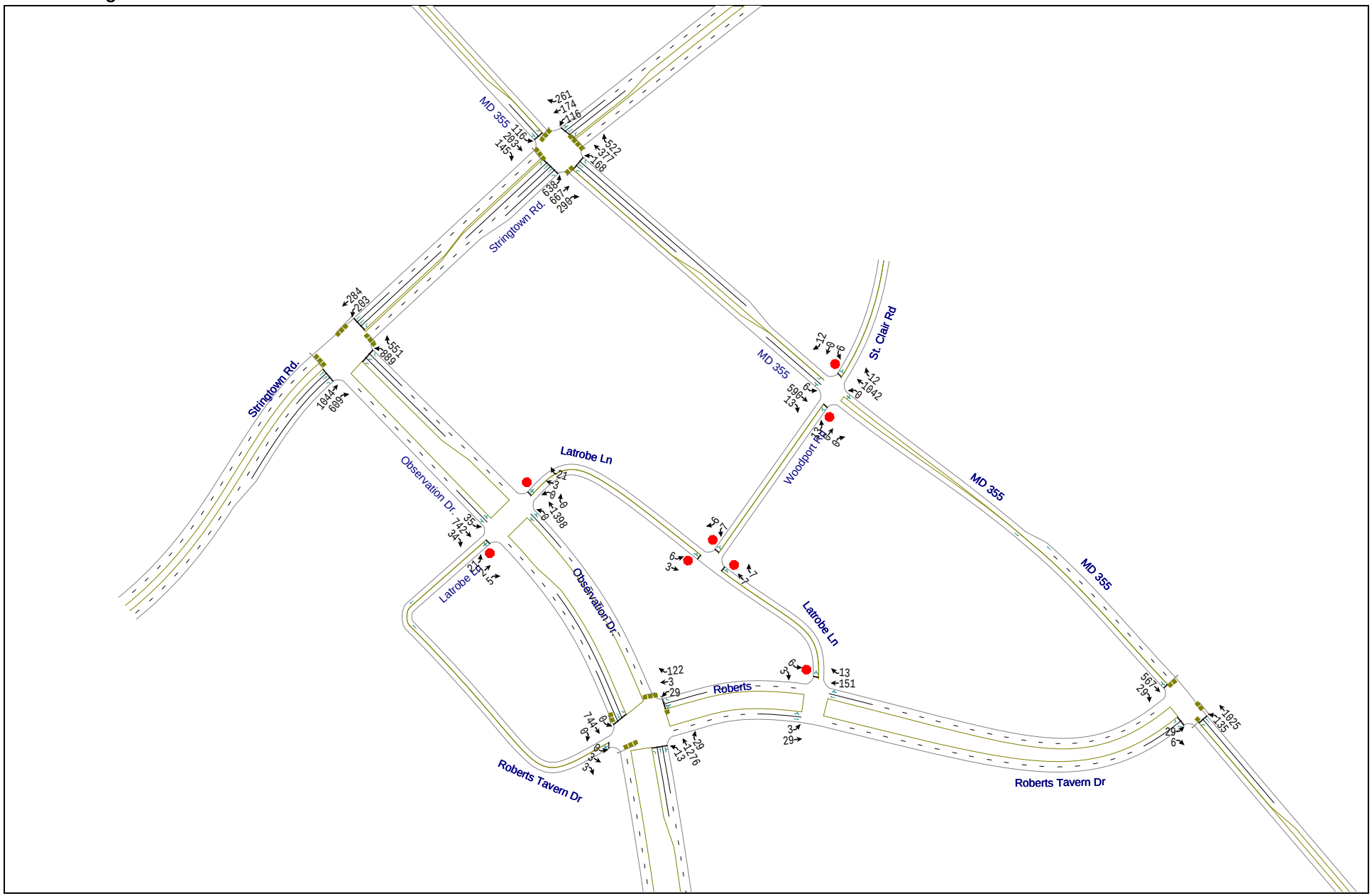
Roberts Tavern Drive Extended

2030 Alternative 3C **PM Peak**

Lane Configurations and Volumes

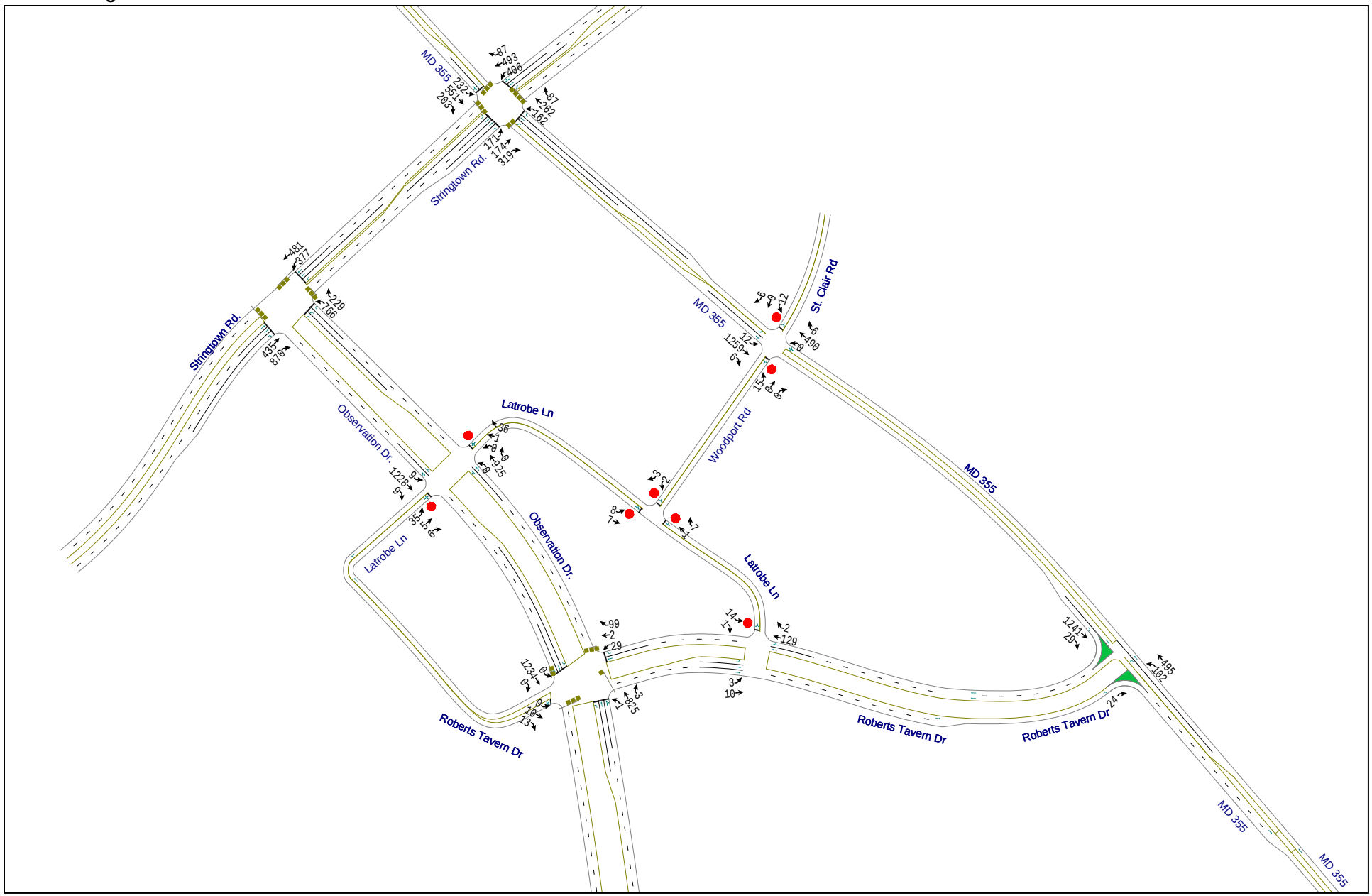


RK&K

Roberts Tavern Drive Extended

2030 Alternative 4 **AM Peak**

Lane Configurations and Volumes

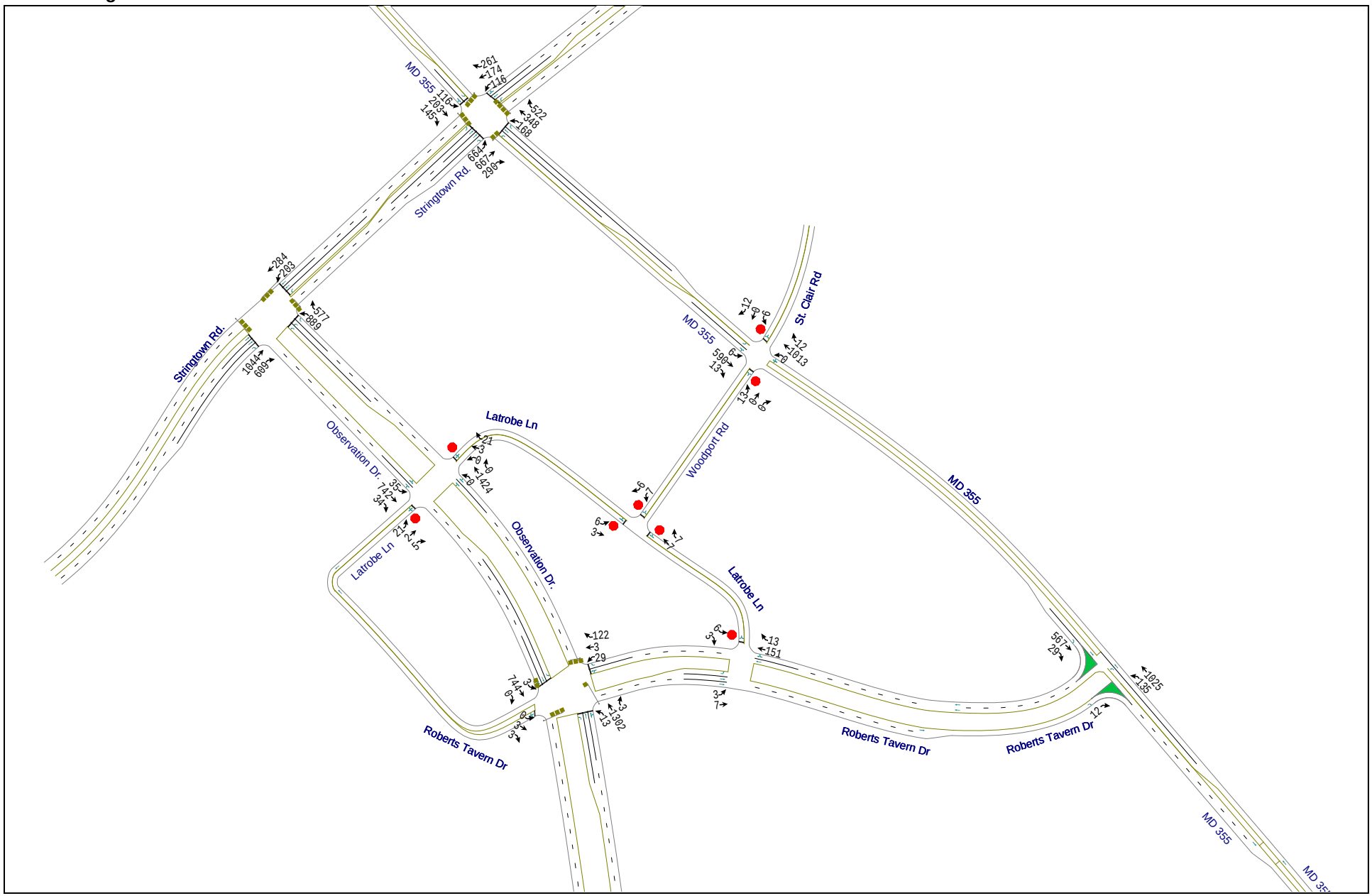


RK&K

Roberts Tavern Drive Extended

2030 Alternative 4 **PM Peak**

Lane Configurations and Volumes

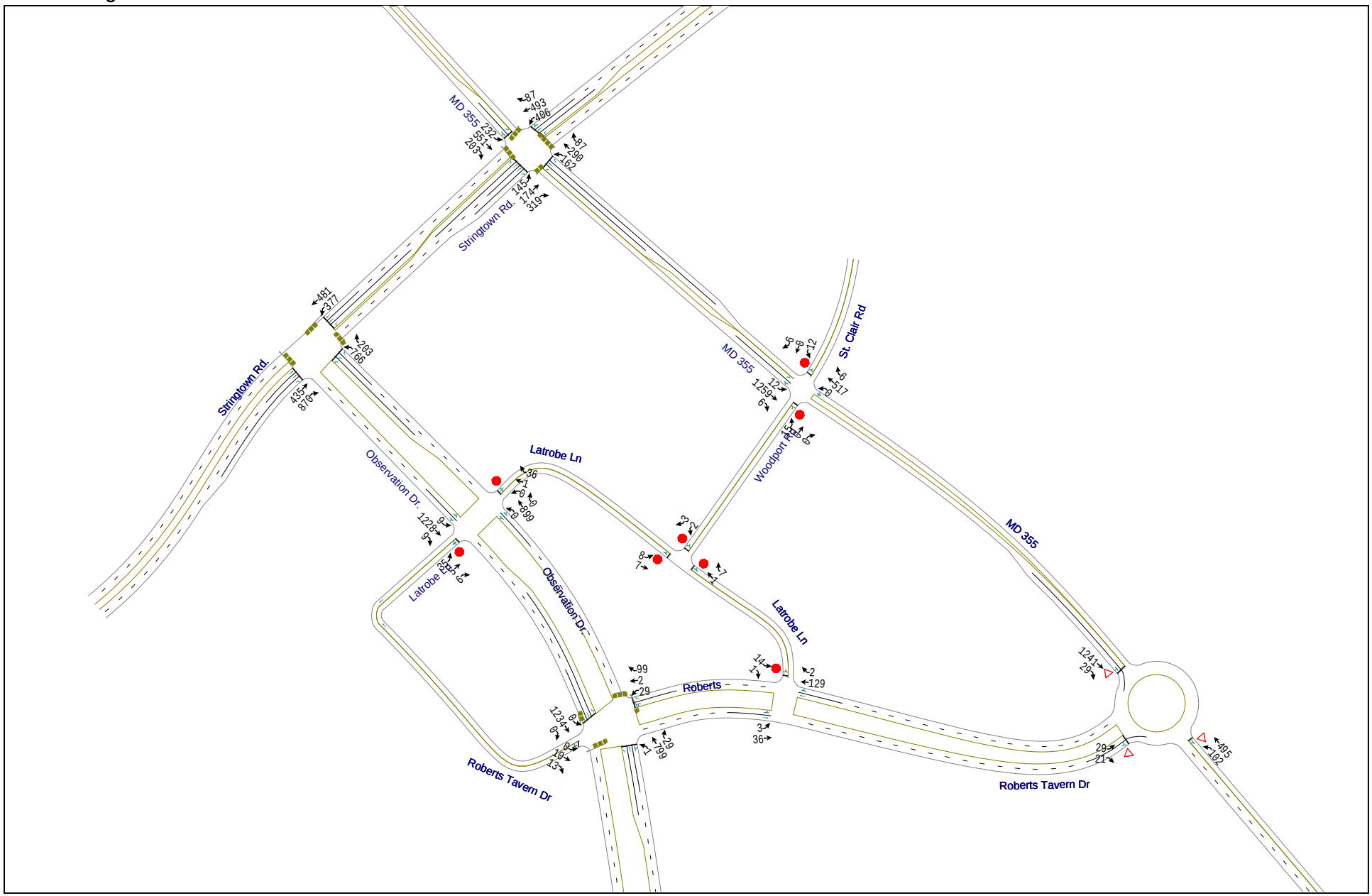


RK&K

Roberts Tavern Drive Extended

2030 Alternative 5 **AM Peak**

Lane Configurations and Volumes

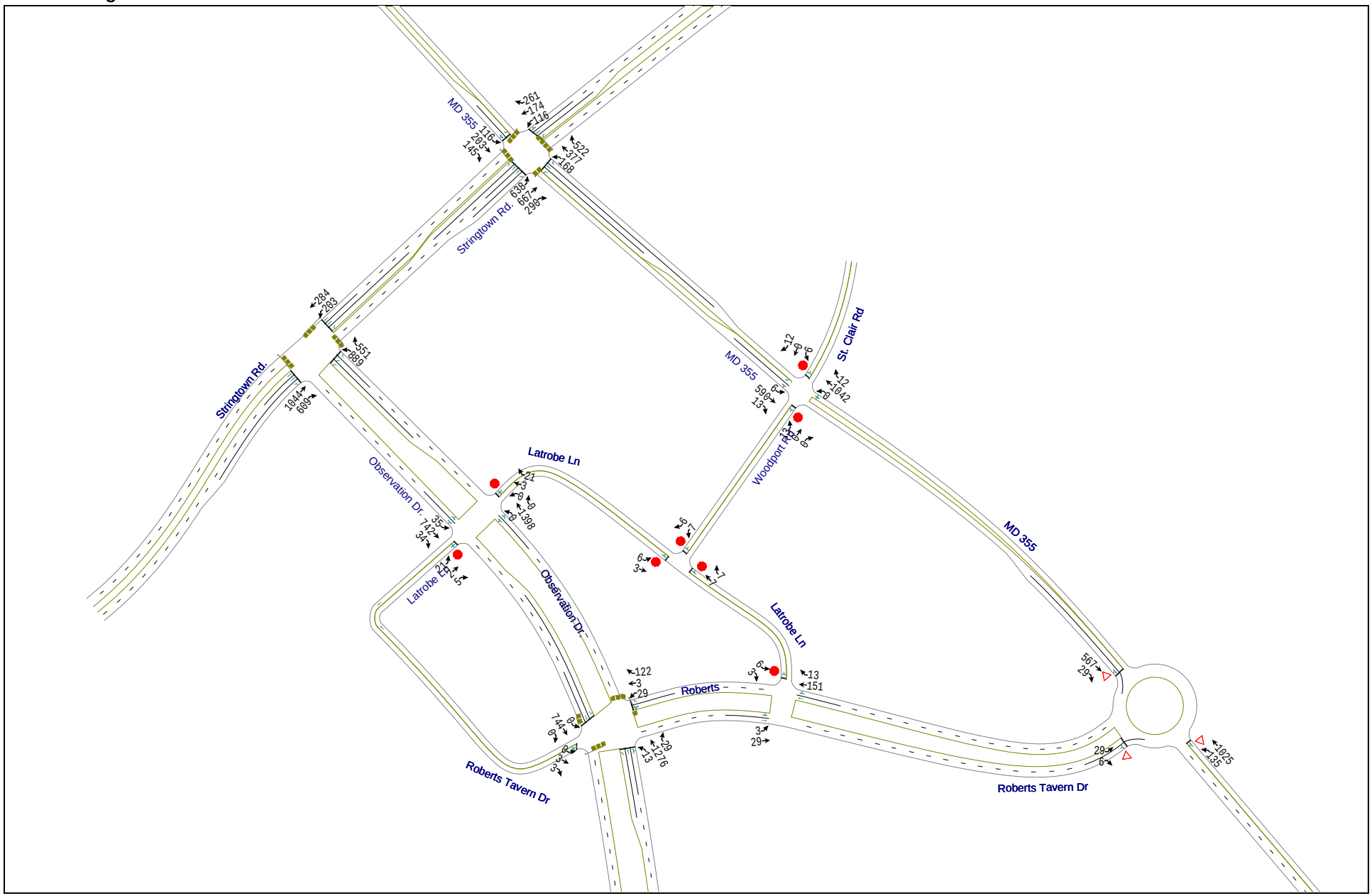


RK&K

Roberts Tavern Drive Extended

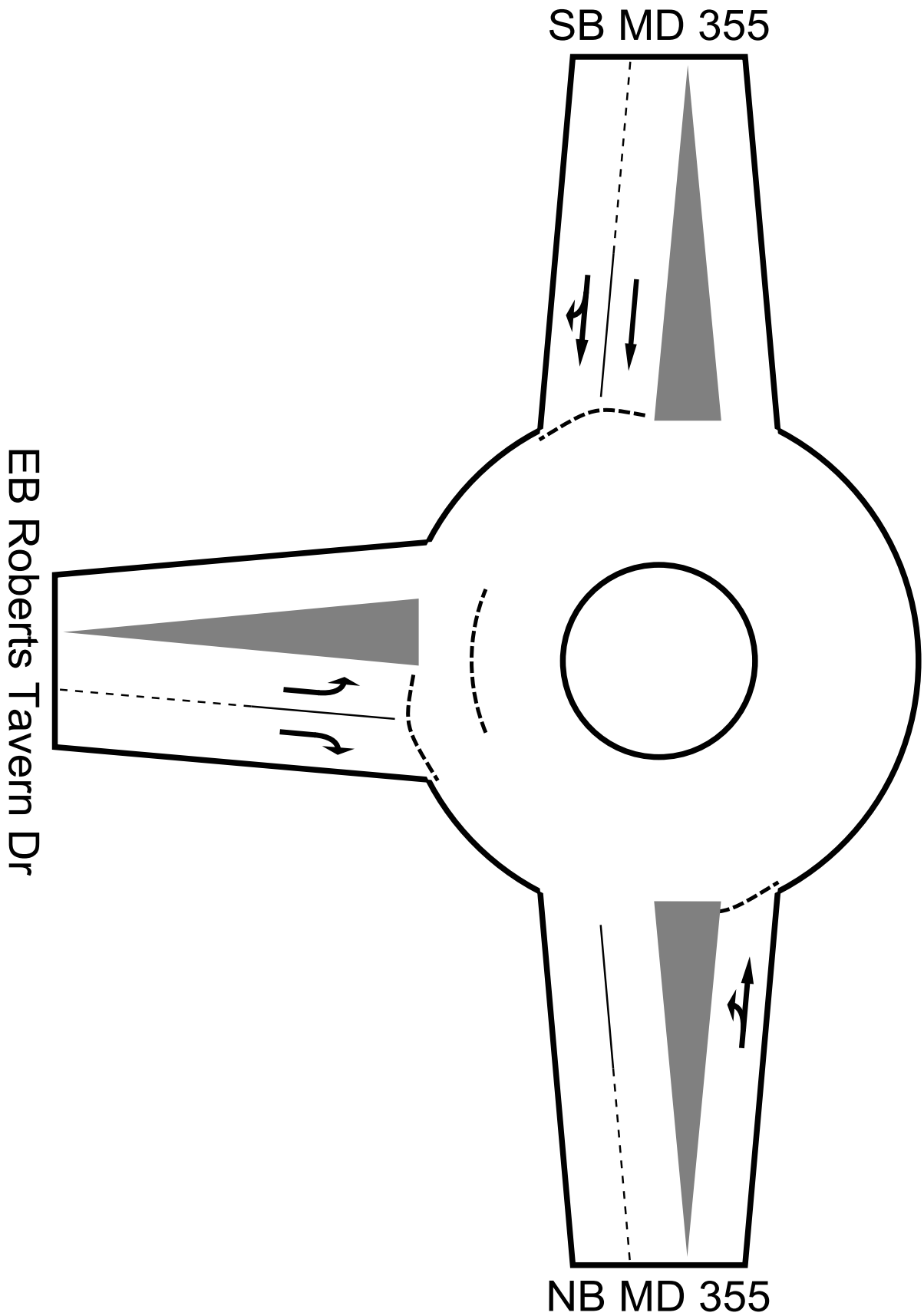
2030 Alternative 5 **PM Peak**

Lane Configurations and Volumes



RK&K

Roberts Tavern Drive Extended


SB MD 355
EB Roberts Tavern Dr
NB MD 355

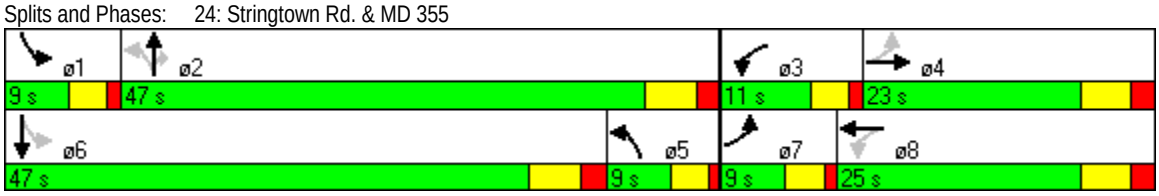
Appendix C:
Synchro, HCM, SIDRA and CLV Analysis Reports

Existing 2009 Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	47	41	212	285	18	67	116	89	19	616	99
Satd. Flow (prot)	1770	3302	0	1770	3507	0	1770	1863	1583	1770	1818	0
Flt Permitted	0.437			0.549			0.118			0.593		
Satd. Flow (perm)	814	3302	0	1023	3507	0	220	1863	1583	1105	1818	0
Satd. Flow (RTOR)		68			7				151		14	
Lane Group Flow (vph)	71	152	0	294	404	0	80	153	151	32	832	0
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Total Split (s)	9.0	23.0	0.0	11.0	25.0	0.0	9.0	47.0	47.0	9.0	47.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	24.0	19.0		28.4	22.8		46.6	46.6	46.6	44.8	44.8	
Actuated g/C Ratio	0.27	0.21		0.32	0.25		0.52	0.52	0.52	0.50	0.50	
v/c Ratio	0.26	0.20		0.77	0.45		0.40	0.16	0.17	0.05	0.91	
Control Delay	23.8	17.4		41.6	30.5		28.9	13.0	2.8	12.8	37.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	23.8	17.4		41.6	30.5		28.9	13.0	2.8	12.8	37.8	
LOS	C	B		D	C		C	B	A	B	D	
Approach Delay		19.4			35.2			12.3			36.8	
Approach LOS		B			D			B			D	
Queue Length 50th (ft)	28	20		132	103		24	48	0	9	428	
Queue Length 95th (ft)	40	21		158	120		45	69	4	16	#666	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250			150			300		500	100		
Base Capacity (vph)	270	751		381	894		200	964	892	587	912	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.26	0.20		0.77	0.45		0.40	0.16	0.17	0.05	0.91	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.91		
Intersection Signal Delay: 30.2	Intersection LOS: C	
Intersection Capacity Utilization 70.6%	ICU Level of Service C	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: 24: Stringtown Rd. & MD 355

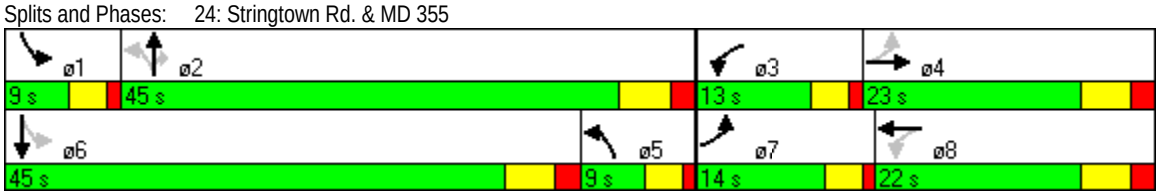


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	278	302	69	131	136	59	37	650	253	25	165	21
Satd. Flow (prot)	1770	3433	0	1770	3373	0	1770	1863	1583	1770	1833	0
Flt Permitted	0.469			0.337			0.621			0.106		
Satd. Flow (perm)	874	3433	0	628	3373	0	1157	1863	1583	197	1833	0
Satd. Flow (RTOR)		31			73				324		9	
Lane Group Flow (vph)	305	420	0	156	257	0	60	691	324	36	220	0
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Total Split (s)	14.0	23.0	0.0	13.0	22.0	0.0	9.0	45.0	45.0	9.0	45.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	29.3	19.3		26.7	18.0		44.6	44.6	44.6	42.8	42.8	
Actuated g/C Ratio	0.33	0.21		0.30	0.20		0.50	0.50	0.50	0.48	0.48	
v/c Ratio	0.79	0.55		0.53	0.35		0.10	0.75	0.34	0.20	0.25	
Control Delay	41.1	32.3		27.9	23.5		14.3	25.8	2.9	16.3	15.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	41.1	32.3		27.9	23.5		14.3	25.8	2.9	16.3	15.1	
LOS	D	C		C	C		B	C	A	B	B	
Approach Delay		36.0			25.1			18.3			15.2	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	133	104		62	46		19	328	0	11	71	
Queue Length 95th (ft)	#253	152		100	65		27	#507	24	21	110	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250			150			300		500	100		
Base Capacity (vph)	384	762		303	733		607	923	948	181	876	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.79	0.55		0.51	0.35		0.10	0.75	0.34	0.20	0.25	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 24: Stringtown Rd. & MD 355

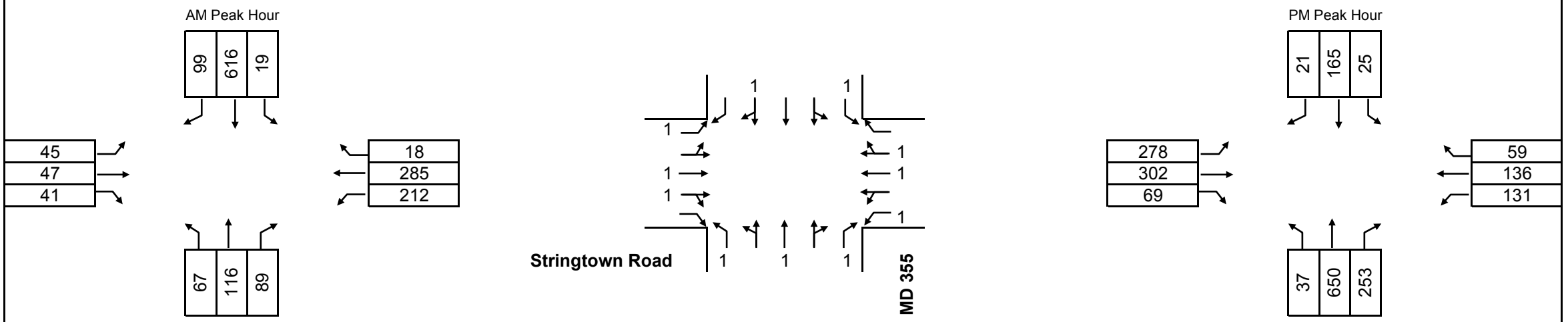


Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2009 Existing

Location: MD 355/Stringtown Road

Computed by: JCP Date: 9/3/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	116	1	116	19	135	782
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	715	1	715	67	782	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	88	0.55	48	212	260	260
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	303	0.55	167	45	212	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,042
						Level Of Service	B
						v/c ratio	0.65

PM Peak Hour

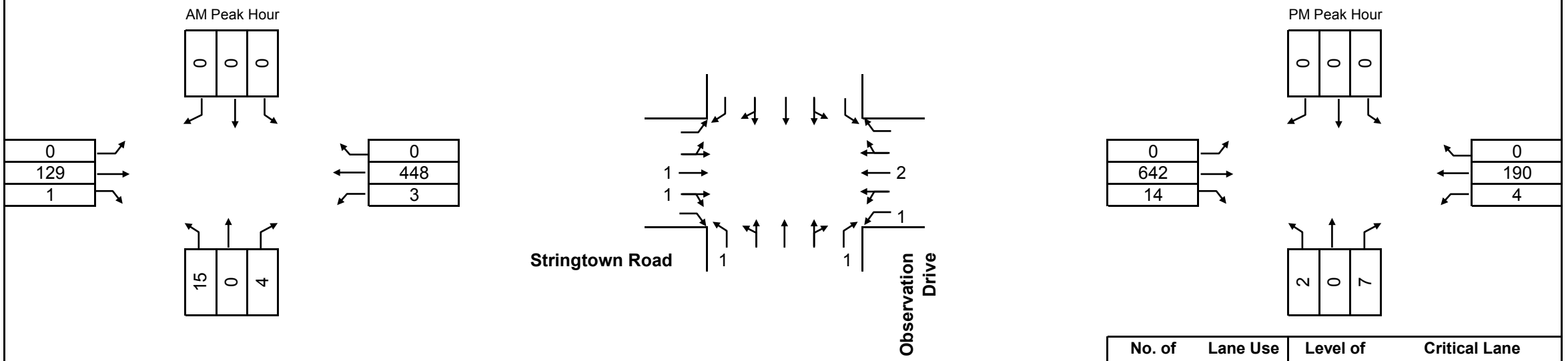
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	650	1	650	25	675	675
	NBR	122	1	122	25	147	
	NBL	0	1	0		0	
	SB	186	1	186	37	223	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	371	0.55	204	131	335	385
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	195	0.55	107	278	385	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,060
						Level Of Service	B
						v/c ratio	0.66

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2009 Existing

Location: Observation Drive/Stringtown Road

Computed by: JCP Date: 9/3/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	1	1	1	0	1	
	NBL	15	1	15		15	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	130	0.55	72	3	75	246
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	448	0.55	246	0	246	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							261
						Level Of Service	A
						v/c ratio	0.16

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	3
	NBR	3	1	3	0	3	
	NBL	2	1	2		2	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	656	0.55	361	4	365	365
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	190	0.55	105	0	105	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							368
						Level Of Service	A
						v/c ratio	0.23

Alternative 1: 2030 No-Build

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	225	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.277			0.463			0.110			0.339		
Satd. Flow (perm)	516	3539	1583	862	3458	0	205	1863	1583	631	1788	0
Satd. Flow (RTOR)			334		16				92		20	
Lane Group Flow (vph)	153	183	336	427	611	0	275	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	23.0	23.0	22.0	33.0	0.0	19.0	52.0	52.0	23.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	27.0	19.0	17.0	41.0	29.0		51.2	51.2	51.2	52.0	52.0	
Actuated g/C Ratio	0.22	0.16	0.14	0.34	0.24		0.43	0.43	0.43	0.43	0.43	
v/c Ratio	0.76	0.33	0.66	0.99	0.72		0.97	0.38	0.13	0.58	1.01	
Control Delay	45.3	40.8	9.6	78.0	46.3		93.8	26.1	5.0	28.3	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	45.3	40.8	9.6	78.0	46.3		93.8	26.1	5.0	28.3	68.2	
LOS	D	D	A	E	D		F	C	A	C	E	
Approach Delay		26.2			59.3			50.9			58.8	
Approach LOS		C			E			D			E	
Queue Length 50th (ft)	78	58	30	285	224		164	160	0	122	~610	
Queue Length 95th (ft)	m97	m73	m37	#543	291		#348	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	200	560	511	431	848		283	794	728	454	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.77	0.33	0.66	0.99	0.72		0.97	0.38	0.13	0.54	1.01	

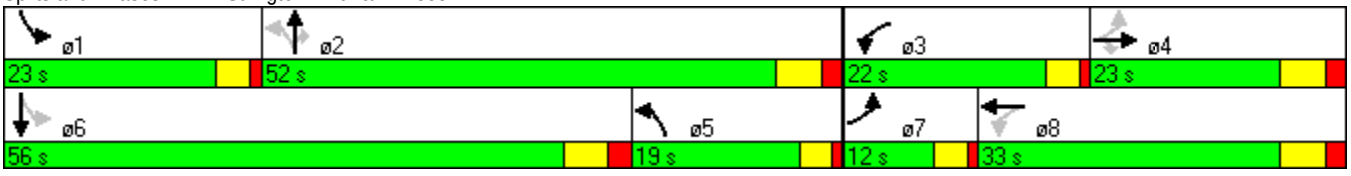
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 51.0	Intersection LOS: D
Intersection Capacity Utilization 96.5%	ICU Level of Service F
Analysis Period (min) 15	

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

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

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

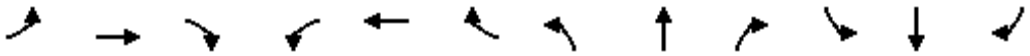
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	500	625	175
Satd. Flow (prot)	3185	0	1770	3539	3433	1583
Flt Permitted			0.174		0.950	
Satd. Flow (perm)	3185	0	324	3539	3433	1583
Satd. Flow (RTOR)	748					214
Lane Group Flow (vph)	1374	0	397	611	763	214
Turn Type			pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Total Split (s)	23.0	0.0	15.0	38.0	22.0	22.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	19.0		34.0	34.0	16.0	18.0
Actuated g/C Ratio	0.32		0.57	0.57	0.27	0.30
v/c Ratio	0.90		0.88	0.30	0.83	0.34
Control Delay	19.3		35.7	5.6	30.9	4.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	19.3		35.7	5.6	30.9	4.6
LOS	B		D	A	C	A
Approach Delay	19.3			17.4	25.2	
Approach LOS	B			B	C	
Queue Length 50th (ft)	112		182	64	133	0
Queue Length 95th (ft)	#258		m#217	m73	#219	40
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)			250		250	
Base Capacity (vph)	1520		449	2005	915	625
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	0.90		0.88	0.30	0.83	0.34

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 49 (82%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 93.3%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

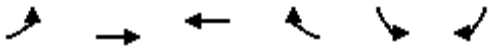
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	9	11	11	2	0	1	739	2	0	1059	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	11	13	13	2	0	1	902	2	0	1293	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (ft)											1099	
pX, platoon unblocked												
vC, conflicting volume	1748	2200	647	1571	2199	452	1293			905		
vC1, stage 1 conf vol	1293	1293		906	906							
vC2, stage 2 conf vol	455	907		665	1293							
vCu, unblocked vol	1748	2200	647	1571	2199	452	1293			905		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	94	97	94	99	100	100			100		
cM capacity (veh/h)	163	192	414	237	191	554	532			747		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	24	16	0	1	602	303	0	862	431
Volume Left	0	13	0	1	0	0	0	0	0
Volume Right	13	0	0	0	0	2	0	0	0
cSH	272	229	1700	532	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.07	0.00	0.00	0.35	0.18	0.00	0.51	0.25
Queue Length 95th (ft)	7	6	0	0	0	0	0	0	0
Control Delay (s)	19.5	21.9	0.0	11.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	C	A	B					
Approach Delay (s)	19.5	21.9		0.0			0.0		
Approach LOS	C	C							

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	48.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	0	0	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	0	0	0	0	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				22	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					22	
vCu, unblocked vol	0				22	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1623				906	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	11	0	2
Volume Left	11	0	0
Volume Right	0	0	2
cSH	1623	1700	1085
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	575	575	250	100	150	225	275	330	415	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.190			0.385			0.286			0.333		
Satd. Flow (perm)	354	3539	1583	717	3221	0	533	1863	1583	620	1745	0
Satd. Flow (RTOR)			305		229				294		29	
Lane Group Flow (vph)	702	702	305	122	458	0	336	403	507	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	42.0	52.0	52.0	13.0	23.0	0.0	20.0	34.0	34.0	11.0	25.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	61.0	48.7	46.7	27.3	19.0		30.0	30.0	30.0	21.0	21.0	
Actuated g/C Ratio	0.55	0.44	0.42	0.25	0.17		0.27	0.27	0.27	0.19	0.19	
v/c Ratio	1.02	0.45	0.36	0.47	0.61		1.03	0.79	0.78	0.64	1.03	
Control Delay	47.1	13.9	1.4	24.4	24.5		102.7	50.0	24.9	55.1	96.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	47.1	13.9	1.4	24.4	24.5		102.7	50.0	24.9	55.1	96.1	
LOS	D	B	A	C	C		F	D	C	E	F	
Approach Delay		25.3			24.5			54.0			85.9	
Approach LOS		C			C			D			F	
Queue Length 50th (ft)	~437	141	4	39	76		~223	264	143	76	~260	
Queue Length 95th (ft)	m#480	m144	m4	68	132		#435	#411	#289	#141	#448	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	685	1566	847	269	746		325	508	646	192	357	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.02	0.45	0.36	0.45	0.61		1.03	0.79	0.78	0.64	1.03	

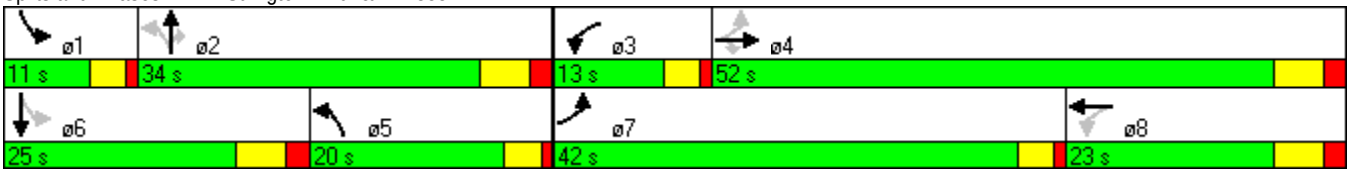
Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 41.4	Intersection LOS: D
Intersection Capacity Utilization 100.7%	ICU Level of Service G
Analysis Period (min) 15	

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

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

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

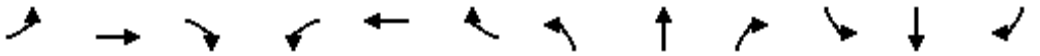
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	925	525	175	375	645	475
Satd. Flow (prot)	3348	0	1770	3539	3433	1583
Flt Permitted			0.067		0.950	
Satd. Flow (perm)	3348	0	125	3539	3433	1583
Satd. Flow (RTOR)	147					190
Lane Group Flow (vph)	1770	0	214	458	788	580
Turn Type			pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Total Split (s)	60.0	0.0	14.0	74.0	36.0	36.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0		70.0	70.0	30.0	32.0
Actuated g/C Ratio	0.51		0.64	0.64	0.27	0.29
v/c Ratio	1.00		0.93	0.20	0.84	0.97
Control Delay	45.7		70.6	8.7	47.3	58.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	45.7		70.6	8.7	47.3	58.1
LOS	D		E	A	D	E
Approach Delay	45.7			28.4	51.9	
Approach LOS	D			C	D	
Queue Length 50th (ft)	598		118	69	271	296
Queue Length 95th (ft)	#795		m#145	m87	#352	#532
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)			250		250	
Base Capacity (vph)	1777		229	2252	936	595
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	1.00		0.93	0.20	0.84	0.97

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 59 (54%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 44.9	Intersection LOS: D
Intersection Capacity Utilization 93.4%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

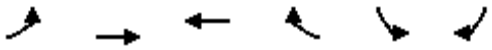
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	4	3	3	8	0	11	1084	12	0	641	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	5	4	4	10	0	13	1324	15	0	783	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								Raised			Raised	
Median storage veh)								2			2	
Upstream signal (ft)											1099	
pX, platoon unblocked												
vC, conflicting volume	1476	2148	391	1755	2141	669	783			1338		
vC1, stage 1 conf vol	783	783		1358	1358							
vC2, stage 2 conf vol	694	1365		397	783							
vCu, unblocked vol	1476	2148	391	1755	2141	669	783			1338		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	97	99	98	95	100	98			100		
cM capacity (veh/h)	264	185	607	148	185	400	831			511		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	9	13	0	13	882	456	0	522	261
Volume Left	0	4	0	13	0	0	0	0	0
Volume Right	4	0	0	0	0	15	0	0	0
cSH	264	173	1700	831	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.08	0.00	0.02	0.52	0.27	0.00	0.31	0.15
Queue Length 95th (ft)	3	6	0	1	0	0	0	0	0
Control Delay (s)	19.1	27.5	0.0	9.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	D	A	A					
Approach Delay (s)	19.1	27.5		0.1			0.0		
Approach LOS	C	D							

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	45.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	0	0	0	0	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	0	0	0	0	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				10	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					10	
vCu, unblocked vol	0				10	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1623				922	1085

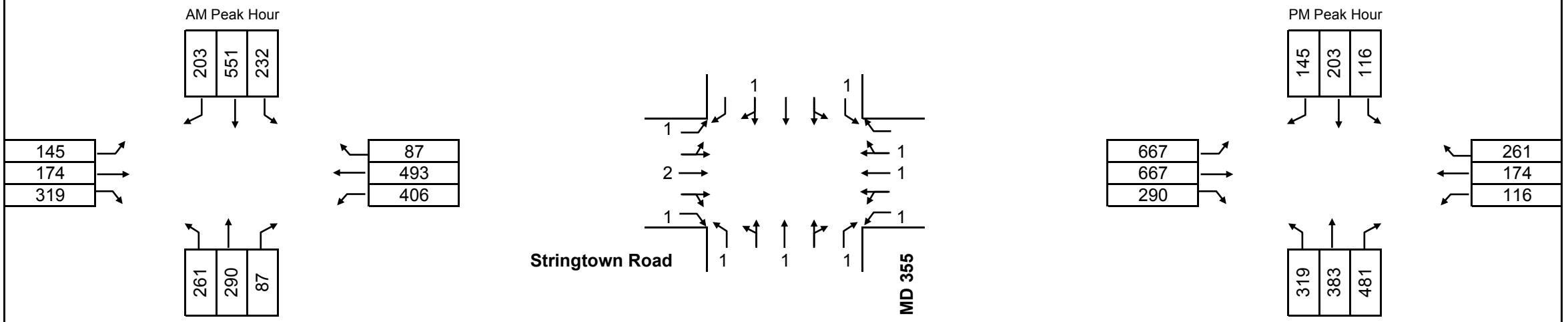
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	5	0	10
Volume Left	5	0	0
Volume Right	0	0	10
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Turning Movement Summary and Level of Service

Count Date: n/a Location: MD 355/Stringtown Road
Conditions/
Design Year: 2030 Alt. 1: No-Build

Computed by: JCP Date: 9/3/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

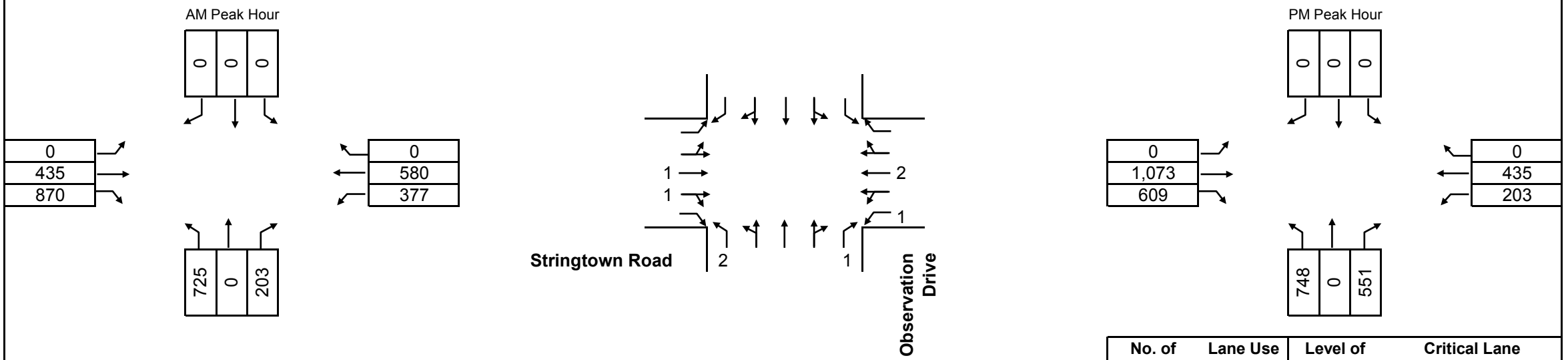
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	1,015
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	261	1,015	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	502
	EBR	58	1	58	406	464	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,517
						Level Of Service	E
						v/c ratio	0.95

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	383	1	383	116	499	667
	NBR	365	1	365	116	481	
	NBL	0	1	0		0	
	SB	348	1	348	319	667	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	906
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	435	0.55	239	667	906	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,573
						Level Of Service	E
						v/c ratio	0.98

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 1: No-Build				
Computed by:	JCP	Date:	9/3/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	435
	NBR	0	1	0	0	0	
	NBL	725	0.6	435		435	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	1,305	0.55	718	377	1,095	1,095
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	580	0.55	319	0	319	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,530
						Level Of Service	E
						v/c ratio	0.96

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	449
	NBR	348	1	348	0	348	
	NBL	748	0.6	449		449	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,682	0.55	925	203	1,128	1,128
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	435	0.55	239	0	239	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,577
						Level Of Service	E
						v/c ratio	0.99

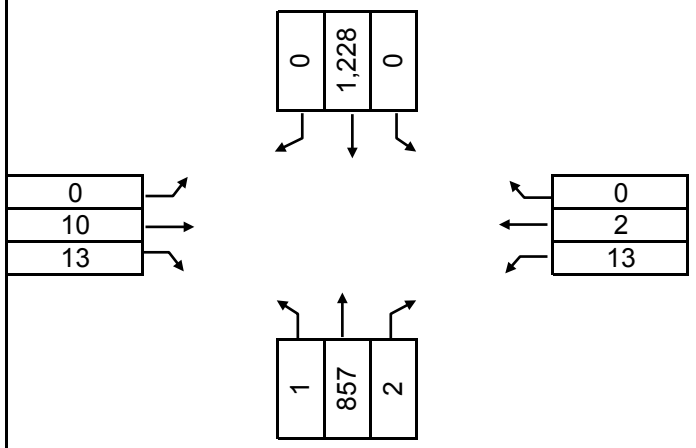
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 1: No-Build

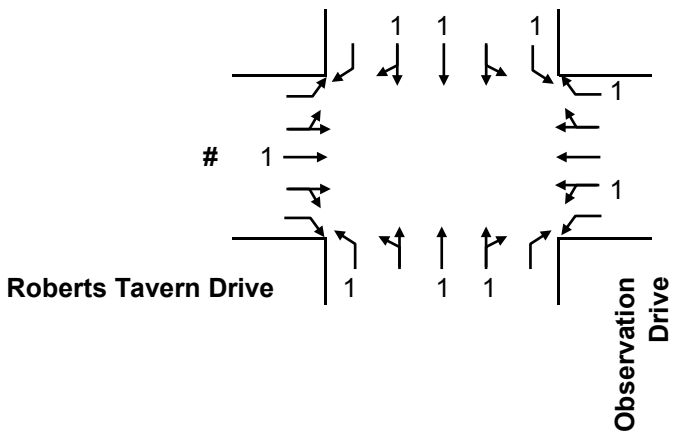
Location: Observation Drive/Roberts Tavern Drive

Computed by: JCP Date: 9/3/09 Checked by: Date:

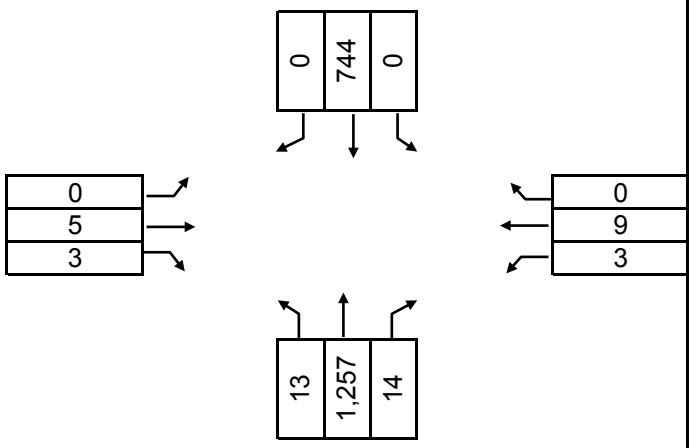
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	859	0.55	472	0	472	676
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,228	0.55	675	1	676	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	23	1	23	0	23	23
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	15	1	15	0	15	15
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							714
						Level Of Service	A
						v/c ratio	0.45

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,271	0.55	699	0	699	699
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	744	0.55	409	13	422	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	12	1	12	0	12	12
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							719
						Level Of Service	A
						v/c ratio	0.45

Alternative 2:
2030 Hybrid of the Master Plan and Existing MD 355 Alignments
Right Turn Spur from Southbound MD 355
No Eastbound Left Turn from Roberts Tavern Drive to MD 355
Unsignalized

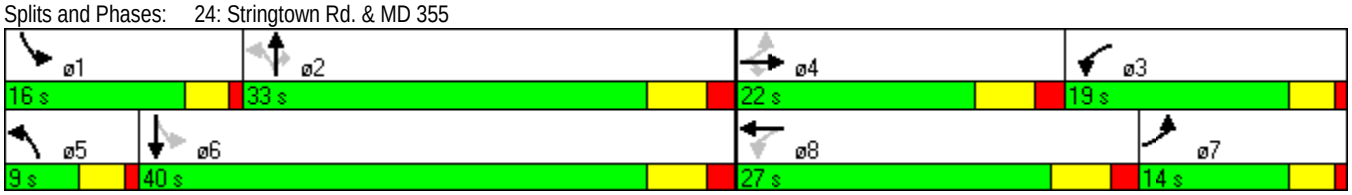
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	150	275	350	425	75	140	226	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.250			0.634			0.136			0.402		
Satd. Flow (perm)	466	3539	1583	1181	3458	0	253	1863	1583	749	1788	0
Satd. Flow (RTOR)			274		21				92		25	
Lane Group Flow (vph)	179	183	336	427	611	0	171	276	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	14.0	22.0	22.0	19.0	27.0	0.0	9.0	33.0	33.0	16.0	40.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.5	18.0	16.0	35.5	23.0		37.8	31.4	31.4	45.3	36.0	
Actuated g/C Ratio	0.29	0.20	0.18	0.39	0.26		0.42	0.35	0.35	0.50	0.40	
v/c Ratio	0.69	0.26	0.66	0.77	0.68		0.80	0.43	0.15	0.49	1.09	
Control Delay	31.0	10.9	7.9	35.8	33.6		46.2	25.8	5.7	16.2	87.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	31.0	10.9	7.9	35.8	33.6		46.2	25.8	5.7	16.2	87.1	
LOS	C	B	A	D	C		D	C	A	B	F	
Approach Delay		14.6			34.5			28.8			70.4	
Approach LOS		B			C			C			E	
Queue Length 50th (ft)	53	16	9	186	158		51	124	0	76	~505	
Queue Length 95th (ft)	118	28	34	280	218		#174	197	33	125	#730	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	290	708	507	584	899		215	649	612	522	730	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.62	0.26	0.66	0.73	0.68		0.80	0.43	0.15	0.47	1.09	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 40.6	Intersection LOS: D
Intersection Capacity Utilization 95.3%	ICU Level of Service F
Analysis Period (min) 15	

~ 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.

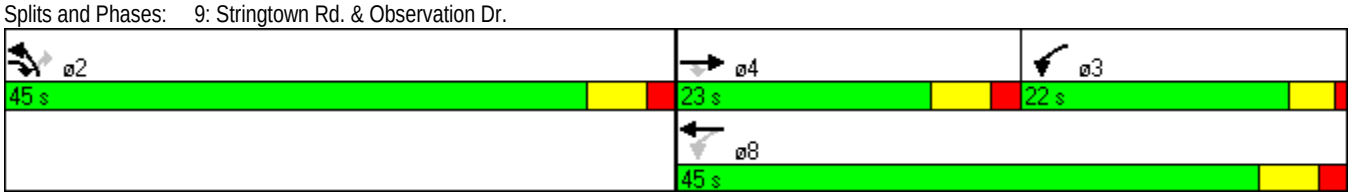
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	197
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.340		0.950	
Satd. Flow (perm)	3539	1583	633	3539	3433	1583
Satd. Flow (RTOR)		183				241
Lane Group Flow (vph)	458	916	397	507	806	241
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	23.0	45.0	22.0	45.0	45.0	45.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	19.0	62.0	41.0	41.0	39.0	41.0
Actuated g/C Ratio	0.21	0.69	0.46	0.46	0.43	0.46
v/c Ratio	0.61	0.80	0.77	0.31	0.54	0.28
Control Delay	36.3	14.2	18.4	6.5	17.5	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	14.2	18.4	6.5	17.5	2.4
LOS	D	B	B	A	B	A
Approach Delay	21.6			11.8	14.1	
Approach LOS	C			B	B	
Queue Length 50th (ft)	124	249	73	45	95	0
Queue Length 95th (ft)	176	447	m94	m55	162	27
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	747	1147	516	1612	1488	852
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.80	0.77	0.31	0.54	0.28

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 80 (89%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

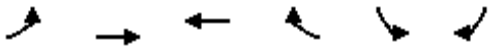
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	711	3	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3536	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3536	0	1863	3539	0
Satd. Flow (RTOR)		13				104		1				
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.2			44.2	8.8	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.2			44.2	8.8	5.0	5.2			2.7	
LOS		C			D	A	A	A			A	
Approach Delay		26.2			17.3			5.2			2.7	
Approach LOS		C			B			A			A	
Queue Length 50th (ft)		6			18	0	0	92			55	
Queue Length 95th (ft)		m21			46	39	2	138			165	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2722			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 71 (79%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

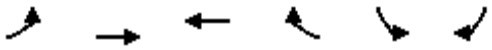
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	9	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	11	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	138				150	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					13	
vCu, unblocked vol	138				150	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				789	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	7	7	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	801
Volume to Capacity	0.00	0.00	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	3.8	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	1.9		0.0		9.6
Approach LOS					A

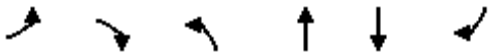
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	24	102	0	0	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	25	107	0	0	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		1111				
pX, platoon unblocked						
vC, conflicting volume	107				120	54
vC1, stage 1 conf vol					107	
vC2, stage 2 conf vol					13	
vCu, unblocked vol	107				120	54
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	1481				818	1002

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	13	13	54	54	31
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	31
cSH	1700	1700	1700	1700	1002
Volume to Capacity	0.01	0.01	0.03	0.03	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	8.7
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.7
Approach LOS					A

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	24	102	495	1241	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	25	107	521	1306	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	2042	1306	1306			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2042	1306	1306			
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	87	80			
cM capacity (veh/h)	49	195	530			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	107	521	1306
Volume Left	0	107	0	0
Volume Right	25	0	0	0
cSH	195	530	1700	1700
Volume to Capacity	0.13	0.20	0.31	0.77
Queue Length 95th (ft)	11	19	0	0
Control Delay (s)	26.2	13.5	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	26.2	2.3		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

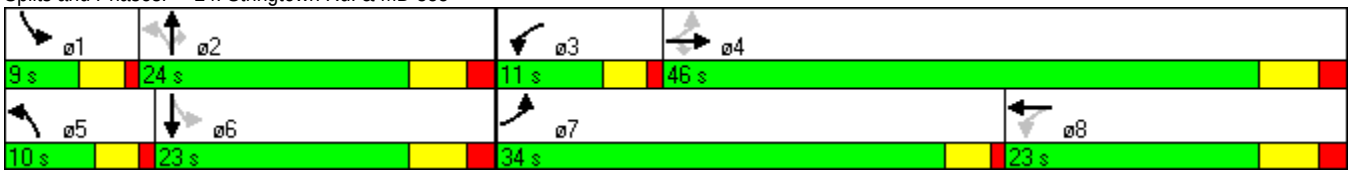
Note: The eastbound right turn movement is shown with stop control because the HCM method will not provide analysis results for the actual intersection configuration, which has a free-flow right turn movement. The LOS D shown above for the eastbound right turn movement should be ignored. The LOS B for the northbound left turn movement is accurate.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	572	575	250	100	150	225	145	300	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.233			0.385			0.222			0.235		
Satd. Flow (perm)	434	3539	1583	717	3221	0	414	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		215				298		36	
Lane Group Flow (vph)	698	702	305	122	458	0	177	366	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	34.0	46.0	46.0	11.0	23.0	0.0	10.0	24.0	24.0	9.0	23.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	53.0	42.2	40.2	25.8	19.0		26.0	20.0	20.0	24.0	19.0	
Actuated g/C Ratio	0.59	0.47	0.45	0.29	0.21		0.29	0.22	0.22	0.27	0.21	
v/c Ratio	1.00	0.42	0.35	0.43	0.54		0.84	0.88	0.94	0.64	0.92	
Control Delay	38.8	9.5	1.0	18.1	19.0		59.7	58.5	42.4	40.6	62.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	38.8	9.5	1.0	18.1	19.0		59.7	58.5	42.4	40.6	62.9	
LOS	D	A	A	B	B		E	E	D	D	E	
Approach Delay		20.0			18.8			50.6			57.3	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	96	80	0	28	62		75	203	152	50	187	
Queue Length 95th (ft)	m#539	m117	m0	52	111		#156	#361	#363	#107	#357	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	701	1659	876	289	850		210	414	584	191	397	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.00	0.42	0.35	0.42	0.54		0.84	0.88	0.94	0.64	0.92	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 33.2	Intersection LOS: C
Intersection Capacity Utilization 92.2%	ICU Level of Service F
Analysis Period (min) 15	

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

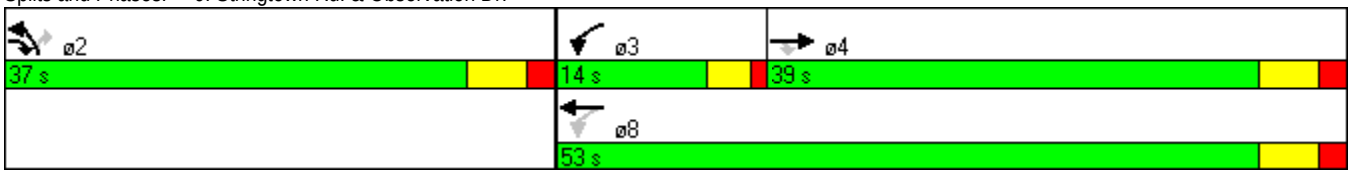
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	497
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.107		0.950	
Satd. Flow (perm)	3539	1583	199	3539	3433	1583
Satd. Flow (RTOR)		189				272
Lane Group Flow (vph)	1099	641	214	299	935	607
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	39.0	37.0	14.0	53.0	37.0	37.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	35.3	70.3	49.0	49.0	31.0	33.0
Actuated g/C Ratio	0.39	0.78	0.54	0.54	0.34	0.37
v/c Ratio	0.79	0.50	0.77	0.16	0.79	0.81
Control Delay	29.3	3.9	29.5	6.6	26.5	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	3.9	29.5	6.6	26.5	18.6
LOS	C	A	C	A	C	B
Approach Delay	19.9			16.1	23.4	
Approach LOS	B			B	C	
Queue Length 50th (ft)	285	62	38	26	247	182
Queue Length 95th (ft)	368	110	m92	m36	211	#111
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	1389	1278	283	1927	1182	753
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.50	0.76	0.16	0.79	0.81

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 50 (56%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 20.8	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

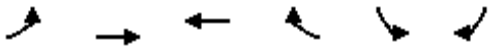
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1122	3	3	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.745		0.355			0.146		
Satd. Flow (perm)	0	1736	0	0	1388	1583	661	3539	0	272	3539	0
Satd. Flow (RTOR)		4				48		1				
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	4	783	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	11.0	58.0	58.0	0.0	11.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.7	14.5	65.5	65.5		76.7	78.7	
Actuated g/C Ratio		0.08			0.09	0.16	0.73	0.73		0.85	0.87	
v/c Ratio		0.05			0.30	0.43	0.03	0.53		0.01	0.25	
Control Delay		29.5			44.3	24.2	5.4	7.4		1.5	1.5	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		29.5			44.3	24.2	5.4	7.4		1.5	1.5	
LOS		C			D	C	A	A		A	A	
Approach Delay		29.5			28.5			7.4			1.5	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			19	39	2	182		0	30	
Queue Length 95th (ft)		m7			47	85	9	267		m1	55	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		312			247	299	481	2574		338	3094	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.03			0.14	0.43	0.03	0.53		0.01	0.25	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 84 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 59.5%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

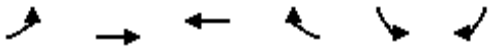
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	6	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	7	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	172				176	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					11	
vCu, unblocked vol	172				176	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				764	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	6	5	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	826
Volume to Capacity	0.00	0.00	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	4.6	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	2.5		0.0		9.4
Approach LOS					A

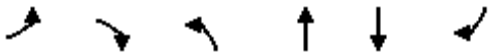
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	12	135	0	0	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	13	142	0	0	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		1111				
pX, platoon unblocked						
vC, conflicting volume	142				148	71
vC1, stage 1 conf vol					142	
vC2, stage 2 conf vol					6	
vCu, unblocked vol	142				148	71
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	1438				787	977

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	6	6	71	71	31
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	31
cSH	1700	1700	1700	1700	977
Volume to Capacity	0.00	0.00	0.04	0.04	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	8.8
Lane LOS					A
Approach Delay (s)	0.0		0.0		8.8
Approach LOS					A

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	12	135	1025	567	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	13	142	1079	597	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	1960	597	597			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1960	597	597			
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	97	85			
cM capacity (veh/h)	60	503	980			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	13	142	1079	597
Volume Left	0	142	0	0
Volume Right	13	0	0	0
cSH	503	980	1700	1700
Volume to Capacity	0.03	0.15	0.63	0.35
Queue Length 95th (ft)	2	13	0	0
Control Delay (s)	12.3	9.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	1.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

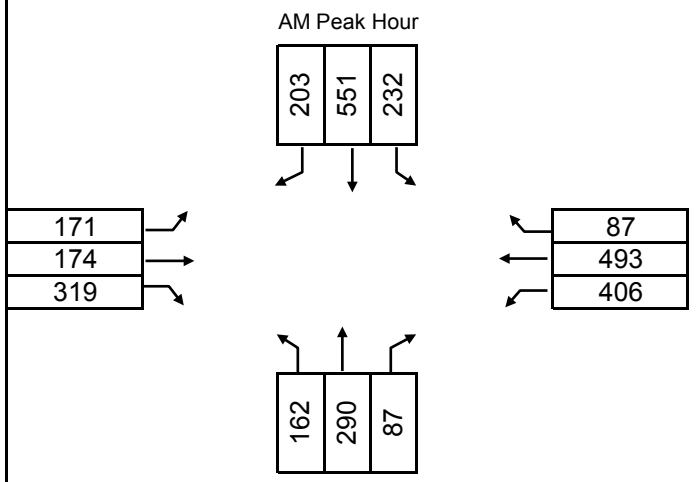
Note: The eastbound right turn movement is shown with stop control because the HCM method will not provide analysis results for the actual intersection configuration, which has a free-flow right turn movement. The LOS B shown above for the eastbound right turn movement should be ignored. The LOS A for the northbound left turn movement is accurate.

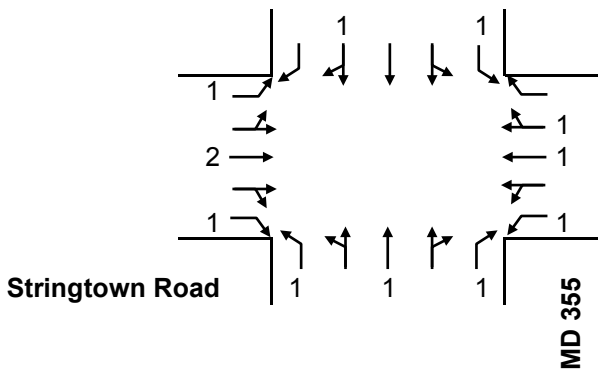
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/ Design Year: 2030 Alt. 2: Free EB R, No EB L at MD 355
Location: MD 355/Stringtown Road

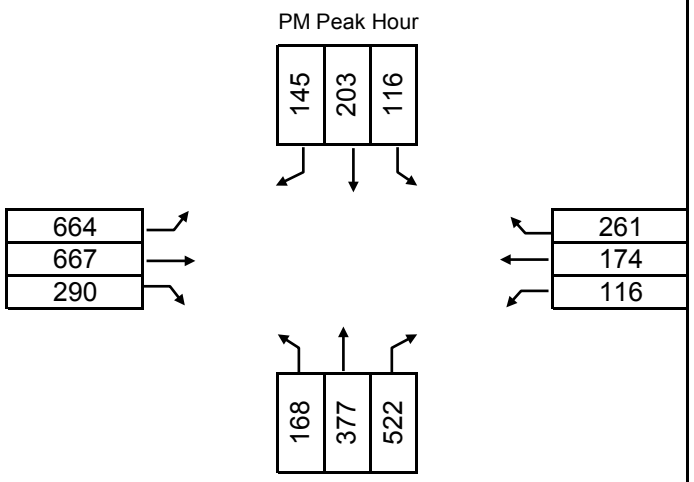
Computed by: JCP Date: 11/4/09 Checked by: Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	171	490	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

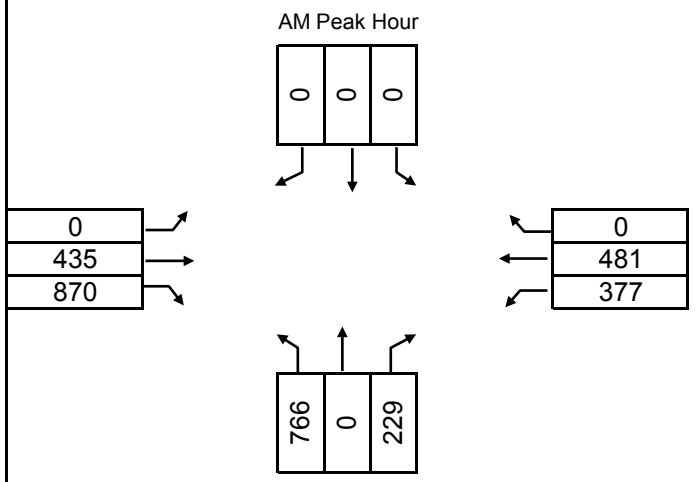
PM Peak Hour

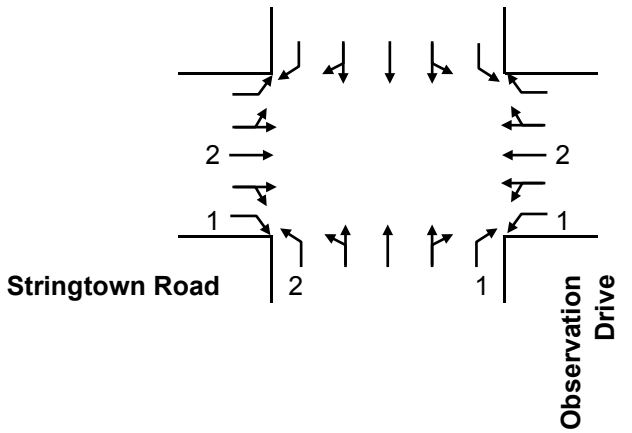
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	903
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	664	903	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,425
						Level Of Service	D
						v/c ratio	0.89

Turning Movement Summary and Level of Service

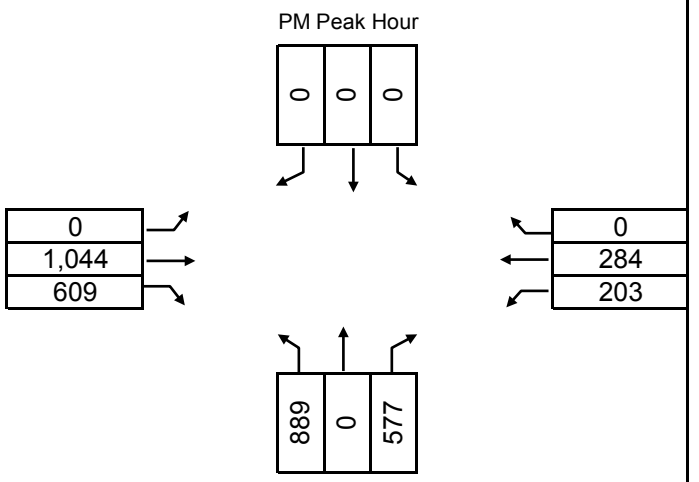
Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 2: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

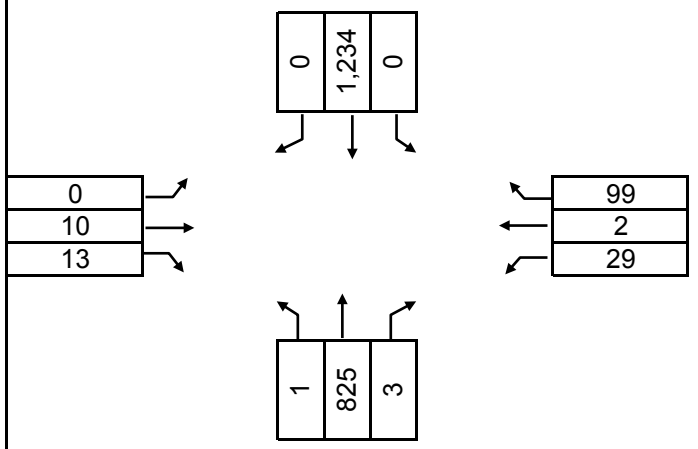
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	374	1	374	0	374	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

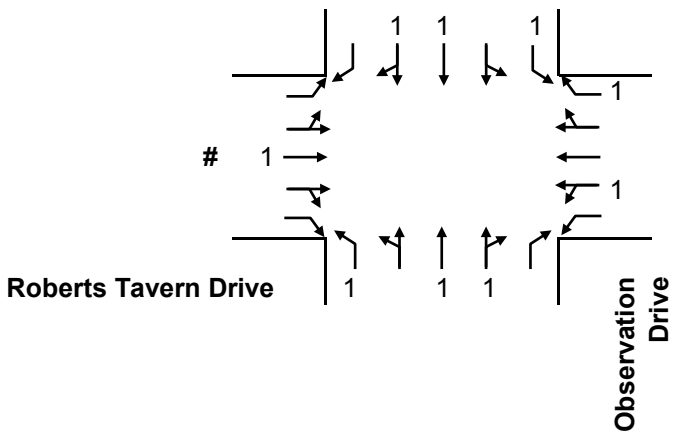
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 2: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

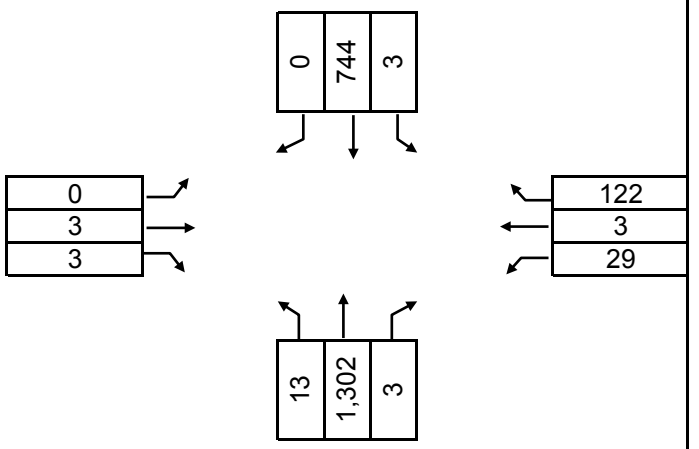
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	23	1	23	0	23	23
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							802
						Level Of Service	A
						v/c ratio	0.50

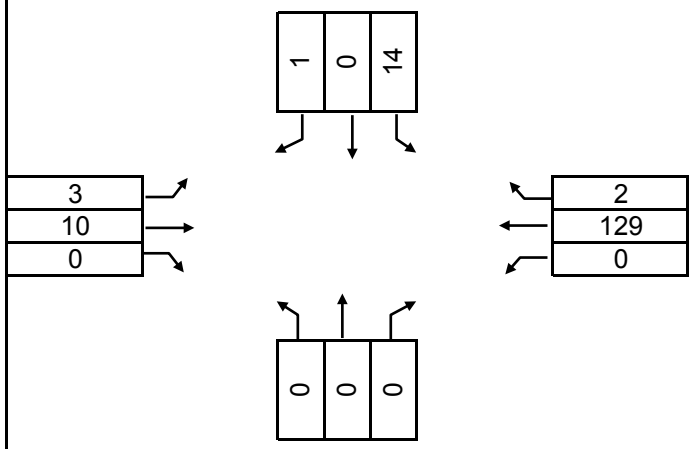
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,305	0.55	718	3	721	721
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	744	0.55	409	13	422	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	6	1	6	0	6	6
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	119
	WBR	119	1	119	0	119	
	WBL	0	1	0		0	
							846
						Level Of Service	A
						v/c ratio	0.53

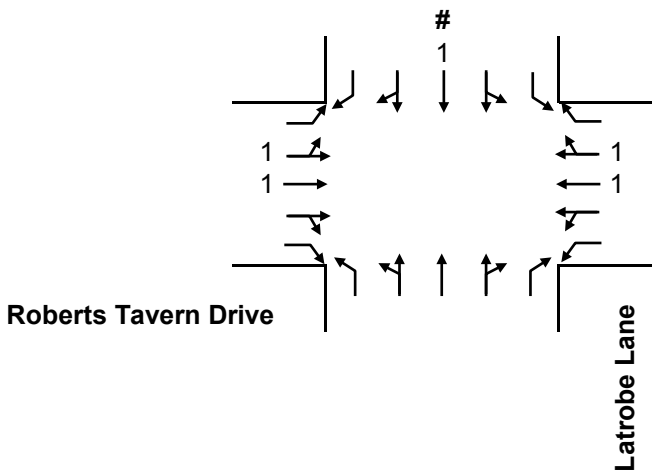
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 2: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

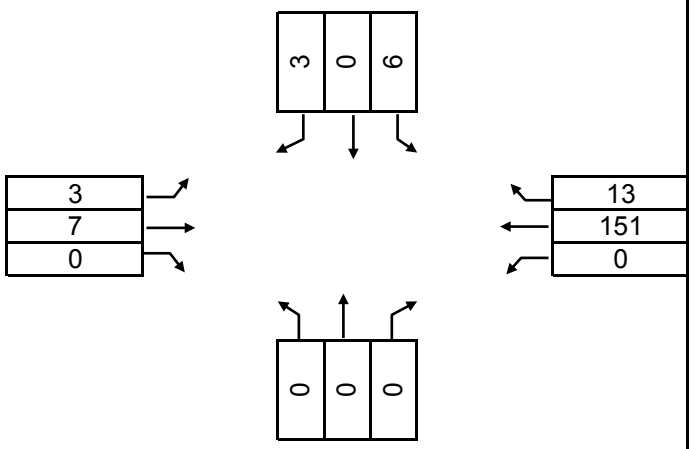
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

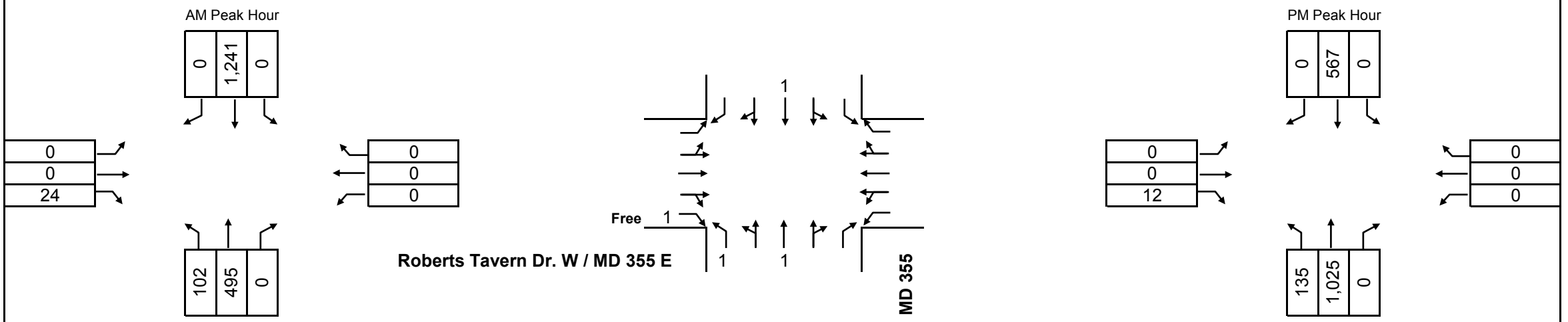
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	13	0.55	7	0	7	75
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	3	75	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							90
						Level Of Service	A
						v/c ratio	0.06

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	9
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	9	1	9	0	9	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	10	0.55	6	0	6	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							102
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/ Design Year:	2030 Alt. 2: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	495	1	495	0	495	1,343
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,241	1	1,241	102	1,343	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	0
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,343
						Level Of Service	D
						v/c ratio	0.84

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,025	1	1,025	0	1,025	1,025
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	567	1	567	135	702	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	0
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,025
						Level Of Service	B
						v/c ratio	0.64

Alternative 2 (Final):
2030 Master Plan Alignment with Signal
Use Existing MD 355 as Northbound Right Turn Spur
No Eastbound Left Turn from Roberts Tavern Drive to MD 355

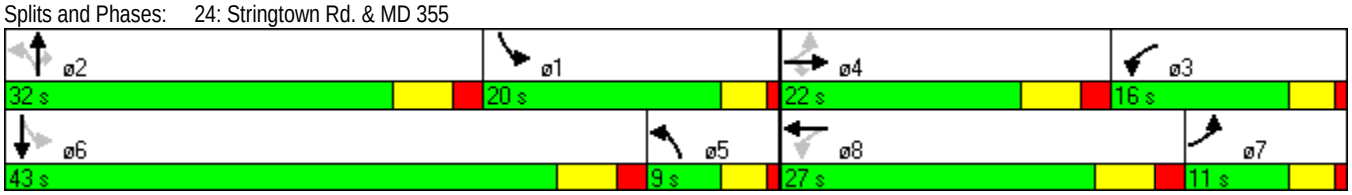
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	150	25	350	425	75	25	225	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.222			0.636			0.154			0.458		
Satd. Flow (perm)	414	3539	1583	1185	3458	0	287	1863	1583	853	1788	0
Satd. Flow (RTOR)			31		21				92		26	
Lane Group Flow (vph)	183	183	31	427	611	0	31	275	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	11.0	22.0	22.0	16.0	27.0	0.0	9.0	32.0	32.0	20.0	43.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	28.6	21.6	19.6	37.6	26.6		33.0	28.0	28.0	44.4	39.0	
Actuated g/C Ratio	0.32	0.24	0.22	0.42	0.30		0.37	0.31	0.31	0.49	0.43	
v/c Ratio	0.78	0.22	0.08	0.75	0.59		0.16	0.47	0.17	0.45	1.01	
Control Delay	49.2	21.5	7.0	34.7	29.8		15.4	28.4	6.0	18.8	59.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	49.2	21.5	7.0	34.7	29.8		15.4	28.4	6.0	18.8	59.6	
LOS	D	C	A	C	C		B	C	A	B	E	
Approach Delay		33.2			31.8			22.2			50.0	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	56	32	0	196	158		8	126	0	71	~436	
Queue Length 95th (ft)	#172	56	15	#342	218		21	200	33	116	#693	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	237	850	369	573	1037		188	580	556	618	790	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.77	0.22	0.08	0.75	0.59		0.16	0.47	0.17	0.39	1.01	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 37.2	Intersection LOS: D
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

~ 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.

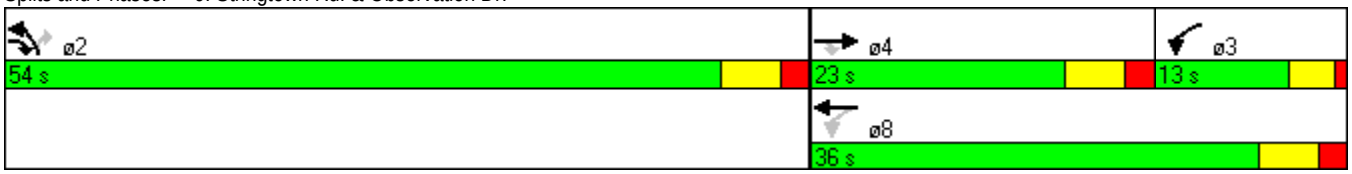
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	125	1025	325	300	775	200
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.655		0.950	
Satd. Flow (perm)	3539	1583	1220	3539	3433	1583
Satd. Flow (RTOR)		165				244
Lane Group Flow (vph)	153	1252	397	366	946	244
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	23.0	54.0	13.0	36.0	54.0	54.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	19.0	71.0	32.0	32.0	48.0	50.0
Actuated g/C Ratio	0.21	0.79	0.36	0.36	0.53	0.56
v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.25
Control Delay	30.2	29.5	23.8	9.7	14.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	29.5	23.8	9.7	14.1	2.6
LOS	C	C	C	A	B	A
Approach Delay	29.6			17.0	11.8	
Approach LOS	C			B	B	
Queue Length 50th (ft)	37	438	86	40	199	29
Queue Length 95th (ft)	64	#959	m#119	m51	80	10
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	747	1284	489	1258	1831	988
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.25

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 89 (99%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 102.8%	ICU Level of Service G
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

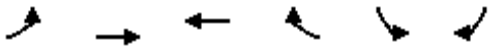
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	8	11	25	2	200	1	714	0	275	1064	0
Satd. Flow (prot)	0	1721	0	0	1779	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.732		0.212			0.261		
Satd. Flow (perm)	0	1721	0	0	1364	1583	395	3539	0	486	3539	0
Satd. Flow (RTOR)		13				59						
Lane Group Flow (vph)	0	23	0	0	33	244	1	872	0	336	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	28.0	41.0	41.0	0.0	28.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	22.7	57.3	57.3		76.7	78.7	
Actuated g/C Ratio		0.08			0.08	0.25	0.64	0.64		0.85	0.87	
v/c Ratio		0.15			0.28	0.55	0.00	0.39		0.54	0.42	
Control Delay		25.1			21.3	12.4	11.0	10.4		4.3	2.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		25.1			21.3	12.4	11.0	10.4		4.3	2.1	
LOS		C			C	B	B	B		A	A	
Approach Delay		25.1			13.4			10.4			2.6	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)		6			4	0	0	125		29	74	
Queue Length 95th (ft)		m19			48	202	3	219		m42	m106	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		317			242	589	252	2254		743	3096	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.07			0.14	0.41	0.00	0.39		0.45	0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 33 (37%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 6.3	Intersection LOS: A
Intersection Capacity Utilization 61.5%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	281	226	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	343	276	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked	0.99				0.99	0.99
vC, conflicting volume	278				454	139
vC1, stage 1 conf vol					277	
vC2, stage 2 conf vol					176	
vCu, unblocked vol	255				432	115
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1296				610	908

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	117	229	184	94	16
Volume Left	2	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1296	1700	1700	1700	626
Volume to Capacity	0.00	0.13	0.11	0.06	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.2	0.0	0.0	0.0	10.9
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		10.9
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	293	203	0	820	25
Satd. Flow (prot)	0	3539	3539	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	1770	1583
Satd. Flow (RTOR)						21
Lane Group Flow (vph)	0	358	248	0	1001	31
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	21.0	21.0	0.0	69.0	69.0
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)		18.1	18.1		61.9	61.9
Actuated g/C Ratio		0.20	0.20		0.69	0.69
v/c Ratio		0.50	0.35		0.82	0.03
Control Delay		35.0	33.6		9.0	0.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		35.0	33.6		9.0	0.6
LOS		D	C		A	A
Approach Delay		35.0	33.6		8.7	
Approach LOS		D	C		A	
Queue Length 50th (ft)		97	66		260	1
Queue Length 95th (ft)		145	103		m166	m1
Internal Link Dist (ft)		625	323		180	
Turn Bay Length (ft)						100
Base Capacity (vph)		711	711		1259	1132
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		0.50	0.35		0.80	0.03

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 27 (30%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 109.3%	ICU Level of Service H
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 25: Roberts Tavern Dr & MD 355 Spur

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	610	575	25	100	150	225	25	301	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.323			0.260			0.260			0.177		
Satd. Flow (perm)	602	3539	1583	484	3221	0	484	1863	1583	330	1745	0
Satd. Flow (RTOR)			31		219				315		37	
Lane Group Flow (vph)	745	702	31	122	458	0	31	368	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	33.0	44.0	44.0	12.0	23.0	0.0	9.0	25.0	25.0	9.0	25.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	52.0	40.0	38.0	27.0	19.0		26.0	21.0	21.0	27.6	24.6	
Actuated g/C Ratio	0.58	0.44	0.42	0.30	0.21		0.29	0.23	0.23	0.31	0.27	
v/c Ratio	1.03	0.45	0.05	0.47	0.54		0.15	0.85	0.90	0.67	0.73	
Control Delay	52.8	11.2	3.8	23.1	18.7		22.2	52.4	34.1	43.5	38.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	52.8	11.2	3.8	23.1	18.7		22.2	52.4	34.1	43.5	38.1	
LOS	D	B	A	C	B		C	D	C	D	D	
Approach Delay		32.0			19.6			40.8			39.4	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	~376	89	0	29	61		12	201	137	49	181	
Queue Length 95th (ft)	#631	125	m1	54	110		31	#351	#340	#102	#332	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	724	1573	686	260	853		211	435	611	181	504	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.03	0.45	0.05	0.47	0.54		0.15	0.85	0.90	0.67	0.73	

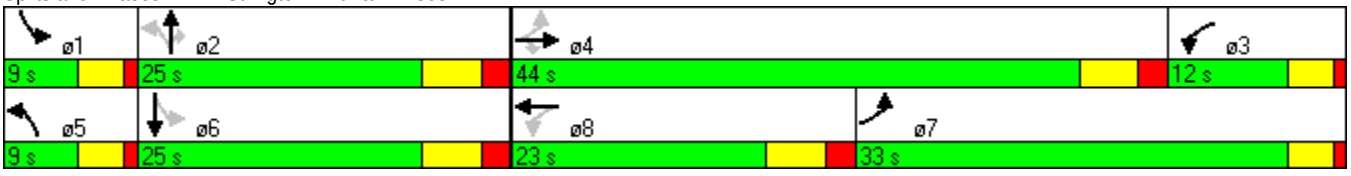
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 33.4	Intersection LOS: C
Intersection Capacity Utilization 90.6%	ICU Level of Service E
Analysis Period (min) 15	

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

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

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

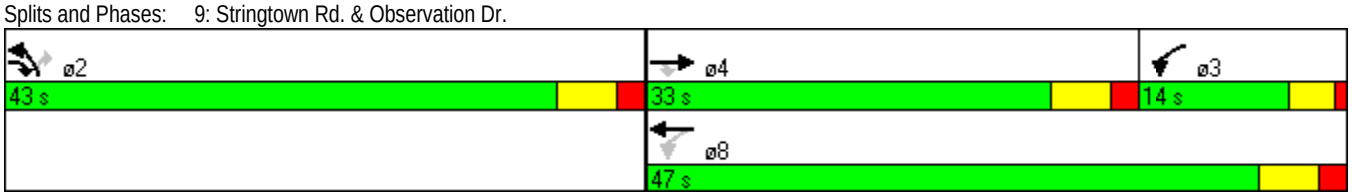
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	675	775	175	125	875	535
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.182		0.950	
Satd. Flow (perm)	3539	1583	339	3539	3433	1583
Satd. Flow (RTOR)		234				276
Lane Group Flow (vph)	824	946	214	153	1068	653
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	33.0	43.0	14.0	47.0	43.0	43.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	29.0	70.0	43.0	43.0	37.0	39.0
Actuated g/C Ratio	0.32	0.78	0.48	0.48	0.41	0.43
v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.78
Control Delay	31.3	7.9	40.5	12.0	20.3	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	7.9	40.5	12.0	20.3	12.8
LOS	C	A	D	B	C	B
Approach Delay	18.8			28.6	17.4	
Approach LOS	B			C	B	
Queue Length 50th (ft)	216	149	81	29	225	22
Queue Length 95th (ft)	284	280	m126	m43	200	50
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	1140	1283	321	1691	1411	842
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.78

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 9 (10%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 75.2%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

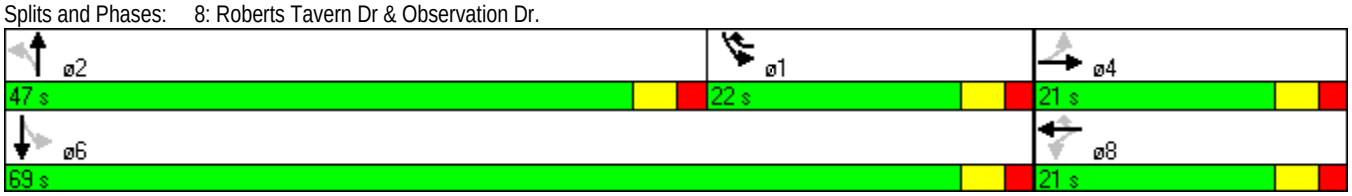
Splits and Phases: 9: Stringtown Rd. & Observation Dr.

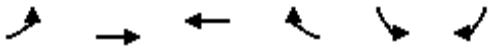


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	4	3	25	3	250	11	1125	0	250	642	0
Satd. Flow (prot)	0	1751	0	0	1785	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.744		0.355			0.129		
Satd. Flow (perm)	0	1751	0	0	1386	1583	661	3539	0	240	3539	0
Satd. Flow (RTOR)		4				20						
Lane Group Flow (vph)	0	9	0	0	35	305	13	1374	0	305	784	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	22.0	47.0	47.0	0.0	22.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.7	25.3	54.7	54.7		76.7	78.7	
Actuated g/C Ratio		0.08			0.09	0.28	0.61	0.61		0.85	0.87	
v/c Ratio		0.06			0.30	0.66	0.03	0.64		0.62	0.25	
Control Delay		29.4			37.1	26.5	10.2	14.6		19.3	2.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		29.4			37.1	26.5	10.2	14.6		19.3	2.0	
LOS		C			D	C	B	B		B	A	
Approach Delay		29.4			27.6			14.6			6.8	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		2			19	130	3	286		47	34	
Queue Length 95th (ft)		m6			48	211	13	382		m136	84	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		315			246	471	402	2150		506	3094	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.03			0.14	0.65	0.03	0.64		0.60	0.25	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 42 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 73.1%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	227	275	11	3	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	277	336	13	4	4
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked						
vC, conflicting volume	352				491	178
vC1, stage 1 conf vol					346	
vC2, stage 2 conf vol					146	
vCu, unblocked vol	352				491	178
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1200				570	833

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	96	185	224	125	7
Volume Left	4	0	0	0	4
Volume Right	0	0	0	13	4
cSH	1200	1700	1700	1700	677
Volume to Capacity	0.00	0.11	0.13	0.07	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.3	0.0	0.0	0.0	10.4
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		10.4
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	229	261	0	264	25
Satd. Flow (prot)	0	3539	3539	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	3539	3539	0	1770	1583
Satd. Flow (RTOR)						31
Lane Group Flow (vph)	0	280	319	0	322	31
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Total Split (s)	0.0	35.0	35.0	0.0	55.0	55.0
Total Lost Time (s)	4.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)		57.2	57.2		22.8	22.8
Actuated g/C Ratio		0.64	0.64		0.25	0.25
v/c Ratio		0.12	0.14		0.72	0.07
Control Delay		11.2	7.7		28.1	3.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		11.2	7.7		28.1	3.6
LOS		B	A		C	A
Approach Delay		11.2	7.7		26.0	
Approach LOS		B	A		C	
Queue Length 50th (ft)		57	34		94	1
Queue Length 95th (ft)		107	67		m117	m1
Internal Link Dist (ft)		625	323		180	
Turn Bay Length (ft)						100
Base Capacity (vph)		2249	2249		983	893
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		0.12	0.14		0.33	0.03

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 61 (68%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 113.3%	ICU Level of Service H
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

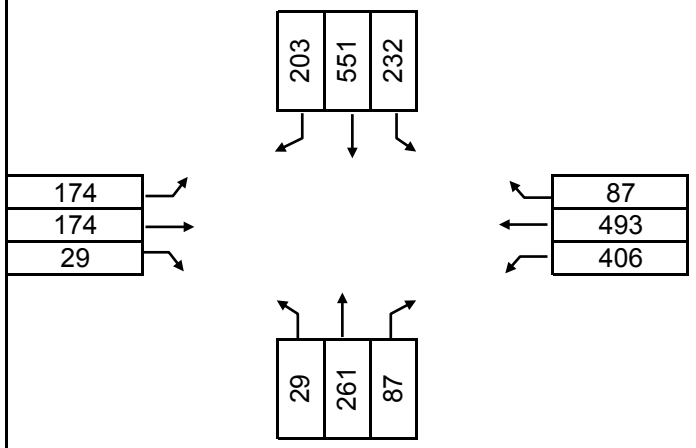
Splits and Phases: 25: Roberts Tavern Dr & MD 355 Spur

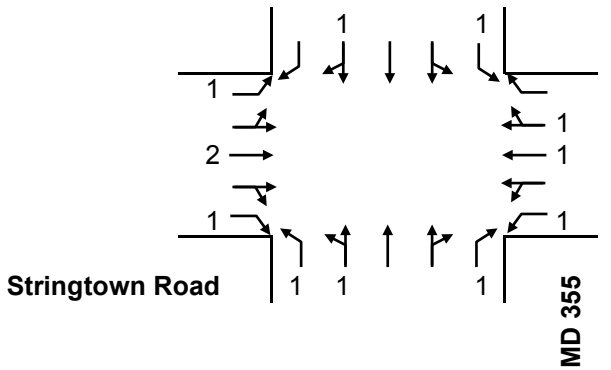
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/ Design Year: 2030 Alt. 2 Final: M.P., No EB RTD Lefts
Location: MD 355/Stringtown Road

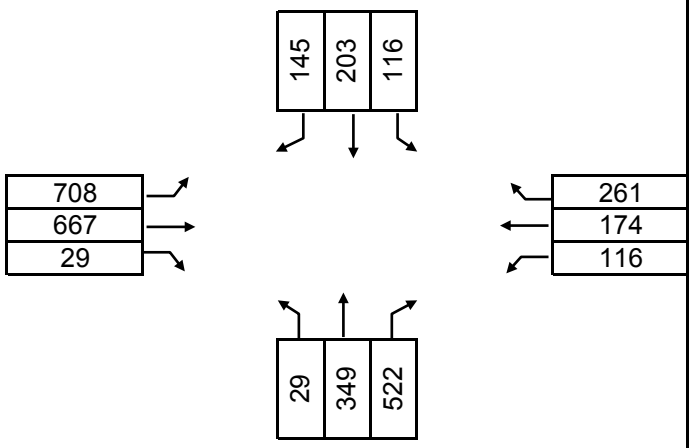
Computed by: JCP Date: 11/2/09 Checked by: Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

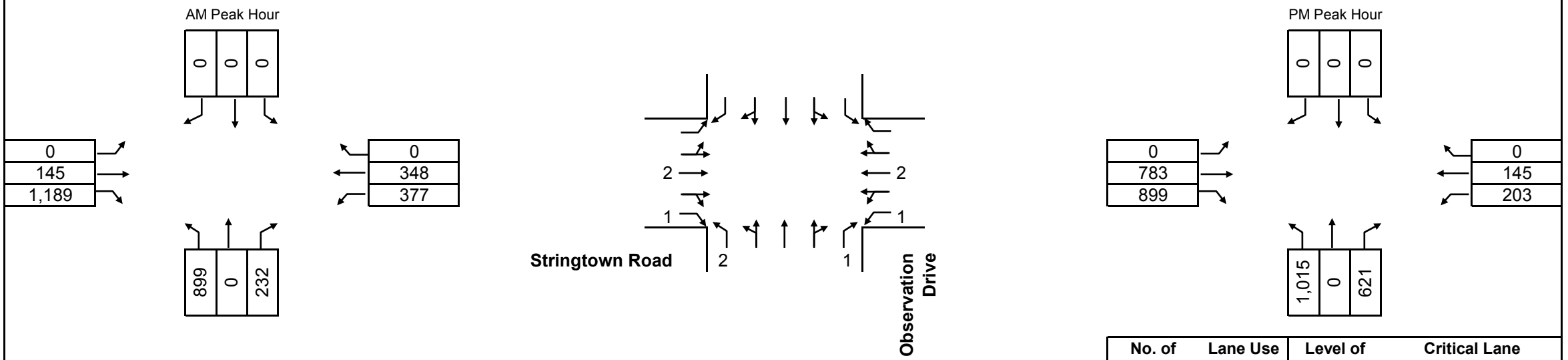
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	348	1	348	232	580	783
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	29	783	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	502
	EBR	29	1	29	406	435	
	EBL	0	1	0		0	
	WB	580	0.55	319	174	493	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,285
						Level Of Service	C
						v/c ratio	0.80

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	407	1	407	116	523	523
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	29	377	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	947
	EBR	29	1	29	116	145	
	EBL	0	1	0		0	
	WB	435	0.55	239	708	947	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,470
						Level Of Service	E
						v/c ratio	0.92

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 2 Final: M.P., No EB RTD Lefts				
Computed by:	JCP	Date:	11/2/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	539
	NBR	0	1	0	0	0	
	NBL	899	0.6	539		539	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	145	0.55	80	377	457	1,027
	EBR	650	1	650	377	1,027	
	EBL	0	1	0		0	
	WB	348	0.55	191	0	191	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,566
						Level Of Service	E
						v/c ratio	0.98

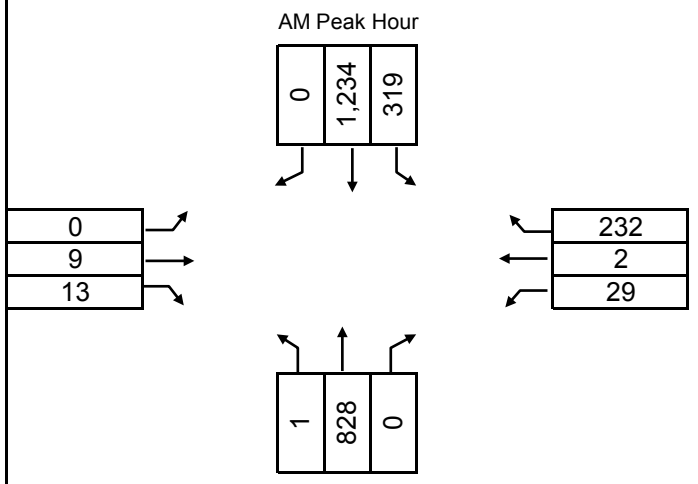
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	609
	NBR	418	1	418	0	418	
	NBL	1,015	0.6	609		609	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	783	0.55	431	203	634	634
	EBR	290	1	290	203	493	
	EBL	0	1	0		0	
	WB	145	0.55	80	0	80	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,243
						Level Of Service	C
						v/c ratio	0.78

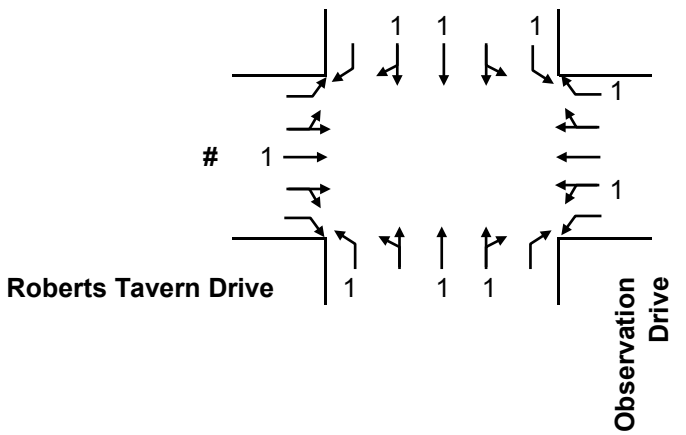
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 2 Final: M.P., No EB RTD Lefts				
Computed by:	JCP	Date:	11/2/09	Checked by:	Date:

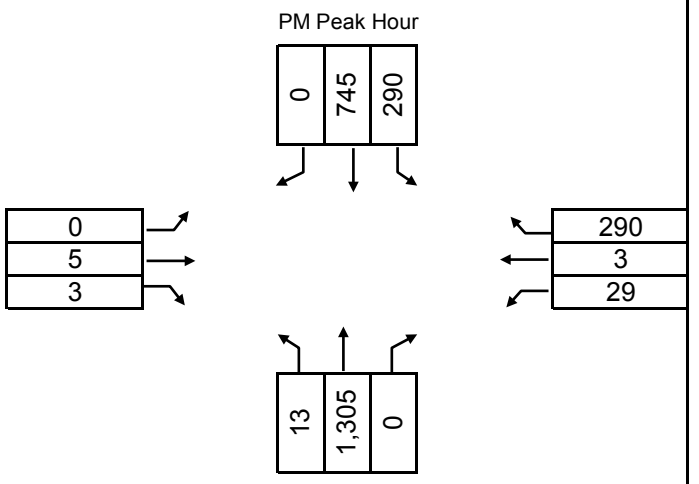
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	319	774	774
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	31
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							827
						Level Of Service	A
						v/c ratio	0.52

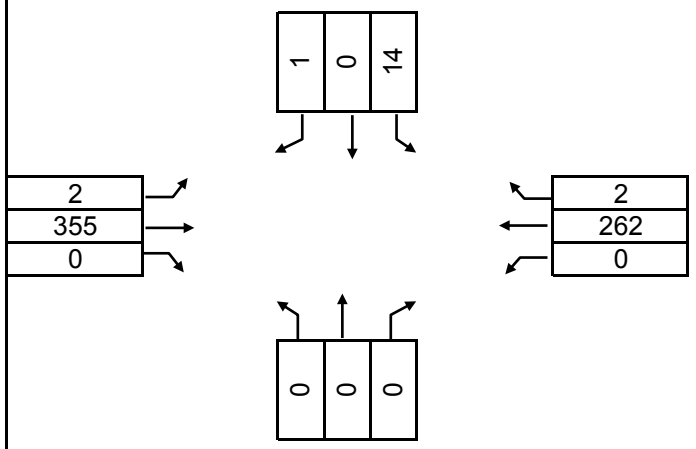
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,305	0.55	718	290	1,008	1,008
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	32
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,048
						Level Of Service	B
						v/c ratio	0.66

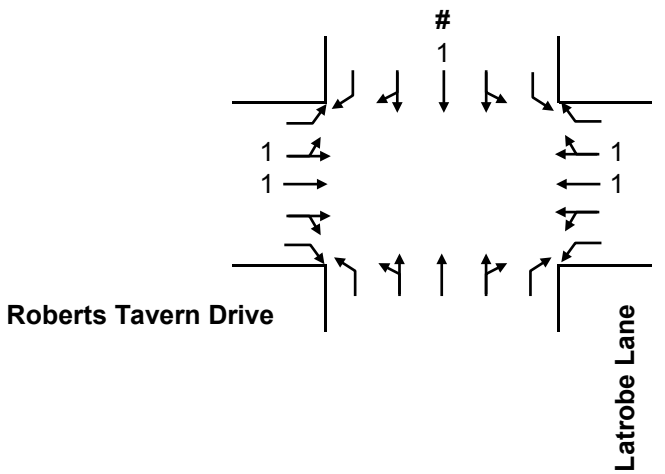
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 2 Final: M.P., No EB RTD Lefts				
Computed by:	JCP	Date:	11/2/09	Checked by:	Date:

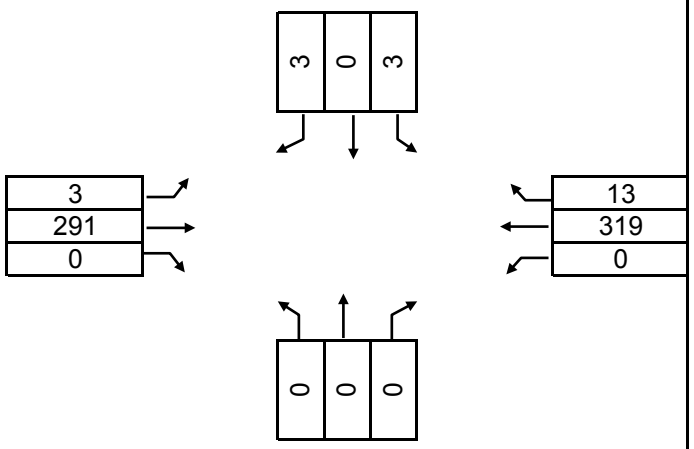
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

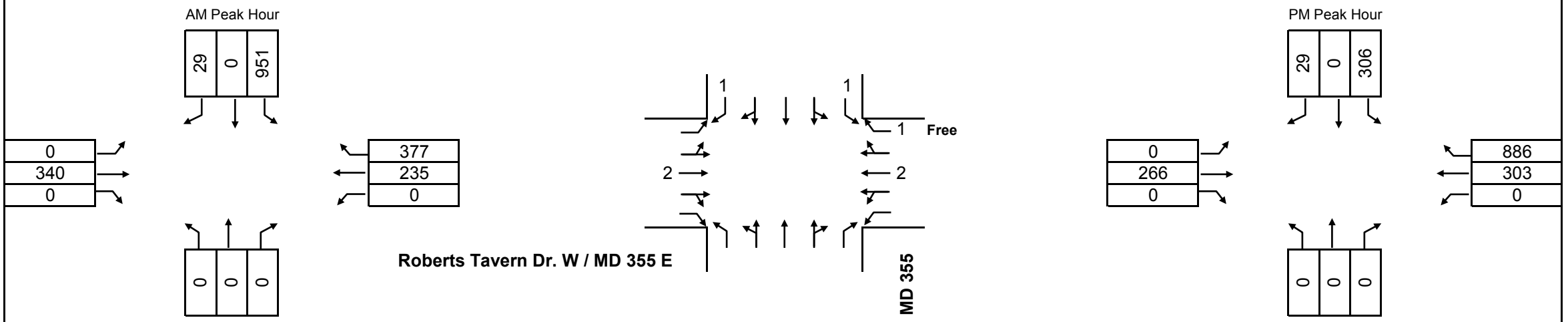
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	359	0.55	197	0	197	197
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	264	0.55	145	2	147	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							212
						Level Of Service	A
						v/c ratio	0.13

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	297	0.55	163	0	163	186
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	332	0.55	183	3	186	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							192
						Level Of Service	A
						v/c ratio	0.12

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/ Design Year:	2030 Alt. 2 Final: M.P., No EB RTD Lefts				
Computed by:	JCP	Date:	11/2/09	Checked by:	Date:



The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	951
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	29	1	29	0	29	
	SBL	951	1	951		951	
2	EB	340	0.55	187	0	187	187
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	235	0.55	129	0	129	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,138
						Level Of Service	B
						v/c ratio	0.71

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	306
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	29	1	29	0	29	
	SBL	306	1	306	0	306	
2	EB	266	0.55	146	0	146	167
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	303	0.55	167	0	167	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							473
						Level Of Service	A
						v/c ratio	0.30

Alternative 2A:
2030 Master Plan Alignment with Signal
Use Existing MD 355 as Northbound Right Turn Spur

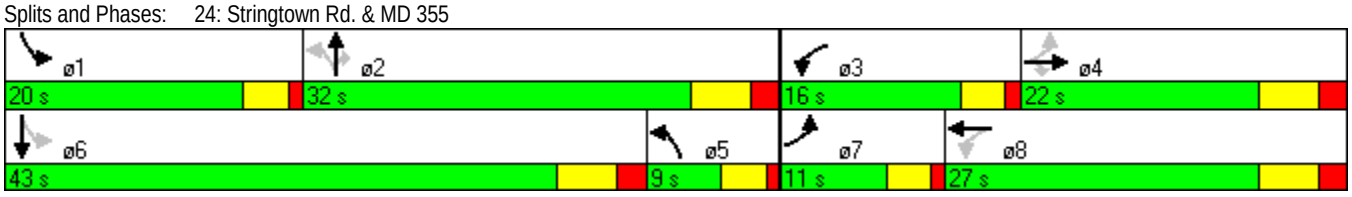
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	25	350	425	75	25	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.278			0.493			0.162			0.332		
Satd. Flow (perm)	518	3539	1583	918	3458	0	302	1863	1583	618	1788	0
Satd. Flow (RTOR)			31		21				92		26	
Lane Group Flow (vph)	153	183	31	427	611	0	31	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	11.0	22.0	22.0	16.0	27.0	0.0	9.0	32.0	32.0	20.0	43.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	25.0	18.0	16.0	34.0	23.0		31.1	31.1	31.1	42.6	42.6	
Actuated g/C Ratio	0.28	0.20	0.18	0.38	0.26		0.35	0.35	0.35	0.47	0.47	
v/c Ratio	0.63	0.26	0.10	0.93	0.68		0.17	0.47	0.15	0.53	0.92	
Control Delay	37.4	22.6	8.0	54.0	33.6		25.6	25.1	4.8	20.3	41.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	37.4	22.6	8.0	54.0	33.6		25.6	25.1	4.8	20.3	41.2	
LOS	D	C	A	D	C		C	C	A	C	D	
Approach Delay		27.5			42.0			20.8			36.3	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)	56	33	0	196	158		11	124	0	89	~436	
Queue Length 95th (ft)	#127	54	15	#398	218		30	206	28	144	#693	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	241	708	307	460	899		186	645	608	497	860	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.63	0.26	0.10	0.93	0.68		0.17	0.47	0.15	0.49	0.92	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 34.9	Intersection LOS: C
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

~ 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.

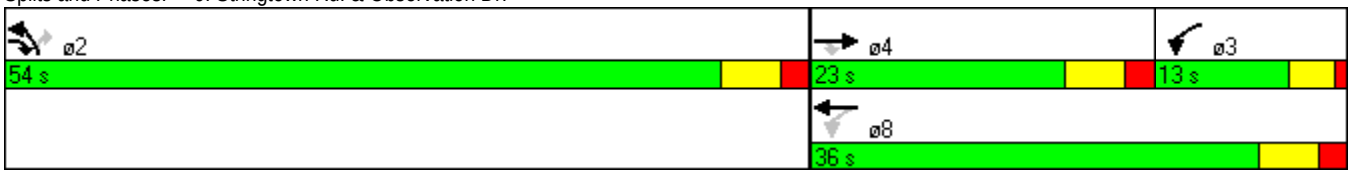
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	125	1025	325	300	775	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.655		0.950	
Satd. Flow (perm)	3539	1583	1220	3539	3433	1583
Satd. Flow (RTOR)		165				214
Lane Group Flow (vph)	153	1252	397	366	946	214
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	23.0	54.0	13.0	36.0	54.0	54.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	19.0	71.0	32.0	32.0	48.0	50.0
Actuated g/C Ratio	0.21	0.79	0.36	0.36	0.53	0.56
v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.22
Control Delay	30.2	29.5	28.0	12.9	14.2	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	29.5	28.0	12.9	14.2	2.8
LOS	C	C	C	B	B	A
Approach Delay	29.6			20.7	12.1	
Approach LOS	C			C	B	
Queue Length 50th (ft)	37	438	83	40	184	23
Queue Length 95th (ft)	64	#959	m#121	m51	215	8
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	747	1284	489	1258	1831	975
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.22

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 21.5	Intersection LOS: C
Intersection Capacity Utilization 102.8%	ICU Level of Service G
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

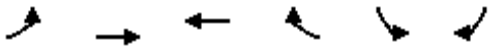
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	8	11	25	2	200	1	689	25	275	1064	0
Satd. Flow (prot)	0	1721	0	0	1779	1583	1770	3522	0	1770	3539	0
Flt Permitted					0.732		0.212			0.262		
Satd. Flow (perm)	0	1721	0	0	1364	1583	395	3522	0	488	3539	0
Satd. Flow (RTOR)		13				66		5				
Lane Group Flow (vph)	0	23	0	0	33	244	1	872	0	336	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	28.0	41.0	41.0	0.0	28.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	22.5	57.5	57.5		76.7	78.7	
Actuated g/C Ratio		0.08			0.08	0.25	0.64	0.64		0.85	0.87	
v/c Ratio		0.15			0.28	0.55	0.00	0.39		0.54	0.42	
Control Delay		24.8			21.2	17.2	11.0	10.4		3.9	1.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		24.8			21.2	17.2	11.0	10.4		3.9	1.7	
LOS		C			C	B	B	B		A	A	
Approach Delay		24.8			17.7			10.4			2.1	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)		5			13	131	0	125		14	37	
Queue Length 95th (ft)		m19			50	203	3	218		m42	m106	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		317			242	593	252	2250		744	3096	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.07			0.14	0.41	0.00	0.39		0.45	0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 28 (31%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 6.4	Intersection LOS: A
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	306	226	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	374	276	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked	0.99				0.99	0.99
vC, conflicting volume	278				469	139
vC1, stage 1 conf vol					277	
vC2, stage 2 conf vol					192	
vCu, unblocked vol	255				447	114
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1296				602	908

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	127	249	184	94	16
Volume Left	2	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1296	1700	1700	1700	619
Volume to Capacity	0.00	0.15	0.11	0.06	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.2	0.0	0.0	0.0	11.0
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		11.0
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	293	203	0	820	25
Satd. Flow (prot)	1770	3539	3539	0	1770	1583
Flt Permitted	0.577				0.950	
Satd. Flow (perm)	1075	3539	3539	0	1770	1583
Satd. Flow (RTOR)						21
Lane Group Flow (vph)	31	358	248	0	1001	31
Turn Type	Perm					Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Total Split (s)	21.0	21.0	21.0	0.0	69.0	69.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)	18.0	18.0	18.0		62.0	62.0
Actuated g/C Ratio	0.20	0.20	0.20		0.69	0.69
v/c Ratio	0.14	0.51	0.35		0.82	0.03
Control Delay	33.1	36.0	33.6		9.9	1.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	33.1	36.0	33.6		9.9	1.3
LOS	C	D	C		A	A
Approach Delay		35.7	33.6		9.6	
Approach LOS		D	C		A	
Queue Length 50th (ft)	14	95	66		255	2
Queue Length 95th (ft)	m28	147	103		m279	m2
Internal Link Dist (ft)		625	323		180	
Turn Bay Length (ft)	150					100
Base Capacity (vph)	215	708	708		1259	1132
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.14	0.51	0.35		0.80	0.03

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 14 (16%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 75.0%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 25: Roberts Tavern Dr & MD 355

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	25	100	150	225	25	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.206			0.385			0.439			0.227		
Satd. Flow (perm)	384	3539	1583	717	3221	0	818	1863	1583	423	1745	0
Satd. Flow (RTOR)			31		222				307		37	
Lane Group Flow (vph)	672	702	31	122	458	0	31	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	33.0	44.0	44.0	12.0	23.0	0.0	9.0	25.0	25.0	9.0	25.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	52.0	40.5	38.5	26.5	19.0		21.0	21.0	21.0	24.6	24.6	
Actuated g/C Ratio	0.58	0.45	0.43	0.29	0.21		0.23	0.23	0.23	0.27	0.27	
v/c Ratio	1.01	0.44	0.04	0.41	0.54		0.13	0.91	0.91	0.64	0.73	
Control Delay	44.0	12.5	2.4	17.4	18.4		29.0	61.0	35.5	45.4	38.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	44.0	12.5	2.4	17.4	18.4		29.0	61.0	35.5	45.4	38.1	
LOS	D	B	A	B	B		C	E	D	D	D	
Approach Delay		27.3			18.2			45.7			39.9	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	~131	99	1	29	60		14	221	143	57	181	
Queue Length 95th (ft)	#532	152	m1	54	108		36	#392	#347	#132	#332	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	668	1593	695	309	855		244	435	605	191	504	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.01	0.44	0.04	0.39	0.54		0.13	0.91	0.91	0.64	0.73	

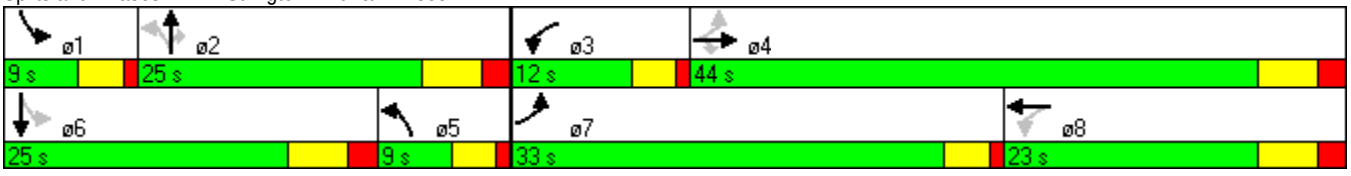
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 32.8	Intersection LOS: C
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

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

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

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

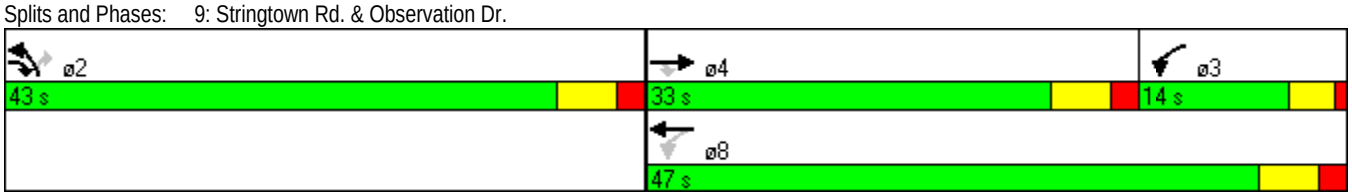
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	675	775	175	125	875	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.182		0.950	
Satd. Flow (perm)	3539	1583	339	3539	3433	1583
Satd. Flow (RTOR)		234				276
Lane Group Flow (vph)	824	946	214	153	1068	580
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	33.0	43.0	14.0	47.0	43.0	43.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	29.0	70.0	43.0	43.0	37.0	39.0
Actuated g/C Ratio	0.32	0.78	0.48	0.48	0.41	0.43
v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.69
Control Delay	31.3	7.9	50.4	21.3	23.0	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	7.9	50.4	21.3	23.0	11.2
LOS	C	A	D	C	C	B
Approach Delay	18.8			38.2	18.8	
Approach LOS	B			D	B	
Queue Length 50th (ft)	216	149	116	42	216	24
Queue Length 95th (ft)	284	280	m181	m68	215	141
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	1140	1283	321	1691	1411	842
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.69

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 56 (62%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 20.7	Intersection LOS: C
Intersection Capacity Utilization 75.2%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

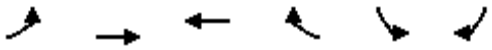
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	4	3	25	3	250	11	1100	0	250	642	0
Satd. Flow (prot)	0	1751	0	0	1785	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.744		0.355			0.115		
Satd. Flow (perm)	0	1751	0	0	1386	1583	661	3539	0	214	3539	0
Satd. Flow (RTOR)		4				22						
Lane Group Flow (vph)	0	9	0	0	35	305	13	1343	0	305	784	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	22.0	47.0	47.0	0.0	22.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.7	26.2	53.8	53.8		76.7	78.7	
Actuated g/C Ratio		0.08			0.09	0.29	0.60	0.60		0.85	0.87	
v/c Ratio		0.06			0.30	0.64	0.03	0.63		0.62	0.25	
Control Delay		31.6			36.9	27.1	11.9	15.7		14.9	2.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		31.6			36.9	27.1	11.9	15.7		14.9	2.3	
LOS		C			D	C	B	B		B	A	
Approach Delay		31.6			28.1			15.6			5.8	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		3			19	135	3	254		78	52	
Queue Length 95th (ft)		m6			48	221	14	424		m134	78	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		315			246	494	395	2116		508	3094	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.03			0.14	0.62	0.03	0.63		0.60	0.25	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 7 (8%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 13.4	Intersection LOS: B
Intersection Capacity Utilization 72.3%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	251	275	11	3	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	306	336	13	4	4
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked						
vC, conflicting volume	352				506	178
vC1, stage 1 conf vol					346	
vC2, stage 2 conf vol					161	
vCu, unblocked vol	352				506	178
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1200				564	833

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	106	204	224	125	7
Volume Left	4	0	0	0	4
Volume Right	0	0	0	13	4
cSH	1200	1700	1700	1700	673
Volume to Capacity	0.00	0.12	0.13	0.07	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.3	0.0	0.0	0.0	10.4
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		10.4
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	229	261	0	264	25
Satd. Flow (prot)	1770	3539	3539	0	1770	1583
Flt Permitted	0.558				0.950	
Satd. Flow (perm)	1039	3539	3539	0	1770	1583
Satd. Flow (RTOR)						31
Lane Group Flow (vph)	31	280	319	0	322	31
Turn Type	Perm					Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Total Split (s)	35.0	35.0	35.0	0.0	55.0	55.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)	57.2	57.2	57.2		22.8	22.8
Actuated g/C Ratio	0.64	0.64	0.64		0.25	0.25
v/c Ratio	0.05	0.12	0.14		0.72	0.07
Control Delay	3.9	4.4	7.7		27.1	5.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	3.9	4.4	7.7		27.1	5.0
LOS	A	A	A		C	A
Approach Delay		4.3	7.7		25.1	
Approach LOS		A	A		C	
Queue Length 50th (ft)	2	11	34		93	0
Queue Length 95th (ft)	m4	16	67		m126	m4
Internal Link Dist (ft)		625	323		180	
Turn Bay Length (ft)	150					100
Base Capacity (vph)	660	2249	2249		983	893
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	0.05	0.12	0.14		0.33	0.03

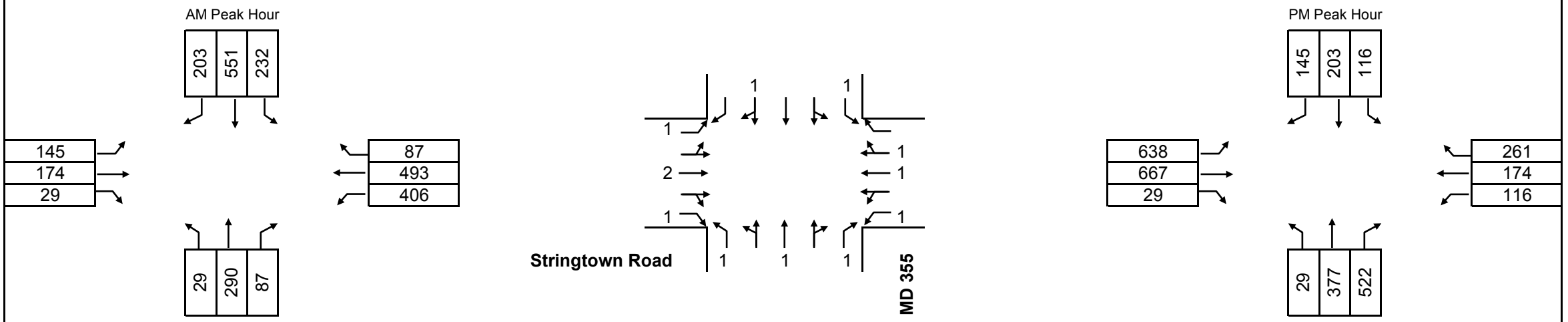
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 21 (23%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 41.2%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 25: Roberts Tavern Dr & MD 355

Turning Movement Summary and Level of Service

Count Date: n/a Location: MD 355/Stringtown Road
Conditions/
Design Year: 2030 Alt. 2A: Master Plan Align.

Computed by: JCP Date: 9/3/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	783
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	29	783	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	502
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,285
						Level Of Service	C
						v/c ratio	0.80

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	29	377	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

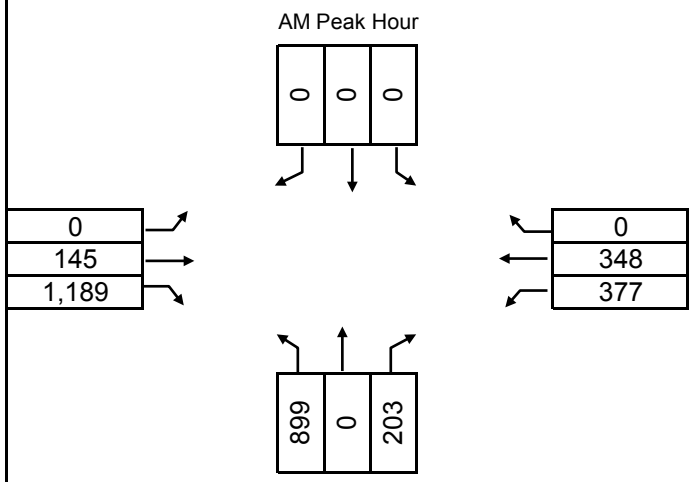
Turning Movement Summary and Level of Service

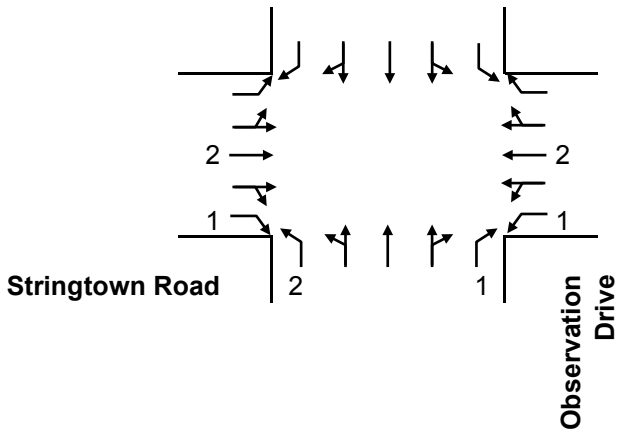
Count Date: n/a
Conditions/
Design Year: 2030 Alt. 2A: Master Plan Align.

Location: Observation Drive/Stringtown Road

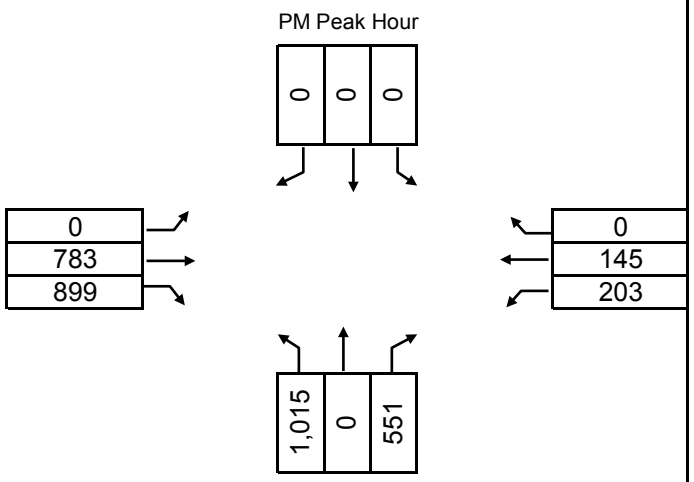
Computed by: JCP Date: 9/22/09 Checked by: Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	539
	NBR	0	1	0	0	0	
	NBL	899	0.6	539		539	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	145	0.55	80	377	457	1,027
	EBR	650	1	650	377	1,027	
	EBL	0	1	0		0	
	WB	348	0.55	191	0	191	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,566
						Level Of Service	E
						v/c ratio	0.98

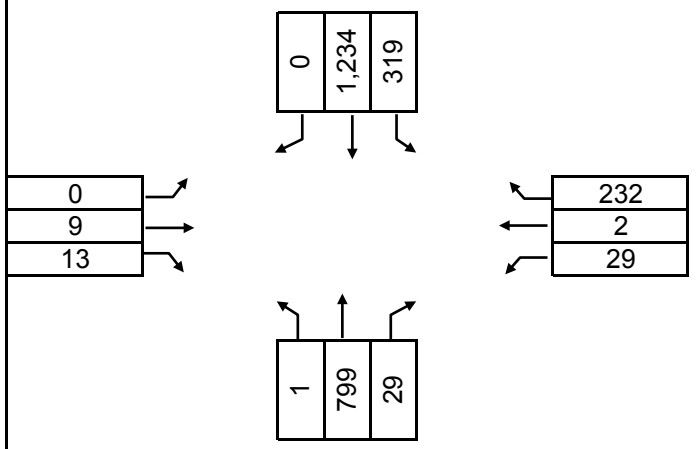
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	609
	NBR	348	1	348	0	348	
	NBL	1,015	0.6	609		609	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	783	0.55	431	203	634	634
	EBR	290	1	290	203	493	
	EBL	0	1	0		0	
	WB	145	0.55	80	0	80	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,243
						Level Of Service	C
						v/c ratio	0.78

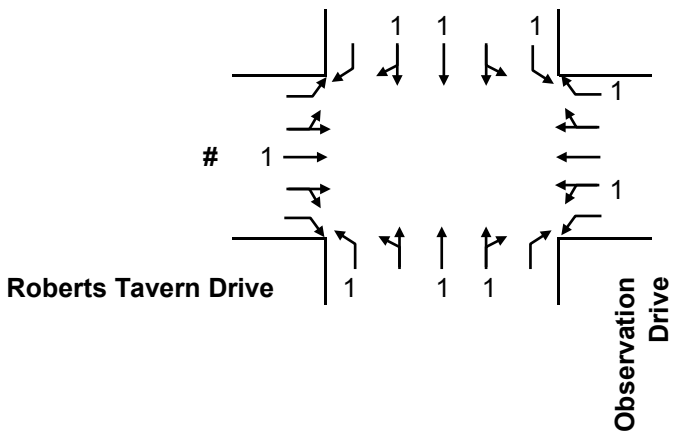
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/					
Design Year:	2030 Alt. 2A: Master Plan Align.				
Computed by:	JCP	Date:	9/3/09	Checked by:	Date:

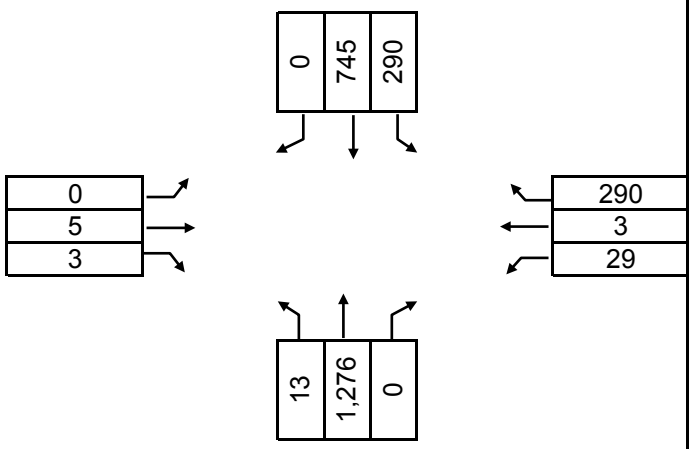
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	319	774	774
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	31
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							827
						Level Of Service	A
						v/c ratio	0.52

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	290	992	992
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	32
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,032
						Level Of Service	B
						v/c ratio	0.65

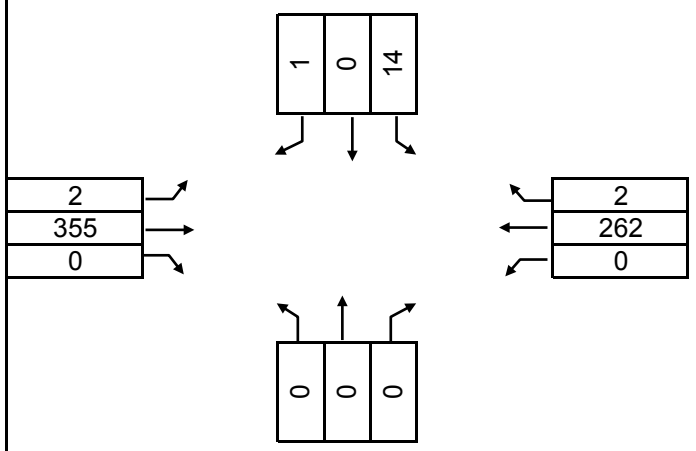
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 2A: Master Plan Align.

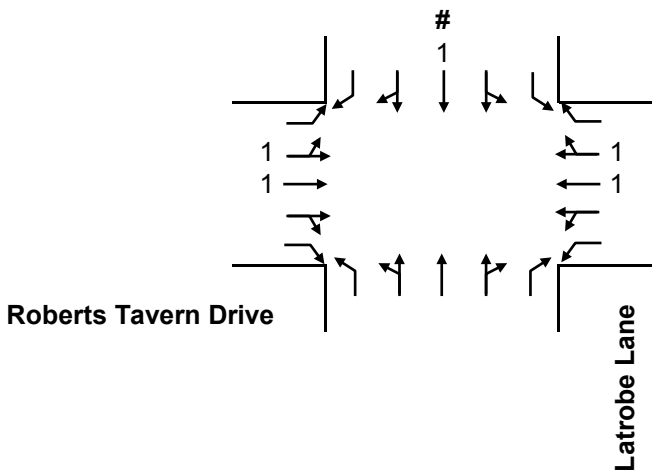
Location: Latrobe Lane/Roberts Tavern Drive

Computed by: JCP Date: 9/3/09 Checked by: Date:

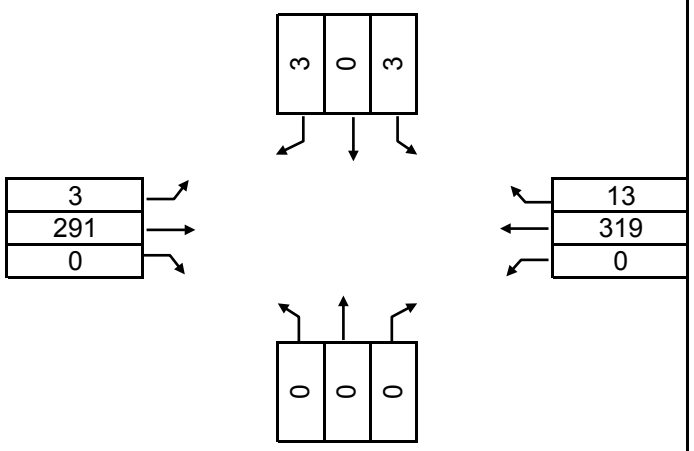
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

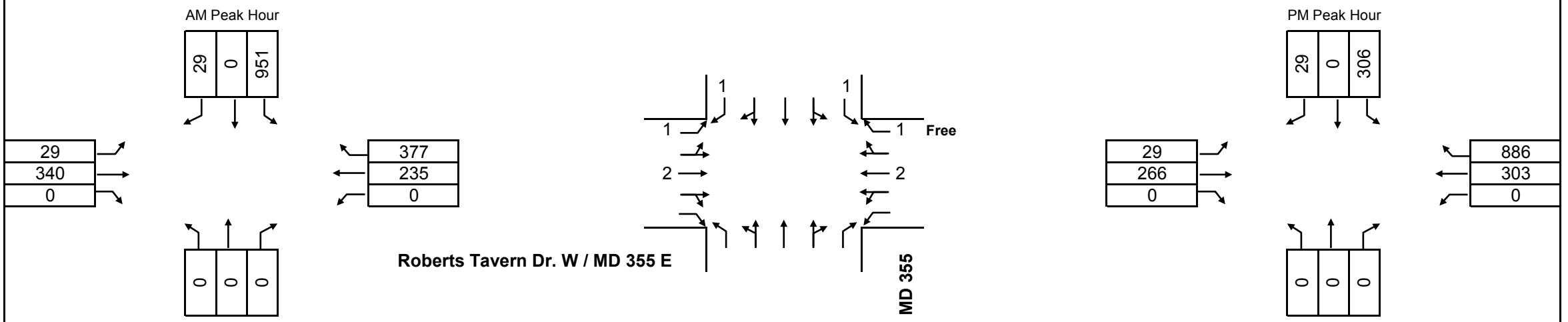
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	359	0.55	197	0	197	197
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	264	0.55	145	2	147	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							212
						Level Of Service	A
						v/c ratio	0.13

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	297	0.55	163	0	163	186
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	332	0.55	183	3	186	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							192
						Level Of Service	A
						v/c ratio	0.12

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/					
Design Year:	2030 Alt. 2A: Master Plan Align.				
Computed by:	JCP	Date:	9/3/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	951
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	951	1	951		951	
2	EB	340	0.55	187	0	187	187
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	235	0.55	129	29	158	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,138
						Level Of Service	B
						v/c ratio	0.71

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	306
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	306	1	306	0	306	
2	EB	266	0.55	146	0	146	196
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	303	0.55	167	29	196	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							502
						Level Of Service	A
						v/c ratio	0.31

Alternative 2B:
2030 Master Plan Alignment with Signal

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	25	350	425	75	25	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.278			0.493			0.162			0.332		
Satd. Flow (perm)	518	3539	1583	918	3458	0	302	1863	1583	618	1788	0
Satd. Flow (RTOR)			31		21				92		26	
Lane Group Flow (vph)	153	183	31	427	611	0	31	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	11.0	22.0	22.0	16.0	27.0	0.0	9.0	32.0	32.0	20.0	43.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	25.0	18.0	16.0	34.0	23.0		31.1	31.1	31.1	42.6	42.6	
Actuated g/C Ratio	0.28	0.20	0.18	0.38	0.26		0.35	0.35	0.35	0.47	0.47	
v/c Ratio	0.63	0.26	0.10	0.93	0.68		0.17	0.47	0.15	0.53	0.92	
Control Delay	37.5	22.6	8.0	54.0	33.6		20.1	21.3	1.8	20.3	41.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	37.5	22.6	8.0	54.0	33.6		20.1	21.3	1.8	20.3	41.2	
LOS	D	C	A	D	C		C	C	A	C	D	
Approach Delay		27.6			42.0			17.0			36.3	
Approach LOS		C			D			B			D	
Queue Length 50th (ft)	57	33	0	196	158		11	124	0	89	~436	
Queue Length 95th (ft)	#127	54	15	#398	218		m14	134	m4	144	#693	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	241	708	307	460	899		186	645	608	497	860	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.63	0.26	0.10	0.93	0.68		0.17	0.47	0.15	0.49	0.92	

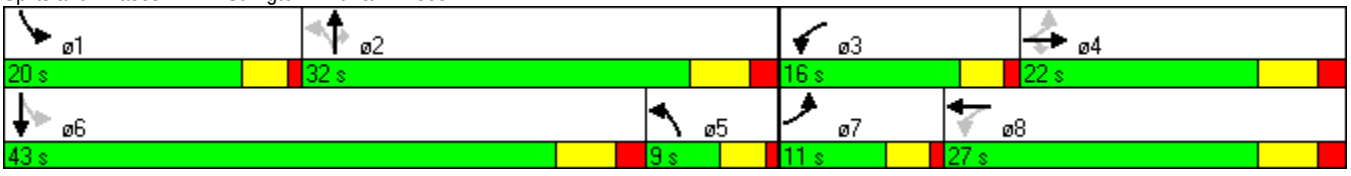
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 34.4	Intersection LOS: C
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

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

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

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

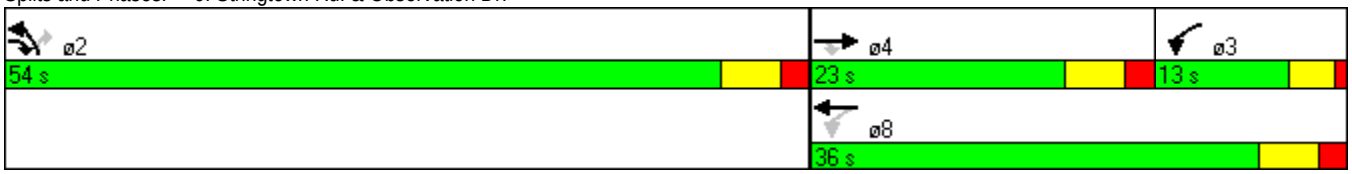
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	125	1025	325	300	775	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.655		0.950	
Satd. Flow (perm)	3539	1583	1220	3539	3433	1583
Satd. Flow (RTOR)		165				214
Lane Group Flow (vph)	153	1252	397	366	946	214
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	23.0	54.0	13.0	36.0	54.0	54.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	19.0	71.0	32.0	32.0	48.0	50.0
Actuated g/C Ratio	0.21	0.79	0.36	0.36	0.53	0.56
v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.22
Control Delay	30.2	29.5	28.0	12.9	14.2	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	29.5	28.0	12.9	14.2	2.8
LOS	C	C	C	B	B	A
Approach Delay	29.6			20.7	12.1	
Approach LOS	C			C	B	
Queue Length 50th (ft)	37	438	83	40	184	23
Queue Length 95th (ft)	64	#959	m#121	m51	218	7
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	747	1284	489	1258	1831	975
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.98	0.81	0.29	0.52	0.22

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 21.5	Intersection LOS: C
Intersection Capacity Utilization 102.8%	ICU Level of Service G
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

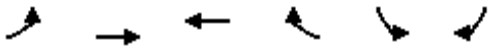
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	8	11	25	2	200	1	689	25	275	1064	0
Satd. Flow (prot)	0	1721	0	0	1779	1583	1770	3522	0	1770	3539	0
Flt Permitted					0.732		0.212			0.262		
Satd. Flow (perm)	0	1721	0	0	1364	1583	395	3522	0	488	3539	0
Satd. Flow (RTOR)		13				66		5				
Lane Group Flow (vph)	0	23	0	0	33	244	1	872	0	336	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	28.0	41.0	41.0	0.0	28.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	22.5	57.5	57.5		76.7	78.7	
Actuated g/C Ratio		0.08			0.08	0.25	0.64	0.64		0.85	0.87	
v/c Ratio		0.15			0.28	0.55	0.00	0.39		0.54	0.42	
Control Delay		24.8			18.1	14.1	11.0	10.4		3.9	1.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		24.8			18.1	14.1	11.0	10.4		3.9	1.7	
LOS		C			B	B	B	B		A	A	
Approach Delay		24.8			14.6			10.4			2.1	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)		5			7	127	0	125		14	37	
Queue Length 95th (ft)		m19			m33	203	3	218		m42	m106	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		317			242	593	252	2250		744	3096	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.07			0.14	0.41	0.00	0.39		0.45	0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 28 (31%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 6.1	Intersection LOS: A
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	306	226	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	374	276	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked						
vC, conflicting volume	278				469	139
vC1, stage 1 conf vol					277	
vC2, stage 2 conf vol					192	
vCu, unblocked vol	278				469	139
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1281				593	883

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	127	249	184	94	16
Volume Left	2	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1281	1700	1700	1700	608
Volume to Capacity	0.00	0.15	0.11	0.06	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.2	0.0	0.0	0.0	11.1
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		11.1
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	293	203	325	820	25
Satd. Flow (prot)	1770	3539	1863	1583	1770	1583
Flt Permitted	0.415				0.950	
Satd. Flow (perm)	773	3539	1863	1583	1770	1583
Satd. Flow (RTOR)				397		20
Lane Group Flow (vph)	31	358	248	397	1001	31
Turn Type	Perm			Perm		Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Total Split (s)	23.0	23.0	23.0	23.0	67.0	67.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	19.8	19.8	19.8	19.8	60.2	60.2
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.67	0.67
v/c Ratio	0.18	0.46	0.60	0.60	0.85	0.03
Control Delay	33.1	33.8	39.8	7.8	11.8	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	33.8	39.8	7.8	11.8	1.7
LOS	C	C	D	A	B	A
Approach Delay		33.8	20.1		11.5	
Approach LOS		C	C		B	
Queue Length 50th (ft)	14	93	131	0	268	2
Queue Length 95th (ft)	m30	144	212	77	m303	m3
Internal Link Dist (ft)		625	481		180	
Turn Bay Length (ft)	150			300		100
Base Capacity (vph)	170	778	410	657	1219	1097
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.46	0.60	0.60	0.82	0.03

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 14 (16%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 18.4	Intersection LOS: B
Intersection Capacity Utilization 80.9%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 25: Roberts Tavern Dr & MD 355

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	25	100	150	225	25	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.206			0.385			0.439			0.227		
Satd. Flow (perm)	384	3539	1583	717	3221	0	818	1863	1583	423	1745	0
Satd. Flow (RTOR)			31		222				307		37	
Lane Group Flow (vph)	672	702	31	122	458	0	31	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	33.0	44.0	44.0	12.0	23.0	0.0	9.0	25.0	25.0	9.0	25.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	52.0	40.5	38.5	26.5	19.0		21.0	21.0	21.0	24.6	24.6	
Actuated g/C Ratio	0.58	0.45	0.43	0.29	0.21		0.23	0.23	0.23	0.27	0.27	
v/c Ratio	1.01	0.44	0.04	0.41	0.54		0.13	0.91	0.91	0.64	0.73	
Control Delay	44.0	12.5	2.4	17.4	18.4		32.3	58.5	34.0	45.4	38.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	44.0	12.5	2.4	17.4	18.4		32.3	58.5	34.0	45.4	38.1	
LOS	D	B	A	B	B		C	E	C	D	D	
Approach Delay		27.3			18.2			43.9			39.9	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	~131	99	1	29	60		14	222	145	57	181	
Queue Length 95th (ft)	#532	152	m1	54	108		m24	#396	#353	#132	#332	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	668	1593	695	309	855		244	435	605	191	504	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.01	0.44	0.04	0.39	0.54		0.13	0.91	0.91	0.64	0.73	

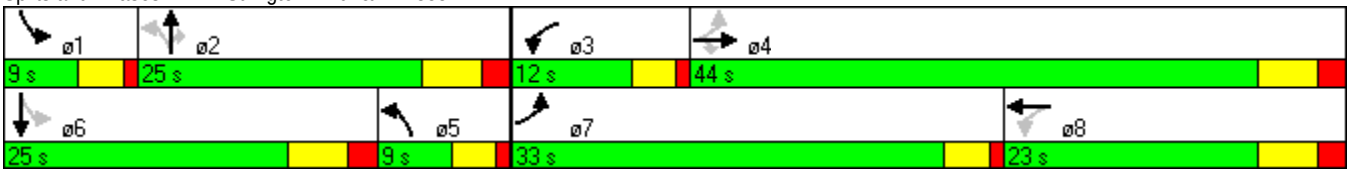
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 32.3	Intersection LOS: C
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

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

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

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

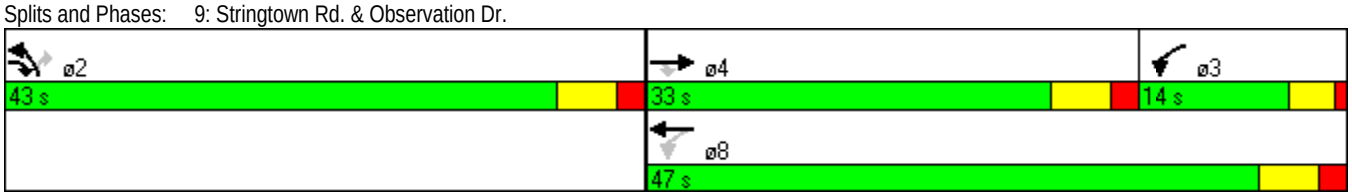
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	675	775	175	125	875	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.182		0.950	
Satd. Flow (perm)	3539	1583	339	3539	3433	1583
Satd. Flow (RTOR)		234				276
Lane Group Flow (vph)	824	946	214	153	1068	580
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Total Split (s)	33.0	43.0	14.0	47.0	43.0	43.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	29.0	70.0	43.0	43.0	37.0	39.0
Actuated g/C Ratio	0.32	0.78	0.48	0.48	0.41	0.43
v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.69
Control Delay	31.3	7.9	50.4	21.3	22.9	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	7.9	50.4	21.3	22.9	11.1
LOS	C	A	D	C	C	B
Approach Delay	18.8			38.3	18.7	
Approach LOS	B			D	B	
Queue Length 50th (ft)	216	149	116	42	216	24
Queue Length 95th (ft)	284	280	m181	m68	215	138
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		350	250		250	
Base Capacity (vph)	1140	1283	321	1691	1411	842
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.74	0.67	0.09	0.76	0.69

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 56 (62%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 20.7	Intersection LOS: C
Intersection Capacity Utilization 75.2%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

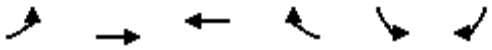
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	4	3	25	3	250	11	1100	0	250	642	0
Satd. Flow (prot)	0	1751	0	0	1785	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.744		0.355			0.115		
Satd. Flow (perm)	0	1751	0	0	1386	1583	661	3539	0	214	3539	0
Satd. Flow (RTOR)		4				22						
Lane Group Flow (vph)	0	9	0	0	35	305	13	1343	0	305	784	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	22.0	47.0	47.0	0.0	22.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.7	26.2	53.8	53.8		76.7	78.7	
Actuated g/C Ratio		0.08			0.09	0.29	0.60	0.60		0.85	0.87	
v/c Ratio		0.06			0.30	0.64	0.03	0.63		0.62	0.25	
Control Delay		31.6			38.5	24.3	11.9	15.7		14.9	2.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		31.6			38.5	24.3	11.9	15.7		14.9	2.3	
LOS		C			D	C	B	B		B	A	
Approach Delay		31.6			25.7			15.6			5.8	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)		3			13	136	3	254		78	52	
Queue Length 95th (ft)		m6			28	189	14	424		m134	78	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		315			246	494	395	2116		508	3094	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.03			0.14	0.62	0.03	0.63		0.60	0.25	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 7 (8%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 72.3%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	251	275	11	3	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	306	336	13	4	4
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	705			
pX, platoon unblocked						
vC, conflicting volume	352				506	178
vC1, stage 1 conf vol					346	
vC2, stage 2 conf vol					161	
vCu, unblocked vol	352				506	178
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1200				564	833

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	106	204	224	125	7
Volume Left	4	0	0	0	4
Volume Right	0	0	0	13	4
cSH	1200	1700	1700	1700	673
Volume to Capacity	0.00	0.12	0.13	0.07	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.3	0.0	0.0	0.0	10.4
Lane LOS	A				B
Approach Delay (s)	0.1		0.0		10.4
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	229	261	764	264	25
Satd. Flow (prot)	1770	3539	1863	1583	1770	1583
Flt Permitted	0.551				0.950	
Satd. Flow (perm)	1026	3539	1863	1583	1770	1583
Satd. Flow (RTOR)				933		27
Lane Group Flow (vph)	31	280	319	933	322	31
Turn Type	Perm			Perm		Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Total Split (s)	59.0	59.0	59.0	59.0	31.0	31.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	59.0	59.0	59.0	59.0	21.0	21.0
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.23	0.23
v/c Ratio	0.05	0.12	0.26	0.69	0.78	0.08
Control Delay	10.1	9.5	7.8	3.6	36.0	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	9.5	7.8	3.6	36.0	7.3
LOS	B	A	A	A	D	A
Approach Delay		9.6	4.7		33.5	
Approach LOS		A	A		C	
Queue Length 50th (ft)	11	54	68	0	164	5
Queue Length 95th (ft)	m0	99	126	46	m230	m14
Internal Link Dist (ft)		625	480		180	
Turn Bay Length (ft)	150			300		100
Base Capacity (vph)	673	2321	1222	1360	511	477
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.12	0.26	0.69	0.63	0.06

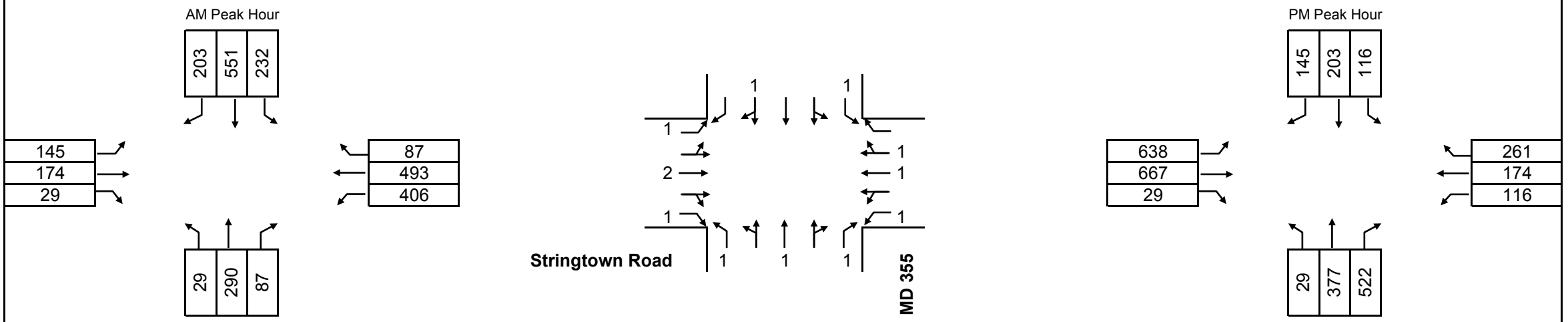
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 21 (23%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 10.8	Intersection LOS: B
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 25: Roberts Tavern Dr & MD 355

Turning Movement Summary and Level of Service

Count Date: n/a Location: MD 355/Stringtown Road
Conditions/
Design Year: 2030 Alt. 2B: Master Plan Align.

Computed by: JCP Date: 9/3/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	783
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	29	783	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	502
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,285
						Level Of Service	C
						v/c ratio	0.80

PM Peak Hour

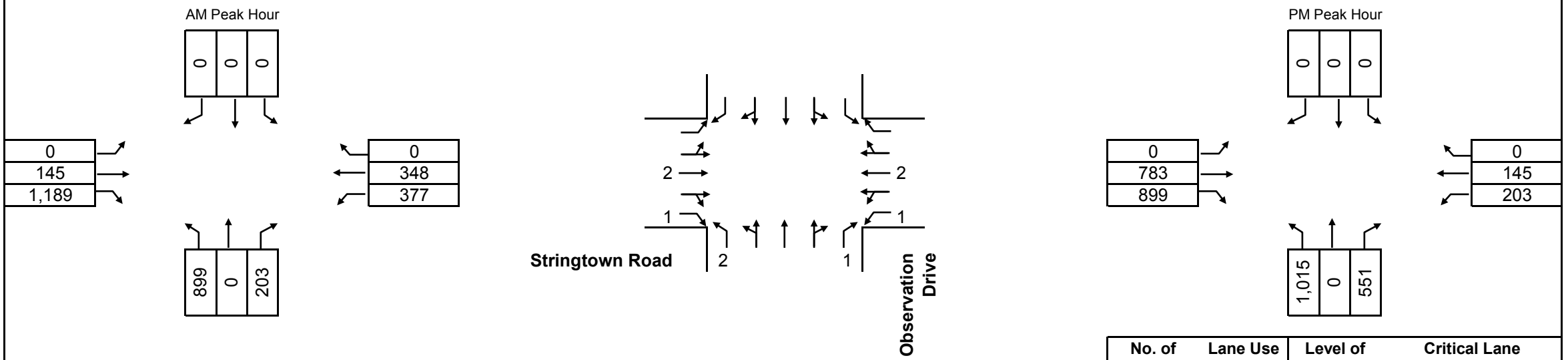
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	29	377	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 2B: Master Plan Align.

Location: Observation Drive/Stringtown Road

Computed by: JCP Date: 9/22/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	539
	NBR	0	1	0	0	0	
	NBL	899	0.6	539		539	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	145	0.55	80	377	457	1,027
	EBR	650	1	650	377	1,027	
	EBL	0	1	0		0	
	WB	348	0.55	191	0	191	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,566
						Level Of Service	E
						v/c ratio	0.98

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	609
	NBR	348	1	348	0	348	
	NBL	1,015	0.6	609		609	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	783	0.55	431	203	634	634
	EBR	290	1	290	203	493	
	EBL	0	1	0		0	
	WB	145	0.55	80	0	80	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,243
						Level Of Service	C
						v/c ratio	0.78

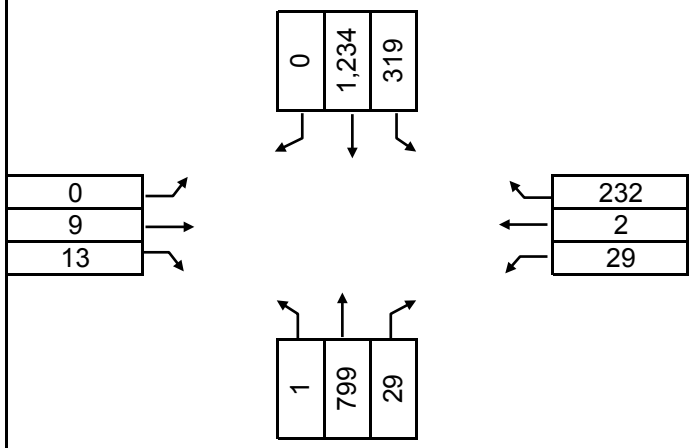
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 2B: Master Plan Align.

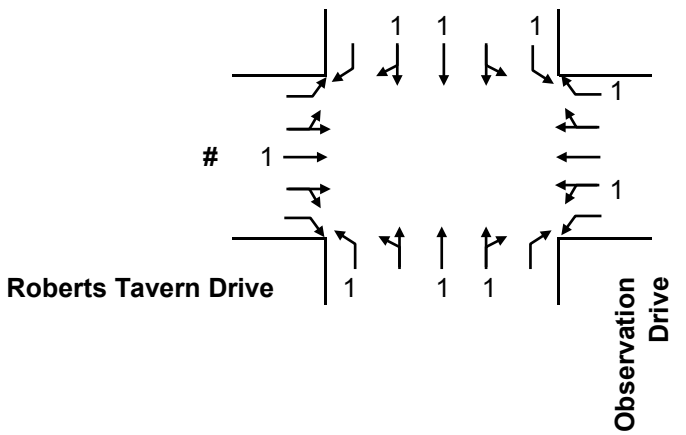
Location: Observation Drive/Roberts Tavern Drive

Computed by: JCP Date: 9/3/09 Checked by: Date:

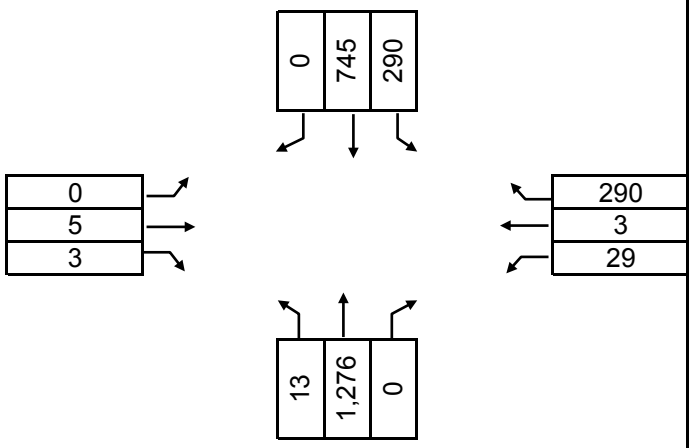
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	319	774	774
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	31
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							827
						Level Of Service	A
						v/c ratio	0.52

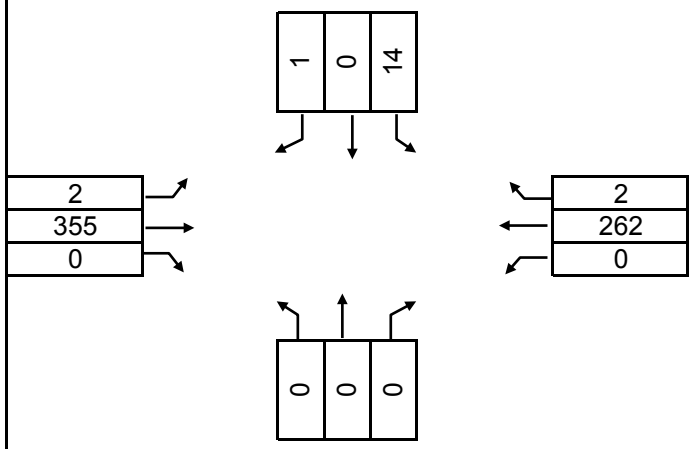
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	290	992	992
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	32
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,032
						Level Of Service	B
						v/c ratio	0.65

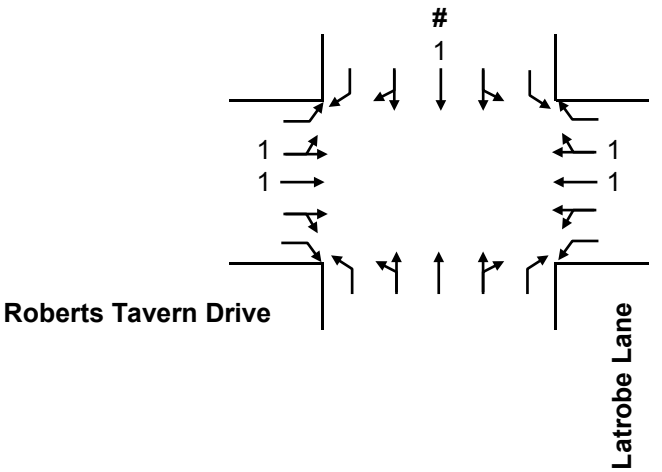
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 2B: Master Plan Align.				
Computed by:	JCP	Date:	9/3/09	Checked by:	Date:

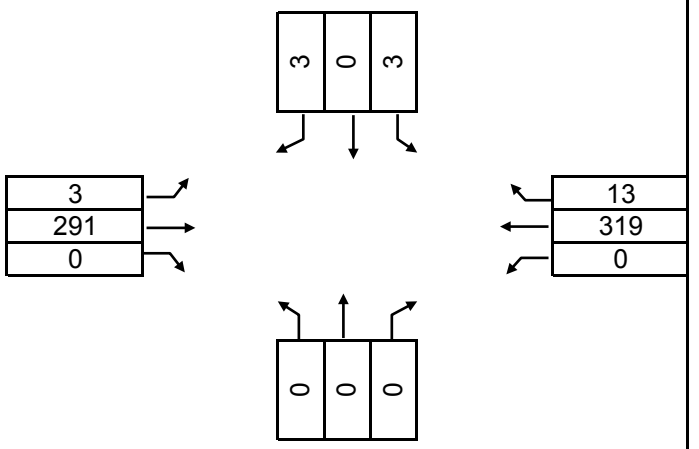
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	359	0.55	197	0	197	197
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	264	0.55	145	2	147	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							212
						Level Of Service	A
						v/c ratio	0.13

PM Peak Hour

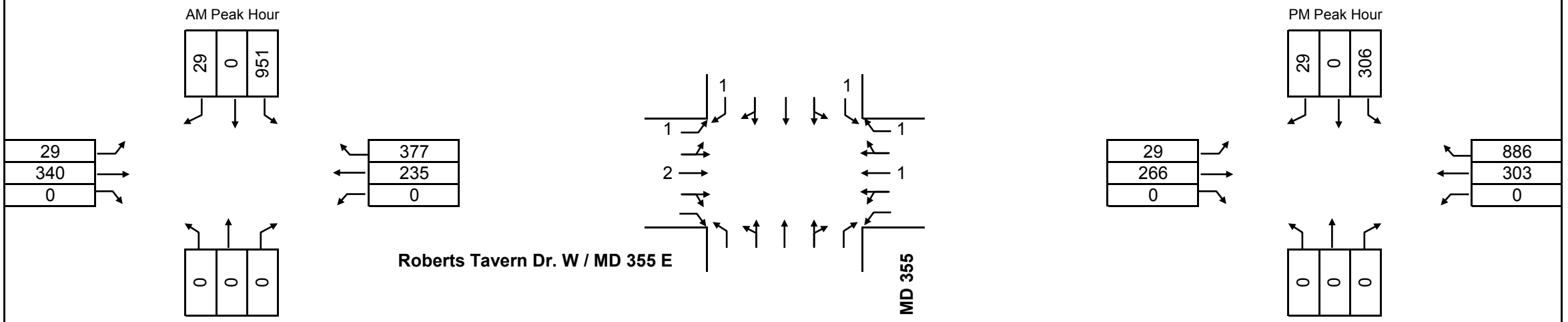
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	297	0.55	163	0	163	186
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	332	0.55	183	3	186	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							192
						Level Of Service	A
						v/c ratio	0.12

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 2B: Master Plan Align.

Location: MD 355/Roberts Tavern Dr. W / MD 355 E

Computed by: JCP Date: 10/8/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	951
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	951	1	951		951	
2	EB	340	0.55	187	0	187	264
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	235	1	235	29	264	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,215
						Level Of Service	C
						v/c ratio	0.76

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	306
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	306	1	306	0	306	
2	EB	266	0.55	146	0	146	609
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	303	1	303	29	332	
	WBR	580	1	580	29	609	
	WBL	0	1	0		0	
							915
						Level Of Service	A
						v/c ratio	0.57

Alternative 3:
Traditional T-Intersection at MD 355 and Roberts Tavern Drive Signalized

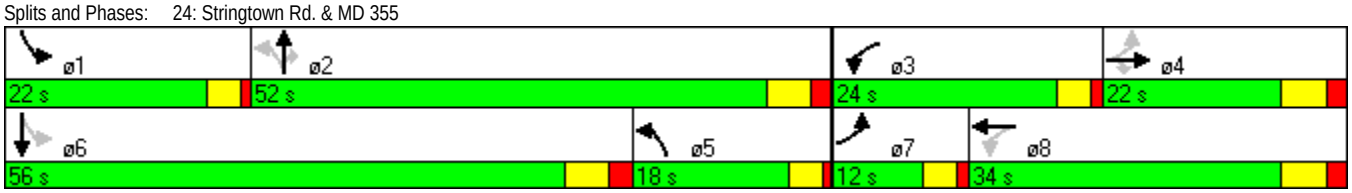
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	140	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.327			0.453			0.110			0.338		
Satd. Flow (perm)	609	3539	1583	844	3458	0	205	1863	1583	630	1788	0
Satd. Flow (RTOR)			320		16				92		20	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	183	336	427	611	0	171	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	22.0	22.0	24.0	34.0	0.0	18.0	52.0	52.0	22.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.0	18.0	16.0	42.0	30.0		50.5	50.5	50.5	52.0	52.0	
Actuated g/C Ratio	0.22	0.15	0.13	0.35	0.25		0.42	0.42	0.42	0.43	0.43	
v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.58	1.01	
Control Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
LOS	D	D	C	E	D		D	C	A	C	E	
Approach Delay		29.8			53.9			31.2			58.9	
Approach LOS		C			D			C			E	
Queue Length 50th (ft)	84	67	116	281	221		85	163	0	122	~610	
Queue Length 95th (ft)	#172	106	189	#527	287		155	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	209	531	488	450	877		269	784	720	444	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.55	1.01	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 95.3% — ICU Level of Service F
Analysis Period (min) 15

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.440		0.950	
Satd. Flow (perm)	3539	1583	820	3539	3433	1583
Satd. Flow (RTOR)		850				214
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	458	916	397	507	806	214
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	60.0	60.0	20.0	80.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0	54.0	76.0	76.0	34.0	36.0
Actuated g/C Ratio	0.47	0.45	0.63	0.63	0.28	0.30
v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34
Control Delay	20.2	7.9	11.5	5.1	48.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	7.9	11.5	5.1	48.8	5.7
LOS	C	A	B	A	D	A
Approach Delay	12.0			7.9	39.8	
Approach LOS	B			A	D	
Queue Length 50th (ft)	111	29	74	46	301	0
Queue Length 95th (ft)	148	175	m87	m52	379	56
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1652	1180	646	2241	973	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

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

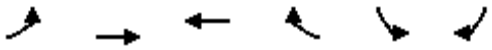
Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	689	25	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3522	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3522	0	1863	3539	0
Satd. Flow (RTOR)		13				104		6				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.3			47.4	14.9	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.3			47.4	14.9	5.0	5.2			2.7	
LOS		C			D	B	A	A			A	
Approach Delay		26.3			22.7			5.2			2.7	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		6			17	9	0	92			85	
Queue Length 95th (ft)		29			m29	m24	2	137			137	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2712			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 31 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.42		
Intersection Signal Delay: 5.0	Intersection LOS: A	
Intersection Capacity Utilization 50.8%	ICU Level of Service A	
Analysis Period (min) 15		

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

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	31	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	38	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	888			
pX, platoon unblocked						
vC, conflicting volume	138				163	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					26	
vCu, unblocked vol	138				163	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				783	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	25	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	795
Volume to Capacity	0.00	0.01	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	1.7	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	0.7		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	25	18	88	427	1070	25
Satd. Flow (prot)	1770	1583	1770	1863	1857	0
Flt Permitted	0.950		0.055			
Satd. Flow (perm)	1770	1583	102	1863	1857	0
Satd. Flow (RTOR)		22			4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	22	107	521	1338	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Total Split (s)	9.0	9.0	9.0	81.0	72.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Act Effct Green (s)	4.6	4.6	79.6	81.6	69.9	
Actuated g/C Ratio	0.05	0.05	0.88	0.91	0.78	
v/c Ratio	0.34	0.22	0.60	0.31	0.93	
Control Delay	48.7	20.2	26.6	1.6	22.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	48.7	20.2	26.6	1.6	22.7	
LOS	D	C	C	A	C	
Approach Delay	36.9			5.9	22.7	
Approach LOS	D			A	C	
Queue Length 50th (ft)	18	1	9	40	565	
Queue Length 95th (ft)	#46	16	#86	60	#1026	
Internal Link Dist (ft)	808			1247	1002	
Turn Bay Length (ft)			250			
Base Capacity (vph)	91	102	178	1689	1443	
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	0.34	0.22	0.60	0.31	0.93	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 55 (61%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 17.9	Intersection LOS: B
Intersection Capacity Utilization 88.6%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

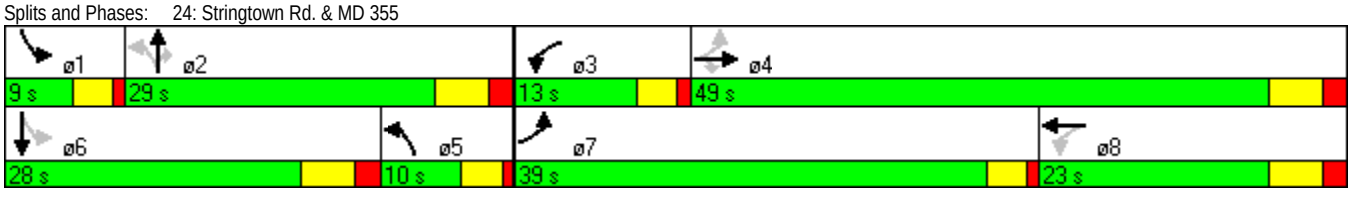
Splits and Phases: 25: Roberts Tavern Dr & MD 355

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	250	100	150	225	145	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.212			0.385			0.358			0.235		
Satd. Flow (perm)	395	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		216				308		34	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	672	702	305	122	458	0	177	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	28.0	19.9		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.28	0.20		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.96	0.43	0.35	0.43	0.56		0.76	0.85	0.88	0.71	0.82	
Control Delay	34.0	11.3	1.0	20.0	21.9		53.4	49.2	27.4	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	11.3	1.0	20.0	21.9		53.4	49.2	27.4	55.9	49.5	
LOS	C	B	A	B	C		D	D	C	E	D	
Approach Delay		18.5			21.5			39.2			51.1	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	118	91	0	33	71		95	243	160	64	203	
Queue Length 95th (ft)	#562	134	m0	59	124		m#188	#404	#360	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	710	1625	866	303	815		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.43	0.35	0.40	0.56		0.76	0.85	0.88	0.71	0.82	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 29.1 — Intersection LOS: C
Intersection Capacity Utilization 90.7% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Stringtown Rd. & MD 355

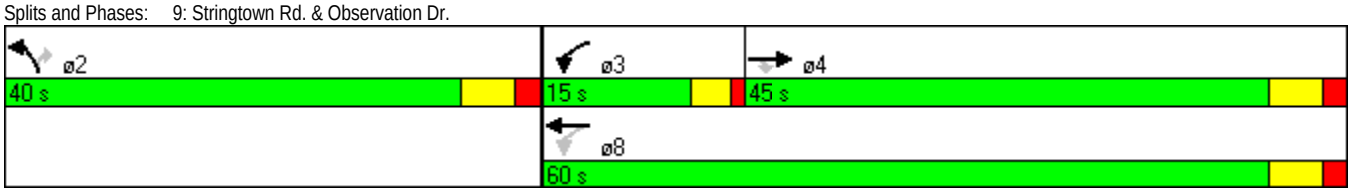


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1099	641	214	299	935	580
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.79
Control Delay	28.9	4.9	32.4	8.6	34.1	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	32.4	8.6	34.1	21.3
LOS	C	A	C	A	C	C
Approach Delay	20.1			18.5	29.2	
Approach LOS	C			B	C	
Queue Length 50th (ft)	308	0	56	38	279	109
Queue Length 95th (ft)	390	71	m#139	m54	284	231
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 58 (58%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

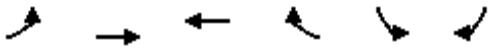


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1100	25	0	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3529	0	1863	3539	0
Flt Permitted					0.745		0.354					
Satd. Flow (perm)	0	1736	0	0	1388	1583	659	3529	0	1863	3539	0
Satd. Flow (RTOR)		4				125		4				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	0	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	81.9	81.9			81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.82	0.82			0.82	
v/c Ratio		0.06			0.31	0.53	0.02	0.48			0.27	
Control Delay		33.2			50.0	22.8	2.2	3.5			3.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		33.2			50.0	22.8	2.2	3.5			3.6	
LOS		C			D	C	A	A			A	
Approach Delay		33.3			28.7			3.4			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			21	15	1	96			45	
Queue Length 95th (ft)		m4			m54	74	5	158			97	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		316			250	387	540	2892			2900	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.48			0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 5.3	Intersection LOS: A
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	25	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	31	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	888			
pX, platoon unblocked						
vC, conflicting volume	172				188	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					23	
vCu, unblocked vol	172				188	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				759	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	14	20	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	822
Volume to Capacity	0.00	0.01	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	2.0	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	0.8		0.0		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	25	5	116	884	489	25
Satd. Flow (prot)	1770	1583	1770	1863	1850	0
Flt Permitted	0.950		0.360			
Satd. Flow (perm)	1770	1583	671	1863	1850	0
Satd. Flow (RTOR)		6			7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	6	142	1079	628	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Total Split (s)	11.0	11.0	10.0	89.0	79.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Act Effct Green (s)	5.9	5.9	88.4	90.4	78.2	
Actuated g/C Ratio	0.06	0.06	0.88	0.90	0.78	
v/c Ratio	0.30	0.06	0.22	0.64	0.43	
Control Delay	50.2	26.7	1.9	4.4	7.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.2	26.7	1.9	4.4	7.8	
LOS	D	C	A	A	A	
Approach Delay	46.4			4.1	7.8	
Approach LOS	D			A	A	
Queue Length 50th (ft)	19	0	11	179	150	
Queue Length 95th (ft)	m43	m6	19	274	m217	
Internal Link Dist (ft)	808			1231	1002	
Turn Bay Length (ft)			250			
Base Capacity (vph)	106	101	651	1684	1448	
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	0.29	0.06	0.22	0.64	0.43	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 84 (84%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 6.2	Intersection LOS: A
Intersection Capacity Utilization 65.6%	ICU Level of Service C
Analysis Period (min) 15	

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

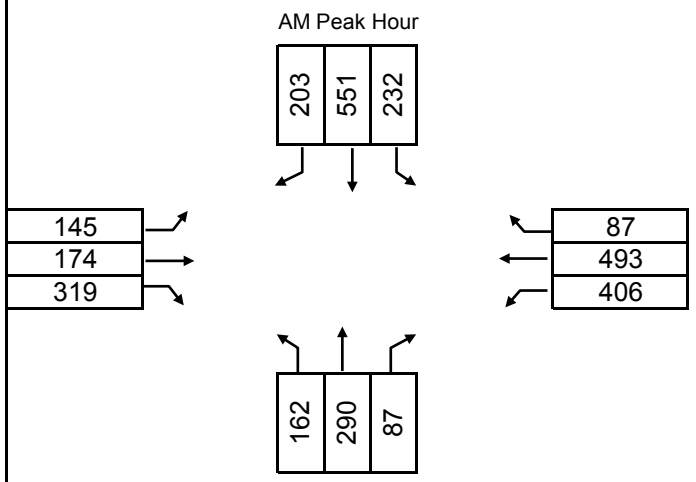
Splits and Phases: 25: Roberts Tavern Dr & MD 355

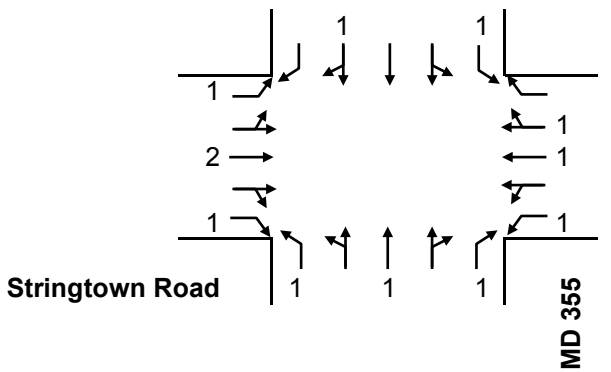
Turning Movement Summary and Level of Service

Count Date: n/a | Location: MD 355/Stringtown Road
Conditions/
Design Year: 2030 Alt. 3-3A

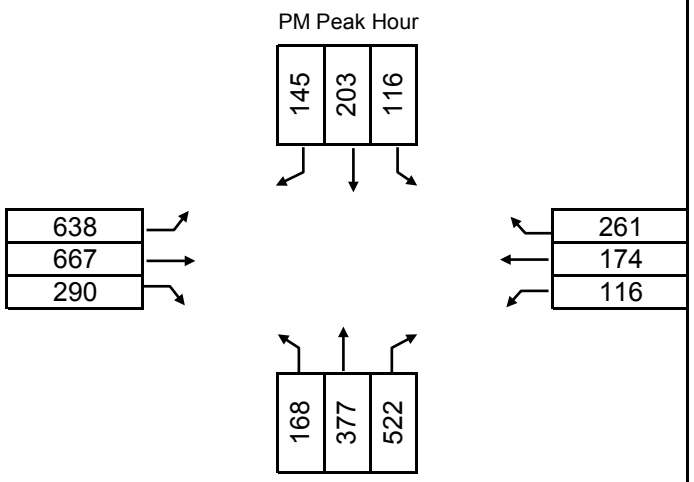
Computed by: JCP | Date: 9/17/09 | Checked by: | Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

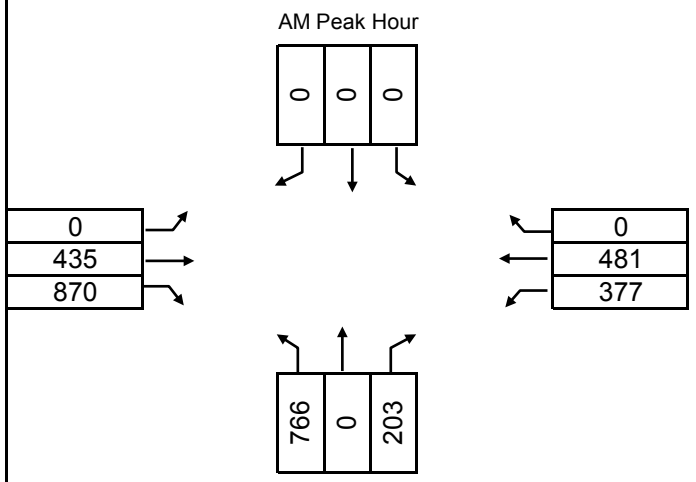
PM Peak Hour

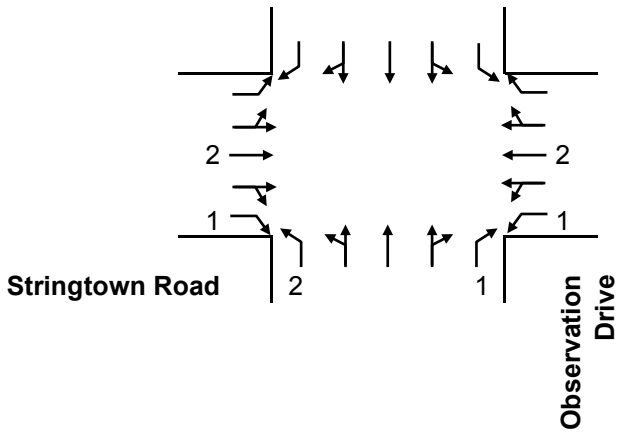
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

Turning Movement Summary and Level of Service

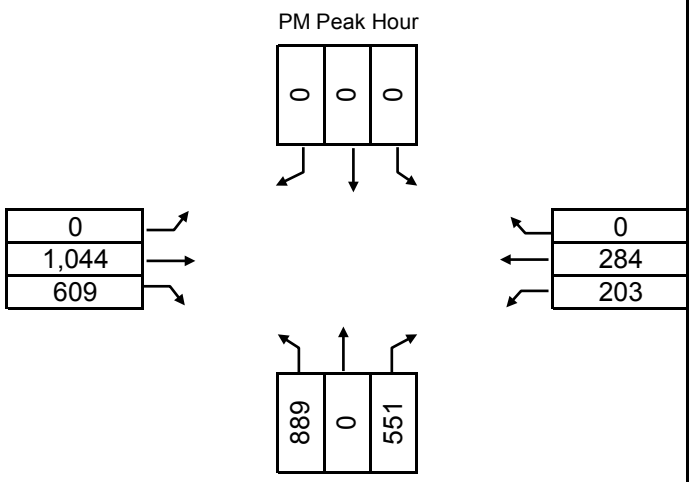
Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3-3A				
Computed by:	JCP	Date:	9/21/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	348	1	348	0	348	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

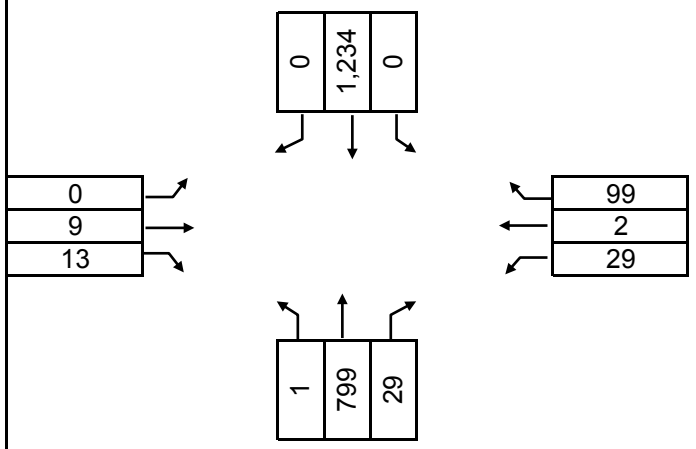
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 3-3A

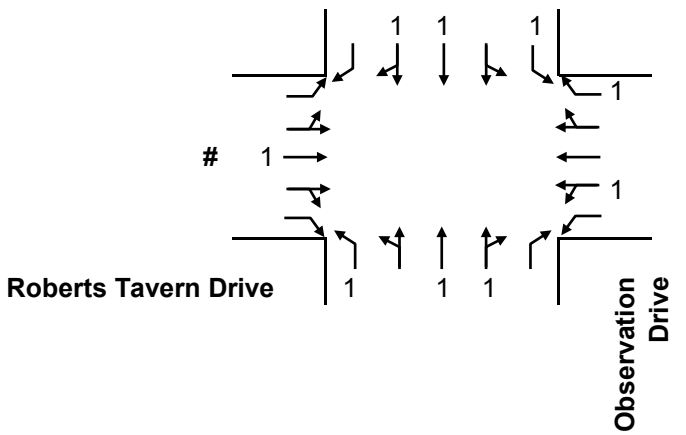
Location: Observation Drive/Roberts Tavern Drive

Computed by: JCP Date: 9/17/09 Checked by: Date:

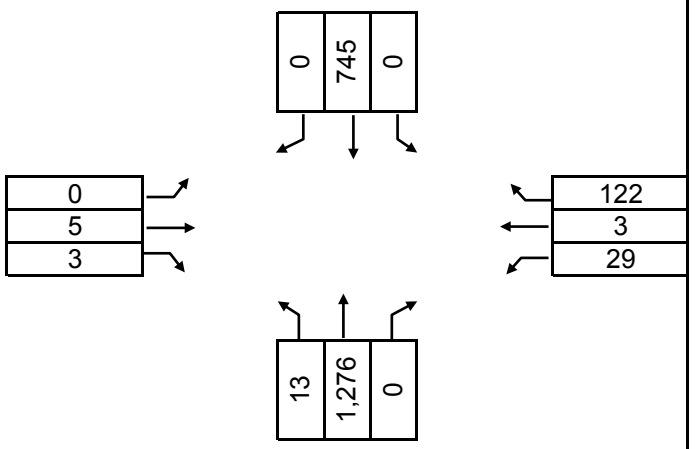
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							801
						Level Of Service	A
						v/c ratio	0.50

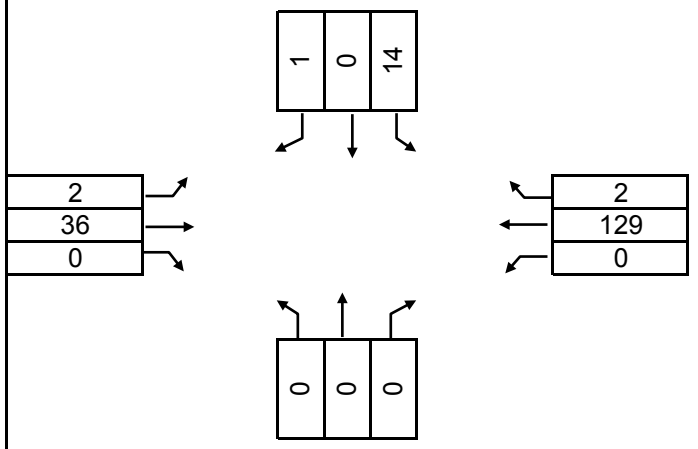
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	0	702	702
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	122
	WBR	122	1	122	0	122	
	WBL	0	1	0		0	
							832
						Level Of Service	A
						v/c ratio	0.52

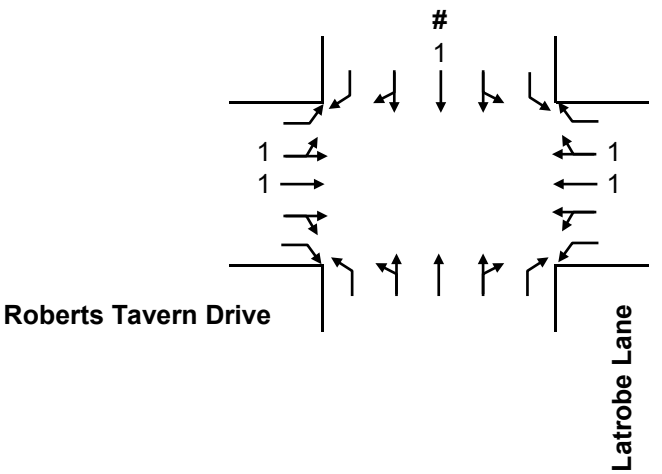
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3-3A				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

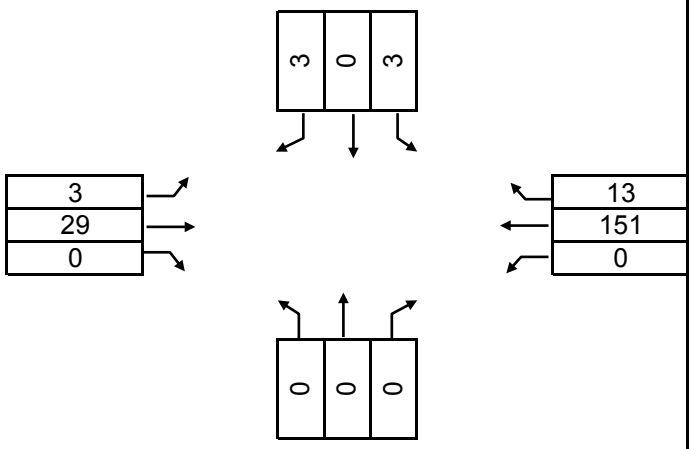
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	38	0.55	21	0	21	74
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	2	74	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							89
						Level Of Service	A
						v/c ratio	0.06

PM Peak Hour

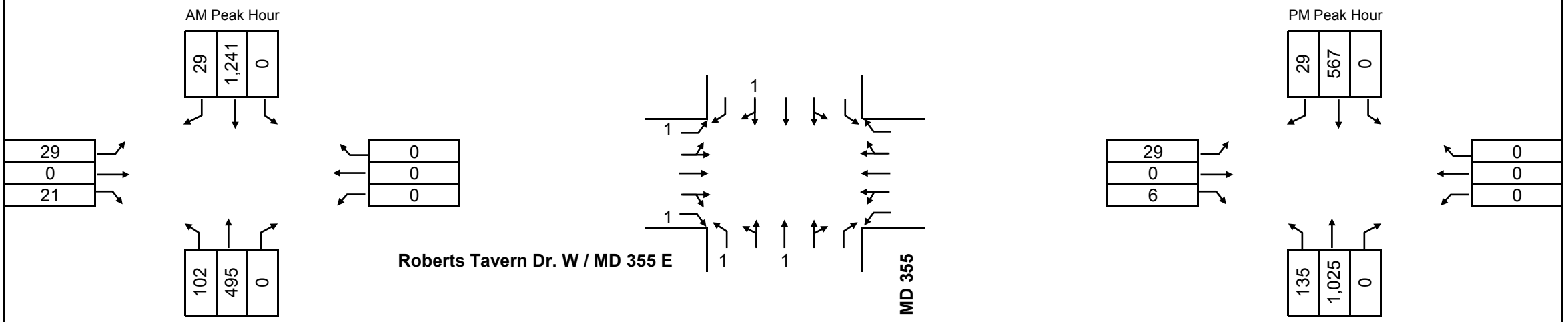
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	32	0.55	18	0	18	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							99
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 3-3A

Location: MD 355/Roberts Tavern Dr. W / MD 355 E

Computed by: JCP Date: 10/8/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	495	1	495	0	495	1,372
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,270	1	1,270	102	1,372	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
						Critical Lane Volume	1,401
						Level Of Service	D
						v/c ratio	0.88

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,025	1	1,025	0	1,025	1,025
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	596	1	596	135	731	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
						Critical Lane Volume	1,054
						Level Of Service	B
						v/c ratio	0.66

Alternative 3A:
Traditional T-Intersection at MD 355 and Roberts Tavern Drive
Unsignalized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	140	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.327			0.453			0.110			0.338		
Satd. Flow (perm)	609	3539	1583	844	3458	0	205	1863	1583	630	1788	0
Satd. Flow (RTOR)			320		16				92		20	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	183	336	427	611	0	171	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	22.0	22.0	24.0	34.0	0.0	18.0	52.0	52.0	22.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.0	18.0	16.0	42.0	30.0		50.5	50.5	50.5	52.0	52.0	
Actuated g/C Ratio	0.22	0.15	0.13	0.35	0.25		0.42	0.42	0.42	0.43	0.43	
v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.58	1.01	
Control Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
LOS	D	D	C	E	D		D	C	A	C	E	
Approach Delay		29.8			53.9			31.2			58.9	
Approach LOS		C			D			C			E	
Queue Length 50th (ft)	84	67	116	281	221		85	163	0	122	~610	
Queue Length 95th (ft)	#172	106	189	#527	287		155	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	209	531	488	450	877		269	784	720	444	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.55	1.01	

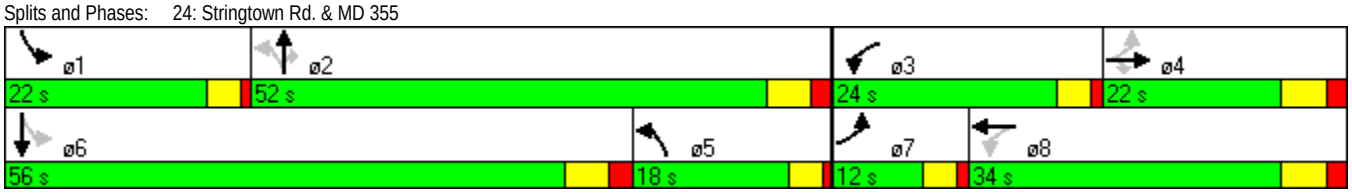
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 95.3% — ICU Level of Service F
Analysis Period (min) 15

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.440		0.950	
Satd. Flow (perm)	3539	1583	820	3539	3433	1583
Satd. Flow (RTOR)		850				214
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	458	916	397	507	806	214
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	60.0	60.0	20.0	80.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0	54.0	76.0	76.0	34.0	36.0
Actuated g/C Ratio	0.47	0.45	0.63	0.63	0.28	0.30
v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34
Control Delay	20.2	7.9	11.5	5.1	48.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	7.9	11.5	5.1	48.8	5.7
LOS	C	A	B	A	D	A
Approach Delay	12.0			7.9	39.8	
Approach LOS	B			A	D	
Queue Length 50th (ft)	111	29	74	46	301	0
Queue Length 95th (ft)	148	175	m87	m52	379	56
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1652	1180	646	2241	973	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

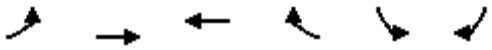
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	689	25	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3522	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3522	0	1863	3539	0
Satd. Flow (RTOR)		13				104		6				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.3			44.2	8.8	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.3			44.2	8.8	5.0	5.2			2.7	
LOS		C			D	A	A	A			A	
Approach Delay		26.3			17.3			5.2			2.7	
Approach LOS		C			B			A			A	
Queue Length 50th (ft)		6			18	0	0	92			85	
Queue Length 95th (ft)		29			46	39	2	137			137	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2712			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 31 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	

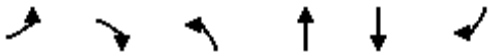
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	31	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	38	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	138				163	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					26	
vCu, unblocked vol	138				163	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				783	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	25	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	795
Volume to Capacity	0.00	0.01	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	1.7	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	0.7		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	18	88	427	1070	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	22	107	521	1307	31
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	2058	1322	1337			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2058	1322	1337			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	36	89	79			
cM capacity (veh/h)	48	191	516			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	31	22	107	521	1337
Volume Left	31	0	107	0	0
Volume Right	0	22	0	0	31
cSH	48	191	516	1700	1700
Volume to Capacity	0.64	0.11	0.21	0.31	0.79
Queue Length 95th (ft)	62	10	19	0	0
Control Delay (s)	166.5	26.3	13.8	0.0	0.0
Lane LOS	F	D	B		
Approach Delay (s)	107.8		2.4		0.0
Approach LOS	F				

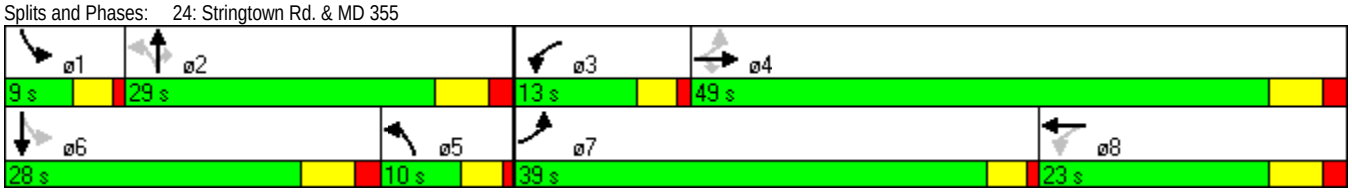
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	250	100	150	225	145	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.212			0.385			0.358			0.235		
Satd. Flow (perm)	395	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		216				308		34	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	672	702	305	122	458	0	177	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	28.0	19.9		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.28	0.20		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.96	0.43	0.35	0.43	0.56		0.76	0.85	0.88	0.71	0.82	
Control Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
LOS	C	B	A	B	C		E	D	C	E	D	
Approach Delay		18.5			21.5			44.4			51.1	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	118	91	0	33	71		94	242	157	64	203	
Queue Length 95th (ft)	#562	134	m0	59	124		#191	#403	#360	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	710	1625	866	303	815		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.43	0.35	0.40	0.56		0.76	0.85	0.88	0.71	0.82	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 30.6 Intersection LOS: C
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Stringtown Rd. & MD 355

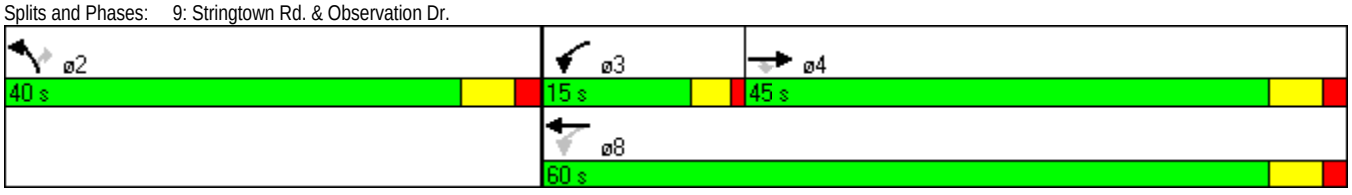


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1099	641	214	299	935	580
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.79
Control Delay	28.9	4.9	32.4	8.6	34.0	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	32.4	8.6	34.0	21.2
LOS	C	A	C	A	C	C
Approach Delay	20.1			18.5	29.1	
Approach LOS	C			B	C	
Queue Length 50th (ft)	308	0	56	38	275	109
Queue Length 95th (ft)	390	71	m#139	m54	283	228
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 58 (58%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

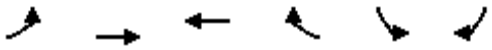


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1100	25	0	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3529	0	1863	3539	0
Flt Permitted					0.745		0.354					
Satd. Flow (perm)	0	1736	0	0	1388	1583	659	3529	0	1863	3539	0
Satd. Flow (RTOR)		4				125		4				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	0	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	81.9	81.9			81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.82	0.82			0.82	
v/c Ratio		0.06			0.31	0.53	0.02	0.48			0.27	
Control Delay		33.2			50.5	17.2	2.2	3.5			3.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		33.2			50.5	17.2	2.2	3.5			3.6	
LOS		C			D	B	A	A			A	
Approach Delay		33.3			24.3			3.4			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			22	3	1	96			45	
Queue Length 95th (ft)		m4			m49	m53	5	158			97	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		316			250	387	540	2892			2900	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.48			0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 5.0	Intersection LOS: A
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

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

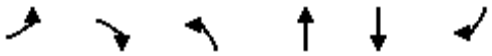
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	25	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	31	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	172				188	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					23	
vCu, unblocked vol	172				188	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				759	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	14	20	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	822
Volume to Capacity	0.00	0.01	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	2.0	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	0.8		0.0		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	5	116	884	489	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	6	142	1079	597	31
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	1975	612	628			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1975	612	628			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	47	99	85			
cM capacity (veh/h)	58	493	954			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	31	6	142	1079	628
Volume Left	31	0	142	0	0
Volume Right	0	6	0	0	31
cSH	58	493	954	1700	1700
Volume to Capacity	0.53	0.01	0.15	0.63	0.37
Queue Length 95th (ft)	52	1	13	0	0
Control Delay (s)	121.6	12.4	9.4	0.0	0.0
Lane LOS	F	B	A		
Approach Delay (s)	103.4		1.1		0.0
Approach LOS	F				

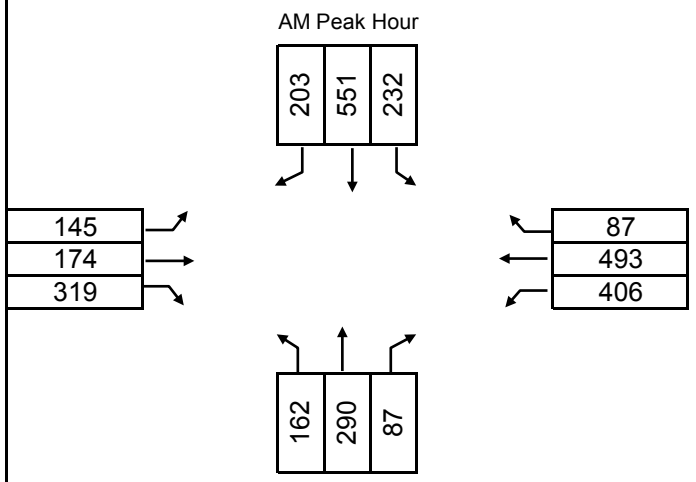
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		

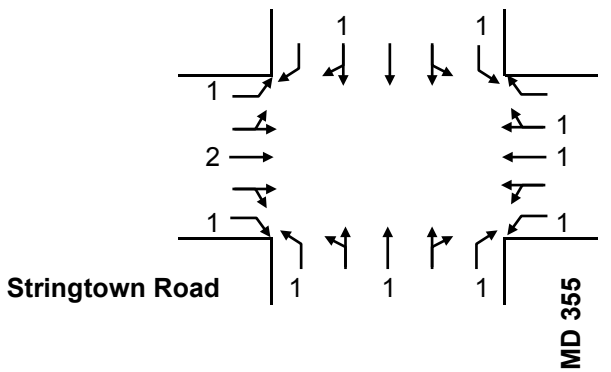
Turning Movement Summary and Level of Service

Count Date: n/a | Location: MD 355/Stringtown Road
Conditions/
Design Year: 2030 Alt. 3-3A

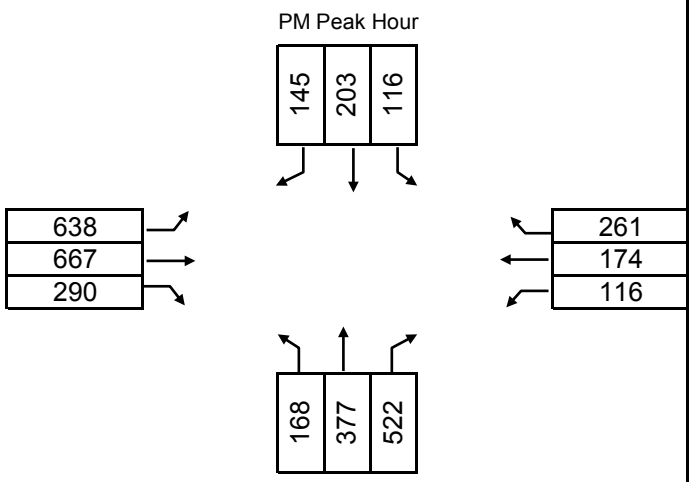
Computed by: JCP | Date: 9/17/09 | Checked by: | Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

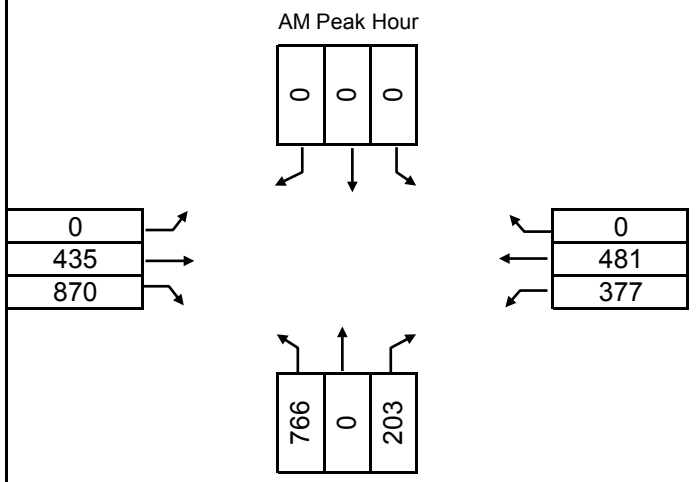
PM Peak Hour

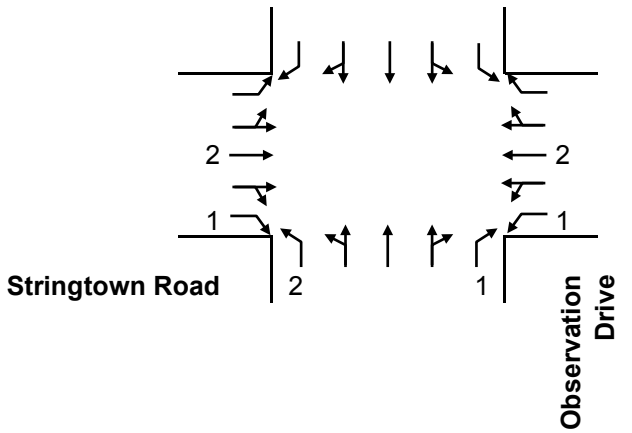
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

Turning Movement Summary and Level of Service

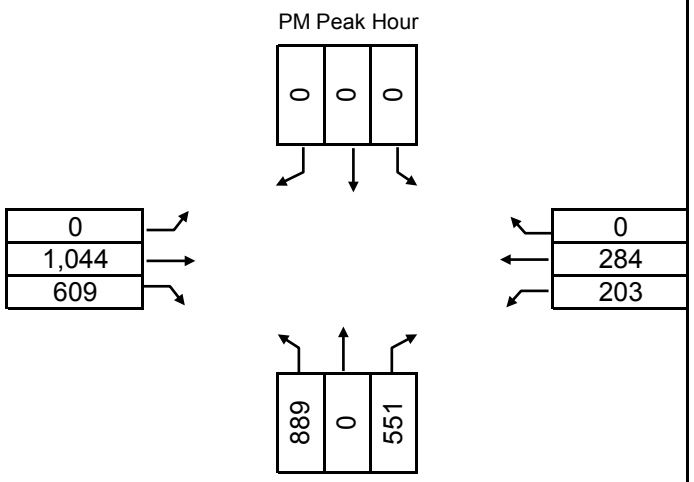
Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3-3A				
Computed by:	JCP	Date:	9/21/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	348	1	348	0	348	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

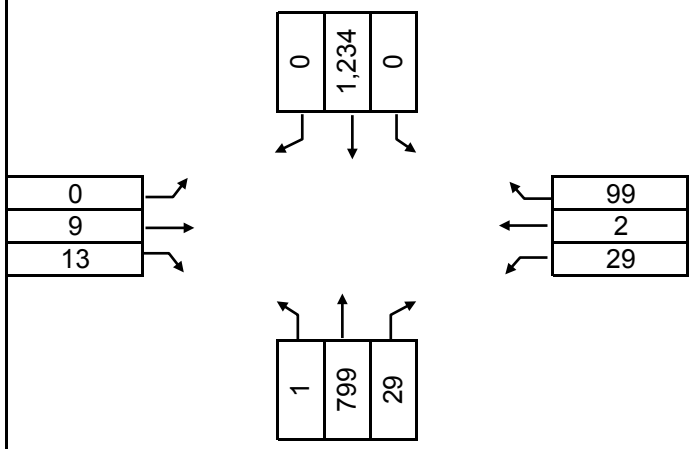
Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 3-3A

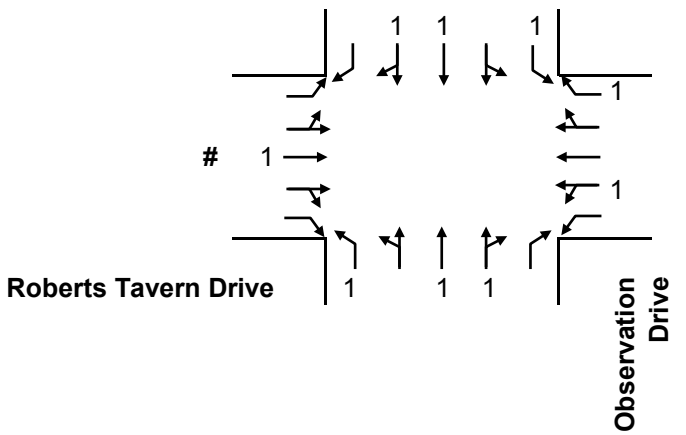
Location: Observation Drive/Roberts Tavern Drive

Computed by: JCP Date: 9/17/09 Checked by: Date:

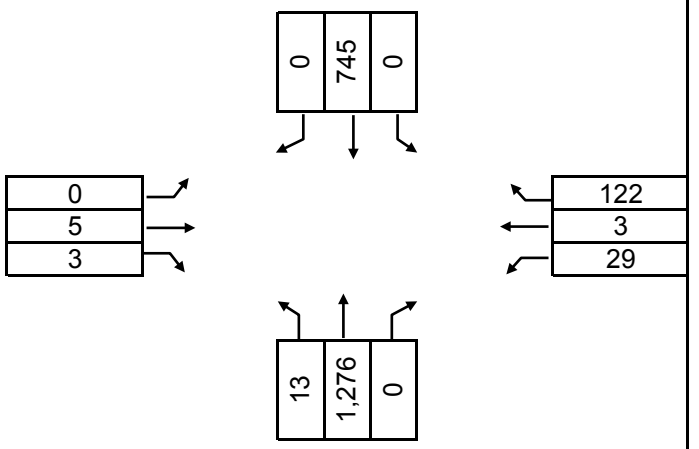
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							801
						Level Of Service	A
						v/c ratio	0.50

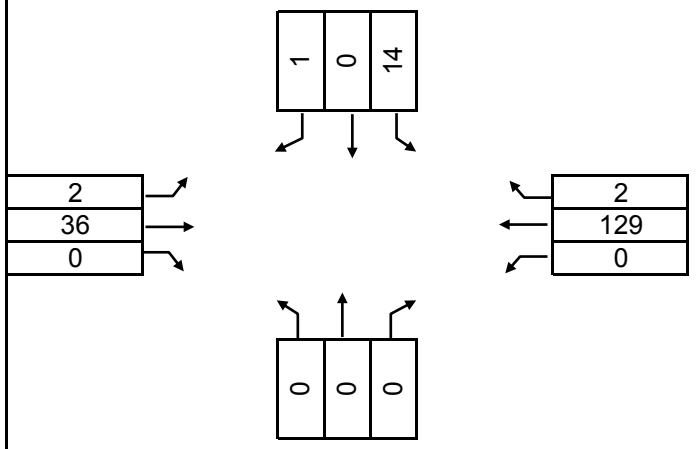
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	0	702	702
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	122
	WBR	122	1	122	0	122	
	WBL	0	1	0		0	
							832
						Level Of Service	A
						v/c ratio	0.52

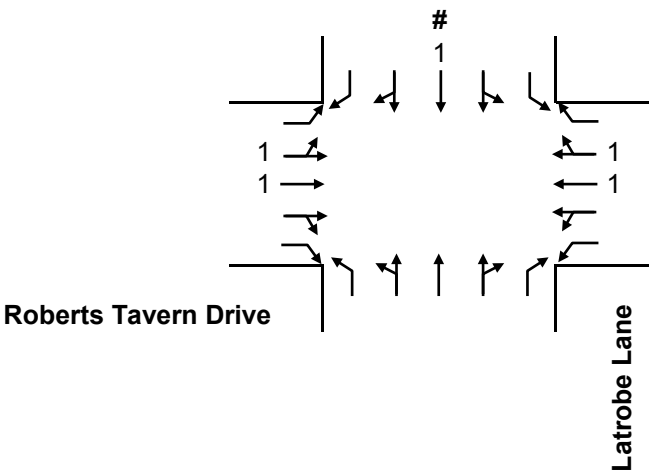
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3-3A				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

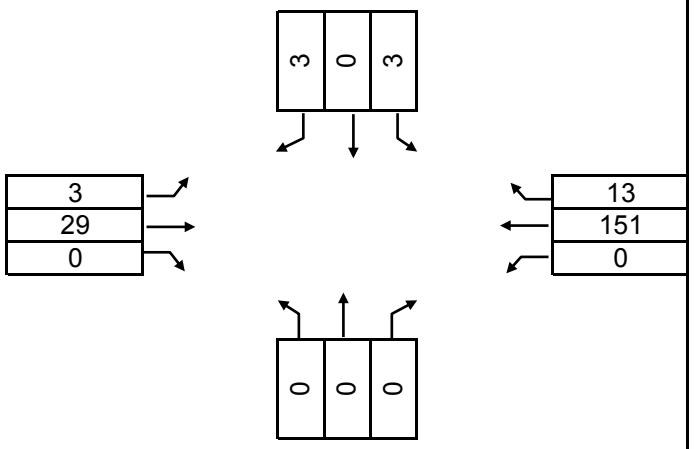
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	38	0.55	21	0	21	74
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	2	74	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							89
						Level Of Service	A
						v/c ratio	0.06

PM Peak Hour

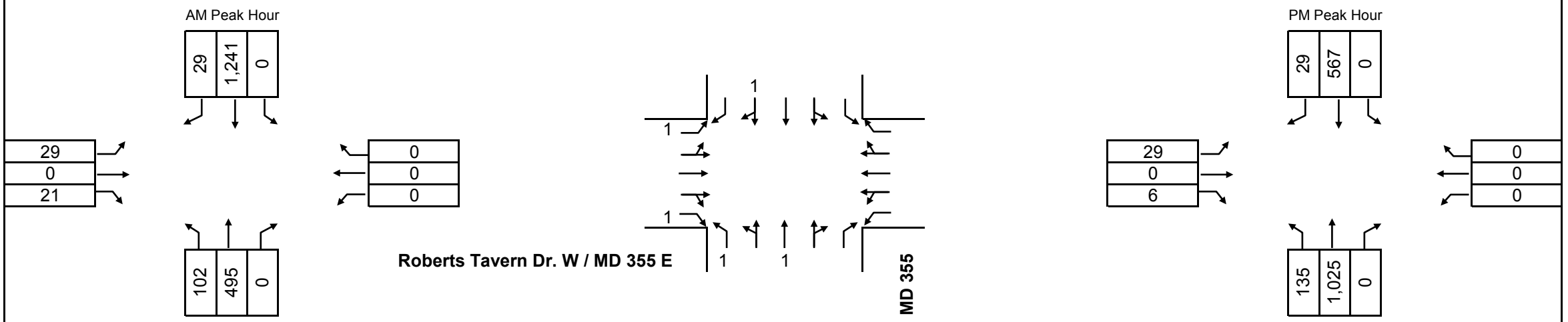
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	32	0.55	18	0	18	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							99
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/
Design Year: 2030 Alt. 3-3A

Location: MD 355/Roberts Tavern Dr. W / MD 355 E

Computed by: JCP Date: 10/8/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	495	1	495	0	495	1,372
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,270	1	1,270	102	1,372	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
						Critical Lane Volume	1,401
						Level Of Service	D
						v/c ratio	0.88

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,025	1	1,025	0	1,025	1,025
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	596	1	596	135	731	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
						Critical Lane Volume	1,054
						Level Of Service	B
						v/c ratio	0.66

Alternative 3B:
"Maryland Tee" Intersection at MD 355 and Roberts Tavern Drive
Unsignalized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	140	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.327			0.453			0.110			0.338		
Satd. Flow (perm)	609	3539	1583	844	3458	0	205	1863	1583	630	1788	0
Satd. Flow (RTOR)			320		16				92		20	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	183	336	427	611	0	171	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	22.0	22.0	24.0	34.0	0.0	18.0	52.0	52.0	22.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.0	18.0	16.0	42.0	30.0		50.5	50.5	50.5	52.0	52.0	
Actuated g/C Ratio	0.22	0.15	0.13	0.35	0.25		0.42	0.42	0.42	0.43	0.43	
v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.58	1.01	
Control Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
LOS	D	D	C	E	D		D	C	A	C	E	
Approach Delay		29.8			53.9			31.2			58.9	
Approach LOS		C			D			C			E	
Queue Length 50th (ft)	84	67	116	281	221		85	163	0	122	~610	
Queue Length 95th (ft)	#172	106	189	#527	287		155	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	209	531	488	450	877		269	784	720	444	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.55	1.01	

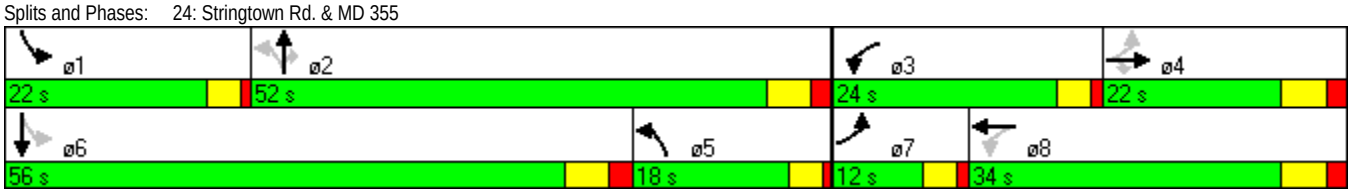
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 95.3% — ICU Level of Service F
Analysis Period (min) 15

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.440		0.950	
Satd. Flow (perm)	3539	1583	820	3539	3433	1583
Satd. Flow (RTOR)		850				214
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	458	916	397	507	806	214
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	60.0	60.0	20.0	80.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0	54.0	76.0	76.0	34.0	36.0
Actuated g/C Ratio	0.47	0.45	0.63	0.63	0.28	0.30
v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34
Control Delay	20.2	7.9	11.5	5.1	48.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	7.9	11.5	5.1	48.8	5.7
LOS	C	A	B	A	D	A
Approach Delay	12.0			7.9	39.8	
Approach LOS	B			A	D	
Queue Length 50th (ft)	111	29	74	46	301	0
Queue Length 95th (ft)	148	175	m87	m52	379	56
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1652	1180	646	2241	973	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

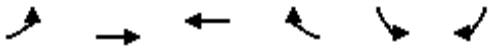
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	689	25	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3522	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3522	0	1863	3539	0
Satd. Flow (RTOR)		13				104		6				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.3			44.2	8.8	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.3			44.2	8.8	5.0	5.2			2.7	
LOS		C			D	A	A	A			A	
Approach Delay		26.3			17.3			5.2			2.7	
Approach LOS		C			B			A			A	
Queue Length 50th (ft)		6			18	0	0	92			85	
Queue Length 95th (ft)		29			46	39	2	137			137	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2712			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 31 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	

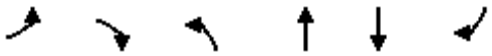
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	31	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	38	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	138				163	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					26	
vCu, unblocked vol	138				163	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				783	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	25	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	795
Volume to Capacity	0.00	0.01	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	1.7	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	0.7		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	18	88	0	1070	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	22	107	0	1307	31
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	1537	1322	1337			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1537	1322	1337			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	89	79			
cM capacity (veh/h)	101	191	516			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	31	22	107	0	1337
Volume Left	31	0	107	0	0
Volume Right	0	22	0	0	31
cSH	101	191	516	1700	1700
Volume to Capacity	0.30	0.11	0.21	0.31	0.79
Queue Length 95th (ft)	29	10	19	0	0
Control Delay (s)	55.4	26.3	13.8	0.0	0.0
Lane LOS	F	D	B		
Approach Delay (s)	43.2		13.8		0.0
Approach LOS	E				

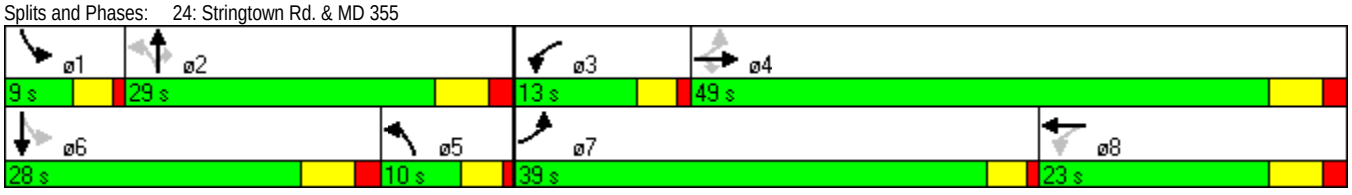
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	250	100	150	225	145	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.212			0.385			0.358			0.235		
Satd. Flow (perm)	395	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		216				308		34	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	672	702	305	122	458	0	177	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	28.0	19.9		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.28	0.20		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.96	0.43	0.35	0.43	0.56		0.76	0.85	0.88	0.71	0.82	
Control Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
LOS	C	B	A	B	C		E	D	C	E	D	
Approach Delay		18.5			21.5			44.4			51.1	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	118	91	0	33	71		94	242	157	64	203	
Queue Length 95th (ft)	#562	134	m0	59	124		#191	#403	#360	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	710	1625	866	303	815		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.43	0.35	0.40	0.56		0.76	0.85	0.88	0.71	0.82	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 30.6 Intersection LOS: C
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Stringtown Rd. & MD 355

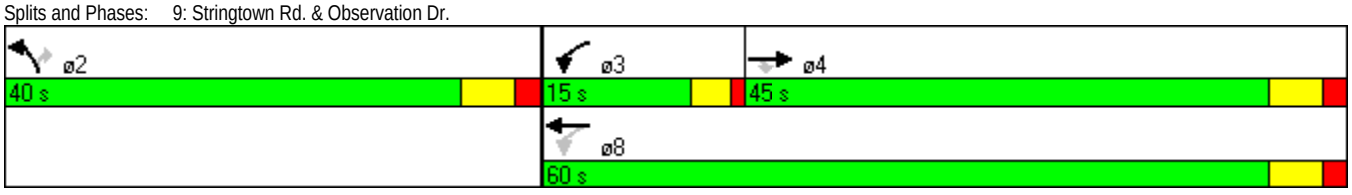


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1099	641	214	299	935	580
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.79
Control Delay	28.9	4.9	32.4	8.6	34.0	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	32.4	8.6	34.0	21.2
LOS	C	A	C	A	C	C
Approach Delay	20.1			18.5	29.1	
Approach LOS	C			B	C	
Queue Length 50th (ft)	308	0	56	38	275	109
Queue Length 95th (ft)	390	71	m#139	m54	283	228
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 58 (58%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

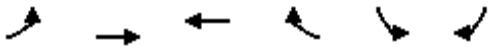


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1100	25	0	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3529	0	1863	3539	0
Flt Permitted					0.745		0.354					
Satd. Flow (perm)	0	1736	0	0	1388	1583	659	3529	0	1863	3539	0
Satd. Flow (RTOR)		4				125		4				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	0	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	81.9	81.9			81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.82	0.82			0.82	
v/c Ratio		0.06			0.31	0.53	0.02	0.48			0.27	
Control Delay		33.2			50.5	17.2	2.2	3.5			3.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		33.2			50.5	17.2	2.2	3.5			3.6	
LOS		C			D	B	A	A			A	
Approach Delay		33.3			24.3			3.4			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			22	3	1	96			45	
Queue Length 95th (ft)		m4			m49	m53	5	158			97	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		316			250	387	540	2892			2900	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.48			0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 5.0	Intersection LOS: A
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

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

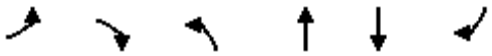
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	25	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	31	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	172				188	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					23	
vCu, unblocked vol	172				188	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				759	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	14	20	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	822
Volume to Capacity	0.00	0.01	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	2.0	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	0.8		0.0		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		



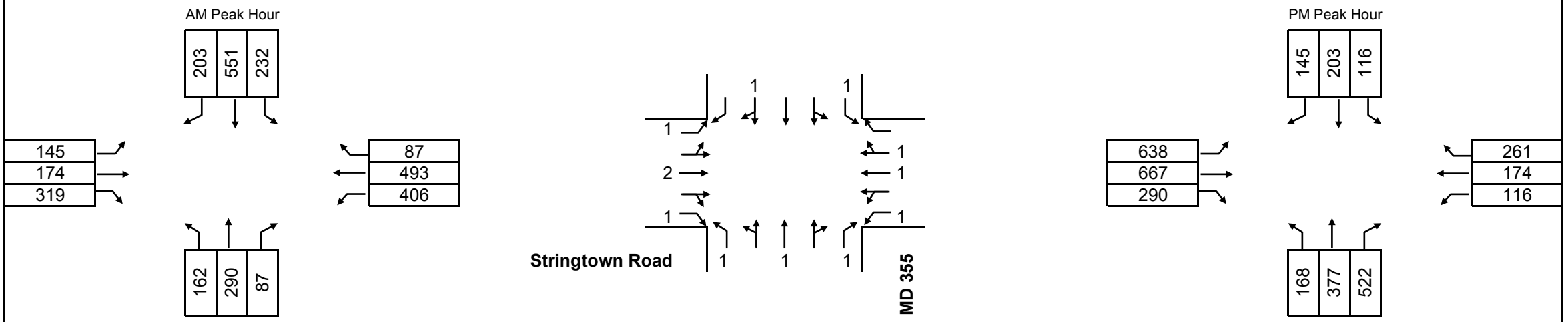
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	5	116	0	489	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	6	142	0	597	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	896	612	628			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896	612	628			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	99	85			
cM capacity (veh/h)	265	493	954			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	31	6	142	0	628
Volume Left	31	0	142	0	0
Volume Right	0	6	0	0	31
cSH	265	493	954	1700	1700
Volume to Capacity	0.12	0.01	0.15	0.63	0.37
Queue Length 95th (ft)	10	1	13	0	0
Control Delay (s)	20.4	12.4	9.4	0.0	0.0
Lane LOS	C	B	A		
Approach Delay (s)	19.0		9.4		0.0
Approach LOS	C				

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

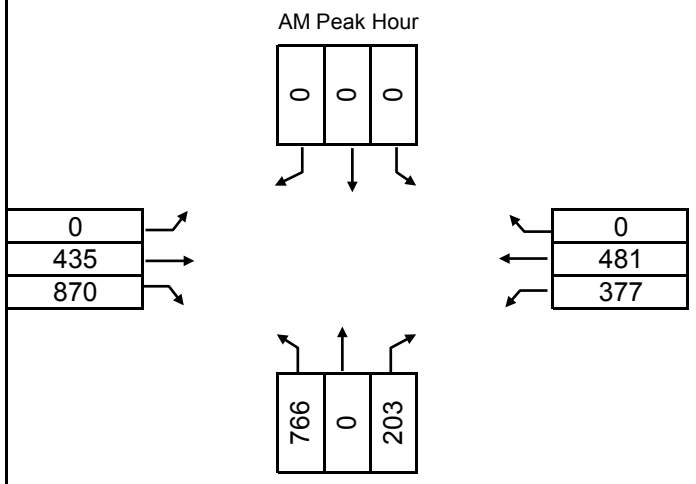
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

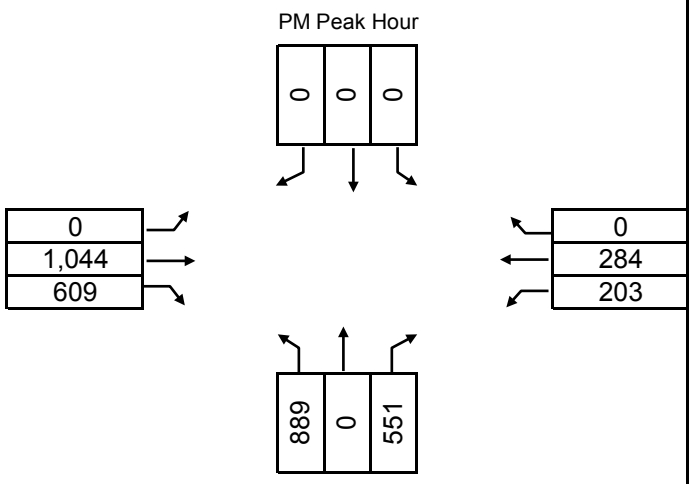
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/21/09	Checked by:	Date:

AM Peak Hour



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

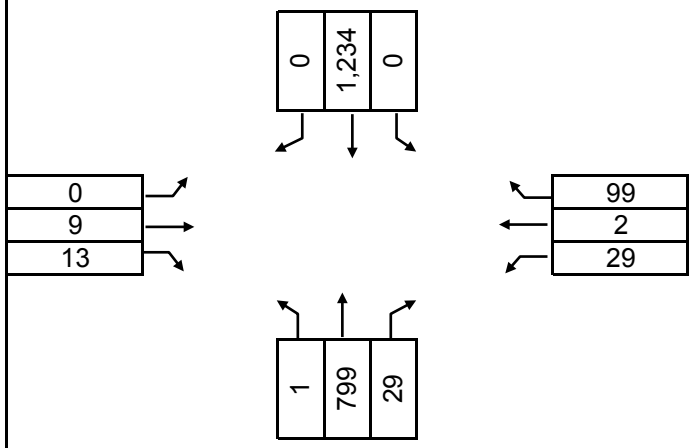
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	348	1	348	0	348	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

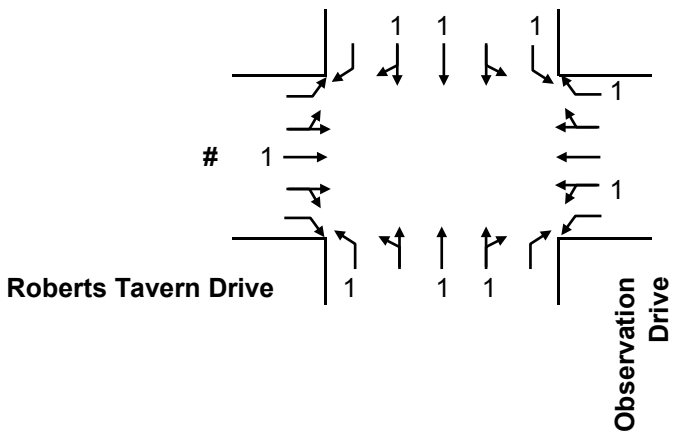
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

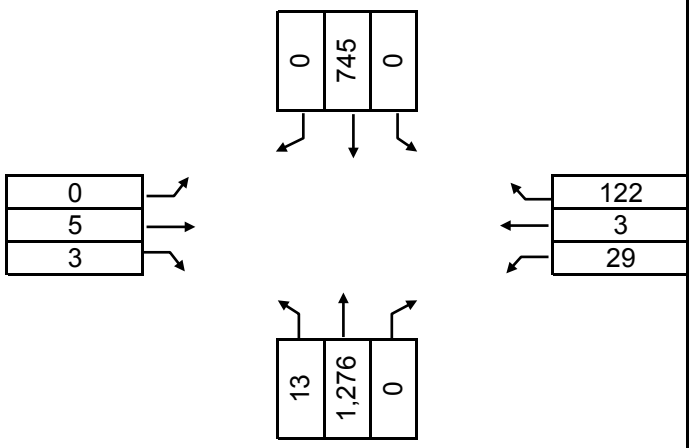
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							801
						Level Of Service	A
						v/c ratio	0.50

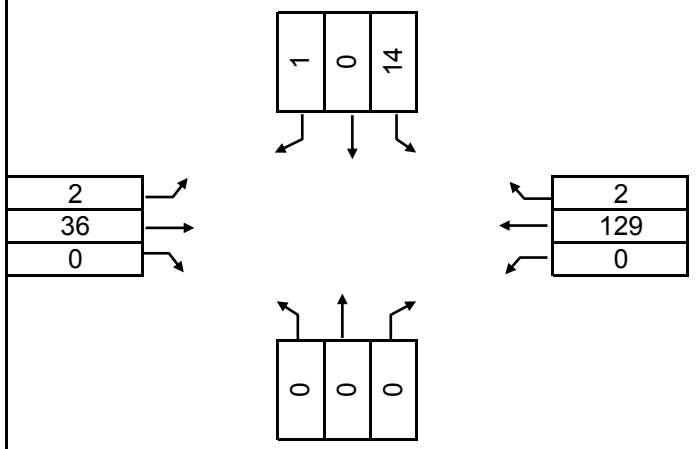
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	0	702	702
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	122
	WBR	122	1	122	0	122	
	WBL	0	1	0		0	
							832
						Level Of Service	A
						v/c ratio	0.52

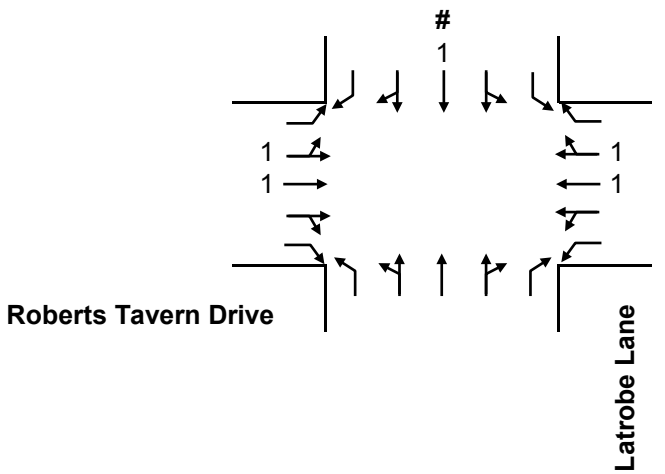
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

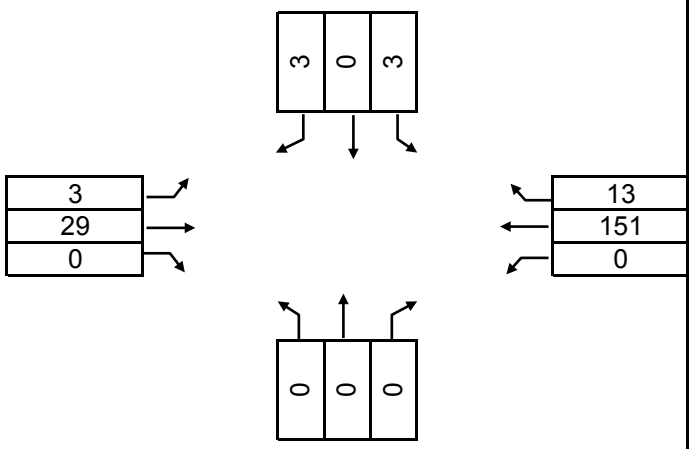
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	38	0.55	21	0	21	74
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	2	74	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							89
						Level Of Service	A
						v/c ratio	0.06

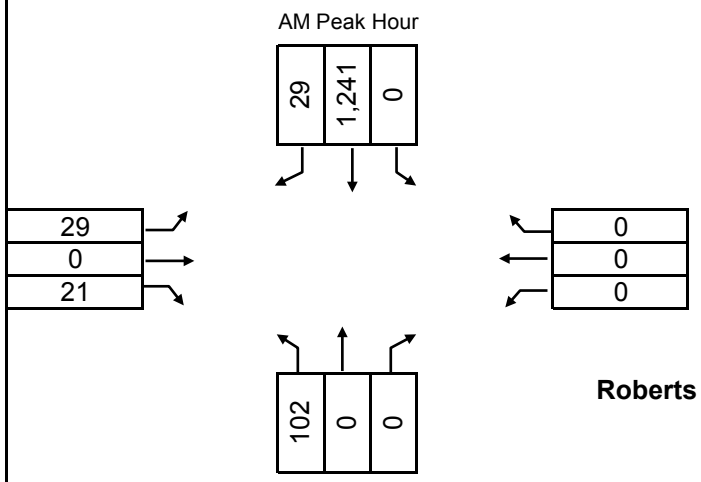
PM Peak Hour

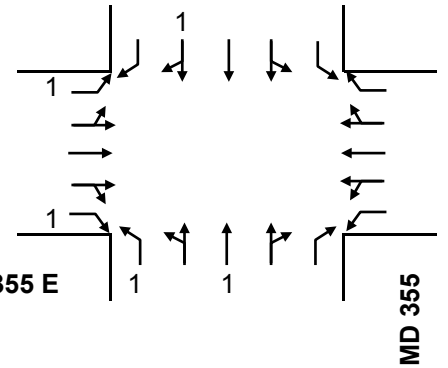
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	32	0.55	18	0	18	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							99
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

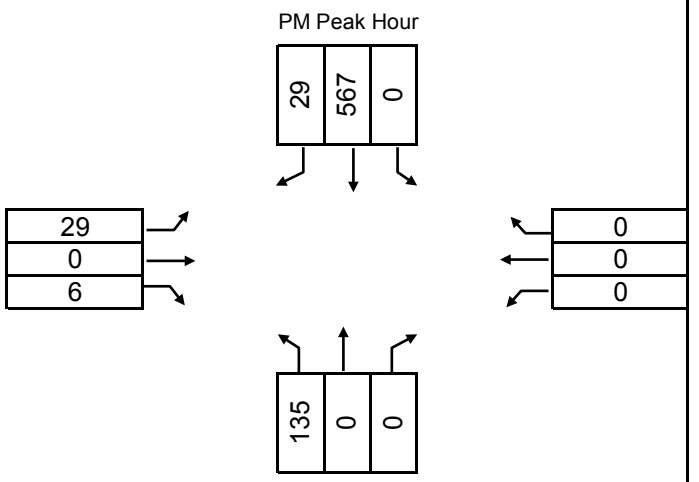
Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	10/2/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	1,372
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,270	1	1,270	102	1,372	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,401
						Level Of Service	D
						v/c ratio	0.88

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	731
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	596	1	596	135	731	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							760
						Level Of Service	A
						v/c ratio	0.48

Alternative 3C:
"Maryland Tee" Intersection at MD 355 and Roberts Tavern Drive Signalized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	140	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.327			0.453			0.110			0.338		
Satd. Flow (perm)	609	3539	1583	844	3458	0	205	1863	1583	630	1788	0
Satd. Flow (RTOR)			320		16				92		20	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	183	336	427	611	0	171	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	22.0	22.0	24.0	34.0	0.0	18.0	52.0	52.0	22.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.0	18.0	16.0	42.0	30.0		50.5	50.5	50.5	52.0	52.0	
Actuated g/C Ratio	0.22	0.15	0.13	0.35	0.25		0.42	0.42	0.42	0.43	0.43	
v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.58	1.01	
Control Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
LOS	D	D	C	E	D		D	C	A	C	E	
Approach Delay		29.8			53.9			31.2			58.9	
Approach LOS		C			D			C			E	
Queue Length 50th (ft)	84	67	116	281	221		85	163	0	122	~610	
Queue Length 95th (ft)	#172	106	189	#527	287		155	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	209	531	488	450	877		269	784	720	444	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.55	1.01	

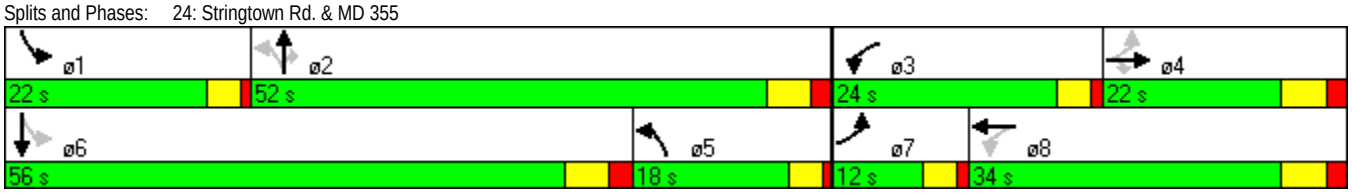
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 95.3% — ICU Level of Service F
Analysis Period (min) 15

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.440		0.950	
Satd. Flow (perm)	3539	1583	820	3539	3433	1583
Satd. Flow (RTOR)		850				214
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	458	916	397	507	806	214
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	60.0	60.0	20.0	80.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0	54.0	76.0	76.0	34.0	36.0
Actuated g/C Ratio	0.47	0.45	0.63	0.63	0.28	0.30
v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34
Control Delay	20.2	7.9	11.5	5.1	48.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	7.9	11.5	5.1	48.8	5.7
LOS	C	A	B	A	D	A
Approach Delay	12.0			7.9	39.8	
Approach LOS	B			A	D	
Queue Length 50th (ft)	111	29	74	46	301	0
Queue Length 95th (ft)	148	175	m87	m52	379	56
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1652	1180	646	2241	973	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

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

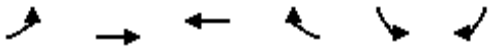
Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	689	25	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3522	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3522	0	1863	3539	0
Satd. Flow (RTOR)		13				104		6				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.3			41.1	10.1	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.3			41.1	10.1	5.0	5.2			2.7	
LOS		C			D	B	A	A			A	
Approach Delay		26.3			17.6			5.2			2.7	
Approach LOS		C			B			A			A	
Queue Length 50th (ft)		6			18	5	0	92			85	
Queue Length 95th (ft)		29			m26	m29	2	137			137	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2712			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 31 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	31	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	38	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	888			
pX, platoon unblocked						
vC, conflicting volume	138				163	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					26	
vCu, unblocked vol	138				163	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				783	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	25	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	795
Volume to Capacity	0.00	0.01	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	1.7	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	0.7		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	ø2
Lane Configurations							
Volume (vph)	25	18	88	427	1070	25	
Satd. Flow (prot)	1770	1583	1770	1863	1857	0	
Flt Permitted	0.950		0.056				
Satd. Flow (perm)	1770	1583	104	1863	1857	0	
Satd. Flow (RTOR)		22			4		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Growth Factor	116%	116%	116%	116%	116%	116%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	31	22	107	521	1338	0	
Turn Type		Perm	custom				
Protected Phases	4!		5	2 4!	6		2
Permitted Phases		4	2				
Total Split (s)	9.0	9.0	9.0	90.0	72.0	0.0	81.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	4.0	
Act Effct Green (s)	4.0	4.0	76.0	90.0	67.0		
Actuated g/C Ratio	0.04	0.04	0.84	1.00	0.74		
v/c Ratio	0.39	0.24	0.66	0.28	0.97		
Control Delay	56.7	26.2	31.2	0.4	29.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	56.7	26.2	31.2	0.4	29.9		
LOS	E	C	C	A	C		
Approach Delay	44.0			5.6	29.9		
Approach LOS	D			A	C		
Queue Length 50th (ft)	17	1	8	0	565		
Queue Length 95th (ft)	#48	24	#84	0	#1026		
Internal Link Dist (ft)	808			1247	437		
Turn Bay Length (ft)			250				
Base Capacity (vph)	79	91	162	1863	1383		
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	0.39	0.24	0.66	0.28	0.97		

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 22.7 — Intersection LOS: C
Intersection Capacity Utilization 88.6% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

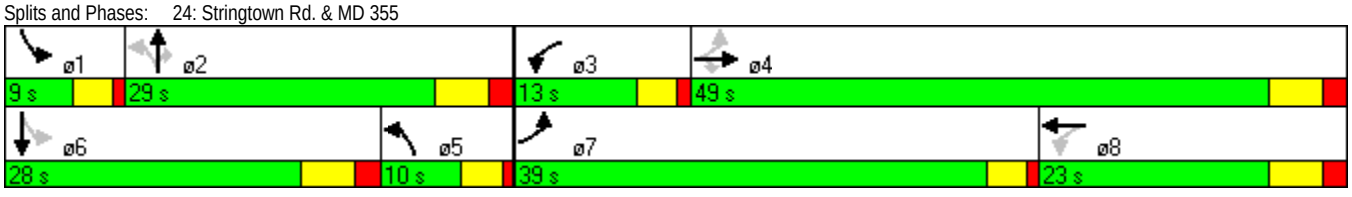
Splits and Phases: 25: Roberts Tavern Dr & MD 355

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	250	100	150	225	145	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.212			0.385			0.358			0.235		
Satd. Flow (perm)	395	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		216				308		34	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	672	702	305	122	458	0	177	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	28.0	19.9		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.28	0.20		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.96	0.43	0.35	0.43	0.56		0.76	0.85	0.88	0.71	0.82	
Control Delay	34.0	11.3	1.0	20.0	21.9		56.6	52.0	30.2	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	11.3	1.0	20.0	21.9		56.6	52.0	30.2	55.9	49.5	
LOS	C	B	A	B	C		E	D	C	E	D	
Approach Delay		18.5			21.5			42.1			51.1	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	118	91	0	33	71		95	243	160	64	203	
Queue Length 95th (ft)	#562	134	m0	59	124		#194	#405	#361	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	710	1625	866	303	815		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.43	0.35	0.40	0.56		0.76	0.85	0.88	0.71	0.82	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 29.9 Intersection LOS: C
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Stringtown Rd. & MD 355

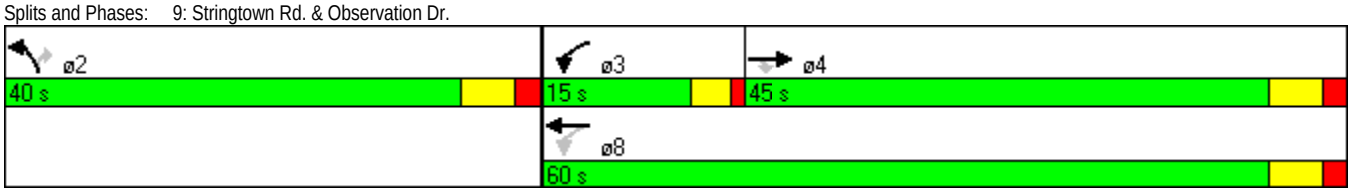


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1099	641	214	299	935	580
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.79
Control Delay	28.9	4.9	32.4	8.6	34.2	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	32.4	8.6	34.2	21.4
LOS	C	A	C	A	C	C
Approach Delay	20.1			18.5	29.3	
Approach LOS	C			B	C	
Queue Length 50th (ft)	308	0	56	38	280	109
Queue Length 95th (ft)	390	71	m#139	m54	285	231
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 58 (58%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.6	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

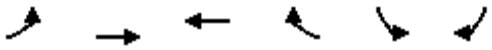


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1100	25	0	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3529	0	1863	3539	0
Flt Permitted					0.745		0.354					
Satd. Flow (perm)	0	1736	0	0	1388	1583	659	3529	0	1863	3539	0
Satd. Flow (RTOR)		4				125		4				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	0	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	81.9	81.9			81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.82	0.82			0.82	
v/c Ratio		0.06			0.31	0.53	0.02	0.48			0.27	
Control Delay		33.2			47.3	20.4	2.2	3.5			3.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		33.2			47.3	20.4	2.2	3.5			3.6	
LOS		C			D	C	A	A			A	
Approach Delay		33.3			26.2			3.4			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			22	15	1	96			45	
Queue Length 95th (ft)		m4			m50	67	5	158			97	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		316			250	387	540	2892			2900	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.48			0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 5.2	Intersection LOS: A
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	25	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	31	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406	888			
pX, platoon unblocked						
vC, conflicting volume	172				188	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					23	
vCu, unblocked vol	172				188	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				759	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	14	20	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	822
Volume to Capacity	0.00	0.01	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	2.0	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	0.8		0.0		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	ø2
Lane Configurations							
Volume (vph)	25	5	116	884	489	25	
Satd. Flow (prot)	1770	1583	1770	1863	1850	0	
Flt Permitted	0.950		0.335				
Satd. Flow (perm)	1770	1583	624	1863	1850	0	
Satd. Flow (RTOR)		6			6		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Growth Factor	116%	116%	116%	116%	116%	116%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	31	6	142	1079	628	0	
Turn Type		Perm	custom				
Protected Phases	4!		5	2 4!	6		2
Permitted Phases		4	2				
Total Split (s)	13.0	13.0	14.0	100.0	73.0	0.0	87.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	4.0	
Act Effct Green (s)	8.0	8.0	82.0	100.0	69.9		
Actuated g/C Ratio	0.08	0.08	0.82	1.00	0.70		
v/c Ratio	0.22	0.05	0.24	0.58	0.48		
Control Delay	45.6	25.8	2.7	1.3	6.8		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	45.6	25.8	2.7	1.3	6.8		
LOS	D	C	A	A	A		
Approach Delay	42.4			1.5	6.8		
Approach LOS	D			A	A		
Queue Length 50th (ft)	19	0	13	0	107		
Queue Length 95th (ft)	m42	m6	23	0	m209		
Internal Link Dist (ft)	808			1231	429		
Turn Bay Length (ft)			250				
Base Capacity (vph)	142	132	615	1863	1296		
Starvation Cap Reductn	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.22	0.05	0.23	0.58	0.48		

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 4.1	Intersection LOS: A
Intersection Capacity Utilization 65.6%	ICU Level of Service C
Analysis Period (min) 15	

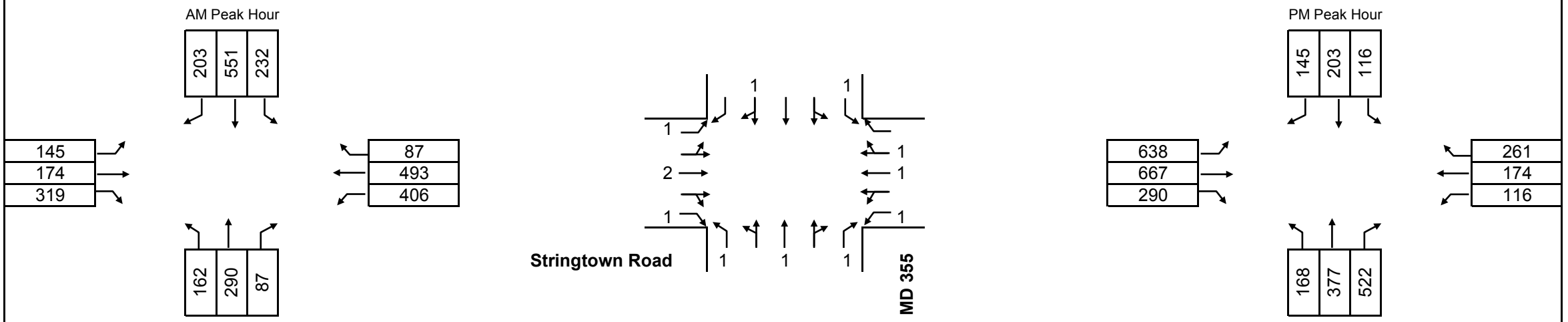
m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 25: Roberts Tavern Dr & MD 355

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

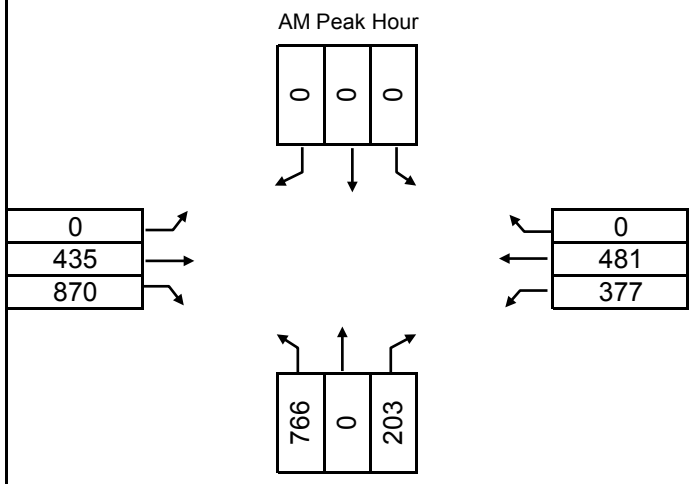
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

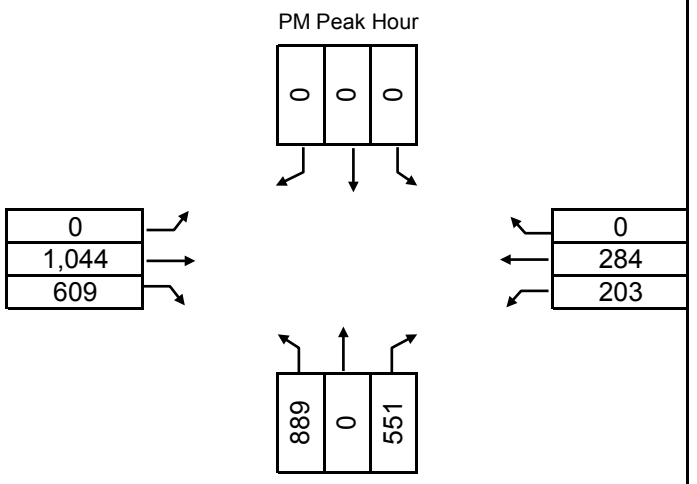
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/21/09	Checked by:	Date:

AM Peak Hour



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

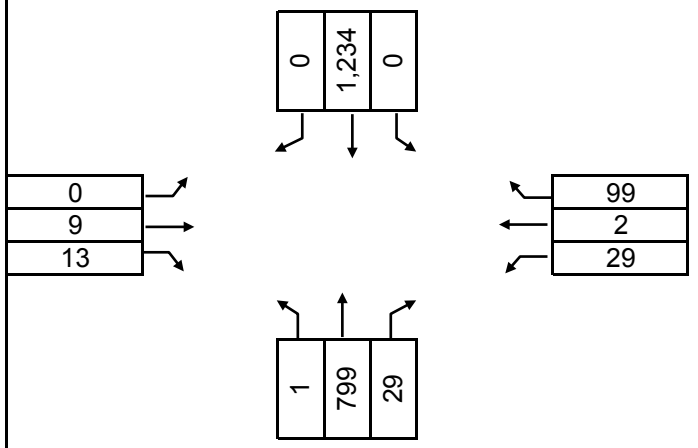
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	348	1	348	0	348	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

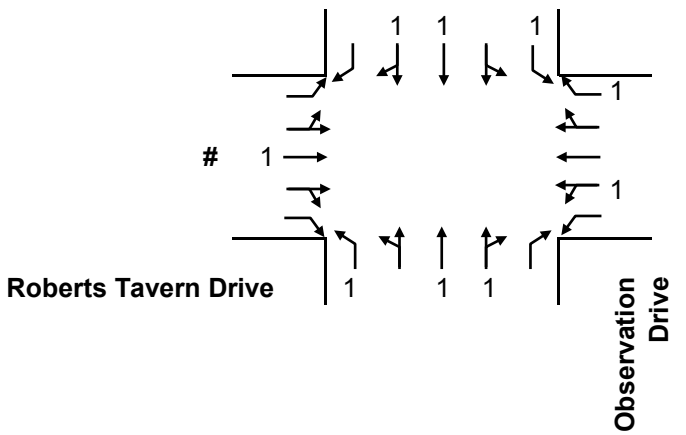
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

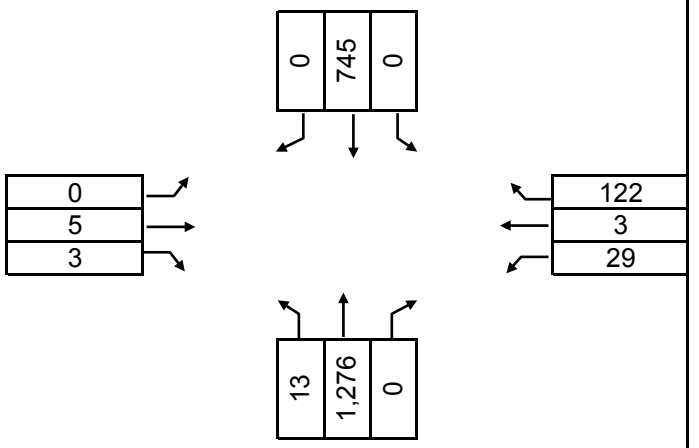
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							801
						Level Of Service	A
						v/c ratio	0.50

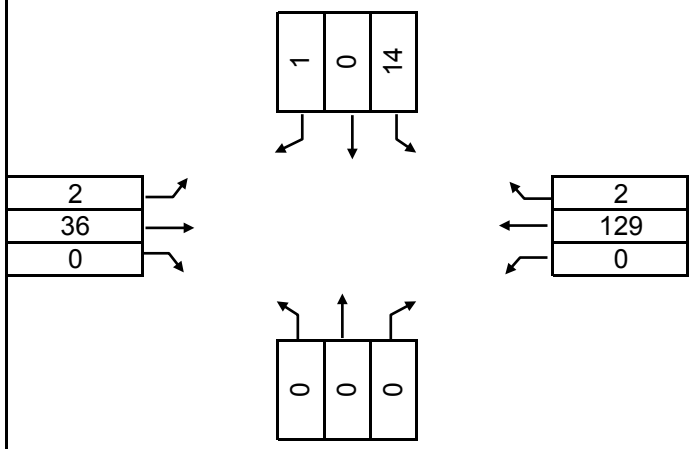
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	0	702	702
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	122
	WBR	122	1	122	0	122	
	WBL	0	1	0		0	
							832
						Level Of Service	A
						v/c ratio	0.52

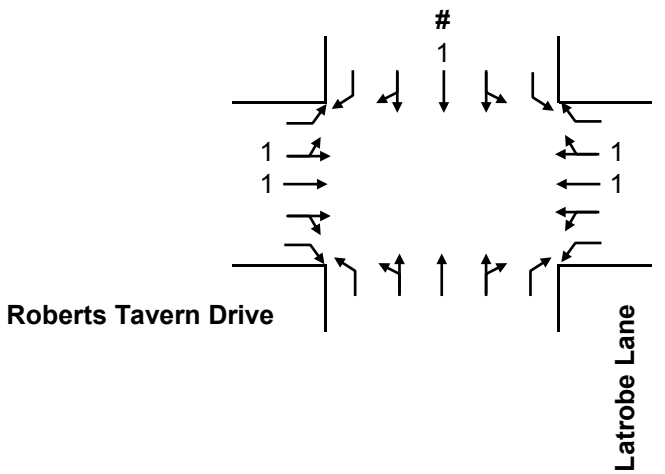
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	9/17/09	Checked by:	Date:

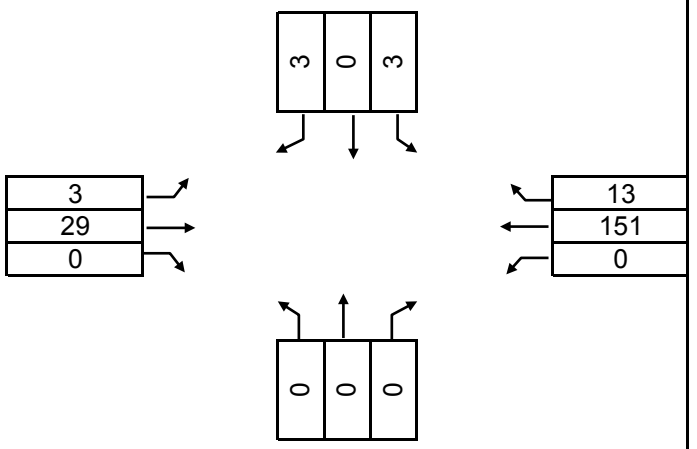
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	38	0.55	21	0	21	74
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	2	74	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							89
						Level Of Service	A
						v/c ratio	0.06

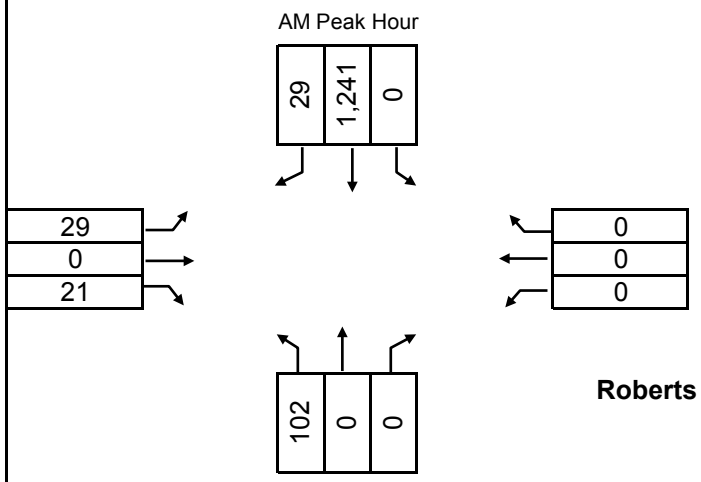
PM Peak Hour

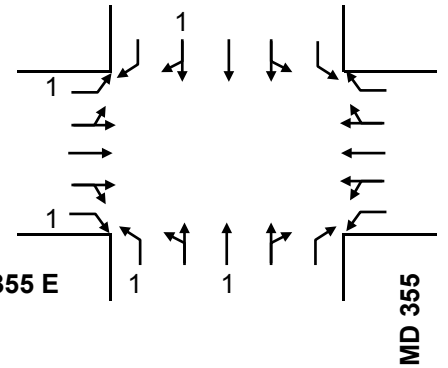
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	32	0.55	18	0	18	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							99
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

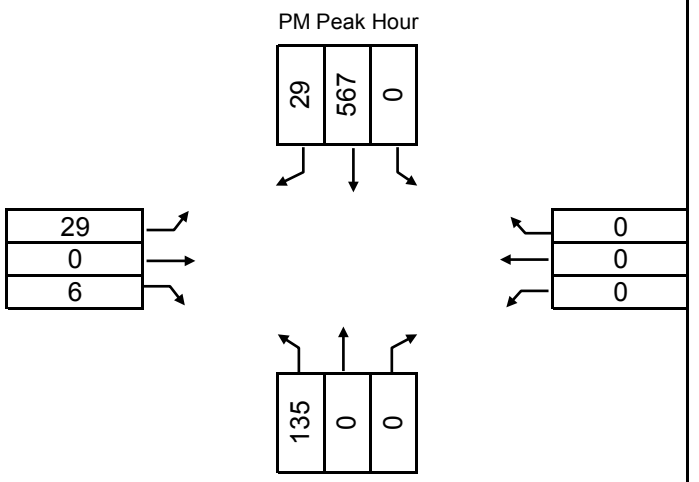
Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/ Design Year:	2030 Alt. 3b-c: MD T Intersection at MD 355 & RTD				
Computed by:	JCP	Date:	10/2/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	1,372
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,270	1	1,270	102	1,372	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,401
						Level Of Service	D
						v/c ratio	0.88

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	731
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	596	1	596	135	731	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	29
	EBR	0	1	0	0	0	
	EBL	29	1	29		29	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							760
						Level Of Service	A
						v/c ratio	0.48

Alternative 4:
2030 Hybrid of the Master Plan and Existing MD 355 Alignments
No Eastbound Left Turn from Roberts Tavern Drive to MD 355
Unsignalized

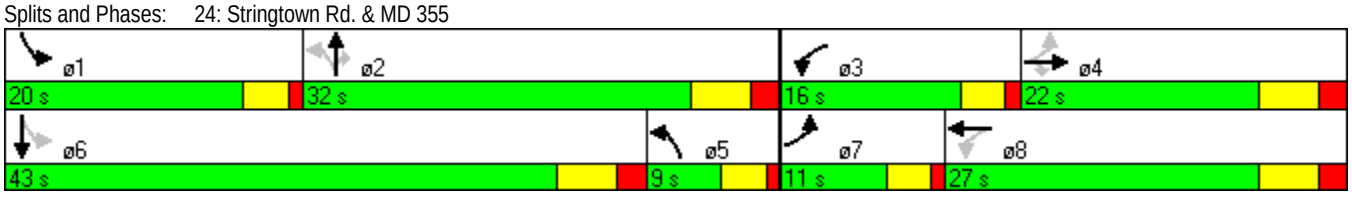
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	150	275	350	425	75	140	226	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.274			0.507			0.155			0.324		
Satd. Flow (perm)	510	3539	1583	944	3458	0	289	1863	1583	604	1788	0
Satd. Flow (RTOR)			240		21				92		26	
Lane Group Flow (vph)	179	183	336	427	611	0	171	276	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	11.0	22.0	22.0	16.0	27.0	0.0	9.0	32.0	32.0	20.0	43.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	25.0	18.0	16.0	34.0	23.0		30.8	30.8	30.8	39.0	39.0	
Actuated g/C Ratio	0.28	0.20	0.18	0.38	0.26		0.34	0.34	0.34	0.43	0.43	
v/c Ratio	0.75	0.26	0.70	0.91	0.68		0.94	0.43	0.15	0.56	1.01	
Control Delay	34.2	23.5	16.7	51.4	33.6		92.0	26.3	5.9	22.4	59.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.2	23.5	16.7	51.4	33.6		92.0	26.3	5.9	22.4	59.7	
LOS	C	C	B	D	C		F	C	A	C	E	
Approach Delay		23.0			40.9			43.7			50.9	
Approach LOS		C			D			D			D	
Queue Length 50th (ft)	38	50	81	196	158		71	121	0	89	~436	
Queue Length 95th (ft)	#114	80	167	#392	218		#197	201	33	144	#693	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	240	708	479	467	899		181	637	602	469	790	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.75	0.26	0.70	0.91	0.68		0.94	0.43	0.15	0.52	1.01	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 40.7	Intersection LOS: D
Intersection Capacity Utilization 95.3%	ICU Level of Service F
Analysis Period (min) 15	

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	197
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.449		0.950	
Satd. Flow (perm)	3539	1583	836	3539	3433	1583
Satd. Flow (RTOR)		886				241
Lane Group Flow (vph)	458	916	397	507	806	241
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	14.0	59.0	31.0	31.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.0	39.0	55.0	55.0	25.0	27.0
Actuated g/C Ratio	0.46	0.43	0.61	0.61	0.28	0.30
v/c Ratio	0.28	0.77	0.65	0.23	0.84	0.37
Control Delay	15.9	6.9	10.6	4.2	37.2	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	6.9	10.6	4.2	37.2	6.6
LOS	B	A	B	A	D	A
Approach Delay	9.9			7.1	30.2	
Approach LOS	A			A	C	
Queue Length 50th (ft)	82	10	55	34	225	21
Queue Length 95th (ft)	116	110	m67	m39	#318	80
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1612	1188	615	2163	954	644
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.77	0.65	0.23	0.84	0.37

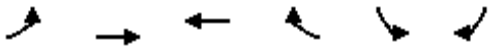
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 63 (70%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	711	3	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3536	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3536	0	1863	3539	0
Satd. Flow (RTOR)		13				60		1				
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	21.0	21.0	0.0	21.0	21.0	28.0	41.0	41.0	0.0	28.0	69.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	14.0	69.1	69.1			78.7	
Actuated g/C Ratio		0.08			0.08	0.16	0.77	0.77			0.87	
v/c Ratio		0.15			0.28	0.35	0.00	0.32			0.42	
Control Delay		23.8			45.0	18.0	5.0	5.3			1.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		23.8			45.0	18.0	5.0	5.3			1.3	
LOS		C			D	B	A	A			A	
Approach Delay		23.8			24.5			5.3			1.3	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		5			18	20	0	93			49	
Queue Length 95th (ft)		m21			m40	m51	2	139			54	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		318			242	589	303	2714			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.08			0.14	0.18	0.00	0.32			0.42	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 30 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 4.4	Intersection LOS: A
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

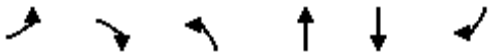
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	9	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	11	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	138				150	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					13	
vCu, unblocked vol	138				150	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				789	980

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	4	5	5	90	48	16
Volume Left	4	0	0	0	0	15
Volume Right	0	0	0	0	2	1
cSH	1443	1700	1700	1700	1700	801
Volume to Capacity	0.00	0.00	0.00	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	0	2
Control Delay (s)	7.5	0.0	0.0	0.0	0.0	9.6
Lane LOS	A					A
Approach Delay (s)	1.9			0.0		9.6
Approach LOS						A

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	21	88	427	1070	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	26	107	521	1307	31
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	2043	1307	1307			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2043	1307	1307			
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	87	80			
cM capacity (veh/h)	49	195	530			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	26	107	521	1307	31
Volume Left	0	107	0	0	0
Volume Right	26	0	0	0	31
cSH	195	530	1700	1700	1700
Volume to Capacity	0.13	0.20	0.31	0.77	0.02
Queue Length 95th (ft)	11	19	0	0	0
Control Delay (s)	26.2	13.5	0.0	0.0	0.0
Lane LOS	D	B			
Approach Delay (s)	26.2	2.3		0.0	
Approach LOS	D				

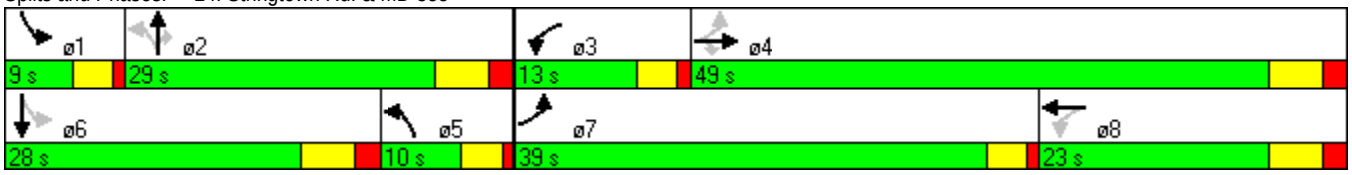
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

Note: The eastbound right turn movement is shown as stop-controlled only to make the intersection configuration acceptable for analysis using the HCM methodology. The actual eastbound right turn movement is free-flowing under this Alternative. However, the HCM methodology will not produce results for any movements at the intersection if the eastbound right turn movement is coded as a free right. The LOS D shown above for the eastbound right turn movement should be ignored. The LOS B shown above for the northbound left turn movement is accurate.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	572	575	250	100	150	225	145	300	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.197			0.385			0.358			0.235		
Satd. Flow (perm)	367	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		217				308		34	
Lane Group Flow (vph)	698	702	305	122	458	0	177	366	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	27.1	19.0		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.27	0.19		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.99	0.43	0.35	0.44	0.58		0.76	0.79	0.88	0.71	0.82	
Control Delay	39.7	12.8	2.3	20.4	22.3		59.6	48.5	32.3	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	39.7	12.8	2.3	20.4	22.3		59.6	48.5	32.3	55.9	49.5	
LOS	D	B	A	C	C		E	D	C	E	D	
Approach Delay		22.0			21.9			42.2			51.1	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	391	150	26	33	71		94	218	157	64	203	
Queue Length 95th (ft)	m#602	m189	m31	59	124		#191	#356	#360	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	704	1625	866	296	788		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.99	0.43	0.35	0.41	0.58		0.76	0.79	0.88	0.71	0.82	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 31.3	Intersection LOS: C
Intersection Capacity Utilization 92.2%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

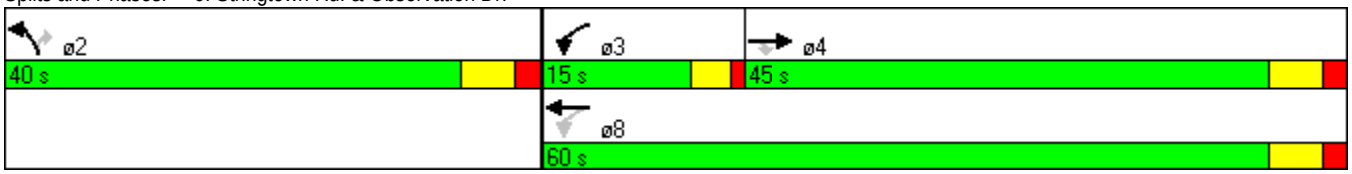
Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	497
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Lane Group Flow (vph)	1099	641	214	299	935	607
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.82
Control Delay	28.9	4.9	41.3	5.7	35.3	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	41.3	5.7	35.3	27.0
LOS	C	A	D	A	D	C
Approach Delay	20.1			20.6	32.0	
Approach LOS	C			C	C	
Queue Length 50th (ft)	308	0	64	28	207	143
Queue Length 95th (ft)	390	71	m#143	m42	390	#449
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.82

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 49 (49%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 25.0	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

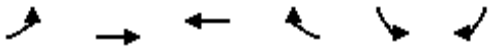
Splits and Phases: 9: Stringtown Rd. & Observation Dr.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1122	3	3	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3539	0	1770	3539	0
Flt Permitted					0.745		0.355			0.157		
Satd. Flow (perm)	0	1736	0	0	1388	1583	661	3539	0	292	3539	0
Satd. Flow (RTOR)		4				121		1				
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	4	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	79.8	79.8		81.9	81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.80	0.80		0.82	0.82	
v/c Ratio		0.06			0.31	0.54	0.02	0.49		0.01	0.27	
Control Delay		27.0			49.6	17.9	3.8	4.8		2.0	2.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		27.0			49.6	17.9	3.8	4.8		2.0	2.3	
LOS		C			D	B	A	A		A	A	
Approach Delay		27.0			24.7			4.8			2.3	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			21	5	1	97		0	41	
Queue Length 95th (ft)		m5			m48	m53	9	271		m1	58	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150			300		
Base Capacity (vph)		316			250	384	527	2823		321	2898	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.49		0.01	0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 5.4	Intersection LOS: A
Intersection Capacity Utilization 59.5%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

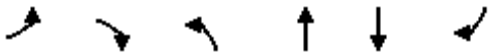
Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	6	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	7	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	172				176	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					11	
vCu, unblocked vol	172				176	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				764	955

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	4	4	4	106	66	10
Volume Left	4	0	0	0	0	6
Volume Right	0	0	0	0	13	4
cSH	1402	1700	1700	1700	1700	826
Volume to Capacity	0.00	0.00	0.00	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	0	1
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	9.4
Lane LOS	A					A
Approach Delay (s)	2.5			0.0		9.4
Approach LOS						A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	10	116	884	489	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	12	142	1079	597	31
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	1960	597	597			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1960	597	597			
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	98	86			
cM capacity (veh/h)	60	503	980			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	142	1079	597	31
Volume Left	0	142	0	0	0
Volume Right	12	0	0	0	31
cSH	503	980	1700	1700	1700
Volume to Capacity	0.02	0.14	0.63	0.35	0.02
Queue Length 95th (ft)	2	13	0	0	0
Control Delay (s)	12.3	9.3	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	12.3	1.1		0.0	
Approach LOS	B				

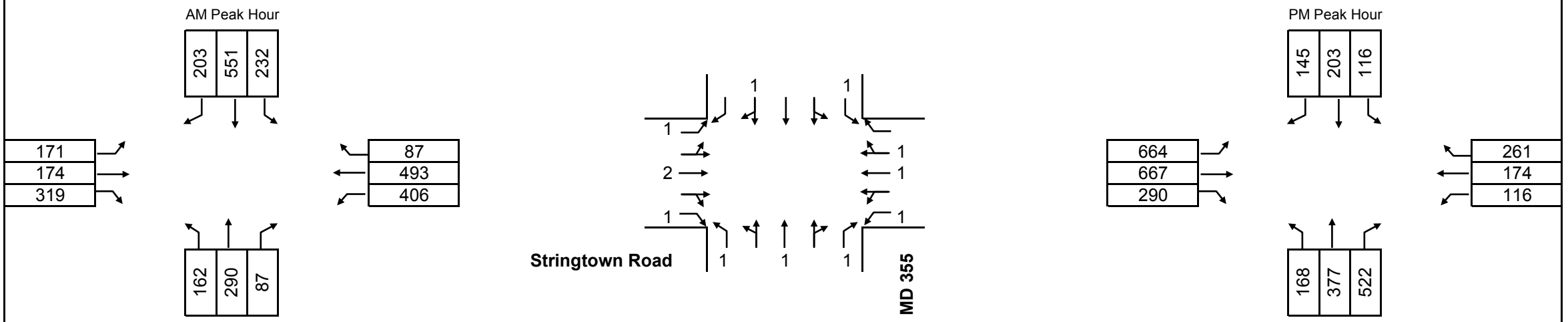
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

Note: The eastbound right turn movement is shown as stop-controlled only to make the intersection configuration acceptable for analysis using the HCM methodology. The actual eastbound right turn movement is free-flowing under this Alternative. However, the HCM methodology will not produce results for any movements at the intersection if the eastbound right turn movement is coded as a free right. The LOS B shown above for the eastbound right turn movement should be ignored. The LOS A shown above for the northbound left turn movement is accurate.

Turning Movement Summary and Level of Service

Count Date: n/a
Conditions/ Design Year: 2030 Alt. 4: Free EB R, No EB L at MD 355
Location: MD 355/Stringtown Road

Computed by: JCP Date: 11/4/09 Checked by: Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	171	490	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

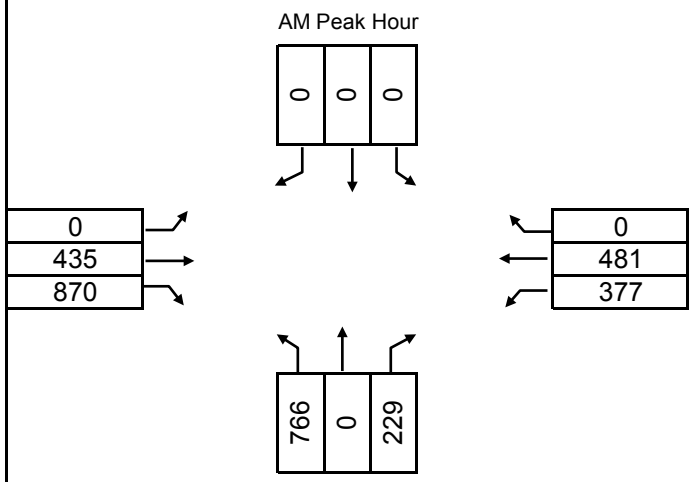
PM Peak Hour

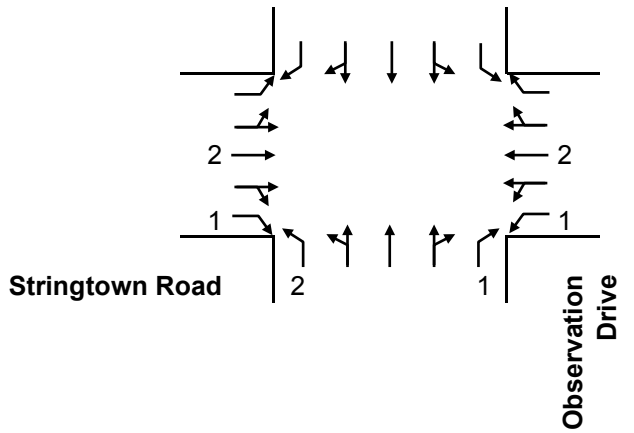
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	903
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	664	903	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,425
						Level Of Service	D
						v/c ratio	0.89

Turning Movement Summary and Level of Service

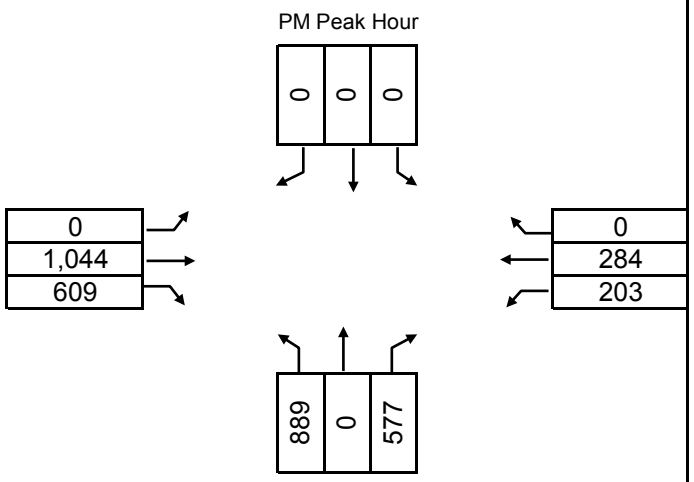
Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 4: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

AM Peak Hour





PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

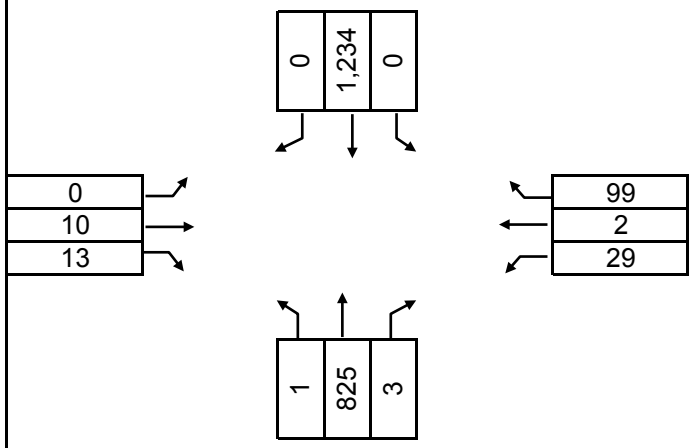
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	374	1	374	0	374	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

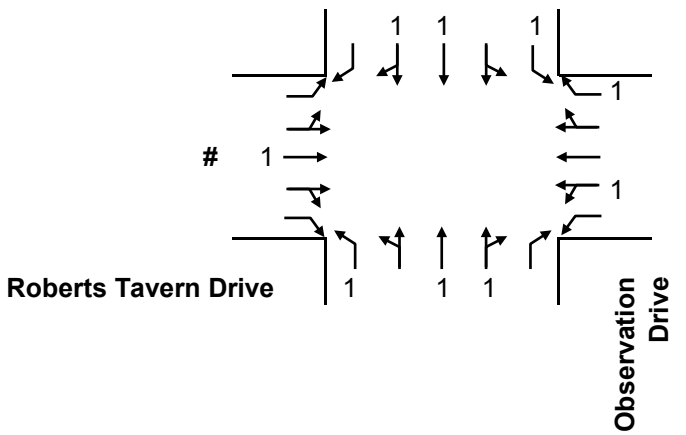
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 4: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

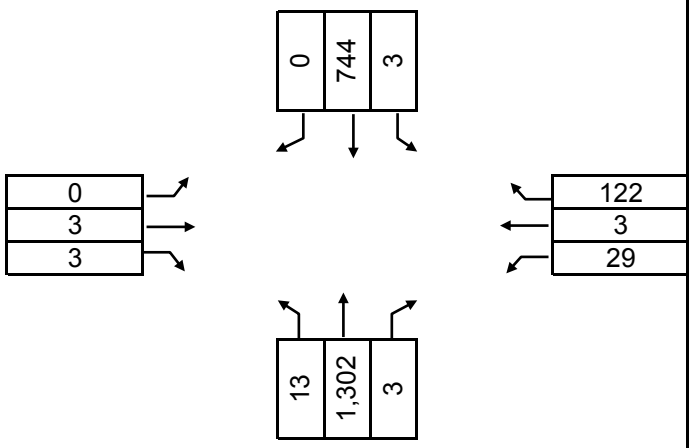
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	23	1	23	0	23	23
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							802
						Level Of Service	A
						v/c ratio	0.50

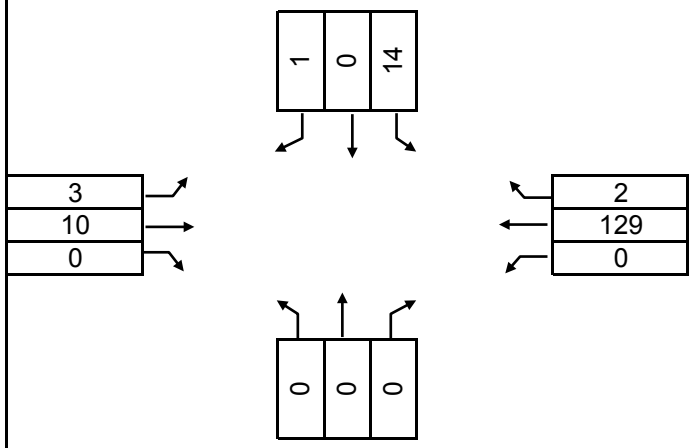
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,305	0.55	718	3	721	721
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	744	0.55	409	13	422	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	6	1	6	0	6	6
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	119
	WBR	119	1	119	0	119	
	WBL	0	1	0		0	
							846
						Level Of Service	A
						v/c ratio	0.53

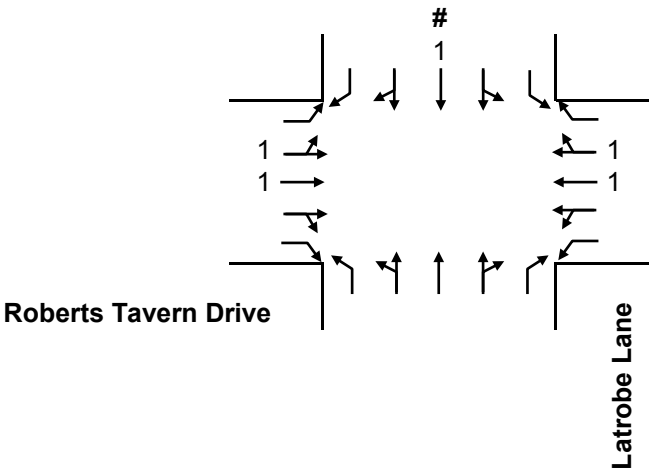
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 4: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:

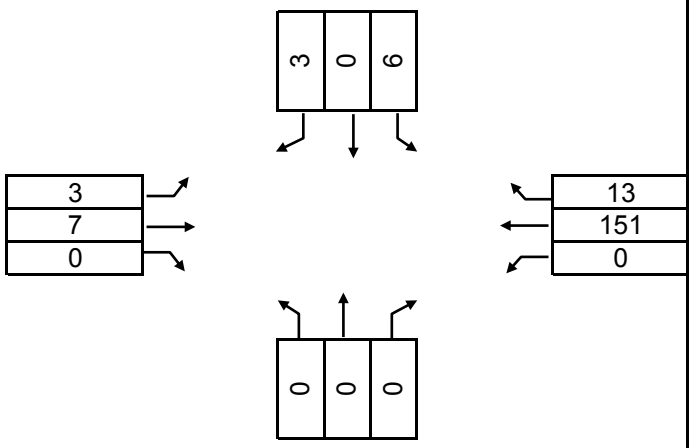
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

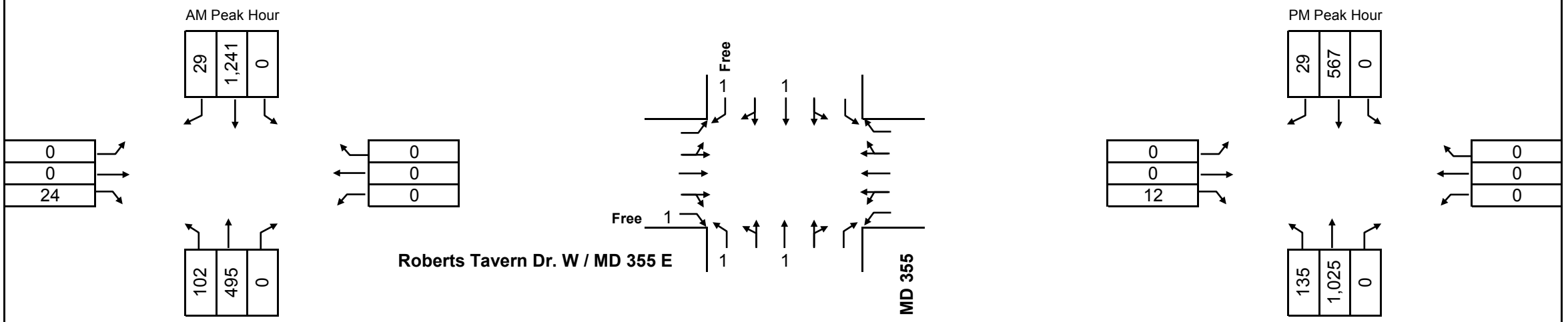
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	13	0.55	7	0	7	75
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	3	75	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							90
						Level Of Service	A
						v/c ratio	0.06

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	9
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	9	1	9	0	9	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	10	0.55	6	0	6	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							102
						Level Of Service	A
						v/c ratio	0.06

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Roberts Tavern Dr. W / MD 355 E
Conditions/ Design Year:	2030 Alt. 4: Free EB R, No EB L at MD 355				
Computed by:	JCP	Date:	11/4/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	495	1	495	0	495	1,343
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,241	1	1,241	102	1,343	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	0	1	0	0	0	0
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,343
						Level Of Service	D
						v/c ratio	0.84

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,025	1	1,025	0	1,025	1,025
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	567	1	567	135	702	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	0	1	0	0	0	0
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	0	1	0	0	0	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,025
						Level Of Service	B
						v/c ratio	0.64

Alternative 5:
T-Intersection at MD 355 and Roberts Tavern Drive
With Multi-Lane Roundabout

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	150	275	350	425	75	140	250	75	200	475	175
Satd. Flow (prot)	1770	3539	1583	1770	3458	0	1770	1863	1583	1770	1788	0
Flt Permitted	0.327			0.453			0.110			0.338		
Satd. Flow (perm)	609	3539	1583	844	3458	0	205	1863	1583	630	1788	0
Satd. Flow (RTOR)			320		16				92		20	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	183	336	427	611	0	171	305	92	244	794	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	22.0	22.0	24.0	34.0	0.0	18.0	52.0	52.0	22.0	56.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	26.0	18.0	16.0	42.0	30.0		50.5	50.5	50.5	52.0	52.0	
Actuated g/C Ratio	0.22	0.15	0.13	0.35	0.25		0.42	0.42	0.42	0.43	0.43	
v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.58	1.01	
Control Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	35.4	22.0	67.0	44.7		53.7	26.5	5.0	28.5	68.2	
LOS	D	D	C	E	D		D	C	A	C	E	
Approach Delay		29.8			53.9			31.2			58.9	
Approach LOS		C			D			C			E	
Queue Length 50th (ft)	84	67	116	281	221		85	163	0	122	~610	
Queue Length 95th (ft)	#172	106	189	#527	287		155	245	33	186	#881	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	209	531	488	450	877		269	784	720	444	786	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.73	0.34	0.69	0.95	0.70		0.64	0.39	0.13	0.55	1.01	

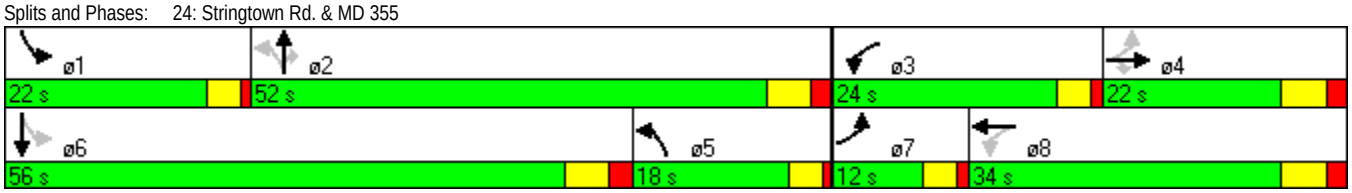
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.7 — Intersection LOS: D
Intersection Capacity Utilization 95.3% — ICU Level of Service F
Analysis Period (min) 15

~ 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.

Splits and Phases: 24: Stringtown Rd. & MD 355



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	750	325	415	660	175
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.440		0.950	
Satd. Flow (perm)	3539	1583	820	3539	3433	1583
Satd. Flow (RTOR)		850				214
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	458	916	397	507	806	214
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	60.0	60.0	20.0	80.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	56.0	54.0	76.0	76.0	34.0	36.0
Actuated g/C Ratio	0.47	0.45	0.63	0.63	0.28	0.30
v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34
Control Delay	20.2	7.9	11.5	5.1	48.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	7.9	11.5	5.1	48.8	5.7
LOS	C	A	B	A	D	A
Approach Delay	12.0			7.9	39.8	
Approach LOS	B			A	D	
Queue Length 50th (ft)	111	29	74	46	301	0
Queue Length 95th (ft)	148	175	m87	m52	379	56
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1652	1180	646	2241	973	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.78	0.61	0.23	0.83	0.34

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 73 (61%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 19.4	Intersection LOS: B
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

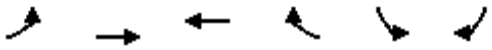
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	11	25	2	85	1	689	25	0	1064	0
Satd. Flow (prot)	0	1727	0	0	1779	1583	1770	3522	0	1863	3539	0
Flt Permitted					0.732		0.212					
Satd. Flow (perm)	0	1727	0	0	1364	1583	395	3522	0	1863	3539	0
Satd. Flow (RTOR)		13				104		6				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	0	0	33	104	1	872	0	0	1299	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	15.0	52.0	52.0	0.0	15.0	67.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		7.5			7.6	13.8	69.3	69.3			78.7	
Actuated g/C Ratio		0.08			0.08	0.15	0.77	0.77			0.87	
v/c Ratio		0.15			0.29	0.31	0.00	0.32			0.42	
Control Delay		26.3			44.2	8.8	5.0	5.2			2.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		26.3			44.2	8.8	5.0	5.2			2.7	
LOS		C			D	A	A	A			A	
Approach Delay		26.3			17.3			5.2			2.7	
Approach LOS		C			B			A			A	
Queue Length 50th (ft)		6			18	0	0	92			85	
Queue Length 95th (ft)		29			46	39	2	137			137	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		356			273	404	304	2712			3096	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.07			0.12	0.26	0.00	0.32			0.42	

Intersection Summary		
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 31 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.42		
Intersection Signal Delay: 4.7	Intersection LOS: A	
Intersection Capacity Utilization 50.8%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	31	111	2	12	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	38	136	2	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	138				163	69
vC1, stage 1 conf vol					137	
vC2, stage 2 conf vol					26	
vCu, unblocked vol	138				163	69
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1443				783	980

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	25	90	48	16
Volume Left	4	0	0	0	15
Volume Right	0	0	0	2	1
cSH	1443	1700	1700	1700	795
Volume to Capacity	0.00	0.01	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	1.7	0.0	0.0	0.0	9.6
Lane LOS	A				A
Approach Delay (s)	0.7		0.0		9.6
Approach LOS					A

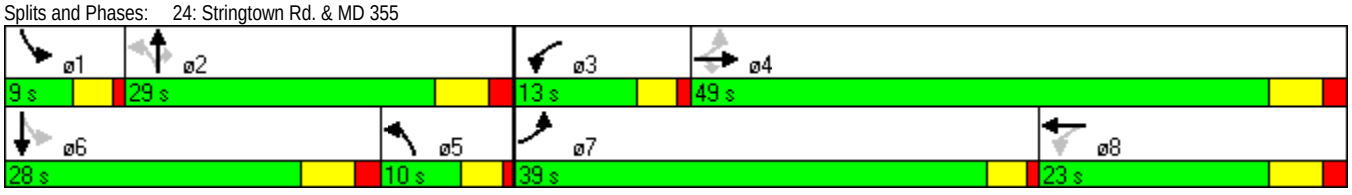
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	550	575	250	100	150	225	145	325	450	100	175	125
Satd. Flow (prot)	1770	3539	1583	1770	3221	0	1770	1863	1583	1770	1745	0
Flt Permitted	0.212			0.385			0.358			0.235		
Satd. Flow (perm)	395	3539	1583	717	3221	0	667	1863	1583	438	1745	0
Satd. Flow (RTOR)			305		216				308		34	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	672	702	305	122	458	0	177	397	549	122	367	0
Turn Type	pm+pt		Perm	pm+pt			pm+pt		Perm	pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	39.0	49.0	49.0	13.0	23.0	0.0	10.0	29.0	29.0	9.0	28.0	0.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	58.0	45.9	43.9	28.0	19.9		25.0	25.0	25.0	24.0	24.0	
Actuated g/C Ratio	0.58	0.46	0.44	0.28	0.20		0.25	0.25	0.25	0.24	0.24	
v/c Ratio	0.96	0.43	0.35	0.43	0.56		0.76	0.85	0.88	0.71	0.82	
Control Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	11.3	1.0	20.0	21.9		59.6	54.5	32.3	55.9	49.5	
LOS	C	B	A	B	C		E	D	C	E	D	
Approach Delay		18.5			21.5			44.4			51.1	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	118	91	0	33	71		94	242	157	64	203	
Queue Length 95th (ft)	#562	134	m0	59	124		#191	#403	#360	#141	#354	
Internal Link Dist (ft)		574			1441			754			1272	
Turn Bay Length (ft)	250		150	150			300		500	100		
Base Capacity (vph)	710	1625	866	303	815		233	466	627	172	445	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.43	0.35	0.40	0.56		0.76	0.85	0.88	0.71	0.82	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 30.6 Intersection LOS: C
Intersection Capacity Utilization 90.7% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Stringtown Rd. & MD 355

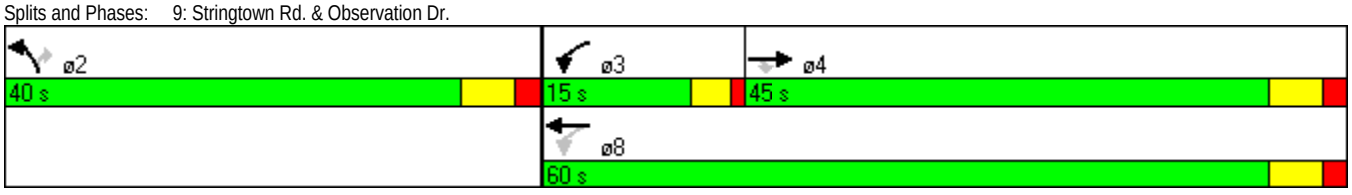


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	900	525	175	245	766	475
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.094		0.950	
Satd. Flow (perm)	3539	1583	175	3539	3433	1583
Satd. Flow (RTOR)		641				263
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1099	641	214	299	935	580
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Total Split (s)	45.0	45.0	15.0	60.0	40.0	40.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	6.0	4.0
Act Effct Green (s)	41.4	39.4	56.0	56.0	34.0	36.0
Actuated g/C Ratio	0.41	0.39	0.56	0.56	0.34	0.36
v/c Ratio	0.75	0.63	0.80	0.15	0.80	0.79
Control Delay	28.9	4.9	32.4	8.6	34.0	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	4.9	32.4	8.6	34.0	21.2
LOS	C	A	C	A	C	C
Approach Delay	20.1			18.5	29.1	
Approach LOS	C			B	C	
Queue Length 50th (ft)	308	0	56	38	275	109
Queue Length 95th (ft)	390	71	m#139	m54	283	228
Internal Link Dist (ft)	693			574	462	
Turn Bay Length (ft)		300	250		250	
Base Capacity (vph)	1467	1012	273	1982	1167	738
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.78	0.15	0.80	0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 58 (58%), Referenced to phase 4:EBT and 8:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 9: Stringtown Rd. & Observation Dr.

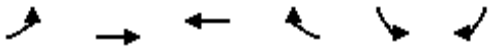


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	3	25	3	105	11	1100	25	0	641	0
Satd. Flow (prot)	0	1736	0	0	1785	1583	1770	3529	0	1863	3539	0
Flt Permitted					0.745		0.354					
Satd. Flow (perm)	0	1736	0	0	1388	1583	659	3529	0	1863	3539	0
Satd. Flow (RTOR)		4				125		4				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%	116%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	35	128	13	1374	0	0	783	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	23.0	23.0	0.0	23.0	23.0	23.0	68.0	68.0	0.0	9.0	77.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Act Effct Green (s)		8.1			8.1	8.1	81.9	81.9			81.9	
Actuated g/C Ratio		0.08			0.08	0.08	0.82	0.82			0.82	
v/c Ratio		0.06			0.31	0.53	0.02	0.48			0.27	
Control Delay		33.2			49.8	16.6	2.2	3.5			3.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0			0.0	
Total Delay		33.2			49.8	16.6	2.2	3.5			3.6	
LOS		C			D	B	A	A			A	
Approach Delay		33.3			23.8			3.4			3.6	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		2			22	2	1	96			45	
Queue Length 95th (ft)		m4			51	55	5	158			97	
Internal Link Dist (ft)		625			326			2693			477	
Turn Bay Length (ft)							150					
Base Capacity (vph)		316			250	387	540	2892			2900	
Starvation Cap Reductn		0			0	0	0	0			0	
Spillback Cap Reductn		0			0	0	0	0			0	
Storage Cap Reductn		0			0	0	0	0			0	
Reduced v/c Ratio		0.03			0.14	0.33	0.02	0.48			0.27	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 5.0	Intersection LOS: A
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 8: Roberts Tavern Dr & Observation Dr.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	25	130	11	5	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	31	159	13	6	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		Raised	Raised			
Median storage veh)		1	1			
Upstream signal (ft)		406				
pX, platoon unblocked						
vC, conflicting volume	172				188	86
vC1, stage 1 conf vol					165	
vC2, stage 2 conf vol					23	
vCu, unblocked vol	172				188	86
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1402				759	955

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	14	20	106	66	10
Volume Left	4	0	0	0	6
Volume Right	0	0	0	13	4
cSH	1402	1700	1700	1700	822
Volume to Capacity	0.00	0.01	0.06	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	2.0	0.0	0.0	0.0	9.4
Lane LOS	A				A
Approach Delay (s)	0.8		0.0		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

SIDRA INTERSECTION

Movement Summary

MD 355 at Roberts Tavern Dr

Alt. 5 - 2030 AM Peak - 2 SB Lanes

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
NB MD 355										
3L	L	111	1.8	0.594	11.5	LOS B	213	0.35	0.58	28.9
8T	T	753	2.0	0.593	3.0	LOS A	213	0.35	0.29	34.0
Approach		**864**	**2.0**	**0.593**	**4.1**	**LOS A**	**213**	**0.35**	**0.33**	**33.1**
SB MD 355										
4T	T	1888	2.0	0.685	3.9	LOS A	242	0.56	0.38	30.4
4R	R	44	2.3	0.688	5.7	LOS A	242	0.54	0.48	29.6
Approach		**1933**	**2.0**	**0.685**	**3.9**	**LOS A**	**242**	**0.56**	**0.38**	**30.4**
EB Roberts Tavern Dr										
5L	L	44	2.3	0.097	17.6	LOS B	15	0.81	0.94	25.6
2R	R	32	3.1	0.095	12.5	LOS B	14	0.80	0.88	27.0
Approach		**76**	**2.6**	**0.097**	**15.5**	**LOS B**	**15**	**0.80**	**0.91**	**26.1**
All Vehicles		**2873**	**2.0**	**0.688**	**4.3**	**LOS A**	**242**	**0.50**	**0.38**	**31.0**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2030 AM 2 SB Lanes
\\Rkkm\v2008\2008\08122_mcboa\Task 2 - Roberts Tavern Drive\Traffic\Analysis\SIDRA\Alternative 5\RTD Alt 5.aap
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SIDRA INTERSECTION

Movement Summary

MD 355 at Roberts Tavern Dr

Alt. 5 - 2030 PM Peak - 2 SB Lanes

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
NB MD 355										
3L	L	147	2.0	0.850	11.8	LOS B	597	0.54	0.50	28.3
8T	T	1163	2.0	0.850	3.3	LOS A	597	0.54	0.31	32.7
Approach		**1310**	**2.0**	**0.850**	**4.3**	**LOS A**	**597**	**0.54**	**0.33**	**32.1**
SB MD 355										
4T	T	637	2.0	0.257	3.5	LOS A	56	0.39	0.34	31.3
4R	R	33	3.0	0.258	5.4	LOS A	56	0.38	0.47	30.2
Approach		**670**	**2.1**	**0.257**	**3.6**	**LOS A**	**56**	**0.39**	**0.35**	**31.2**
EB Roberts Tavern Dr										
5L	L	33	3.0	0.037	13.4	LOS B	5	0.52	0.72	27.1
2R	R	7	12.5	0.019	9.6	LOS A	2	0.58	0.66	28.7
Approach		**41**	**4.9**	**0.037**	**12.7**	**LOS B**	**5**	**0.53**	**0.71**	**27.3**
All Vehicles		**2021**	**2.1**	**0.850**	**4.2**	**LOS A**	**597**	**0.49**	**0.34**	**31.7**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: 2030 PM 2 SB Lanes
\\Rkkm\v2008\2008\08122_mcboa\Task 2 - Roberts Tavern Drive\Traffic\Analysis\SIDRA\Alternative 5\RTD Alt 5.aap
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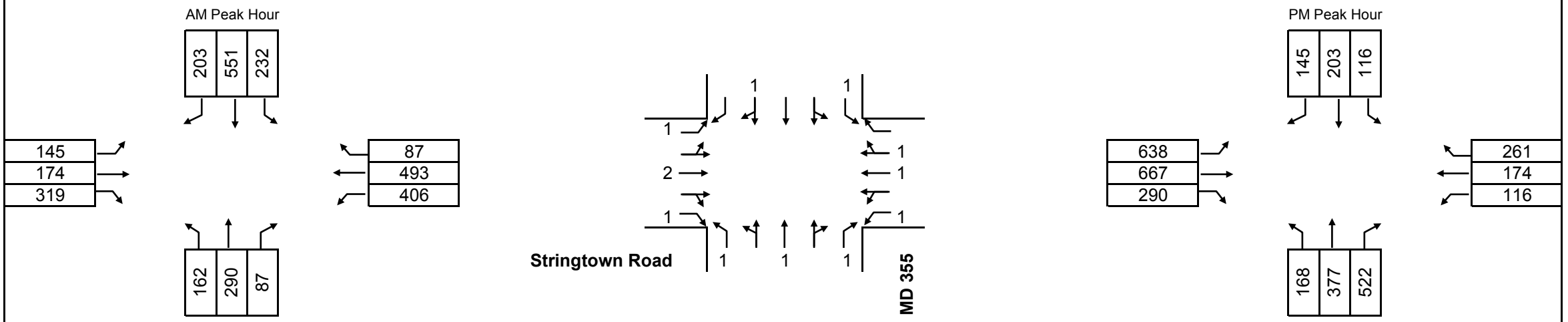
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	MD 355/Stringtown Road
Conditions/ Design Year:	2030 Alt. 5: RTD Roundabout at MD 355				
Computed by:	JCP	Date:	11/3/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.
The CLV for this intersection would exceed the congestion standard in 2030

AM Peak Hour

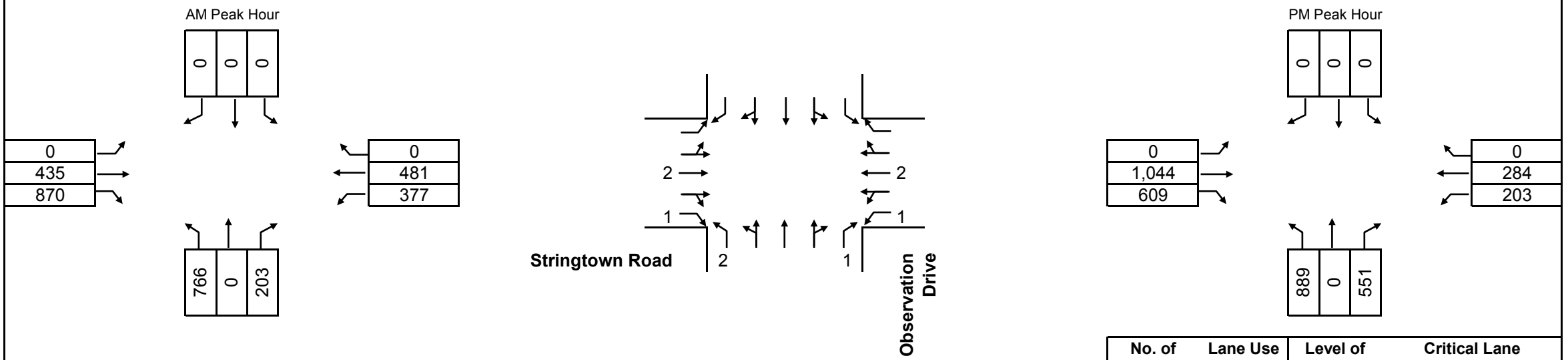
Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	290	1	290	232	522	916
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	754	1	754	162	916	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	174	0.55	96	406	502	563
	EBR	157	1	157	406	563	
	EBL	0	1	0		0	
	WB	580	0.55	319	145	464	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,479
						Level Of Service	E
						v/c ratio	0.92

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	377	1	377	116	493	522
	NBR	406	1	406	116	522	
	NBL	0	1	0		0	
	SB	348	1	348	168	516	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	667	0.55	367	116	483	877
	EBR	122	1	122	116	238	
	EBL	0	1	0		0	
	WB	435	0.55	239	638	877	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,399
						Level Of Service	D
						v/c ratio	0.87

Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Stringtown Road
Conditions/ Design Year:	2030 Alt. 5: RTD Roundabout at MD 355				
Computed by:	JCP	Date:	11/3/09	Checked by:	Date:



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	460
	NBR	0	1	0	0	0	
	NBL	766	0.6	460		460	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	435	0.55	239	377	616	787
	EBR	410	1	410	377	787	
	EBL	0	1	0		0	
	WB	481	0.55	265	0	265	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,247
						Level Of Service	C
						v/c ratio	0.78

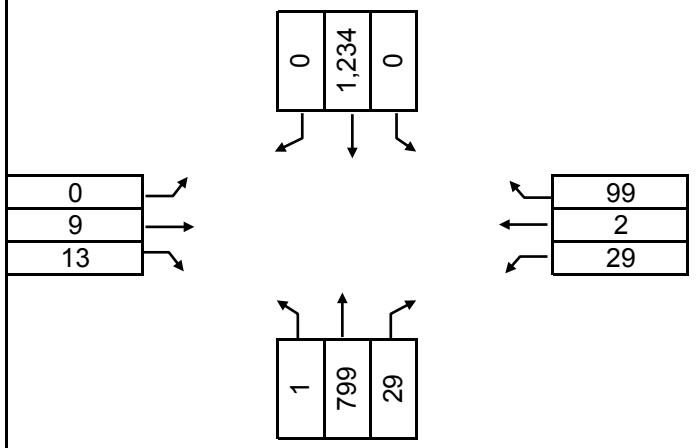
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	533
	NBR	348	1	348	0	348	
	NBL	889	0.6	533		533	
	SB	0	1	0	0	0	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	1,044	0.55	574	203	777	777
	EBR	76	1	76	203	279	
	EBL	0	1	0		0	
	WB	284	0.55	156	0	156	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							1,310
						Level Of Service	D
						v/c ratio	0.82

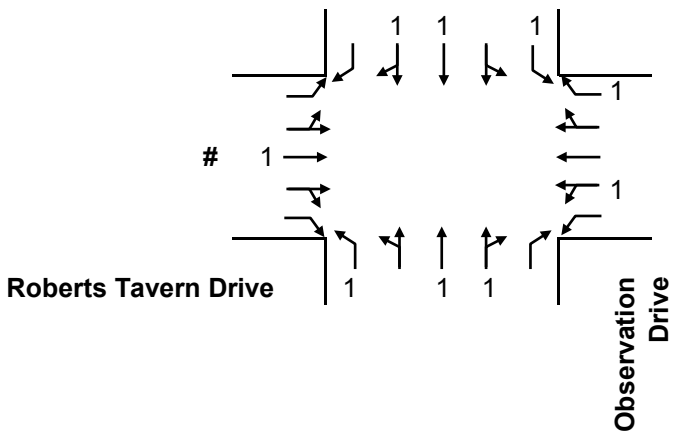
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Observation Drive/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 5: RTD Roundabout at MD 355				
Computed by:	JCP	Date:	11/3/09	Checked by:	Date:

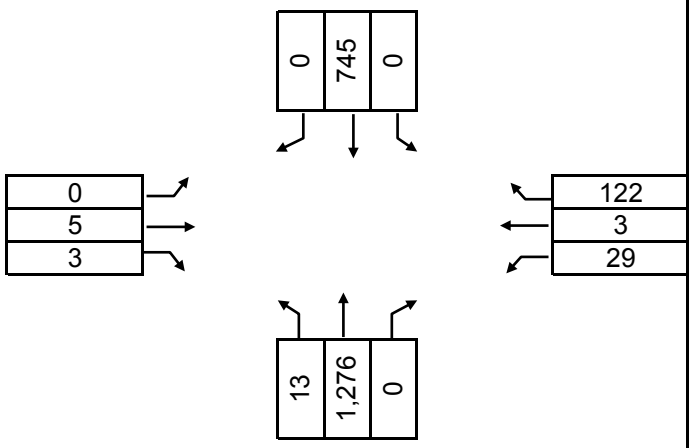
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

East/West movements are split-phased

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	828	0.55	455	0	455	680
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	1,234	0.55	679	1	680	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	22	1	22	0	22	22
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	31	1	31	0	31	99
	WBR	99	1	99	0	99	
	WBL	0	1	0		0	
							801
						Level Of Service	A
						v/c ratio	0.50

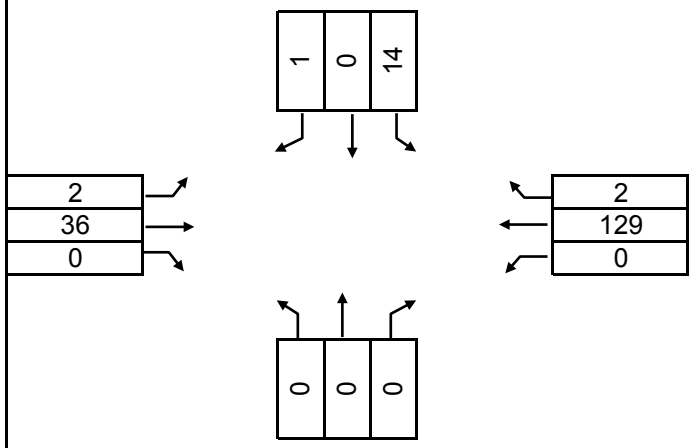
PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	1,276	0.55	702	0	702	702
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	745	0.55	410	13	423	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	8	1	8	0	8	8
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
3	WB	32	1	32	0	32	122
	WBR	122	1	122	0	122	
	WBL	0	1	0		0	
							832
						Level Of Service	A
						v/c ratio	0.52

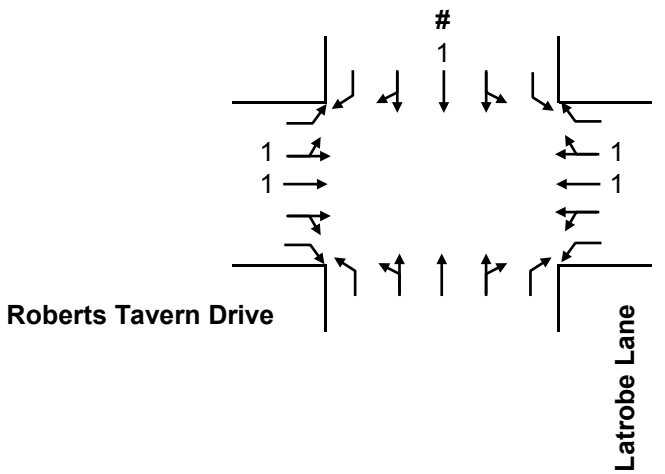
Turning Movement Summary and Level of Service

Count Date:	n/a			Location:	Latrobe Lane/Roberts Tavern Drive
Conditions/ Design Year:	2030 Alt. 5: RTD Roundabout at MD 355				
Computed by:	JCP	Date:	11/3/09	Checked by:	Date:

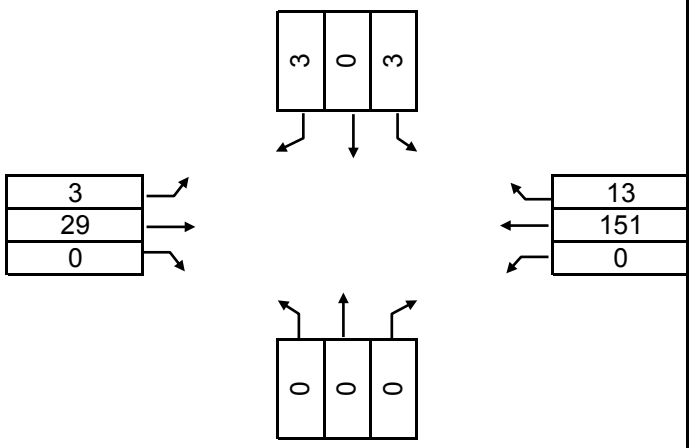
AM Peak Hour



# Indicates shared lane for all movements



PM Peak Hour



No. of Lanes	Lane Use Factor	Level of Service	Critical Lane Volume Total
1	1.00	A	1,000 or LESS
2	0.55	B	1,000 to 1,150
3	0.40	C	1,150 to 1,300
4	0.30	D	1,300 to 1,450
5	0.25	E	1,450 to 1,600
Double turn	0.60	F	1,600 or MORE
Triple turn	0.45		

The Local Area Transportation Review (LATR) Intersection Congestion Standard for the Clarksburg Policy Area is 1,425 CLV.

AM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	15
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	15	1	15	0	15	
	SBR	0	1	0	0	0	
	SBL	0	1	0		0	
2	EB	38	0.55	21	0	21	74
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	131	0.55	72	2	74	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							89
						Level Of Service	A
						v/c ratio	0.06

PM Peak Hour

Phase	Movement	Volume	Lane Use Factor	Lane Volume	Opposing Volume	Sum	Critical Lane Volume
1	NB	0	1	0	0	0	6
	NBR	0	1	0	0	0	
	NBL	0	1	0		0	
	SB	6	1	6	0	6	
	SBR	0	1	0	0	0	
	SBL	0	1	0	0	0	
2	EB	32	0.55	18	0	18	93
	EBR	0	1	0	0	0	
	EBL	0	1	0		0	
	WB	164	0.55	90	3	93	
	WBR	0	1	0	0	0	
	WBL	0	1	0		0	
							99
						Level Of Service	A
						v/c ratio	0.06

Appendix D:
Crash History Reports

Martin O'Malley, *Governor*
Anthony G. Brown, *Lt. Governor*

State Highway Administration

Beverley K. Swaim-Staley, *Secretary*
Neil J. Pedersen, *Administrator*

MARYLAND DEPARTMENT OF TRANSPORTATION

September 2, 2009

Mr. Jeffrey C. Parker, P.E.
RK&K
81 Mosher Street
Baltimore, MD 21217

RE: Accident Data for MD 355 from Cool Brook Lane to Stringtown Rd. and
MD 355 @ Stringtown Rd. intersection in Montgomery County, Maryland

Dear Mr. Parker:

Thank you for your recent request for accident information for the subject locations in Montgomery County, Maryland. Attached are study worksheets, accident summary, accident history, intersection collision diagram and line diagram for each location. These accident data are for the five years study period, 2003 through 2007. These forms depict the accident experience by year, severity, collision type, probable cause, accident rate per 100 million vehicle miles of travel (acc/100mvm) and comparable weighted statewide average accident rates for all similarly designed highways under State Highway administration maintenance.

We utilized the AADT data from the Maryland Highway Information Services Division's Highway Location Reference Book for the purpose of preparing accident rates. All *significantly high* accident categories are indicated as such on the study worksheets with asterisks (*).

Should you have any questions regarding this information, please contact me at (410) 787-5832, or via e-mail at: jpatel@sha.state.md.us .

Sincerely,

Jayanti Patel, Transportation Engineer
Maryland State Highway Administration
Office of Traffic & Safety
Traffic Development & Support Division

Enclosures

cc: Mr. Darrell B. Mobley-District engineer
Mr. Jeffrey Wentz ADE-Traffic
Hai-Yan Zhang. Department of Transportation, Montgomery County

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Study Worksheet Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 Frederick Rd.@ CO 15 Stringtown Rd.
Logmile: 022.64 At 003.13 Radius: 150 ft
County: Montgomery Period: January 1, 2003 To December 31, 2007 Note(s):

YEAR ▸	2003	2004	2005	2006	2007	TOTAL
FATAL						
No. KILLED						
INJURY	3	1	3		3	10
No. INJURED	4	2	5		4	15
PROP DAMAGE		1	1	1		3
TOTAL ACC	3	2	4	1	3	13
OPPOSITE DIR						
REAR END	1		1		1	3
SIDESWIPE						
LEFT TURN	1				1	2
ANGLE	1	2	3	1	1	8
PEDESTRIAN						
PARKED VEH						
FIXED OBJECT						
OTHER						
U-TURN						
BACKING						
ANIMAL						
RAILROAD						
EXPL./FIRE						
OVERTURN						
OTHER/UNK						
TRCK REL ACC						
NIGHTTIME	1				1	2
WET SURFACE	2	1				3
ALCOHOL REL						
INTERSEC REL	2	2	4	1	3	12
TOTAL VEH	7	4	8	2	7	28
TOTAL TRUCKS						
PERCENT TRKS	0.0	0.0	0.0	0.0	0.0	0.0

High Accident Intersection Information:

High Accident Section Information:

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Combined Summary Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 Frederick Rd.@ CO 15 Stringtown Rd.
Logmile: 022.64 At 003.13 Radius: 150 ft
County: Montgomery
Period: January 1, 2003 To December 31, 2007
Note(s):

SEVERITY	Fatal	Injury	P-Damage	Total
Accidents		10	3	13
Veh Occ		15		
Pedestrian				

DAY OF THE WEEK	SUN	MON	TUE	WED	THU	FRI	SAT	UNK
	2	1		3	3	2	2	

MONTH OF THE YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK
	1				1	2	3			2	1	3	

CONDITION:	DRIVER	PED
Normal:	13	
ALCOHOL:		
Other:		

TIME	12	01	02	03	04	05	06	07	08	09	10	11	UNK
AM:									1			2	
PM:		2		1		3	3		1				

VEHICLES INVOLVED PER ACCIDENT	1	2	3	4	5	6+	UNK	TOTAL
		11	2					28

VEHICLE TYPE			
2	M_Cycle/Moped		Trk_Trailer
14	Passenger Veh	1	Passenger Bus
3	Light Truck		School Bus
	Heavy Truck		Emergency Veh
8	Other Types		

SURFACE	
3	WET
10	DRY
	SNO/ICE
	MUD
	OTHER

MOVEMENTS	NORTH			SOUTH			EAST			WEST		
	LF	ST	RT	LF	ST	RT	LF	ST	RT	LF	ST	RT
		12		2	4			2		1	3	2

OTHER MOVEMENTS 2

PROBABLE CAUSES		
	Inf. of Drugs	Improper Parking
	Inf. of Alcohol	Passenger Interfere/Obstr.
	Inf. of Medication	Illegally in Roadway
	Inf. of Combined Substance	Bicycle Violation
	Physical/Mental Difficulty	Clothing not Visible
	Fell Asleep/Fainted etc.	Smog, Smoke
3	Fail to give full attent.	Sleet, Hail, Frz. Rain
	Lic. Restr. Non-comply	Blowing Sand, Soil, Dirt
5	Fail to Yield Rightofway	Severe Crosswinds
	Fail to Obey Stop Sign	Rain, Snow
1	Fail to Obey Traffic Sig	Animal
	Fail to Obey Other Contr.	Vision Obstruction
	Fail to Keep Right of Ctr	Vehicle Defect
	Fail to Stop for Sch. Bus	Wet
	Wrong Way on One Way	Icy or Snow Covered
1	Exceeded Speed Limit	Debris or Obstruction
1	Too Fast for Conditions	Ruts, Holes, Bumps
	Followed too Closely	Road Under Construction
1	Improper Turn	Traffic Cntrl Device Inop.
	Improper Lane Change	Shoulders Low, Soft, High
	Improper Backing	
	Improper Passing	1 Other or Unknown
	Improper Signal	

COLLISION TYPES		FAT	INJ	PROP	TOTAL
OPPOSITE DIR	RELATED:				
	UNRELATED:				
REAR END	RELATED:		2	1	3
	UNRELATED:				
SIDESWIPE	RELATED:				
	UNRELATED:				
LEFT TURN	RELATED:		1		1
	UNRELATED:		1		1
ANGLE	RELATED:		6	2	8
	UNRELATED:				
PEDESTRIAN	RELATED:				
	UNRELATED:				
PARKED VEH.	RELATED:				
	UNRELATED:				
OTHER CT	RELATED:				
	UNRELATED:				

F	BRIDGE	01
I	BUILDING	02
X	CULVERT/DITCH	03
E	CURB	04
D	GUARDRAIL/BARRIER	05
	EMBANKMENT	06
O	FENCE	07
B	LIGHT POLE	08
J	SIGN POST	09
E	OTHER POLE	10
C	TREE/SHRUBBERY	11
T	CONSTR. BARRIER	12
S	CRASH ATTENUATOR	13
	OTHER FIXED OBJECT	

WEATHER		ILLUMINATION		TOTALS	
10	CLEAR/CLDY	10	DAY	2003	3
	FOGGY	1	DAWN/DUSK	2004	2
3	RAINING	2	DARK - LIGHTS ON	2005	4
	SNOW/SLEET		DARK - NO LIGHTS	2006	1
	OTHER		OTHER	2007	3

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Combined Logmile History Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 Frederick Rd.@ CO 15 Stringtown Rd.
Logmile: 022.64 At 003.13 Radius: 150 ft
County: Montgomery Period: January 1, 2003 To December 31, 2007 Note(s):

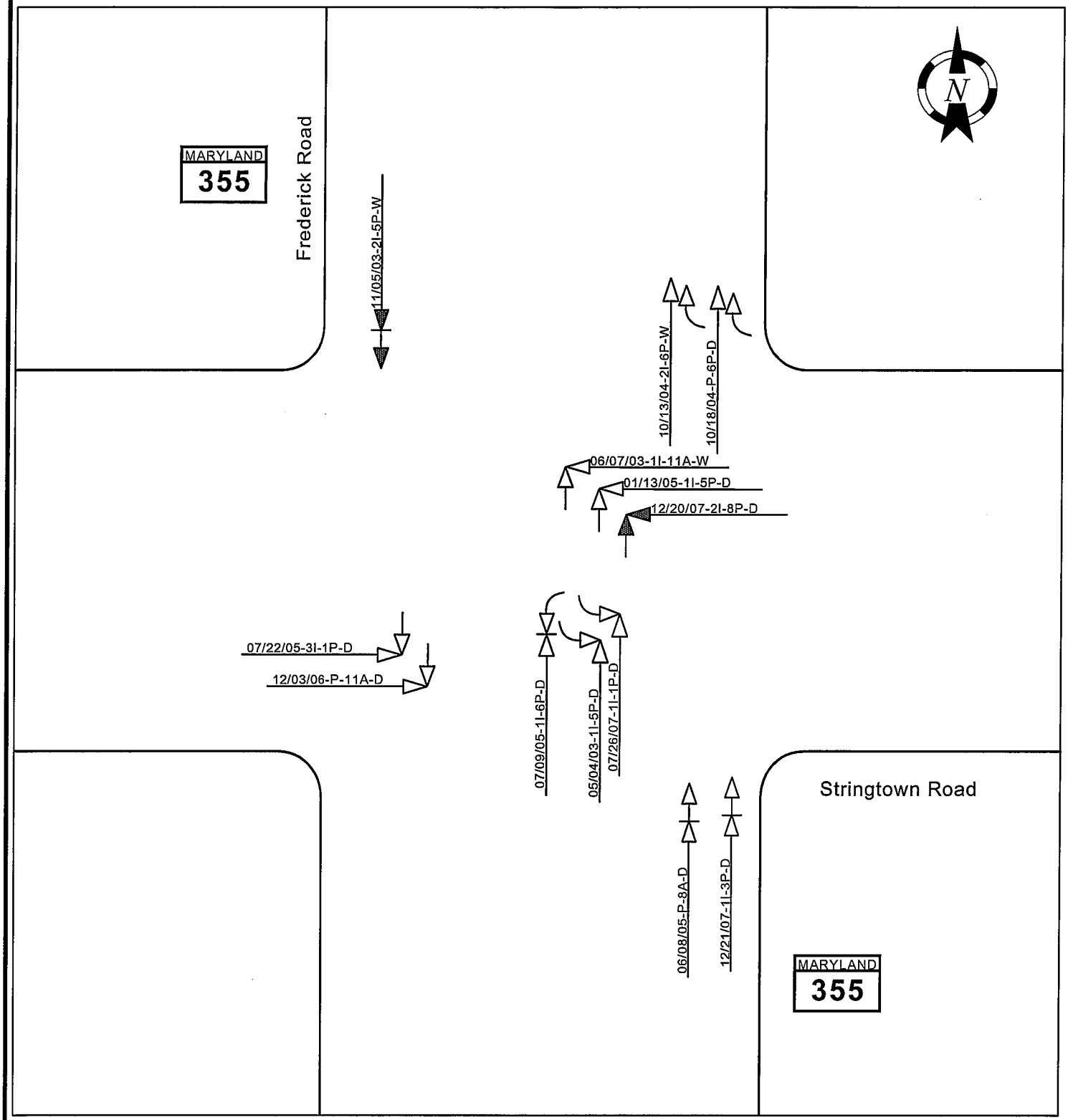
LOGMILE	IR	DATE	SEVERITY	TIME	LIGHT	SUR FACE	ALC	FX OB	CLSN TYPE	MOVE V1 V2	PROBABLE CAUSE
CO0015											
3.13	√	072607	1 Inj.	1P	DAY	DRY			LFTRN	SL NS	FAIL TO YIELD RIGHT OF WAY
3.13	√	122107	1 Inj.	3P	DAY	DRY			RREND	NS NS	TOO FAST FOR CONDITIONS
MD0355											
22.63	√	072205	3 Inj.	1P	DAY	DRY			ANGLE	SS ES	UNKNOWN OR OTHER CAUSE
22.64	√	110503	2 Inj.	5P	NIGHT	WET			RREND	SS SS	FAIL TO GIVE FULL TIME/ATTENT
22.64	√	060703	1 Inj.	11A	DAY	WET			ANGLE	WS NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	101304	2 Inj.	6P	DAY	WET			ANGLE	WR NS	IMPROPER TURN
22.64	√	101804	PROPERTY	6P	DAY	DRY			ANGLE	WR NS	FAIL TO GIVE FULL TIME/ATTENT
22.64	√	070905	1 Inj.	6P	DAY	DRY			ANGLE	WL NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	011305	1 Inj.	5P	DAY	DRY			ANGLE	WS NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	060805	PROPERTY	8A	DAY	DRY			RREND	NS NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	120306	PROPERTY	11A	DAY	DRY			ANGLE	ES SS	EXCEEDED SPEED LIMIT
22.64	√	122007	2 Inj.	8P	NIGHT	DRY			ANGLE	WS NS	FAIL TO OBEY TAFFIC SIGNAL
22.65		050403	1 Inj.	5P	DAY	DRY			LFTRN	SL NS	FAIL TO GIVE FULL TIME/ATTENT

FXOB (01)=Bridge (02)=Building (03)=Culver/Ditch (04)=Curb (05)=Guardrail/Barrier (06)=Embankment (07)=Fence
(08)=Light Pole (09)=Sign Post (10)=Other Pole (11)=Tree/Shrubbery (12)=Construc. Barrier (13)=Crash Attenuator

SHA State Highway Administration — Maryland Department of Transportation

Office of Traffic & Safety
Traffic Development & Support Division
Crash Analysis Safety Team

Location: MD 355
County: MONTGOMERY
Study Period: 01/01/2003 to 12/31/2007
Analyst: JPATEL Date: 08/31/2009



DATE-SEVERITY-TIME-SURFCE
NIGHT
ALCOHOL
DRUGS

SEVERITY
F - Fatalities
I - Injured
P - Property Damage Only

SURFACE
D - Dry Surface
W - Wet Surface
I - Icy Surface
S - Snowy Surface

00 - Not Applicable
01 - Bridge or Overpass
02 - Building
03 - Culvert or Ditch
04 - Curb
05 - Guardrail or Barrier
06 - Embankment
07 - Fence
08 - Light Support Pole
09 - Sign Support Pole
10 - Other Pole
11 - Tree Shrubbery
12 - Construction Barrier
13 - Crash Attenuator
88 - Other
99 - Unknown

B - Bicycle
P - Other Pedalcycle
C - Other Conveyance
T - Railway Train
A - Animal
O - Other Object
S - Spilled Cargo
J - Jackknife

U - Units Seperated
N - Other Non collision
D - Off Road
R - Downhill Runaway
F - Explosion or Fire
? - Unknown

template 06-27-06

U - TURN
BACKING
OVERTURN
Parked Vehicle
P Pedestrian

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Study Worksheet Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 From Cool Brook Lane To Stringtown Road
Logmile: From 022.17 To 022.64 Length: 0.47
County: Montgomery Period: January 1, 2003 To December 31, 2007 Note(s):
Type Controls: 8U-100%
* Significantly Higher than Statewide

YEAR ▸	2003	2004	2005	2006	2007	TOTAL	STUDYRATE	STWDRATE
FATAL							0.0	6.5
No. KILLED								
INJURY	2	2	6		1	11	92.3	356.0
No. INJURED	3	4	9		2	18		
PROP DAMAGE	1	1	2	1	1	6	50.4	489.5
TOTAL ACC	3	3	8	1	2	17	142.7	852.5
RATE	132.5	130.1	353.3	39.4	78.8			
WAADT	13200	13400	13200	14800	14800			
VMT(millions)	2.3	2.3	2.3	2.5	2.5	11.9		
OPPOSITE DIR			1			1	8.4	58.5
REAR END	2		2			4	33.6	272.5
SIDESWIPE							0.0	33.5
LEFT TURN					1	1	8.4	61.0
ANGLE	1	2	3	1	1	8	67.2	151.0
PEDESTRIAN							0.0	19.5
PARKED VEH			1			1	8.4	29.5
FIXED OBJECT		1	1			2	16.8	137.5
OTHER							0.0	48.5
U-TURN								
BACKING								
ANIMAL								
RAILROAD								
EXPL./FIRE								
OVERTURN								
OTHER/UNK								
TRCK REL ACC	1					1	8.4	49.5
NIGHTTIME	1	1	2		1	5	29 %	32 %
WET SURFACE	2	2				4	23 %	28 %
ALCOHOL REL			1			1	5 %	8 %
INTERSEC REL	2	2	4		2	10		
TOTAL VEH	7	5	16	2	4	34		
TOTAL TRUCKS	1					1		
PERCENT TRKS	14.3	0.0	0.0	0.0	0.0	2.9		

High Accident Intersection Information:

High Accident Section Information:

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Combined Summary Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 From Cool Brook Lane To Stringtown Road
Logmile: From 022.17 To 022.64 Length: 0.47
County: Montgomery
Period: January 1, 2003 To December 31, 2007
Note(s):

SEVERITY	Fatal	Injury	P-Damage	Total
Accidents		11	6	17
Veh Occ		18		
Pedestrian				

DAY OF THE WEEK

SUN	MON	TUE	WED	THU	FRI	SAT	UNK
2	2	2	5	2	1	3	

MONTH OF THE YEAR

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK
2		1			3	4	1	1	2	1	2	

CONDITION:	DRIVER	PED
Normal:	15	
ALCOHOL:	1	
Other:	1	

TIME

	12	01	02	03	04	05	06	07	08	09	10	11	UNK
AM:									1			2	
PM:		2		1	1	3	3		1		2	1	

VEHICLES INVOLVED PER ACCIDENT

1	2	3	4	5	6+	UNK	TOTAL
2	13	2					34

VEHICLE TYPE			
1	M_Cycle/Moped	Trk_Trailer	
19	Passenger Veh	1	Passenger Bus
3	Light Truck		School Bus
1	Heavy Truck	1	Emergency Veh
8	Other Types		

SURFACE	
4	WET
13	DRY
	SNO/ICE
	MUD
	OTHER

MOVEMENTS

NORTH			SOUTH			EAST			WEST		
LF	ST	RT	LF	ST	RT	LF	ST	RT	LF	ST	RT
	14	1	1	7			2		1	3	2

OTHER MOVEMENTS 3

PROBABLE CAUSES		
	Inf. of Drugs	Improper Parking
1	Inf. of Alcohol	Passenger Interfere/Obstr.
	Inf. of Medication	Illegally in Roadway
	Inf. of Combined Substance	Bicycle Violation
	Physical/Mental Difficulty	Clothing not Visible
	Fell Asleep/Fainted etc.	Smog, Smoke
4	Fail to give full attent.	Sleet, Hail, Frz. Rain
	Lic. Restr. Non-comply	Blowing Sand, Soil, Dirt
5	Fail to Yield Rightofway	Severe Crosswinds
	Fail to Obey Stop Sign	Rain, Snow
1	Fail to Obey Traffic Sig	Animal
	Fail to Obey Other Contr.	Vision Obstruction
	Fail to Keep Right of Ctr	Vehicle Defect
	Fail to Stop for Sch. Bus	Wet
	Wrong Way on One Way	Icy or Snow Covered
1	Exceeded Speed Limit	Debris or Obstruction
1	Too Fast for Conditions	Ruts, Holes, Bumps
1	Followed too Closely	Road Under Construction
1	Improper Turn	Traffic Cntrl Device Inop.
	Improper Lane Change	Shoulders Low, Soft, High
	Improper Backing	
1	Improper Passing	1 Other or Unknown
	Improper Signal	

COLLISION TYPES		FAT	INJ	PROP	TOTAL
OPPOSITE DIR	RELATED:				
	UNRELATED:		1		1
REAR END	RELATED:		2	1	3
	UNRELATED:			1	1
SIDESWIPE	RELATED:				
	UNRELATED:				
LEFT TURN	RELATED:			1	1
	UNRELATED:				
ANGLE	RELATED:		5	1	6
	UNRELATED:		1	1	2
PEDESTRIAN	RELATED:				
	UNRELATED:				
PARKED VEH.	RELATED:				
	UNRELATED:			1	1
OTHER CT	RELATED:				
	UNRELATED:				

F	BRIDGE	01			
I	BUILDING	02			
X	CULVERT/DITCH	03			
E	CURB	04			
D	GUARDRAIL/BARRIER	05			
	EMBANKMENT	06			
O	FENCE	07			
B	LIGHT POLE	08			
J	SIGN POST	09			
E	OTHER POLE	10	1		1
C	TREE/SHRUBBERY	11	1		1
T	CONSTR. BARRIER	12			
S	CRASH ATTENUATOR	13			
	OTHER FIXED OBJECT				

WEATHER		ILLUMINATION		TOTALS	
13	CLEAR/CLDY	11	DAY	2003	3
	FOGGY	1	DAWN/DUSK	2004	3
4	RAINING	4	DARK - LIGHTS ON	2005	8
	SNOW/SLEET	1	DARK - NO LIGHTS	2006	1
	OTHER		OTHER	2007	2

Maryland State Highway Administration
Office of Traffic and Safety - Traffic Development and Support Division
SHA 52.1 ADC Combined Logmile History Output rev. 06/2006-1

Name: Jayanti Patel
Date: 08/31/2009

Location: MD 355 From Cool Brook Lane To Stringtown Road
County: Montgomery Period: January 1, 2003 To December 31, 2007

Logmile: From 022.17 To 022.64 Length: 0.47
Note(s):

LOGMILE	IR	DATE	SEVERITY	TIME	LIGHT	SUR FACE	ALC	FX OB	CLSN TYPE	MOVE V1	MOVE V2	PROBABLE CAUSE
MD0355												
22.22		030605	1 Inj.	4P	DAY	DRY		10	FXOBJ	SS	na	IMPROPER PASSING
22.31		060504	2 Inj.	10P	NIGHT	WET		11	FXOBJ	NS	na	TOO FAST FOR CONDITIONS
22.40		012003	PROPERTY	1P	DAY	DRY			RREND	NS	NR	FAIL TO GIVE FULL TIME/ATTENT
22.40	√	091305	1 Inj.	3P	DAY	DRY			RREND	NS	NS	FOLLOWED TOO CLOSELY
22.51	√	080707	PROPERTY	5P	DAY	DRY			LFTRN	SL	NS	FAIL TO YIELD RIGHT OF WAY
22.58		071305	2 Inj.	10P	NIGHT	DRY	√		OPDIR	NS	SS	UNDER INFLUENCE OF ALCOHOL
22.61		071305	PROPERTY	11P	NIGHT	DRY			PARKD	SS	UP	FAIL TO GIVE FULL TIME/ATTENT
22.63		072205	3 Inj.	1P	DAY	DRY			ANGLE	SS	ES	UNKNOWN OR OTHER CAUSE
22.64	√	060703	1 Inj.	11A	DAY	WET			ANGLE	WS	NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	110503	2 Inj.	5P	NIGHT	WET			RREND	SS	SS	FAIL TO GIVE FULL TIME/ATTENT
22.64	√	101304	2 Inj.	6P	DAY	WET			ANGLE	WR	NS	IMPROPER TURN
22.64	√	101804	PROPERTY	6P	DAY	DRY			ANGLE	WR	NS	FAIL TO GIVE FULL TIME/ATTENT
22.64	√	070905	1 Inj.	6P	DAY	DRY			ANGLE	WL	NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	011305	1 Inj.	5P	DAY	DRY			ANGLE	WS	NS	FAIL TO YIELD RIGHT OF WAY
22.64	√	060805	PROPERTY	8A	DAY	DRY			RREND	NS	NS	FAIL TO YIELD RIGHT OF WAY
22.64		120306	PROPERTY	11A	DAY	DRY			ANGLE	ES	SS	EXCEEDED SPEED LIMIT
22.64	√	122007	2 Inj.	8P	NIGHT	DRY			ANGLE	WS	NS	FAIL TO OBEY TAFFIC SIGNAL

FXOB (01)=Bridge (02)=Building (03)=Culver/Ditch (04)=Curb (05)=Guardrail/Barrier (06)=Embankment (07)=Fence
(08)=Light Pole (09)=Sign Post (10)=Other Pole (11)=Tree/Shrubbery (12)=Construc. Barrier (13)=Crash Attenuator